

20220202 - February's Specifications Committee Meeting

February Specifications Committee Meeting Agenda

Meeting Date

Wednesday, February 2, 2022 @ 9:00am

Google Meet video conference. E-mail distribution message includes instruction.

Approved Permanent Specification changes from last Committee meeting (12/1/21)

- **Section 420-Single/Multiple Course Micro Surfacing** Complete rewrite, the update is to make the spec more in line with AASHTO spec and industry standards.
- **Section 503-Sealing Cracks in Concrete Pavement** The revision updates terminology and clarifies when section 503/507 should be used for repair.
- **Section 507-Large Crack and Pothole Repair of Concrete Pavement** The revision updates terminology and clarifies when section 503/507 should be used for repair.
- **604.12.3-Testing of Pipe** Clarifies when testing is to be performed.
- **607.1-Description** Removes modified Cut Slope Terminal paragraph.
- **Section 610-Curbs, Combination Curbs and Gutters, and Medians** Removes reflective concrete curbing and resetting curb items, updates median barrier item, and adds item for raised concrete traffic island.
- **Section 623-Pneumatically Applied Mortar or Concrete (Shotcrete).** The update clarify the requirements.
- Three specification changes adding Type H (High Density Polyethylene) conduit:
 - **659.2.2-Conduit**
 - **662.2.3.3-Type H (High Density Polyethylene), 662.15.1-Conduit, & 662.17-Pay Items**
 - **715.42.10-Type H (High Density Polyethylene)**
- Specification changes adding electrical material & certification requirements:
 - **659.2.1-Electrical Material Documentation and Certification**
 - **660.1-Description and 660.2-Materials**
 - **662.2.1-Electrical Material Documentation and Certification**
 - **715.43-Electrical Material Compliance Documentation and Certification**
- Removal of several sections of the spec book that have had minimal contract use in the past 12 years and no recent updates to their associated sections, making them Project Specific Provisions:
 - a. **Section 611-Precast Concrete Traffic Directors, 715.20-Precast Concrete Traffic Directors**
 - b. **Section 612-Tunnel Liner Plate Pipe**
 - c. **Section 621-Steel Grid Flooring**
 - d. **Section 622-Timber Bridge Structures**
 - e. **Section 632-Horizontal Drains**
 - f. **Section 656-Seedling Planting, 715.34-Seedling Plants**
 - g. **Section 665-Plugging Gas, Oil, and Drilled Water Well**
 - h. **Section 689-Metalizing Steel**
- Four Specification Changes updating prequalification Process:
 - a. **102.1-Eligibility of Bidders, 102.5.3-Notice to Contractors, 102.5.4-Bid Bond, 102.6-Proposal Guaranty, & 102.12-Irregular Proposals**
 - b. **103.1-Consideration of Proposals, 103.5-Return of Proposal Guaranty, & 103.6-Requirements of Contract Bond**
 - c. **108.1-Subletting of Contract**
 - d. **109.6-Partial Payments**

Approved Project Specific Special Provisions (SP) from last Committee meeting (12/1/21)

- SP663-Bicycle Lane Background Markings, Type V
- SP601-Grout Injection
- SP628-Exploratory Drilling
- SP607-TL-5 Guardrail System
- SP691-High Velocity Texturing

Items removed from Committee Agenda

- 709.1-Steel Bars for Concrete Reinforcement

Old Business-Provisions discussed at last Committee meeting

SECTION	TITLE	DESCRIPTION
410	Section 410-Asphalt Base and Wearing Courses, Percent within Limit (PWL) Champion: Industry and management	7th time to Committee. Discussed in December. Proposed specification change to Section 410. This specification incorporates suggestions is from Industry (these changes are redline copy showing the proposed changes). The specification has been updated and removes the bonuses from it. These changes are redline copy with yellow highlights showing these proposed changes.
601	SP601-Ultra High Performance Concrete A. Mongi	Update to previously approved SP. 3rd time to Committee. Discussed in December. Project Specific Special Provision on UHPC. The revision updates the material, submittal, and constructions methods requirements. Provision has been updated per comments at the last meeting; it is redline copy showing the revisions. Approval is expected in February.
207	SP207-Settlement Plate A. Mongi	3rd time to Committee. Discussed in December. Project Specific Special Provision on Settlement Plate. The device is installed on project to monitor/measures settlement of a placed embankment. No update to the provision. Approval is expected in February.
636	636.20-Temporary Traffic Signals or Temporary Lighting, 636.23.16-Temporary Traffic Signal , 636.23.23-Temporary Lighting and 636.25-Pay Items S. Boggs	3rd time to Committee. Discussed in December. Specification changes to Section 636-Maintaining Traffic. The update clarify the temporary traffic signal requirements. The specification has been updated per comments at the last meeting; it is redline copy showing the proposed changes.

613	SP613-Spray Applied Pipe Liner	<p>Update to previously approved SP. 2nd time to Committee. Discussed in December.</p> <p>Project Specific Special Provision on Spray Applied Pipe Liner. The revision updates the material and testing requirements.</p> <p>The provision has been updated per comments at the last meeting; it is redline copy showing the revisions.</p> <p>A. Gillispie</p> <p>Approval is expected in February.</p>
703	703.1.1-General Requirements	<p>2nd time to Committee. Discussed in December.</p> <p>Specification change to Section 703-Course Aggregates. The revision is to assure the aggregates provided by any source are not contaminated or mixed with any undeclared materials.</p> <p>R. Shuman</p> <p>The specification is redline copy showing the revisions.</p>

New Business - New Provisions for Spec Committee

SECTION	TITLE	DESCRIPTION
108	108.7.1-Failure to Complete on Time and Liquidated Damages	<p>1st time to Committee.</p> <p>Specification change to Section 108-Prosecution and Progress. The revision updates Table 108.7.1-Schedule of Liquidated Damages.</p> <p>The specification is redline copy showing the revisions.</p> <p>S. Boggs</p>
605	605.2-Materials, 605.4-Method of Measurement, & 605.6-Pay Items	<p>1st time to Committee.</p> <p>Specification change to Section 605-Manholes and Inlets. The revision clarifies materials for perforated slot inlets and adds items for Modified Inlet and Modified Manhole.</p> <p>S. Boggs</p> <p>The specification is redline copy showing the revisions.</p>
601	601.12-Water Temperature	<p>1st time to Committee.</p> <p>Two specification changes related to controlling water temperature of concrete curing</p> <ol style="list-style-type: none"> 1. Section 601, Subsection 601.12-Water Temperature 2. Section 679, Subsection 679.3-Water Temperature <p>The specifications are redline copy showing the revisions.</p>
679	679.3-Water Temperature	
501	501.4-Test Methods	<p>1st time to Committee.</p> <p>Six specification changes related to AASHTO name change T23 to R100.</p> <ol style="list-style-type: none"> 1. 501.4-Test Methods 2. 511.3.6.1-Testing 3. 601.4.1-Sampling and Testing Methods 4. 603.6.4-Sampling and Test Methods 5. 620.5.5.1.2-Compression Testing 6. 679.2.2-Specialized Concrete Mix Design and Testing
511	511.3.6.1-Testing	
601	601.4.1-Sampling and Testing Methods	
603	603.6.4-Sampling and Test Methods	

620	620.5.5.1.2- Compression Testing	The specifications are redline copy showing the revisions.
679	679.2.2-Specialized Concrete Mix Design and Testing	
M. Perrow		

Comments

Comments are requested on these Specifications Changes and Project Specific Special Provisions. Please share your comments by **January 31, 2022**, they help in the decision making process.

Please Send Comments to: DOHSpecifications@wv.gov

Deadline for new items & updates to these provision is March 11, 2022.

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.*

Next Meeting

Wednesday, **April 6, 2022 at 9:00 a.m.**

Meeting will be held virtually via Google Meet video conference. E-mail distribution message includes instruction.

2017 Standard Specification Roads and Bridges & 2022 Supplemental Specifications

Electronic Copy (pdf): The 2017 Standard Specifications Roads & Bridges & 2022 Supplemental Specifications can be viewed, printed, or downloaded from the Specifications Website. A link to the Specifications pages is here: <http://transportation.wv.gov/highways/contractadmin/specifications>

Print Version: We are out of hard copies of the 2017 Standard Specifications Roads and Bridges. Hard copies of the 2022 Supplemental Specifications are available thru Technical Support Division. An order form for the book is on Specifications Website. A link to the page is here:

<http://transportation.wv.gov/highways/contractadmin/specifications>

2022 Specifications Committee

The Specification Committee typically meet every other month; on the first Wednesday. 2022 meetings will be held in February (2/2), April (4/6), June (6/1), August (8/3), October (10/5), and December (12/7).

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

Specifications Committee Website

A copy of the meeting agenda can be found on the Specifications Committee Website

<http://transportation.wv.gov/highways/contractadmin/specifications>

Materials Procedures

Material Procedures (MPs) referenced in provisions are available upon request.

For questions regarding the Standard Specifications Road and Bridges, Supplemental Specifications, Project Specific Provisions, or the Specifications Committee please email DOHSpecifications@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 thru 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 WVDOT Standard Specifications.
 - Unless inserted into a project proposal, these changes typically go into effect in January (of subsequent year) with the Supplemental Specifications
2. Project Specific Special Provisions (SP) – Are applied to specifically designated projects.
3. Updates to previously approved SP – Changes/edits/updated to SP that have been approved by spec committee.

NEW BUSINESS ITEMS:

New items should be setup & submitted in the following format:

1. Specification Changes – Show as red-line copy (see note)
2. Project Specific Special Provisions (SP) – Will be shown in all black.
3. Updates to approved SP – Shown as red-line copy.

Each item should also include a description with:

- Brief overview of item
- Background info and/or reason for change

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 or you can manually reline document with font color changes & strike-through.

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.
- SP's in committee may be used in advertised project. Hope to work to address comments & finish approving at subsequent meeting.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 410
ASPHALT BASE AND WEARING COURSES,
PERCENT WITH LIMITS (PWL)

DELETE THE CONTENTS AND REPLACE WITH THE FOLLOWING:

410.1-DESCRIPTION:

410.1.1-General: The Contractor shall note that this Section is to be used for Square Yard Paving operations; however, the proposal and / or plans may contain 401 and 402 items to be paid and measured by the Ton (TN). In instances where those items occur, they shall be constructed and measured in accordance with the applicable sections of the West Virginia Division of Highways Standard Specifications Roads and Bridges, current edition, and the Supplemental Specifications current when the contract is let.

Additionally, the following Materials Procedures (MP's) for Square Yard Paving ~~may can~~ be ~~obtained by contacting found on~~ the Materials Control, Soils and Testing (MCS&T) Division website: <https://transportation.wv.gov/highways/mcst/Pages/WVDOH-Materials-Procedures.aspx>.

- a. MP 401.02.31 QC & Acceptance
- b. MP 401.07.20 Sampling Loose Asphalt Pavement Mixtures
- c. MP 401.07.21 Sampling Compacted Asphalt
- d. MP 401.07.22 Thickness of Asphalt Concrete Using Cores
- e. MP 401.07.23 Bond Strength
- f. MP 401.07.24 Pavement Macrotexture
- g. MP 401.07.25 Evaluation of Asphalt Pavements
- h. MP 401.13.50 Determination of PWL

410.1.2-PWL Paving Description: This work shall consist of constructing one or more courses of asphalt, mixed mechanically in a plant, composed of aggregate and asphalt material designed in accordance with either the Marshall or Superpave Design System as specified in the contract documents, on a prepared foundation in accordance with these specifications and in ~~reasonable~~ reasonably close conformity with the lines, grades, weights or thicknesses, and cross sections shown on the Plans or established by the Engineer.

The unit of measurement for asphalt will be by the ton-~~(megagram)~~, square yard-~~(square meter)~~, or cubic yard-~~(cubic meter)~~.

DRAFT

The work will be accepted in accordance with these Specifications and the applicable requirements of Sections 105, 106, and 109.

410.2-MATERIALS:

The materials shall conform to the following requirements:

MATERIAL	SUBSECTION
Coarse Aggregate	703.1 thru 703.3 ^{Note 1 & Note 2} (See MP 401.02.28 for exceptions and additions required for Superpave Items.)
Fine Aggregate	702.3 (See MP 401.02.28 for additions required for Superpave Items)
Mineral Filler	702.4
Performance Graded Binders	705.5

Note 1 The total shale, coal and other lightweight deleterious material and friable particles shall not exceed 3%.

