

20160302 - March's Specification Committee Meeting

Specification Committee Meeting Agenda

Wednesday, March 2nd @ 9:00am

Building 5, Room 122

Approved Permanent Specification changes from last Committee meeting (2/3/16)

- 607.4.1 & 607.7 - Guardrail 607.4.1 - Places slotted holes in w-beam. 607.7 - Adds information for Cut-slope Terminal
- 102.17 - Drug-Free Workplace
- 108.3.2 - Detailed Construction Schedule

Approved Project Specific Provisions from last Committee meeting (2/3/16)

- SP 403 - Crack Sealing in Bituminous Pavement (to be used on Statewide Sealing Contract)
- SP 481 - Asphalt Interlayer Membrane
- SP 306 - Rubblization
- SP 601 - Concrete Sealer (via Roadware 10 Minute Concrete Mender)
- SP 601- FRP Concrete Patching
- SP 601 - Guardrail (Corridor H: wood post & block)
- SP 608 - Right-of-Way Fence (Corridor H: wood fence post)
- SP 650 - Sodding

Items removed from Committee Agenda

- None

Provisions to be discussed:

Anticipated Start Time	Provision	Title	Description	Approval
9:05	406	SP 406 High Friction Surface Treatment	<p>Discussed in January & February; 3rd time to Committee. Update to previously approved SP. Project Specific provision for high friction surface treatment.</p> <p>Updated per comments at the last meeting; however price adjustment for aggregate is being kept in the provision. Redline copy included</p> <p>Approval expected in March.</p>	
9:10	601	SP 601 - Fiber Reinforced Polymer (FRP)	<p>Discussed in January & February; 3rd time to Committee. Update to previously approved SP Project Specific provision for Fiber Reinforced Polymer (FRP) wrap system.</p> <p>Part of WVDOT research project - would require some calibration with WVU.</p>	

			<p>Provision updated per comments at the February meeting; clarifying payment as surface area of FRP placed and subject to field verification.</p> <p>Approval expected in March.</p>
9:15	607	SP 607 - Aesthetic Guardrail	<p>Discussed in January & February; 3rd time to Committee.</p> <p>Project Specific provision for aesthetic treatment options to galvanized guardrail.</p> <p>No updates to the provision.</p>
9:20	627	SP 627 - High Load Bearings	<p>Discussed in January & February; 3rd time to Committee.</p> <p>Project Specific provision for high load multi-rotational bearings - Disc bearing assemblies.</p> <p>Updated per comments at the last meeting</p> <p>Approval expected in March.</p>
9:20	627	SP 627 - Cable Stay Repairs	<p>Discussed in January & February; 3rd time to Committee.</p> <p>Project Specific provision for cable stay repair; pipe & grout removal & replacement.</p> <p>No update provision contents.</p> <p>Approval expected in March.</p>
9:20	627	SP 627 - Cable Stay Tape	<p>Discussed in January & February; 3rd time to Committee.</p> <p>Project Specific provision for cable stay taping (to block the UV-rays to not damage the HDPE).</p> <p>No update provision contents.</p> <p>Approval expected in March.</p>
9:25	688	688 - Painting Metal Structures	<p>Discussed in January & February; 3rd time to Committee.</p> <p>Permanent Specification change. Section updated, with complete re-write.</p> <p>Provision has been updated. MCS&T Coating Section held meeting outside of Committee with Industry to discuss.</p> <p>Approval expected in March.</p>
9:35	663	663 - Pavement Markings	<p>Discussed in January, 2nd time to Committee.</p> <p>Permanent Specification change. Section updated, with complete Re-write.</p> <p>Updated per comments at the last meeting</p>

			Approval expected in March.
9:45	711	711.41 - Type II	<p>Discussed in January, 2nd time to Committee. Permanent Specification change. Subsection updated. Change start date for installation of type II paint markings are not subject to warranty requirements from 10/1 to 11/1</p> <p>Updated per comments at the last meeting</p> <p>Approval expected in March.</p>
9:50	715	715.40 - Pavement Markings Material	<p>Discussed in January, 2nd time to Committee. Permanent Specification change. Subsection updated. Adds enhanced skid resistant material & performance requirements.</p> <p>Updated per comments at the last meeting</p> <p>Approval expected in March.</p>
9:55	716	716.1.1.3 - Softshale	<p>Discussed in January, 2nd time to Committee. Permanent Specification change. Subsection rewrite.</p> <p>No update to the provision.</p> <p>Approval expected in March.</p>
10:00	425	SP 425 - Asphalt Emulsion Mineral Bond	<p>Discussed in January, 2nd time to Committee. Project Specific provision for Asphalt Emulsion Mineral Bond.</p> <p>No update to the provision.</p> <p>Approval expected in March.</p>
10:05	705	705 - Liquid Asphalt	<p>Discussed in February, 2nd time to Committee. Permanent Specification change. Section updated, with complete re-write.</p> <p>Updated per comments from the February meeting.</p> <p>Approval expected in March.</p>
10:10	415	415 - Milling of Asphalt Surfaces	<p>Discussed in February, 2nd time to Committee. Permanent Specification change. Re-write of entire section.</p> <p>Provision updated per comments from the February meeting; items moved into Section 415.</p>
10:15	410	410 - Percent Within Limits (PWL)	<p>Discussed in February, 2nd time to Committee. Permanent Specification change. New addition to the Spec book.</p>

			Provision has been updated per comments from the February meeting.	
10:20	109	109.11 - Square yard paving adjustments	<p>Discussed in February, 2nd time to Committee.</p> <p>Permanent Specification change. Adds square yard paving adjustment.</p> <p>Approval expected in March.</p>	
10:20	627	SP627 - ASAP Bridge	<p>Discussed in January, removed from agenda last month, 2nd time to Committee.</p> <p>Project Specific provision for design & construction of prefab structure.</p> <p>Updated per comments from the January meeting.</p>	
10:25	627	SP 627 - Strip Seal Expansion Joint	<p>1st time to Committee. Update to previously approved SP. Project Specific provision for Strip Seal Expansion Joint Assembly.</p> <p>Update removes elastomeric concrete from SP.</p>	
10:30	102	SP102.17 - Grant Funding	<p>1st time to Committee.</p> <p>Project Specific provision to help facilitate and administer projects with Grant funding.</p>	
10:35	105	SP 105.6.1 - Division owned utilities	<p>1st time to Committee.</p> <p>Project Specific provision for locating Department owned utilities on projects.</p> <p><i>Please expedite your review; as the provision will be included in <u>all</u> proposals.</i></p>	
10:40	105	105.3 - Conformity with Plans and Specs	<p>1st time to Committee.</p> <p>Permanent Specification change.</p> <p>To Clarify administration cost are for <u>each</u> adjusted price.</p>	
10:45	Various	Aggregate related	<p>1st time to Committee.</p> <p>Permanent Specification changes to aggregate related items in the Material Subsection.</p> <p>Specification Section's:</p> <ol style="list-style-type: none"> 1. 207 - Excavation and Embankment 2. 212 - Structure, Rock, and Wet Excavation 3. 218 - Slope and Foundation Protection 4. 307 - Crushed Aggregate Base Course 5. 604 - Pipe Culverts 6. 609 - Sidewalks 7. 626 - Retaining Wall Systems 8. 703 - Coarse Aggregates 9. 716 - Embankment and Subgrade Material 	
11:15	650	SP 650 - Grass Cutting	<p>1st time to Committee.</p> <p>Project Specific provision for the mowing of Rest Area grounds while under construction.</p>	

11:20	685	685 - Bridge Cleaning	<p>1st time to Committee. Permanent Specification change. New addition to the Spec book.</p> <p>MCS&T Coating Section held meeting outside of Committee with Industry to discuss.</p>	
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Note – This meeting will not be broadcast online.

Next Meeting

Wednesday, March 2, 2016 at 9AM

Building 5, Room 122: *(If Available. If not available a change in venue will be attached on the door)*

2016 Supplemental

The 2016 Supplemental is currently located online at this location:

<http://www.transportation.wv.gov/highways/contractadmin/specifications/Pages/default.aspx>

2016 Specifications Committee

The Specification Committee meets the first Wednesday of each month.

The remaining 2016 Committee dates are as follows:

March 2nd, April 6th, May 4th, June 1st, July 6th, August 3rd, September 7th, October 5th, November 2nd, and December 7th

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

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

FOR

SECTION 406

HIGH FRICTION SURFACE TREATMENT

406.1-DESCRIPTION:

This work shall consist of the construction of a high friction surface treatment (HFST) material, composed of binder material and aggregate, upon an existing surface, in accordance with these Specifications and in reasonably close conformity with the lines, grades, thicknesses, and cross sections shown on the Plans or established by the Engineer.

The contractor shall notify the Engineer a minimum of two weeks prior to starting any high friction surface treatment operation.

406.2-MATERIALS:

The materials shall conform to the requirements of the following:

The binder shall be a multi-component cold-applied modified exothermic polymer resin binder treatment. The binder shall cure exothermically and hold the aggregate firmly in position and meet the following requirements:

TABLE 406.2a-MULTI-COMPONENT MODIFIED BINDER RESIN SYSTEM

Property	Test Method*	Specification Limits
Viscosity	ASTM D2556	7 – 30 P
Durometer Hardness	ASTM D2240	60 - 80
Cure Rate (Dry through time)	D1640	3 hours max.
Adhesive Strength	ASTM C1583	250 PSI min. (100% substrate failure)
Compressive Strength		1000 psi (@ 3 hours 5000 psi @ 7 days
Elongation at break point	ASTM D-638	30% min.
Gel Time	ASTM C-881	10 minutes min.
Water Absorption	ASTM D-570	1 % max.
Mixing Ratio	Per Manufacturer's Recommendations	

TABLE 406.2a-MULTI-COMPONENT MODIFIED BINDER RESIN SYSTEM

*Additional testing notes for laboratory: Prepare all samples per manufacturer's recommendation.

- Viscosity – prepare one pint sample and mix for 2 to 3 minutes before testing. Use X1.1 for spindle selection and test at a temperature of $73 \pm 2^{\circ}\text{F}$.
- Gel Time – Prepare a 60 g sample per manufacturer's recommendation. Perform testing at a temperature of $73 \pm 2^{\circ}\text{F}$.
- Cure Rate – Prepare specimens of 50-55 wet mil thickness.
- Cure the following test specimens for 7 days at $73 \pm 2^{\circ}\text{F}$, and test immediately without delay.
- Durometer Hardness – Use the type 1 precision type D method.
- Compressive Strength – Prepare specimen according to Method "B", 2" x 2" cube, using 2.75 parts of sand to one part mix polymer resin by volume. Sand must conform to ASTM C778, 20-30 sand.
- Ultimate Tensile Strength Prepare Type 1 specimens in accordance to ASTM D638.
- Elongation at break point – Prepare Type 1 specimens in accordance to ASTM D638.

The aggregate shall be bauxite material that is clean, dry and free from foreign matter and meets the following requirements:

TABLE 406.2b-AGGREGATE

Property	Test Method*	Specification Limits
SFC – Side Force Coefficient	ASTM E670-94 0	.70 minimum
SRV/SRT – Skid Resistance Value Test	ASTM E-274	65.0 mm min (70 mm)
AAV-Aggregate Abrasion Value	AASHTO T96	20.0 max.
Aggregate Gradation	AASHTO T27	95.0–100.0% Passing No. 6 0.0-5.0 % Passing No. 16
Aluminum Oxide Content	ASTM C-25	87% min

* As an option, and with approval of the Engineer, the current edition of a corresponding AASHTO test may also be used in lieu of any ASTM test.

406.2.1-Quality Control Testing: Quality control is the responsibility of the Contractor as specified in 106.1.

The contractor shall design a quality control plan in accordance with applicable section of MP307.00.50, excluding attachment 1, detailing the methods by which the quality control program will be conducted. Samples shall be obtained at a minimum frequency of one sample per day of aggregate placement.

406.3-ACCEPTANCE TESTING:

Acceptance sampling and testing of aggregates is the responsibility of the Division, except for furnishing the necessary materials. Quality control sampling and testing performed by the Contractor may be used by the Division for Acceptance.

406.3.1-Skid Testing: The skid testing will be conducted within 90 days of the completed project installation by the Division or an independent testing firm at the discretion of the Division. Any surface application with a skid value less than 69

will be deemed unacceptable. The installed system will be tested for skid resistance 12 months after initial test, but not greater than 14 months, to determine friction compliancy to a minimum requirement of 64. Any surface application with less than 64 will be deemed unacceptable and will require reinstallation of the complete surface system at no cost to the Department.

406.3.2-Acceptance for the Grading of Aggregate: Acceptance for gradation shall be on the basis of test results on consecutive random samples from a lot. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. Generally at the beginning of the project, the average shall be started on the second sample in accordance with MP 300.00.51. A subplot is the quantity of material represented by a single gradation test. In the case where only one sample is taken, this subplot shall be considered the lot. The material shall be sampled and tested in accordance with the applicable specification. The gradation test results shall be plotted on a control chart in accordance with MP 300.00.51. When the average, or when the most recent three consecutive individual test values fall outside the guidelines for this aggregate the lot of material represented will be considered nonconforming to the extent that the last of its sublots is nonconforming. When this occurs, the last subplot shall have its price adjusted in accordance with Table 406.3.2.2. In the case where the average is nonconforming and the last subplot contained is conforming, then there would be no price adjustment. In no event, however, shall a subplot of material have its price adjusted more than once, and the first adjustment, which is determined, shall apply.

406.3.2.1-Degree of Nonconformance: When a subplot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming and this value shall be multiplied by its appropriate multiplication factor as set forth in Table 406.3.2.1 to determine the degree of nonconformance on that sieve.

TABLE 406.3.2.1

Nonconforming Sieve Size	Multiplication Factor
4 IN (100mm) to No 16(1.18mm)	1.0
No 40 (4.25µm) to No 50 (300µm)	1.5
No 100 (150µm)	2.0
No 200 (75µm)	3.0
No. 6 (3.35mm)	1.5
No. 16 (1.18mm)	2.0

The total measure of nonconformance of an individual subplot is the sum of all nonconformances on the various sieve sizes of that subplot. When the total degree of nonconformance has been established and it is 12.0 or less, the material will be paid for at an adjusted contract price as specified in Table 406.3.2.2. When the degree of nonconformance is greater than 12.0, the nonconforming subplot shall be resolved on an individual basis, requiring

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a special investigation by the Engineer to determine the appropriate course of action to be followed.

~~**406.3.2.2-Price Adjustment:** Aggregates not conforming with the gradation requirements as described in Table 406.2b AGGREGATE will be paid for at the adjusted contract price based on the degree of nonconformance as specified in Table 406.3.2.2.~~

TABLE 406.3.2.2

Adjustment of Contract Price for Gradation Not Within Specifications	
Degree of Nonconformance	Percent of Contract Price To Be Reduced
1.1 to 3.0	2
3.1 to 5.0	4
5.1 to 8.0	7
8.1 to 12.0	11
Greater than 12	*
* The Division will make a special evaluation of the material and determine the appropriate action.	

CONSTRUCTION METHODS

406.4-WEATHER RESTRICTIONS:

The polymer binder material shall not be placed on a wet surface, when the ambient air or surface temperature is either *below 50 degrees Fahrenheit or ambient temperature above 110 degrees Fahrenheit, or when the anticipated weather conditions or pavement surface temperature would prevent proper application of the surface treatment as determined by the Engineer in consultation with the manufacturer’s representative.

*Applications below 50 degrees Fahrenheit will be considered acceptable if the manufacturer can demonstrate a cure rate (dry through time) of <3 hours at current field conditions.

Do not place the HFST with visible moisture on the prepared surface at the time of placing. Test for moisture in the pavement by taping an 18”x18” plastic sheet to the pavement per ASTM D4263. Perform the plastic sheet test only when surface temperatures and ambient conditions are within the established parameters for application of the overlay system. In the event of rain, the pavement must be allowed to air dry prior to performing the plastic sheet test. A 2 hour minimum test duration is allowed in lieu of the 16 hours specified in ASTM D4263.

406.5-METHODS:

The Contractor shall ensure that a manufacturer’s representative is on site to provide technical assistance during the startup operations and as necessary during the surface preparation, material placement and during any necessary remedial work.

The contractor shall cover and protect all existing pavement markings and utilities that are left in place prior to placement. All inadequately sealed joints and cracks greater than ¼” shall be cleaned and filled with a crack sealant approved by the polymer resin manufacturer.

For applications on new asphalt pavements, install the polymer binder and high friction aggregate topping a minimum of 30 days after placement of the new pavement.

Surfaces shall be clean, dry, and free of all dust, oil, debris and any other material that might interfere with the bond between the polymer resin binder material and existing surfaces. Adequate cleaning of all surfaces will be determined by the manufacturer's representative. Utilities, drainage structures, curbs and any other structure within or adjacent to the treatment location shall be protected from the application of the surface treatment materials. Cover and protect all existing pavement markings that are adjacent to the application as directed by the Engineer. Pavement markings that conflict with the surface application shall be removed by grinding and the surface shall be swept clean prior to the polymer binder application.

Clean concrete pavement surfaces by shot blasting and vacuum sweeping. Shot blast all surfaces to remove all curing compounds, loosely bonded mortar, surface carbonation, and deleterious material. Ensure that the prepared surface complies with the International Concrete Repair Institute (ICRI) standard for surface roughness CSP 5. After shot blasting, vacuum sweep or air wash, with a minimum of 180 cfm of clean and dry compressed air, all surfaces to remove all dust, debris, and deleterious material. Maintain air lance perpendicular to the surface and the tip of the air lance within 12 inches of the surface.

