

# 20250305 – March Specifications Committee Meeting

## March Specifications Committee Meeting Agenda

### Meeting Date

**Wednesday, March 5, 2025 @ 9:00am**

**Meeting Location: Building 5, Conference Room 820, Technical Support Division Charleston, WV**

Also meeting virtually via Google Meet video conference. E-mail distribution message includes instruction.

**\*\*\*\*2025 SPECIFICATION COMMITTEE MEETING UPDATE\*\*\*\***

**WE ARE GOING TO BE SWITCHING TO ODD MONTHS SO WE WILL MEET:**

**March (3/5), May (5/7), July (7/9), September (9/3), and November (11/5).**

*Calendar subject to change, updates will be given, as needed.*

**\*\*\*\*\*DEADLINE FOR MAY SUBMISSIONS\*\*\*\*\***

**April 7, 2025**

### Approved Permanent Specification changes from last Committee meeting (01/08/25)

- None.

### Approved Special Provisions (SP) from last Committee meeting (01/08/25)

- **SP695-Mainline Pavement:** The Special Provision removes subsection 695.6-Thickness Testing.

### Items removed from the Agenda:

- None

### Old Business Items

SECTION	TITLE	DESCRIPTION
<a href="#">651</a>	<b>Section 651-Furnishing and Placing Soil</b>	<b>2nd time to Committee.</b> Three specification changes updating the requirements for seeding and mulching. <ol style="list-style-type: none"><li>1. Section 651-Furnishing and Placing Soil</li><li>2. Section 652-Seeding and Mulching<ol style="list-style-type: none"><li>a. <i>Updated from the last meeting.</i></li></ol></li><li>3. Section 715.25-715.32<ol style="list-style-type: none"><li>a. (Ground Agricultural Limestone, Fertilizers, Mulch Material, Seed, Inoculating Bacteria, Biological Growth Stimulants, and Hydraulic Growth Material)</li><li>b. <i>Updated from the last meeting.</i></li></ol></li></ol>
<a href="#">652</a>	<b>Section 652-Seeding and Mulching</b>	
<a href="#">715</a>	<b>Section 715.25-715.32</b> <i>(Ground Agricultural Limestone, Fertilizers, Mulch Material, Seed, Inoculating Bacteria, Biological Growth Stimulants, and Hydraulic Growth Material)</i>	
	D. Kirk	Specifications are redlined show the revisions.

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<p><a href="#">SP 207</a></p>	<p><b>SP207-Settlement Plates</b></p>          <p>A. Wentz</p>	<p><b>2nd time to Committee.</b>            Converting a Project Specific Special Provision into a Special Provision (SP) for Settlement Plates.</p> <p>Settlement plates are used to determine the magnitude and rate of settlement of embankments and subgrades. The reason for changes to this project is to clarify the use of settlement plates, as well as how they are to be installed and the frequencies with which they are to be monitored.</p> <p>No updates from the last meeting.            The SP is redline copy showing the revision.</p> <p><b>Approval is expected in March.</b></p>
<p><a href="#">SP 601</a></p>	<p><b>SP601-Structural Concrete</b></p>          <p>A. Thaxton</p>	<p><b>2nd time to Committee.</b>            This is an update to a previously approved Special Provision (SP) for Class (S) Structural Concrete. The Special Provision removes Sequential Air Method (SAM) Test (AASHTO T 395) from the table in 601.4.1.</p> <p>No updates from last meeting.            SP is redlined showing the revisions.</p> <p><b>Approval expected in March.</b></p>
<p><a href="#">SP 662</a></p>          <p><a href="#">SP715</a></p>	<p><b>SP662-Roadway Lighting, PVC-Coated Rigid Galvanized Steel Conduit</b></p>          <p><b>SP715-Miscellaneous Materials, PVC-Coated Rigid Galvanized Steel Conduit</b></p>          <p>R. Tabassum</p>	<p><b>2<sup>nd</sup> time to Committee.</b>            Two Special Provisions (SP) for PVC-Coated Rigid Galvanized Steel Conduit to be used for all roadway crossings.</p> <ul style="list-style-type: none"> <li>• SP662-Roadway Lighting, PVC-Coated Rigid Galvanized Steel Conduit</li> <li>• SP715-Miscellaneous Materials, PVC-Coated Rigid Galvanized Steel Conduit</li> </ul> <p>The Standard Detail Volume II, Sheet TEL-30 referring to road crossing and trench details work shall now be bid under this item.</p> <p>No updates from the last meeting.  <b>Approval expected in March.</b></p>

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<p><a href="#"><u>615</u></a></p>	<p><b>615.6.3-Bearings and Anchorage's</b></p> <p>J. Adkins</p>	<p><b>2<sup>nd</sup> time to Committee.</b>                      Specification Change to 615-Steel Structures, 615.6.3-Bearings and Anchorage's.                      Revision updates a typo in the specification.</p> <p>No updates from last meeting.                      The specification is redlined showing the revision.  <b>Approval expected in March.</b></p>
<p><a href="#"><u>679</u></a></p>	<p><b>679.2.2-Specialized Concrete Mix Design and Testing</b></p> <p>A. Thaxton</p>	<p><b>2<sup>nd</sup> time to Committee.</b>                      Specification Change to 679-Overlaying of Portland Cement Concrete Bridge Decks, 679.2.2-Specialized Concrete Mix Design and Testing. The revision update replaces the rapid chloride permeability test with the surface resistivity test and requirements.</p> <p><i>Updated from the last meeting. Table 679.2.2.1 updated 28 days to 36 days for consistency with spec.</i></p> <p>The specification is redlined showing the revision.  <b>Approval is expected in March.</b></p>
<p><a href="#"><u>679</u></a></p>	<p><b>679.2.3.1.1-Hydrodemolishing Equipment</b></p> <p>J. Neeley</p>	<p><b>2<sup>nd</sup> time to Committee.</b>                      Specification Change to 679-Overlaying of Portland Cement Concrete Bridge Decks, 679.2.3.1.1-Hydrodemolishing Equipment. The revision adds pressure requirements for the hydrodemolishing equipment. The intent of this specification change is to get a profile for adhesion and removal of all unsound/bad concrete.</p> <p>No updates from last meeting.                      The specification is redlined showing the revision.  <b>Approval is expected in March.</b></p>
<p><a href="#"><u>701</u></a></p>	<p><b>701.3-Blended Hydraulic Cements</b></p> <p>K. Kukaua</p>	<p><b>2<sup>nd</sup> time to Committee.</b>                      Specification Change to 701-Hydraulic Cement, 701.3-Blended Hydraulic Cements. The revision adds Portland Ternary Cement, Type 1T. This will be governed by ASTM C595.</p> <p><i>Updated a minor typo from the last meeting (1 to l).</i></p> <p>The specification is redlined showing the revision.  <b>Approval is expected in March.</b></p>

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<a href="#"><u>SP709</u></a>	<b>SP709-Galvanized Coated Bars for Concrete Reinforcement</b>	<p><b>2nd time to Committee.</b> Special Provision (SP) for 709-Metals, 709.1.3-Galvanized Coated Bars for Concrete Reinforcement. The revision adds inspection requirements for galvanized reinforcing steel. The revision also adds requirements if ASTM A767 is used as the method of galvanizing.</p> <p>No updates from last meeting.</p> <p>The SP is redlined showing the revision. <b>Approval expected in March.</b></p>
	C. Preston	

### New Business

SECTION	TITLE	DESCRIPTION
<a href="#"><u>642</u></a>	<p><b>642.6-Silt Fence</b></p> <p><b>642.7-Method of Measurement (Table 642.7.1)</b></p> <p>D. Kirk</p>	<p><b>1<sup>st</sup> time to Committee!</b> Two specification changes updating Section 642-Temporary Pollution Control:</p> <ol style="list-style-type: none"> <li><b>1. Section 642.6-Silt Fence</b> <ul style="list-style-type: none"> <li>• Specification adds three grades of silt fence. This is based on a range of products on the WVDOH Approved Products List. Recommended in the specification are Temporary, Standard, and High Performance. The differences are strength and UV stability. Temporary silt fence will be adequate for projects that can be completed in a single construction season. Standard silt fence will be used for projects that last two seasons. High Performance silt fence will be used for longer projects, and in challenging situations such as shallow concentrated flow that are likely to overstress standard silt fence. Guidance is also provided for post spacing, and for length and slope of disturbed area above the silt fence.</li> </ul> </li> <li><b>2. Section 642.7-Method of Measurement:</b> <ul style="list-style-type: none"> <li>• Updating the Table that is linked to 642.7.1-Temporary Pollution Control Units Value Method:</li> </ul> </li> </ol>

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		<p><a href="https://transportation.wv.gov/highways/TechnicalSupport/specifications/642.7UnitValueMethod/Pages/default.aspx">https://transportation.wv.gov/highways/TechnicalSupport/specifications/642.7UnitValueMethod/Pages/default.aspx</a></p> <p>The revisions removes 652 Items in the Table.</p>
<a href="#"><u>SP 106</u></a>	<p><b>SP106-Build America Buy America (2025)</b></p> <p>J. Adkins</p>	<p><b>1<sup>st</sup> time to Committee!</b></p> <p>Special Provision for Section 106-Control of Materials, Subsection 106.1-Source of Supply and Quality Requirements. The revision adds the definition of manufactured products and adds language on State and/or Federal use of Manufactured products. The final assembly of the manufactured product shall be manufactured in the United States.</p> <p><b>*****THIS WILL NEED TO BE ADDED TO PROPOSALS WHEN THE PROJECT IS AUTHORIZED BY THE FEDS ON 10/1/2025 OR LATER.*****</b></p> <p>The SP is redlined showing the revision.</p>
<a href="#"><u>106</u></a>	<p><b>106.1-Source of Supply and Quality Requirements (BUY AMERICA)</b></p> <p>J. Adkins</p>	<p><b>1<sup>st</sup> time to Committee!</b></p> <p>Specification Change to Section 106-Control of Materials, Subsection 106.1-Source of Supply and Quality Requirements. The revision adds the definition of manufactured products and adds language on State and/or Federal use of Manufactured products. The final assembly of the manufactured product shall be manufactured in the United States</p> <p>The specification is redlined showing the revision.</p>
<a href="#"><u>109</u></a>	<p><b>109.7-Payment for Material on Hand</b></p> <p>G. Hanna</p>	<p><b>1<sup>st</sup> time to Committee!</b></p> <p>Specification Change to Section 109-Measurement and Payment, Subsection 109.7-Payment for Material on Hand. The revision allows for payment to steel fabricators for the raw steel for which they will have to pay for well in advance of when they will be paid for the finished product.</p> <p>The specification is redlined showing the revision.</p>

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<a href="#"><u>212</u></a>	<b>212.2.5.3-Degree of Nonconformance</b>  J. Adkins	<b>1<sup>st</sup> time to Committee!</b> Specification Change to Section 212-Structure, Rock, and Wet Excavation, Subsection 212.2.5.3-Degree of nonconformance. The revision adds reference to MP 212.02.20.  The specification is redlined showing the revision.
<a href="#"><u>SP315</u></a>	<b>SP315-Trail Surface Aggregate (TSA)</b>  T. Ross	<b>1<sup>st</sup> time to Committee!</b> A Special Provision for Trail Surface Aggregate. The revision adds guidelines for Trail Surface Aggregate (TSA). Overall, the SP creates a mixture of crushed aggregates that will compact.  The SP is redlined showing the revision.
<a href="#"><u>410</u></a>	<b>410.7.1.5-Bond Strength</b>  <b>410.13.6-Bond Strength Adjustment</b>  S. Jack	<b>1<sup>st</sup> time to Committee!</b> Two specification changes to Section 410-Asphalt Base And Wearing Courses, Percent With Limits (PWL), <ul style="list-style-type: none"> <li>• <b>410.7.1.5-Bond Strength</b></li> <li>• <b>410.13.6-Bond Strength Adjustment</b></li> </ul> Revisions to the Bond Strength Testing and Payments within Section 410 Percent within Limits. Revisions waive negative price adjustments given a proper tack coat application as per a contractor’s QCP. This revision is based on observations made during field studies which indicated that the bond testing protocols may not be reflective of in-place performance.  The specification is redlined showing the revision.
<a href="#"><u>506</u></a>	<b>506.8-Repair Assessment Period</b>  K. Kukaua	<b>1<sup>st</sup> time to Committee!</b> Specification change to Section 506-Concrete Pavement Repair. The revision adds Subsection 506.8-Repair Assessment Period. This requires additional repairs on newly repaired pavements exhibiting signs of failure within a 30-day assessment period.  The specification is redlined showing the revision.
<a href="#"><u>SP 601</u></a>	<b>SP601-Mass Concrete</b>  K. Kukaua	<b>1<sup>st</sup> time to Committee!</b> A Special Provision for Mass Concrete. The revision updates a previously approved SP adding Type 1T To the Materials section.  The SP is redlined showing the revision.

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<a href="#"><u>601</u></a>	<b>601.3.1-Mix Design Requirements</b>	<p><b>1<sup>st</sup> time to Committee!</b> Specification Change to Section 601-Structural Concrete, subsection 601.3.1-Mix Design Requirements. The revision adds the Sequential Air Meter (SAM) testing requirements for Mix Design Approval. This will replace the 601 SAM Testing SP requirements and would be a requirement for any future mix design submitted after the supplemental specification goes into effect.</p> <p>A. Thaxton</p> <p>The specification is redlined showing the revision.</p>
<a href="#"><u>601</u></a>	<b>601.1–Description, 601.2–Materials, 601.3- Proportioning, 601.4- Testing, 601.8-Forms, 601.9-Adverse Weather Conditions, 601.10-Placing Concrete, 601.12-Curing and Protecting Concrete</b>	<p><b>1<sup>st</sup> time to Committee!</b> Specification change to Section 601-Structural Concrete. The revision adds requirements for Class M concrete. WVU was contracted to research and develop a specification for mass concrete. The following subsections have been revised:</p> <ul style="list-style-type: none"> <li>• 601.1–Description:</li> <li>• 601.2–Materials</li> <li>• 601.3-Proportioning</li> <li>• 601.4-Testing</li> <li>• 601.8-Forms</li> <li>• 601.9-Adverse Weather Conditions <ul style="list-style-type: none"> <li>○ The addition of 601.9.3-Mass Concrete</li> </ul> </li> <li>• 601.10-Placing Concrete</li> <li>• 601.12-Curing and Protecting Concrete</li> </ul> <p>Developed by WVU Vetted by A. Thaxton</p> <p>The specification is redlined showing the revision.</p>
<a href="#"><u>609</u></a>	<b>609.2.1-Detectable Warning Surfaces</b>	<p><b>1<sup>st</sup> time to Committee!</b> Specification change to Section 609-Sidewalks, subsection 609.2.1-Detectable Warning Surfaces. The revision requires the products to meet AASHTO-PEAS testing T388 requirements. It also lists out dome size requirements.</p> <p>G. Mullins</p> <p>The specification is redlined showing the revision.</p>
<a href="#"><u>625</u></a>	<b>625.5.3-Casing</b>	<p><b>1<sup>st</sup> time to Committee!</b> Specification change to Section 625-Rock Socketed Drilled Shaft. The revision updates language, clarifying the specification’s intent.</p> <p>J. Hamilton</p> <p>The specification is redlined showing the revision.</p>

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<a href="#"><u>688</u></a>	<p><b>Section 688-Field Painting of Metal Structures</b></p> <p>K. Trent</p>	<p><b>1<sup>st</sup> time to Committee!</b> Specification change to the entire Section 688-Field Painting of Metal Structures.</p> <p>The specification is redlined showing the revision.</p>
<a href="#"><u>720</u></a>	<p><b>720.3.2-Quality Assurance (QA) Testing:</b></p> <p>V. Allison</p>	<p><b>1<sup>st</sup> time to Committee!</b> An update to a recently approved Section 720 specification. Update replaces “Contractor” with “Engineer”.</p> <p>The specification is redlined showing the revision.</p>

**Deadline for new items & updates for the May 7, 2025 Meeting are due April 7, 2025.**

If you are the ‘champion’ of any specification changes and/or project specific special provisions currently in the Specification Committee, it is your responsibility to edit/update/modify them in a timely manner per comments and discussion in Spec Committee. *Failure to submit updates may result in removal of item and/or delays.*

**Comments**

Comments are requested for Specifications Changes and Project Specific Special Provisions as they help in the decision-making process. Please send comments by Friday prior to the meeting!

Please Send Comments to: **Janie.M.Adkins@wv.gov**

**File Format Structure and Progression of items thru Specifications Committee**

The purpose of the below protocol is to provide guidance on the file structure of Proposed Specifications & Project Specific Provisions as they progress through Specifications Committee. This procedure would facilitate a means of tracking changes from meeting to meeting as the agenda & provisions are posted publicly online on the Spec Committee website.

**TYPES OF PROVISIONS:**

There are three standard types of provisions typically discussed in committee:

1. **Specification Changes** – These are permanent changes to the WVDOH Standard Specifications.
  - Unless inserted into a project proposal, these changes typically go into effect in January (of subsequent year) with the Supplemental Specifications
2. **Special Provisions (SP)** – Are applied to an individual project or a small group of projects and require two (2) meetings for approval.
3. **Project Specific Special Provisions (PSSP)** – Can be shown to committee-but not required, does not require two (2) meetings for approval, **REQUIRES MANAGEMENT APPROVAL.** Project Specific Special Provisions are applied to only an individual project.

**NEW BUSINESS ITEMS:**

New items should be setup & submitted in the following format along with a brief overview of the item or reason for the change:

1. **Specification Changes** – Show as red-line copy (see note)



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2. **Project Specific Special Provisions (SP)** – Will be shown in all black.
3. **Updates to approved SP** – Shown as red-line copy.

NOTE: Red-line copy is a form of editing which indicates removal or addition of text. You can redline a Microsoft Word document by using the built-in “Track Changes” feature.

## **OLD BUSINESS ITEMS:**

Updated provisions that were discussed at the last committee meeting should be setup in the following format:

- Redline copy from prior meeting would not be shown.
- Redline copy of new changes/updates (from previous meeting)

## **PROGRESSION OF ITEMS THRU COMMITTEE AND APPROVAL:**

Depending on how important the project and/or comments/discussion of item at previous meeting, then several things can happen in no particular order.

- Few comments/discussion/minor changes...will recommend approval of item at next meeting.
- A lot of comments/discussion...will not recommend approval at next meeting; item will be updated and reviewed again at the next meeting.
- SPs in committee may be used in advertised project. Hope to work to address comments & finish approving at subsequent meeting.

## **2023 Standard Specification Roads and Bridges**

Print Version:

**WVDOH Employees**-contact us or stop by Technical Support

**Industry**-We have an order form on our webpage here:

- [https://transportation.wv.gov/highways/TechnicalSupport/specifications/Documents/SpecBookOrderForm\\_20230925.pdf](https://transportation.wv.gov/highways/TechnicalSupport/specifications/Documents/SpecBookOrderForm_20230925.pdf)

## **2025 Supplemental Specifications**

The 2025 Supplemental is posted on our webpage.

- <https://transportation.wv.gov/highways/TechnicalSupport/specifications/Pages/default.aspx>

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 651

FURNISHING AND PLACING TOPSOIL

DELETE THE ENTIRE CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

**651.1-DESCRIPTION:**

This work shall consist of acquiring sites outside the right-of-way from which topsoil can be obtained and the hauling and placing of such material, or hauling and placing of topsoil from stockpiles within the right-of-way, all in accordance with these Specifications and at locations indicated on the Plans or designated by the Engineer.

**651.2-MATERIALS:**

Topsoil shall consist of the uppermost layers of fertile and friable soil that contains humus material. This material varies in thickness in accordance with soil groups and usually possesses a darker color than the subsoil. The texture of the topsoil may vary within the range of natural loam, silty clay loam, and sandy loam. Acceptable topsoil shall contain at least 3% organic matter ~~in the range of 2% to 20%~~ and be sampled at least once per project using AASHTO T 267 method; multiple sources or change of sources shall also be sampled.

Topsoil containing less than 3% organic matter shall be conditioned with biological growth stimulants. The requirements for these amendments shall conform to 715.30.

**CONSTRUCTION METHODS**

**651.3-STRIPPING TOPSOIL:**

~~Prior to removal from the site, the soil will be tested by the Division to determine the humus and nutrient value.~~ Care shall be exercised as to the depth of stripping, and any loads with an excess of subsoil shall be discarded. The Contractor shall ~~mow or otherwise remove~~ remove all heavy grass, weeds, or other vegetation, including root mass, in ~~over~~ the areas before stripping.

Topsoil shall be stored on the stripping site out of construction limits, if feasible. Any topsoil that cannot be stored on the construction site must acquire approval by the Engineer ~~must be obtained prior~~ to transporting any material from the stripping site.

# DRAFT

## 651.4-TRANSPORTING:

Topsoil material shall not be placed until the entire roadway (including surfacing) has been completed, unless otherwise provided for on the Plans or approved in writing. During hauling operations, the surface of the highway shall be kept reasonably clean to avoid creating a traffic hazard.

## 651.5-PLACING AND MANIPULATING:

Areas to be topsoiled shall be brought reasonably close to the lines and grades shown on the Plans or established by the Engineer. Topsoil may not be applied to slopes steeper than 2H:1V. All slopes less than or equal to 2H:1V that do not meet an organic matter of at least 3% require the application of topsoil. An approved hydraulic growth medium may be used in replace of topsoil if designated by the Engineer and must meet all requirements in 715.31.

Prior to application, fertilizer lime or sulfur, and other soil amendments shall be added to the topsoil according to the soil analysis, in accordance with section 652.4.1. The Contractor shall ~~scarify~~ track the surface of the subsoil before the topsoil is placed, unless otherwise permitted, for bonding the topsoil layer with the subsoil.

Topsoil shall be applied at a minimum depth of 6 inches. For Type B and C seed mixtures, the topsoil must be tracked again to compact to a minimum thickness of 4 inches. For Type A seeding (lawn type seeding), compact the topsoil and then finely graded to provide a smooth surface. All sites must then be scarified shall be accomplished by disking, harrowing, raking, or other approved methods. Depressions and ridges formed by construction equipment, during final grading or scarifying, shall be parallel to the contours.

~~Topsoil shall not be spread to a greater depth than that required to make the work conform to the natural terrain after shrinkage and settlement have taken place.~~ After spreading the soil, all deleterious materials (large lumps or clods, brush, litter, or other foreign material, and stones exceeding two (2) inches approximately in any dimension) shall be raked up and removed from the site. For Type A seeding (lawn type seeding), remove all material over 1 inch in any dimension.

The Contractor shall take all reasonable precautions to avoid injury to existing plant growth, structures, and roadway surface.

## 651.6-METHOD OF MEASUREMENT:

The quantity of work done will be measured in cubic yards of "Furnishing and Placing Topsoil" or "Placing Stockpiled Topsoil", which shall be the material actually removed from previously selected site or sites outside the right-of-way of from stockpiles within the right-of-way, and acceptably placed and spread on the areas designated to receive it, as determined from the net total of load tickets of vehicles.

## 651.7-BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract unit prices bid for the items listed below, which prices and payments shall be full compensation for furnishing all the materials and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

No separate payment will be made for stripping topsoil within the right-of-way limits and transporting or stockpiling of such material.

**651.8-PAY ITEMS:**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>
651001-*	Furnishing and Placing Topsoil	Cubic Yard
651002-*	Placing Stockpiled Topsoil	Cubic Yard

\* Sequence number

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 652  
SEEDING AND MULCHING

DELETE THE ENTIRE CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

652.1-DESCRIPTION:

This work shall cover all operations incidental to the establishment and maintenance of grass, forb, and leguminous vegetation, including the furnishing and sowing of seed; furnishing and applying fertilizer, agricultural-limestone, other soil amendments, and mulch material, all in accordance with these Specifications and at locations indicated on the Plans or designated by the Engineer.

652.2-MATERIALS:

Materials shall meet the requirements in the following Subsections of Division 700:

MATERIAL	SUBSECTION
<u>Biological Growth Stimulants</u>	<u>715.30</u>
Fertilizers	715.26
Ground Agricultural Limestone	715.25
<u>Hydraulic Growth Mediums</u>	<u>715.31</u>
Inoculating Bacteria	715.29
Matting for Erosion Control	715.24
Mulch Materials	715.27
<u>Seed</u>	<u>715.28</u>
Water	*

\* Water shall be reasonably free from injurious chemicals and other toxic substances harmful to plant life. The source of water used is subject to the approval of the Engineer.

Temporary seed, such as annual ryegrass (Italian ryegrass) and weeping lovegrass common oats and cereal rye, used in the seed mixtures B, C, or D, shall be of a commercial grade meeting the requirements of the State Seed Law. Temporary seed labeled with the notation "germination below standard" shall not be used. Temporary seed shall not be used after one year from date of

germination test shown on the label. Seed other than that specified above shall meet the requirements of subsection 715.28.

Tackifier or chemical mulch binders shall be of commercial grade and conform to the requirements in subsection 715.27.1. Topsoil, if called for, shall conform to the requirements in section 651. All materials will be subject to approval or rejection, in part or in whole.

## CONSTRUCTION METHODS

### 652.3-SEASON OF WORK:

Permanent seeding or ~~second and third seeding re-application and spot application,~~ following the original seeding, under section 652, shall be performed between the dates of ~~March 1 February 15<sup>th</sup> to June 15 20<sup>th</sup> May 31<sup>st</sup>~~ and August 1<sup>st</sup> to October ~~15 31<sup>st</sup>~~. Specific seeding dates are made for each seed mixture and can be found in 652.5.

Temporary seeding outside the above planting dates shall fall under section 642. Seed shall be applied following construction at any time the weather will allow seeding equipment to operate, under 642, without regard to seasons.

### 652.4-AREA PREPARATION FOR SEEDING AND MULCHING:

Seeding, fertilizing, liming, applying soil treatments, and mulching shall not be applied conducted until the specified areas have been brought to lines and grades shown on the Plans. Topsoil, ~~when called for, or hydraulic growth media~~ shall be spread ~~to the depths indicated on the Plans.~~ In accordance to section 651.

~~The application rate for agricultural limestone will be determined by a pH test after cuts and embankments are completed just prior to seeding. The Plans will show the estimated tons of lime needed for the job based on general knowledge of the soils in the area. The final application rate will be determined by the Engineer based on the pH test, conducted in accordance with MP 700.04.10.~~

652.4.1-Soil Tests and Analysis: A soil test is required on all areas greater than one (1) acre when the area has reached final grade and permanent seeding is the next step. A soil test is optional for areas less than one (1) acre and will be determined by the Engineer if required. The area shall be evaluated by the Engineer to determine where the distinguishable representative areas are located. A distinguishable representative area is defined as where visible changes, such as a change in color or texture, in soil occur. All representative areas of the site shall be divided into maximum of five (5) acre increments and tested individually.

On each representative soil type, a composite sample is needed. A minimum of ten (10) subsamples of soil from the top four (4) to six (6) inches will be collected. The subsamples should be taken randomly throughout the area. The subsamples should be thoroughly mixed and the composite sample should be sent to a certified soil testing laboratory for analysis. The laboratory, at a minimum, should report: pH, buffer pH, fertilizer requirements and recommendations, and lime requirements and recommendations.

652.4.2-Seedbed Preparation: ~~Interchanges, medians and similar~~ Areas with ~~3 to 2~~ Horizontal : 1 Vertical (H:V) slope or flatter, excluding areas involving subsurface drainage from base course material, shall be scarified sufficiently to produce a seed bed ~~as directed by the Engineer.~~ For slopes 3H:1V and flatter, scarify soil to a depth of 2-4 inches. For slopes

3H:1V to 2H:1V, scarify subsoil to a depth of 0.5-1 inches. Remediation of the pH should be made to the subsoil at the time of soil scarification, whether lime or sulfur is required based on soil test. See Table 653.4.3 for recommended bulk densities. All large sticks, brush, loose roots, stones exceeding two (2) inches approximately in any dimension, and other debris shall be removed prior to seeding operations. The area shall be back dragged to eliminate depressions, ruts, or equipment track marks on slopes. Before topsoil application, use a bulldozer to track the soil perpendicular to the slope making track indentations to reduce potential for topsoil slippage. Once check slots are in place, apply and track with a dozer to a minimum thickness of four (4) inches. The area shall be free of depressions, ruts, or excessive equipment track marks, other than check slots, on slopes. Seed bed preparation will not be necessary on slopes steeper than ~~3 to 1~~ 2H:1V.

**652.4.1-652.4.3-Preparation of Lawn Type Area for Seeding:** All areas to be seeded to "Type C 2" lawn mixture, and "Type C 1" mixture in rest areas. Lawn type areas will use "Type A" mixture in rest areas, medians, shoulders, and lawns. The seedbed shall be fine graded. The finished grade shall be uniform and free of irregularities or ~~water pockets~~ depressions. The finished grade shall be free of weed and plant growth, stones over one (1) inches in diameter, or other debris. This debris will be disposed of as directed by the Engineer. Immediately prior to seeding, all areas shall be cultivated to provide a reasonably firm but friable seedbed. The depth of tillage shall be three (3) inches or as directed by the Engineer. Limestone as required and fertilizer as specified shall be worked into the upper three (3) inches of the seedbed before seeding.

**TABLE 652.4.3**

<b><u>Recommended Lime Bulk Densities</u></b>			
<b><u>Soil Texture</u></b>	<b><u>Ideal Bulk Densities</u></b>	<b><u>Bulk Densities that May Affect Root Growth</u></b>	<b><u>Bulk Densities that Restrict Root Growth</u></b>
	<b><u>(lb/ft<sup>3</sup>)</u></b>	<b><u>(lb/ft<sup>3</sup>)</u></b>	<b><u>(lb/ft<sup>3</sup>)</u></b>
<u>Sands, loamy sands</u>	<u>&lt; 99.9</u>	<u>105.5</u>	<u>&gt; 112.4</u>
<u>Sandy loam, loams</u>	<u>&lt; 87.4</u>	<u>101.8</u>	<u>&gt; 112.4</u>
<u>Sandy clay loams, loams, clay loams</u>	<u>&lt; 87.4</u>	<u>99.9</u>	<u>&gt; 109.2</u>
<u>Silts, silt loams</u>	<u>&lt; 81.2</u>	<u>99.9</u>	<u>&gt; 109.2</u>
<u>Silt loams, silty clay loams</u>	<u>&lt; 87.4</u>	<u>96.8</u>	<u>&gt; 103.0</u>
<u>Sandy clays, silty clays, some clay loams (35-45% clay)</u>	<u>&lt; 68.7</u>	<u>93</u>	<u>&gt; 98.6</u>
<u>Clays (&gt; 45% clay)</u>	<u>&lt; 68.7</u>	<u>86.8</u>	<u>&gt; 91.8</u>

**652.4.4-Soil Additives and Amendments:** The application rate for limestone, fertilizer, and other soil amendments will be determined by a soil test after cuts and embankments are completed just prior to seeding. The Plans will show the estimated tons of lime, fertilizer, and other soil amendments needed for the job based on general knowledge of the soils in the area. The final application rate will be determined by the Engineer based on the soil test, conducted in accordance with MP 700.04.10.

## 652.5-SOWING SEED:

Immediately following area preparation, seed shall be sown. Only certified seed shall be used. Certified seed is seed that has been screened to check for satisfactory genetic purity and varietal identity and meets all requirements of State Seed Law. Seed shall not be used after one year from date of germination test shown on the label Legume seed shall be inoculated with approved cultures, in accordance with the instruction of the manufacturer. Seed may be directly sown with a drill seeder, if site conditions permit. Alternatively, seed may be sown by hydroseeding. When using a hydroseeder, the inoculant shall be increased to five times the normal rate.

~~\_\_\_\_\_ If machine breakdown occurs during hydroseeding, the following practices should be used to avoid seed damage:~~

~~\_\_\_\_\_ For machine breakdown of thirty (30) minutes to two (2) hours, fifty percent (50%) more seed shall be added to the slurry, based on the proportion of the slurry remaining in the tank.~~

~~\_\_\_\_\_ For machine breakdown of more than two (2) hours, a full rate of seed shall be used.~~

Seed shall be sown by approved methods which provide for uniform distribution of seed. Rates of application and type of seed mixture shall be in accordance with Table 652.5 unless otherwise specified on the Plans.

~~For lawn areas, the broadcast seeding shall be made in two applications, using one half the seed each time and the second sowing to be at right angles to the first. After broadcasting or otherwise applying the seed, the seedbed shall be firmed by means of a roller or cultipacker.~~

~~\_\_\_\_\_ Specific seeding dates are made for each seed mixture.~~

- ~~a. Type A is to be seeded from February 15<sup>th</sup> to June 20<sup>th</sup> May 31<sup>st</sup> and from August 1st to October 31st.~~
- ~~b. Type B seed mixture is to be seeded from March 1<sup>st</sup> to June 20<sup>th</sup> and October 1<sup>st</sup> to October 31<sup>st</sup>.~~
- ~~c. Type C mixture is to be seeded from August 1<sup>st</sup> to October 31<sup>st</sup>.~~
- ~~d. Type E mixture is to be planted from March 20<sup>th</sup> to June 30<sup>th</sup> and October 15<sup>th</sup> to the first frost.~~

~~\_\_\_\_\_ **652.5.1-Reseeding, Refertilizing, and Remulching:** Any area failing to establish a stand due to weather or adverse soil conditions seventy percent (70%) of cover by area over 100% of the site due to any reason shall be reseeded, refertilized, and remulched as directed by 652.8 and by the Engineer.~~



**TABLE 652.5-SEED MIXTURES**

Variety of Seed	Type B	Type C**		Type D	Type L
		C-1	C-2		
	Medians, Shoulders (Ditch Slope) Waterways, and Mowable Areas of Interchange*	Coarse Lawn Grass ----- For Use in Urban and Rest Area Locations	Fine Lawn Grass ----- For Use where a Fine Lawn is Desired	Cut and Fill Slopes ----- (Including Benches and Bifurcated Median)	All areas
	Lb. per acre	Lb. per acre	Lb. per acre	Lb. per acre	Lb. per acre
Kentucky 31 Fescue	65	45		20	
Red Fescue (Pennlawn)	20	20	20	20	41
Kentucky Bluegrass		25	40		
Merion Bluegrass			30		
Crown Vetch				20	
Hard Fescue Mixture***					63
White Dutch Clover	3				
Annual Ryegrass Aug 1 to May 15 — or Weeping Lovegrass May 15 to Aug 1	7  3	7  3	7	7  3	12  5

\* Areas will be considered mowable when slopes are 3 to 1 or flatter.

\*\* Type C 1 and C 2 seed mixtures shall be used in all urban, suburban, and rest areas where lawn type turf is desired with mowing maintenance intended. C 2 lawn mixture shall be used along sidewalks, adjacent to private lawns.

\*\*\* A combination of approved certified varieties with no one variety exceeding 50% of the total hard fescue component.