Note 2 When slag is specified in the contract, the coarse aggregate shall be slag which meets the requirements of 703.3, except as amended in this subsection.

410.2.1-Performance Graded Binder Grade: The standard grade for Performance Graded (PG) binders shall be PG 64S-22, any deviation will be noted in the contract documents. PG 64H-22 shall be used on projects specified with over 20 million ESALs over the design life. PG 64S-22 binder may be used in asphalt placed below the top two lifts in any pavement section, scratch course and patching-and-leveling are not identified as lifts.

CONSTRUCTION METHODS

410.3-GENERAL:

Construction methods to be used in performing the work shall be submitted to the Engineer for review prior to the start of work. This review may require modification of the proposed methods to provide the desired end product. All equipment, tools, machinery, and plant shall be maintained in a satisfactory working condition.

410.4-COMPOSITION OF MIXTURES:

410.4.1-General: The aggregate for use in the designated mixture shall consist of a mixture of aggregate (coarse, fine, reclaimed asphalt pavement (RAP) if desired, or mixture thereof) and mineral filler if required. It shall be the responsibility of the Contractor to determine the percentage of RAP to be used in the mix. The amount and grade of virgin PG Binder to be used in the RAP designs shall be determined in accordance with Materials Procedure (MP) 401.02.24 and MP 401.02.28.

410.4.2-Job Mix Formula: Job Mix Formula (JMF) is the specification for a single mix produced at a single plant. This mix may be specific to a single project or be used on multiple projects if the basic design criteria (design compaction level and PG Binder grade) are the same.

The Contractor shall submit a proposed JMF for each combination of aggregate and asphalt material for each asphalt mixture to be produced. Depending on the design type, the JMF gradations shall be within the tolerances set forth in either Table 410.4.2A or Table 410.4.2B. Marshall mix designs shall be developed in accordance with MP 401.02.22. Superpave mix designs shall be developed in accordance with MP 401.02.28.

Each proposed JMF must be documented on the Division Form T400 or T400SP and the entire JMF package shall be forwarded for review to the District Materials Engineer/Supervisor. After the District reviews the T400/T400SP and JMF package shall then be transmitted to the Materials Control, Soils and Testing Division for final review. If the JMF requires revision, it will be returned to the designer through the District. The T400/T400SP Form shall contain the following information:

- i. Identification of the source and type of materials used in the design.
- ii. The aggregate blend percentages and the percentage for each sieve fraction of aggregate considered the desirable target for that fraction.
- iii. The percentage of virgin asphalt binder to be blended with RAP and the total asphalt binder representing the optimum asphalt content for the JMF submitted, which is to be considered the desirable target percentage.
- iv. The temperature of the completed mixture at the plant which shall be within $\pm 25^{\circ}$ F ($\pm 14^{\circ}$ C) of the median mix temperature established by the temperature-viscosity chart or as recommended by the asphalt supplier.
- v. The ratio (calculated to the nearest one-tenth percent) of the Fines to Asphalt (FA). For Marshall mixes the ratio is defined as the percentage of aggregate passing the No. 200 (75 μ m) sieve, divided by the percentage of asphalt content calculated at the percentage optimum asphalt content of the design. For Superpave mixes the ratio is defined as the percentage of aggregate passing the 75 μ m (No. 200) sieve, divided by the percentage of effective asphalt content calculated at the percentage optimum asphalt content of the design.

**TABLE 410.4.2A
Design Aggregate Gradation Requirements for Marshall Mix Designs**

Type of Mix	Base-I	Base-II (Patch & Level)	Wearing IV	Wearing-I (Scratch-I)	Wearing-III (Scratch-III)
	Nominal Maximum Size				
Sieve Size	1 ½ in (37.5 mm)	¾ in (19 mm)	¾ in (19 mm)	3/8 in (9.5 mm)	No. 4 (4.75 mm)
2 in (50 mm)	100	–	–	–	–
1 ½ in (37.5 mm)	90-100	–	–	–	–
1 in (25 mm)	90 max	100	100	–	–
¾ in (19 mm)	–	90-100	90-100	–	–
½ in (12.5 mm)	–	90 max	90 max	100	–
3/8 in (9.5 mm)	–	–	–	85-100	100
No. 4 (4.75 mm)	–	–	47 min	80 max	90-100
No. 8 (2.36 mm)	15-36	20-50	20-50	30-55	90 max
No. 16 (1.18 mm)	–	–	–	–	40-65
No. 30 (600 μ m)	–	–	–	–	–
No. 50 (300 μ m)	–	–	–	–	–
No. 200 (75 μ m)	1-6	2-8	2-8	2-9	3-11

TABLE 410.4.2B
Design Aggregate Gradation Requirements for Superpave Mix Designs

Type of Mix	37.5	25	19 ^{Note 1} (Patch & Level)	12.5	9.5 (Scratch)	4.75 (Scratch)
Sieve Size	Nominal Maximum Size					
	37.5 mm (1 ½ inch)	25 mm (1 inch)	19 mm (¾ inch)	12.5 mm (½ inch)	9.5 mm (⅜ inch)	4.75 (No. 4)
50 mm (2")	100	–	–	–	–	–
37.5 mm (1½")	90-100	100	–	–	–	–
25 mm (1")	90 max	90-100	100	–	–	–
19 mm (¾")	–	90 max	90-100	100	–	–
12.5 mm (½")	–	–	90 max	90-100	100	100
9.5 mm (⅜")	–	–	–	90 max	90-100	95-100
4.75 mm (No.4)	–	–	–	–	90 max	90-100
2.36 mm (No.8)	15-41	19-45	23- 49	28-58	32-67	
1.18 mm (No.16)	–	–	–	–	–	30-60
600 µm (No.30)	–	–	–	–	–	–
300 µm (No. 50)	–	–	–	–	–	–
75 µm (No.200)	0-6	1-7	2-8	2-10	2-10	6-12

Note 1 When a 19 mm mix is specified for use as a heavy-duty surface mix, it shall be designed as a fine graded mix with the additional requirement of a minimum of 47% passing the 4.75 mm (No.4) screen.

If it becomes necessary to change aggregate sources, a new mix design shall be developed and submitted for approval. When using neat (unmodified) PG Binders, the binder grade must always remain the same for each design, however the binder source may be changed without requiring a new mix design given that the replacement binder is provided from an approved source. If a source change results in the use of an additive enhanced modified binder of the same grade, a new mix design will be required.

If a modified binder source is changed or if the modification process is changed, a new mix design shall be developed and submitted for approval. A source change to a new location with the original manufacturer/supplier and the original modification process will not require a new mix design.

At no time shall different grades of PG Binders be mixed together in the same storage tank. When it is necessary to switch to a new binder grade the tank shall be drawn down as far as possible, normally to the top of heating coils, before refilling with the new binder. The new binder shall be circulated thoroughly before restarting production.

410.4.2.1-Warm Mix Asphalt: When the Contractor chooses to use an approved asphalt design to be produced as warm-mix asphalt (WMA) using the water injection system, the temperature of the completed mixture at the plant may be lowered to an established range that has previously been determined through trial production. The allowable temperature range specified on the approved T400 mix design form shall be adjusted accordingly when producing WMA. In addition, all references to the minimum compaction temperatures in Sections 410.10.3 and 410.10.4 of this specification, may be

waived if it can be established that additional density can be obtained at lower temperatures without damaging the pavement. All testing requirements established for Hot Mix Asphalt mix designs and quality assurance/quality control testing shall also apply to WMA.

410.5-TESTING:

410.5.1-Test Methods:

MP 700.00.06	Aggregate Sampling Procedures
AASHTO T168	Sampling Hot-Mix Asphalt
AASHTO T11	Materials Finer than No. 200 (75 µm) Sieve in Mineral Aggregates by Washing
AASHTO T27	Sieve Analysis of Fine and Coarse Aggregates
AASHTO T30	Mechanical Analysis of Extracted Aggregate
AASHTO T164	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
AASHTO T308	Asphalt Content of HMA by the Ignition Method (Test Method A)
AASHTO T245	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D5581	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (For Base-I Marshall designs only)
AASHTO T166	Bulk Specific Gravity of Compacted Bituminous Mixtures
AASHTO T209	Maximum Specific Gravity of Bituminous Paving Mixtures
AASHTO T312	Determining the Density of HMA Specimens by Means of the Superpave Gyrotory Compactor
AASHTO T331	Bulk Specific Gravity and Density of Compacted HMA Using Automatic Vacuum Sealing Method
ASTM D7227	Rapid Drying of Compacted Asphalt Specimens Using Vacuum Drying Apparatus
MP 401.02.31	Quality Control and Acceptance of Asphaltic Mixtures
MP 401.07.20	Sampling Loose Asphaltic Mixtures in the Field
MP 401.07.21	Sampling Compacted Asphaltic Mixtures in the Field
MP 401.07.22	Measuring Thickness of Asphalt Pavement using Drilled Cores
MP 401.07.23	Measuring Bond Strength of Cored Specimens
MP 401.07.24	Measuring Asphaltic Pavement Macrottexture
MP 401.07.25	Evaluation of Pavement with Substandard Properties
MP 401.13.50	Determination of Percent Within Limits

410.6-CONTRACTORS QUALITY CONTROL:

410.6.1-Quality Control Testing: Quality control of the asphalt pavement is the responsibility of the Contractor. The Contractor shall maintain equipment and qualified personnel including at least one certified Asphalt Plant Technician at each plant. The technician shall be in charge of all plant quality control activities such as mix proportioning and adjustment and all sampling and testing activities necessary to maintain the various properties of asphalt within the limits of the specification.

The Contractor shall maintain necessary equipment and qualified personnel including at least one certified Asphalt Field and Compaction Technician at each project during paving operations. Additionally, a certified Asphalt Field and Compaction Technician with certification to perform nuclear density testing of asphalt pavements shall perform all testing

necessary to assure compaction of the asphalt meets specification requirements. ~~Compaction Technicians may serve as Asphalt Field and Compaction Technicians for asphalt compaction testing until December 31, 2017.~~

410.6.2-Job Mix Formula Field Verification: For each JMF, a mix design field verification shall be conducted during the first days of plant production. For Marshall and Superpave designs, the verification shall be in accordance with the guidelines established in MP 401.02.31. The field verification is for the purpose of demonstrating that the JMF can be produced within the specified tolerances set forth in the MP 401.02.31. If the mix cannot be produce within these requirements, a new mix design will be required.

410.6.3-Quality Control Testing Requirements: After the JMF design field verification has been successfully completed, sampling frequency and test requirements for quality control shall be as set forth in MP 401.02.31 for Marshall and Superpave designs. If the Division determines that a mix cannot be consistently produced within the tolerance limits of the specified design properties, approval of the mix may be revoked and the contractor will be required to provide a new mix design.

410.7-ACCEPTANCE TESTING:

410.7.1-Acceptance Testing of Asphalt: For Interstates and divided NHS Highways, material from the paving of the traveled lanes and shoulders will be accepted in the field on a lot-by-lot basis. Lots will be established cumulatively and will be specific for each JMF. Each lot consists of five equal sublots (n=5). A completed subplot will have cores obtained for Pavement Density, and Bond Strength and a Loose Mixture sample for gradation and asphalt content. Samples for mat density and bond strength shall also be used to measure lift thickness prior to any preparation for density or bond strength. All field samples shall be obtained from locations determined as per MP 401.07.20 and MP 401.07.21.

A normal lot size is 2,500 tons with five, 500-ton sublots (n=5), unless operational conditions or project size dictate otherwise. If operational conditions or project size dictate, readjustment of the lot will be made as specified in Table 410.7.1. Breakdowns or stoppages of short periods due to such causes as weather or equipment failure will not be considered as reason to adjust the lot size. The original lot will be continued when work resumes after stoppages of less than 5 days. If a lot is terminated due to a stoppage of 5 days or more, adjust the lot size and number of sublots as specified in Table 410.7.1.

For two lane and non-divided NHS Routes, refer to Section 410.13.7.1.