The HFST must conform to the following:

1. Surface preparation work, surface temperature, placement of the HFST must be in conformance with the binder supplier's specifications, these special provisions and as approved by the Engineer.
2. The spread rate range for polymer resin binder shall be 25-32 sf./gal.
3. The spread rate range of retained aggregate shall be 13-20 lb/sq yd.
4. HSFT must be allowed to cure for the minimum duration as recommended by the supplier's specifications and during that time the application area must be closed to all traffic including Contractor's equipment.

Mixing and Application Methods

Utilize one of the following methods to apply the resin binder and aggregate wearing course, in accordance with manufacturer's recommendations. Application method 1 shall be utilized on areas greater than 250 feet in length.

1. Automated Continuous Application

Automated continuous application shall be performed by an applicator vehicle with a minimum aggregate capacity of 40,000lbs and a minimum of 1200 gallons of the resin binder. The applicator shall continuously mix, meter, monitor and apply the resin binder and high friction aggregate in one continuous application pass.

The applicator vehicle shall be equipped with an inbuilt data management unit which is capable of producing real time data flow showing the volume of resin, the resin mil thickness on average throughout the application width, the volume of aggregate applied throughout the application width. The automated continuous application vehicle will have continuous pumping and portioning devices that blend the polymer binder within a controlled system. The polymer binder shall be blended and mixed in the ratio per the manufacturer's specification (+/- 2% by volume); the polymer binder shall be continuously applied once blended. The application vehicle should be capable of applying the minimum polymer binder spread rate.

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The high friction aggregate shall be applied by the same automated continuous application vehicle that applies the resin binder to the pavement section. The automatic aggregate spreader shall be capable of applying up to a continuous 12 foot width application. The high friction aggregate shall be applied within 3 seconds (+/- 1 sec) of the base polymer binder application onto the pavement section, from a minimum height of 12 inches from above the pavement section surface, at **no less than** the minimum spread rate.

No exposed wet spots of the polymer binder shall be visible once the aggregate is installed. The operations should proceed in such a manner that will not allow the mixed material to separate, cure, dry, be exposed or otherwise harden in such a way as to impair retention and bonding of the high friction surfacing aggregate, walking, standing or any form of contact or contamination with the wet uncured resin will result in that section of resin being removed and replaced at the contractor's expense.

2. Hand Mixing and Application

For areas deemed to be low volume and areas less than 250 feet in length, hand-mix the resin binder in accordance to the manufacturer's recommendations. Uniformly spread the resin binder onto the surface using a serrated edge squeegee. Immediately broadcast the high friction surfacing aggregates until refusal. **no wet spots of the polymer binder are visible.**

~~The excess aggregate can be reused; the aggregate shall be reclaimed by a mechanical sweeper, the recovered aggregate must be clean, uncontaminated and dry.~~

The excess aggregate may be recovered and reused. The excess aggregate shall be recovered by a mechanical sweeper and shall be clean, dry and uncontaminated.

The recovered aggregate may be used at a rate no higher than 1 part recovered aggregate to 2 parts virgin aggregate. The recovered aggregate and virgin aggregate shall be a homogenous blend and is subject to sampling and testing for gradation.

Excess and loose aggregate must be removed from the traveled way and shoulders by street sweeping. Application of HFST on highway ramps require a second street sweeping 24-48 hours after application on the ramp.

Utilities, drainage structures, curbs, and any other structures within or adjacent to the treatment location must be protected against the application of the HFST materials.

When magnesium phosphate concrete is placed prior to the HFST bridge deck overlay, the magnesium phosphate concrete must be placed at least 72 hours prior to placing the polymer resin binder.

When modified high alumina based concrete is placed prior to the HFST bridge deck overlay, the polymer resin binder must not be placed on the concrete until at least 30 minutes after final set of the modified high alumina based concrete.

Expansion joints and deck drains must be adequately isolated prior to applying HSFT.

All debris, excess aggregate, material containers, and other waste shall be disposed of off the Right-of-Way according to Section 207 by the Contractor at no direct cost to the Department.

Any roadway features disturbed by the work of the Contractor's operations shall be restored in kind by the Contractor and approved by the Engineer at no cost to the Department.

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406.7-CLEANING AND SWEEPING:

Excess and loose aggregate must be removed from the traveled way and shoulders by street sweeping. Application of HFST requires a second street sweeping 24-48 hours after application.

406.8-JOINTS:

The longitudinal construction joints between adjacent lanes shall be kept clean of material foreign to the type of surface being treated. The joints shall be constructed without overlaps or gaps between the materials.

The transverse joint at the end of successive sections or lanes shall be covered with paper to prevent overlapping of the binder material. Following its use, the paper shall be removed and disposed of satisfactorily.

406.9-PROTECTION OF PAVEMENT AND TRAFFIC CONTROL:

The Contractor shall be responsible for the protection of the surface against damage by their equipment and personnel. Traffic shall not be permitted on any part of the work under construction until the treatment has cured sufficiently to prevent raveling or pickup under traffic. The applicable provisions of 636 shall apply for regulating traffic.

406.11-METHOD OF MEASUREMENT:

No materials shall be removed from the Project for any purpose until the operation has been completed and the quantities of materials incorporated into the operations have been determined, except when authorized by the Engineer.

The quantities of work done will be measured as follows:

~~Where a surface treatment is placed upon a base constructed as an item in the same contract, the conditioning and cleaning and sweeping of the base shall be considered as a part of the construction of the base and no additional compensation will be allowed for "Cleaning and Sweeping".~~

The Quantity of "High Friction Surface Treatment", when specified to be paid by the square yard, shall be measured by the total area the surface treatment is applied measured in place and accepted.

When items for maintaining traffic are included in the Contract, they will be measured and paid as provided in Section 636.

406.12-BASIS OF PAYMENT:

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

The Quantity of "High Friction Surface Treatment" when specified to be paid by the square yard shall include the cleaning and sweeping, binder material, aggregate and all labor and equipment required to perform the operation

406.12.1- Price Adjustment: Aggregates not conforming with the gradation requirements as described in TABLE 406.2b-AGGREGATE will be paid for at the adjusted contract price based on the degree of nonconformance as specified in Table 406.12.1.

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TABLE 406.12.1

Adjustment of Contract Price for Gradation Not Within Specifications	
Degree of Nonconformance	Percent of Contract Price To Be Reduced
1.1 to 3.0	2
3.1 to 5.0	4
5.1 to 8.0	7
8.1 to 12.0	11
Greater than 12	*
* The Division will make a special evaluation of the material and determine the appropriate action.	

406.13-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
406001-*	High Friction Surface Treatment	Square Yard (Square meter)

* Sequence number

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 601

STRUCTURAL CONCRETE

601.1-DESCRIPTION:

ADD THE FOLLOWING TO THE END OF THE SECTION:

Fiber Reinforced Polymer (FRP) For Non-Structural Surface Protection - This work shall consist of the repair and corrosion protection of concrete with a Fiber Reinforced Polymer (FRP) wrap system in accordance with these specifications and in reasonably close conformity with the lines, grades, dimensions and locations as shown on the plans or as established by the Engineer.

601.2-MATERIALS:

ADD THE FOLLOWING TO THE END OF THE SECTION:

Fiber Reinforced Polymer (FRP): All materials of the FRP system (fabric, resin, primer, etc.) shall be supplied by a single FRP Manufacturer (mixing of materials from different manufacturers is not approved). All materials must be approved by WVDOH.

The FRP repair system must meet the following minimum properties for the laminate:

Property	
Fabric Type	Glass or Carbon
Fabric Configuration bi-directional, equal weight in both directions	0°/90°
Minimum Tensile Strength (ASTM D3039)	30,000 psi
Modulus of Elasticity (ASTM D3039)	2,200 ksi
Minimum Thickness inches/ply for the laminate	0.04
Minimum fabric weight per square yard	26 oz. Glass 9 oz. Carbon

The Engineer shall notify Dr. Hota GangaRao of West Virginia University-Constructed Facilities Center (WVU-CFC) at (304) 293-9986 at least seven days prior to the start of wrapping.

601.4-TESTINGS:

ADD THE FOLLOWING TO THE END OF THE SECTION:

601.4.6-FRP Approvals: Material specifications, installation-construction procedures, and quality control plan must be submitted to the Engineer and approved by WVDOH prior to securing materials and beginning of installation.

601.4.7-FRP Quality Control: Quality assurance during installation of the FRP system components shall be described in a Quality Control plan. The quality control plan will include, but not limited to, the following:

- 1) Certification that the contractor has been trained to apply the specific FRP wrap material
- 2) Storage requirements
- 3) Procedures to inspect wrap during installation to ensure that it meets the manufacturer's instructions and those in these provisions

This plan shall also include field inspection of the FRP wrap by WVU-CFC personnel with InfraRed Thermography (IRT) and/or Digital Tap Hammer (DTH) to detect voids between the FRP wrap and the underlying concrete.

Test sections shall be made during FRP repair to permit tensile testing of the cured laminate to verify the material properties. The test section should be a section of the FRP wrap applied to a sheet of plastic to produce a laminate that is 18"x18" and the same thickness as the laminate installed on the structure. The test section should be made during the installation of the wrap on the structure and under the same application and environmental conditions. ASTM 3039 tensile tests will be conducted on this test section to verify the as-built laminate matches the minimum material specifications. Samples will be tested by WVDOT or WVU-CFC within 5 business days. If tested samples do not meet the minimum specifications listed above, additional layers of FRP wrap must be applied to bring the total laminate up to the minimum specifications at no additional cost to the Department.

601.10-PLACING CONCRETE:

DELETE THE SECTION AND REPALCE WITH THE FOLLOWING:

601.10-FRP CONSTRUCITON REQUIREMENTS:

Unless otherwise dictated by the FRP manufacturer's instructions, the following installation guidelines shall be followed for the entire FRP wrap system (primer, resin, fabric, etc.):

- DRAFT
- 1) Area to be wrapped with FRP (as shown on the plans) shall be cleaned with water at pressures of 1000 to 2000 psi starting at the top and working down no more than 72 hours prior to wrapping.
 - 2) The ambient temperature and the temperature of the resin shall be between 55oF and 95oF at the time of mixing. The composite shall be applied when the relative humidity is less than 85% and the surface temperature is more than 5oF above the dew point. Contractor should provide verification of the temperature and humidity at the application location prior to use. The concrete surface should be dry prior to wrapping.
 - 3) A compatible primer as recommended shall be applied to the concrete surface.
 - 4) The FRP wrap system (fabric/resin) shall be applied to the concrete surface using methods that ensure that the entire width of the fabric is in intimate contact with the underlying.
 - 5) Minimum of two mutually orthogonal layers of glass FRP fabric are required.
 - a. For round column wrapping, a minimum of two layers of FRP fabric wrapped in a spiral form around the column circumference and along the column height with a minimum overlap specified by the manufacturer.
 - b. Wrapping details for other cross sections are detailed in the plans.
 - c. New rolls should overlap the previous roll by 6 inches along the length of the roll.
 - d. The wrap should be installed so that vertical seams do not allow for water intrusion (i.e. lower wraps shall not overlap upper wraps).
 - e. Successive layers of wet composite materials shall be placed before curing begins (polymerization) on the previous layer.
 - 6) Adequate ventilation of the project area shall be maintained at all times.
 - a. Containment shall be provided by the Contractor to prevent the spread of fibers and/or resin residue during construction. All contained or waste material shall be properly disposed of by the Contractor.
 - b. Contractor shall read and apply all safety precautions for all FRP wrap system components.

After the wrap is installed but before protective coatings are applied, the wrap will be inspected by WVU-CFC personnel using IRT or DTH within 24 hours following wrapping. Any voids over 2 square inches between the wrap and concrete must be filled with an injectable epoxy as per ACI 440.2R-08. Filling of voids is required for completion of the work and will be at no additional cost to the WVDOH.

601.10.1-Coating System Application Notes: After the final wrap layer is completely polymerized, an acrylic paint or equivalent should be applied to the entire FRP wrap area (color to be chosen by WVDOH).

601.14-METHOD OF MEASUREMENT:

ADD THE FOLLOWING TO THE END OF THE SECTION:

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The measurement for payment for Item 601015-005, FRP Wrap System, will be based on the surface area in square feet as determined from the lines and dimensions shown on the plans, subject to field verification. The quantities, shall include all labor, tools, materials, equipment, supplies and incidentals necessary to complete the FRP installation as identified in this special provision and the contract documents. Cost shall include all means required to place material (lifts, etc.) and provide inspection access to WVDOH and WVU-CFC.

601.16-PAY ITEM:

ADD THE FOLLOWING ITEM TO THE TABLE:

ITEM	DESCRIPTION	UNIT
601015-005	FRP Wrap System	SF

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

FOR

SECTION 607

GUARDRAIL

AESTHETIC TREATMENT TO GALVANIZED SURFACES

607.1-DESCRIPTION:

ADD THE FOLLOWING SUBSECTION TO THE SECTION:

607.1.1-Galvanized Surface Staining: This work consists of preparing, staining, and finishing all visible galvanized surfaces and appurtenances to achieve a rustic brown color with a matte finish.

607.1.2-Painted Galvanized Surface: This work shall consist of preparing and painting, as required by the paint manufacturer’s requirements, galvanized surfaces with a rustic brown color surface as required by the manufacturer’s requirements

607.1.3-Powder Coated Galvanized Surface: This work shall consist of preparing and powder coating galvanized surfaces a rustic brown color.

607.2-MATERIALS:

ADD THE FOLLOWING SUBSECTIONS TO THE SECTION:

607.2.1-Galvanized Surface Staining: The stain must consist of a clear soluble solution of natural oxidizers and soft buffered organic acids that accelerates the oxidization process without compromising the protective qualities of the galvanized surfacing. No pigment

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based colorants should be added to achieve the desired color. The stain must react with the target surface over a period of 7 - 21 days to produce a rustic brown color with a matte finish. The stain must be resistant to fading in the sun.

607.2.1.1-Submittals:

A. Submit the following items:

1. A copy of the manufacturer's product Material Safety Data Sheet together with instructions for application of stain 5 days before application.
2. Proposed methods to control overspray, spillage and protection of adjacent surfaces for approval by the State Representative. No staining will be allowed prior to approval.
3. Independent lab tests showing that the stain material is environmentally safe.

607.2.1.2-Quality Control and Assurance:

A. Sample Section

1. Apply stain to a minimum 12 inch sample section of metal. Notify the Engineer not less than 7 days before staining the sample section. Prepare and stain the sample section with the same materials, tools, equipment and methods to be used in staining final surfaces. The applied stain must be allowed to cure for a minimum of 14 days before the Engineer inspection. In the event more than one sample section is required by the Engineer, each additional sample section will be paid for as change order work.
2. Use the Engineer approved sample as the standard of comparison in determining acceptability of staining.

607.2.2-Painted Galvanized Surface: The paint and application shall be in accordance with Subsection 688.3.4.3. All operations including cleaning, priming and painting shall be shop applied as required by the paint manufacturer. Only minor touch-up will be permitted in the field.

607.2.3-Powder Coated Galvanized Surface: The products provided shall be commercially powder coated materials and shall meet the requirements of Section 690.

ADD THE FOLLOWING SUBSECTION TO THE SECTION:

607.3.4-Galvanized Surface Staining Construction:

607.3.4.1-Preparation: Target surfaces to be stained must be free of excessive oils, dirt and other contaminants. All surfaces must be dry before application of stain.

607.3.4.2-Application:

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- a. After areas to be stained have been prepared and the sample approved, apply stain to all existing galvanized surfaces and appurtenances required to be stained. Apply stain according to the manufacturer's instructions to achieve a color consistent with the approved sample. Minimize overspray. Spray application should not be performed under windy or rainy conditions
- b. Stain must be applied uniformly. Irregularities must be corrected according to the stain manufacturer's recommendations.
- c. Stained surfaces must be kept dry for a period of 5 days following the application of stain.
- d. Final approval of product samples shall be made by the Owner and/or Construction Manager.
- e. No work shall proceed until written approval is received.

607.3.4.3-Approved Products:

**METALS
STAINS FOR GALVANIZED STEEL PRODUCTS**

Products	Manufacturer's Address
Natina Steel	Natina Products, LLC PO Box 4563 Palm Desert, CA 92261 (877) 762-8462 www.Natinaproducts.com
Or Approved Equal As approved by the Engineer	

607.6-METHOD OF MEASUREMENT:

ADD THE FOLLOWING SUBSECTION TO THE SECTION:

The aesthetic treatment applied to guardrail will be measured in linear foot (meter) of guardrail as described above. The aesthetic treatment applied to end terminals will be measured separately and will be the actual number of end terminals or attenuators with applied treatment measured per each.

607.7-BASIS OF PAYMENT:

ADD THE FOLLOWING BELOW THE FIRST PARAGRAPH:

The quantities of Aesthetic Treatment to Galvanized Surface shall be measured as provided above and paid for by the items listed below, which payments shall constitute full compensation for all materials, labor and incidentals necessary to complete the work of the aesthetic treatment as required.

607.8-PAY ITEMS:

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ADD THE FOLLOWING TO THE TABLE:

ITEM NUMBER	DESCRIPTION	UNIT
607XXX-000	Aesthetic Treatment To Galvanized Surfaces	LF
607XXX-001	Aesthetic Treatment To Galvanized Surfaces	EA

{The above Item numbers could be left open as shown above or developed to with “Alternates” so that the selected system is known for historical base information.}

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

FOR

SECTION 627

**HIGH LOAD MULTI-ROTATIONAL
BEARINGS – DISC BEARING ASSEMBLIES**

627.1-GENERAL:

This work shall consist of fabricating, testing, furnishing, and installing High Load Multi-Rotational Bearings that are shear inhibited disc type structural bearing devices of the type shown on the plans at the location shown on the plans and in accordance with these Special Provisions. The structural bearings shall adequately provide for movements such as thermal expansion and contraction, rotation, camber changes, and creep-shrinkage of structural members where applicable. The Contractor shall provide the specific manufacturer and model number of the device he intends to furnish and install within 60 days of award of Contract.