**TABLE 652.5**  
**Seed Mixtures**

<u>Variety of Seed</u>	<u>Type A</u>	<u>Type B</u>	<u>Type C</u>	<u>Type E</u>
	<u>Mowable Areas<sup>b</sup></u> (lb/ac)	<u>Cut and Fills</u> (lb/ac)	<u>Cool Season</u> (lb/ac)	<u>Wet Areas</u> (lb/ac)
<u>Common Oat</u> ( <i>Avena sativa</i> ) (March 1- October 31) <sup>a</sup>		<u>30</u>		
<u>Cereal Rye</u> ( <i>Secale cereal</i> ) (November 1-Feb 28) <sup>a</sup>		<u>30</u>		
<u>Autumn Bentgrass</u> ( <i>Agrostis perennans</i> )	<u>10</u>	<u>3.7</u>		
<u>Chewing’s Fescue</u> ( <i>Festuca rubra ssp. commutate</i> )	<u>25</u>			
<u>Hard Fescue ‘Chariot’</u> ( <i>Festuca brevipila</i> )	<u>35</u>		<u>35</u>	
<u>Hard Fescue ‘Heron’</u> ( <i>Festuca ovina var. duriuscula</i> )	<u>35</u>		<u>35</u>	
<u>Creeping Red Fescue</u> ( <i>Festuca rubra</i> )	<u>55</u>		<u>55</u>	
<u>White Clover</u> ( <i>Trifolium repens</i> )	<u>3</u>		<u>7</u>	
<u>Big Bluestem</u> ( <i>Andropogon gerardii</i> )		<u>6</u>		
<u>Virginia Wildrye</u> ( <i>Elymus virginicus</i> )		<u>8.4</u>		<u>4</u>
<u>Switchgrass</u> ( <i>Panicum virgatum</i> )		<u>6.4</u>		
<u>Indiangrass</u> ( <i>Sorghastrum nutans</i> )		<u>14</u>		
<u>Partridge Pea</u> ( <i>Chamaecrista fasciculata</i> )		<u>1</u>		
<u>Black-Eyed Susan</u> ( <i>Rudbeckia hirta</i> )		<u>0.6</u>		
<u>Narrowleaf Mountainmint</u> ( <i>Pycnanthemum tenuifolium</i> )		<u>0.1</u>		
<u>Wild Bergamot</u>		<u>0.5</u>		
<u>Panicledleaf Ticktrefoil</u> ( <i>Desmodium paniculatum</i> )		<u>0.4</u>		
<u>Smooth Oxeye</u> ( <i>Heliopsis helianthoides</i> )		<u>0.4</u>		
<u>Flat-top Goldentop</u> ( <i>Euthamia graminifolia</i> )		<u>0.1</u>		
<u>Redtop</u> ( <i>Agrostis gigantea</i> )			<u>4</u>	

**TABLE 652.5  
Seed Mixtures**

<u>Variety of Seed</u>	<u>Type A</u>	<u>Type B</u>	<u>Type C</u>	<u>Type E</u>
	<u>Mowable Areas<sup>b</sup></u> (lb/ac)	<u>Cut and Fills</u> (lb/ac)	<u>Cool Season</u> (lb/ac)	<u>Wet Areas</u> (lb/ac)
<u>Birdsfoot Trefoil</u> ( <u>Lotus corniculatus</u> )			<u>8</u>	
<u>Fox Sedge</u> ( <u>Carex vulpinoidea</u> )				<u>4</u>
<u>Fowl Bluegrass</u> ( <u>Poa palustris</u> )				<u>3.5</u>
<u>Redtop Panicgrass</u> ( <u>Panicum rigidulum</u> )				<u>4</u>
<u>Common Rush</u> ( <u>Juncus effuses</u> )				<u>0.5</u>
<u>Shallow Sedge</u> ( <u>Carex lurida</u> )				<u>3</u>
<u>Blue Vervain</u> ( <u>Verbena hastate</u> )				<u>0.8</u>
<u>Wingstem</u> ( <u>Verbesina alternifolia</u> )				<u>0.2</u>
<u>Joe Pye Weed</u> ( <u>Eutrochium purpureum</u> )		<u>1.5</u>		<u>1.5</u>
<u>Swamp milkweed</u> ( <u>Asclepias incarnata</u> )				<u>.1</u>
<u>Butterfly Milkweed</u> ( <u>Asclepias tuberosa L.</u> )		<u>.10</u>		
<u>Common Milkweed</u> ( <u>Asclepias syriaca</u> )		<u>.10</u>		
<u>Purple coneflower</u> ( <u>Echinacea purpurea</u> )		<u>1.5</u>		

- a. Choose a nurse crop according to season of planting.
- b. Type A will be utilized for mowable areas. Type A seed mixture shall be used in all urban, suburban, rest areas, WVDOH facilities, and mowable areas along roadways where lawn type turf is desired with mowing maintenance intended.

**652.6-APPLYING MULCH, LIME, AND FERTILIZER, AND OTHER SOIL AMENDMENTS:**

**652.6.1-General:** Whenever permanent or temporary seeding is made on bare soil or newly completed construction work, the following criteria shall be followed in regard to mulching.

- i. Hydraulic erosion control products shall be used on all slopes but consult 652.6.2 for further details and specifications.
- ii. Rolled erosion control products (RECPs) may be used on slopes less than or equal to

2H:1V.

iii. Straw mulch (excluding hay) shall be used on slopes ~~1 1/2 to 1 or flatter~~ less than or equal to 4H:1V. ~~Wood cellulose fiber mulch shall be used on cut slopes steeper than 1 1/2 to 1. The Engineer may make adjustments in the type of mulch to meet local conditions on the job.~~

i.

When using straw mulch, the mulch shall be anchored with ~~an acceptable~~ a non-toxic tackifier or binder as described in Section 652.6.~~25~~below. The sequence of application, when using straw mulch shall be as follows:

- 1) Seed, ~~lime, and~~ fertilizer, other soil amendments shall be sown prior to mulching.
- 2) Mulch and ~~non-toxic tackifier-mulch or~~ binder shall be placed within twenty-four (24) hours of sowing seed.

~~When permanent seeding follows a temporary cover crop, wood cellulose fiber mulch shall be used and the quantity of mulch shall be determined by the amount of living and dead plant residue on the soil surface in accordance with subsection 652.6.3.2.~~

Where the temporary seeding has been destroyed by subsequent construction, the mulch will be the same type and amount as required for bare soil or new construction.

~~**652.6.2-Straw Mulch:** Straw shall be applied at the rate of approximately two tons per acre. Straw mulch around buildings, sidewalks or other structures may be held in place with a form of netting or chemical mulch binders applied according to the manufacturers' specifications.~~

~~**652.6.2-Hydraulic Erosion Control Products:** Hydraulically applied erosion control products (HECPs) are applied to bare soil by means of a mechanically agitated hydro seeder or by broadcast spreading. Typically, a mixture of cut or shaved wood, straw, bonded fiber matrix, or defibrated organic fiber matrix and a stabilizing emulsion or tackifier constitutes the components of HECP. Paper mulch is not approved for use other than for the use of a mulch binder on straw.~~

~~Table 652.6.2A lists qualifications for the accepted HECPs. The products are presented in respect to the acceptable slope that the individual HECPs may be applied, as shown in Table 652.6.2B.~~

**TABLE 652.6.2A**

<u>Mulch Types</u>					
<u>Property</u>	<u>Test Method</u>	<u>Straw</u>	<u>HECP Type 1</u>	<u>HECP Type 2</u>	<u>HECP Type 3</u>
<u>Physical</u>					
<u>Color</u>	<u>Observed</u>	<u>Natural</u>	<u>Colored to contrast application area, shall not stain concrete or painted surfaces.</u>		
<u>Organic Matter</u>	<u>ASTM D2974</u>	<u>100%</u>	<u>90% minimum</u>		
<u>Water Holding Capacity</u>	<u>ASTM D7367</u>		<u>600% Minimum</u>	<u>800% Minimum</u>	<u>1200% Minimum</u>

<u>Acute Toxicity</u>	<u>ASTM 7101</u>	<u>Non Toxic</u>			
	<u>EPA 2021.0-1</u>				
<b><u>Endurance</u></b>					
<u>Functional Longevity</u>	<u>ASTM D5338</u>	<u>≥ 90 days</u>	<u>≥ 90 days</u>	<u>≥ 180 days</u>	<u>≥ 365 days</u>
<b><u>Performance</u></b>					
<u>Maximum Slope Application</u>	<u>Observed</u>	<u>4.0H:1V</u>	<u>4.0H:1V</u>	<u>2.0H:1V</u>	<u>0.5H:1V</u>
<u>Cover Factor</u>	<u>ASTM D8298</u>	<u>-</u>	<u>C ≤ 0.3</u>	<u>C ≤ 0.05</u>	<u>C ≤ 0.01</u>
<u>Ground Cover</u>	<u>ASTM D6567</u>	<u>&gt; 85%</u>	<u>&gt; 90%</u>	<u>&gt; 95%</u>	<u>&gt; 97%</u>
<u>Vegetation Establishment</u>	<u>ASTM D7322a</u>		<u>300% Minimum</u>	<u>400% Minimum</u>	<u>500% Minimum</u>

- a. ASTM test methods developed for Rolled Erosion Control Products (RECPs) that have been modified to accommodate Hydraulic Erosion Control Products (HECPs).

**TABLE 652.6.2B**

<b><u>Mulch Application</u></b>		
<b><u>Mulch</u></b>	<b><u>Applicable Slopes</u></b>	<b><u>Minimum Application Rate (lb/acre – dry) <sup>a</sup></u></b>
<u>HECP Type 1</u>	<u>≤ 4H:1V</u>	<u>2,500</u>
<u>HECP Type 2</u>	<u>4H:1V &lt; S ≤ 2H:1V</u>	<u>3,000</u>
<u>HECP Type 3</u>	<u>2H:1V &lt; S ≤ 0.5H:1V</u>	<u>4,000 <sup>b</sup></u>
<u>Straw</u>	<u>≤ 4H:1V</u>	<u>4,000</u>

- a. A higher level of mulch may be applied than that specified on the Plans, Specifications, and other terms of the Contract. In this situation, the higher level mulch is applied at the rate for the actual slope condition of the site in accordance with the mulch tables, and payment is for the actual mulch specified, not the higher level mulch.
- b. HECP Type 3 may be used for permanent cover applications on slopes 1H:1V or greater at a minimum rate of 4,500 pounds per acre as directed by the Engineer only when the proper TRM installation is not practicable due to site constraints.

**652.6.2.1-HECP Type Overview:** Provide a HECP Type 1, 2, or 3 that has no germination or growth inhibiting factors and does not form a water-resistant crust that can inhibit plant growth. Provide a HECP Type 1, 2, or 3 that completely photo-degrades or biodegrades. Add seed, lime, fertilizer, and other soil amendments to the HECP Type 1, 2, or 3 mixture.

Furnish HECP Type 1, 2, or 3 where all components are pre-packaged by the manufacturer to assure material performance and compliance with the minimum requirements of Table 652.7.2.1. Under no circumstances will field mixing of HECP Type 1, 2, or 3 additives or components be accepted.

HECP Type 1 or 2 shall be applied when the soil is dry and rain is not expected within 24 hours following application. HECP Type 3 shall be applied when the soil is dry and rain is not expected within eight (8) hours following application. All applications shall have a

high degree of certainty that no heavy rain events follow within forty-eight (48) hours following application.

The HECPs must comply at minimum with Tables 652.6.2A and 652.6.2B.

**652.6.2.2-HECP Type 1:** Provide a HECP Type 1 (Hydraulic Mulch with Tack) composed of non-toxic fibers consisting of a minimum of seventy percent (70%) wood fiber or natural fibers that contain non-toxic tackifiers or binders. The HECP Type 1 should be insoluble and non-dispersible after drying to limit raindrop impact.

**652.6.2.3-HECP Type 2:** Provide a HECP Type 2 (bonded fiber matrix (BFM)) consisting of a hydraulically applied matrix composed of a minimum of seventy percent (70%) of non-toxic defibrated organic fibers with at least one of the following non-toxic additives:

- i. Soil tackifiers
- ii. Soil flocculants
- iii. Soil polymers
- iv. Cross-linked hydro-colloidal polymers, or
- v. Cross-linked tackifiers.

The HECP Type 2 should be insoluble and non-dispersible after drying to limit raindrop impact.

Do not use materials composed of paper, cellulose fiber, or any mixture containing paper or cellulose. Do not use materials listed for use as a HECP Type 1. Add seed, legume inoculant, lime, and fertilizer to the HECP Type 2 mixture.

**652.6.2.4-HECP Type 3:** Provide a HECP Type 3 (fiber reinforced matrix (FRM)) consisting of a hydraulically applied matrix composed of a minimum of seventy percent (70%) of non-toxic defibrated organic fibers and a minimum of five percent (5%) crimped, biodegradable interlocking fibers with least one of the following non-toxic additives:

- i. Soil tackifiers,
- ii. Soil flocculants,
- iii. Soil polymers,
- iv. Cross-linked hydro-colloidal polymers, or
- v. Cross-linked tackifiers.

The HECP Type 3 should be insoluble and non-dispersible after drying to limit raindrop impact.

Do not use materials composed of paper, cellulose fiber, or any mixture containing paper or cellulose. Do not use materials listed for use as HECP Type 1 or 2. Add seed, legume inoculant, lime, and fertilizer to the HECP Type 3 mixture.

### **652.6.3-Hydraulic Application of Wood Cellulose Fiber as a Mulching Agent:**

#### **652.6.3-Hydraulic Erosion Control Products Application:**

**652.6.3.1-Equipment:** Hydraulic equipment shall be used for the application of a slurry of fertilizer, lime, seed, ~~prepared wood cellulose fiber, and water.~~ tackifier, legume

inoculant, water, and HECP. This equipment shall have a built-in agitation system with ~~an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed, and water.~~ a working capacity sufficient to agitate, suspend, and homogeneously mix a slurry of the specified amount of tackifier, fertilizer, lime, seed, legume inoculant, other soil amendments, water, and HECP. -The slurry distribution lines shall be large enough to prevent stoppage. This discharge line shall be equipped with a set of hydraulic spray nozzles which will provide even distribution of the mixture or slurry in the various areas to be seeded. The slurry tank ~~shall have a minimum capacity of 1,000 gal and~~ shall be mounted on a traveling unit which may be either self-propelled or drawn, with a separate unit which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded to provide uniform distribution without waste.

**652.6.3.2-Preparation of Slurry and Application of HECPs: Fertilizer, Seed, and Mulch:** ~~Wood cellulose fiber shall be applied at a minimum rate of 1,500 lbs. net dry weight per acre when seeding bare soil or new construction.~~ HECPs shall be applied at the specified rate according to the manufacturer, while following the minimum standards specified in Table 652.6.2B. When seeding into a residue or growth where temporary seeding has previously been performed, the rate will be determined by the Engineer, usually 1,000 lbs. net dry weight per acre. ~~The seed, fertilizer, wood cellulose fiber, and water~~ HECP, tackifier, seed, legume inoculant, fertilizer, lime, other soil amendments, and water shall all be combined into the slurry tank for distribution of all ingredients in one operation by the hydraulic seeding method. The agitator shall be operating at a rate sufficient to keep all materials in suspension at the time such material is added. ~~Seed shall be added first, shall be thoroughly mixed, and the fertilizer then added and put into suspension.~~ When the tank is 40 percent (40%) full, the mulch material may be added and shall be in complete suspension by the time the tank is 75 percent (75%) full. ~~Such increased mixing speed as is necessary for putting the entire admixture in suspension shall be maintained until the tank is emptied.~~ Spraying may commence at such time as the full complement of water has been mixed into the slurry. ~~It is the intent of this Specification to maintain the slurry, during the spraying operation, as~~ The addition of materials into the slurry shall be conducted in the order and time specified by the manufacturer to ensure a homogeneous slurry and survivability of the seed and inoculants. During the spraying operation, a homogenous mixture of suspended solids in the tank until the tank is emptied. Upon request of the Engineer, a representative from the HECP manufacturer shall be on site to aid in application and inspection of the mixture application.

**652.6.4-Rolled Erosion Control Products:** Rolled erosion control products (RECPs) shall be composed of natural or polymer fibers bound together to form a matrix to provide erosion control. RECPs shall conform to all requirements within 715.24. RECPs shall be installed in accordance with the manufacturer's recommendations to slope with 100% surface coverage. Single net straw matting shall be installed on slopes less than or equal to 3H:1V. Double net straw matting shall be installed on slopes less than or equal to 2H:1V.

Site preparation is crucial to achieve continuous intimate contact between the soil and the RECP. The site must be fine graded to a smooth profile and the surface must be free from any

bumps or dips that cause separation between the soil and the RECP. All installed RECP's shall be inspected to ensure proper installation. All deficiencies shall be corrected.

RECPs shall be installed as follows for proper long term effectiveness. A six (6) inch by six (6) inch trench shall be dug a minimum of three (3) feet above the top of slope. The RECP shall then be laid into the trench with six (6) inches of material extended above the trench to be used for overlap. The RECP laid in the trench shall be anchored with six (6) inch anchors at one (1) foot intervals along the width of the RECP. Backfill soil shall then be added to the trench on top of the anchored RECP and compacted. The six (6) inch overlap will then wrap around the backfilled soil and be anchored. The RECP shall then be installed parallel to the slope direction.

Each RECP should overlap another by six (6) inches to provide maximum coverage and stability. Each overlap shall be anchored at one (1) foot intervals along the length of the RECP. RECPs shall be pulled to remove excess slack without breaking contact with the soil surface and anchored to the slope with six (6) inch anchors (stakes or pins). The Engineer may require longer anchors for sandy or loose soils. Refer to table 652.7.4.1 for the minimum anchor frequency requirements.

**TABLE 652.6.4**

<b>RECP Anchoring Requirement</b>	
<b>Slope Grade</b>	<b>Anchoring Frequency (anchors / square yard)</b>
<u>Up to 3H:1V</u>	<u>1.5</u>
<u>3H:1V to 2H:1V</u>	<u>2.0</u>

**652.6.5-Straw Mulch:** Clean, dry straw mulch may be applied on slopes less than 4H:1V. Straw mulch may be applied to slopes up to 2H:1V if the coverage area is less than 1 acre. Straw mulch shall be applied at a rate of two (2) tons per acre with eighty five percent (85%) surface coverage by visual observation. The maximum allowable continuous slope length for straw mulch is fifty (50) feet. Slope interruption devices or rolled erosion control products are required for continuous slope length longer than fifty (50) feet. Straw mulch must be anchored with a non-toxic tackifier or binder according to the manufacturer specifications. The non-toxic tackifier or binder should be applied on the straw at the manufacturer's recommended rates. The Contractor shall be responsible for any damage to structures from the tackifier or binder.

Straw mulch around buildings, sidewalks, or other structures may be held in place with a form of netting or may be sprayed with a non-toxic tackifier or binder by hand while protecting the structures from over spray.

**652.6.6-Limestone:** The kind and rate of application of limestone shall be determined by the soil analysis. Agricultural granular, fast acting lime, or both may be needed depending on the results from the soil analysis. Lime is not required for temporary seeding unless directed by the Engineer.

**652.6.6.1-Agricultural Granular Limestone:** Agricultural granular limestone is used for long term pH remediation. Agricultural lime shall be uniformly distributed among the area and thoroughly mixed with the soil to a depth of three (3) inches. Mixing is not



required when spreading lime with hydraulic methods. Agricultural lime shall be spread at the rate recommended by the soil analysis.

**652.6.6.2-Fast Acting Limestone:** Fast acting limestone is used for immediate pH remediation and should only be used on sites that have time-sensitive guidelines, as directed by the Engineer. Fast acting lime comes in two forms: liquid and dry. The type of fast acting lime shall be determined by the Engineer. Both forms of fast-acting limestone shall be applied at the recommended rate from results of the soil analysis.

~~**652.6.47-Fertilizer:** The kind and amount of fertilizer per acre shall consist of any type with 1-2-1 ratio (nitrogen, phosphoric acid, and potash) providing the minimum nutrient equivalent of 1,000 lb. of 10-20-10. In addition, 300 lb. per acre of slow release urea formaldehyde fertilizer shall be added whenever second step seeding and fertilizing is not feasible due to the Contract completion date. When hydraulic seeding methods are used, the fertilizer shall be applied concurrently with the seeding and mulching operation as part of the slurry mix. When commercial fertilizer is applied by the spray or hydraulic method, it need not be worked into the soil.~~

~~Fertilizer applications for second and third step seeding shall be in accordance with subsection 652.8. be determined by the soil analysis. Fertilizer type and quantity will then be prescribed by the Engineer based on a site-by-site analysis. The Engineer may require more than one type and quantity of fertilizer based on the project site characteristics due to varying soil conditions and properties.~~

~~Re-application and spot application fertilizer requirements shall be based on soil tests to determine the appropriate type and quantity to mitigate the failed vegetative establishment.~~

~~Temperature Release Nitrogen (Environmentally Sensitive Nitrogen (ESN)) should be considered during winter seeding to prevent excess nitrogen runoff and to preserve nitrogen for the growing season.~~

**652.6.8-Biological Growth Stimulants:** Biological growth stimulants shall be applied to all topsoil containing less than three percent (3%) organic matter by weight. The amount and type of stimulant will be determined by the soil analysis. All biological growth stimulants shall conform to 715.30.

**652.6.9-Hydraulic Growth Medium:** Hydraulic growth medium (HGM) shall be used when topsoil cannot be used and the subsoil analyzed for permanent seeding does not contain at least three percent (3%) organic matter by weight. The HGMS shall conform to sections 651 and 715.31.

~~**652.6.510-Wood Chips:** Wood chips, recovered from clearing and grubbing operations, or bark will be acceptable as a mulch for seeding and shall be used at a rate of 35 cubic yard per acre in lieu of straw or hay, for landscaping at a depth of two (2)-four (4) inches or used to fill compost socks for erosion control measures instructed by the Engineer.~~

## **652.7-MAINTENANCE OF SEEDED AND MULCHED AREAS:**

**652.7.1-Contractor Maintenance Requirements:** The Contractor shall maintain all seeded areas until final acceptance of the project, minimum of seventy percent (70%)

vegetative cover. All areas shall be protected from equipment ~~traffic and any damaged areas shall be repaired and reseeded.~~ and foot traffic and any damaged areas shall be repaired and reseeded. The Engineer will require spot application or re-application, or both, depending upon the completion date and estimated completion time of any remaining items on the project.

## **~~652.8-SECOND AND THIRD STEP SEEDING, FERTILIZING AND MULCHING:~~**

**~~652.7.2-Re-Application:~~** The re-application of seed, mulch, and fertilizer shall be applied as directed by the Engineer based on The Engineer will require second or third step seeding, or both, depending upon the completion date, and estimated completion time of any remaining items on the project, and unsatisfactory stand development. ~~—The second application of fertilizer, seed and mulch shall be applied as directed by the Engineer.~~ The application rates will be based on the stand of grass, severity of erosion and condition or growth of grass as described. ~~Spring seedings shall be refertilized and reseeded as needed in the fall from August 15 to October 15. Fall seeded areas shall be given a second step seeding and fertilizing, as required, the following spring from March 15, to May 15. Spring seeding shall be re-fertilized and re-seeded as needed in the summer and fall from August 1<sup>st</sup> to October 31<sup>st</sup>. Summer and fall seeded areas shall be re-seeded and re-fertilized in the following spring from March 1<sup>st</sup> to June 20<sup>th</sup> May 31<sup>st</sup>.~~

The following shall be used as a guide for ~~second step application~~ for re-application:

- i. For areas with less than fifty percent (50%) stand or subject to sever erosion, apply the ~~complete amount of seed, fertilizer, and mulch (wood cellulose fiber) as specified in the original seeding.~~ original specified seed, fertilizer, lime, and mulch rates.
- ii. For areas with over fifty percent (50%) ~~of grass and slight to moderate erosion stand,~~ apply one half the original fertilizer and seed fertilizer, lime, and mulch rates., ~~. If erosion is a problem apply one half the original wood fiber mulch.~~

~~The third step seeding, mulching, and fertilizing shall consist of spot application on areas not showing a satisfactory stand after the second step application. The quantity of material will be determined on the same basis as for the second step application. No urea formaldehyde fertilizer will be needed for third step seeding.~~

**~~652.7.3-Spot Application:~~** Spot application is for areas that have been damaged or not showing a satisfactory stand after the original or re-application, or both for seeding, mulching, liming, and fertilizing of the project site. The quantity of material will be determined by the Engineer based on the size and requirements of the spot applications.

## **652.8-Blank**

## **652.9-METHOD OF MEASUREMENT:**

Ground agricultural limestone, fast-acting limestone, fertilizer, and mulch will be measured by the ton. Seed will be measured by the pound.

~~Wood chips or bark~~ Mulch will be measured by the cubic yard. It is assumed that 17.5 cubic yard of chips or bark are equal to one (1) ton of straw for seeding. Wood chips or bark mulch will be measured by truck load or other loose volume measurement, and payment will be made on one ton equivalent of straw for each 17.5 cubic yard of ~~wood chips or bark~~ mulch.

~~Second and third step seeding operations~~ Re-application and spot application will be measured and included for payment under items in subsection 652.11.

~~Chemical mulch binders~~ Tackifier or binder for anchoring mulch will not be measured separately, but their cost shall be included in the unit price bid for mulch.

**652.10-BASIS OF PAYMENT:**

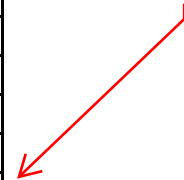
The quantities determined as provided above, will be paid for at the contract unit prices bid for the items listed below, which prices and payments shall be considered full compensation for furnishing all materials and performing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

Topsoil will be measured and paid for in accordance with the provisions of section 651.

The bid price for fertilizer is based on 10-20-10 type. ~~When other types of fertilizer are used, pay quantities will be determined using the following table.~~ determined by the Engineer based on soil tests, pay quantities will be established by the following table.

Type of Fertilizer	Actual Quantity Used Pounds	Pay Quantity Pounds
5-10-5	100	50
8-16-8	100	80
10-20-10	100	100
12-24-12	100	120
15-30-15	100	150
<u>18-46-0</u>	<u>100</u>	<u>180</u>

DISCUSSION DURING MEETING?



When fertilizer types other than those shown above are used, the relationship between the pay quantity and the actual quantity used will be established by the Engineer.

**652.11-PAY ITEMS:**

ITEM	DESCRIPTION	UNIT
652001-*	Agricultural Limestone	Ton
<u>652001-*</u>	<u>Fast-Acting Limestone, Dry</u>	<u>Pound</u>
<u>652001-*</u>	<u>Fast-Acting Limestone, Liquid</u>	<u>Gallon</u>
652002-*	Fertilizer, "type"	Ton
652003-*	Seed Mixtures, "type"	Pound
652004-*	<u>"type"</u> Mulch, <u>"type"</u>	Ton
<u>652006-*</u>	<u>Biological Growth Stimulant, "type"</u>	<u>Pound</u>
<u>652006-*</u>	<u>Hydraulic Growth Medium, "type"</u>	<u>Pound</u>

\* Sequence number

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 715  
MISCELLANEOUS MATERIALS

DELETE THE ENTIRE CONTENTS OF SUBSECTIONS 715.25 THROUGH 715.32 AND REPLACE WITH THE FOLLOWING:

**715.25-~~GROUND AGRICULTURAL~~ LIMESTONE:**

**715.25.1-Ground Agricultural Limestone:** Ground agricultural limestone shall consist of high calcitic or dolomitic limestone containing not less than 85% of total calcium and magnesium carbonates, ground to such fineness and clearly labeled in accordance with the requirements of the West Virginia Department of Agriculture. Ground agricultural limestone shall be furnished and used in accordance with State Laws. Suppliers must be registered with the West Virginia Department of Agriculture.

**715.25.2-Fast Acting Limestone:** Fast acting limestone shall meet all requirements of ground agricultural limestone with the West Virginia Department of Agriculture, except percent by weight passing U.S. Standard Sieves.

**715.26-FERTILIZERS:**

Commercial fertilizers shall be supplied separately or in mixtures containing the specified percentages of total nitrogen, available phosphoric acid, and water-soluble potash. Fertilizer shall be furnished in standard containers with weight, name of plant nutrients and guaranteed percentages, clearly marked, all in accordance with governing State and Federal laws. Brands must be registered with the West Virginia State Department of Agriculture.

**715.26.1-Fertilizer for Seeding:** Fertilizer for seeding shall consist of any type ~~with a 12:1 ratio providing the minimum nutrient equivalent specified meeting the minimum specified by the soil analysis~~. Urea formaldehyde fertilizer shall contain a minimum of 38 percent (38%) slowly available nitrogen.

Commercial fertilizer for seeding may be supplied in any of the following forms, subject to the approval of the Engineer.

- i. A dry, free flowing fertilizer that may be applied by ordinary agricultural spreaders.
- ii. A fertilizer which is water soluble or one which will permit complete suspension of insoluble particles in water, applicable to hydraulic methods of application.

**715.26.2-Fertilizer for Landscape Planting:** The fertilizer shall be a co-granulated magnesium ammonium phosphate and magnesium potassium phosphate, controlled release, inorganic fertilizer compound (coarse grade). It shall have a guaranteed minimum analysis of:

	Percent
Nitrogen .....	7
Maximum water soluble ammoniacal nitrogen.....	2
Minimum water insoluble ammoniacal nitrogen .....	5
Phosphoric acid (available P <sub>2</sub> O <sub>5</sub> ).....	40
Potash(K <sub>2</sub> O).....	6

**715.27-MULCH MATERIAL:**

**715.27.1-Mulch Material for Seeding:**

**715.27.1.1-Straw Mulch:** Straw mulch for seeding shall include baled wheat or oats straw, ~~or baled grass hay. Alfalfa, clover and salt grass hay are not acceptable~~ free of seed heads. Hay shall not be used. Straw mulch shall be dry and reasonably free from weeds, sticks, or other foreign material.

Acceptance shall be based on the Division's visual inspection of the material.

Wood Mulch for seeding should be 100% recycled materials, biodegradable, thermally refined, plastic-free, and phytosanitized to eliminate potential weed seeds and pathogens.

**715.27.1.2-Wood Cellulose Mulch Hydraulic Erosion Control Products (HECP):**

Mulch for use with the hydraulic application of grass seed shall consist of a minimum of 70% wood cellulose fiber. It should become insoluble and non-dispersible after drying to limit raindrop impact on soil. Do not use materials composed of paper, cellulose fiber, or any mixture containing paper or cellulose. It shall contain no growth or germination inhibiting factors ~~and~~, shall be dyed green, and shall not form a water-resistant crust.

When the material is agitated in slurry tanks with fertilizers, grass seed, water and other approved additives, the fibers shall become uniformly suspended to form a homogeneous slurry. The hydraulically sprayed slurry shall form a blotter-like ground cover impregnated with grass seed. The ground cover shall permit the absorption of water and allow rainfall or mechanically applied water to percolate to the underlying soil, and it must completely photo-degrade or biodegrade.

The ~~wood cellulose fiber mulch~~ hydraulic erosion control product shall conform to the following requirements:

- ~~Length of fibers~~    ~~10 mm. maximum~~
- ~~Thickness of Fibers~~    ~~1 mm. maximum~~
- ~~Net Dry Weight Content\*~~    ~~Minimum stated on bag~~
- ~~pH\*~~    ~~4.0-8.5~~
- ~~Water Holding Capability\*~~    ~~90% Minimum~~

\* ~~Test Procedure MP 715.27.20~~

**TABLE 715.27.1.2**

<u>Mulch Types</u>				
<u>Property</u>	<u>Test Method</u>	<u>HECP Type 1</u>	<u>HECP Type 2</u>	<u>HECP Type 3</u>
<b><u>Physical</u></b>				
<u>Color</u>	<u>Observed</u>	<u>Colored to contrast application area, shall not stain concrete or painted surfaces.</u>		
<u>Organic Matter</u>	<u>ASTM D2974</u>	<u>90% minimum</u>		
<u>Water Holding Capacity</u>	<u>ASTM D7367</u>	<u>600% Minimum</u>	<u>800% Minimum</u>	<u>1200% Minimum</u>
<u>Acute Toxicity</u>	<u>ASTM 7101 EPA 2021.0-1</u>	<u>Non Toxic</u>		
<u>Mass per Unit Area (g/m<sup>2</sup>)</u>	<u>ASTM D6566</u>	<u>150</u>	<u>250</u>	<u>350</u>
<u>Thickness of Fibers (mm)</u>	<u>ASTM D6525</u>	<u>2.5</u>	<u>3</u>	<u>4</u>
<b><u>Endurance</u></b>				
<u>Functional Longevity</u>	<u>ASTM D5338</u>	<u>≥ 90 days</u>	<u>≥ 180 days</u>	<u>≥ 365 days</u>
<b><u>Performance</u></b>				
<u>Maximum Slope Application</u>	<u>Observed</u>	<u>4.0H:1V</u>	<u>2.0H:1V</u>	<u>0.5H:1V</u>
<u>Cover Factor</u>	<u>ASTM D8298</u>	<u>C ≤ 0.3</u>	<u>C ≤ 0.05</u>	<u>C ≤ 0.01</u>
<u>Ground Cover</u>	<u>ASTM D6567</u>	<u>&gt; 90%</u>	<u>&gt; 95%</u>	<u>&gt; 97%</u>
<u>Vegetation Establishment</u>	<u>ASTM D7322<sup>a</sup></u>	<u>300% Minimum</u>	<u>400% Minimum</u>	<u>500% Minimum</u>

a. ASTM test methods developed for Rolled Erosion Control Products (RECPs) that have been modified to accommodate Hydraulic Erosion Control Products (HECPs).

The mulch shall be delivered in packages not to exceed 100 lbs. The package shall bear the name of the manufacturer, the net weight and a supplemental statement of the net dry weight.

The material must be approved prior to being used. Acceptance will be based on sampling and testing by the Division for conformance to specifications.

**715.27.1.3-Chemical Mulch Binder:** A chemical mulch binder shall consist of a polymer, ~~synthetic resin, polypectate~~ guar, starch, polyacylamide, or other material which can readily be removed and will give similar adhesive properties as asphalt when sprayed on straw or other fiber mulches.

**715.27.2-Mulch Materials for Landscape Plantings:** Acceptable materials for mulching shall be shredded bark, buckwheat hulls, wood chips or other organic materials approved by the Engineer.

Certain inorganic materials such as calcined clay, crushed rock or coarse gravel will be acceptable when designated on the Plans.

**715.28-SEED:**

The varieties of grass and legume seeds to be furnished to the project shall bear a tag on

each bag of each species showing the lot number, the seedman's name, the percent of purity, the percent of germination and the weed seed content, in accordance with governing State and Federal laws.

All seeds shall be free from noxious weed seeds as set forth in the West Virginia State seed law and in no event shall the total weed content of any lot of seed or seed mixture exceed one-half percent by weight. The minimum percent purity and germination for the various seeds shall be as shown in Table 715.28.

Seed	Purity Minimum %	Germination	
		Total Minimum (%)	Minimum Quick Sprouts (%)
<del>Crown Vetch</del>	99	*70	35
<del>Kentucky Bluegrass</del>	85	75	
<del>Kentucky 31 Fescue</del>	98	85	
<del>Marion Bluegrass</del>	90	75	
<del>Perennial Ryegrass</del>	95	85	
<del>Red Fescue</del>	98	85	
<del>White Dutch Clover</del>	98	*85	55

Pure Live Seed  
(PLS)  
Discussion?