TABLE 410.7.1

Re-adjustment of Lot Size and Associated Number of Sublots Remaining Quantity Following Last Full Lot	Action
Less than 500 tons without a combination of one mixture acceptance sample and one density core	Quantity combined with the previous lot, (n=5)
Less than 500 tons with a combination of one mixture acceptance sample and one density core	One new subplot defined and quantity combined with the previous lot, (n=6)
500 tons to less than 1,000 tons without a combination of two mixture acceptance samples and two density cores	One new subplot defined and quantity combined with the previous lot, (n=6)
500 tons to less than 1,000 tons with a combination of two mixture acceptance samples and two density cores	Two new sublots defined and quantity combined with the previous lot, (n=7)
1,000 tons to less than 1,500 tons without a combination of three mixture acceptance samples and three density cores	Two new sublots defined and quantity combined with the previous lot, (n=7)
1,000 tons to less than 1,500 tons with a combination of three mixture acceptance samples and three density cores	New lot defined, (n=3)
1,500 tons to less than 2,000 tons without a combination of four mixture acceptance samples and four density cores	New lot defined, (n=3)
1,500 tons to less than 2,000 tons with a combination of four mixture acceptance samples and four density cores	New lot defined, (n=4)
2,000 tons to less than 2,500 tons without a combination of five mixture acceptance samples and five density cores	New lot defined, (n=4)
2,000 tons to less than 2,500 tons with a combination of five mixture acceptance samples and five density cores	New lot defined, (n=5)

Immediately after each sample is taken, it shall be identified by labeling or otherwise with the following information:

1. Contract ID
2. State Project Number
3. Sample Type (density, bond, loose, etc.)
4. Pavement Course (surface, base)
5. Lot Number
6. Sublot Number
7. Date
8. Sampled By

A sample labeling standard is shown in MP 401.07.20 Sampling of Loose Asphaltic Pavement Mixtures and MP 401.07.21. Upon fully identifying, marking, or labeling, and securing, samples shall be transported to the District Materials Laboratory for testing unless otherwise indicated in the proposal.

410.7.1.1-Mixture Acceptance Samples. The Inspector will select sample locations in each subplot according to MP 401.07.20 Sampling of Loose Asphaltic Pavement Mixtures. The Inspector or in the presence of the Inspector, one loose mixture sample shall be obtained for each subplot. This sample is to be taken directly from the uncompacted mixture and immediately processed in accordance with the MP.

410.7.1.2-Compaction: Compaction testing for mat density shall be performed for all traveled lanes, ramps and shoulders. Work will be evaluated based on an Upper Specification Limit (USL) of ~~97.0~~98.0 and a Lower Specification Limit (LSL) of 91.5 for all mats within travel lanes. Acceptance of mat density shall be in accordance with 410.13.3.

Maximum density values that are supplied by the asphalt producer shall be verified by the District Materials staff by determining the theoretical maximum specific gravity in accordance with AASHTO T209 Theoretical Maximum Specific Gravity (Gmm). This verification of Gmm shall be conducted once per lot for all mixes, or one in each five reported values from the asphalt producer. This Gmm value must be within 0.024 of the asphalt producer's daily average. Any deviation of greater shall warrant special evaluation. Joint density testing is required. The joint density shall be evaluated based on a Lower Specification Limit (LSL) of 89% of a maximum density established by averaging the maximum densities for the paved mats adjacent to the constructed longitudinal joint. The joint density requirement shall only apply to the surface lift of the pavement structure. Lots for joint density shall also be established cumulatively and laid out as per the applicable provisions within MP 401.07.21.

A normal lot size for evaluation of joint density is 10,000 linear feet of constructed joint with five, 2000 foot long sublots, unless operational conditions or project size dictate otherwise. Lots for joint density determined to be 4000 feet in length or less shall be incorporated into the previous full lot. If the length is 2000 feet or less, then one sample shall be taken, and the lot be evaluated with six samples (n=6). If the length is greater than 2000 feet, then ~~and~~ two samples shall be taken, and the lot be evaluated with seven samples (n=7). Lots for joint density that are greater than 4000 feet in length shall have samples taken representative of each 2000-foot long subplot or portion thereof.

Acceptance for joint density shall be as per 410.13.4.

Patching-and-leveling and scratch courses shall not be included in determining the total new pavement thickness to be tested for compaction. When asphalt is placed in areas that require a non-uniform thickness or is tapered to a thin edge, the method of acceptance testing shall be determined by the Engineer. Acceptance testing is not required on areas in which a full-size roller is restricted from compacting the mat properly. These areas shall be compacted to the satisfaction of the Engineer.

410.7.1.3-Shoulders and Ramps: As per MP 401.07.21, shoulders and ramp areas that are constructed simultaneously with the mainline are not included in the sampling plan. However, these simultaneously constructed shoulder and ramp areas shall be included in the lot of the adjacent mainline for the purposes of penalty ~~and bonus~~ calculations for compaction and mixture properties.

Shoulders that are constructed independently of the mainline shall be tested as per MP 401.07.21. However, compaction penalty calculations for these independently constructed shoulders shall not apply.

410.7.1.4-Thickness: Thickness testing shall be performed on all traveled lanes, ramps and independently constructed shoulders.

Cores obtained for mat density and bond strength will both be measured for thickness as per MP 410.07.22 Measurement for Thickness of Asphalt Pavement Using Drilled Cores, prior to those subsequent analyses. The core measurements which represent the thickness of the sampling units shall be analyzed to determine the average value of the pavement thickness. Pavement Thickness (T) shall include all of the pavement layers as specified excluding any patch and level course and scratch courses. This value will be used to determine the degree of compliance with the provisions and to develop certain factors to be used in the derivation of equitable deductions as set forth in Section 410.13.5, in the event the provisions of this Specification are not met.

410.7.1.5-Bond Strength: 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 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 bond strength shall exceed a minimum of 100 psi when tested in accordance to MP 410.07.23 Guide to Determining Interface Bond Shear Strength.

410.7.2-Surface Tolerance: Shall be in accordance with Section 720 on the finished mat.

410.7.3-Pattern Segregation: Pattern segregation is continuous or repeated areas of non-uniform distribution of coarse and fine aggregate particles in the finished mat. The Division will address pattern segregation as follows:

410.7.3.1-Evaluating Pattern Segregation: If the Engineer observes pattern segregation that may result in defective pavement, then:

- i. The Inspector will notify the Contractor of the observed pattern segregation.
- ii. The Contractor may continue to work at their own risk while they immediately

and continually adjust the operation to eliminate the pattern segregation from future work.

- iii. As a minimum and in the presence of the Engineer and the Contractor's Representative, Division personnel shall determine the average depth of pavement surface macrotexture according to MP 401.07.24 in areas with the pattern segregation and in areas with non-segregated pavement. The pattern segregation is unacceptable if the difference in average pavement texture depth between the non-segregated and segregated areas exceeds the following:
 - a. For 9.5 mm or Wearing I mixes – 0.012 inch (~~0.305 mm~~)
 - b. For 12.5 mm mixes – 0.016 inch (~~0.406 mm~~)
- iv. The Engineer will determine if the pavement is defective as specified in Section 410.7.3.3.

410.7.3.2-Test Section: If the macrotexture tests identify unacceptable pattern segregation, then:

- i. Immediately suspend placing the asphalt course. Evaluate the cause of pattern segregation according to the Paving Operation QC Plan. Provide proposed corrective actions to the Engineer and do not resume placing the asphalt course until after the Engineer reviews the proposed corrective actions and authorizes paving to continue.
- ii. Determine if the pattern segregation resulted in defective pavement as specified in Section 410.7.3.3.
- iii. After the Engineer allows paving to resume, place a test section not to exceed 200 tons. If the corrective actions do not eliminate observed pattern segregation, the Department will suspend paving, even if it is before the Contractor places the entire test section. Propose additional corrective actions and construct another test section. Resume normal paving operations after constructing an entire test section without pattern segregation as determined by the Engineer.

410.7.3.3-Defective Pavement: At locations selected by the Engineer and with the Engineer present, drill three 6-inch diameter cores from the area of pattern segregation and three cores from the pavement representing a non-segregated area. Do not compress, bend, or distort samples during cutting and handling and immediately provide the cores to the Inspector. The Inspector will transport cores to the producer's laboratory. With the Engineer present, test the cores at the plant for density, asphalt content, and gradation. Additional cores and/or additional testing as per MP 401.07.24 Measuring Pavement Macrotexture Depth can be used to further evaluate the pavement.

An area of pattern segregation contains defective pavement if:

- a. the summation of absolute deviations from any two sieves is 20% or more from the JMF;
- b. the core density is defective, the mixture is defective in asphalt content;
- c. or the mixture is defective for percent passing the 75 μ m (No. 200) sieve.

The core density is defective, or the cores are defective for asphalt content or gradation of the 75 μ m (No. 200) sieve if the PWL is less than 55 as determined in accordance with MP 401.13.50 and based on three samples (n=3). Remove and replace the full width of the

affected lane and a minimum of 5 feet beyond each end of the area with unacceptable pattern segregation. Construct replacement pavement conforming to the appropriate surface tolerances.

410.7.4-Flushing: Provide a mix that will not flush. Flushing is continuous or repeated areas of excessive asphalt on the pavement surface. The Division may recognize flushing until the Division approves the project through final inspection. The Division will address flushing as follows:

410.7.4.1-Evaluating Flushing: When the Engineer observes flushing, then:

- i. The Engineer will immediately notify the Contractor of the observed flushing.
- ii. The Contractor may continue work at its own risk while it immediately and continually adjusts the operation to eliminate flushing from future work.
- iii. In the presence of the Engineer, determine the average depth of pavement surface macrotexture according to MP 401.07.24 in areas of suspected flushing. If the average texture depth is less than or equal to 0.006 inches (~~0.152 mm~~), then the pavement will be considered to be flushed and is defective.

410.7.4.2-Test Section: If the macrotexture tests identify flushing, then:

- i. Immediately suspend placing the paving course. Evaluate the cause of flushing according to the Paving Operation QC Plan and as directed. Provide proposed corrective actions to the Engineer and do not resume placing the paving course until after the Engineer reviews the proposed corrective actions and authorizes paving to continue.
- ii. Remove and replace the defective wearing course at no cost to the Division for the full width of the affected lane and a minimum of 5 feet beyond each end of the area of defective wearing course. Construct replacement wearing course conforming to the appropriate surface tolerances.
- iii. After the Engineer allows paving to resume, place a test section not to exceed 200 ~~TN~~ tons. If the corrective actions do not eliminate observed flushing, the Division will suspend paving even if it is before the Contractor places the entire test section. Propose additional corrective actions and construct another test section. Resume normal paving operations after constructing an entire test section without flushing as determined by the Engineer.

410.8-BLANK

410.9-EQUIPMENT:

410.9.1-Plants: All plants shall meet the general requirements set forth in AASHTO M156 unless it can be demonstrated to the satisfaction of the Engineer that a consistent quality mix can be produced with modifications to any of these requirements.

All plants in West Virginia producing asphalt for the Division shall provide documented evidence of compliance with current requirements of the West Virginia Air Pollution Control Commission.

All plants which are not in West Virginia but producing asphalt for the West Virginia Division of Highways shall provide documented evidence of compliance with current

requirements of the laws and regulations of the State in which they are producing, applicable to air pollution.

410.9.2-Dust Collector: An efficient dust collecting system shall be provided to prevent the loss of fine material. The material collected may be returned to the mixture at a uniform rate or discarded.

410.9.3-Truck Scales: Truck scales shall be provided at each Plant, except that truck scales are not required at properly calibrated automatic batching plant facilities which are equipped with digital printout equipment, and which load the trucks directly from the mixer or the weigh hopper in a surge or storage silo.

A person designated as a weigher shall be provided by the producer. The weigher shall certify that the weight of the asphalt, as determined either by the truck scales or from the digital printout of the batch weights, is correct.

Each truck shall be weighed empty prior to each load, except at automatic batch plants approved to operate without truck scales.

All truck scales shall be mounted on solid foundations which will insure them remaining plumb and level.

Approval and sealing of scales shall be conducted at the frequency determined by the West Virginia Division of Labor, Bureau of Weights and Measures, and when the plant is moved, or upon the request of the Engineer. The Engineer shall be notified of any scale malfunctions when material is being furnished to Division of Highways projects. The Division may, at its option, accept inspection and sealing by out-of-state agencies when the mixing plant is located outside West Virginia.

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 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.

The scales shall be of sufficient size and capacity to weigh the loaded trucks that are used for delivery of asphalt from the plant.

410.9.4-Test Weights: As part of its standard equipment, each plant which proportions aggregate by weight shall provide a minimum of ten 50-pound ~~(22.68 kg)~~ test weights for the purpose of verifying the continued accuracy of its weighing equipment.

Plants which proportion asphalt material by weight shall furnish, in addition to the above, one five pound ~~(2.268 kg)~~ test weight.