627.2-DEFINITION:

627.2.1-Shear Inhibited Disc Structural Bearing:

The load bearing and rotational disc shall be composed of polyether urethane material. This disc shall be contained between upper and lower steel bearing plates and equipped with an internal shear restriction mechanism.

For expansion bearings, the upper steel bearing plate shall have a PTFE sheet recessed and bonded into the top half of the plate to accommodate the horizontal movement of the structure. The PTFE surface of the upper steel bearing plate shall support an upper steel plate fitted with a continuously welded, highly polished stainless steel face. For unidirectional expansion bearings, the upper steel plate shall be fitted with guide bars or a keyway system to restrict the lateral movement of the structure. The guide bars and their opposing guided surfaces shall be faced with opposing strips of PTFE/stainless steel. The guide bars and shear restriction mechanism shall be designed to withstand a minimum force of 10% of the total vertical load. Higher horizontal forces shall be noted in the contract plans. Guiding off of the fixed base or any extension of it will not be permitted.

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All materials shall be as specified in the contract documents or as recommended by the manufacturer of the bearing device. Shear inhibited disc structural bearing shall be referred to throughout this specification as the bearing device.

627.3-QUALIFICATIONS:

The supplier shall show previous history in the design and fabrication of disc bearings. Documentation showing a minimum of five years’ experience and ten bridge installations shall be provided to the Engineer.

627.4-CONTRACT DRAWINGS:

The contract drawings shall indicate the following design parameters for proper sizing and detailing of structural bearings:

1. Maximum and minimum vertical load.
2. Horizontal load if it is over the minimum 10% of the total vertical load and the direction
3. Total movement for expansion bearings and the direction.
4. Amount of rotation anticipated.
5. Allowable pressure on concrete substructure.
6. Anchorage details.
7. Uplift data, if required.
8. Temporary holding clips, if required.
9. Removable bearing details, if required.
10. Self-aligning rotation in plan details, if required.
11. Jacking port details.
12. Flexible guide details, if required.
13. Type of bearing, i.e. fixed guided, non-guided.
14. Seismic details.

627.5-MATERIALS:

All materials shall be new and unused with no reclaimed material incorporated in the finished bearing.

The Contractor shall furnish a manufacturer’s certification that the materials proposed for use on the project have been pre-tested and will meet the requirements as set forth in the manufacturer’s current literature.

The material shall not be installed in the field prior to the Engineer’s approval

627.5.1-Polyether Urethane Rotational Element: The rotational element used in the construction of the shear inhibited disc type bearings shall be molded from a polyether urethane compound. The physical properties of the polyether urethane shall conform to the following requirements:

<u>PHYSICAL PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>REQUIREMENT</u>
Hardness, Type D Durometer	D-2240	60 min 64 max
Tensile stress, psi	D-412	
@ 100% Elongation		2100 min
@ 200% Elongation		3700 min
Tensile strength, psi	D-412	5500 min
Ultimate Elongation, %	D-412	253 min
Compression Set, 22h @ 158 °F, %		40 max

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627.5.2-Steel: All steel used in the construction of the bearings (except stainless), shall conform to AASHTO M 270 unless otherwise specified in the contract plans. All steel surfaces exposed to the atmosphere (except stainless and area in contract with the polyether urethane rotational element) shall be hot dipped galvanized in accordance with AASHTO Mill.

627.5.3-Stainless Steel: Stainless steel for expansion bearings shall conform to ASTM A167 Type 304 or ASTM A240 Type 304, and shall be continuously welded to upper steel plate. The face of the stainless steel in contact with PFTE shall have a No. 8 bright mirror finish (less than 5 micro inches root mean square). The minimum thickness of the stainless steel shall be 16 gauge. Bonding or mechanically fastening of stainless to upper steel plate will not be allowed.

627.5.4-Polytetrafluoroethylene (PTFE): PTFE shall be manufactured from pure virgin (not reprocessed) unfilled PTFE resin. The PTFE sheet shall be bonded and recessed into the upper steel bearing plate. The PTFE sheet shall have a minimum thickness of 1/8 of an inch and be recessed one-half of its thickness into its steel substrate. The PTFE sheet shall be acid-etched on the bonded side and polished on the side facing the stainless steel to insure a low coefficient of friction.

The PTFE strips for guide bars shall be 15% glass filled and a minimum of 1/32 inch thick and shall be bonded and mechanically fastened into the steel edges. The fasteners shall be recessed so as not to interfere with sliding during movement. The PTFE shall be resistant to all acids, alkalis and petroleum products, stable at temperature from -350 OF to +500 OF, non-flammable, and non-absorbing of water. The PTFE shall be bonded to grit blasted steel using an adhesive approved by the manufacturer. The unfilled PTFE shall conform to the following requirements:

<u>PHYSICAL PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>REQUIREMENT</u>
Ultimate Tensile Strength, psi	D-638	2800 min
Ultimate Elongation, %	D-638	200 min
Specific Gravity	D-292	2.13in

627.6-FABRICATION REQUIREMENTS:

The finish of the mold used to produce the rotational element shall conform to good machine shop practice. Each bearing shall have a project identification number and lot number marked on a side that will be visible after erection.

Gross bearing dimensions shall have a tolerance of -0, +1/8 inch. Overall thickness tolerance shall be -0, +1/8 inch. All bearing surfaces of steel plates shall be finished flat within 0.01 inch.

627.7-TESTING:

The bearing devices to be tested shall be selected by the design authority at random. The bearing device will be visually examined both during and after the test. Any visual effects shall be cause for rejection.

627.7.1-Coefficient of Friction: Sliding coefficient of friction tests will be performed by the manufacturer of one expansion bearing device from each lot. A lot will be the quantity as

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defined by the designed authority with a maximum of 25 bearings per lot. The coefficient of friction will be measured at the bearing design capacity on the 5th, 15th, and 100th cycle at a speed on one inch/minute. A total of 100 cycles shall be run. The sliding coefficient of friction shall be calculated as the horizontal load required to maintain continuous sliding at a given speed divided by the bearings design capacity vertical load. The vertical load shall have been applied continuously for a minimum of one-hour prior to testing.

The measured sliding coefficient of friction shall not exceed 0.03.

627.7.2-Rotation: Rotation tests will be performed by the manufacturer on one bearing device from each lot. The polyether urethane element shall be capable of maintaining its initial uniform contact with the steel bearing plates through a rotation of 0.02 radians under a compressive load equal to 150% of the design capacity of the bearing device.

Any observed separation between the edge of the rotational elements and the bearing plates shall be cause for rejection.

627.8-CONSTRUCTION REQUIREMENTS:

The Contractor shall submit shop drawings in a timely fashion after the award of contract. At the discretion of the Engineer, the manufacturer may be required to furnish facilities for inspection of the completed device or a representative sample I his plant. The inspectors shall be allowed free access to the necessary parts of the manufacturer’s plant. The manufacturer shall provide a technical representative to be present at times while the bearing device is being installed. The Contractor shall notify the bearing device installation date.

The bearing device manufacturer’s instructions for the proper installation of the bearing shall be entered in the shop drawings. Shop drawings, which lack manufacturer’s installation instructions, may be returned without approval.

The bearing device shall be installed strict accordance with the manufacturer’s instructions, this specification and the advice of their official representative.

The manufacturer shall ship each bearing fully assembled. The bearing devices are not to be disassembled prior to installation with the knowledge of the design author and manufacturer.

627.9-BASIS OF PAYMENT:

The accepted quantity of bridge bearing device will be paid for at the contract unit per hearing.

627.10-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
627006-001	Guided Bearing Disc	Each
627006-002	Non-Guided Bearing Disc	Each
627006-003	Fixed Bearing, Disc	Each

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

FOR

SECTION 627

CABLE STAYED BRIDGE, CABLE STAY REPAIRS

627.1-DESCRIPTION:

The work shall consist of removing existing polyethylene pipe (PE pipe) and grout, and furnishing and placing rust inhibitor(s), grout and re-installing existing and/or installing new PE pipe at the locations indicated on the plans, and, providing access for the Engineer to the repairs during all activities. This work shall be in accordance with this Specification and in conformity with the plans.

627.2-MATERIALS:

627.2.1-Polyethylene Pipe: New PE pipe shall be PE3408 and have a minimum cell classification of 345464C per ASTM D3350 with a minimum 20 minutes of OIT. HDPE welding rod shall contain a minimum 2.5% carbon black, with MI less than 0.4 g/10 min and OIT of 20 minutes.

All PE pipe, and all material for welding PE pipe shall be stored in a clean, dry location and kept out of direct sunlight. All material shall be clearly labeled or marked with the following information:

- 1) Product name
- 2) Date of manufacture
- 3) Name & address of the manufacturer

Unless new pipe is proposed as indicated on the plans, the existing PE pipe shall be reinstalled. The Contractor may propose to use new PE pipe in additional locations if PE pipe

of suitable dimensions and meeting the requirements of this specification can be obtained by the Contractor. The Contractor shall provide material information for all proposed PE pipe and PE pipe welding material to WVDOH for approval prior to mobilizing equipment and/or personnel to the project site. The Contractor shall provide a 1-ft. sample of the new pipe and 80 grams of PE pipe welding material to the Engineer prior to mobilizing equipment and/or personnel to the project site and at least 2 weeks prior to scheduled start of the repair work. All unused new and removed PE pipe shall become the property of WVDOH and the Contractor shall make arrangements with Mr. Dave Sada, District 6, District Bridge Engineer for the delivery of the material.

627.2.2-Grout:

Grout mix shall conform to the requirements of the 1998 AASHTO LRFD Bridge Construction Specifications, 3rd Edition (as amended through the 2014 Interims) Section 10.9.3 "Grout Physical Properties" and as specified within these Specifications. Grout shall be Class B (Aggressive Exposure Type) per Table 10.9.3-1 and have the properties indicated in Table 10.9.3-2 of the AASHTO LRFD Bridge Construction Specifications (3rd Edition, as amended through the 2014 Interims). SIKA Grout 300PT or Engineer approved equal shall be the grout used for this project.

Grout Physical Properties

Grout shall contain components to achieve a thixotropic behavior.

Grouts shall contain no aluminum powder.

Water shall be potable, clean and free of injurious quantities or substances (chlorides, sulfates and nitrates) known to be harmful to Portland cement or post-tensioning steel.

All grout shall be stored in a clean, dry location, and shall be pre-bagged in plastic lined or coated bags. All material shall be clearly marked with the following information:

1. Product name
2. Date of manufacture
3. Name and address of manufacture
4. Shelf life
5. Lot number
6. Mixing instructions
7. Conformance to latest pre-qualification for testing and performance requirements

Any grout package that does not exhibit the above information, or loses that information, or has the integrity of the packaging compromised in the opinion of the Engineer, shall be rejected and shall be removed from the site and wasted to prevent reuse.

Storage of grout in the open must be on a raised platform and with adequate waterproof covering. On-site storage of grout is limited to a maximum period of one month.

627.2.3-Cable Coatings: The cable coatings to be used for this work shall be PreLube 19, spray penetrating oil, and SYNCAN, synthetic complex grease, both as manufactured by the Grignard Company or Engineer approved equal. The Contractor shall determine what amount

of cable coating material will be necessary to complete the work and purchase that material prior to beginning work.

627.2.4-Cable Taping: The cable taping material shall conform to WVDOH Special Provision 627, Cable Stay Tape.

627.3-EXISTING POLYETHYLENE PIPE REMOVAL:

The existing polyethylene pipe (PE pipe) shall be removed at the locations identified in the plans and to the extents as shown in the plans. The Engineer may modify the extent of the PE pipe removal and may add locations based on changed conditions and/or judgment.

The Contractor shall take those precautions necessary to ensure the removed PE pipe or the equipment or other material used in the removal of the PE pipe will not be allowed to fall to the bridge below or into the Ohio River.

The Contractor shall use equipment that can be adjusted to limit its cutting depth, and shall not cut to a depth greater than the PE pipe wall thickness at that repair location. The longitudinal cut line shall not be extended past the circumferential line and/or cut line with power equipment, but shall be completed with manual cutting tools (such as a hammer and chisel). The Contractor shall monitor all PE pipe cutting activities and adjust the cutting depths as necessary to avoid cutting past the PE pipe wall into the grout as the exact location of the cable wire strands is not known, and these wire strands must not be cut or reduced in area in any way.

The sections of PE pipe to be removed shall be marked prior to their removal to ensure they will be re-installed in their original positions. The existing PE pipe that is removed shall be re-installed at all repair locations.

The Contractor shall prevent cupping or other distortion of the removed pipe due to residual stresses while it is awaiting re-installation.

The Engineer shall inspect the removed PE pipe immediately after removal, and immediately prior to re-installation for any defects or other damage that may require additional investigation.

627.4-EXISTING GROUT REMOVAL:

The existing grout shall be removed at the locations identified in the plans and not less than the extent as shown in the plans. The Engineer may modify the extent of grout removal and may add locations based on changed conditions and/or judgment. The Contractor shall take those precautions necessary to ensure that at no time shall the removed grout, or the equipment or other material used in the removal of the grout or inspection of the wires, be allowed to fall onto the bridge below or into the Ohio River. The removed grout shall be collected and disposed of off-site.

A small section of grout shall be removed around the circumference of the cable in the middle of the exposed section of grout to determine the depth of grout cover on the cables' strand. Maximum 1/8-in. deep score lines shall then be cut, but at no time shall the depth of the score line be allowed to nick, cut or touch the wire strands. Steel band clamps shall be installed adjacent to the score lines and the grout then removed between the score lines. Grout removal shall be performed by hand with the lightest hammer necessary to fracture the grout. The tool or equipment used to cut the grout score lines shall be capable of being adjusted to limit the cutting depth to 1/8-in.

All grout shall be removed between the score lines. The Contractor shall take care that the hammer does not contact the strand with sufficient force to damage the wires.

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The Contractor shall provide brass or bronze wire brushes to the Engineer for use in removing the final remains of the grout on the strand. The Contractor shall allot a minimum of two hours for the Engineer to inspect the strand at each repair location after the grout has been removed to the approval of the Engineer. The Contractor shall also provide brass or bronze screw drivers or other prying tools for the Engineer's use to facilitate this inspection. The Engineer may direct the Contractor to expand the repair extent should corrosion extend beyond the area initially opened and exposed for inspection. The Contractor shall then perform the same applicable operations for the expanded repair extent. The Contractor shall be paid for the total length of repair (per LF) of cable, this LF includes the original repair length and any additional length required as directed by the Engineer.

627.5-APPLICATION OF CABLE COATINGS:

The strand shall be coated with two corrosion inhibitors. The first shall be a spray penetrating oil and the second shall be a synthetic grease as specified in Section 627.2.3 of this Special Provision. The Contractor shall take those precautions necessary to ensure that at no time shall the cable coating materials be allowed to drip or fall off the wire strands to the cables, bridge or Ohio River below. The Contractor shall clean any cable coating material from cable and bridge surfaces should any material fall, drip or be spilled from the repair location.

The top layer of wires shall be worked with brass or bronze tools during oiling to allow the penetrating oil to be applied to the second layer of wire strands. All visible and exposed wires shall be coated with penetrating oil.

The synthetic grease shall be applied after the penetrating oil and after the penetrating oil has ceased dripping from, or collecting on the strand. The Contractor shall apply the grease to all exposed wires in a uniform coating.

The Contractor shall clean all cable coating material from the exposed grout, polyethylene pipe and Tedlar PVF tape with the appropriate cleaning material and equipment.

627.6-INSTALLATION OF POLYETHYLENE PIPE:

The Contractor shall prepare the removed and new polyethylene pipe (PE pipe) for installation as shown in the plans. The use of a "backer bar" or other means, may be necessary to facilitate the welding of the longitudinal cuts in the grout void region.

The Contractor shall provide a demonstration of the PE pipe welding equipment, material, and personnel capabilities for the Engineer using the new PE pipe prior to beginning the repairs. Three 1 foot sections of PE pipe shall be split and then welded back together. The welded pipe sections shall be submitted to the engineer a minimum of 2 weeks prior to the scheduled start of work. Gas temperatures at the tip of the welding gun shall be recorded. The welded samples will be tested for strength. The welds must develop a minimum of 80% of the tensile strength of the PE pipe. The Contractor shall utilize the same welding equipment, material and personnel for all PE pipe repairs. Should any factor change, the Contractor shall provide additional demonstrations to satisfy the Engineer prior to re-starting repair work.

627.7-GROUT PLACEMENT:

The Contractor shall follow the grout manufacturer's recommendations and provide a complete list of equipment, material, and placement procedures to Engineer prior to mobilizing equipment and/or personnel to the project site.

The Contractor shall inject new grout at all repair locations where existing grout is removed. The grout injection shall be accomplished as shown in the plans and as specified herein. The Contractor shall utilize a mechanical mixer and grout pump in the performance of this work, manually mixing the grout and hand placement of the grout shall not be allowed.

Grout placement shall not be done when the temperature of the grout exceeds 81° F, when the temperature of the cable sheathing exceeds 100° F, or when the ambient air temperature is forecast to be lower than 45° F within a 24 hour period.