**TABLE 715.28**  
**Minimum Seed Purity And Germination**

<u>Variety of Seed</u>	<u>Minimum Seed Purity (%)</u>	<u>Minimum Seed Germination (%)</u>
<u>Common Oat</u> <u>(<i>Avena sativa</i>) (March 1-October 31)</u>	<u>98</u>	<u>85</u>
<u>Cereal Rye</u> <u>(<i>Secale cereal</i>) (November 1 – February 28)</u>	<u>98</u>	<u>85</u>
<u>Autumn Bentgrass</u> <u>(<i>Agrostis perennans</i>)</u>	<u>95</u>	<u>85</u>
<u>Chewing's Fescue</u> <u>(<i>Festuca rubra ssp. commutate</i>)</u>	<u>97</u>	<u>85</u>
<u>Hard Fescue 'Chariot'</u> <u>(<i>Festuca brevipila</i>)</u>	<u>97</u>	<u>85</u>
<u>Hard Fescue 'Heron'</u> <u>(<i>Festuca ovina var. duriuscula</i>)</u>	<u>97</u>	<u>85</u>
<u>Creeping Red Fescue</u> <u>(<i>Festuca rubra</i>)</u>	<u>97</u>	<u>85</u>
<u>White Clover</u> <u>(<i>Trifolium repens</i>)</u>	<u>99</u>	<u>85</u>
<u>Big Bluestem</u> <u>(<i>Andropogon gerardii</i>)</u>	<u>85</u>	<u>70</u>
<u>Virginia Wildrye</u> <u>(<i>Elymus virginicus</i>)</u>	<u>85</u>	<u>70</u>
<u>Switchgrass</u> <u>(<i>Panicum virgatum</i>)</u>	<u>95</u>	<u>75</u>
<u>Indiangrass</u> <u>(<i>Sorghastrum nutans</i>)</u>	<u>85</u>	<u>70</u>
<u>Partridge Pea</u> <u>(<i>Chamaecrista fasciculata</i>)</u>	<u>98</u>	<u>70</u>

<u>Black-Eyed Susan</u> <i>(Rudbeckia hirta)</i>	<u>80</u>	<u>60</u>
<u>Narrowleaf Mountainmint</u> <i>(Pycnanthemum tenuifolium)</i>	<u>80</u>	<u>40</u>
<u>Wild Bergamot</u> <i>(Monarda fistulosa)</i>	<u>80</u>	<u>40</u>
<u>Panicledleaf Ticktrefoil</u> <i>(Desmodium paniculatum)</i>	<u>90</u>	<u>70</u>
<u>Smooth Oxeye</u> <i>(Heliopsis helianthoides)</i>	<u>80</u>	<u>60</u>
<u>Flat-top Goldentop</u> <i>(Euthamia graminifolia)</i>	<u>70</u>	<u>40</u>
<u>Redtop</u> <i>(Agrostis gigantea)</i>	<u>92</u>	<u>80</u>
<u>Birdsfoot Trefoil</u> <i>(Lotus corniculatus)</i>	<u>98</u>	<u>95</u>
<u>Fox Sedge</u> <i>(Carex vulpinoidea)</i>	<u>85</u>	<u>60</u>
<u>Fowl Bluegrass</u> <i>(Poa palustris)</i>	<u>90</u>	<u>70</u>
<u>Redtop Panicgrass</u> <i>(Panicum rigidulum)</i>	<u>99</u>	<u>70</u>
<u>Common Rush</u> <i>(Juncus effuses)</i>	<u>85</u>	<u>60</u>
<u>Shallow Sedge</u> <i>(Carex lurida)</i>	<u>85</u>	<u>60</u>
<u>Blue Vervain</u> <i>(Verbena hastate)</i>	<u>80</u>	<u>50</u>
<u>Wingstem</u> <i>(Verbesina alternifolia)</i>	<u>90</u>	<u>80</u>
<u>Joe Pye Weed</u> <i>(Eutrochium purpureum)</i>	<u>80</u>	<u>60</u>
<u>Swamp milkweed</u> <i>(Asclepias incarnata)</i>	<u>80</u>	<u>60</u>
<u>Butterfly Milkweed</u> <i>(Asclepias tuberosa L.)</i>	<u>80</u>	<u>60</u>
<u>Common Milkweed</u> <i>(Asclepias syriaca)</i>	<u>80</u>	<u>60</u>
<u>Purple coneflower</u> <i>(Echinacea purpurea)</i>	<u>80</u>	<u>60</u>

~~Crown vetch seed~~ All legumes shall be inoculated according to the supplier's recommendations. However, when seeding with the hydroseeder the inoculant shall be increased to five times the recommended rate.

If test results indicate noncompliance with the above germination or purity requirements, or both, additional seed may be added to give the equivalent germination or purity, or both.

The Division reserves the right to test, reject or approve all seed after delivery on the project.

**715.29-INOCULATING BACTERIA:**

This material shall be used to treat all leguminous seed and shall be a pure culture of



nitrogen fixing bacteria selected for maximum vitality and ability to transform nitrogen from the air into soluble nitrates and deposit them in the soil. It shall not be more than one year old.

~~715.30 through 715.32: Blank~~

**715.30-BIOLOGICAL GROWTH STIMULANTS:**

Biological growth stimulants (BGSs) shall be applied to topsoil containing less than 3% organic matter. BGSs shall provide immediate organic matter adjustment to help stimulate seed germination, improve the availability of nutrients to the grass, and generate robust plant growth which is more tolerant of changes in environmental conditions.

Animal by-products, municipal waste products, and liquid fertilizers are not acceptable for use as a BGSs.

BGSs shall not contain germination or growth inhibiting factors or form a water-resistant crust that can inhibit plant growth. BGSs shall come pre-packaged by the manufacturer to assure material performance and compliance with the minimum requirements in Table 715.30.1 No field mixing of components shall occur on site.

**TABLE 715.30.1**

<b><u>Minimum Biological Growth Stimulant Requirements</u></b>		
<b><u>BGS Property</u></b>	<b><u>Test Method</u></b>	<b><u>Required Value</u></b>
<b><u>Physical</u></b>		
<u>Humate/Humic Acid</u>		<u>1% minimum</u>
<u>Acute Toxicity</u>	<u>ASTM 7101 EPA 2021.0-1</u>	<u>Non Toxic</u>
<b><u>Performance</u></b>		
<u>Seed Germination</u>	<u>ASTM D7322<sup>a</sup></u>	<u>200% minimum</u>
<u>Plant Height</u>	<u>ASTM D7322<sup>a</sup></u>	<u>200% minimum</u>
<u>Plant Mass</u>	<u>ASTM D7322<sup>a</sup></u>	<u>110% minimum</u>

a. ASTM test methods developed for Rolled Erosion Control Products (RECPs) that have been modified for comparison to control at 21 days.

**715.31-HYDRAULIC GROWTH MEDIUM:**

Hydraulic growth mediums (HGMs) may be applied on areas to replace topsoil, by instruction of the Engineer, in areas where little to no organic matter is present in the parent subsoil. The HGMs provides a substance on which plants can be grown that requires no curing time, provides exceptional seeding germination and plant establishment, assists in soil building, and provides erosion control. HGMs may be applied to slopes with a steepness factor of 2H:1V or less.

The HGMs shall consist of a two-part system:

- i. A blend of organic and natural fibers with fast-acting soil building and growth components.
- ii. Materials and components that increase the water and nutrient holding capacity of the soil and create an environment for growth of beneficial microorganisms while allowing seed germination and vegetation establishment. These shall include at least 10% of the final composition:
  - a. Biochar
  - b. Humus/Humic Acid
  - c. Mycorrhizae Fungi

- d. Seaweed Extract
- e. Trace Elements
- f. Growth Stimulators
- g. Beneficial Microorganisms
- h. Micronutrients
- i. Organic Growth Mediums.

**TABLE 715.31.1**

<b>Organic Fiber Requirements</b>		
<b>Property</b>	<b>Test Method</b>	<b>Value</b>
<b>Physical</b>		
<u>Minimum Organic Fiber Content like a combination of Bark fiber, wood fiber etc.</u>		<u>80%</u>
<u>Moisture Content</u>		<u>≤20%</u>
<u>Minimum Total Organic Matter</u>	<u>ASTM D586</u>	<u>88%</u>
<u>Maximum Carbon: Nitrogen Ratio</u>	<u>ASTM D1508</u>	<u>50:1</u>
<u>pH</u>	<u>ASTM D1293</u>	<u>5-7</u>
<b>Performance</b>		
<u>21 Day Germination</u>	<u>ASTM D7322</u>	<u>500%</u>
<u>Minimum Water Holding Capacity</u>	<u>ASTM D7367</u>	<u>900%</u>

The application rates for all components shall be to manufacturer’s specifications while following the minimum application rates outlined in Table 715.31.2 and Table 715.31.3.

**TABLE 715.31.2**

<b>Organic Fiber Material Minimum Rates</b>	
<b>Property</b>	<b>Minimum Application Rate lbs/acre</b>
<b><u>% Organic Matter of Subsoil</u></b>	
<u>≤ 0.75</u>	<u>5,000</u>
<u>0.75 – 1.5</u>	<u>4,500</u>
<u>1.5 - 2.0</u>	<u>4,000</u>
<u>2.0 – 5.0</u>	<u>3,500</u>

**TABLE 715.31.3**

<b>Soil Chemistry and Stabilizer Material Minimum Rates</b>		
<b>Slope</b>	<b>Soil Type</b>	<b>Minimum Application Rate lbs/acre</b>
<u>&lt;3H:1V</u>	<u>Sand</u>	<u>35</u>
	<u>Clay</u>	<u>70</u>
<u>3H:1V – 2H:1V</u>	<u>Sand</u>	<u>70</u>
	<u>Clay</u>	<u>140</u>

715.32-Blank

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: \_\_\_\_\_

FEDERAL PROJECT NUMBER: \_\_\_\_\_

SECTION 207  
EXCAVATION AND EMBANKMENT

207.1-DESCRIPTION:

ADD THE FOLLOWING:

**207.1.1-Settlement Plate:** The work specified in this section consists of the fabrication, installation, protection and maintenance of settlement plates in accordance with these Special Provisions, the details shown on the plans and as directed by the Engineer. The Contractor shall be responsible for the fabrication, installation, protection and maintenance of settlement plates.

The system of settlement plates is designed to enable the Engineer to observe and determine the magnitude and rate of embankment or subgrade settlement. The determination of the time at which the necessary consolidation has taken place and the embankment or subgrade may be released for additional lifts of fill or the next stages of construction will be determined by the Engineer on the basis of the data obtained from the combined settlement monitoring instrumentation.

207.2-MATERIALS:

ADD THE FOLLOWING:

**207.2.3-Settlement Plate:** The settlement plate assembly shall be constructed in accordance with the plate and stem options as shown on Settlement Plate Detail in the Bridge Plans. All iron pipe and fittings shall be fabricated from standard weight stock; all PVC pipe and fittings shall be Schedule 40; the sizes shall be as shown on Settlement Plate sheet in the Bridge Plans. Materials will be accepted on the basis of a visual inspection.

**207.2.3.1-Installation and Monitoring:** The settlement plates shall be installed after completion of clearing and grubbing below but prior to placing embankment and/or surcharge fill. The settlement plates shall be installed by the Contractor.

An excavation slightly larger than the settlement plate shall be made to an elevation established by the Engineer. The excavation shall form a pit having a minimum depth of twelve (12) inches with a level bottom.

The plate shall be placed in the pit with one section of marker pipe attached. The attached marker pipe shall be five (5) feet in length as shown in Settlement Plate Detail in the Bridge Plans. The plate shall have full bearing and the marker pipe plumb before proceeding with the stem assembly. When realignment of the plate and marker pipe is necessary, the plate and pipe shall be removed and the pit bottom reshaped for proper alignment.

With plate and marker pipe in place, wrap the lower six (6) inches of marker pipe with oakum; slip one section of casing pipe over the marker pipe; and, lower the casing to uniformly encase the oakum seal while seating the casing on the plate as shown in Settlement Plate Detail in the Bridge Plans.

With marker pipe and casing centered with respect to each other and maintained in a vertical position, the pit shall be backfilled in layers by hand and thoroughly compacted by hand. Prior to backfilling the pit, the elevation of the top of the plate shall be determined. A maximum of one foot of soil cover can be placed to stabilize the settlement plates.

Each section of PVC casing shall be capped until the next section is added. The settlement plate stem shall be flagged and protected from construction vehicles and equipment. If the settlement plate assembly is disturbed, it shall be replaced in kind within 24 hours, unless otherwise directed by the Engineer.

The embankment or surcharge material in the immediate vicinity of the settlement plate stem shall be placed and compacted in accordance with the requirements of the Specifications, or as directed by the Engineer. Embankment or surcharge material within three (3) feet of the stem shall be placed and compacted by hand with non-impact, light vibratory plate compactors.

When surface of the embankment or surcharge reaches a level approximately two (2) feet below the top of the stem section in place, the next section of marker pipe and casing shall be installed, the casing shall be capped, and the stem flagged for protection. Added sections shall be five (5) feet in length.

As the height of the embankment or surcharge material increases, this procedure shall be repeated until the embankment and/or surcharge material placement is completed.

Settlement plate assemblies constructed within permanent embankment material shall remain in place and become the property of the West Virginia Division of Highways. Settlement plate assemblies constructed within temporary surcharge shall be removed as specified in project plans.

The Contractor will obtain and record all measurements and elevations necessary for the accurate determinations of settlement data following construction of the embankment or surcharge. Elevations shall be surveyed at frequencies as directed in project plans. The surveying must be performed by leveling methods using instruments and methods to yield a vertical accuracy of plus or minus 0.002 feet. Establish a benchmark on stable ground that is not subject to settlement and is located away from any earthwork/construction activities. The settlement data should be provided to the Engineer to evaluate when

foundation construction can proceed. It is expected that construction ~~of the abutment foundations~~ can proceed once it is determined that the rate of settlement is less than 1/10 of an inch per week for at least two (2) consecutive weeks at each settlement plate location.

**207.2.3.2-Protection and Maintenance:** The settlement plate stem shall remain in a vertical position at all times during the life of the required monitoring period. The Contractor shall operate his equipment in a manner to insure that settlement plate assemblies are not damaged or displaced laterally. Each assembly shall be clearly marked and flagged as approved by the Engineer and protective barricades shall be erected around each assembly. Stems deviating from a vertical position, becoming uncoupled or broken shall be repaired or replaced by the Contractor, as directed by the Engineer, at the Contractor’s expense.

The Contractor will not be held responsible for repair or replacement of any settlement plate assembly which is made inoperable as a result of instability of the embankment caused by factors, which in the opinion of the Engineer, are beyond the control of the Contractor.

**207.15-METHOD OF MEASUREMENT:**

ADD THE FOLLOWING:

The quantity of work done will be the actual number of “Settlement Plate Assemblies”, installed and maintained in a satisfactory operating condition until final acceptance of the project.

**207.16-BASIS OF PAYMENT:**

ADD THE FOLLOWING:

The quantities, determined as provided above, will be made at the contract price for each assembly, which price and payment shall be full compensation for furnishing all material, labor and equipment for proper installation of the assembly, for protecting the assembly, for repair and replacing damaged assemblies and for all other work and incidentals necessary to complete the work.

**207.17-PAY ITEM:**

ADD THE FOLLOWING:

ITEM	DESCRIPTION	UNIT
207035-001	Settlement Plate Assembly	Each

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: \_\_\_\_\_

FEDERAL PROJECT NUMBER: \_\_\_\_\_

SECTION 601  
STRUCTURAL CONCRETE

601.1-DESCRIPTION:

ADD THE FOLLOWING AFTER THE TENTH PARAGRAPH IN THE SUBSECTION:

Class S concrete shall be used for bridge decks and other bridge elements when designated in the plans. This mix shall be used to produce a concrete of high durability with low shrinkage potential.

601.2-MATERIALS:

ADD THE FOLLOWING TO THE TABLE:

MATERIAL	SECTION OR SUBSECTION
Expansive Hydraulic Cement	701.5

601.3-PROPORTIONING:

ADD THE FOLLOWING AFTER THE FIFTH PARAGRAPH:

Design mixture testing for Class S concrete shall be in accordance with MP 711.03.23 and shall include air content, slump, compressive strength, surface resistivity, sequential air method (SAM) number, and shrinkage tests. The Contractor shall complete the following tests for mix design acceptance of Class S concrete before mix design submittal and approval:

- **Surface Resistivity-** For establishment of the mixture proportions, specimens for surface resistivity tests shall be made on representative samples prepared and tested in accordance

with AASHTO T 358. A set of three 4-inch x 8-inch cylinders shall be fabricated and moist cured from both of the batches at the minimum cement factor as outlined in Section 3.3 of MP 711.03.23, as specified in AASHTO R 39, for 28 days prior to testing, and the results of this test shall not be less than 40 kΩ-cm.

- **SAM number-** For establishment of the mixture proportions, SAM number tests shall be performed on a representative sample from both of the batches at the minimum cement factor as outlined in Section 3.3 of MP 711.03.23. These samples shall be prepared and tested in accordance with AASHTO T 395. The SAM number for both of these samples shall be less than or equal to 0.20.
- **Shrinkage-** For establishment of the mixture proportions with Portland cement, the 28-day drying shrinkage shall not exceed 0.035% based on average of three specimens from a representative sample from one of the batches at the minimum cement factor as outlined in Section 3.3 of MP 711.03.23. This sample shall be tested in accordance with ASTM C157. Specimens shall be moist cured for 7 days before beginning the 28-drying shrinkage testing.

For establishment of the mixture proportions with Expansive hydraulic cement, the 28-day drying shrinkage shall not exceed 0.035% based on average of three specimens from a representative sample one of the batches at the minimum cement factor as outlined in Section 3.3 of MP 711.03.23. This sample shall be tested in accordance with ASTM C878. The initial 7-day expansion shall range from 0.03% to 0.06%. Specimens shall be moist cured for 7 days before beginning the 28-drying shrinkage testing.

The cost of all test mix requirements shall be considered incidental to the cost of Class S concrete.

#### **601.3.1-Mix Design Requirements:**

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

Prior to the start of construction, the Contractor shall design and submit to the Engineer for approval the proportion of materials, including admixtures, to be used which will result in a workable concrete having the applicable properties enumerated below, including those of Table 601.3.1A. A mix design prepared in accordance with MP 711.03.23, shall be required for each class of concrete to be used in the work. The mix design shall be accompanied by a statement giving the source of materials and certified test data from a Division approved laboratory demonstrating the adequacy of the mix design. The Contractor shall notify the Engineer of any change in the source of materials or the addition of admixtures during the progress of the work, since such change may necessitate a new mix design. The Contractor shall also state the  $\bar{A}$  value of the fine aggregate and the  $\bar{A}$  value of the combined grading of the coarse aggregate, fine aggregate, and cement used in the mix design. Each mix design shall remain approved for a period of three years from the date of approval, after which the mix design may be re-approved for an additional time period. The guidelines for this re-approval process are set forth in MP 711.03.23.

Approved Hydration Control Stabilizing Admixtures, as defined in Section 707.15, which are designed to stop the hydration of cement in a concrete mix, enabling an extension to the allowable discharge time from a truck mixer as outlined in Section 601.7, may be added to an

existing approved concrete mix design in accordance with the procedures outlined in MP 711.03.23.

**TABLE 601.3.1A**

Class of Concrete	Design 28 Day Compressive Strength	Target Cement Factor	Maximum Water Content	Standard Size of Coarse Aggregate***	Entrained Air
	Pounds per Square inch	lbs./c.y.*	lb. of water / lb. of cement **	Number	Percent
A	3500	682	0.51	7, 78, or 8	7.5
K	4000	658	0.44	57, 67	7.0
B	3000	564	0.49	57, 67	7.0
C	2500	494	0.58	57, 67	6.0
D	2000	400	0.62	57, 67	5.5
H	4000	See Table 601.3.1C	0.40	57,67	6.5
DC	4500	705	0.44	7, 78, 8	6.0

\* An equal mass of a SCM may be substituted for Portland cement up to the maximum amount in Table 601.3.1B. Only one SCM is permitted in a mix design, except for Class H concrete. The target cement factor of Class H concrete shall consist of Option 1 or Option 2 from Table 601.3.1C. The Contractor may choose either option.

\*\* When using a SCM, masses of these materials shall be considered as cement for purposes of establishing maximum water content.

\*\*\* A number 67 coarse aggregate may be used in Class DC concrete, provided the Engineer approves the use of that size aggregate for the specific project on which it is to be used. That approval will depend on the minimum spacing of the reinforcing steel in the drilled shaft foundation.

**TABLE 601.3.1B**

Material	Class of Concrete	Quantity
Fly Ash	All Classes Except H	20%
Slag Cement	All Classes Except H	50%
Silica Fume	All Classes Except H	8%

**TABLE 601.3.1C**

Option	Cement	Fly Ash	Slag Cement	Silica Fume
1	470 lbs.	132 lbs.		30 lbs.
2	423 lbs.		195 lbs.	30 lbs.

MP 711.03.26 shall be used to control the cement factor in all classes of concrete except Class H and Class S.

The Contractor may develop mix designs with a reduced target cement factor as indicated in Table 601.3.1D in lieu of Table 601.3.1A, provided the aggregates used in those mix designs meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. The  $\bar{A}$  requirements will not apply for mix designs that use optimized aggregate gradation.

The Contractor shall develop Class S mix designs according to the requirements of Table 601.3.1D. The aggregates used in Class S mix designs shall meet the requirements for



optimized aggregate gradation in Section 601.3.2.4.1. The  $\bar{A}$  requirements will not apply to Class S concrete.

**TABLE 601.3.1D**

Class of concrete	Design 28 Day Compressive Strength	Target Cement Factor	Maximum Water Content	Nominal Maximum Aggregate Size	Entrained Air
	Pounds per Square inch	lbs./c.y. <sup>Note 1</sup>	lb. of water/lb. of cement <sup>Note 2</sup>	Inches	Percent
A	3,500	642	0.51	½ or ⅜	7.5
K	4,000	618	0.44	1 or ¾	7.0
B	3,000	524	0.49	1 or ¾	7.0
C	2,500	454	0.58	1 or ¾	6.0
D	2,000	360	0.62	1 or ¾	5.5
H	4,000	See Table 601.3.1E	0.40	1 or ¾	6.5
S	4,000	600	0.42 <sup>Note 4</sup>	1 or ¾	6.5
DC <sup>Note 3</sup>	4,500	665	0.44	½ or ⅜	6.0

<sup>Note 1</sup> An equal mass of a SCM may be substituted for Portland cement up to the maximum amount in Table 601.3.1B. Only one SCM is permitted in a mix design, except for Class H concrete. The target cement factor of Class H concrete shall consist of Option 1 or Option 2 from Table 601.3.1E. The Contractor may choose either option. This footnote does not apply to Class S concrete for the substitution of a SCM for cement. The substitution of a SCM for cement is specified in the last paragraph of this subsection.

<sup>Note 2</sup> When using a SCM, masses of these materials shall be considered as cement for purposes of establishing maximum water content.

<sup>Note 3</sup> Nominal maximum aggregate size of ¾ inches may be used in Class DC concrete, provided the Engineer approves the use of that size aggregate for the specific project on which it is to be used. That approval will depend on the minimum spacing of the reinforcing steel in the drilled shaft foundation.

<sup>Note 4</sup> The maximum water content for a mix design with Expansive hydraulic cement may be increased to 0.45.

**TABLE 601.3.1E**

Option	Cement	Fly Ash	Slag Cement	Silica Fume
1	440 lbs.	127 lbs.		25 lbs.
2	397 lbs.		186 lbs.	25 lbs.

The target cement factor for Class S concrete shall include at least one of the SCMs from Table 601.3.1F as a replacement portion by equal mass. The SCM(s) shall be limited to not more than two of the SCMs listed in Table in 601.3.1F. However, the maximum replacement percentage for any individual SCM shall not be exceeded, and the total replacement percentage of any combination of SCMs shall not exceed 50%.

**TABLE 601.3.1F**

Material	Quantity	
	Minimum %	Maximum %
Fly Ash	15	25
Slag Cement	25	50
Silica Fume	6	10

**601.3.1.1-Mix Design Using Potentially Reactive Aggregate:  
601.3.1.1.1-Selecting Preventive Measures For ASR:  
601.3.1.1.1.3-Level of Prevention:**

DELETE THE TABLE AND REPLACE WITH FOLLOWING:

**TABLE 601.3.1.1.1.3**  
Determining the Level of Prevention

Level of ASR Risk	Classes of Concrete		Precast Concrete Member	Prestressed Concrete Member
	D	A, B, C, K, H, S, DC		
Risk Level 0	V	V		V
Risk Level 1	W	X		Y
Risk Level 2	X	Y		Z
Risk Level 3	Y	Z		See footnote**

\*\* It is not permitted to construct prestressed concrete members (Section 603) with Aggregate Reactivity Class of R3. Measures must be taken to reduce the level of risk in these circumstances by selecting the aggregates only from the Reactivity Classes of R0, R1, or R2.

**601.3.1.1-Mix Design Using Potentially Reactive Aggregate:  
601.3.1.1.1-Selecting Preventive Measures For ASR:  
601.3.1.1.1.4-Requirements for Various Prevention Levels:**

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

These requirements shall apply to all classes of concrete except Class H and Class S. The prevention levels for Class H and Class S concrete is specified in section 601.3.1.1.1.5.

**601.3.1.1-Mix Design Using Potentially Reactive Aggregate:  
601.3.1.1.1-Selecting Preventive Measures For ASR:  
601.3.1.1.1.4-Requirements for Various Prevention Levels:  
601.3.1.1.1.4.2-Preventions Level W, X and Y:**

DELETE AND REPLACE THE CONTENTS OF TABLE 601.3.1.1.1.4.2b WITH THE FOLLOWING:

**TABLE 601.3.1.1.1.4.2b**  
Minimum Replacement Level of SCM (percentage by mass of cementitious material)

Type of SCM*****	Alkali Content of SCM* (Na <sub>2</sub> O <sub>e</sub> )	Level W	Level X	Level Y
Fly ash** (Cao ≤18%)	≤3.0	15	20	25*****
	>3.0, ≤4.5	20	25*****	Not Allowed
Slag Cement	≤1.0	25	35	50

**TABLE 601.3.1.1.1.4.2b**

Minimum Replacement Level of SCM (percentage by mass of cementitious material)

Silica Fume***	≤1.0	1.2 x LBA or 2.0 x KGA	1.5 x LBA or 2.5 x KGA	1.8 x LBA or 3.0 x KGA
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- \* The alkali content of all approved SCM sources is listed on the WVDOH approved list of SCMs (APL). If the alkali content of an SCM source is not listed on the APL, the Division will test the SCM from the source to determine the alkali content prior to its use on any WVDOH project.
  - \*\* The CaO content of approved fly ash sources is listed on the WVDOH approved list of fly ash (APL). If the CaO content of a fly ash source is not listed on the APL, the Division will test the fly ash from the source to determine the CaO content prior to its use on any WVDOH project.
  - \*\*\* The minimum level of silica fume (as a percentage by mass of cementitious material) is calculated on the basis of the alkali (Na<sub>2</sub>O<sub>e</sub>) content of the concrete contributed by the Portland cement and expressed in lb/yd<sup>3</sup> (LBA in Table 601.3.1.1.1.4.2b). LBA is calculated by multiplying the cement content of the concrete in lb/yd<sup>3</sup> by the alkali content of cement divided by 100. For example, for a concrete containing 500 lb/yd<sup>3</sup> of cement with an equivalent alkali content of 0.81 percent of Na<sub>2</sub>O<sub>e</sub>, the value of LBA = 500 x 0.81/100 = 4.05 lb/yd<sup>3</sup>. For this concrete, the minimum replacement level of silica fume for Level Y is 1.8 x 4.05 = 7.3 percent. Regardless of the calculated value, the minimum level of silica fume shall not be less than 7 percent when it is only method of prevention. Mix design with silica fume > 8% shall be reviewed and approved by the Engineer.
  - \*\*\*\* Mix designs with minimum 25% of fly ash shall be reviewed and approved by the Engineer.
  - \*\*\*\*\* If two SCMs are used in Class S concrete in combination, the minimum mass replacement levels given in Table 601.3.1.1.1.4.2b for the individual SCMs may be reduced, provided the sum of the parts of each SCM is greater than or equal to one. For example, if silica fume and slag cement are used together, the silica fume level may be reduced to one-third of the minimum silica fume level in the Table 601.3.1.1.1.4.2b provided the slag cement is at least two-thirds of the minimum slag level required.
- Note: The minimum replacement levels in Table 601.3.1.1.1.4.2b are appropriate for use with Portland cements of moderate to high alkali contents (0.71 to 1.00 percent Na<sub>2</sub>O<sub>e</sub>). Table 601.3.1.1.1.4.2c provides recommendations for adjusting the level of SCM when the equivalent alkali content of the Portland cement is above or below this range. The replacement levels should not be below those given in Table 601.3.1.1.1.4.2b for prevention level W, regardless of the equivalent alkali content of the Portland cement.

**DELETE AND REPLACE THE CONTENTS OF OPTION 3 WITH THE FOLLOWING:**

**Option 3: Using the Lithium Nitrate Admixture:** The 30 percent (30%) aqueous solution of Lithium Nitrate Admixture meeting the requirements of Section 707.17 shall be used for all level of prevention including “Level Z” given in Table 601.3.1.1.1.3 except for Class H and Class S concrete. The dosage rate of Lithium Nitrate Admixture shall be based upon the alkali content of cement used in a concrete mix.

Calculation of lithium nitrate (LiNO<sub>3</sub>) admixture dosage (100 percent) for mitigation without use of SCMs with a 30 percent (30%) aqueous solution of lithium nitrate.

$$\text{Gallons of LiNO}_3/\text{yd}^3 = (A \times B \times 0.55)/100$$

Where:

- A = Pound of Portland cement per cubic yard in a concrete mix
- B = Percentage of Alkali content of cement used in a concrete mix

Example: If the cement content of concrete is 550 lbs/yd<sup>3</sup> and the total alkali content of the cement is 0.82 percent (0.82%), the dosage of lithium nitrate admixture is:  $(550 \times 0.82 \times 0.55)/100 = 2.48$  Gal/yd<sup>3</sup>.

The water content of the mix shall be adjusted by removing 0.85 gallons of water per gallon of lithium nitrate solution.

Example: Amount of water to be reduced (using the value from above example)  
Gal/yd<sup>3</sup> = 0.85 x 2.48 = 2.11

Any concrete mix using a 100 percent (100%) lithium nitrate admixture dosage will be accepted without evaluation. The contractor shall evaluate the effectiveness of less than 100 percent (100%) lithium nitrate admixture in a concrete mix, alone or in combination with fly ash or slag cement or silica fume, in the reduction of expansion in accordance with ASTM C1567\*, when a reactive aggregate(s) is (are) used in a concrete mix, at a Division approved lab (an AASHTO accredited Lab, accredited for ASTM C1567) at the contractor's expense. The dosage rate shall not be less than 50 percent (50 %) when only a lithium nitrate admixture is using for evaluation and no SCMs are included in the concrete mix. The sampling and shipping of all aggregate shall be witnessed by a representative of the Division. The ASTM C1567 test results will be considered valid for 5 years from the date of testing.

If both of the aggregates (coarse and fine) used in a concrete mix are reactive (R1, R2 or R3), the contractor shall evaluate the effectiveness of the lithium nitrate admixture, alone or in combination with fly ash or slag cement or silica fume for both of the aggregates separately. When the same source material\*\* is proposed for the use both as coarse and as fine aggregate, test only a selection of the reactive fine aggregate or reactive coarse aggregate, unless there is reason to expect that the coarse aggregate has a different composition than the fine aggregate or vice-versa. The combination of cement, lithium nitrate admixture, alone or in combination with fly ash or slag cement or silica fume, and aggregate that expands less than 0.10% at 16 days after casting will be considered as meeting the "Requirements for Various Prevention Levels (Section 601.3.1.1.1.4)" except for Class H and Class S concrete.

The approved lithium nitrate admixture shall meet the requirements of Section 707.17 and will be listed as "Type S" admixture with footnote of approved admixture for ASR mitigation on the MCS&T web page under Division Approved Source/Product Listing (APL) for Type S: Special Performance. The alkali level of fly ash used in the subject mix shall not exceed 4.5%. The alkali level of slag cement used in the subject mix shall not exceed 1.00%. The alkali level of silica fume used in the subject mix shall not exceed 1.00%. Mix design shall be reviewed and approved by the Engineer.

\* Modify the w/c ratio of the mortar used in the ASTM C1567 test to 0.50.

Replace Section 5.3 (Sodium Hydroxide Solution) of ASTM C1567 with the following:

Sodium Hydroxide Solution - Each liter of solution shall contain 40.0 g of NaOH dissolved in 800 ml of water. Add 71 ml of the lithium nitrate admixture multiplied by the decimal equivalent of the lithium nitrate admixture dosage. (For example,

to test a 75% lithium nitrate admixture dosage, each liter of solution will contain 0.75 times 71 ml of lithium nitrate admixture.) This mixture shall be diluted with additional distilled or deionized water to obtain 1.0 liter of solution. The volume proportion of soaking solution to mortar bars in a storage container shall be  $4 \pm 0.5$  volumes of solution to 1 volume of mortar bars. The volume of a mortar bar may be taken as 184 ml. Include sufficient test solution to ensure complete immersion of the mortar bars.

\*\* Same source material applies to same Limestone, Diabase, Quartzite and Basalt source.

**601.3.1.1-Mix Design Using Potentially Reactive Aggregate:**

**601.3.1.1.1-Selecting Preventive Measures For ASR:**

**601.3.1.1.1.5-Requirements for Various Prevention Levels for Class H Concrete:**

DELETE THE TITLE OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

**601.3.1.1.1.5-Requirements for Various Prevention Levels for Class H and Class S Concrete:**

**601.3.1.1-Mix Design Using Potentially Reactive Aggregate:**

**601.3.1.1.1-Selecting Preventive Measures For ASR:**

**601.3.1.1.1.6-Evaluation of the effectiveness of SCM to prevent deleterious expansion:**

DELETE THE CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

The contractor may evaluate the effectiveness of an SCM in the reduction of expansion in accordance with ASTM C1567\*, when a reactive aggregate(s) is (are) used in a concrete mix, at a Division approved lab (an AASHTO accredited Lab, accredited for ASTM C1567) at the contractor's expense. The sampling and shipping of all aggregate shall be witnessed by a representative of the Division. ASTM C1567 test will be considered valid for 5 years from the date of testing.

If both of the aggregates (coarse and fine) used in a concrete mix are reactive (R1, R2 or R3), the contractor shall evaluate the effectiveness of SCM for both of the aggregates separately. When the same source material\*\* is proposed for the use both as coarse and as fine aggregate, test only a selection of the reactive fine aggregate or reactive coarse aggregate, unless there is reason to expect that the coarse aggregate has a different composition than the fine aggregate or vice-versa. The combination of cement, SCM and aggregate that expand less than 0.10% at 16 days after casting will be considered as meeting the "Requirements for Various Prevention Levels (Section 601.3.1.1.1.4)" except for Class H and Class S concrete. The evaluation with the higher percentage of SCM replacement shall be selected for the minimum replacement level of SCM for prevention level in a mix design using potentially reactive aggregate.

When more than one mix design, for the same Producer/Supplier, is submitted for evaluation, only one evaluation of the effectiveness of an SCM in the reduction of expansion in accordance with ASTM C1567 testing data, as outlined in paragraphs first through four of this sub-section, will be required for that entire group of mix designs (except Class H and Class S) if all of the mix design in that entire group of mix designs have the same combination of cement, SCM and aggregate sources.