410.9.5-Surge and Storage Silos: During the normal daily operation of the plant, asphalt may be stored in a surge or storage silo for a maximum of ~~12-6~~ hours, provided the silo has received prior evaluation and acceptance through the District plant inspection. The resulting temperature of the material at time of placement and compaction shall be sufficient to comply with 410.10.1, ~~3~~ and 410.10.4

~~Longer silo storage times, up to 24 hours, may be permitted for dense graded asphalt if the storage silo is insulated and/or heated to assure that the proper mix temperature is maintained. The gates at the bottom of the storage silo shall be adequately heated and sealed when the asphalt is held for the extended period of time. When asphalt is stored for the extended time period, it shall not be used until the temperature has been checked and the asphalt has been visually inspected for hardening of the mix and stripping of the asphalt from the aggregate. Approval of the extended storage time may be revoked if it is determined through inspection and/or testing that the extended storage is having a detrimental effect on the asphalt.~~

410.9.6-Inspection of Equipment and Plant Operations: The Engineer shall have access to the plant to assure the adequacy of the equipment in use, to inspect the conditions and operation of the plant, to verify weights, to verify the proportion and character of materials, and to determine if specified temperatures are being maintained in the preparation of the mixture.

410.9.7-Trucks for Transporting Mixture: The use of diesel fuel, kerosene, or similar solvent-based products which can dissolve the asphalt film from the aggregate particles will not be permitted for use as a release agent. Any commercial release agent which is certified as harmless to the mix may be used; however, the Division reserves the right to restrict any release agent that is shown to cause problems during placement of the mix. All excess release agent shall be removed from the truck bed prior to loading the asphalt.

All truck beds shall be insulated with approved material. No trucks shall be used which cause segregation of the materials, which show large oil leaks, or which cause undue delays in delivery of material. All trucks shall be provided with a waterproof cover and a hole in the body for the purpose of conveniently checking the temperature of the load. Covers shall be suspended slightly above the mixture, shall extend over the sides of the truck, and shall be securely fastened to eliminate air infiltration and to prevent water from coming in contact with the mixture.

410.9.8-Laboratory: A testing facility or laboratory, as described below, shall be provided within reasonable proximity of the asphalt plant. Plant operations must be visible from within the laboratory.

The laboratory shall be of sufficient size to hold all laboratory test equipment and supplies with adequate floor space to allow the technicians to test samples in an efficient manner. The laboratory shall be furnished and maintained with adequate ventilation, heat, light, water, sink and drainage, electrical or gas outlets, or both, work table, shelves, and supply cabinets.

The laboratory shall be supplied with the equipment and materials listed below and these shall be maintained to meet the applicable requirements of AASHTO or ASTM:

- i. Hot plate, gas or electric.
- ii. Large ovens (as needed for heating and drying samples), gas or electric.
- iii. Unit weight container, ½ cubic foot ~~(0.014 cubic meter)~~. Required for slag only.
- iv. Balances of sufficient capacity and accuracy for conducting specified tests and plant calibration.

- v. Thermometers: dial type, liquid-in-glass, and digital as required for conducting standard test procedures and monitoring mix temperatures. Digital thermometers shall be equipped with an appropriate sturdy probe that can be pushed into a sample of hot asphalt to check the temperature of the mix.
- vi. Ro-Tap Sieve shaker or equivalent, with 8 and/or 12 inch ~~(200 and/or 300 mm)~~ diameter screens.
- vii. Sample splitters for fine and coarse aggregates.
- viii. Miscellaneous items (including sample splitting trowels, scoops, square point shovel, aggregate sample pans, heat resistant gloves, measuring rules, brushes, flashlight, timing devices, and glassware as needed).
- ix. Expendable supplies necessary for performance of tests.
- x. Equipment for determining the maximum specific gravity of asphalt mixtures as specified in AASHTO T209.
- xi. Non-contact infrared thermometer accurate to $\pm 2^{\circ}\text{F}$ ~~($\pm 1^{\circ}\text{C}$)~~.
- xii. Equipment for determining the bulk specific gravity of asphalt mixtures using saturated surface dry specimens complying with AASHTO T166.
- xiii. Marshall equipment necessary to comply with AASHTO T245 and ASTM D5581, including a calibrated automatic testing apparatus having recording capabilities and compaction hammers. (Marshall designs only)
- xiv. Asphalt content ignition oven with built-in scale and printer meeting the requirements of AASHTO T308, Test Method A.
- xv. Calibrated Gyratory compactor meeting requirement of AASHTO T312 with computer (including software for data acquisition and test calculations) and printer. Compactor must be calibrated to the internal angle in accordance with AASHTO TP71 with annual verification (Superpave designs only).

410.9.9-Asphalt Paving Equipment: Asphalt paving equipment shall be self-contained and of sufficient size, power, and stability to receive, distribute and strike-off the asphalt mixture at rates and widths commensurate with the typical sections and other details shown on the plans. The paver shall be provided with an activated screed or strike-off assembly equipped to be heated. Approval of the paver by the Engineer will be based on the demonstrated capability of the equipment to place the mixture to the required cross-section, profile, and alignment in an acceptable, finished condition ready for compaction.

The paver shall be equipped with means of preventing the segregation of the coarse aggregate particles when moving the mixture from the paver hopper to the paver augers. It shall also be capable of pushing a sufficient amount of the mixture under the auger gearbox to prevent streaking or tearing of the mat. Some paver models may require the installation of a manufacturer retrofit kit or equipment modification to accomplish this.

Specialized equipment or hand methods approved by the Engineer may be employed to spread the asphalt mixture where the use of standard full-scale paver is impractical due to the size or irregularity of the area to be paved.

Pavers shall be equipped with mechanical or automatic grade and slope controls. The use of automatic grade and slope controls with a traveling straight edge shall be required only when specified on the Plans or in the Proposal. Both the grade and slope controls shall be in working order at all times. In the event of failure of the automatic controls, the Contractor will be permitted to finish the day's work using manual controls but will not be allowed to resume work the following day until the grade and slope controls are in proper working order.

410.9.10-Compaction Equipment: Compaction may be performed by self-propelled steel-wheeled, pneumatic-tired and/or vibratory rollers. Hand-held rollers or vibrating plates may be used in small inaccessible areas if approved by the Engineer. Prior to use on any project, the roller shall be inspected to see that it is in good mechanical condition. The total weight, weight per inch of width (steel-wheeled), and average ground contact pressure (pneumatic-tired) shall be documented.

410.10-PAVING OPERATIONS:

410.10.1-Spreading and Finishing: Before spreading any material, the contact surfaces of curbs, gutters, manholes, and of adjacent Portland cement concrete pavement edges shall be painted or sealed with asphalt material. Exact edge of pavement, except on concrete, shall be established by a string or chalk line for a distance of not less than 500 feet ahead of the spreading operation. For projects where the existing pavement was milled prior to the placement of new asphalt, the edge of pavement shall be the edge of milled section.

For mixes produced with neat (non-modified) asphalts (which may include PG 64H- 22, PG 64S-22, PG 58H-28, and PG 58S-28) the temperature of the mixture at the time of placement shall be within the temperature requirements of the JMF. The JMF temperature range shall be the liquid asphalt supplier's specified mixing temperature $\pm 45^{\circ}\text{F}$ ($\pm 25^{\circ}\text{C}$) with a maximum mixing temperature of 338°F (170°C). Additional allowances will be made for water injection processes with a minimum mixing temperature of 220°F (105°C).

The mix temperature shall be monitored by inserting a thermometer into the mix through the hole in the truck bed.

The temperature of the completed mix, when measured at the plant, shall be within the tolerance as established by the JMF. The first load which demonstrates temperatures outside of that range shall be accepted, provided that the temperature is still within the master temperature range. No additional loads of material shall be run out until necessary steps are taken to reestablish the temperature of the mix within the plant tolerance. When measured at the project site, the temperature of the mix shall be within the tolerance established by the JMF. The first truck load of material which demonstrates temperatures outside of that range or any trucks in transit at that time shall be accepted provided temperatures are within the master temperature range. Any truckload of material which exceeds the master temperature range may be rejected by the Engineer. However, the plant shall immediately be notified that no additional loads of material are to be dispatched until necessary action is taken to reestablish temperature within JMF specification limits.

When the surface temperature falls to within 10°F (6°C) of the weather restrictions of Table 410.8, the mix temperature may be increased up to a maximum of 338°F (170°C) unless otherwise specified by the asphalt supplier. The temperature of each truckload of material shall be monitored for compliance. Any truckload of material which exceeds this maximum temperature may be rejected by the Engineer.

Mixes produced with asphalts that contain modifiers for high or low temperature performance enhancement shall meet the temperature requirements recommended by the asphalt supplier, as determined using the mid-point of the mixing temperature range shown on the asphalt temperature-viscosity charts and allowing for $\pm 25^{\circ}\text{F}$ (14°C).

410.10.2-Safety Edge: When the total specified lift thickness of pavement is 1.5 inches or greater, asphalt safety edge shall be constructed on the outside pavement edge. The device utilized shall be a model listed on Division Approved Product Listing.

The resulting finished surface of the safety edge shall be sufficiently consolidated so as to show no segregation or raveling of the aggregate and shall have the same surface profile and texture of the compacted mat surface.

Safety edge is not to be used through intersections, against curb or barrier, or when directed by the Engineer. The paving operation shall allow for automatic and/or manual transitions at cross roads, driveways, and intersections. The Engineer may allow short sections of handwork for transitions at driveways, intersections, interchanges, and bridges.

410.11-PROTECTION OF PAVEMENT AND TRAFFIC CONTROL:

The Contractor shall be responsible for the protection of asphalt surfaces from damage by their equipment and personnel. When the construction of asphalt surfaces is undertaken on projects under public traffic and the road surface is 16 feet wide or greater and the ADT is 400 or greater, the Contractor shall place no passing signs, Interim pavement markings, and Temporary pavement markings to delineate the edge line, centerline, and/or lane line of the roadway as required herein and in the project plans. The provision of Section 336: Maintaining Traffic shall apply.

Interim markings are described as markings applied to freshly resurfaced roadways between lifts and after placement of the final lift prior to opening the portion of the roadway being resurfaced to traffic. These markings are intended to provide the minimum amount of delineation required for safe navigation of the roadway and are to be succeeded by Temporary markings within a three (3) to fourteen (14) day period, based on the type of roadway and ADT, as specified herein. Interim and Temporary markings shall conform to the requirements of Section 663: Pavement Markings.

410.12-METHOD OF MEASUREMENT:

Asphalt will be measured by the Square Yard (SY). The quantity will be determined by the Plan Quantity as provided for in the proposal unless otherwise directed by the Engineer.

Any patching or leveling mixture placed on a subbase or base course constructed in the same Contract with the asphalt items shall be at the expense of the Contractor. No additional compensation will be allowed for the material or any work incidental to its placement unless otherwise approved by the Engineer. No additional measurement is necessary nor will additional compensation be allowed for the placement of Safety Edge.

410.13-BASIS OF PAYMENT:

The quantities determine as provided above, will be paid for at the contract unit price for the items listed below, which prices and payment shall be full compensation for furnishing all the materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, field laboratory, supplies, tack coat, and incidentals necessary to complete the work and provide the performance criteria specified.

There will be no additional compensation for Interim Pavement Markings.

410.13.1-When a Lot of asphalt material is found not in compliance with the tolerance requirements for asphalt content and gradation as shown in MP 401.02.31, it shall be subject

to a price adjustment in accordance with the criteria for Determination of Percent Within Limits established in MP 401.13.50 and pay factors in Table 410.13.3.1.

410.13.2-Blank

410.13.3–For Interstates and divided NHS Highways, the unit price for each Lot of asphalt pavement Mat shall be adjusted as follows in Table 410.13.3.1 in accordance with MP 401.13.50. For two-lane and non-divided NHS Routes, the pay factor for asphalt content and percent passing the 75 µm (No. 200) sieve shall be determined by Table 410.13.3.1. However, the mat density pay factor shall be determined by Table 410.13.7.2.