Grout shall be injected into the PE pipe at the low point of the cable as shown in the plans. The pumping pressure shall be constant as the PE pipe is being filled, and as grout is forced out the grout vent hole for a minimum of 15 seconds. The 15 seconds shall be considered fulfilled when the grout has flowed from the grout vent with no visible slugs of grout, air or water for 15 seconds. Should a slug of grout, air or water be observed, the grout will continue to be injected at the constant pressure and a new 15 second period began. When the 15 second period has been fulfilled, the grout vent hole shall be plugged and the pressure held for 5 seconds. The grout injection port shall then be plugged and bleed water removed. The Contractor shall repeat the process if the grout injection port is not plugged in a timely fashion and injected grout is lost, at no extra cost to WVDOH.

The Contractor shall obtain the agreement of the Engineer for the fulfillment of this work. The Contractor shall clean all grout from the PE pipe and Tedlar PVF tape surfaces during and after the grout placement has been completed to the approval of the Engineer.

After the grout has cured according to the manufacturer's recommendations, the Contractor shall remove the plug in the grout injection port and grout vent hole and allow the Engineer to verify full grouting at those locations. The Contractor may be required to drill ¼ in. diameter "observation holes" in the cable to verify full grouting the length of the repair at the discretion of the Engineer. After the grouting procedure is finished, "observation holes" shall be filled with PE pipe weld material.

Grouting equipment shall be the same as used for the grout acceptance tests. Grouting equipment shall include a moving blade mixer capable of continuous mechanical mixing which will produce a grout free of lumps and undispersed cement. Follow the grout manufacturer's recommendation for the use of a grout mixer. The pump shall be a positive displacement type able to produce an outlet pressure of 75 psi and shall have seals which are adequate to prevent introduction of oil or other foreign substance into the grout.

A pressure gauge having a full-scale reading of no greater than 1.5 times the anticipated grouting pressure shall be installed in the grout line between the pumping outlet and the grout injection port.

A screen, which is easily accessible for inspection and cleaning with clear openings of 3/16-in. maximum size, shall be installed between the mixer and the pump.

The grouting equipment shall utilize gravity feed to the pump inlet from a hopper attached directly over it. The hopper must be kept at least 1/3 full of grout at all times during the pumping operation to prevent air from being drawn into the stay pipe. Prior to beginning grouting operations, the contractor shall demonstrate that the combination of grout materials, mixer and pump are capable of satisfactorily grouting the stays by performing a grouting acceptance test on a mock-up of a stay cable repair.

Introduction of admixtures and mixing of the grout shall be in accordance as recommended

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in writing by the manufacturer of the admixtures used and in accordance with the procedures used in the grout test.

627.8-SHOP DRAWINGS:

The Contractor shall prepare shop drawings for the repairs as shown in the plans. Shop drawings for the repairs shall include plans and details for the fittings, valves and other that will be necessary to provide positive mechanical shut off valves. The shop drawings shall be submitted to the Engineer for review and approval prior to fabrication.

627.10-ACCEPTANCE CRITERIA:

The Engineer shall not accept the Contractor’s work if in his judgment, the following criteria are not met:

1. The Contractor fails to store, handle, mix, or install the materials according to the Manufacturer’s recommendations and as specified herein.
2. The Contractor fails to store, handle, mix, or install the materials according to the Manufacturer’s recommendations and as specified herein.
3. Degradation of material properties under field conditions is detected. Any material showing degradation shall be replaced by the Contractor.
4. If any PE pipe needs to be rewelded for whatever reason, it will be done by the Contractor.
5. If a repair is found not fully grouted, it will be filled by the Contractor with material and methods acceptable and approved by the Engineer.
6. All work done as a result of the acceptance criteria shall be done at no additional cost to the Department.

627.11-METHOD OF MEASUREMENT:

Cable stay repairs will be measured in place, in linear feet, based on the length of PE pipe removed, and shall include all material and work necessary for the PE pipe removal and installation, grout removal and injection and cable coatings within the limits of the repairs.

627.12-BASIS OF PAYMENT:

The preparation for the cable stay repair, testing, polyethylene pipe, polyethylene pipe welding material, grout, cable coatings, and removal and installation of all of the specified materials to affect the cable stay repair shall be included in the payment for the item. The quantities, determined above, will be paid for at the contract unit price bid for the items below, which price and payment shall be full compensation for furnishing all materials and doing all the work herein prescribed, including all the cost, labor, tools, equipment, supplies and incidentals necessary to complete the work.

627.13-PAY ITEM:

ITEM	DESCRIPTION	UNIT
627001-002	Cable Stay Repair	LF

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The work shall consist of furnishing and placing Tedlar PVF tape at the locations indicated in the plans, and providing access for the Engineer to the repairs during all activities. This work shall be in accordance with this Specification and in conformity with the plans.

627.21-MATERIALS:**627.21.1-Tedlar PVF Tape:****REQUIREMENTS**

Backing	Tedlar PVF	
Adhesive	Acrylic	
Color	White	
Width	4 in.	
Adhesion to steel	Minimum of 45 oz./in width	ASTM Test Method D-3330
Tensile Strength	Minimum of 22 lbs./in width	ASTM Test Method D-3759
Elongation at Break	Minimum of 160%	ASTM Test Method D-3759
Backing Thickness	2.1 mils +/- 0.1 mils	ASTM Test Method D-3652
Total Tape Thickness	3.4 mils +/- 0.15 mils	ASTM Test Method D-3652
Temperature Use Range	-90 deg. to 210 deg. F	

All Tedlar PVF tape shall be stored in a clean dry location and in accordance with manufacturer's recommendations. All material shall be clearly labeled or marked with the following information:

- 1) Product name
- 2) Date of manufacture
- 3) Name & address of the manufacturer
- 4) Expiration Date
- 5) Lot number

The manufacturer of the Tedlar PVF tape shall submit documentation showing that the material submitted for construction is of equal or higher quality than the material provided by WVDOH.

At the end of project, all rolls (full or partial) of tape shall become the property of the WVDOH and the Contractor shall make arrangements with Mr. Dave Sada, District 6, District Bridge Engineer for the delivery of the material.

627.21.2-Cable Stay Tape Preparation:

The loose, rough, or ragged edges of the Tedlar PVF tape at the repair locations shall be trimmed. The polyethylene pipe at the repair location shall be cleaned using a cloth soaked in a cleaning solvent which is acceptable to the tape and polyethylene pipe manufactures such as VM&P Naphtha and isopropyl alcohol. The use of oily or soapy solutions that might leave a film behind is prohibited.

The Contractor shall clean and dry the area to receive Tedlar PVF tape to the satisfaction of the Engineer immediately prior to Tedlar PVF tape application.

627.21.3-Cable Stay Tape Application:

The contractor shall apply Tedlar PVF tape at the locations indicated and to the extents shown in the plans. The application of Tedlar PVF tape shall be done in dry ambient conditions with a maximum allowable air temperature of 84°F and a minimum allowable air temperature of 36°F.

Prior to the Contractor mobilizing equipment and/or personnel to the project site, the Contractor shall provide a demonstration of the methods and personnel they intend to utilize during the repairs on a 10-ft. section of inclined polyethylene pipe. The Contractor shall demonstrate to the satisfaction of the Engineer that the tape can be applied in the helical manner without wrinkles and bumps using a taping machine or manual methods. The method approved at the demonstration stage shall be used for the actual repairs.

The Tedlar PVF tape shall be applied (wrapped) in a helical manner from bottom of repair to top, under tension with a 50% overlap. The taping process shall be started and ended with 2 wraps of 100% overlap.

Splicing of the Tedlar PVF tape is prohibited except for repairs which require a length of tape greater than a new roll of tape. If necessary, the Contractor shall splice rolls of Tedlar tape together carefully by overlapping the trailing end of one roll by 2-in. minimum onto the leading end of the new roll and continuing the wrapping process. At each splice location, 2

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wraps of 100% overlap shall occur. For those circumstances which require a splice, only one splice is allowed.

627.21.4-Acceptance Criteria:

The Engineer shall not accept the Contractor's work if in his judgment, the following criteria are not met:

The Contractor fails to store, handle, or install the materials according to the Manufacturer's recommendation and as specified herein.

The Tedlar tape shall have a clean smooth appearance free of any wrinkles, bumps or debris between the tape and the PE pipe which would affect the performance of the tape.

If any Tedlar tape needs to be rewrapped for whatever reason, it will be done by the Contractor.

If a repair is found not fully sealed, the affected area will be rewrapped by the Contractor.

Degradation of material properties under field conditions is detected. Any material showing degradation shall be replaced by the Contractor.

All work done as a result of the acceptance criteria shall be done at no additional cost to the Department.

627.21.5-Method of Measurement:

Cable stay tape will be measured in place, in linear feet, based on the length of PE pipe taped, and shall include all material and work necessary for the Tedlar PVF tape preparation and installation within the limits of the repairs.

627.21.6-Basis of Payment:

The purchase, preparation and installation of the Tedlar PVF tape shall be included in the payment for the item. The quantities, determined as given in Section 627.21.5, Method of Measurement, will be paid for at the contract unit price bid for the items below, which price and payment shall be full compensation for furnishing all materials and doing all the work herein prescribed, including all the cost, labor, tools, equipment, supplies and incidentals necessary to complete the work.

627.21.7-PAY ITEM:

No direct payment will be made for this work, but shall be included under 627001-002, Cable Stay Repair, LF.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
FOR
SECTION 688
PAINTING METAL STRUCTURES

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

SECTION 688
FIELD PAINTING OF METAL STRUCTURES

688.1-DESCRIPTION:

The field painting (coating) of metal structures shall follow the provided requirements set forth in this specification unless otherwise noted in the Contract. This specification shall apply to surface preparation, coating application, contractor responsibilities, environmental and worker protection, and waste handling/disposal.

688.2-GENERAL:

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

688.2.2-Surface Preparation:

688.2.2.1-Non-Blasting: When non-blast cleaning is specified in the contract documents, any one or any combination of the methods below shall be used. The surface and the surface profile after cleaning shall meet the requirements of the methods below. The amount of material, rust scale, and pack rust removed after non-blast cleaning, will meet the requirements of the SSPC methods listed:

1. Hand Tool Cleaning SSPC-SP2
2. Power Tool Cleaning SSPC-SP3
3. Commercial Grade Power Tool Cleaning SSPC-SP15

688.2.2.2-Blasting: The abrasives used for all blasting shall meet the guidelines set forth in SSPC AB1 for mineral and slag abrasives, and AB3 for ferrous metallic abrasives. Any additive mixed with the abrasive shall be approved by the Division prior

to use. The abrasives used shall produce a height of profile between 2.0 and 3.0 mils (50 μm and 75 μm).

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

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

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

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

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

688.2.2.3-Water Jetting: Shall meet the requirements of SSPC-SP 12, section 2.1.6 "Ultrahigh-Pressure Water Jetting" (UHP WJ), visual standard condition WJ-1, prior to painting.

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

688.2.3-Paint Application Requirements:

688.2.3.1-Weather Conditions: Painting shall not be done when the ambient temperature is below 40° F (5° C) or above 100° F (38° C), or the relative humidity above 90 percent. The temperature of the steel must be at least 5° F (3° C) above the dew point. Painting shall not be performed when the surface to be coated is sufficiently hot to cause blistering of the film or too rapid solvent release. Painting will only be permitted between the dates of April 15th through October 15th. There will be no painting permitted to occur in a heated containment.

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688.2.3.2-Paint Storage: Paint and thinners shall be stored in a temperature-controlled environment between 40° F (5° C) and 100° F (38° C). At no time will paint be used beyond the manufacturer's shelf life.

688.2.3.3-Paint Application: The blast cleaned surface shall be painted within 24 hours. In the event rust bloom or flash rusting occurs, the effected members shall be re-cleaned by blasting. The paint shall be applied by spray methods, except those areas inaccessible to spray application may be brushed or rolled. Brushes or rollers, when used, shall have sufficient body and length of bristle or roller nap to spread a uniform coat. Small touch-up areas may be brushed or roller, if approved by the Engineer. Use of an agitated pot shall be mandatory in spray application of zinc-rich primer. The agitator or stirring rod shall reach within 1 inch (25 mm), of the bottom of the pot and shall be in motion at all times during paint application. Coatings shall be mixed in strict accordance with the coating manufacturer's written instructions. Under certain conditions, it may be necessary to thin or adjust the solvent balance of the paint. The type and amount of solvent to be used shall be that listed on the coating manufacturer's product data sheet for that material. Upon thinning, the dry film thickness requirement shall still be met.

Application requirements and drying times between coats shall be in accordance with the manufacturer's recommendations. Exposed steel surfaces of expansion dams shall be painted as specified for structural steel.

Spray guns must be equipped with the recommended size tip for the paint product being applied and shall be held perpendicular (90 degrees) to, and at, the proper distance from the receiving surface. Complete protection shall be provided by the contractor against paint spatter, spillage, overspray, wind-blown paint, or similar releases.

Appropriate containment shall be placed around the work area to protect public and private property. This shall include pedestrian, marine, railroad, or vehicular traffic on any portion of the bridge, and any highway appurtenances that are found upon, beneath, or adjacent to the structure. Staging must be adequate to provide access to all areas being painted. Violation of these requirements causing excessive paint waste will be justification for the WVDOT Engineer to order the Contractor to cease all work on the project until corrective action has been taken. The Contractor shall be responsible for cleaning and/or replacing any property damaged by the Contractor's operations at no cost to the Department. The method of cleaning and/or replacement shall be submitted to the Engineer in advance for approval.

688.2.3.3.1-Paint Systems:

3 COAT: Primer, Intermediate, Top Coat

2 COAT: Primer, Top Coat

1 COAT: Epoxy Mastic only

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

688.2.3.3.3-Damage to Galvanized Surfaces: The Contractor is to exercise care while cleaning and painting around expansion joints and galvanized surfaces. Any

damage to the expansion joints or galvanized surfaces found by the Engineer, as a result of the cleaning and painting operation shall be repaired and/or replaced, to the satisfaction of the Engineer, at the Contractor's expense.

688.2.4-Inspection Requirements:

688.2.4.1-Inspection of Applied Paint: If in the opinion of the Engineer the coating has flaws other than deficiencies in the prescribed dry film thickness, the material shall be repaired or shall be removed and replaced. Defects in the film, including but not limited to runs, sags, mud-cracking, lifting, overspray, dry spray, pinholes, and holidays shall be corrected until a continuous uniform film has been applied. Excessive film thickness shall be reduced and insufficient film thickness shall be increased. If the thickness of the finish coat is reduced, a thin coat of the finish shall be reapplied to seal the surface and to blend the area into the surrounding coating. Depending on the defect, total removal and replacement of the effected coating may be required. No unsightly runs or sags shall be visible. All "mud-cracking" and/or "dry overspray" in the paint film shall be removed. Excessive bubbles or pinholes shall not be visible in the coat after examination under a minimum of 8X magnification. Calibration of the thickness gage and dry film thickness measurements shall be in accordance with MP 708.40.00.

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

688.2.4.3-Repair Procedures for Field Paint Deficiencies: All field repairs to the coating shall be made in strict accordance with the coating manufacturer's recommendations, except where the requirements listed in this specification are more stringent. Any products used during repairs to the coating deficiencies shall be from the same manufacturer as the coating being repaired. All welds from which the coating of paint has been damaged or is otherwise defective shall be cleaned and repaired. Surfaces that will be inaccessible for coating after erection shall be repaired and/or recoated prior to erection. The Engineer is to review and accept a repair plan before deficient areas are repaired. The requirements specified herein for provisions for inspection, mixing, thinning, temperature and humidity, and application shall govern the coating of the repaired areas. In order to avoid abrupt changes in paint thickness, the area adjacent to repair areas shall transition from zero paint thickness to full system thickness within not less than 3 inches (75 mm) of the repair area by means of sanding the transition area. The requirements for the dry film thickness of the repair coats are the same as those specified for the paint system.

688.2.5-Submittals: Submittals shall be forwarded through the Prime Contractor and be accepted by the Engineer prior to commencement of the subject work. This is the responsibility of both the Fabricator and the Field Contractor.

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

688.2.5.2-Containment/Disposal Control Plan for Existing Steel Structures: Minimum requirements shall be set forth in MP 688.03.20.

688.2.5.3-Contractors Qualifications: Contractors performing abrasive blasting or power tool cleaning, and field painting operations shall be SSPC-QP 1, and SSPC-QP 2 qualified. Contractors performing only field painting operations shall be SSPC-QP 1 qualified.

688.3-COMplete PAINTING OF EXISTING STRUCTURES:

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

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

688.3.3-Paint Application Requirements: Painting shall be in accordance with Section 688.2.3.

688.3.4-Painting Sequence: Shall be in accordance with the following:

FULL PRIME COAT:

The structure shall receive one coat of a primer meeting the requirements of Section 711 of the Standard Specifications. The full prime coat shall be applied before the stripe prime coat. The primer used for the full prime coat and the stripe prime coat shall be of the same type and shall be from the same manufacturer. Dry film thickness for the full prime coat shall be 4 – 6 mils.

STRIPE PRIME COAT:

All edges, outside corners, seams, bolt heads and nuts, all rivet heads, edges of flanges and plates, welds, sharp edges, in general all edges, shall receive one stripe coat, by brush or roller application, of the same primer as the Full Prime Coat.

Striping shall extend a minimum of one inch (2cm) from the edge. The prime coat shall at a minimum, be set-to-touch before the stripe coat is applied. No dry film thickness is specified for this coat. This coat shall be tinted as allowed by the manufacturer to be in contrast to the full prime coat and intermediate coat. The tinting agent shall be the paint manufacturer's approved tinting agent.