The alkali level of fly ash shall not exceed 4.5%. The alkali level of slag cement shall not exceed 1.00%. The alkali level of silica fume shall not exceed 1.00%. Mix designs with minimum 25% of fly ash shall be reviewed and approved by the Engineer. Mix design with silica fume > 8% shall be reviewed and approved by the Engineer.

- \* Modify the w/c ratio of the mortar used in the ASTM C1567 test to 0.50.
- \*\* Same source material applies to same Limestone, Diabase, Quartzite and Basalt source.

### **601.3.2-Field Tolerances and Adjustments:**

#### **601.3.2.1-Consistency:**

DELETE THE CONTENTS OF THE FOURTH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

Upon addition of a superplasticizer at the job site, the mixing drum shall be turned for a minimum of 60 revolutions or 5 minutes at mixing speed to establish a workable mixture of uniform composition and consistency. If a second job site addition of superplasticizer is used; the mixing drum shall be turned a minimum of 30 additional revolutions at mixing speed. All additions and mixing of the superplasticizer shall be completed before placement of the concrete is started. The total number of revolutions shall not exceed 300, and the concrete shall be discharged within the time limits in section 601.7. The slump of Class H and Class S concrete shall not exceed seven (7) inches under any circumstances.

#### **601.3.2.2-Air Content:**

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

The target value of the entrained air at the point of placement shall be as shown in Tables 601.3.1A and D. However, when pumping concrete, the air content shall be measured before the concrete pump, and the target value of the entrained air shall be as shown in Tables 601.3.1A and D at that point. If the entrained air does not conform with the target value within plus or minus 2.5 percentage points, the Contractor shall take immediate steps to adjust the air content of succeeding loads by making necessary adjustments in the mixture. The air content shall be measured on loads already batched and enroute, as well as the first load to which any adjustments were made in batching procedures. If the air content exceeds the target value plus 3.0 percentage points the concrete shall be rejected. When the concrete is delivered in a truck mixer and the air content is less than the target value minus 2.5 percentage points the concrete shall be rejected, or the Contractor may use additional air entraining agent in an amount that is intended to achieve the target value specified. The addition is permitted under the conditions listed below.

The target of the entrained air content of Class H and Class S concrete at the time of placement shall be as shown in Tables 601.3.1A and D. If the entrained air does not conform with the target value within plus or minus 1.5 percentage points, the Contractor shall take immediate steps to adjust the air content of succeeding loads by making necessary adjustments in the mixture. If the entrained air content of Class H and Class S concrete does not conform to the target value plus 2.0 percentage points, the concrete shall be rejected. When Class H or Class S concrete is delivered in a truck mixer and the air content is less than the target value minus 2.0 percentage points, the concrete shall be rejected, or the Contractor may use additional air-entraining agent in an amount that is intended to achieve the target value specified. The addition is permitted under the conditions listed below.

- i. The air entraining agent is the same as used in the approved mix design and is thoroughly mixed with a minimum of 2 gallons of water. The solution will be directed to the front of the mixer.
- ii. The mixer is turned a minimum of 30 revolutions, at mixing speed, or the number of revolutions established in tests to comply with uniformity requirements, whichever is more.

Immediately after mixing, the air content and slump shall be measured by a certified inspector.

An air adjustment may be attempted twice per truck. If after the second addition the specified air content is not achieved, the concrete shall be rejected. These procedures do not alter the limits placed on time to discharge, the total revolutions of the mixing drum, or the specified slump.

**601.4-TESTING:**

**601.4.1-Sampling and Testing Methods:**

ADD THE FOLLOWING TO THE TABLE:

<del>Sequential Air Method (SAM) Test</del>	<del>AASHTO T 395</del>
Surface Resistivity Test	AASHTO T 358

ADD THE FOLLOWING SUBSECTION:

**601.4.6-Surface Resistivity Tests for Acceptance of Class S Concrete:** The Contractor shall also be required to fabricate and test three (3) Surface Resistivity test specimens, in accordance with AASHTO R 100 and AASHTO T 358, every time that a set of compressive strength specimens for Class S concrete is fabricated. These test specimens shall be 4-inch x 8-inch, and they shall be tested at an age of 28-days. These test specimens shall be moist cured until as close to the time of testing as possible and the results of this test shall not be less than 30 kΩ-cm. If the testing result is less than 30 kΩ-cm, then the concrete represented by resistivity value may be removed and replaced by the Contractor. If the Contractor elects to leave the material in place, the Engineer shall evaluate it as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the use intended shall be removed and replaced by the Contractor. When the Engineer’s evaluation indicates that the work may satisfactorily remain in place, the subject material shall be paid for at a reduced unit price based on Table 601.4.6.

**Table 601.4.6**

Resistivity result obtained (values expressed in kΩ-cm)	Percent of unit bid price paid for material in question
28-29	95%
26-27	90%
24-25	85%
22-23	80%
20-21	70%
<20	Remove and replace

**601.6-HANDLING, MEASURING, AND BATCHING OF MATERIALS:**

ADD THE FOLLOWING PARAGRAPH AFTER THE FOURTH PARAGRAPH

When Expansive hydraulic cement is used, to avoid potential localized volcanic expansions, it is recommended to use pre-blended Type K expansive cement. Alternatively, the Expansive component can be added by a pre-mixed slurry at the plant or by slurry pump at the jobsite, instead of pre-blended cement, to prevent potential localized volcanic expansions.

**601.7-MIXING:**

DELETE AND REPLACE THE CONTENTS OF THE SIXTH PARAGRAPH OF THE SUBSECTION WITH THE FOLLOWING:

For all classes of concrete except Class H, Class S, and concrete for specialized overlays, the total amount of water in a concrete mix, including any water added at the job site, shall not be more than the amount which would cause the water-cement ratio (w/c) of that concrete mix to exceed the w/c which corresponds to the Mix Design Approved Strength, as outlined in Section 5.4 of MP 711.03.23. The maximum water amount shall also be shown in Attachment 4 or 5 of MP 711.03.23 for all approved concrete mix designs. However, under no circumstances shall the w/c in Table 601.3.1A be exceeded.

**601.9-ADVERSE WEATHER CONDITIONS:**

**601.9.1-Cold Weather Concreting:**

DELETE AND REPLACE THE FOLLOWING CONTENTS IN THE LAST PARAGRAPH:

**Class H, Class S, and Class K Concrete Cold Weather Provisions:** Cold weather periods shall be defined as those periods when temperatures above 50° F do not occur for more than half of any 24-hour duration. The temperature of the surface on which the concrete is to be placed shall



not be less than 45° F immediately prior to placement of the concrete. During the cold weather periods, as defined above, the temperature of the concrete immediately after placement shall be between 55 and 75° F.

**601.10-PLACING CONCRETE:**

**601.10.1-General:**

**601.10.1.2-Concrete Placement Limitations:**

DELETE AND REPLACE THE CONTENTS OF THE FIRST PARAGRAPH IN THE SUBSECTION:

Immediately prior to, and during, placement of Class H and Class S concrete, if the evaporation rate exceeds 0.10 lb./sq. ft. per hour (see Figure 1), the Contractor shall make provisions (i.e. wind breaks, fogging, etc.) to reduce the rate prior to placing concrete. These provisions shall be maintained during the placement of the concrete. If the evaporation rate obtained from Figure 1 is close enough to the maximum allowable value of 0.10 lb./sq. ft. per hour that there may a discrepancy in the exact numerical value, the following equation shall be used to obtain a more accurate value.

**601.10.4-Placing Concrete Bridge Decks:**

**601.10.4.1-Fogging Equipment:**

REMOVE AND REPLACE THE CONTENTS OF THE SUBSECTION WITH THE FOLLOWING:

When Class H and Class S concrete is used, fogging equipment shall be available for use in accordance with these specifications. The fogging nozzles shall produce an atomized mist. Fogging nozzles shall incorporate compressed air to create the mist. Handheld or hand operated equipment shall be permitted when the Contractor has demonstrated that his operator has been trained in its use.

**601.11-FINISHING CONCRETE SURFACES:**

**601.11.4-Finishing Concrete Bridge Decks:**

**601.11.4.2-Class H Bridge Decks:**

DELETE THE TITLE AND CONTENT OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

**601.11.4.2-Class H and Class S Bridge Decks:** The surface of the Class H and Class S concrete shall be uniformly smooth, dense and even. The surface shall then be given a suitable texture with an approved burlap drag.

The Contractor shall texture in a transverse or longitudinal direction. Once begun, the direction of texturing shall not change. All texturing shall be performed prior to the beginning of curing operations. Only one pass of the drag over the finished area will be

permitted. Texturing shall be in strict accordance with the time requirements of 601.12.4 for applying wet burlap.

If texturing is done in the transverse direction, the Contractor shall texture by hand methods as soon as practicable after finishing machine passage, without any additional finishing operations between the machine passage and texturing operations.

If texturing is done in the longitudinal direction, the burlap drag shall be a seamless strip and shall be attached to the work bridge such that the surface of the concrete is textured as soon as practicable after finishing machine passage, without any additional finishing operations between the machine passage and texturing operations. Small areas, inaccessible to the attached drag, may be textured by hand methods.

The finishing movement and resulting progress of the burlap drag shall be done in a manner so as to prevent ridges or gouges from forming in the concrete surface. The drag shall be weighted, and the contact area changed as required to produce a texture acceptable to the Engineer. The drag shall be cleaned as required; to remove all hardened concrete particles and shall be replaced after each day's operation.

Texture resulting from the drag shall stop within one foot of curbs or parapets.

Any hand finishing operations shall be kept to a minimum for Class H and Class S bridge decks.

**601.11.4.4-Class H Concrete Finished Deck Grooving:**

ADD THE FOLLOWING TO THE TITLE OF THE SUBSECTION:

**601.11.4.4-Class H and Class S Concrete Finished Deck Grooving:**

**601.12-CURING AND PROTECTING CONCRETE:**

**601.12.1-Curing Under Normal Conditions:**

DELETE AND REPLACE THE CONTENTS OF THE SECOND PARAGRAPH WITH THE FOLLOWING:

Concrete surfaces shall be kept completely and continuously moist. Curing shall be continued for a period of at least 7 days. This curing period may be reduced if the contractor presents evidence that the in-place concrete has attained 70% of the specified strength for the class of concrete under cure. Under no circumstances, shall the period of cure be less than 3 days. The reduced curing period option is not applicable to Class H, Class S, or Class K concrete. When placing concrete elements with a minimum dimension greater than two (2) feet, the contractor shall not be permitted to add additional cement to the target cement factor in the approved mix design in order to obtain high-early strength and/or reduce curing time. Surfaces may have coverings temporarily removed for finishing, but the covering shall be restored as soon as possible.

**601.12.2-Curing Under Cold Weather Conditions:**

DELETE THE FOURTH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

**Class H, Class S, and Class K Concrete Provisions:** The surface temperature of the concrete shall be maintained between 55 and 75°F for 72 continuous curing hours immediately after placement. After this 72 hour period, a minimum concrete surface temperature of at least 50°F shall be maintained for an additional 96 continuous curing hours.

**601.12.4-Curing Class H Concrete:**

REMOVE AND REPLACE THE CONTENTS OF THE TITLE AND SUBSECTION WITH THE FOLLOWING:

**601.12.4-Curing Class H and Class S Concrete:** It is the nature of Class H and Class S concrete material to quickly form a plastic film at the surface upon drying. This film is to be protected from drying and cracking by prompt covering with wet burlap. Regardless of the type of concrete placed, the use of membrane curing compounds will not be allowed. Floor drains shall be immediately unplugged to permit the deck to drain.

The concrete surface shall be completely covered with clean, wet burlap. The burlap shall be thoroughly saturated over its entire area, but shall be drained of excess water before application. Burlap shall be lapped a minimum of one foot and shall lay flat. Failure to apply wet burlap within 30 minutes after discharge of the concrete from the truck and within 10 minutes of the completion of finishing operations shall be cause for rejection of the work as determined by the Engineer. Care shall be exercised to ensure that the burlap is well drained. Burlap shall be continuously wet for a period of seven days by means of automatic intermittent sprinkling or a continuous wetting system.

**601.13-PROTECTIVE SURFACE TREATMENT:**

**601.13.1-Silane Treatment for Bridge Superstructure:**

REMOVE AND REPLACE THE SECOND PARAGRAPH OF THE SUBSECTION WITH THE FOLLOWING:

The application of this silane protective surface treatment is not required for elements constructed from Class H and Class S concrete.

**601.14-METHOD OF MEASUREMENT:**

REMOVE AND REPLACE THE FIRST AND SECOND PARAPGRAPH OF THE SUBSECTION WITH THE FOLLOWING:

The quantity of work done for Classes A, B, C, D, H, K, M, and S concrete will be measured in cubic yards, complete in place and accepted as determined by the dimensions on the Plans or Contract Documents, subject to adjustments provided for in Sections 104.2 and 109.2.

The quantity of work done for Class H, Class S, and Class K concrete will be measured in cubic yards, complete in place and accepted, as measured from one end of the bridge to the other, fascia to fascia, and from the top of the forms to the finished elevation of the proposed deck surface. The volume of concrete required to fill the flutes of stay-in-place forms shall be calculated by

taking the Contractor's approved  $SIP_{adj}$  factor and multiplying by the square yardage of SIP area minus beam widths, expansion dam widths, etc. as applicable.

**601.16-PAY ITEMS:**

ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
601010-*	Class S Concrete	Cubic Yard
601025-009	Modified Concrete, Class S	Cubic Yard
601026-005	Modified Architectural Concrete, Class S	Cubic Yard

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SPECIAL PROVISION**

**FOR**

**STATE PROJECT NUMBER:** \_\_\_\_\_

**FEDERAL PROJECT NUMBER:** \_\_\_\_\_

**FOR**

**SECTION 662  
ROADWAY LIGHTING**

**662.2-MATERIALS:**

**662.2.3-ELECTRICAL CONDUIT:**

ADD THE FOLLOWING SUBSECTION:

**662.2.3.5-Type PR (PVC-Coated Rigid Galvanized Steel Conduit “PVC-RGS”):**

Type PR (PVC-Coated Rigid Galvanized Steel Conduit) shall meet the applicable requirements of Section 715.42.10.1 and Section 715.42.10.5.

**662.17-PAY ITEMS:**

<b>ITEM NUMBER</b>	<b>DESCRIPTION</b>	<b>UNIT</b>
662005-001	PVC-Coated Rigid Galvanized Steel Conduit	Lump Sum

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SPECIAL PROVISION**

**FOR**

**STATE PROJECT NUMBER:** \_\_\_\_\_

**FEDERAL PROJECT NUMBER:** \_\_\_\_\_

**FOR**

**SECTION 715  
MISCELLANEOUS MATERIALS**

**715.42-TRAFFIC SIGNAL MATERIALS AND EQUIPMENT:**

**715.42.10-Electrical Conduit:**

ADD THE FOLLOWING SUBSECTION:

**715.42.10.5-Type PR (PVC-Coated Rigid Galvanized Steel Conduit):** A nominal 40 mil polyvinyl chloride exterior coating shall be bonded to a hot-dipped galvanized rigid steel conduit conforming to NEMA/ANSI C80.1. The bond between the PVC coating and the conduit surface shall be greater than the tensile strength of the coating. The interior of the conduit shall have a nominal 2 mil urethane coating. The threads shall be urethane coated as well. The conduit shall be epoxy prime coated prior to the application of PVC and urethane coatings.

Female ends shall have plastic sleeve extending a minimum of one pipe diameter or two (2) inches, whichever is less beyond the opening. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used with it.

Conduit shall pass the high temperature water PVC coating adhesion test and be ETL Verified PVC-001. Conduit shall meet standards NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6, and NEMA RN 1.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 615  
STEEL STRUCTURES**

**615.6-ERECTION**

**615.6.3-Bearings and Anchorage's:**

DELETE THE CONTENTS OF THE SECOND PARAGRAPH OF 615.6.3 AND REPLACE WITH THE FOLLOWING

The Contractor shall drill the holes and set the anchor bolts, except where the bolts are built into the masonry. The bolts shall be set accurately and fixed with Portland cement ~~grout~~completely grout completely filling the holes. The location of anchor bolts in relation to the slotted holes in the expansion shoes shall correspond with the temperature at the time of erection. The nuts or anchor bolts at the expansion ends of spans shall be adjusted to permit the free movement of the span.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**SUPPLEMENTAL SPECIFICATION**  
**FOR**  
**SECTION 679**  
**OVERLAYING OF PORTLAND CEMENT CONCRETE BRIDGE DECKS**

**679.2-MATERIALS:**

**679.2.2-Specialized Concrete Mix Design and Testing:**

DELETE THE CONTENTS OF SUBSECTION 679.2.2 AND REPLACE WITH THE FOLLOWING:

Specialized concrete shall consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, latex or silica fume admixture, chemical admixtures, and water. The use of fibers in the specialized concrete shall be allowed.

The Contractor shall determine mixture proportions in general accordance with ACI 211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete." Establishment of mixture proportions shall be coordinated with the manufacturer of the latex or silica fume admixture. The dosage rate in lbs./cy of fibers for any application shall be the manufacturer's recommendation to meet the requirements of 715.3. The dosage rate shall not be less than the submitted rate used for product approval which can be found in the approved products list. The dosage rate shall not exceed 5.0 lbs./cy, unless the manufacturer can demonstrate, through a field demonstration, that the concrete mixture will be workable and fiber balling is not a problem.

Prior to the start of construction, the Contractor shall design and submit to the Engineer for approval the proportion of materials, including admixtures, to be used which will result in a workable concrete having the applicable properties enumerated below, including those of section 679.2.2.1 or 679.2.2.2. This mix design shall be prepared in accordance with MP 711.03.23.

Design mixture testing shall include air content, slump, and compressive strength results at 28 days and results of ~~rapid chloride permeability~~ AASHTO T 358 ~~concrete surface resistivity tests.~~ Compressive strength cylinders for silica fume concrete shall be cured in accordance with ASTM C192 for 28 days, but compressive strength cylinders for latex modified concrete shall be moist cured in accordance with ASTM C192 for 2 days then air cured in the lab at a temperature between  $73.5 \pm 3.5$  °F for 26 days. For establishment of mixture proportions, ~~rapid chloride permeability~~ concrete surface resistivity tests for silica fume concrete shall be made on representative samples cured for ~~56-28 days in accordance with ASTM C192,~~ then allowed to air dry in the lab at a temperature of  $73.5 \pm 3.5$  °F until the



time of test. These specimens then shall be prepared and tested in accordance with AASHTO -T -358 at an age of 28 days.

For establishment of mixture proportions, ~~rapid chloride permeability surface resistivity~~ tests for latex modified concrete shall be made on representative samples moist cured in accordance with ASTM C192 for 2 days, air cured at in the lab at a temperature between  $73.5 \pm 3.5$  °F for 54 days, then resubmerged in in the pour solution for 7 days then prepared and tested in accordance with AASHTO T 358 at an age of 61 days ~~AASHTO T 277 at an age of 56 to 90 days.~~ The ~~final rapid chloride permeability surface resistivity test result shall consist of the average of two individual test results the three cylinders. This average shall be at least 30 kΩ-cm.~~

~~For establishment of mixture proportions, as an alternative to the curing methods for rapid chloride permeability testing outlined in the previous paragraph,~~ Silica fume concrete specimens may be moist cured for 7 days in accordance with ASTM C192, then cured for 21 days in lime-saturated water at  $100.0 \pm 3.5$  °F, then tested at an age of 28 days. For establishment of mixture proportions, as an alternative to the curing methods for ~~rapid chloride permeability testing outlined in the previous paragraph~~ surface resistivity test, latex modified concrete specimens may be moist cured for 2 days in accordance with ASTM C192, then cured for 26 days in air at  $100.0 \pm 3.5$  °F and a minimum of 50% relative humidity, then resubmerged in in the pour solution for 7 days and tested at an age of 28 36 days. ~~These methods of curing shall be noted as the accelerated RCPT curing methods.~~

~~The 28-day compressive strength of the test mix that satisfies the 750-coulomb~~ A surface resistivity result of at least 30 kΩ-cm shall be used as the basis for acceptance of the Specialized Concrete Overlay permeability requirements. Concrete for any slump test shall be deposited in a manner and location that excludes the effects of vibrations caused by traffic and concrete placement operations.

The total concrete constituents shall contribute less than 0.10% water soluble chloride ion by weight of cement. Use one brand and/or one source for any concrete constituent.

The Contractor shall obtain a written statement from the manufacturer of the latex or silica fume admixture that confirms the compatibility of the material combination and the sequence in which they are combined. The written statement, along with the results of all required tests, shall be furnished to the Engineer prior to the pre-construction meeting (refer to 679.2.2.3). Substantiating data showing compliance with the requirements of this specification shall also be submitted. This data shall also include the sources of coarse and fine aggregates as well as the brands of all admixtures to be used.

**Contractor's Quality Control:** Quality control of the specialized concrete is the responsibility of the Contractor as designated in MP 601.03.50. The Contractor shall maintain equipment and qualified personnel, including at least one certified Portland Cement Concrete Technician who shall direct all field inspection, sampling, and testing necessary to determine the magnitude of the various properties of concrete governed by the Specifications and shall maintain these properties within the limits of this Specification. The Contractor's personnel who conduct the field sampling and testing shall be a certified Portland Cement Concrete Inspector. The quality control plan designated in MP 601.03.50 shall be submitted to the Engineer at the preconstruction conference. Work shall not begin until the plan is reviewed for conformance with the contract documents.

Compressive strength specimens shall be made and cured in accordance with AASHTO R 100 and MP 601.04.20 at the frequency required in MP 601.03.50 except that specimens for latex modified concrete shall be moist cured for 2 days and air cured at a temperature of  $73.5 \pm 3.5$  °F for 26 days.

During construction, a minimum of three specimens shall be fabricated ~~rapid chloride permeability surface resistivity testing~~ in accordance with ~~AASHTO T358 AASHTO T 277~~ every time that a set of compressive strength specimens is fabricated.

~~If the 28 day compressive strength of the in place concrete, obtained from specimens made as outlined in the previous paragraph, is less than or equal to eighty percent (80%) of the compressive strength of the approved test mix, these rapid chloride permeability test specimens shall be tested, as outlined in the following two paragraphs. Otherwise, testing of these specimens is not required.~~

~~When silica fume concrete is used, these specimens shall be moist cured for 56 days and then allowed to air dry at a temperature of  $73.5 \pm 3.5$  °F until the time of test. These Two specimens shall be tested at an age of ~~90~~28 days in accordance with AASHTO ~~T277~~T358, and if necessary, the remaining two specimens shall be tested at an age of 180 days in accordance with AASHTO T 277. The average result of the ~~two~~three values from these specimens shall be reported as the result required in Note (a) in section 679.2.2.2.~~

When latex modified concrete is used these specimens shall be moist cured for 2 days and then air dried at a temperature of  $73.5 \pm 3.5$  °F until the time of the compressive strength test. These specimens shall be resubmerged for 7 days and tested at an age of 36 ~~90~~ days in accordance with AASHTO T358~~277~~, and the average result of the ~~two~~three values from these specimens shall be reported as the result required in Note (a) in section 679.2.2.1. ~~If necessary, the remaining two specimens shall be tested at an age of 180 days in accordance with AASHTO T 277 358, and the average result of the two values from these specimens shall be reported as the result required in Note (a) in section 679.2.2.1.~~

Gradation testing shall be performed in accordance with Section 601.3.2.4.

**679.2.2.1-Latex Modified Concrete:**

DELETE & REPLACE THE FOLLOWING TABLES FIELDS & FOOTNOTES WITH:

The following test criteria must be met for all latex modified concrete pours placed at the structure. This testing shall be performed by the Contractor or his designated representative and certified results provided to the Engineer prior to final acceptance of the project.

**Table 679.2.2.1**

<u>Surface Resistivity</u> <sup>(a)</sup> <u>Chloride Permeability</u> <sup>(a)</sup>	<u>Minimum 30 kΩ-cm @ 28 36 days (per AASHTO T 358)</u> <u>1000 coulombs @ 90 or 180 days, maximum (per AASHTO T 277)</u>
Compressive Strength <sup>(b)</sup>	not less than 80% of 28-day compressive strength of the approved test mix
Water/Cement Ratio <sup>(c)</sup>	0.40 by weight, maximum
Portland Cement Content	658 lb/cu. yd., minimum

**Table 679.2.2.1**

Latex Admixture Content <sup>(d)</sup>	24.5 gal/cu. yd., minimum
Air Content <sup>(e)</sup>	6.5% maximum (Per AASHTO T 152)
Slump	4.0 inches ± 2.0 inches

Note (a) ~~When required, as outlined in the Contractor’s Quality Control Section of Section 679.2.2, the surface resistivity tests shall be performed and the results tabulated and submitted to the Engineer. If the compressive strength requirements noted in Table 679.2.2.1 are not satisfied, and the surface resistivity value is under the requirement noted in the Table 679.2.2.1, then the concrete represented by these strength and surface resistivity values may be removed and replaced by the Contractor. When required, as outlined in the Contractor’s Quality Control Section of Section 679.2.2, rapid chloride permeability tests shall be performed and the results tabulated and submitted to the Engineer. Chloride permeability of the in place concrete shall be considered acceptable if the 28-day compressive strengths obtained in Section 679.2.2 are greater than eighty percent (80%) of the 28-day compressive strength of the approved test mix. If the compressive strength requirements noted in Table 679.2.2.1 are not satisfied, and the permeability value noted in the Table 679.2.2.1 is exceeded, then the concrete represented by these strength and permeability values may be removed and replaced by the Contractor. If the Contractor elects to leave the material in place, the Engineer shall evaluate it as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the use intended shall be removed and replaced by the Contractor. When the Engineer’s evaluation indicates that the work may satisfactorily remain in place, the subject material shall be paid for at a reduced unit price based on Table 679.2.2.2B.~~

Note (b) ~~The minimum 28-day compressive strength shall be 4,000 psi. Overlay concrete with a compressive strength of less than this acceptance level may be removed and replaced at the contractor’s expense. The minimum compressive strength for the overlay concrete shall be 80% of the 28-day compressive strength of the approved test mix. However, the minimum 28-day compressive strength shall be 4,000 psi. Overlay concrete with a compressive strength of less than this acceptance level may be removed and replaced at the contractor’s expense.~~

Note (c) The amount of added water shall be adjusted to provide slump at or below the prescribed limit. The water portion of all admixtures shall be included as part of the water/cement ratio.

Note (d) Latex sampling shall be in accordance with 707.5.

Note (e) The initial mix design shall be based on an expected air content range of 3% to 6%. The mixture proportions shall be determined using actual conditions for fineness modulus and bulk specific gravities (saturated surface dry for aggregates).

**679.2.2-Specialized Concrete Mix Design and Testing:**

**679.2.2.2-Silica Fume Concrete:**

DELETE & REPLACE THE FOLLOWING TABLES FIELDS & FOOTNOTES WITH:

The following test criteria must be met for all silica fume concrete pours placed at the structure. This testing shall be performed by the Contractor or his designated representative and certified results provided to the Engineer prior to final acceptance of the project.

**Table 679.2.2.2A**

<del>Surface Resistivity (a) Chloride Permeability <sup>(a)</sup></del>	<del>Minimum 30 kΩ-cm @ 28 days (per AASHTO T 358) 1000 coulombs @ 90 days or 180 days; maximum (per AASHTO T 277)</del>
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**Table 679.2.2.2A**

Compressive Strength <sup>(b)</sup>	not less than 80% of 28-day compressive strength of the approved test mix
Water/(Cementitious Materials) Ratio <sup>(c)</sup>	0.37 by weight, maximum
Portland Cement Content <sup>(d)</sup>	680 lb/cu.yd., minimum
Silica Fume Content <sup>(e)</sup> (Dry Weight)	50 lb/cu. yd., minimum
Air Content	7.0% (plus or minus 1.5%) (Per AASHTO T 152)
Slump	6.5 inches ± 1.5 inches
High Range Water Reducer (Superplasticizers) <sup>(f)</sup>	As needed for workability, slump and water/cementitious ratios

- Note (a) ~~When required, as outlined in the Contractor’s Quality Control Section of Section 679.2.2, the surface resistivity tests shall be performed and the results tabulated and submitted to the Engineer. If the compressive strength requirements noted in Table 679.2.2.2 are not satisfied, and the surface resistivity value noted in the Table 679.2.2.2 is under the requirement, then the concrete represented by these strength and surface resistivity values may be removed and replaced by the Contractor.~~ When required, as outlined in the Contractor’s Quality Control Section of Section 679.2.2, rapid chloride permeability tests shall be performed and the results tabulated and submitted to the Engineer. Chloride permeability of the in place concrete shall be considered acceptable if the 28 day compressive strengths obtained in Section 679.2.2 are greater than eighty percent (80%) of the 28 day compressive strength of the approved test mix. If the compressive strength requirements noted in Table 679.2.2.2 are not satisfied, and the permeability value noted in the Table 679.2.2.2 is exceeded, then the concrete represented by these strength and permeability values may be removed and replaced by the Contractor. If the Contractor elects to leave the material in place, the Engineer shall evaluate it as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the use intended shall be removed and replaced by the Contractor. When the Engineer’s evaluation indicates that the work may satisfactorily remain in place, the subject material shall be paid for at a reduced unit price based on Table 679.2.2.2B.
- Note (b) ~~The minimum 28-day compressive strength shall be 4,000 psi. Overlay concrete with a compressive strength of less than this acceptance level may be removed and replaced at the contractor’s expense.~~ The minimum compressive strength for the overlay concrete shall be 80% of the 28 day compressive strength of the approved test mix. However, the minimum 28 day compressive strength shall be 4,000 psi. ~~Overlay concrete with a compressive strength of less than this acceptance level may be removed and replaced at the contractor’s expense.~~
- Note (c) The amount of added water shall be adjusted to provide slump at or below the prescribed limit. The water portion of all admixtures shall be included as part of the water/cement ratio.
- Note (d) An equal volume of fly ash may be substituted for cement to a maximum of 1 ¼ bags per cubic yard. An equal volume of slag cement may be substituted for cement to a maximum of 3 bags per cubic yard. When fly ash or slag cement are used, equivalent volumes of fly ash or slag cement shall be considered as cement for purposes of determining the proportioning ratios.
- Note (e) Silica fume sampling shall be in accordance with 707.4.3.
- Note (f) A high range water-reducing admixture is required to improve workability. No more than two additions of the admixture shall be made, and the total quantity shall not exceed the manufacturer's maximum dosage rate. Each time high range water reducer is added, the concrete shall be mixed an additional minimum of 30 revolutions. The total number of revolutions shall not exceed 300.

**Table 679.2.2.2B**

Permeability result obtained in Table 679.2.2.1 or 679.2.2.2A. See Note (a) (values expressed in Coulombs)	Percent of unit bid price paid according to Section 679.6.3 which will be paid for material in question
≥1,000—1,500	95%
≥1,500—2,000	90%
≥2,000—2,500	85%
≥2,500—3,000	80%
≥3,000—3,500	70%
≥3,500—4,000	60%
≥4,000	Remove and replace

**Table 679.2.2.2B**

<u>Resistivity Result (kΩ-cm)</u>	<u>Percent of Unit Bid Price Paid</u>
<u>&gt;25-29</u>	<u>90%</u>
<u>&gt;20-25</u>	<u>70%</u>
<u>&gt;15-20</u>	<u>50%</u>
<u>≤15</u>	<u>Remove &amp; Replace</u>

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
SUPPLEMENTAL SPECIFICATION  
FOR  
SECTION 679  
OVERLAYING OF PORTLAND CEMENT CONCRETE BRIDGE DECKS

**679.2-MATERIALS:**

**679.2.3-Equipment:**

**679.2.3.1-Cutting Equipment:**

**679.2.3.1.1-Hydrodemolishing Equipment:**

DELETE THE CONTENTS OF THE FIRST PARAGRAPH IN SUBSECTION 679.2.3.1.1 AND REPLACE WITH THE FOLLOWING:

The hydrodemolishing system shall be self-propelled, completely programmable, designed for high production concrete removal, and ~~capable of removing precise depths of sound concrete~~ utilizes a high-pressure water jet stream capable of attaining pressures in the range of 18,000 to 20,000 PSI and removing all unsound, or otherwise designated, concrete to the depth specified.. The pressure used for this work shall be a minimum of 18,000 PSI and a maximum of 20,000 PSI. Ultra high-pressure machines shall not be permitted. Water usage per minute shall be a minimum of 55 gallons (55 GPM minimum). Hydrodemolishers shall be capable of removing concrete from around and below the steel reinforcement. Lances shall be of a type intended to remove rather than scarify concrete. Individuals certified by the equipment manufacturers shall operate the removal equipment.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

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**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 701  
HYDRAULIC CEMENT**

**701.3-BLENDED HYDRAULIC CEMENTS:**

ADD THE FOLLOWING CONTENTS TO THE END OF 701.3:

Blended hydraulic cement shall conform to the requirements of ASTM C595 for Portland blast-furnace slag cement, Type IS, or Portland-pozzolan cement, Type IP, or Portland-limestone cement, Type IL, or Portland ternary cement, Type IT.

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SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: \_\_\_\_\_

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SECTION 709

METALS

709.1-STEEL BARS FOR CONCRETE REINFORCEMENT:

709.1.3-Galvanized Coated Bars for Concrete Reinforcement

DELETE THE CONTENTS OF SUBSECTION 709.1.3 AND REPLACE WITH THE FOLLOWING:

For galvanized coated reinforcing steel, the uncoated material shall conform to Section 709.1. The galvanized coating shall conform to the requirements of ASTM A767 for the immersion process or ASTM A1094 for the continuous hot dip galvanizing process, ~~unless otherwise specified in the Contract Documents.~~ All field handling and repair requirements shall conform to ASTM A767 or ASTM A1094 as applicable. All galvanized reinforcing steel shall be inspected by a representative of the WVDOH MCS&T Division, at the location of galvanizing, prior to shipment. If ASTM A767 is used as the method of galvanizing, the coating shall be Class 1, field bending shall be prohibited, and shop bending shall be prohibited after galvanizing.