TABLE 410.13.3.1

Percentage of Material Within Specification Limits (PWL)	Lot Pay Factor (Percent of Contract Unit Price)
96-100 ^{Note 1}	102 ^{Note 1}
90- 95-100	100
75-89	[(0.5)PWL]+55
55-74 ^{Note 2}	[(1.4)PWL]-12

Note 1 ~~Payment of 102% for mat density shall be subject to additional requirement of the average compaction for the lot being evaluated to be a minimum of 93% density.~~

Note 2 Material with a PWL less than 55 is considered defective and will be considered for removal and replacement of the lot. If only one lot characteristic has a percent within limits less than 55, the Engineer, may allow the Contractor to leave the defective lot in place. The decision to remove and replace the subject lot shall include evaluation of all lot characteristics for pay and surface characteristics as per guidelines set forth in MP 401.07.25. If the material is left in place, the Department will pay for the defective lot at a value not to exceed 50% of the contract unit price of asphalt per square yard. (i.e., Contract unit price = \$10 sy → \$5 sy max)

410.13.3.1-Price Adjustment: The Division will compute the percent of the contract unit price paid as follows:

$$\text{Lot Payment} = \text{CP} (2\text{PD} + \text{PB} + \text{PA}) / 400$$

Where:

CP = Contract unit price per lot (unit price times lot quantity)

PD = Payment Factor Percentage for mat density

PB = Payment Factor Percentage for asphalt content.

PA = Payment Factor Percentage for percent passing the 75 µm (No. 200) sieve

Shoulders and ramps shall be included in penalty calculations for mixture and compaction unless they are constructed independently, where the density requirements shall be waived. When compaction requirements are waived, PD will be minimum of 100.

410.13.4-Joint Density Adjustments: For Interstates and divided NHS Highways, joint Density PWL calculations shall be in accordance with MP 401.13.50. Joint Density bonus adjustments will be calculated for joint lots with a PWL greater than or equal to 80. Joint Density negative adjustments will be calculated for joint list with a PWL less than or equal to

60. Price adjustments shall be calculated using the formulas below. There will be no adjustment for joint lots who's PWL falls between 60 and 80 greater than 60.

~~Bonus adjustment calculated as follows:~~

$$\text{\$T} = \frac{\text{PWL} - 80}{20} \times 4,000$$

Negative adjustment calculated as follows:

$$\text{\$T} = \frac{60 - \text{PWL}}{60} \times 12,500$$

Adjustments calculated for lots less than or greater than 10,000 feet in length shall be prorated directly proportional to the amount of length less than or greater than 10,000 feet.

For two-lane and non-divided NHS Routes, refer to Section 410.13.7.3.

410.13.5-Thickness Adjustments: No payment will be made for pavement areas deficient in thickness by more than 35% T.

Pavement which is deficient in thickness by more than 50% T is considered to be inadequate to perform satisfactorily and shall be removed and replaced at no added cost to the Division.

The balance of the item, the portion of the item not treated in the manner set forth above, will be treated in the manner set forth in 410.13.5.1 below.

410.13.5.1-Price Adjustments for Thickness - When all individual measurements meet or exceed the specified thickness, there will be no adjustment for payment. If any individual values or when the average value of the pavement thickness per lot is less than the specified total thickness, the quantity of pavement represented by this average thickness will be paid by a direct calculation as defined as follows:

$$\text{Price Adjustment \%} = \left(\frac{t}{T} \right) \times 100$$

Where:

T = Total Plan Thickness

t = avg. lot thickness + 0.04 in.

This value is then applied to the unit price for the asphalt place in the lot, this adjustment shall remain separate from the PWL adjustments for AC, Gradation, Density, etc.

410.13.6-Bond Strength Adjustment: For Interstates and divided NHS Routes, bond Strength PWL calculations shall be in accordance with 410.13.50 MP 401.13.50, Guide to Statistical Analysis of Material Using Quality Level Analysis-Percent within Limits. However, for the purpose of relieving large standard deviations from abnormally strong samples, any sample with a strength exceeding 150 psi will be evaluated as 150 psi instead of the actual strength. The actual strength ~~should~~ shall still be recorded as such on the reporting form.

~~Bond Strength positive adjustments will be calculated for lots with PWL greater than or equal to 90.~~ 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 falls between 70 and 90 greater than 70.

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Positive adjustment calculated as follows:

$$\$T = \frac{PWL - 90}{20} \times 2,000$$

Negative adjustment calculated as follows:

$$\$T = \frac{70 - PWL}{70} \times 40,000 - 25,000$$

Adjustments calculate 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: Due to the wide range of variability on the roadway, the following exceptions for lot/sublot layout and analysis of existing condition dependent test results shall apply:

410.13.7.1-Acceptance Testing of Asphalt: A lot shall consist of three (3) to seven (7) equal sublots. A normal sublot size is 500 tons unless operational conditions and sublot size dictate otherwise. Determine the number of sublots on the project by converting the square yardage of the travel lanes and simultaneously paved shoulders to tonnage. Divide the tonnage by 500 and round to the nearest whole number (n). Use that number (n) in Table 410.13.7.1 to determine the number of lots to be used for acceptance.

TABLE 410.13.7.1

<u>Number of Sublots (n)</u>	<u>Number of Lots</u>
<u>3 to 7</u>	<u>1 Lot with (n) even sublots</u>
<u>8</u>	<u>2 Lots with 4 even sublots each</u>
<u>9</u>	<u>2 Lots - Lot 1, 5 Sublots / Lot 2, 4 Sublots</u>
<u>10</u>	<u>2 Lots with 5 even sublots each</u>
<u>11</u>	<u>2 Lots - Lot 1, 6 Sublots / Lot 2, 5 Sublots</u>
<u>12</u>	<u>2 Lots with 6 even sublots each</u>
<u>13</u>	<u>2 Lots - Lot 1, 7 Sublots / Lot 2, 6 Sublots</u>
<u>14</u>	<u>3 Lots - Lot 1, 5 Sublots / Lot 2, 5 Sublots / Lot 3, 4 Sublots</u>
<u>15</u>	<u>3 Lots with 5 even Sublots each</u>

Turn lanes, intersections, and independently constructed shoulders shall not be subject to price adjustments, positive or negative, if the combined square yardage converts to less than 500 tons. If the square yardage converts to over 500 tons, then one additional sublot for asphalt content, percent passing the 75 µm (No. 200) sieve, and bond strength shall be added to the last lot constructed. Compaction shall be monitored, documented, and submitted to the Engineer by a certified Asphalt Field and Compaction Technician to assure that it meets specification requirements.

410.13.7.2 -Basis of Payment: The payment factor for density shall be adjusted as follows in Table 410.13.7.2. This payment factor (PD) will then be used in the Lot Payment calculation formula in Section 410.13.3.1.

TABLE 410.13.7.2

Payment Factors for Pavement Mat Density	
Average Lot Percent Density	Payment Factor (PD)
Greater than 98 %	Note 1
94.00% to 98.00%	102
93.00% to 93.99%	101
91.50% to 92.99% 98.00%	100
88.00% to 91.49%	$= 100 - 4*(91.50\% - \text{Percent density})$
Less than 88%	$= 84 - 10*(88\% - \text{Percent density})$ ^{Note 2}

Note 1 High mat density is only a problem if it leads to asphalt flushing on the surface of the mat or rutting due to an unstable mix. The Division will make a special evaluation of the material and determine the appropriate action.

Note 2 When the density decreases, the mat will be more susceptible to accelerated deterioration and a decrease in the expected service life of the pavement. For mat densities less than 88%, the percent of Contract Bid Price will be decreased by an additional 10% per percentage of mat density less than 88%, unless a Special evaluation performed by the Division determines a more appropriate action.

410.13.7.3-Joint Density Adjustments: The adjustment for joint density shall be determined by Table 410.13.7.3. This adjustment is per linear foot and will be multiplied by the total number of liner feet in the lot to determine the total lot adjustment. This is calculated per lot and applied per Section 410.13.8.3.

TABLE 410.13.7.3

Pay Adjustment for Pavement Joint Density per Linear Foot	
Average Lot Percent Density	Price Adjustment (\$ / LF)
Greater than 97 %	Note 3
94.00% to 97.00%	0.40
91.50% to 93.99%	$= [0.40 - \{0.12*(94.00 - \text{Percent Density})\}]$
89.00 % to 97.00%	0
88.00% to 88.99%	-0.20
Less than 88%	$= [\{0.50*(\text{Percent Density} - 88.00)\} - 0.20]$

Note 3 Joint density slightly above 97% is normally only a problem if it leads to asphalt flushing on the surface of the mat or rutting due to an unstable mix. The Division will make a special evaluation of the material and determine the appropriate action.

410.13.7.4-Bond Strength Adjustments: 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.

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TABLE 410.13.7.4	
Pay Adjustment for Bond Strength per 2500 Ton Lot	
Average Lot Bond Strength (PSI)	Price Adjustment (\$ / Lot)
Greater than 150.00	5,000
100.00 to 149.99	= [5,000 - 100*(150.00 - PSI)]
Greater than 100.00	0
75.00 to 99.99	= [1,000*(PSI - 75.00)] - 25,000
Less than 75.00	- 25,000

410.13.78-Lot Payment Calculations: The pay factors that are calculated with in the specification are to be applied in the following way:

410.13.78.1-PWL Factors: The calculated total PWL for a given lot is applied to the bid unit price for the asphalt mixture in the lot. Once the unit price has been adjusted the quantities can be calculated to arrive at the payment for the lot.

410.13.78.2-Thickness Adjustment: There is no adjustment for thickness greater than the thickness that is specified in the plans. If there is a Price Adjustment (Section 410.13.5) for thickness this factor (percentage) is applied to the contract bid unit price times the quantity in the lot to arrive at a dollar amount penalty. This penalty is applied to the overall payment for the lot.

410.13.78.3-Joint Density Adjustment: If it is determined in Section 410.13.4 of this specification that a Joint Density Adjustment is warranted the dollar amount determined in the formulas of Section 410.13.4 or Table 410.13.7.3 shall be applied to the overall payment for the lot.

410.13.78.4-Bond Strength Adjustment: If it is determined that a Bond Strength Adjustment is warranted ~~by~~ the formulas in Section 410.13.6 or Table 410.13.7.4 shall be used to calculate the adjustment. This adjustment shall be applied to the overall payment for the lot.

410.14-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
410001-*	“design method” Asphalt Base Course, Type “mix type”	Square Yard (Meter)
410002-*	“design method” Asphalt Wear Course, Type “mix type”	Square Yard (Meter)
410007-*	“design method” Asphalt Skid Pavement, Type “mix type”	Square Yard (Meter)

* Sequence number
 “design method” shall be either Marshall or Superpave
 “mix type” from Table 401.4.2A or 401.4.2B

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

**SECTION 601
STRUCTURAL CONCRETE**

601.1-GENERAL:

ADD THE FOLLOWING SUBSECTION:

601.1.1-Ultra High Performance Concrete: The Contractor shall furnish all materials, tools, and labor necessary for the performance of all work to form, cast, finish, and cure Ultra High Performance Concrete (UHPC) where required per plan. Before casting UHPC for actual construction, the Contractor will cast mockups to demonstrate the ability to properly cast the UHPC.

All UHPC shall be premixed/prebagged product provided ready for site mixing and installation by one of the following manufacturers:

1. ceEntek, Inc.
2. Cor-Tuf UHPC
3. Holcim US, Ductal®
4. Steellike, Inc.

UHPC manufacturers shall submit product data sheets and test reports from an AASHTO accredited independent testing laboratory for UHPC testing showing that the product meets the requirements of this Special Provision. Any change of materials or material sources shall require a submission of new test reports by an AASHTO accredited independent testing laboratory for UHPC testing showing conformance of the UHPC with this Special Provision. The UHPC concrete mixture described in this Special Provision shall be used at all locations specified in the Contract Plans.