INTERMEDIATE COAT:

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

CAULKING:

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

Caulking in a 3-coat system shall be applied after the intermediate coat has cured. Caulking on a 2-coat system shall be applied after prime coat has cured. The top coat shall not be applied until the caulking has fully cured in accordance with the manufacturer's recommendations.

The caulking material shall be compatible with the paint system being applied and shall be by written recommendation of the paint manufacturer. The caulking material shall be tested for compatibility with the paint system at the same time that the paint is tested for intercoat compatibility. Caulking operations shall be performed only when weather conditions are within the parameters as specified in section 688.2.3.1.

TOP COAT:

The structure shall receive one uniform coat of paint as designated in the plans meeting the requirements of Section 711 of the Standard Specifications. The color shall be as designated in the plans and shall be in accordance with current Federal Standard 595. Dry film thickness requirements shall be as specified by the manufacturer's recommendations, or as specified in the contract documents.

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

688.3.6-Utilities: Any damage to existing utilities or Department-owned utilities (electrical service lines, conduit, lighting, etc) shall be repaired and/or replaced, to the satisfaction of the utility owner, at the Contractors expense.

688.3.7-Paint Designation Label:

688.3.7.1-Description: The bridge paint designation label shall consist of painting on the fascia web of the exterior girder with the following information; the paint system, contractor, and the month-year the project was completed. This paint designation label will only be utilized during the complete removal and painting of existing or new structures. The acronyms and details for the paint designation label will be assigned to the Contractor by the Materials Control, Soils and Testing Division when the Quality Control Plan for Painting is approved.

688.3.7.1-Location: The paint designation label will be located at abutment number one on the fascia web of the exterior girder with a southern or eastern orientation, and paint color shall be a semi-gloss black paint compatible with the topcoat material.

688.3.7.2-General: All work performed regarding the paint designation label shall be considered incidental to the painting of the structure.

688.4-ZONE PAINTING OF EXISTING STRUCTURES:

688.4.1-General: The field coats (total system) of paint shall meet the requirements of Section 711. The applicable sections of 711, the dry film thickness shall be in accordance with the manufacturer's recommendations and the color shall be as specified in the contract documents. Each coat shall be a contrasting color to the one previously applied. The contract documents shall specify the areas to be prepared and painted.

688.4.2-Surface Preparation: The surface shall be prepared as specified in the contract documents. Specific instructions will be given on the amount of surface required to be cleaned in accordance with the specific standards identified in 688.2.2. All laminar and stratified rust that has formed on the existing steel surfaces shall be removed. Pack rust formed along the perimeter of mating surfaces of connected plates or shapes shall be removed to the extent feasible without mechanically detaching the mating surface. Any rust remaining after cleaning shall be tight and intact when examined using a dull putty knife. The tools used to remove these corrosion products shall be identified in the submittals and accepted by the Engineer. If the surface preparation or removal of rust results in nicks or gouges, the work shall be suspended, and the damaged areas repaired to the satisfaction of the Engineer, at the Contractor's expense. The Contractor is to exercise care while cleaning and painting around expansion joints and galvanized surfaces. Any damage to the expansion joints or galvanized surfaces found by the Engineer, as a result of the cleaning and painting operation shall be repaired and/or replaced, to the satisfaction of the Engineer, at the Contractor's expense.

688.4.3-Paint Application Requirements: Painting shall be in accordance with Section 688.2.3.

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688.4.4-Painting Sequence:**SPOT PRIME COAT:**

Areas designated on the contract documents shall receive one coat of a primer meeting the requirements of Section 711 of the Standard Specifications. The spot prime coat shall be applied before the stripe prime coat. The primer used for the spot prime coat and the stripe prime coat shall be of the same type and shall be from the same manufacturer.

STRIPE PRIME COAT:

All edges, outside corners, seams, bolt heads and nuts, all rivet heads, edges of flanges and plates, welds, sharp edges, in general all edges, shall receive one stripe coat, by brush or roller application, of the same primer as the Spot Prime Coat. Striping shall extend a minimum of one inch (2cm) from the edge. The prime coat shall at a minimum, be set-to-touch before the stripe coat is applied. No dry film thickness is specified for this coat. This coat shall be tinted as allowed by the manufacturer to be in contrast to the full prime coat and intermediate coat. The tinting agent shall be the paint manufacturer's approved tinting agent.

INTERMEDIATE COAT:

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

CAULKING:

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

Caulking in a 3-coat system shall be applied after the intermediate coat has cured. Caulking on a 2-coat system shall be applied after prime coat has cured. The top coat shall not be applied until the caulking has fully cured in accordance with the manufacturer's recommendations.

The caulking material shall be compatible with the paint system being applied and shall be by written recommendation of the paint manufacturer. The caulking material shall be tested for compatibility with the paint system at the same time that the paint is tested for intercoat compatibility. Caulking operations shall be performed only when weather conditions are within the parameters as specified in section 688.2.3.1.

TOP COAT:

The structure shall receive one uniform coat of paint as designated in the plans meeting the requirements of Section 711 of the Standard Specifications. The color shall be as designated in the plans and shall be in accordance with current Federal Standard 595. Dry film thickness requirements shall be as specified by the manufacturer's recommendations, or as specified in the contract documents.

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

688.4.6-Utilities: Any damage to existing utilities or Department-owned utilities (electrical service lines, conduit, lighting, etc) shall be repaired and/or replaced, to the satisfaction of the utility owner, at the Contractors expense.

688.5 -FIELD PAINTING OF SHOP PRIMED COATED STEEL:

688.5.1-General: Field painting of new shop prime coated structures: Shall include, unless otherwise specified in the contract, the preparation of the primed surface for painting, the procurement of all materials to meet the necessary specifications and the application of the coatings. In addition, the Contractor shall protect pedestrian, vehicular, and other traffic on or underneath the structure from splattering, splashing, or dripping paint. Railings, curbs and all other superstructure and substructure shall be protected against spatters, splashes, and the like.

688.5.2-Shear Studs: Shear studs shall be applied in the field. Repair to the Prime Coat shall be completed at this time to the satisfaction of the Engineer. Any and all adjoining concrete work shall be finished.

688.5.3 -Materials: The field coats (Intermediate and/or Top Coats) of paint shall meet the requirements of 711.22.3 and 711.22.4. Dry film thickness requirements shall be as specified by the manufacturer's recommendations, or as specified in the contract documents. Each coat shall be a contrasting color to the previous coat. In addition, the field intercoat adhesion shall be at least 3A when tested in accordance with MP 711.00.20.

688.5.4-Surface Preparation: Prior to field coats, surface contamination such as rust, dirt, mud, oil, concrete, loose zinc, salts, or other foreign matter shall be removed. The shop primed structural steel shall be pressure washed, with a soluble salt remover from the division's approved product list, at 2000 – 3000 psi (13800 – 20700 kpa). Touch up of the primer shall be in accordance with section 688.2.3.3.

688.5.5-Paint Application Requirements: Painting shall be in accordance with Section 688.2.3.

688.5.6-Paint Sequence: Painting shall be in accordance with Section 688.5.4, with the exception of the Full Prime Coat and Stripe Coat. Paint containment shall be Class 3P as specified in the current edition of SSPC Guide 6.

688.6-ENVIRONMENTAL, WORKER PROTECTION, AND WASTE HANDLING:

688.6.1-General: Environmental protection shall be used when cleaning, painting, welding or cutting an existing bridge. The containment class, emission assessment methods and levels as defined by the current revision of SSPC Guide 6 shall be as stated in the contract documents. A containment/disposal control plan shall be submitted by the prime contractor to the Division according to the requirements as set forth in MP 688.03.20 - Guide for Developing the Contractor's Containment/Disposal Control Plan for Spent Material Prior to Painting Existing Steel Structures. The specific pollution control system which is proposed for the complete capture, containment, collection, and disposal of the "spent material" generated by the work shall be included in the plan. This work shall be performed in compliance with West Virginia Division of Environmental Protection (WVDEP), United States Environmental Protection Agency (EPA) Occupational Safety & Health Administration (OSHA), United States Coast Guard (USCG), SSPC Guide 6 and Guide 7, and other agencies' rules, regulations, standards and guidelines in effect at the time the work is bid.

688.6.2-Permits for Disposal of "Spent Material": The Contractor shall obtain all documents and/or permits that are required for the handling and disposal of the "spent material" collected during the course of the work. All material shall be disposed of at an approved site(s) by a licensed and permitted waste transporter. The Contractor shall not begin cleaning or blasting until he has submitted final documentation that he has an approved disposal site and has all documents and/or permits for the handling, storing, and transporting of hazardous and non-hazardous waste. "Spent material" regardless of the presence of hazardous metals shall be stored in roll-offs or sealed 55-gallon drums. In no case shall the material be stored directly on the ground or on tarps on the ground. The containers shall be marked and labeled in accordance with all applicable and current Federal and State regulations. The "spent material" shall not be disposed of until authorized by the Engineer and in no case shall "spent material" be allowed to accumulate longer than 90 days prior to transport.

688.6.2.1-"Spent Material": This shall include material generated by surface preparation operations and shall be sampled and tested in accordance with the current revision of SSPC Guide 7 and all applicable methods of EPA SW-846. The Contractor shall, at the Contractor's expense, select a laboratory that will sample and analyze the "spent materials". The laboratory must be certified by the WVDEP, EPA or by another state's DEP-equivalent. Certification will be provided to the Engineer prior to the beginning of work. The "spent material" will be transported and disposed of in accordance with all applicable and current Federal and State regulations. The waste transporter for both hazardous and non-hazardous waste will be listed on the Contractor's Containment/Disposal Control Plan.

688.6.3-Additional requirements for all containment classes: Contractor will provide ground covers beneath the containment area and all equipment where spills are possible to

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

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

688.6.5-Worker Protection: The Contractor shall provide protection for their Workers as per the requirements of 29 CFR 1926.62 and any other applicable requirements set forth by OSHA. The Contractor shall have a Certified Industrial Hygienist (CIH) develop, review and approve their written compliance plan. The CIH shall be certified by the American Board of Industrial Hygiene. The CIH, or a technician working under the direction of the CIH, shall be present during the first three days of work and at least twice a month thereafter. The CIH shall certify in writing during the first week of work and at the end of the work that the worker protection plan fully complied with all regulations and that the plans were fully implanted. Daily inspections of the work area shall be made by the project "competent person". The Contractor shall have identified the "competent person" by name in both the CIH's written compliance plan and the Contractor's Containment/Disposal Control Plan. The compliance plan shall also include the "competent person's" qualifications and the frequency of inspections to be taken.

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

688.7-METHOD OF MEASUREMENT:

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

688.8-BASIS OF PAYMENT:

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

tools, equipment, supplies and incidentals necessary to complete the work.

688.9-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
688001-*	Clean and Paint Existing Steel Bridge	Lump Sum
688003-*	Containment and Disposal of Spent Material	Lump Sum
688005-*	Zone Cleaning and Painting Steel Bridge	Sq. Ft.
688007-*	Field Painting of Shop Primed Steel	Lump Sum

* Sequence Number

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 663
PAVEMENT MARKINGS

REPLACE THE ENTIRE SECTION WITH THE FOLLOWING:

663.1-DESCRIPTION:

Pavement markings shall consist of furnishing and installing various types of markings. It shall include, but is not limited to, edge lines, lane lines, center lines, channelizing lines, intersection markings, stripes, curb markings, island markings, and raised markers, or combinations thereof, in accordance with Contract plans and the following specifications or as directed by the Engineer.

All details not specified or shown on the Plans shall conform to the details and requirements set forth in the following publications. These publications shall collectively be referred to as the "pavement marking standards" throughout the remainder of this Section:

1. The WVDOH Standard Details Book, Vol. II, Signing, Signals, Lighting, and Marking, latest issue date
2. The Manual on Uniform Traffic Control Devices for Streets and Highways, latest issue, as printed by the Federal Highway Administration, U.S. Department of Transportation. (Referred to as the MUTCD.)

663.2-MATERIALS:

Materials shall conform to the following Subsections of Division 700 of the Standard Specifications:

MATERIAL	SUBSECTION
Temporary White or Yellow Traffic Paint	711.40
White or Yellow Fast-Dry Traffic Paint, Type II	711.41
Preformed Traffic Markings, Type V	715.40.2
Interim Pavement Markings, Type VIIA	715.40.3
Temporary Pavement Marking Tape, Types VIIB and VIIC	715.40.4
Raised Pavement Markers	715.40.6

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663.3-TYPES OF PAVEMENT MARKINGS:

663.3.1-Edge Lines: Edge lines shall be continuous or dashed, white or yellow beaded stripes, six (6) inches (100 mm) or eight (8) inches (150 mm) in width, as specified on the Plans or otherwise in the pavement marking standards. Color to be specified on the Plans. Center of stripe shall be located six (6) inches (150 mm) from the edge of the pavement or as otherwise specified on the Plans.

Dashed edge lines shall be applied in lengths of two (2) feet (0.6 m), separated by gaps of six (6) feet (1.8 m), or as otherwise specified on the Plans.

663.3.2-Lane Lines and Centerline: Lane lines and centerlines shall be lines between contiguous lanes of pavement. They shall be continuous, broken, or dashed, white or yellow beaded stripes six (6) inches (150mm) or eight (8) inches (200mm) in width, as specified on the Plans or otherwise in the pavement marking standards.

Lane lines and broken centerline lines shall be applied in lengths of ten (10) ft. (3m), separated by gaps of thirty (30) ft. (9m). Dashed lane lines shall be applied in lengths of two (2) ft. (0.6m) separated by gaps of thirteen (13) ft. (4m), or lengths of three (3) ft. (0.9m) separated by gaps of nine (9) ft. (2.7m), as specified on the Plans or otherwise in the pavement marking standards.

When applied to bituminous surfaces, the center of single stripes shall be centered about the dividing line between the contiguous lanes. When applied to Portland cement concrete pavement, the near edge of single stripes shall be offset to the left and four (4) inches (100 mm) from the longitudinal joint. Double yellow centerlines shall be centered about the dividing line between the contiguous lanes, with the gap between the stripes being equal to the width of the stripes.

663.3.3-Railroad Crossing Marking: Railroad Crossing Markings shall be white beaded markings located as shown on the Plans or otherwise in the pavement marking standards. Dimensioning shall be in accordance with the pavement marking standards.

663.3.4-Channelizing Lines: Channelizing lines shall be continuous white beaded stripes, eight (8) inches (200mm) in width. The length of the line shall be as detailed on the Plans.

663.3.5-Stop and Crosswalk Lines: Stop lines shall be solid white beaded lines, twelve (12) inches (300 mm) or twenty-four (24) inches (600 mm) wide, as specified on the Plans or otherwise in the pavement marking standards. Crosswalk lines shall be solid white beaded lines, twelve (12) inches (300 mm) wide by six (6) feet (1.8 m) in length.

663.3.6-Stripes: These markings are transverse, diagonal or longitudinal white or yellow beaded lines, twelve (12) inches (300 mm) wide. They are used to increase the visibility of pedestrian crosswalk areas and to designate neutral traffic zones formed by channelizing lines or edge lines. Location, spacing and use of these stripes shall be shown on the Plans or otherwise in the pavement marking standards.

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663.3.7-Curb and Island Markings: Where specified, exposed surfaces of curbs and paved islands shall be painted solid with yellow or white fast-dry traffic zone paint (Type II) and covered with glass beads. Color to be specified on the Plans.

663.3.8-Arrows: Arrows shall be white beaded markings located as shown on the Plans or otherwise in the pavement marking standards. Dimensioning shall be in accordance with the pavement marking standards. Arrows may be one of the following:

1. One Directional Lane Assignment Arrows
2. Multi Directional Lane Assignment Arrows
3. Ramp Wrong Way Arrows
4. Lane Drop Arrows

663.3.9-Lane Letters: Lane letters shall be white beaded markings located as shown on the Plans or otherwise in the pavement marking standards. Dimensioning shall be in accordance with the pavement marking standards.

663.3.10-Raised Pavement Markers (RPM's): RPM's include reflective Type P-2 markers and reflective Type R-4 markers. The type to be installed and general placement guidelines shall be as shown on the Plans or otherwise in the pavement marking standards.

663.3.11-Yield Triangles: Yield Triangles shall be white beaded markings located as shown on the Plans or otherwise in the pavement marking standards. Dimensioning shall be in accordance with the pavement marking standards.

663.3.12-Handicapped Symbols: Handicapped symbols shall be white beaded markings located as shown on the Plans or otherwise in the pavement marking standards. Dimensioning shall be in accordance with the pavement marking standards.

663.3.13-Bicycle Symbols: Bicycle symbols shall be white beaded markings located as shown on the Plans or otherwise in the pavement marking standards. Dimensioning shall be in accordance with the pavement marking standards.

CONSTRUCTION METHODS

663.4-PAVEMENT PREPARATION-PREMARKING, CODING:

The Contractor shall clean all debris from the surface to be marked by means of a power broom, compressed air or other mechanical means to the satisfaction of the Engineer. Markings and markers shall be applied only when the surface is clean and dry and when ambient and other roadway conditions are within any specified requirements herein.

If pavement markings are included in the contract, they shall be applied in a timely manner and in the patterns directed by the Plans or pavement marking standards.

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All materials shall be applied as recommended by the material manufacturer. This shall include surface pre-treatment, if required.

All surface cleaning, surface pre-treatment and premarking shall be performed by the Contractor prior to the installation of the proposed markings, or markers, and shall be subject to approval by the Engineer.

Coding and premarking changes in traffic flow patterns, i.e., passing, no passing zones, is very critical and should always be approved by the Engineer.