**SECTION BREAK**

**NEW BUSINESS ITEMS**

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

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SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: \_\_\_\_\_

FEDERAL PROJECT NUMBER: \_\_\_\_\_

SECTION 642  
TEMPORARY POLLUTION CONTROL

642.6-TEMPORARY PIPE, CONTOUR DITCHES, BERMS, SLOPE DRAINS, ROCK CHECK DAM, SILT FENCE, AND SUPER SILT FENCE:

REMOVE AND REPLACE 642.6.5 WITH THE FOLLOWING:

~~642.6.5-Silt Fence: The minimum-height above ground for the silt fence shall be sixteen (16) -inches and twenty-four (24) inches~~two (2) feet~~. Minimum embedment depth shall be eight (8) inches. ~~The maximum post spacing shall be based on elongation of the geotextile as measured in accordance with Test Method D 4632. Silt fence geotextile with elongation 50 % shall have a maximum post spacing of four (4) feet. Silt fence geotextile with elongation < 50 % shall have a maximum post spacing of 6.5 feet. When silt fence is installed in valleys where water can pond behind the fence then the post spacing shall be half of the maximum post spacing for the geotextile used.~~~~

~~When silt fence is installed by the trenching method the geotextile at the bottom of the fence shall be buried in a "J" configuration to a minimum depth of eight (8) inches in a trench so that no flow can pass under the silt fence. Backfill the trench and compact the soil over the geotextile.~~

~~When silt fence is installed by the soil slicing method the geotextile shall be installed in a slit in the soil eight (8) to twelve (12) inches deep so that no flow can pass under the silt fence. Create the slit such that a horizontal chisel point (approx. 3 inches wide) at the base of a soil slicing blade (approx. 3/4 inches wide) that slightly disrupts soil upward as the blade slices through the soil. This upward disruption minimizes horizontal compaction and creates an optimal soil condition for mechanical compaction against the geotextile. Overturning of the soil shall not be permitted. The geotextile shall be mechanically inserted directly behind the soil slicing blade in a simultaneous operation, achieving consistent placement and depth. Soil along the fence shall be compacted to ensure that the fence fabric is well anchored in the soil.~~

~~The silt fence geotextile shall be spliced together with a sewn seam only at a support post, or two sections of fence may be overlapped.~~

~~Silt fence posts shall be driven to a minimum of twenty (20) inches into the ground. This depth shall be increased to two (2) feet if the fence is placed on a slope of 3:1 or greater. Where the minimum~~

depth is ~~impossible-difficult~~ to attain, the steel posts may be necessary. ~~shall be adequately secured to prevent overturning of the fence due to loading.~~ The geotextile shall be properly fastened to the upslope side of the fence posts.

Silt fences shall be continuous and transverse to the flow. The silt fence shall follow the level contours of the site as closely as possible to prevent concentrated flow. ~~Place the fence such that the water cannot runoff around the end of the fence~~ To prevent water from flowing around the end of the silt fence, turn the ends of the fence upslope.

~~The silt fence trench shall be compacted on the upstream side first, and then the downstream side. The silt fence trench shall be compacted to a minimum of 90% of the original ground density and the posts must be installed after compaction of the trench. The trench compaction will be based on visual inspection and the engineer may require compaction testing to verify the visual inspection.~~

The contractor shall inspect and maintain all silt fences ~~immediately after each rainfall and at least daily during prolonged rainfall~~ in accordance with all applicable permits and the site specific Stormwater Pollution Prevention Plan (SWPPP). The contractor shall immediately correct any deficiencies. The contractor shall also make a daily review of the location of silt fences in areas where construction activities have altered the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness. Where deficiencies exist as determined by the Qualified Person or Environmental Monitor, engineer, additional silt fence shall be installed as necessary and as directed by the Engineer. Accumulation of sediment along the silt fence indicates inadequate protection of upslope disturbed ground. When this is observed, corrective action shall be taken to reduce erosion. When the sediment deposits reach a depth of six (6) inches sediment shall be removed. Also, remedial BMP measures shall be implemented as red-line changes to the SWPPP to prevent erosion above the silt fence. The cost of sediment removal is incidental to Silt Fence. Remedial BMP's shall be paid in accordance with the provisions of the contract. ~~When the sediment deposits reaches half the height of the fence the sediment shall be removed or a second silt fence shall be installed as directed by the engineer. The cost of this work shall be paid as "Sediment Removal" or "Silt Fence".~~

The silt fence shall remain in place until the Engineer directs it to be removed. Upon removal the contractor shall remove and dispose of any excess sediment accumulations, ~~dress the area to give it a pleasing appearance,~~ and vegetate all bare areas. Removed silt fence may be used at other locations provided the geotextile and other material requirements continue to be met to the satisfaction of the Engineer.

Silt fence material shall be selected from the WVDOH Approved Products List for Engineering Fabric for Sediment Control (Silt Fence). Longer duration projects will require stronger silt fence materials with greater UV stability in accordance with the following table.

**Silt Fence Application Table**

	<u>ASTM Standard</u>	<u>Temporary</u>	<u>Standard</u>	<u>High Performance</u>
<u>Application</u>	<u>n/a</u>	<u>1 construction season</u>	<u>2 construction seasons</u>	<u>Longer projects and challenging situations</u>
<u>Grab Strength Machine Direction (lb)</u>	<u>D-4632</u>	<u>120</u>	<u>280</u>	<u>400</u>
<u>Maximum Elongation (%)</u>	<u>D-4632</u>	<u>50</u>	<u>50</u>	<u>50</u>

<u>Min. Permittivity (sec<sup>-1</sup>)</u>	<u>D-4491</u>	<u>0.05</u>	<u>0.05</u>	<u>0.05</u>
<u>Max. Apparent opening size (mm)</u>	<u>D-4751</u>	<u>0.6</u>	<u>0.6</u>	<u>0.6</u>
<u>UV Stability (%)</u>	<u>D-4355</u>	<u>70</u>	<u>80</u>	<u>90</u>

Refer to the following table for post spacing

<u>Max. Post Spacing (ft)</u>		
	<u>16" high fence</u>	<u>24" high fence</u>
<u>Steel T-post</u>		
<u>0.95#/ft</u>	<u>5</u>	<u>3</u>
<u>1.25#/ft</u>	<u>6</u>	<u>4</u>
<u>1.33#/ft</u>	<u>7</u>	<u>5</u>
<u>Wood stakes</u>		
<u>1-1/4" x 1-3/4"</u>	<u>6</u>	<u>4</u>
<u>1-3/4" x 1-3/4"</u>	<u>6</u>	<u>4</u>

Longer and steeper slopes require multiple rows of silt fence for effective protection. Add rows of silt fence in accordance with the following table.

<u>Maximum Slope Length Above Silt Fence</u>		
<u>Slope</u>		<u>Slope Length (ft)</u>
<u>0% - 2%</u>	<u>Flatter than 50:1</u>	<u>250</u>
<u>2% - 10%</u>	<u>50:1 - 10:1</u>	<u>125</u>
<u>10% - 20%</u>	<u>10:1 - 5:1</u>	<u>100</u>
<u>20% - 33%</u>	<u>5:1 - 3:1</u>	<u>75</u>
<u>33% - 50%</u>	<u>3:1 - 2:1</u>	<u>50</u>

**642.9-PAY ITEMS:**

ADD THE FOLLOWING TO THE TABLE:

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
<u>642011-*</u>	<u>Temporary Silt Fence</u>	<u>Linear Foot</u>
<u>642012-*</u>	<u>Standard Silt Fence</u>	<u>Linear Foot</u>
<u>642013-*</u>	<u>High Strength Silt Fence</u>	<u>Linear Foot</u>

\*Sequence number

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**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 642  
TEMPORARY POLLUTION CONTROL**

NOTE: This table will be posted at :  
<https://transportation.wv.gov/highways/TechnicalSupport/specifications/642.7UnitValueMethod/Pages/default.aspx/>  
 (this link will be revised prior to publication of 2026 Supplemental Specifications).

**642.7-METHOD OF MEASUREMENT:**

ADD THE FOLLOWING:

**TABLE 642.7.1 – Pollution Control Device Rate Schedule**

Description	(Item)	Unit	Value per Unit	Specification Note 2
Temporary Berm	(642001-001)	LF	2	Yes
Slope Drain	(642002-001)	LF	21	Yes
Seed Mixture, Temporary	(642004-001)	LB	2	Yes
Seed Mixture, B	(642004-002)	LB	5	Yes
Seed Mixture, D	(642004-003)	LB	20	Yes
Seed Mixture, L	(642004-004)	LB	18	Yes
Mulch, Straw or Hay	(642005-001)	TN	450	Yes
Mulch, Wood Cellulose Fiber	(642005-002)	TN	2,500	Yes
Mulch	(642005-003)	TN	2,500	Yes
Hydraulic Erosion Control Product, function longevity (1 to < 6 months)		LB	1	-
Hydraulic Erosion Control Product, function longevity (> 6 months)		LB	1	-
Hydraulically Applied Polymers		LB	1	-
Biotic Soil Amendment		LB	1	-
Fertilizer	(642006-001)	TN	850	Yes
Fiber Matting	(642007-001)	SY	2	Yes
Temporary Pipe	(642008-001)	LF	73	Yes
Contour Ditch	(642009-001)	LF	2	Yes
Agricultural Limestone	(642010-001)	TN	68	Yes
Wattle, ≥ 8 IN		LF	12	-

**TABLE 642.7.1 – Pollution Control Device Rate Schedule**

Description	(Item)	Unit	Value per Unit	Specification Note 2
Silt Fence	(642012-001)	LF	4	Yes
Super Silt Fence	(642015-001)	LF	10	Yes
SMARTFence, 36 IN		LF	5	-
SMARTFence, 42 IN		LF	10	-
Simplified Diversion Fence		LF	5	-
Compost Filter Sock, 8 IN	(642016-001)	LF	7	SP
Compost Filter Sock, 12 IN	(642016-002)	LF	8	SP
Compost Filter Sock, 18 IN	(642016-003)	LF	9	SP
Compost Filter Sock, 24 IN	(642016-004)	LF	10	SP
Compost Filter Sock, 32 IN	(642016-005)	LF	11	SP
Rock Check Dam	(642031-001)	EA	93	Yes
Sediment Trap	(642033-001)	CY	17	Yes
Sediment Basin	(642034-001)	CY	17	Yes
Riser	(642035-001)	EA	9,000	Yes
Skimmer	(642035-002)	EA	2,800	SP
Sediment Removal	(642036-001)	CY	7	Yes
Inlet Protection	(642040-001)	EA	270	Yes
Flocculant Block	(642042-001)	EA	180	SP
Polyacrylamide		LB	1	-
Premanufactured Ditch Check	(642043-001)	EA	67	-
Turbidity Curtain	(642045-002)	FT	100	SP
Coir Baffles		LF	9	-
Dewatering Device	(642050-001)	EA	720	Yes
Erosion Control Matting	(642055-001)	SY	2	-
Coconut Matting		SY	4	-
Non-Woven Geotextile Fabric		SY	3	-
Rock Borrow Excavation	(211008-000)	TN	75	Yes
Impervious Core	(211017-001)	SF	4	Yes
<del>Seed Mixture, B, C-1, or C-2</del>	<del>(652003-001)</del>	<del>LB</del>	<del>20</del>	<del>Yes</del>
<del>Seed Mixture, D</del>	<del>(652003-002)</del>	<del>LB</del>	<del>20</del>	<del>Yes</del>
<del>Mulch, Straw or Hay</del>	<del>(652004-001)</del>	<del>TN</del>	<del>450</del>	<del>Yes</del>
<del>Mulch, Wood Cellulose Fiber</del>	<del>(652004-002)</del>	<del>TN</del>	<del>850</del>	<del>Yes</del>
<del>Fertilizer, 10-20-10</del>	<del>(652002-001)</del>	<del>TN</del>	<del>500</del>	<del>Yes</del>
<del>Fertilizer, Urea Formaldehyde</del>	<del>(652002-002)</del>	<del>TN</del>	<del>60</del>	<del>Yes</del>
Tied Concrete Block Mattress	(655002-002)	SY	90	SP

Note 1: Units are calculated by multiplying the quantity of temporary pollution control devices installed on project by the rate value.

Example: 175 lbs of “Seed Mixture, Temporary” X 2 = 350 Units

Note 2 Items not covered by WVDOH Specification or Special Provision (SP) shall be handled and installed according to the manufacturer’s recommendations.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

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FOR

STATE PROJECT NUMBER: \_\_\_\_\_

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SECTION 106  
CONTROL OF MATERIALS

106.1-SOURCE OF SUPPLY AND QUALITY REQUIREMENTS:

106.1.1-Definitions:

ADD THE FOLLOWING DEFINITION TO THE SUBSECTION:

“Manufactured products” means articles, materials, or supplies that have been processed into a specific form and shape, or combined with other articles, materials, or supplies to create a product with different properties than the individual articles, materials, or supplies. If an item is classified as an iron or steel product, an excluded material, or other product category as specified by law or in 2 CFR part 184, then it is not a manufactured product. However, an article, material, or supply classified as a manufactured product may include components that are iron or steel products, excluded materials, or other product categories as specified by law or in 2 CFR part 184. Mixtures of excluded materials delivered to a work site without final form for incorporation into a project are not a manufactured product.

ADD THE FOLLOWING SUBSECTION TO THE SECTION:

106.1.5-State and/or Federal Use of Manufactured Products: All manufactured products used in the project are to be produced in the United States. The final assembly of the manufactured product shall be manufactured in the United States and compliant with the “Infrastructure Investment and Jobs Act,” Section 70901-52, entitled the “Build America, Buy America Act.” Section 70901-52, entitled the “Build America, Buy America Act” as implemented by the Office of Management and Budget (OMB) in the OMB Memorandum M24-02, and MP 106.10.50.

UPDATE THE TITLE OF THE SUBSECTION BELOW:

106.1.56-Exceptions:

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 106

CONTROL OF MATERIALS

**106.1-SOURCE OF SUPPLY AND QUALITY REQUIREMENTS:**

**106.1.1-Definitions:**

ADD THE FOLLOWING DEFINITION TO THE SUBSECTION:

“Manufactured products” means articles, materials, or supplies that have been processed into a specific form and shape, or combined with other articles, materials, or supplies to create a product with different properties than the individual articles, materials, or supplies. If an item is classified as an iron or steel product, an excluded material, or other product category as specified by law or in 2 CFR part 184, then it is not a manufactured product. However, an article, material, or supply classified as a manufactured product may include components that are iron or steel products, excluded materials, or other product categories as specified by law or in 2 CFR part 184. Mixtures of excluded materials delivered to a work site without final form for incorporation into a project are not a manufactured product.

ADD THE FOLLOWING SUBSECTION TO THE SECTION:

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UPDATE THE TITLE OF THE SUBSECTION BELOW:

**106.1.~~56~~-Exceptions:**



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

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SUPPLEMENTAL SPECIFICATION

FOR

SECTION 109

MEASUREMENT AND PAYMENT

**109.7-PAYMENT FOR MATERIAL ON HAND:**

ADD THE FOLLOWING PARAGRAPH AFTER THE FIRST PARAGRAPH OF SUBSECTION 109.7

Partial payment may be made to the extent of the delivered costs of material to be incorporated into the work, provided the material meets the requirements of the Plans and Specifications when delivered in the vicinity of the project or at approved off-site locations. In any event, partial payment for material on hand will not exceed the bid price. Such material shall be stored in acceptable storage places, and the Contractor shall furnish evidence of payment for the delivered cost of the material within ninety (90) calendar days of the cut-off date of the estimate on which this material was paid.

When requested in writing by the Contractor, payments for raw structural steel may be made for materials that are to be used in the fabrication of bridge superstructure materials. These materials include steel girders, rolled steel beams, cross frames, and diaphragms. The contractor will be allowed to invoice for 100 percent of the cost of raw structural steel delivered to the fabricator, not to exceed 60 percent of the contract price. The provisions of this payment shall follow section 109.2.1 of The 2022 WVDOH Construction Manual.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

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**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 212**

**STRUCTURE, ROCK, AND WET EXCAVATION**

**212.2-MATERIALS:**

**212.2.5-Acceptance Plan:**

**212.2.5.3-Degree of Nonconformance:**

ADD THE FOLLOWING TO THE END OF THE FIRST PARAGRAPH OF THE SUBSECTION:

When a subplot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming, and this value shall be multiplied by its appropriate multiplication factor as set forth in Table 212.2.5.3 to determine the degree of nonconformance of that sieve, as defined in MP 212.02.20.

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STATE PROJECT NUMBER: \_\_\_\_\_

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**SECTION 315**  
**TRAIL SURFACE AGGREGATE (TSA)**

ADD THE FOLLOWING SECTION:

**315.1-DESCRIPTION:**

This work shall consist of furnishing, spreading, and compacting (TSA) on a prepared surface in accordance with these Specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

**315.2-MATERIALS:**

TSA Shall be crushed limestone or sandstone or any combination of these materials uniformly blended to conform to the quality requirements of Table 315.2A, gradation requirements of Table 315.2B. Test Methods for quality requirements on Table 315.2C.

**Table 315.2A Quality Requirements**

<b><u>Deleterious Material, Percent max</u></b>	<b><u>Los Angeles Abrasion, Percent Max.</u></b>	<b><u>Liquid Limit Max,</u></b>	<b><u>Plastic Limit Max</u></b>	<b><u>pH Between</u></b>
<u>5%</u>	<u>40%</u>	<u>12 Max</u>	<u>6 Max</u>	<u>6 to 12</u>

**Table 315.2B Gradation Requirements**

<b><u>Sieve Size</u></b>	<b><u>Percent Passing</u></b>
<u>1/2"</u>	<u>100%</u>
<u>3/8"</u>	<u>96-100</u>
<u>#4</u>	<u>75-90</u>
<u>#8</u>	<u>55-75</u>
<u>#16</u>	<u>35-50</u>
<u>#200</u>	<u>12-20</u>

**TABLE 315.2C Test Methods**

<u>Deleterious Materials</u>	<u>ASTM C295, MP 703.01.20, MP 702.01.20, MP 703.00.27</u>
<u>Gradation</u>	<u>AASHTO T 11 and T 27</u>
<u>Liquid Limit</u>	<u>AASHTO T 89</u>
<u>Los Angeles Abrasion</u>	<u>AASHTO T 96, ASTM C535</u>
<u>Plasticity Index</u>	<u>AASHTO T 90</u>
<u>pH</u>	<u>EPA 9045C</u>

**315.2.1-Quality Control Testing:** Quality control of the TSA material is the responsibility of the Contractor as specified in section 106.1.

The Contractor shall maintain necessary equipment and qualified personnel to perform all sampling and testing necessary to determine the magnitude of the various properties of the material governed by the Specifications and shall maintain these properties within the limits of the Specifications.

The Contractor shall submit a quality control plan detailing the methods by which the quality control program will be conducted. This plan, prepared in accordance with the guidelines set forth in the appropriate portions of MP 307.00.50 and MP 717.04.21, shall be submitted to the Engineer at the preconstruction conference. The work shall not begin until the plan is reviewed for conformance with the contract documents.

**315.2.2-Acceptance Testing:** Acceptance sampling and testing of crushed aggregate base course is the responsibility of the Division, except for furnishing the necessary materials. Quality control sampling and testing performed by the Contractor may be used by the Division for acceptance.

**315.2.3-Sampling and Testing:** Frequency of sampling and testing shall be in accordance with the Contractor’s quality control plan. The minimum frequencies shall be as indicated in applicable portions of MP 307.00.50. Crushed aggregate shall be sampled in accordance with MP 700.00.06, Aggregate Sampling Procedures.

**315.2.4-Acceptance Procedure:** Material conforming to the specification requirements will be accepted at full contract price. Material failing to comply with the quality requirements of Table 315.2A shall not be incorporated into the work.

Acceptance of TSA material for compaction and for gradation shall be in accordance with appropriate portions of subsection 307.2.4.1.

**315.2.4.1-Acceptance Plan:**

**315.2.4.1.1-Compaction:** The contractor shall use a vibratory roller with a minimum weight of three (3) tons. The initial pass of the TSA material shall be in the static mode.

The Contractor shall notify the Engineer prior to construction of the test strips as set forth in MP 700.00.24. The Contractor shall perform quality control compaction tests and record the data on the forms as set forth in the Materials Procedures (MPs). The test data shall be available to the Engineer at the time of testing or as indicated in the Contractor’s quality control plan.

Maximum density, quality control density and acceptance density for crushed aggregate base course and aggregate subbase shall be determined in accordance with MP 700.00.24.

The TSA aggregate shall be compacted to the target percentage of dry density of 95%. The maximum required dry density shall be determined in accordance with MP 700.00.24 Part I on a control test strip having a compacted thickness of six (6) inches or less. The in-place dry density of each base course layer shall be determined in accordance with MP 700.00.24 Part II. The maximum layer thickness, other than the test strip(s), shall not exceed six (6) inch or as specified in the project documents. The density of layers with thickness that differ from the thickness of the control test strip(s) shall be subject to the density requirements determined by the control test strip

**315.2.4.1.2-For Gradation:** The material shall be sampled and tested in accordance with Section 307.2.3. Acceptance for gradation shall be based on test results of consecutive random samples from a lot. A subplot is the quantity of material represented by a single gradation test as defined in MP 700.00.06. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. In the case where only one sample is needed for the total plan quantity, the subplot shall be considered the lot.

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

When the test value of a lot and the test value of the last subplot, or when the last three consecutive individual test values of a lot fall outside the gradation limits of Table 704.6.2A, the lot of material represented will be considered nonconforming to the extent that the last of its sublots are nonconforming. When this occurs, the last subplot shall have its price adjusted in accordance with Table 307.9.1.

**315.2.4.2-Degree of Nonconformance:** When a subplot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming, and this value shall be multiplied by its appropriate multiplication factor as set forth in Table 307.2.4.2 to determine the degree of nonconformance on that sieve.

**Table 307.2.4.2**

<u><b>Nonconforming Sieve Size</b></u>	<u><b>Multiplication Factor</b></u>
<u>1/2"</u>	<u>1.0</u>
<u>3/8"</u>	<u>1.0</u>
<u>#4</u>	<u>1.0</u>
<u>#8</u>	<u>1.5</u>
<u>#16</u>	<u>2.0</u>
<u>#200</u>	<u>2.5</u>

The total measure of nonconformance of an individual subplot is the sum of all nonconformances on the various sieve sizes of that subplot.

When the total degree of nonconformance has been established and it is 12.0 or less, the material will be paid for at an adjusted contract price as specified in Table 307.9.1.

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

**315.2.4.4-TSA Base Material:** The TSA base material shall be Class 1 or Class 10 material placed and compacted in accordance with Section 307 of the West Virginia Specifications. When a crown or cross slopes are in the plans the crown shall be established in the base layer and reflected in the TSA layer.

## CONSTRUCTION METHODS

### 315.3-EQUIPMENT:

A small paver or a combination of machines, or equipment which will handle the material without segregation and produce the completed TSA meeting these Specifications for handling, spreading, moistening, mixing and compacting may be used when approved by the Engineer.

**315.3.1-PLACEMENT:** Material shall be placed starting from the furthest point from the source working backward to the source. The TSA aggregate shall be placed by means of a paver. If the working site does not permit the use of a paver the Engineer may permit the contractor to dump and spread the TSA aggregate. At no time shall the TSA aggregate be overworked to the point of segregation. The moisture content of the TSA material prior to and during compaction shall be uniformly distributed throughout each layer. TSA materials shall have placement moisture content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift. The moisture content of the TSA shall be maintained at a level sufficient to facilitate compaction.

### 315.3.2-TOLERANCE:

**315.3.2.1 Surface Tolerance:** The completed surface shall not vary more than 3/8 inch above or below Plan grade, nor more than 3/8 inch from a straightedge ten (10) feet long applied parallel to the centerline of the pavement. Deviations shall be corrected by scarifying, adding additional approved aggregate if necessary, reshaping, and recompacting.

Shoulder surfaces on resurfacing projects adjacent to concrete or asphalt pavement do not need to be checked with a straightedge.

**315.3.2.2-Thickness Tolerance:** The base course shall be checked for proper thickness after final compaction. The Contractor shall refill all test holes with approved base course material and adequately recompact the material.

Any deficiency in total thickness of the base course in excess of ½ inch shall be corrected.

**315.3.2.3-Maintenance:** The surface of the completed base shall be protected against the loss of fine material by the addition of moisture when necessary, and it shall be maintained in a satisfactory and smooth condition until such time that it is accepted.

### **315.4-METHOD OF MEASUREMENT:**

**315.4.1-Cubic Yard Measurement:** The quantity of work done will be the number of cubic yards measured in place. Any additional work beyond the scope of the original Plans but authorized by the Engineer will be measured in cubic yards in place and paid for at the unit bid price for this item, subject to the provisions of 104.2 and 109.2.

TSA constructed outside the lines, dimensions, and cross sections shown on the Plans or designated will not be measured for payment.

**315.4.2-Ton Measurement:** The quantity of work done will be the number of tons of material complete in place and accepted.

The number of tons shall be determined by the total of the weights shown on receipted railroad freight bills when materials are shipped by rail; by actual measured displacement of barges certified by the producer when water shipments are made, providing materials delivered by the methods are not stockpiled or stored; or determined by the Contractor from the total of weigh slips for each vehicle load weighed on an approved standard scale or from digital printout slips from an automatic batching plant, and certified by the Contractor to be correct.

Truck scales shall be provided by the producer or Contractor, except that truck scales are not required where the material is weighed at properly calibrated automatic batching plant facilities which are equipped with digital print-out equipment. The scales shall be of sufficient size and capacity to weigh the heaviest loaded trucks that are used for delivery of the material.

All truck scales shall be mounted on solid foundations, which will insure their remaining plumb and level. All truck scales shall be inspected and sealed by the West Virginia Division of Labor, Bureau of Weights and Measures, or other appropriate agencies of the State or its political subdivisions. The Division may, at its option, accept inspection and sealing by out of state agencies when the material is weighed outside West Virginia.

The producer shall provide a weigh person. The weigh person shall certify that the weight of the material, as determined from the digital printout of the weights, is correct.

Each truck shall be weighed empty prior to each load, except at automatic batch plants approved to operate without truck scales. A digital recorder shall be required on all truck scales. The digital recorder shall produce a printed record of the gross, tare and net weights, and the time, date, truck identification and project number. Provision shall be made for constant zero compensation and further provision shall be made so that the scales may not be manually manipulated during the printing process. The system shall be interlocked so as to allow printing only when the scale has come to rest.

In case of a breakdown of the automatic equipment, the Engineer may permit manual operation for a reasonable time, normally not to exceed 48 hours, while the equipment is being repaired.

**315.5-BASIS OF PAYMENT**

The quantities, determined as provided above, will be paid for at the contract unit price bid for the items listed below, which price and payment shall be full compensation for furnishing all the materials including water for compaction, scarification and manipulation of existing surface, and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

**315.5.1-Price Adjustment:** Aggregates not conforming with the gradation requirements as described in 307.2.4.1 will be paid for at the adjusted contract price based on the degree of nonconformance as specified in Table 315.6.1.

**TABLE 315.6.1**

<b><u>Adjustment of Contract Price for Gradation not Within Specifications</u></b>	
<b><u>Degree of Nonconformance</u></b>	<b><u>Percent of Contract Price to be Reduced</u></b>
<u>1.0 to 3.0</u>	<u>2</u>
<u>3.1 to 5.0</u>	<u>5</u>
<u>5.1 to 8.0</u>	<u>8</u>
<u>8.1 to 12.0</u>	<u>12</u>
<u>12.1 to 16.0</u>	<u>16</u>
<u>Greater than 16</u>	<u>*</u>

**315.6-PAY ITEM:**

<b><u>ITEM</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>UNIT</u></b>
<u>315001-*</u>	<u>Trail Surface Aggregate (TSA)</u>	<u>Cubic Yard</u>
<u>315005-*</u>	<u>Trail Surface Aggregate (TSA)</u>	<u>Ton</u>

\*Sequence Number



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 410  
ASPHALT BASE AND WEARING COURSES,  
PERCENT WITHIN LIMIT (PWL)

410.7-ACCEPTANCE TESTING:

410.7.1-Acceptance Testing of Asphalt:

410.7.1.5-Bond Strength:

REMOVE AND REPLACE SUBSECTION 410.7.15 WITH THE FOLLOWING:

Bond Strength Testing shall be conducted to ensure the creation of a monolithic layered pavement; this is typically achieved by the application of a tack coat between pavement layers. Any tack coats applied by the Contractor shall be applied in accordance with Section 408.

Bond Testing shall be performed on all surface layers beginning with the existing pavement layer and then all intermediate pavement layers called for in the proposal and plans, this testing shall be performed on all traveled lanes and shoulders.

Bond Testing is not required for pavement layers placed on top of a granular type layer (aggregate base, rubblized concrete, macadam, etc.). ~~If-if~~ In addition, Bond testing is not required if an asphalt pavement layer is to be placed atop a concrete surface, ~~Bond Strength testing is not required~~ however, a tack coat shall be applied in accordance with Section 408 to ensure complete coverage of the surface and to the satisfaction of the Engineer.

~~Core B~~ Core bond strength shall meet ~~exceed~~ a minimum of ~~100-50~~ psi when tested in accordance with ~~the~~ MP 410.07.23 Guide to Determining Interface Bond Shear Strength.

For layers requiring Bond Testing the following requirements shall be adhered to:

- i. All negative price adjustments shall be waived on the initial lot of each material given a tack coat is applied in accordance with the construction methods prescribed in Section 408 and the pavement has a full coverage application.
- ii. If after the first lot, the Bond testing results fail to meet the minimum requirements, sufficient effort as described in the Contractors Quality Control Plan shall be made to achieve the minimum Bond testing threshold. QCPs shall include descriptions of alternative methods which the Contractor will utilize to improve Bond testing results.
- iii. If the underlying materials show an inability to support an adequate bond, negative adjustments shall be waived, and the Contractor shall continue to tack in accordance with 408. No further Bond testing shall be required.
- iv. On subsequent lots, if such alternative methods are implemented and however, Bond testing results do not improve, the Contractor shall continue to utilize

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whichever method corresponds to the higher Bond testing results. In addition, the negative adjustments shall be waived.

v. If at any point the Dēvision determines the Contractor is not following their QCP, MCS&T shall review with the Dēistrict the appropriate action and payment adjustment for materials with Bond testing results below the given threshold shall be enforced.

**410.13-BASIS OF PAYMENT:**

**410.13.6-Bond Strength Adjustment:**

REMOVE AND REPLACE SUBSECTION 410.13.6 WITH THE FOLLOWING:

If it is determined byfrom Section 410.7.1.5, that a lot is subject to pay adjustments for Bond Strength, the following shall apply. For Interstates and divided NHS Routes, ~~B~~ Bond Strength PWL calculations shall be in accordance with MP 401.13.50, Guide to Statistical Analysis of Material Using Quality Level Analysis-Percent within Limits. ~~F~~However, for the purpose of relieving large standard deviations from abnormally strong samples, any sample with a strength exceeding 1050 psi will be evaluated as 150 psi instead of the actual strength. However, the actual strength shall be recorded as such on the reporting form and is used in the lower Quality Index (QL) calculation of MP 401.13.50.

Bond Strength Negative adjustment will be calculated for lots with PWL less than or equal to 70. There is no adjustment for bond Strength lots who’s PWL is greater than 70.

Negative adjustment calculated as follows:

$$\$T = \frac{70 - \text{PWL}}{70} \times 25,000$$

Adjustments calculated for lots less than or greater than the standard 2,500 tons shall be prorated directly proportional to the amount of tonnage less than or greater than 2,500 tons. This shall be calculated on the theoretical tonnage for the lot, not the actual tonnage used.

For two-lane and non-divided NHS Routes, refer to Section 410.13.7.4.

**410.13.7-Two-Lane and Non-divided NHS Route Exceptions:**

**410.13.7.4-Bond Strength Adjustments:**

REMOVE SECTION 410.13.7.4 AND REPLACE WITH THE FOLLOWING

If it is determined byfrom Section 410.7.1.5, that a lot is subject to pay adjustments for Bond Strength, the following shall apply. The adjustment for bond strength shall be determined by Table 410.13.7.4. This is calculated per lot and applied per Section 410.13.8.4. This shall be calculated on the theoretical tonnage for the lot, not the actual tonnage used.

**TABLE 410.13.7.4**

Pay Adjustment for Bond Strength per 2500 Ton Lot	
Average Lot Bond Strength (PSI)	Price Adjustment (\$ / Lot)
<del>100.50</del> .00 and Greater	0
<del>7525</del> .00 to <del>5099</del> .99	= [{"1,000*(PSI - <del>7525</del> .00)} - 25,000]
Less than <del>7525</del> .00	- 25,000

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATIONS

FOR

SECTION 506

CONCRETE PAVEMENT REPAIR

ADD THE FOLLOWING SUBSECTION:

**506.8-REPAIR ASSESSMENT PERIOD:**

A repair assessment period will last thirty (30) Calendar Days. The assessment period will begin after all Type I, Type II, and Type III repairs are completed. The Division will review pavement repairs during the assessment period.

Failures resulting from such repairs that appear within the thirty (30)-day assessment period will require removal and replacement at no additional cost to the Division. Failures may include, but are not limited to, loss of bond to the in-place concrete, formation of cracks other than the newly constructed joint, and damage caused by the Contractor's operations.

The thirty (30) Calendar Day repair assessment period shall restart after the completion of any repaired failures.

RENUMBER THE FOLLOWING SUBSECTIONS:

**506.89-METHOD OF MEASUREMENT:**

**506.109-BASIS OF PAYMENT:**

**506.110-PAY ITEMS:**

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

STATE PROJECT NUMBER: \_\_\_\_\_

FEDERAL PROJECT NUMBER: \_\_\_\_\_

SECTION 601  
STRUCTURAL CONCRETE

601.1-DESCRIPTION:

ADD THE FOLLOWING SUBSECTION:

**601.1.1-Mass Concrete:** Concrete placements whose least dimension exceeds 48.0 inches, excluding Drilled Caissons and tremie seals, shall be considered mass concrete and shall conform to the details shown on the plans and these special provisions.

Compensation for conforming to these requirements will be at no additional cost and shall be included in Pay Items for individual elements identified in the plans.

601.2-MATERIALS:

IN THE TABLE, REPLACE THE PORTLAND CEMENT AND COARSE AGGREGATE ROWS WITH THE FOLLOWING:

MATERIAL	SECTION OR SUBSECTION
* Portland Cement	701.1, 701.3, ASTM C150 Type II, <u>ASTM C595 Type IT</u>
***** Coarse Aggregate	703

IN THE FOOTNOTE SECTION OF THE TABLE, REPLACE ITEM \*\*\*, WITH THE FOLLOWING AND ADD FOOTNOTE \*\*\*\*\*:

\*\*\* The use of a SCM will not be permitted when a blended hydraulic cement is used. For the purposes of cement material substitution with SCMs, Type IL cement shall not be treated as a blended cement, and a SCM may be used with Type IL cement. Sources of each type of SCM shall be approved by the Engineer. Multiple sources of the same type of SCM shall not be permitted.

\*\*\*\*\* All coarse aggregate used in mass concrete placements shall be limestone

**601.3-PROPORTIONING:**

ADD THE FOLLOWING TO SUBSECTION 601.3.1:

**601.3.1-Mix Design Requirements:** For Mass Concrete placements, the Design Mix shall meet the 28-day compressive strength as specified in the plans. If the 28-day compressive strength obtained in the field does not meet the design 28-day compressive strength requirement, acceptance may be based on a 56-day compressive strength test, if approved by the Engineer after considering the stresses resulting from the construction sequence proposed by the Contractor. Acceptance shall be in accordance with Section 601.4.4 of the Standard Specifications and of this Special Provision, and per the approval of the Engineer.

For Mass Concrete placements, SCMs may be a combination of the following materials at the substitution rate shown in the following table:

<b>Cementitious Materials</b>	<b>Maximum percent of total cementitious materials by mass**</b>
Class F Fly Ash	25
Slag Cement	50
Silica Fume	10
Total of Fly Ash and Slag Cement	50*
Total of Slag Cement and Silica Fume	50*
Total of Fly Ash and Silica Fume	35*

A combination exceeding more than two types of SCMs will not be permitted.

\* Fly Ash shall not constitute more than 25-percent of the total cementitious materials.