601.2-MATERIALS:

ADD THE FOLLOWING:

- A. UHPC:** Use a UHPC premixed/prebagged product supplied by one of the manufacturers identified in 601.1.1. The UHPC shall have an optimized gradation of granular constituents, super plasticizer, and water, and shall have a minimum steel fiber content of 2% by volume and be able to achieve the following material and durability properties:

Material Characteristic Description	Test Method	Pre-Constr. Testing	Constr. Testing	Testing Frequency	Acceptance Criteria
Flow**	ASTM C1437 (as modified by ASTM C1856)	Yes	Yes	Once per batch	7 to 10 inches
Min. Compressive Strength at 4-days	ASTM C39 (as modified by ASTM C1856)	Yes	Yes	At least once per lot (15 yd ³) or once per 12-hr shift	14 KSI
Min. Compressive Strength at 28-days	ASTM C39 (as modified by ASTM C1856)	Yes	Yes	At least once per lot (15 yd ³) or once per 12-hr shift	20 KSI
Flexural Tension Stress, first crack-peak strength, minimum	ASTM C1609 (as modified by ASTM C1856)	Yes	Not Required	N/A	1.5 KSI
<u>Flexural Tension Stress, peak strength, minimum</u>	<u>ASTM C1609 (as modified by ASTM C1856)</u>	<u>Yes</u>	<u>Yes</u>	<u>At least once per lot (15 yd³) or once per 12-hr shift</u>	<u>2.0 KSI</u>
Long-Term Shrinkage	ASTM C157 (as modified by ASTM C1856)	Yes	Not Required	N/A	≤ 800 microstrain at 28-days
Scaling Resistance	ASTM C672- <u>12</u>	Yes	Not Required	N/A	y < 3
<u>Abrasion Resistance</u>	<u>ASTM C944 (2x weight; ground surface)</u>	<u>Yes</u>	<u>Not Required</u>	<u>N/A</u>	<u>< 0.025 oz. lost</u>
Chloride Ion Penetrability	ASTM C1202	Yes	Not Required	N/A	≤ 500 coulombs by 28-days
Freeze-Thaw Resistance	ASTM C666A	Yes	Not Required	N/A	RDM ≥ 95% after 300 cycles
Alkali-Silica Reaction	ASTM C1567	Yes	Not Required	N/A	Innocuous at 28-days

NOTE: RDM = Relative Dynamic Modulus of Elasticity

** Flow tests are to be performed on a vibration free area

B. Accelerated Curing UHPC: Use a UHPC premixed/prebagged product supplied by one of the manufacturers identified in 601.1.1. The UHPC shall have an optimized gradation of granular constituents, super plasticizer, accelerator, and water, and shall have a minimum steel fiber content of 2% by volume and be able to achieve the following material and durability properties:

Material Characteristic Description	Test Method	Pre-Constr. Testing	Constr. Testing	Testing Frequency	Acceptance Criteria
Flow**	ASTM C1437 (as modified by ASTM C1856)	Yes	Yes	Once per batch	7 to 10 inches
Min. Compressive Strength at 24-hours	ASTM C39 (as modified by ASTM C1856)	Yes	Yes	At least once per lot (15 yd ³) or once per 12-hr shift	10 KSI
Min. Compressive Strength at 48-hours	ASTM C39 (as modified by ASTM C1856)	Yes	Yes	At least once per lot (15 yd ³) or once per 12-hr shift	14 KSI
Min. Compressive Strength at 28-days	ASTM C39 (as modified by ASTM C1856)	Yes	Yes	At least once per lot (15 yd ³) or once per 12-hr shift	20 KSI
Flexural Tension Stress, first-peak crack strength, minimum	ASTM C1609 (as modified by ASTM C1856)	Yes	Yes	At least once per lot (15 yd ³) or once per 12-hr shift	1.5 KSI
<u>Flexural Tension Stress, peak strength, minimum</u>	<u>ASTM C1609 (as modified by ASTM C1856)</u>	<u>Yes</u>	<u>Yes</u>	<u>At least once per lot (15 yd³) or once per 12-hr shift</u>	<u>2.0 KSI</u>
Long-Term Shrinkage	ASTM C157 (as modified by ASTM C1856)	Yes	Not Required	N/A	≤ 800 microstrain at 28-days
Scaling Resistance	ASTM C672-12	Yes	Not Required	N/A	y < 3
<u>Abrasion Resistance</u>	<u>ASTM C944 (2x weight; ground surface)</u>	<u>Yes</u>	<u>Not Required</u>	<u>N/A</u>	<u>< 0.025 oz. lost</u>
Chloride Ion Penetrability	ASTM C1202	Yes	Not Required	N/A	≤ 500 coulombs by 28-days

Material Characteristic Description	Test Method	Pre-Constr. Testing	Constr. Testing	Testing Frequency	Acceptance Criteria
Freeze-Thaw Resistance	ASTM C666A	Yes	Not Required	N/A	RDM \geq 95% after 300 cycles
Alkali-Silica Reaction	ASTM C1567	Yes	Not Required	N/A	Innocuous at 28-days

NOTE: RDM = Relative Dynamic Modulus of Elasticity
 ** Flow tests are to be performed on a vibration free area

C. Qualification Testing: A minimum of two months prior to placement of UHPC, the Contractor shall complete qualification testing to demonstrate that the material and durability properties in 601.2.A or 601.2.B are met. Only a UHPC mix design that passes these tests may be used. Testing shall be performed by an AASHTO accredited independent testing laboratory for UHPC testing approved by the UHPC manufacturer and the Engineer. ~~A WVDOH representative shall be present to witness the testing of the quality control samples and report the results to Cement and Concrete Group of the WVDOH, MCS&T Division.~~ The casting of mockups as described in 601.5.D shall also apply.

D. Water: Water used for mixing shall meet the requirements of 715.7 and the manufacturer's specifications. Ice may be used to displace a proportion of the water as determined by the UHPC manufacturer.

E. Admixtures: Admixtures shall be determined by the UHPC manufacturer.

F. Fiber Reinforcement: Fibers shall be 0.5 to 1.0-inch long and 0.008 ± 0.002 -inch diameter made from ASTM A820, Type I steel wire with a minimum tensile strength of 290,000 psi. Steel fibers shall be Buy America Act compliant with all steel and iron components originating from the United States of America as documented by steel mill certifications.

601.3-PROPORTIONING:

ADD THE FOLLOWING SUBSECTION:

601.3.4-UHPC Submittals: The Contractor shall submit ~~batching, forming, placing, curing, and testing procedures~~ a detailed work plan to the Engineer for review and approval a minimum of thirty-seven (307) working days prior to casting. ~~The mixing sequence shall include the order and time of introduction of the materials, mixing time, and QA/QC procedure for the verification of the mix uniformity.~~ As a minimum, the following items shall be included in the work plan:

1. Quality control plan in accordance with Section 601.4.2.

2. UHPC mix design including mix ingredients and their proportions, water-to-cementitious ratio, mixing time, flow, set time, and compressive strength properties of the mix at the times shown in 601.2.A or 601.2.B.
3. Submission of qualification testing in accordance with Section 601.2.C.
4. Location of storage areas and storage requirements of UHPC material in accordance with 601.5.C.
5. Bridge plans with dimensions showing connection joints, suggested sequence of UHPC placement, and project schedule requirements. Include placement drawings with location of bulkheads and stages (if staged construction is used).
6. Working drawings and calculations for all proposed formwork, including materials and procedure for maintaining watertight joints in accordance with 601.5.D.
7. Details of top forms for deck-level connections and adequate hold downs. Top forms for deck-level connections are set at a minimum of 1/4-inch higher than adjacent surfaces to allow for all overfilling in accordance with 601.5.A.2.
8. Number, location, and details of all equipment to be used to batch, mix, and place UHPC materials.
9. Schedule and duration of traffic control measures required for completion of the work.
10. Method to attain an exposed aggregate finish with an average amplitude of 1/8-inch minimum for all precast concrete surfaces in contact with UHPC. The use of paste retarders is required to provide the required aggregate finish of precast concrete surfaces in contact with UHPC surfaces.
11. Surface preparation plan of existing concrete surfaces and pre-wetting of the existing concrete interface to a saturated surface-dry (SSD) condition immediately prior to UHPC placement.
12. Detailed plan and procedure for casting of a demonstration UHPC mockup meeting the requirements of 601.5.D.
13. Provisions for acceptable ambient temperature, batch temperatures, ambient relative humidity, batch consistency, and batch times.
14. Mixing, batching, delivery, placement, finishing, and curing procedures for UHPC.
15. Proposed schedule and procedure for watertight integrity testing of completed UHPC bridge deck joints.
16. Pre-pour meeting agenda, including UHPC Manufacturer’s recommended topics.

601.5-CONSTRUCTION METHODS:

ADD THE FOLLOWING:

A. Quality Assurance:

1. The Contractor must follow the directions of the UHPC manufacturer when assisting with mixing the UHPC and must work with the UHPC manufacturer to fully understand the properties of the UHPC so that the Contractor is able to effectively place the UHPC. The Contractor shall be pre-qualified by the UHPC manufacturer that they have the capability to mix and place UHPC. Proof of pre-qualification shall be submitted in writing from the Contractor to the Engineer a minimum of ten (10) working days before any UHPC is cast. The Contractor shall have a UHPC Manufacturer Technical

- Representative on site during all batching and placement of the UHPC material. Notify the Engineer at least 48 hours prior to the anticipated UHPC placement.
2. The top surface of the UHPC shall be formed and filled 1/4-inch higher than adjacent surfaces to allow for consolidation and then ground flush after curing, unless the entire deck surface is to be ground after placement in which case the UHPC may be placed flush with the precast surface. Other tolerances shall be in compliance with PCI Manual – 116 or otherwise specified in the Contract Plans.

B. Pre-Pour Meeting: The Contractor shall arrange for an onsite meeting with the UHPC Manufacturer Technical Representative, Construction Inspector, and Engineer to take place a minimum of one day prior to the UHPC mockup demonstration. The Contractor’s staff and Construction Inspectors shall attend the site meeting. The objective of the meeting will be to clearly outline the procedures for mixing, testing, transporting, finishing, and curing of the UHPC material. The Contractor shall arrange for a UHPC Manufacturer Technical Representative to be on site during the casting of the mockup and during placement of all UHPC material. The UHPC Manufacturer Technical Representative shall be knowledgeable in the supply, mixing, batching, testing, delivery, placement, and curing of the UHPC material. Mockup shall be representative of the required placement as demonstrated in the approved work plan by the Engineer and shall be performed per the recommendations of the UHPC manufacturer.

C. Storage: The Contractor shall assure the proper storage of the UHPC premixed/prebagged product including powder, fibers, and additives as required by the UHPC manufacturer’s specifications in order to protect materials against loss of physical and mechanical properties. Material must be used within the manufacturer’s recommended shelf life.

D. Forming, Batching, Placement, And Curing: The Contractor shall work together with the UHPC manufacturer to ensure appropriate initial strength gains to meet the desired project schedule. Grinding of the UHPC surface shall be performed upon recommendations from the UHPC manufacturer once the UHPC has reached a minimum compressive strength of 10 KSI as validated in accordance with 601.5.E. If significant fiber pullout is observed during grinding operations, grinding shall be suspended and not resumed until approved by the Engineer. The finished surface of the UHPC shall match the proposed profile to within a tolerance specified in 601.11.4.3.

The bridge can be opened to traffic when the UHPC has been properly cured and achieved a minimum compressive strength of 14 KSI.

Construction loads applied to the bridge during UHPC placement and curing are the responsibility of the Contractor. Contractor shall submit the weight and placement of concrete buggies, grinding equipment, or other significant construction loads to the Engineer for review prior to the pre-pour meeting describe above.

Forming, batching, placing, and curing shall be in accordance with the procedures recommended by the UHPC manufacturer and as submitted and accepted by the Engineer.

The design and fabrication of forms shall follow the approved installation-work plan drawings-submission and shall follow the recommendations of the UHPC manufacturer. All the forms for UHPC shall be constructed from marine-grade plywood and shall have

nonabsorbent surfaces that are properly sealed and capable of resisting hydrostatic pressure from UHPC in the unhardened state.

The surfaces of all concrete against which UHPC will be placed shall have an exposed aggregate finish with an average amplitude of 1/8-inch minimum and shall be continuously wetted for a minimum of 12 hours and be in a saturated surface-dry (SSD) condition immediately prior to UHPC placement. The interface surface shall be cleaned of all laitance and other deleterious materials prior to the placement of UHPC.

Mockups of each UHPC placement shall be performed prior to actual UHPC construction and conducted per the requirements of this Special Provision and the recommendation of the UHPC Manufacturer Technical Representative. Mockups of horizontal closure pours shall be four feet in length with all other dimensions to match those required by the plans. Mockups for vertical closure pours shall be two feet in length with all other dimensions to match those required by the plans. The mockup process shall be observed by the UHPC Manufacturer Technical Representative and the Engineer.

A minimum of two portable batching units will be supplied by the UHPC manufacturer to the Contractor for mixing of the UHPC. Alternatively, the use of a ready-mix concrete truck may be approved at the discretion of the Engineer if successful implementation can be demonstrated by the Contractor. Any loss of material or equipment caused by alternate batching and placement methods shall be remediated at the Contractor's expense. The UHPC shall be mixed in equipment that has been recommended and approved by the UHPC manufacturer. The Contractor shall follow the batching sequence as specified by the UHPC manufacturer and approved by the Engineer.

Each UHPC placement shall be cast using one continuous pour wherever possible per each stage of construction. No cold joints are permitted unless previously agreed upon by the UHPC Manufacturer Technical Representative and the Engineer.