663.5-APPLICATION:

663.5.1-General: The Contractor shall supply all of the marking material, equipment, and traffic control devices required for the completion of the project.

The Contractor shall provide and have approved by the Division a plan for traffic control and maintenance for all phases of the marking operations. The plan must be approved by the Division prior to the beginning of work. All traffic control plans shall be in conformance with provisions in the WVDOH publication "Manual on Temporary Traffic Control for Streets and Highways", latest Edition.

663.5.1.1-Interim Traffic Control, Temporary Marking, and Permanent Marking Placement Schedule: The Contractor shall adhere to specific guidelines provided herein for scheduling the placement of interim traffic control, temporary pavement markings, and permanent pavement markings. These guidelines are based on various factors such as facility type, ADT, and time of season. All interim, temporary, and permanent pavement markings shall be in conformance with specifications herein, the project Plans, or otherwise the pavement marking standards. The Contractor shall be responsible for maintaining both interim traffic control signs and temporary pavement markings until such time as the permanent markings are placed or for the duration of the thirty (30) calendar day warrantied performance period for the temporary markings, whichever is less. No separate payment will be made for maintenance of these items but shall be included in the applicable pay items for initial installation.

If it becomes necessary to open the roadway to traffic prior to the completion of the final paving course for longer than fourteen (14) calendar days, the Contractor shall install full compliance temporary pavement markings in conformance with Section 636 and the specifications herein.

663.5.1.1.1-Interim Traffic Control Placement Schedule: Interim Traffic Control includes interim pavement markings and may also include "Do Not Pass" regulatory signs. Interim markings are 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. Interim markings shall be Type VIIA material applied as described in Section 663.5.6 and shall meet the requirements of Material Section 715.40.3. All interim markings shall be installed by the end of the work day by placing the markings as the paving operation progresses within 1000 feet (300 meters) of the paver. Removal of interim markings shall not be required between lifts or

after placement of the subsequent markings. Payment of interim markings shall be incidental to the Paving Items. The specific interim traffic control to be placed shall be in accordance with the following.

663.5.1.1.1.1-Two-Lane, Two-Way Roadways: Prior to any work which will cover the centerline, the Contractor shall install twenty-four (24) inch (600mm) x thirty (30) inch (750mm) “Do Not Pass” (R4-1) signs on permanent posts at the beginning of each no passing zone throughout the length of the project. These signs shall be placed at the beginning of each no passing zone and shall be repeated every 2,500 feet (762 m) as required. Payment shall be made under the “Traffic Control Devices” item.

To delineate the centerline of the roadway, the Contractor shall install yellow interim markings measuring four (4) inches (100mm) x four (4) inches (100mm) along the centerline of the roadway on twenty (20) foot (6 m) centers.

663.5.1.1.1.2-One-Way Multilane Roadways: On all one-way multilane roadways, the Contractor shall install white interim markings measuring four (4) inches (100mm) x forty-eight (48) inches (1200mm) along the lane line. Interim markings shall be placed on forty (40) foot (12 m) centers.

663.5.1.1.1.3-Two-Way Three-Lane Roadways: Prior to any work which will cover the centerline and/or lane lines, the Contractor shall install twenty-four (24) inch (600mm) x thirty (30) inch (750mm) “Do Not Pass” (R4-1) signs on permanent posts at the beginning of each no-passing zone throughout the length of the project as required. “Do Not Pass” signs in both directions will be required when the center lane is a two way left turn lane. These signs shall be placed at the beginning of each no-passing zone and shall be repeated every 2500 feet (762 m) as required. Payment shall be made under the “Traffic Control Devices” item.

The Contractor shall install interim markings measuring four (4) inches (100mm) x forty-eight (48) inches (1200mm). On such roadways having two thru lanes in one direction, the centerline shall be marked with two parallel yellow lines separated by a four (4) inch (100mm) space placed on forty (40) foot (12 m) centers. Lane lines shall be marked with white lines placed on forty (40) foot (12 m) centers. On such roadways having a two way left turn lane, the center lane shall be marked on both sides with two parallel yellow lines separated by a four (4) inch (100mm) space, and placed on forty (40) foot (12 m) centers.

663.5.1.1.1.4-Two-Way Four-Lane and Five-Lane Roadways: On all two-way four-lane and five-lane roadways, the Contractor shall install interim markings measuring four (4) inches (100mm) x forty-eight (48) inches (1200mm) along the lane line and centerline where required. Centerlines shall be marked with two parallel yellow lines separated by a four (4) inch (100mm) space placed on forty (40) foot (12 m) centers. On five-lane roadways these markings shall be placed on both sides of the two way left turn lane. Lane lines shall be marked with white lines placed at forty (40) foot (12 m) centers.

663.5.1.1.2-Temporary Pavement Marking Placement Schedule: Interim markings 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. Temporary markings are markings, typically short-lived in nature, which supplant interim markings. Temporary markings shall be applied as specified herein and in Section 636, and shall meet the requirements of Materials Section 711.40. Payment for Temporary pavement markings shall be made under the "Temporary Pavement Marking Paint" pay item.

Interim Markings shall be permitted only for a period of up to three (3) calendar days after completion of the final course. The only exception to this shall be for two-way, two-lane roadways having an ADT < 3,000, in which case fourteen (14) Calendar Days shall be permitted after completion of the final course.

Full compliance temporary centerline and edge lines in conformance with Section 636 and the specifications herein shall be installed on two-way, two-lane roadways within the time frame specified above. Two-way three-lane, two-way four-lane, and two-way five-lane roadways shall have full compliance temporary centerline, lane line, and edge lines installed in conformance with Section 636 and the specifications herein within the time frame specified above.

On one-way multilane roadways, the Contractor shall install a full compliance temporary yellow edge line after paving is first completed in the left lane and prior to the left lane being opened to traffic. Prior to the remaining lanes being opened to traffic, the Contractor shall install a full compliance temporary white lane lines and white edge line. These markings shall be installed in conformance with Section 636 and the specifications herein.

663.5.1.1.3-Permanent Pavement Marking Placement Schedule: Permanent markings are the final pavement marking application within a project. Permanent markings shall be placed as specified herein and shall meet the requirements of Materials Sections 711.41, 715.40.2, 715.40.6, and/or any other material specifications made part of the Contract.

The Contractor shall be required to place full compliance permanent pavement markings within sixty (60) calendar days after the placement of temporary pavement markings. In addition, there shall be a minimum thirty (30) calendar day period between the placement of temporary and permanent markings when the temporary markings are placed on or after April 15th and prior to November 1st. There shall be a minimum fifteen (15) calendar day period between the placement of temporary and permanent markings when the temporary markings are placed on or after November 1st and prior to April 15th of the following year. Full compliance markings shall consist of all centerline, lane line, channelizing line, edge line, and intersection markings.

663.5.2-Temporary and Permanent White or Yellow Traffic Zone Paint: Pavement marking lines shall be straight or of uniform curvature and shall conform to the tangents, curves, and transitions as specified in the Plans, the pavement marking standards, and/or as directed by the Engineer.

The finished lines shall have well-defined edges and be free of horizontal fluctuations. The lateral deviation shall not exceed 0.5 inch (13 mm) from the proposed location alignment as specified herein, on the Plans, in the pavement marking standards, and/or as directed by the Engineer.

When striping interchanges and intersections, material shall be applied for the full length of all ramps and the entire perimeter surrounding islands and gore areas. When striping at-grade intersections, yellow edge lines shall be placed completely around and shall be connected at the median ends.

The Contractor shall be responsible for removing all pavement marking materials spilled upon the roadway surface or adjoining area. The Contractor shall use methods acceptable to the Engineer for removing the spilled material.

Any pavement marking which is crossed by a vehicle and tracked shall be replaced and any subsequent marking made by the vehicle shall be removed by methods acceptable to the Engineer and at no additional cost to the Department.

Unless otherwise specified, the Contractor shall be responsible for coding and spotting per the Plans or otherwise the pavement marking standards. The Contractor's coding and spotting shall be reviewed and approved by the Engineer prior to application.

The Contractor will be responsible for cleaning any Raised Pavement Marker (RPM) lenses that are painted during this Contract. If the RPMs are not able to be cleaned, the Contractor shall replace the effected RPM lenses.

Permanent Traffic Paint shall be Type II, White or Yellow Fast-Dry Traffic Paint as described in Materials sections 711.41, unless otherwise specified in the Contract Plans. In regards to ambient air temperature, the Contractor shall utilize an appropriate pavement marking material such that the ambient air temperature at the time of application is within the recommended ambient air application temperatures specified by the material manufacturer. This requirement shall apply to both temporary and permanent traffic zone paint. The Contractor shall not be granted any time extensions to the requirements for the application of temporary or permanent markings, based on ambient air temperature, when the ambient air temperature is thirty-five (35) degrees Fahrenheit (1.7 degrees Celsius) or above. The Contractor shall not be paid any additional monies in order to provide materials suitable for cold weather application. Whenever temporary or permanent traffic zone paint is applied at an ambient air temperature below fifty (50) degrees Fahrenheit (10 degrees Celsius), the Contractor shall provide, upon request by the WVDOH, a certification letter from the marking material manufacturer. This certification letter shall reference the project number, shall identify the marking material supplied for the project, and shall state the minimum acceptable ambient air temperature for application of the material.

Temporary traffic paint shall be applied at the same width as will be used for the permanent markings.

663.5.2.1-Approved Equipment and Personnel: The following provisions shall apply to the application of permanent traffic zone paint only:

The Contractor (prior to commencement of the project) shall submit to the Engineer a detailed list of all equipment and the resumes of all personnel within the confines of the project. The Contractor shall also provide certification from the binder manufacturer that the Contractor is qualified to apply the manufacturer's material in conformance with these specifications. Drivers and operators with less than one year of experience shall not be used on this project.

The Contractor's striping machine shall be equipped with electrical foot counters. The counters shall individually tabulate the amount of footage applied by each striping gun whether solid or dashed. The counters shall be six digit types with a reset feature. The Contractor

shall determine the accuracy of the foot counters and establish an adjustment factor as required to determine the pay item quantities. The foot counters shall be periodically checked to assure accurate measurements. No paint shall be applied without the accurate operation of the foot counters. The Contractor shall provide the Engineer with a certified document on these calibrations.

The Contractor shall use an accurate dashing mechanism, capable of being adjusted to retrace existing lane or center line markings.

Glass beads applied to the surface of the completed marking material shall be applied by an automatic bead dispenser attached to the pavement marking equipment in such a manner that the beads are dispensed uniformly and almost instantly upon the marking as the marking is being applied to the road surface. The bead dispenser shall be equipped with an automatic cut-off control, synchronized with the cut-off of the pavement marking equipment.

663.5.2.2-Contractor's Warranty: The Contractor shall warranty the performance of temporary traffic zone paint for a period of thirty (30) Calendar Days after application, and shall warranty the performance of Type II permanent traffic zone paint through October 31st. If the Type II markings are placed on or after November 1st, the markings shall only be required to meet the initial performance requirements specified in the Materials Section. The required performance level of the markings are described in Section 711.41.

During the warranty periods, if any markings greater than 1000 feet (305 m) are found to be deficient for any reason, the Contractor will be given notification stating the locations and the type of deficiency. These notifications will be given at any time within the specified warranty periods for the markings. The Contractor shall completely replace the deficient markings, as directed by the Engineer, within twenty (20) calendar days of the written notification. Retroreflectivity and color may be checked after re-application of the pavement marking to ensure that segment meets the minimum values specified in Section 711.41.

If the Contractor does not complete the replacement of all of the deficient pavement markings by the end of the twenty (20) calendar day replacement period, and the Contract has not been finalized, the Contractor shall be subject to liquidated damages as described within Section 108.7 until replacement is completed. These liquidated damages shall not stop during the winter shut-down period. No direct payment shall be made for the replacement of any deficient pavement marking during the warranty period as such work shall be considered as incidental to the work as paid for by the various pavement marking items in the Contract.

663.5.3 THROUGH 663.5.4-BLANK

663.5.5-Type V Preformed Intersection Traffic Markings: Type V preformed intersection traffic markings shall be affixed to bituminous or Portland cement concrete pavements as specified in the Contract Plans, or as otherwise specified on the pavement marking details.

Care shall be taken by the Contractor to follow the installation recommendations of the material manufacturer. Preformed tapes used as Type V material are particularly sensitive to

ambient air temperatures and road surface temperatures. Both preformed tapes and thermoplastics are highly sensitive to extraneous materials on the road surface and moisture contained on and within the road surface. Type V materials shall not be applied if the manufacturer's recommendations are not met.

The Contractor shall provide the Engineer with certification from the Manufacturer that they have been adequately trained through the Division of Highway's approved training seminar to apply this material. This certification shall be valid for a period of four (4) years after being issued, after which recertification shall be required.

663.5.5.1-Contractor's Warranty: If the material has been identified by the Division as having failed the skid resistance (when applicable), adherence, road presence, color, and/or retroreflectivity requirements described in Materials Section 715.40.2 prior to finalization of the Contract, the material shall be corrected by the Contractor in a manner acceptable to the Division and in accordance with the Manufacturer's recommendations at no additional cost to the Division if the failure is determined by the WVDOH to be caused by improper installation or defects in the manufacturer's materials.

If the material has been identified by the Division as having failed the skid resistance (when applicable), adherence, road presence, color, and/or retroreflectivity requirements described in Materials Section 715.40.2 after finalization of the Contract, and less than one (1) year from the date of application, the material shall be corrected by the Contractor in a manner acceptable to the Division and in accordance with the Manufacturer's recommendations at no additional cost to the Division if the failure is determined by the WVDOH to be caused by improper installation.

All warranty related work required shall be completed within sixty (60) calendar days of notification. In the event that the Contractor fails to meet this time requirement, liquidated damages will be charged for each Calendar Day in the amount of \$120 per day.

The Contractor may, but shall not be required to replace preformed thermoplastic Type V material between December 1st and March 1st of the following year. The Contractor may, but shall not be required to replace preformed marking tape Type V material between October 1st and May 1st of the following year. Calendar Days falling within the time frames specified above will not be counted against the Contractor.

In addition to any liquidated damages, non-compliance with the warranty requirements specified above may result in the Division's temporary non-recognition of the Contractor's material application manufacturer certifications, as described in Section 663.5.5 and as they pertain to other ongoing and/or future Contracts, until the failed materials are corrected.

663.5.6-Interim Pavement Markings (Type VIIA Material): Interim Pavement Markings shall be Type VIIA Interim Pavement Marking Tape. Type VIIA Marking shall be installed in accordance with the manufacture's recommendations.

The Contractor shall remove all dirt, debris, and loose particles from the road surface application areas immediately prior to the installation of Interim markings.

While in place, Type VIIA pavement markings shall remain adhered to the pavement, and shall meet the color and retroreflectivity requirements described in Materials Section 715.40.3. Any material that fails to meet the above provisions shall be corrected by the

Contractor in a manner acceptable to the Engineer at no additional cost to the Division. If necessary, the material shall be tested and evaluated for deficiencies, with the devices described in the Materials Section, based on an adequate sampling to be determined by the Engineer.

663.5.7-Temporary Pavement Marking Tape (Types VIIB and VIIC Material): Temporary Pavement Marking Tape shall be either Type VIIB or VIIC, as called for in the Contract plans, and shall be installed in accordance with the manufacturer's recommendations.

The pavement surface shall be dry at the time of pavement marking application. The Contractor shall remove all dirt, debris, loose particles and heavy oil residues from the road surface application areas immediately prior to installation of pavement markings.

Care shall be taken by the Contractor to follow the installation recommendations of the material manufacturer. The Contractor shall be responsible for determining if a surface primer is necessary. Type VIIB and VIIC temporary pavement marking film shall be applied with a mechanical applicator to provide pavement lines which are neat, accurate and uniform. The mechanical applicator shall be equipped with a film cut-off device. The pavement marking film shall be rolled or tamped to facilitate adhesion to road surface.

While in place, all temporary pavement markings shall remain adhered to the pavement and shall meet the color and retroreflectivity requirements described in Materials Section 715.40.4. These provisions shall also apply to Type VIIC materials in wet conditions, as described in the Materials Section. Any materials that fail to meet the above provisions shall be corrected by the Contractor in a manner acceptable to the Engineer at no additional cost to the Division. If necessary, the materials shall be tested and evaluated for deficiencies, with the devices described in the Materials Section, based on an adequate sampling to be determined by the Engineer.

Beginning on November 1st, the adherence, color, and retroreflectivity requirements referenced in the previous paragraph shall no longer apply to temporary tape materials which were installed prior to this date. In addition, the adherence, color, and retroreflectivity requirements shall at no point apply to temporary tapes placed on or after November 1st and prior to April 1st of the following calendar year.

When temporary pavement markings are no longer required as approved or determined by the Engineer, the plastic pavement marking film shall be neatly removed in its entirety. The cost for this work shall be included in the Contractor's bid price for installing the temporary markings.

663.5.8-BLANK

663.5.9-Raised Pavement Markers (RPM's): Unless otherwise directed by the Engineer, RPM's shall be placed as specified in the Plans or as otherwise specified in the pavement marking details. The proposed placement of all RPM's shall be reviewed and approved by the Engineer prior to proceeding.

In all cases, the reflective faces of RPM's shall be perpendicular to a line parallel to the roadway centerline.

Up until the time of installation, Type P-2 and R-4 markers should be stored indoors and should be protected from any source of moisture both during shipment to the jobsite and at

the jobsite. The markers should be maintained at a high enough temperature as to preclude moisture condensation and, at the time of placement, both the markers and their containers shall be dry.