\*\* Total cementitious materials include the summation of portland cement, fly ash, slag cement, and silica fume.

**601.4-TESTING:**

**601.4.4-Compressive Strength Tests for Acceptance:**

ADD THE FOLLOWING TO SUBSECTION 601.4.4:

Compressive strength acceptance criteria pertaining to mass concrete elements may be based on 56-day compressive strength if approved by the Engineer after considering the stresses resulting from the construction sequence proposed by the Contractor.

**601.12-CURING AND PROTECTING CONCRETE:**

ADD THE FOLLOWING SUBSECTION:

**601.12.4-Mass Concrete:**

**601.12.4.1-Thermal Control Plan:** The Thermal Control Plan shall describe the measures and procedures the Contractor intends to use to satisfy the following Temperature Control Requirements for each mass concrete element:

1. The Maximum Allowable Temperature Differential shall be limited to 35 degrees F. The temperature differential between the hottest interior locations and exterior portions of the designated mass concrete elements during curing will be maintained to be less than or equal to this Maximum Allowable Temperature Differential, and
2. The Maximum Allowable Concrete Temperature shall be limited to 160 degrees F.

A change to the Temperature Control Requirements specified in section i above may be proposed by the Contractor and shall be submitted to the Engineer for approval prior to any pour. This submission will include the new proposed Maximum Allowable Temperature Differential, along with all necessary data providing evidence to satisfactorily demonstrate to the Engineer that the deleterious effects to the concrete can be avoided. The Contractor shall allow seven (7) days for approval.

As a minimum, the Thermal Control Plan shall include the following:

- A. Mix design
- B. Methodology used to determine the heat of hydration
- C. Duration and method of curing.
- D. Methods of controlling maximum concrete temperature and temperature differentials.
- E. An analysis of the anticipated thermal developments in the mass concrete elements for all expected project temperature ranges using the proposed mix design, casting procedures, and materials. It shall show complete details and determine the maximum allowable temperature differentials between the hottest point of the concrete and the exterior faces.
- F. Temperature sensor types and locations including installation details
- G. Temperature Monitoring System including system description, operating plan, recording and reporting plan, and remedial action plan
- H. Field measures to ensure conformance with the maximum concrete temperature and temperature differential requirements.
- I. Field methods of applying immediate corrective action should the temperature differential approach the Maximum Allowable Temperature Differential.

The Contractor shall submit the Thermal Control Plan to the Engineer for approval a minimum of thirty working days prior to concrete placement. Mass concrete placement shall not begin until the Engineer has approved the Thermal Control Plan.

**601.12.4.2-Temperature Monitoring System:** The temperature monitoring and recording system for mass concrete shall consist of temperature sensors connected to a data acquisition system capable of printing, storing, and downloading data to a computer. Temperature sensors shall be located such that the maximum temperature difference within a mass concrete element can be monitored. As a minimum, concrete temperatures shall be monitored at: the

calculated hottest location, within 1 in. of the center, an outside vertical edge of the outer face that is furthest from the center of the element, and at the center and an outside edge of the top surface.

Temperature readings shall be automatically recorded on an hourly or more frequent basis. A redundant set of sensors shall be installed near the primary set. Provision shall be made for recording the redundant set, but records of the redundant sensors need not be made if the primary set is operational.

Methods of concrete consolidation shall prevent damage to the temperature monitoring and recording system. Wiring from temperature sensors cast into the concrete shall be protected to prevent movement. Wire runs shall be kept as short as possible. The ends of the temperature sensors shall not come into contact with either a support or concrete form, or reinforcing steel.

When any equipment used in the temperature control and monitoring and recording system fails during the mass concrete construction operation, the Contractor shall take immediate remedial measures to correct the situation as specified in the Thermal Control Plan.

**601.12.4.3-Construction:** Temperature readings will begin immediately after casting is complete. Temperature readings will continue until the maximum temperature differential (not maximum temperature) is reached and a decreasing temperature differential is confirmed as defined in the Thermal Control Plan and the maximum concrete temperature is within the Maximum Allowable Temperature Differential of the ambient air temperature in the shade. Data shall be printed and submitted to the Engineer daily. A copy shall be submitted to the Materials, Soils and Testing Division for informational purposes.

If monitoring indicates the Temperature Control Requirements have been exceeded, the Contractor shall take immediate corrective action as defined in the Thermal Control Plan.

In the event that the Temperature Control Requirements are exceeded, the Contractor shall conduct an investigation to determine if the concrete element was damaged as a result. The investigation shall be subject to the approval of the Engineer. If the investigation determines that the concrete is not damaged, no further action is required. If the investigation determines that the concrete is, or might be, damaged, the Contractor shall submit a repair plan to return the concrete to acceptable quality. The repair shall be subject to the approval of the Engineer. If the Engineer approves the repair plan, the concrete shall be repaired by the Contractor at his expense. If the Engineer determines that the concrete cannot be repaired, it shall be replaced by the Contractor at his expense.

The Contractor will make the necessary revisions to the approved Thermal Control Plan to satisfy the Temperature Control Requirements without resorting to corrective action on any remaining placements. Revisions to the approved plan must be approved by the Engineer prior to implementation. The revised plan will be used on future placements. No extension of time or compensation will be made for any rejected or repaired mass concrete element or revisions of the Thermal Control Plan.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 601  
STRUCTURAL CONCRETE

**601.3-PROPORTIONING:**

**601.3.1-Mix Design Requirements:**

ADD THE FOLLOWING CONTENTS TO THE FIRST PARAGRAPH IN SUBSECTION 601.3.1:

Prior to the start of construction, the Contractor shall design and submit to the Engineer for approval the proportion of materials, including admixtures, to be used which will result in a workable concrete having the applicable properties enumerated below, including those of Table 601.3.1A. In addition, Class H, K and S mix designs shall have a Sequential Air Meter (SAM) number of less than or equal to 0.20 psi for establishment of the mixture proportions in accordance with AASHTO T 395 for mix design approval.

\_\_\_\_\_ A mix design prepared in accordance with MP 711.03.23, shall be required for each class of concrete to be used in the work. The mix design shall be accompanied by a statement giving the source of materials and certified test data from a Division approved laboratory demonstrating the adequacy of the mix design. The Contractor shall notify the Engineer of any change in the source of materials or the addition of admixtures during the progress of the work, since such change may necessitate a new mix design. The Contractor shall also state the  $\bar{A}$  value of the fine aggregate and the  $\bar{A}$  value of the combined grading of the coarse aggregate, fine aggregate, and cement used in the mix design. Each mix design shall remain approved for a period of three years from the date of approval, after which the mix design may be re-approved for an additional time period. The guidelines for this re-approval process are set forth in MP 711.03.23.



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 601  
STUCTURAL CONCRETE

601.1–DESCRIPTION:

ADD THE FOLLOWING:

Class M concrete shall be used to produce less heat of hydration and intended for use in large concrete bridge substructure elements including pier stems, pier caps, footers, and abutments.

601.2–MATERIALS:

ADD THE FOLLOWING AFTER “Class H Concrete Requirements”:

Class M Concrete Requirements: All coarse aggregate used in Class M concrete shall be limestone. River sand or limestone sand shall be used as fine aggregate in Class M concrete. Slag cement used in Class M concrete shall be Grade 100 or Grade 120. Fly ash used in Class M concrete shall be Class F. Sources of each type of supplemental cementitious material (SCM) shall be approved by the Engineer. Multiple sources of the same type of supplemental cementitious material shall not be permitted.

601.3–PROPORTIONING:

601.3.1-Mix Design Requirements:

ADD CLASS “M” CONCRETE AND UPDATE THE FIRST FOOTNOTE TO TABLE 601.3.1A:

TABLE 601.3.1A

Class of Concrete	Design 28 Day Compressive Strength	Target Cement Factor	Maximum Water Content	Standard Size of Coarse Aggregate***	Entrained Air
	Pounds per Square inch	lbs./c.y.*	lb. of water / lb. of cement **	Number	Percent

<u>M</u>	<u>3500</u>	<u>See Table 601.3.1E</u>	<u>0.42</u>	<u>57, 67</u>	<u>6.0</u>
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\* An equal mass of a SCM may be substituted for Portland cement up to the maximum amount in Table 601.3.1B. Only one SCM is permitted in a mix design, except for Class H concrete. The target cement factor of Class H concrete shall consist of Option 1 or Option 2 from Table 601.3.1C. The target cement factor of Class M concrete shall consist of Option 1, Option 2, or Option 3 from Table 601.3.1F. The Contractor may choose either option.

ADD THE FOLLOWING TO TABLE 601.3.1B:

**TABLE 601.3.1B**

<b>Material</b>	<b>Class of Concrete</b>	<b>Quantity</b>
Fly Ash	All Classes Except H <u>and M</u>	20%

ADD THE FOLLOWING TABLE TO SUBSECTION:

**TABLE 601.3.1F**

<u>Option</u>	<u>Cement</u>	<u>Fly Ash</u>	<u>Slag Cement</u>	<u>Silica Fume</u>
<u>1</u>	<u>564 lb/c.y.</u>			
<u>2</u>	<u>254 lb/c.y.</u>		<u>254 lb/c.y.</u>	
<u>3</u>	<u>340 lb/c.y.</u>	<u>168 lb/c.y.</u>		

**601.3.2-Field Tolerances and Adjustments:**  
**601.3.2.2-Air Content:**

REMOVE AND REPLACE THE PARAGRAPH IN SUBSECTION 601.3.2.2 WITH THE FOLLOWING:

    The target of the entrained air content of Class H and Class M concrete at the time of placement shall be as shown in Table 601.3.1A. If the entrained air does not conform with the target value within plus or minus 1.5 percentage points, the Contractor shall take immediate steps to adjust the air content of succeeding loads by making necessary adjustments in the mixture. If the entrained air content of Class H and Class M concrete does not conform to the target value plus 2.0 percentage points, the concrete shall be rejected. When Class H and Class M concrete is delivered in a truck mixer and the air content is less than the target value minus 2.0 percentage points, the concrete shall be rejected or the Contractor may use an additional air-entraining agent in an amount that is intended to achieve the target value specified. The addition is permitted under the conditions listed below.

ADD THE FOLLOWING SUBSECTION:

**601.3.3-Class M Mix Development:** The chemical reaction of cement and water releases heat which can cause detrimental thermal cracking in large concrete structures. To prevent thermal cracking, Class M concrete shall obtain minimum strength in accordance with 601.3.3.1. The Division will approve Supplementary Cementitious Materials, admixtures, and

Cements based on their chemical, and thermal properties for Class M concrete during mix design approval.

**601.3.3.1–Tests for Strength Acceptance of Class M Concrete:** Mass concrete structures experience early-age tensile stresses due to the temperature differentials caused by the heat of hydration. Class M concrete must have sufficient early-age tensile strength to resist thermal cracking. Class M concrete shall obtain a minimum 1-day and 3-day splitting tensile strength shown in Table 601.3.3.1. The compressive strength at 1-day and 3-day may be used for approval if splitting tensile strength is not available. Class M concrete shall obtain a minimum 1-day and 3-day strength shown in Table 601.3.3.1.

**TABLE 601.3.3.1**

<u>Minimum Splitting Tensile Strength of Class M Concrete</u>			
<u>Testing Age</u>	<u>Option 1</u>	<u>Option 2</u>	<u>Option 3</u>
<u>1-Day</u>	<u>230 psi (1.6 MPa)</u>	<u>110 psi (0.76 MPa)</u>	<u>180 psi (0.76 MPa)</u>
<u>3-Day</u>	<u>330 psi (2.3 MPa)</u>	<u>220 psi (1.5 MPa)</u>	<u>250 psi (1.4 MPa)</u>
<u>Minimum Compressive Strength of Class M Concrete</u>			
<u>1-Day</u>	<u>1580 psi (10.9 MPa)</u>	<u>710 psi (4.9 MPa)</u>	<u>1010 psi (6.9 MPa)</u>
<u>3-Day</u>	<u>2700 psi (18.6 MPa)</u>	<u>1680 psi (11.6 MPa)</u>	<u>1810 psi (12.5 MPa)</u>

A strength test shall consist of three test specimens. Specimens shall be cured in a water bath at 72.3 °F (23 °C). The test shall be the average of the three specimens, except if one specimen shows manifest evidence of improper sampling, molding, or testing, it shall be discarded, and the remaining two strengths averaged. Should more than one specimen representing a given test show definite defects due to improper sampling, molding, or testing, the entire test shall be discarded. The maximum acceptable range of compressive strengths within a set of three cylinders is 9.5%. This range is found by multiplying 9.5% times the average compressive strength of the three cylinders. If this acceptable range is exceeded, the cylinder that varies the most from the average shall be discarded, and the remaining two cylinders shall be evaluated as outlined in the following paragraph. The maximum acceptable range of compressive strengths within a set of two cylinders is 8.0%. This range is found by multiplying 8.0% times the average compressive strength of the two cylinders. If this acceptable range is exceeded, the entire test shall be discarded. Under no circumstances shall a compressive strength test consist of less than the average of two specimens.

**601.4–TESTING:**

**601.4.1–Sampling and Testing Methods:**

ADD THE FOLLOWING TO THE TABLE:

<u>Splitting tensile strength of cylindrical concrete specimens</u>	<u>AASHTO T 198</u>
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**601.8–FORMS:**

**601.8.7-Removal of Forms and Construction of Superimposed Elements:**

ADD THE FOLLOWING PARAGRAPH AT THE END OF SUBSECTION 601.8.7:

Concrete elements cast with Class M or Class B concrete shall have forms remain in place for a minimum of 96 hours. Insulated concrete elements with Class M concrete shall follow 601.8.11. Insulated concrete elements with Class B concrete shall have forms remain in place for a minimum of 11 days.

ADD THE FOLLOWING SUBSECTION:

**601.8.11-Removal of Form Insulation of Class M Concrete:** Insulated forms shall remain in place for a minimum of 96 hours. The insulation may be removed when the temperature difference between the concrete surface and the lowest daily ambient temperature is less than 40 °F after 96 hours. The lowest forecast ambient temperature during the week of formwork removal shall be used as the lowest daily ambient temperature. The concrete surface temperature measurement shall be taken before exposing the concrete surface to the ambient temperature. The concrete surface temperature may be measured using an embedded temperature sensor 2-in from the concrete surface at the center of the side face closest to the center of the element. In the absence of an embedded temperature sensor, other approved temperature devices may be used to measure the concrete side face temperature closest to the center of the element. In lieu of concrete surface temperature measurements, the form insulation removal time for an R = 5 insulation in an ambient temperature ranging from 60 °F to 30 °F is shown in Table 601.8.11. Ambient temperature outside the 60 °F to 30 °F range requires a temperature sensor. The actual minimum dimension shall be rounded up to the nearest tabulated minimum dimension. If the minimum dimension exceeds the minimum dimension tabulated in Table 601.8.11, the structure shall be designated as mass concrete and require a thermal control plan meeting the requirements in 601.9.3.5. Concrete placement outside the 60 °F to 30 °F temperature range and without an embedded temperature sensor specified above shall meet 601.12.2 requirement for insulation removal: "When protection is removed from the structure after the specified curing is complete, the temperature of the concrete shall not be permitted to fall at a greater rate than 20 °F per 24-hrs." The specified curing for these cases shall be at least 7-days. Additionally, the temperature difference between the concrete surface and the lowest daily ambient temperature shall not be greater than 40°F.

**TABLE 601.8.11**

Form Insulation Removal Times (Class M concrete with R = 5 Insulation)

<u>Type</u>	<u>Cross-Section</u>	<u>Minimum Dimension (ft)</u>	<u>Class M Concrete: Option 1</u>	<u>Class M Concrete: Option 2</u>	<u>Class M Concrete: Option 3</u>
<u>Pier Stem</u>	<u>Circular</u>	<u>6 or less</u>	<u>288-hrs</u>	<u>216-hrs</u>	<u>192-hrs</u>
		<u>7</u>	<u>See 601.9.3.5</u>	<u>240-hrs</u>	<u>240-hrs</u>
		<u>8</u>	<u>See 601.9.3.5</u>	<u>288-hrs</u>	<u>288-hrs</u>
	<u>Square</u>	<u>3.5 or less</u>	<u>168-hrs</u>	<u>168-hrs</u>	<u>144-hrs</u>
		<u>4.5</u>	<u>264-hrs</u>	<u>216-hrs</u>	<u>216-hrs</u>

		<u>5.5</u>	<u>See 601.9.3.5</u>	<u>288-hrs</u>	<u>264-hrs</u>
	<u>Rectangular</u>	<u>2 or less</u>	<u>144-hrs</u>	<u>120-hrs</u>	<u>120-hrs</u>
		<u>3</u>	<u>240-hrs</u>	<u>192-hrs</u>	<u>192-hrs</u>
		<u>4</u>	<u>See 601.9.3.5</u>	<u>288-hrs</u>	<u>288-hrs</u>
<u>Pier Cap</u>	<u>Hammerhead (Less than 14-ft in width and less than 5-ft in height)</u>	<u>5 or less</u>	<u>228-hrs</u>	<u>192-hrs</u>	<u>204-hrs</u>
		<u>6</u>	<u>See 601.9.3.5</u>	<u>216-hrs</u>	<u>240-hrs</u>
		<u>7</u>	<u>See 601.9.3.5</u>	<u>240-hrs</u>	<u>See 601.9.3.5</u>
	<u>Hammerhead (Less than 36-ft in width and less than 10-ft in height)</u>	<u>2.5 or less</u>	<u>180-hrs</u>	<u>180-hrs</u>	<u>192-hrs</u>
		<u>3</u>	<u>240-hrs</u>	<u>216-hrs</u>	<u>228-hrs</u>
		<u>3.5</u>	<u>See 601.9.3.5</u>	<u>240-hrs</u>	<u>240-hrs</u>
	<u>Two-column pier cap (Less than 23-ft in span, and less than 5-ft in height)</u>	<u>3 or less</u>	<u>264-hrs</u>	<u>204-hrs</u>	<u>240-hrs</u>
		<u>3.5</u>	<u>See 601.9.3.5</u>	<u>240-hrs</u>	<u>See 601.9.3.5</u>
		<u>4</u>	<u>See 601.9.3.5</u>	<u>264-hrs</u>	<u>See 601.9.3.5</u>
	<u>Three-column pier cap (Less than 16-ft in each span, and less than 5-ft in height)</u>	<u>3 or less</u>	<u>240-hrs</u>	<u>144-hrs</u>	<u>192-hrs</u>
		<u>4</u>	<u>See 601.9.3.5</u>	<u>216-hrs</u>	<u>See 601.9.3.5</u>
		<u>5</u>	<u>See 601.9.3.5</u>	<u>240-hrs</u>	<u>See 601.9.3.5</u>
<u>Rectangular Footer (Thickness = H x Width x Length)</u>	<u>H X 3H X 4H</u>	<u>3 or less</u>	<u>240-hrs</u>	<u>144-hrs</u>	<u>144-hrs</u>
		<u>3.5</u>	<u>See 601.9.3.5</u>	<u>192-hrs</u>	<u>240-hrs</u>
		<u>4</u>	<u>See 601.9.3.5</u>	<u>240-hrs</u>	<u>See 601.9.3.5</u>
	<u>H X 4H X 4H</u>	<u>2.5 or less</u>	<u>96-hrs</u>	<u>96-hrs</u>	<u>120-hrs</u>
		<u>3</u>	<u>240-hrs</u>	<u>168-hrs</u>	<u>192-hrs</u>
		<u>3.5</u>	<u>See 601.9.3.5</u>	<u>240-hrs</u>	<u>240-hrs</u>
	<u>H X 4H X 5H</u>	<u>2.5 or less</u>	<u>96-hrs</u>	<u>120-hrs</u>	<u>120-hrs</u>
		<u>3</u>	<u>240-hrs</u>	<u>168-hrs</u>	<u>240-hrs</u>
		<u>3.5</u>	<u>See 601.9.3.5</u>	<u>240-hrs</u>	<u>See 601.9.3.5</u>
	<u>H X 4H X 36</u>	<u>2.5 or less</u>	<u>240-hrs</u>	<u>240-hrs</u>	<u>240-hrs</u>
		<u>3</u>	<u>See 601.9.3.5</u>	<u>264-hrs</u>	<u>See 601.9.3.5</u>

**DRAFT****601.9-MASS CONCRETE TEMPERATURE CONTROL:****601.9.1-Cold Weather Concreting:**

ADD THE FOLLOWING TO THE END OF THE SUBSECTION:

**Class M Concrete Cold Weather Provisions:** Cold weather periods shall be defined as those periods when temperatures above 50 °F do not occur for more than half of any 24-hour duration. The temperature of the surface on which the concrete is to be placed shall not be less than 40 °F immediately prior to the placement of the concrete. During the cold weather periods, as defined above, the temperature of the concrete immediately after placement shall be between 50 °F to 65 °F

ADD THE FOLLOWING CONTENT AS A NEW SUBSECTION:

**601.9.3-Mass Concrete:**

**601.9.3.1-General:** Mass concrete is defined as “Any large volume of cast-in-place concrete with dimensions large enough to require measures to be taken to cope with the generation of heat and attendant volume changes to minimize cracking”. A concrete element’s dimensions will be classified as mass concrete when the early-age tensile stresses exceed 80% of the tensile strength. Rock socketed drilled shafts shall not be classified as mass concrete.

~~This section describes the requirements for concrete used in mass concrete elements and is intended to produce structures free of thermal cracks caused by the heat of hydration during the curing of large concrete cross-sections. This is accomplished by using appropriate mix designs, cross-section, and managing the structure’s temperature differential. This section does not apply to rock socketed drilled shafts. Concrete pier stems, pier caps, footers, and abutments shall be considered mass concrete if they exceed the dimensions in Section 601.9.3.1.12, Section 601.9.3.1.2, and Section 601.9.3.1.34, respectively.~~

~~Compensation for conforming to these requirements will be at no additional cost and shall be included in Pay Items for individual elements identified in the plans.~~

**601.9.3.1.1-Requirements for Requirements for Miscellaneous Mass Concrete Mass Definition Tables:** Tables in Section 601.9.3.1.1601.9.2, Section 601.9.3.1.2601.9.3 and Section 601.9.3.1.3601.9.4 shall be cast with Class M and Class B concrete meeting the requirements in Table 601.3.1A, Table 601.3.1B, and Table 601.3.1F. The placement temperature of a concrete element shall meet the requirements of 601.10.1.4. Concrete forms for non-insulated concrete elements shall remain in place for a minimum of ninety-six (96) hours. Concrete shall be cured following 601.12.1. When insulation is not used, a plastic sheet shall cover the concrete forms to protect the concrete element from excessive wind. Tables labeled as “non-insulated” shall only be used in ambient temperatures above 60 °F. Ambient temperature below the 60 °F range shall require insulation. Insulated concrete elements shall have insulated formworks or blankets with a minimum overall R-value of five (5). The insulation shall remain in place until the requirements in 601.8.11 are met for Class M concrete and the requirements in 601.8.7 are met for Class B concrete.

601.9.3.1.1-Pier Stems: Pier stems with minimum dimensions per Table 601.9.3.1.1 – Table 601.9.3.1.6 shall be designated as mass concrete and require a thermal control plan meeting the requirements in 601.9.3.5.

**TABLE 601.9.3.1.1**

<b><u>Class M Option 1 (Non-Insulated)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>Circular</u>	<u>&gt; 3.5 ft</u>
<u>Square</u>	<u>≥2.5 ft</u>
<u>Rectangular</u>	<u>&gt;1.5 ft</u>

**TABLE 601.9.3.1.2**

<b><u>Class M Option 1 (Insulated R&gt;5)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>Circular</u>	<u>&gt; 6.0 ft</u>
<u>Square</u>	<u>&gt;4.5 ft</u>
<u>Rectangular</u>	<u>&gt;3.0 ft</u>

**TABLE 601.9.3.1.3**

<b><u>Class M Option 2 &amp; 3</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>Circular</u>	<u>&gt; 4.5 ft</u>
<u>Square</u>	<u>≥3.0 ft</u>
<u>Rectangular</u>	<u>&gt;2.0 ft</u>

**TABLE 601.9.3.1.4**

<b><u>Class M Option 2 &amp; 3 (Insulated R&gt;5)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>Circular</u>	<u>&gt; 8.0 ft</u>
<u>Square</u>	<u>≥5.5 ft</u>
<u>Rectangular</u>	<u>&gt;4.0 ft</u>

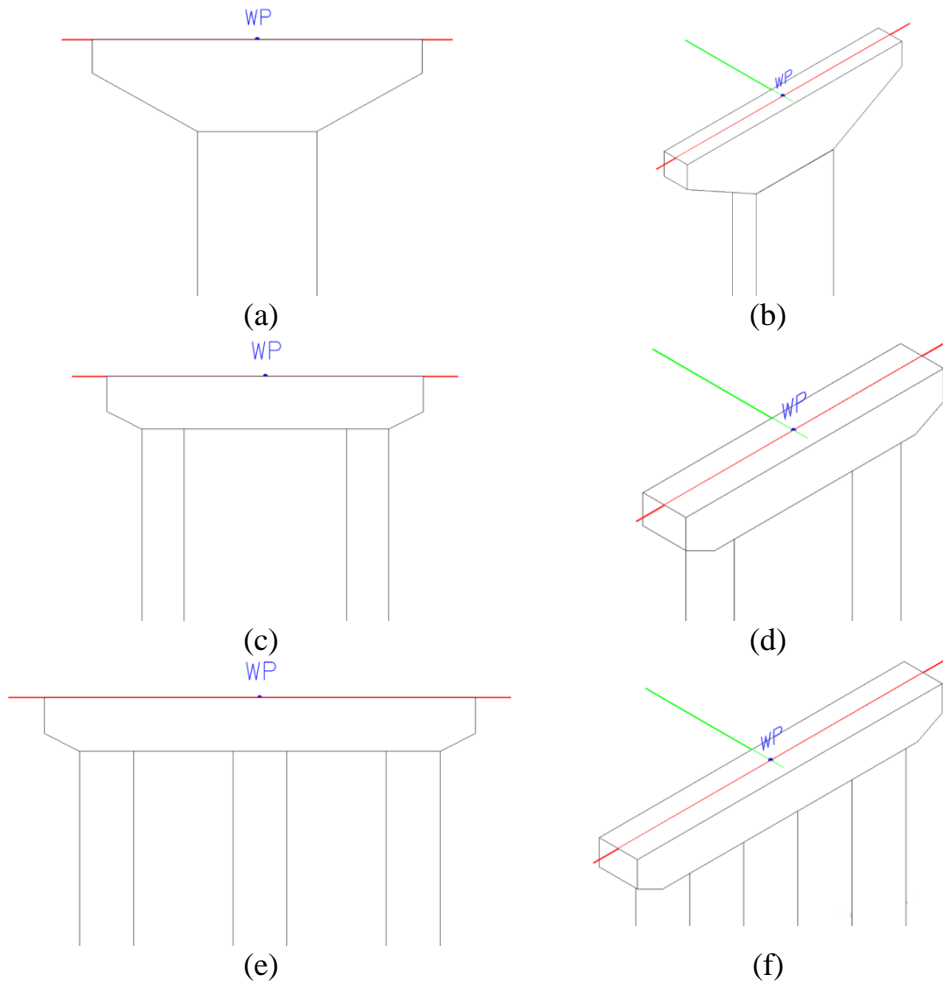
**TABLE 601.9.3.1.5**

<b><u>Class B (Non-Insulated)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>Circular</u>	<u>&gt; 3.0 ft</u>
<u>Square</u>	<u>≥2.0 ft</u>
<u>Rectangular</u>	<u>&gt;1.5 ft</u>

**TABLE 601.9.3.1.6**

<b><u>Class B (Insulated R≥5)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>Circular</u>	<u>&gt; 5.5 ft</u>
<u>Square</u>	<u>≥4.0 ft</u>
<u>Rectangular</u>	<u>&gt;2.5 ft</u>

**601.9.3.23-Pier Caps:** Pier caps with minimum dimensions ( $W$ ) per Table 601.9.3.2.1 – Table 601.9.3.2.6 shall be designated as mass concrete and require a thermal control plan meeting the requirements in 601.9.3.5. A hammerhead type pier cap with less than 14-ft in width and less than 5-ft in height shall be treated as a “14-ft Hammerhead”. A hammerhead type pier cap with less than 36-ft in width and less than 10-ft in height shall be treated as a “36-ft hammerhead”. “Two-column” pier cap shall have the span of less than 23-ft, and height of less than 5-ft. “Three-column” pier cap shall have the span of less than 16-ft, and height of less than 5-ft. A schematic drawing of a hammerhead, a two-column and a three-column pier cap is shown in Figure 601.9.3.2A.



**Figure 601.9.3.2A:** Schematic drawing of a hammerhead pier cap (a) front view (b) isometric view, a two-column pier cap (c) front view (d) isometric view, a three-column pier cap (e) front view (f) isometric view.

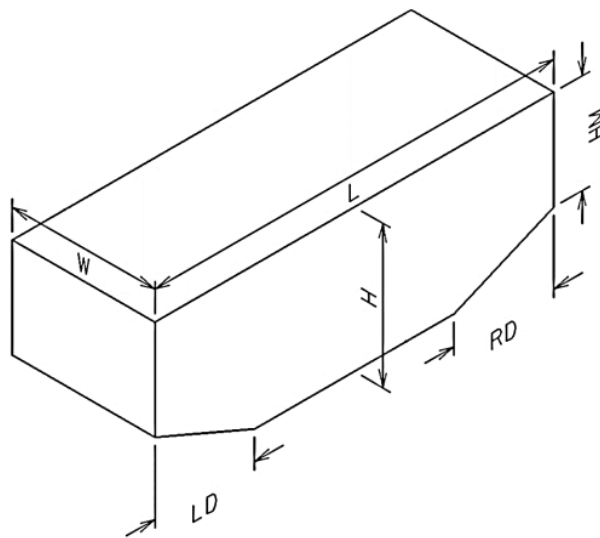
Detailed dimensions of each pier cap type are shown in TABLE 601.9.3.2. A schematic of the pier cap geometry and the parameters used in TABLE 601.9.3.2 are shown in



Figure 601.9.3.2B. The dimensions shown in TABLE 601.9.3.2 remain the same and only the thickness 'W' changes.

**TABLE 601.9.3.2**

<u>Types</u>	<u>Pier Cap Dimensions</u>			
	<u>L (ft)</u>	<u>H (ft)</u>	<u>HM (ft)</u>	<u>LD and RD (ft)</u>
<u>Hammerhead (14ft)</u>	<u>14</u>	<u>5</u>	<u>3.5</u>	<u>3.5</u>
<u>Hammerhead (36ft)</u>	<u>36</u>	<u>10</u>	<u>3.625</u>	<u>11.5</u>
<u>Two-Column Pier Cap (30ft)</u>	<u>30</u>	<u>5</u>	<u>3.333</u>	<u>3.3</u>
<u>Three-Column Pier Cap (40ft)</u>	<u>40</u>	<u>5</u>	<u>3.333</u>	<u>3.3</u>



**Figure 601.9.3.2B: Pier Cap Geometry**

**TABLE 601.9.3.2.1**

<u>Class M Option 1 (Non-Insulated)</u>	
<u>Geometry</u>	<u>Minimum Cross-Section</u>
<u>14 ft Hammerhead</u>	<u>&gt; 2.0 ft</u>
<u>36 ft Hammerhead</u>	
<u>Two-Column</u>	
<u>Three-Column</u>	

**TABLE 601.9.3.2.2**

<u>Class M Option 1 (Insulated R≥5)</u>	
<u>Geometry</u>	<u>Minimum Cross-Section</u>
<u>14 ft Hammerhead</u>	<u>&gt; 5.0 ft</u>
<u>36 ft Hammerhead</u>	<u>&gt; 3.0 ft</u>
<u>Two-Column</u>	<u>&gt; 2.5 ft</u>
<u>Three-Column</u>	<u>&gt; 3.0 ft</u>

**TABLE 601.9.3.2.3**

<b><u>Class M Option 2 &amp; 3 (Non-Insulated)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>14 ft Hammerhead</u>	<b><u>&gt; 2.5 ft</u></b>
<u>36 ft Hammerhead</u>	
<u>Two-Column</u>	
<u>Three-Column</u>	

**TABLE 601.9.3.2.4**

<b><u>Class M Option 2 &amp; 3 (Insulated R&gt;5)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>14 ft Hammerhead</u>	<b><u>&gt; 6.0 ft</u></b>
<u>36 ft Hammerhead</u>	<b><u>&gt;3.5 ft</u></b>
<u>Two-Column</u>	<b><u>&gt;3.0 ft</u></b>
<u>Three-Column</u>	<b><u>&gt;3.5 ft</u></b>

**TABLE 601.9.3.2.5**

<b><u>Class B (Non-Insulated)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>14 ft Hammerhead</u>	<b><u>&gt; 2.0 ft</u></b>
<u>36 ft Hammerhead</u>	
<u>Two-Column</u>	
<u>Three-Column</u>	

**TABLE 601.9.3.2.6**

<b><u>Class B (Insulated R&gt;5)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>14 ft Hammerhead</u>	<b><u>&gt; 4.5 ft</u></b>
<u>36 ft Hammerhead</u>	<b><u>&gt;2.5 ft</u></b>
<u>Two-Column</u>	<b><u>&gt;2.0 ft</u></b>
<u>Three-Column</u>	<b><u>&gt;2.5 ft</u></b>

**601.9.3.3 3.4-Footers:** Footers with minimum dimensions per Table 601.9.3.3.1 – Table 601.9.3.3.6 shall be designated as mass concrete and require a thermal control plan meeting the requirements in 601.9.3.5. “H” in the tables shall be referred to as the minimum dimension in thickness. The actual minimum dimension shall be rounded up to the nearest tabulated minimum dimension.

**TABLE 601.9.3.3.1**

<b><u>Class M Option 1 (Non-Insulated)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>H x 3H x 4H</u>	<b><u>&gt; 2.5 ft</u></b>
<u>H x 4H x 4H</u>	
<u>H x 4H x 5H</u>	
<u>H x 4H x 36</u>	

**TABLE 601.9.3.3.2**

<b><u>Class M Option 1 (Insulated R&gt;5)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>H x 3H x 4H</u>	<u>&gt; 3.0 ft</u>
<u>H x 4H x 4H</u>	
<u>H x 4H x 5H</u>	<u>&gt;2.5 ft</u>
<u>H x 4H x 36</u>	

**TABLE 601.9.3.3.3**

<b><u>Class M Option 2 &amp; 3 (Non-Insulated)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>H x 3H x 4H</u>	<u>&gt; 3.0 ft</u>
<u>H x 4H x 4H</u>	
<u>H x 4H x 5H</u>	<u>&gt;2.5 ft</u>
<u>H x 4H x 36</u>	

**TABLE 601.9.3.3.4**

<b><u>Class M Option 2 &amp; 3 (Insulated R&gt;5)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>H x 3H x 4H</u>	<u>&gt; 3.5 ft</u>
<u>H x 4H x 4H</u>	
<u>H x 4H x 5H</u>	<u>&gt; 3.0 ft</u>
<u>H x 4H x 36</u>	<u>&gt;2.5 ft</u>

**TABLE 601.9.3.3.5**

<b><u>Class B (Non-Insulated)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>H x 3H x 4H</u>	<u>&gt; 2.0 ft</u>
<u>H x 4H x 4H</u>	
<u>H x 4H x 5H</u>	
<u>H x 4H x 36</u>	

**TABLE 601.9.3.3.3**

<b><u>Class M Option 2 &amp; 3 (Insulated R&gt;5)</u></b>	
<b><u>Geometry</u></b>	<b><u>Minimum Cross-Section</u></b>
<u>H x 3H x 4H</u>	<u>&gt; 2.5 ft</u>
<u>H x 4H x 4H</u>	
<u>H x 4H x 5H</u>	<u>&gt;2.0 ft</u>
<u>H x 4H x 36</u>	

**601.9.3.5-Thermal Control Plan:** When it is determined that a Thermal Control Plan is required, as outlined in Section 601.9.2, the following provisions shall apply. The Thermal Control Plan shall describe the measures and procedures the Contractor intends

to use to satisfy the following Temperature Control Requirements for each mass concrete element.