The UHPC in the forms shall be cured according to manufacturer's recommendations at a minimum temperature of 50°F to attain the design strength.

- E. Acceptance Testing:** The following tests shall be performed following casting of the mockup and during construction for every lot of UHPC. A lot of UHPC is defined as 15 cubic yards or one day of production, whichever comes first.
1. Concrete compressive strength test according to ASTM C39 as modified by ASTM C1856. From every lot, take four (4) sets of three (3) compressive strength test cylinders for a total of twelve (12) specimens. One set will be taken at the beginning and one set at the end of each lot. In an evenly distributed manner, take two (2) intermediate sets from the middle portion of the lot. All cylinders shall measure 3-inch diameter by 6-inches in length and shall be cured using the same method of curing proposed to be used in the field. For traceability, track all sets of specimens to lot numbers. Prior to the Contractor removing forms and initiating grinding operations, three (3) specimens shall be tested to validate the achievement of 10 KSI compressive strength. Additionally, three (3) specimens shall be tested to validate the achievement of 14 KSI compressive strength prior to ~~grinding the in-place UHPC and~~ opening the bridge to traffic. Lastly, three (3) specimens shall be tested at 28-days to verify final strength. WVDOH may reject a portion or all the in-place UHPC should testing indicate that it does not meet required minimum strengths. The rejected UHPC shall be removed and replaced or remediated to the satisfaction of the Engineer at the

Contractor's expense. The remaining three (3) specimens shall be treated as reserves for resolution testing, if needed. Final acceptance will be based on the 28-day compressive strength. Field coring of UHPC for dispute resolution is not allowed.

All UHPC specimens shall be tested by an AASHTO accredited independent testing laboratory for UHPC testing approved by the UHPC manufacturer and the Engineer. A WVDOH representative shall be present to witness the testing of the acceptance samples and report the results to Cement and Concrete Group of the WVDOH, MCS&T Division. Each UHPC cylinder sample shall have both ends ground in accordance with ASTM C1856 prior to compressive strength testing.

~~2. Cast three (3) additional 3-inch diameter by 6-inch long cylinders per lot and provide to Cement and Concrete Group of the WVDOH, MCS&T Division for their evaluation.~~

~~3.2.~~ Determination of static flow shall be in accordance with ASTM C1437 as modified by ASTM C1856. The measured diameter of the UHPC at the end of the test shall be within the limits: minimum 7-inches; maximum 10-inches. The test shall be performed on every UHPC batch. The flow test must be performed in an area free of vibration to give the most accurate results.

F. Manufacturers Contacts Information: All UHPC shall be premixed/prebagged product from one of the following manufacturers:

1. ceEntek, Inc.
38510 Crimm Rd.
Scio, OH 43988
Phone: 403-669-8632
Email: USA@ceEntek.com
2. Cor-Tuf UHPC
11128 Industrial Road
Manassas, VA 20109
Phone: 540-270-9239
Email: info@cor-tuf.com
3. Holcim US
8700 W Bryn Mawr Avenue, Suite 300
Chicago, IL 60631
Phone: 734-489-9555
Email: ductal-na@lafargeholcim.com
4. Steellike, Inc.
7631 Fullerton Road 7G
Springfield, VA 22153
Phone: 703-520-2763
US Toll Free: 1-888-364-2541
Email: info@steellike.com

601.14-METHOD OF MEASUREMENT:

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ADD THE FOLLOWING:

The UHPC quantities will be measured in cubic yards, complete in place, and accepted as determined by the dimensions on the Plans or Contract Documents.

601.15-BASIS OF PAYMENT:

ADD THE FOLLOWING:

The quantity, determined as provided above, will be paid for at the contract unit price bid for this item, which price and payment shall be full compensation for preparation of UHPC work plan submittal, furnishing all the materials, and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, field laboratory, supplies, and incidentals necessary to complete the work.

601.16-PAY ITEM:

ADD THE FOLLOWING:

ITEM	DESCRIPTION	UNIT
601800-001	Ultra High Performance Concrete	Cubic Yard

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 settlement. The determination of the time at which the necessary consolidation has taken place and the embankment 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 fill. The settlement plates shall be installed by the Contractor..

The settlement plate locations are presented in the following table:

Settlement Plate #	Roadway Station	Offset (ft)
SP-1	220+80	20'LT
SP-2	220+80	CL
SP-3	220+80	20' RT

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 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 5.0 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 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 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 within three feet of the stem shall be placed and compacted by hand with non-impact, light vibratory plate compactors.

When surface of the embankment reaches a level approximately two 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 feet in length.

As the height of the embankment increases, this procedure shall be repeated until the embankment is completed.

Settlement plate assemblies shall remain in place and become the property of the West Virginia Division of Highways.

The Contractor will obtain and record all measurements and elevations necessary for the accurate determinations of settlement data following construction of the embankment. Elevations shall be surveyed once a week for a minimum of two months after completion

of fill placement. 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 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 this Contract. 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 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

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 636
MAINTAINING TRAFFIC

636.20-TEMPORARY TRAFFIC SIGNAL(S) OR TEMPORARY LIGHTING:

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

636.20-TEMPORARY TRAFFIC SIGNALS OR TEMPORARY LIGHTING:

636.20.1-Temporary Traffic Signals: Temporary traffic signal work may involve temporary modifications to existing permanent traffic signals or the installation of temporary signals. Temporary signal installations may entail the installation of traffic signals and associated equipment using wood pole supports, or the use of portable temporary traffic signal trailers. Individual signals or trailers at specific project Plan designated locations shall be interconnected and programmed to operate in a coordinated manner as a system. Temporary traffic signal work shall consist of furnishing, installing, maintaining, adjusting, and subsequent removal of various types of traffic signal components and equipment as necessary due to the maintenance of traffic plan. It shall include, but not be limited to, temporary traffic signals and traffic signal interconnections to be installed, and temporary modification to permanent traffic signals in accordance with Section 660 and Subsection 715.42 of the Specifications. As a minimum, the temporary traffic signals shall be equipped with a three-dial fixed time controllers. When the temporary traffic signals are no longer needed, they will become the property of the Contractor. Existing permanent signals shall be modified as detailed in the plans to match the traffic pattern for each phase of construction work and shall be returned to their original condition at the completion of the project.

Except as otherwise specified in the project Plans, wood pole temporary traffic signal installations shall be in conformance with Standard Details Book Volume II sheet TES-23 and Section 715.42.9.3.

636.20.2-Temporary Lighting: Temporary lighting shall consist of furnishing, installing, maintaining, and subsequent removal of various types of lighting systems as necessary due to the maintenance of traffic plan. It shall include but not be limited to lighting to be installed in accordance with Section 662 of the Specifications. When the temporary lighting is no longer needed, it will become the property of the Contractor.

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636.23-METHOD OF MEASUREMENT:

636.23.16-BLANK

DELETE SUBSECTION 636.23.16 AND REPLACE WITH THE FOLLOWING:

636.23.16-Temporary Traffic Signal: "Temporary Traffic Signal" shall include the furnishing, and installation, of complete and operational temporary traffic control signals. It shall also include adjusting and/or furnishing equipment and/or components for existing traffic signals to address different phases of construction work. Payment shall include interconnection, maintaining, relocating, resetting, and removal of all equipment and material necessary to adequately meet the requirements of the Traffic Control Plan and shall be measured as complete units and paid by the month, or fraction thereof, or Lump Sum as appropriate.

636.23.23-Temporary Traffic Signal(s) or Temporary Lighting:

DELETE SUBSECTION 636.23.16 AND REPLACE WITH THE FOLLOWING:

~~**636.23.23-Temporary Traffic Signal(s) or Temporary Lighting:** "Temporary Traffic Signal(s)" shall include the furnishing, installation, maintaining and subsequent removal of all equipment and material necessary to adequately meet the requirements of the Traffic Control Plan and shall be measured as complete units and paid by the month, or fraction thereof.~~

“Temporary Lighting” shall be on a lump sum basis and shall include the furnishing, installing, maintaining and ~~subsequent~~ removal of all equipment and material necessary to adequately meet the requirements of the Traffic Control Plan.

636.25-PAY ITEMS:

DELETE ITEM 636023 “TEMPORARY TRAFFIC SIGNAL” AND REPLACE WITH THE FOLLOWING:

ITEM	DESCRIPTION	UNIT
<u>636023-001</u>	<u>Temporary Traffic Signals, Wood Pole</u> ^{Note 1}	<u>Lump Sum</u>
<u>636023-002</u>	<u>Temporary Traffic Signals, “location”</u> ^{Note 1} <u>Portable</u> _{Note 2}	Month
<u>636023-003</u>	<u>Temporary Traffic Signals, Modification to Permanent Traffic Signals</u>	<u>Lump Sum</u>

Note 1 Wood pole supported temporary signals are only to be specified for projects with approval from the Traffic Engineering Division.

Note 1: “location” shall be designated as “01”, “02”, etc. for each different physical location as designated on the plans. Each different, physical location will have only one item for each location and shall include all individual temporary traffic signals required at the location regardless of how many signals are required.

Note 2 Units shall be computed as the total combined number of months that each portable temporary traffic signal trailer is operational on the project.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**DIVISION OF HIGHWAYS****SPECIAL PROVISION****FOR****STATE PROJECT NUMBER:** _____**FEDERAL PROJECT NUMBER:** _____

ADD THE FOLLOWING:

**SECTION 613
SPRAY APPLIED AND SPIN-CAST PIPE LINING****613.1-DESCRIPTION:**

This work shall consist repairing and rehabilitating culverts and storm drain pipes by filling voids and lining the entire interior surface of the pipe with factory blended cementitious or geopolymer material. Material may be spray applied, centrifugally spin-cast or applied with hand tools. Application methods may vary based on the size and shape of the culvert. The term “host pipe” refers to the existing pipe being rehabilitated. This is applicable for pipes ranging in size from 30” to 120”.

The plans should include the following site information to facilitate design:

Factor	Description / Units
Extent of Deterioration	Fully, Partial, or Condition of the Pipe Being Rehabilitated
Size & Material	Length of the Pipe, Diameter, and Pipe Material (Corrugated Metal Pipe, Reinforced Concrete Pipe, etc.)
Ovality	What % is the Pipe’s Deformity
Cover Depth (from crown)	How many Vertical Feet of Fill is Above the Crown of the Pipe
Soil Type (Density/Modulus)	Soil density (lb/ft ³) E’ in (psi)
Water Table (from invert)	Where is the water table in relation to the invert (ft)
Loading	Up to a HS-25 Truck load according to AASHTO the Pipe is required to take
Factor of Safety	2.0

613.2-MATERIALS:

Furnish materials for patching and filling voids conforming to the following.

Cementitious Materials

ASTM C1157

Geopolymer Materials

ASTM C1157, C989, C618

Furnished cementitious liner material that meets the following minimum property requirements:

Test Method	Test Property	Duration	Requirement	
AASHTO T 358	Surface Resistivity	28 Days	Minimum	14.3 kΩ-cm
ASTM C 109	Compressive Strength	1 day	Minimum	2500 psi
		28 Days	Minimum	8000 psi
ASTM C 1609	Flexural Strength	7 Days	Minimum	685 psi
		28 Days	Minimum	990 psi
ASTM C 418	Abrasion Resistance	28 Days	Maximum	0.085 cm ³ / cm ²
ASTM C 469	Modulus of Elasticity	28 Days	Minimum	3,360,000 psi
ASTM C 496	Tensile Strength	7 Days	Minimum	470 psi
		28 Days	Minimum	670 psi
ASTM C 1090	Height Change	28 Days	Maximum	-0.08%
ASTM C 1583	Bond Strength	28 Days	Minimum	615 psi
ASTM C 403	Set Time	Initial Set	Maximum	170 minutes
		Final Set	Maximum	300 minutes
ASTM C 666	Freeze Thaw	300 Cycles	40-0 °F and 0-40 °F in not less than 2 nor more than 5 hrs	
ASTM C 1202	Chloride Permeability	28 Days	Maximum	< 550 Coulombs

Furnished geopolymer liner material that meets the following minimum property requirements:

Test Method	Test Property	Duration	Requirement	
ASTM C109	Compressive Strength	28 days	Minimum	8000 psi
ASTM C78	Flexural Strength	28 days	Minimum	800 psi
ASTM C882	Bond Strength	28 days	Minimum	3000-2500 psi
ASTM C469	Modulus of Elasticity	28 days	Minimum	5 x 10 ⁶ psi
ASTM C1202	Chloride Ion Penetration Resistance	28 days	Maximum	250-1000 Coulombs
ASTM C496	Split Tensile Strength	28 days	Minimum	900-800 psi
ASTM C1090	Shrinkage	28 days	Maximum	0.02%
ASTM C666	Freeze Thaw	300 Cycles	40-0 °F and 0-40 °F in not less than 2 nor more than 5 hrs	
ASTM C1138	Abrasion Resistance	6 cycles at 28 days	Maximum	loss < 1.0%

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613.3-SHIPMENT AND STORAGE:

Materials supplier and Contractor shall follow the manufacturer's recommendations for shipment and storage for all products, and ensure that the material safety data sheet accompanies the material.