The color(s) of the lenses and bodies (Type R-4 only) of the markers shall be in accordance with the Plans or as otherwise specified in the pavement marking details.

Unless otherwise specified in the Plans, markers supplementing a broken line, such as a lane line, shall be placed in line with the pavement marking and within the gaps along the line at the appropriate spacing. Markers supplementing a solid line, such as a channelizing line, shall be installed immediately adjacent to the line with the edge of the marker against the edge of the line. If a Type R-4 marker is to be installed in line with the normal location of a solid line pavement marking, no painted or Type V pavement marking shall be installed at the locations where the R-4 markers are to be installed. R-4 markers shall not be placed on top of existing pavement markings.

The Contractor shall be responsible for the replacement of any markers having failed due to non-conformance with any portion of the specifications herein, and shall incur all associated costs. The Contractor shall also be responsible for the repair of any pavement surfaces damaged and requiring repair, as determined to be necessary by the Engineer and by a method approved by the Engineer, due to non-conformance with any portion of the specifications herein, and shall incur all associated costs.

663.5.9.1-Type P-2 Marker Installation: At the time of installation, the exposed surfaces of Type P-2 castings shall be free of scale, dirt, rust, oil, grease, or any other contaminant which may impair adhesion. If upon inspection the Engineer determines that one or more of the markers are not sufficiently in conformance with this requirement, the Contractor shall clean each contaminated holder by sand blasting or other means acceptable to the Engineer in order to remove all such foreign matter prior to installation.

The location of placement for each Type P-2 marker shall be of a constant slope longitudinally and laterally, and homogeneous. The location shall show no visible signs of distress or failure, such as cracking or delamination. All edges of the marker shall be placed a minimum of two (2) inches (50 mm) from any portion of the road surface showing such signs of distress or failure. Type P-2 markers shall be placed such that all edges are a minimum of (2) inches (50 mm) from any lateral construction joint. In addition, Type P-2 RPM's shall not be placed within an intersection with a public street or highway where the placement of the marker creates a likelihood that the marker will be plowed in a direction other than that which the marker is designed for. If it is determined during pre-installation planning that a marker would be placed at a point with one of the aforementioned pavement surface defects, or at a lateral construction joint, or within the intersection of a public street or highway as a result of typical marker spacing, the affected marker may be relocated longitudinally a sufficient distance to be approved by the Engineer. The distance the marker may be relocated shall not exceed ten (10) % of the typical marker spacing. Where it would be necessary to relocate the marker a distance greater than ten (10) % of the typical marker spacing, the affected marker shall be deleted.

With the exception of markers installed to supplement yellow centerline markings along undivided roadways, all Type P-2 markers shall be installed such that the near edge of the casting is a minimum of two (2) inches (50 mm) from the nearest longitudinal

construction joint. Individual markers may be shifted laterally up to two (2) inches (50 mm), and up to ten (10) % of the typical marker spacing longitudinally in order to meet this requirement. Where it would be necessary to shift the marker a greater distance laterally and/or longitudinally as allowed above, the affected marker shall be deleted.

The recesses for P-2 markers shall be machine cut fully in accordance with the marker manufacturer's specifications pertaining to, but not limited to, dimensions and blade configuration. All P-2 markers shall be installed within seven (7) days of cutting the recesses. All recesses shall be dry at the time of installation of the markers, and the pavement and ambient air temperature shall be a minimum of fifty (50) degrees Fahrenheit (10 degrees Celsius) and rising. Prior to installation of the markers, the recesses shall be brushed or blown clean of any loose material.

Epoxy adhesive recommended by the marker manufacturer and meeting the requirements of Materials Section 715.40.6 shall be used to adhere the Type P-2 marker castings in the recesses. Unless otherwise specified by the adhesive manufacturer, the epoxy adhesive shall be mixed by combining components A and B in a ratio of 1:1 by volume. The epoxy adhesive requires that the mixing operation and placing of the pavement markers be done rapidly. Any mixed batch that becomes so viscous that it cannot be readily extruded from under the casting under light pressure shall not be used. Unless otherwise specified or allowed by the adhesive manufacturer, the adhesive shall be maintained at 60 to 80 degrees Fahrenheit (15 to 27 degrees Celsius) before mixing, and shall not be heated above 120 degrees Fahrenheit (49 degrees Celsius) once mixing starts. Any heating of the epoxy shall be by the application of indirect heat. The Contractor shall insure that the epoxy is thoroughly mixed until it is one homogeneous color. The epoxy shall be placed fully in accordance with the epoxy manufacturer's specifications. Any requirements made by the adhesive manufacturer which are more stringent than those contained herein shall take precedence.

The Contractor shall install P-2 marker castings in the recesses using the epoxy adhesive fully in accordance with the marker manufacturer's specifications. Sufficient epoxy shall be placed in the recess to ensure that all voids beneath and around the casting are filled so as to create a watertight seal around the casting. The casting shall be hand placed into the recesses. The Contractor shall insure that each of the lugs on the sides of the casting are resting on the pavement and that the tips of the casting snowplow deflecting surface(s) are below the pavement surface. The Contractor shall take reasonable steps to avoid buildup of epoxy on either the pavement surface or the casting lip in front of the lens as this buildup will affect the maximum visibility distance of the markers. There shall be no epoxy on the marker lens. If this occurs, the Contractor shall replace the marker lens in accordance with the manufacturer's recommendations and will incur all costs associated with this.

Newly installed P-2 markers shall not be exposed to traffic until the epoxy adhesive has sufficiently cured. The amount of cure time required is based on the ambient air temperature. The Contractor shall follow the recommendations of the adhesive manufacturer. In no case shall the newly installed markers be exposed to traffic within a time period less than that which is shown in the following table:

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Ambient Air Temperature, °F (°C)	Minimum Protection Time (minutes)
100 (38)	15
90 (32)	20
80 (27)	25
70 (21)	30
60 (16)	35
50 (10)	45

663.5.9.3-Type R-4 Marker Installations: Type R-4 markers shall be placed such that all edges are a minimum of (2) inches (50 mm) from any lateral construction joint. If during pre-installation planning, it is determined that a marker would be placed at a lateral construction joint, the affected marker may be relocated longitudinally a sufficient distance to be approved by the project Engineer. The distance the marker may be relocated shall not exceed ten (10) % of the typical marker spacing. Where it would be necessary to relocate the marker a distance greater than ten (10) % of the typical marker spacing, the affected marker shall be deleted. In addition, Type R-4 markers shall not be installed spanning a longitudinal pavement joint. Affected markers may be shifted if necessary such the edge of the marker bodies are along the edge of the joint.

All applications shall be made on dry pavement surfaces free of extraneous materials such as, but not limited to, dirt, dust, grease, oils, existing pavement markings, and excessive remnants of previous delineation or channelization device adhesives. Extraneous materials shall be removed prior to placement by means approved by the Engineer, such as sweeping, high pressure air, scraping, or grinding. The Engineer shall make the final determination as to when the existing surface has been sufficiently cleaned for placement of the markers.

Type R-4 markers shall be applied to the asphalt or concrete surface fully in accordance with the manufacturer's recommendations using an adhesive recommended by the marker manufacturer. The adhesive shall be either 1) a rapid set epoxy adhesive, 2) a standard set epoxy adhesive, or 3) a bitumen adhesive, and shall meet any applicable requirements contained in Materials Section 715.40.6. The Contractor is cautioned in regards to the application of markers to new asphalt or concrete surfaces. If the markers are to be applied to a new asphalt surface, the Contractor shall consult with the adhesive manufacturer and follow all recommendations of the adhesive manufacturer in regards to special surface preparation steps or recommended waiting periods between the completion of paving operations and adhesive application. In no case shall the markers be placed until the new asphalt surface has cured for a minimum period of fourteen (14) Calendar Days. If the markers are to be applied to a new concrete surface less than ninety (90) Calendar Days after concrete placement, any remaining curing compound on the application surface shall be removed by an Engineer approved method and procedures such as sandblasting, hydro-blasting, shot blasting, or grinding. Regardless of the type of adhesive used, type R-4 markers shall not be placed under the following conditions:

1. When either the pavement or air temperature is 32°F (0°C) or less when using rapid set epoxy, 50°F (10°C) or less when using standard set epoxy, or 40°F (4.4°C) or less when using bitumen adhesive.

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2. If the relative humidity of the air is greater than 80 %
3. If the pavement is not surface dry or if there has been rainfall in the previous 24 hours

If the markers are to be applied using an epoxy adhesive, this requires that the mixing operation and placing of the markers be done rapidly. If standard set epoxy adhesive is used, the Contractor may mix this material by hand; however, not more than one (1) qt. (1 L) shall be mixed at one time and the markers shall be aligned and pressed into place within five (5) minutes after mixing operations are started. Any mixed batch which becomes so viscous that the adhesive cannot be readily extruded from under the marker on application of slight pressure shall not be used. Rapid set epoxy adhesive shall not be mixed by hand; it shall be mixed by a 2-component type automatic mixing and extrusion apparatus. Automatic mixing equipment for the epoxy adhesive shall use positive displacement pumps and shall properly meter the two components in the specified ratio. At any time requested by the Engineer, the ratio shall be checked by the Contractor in the presence of the Engineer. This check shall be made by disconnecting the mixing heads, or using suitable bypass valves, and filling two suitable containers with the unmixed components. The mixing head shall properly mix the two components so that there is no trace of black or white streaks in the mixed material. Voids in a cured, undisturbed sample of the mixed adhesive obtained from the extrusion nozzle should not exceed four (4) %.

When machine mixing standard or rapid set epoxy adhesives, the markers shall be placed within sixty (60) seconds after the adhesive has been mixed and extruded, and no further movement of the marker shall be allowed. No more than ninety (90) seconds shall be permitted between the time the adhesive is in place on the roadway and the marker is no longer subjected to further movement. The mixed adhesive should not remain in the mixing head for more than forty-five (45) seconds. Adhesive remaining in the mixing head longer than this period shall be wasted before resuming the operation.

When applying the markers with epoxy adhesive, the adhesive shall be placed uniformly on the cleaned pavement surface or on the bottom of the marker in a quantity sufficient to result in complete coverage of the area of contact of the marker with no voids present and with a slight excess after the marker has been lightly pressed in place. Ideally there will be approximately 0.060 in. (1.5 mm) adhesive between the marker and the pavement. Excess adhesive around the edge of the marker, excess adhesive on the pavement, and adhesive on the exposed surfaces of the markers shall be immediately removed. Soft rags moistened with mineral spirits in accordance with Federal Specification TT-T-291 or kerosene may be used to remove adhesive from exposed faces of pavement markers. No other solvent shall be used. The markers should be protected against impact until the adhesive has hardened to a sufficient degree, as determined by the Engineer.

Bituminous adhesive shall be dispensed from a thermostatically controlled melter-applicator at a temperature of 375 to 425 degrees Fahrenheit (141 to 218 degrees Celsius). The material shall be stirred frequently to ensure even heating. The adhesive shall be dispensed in a puddle slightly larger than the bottom of the marker, and the marker shall be dropped onto the puddle as quickly as possible, preferably within five (5) seconds of adhesive placement. The marker shall then be pressed lightly onto the

adhesive. The adhesive will set up in approximately two (2) minutes and typically no longer requires protection from traffic.

Any requirements made by the adhesive manufacturer which are more stringent than those contained herein shall take precedence.

663.6-METHOD OF MEASUREMENT:

Pavement markings shall be measured complete in place in the units designated below. Length measurements shall exclude gaps. Calibrated and verified odometer measurements will be acceptable as method of measurement on edge lines (mainline only), lane lines, and centerlines only for plan quantities in excess of 10,000 linear feet (3 000 m) or two linear miles (3.2 km).

Island marking will be measured by the square foot (meter) of island area painted.

Type P-2 markers, Type S markers, and Type R-4 markers shall be measured in units of each, completely installed as specified herein. Payment for the installation of Type P-2 and Type S markers shall include payment for the marker lens, regardless of whether the lens is factory or field installed.

Yield Triangle, Handicapped symbol, Bicycle Symbol, Arrow, Lane Letter, and Railroad Crossing Marking intersection markings shall be measured in units of each, completely installed as specified herein. One unit of the Railroad Crossing Marking shall consist of the large "X" and the two "R" letters necessary to install the complete marking in one direction.

663.7-BASIS OF PAYMENT:

663.7.1-General: The quantities, determined as provided above, will be paid for at the Contract unit prices less adjustments provided for in the Contract, which shall constitute full compensation for furnishing all materials and doing all the work prescribed in a workmanlike and acceptable manner, including the furnishing of all the auxiliary vehicles, labor, tools, equipment, supplies and incidentals necessary to complete the work.

The payment for Temporary Pavement Markings includes removal of the pavement marking film.

663.8-PAY ITEMS:

ITEM NUMBER	DESCRIPTION	UNIT
663001-*	EDGE LINE, TY "type", "size" IN, "color"	LF or MI
663002-*	LANE LINE, TY "type", "size" IN	LF or MI
663002-*	CENTER LINE, TY "type", "size" IN	LF or MI
663004-*	CHANNELIZING LINE, TY "type", "size" IN	LF
663005-*	STOP LINE, TY V, "size" IN	LF
663006-*	CROSSWALK LINE, TY V, 12 IN x 6 FT	LF
663007-*	STRIPE, TY V, 12 IN, "color"	LF
663008-*	YIELD TRIANGLE, TY V	EA
663009-*	HANDICAPPED SYMBOL, TY V	EA
663009-*	BICYCLE SYMBOL, TY V	EA
663010-*	ONE DIRECTION LANE ARROW, TY V**	EA
663010-*	MULTI DIRECTION LANE ARROW, TY V***	EA

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663010-*	RAMP WRONG WAY ARROW, TY V	EA
663010-*	LANE DROP ARROW, TY V	EA
663011-*	LANE LETTER, TY V	EA
663012-*	RAISED PVT MARKER, TY "type"	EA
663015-*	RAILROAD CROSSING MARKINGS, TY V	EA

* = sequence number

** = single headed lane assignment arrow. Typically left or right turn

*** = multi-headed lane assignment arrow with two to three arrow heads

"type" = pavement marking type

"size" = pavement marking size or width

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

SECTION 711

PAINTS, COATINGS, OILS, AND INKS

711.41-WHITE OR YELLOW FAST-DRY TRAFFIC PAINT (TYPE II):

711.41.1-General:

DELETE THE 6TH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

An appropriate pavement marking material shall be used such that the ambient air temperature at the time of application is within the recommended ambient air application temperatures specified by the material manufacturer. Section 663 specifies that the Contractor shall be required to apply an appropriate Type II material at temperatures as low as thirty-five (35) degrees Fahrenheit (1.7 degrees Celsius).

DELETE THE LAST PARAGRAPH AND REPLACE WITH THE FOLLOWING:

The warranty and performance criteria of this specification shall apply to Type II markings placed on or after April 15th and prior to November 1st. Markings placed prior to April 15th, and on or after November 1st shall be required to meet the specified warranty performance requirements at the time of application only.

711.41.2-Color and Retroreflectivity Requirements:

REPLACE THE FIRST PARAGRAPH IN THE “RETROREFLECTIVITY” SECTION WITH THE FOLLOWING:

Markings installed on or after April 15th and prior to November 1st shall maintain a minimum retroreflectivity value of 200 mcd/m²/lx for white pavement markings and 150 mcd/m²/lx for yellow pavement markings through October 31st.

REPLACE THE FIRST SENTENCE OF THE SECOND PARAGRAPH IN THE “RETROREFLECTIVITY” SECTION WITH THE FOLLOWING:

February 17, 2016

Readings shall be taken with a LTL-X, or Traffic Engineering Division approved equal, 30 meter geometry retroreflectometer.

711.41.3-Sampling and Testing Procedures for Performance Samples:

DELETE THE LAST TWO PARAGRAPHS.

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FOR

SECTION 715

MISCELLANEOUS MATERIALS

715.40-PAVEMENT MARKING MATERIAL:

715.40.2-Preformed Traffic Markings:

DELETE THIS SECTION AND INSERT THE FOLLOWING:

715.40.2-Preformed Intersection Traffic Markings (Type V Material): The markings described are preformed, retroreflective pavement markings conforming in color, size and shape to the WVDOH Standard Details Book, Vol. II, and to the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD)

Preformed thermoplastic traffic markings shall be fabricated to a uniform thickness of not less than 125 mils, including retroreflective beads. Preformed pavement marking tapes, applied as Type V material, shall be fabricated such that no portion of the material profile is less than 60 mils, including adhesive and retroreflective beads.

As a minimum, preformed thermoplastic traffic markings shall be capable of being applied to clean road surfaces at minimum road surface and ambient air temperatures of 35 degrees Fahrenheit (2 degrees Celsius), with a surface primer if necessary, providing moisture has been sufficiently removed from the application surface.

As a minimum, preformed pavement marking tapes applied as Type V material shall be capable of being applied to clean road surfaces, with a surface primer if necessary, when the following conditions are met:

1. Road surface is dry
2. Ambient air temperature 60 degrees Fahrenheit (16 degrees Celsius) and rising
3. Road surface temperature 70 degrees Fahrenheit (21 degrees Celsius) and rising
4. No rainfall 24 hours prior to application
5. Minimum air temperature overnight prior to application 40 degrees Fahrenheit (4 degrees Celsius)

715.40.2.1-Enhanced Skid Resistant Preformed Thermoplastic Traffic Markings: Specific markings, as identified on the Plans or otherwise on the applicable sheets in the WVDOH Standard Details Book, Vol. II, shall be applied only with preformed thermoplastic markings with enhanced skid resistant properties. The enhanced skid resistance of this material shall be achieved by utilizing surface applied abrasives with a minimum hardness of 7 (Mohs scale). The material, after application, shall have a minimum skid resistant value of 60 BPN when tested in accordance with ASTM specification E303, and shall not fall below this value for the warranty period specified in 715.40.2.2.