- i. The Maximum Allowable Temperature Differential shall be limited to 35 °F. The temperature differential between the hottest interior location and exterior portions of the designated mass concrete elements during curing will be maintained to be less than or equal to this Maximum Allowable Temperature Differential, and
- ii. The Maximum Allowable Concrete Temperature shall be limited to 160 °F.

A change to the Temperature Control Requirements specified above can be addressed in the Thermal Control Plan through a demonstration that deleterious effects to the concrete can be avoided through adherence to the Thermal Control Plan. Such a change requires approval by the Engineer.

As a minimum, the Thermal Control Plan shall include the following:

- A. Mix Design.
- B. Methodology used to determine the heat of hydration.
- C. Duration and method of curing.
- D. Methods of controlling maximum concrete temperature and temperature differentials.
- E. An analysis of the anticipated thermal developments in the mass concrete elements for all expected project temperature ranges using the proposed mix design, casting procedure, and materials. It shall show complete details and determine the maximum allowable temperature differentials between the hottest point of the concrete and the exterior faces.
- F. Temperature sensor type and location including installation details.
- G. Temperature Monitoring System includes description, operating plan, recording, and reporting plan, and remedial action plan.
- H. Field measures to ensure conformance with the maximum concrete temperature and temperature differential requirements.
- I. Field methods of applying immediate corrective action should the temperature differential approach the Maximum Allowable Temperature Differential.

The Contractor shall submit the Thermal Control Plan to the Engineer for approval a minimum of thirty (30) working days prior to concrete placement. Mass concrete placement shall not begin until the Engineer has accepted the Thermal Control Plan and the demonstration placement has verified the accuracy of the temperature predictions. If the demonstration placement fails to verify the accuracy of the temperature predictions to the satisfaction of the Engineer, the Thermal Control Plan shall be revised and resubmitted. If necessary, a second demonstration placement shall be required by the Engineer.

**601.9.3.5.1–Temperature Monitoring System:** The temperature monitoring and recording system for mass concrete shall consist of temperature sensors connected to a data acquisition system capable of printing, storing, and downloading data to a computer. Temperature sensors shall be located such that the maximum temperature difference within a mass concrete element can be monitored. As a minimum, concrete temperatures shall be monitored: within 1 inch of the calculated hottest location, an outside vertical edge of the outer face that is furthest from the center of the element, and at both the center and an outside edge of the top surface. No temperature sensor shall be placed within the clear distance between the reinforcing steel and the outer concrete surface

Temperature readings shall be automatically recorded on an hourly or more frequent basis. A redundant set of sensors shall be installed near the primary set. Provision shall be made for recording the redundant set, but records of the redundant sensors need not be made if the primary set is operational.

Methods of concrete consolidation shall prevent damage to the temperature monitoring and recording system. Wiring from temperature sensors cast into the concrete shall be protected to prevent movement. Wire runs shall be kept as short as possible. The ends of the temperature sensors shall not come into contact with either supports or concrete form or reinforcing steel.

When any equipment used in the temperature control and monitoring and recording system fails during the mass concrete construction operation, the Contractor shall take immediate remedial measures to correct the situation. Remedial measures shall be included in the Thermal Control Plan.

**601.9.3.5.2–Construction:** Temperature readings will begin immediately after casting is complete. Temperature reading will continue until the maximum temperature differential (not maximum temperature) is reached and a decreasing temperature differential is confirmed as defined in the Thermal Control Plan and the maximum concrete temperature is within the Maximum Allowable Temperature Differential of the ambient air temperature in the shade. Data shall be submitted to the Engineer daily.

**601.9.3.5.3-Temperature Control Failure:** If monitoring indicates the Temperature Control Requirements have been exceeded, the Contractor shall take immediate corrective action as defined in the Thermal Control Plan. The Contractor will provide all analyses and test results deemed necessary by the Engineer for determining the structural integrity and durability of the mass concrete element. If, in the sole opinion of the Engineer, the concrete placement has been damaged so as not to be serviceable as a result of exceeding the Temperature Control Requirements, then the Contractor shall remove and replace the concrete placement at no additional cost to the project. The Contractor will make the necessary revisions to the approved Thermal Control Plan to satisfy the Temperature Control Requirements on any remaining placements. Revisions to the approved plan must be approved by the Engineer prior to implementation. The revised plan will be used on future placements. No extension of time or compensation will be made for any rejected mass concrete element or revisions of the Thermal Control Plan.

If the monitoring indicates that the Temperature Control Requirements have been exceeded then a penalty shall be assessed for bullets (i) and (ii) above in 601.9.3.5 if the concrete is allowed to remain in place, independently as follows:

\$100/ °F or fraction there-of the allowable temperature range multiplied by the number of yards in the element.

## **601.10–PLACING CONCRETE:**

### **601.10.1–General:**

ADD THE FOLLOWING SUBSECTION:

**601.10.1.4–Class M Concrete Placement Limitations:** The maximum concrete placement temperature of Class M concrete shall not exceed 75 °F. Class M concrete shall

not be used in cold weather placements, as defined in 601.9.1, without form insulation. The anticipated placement completion time of non-insulated Class M concrete shall be between 12:00 AM to 10:00 AM.

## **601.12–CURING AND PROTECTING CONCRETE:**

### **601.12.1–Curing Under Normal Conditions:**

DELETE THE SECOND PARAGRAPH IN THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

Concrete surfaces shall be kept completely and continuously moist. Curing shall be continued for a period of at least seven (7) days. This curing period may be reduced if the contractor presents evidence that the in-place concrete has attained 70% of the specified strength for the class of concrete under cure. Under no circumstances shall the period of cure be less than three (3) days. The reduced curing period option does not apply to Class H, Class K, or Class M concrete. When placing concrete elements with a minimum dimension greater than two (2)-feet (0.61-m), the contractor shall not be permitted to add additional cement to the target cement factor in the approved mix design to obtain high-early strength and/or reduce curing time. Water spreading directly on the concrete surface shall not be permitted for concrete elements with a minimum dimension greater than 1.5-feet. Plastic sheets shall be used to protect exposed concrete surfaces from wind and evaporation. Moist burlap shall be placed on the plastic sheets. Mass concrete placement shall be completely protected from exposure to precipitation to prevent cooling of the surface this includes extruding steel reinforcement. Mass concrete placement shall be continuously moist cured for at least seven (7) days. Concrete forms shall be considered to prevent moisture loss for mass concrete placements and be counted as moist curing days. The temperature of any water used for moist curing of concrete shall be controlled to within 10°F of the mean concrete surface temperature. Surfaces may have coverings temporarily removed for finishing, but the covering shall be restored as soon as possible. When protection is removed from the structure after the specified curing is complete, the temperature of the concrete shall not be permitted to fall at a greater rate than 20°F per 24- hrs.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 609  
SIDEWALKS

609.2-MATERIALS:

609.2.1-Detectable Warning Surfaces:

DELETE THE CONTENTS IN SUBSECTION 609.2.1 AND REPLACE WITH THE FOLLOWING:

Detectable warning panels shall have a detectable warning surface meeting Proposed Accessibility Guidelines for Pedestrian Facility in Public Right of Way (PROWAG), latest edition, requirements. The detectable warning surface should be comprised of truncated domes. Detectable warning panel and surface dimensions shall be ADA Standards for Accessible Design compliant. The panel dimensions shall not deviate more than 1/16 inch. Detectable warnings shall be evaluated by AASHTO Product Evaluation and Audit Solutions. The results shall meet the requirements of AASHTO T 388. AASHTO T 388 requires ADA Standards for Accessible Design dimensions of Detectable Warnings. The dome dimension range requirements before and after testing are shown in Table 609.2.1.

Dimensions of Reference from ADA Standards for Accessible Design:

TABLE 609.2.1

<u>Dome Element</u>	<u>Dome Dimension Ranges Before and After Testing</u>
<u>Dome Size Base Diameter</u>	<u>0.9 inch minimum – 1.4 inch maximum</u>
<u>Dome Size Top Diameter</u>	<u>50% of Base Diameter min – 65% of Base Diameter max</u>
<u>Dome Height</u>	<u>0.2 inch required</u>

The panel colors shall be as shown in the plans or as approved by the Engineer. The panel shall contrast visually with adjacent gutter, street or highway, or curb ramp surface, either light-on-dark or dark-on-light. The color black shall not be accepted. -The panels shall be textured to provide a slip resistant surface.

There shall be two (2) types of warning surfaces: panels for fresh concrete surfaces while the concrete is still plastic and panels for cured concrete surfaces. Mold-in-place concrete domes, brick pavers, tiles, or iron or steel warning systems shall not be used. Detectable warning panels must be on the WVDOH Approved Products List. All materials to be used shall be covered by a five (5) year manufacturer warranty under normal conditions. The installed device dimensions shall remain ADA Standards for Accessible Design compliant for the duration of the warranty period.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 625

ROCK SOCKETED DRILLED SHAFT

**625.5-MATERIALS:**

**625.5.3-Casing:**

DELETE THE CONTENTS IN SUBSECTION 625.5.3 AND REPLACE WITH THE FOLLOWING:

Metal casing shall be used in the upper drilled shaft portion of the rock socketed drilled shaft to prevent caving of the soil material or to exclude ground water. Casing shall be metal, of unit or sectional construction, be strong enough to withstand handling stresses, withstand the pressures of concrete and of the surrounding earth and ground water, and prevent seepage of water. The casing used shall be selected by the Contractor to control dimensions and alignment of excavations within tolerances, to seal the casing into impervious materials, and to execute all other construction operations.

Casing pipe used for permanent applications shall be new material and conform to ASTM A252, Grade 2. When used for temporary applications only, casing pipe shall conform to ASTM A252, Grade 2.

Any required casing splices shall be welded with no interior splice plates, producing true and straight casing. All welding shall be in accordance with ANSI/AWS D1.1.

Permanent casing is required in all drilled shafts where noted on the plans. All temporary casing shall be removed during placement of concrete unless otherwise noted on the plans. Should the Contractor be unable to remove the temporary casing or if conditions require the temporary casing remain in place, the Contractor shall pressure grout the annular space between ~~casing~~ any casing remaining in place and soil. Materials and methods for the pressure grouting operation shall be submitted to the Engineer for approval for the pressure grouting operation. There shall be no additional cost to the Division for the pressure grouting operation.



**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 688**

**FIELD PAINTING OF METAL STRUCTURES**

DELETE THE CONTENTS OF THE ENTIRE SECTION AND REPLACE WITH THE FOLLOWING:

**688.1-DESCRIPTION:**

All field painting (coating) of metal structures shall follow the provided requirements set forth in this specification unless otherwise directed within the contract documents. This specification shall apply to surface preparation, paint application, paint inspection, contractor responsibilities, environmental and worker protection, and waste handling/disposal. Manufacturer's Recommendation shall be based only on information published in the most current Product Data Sheets (PDS) for the paint material in question.

**688.2-SURFACE PREPERATION:**

All structures shall be washed in accordance with Section 685 Bridge Cleaning prior to performing any of the other surface preparations provided herein. Surface preparation shall be performed in such a manner that no damage is done to partially or entirely completed portions of work.

**688.2.1-Non-Blasting:** When non-blast cleaning is specified within the contract documents, any one or any combination of the SSPC method(s) listed may be used to achieve the specified surface cleanliness and surface profile in accordance with the SSPC method(s) used.

1. Hand Tool Cleaning shall meet the requirements of SSPC-SP 2 prior to painting.
2. Power Tool Cleaning shall meet the requirements of SSPC-SP 3 prior to painting.
3. Commercial Grade Power Tool Cleaning shall meet the requirements of SSPC-SP 15 prior to painting.

**688.2.2-Blasting:** When blast cleaning is specified within the contract documents, any one or any combination of the SSPC/NACE joint surface preparation method(s) listed may be used to achieve the specified surface cleanliness and surface profile in accordance with the SSPC/NACE method(s) used.

**688.2.2.1-Commercial Blast:** Shall meet the requirements of SSPC-SP 6 / NACE 3 prior to painting.

**688.2.2.2-Brush-Off Blast:** Shall meet the requirements of SSPC-SP 7 / NACE 4 prior to painting.

**688.2.2.3-Near White Metal Blast:** Shall meet the requirements of SSPC-SP 10 / NACE 2 prior to painting.

**688.2.2.4-Water Jetting:** Shall meet the requirements of SSPC-SP WJ-1 / NACE WJ-1 prior to painting.

**688.2.2.5-Post-Surface Preparation:** Upon completion of surface preparations, any area repaired by welding, grinding, or other destructive means, shall have the surface cleanliness and anchor pattern restored prior to paint application in accordance with Section 688.2.

All dust, loose residues, and abrasives shall be removed from prepared surfaces by brushing, blowing off with clean, dry air, or vacuum cleaning. All blast cleaned surfaces shall be painted prior to any rust bloom or flash rust occurring or within 24 hours, whichever occurs first. In the event rust bloom or flash rusting occurs, the affected areas shall be prepared again to achieve the specified cleanliness in accordance with the SSPC/NACE methods(s) previously used.

**688.2.3- Abrasives:** The abrasives used for all blasting shall meet the guidelines set forth in SSPC AB1 for mineral and slag abrasives, and AB3 for ferrous metallic abrasives. Any additive mixed with the abrasive shall be approved by the Division prior to use. The abrasives used shall produce a height of profile between 2.0 and 3.0 mils.

The container/bag of abrasive shall include the name of the abrasive, the name of the manufacturer, and the size of the abrasive. If any additive has been included with the abrasive, the name and the percentage of the additive shall be included on the container/bag.

The compressed air used for nozzle blasting shall be free of water and oil. The cleanliness of each compressed air system shall be verified at least once per shift using the blotter test in accordance with ASTM D4285, "Standard Test Method for Indicating Oil or Water in Compressed Air".

### **688.3-PAINT (COATING) APPLICATION REQUIREMENTS:**

Proper surface preparation in accordance with contract plans and section 688.2 of this specification shall be obtained prior to any paint application. The chosen paint system shall meet the requirements of Section 711, Protective Coatings, Stains, and Traffic Paints. The paint shall be applied by spray methods. Areas that are inaccessible to spray methods may be brushed or rolled. The paint application method used must achieve the specified film thickness and coverage in accordance with the manufacturer's recommendations. Application requirements and drying times between coats shall be in accordance with the manufacturer's recommendations.

**688.3.1-Weather Conditions:** Weather conditions shall be in accordance with the paint manufacturers recommendations. Heated containment may be used at the direction of the Engineer.

**688.3.2-Paint Storage:** Paint and thinners shall be stored in accordance with the manufacturers recommendations. At no time will paint be permitted to be used beyond the manufacturer's shelf life.

**688.3.3-Mixing and Thinning:** Paint shall be mixed and thinned in strict accordance with the manufacturer's written instructions. When thinning is necessary the dry film thickness requirement shall still be met by appropriately increasing the wet film thickness.

**688.3.4 Galvanized Surfaces:** Painting Galvanized surfaces shall be in accordance with the paint manufacturer's recommendations. Repair of galvanized surfaces shall be in accordance with ASTM A780

**688.3.5 Paint Containment:** Appropriate containment shall be placed around the work area to protect public and private property. Complete protection shall be provided by the contractor against paint spatter, spillage, overspray, wind-blown paint, or similar releases. Staging must be adequate to provide access to all areas being painted.

Any violation of these requirements resulting in excessive paint material waste will be justification for the Engineer to order the Contractor to cease all work on the project until corrective action has been taken. The method of corrective action shall be submitted to the Engineer in advance for approval. Any corrective actions taken, or replacement of paint material will be at the Contractor's expense.

**688.3.6-Paint Systems:**

3 COAT SYSTEM: Organic Zinc Primer, Intermediate, Top Coat

2 COAT SYSTEM: Organic Zinc Primer, Top Coat (2 coats of the Top Coat)

1 COAT SYSTEM: Organic Zinc Primer or Epoxy Mastic Primer

**688.3.7-Painting Sequence:**

**FULL PRIME COAT:**

The structure shall receive one coat of an Organic Zinc primer meeting the requirements of the applicable sections of Specification 711. The full prime coat shall be applied in accordance with the manufacturer's recommendations. Dry film thickness requirements shall be in accordance with the manufacturer's recommendations.

**STRIPE COAT:**

All edges, outside corners, seams, bolt heads and nuts, all rivet heads, edges of flanges and plates, welds, sharp edges, in general all edges, shall receive one stripe coat. The stripe coat shall be applied in accordance with the manufacturer's recommendations. The stripe coat shall extend a minimum of one (1) inch from the edge. The stripe coat shall be a contrasting color to the full prime coat, as well as the coat of paint applied following the stripe coat. The contractor will be responsible for consulting with the paint manufacturer to obtain a primer in a contrasting color for the stripe coat. The prime coat shall at a minimum, be set-to-touch before the stripe coat is applied. No dry film thickness is specified for this coat.

**INTERMEDIATE COAT:**

The structure may receive one uniform intermediate coat of paint meeting the requirements of the applicable sections of Specification 711. The intermediate coat shall be a contrasting color to the full prime, stripe coat and top coat. The contractor will be responsible

for consulting with the paint manufacturer to obtain an intermediate coat in a contrasting color to the other coats being applied. The intermediate coat shall be applied in accordance with the manufacturer's recommendations. Dry film thickness requirements shall be in accordance with the manufacturer's recommendations.

#### CAULKING:

The caulking material shall be compatible with the paint system being applied and shall be by written recommendation of the paint manufacturer. The caulking material shall be tested for compatibility with the paint system during the time that the paint is tested for intercoat compatibility. Caulking shall be applied prior to the application of the topcoat and in accordance with the manufacturer's recommendations.

This includes all seams between diaphragm connections to stiffeners and splices and seams between any connection that is riveted or bolted. Any welded connections that are not fully sealed by the weld shall be caulked with a paste type caulk. The caulk shall be pressed into the seams between the adjoining surfaces, by wetted finger or specialty tool, to ensure bond and provide a smooth uniform surface. Bottom seams shall not be caulked on vertical surfaces.

#### TOP COAT:

The structure shall receive one uniform coat of paint as designated in the plans meeting the requirements of the applicable sections of Specification 711. The color shall be as designated in the plans and shall be in accordance with current SAE-AMS-STD-595. Dry film thickness requirements shall be in accordance with the manufacturer's recommendations.

**688.3.7-Vegetation:** Vegetation may need to be trimmed or removed to accomplish the cleaning and painting of the structure. If permitted by the Contract Documents, the Contractor may waste vegetation within the Right-of-Way. Otherwise, any such vegetation cut shall be removed from the site by the contractor. No direct payment will be made for this work but shall be included in the contract price for the item in connections with which it is used .

**688.3.8-Utilities:** Shall be in accordance with Section 105.5 Cooperation with Utilities and Section 107.17, Contractor Responsibility for Utility Property and Services.

#### **688.4-INSPECTION:**

The Contractor shall furnish suitable, safe access for the Division's inspection of ALL bridge cleaning, surface preparation and painting operations. Rubber rollers or other protective devices shall be used when providing inspection access to avoid damage to previously painted surfaces. No temporary attachment supports for access, or forms, shall be allowed to damage the paint system. Any damage that occurs from such devices shall be repaired to the satisfaction of the Engineer at the Contractors expense.

**688.4.1-Inspection of Cleaning and Painting Operations:** The contractor shall provide the Engineer an inspection plan outlining "Hold Points" to occur during the bridge cleaning, surface preparation and paint application operations.

If the Engineer determines at any time, there are inadequacies during bridge cleaning and surface preparation, or defects in the applied coats of the paint system, the Contractor shall repair those areas to the satisfaction of the Engineer at the Contractors expense.

**688.4.2-Repair Procedures for Field Paint Deficiencies:** All field repairs to the paint system shall be made in strict accordance with the paint manufacturer's recommendations, except where the requirements listed in this specification are more stringent. The Contractor shall provide the Engineer with a repair plan to be approved prior to any repairs being made.

Paint Materials used during repairs shall be the same paint materials as applied according to the Contractors Quality Control Plan for Painting, Section 688.5.1.

All welds from which the paint has been damaged or is otherwise defective shall be cleaned and repaired in accordance with Section 688.2.

Surfaces that will be inaccessible for painting after erection shall be repaired and/or repainted prior to erection.

The Contractor is to exercise care during bridge cleaning and painting operations around expansion joints, weathering steel, and galvanized surfaces. Any damage to these areas found by the Engineer, as a result of the bridge cleaning, surface preparation or painting operations, shall be repaired and/or replaced, to the satisfaction of the Engineer, at the Contractor's expense.

Depending on the severity of the defect, total removal, and replacement of the effected coat of paint may be required. In order to avoid abrupt changes in paint thickness, the area adjacent to repair areas shall transition from zero paint thickness to full system thickness within not less than three (3) inches of the repair area by means of sanding the transition area.

No unsightly runs or sags shall be visible. All "mud-cracking" and/or "dry overspray" in the paint film shall be removed. Excessive bubbles or pinholes shall not be visible in the coat after examination under 8X magnification. Calibration of the thickness gage and dry film thickness measurements shall be in accordance with MP 708.40.00.

The requirements for the dry film thickness of the repair areas are the same as those specified for the paint system. The requirements specified herein for provisions for inspection, mixing, thinning, temperature and humidity, and application shall govern the painting of the repaired areas.

## **688.5-CONTRACTOR CERTIFICATIONS AND SUBMITTALS:**

Certifications and Submittals shall be forwarded through the Prime Contractor and be accepted by the Engineer prior to commencement of the subject work. This is the responsibility of both the Fabricator and the Field Contractor. Electronic submittals will be accepted.

**688.5.1-SSPC QP-1:** The Contractor shall be certified to perform coating applications according to *SSPC QP-1, Standard Procedure for Evaluating Qualifications of Industrial/Marine Painting Contractors, Field Applications in Complex Structures* in order to perform coating operations on all new and existing steel structures. The Contractor shall submit proof of such current certification to the Engineer before starting the Work.

**688.5.2-SSPC QP-2:** The Contractor shall be certified to perform coating removal operations according to *SSPC QP-2, Standard for Evaluating Painting Contractors, Removal of Hazardous Coatings from Industrial/Marine Steel Structures* in order to perform coating removal operations. The Contractor shall submit proof of this certification to the Engineer before starting the Work.

The SSPC QP-2 certified contractor shall assign a SSPC QP-2 qualified Competent Person to oversee removal activities to protect the environment and workers safety and health while performing removal activities under the contract. For the purposes herein a Competent Person is an individual who meets the qualifications defined in the document SSPC-QP2 –

Qualifications, Section 2. The SSPC QP-2 Competent Person shall be present during startup, surface preparations, removal operations, and waste removal/disposal activities to ensure and verify environmental protection and worker safety and health practices and procedures comply with the prepared plans.

The SSPC QP-2 Competent Person shall submit written certification to the Engineer that the Contractor's work operations are meeting the environmental and worker safety and health plans requirements weekly. The SSPC QP-2 Competent Person shall submit written certification at the completion of the project that the environmental and worker safety and health plans fully complied with all applicable regulations and was fully implemented by the Contractor. If any noncompliance is noted, the Competent Person shall submit in writing, within 24 hours of the noncompliance, the corrective actions taken by the Contractor to remedy the noncompliance.

**688.5.3-Quality Control Plan for Painting:** Minimum requirements and document form are set forth in MP 688.02.20.

**688.5.4-Containment/Disposal Control Plan for Existing Steel Structures:** Minimum requirements and document form are set forth in MP 688.03.20.

## **688.6-CLEANING AND PAINTING OF EXISTING STRUCTURES:**

The complete removal and replacement of existing paint systems shall follow the provided requirements set forth in this specification unless otherwise directed within the contract documents.

**688.6.1-Surface Preparation:** All contracts for the complete removal and replacement of the previous paint system shall undergo a "Near-White" blast cleaning in accordance with SSPC SP 10/NACE 2. All structural steel is to include 100% of the girders, stringers, diaphragms, floor beams, upper and lower chord members, drains, bearing devices, etc. In general, all accessible steel surfaces not galvanized, aluminum, or weathering steel shall be blast cleaned. All laminar and stratified rust that has formed on the existing steel surfaces shall be removed. Pack rust formed along the perimeter of mating surfaces of connected plates or shapes shall be removed to the extent feasible without mechanically detaching the mating surface.

**688.6.2-Paint Designation Label:** The bridge paint designation label will only be utilized during the complete removal and replacement of the paint system on existing or new structures. The paint designation label shall be located at abutment number one on the fascia web of the exterior girder with a southern or eastern orientation. The paint color will be semi-gloss black paint and shall be the same paint material/manufacturer as the full paint system applied, with the following information: the paint system, contractor, and the month-year the project was completed. The acronyms and details for the paint designation label will be assigned to the Contractor by the Materials Control, Soils and Testing Division when the Quality Control Plan for Painting is approved. All work performed regarding the paint designation label shall be considered incidental to the painting of the structure.

## **688.7-ZONE CLEANING AND PAINTING OF EXISTING STRUCTURES:**

The zone cleaning and painting of existing structures shall follow the provided requirements set forth in this specification unless otherwise directed within the contract documents. The contract documents shall specify the areas to be prepared, and zone painted.

**688.7.1-Surface Preparation:** The surface shall be prepared as specified in the contract documents. Specific instructions will be given on the amount of surface area required to be cleaned in accordance with section 688.2. If the surface preparation or removal of rust results in nicks or gouges, the work shall be suspended, and the damaged areas repaired to the satisfaction of the Engineer, at the Contractor's expense.

## **688.8-FIELD CLEANING AND PAINTING OF SHOP PRIMED STEEL:**

Field cleaning and painting of shop primed steel shall follow the provided requirements set forth in this specification unless otherwise directed within the contract documents.

**688.8.1-Surface Preparation:** The surface shall be prepared as specified in the contract documents and shall include the preparation of the primed surface for field painting, and the application of the remaining coats of the paint system. Prior to field coats, surface contamination such as rust, dirt, mud, oil, concrete, loose zinc, salts, or other foreign matter shall be removed in accordance with section 688.2 of this specification. Touch up of the primer shall be in accordance with section 688.4.2.

**688.8.2-Shear Studs:** When shear studs are applied in the field, repair to the Prime Coat shall be completed in accordance with section 688.4.2, to the satisfaction of the Engineer and prior to any and adjoining concrete work.

**688.8.3-Materials:** The Intermediate and/or Top Coats of paint shall meet the requirements of specification 711. Dry film thickness requirements shall be in accordance with the manufacturer's recommendations. Each coat shall be a contrasting color to the previous coat. In addition, the field intercoat adhesion shall be at least 3A when tested in accordance with MP 711.00.20.

## **688.9-ENVIRONMENTAL, WORKER PROTECTION, AND WASTE HANDLING:**

Environmental and worker protections shall be used when cleaning, painting, welding or cutting an existing bridge. The containment class, emission assessment methods and levels as defined by the current publication of SSPC Guide 6 shall be as stated in the contract documents. The specific pollution control system which is proposed for the complete capture, containment, collection, and disposal of the "Spent Material" generated by the work shall be included in the plan.

**688.9.1-"Spent Material":** This shall include all material generated by bridge cleaning and surface preparation operations. The "Spent Material" shall be sampled and tested in accordance with the current edition of SSPC Guide 7, and all other applicable State and Federal regulations. The Contractor shall, at the Contractor's expense, select a laboratory that will sample and analyze the "Spent Material" to determine if the spent material is hazardous or non-hazardous. The laboratory shall be certified by the WVDEP in accordance with 47CSR32 - *Regulations Governing Environmental Laboratories Certification and Standards*

*of Performance.* The laboratory certification shall be provided to the Engineer prior to the beginning of work. The waste transporter for both hazardous and non-hazardous waste shall be listed on the Contractor's Containment/Disposal Control Plan.

**688.9.2–Permits for Disposal of “Spent Material”:** Shall be in accordance with all State and Federal regulations and Section 107.2, Permits, Licenses, and Taxes.. The “spent material” shall not be disposed of until authorized by the Engineer and in no case shall “spent material” be allowed to accumulate longer than 90 days prior to transport.

**688.9.3-Temporary Waste Storage:** The Division (WVDOH) will obtain a provisional (temporary) EPA waste generator number for the project prior to the beginning of the work. The location of the temporary waste storage site at the project shall be noted in the Contractor's Containment/Disposal Control Plan. This location must be approved by the Division prior to beginning work.

**688.9.4-Additional Requirements for All Classes of Containment:** The Contractor shall provide ground covers beneath the containment area and all equipment where spills are possible to capture inadvertent spills or leaks of debris. Extend the covers a minimum of five (5) feet beyond the area to be covered. Debris shall be removed from the covers at least once per shift, or as directed by the Engineer. If the ground beneath the structure serves as the base of the containment, install and maintain air and dust impenetrable materials such as solid plywood panels or flexible materials such as tarpaulins. Provide explosion–proof lighting inside containment for all paint application. Maintain a minimum of ten (10) foot-candles for surface preparation and painting, and a minimum of thirty (30) foot-candles for inspection. Water booms shall be used to contain inadvertent releases of debris unless prohibited by navigation lanes. In these cases, a boat with a skimmer shall be available to collect fugitive materials. Remove all project-related debris from the surface of the water or from the stream sediment at the end of each working day at a minimum unless directed otherwise by the Engineer.

**688.9.5-Worker Protection:** Shall be in accordance with Section 107.7, Public Convenience and Safety, and any other applicable sections of Section 107. The Contractor shall have a Certified Industrial Hygienist (CIH) develop, review, and approve their written compliance plan. The CIH shall be certified by the American Board of Industrial Hygiene. The CIH, or a technician working under the direction of the CIH, shall be present during the first three days of work and at least twice a month thereafter. The CIH shall certify in writing during the first week of work and at the end of the work that the worker protection plan fully complied with all regulations and that the plans were fully implanted. Daily inspections of the work area shall be made by the project “competent person”. The Contractor shall have identified the “competent person” by name in both the CIH's written compliance plan and the Contractor's Containment/Disposal Control Plan. The compliance plan shall also include the “competent person's” qualifications and the frequency of inspections to be taken. The CIH requirements will not apply to those zone painting projects where only SP 2 and SP 3 surface preparation is being done.



**688.9.6-Division Employee Worker Protection:** The Contractor shall provide respiratory protection and protective clothing and other necessary equipment for up to 2 Division employees at each site.

**688.10-METHOD OF MEASUREMENT:**

The unit of measurement for “Clean and Paint Existing Steel Bridges”, "Containment and Disposal of Spent Material", “Field Painting of Shop Primed Steel” shall be lump sum. The unit of measurement for “Zone Cleaning and Painting Steel Bridges” shall be square foot.

**688.11-BASIS OF PAYMENT:**

Basis of Payment for “Clean and Paint Existing Steel Bridges”, "Containment and Disposal of Spent Material", “Field Painting of Shop Primed Steel” shall be lump sum price bid. “Zone Cleaning and Painting Steel Bridge” shall be square foot price bid. The cost for the items listed below, which price and payment shall be full compensation for furnishing all the materials and doing all the work herein prescribed in workmanlike and acceptable manner, including all labor, tools, equipment, supplies and incidentals necessary to complete the work.

**688.12-PAY ITEMS:**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>
688001-*	Clean and Paint Existing Steel Bridge	Lump Sum
688003-*	Containment and Disposal of Spent Material	Lump Sum
688005-*	Zone Cleaning and Painting Steel Bridge	Square Foot
688007-*	Field Painting of Shop Primed Steel	Lump Sum

\* Sequence number

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 688

FIELD PAINTING OF METAL STRUCTURES

DELETE THE CONTENTS OF THE ENTIRE SECTION AND REPLACE WITH THE FOLLOWING:

688.1-DESCRIPTION:

~~The~~ All field painting (coating) of metal structures shall follow the provided requirements set forth in this specification unless otherwise ~~noted~~ directed in within the contract documents. This specification shall apply to surface preparation, ~~coating~~ paint application, paint inspection, contractor responsibilities, environmental and worker protection, and waste handling/disposal. Manufacturer's Recommendation shall be based only on information published in the most current Product Data Sheets (PDS) for the paint material in question.

688.2-~~GENERAL~~ SURFACE PREPERATION:

All structures shall be washed in accordance with Section 685 Bridge Cleaning prior to performing any of the other surface preparations provided herein. Surface preparation shall be performed in such a manner that no damage is done to partially or entirely completed portions of work.

~~688.2.1-Bridge Pre-Cleaning and Washing: All structures shall be pre-cleaned and washed in accordance with Section 685 of the Specifications.~~

~~688.2.2-Surface Preparation:~~

688.2.2.1-Non-Blasting: When non-blast cleaning is specified ~~in~~ within the contract documents, any one or any combination of the SSPC method(s) below shall be listed may be used to achieve the specified surface cleanliness and surface profile in accordance with the SSPC method(s) used. The surface and the surface profile after cleaning shall meet the requirements of the methods below. The amount of material, rust scale, and pack rust removed after non-blast cleaning, will meet the requirements of the SSPC methods listed:

1. Hand Tool Cleaning shall meet the requirements of SSPC-SP 2 prior to painting.
2. Power Tool Cleaning shall meet the requirements of SSPC-SP 3 prior to painting.
3. Commercial Grade Power Tool Cleaning shall meet the requirements of SSPC-SP 15 prior to painting.