The Contractor shall not use material from defective, punctured, or damaged containers and ensure that each container is labeled with a batch or lot number and an expiration or use by date. Contractor shall not use material that exceeds the use by date or useful life.

613.4-INSTALLATION PLAN:

The Contractor shall submit a written installation plan for the pipe renewal to the Engineer for acceptance at least ten calendar days before beginning work. The submission shall include the following information:

1. All calculations shall be performed and signed and sealed by a registered Professional Engineer in the state of West Virginia. The design of the rehabilitation system will be required to support the dead load and live load, address the spray liner physical properties, and the provide minimum lining thicknesses. The minimum allowable thickness is 0.5 inch; where bolts are present, a minimum 0.5 inch thickness over the bolt is required. The calculated minimum finished thickness of the liner shall be based on a maximum possible crack width of 0.01 inch with a factor of safety of 2.0. Liner thicknesses do not have to be uniform.
2. Required minimum lining thickness, invert lining thickness, and proposed manufacturer's material.
3. Method of cleaning the host pipe.
4. Plan to bypass flow around the host pipe.
5. Method to verify applied thickness during installation.
6. Video survey of the host pipe before installation.
7. Site specific health and safety plan.
8. A certification letter from the manufacturer stating that the contractor is an approved installer of the material.

The Contractor cannot make any changes or deviations from the accepted submittals without resubmitting and approval by the Engineer. The Engineer will not grant an extension of time because of incomplete or subsequent submittals.

During construction, the contractor shall submit the following information to the Engineer:

1. Test results that demonstrate the liner material meets the material requirements.
2. Daily thickness measurements of the spray material.
3. Temperature and humidity readings in the host pipe.

613.5-CONSTRUCTION:

- A. **Preparation.** Remove all debris and obstructions from the host pipe. Clean and prepare the surface of the host pipe according to the manufacturer's recommendations.
- B. **Flow Bypass.** Prevent the accumulation and flow of water through the host pipe and liner until after the work is complete. When required, bypass flows around the host pipe in

accordance with the requirements of the contract documents. After the lining process begins, maintain the bypass flow until the lining process, including curing, is complete. All immediately connected manholes and inlets should be plugged to prevent water from coming through the host pipe. Comply with USACE 404 and NPDES permits if applicable.

- C. **Preinstallation inspection.** After cleaning and before beginning the lining process, inspect the host pipe to ensure there are no obstructions that would hinder the lining process. Perform a pre-installation video survey of the host pipe and provide a copy of the video to the Engineer.
- D. **Installation.** Measure and record the temperature and humidity. The upper limit ambient and surface temperature is 100 Degrees Fahrenheit. The lower limit is 45 Degrees Fahrenheit when ambient temperatures are expected to fall below within 72 hours of placement. Suspend work if conditions are expected to be outside the acceptable range.

Patch corrugations, holes, and gaps in the host pipe with an approved hydraulic cement or the same cementitious or geopolymer based material to be used for the liner to provide a solid continuous surface on which to spray. Completely stop water infiltration into the host pipe.

Protect walls, surfaces, streambed and plants at the entrance and exit of the host pipe from overspray. Apply the material to the prepared surface using methods that provide a uniform surface. Use only equipment recommended by the manufacturer to perform the spray lining. Minimize hand troweling to the extents practicable.

Record the batch or lot number from the containers and weight of material used each day.

For cementitious or geopolymer material, prepare 3 specimens for the 1 day and 3 specimens for the 7 day and 3 specimens for the 28-day test as required per ASTM C109. Prepare an additional 3 specimens for reserve for a total of 12 test specimens. Utilize an ACI Certified level one sample technician or WVDOH equivalent to properly obtain and transport the test specimens material to the District's Materials Lab MCS&T laboratory or an accredited third-party laboratory for ASTM C109 testing. The material is to be sampled for testing on the first day and last day of use of pipe lining as well as every 42,000 lbs of lining on the project. Conduct air testing daily to ensure cementitious or geopolymer material is within manufacturers specifications.

Ensure the liner is continuous over the entire length of the host pipe and free from defects such as foreign inclusions, holes, and cracks larger than 0.01 inches wide. Ensure the renewed pipe is impervious to infiltration and exfiltration.

613.6-AFTER INSTALLATION:

The Contractor shall repair all defects in the liner as directed by the Engineer. All repairs shall be at no additional expense to the Division.

Perform non-destructive testing to verify liner thickness at the crown, invert, and spring lines at an interval of 20 ft for the entire length of the liner. Ensure the accuracy of the pachometer by physically measuring the liner thickness at the ends of the pipe or by other methods accepted by Engineer. Other non-destructive testing methods may be used if accepted by the Engineer. Furnish all the measurements to the Engineer.

613.7-WARRANTY:

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~~For project located on NHS Routes, the~~ The Contractor shall provide a one-year written Manufacturer Material warranty which shall warrant all work against defects in materials and workmanship. The Manufacturer shall replace or repair any lining system components demonstrating unsatisfactory performance or durability within the one-year period commencing from the date of completion of the contract. All material, labor costs, and all other items need to install (including traffic control and incidentals) shall be paid by the Manufacturer.

613.8-METHOD OF MEASUREMENT:

If required, invert and void repair will be incidental to the pipe lining work. “Spray Applied or Spin Cast Pipe Lining” will be paid measured by the linear foot of accepted pipe covered by required minimum thickness.

613.9-BASIS OF PAYMENT:

Payment for “Spray Applied or Spin Cast Pipe Lining” includes submittals, excavation, backfill, encasement, preparation, flow bypass, inspections, and all other work and incidentals required to complete the specified items.

613.10-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
613002-*	“size” Spray Applied or Spin Cast Pipe Lining	Linear Feet

* Sequence Number
 “size” Nominal diameter of host pipe being lined

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 703
COARSE AGGREGATE**

703.1-CRUSHED AGGREGATE:

703.1.1-General Requirements:

DELETE THE CONTENTS OF SUBSECTION 703.1.1 AND REPLACE THE FOLLOWING.

Crushed stone shall consist of particles of clean, hard, tough, durable rock free from adherent coatings and shall contain only the mineral composition declared by the producer/supplier. Aggregates that do not meet these requirements are subject to being restricted to limited application. Limited application is defined as material that is only approved for use in applications covered by Section 704. The approval process for coarse aggregates is governed by MP 700.00.56.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 108

PROSECUTION AND PROGRESS

108.7-COMPLETION DATES:

108.7.1-Failure to Complete on Time and Liquidated Damages:

DELETE TABLE 108.7.1 AND REPLACE WITH THE FOLLOWING:

**TABLE 108.7.1
Schedule of Liquidated Damages**

Original Contract Amount		Daily Charges Per Calendar Day
For More Than	To and Including	
\$0	\$500,000	\$300-\$350
\$500,000	\$2,000,000	\$600-\$650
\$2,000,000	\$10,000,000	\$1,500-\$1,600
\$10,000,000	\$25,000,000	\$3,000-\$3,100
\$25,000,000		\$4,000-\$4,200

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 605
MANHOLES AND INLETS**

605.2-MATERIALS:

DELETE THE TABLE AND REPLACE WITH THE FOLLOWING:

MATERIAL	SUBSECTION
Aggregate for <u>Perforated</u> Slot Inlets (Aggregate For Fabric Underdrain)	606.2
Clay or Shale Brick	715.16
Concrete Brick	715.17
Concrete Masonry Blocks	715.18
Fabric for <u>Perforated</u> Slot Inlets	715.11
Gray Iron Castings	709.10
Joint Mortar	708.8
Manhole Steps	709.10, 715.19, 715.38
Pipe for Slot Inlets	713.2

605.4-METHOD OF MEASUREMENT:

DELETE THE CONTENTS AND REPLACE WITH THE FOLLOWING:

Manholes and inlets, new, modified, or adjusted will be measured by the unit; slot inlets will be measured by the linear foot (~~m~~) in place.

605.6-PAY ITEMS:

ADD THE FOLLOWING ITEMS TO THE TABLE:

ITEM	DESCRIPTION	UNIT
605014-*	Modified Inlet, "type"	Each
605016-*	Modified Manhole, "type"	Each

DELETE ITEMS 605040 AND 605041 FROM THE TABLE AND REPLACE WITH THE FOLLOWING:

ITEM	DESCRIPTION	UNIT
605040-*	"size" Perforated Slot Inlet Riser	Each <u>Linear Foot</u>
605041-*	"size" Slot Inlet Riser	Linear Foot (Meter)

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 601
STRUCTURAL CONCRETE**

601.12-CURING AND PROTECTING CONCRETE:

601.12.1-Curing Under normal Conditions:

ADD THE FOLLOWING AT THE END OF FIRST PARAGRAPH:

The temperature of the curing water shall not exceed the maximum ambient temperature of the last 24 hours by more than 5°F.

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

679.3-CONSTRUCTION METHODS

679.3.7-Placing and Finishing Specialized Concrete Overlay

679.3.7.5-Curing

DELETE THE FIRST PARAGRAPH AND REPLACE WITH THE FOLLOWING:

It is the nature of specialized concrete overlay 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. The temperature of the water for the wet burlap shall not exceed the maximum ambient temperature of the last 24 hours by more than 5°F. 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.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 501

PORTLAND CEMENT CONCRETE PAVEMENT

501.4-TESTING:

501.4.1-Test Methods:

DELETE THE FIFTH LINE OF THE TABLE AND REPLACE WITH THE FOLLOWING:

Making and Curing Concrete Test Specimens in the Field <u>Standard Practice for Making and Curing Concrete Test Specimens in the Field</u>	<u>AASHTO T-23 R 100</u> with MP 601.04.20
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EST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 511

DOWEL BAR RETROFIT

511.3-CONSTRUCTION METHODS:

511.3.6-Mixing and Placing Backfill Material:

511.3.6.1-Testing:

DELETE THE CONTENTS OF SUBSECTION 511.3.6.1 AND REPLACE WITH THE FOLLOWING:

Fabricate a minimum of six compressive strength specimens in accordance with AASHTO ~~T-23-R 100~~ for each day of backfill placement. The compressive strength of an average of three of these specimens shall represent the compressive strength of all backfill material placed after the batch from which the previous compressive strength specimens were fabricated through the batch from which these specimens were fabricated.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 601
STRUCTURAL CONCRETE**

601.4-TESTING:

601.4.1-Sampling And Testing Methods:

DELETE THE SEVENTH LINE OF THE TABLE AND REPLACE WITH THE FOLLOWING:

~~Making and curing concrete compressive specimens
Standard Practice for Making and Curing Concrete Test
Specimens in the Field~~

AASHTO ~~T-23-R 100~~
with MP 601.04.20

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 603

PRESTRESSED CONCRETE MEMBERS

603.3-CONCRETE:

603.6.4-Sampling and Test Methods:

DELETE THE FIFTH LINE OF THE TABLE AND REPLACE WITH THE FOLLOWING:

Making and Curing Concrete Test Specimens in the Field Standard Practice for Making and Curing Concrete Test Specimens in the Field	AASHTO-T 23 R 100
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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 620
THREE-SIDED REINFORCED CONCRETE BRIDGE/CULVERT

620.5-MATERIALS:

620.5.5-Testing and Inspection

620.5.5.1-Precast Three-Sided Bridge/Culvert

620.5.5.1.2-Compression Testing:

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

Cylinders shall be made and tested as prescribed by the AASHTO T-22 and ~~T-23-R-100~~ Specifications. Cores shall be obtained and tested for 474 compressive strength in accordance with the provisions of the AASHTO T280 Specification.

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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 TENTH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

Compressive strength specimens shall be made and cured in accordance with AASHTO ~~T~~
~~23-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 ± 3.5 °F (~~23 ± 2 °C~~) for 26 days.