~~688.2.2.2-Blasting: The abrasives used for all blasting shall meet the guidelines set forth in SSPC AB1 for mineral and slag abrasives, and AB3 for ferrous metallic abrasives. Any additive mixed with the abrasive shall be approved by the Division prior to use. The abrasives used shall produce a height of profile between 2.0 and 3.0 mils.~~

~~In addition, the container or bag of abrasive shall include the name of the abrasive, the name of the manufacturer, and the size of the abrasive. If any additive has been included with the abrasive, the name and the percentage of the additive shall be on the container or bag.~~

~~The compressed air used for nozzle blasting shall be free of water and oil. The cleanliness of each compressed air system shall be verified at least once per shift using the blotter test in accordance with ASTM D4285, "Standard Test Method for Indicating Oil or Water in Compressed Air". When blast cleaning is specified within the contract documents, any one or any combination of the SSPC/NACE joint surface preparation method(s) listed may be used to achieve the specified surface cleanliness and surface profile in accordance with the SSPC/NACE method(s) used.~~

~~688.2.2.2.1-Commercial Blast: Shall meet the requirements of SSPC-SP 6 / NACE 3 prior to painting. The appearance of the steel surface after blast cleaning shall correspond to the applicable and current SP 6 pictorial standards of SSPC Vis 1.~~

~~688.2.2.2.2-Brush-Off Blast: Shall meet the requirements of SSPC-SP 7 / NACE 4 prior to painting. The appearance of the steel surface after brush-off blast cleaning shall correspond to the applicable and current SP 7 pictorial standards of SSPC Vis 1.~~

~~688.2.2.2.3-Near White Metal Blast: Shall meet the requirements of SSPC-SP 10 / NACE 2 prior to painting. The appearance of the steel surface after blast cleaning shall correspond to the applicable and current SP 10 pictorial standards of SSPC Vis 1.~~

~~688.2.2.34-Water Jetting: Shall meet the requirements of SSPC-SP WJ-1 / NACE WJ 1 and visual standard condition WJ 1 prior to painting.~~

~~688.2.2.45-Post-Surface Preparation: Surface prep operations shall be performed in such a manner that no damage is done to partially or entirely completed portions of the work. After surface prep, Upon completion of surface preparations, any areas repaired by welding, grinding, or other destructive means, shall have the surface cleanliness and anchor pattern restored prior to paint application in accordance with Section 688.2. that are repaired by welding shall be prepped again. Areas repaired by grinding or other means shall have the anchor pattern restored. Visible deposits of oil, grease, or other contaminants shall be removed according to SSPC-SP 1 "Solvent Cleaning" prior to painting. Dust, loose residues, and the removal of abrasives from pockets and corners shall be removed from prepared surfaces by brushing, blowing off with clean, dry air, vacuum cleaning. The prepped surface shall be checked for cleanliness by wiping a clean, dark cloth across the surface. If residue is present, the surface shall be cleaned again and rechecked. All blast cleaned surfaces shall be painted prior to any rust bloom or flash rust occurring or within 24 hours, whichever comes first.~~

~~All dust, loose residues, and abrasives shall be removed from prepared surfaces by brushing, blowing off with clean, dry air, or vacuum cleaning. All blast cleaned surfaces~~

shall be painted prior to any rust bloom or flash rust occurring or within 24 hours, whichever occurs first. In the event rust bloom or flash rusting occurs, the affected areas shall be prepared again to achieve the specified cleanliness in accordance with the SSPC/NACE methods(s) previously used.

**688.2.3- Abrasives:** The abrasives used for all blasting shall meet the guidelines set forth in SSPC AB1 for mineral and slag abrasives, and AB3 for ferrous metallic abrasives. Any additive mixed with the abrasive shall be approved by the Division prior to use. The abrasives used shall produce a height of profile between 2.0 and 3.0 mils.

The container/bag of abrasive shall include the name of the abrasive, the name of the manufacturer, and the size of the abrasive. If any additive has been included with the abrasive, the name and the percentage of the additive shall be included on the container/bag.

The compressed air used for nozzle blasting shall be free of water and oil. The cleanliness of each compressed air system shall be verified at least once per shift using the blotter test in accordance with ASTM D4285, "Standard Test Method for Indicating Oil or Water in Compressed Air".

**688.2.3-Paint Application Requirements**

**688.3-PAINT (COATING) APPLICATION REQUIREMENTS:**

Proper surface preparation in accordance with contract plans and section 688.2 of this specification shall be obtained prior to any paint application. The chosen paint system shall meet the requirements of Section 711, Protective Coatings, Stains, and Traffic Paints. The paint shall be applied by spray methods. Areas that are inaccessible to spray methods may be brushed or rolled. The paint application method used must achieve the specified film thickness and coverage in accordance with the manufacturer's recommendations. Application requirements and drying times between coats shall be in accordance with the manufacturer's recommendations.

**688.2.3.1-Weather Conditions:** Weather conditions shall be in accordance with the paint manufacturers recommendations. ~~Painting shall not be done when the ambient temperature is below 40°F or above 100°F, or the relative humidity above 90 percent (90%). The temperature of the steel must be at least 5°F above the dew point. Painting shall not be performed when the surface to be coated is sufficiently hot to cause blistering of the film or too rapid solvent release. Painting will only be permitted between the dates of April 15<sup>th</sup> through October 15<sup>th</sup>. There will be no painting permitted to occur in a heated containment. Heated containment may be used at the direction of the Engineer.~~

**688.2.3.2-Paint Storage:** Paint and thinners shall be stored in accordance with the manufacturers recommendations.~~a temperature controlled environment between 40°F and 100°F.~~ At no time will paint be permitted to be used beyond the manufacturer's shelf life.

~~**688.2.3.3-Paint Application:** The blast cleaned surface shall be painted within 24 hours. In the event rust bloom or flash rusting occurs, the affected members shall be re-cleaned by blasting. The paint shall be applied by spray methods, except those areas inaccessible to spray application may be brushed or rolled. Brushes or rollers, when used, shall have sufficient body and length of bristle or roller nap to spread a uniform coat. Small touch up areas may be brushed or rolled, if approved by the Engineer.~~

- ~~— Use of an agitated pot shall be mandatory in spray application of zinc-rich primer. The agitator or stirring rod shall reach within one (1) inch, of the bottom of the pot and shall be in motion at all times during paint application. Coatings shall be mixed in strict accordance with the coating manufacturer's written instructions. Under certain conditions, it may be necessary to thin or adjust the solvent balance of the paint. The type and amount of solvent to be used shall be that listed on the coating manufacturer's product data sheet for that material. Upon thinning, the dry film thickness requirement shall still be met by appropriately increasing the wet film thickness.~~
- ~~— Application requirements and drying times between coats shall be in accordance with the manufacturer's recommendations. Exposed steel surfaces of expansion dams shall be painted as specified for structural steel.~~
- ~~— Spray guns must be equipped with the recommended size tip for the paint product being applied and shall be held perpendicular (90 degrees) to, and at, the proper distance from the receiving surface. Complete protection shall be provided by the contractor against paint spatter, spillage, overspray, wind-blown paint, or similar releases.~~
- ~~— Appropriate containment shall be placed around the work area to protect public and private property. Staging must be adequate to provide access to all areas being painted. Violation of these requirements causing excessive paint waste will be justification for the WVDOH Engineer to order the Contractor to cease all work on the project until corrective action has been taken. The method of cleaning and/or replacement shall be submitted to the Engineer in advance for approval.~~

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**688.3.3-Mixing and Thinning:** Paint shall be mixed and thinned in strict accordance with the manufacturer's written instructions. When thinning is necessary the dry film thickness requirement shall still be met by appropriately increasing the wet film thickness.

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**688.3.4 Galvanized Surfaces:** Painting Galvanized surfaces shall be in accordance with the paint manufacturer's recommendations. Repair of galvanized surfaces shall be in accordance with ASTM A780

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**688.3.5 Paint Containment:** Appropriate containment shall be placed around the work area to protect public and private property. Complete protection shall be provided by the contractor against paint spatter, spillage, overspray, wind-blown paint, or similar releases. Staging must be adequate to provide access to all areas being painted.

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Any violation of these requirements resulting in excessive paint material waste will be justification for the Engineer to order the Contractor to cease all work on the project until corrective action has been taken. The method of corrective action shall be submitted to the Engineer in advance for approval. Any corrective actions taken, or replacement of paint material will be at the Contractor's expense.

- ~~— **688.2.3.3.1 Paint Systems:**
  - ~~— **3 COAT:** Primer, Intermediate, Top Coat~~
  - ~~— **2 COAT:** Primer, Top Coat~~
  - ~~— **1 COAT:** Epoxy Mastic only~~~~

~~—688.2.3.3.2-Painting over Galvanized Surfaces: Painting Galvanized surfaces shall be in accordance to the paint manufacturer's recommendations.~~

~~—688.2.3.3.3-Damage to Galvanized Surfaces: The Contractor is to exercise care while cleaning and painting around expansion joints and galvanized surfaces. Any damage to the expansion joints or galvanized surfaces found by the Engineer, as a result of the cleaning and painting operation shall be repaired and/or replaced, to the satisfaction of the Engineer, at the Contractor's expense.~~

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### **688.3.6-Paint Systems:**

3 COAT SYSTEM: Organic Zinc Primer, Intermediate, Top Coat

2 COAT SYSTEM: Organic Zinc Primer, Top Coat (2 coats of the Top Coat)

1 COAT SYSTEM: Organic Zinc Primer or Epoxy Mastic Primer

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### **688.3.7-Painting Sequence:**

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#### **FULL PRIME COAT:**

The structure shall receive one coat of an Organic Zinc primer meeting the requirements of the applicable sections of Specification 711. The full prime coat shall be applied in accordance with the manufacturer's recommendations. Dry film thickness requirements shall be in accordance with the manufacturer's recommendations.

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#### **STRIPE COAT:**

All edges, outside corners, seams, bolt heads and nuts, all rivet heads, edges of flanges and plates, welds, sharp edges, in general all edges, shall receive one stripe coat. The stripe coat shall be applied in accordance with the manufacturer's recommendations. The stripe coat shall extend a minimum of one (1) inch from the edge. The stripe coat shall be a contrasting color to the full prime coat, as well as the coat of paint applied following the stripe coat. The contractor will be responsible for consulting with the paint manufacturer to obtain a primer in a contrasting color for the stripe coat. The prime coat shall at a minimum, be set-to-touch before the stripe coat is applied. No dry film thickness is specified for this coat.

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#### **INTERMEDIATE COAT:**

The structure may receive one uniform intermediate coat of paint meeting the requirements of the applicable sections of Specification 711. The intermediate coat shall be a contrasting color to the full prime, stripe coat and top coat. The contractor will be responsible for consulting with the paint manufacturer to obtain an intermediate coat in a contrasting color to the other coats being applied. The intermediate coat shall be applied in accordance with the manufacturer's recommendations. Dry film thickness requirements shall be in accordance with the manufacturer's recommendations.

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#### **CAULKING:**

The caulking material shall be compatible with the paint system being applied and shall be by written recommendation of the paint manufacturer. The caulking material shall be tested for compatibility with the paint system during the time that the paint is tested for intercoat compatibility. Caulking shall be applied prior to the application of the topcoat and in accordance with the manufacturer's recommendations.

This includes all seams between diaphragm connections to stiffeners and splices and seams between any connection that is riveted or bolted. Any welded connections that are not fully sealed by the weld shall be caulked with a paste type caulk. The caulk shall be pressed

into the seams between the adjoining surfaces, by wetted finger or specialty tool, to ensure bond and provide a smooth uniform surface. Bottom seams shall not be caulked on vertical surfaces.

TOP COAT:

The structure shall receive one uniform coat of paint as designated in the plans meeting the requirements of the applicable sections of Specification 711. The color shall be as designated in the plans and shall be in accordance with current SAE-AMS-STD-595. Dry film thickness requirements shall be in accordance with the manufacturer's recommendations.

**688.3.7-Vegetation:** Vegetation may need to be trimmed or removed to accomplish the cleaning and painting of the structure. If permitted by the Contract Documents, the Contractor may waste vegetation within the Right-of-Way. Otherwise, any such vegetation cut shall be removed from the site by the contractor. No direct payment will be made for this work but shall be included in the contract price for the item in connections with which it is used .

**688.3.8-Utilities:** Shall be in accordance with Section 105.5 Cooperation with Utilities and Section 107.17, Contractor Responsibility for Utility Property and Services.

**688.2.4-INSPECTION REQUIREMENTS:**

The Contractor shall furnish suitable, safe access for the Division's inspection of ALL bridge cleaning, surface preparation and painting operations. Rubber rollers or other protective devices shall be used when providing inspection access to avoid damage to previously painted surfaces. No temporary attachment supports for access, or forms, shall be allowed to damage the paint system. Any damage that occurs from such devices shall be repaired to the satisfaction of the Engineer at the Contractors expense.

**688.2.4.1-Inspection of Cleaning and Painting Operations**~~Applied Paint:~~ The contractor shall provide the Engineer an inspection plan outlining "Hold Points" to occur during the bridge cleaning, surface preparation and paint application operations.

~~If in the opinion of the Engineer determines at any time, there are inadequacies during bridge cleaning and surface preparation, or defects in the applied coats of the paint system, the coating has flaws other than the Contractor shall repair those areas deficiencies in the prescribed dry film thickness, the material shall be repaired to the satisfaction of the Engineer at the Contractors expense.or shall be removed and replaced. Defects in the film, including but not limited to runs, sags, mud cracking, lifting, overspray, dry spray, pinholes, and holidays shall be corrected until a continuous uniform film has been applied.~~

~~Excessive film thickness shall be reduced and insufficient film thickness shall be increased. If the thickness of the finish coat is reduced, a thin coat of the finish shall be reapplied to seal the surface and to blend the area into the surrounding coating. Depending on the defect, total removal and replacement of the effected coating may be required. No unsightly runs or sags shall be visible. All "mud cracking" and/or "dry overspray" in the paint film shall be removed. Excessive bubbles or pinholes shall not be visible in the coat after examination under 8X magnification. Calibration of the thickness gage and dry film thickness measurements shall be in accordance with MP 708.40.00.~~

~~— **688.2.4.2 Access for Inspection:** The Contractor shall furnish suitable safe access and shall provide a time mutually agreed to for inspecting the structural steel prior to and after each coating. The Division's inspector shall approve all repairs. When providing suitable safe access, rubber rollers or other protective devices shall be used. Metal rollers or clamps and other types of fastenings that will mar or damage freshly coated surfaces shall not be used. No temporary attachments, supports for access, or forms, shall damage the coating system. In particular, on the fascias where bracing is used, sufficient size support pads must be provided. Any damage that occurs from such devices shall be repaired to the satisfaction of the Engineer at the Contractors expense.~~

**688.2.4.32-Repair Procedures for Field Paint Deficiencies:** All field repairs to the ~~coating paint system~~ shall be made in strict accordance with the ~~coating paint~~ manufacturer's recommendations, except where the requirements listed in this specification are more stringent. The Contractor shall provide the Engineer with a repair plan to be approved prior to any repairs being made.

Any ~~products~~ Paint Materials used during repairs to the coating deficiencies shall be the same paint materials from the same manufacturer as the coating being repaired applied according to the Contractors Quality Control Plan for Painting, Section 688.5.1.

All welds from which the ~~coating of~~ paint has been damaged or is otherwise defective shall be cleaned and repaired in accordance with Section 688.2.

Surfaces that will be inaccessible for ~~coating painting~~ after erection shall be repaired and/or recoated repainted prior to erection. ~~The Engineer is to review and accept a repair plan before deficient areas are repaired.~~

The Contractor is to exercise care during bridge cleaning and painting operations around expansion joints, weathering steel, and galvanized surfaces. Any damage to these areas found by the Engineer, as a result of the bridge cleaning, surface preparation or painting operations, shall be repaired and/or replaced, to the satisfaction of the Engineer, at the Contractor's expense.

The requirements specified herein for provisions for inspection, mixing, thinning, temperature and humidity, and application shall govern the coating of the repaired areas. ~~Depending on the severity of the defect, total removal, and replacement of the effected coat of paint may be required. In order to avoid abrupt changes in paint thickness, the area adjacent to repair areas shall transition from zero paint thickness to full system thickness within not less than three (3) inches of the repair area by means of sanding the transition area.~~

No unsightly runs or sags shall be visible. All "mud-cracking" and/or "dry overspray" in the paint film shall be removed. Excessive bubbles or pinholes shall not be visible in the coat after examination under 8X magnification. Calibration of the thickness gage and dry film thickness measurements shall be in accordance with MP 708.40.00. ~~In order to avoid abrupt changes in paint thickness, the area adjacent to repair areas shall transition from zero paint thickness to full system thickness within not less than three (3) inches of the repair area by means of sanding the transition area.~~

The requirements for the dry film thickness of the repair ~~coats areas~~ are the same as those specified for the paint system. The requirements specified herein for provisions for inspection, mixing, thinning, temperature and humidity, and application shall govern the painting of the repaired areas.

## **688.2.5-CONTRACTOR CERTIFICATIONS AND SUBMITTALS:**



Certifications and Submittals shall be forwarded through the Prime Contractor and be accepted by the Engineer prior to commencement of the subject work. This is the responsibility of both the Fabricator and the Field Contractor. Electronic submittals will be accepted.

**688.5.1-SSPC QP-1:** The Contractor shall be certified to perform coating applications according to *SSPC QP-1, Standard Procedure for Evaluating Qualifications of Industrial/Marine Painting Contractors, Field Applications in Complex Structures* in order to perform coating operations on all new and existing steel structures. The Contractor shall submit proof of such current certification to the Engineer before starting the Work.

**688.5.2-SSPC QP-2:** The Contractor shall be certified to perform coating removal operations according to *SSPC QP-2, Standard for Evaluating Painting Contractors, Removal of Hazardous Coatings from Industrial/Marine Steel Structures* in order to perform coating removal operations. The Contractor shall submit proof of this certification to the Engineer before starting the Work.

The SSPC QP-2 certified contractor shall assign a SSPC QP-2 qualified Competent Person to oversee removal activities to protect the environment and workers safety and health while performing removal activities under the contract. For the purposes herein a Competent Person is an individual who meets the qualifications defined in the document SSPC-QP2 – Qualifications, Section 2. The SSPC QP-2 Competent Person shall be present during startup, surface preparations, removal operations, and waste removal/disposal activities to ensure and verify environmental protection and worker safety and health practices and procedures comply with the prepared plans.

The SSPC QP-2 Competent Person shall submit written certification to the Engineer that the Contractor's work operations are meeting the environmental and worker safety and health plans requirements weekly. The SSPC QP-2 Competent Person shall submit written certification at the completion of the project that the environmental and worker safety and health plans fully complied with all applicable regulations and was fully implemented by the Contractor. If any noncompliance is noted, the Competent Person shall submit in writing, within 24 hours of the noncompliance, the corrective actions taken by the Contractor to remedy the noncompliance.

**688.2.5.13-Quality Control Plan for Painting:** Minimum requirements and document form are set forth in MP 688.02.20.

**688.2.5.24-Containment/Disposal Control Plan for Existing Steel Structures:** Minimum requirements and document form are set forth in MP 688.03.20.

### **688.36-COMPLETE CLEANING AND PAINTING OF EXISTING STRUCTURES:**

The complete removal and replacement of existing paint systems shall follow the provided requirements set forth in this specification unless otherwise directed within the contract documents.

~~**688.3.1-General:** The field coats (total system) of paint shall meet the requirements of Section 711. The applicable sections of 711, the dry film thickness and the color shall be as specified in the contract documents. Each coat shall be a contrasting color to the one previously applied.~~

~~**688.3.26.1-Surface Preparation:** All structural steel shall undergo a near-white blast cleaning in accordance with SSPPC SP 10. All contracts for the complete removal and replacement of the previous paint system shall undergo a “Near-White” blast cleaning in accordance with SSPPC SP 10/NACE 2. All structural steel is to include 100% of the girders, stringers, diaphragms, floor beams, upper and lower chord members, drains, bearing devices, etc. In general, all accessible steel surfaces not galvanized, aluminum, or weathering steel shall be blast cleaned. -All laminar and stratified rust that has formed on the existing steel surfaces shall be removed. Pack rust formed along the perimeter of mating surfaces of connected plates or shapes shall be removed to the extent feasible without mechanically detaching the mating surface. The Contractor is to exercise care while cleaning and painting around expansion joints, weathering steel, and galvanized surfaces. Any damage to these surfaces found by the Engineer as a result of the cleaning and painting operation shall be repaired and/or replaced, to the satisfaction of the Engineer, at the Contractor’s expense.~~

~~**688.3.3 Paint Application Requirements:** Painting shall be in accordance with Section 688.2.3.3.~~

~~**688.3.4 Painting Sequence:**~~

~~**FULL PRIME COAT:**~~

~~—The structure shall receive one coat of a primer meeting the requirements of Section 711. The full prime coat shall be applied before the stripe coat. The primer used for the full prime coat and the stripe prime coat shall be of the same type and shall be from the same manufacturer. Dry film thickness requirements shall be as specified by the manufacturer’s recommendations, or as specified in the contract documents.~~

~~**STRIPE COAT:**~~

~~—All edges, outside corners, seams, bolt heads and nuts, all rivet heads, edges of flanges and plates, welds, sharp edges, in general all edges, shall receive one stripe coat, by brush or roller application, of the same primer as the Full Prime Coat. Striping shall extend a minimum of one (1) inch from the edge. The prime coat shall at a minimum, be set to touch before the stripe coat is applied. No dry film thickness is specified for this coat. This coat shall be tinted as allowed by the manufacturer to be in contrast to the full prime coat and intermediate coat. The tinting agent shall be the paint manufacturer’s approved tinting agent.~~

~~**INTERMEDIATE COAT:**~~

~~—The structure shall receive one uniform coat of a paint meeting the requirements of Section 711. The color shall be in contrast to the prime and top coats. If tinting is required, the tinting agent shall be the paint manufacturer’s approved tinting agent. The intermediate coat shall not be applied until the primer and stripe coat have fully cured according to the manufacturer’s recommendations. Dry film thickness requirements shall be as specified by the manufacturer’s recommendations, or as specified in the contract documents.~~

~~**CAULKING:**~~

~~—Caulking shall be applied before the application of the topcoat. This includes all seams between diaphragm connections to stiffeners and splices and seams between any connection that is riveted or bolted. Any welded connections that are not fully sealed by the weld shall be caulked with a paste type caulk. The caulk shall be pressed into the seams between the adjoining surfaces, by wetted finger or specialty tool, to insure bond and provide a smooth uniform surface. Bottom seams shall not be caulked on vertical surfaces.~~

~~—Caulking in a 3 coat system shall be applied after the intermediate coat has cured. Caulking on a 2 coat system shall be applied after prime coat has cured. The top coat shall not be applied until the caulking has fully cured in accordance with the manufacturer's recommendations.~~

~~—The caulking material shall be compatible with the paint system being applied and shall be by written recommendation of the paint manufacturer. The caulking material shall be tested for compatibility with the paint system at the same time that the paint is tested for intercoat compatibility. Caulking operations shall be performed only when weather conditions are within the parameters as specified in section 688.2.3.1.~~

#### **TOP COAT:**

~~—The structure shall receive one uniform coat of paint as designated in the plans meeting the requirements of Section 711. The color shall be as designated in the plans and shall be in accordance with current SAE AMS STD 595. Dry film thickness requirements shall be as specified by the manufacturer's recommendations, or as specified in the contract documents.~~

~~**688.3.5-Vegetation:** Vegetation may need to be trimmed or removed in order to accomplish the cleaning or painting of the structure. If allowed by the Contract Documents, the Contractor may waste vegetation within the Right of Way. Otherwise, any such vegetation cut, shall be removed from the site by the contractor. No direct payment will be made for this work, but shall be included in the contract price for the item in connections with which it is used.~~

~~**688.3.6-Utilities:** Shall be in accordance with Section 107.17, Contractor Responsibility for Utility Property and Services or any other applicable sections of Section 107.~~

#### **688.3.7.2-Paint Designation Label:**

~~**688.3.7.1-Description:** The bridge paint designation label shall consist of painting on the fascia web of the exterior girder with the following information; will only be utilized during the complete removal and replacement of the paint system on existing or new structures. The paint designation label shall be located at abutment number one on the fascia web of the exterior girder with a southern or eastern orientation. The paint color will be semi-gloss black paint and shall be the same paint material/manufacturer as the full paint system applied, with the following information: the paint system, contractor, and the month-year the project was completed. This paint designation label will only be utilized during the complete removal and painting of existing or new structures. The acronyms and details for the paint designation label will be assigned to the Contractor by the Materials Control, Soils and Testing Division when~~

the Quality Control Plan for Painting is approved. All work performed regarding the paint designation label shall be considered incidental to the painting of the structure.

~~— **688.3.7.1-Location:** The paint designation label will be located at abutment number one on the fascia web of the exterior girder with a southern or eastern orientation, and paint color shall be a semi-gloss black paint compatible with the topcoat material.~~

~~— **688.3.7.2-General:** All work performed regarding the paint designation label shall be considered incidental to the painting of the structure.~~

## **688.47-ZONE CLEANING AND PAINTING OF EXISTING STRUCTURES:**

The zone cleaning and painting of existing structures shall follow the provided requirements set forth in this specification unless otherwise directed within the contract documents. The contract documents shall specify the areas to be prepared, and zone painted.

~~— **688.4.1-General:** The field coats (total system) of paint shall meet the requirements of Section 711. The applicable sections of 711, the dry film thickness shall be in accordance with the manufacturer's recommendations and the color shall be as specified in the contract documents. Each coat shall be a contrasting color to the one previously applied. The contract documents shall specify the areas to be prepared and zone painted.~~

**688.4.27.1-Surface Preparation:** The surface shall be prepared as specified in the contract documents. Specific instructions will be given on the amount of surface area required to be cleaned in accordance with ~~the specific standards identified in subsection~~ section 688.2.2. ~~All laminar and stratified rust that has formed on the existing steel surfaces shall be removed. Paek rust formed along the perimeter of mating surfaces of connected plates or shapes shall be removed to the extent feasible without mechanically detaching the mating surface. Any rust remaining after cleaning shall be tight and intact when examined using a dull putty knife. The tools used to remove these corrosion products shall be identified in the submittals and accepted by the Engineer.~~ If the surface preparation or removal of rust results in nicks or gouges, the work shall be suspended, and the damaged areas repaired to the satisfaction of the Engineer, at the Contractor's expense. ~~The Contractor is to exercise care while cleaning and painting around expansion joints and galvanized surfaces. Any damage to the expansion joints or galvanized surfaces found by the Engineer, as a result of the cleaning and painting operation shall be repaired and/or replaced, to the satisfaction of the Engineer, at the Contractor's expense.~~

~~— **688.4.3-Paint Application Requirements:** Painting shall be in accordance with Section 688.2.3.3.~~

~~— **688.4.4-Painting Sequence:** Painting shall be in accordance with Section 688.3.4.~~

~~— **688.4.5-Vegetation:** Shall be in accordance with Section 688.3.5~~

~~— **688.4.6-Utilities:** Shall be in accordance with Section 107.17, Contractor Responsibility for Utility Property and Services or any other applicable sections of Section 107.~~

## **688.58-FIELD CLEANING AND PAINTING OF SHOP PRIMED-~~COATED~~ STEEL:**

~~688.5.1-General:~~ Field cleaning and painting of new shop primed coated structures: steel shall follow the provided requirements set forth in this specification unless otherwise directed within the contract documents.

~~688.8.1-Surface Preparation:~~ The surface shall be prepared as specified in the contract documents and shall include, ~~unless otherwise specified in the contract,~~ the preparation of the primed surface for field painting, the procurement of all materials to meet the necessary specifications and the application of the coatings remaining coats of the paint system. Prior to field coats, surface contamination such as rust, dirt, mud, oil, concrete, loose zinc, salts, or other foreign matter shall be removed in accordance with section 688.2 of this specification Touch up of the primer shall be in accordance with section 688.4.2. ~~In addition, the Contractor shall protect pedestrian, vehicular, and other traffic on or underneath the structure from splattering, splashing, or dripping paint. Railings, curbs and all other superstructure and substructure shall be protected against spatters, splashes, and the like.~~

**688.58.2-Shear Studs:** When shear studs are applied in the field, repair to the Prime Coat shall be completed in accordance with section 688.4.2, to the satisfaction of the Engineer and prior to any and adjoining concrete work.

**688.58.3-Materials:** The ~~field coats (Intermediate and/or Top Coats)~~ of paint shall meet the requirements of specification 711.22.3 and 711.22.4. Dry film thickness requirements shall be ~~as specified by the manufacturer's recommendations, or as specified in the contract documents in accordance with the manufacturer's recommendations.~~ Each coat shall be a contrasting color to the previous coat. In addition, the field intercoat adhesion shall be at least 3A when tested in accordance with MP 711.00.20.

~~688.5.4-Surface Preparation:~~ Prior to field coats, surface contamination such as rust, dirt, mud, oil, concrete, loose zinc, salts, or other foreign matter shall be removed. The shop primed structural steel shall be pressure washed, with a soluble salt remover from the division's approved product list, at 2000—3000 psi. Touch up of the primer shall be in accordance with section ~~688.2.3.3.~~

~~688.5.5-Paint Application Requirements:~~ Painting shall be in accordance with Section ~~688.2.3.~~

~~688.5.6-Paint Sequence:~~ Painting shall be in accordance with Section ~~688.3.4,~~ with the exception of the Full Prime Coat and Stripe Coat. Paint containment shall be a minimum of Class ~~3P as specified in the current edition of SSPC Guide 6.~~

## **688.69-ENVIRONMENTAL, WORKER PROTECTION, AND WASTE HANDLING:**

~~688.6.1-General:~~ Environmental and worker protections shall be used when cleaning, painting, welding or cutting an existing bridge. The containment class, emission assessment methods and levels as defined by the current ~~revision edition~~ publication of SSPC Guide 6 shall be as stated in the contract documents. The specific pollution control system which

is proposed for the complete capture, containment, collection, and disposal of the “Spent Material” generated by the work shall be included in the plan.

**688.9.1-“Spent Material”:** This shall include all material generated by bridge cleaning and surface preparation operations. The “Spent Material” shall be sampled and tested in accordance with the current edition of SSPC Guide 7, and all other applicable State and Federal regulations. The Contractor shall, at the Contractor’s expense, select a laboratory that will sample and analyze the “Spent Material” to determine if the spent material is hazardous or non-hazardous. The laboratory shall be certified by the WVDEP in accordance with 47CSR32 - Regulations Governing Environmental Laboratories Certification and Standards of Performance. The laboratory certification shall be provided to the Engineer prior to the beginning of work. The waste transporter for both hazardous and non-hazardous waste shall be listed on the Contractor’s Containment/Disposal Control Plan.

**688.69.2-Permits for Disposal of “Spent Material”:** Shall be in accordance with all State and Federal regulations and Section 107.2, Permits, Licenses, and Taxes, ~~or any other applicable sections of Section 107.~~ The “spent material” shall not be disposed of until authorized by the Engineer and in no case shall “spent material” be allowed to accumulate longer than 90 days prior to transport.

~~— **688.6.2.1-“Spent Material”:** This shall include material generated by surface preparation operations and shall be sampled and tested in accordance with the current revision of SSPC Guide 7. The Contractor shall, at the Contractor’s expense, select a laboratory that will sample and analyze the “spent materials”. The laboratory must be certified by the WVDEP, EPA or by another state’s DEP equivalent. Certification will be provided to the Engineer prior to the beginning of work. The waste transporter for both hazardous and non-hazardous waste will be listed on the Contractor’s Containment/Disposal Control Plan.~~

**688.9.3-Temporary Waste Storage:** The Division (WVDOH) will obtain a provisional (temporary) EPA waste generator number for the project prior to the beginning of the work. The location of the temporary waste storage site at the project shall be noted in the Contractor’s Containment/Disposal Control Plan. This location must be approved by the Division prior to beginning work.

**688.69.34-Additional Requirements for All Classes of Containment:** The Contractor will shall provide ground covers beneath the containment area and all equipment where spills are possible to capture inadvertent spills or leaks of debris. Extend the covers a minimum of five (5) feet beyond the area to be covered. Debris shall be removed from the covers at least once per shift, or as directed by the Engineer. If the ground beneath the structure serves as the base of the containment, install and maintain air and dust impenetrable materials such as solid plywood panels or flexible materials such as tarpaulins. Provide explosion-proof lighting inside containment for all paint application. Maintain a minimum of ten (10) foot-candles for surface preparation and painting, and a minimum of thirty (30) foot-candles for inspection. Water booms shall be used to contain inadvertent releases of debris unless prohibited by navigation lanes. In these cases, a boat with a skimmer shall be available to collect fugitive materials. Remove all project-related debris from the surface of the water or from the stream

sediment at the end of each working day at a minimum unless directed otherwise by the Engineer.

~~688.6.4 Temporary Waste Storage: The Division (WVDOH) will obtain a provisional (temporary) EPA waste generator number for the project prior to the beginning of the work. The location of the temporary waste storage site at the project shall be noted in the Contractor's Containment/Disposal Control Plan. This location must be approved by the Division prior to beginning work.~~

~~688.6.5 Worker Protection:~~ Shall be in accordance with Section 107.7, Public Convenience and Safety, ~~or and~~ any other applicable sections of Section 107. The Contractor shall have a Certified Industrial Hygienist (CIH) develop, review, and approve their written compliance plan. The CIH shall be certified by the American Board of Industrial Hygiene. The CIH, or a technician working under the direction of the CIH, shall be present during the first three days of work and at least twice a month thereafter. The CIH shall certify in writing during the first week of work and at the end of the work that the worker protection plan fully complied with all regulations and that the plans were fully implanted. Daily inspections of the work area shall be made by the project "competent person". The Contractor shall have identified the "competent person" by name in both the CIH's written compliance plan and the Contractor's Containment/Disposal Control Plan. The compliance plan shall also include the "competent person's" qualifications and the frequency of inspections to be taken. The CIH requirements will not apply to those zone painting projects where only SP 2 and SP 3 surface preparation is being done.

~~688.6.6 Division Employee Worker Protection:~~ The Contractor shall provide respiratory protection and protective clothing and other necessary equipment for up to 2 Division employees at each site.

**688.7.10-METHOD OF MEASUREMENT:**

The unit of measurement for "Clean and Paint Existing Steel Bridges", "Containment and Disposal of Spent Material", "Field Painting of Shop Primed Steel" shall be lump sum. The unit of measurement for "Zone Cleaning and Painting Steel Bridges" shall be square foot.

**688.8.11-BASIS OF PAYMENT:**

Basis of Payment for "Clean and Paint Existing Steel Bridges", "Containment and Disposal of Spent Material", "Field Painting of Shop Primed Steel" shall be lump sum price bid. "Zone Cleaning and Painting Steel Bridge" shall be square foot price bid. The cost for the items listed below, which price and payment shall be full compensation for furnishing all the materials and doing all the work herein prescribed in workmanlike and acceptable manner, including all labor, tools, equipment, supplies and incidentals necessary to complete the work.

**688.9.12-PAY ITEMS:**

ITEM	DESCRIPTION	UNIT
688001-*	Clean and Paint Existing Steel Bridge	Lump Sum
688003-*	Containment and Disposal of Spent Material	Lump Sum
688005-*	Zone Cleaning and Painting Steel Bridge	Square Foot
688007-*	Field Painting of Shop Primed Steel	Lump Sum

\* Sequence number

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 720  
SMOOTHNESS TESTING

**720.3-RIDE QUALITY TESTING:**

REMOVE AND REPLACE THE FOLLOWING IN SUBSECTION 720.3.2:

**720.3.2-Quality Assurance (QA) Testing:** QA testing is the responsibility of the Division. The Engineer shall submit a pavement testing request form to MCS&T to the DOH MCS&T roadway inbox DOHMCSnTRoadway@wv.gov within five (5) calendar days after all lanes are continuously open to traffic. QA testing will be completed in accordance with MP 720.10.01 Section 8 and should be completed no later than thirty (30) calendar days after receiving the pavement testing request from the ~~Contractor~~ Engineer, or within 30 calendar days of the Contractor's QC test. In the event QA testing cannot be completed within thirty (30) calendar days of QC testing, price adjustments will be calculated solely based on QC data. If QC testing was not performed, then price adjustments will be calculated solely based on QA data regardless of time frame. The Division will perform testing using a certified inertial profiler and a certified inertial profiler operator in accordance with the most recent edition of AASHTO R 56 "Standard Practice for Certification of Inertial Profiling Systems".