715.40.2.2-Adherence, Retroreflectivity, Color, Road Presence, and Skid Resistance Warranty Requirements: Section 663 requires the Contractor to correct any markings not meeting the warranty requirements specified herein up to the finalization date of the contract, if the cause of non-conformance with the performance requirements herein is due to either improper application or material defect(s), and requires the Contractor to correct any markings not meeting the warranty requirements specified herein for the balance of the one (1) year period from the date of installation when the failure is determined by the WVDOH to be caused by improper application. Warranty of the performance of the material for the balance of the warranty periods specified herein shall be provided directly to the WVDOH by the material manufacturer, and shall apply only to non-conformance with the performance requirements herein determined by the WVDOH to be caused by material defects.

Transverse markings shall be warranted to adhere to both asphalt and concrete, maintain road presence, and meet the retroreflectivity and color requirements described herein, for a minimum of three (3) years when applied according to the Manufacturer's recommendations. Transverse markings shall include stop bars, yield triangle markings, legend, symbols such as lane assignment arrows and lane drop arrows, railroad crossing markings, crosswalk markings, stripes inside lane shunts and gore areas, and other similar markings. When Enhanced Skid Resistant Preformed Thermoplastic material is specified, the marking shall meet the skid resistance requirement specified in 715.40.2.1 for the three year warranty period.

Longitudinal lines shall be warranted to adhere to both asphalt and concrete, maintain road presence, and to meet the retroreflectivity and color requirements described herein, for a minimum of four (4) years when applied according to the Manufacturer's recommendations. Longitudinal lines shall include lane lines, channelizing lines, edge lines, center lines, and other similar markings. When Enhanced Skid Resistant Preformed Thermoplastic material is specified, the marking shall meet the skid resistance requirement specified in 715.40.2.1 for the four year warranty period.

RETROREFLECTIVITY: Both white and yellow markings shall be warranted to maintain a minimum retroreflectivity level of 150 millicandelas, with beads applied, for the applicable warranty period described above.

All retroreflectivity measurements will be taken with a LTL-X or other Traffic Engineering Division approved 30-meter geometry retroreflectometer. A 5% tolerance with the stated minimum required retroreflectivity value shall be allowed when tested

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with a hand held retroreflectometer. Average retroreflectivity values shall be determined by following an adequate sampling plan to be determined by the Division.

Generally, conformance of markings with the retroreflectivity requirement shall be based on a well dispersed sampling, to be determined by the Division, of the retroreflectivity over the whole marking. Retroreflectivity sampling may be concentrated on a specific area of the marking that appears to be in non-compliance with the Road Presence requirement for the purpose of determining non-compliance with quantitative data.

COLOR: Each color installed shall be warranted to fall within the boundaries created by the following CIE Chromaticity Coordinate Limits, with beads applied, for the applicable warranty period described above:

COLOR	CIE CHROMATICITY COORDINATE LIMITS							
	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
White	0.480	0.410	0.430	0.380	0.405	0.405	0.455	0.435
Yellow	0.575	0.425	0.508	0.415	0.473	0.453	0.510	0.490

The colormeter used shall be a LTL-Y, or other hand-held colormeter device approved by the Division. Average color coordinate values shall be determined by following an adequate sampling plan to be determined by the Division.

Generally, conformance of markings with the color requirements shall be based on a well dispersed sampling, to be determined by the Division, of the color values over the whole marking. Color sampling may be concentrated on a specific area of the marking that appears to be in non-compliance with the Road Presence requirement for the purpose of determining non-compliance with quantitative data.

ADHERENCE AND ROAD PRESENCE: Both white and yellow markings shall be warranted to maintain adherence and road presence for the applicable warranty period described above.

The Adherence and Road Presence requirement shall apply to materials worn uniformly, from the surface down, by normal traffic and snow-plowing. In addition, these requirements shall apply to materials at intersections subject to turning movements by normal traffic. However, these requirements shall not apply in cases of damage attributable to snow-plowing such as chiseling, cutting, chipping, or in cases of material removal from the roadway (other than removal from the surface down due to normal wearing as described above) when it can be shown that the material removal is due to snow-plowing rather than material adhesion failure. Loss due to pavement failure, unless caused by the marking material, will not be considered as a material failure.

715.40.2.3-Approved Products Listing: Material approvals are based on results from AASHTO's NTPEP testing program and/or WVDOH field evaluation tests. Approvals may also be granted or rescinded based on actual performance on WVDOH projects. A list of approved materials, code numbers, and approved Contractor personnel may be obtained by contacting:

February 17, 2016

Materials Control, Soils, & Testing Division
190 Dry Branch Drive
Charleston, West Virginia 25306

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 716

EMBANKMENT AND SUBGRADE MATERIAL

716.1-GENERAL:

716.1.1.3-Softshale:

DELETE THE ENTIRE CONTENTS AND REPLACE THE FOLLOWING.

716.1.1.3-Softshale: Soft shale shall be considered as any of the shales, weak sandstone, weak limestone, claystones or silt stones that break down using the following roller test. Rock which break down under three complete coverages with a steel drum roller, meeting the following requirement, shall be classified as soft shale to be placed as specified in 207.7.3.2.1. Smooth drum rollers shall provide a minimum 1.5 tons per linear foot of roller width and drum rollers with any type of feet (sheep's foot, tamping foot, and etc.) shall provide the same minimum of 1.5 tons per linear foot of roller drum width. This criteria applies to single and multiple drum rollers as well as vibratory rollers with the vibration set to maximum. This criteria shall be calculated for each roller and test combination by dividing the operating weight of the roller in tons by the total measured width of the drum in feet, or the total of all drums if more than one drum. This calculation shall be provided to the Engineer in writing prior to the test. The contractor shall provide the roller or rollers and any other necessary equipment for this test without additional compensation.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SPECIAL PROVISION
FOR

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STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 425

ASPHALT EMULSION MINERAL BOND

425.1-DESCRIPTION:

This section covers the materials, equipment, construction and application procedures for placing Asphalt Emulsion Mineral Bond used to treat asphalt pavement shoulders and low volume roadways. The Asphalt Emulsion Mineral Bond shall be the process of applying a mixture of asphalt emulsion, aggregate, water, and additives as needed to the existing asphalt pavement as a preservation treatment. All ingredients are to be properly proportioned, mixed, and spread on the paved surface in accordance with this Specification and as directed by the Engineer.

425.2-MATERIALS:

Furnish the components of the Asphalt Emulsion Mineral Bond to include asphalt emulsion, fine aggregate, water, and additives. Use materials meeting the following:

425.2.1 Asphalt Emulsion-The emulsified asphalt shall contain asphalt, water, emulsifier, and polymer or other additives. It shall be pumpable and suitable for application through a distributor truck.

Emulsified asphalt shall meet the requirements listed in Section 705 of the Standard Specifications. In addition to the emulsion shall meet the requirements of either Table 425.2.1A or Table 425.2.1B.

Table 425.2.1A (Non-Ionic)			
Criteria	ASTM/AASHTO METHOD	Value	Units
Particle Charge	T-59 Section 8	Neutral	
Brookfield Viscosity at 77 °F (Spindle 5, 20 rpm)	D2196	11,000 – 20,000	cPs
pH	E70	5.0 – 7.5	pH
Density	T59	8.5 – 9.0	lbs/gal
Solids Content	T59	50.0 - 54.0	%, by weight
Ash Content	T111	4.0 – 6.0	%, by weight

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Criteria	ASTM/AASHTO METHOD	Value	Units
Viscosity, Saybolt Furol at 25 C	10	10-90	Seconds
Particle charge	T-59 Section 8	Positive	
Sieve test		0.50 max	%, by weight
Residue		57 min	%, by weight
Penetration (Residue from Distillation), 25 C, 100 g, 5 s,		30-150	

The sieve test may be waived if material applies without clogging nozzles and satisfactory field results are obtained.

The storage stability test may be waived provided the asphalt emulsion storage tank at the mixing site has adequate provisions for circulating the entire contents of the tank, and provided satisfactory field results are obtained.

425.2.2 Aggregate-The composite aggregate / mineral filler blend shall be free of cemented or conglomerated material and shall not have any detrimental material. It is recognized that high mineral filler mixture will require separate tests to be run on the aggregate and the mineral filler components. This will require verification of the stated blend percentages for the mixture.

425.2.2.1 Gradation-When tested in accordance with AASHTO T 27 (ASTM C 136) and AASHTO T 11 (ASTM C 117), the aggregate gradation shall be within one of the following bands.

Sieve Size	Percent Passing
#8 (2.36 mm)	100
#16 (1.19mm)	95-100
#30 (600µm)	85-100
#50 (300µm)	40-70
#100 (150µm)	30-60
#200 (75 µm)	25-65

425.2.3 Water-The water used shall be two parts hydrogen and one part oxygen from a potable source and free from harmful soluble salts.

425.2.4 Additives – Other material added to the mixture proprietary or otherwise shall be supplied by the manufacture of the mixture.

425.3-MIXTURE DESIGN REQUIREMENTS:

425.3.1 Mix Design-Submit to the Engineer, at least five working days before the start of production, a complete mix design prepared and certified by an experienced laboratory. The mix design shall consist of:

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1. Signed certificate(s) of analysis covering the specific materials to be used on the project.
2. Specify target application rates for the mixture as well as permissible operating tolerances so that adjustments may be made due to varying field conditions.
3. Test results of the tests required in Section 425.3.2.
4. List of material sources. Material sources must be on approved source lists published by the division. Materials Procedure 700.00.05, Guidelines for Establishing and Maintaining Approved Lists of Materials and Sources, outlines the requirements of these approved lists.

Once the design has been approved, no material substitution will be permitted unless approved by the Engineer. A new mix design is required for any change in aggregate or asphalt emulsion source.

425.3.2 Mix Design Guidelines-Mix acceptance will be subject to satisfactory field performance as determined by the engineer.

The mixture shall contain a minimum of 30% mineral aggregate by weight. This shall be determined by AASHTO T-308 Asphalt Content by Ignition Method, this method is modified to account for the high asphalt, fine aggregate mix.

The mixture shall pass the International Slurry Seal Association's Modified TB100 test for Wet-Track Abrasion Loss (3 day) Soak. There shall be a maximum of 80 g/m².

425.4-CONSTRUCTION:

425.4.1 Equipment-Provide safe, environmentally acceptable equipment that can produce a specification product. All equipment, tools, and machines used in the application of asphalt emulsion mineral bond shall be maintained in satisfactory working conditions at all times.

425.4.1.1 Emulsion and Aggregate Mixing Equipment-The mixture shall be mixed thru a central mixing plant. Aggregate, asphalt emulsion, water and additives shall be proportioned by weight (mass) utilizing the mix design approved by the Engineer. Storage and transportation tanks shall be equipped with a full sweep agitator capable of producing a homogeneous mastic surface treatment mix.

Individual weight (mass) controls for proportioning each item to be added to the mix shall be provided. Measurement of volumes is permitted during production with the appropriate specific gravity calculations in insure that the mixture meets the weight proportions of the mix design. Each material control device shall be calibrated and properly marked. Each device shall be accessible for ready calibration and placed such that the engineer may determine the amount of each material used at the time.

425.4.1.2 Storage Tanks-The storage tank shall have an internal full sweep mixing system. The storage tank shall have sufficient mixing capability to assure proper suspension of fine aggregates in the mix.

425.4.1.3 Distributor-The distributor shall be fully self-contained and shall have a storage tank with full sweep agitation, hydraulic system, operator controls, pumping system, material filters and spray bar capable of applying a full lane width. The equipment shall have sufficient available power to operate the full spray system and the agitation system at the same time.

The distributor shall include computerized application controls, a tachometer, pressure gauges, accurate volume devices, calibrated tank, and a thermometer for

measuring temperatures of the emulsified asphalt in the tank. The distributor shall be equipped with a system allowing the measurement and calculation of application rates.

The pumps shall provide operation resulting in high volume and low potential for cavitation. The pumps shall be engineered to allow the system to handle fine aggregate filled materials. The distributor shall have computerized rate controller that automatically adjusts the distributor's pumps to the ground speed.

The applicator spray bar shall be sized with volumetric capacity to dampen any possible pressure ripples by providing even pressure to all spray tips. Attachments such as a spray shield and wind deflector shall be available.

425.4.1.4 Miscellaneous Equipment-Provide hand squeegees, shovels and other equipment as necessary to perform the work. Provide cleaning equipment such as power brooms, air compressors, water flushing equipment, and hand brooms for surface preparation.

425.4.2 Application-Asphalt emulsion mineral bond seals shall be applied in a manner to fill cover the area specified with at a uniform application rate to seal the asphalt pavement. If, indicated in the Contract documents, the Contractor shall apply a minimum of two applications of mixture, each applied separately to the entire pavement surface.

425.4.2.1 Weather Limitations-Mixture shall not be placed when either the air temperature or the temperature of the surface on which the mixture is to be placed is below 60 F, when it is raining, when there is a chance of temperatures below 32 F (0 C) within 24 hours after placement, or as directed by the engineer.

425.4.2.2 Dilution-Contractor shall not dilute mixture in the field with water or any other additive. Only materials mixed at the manufacturing facility will be allowed. No mixing of designed materials will be allowed in the distribution truck or on the job site.

425.4.2.2 Surface Preparation-The surface shall be thoroughly clean and dry when the mixture is applied. Material cleaned from the surface shall be removed and disposed of as directed by the engineer. Protect drainage structures, monument boxes, water shut-offs, etc., during application of bond coat and mixture.

425.4.2.3 Mixture Application-The application rate will be as shown on the plans or as directed by the engineer. The minimum application shall be 0.10 gal/yd² per pass. Placement of the mix shall be performed in two passes with a minimum coverage of 0.20 gal/yd² for the first pass and 0.16 gal/yd² for the second.

The mixture shall be uniform and homogeneous after applying on the existing surfacing and shall not show separation of the emulsion and aggregate after setting.

Placement of the material may be permitted in multiple passes at the election of the contractor. Contractor shall provide a mat ensuring total coverage and especially free of voids and pit holes. Leave no streaks, holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement.

After application, the roadway shall remain closed until the surface is tack-free and capable of being open to traffic without tracking.

Properly sized nozzles shall be used for the material and application rate specified. Multiple series of nozzles, for spraying the mixture, shall be spaced longitudinally.

425.4.2.6 Clean-up-Remove spatter and mar from curb and gutter, sidewalk, guard rails and guide posts, etc. at the Contractor's expense. Remove surface treatment material from fixtures, manholes, valve covers, etc. Leave no streaks, holes, bare spots,

or cracks through which liquids or foreign matter could penetrate to the underlying pavement.

425.4.3 Temporary Pavement Marking-Shall be in accordance with Section 636

425.4.4 Pre-application Meeting-Hold an on-site pre-application meeting with the Engineer before beginning work to review and discuss the following.

1. Detailed work schedule
2. Traffic control plan
3. Calibration of equipment
4. Mix design previously submitted to the Engineer
5. Equipment inspection, including transport units

425.4.5 Test strip-Test Strip(s) are intended to demonstrate the mixing of materials and placement procedures of each mixing machine to be used on the project. Test strip shall be performed at the beginning of the first day production and on the roadway to be treated. The completed test strip (minimum 500 feet length) shall be reviewed to detect and correct any variances in surface texture, material ratio(s) and finished surface appearance. Additionally, the test strip may be used to establish the target job application rate.

425.4.6-Traffic Control - Do not allow traffic on the mixture until it has cured sufficiently to prevent pickup by vehicle tires. Protect the new surface from damage at intersections and driveways. Repair all damage to the mixture caused by traffic. All costs associated with this repair work will be borne by the Contractor. Otherwise Traffic Control will be in accordance with Section 636, and the *Manual on Temporary Traffic Control For Streets and Highways, 2006 Edition*, or as directed by the Engineer.

425.4.7 Quality Control-A mixture is to be produced that will meet the JMF and quality control tolerances. Notify the Engineer immediately if the quality control test results exceed any of the tolerances and stop mixture production. Identify the cause of the excess deviation and determine the corrective action necessary to bring the mixture into compliance. Secure the Engineer's approval before resuming work.

For Quality Assurance purposes, samples may be taken at the Project. The frequency of sampling and testing will be established by the Engineer based upon the Department's current acceptance program and local conditions encountered.

425.5-MEASUREMENT AND PAYMENT:

Payment for asphalt emulsion mineral bond includes all materials, equipment, labor for preparing the surface, placing temporary pavement markings, placing the mixture and complying with all requirements including the warranty. The placement includes application a surface course for full width coverage as specified in the contract documents.

The completed work as measured will be paid for at the contract unit price for the Items detailed in Section 425.6.

425.6-PAY ITEMS:

ITEM NUMBER	DESCRIPTION	UNIT
425001-001	Asphalt Emulsion Mineral Bond	Square Yard (SY)

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 415

REMOVING EXISTING PAVEMENT SURFACES

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

SECTION 415

MILLING OF ASPHALT PAVEMENT SURFACES

415.1-DESCRIPTION:

This item shall govern for the milling of existing and/or new asphalt pavement at locations shown on the plans or as directed by the engineer in accordance with the requirements herein and MP 401.07.24. The work shall provide a skid resistant surface that meets smoothness requirements and provides a constant cross slope, or be used as surface preparation prior to placement of a final surface course.

415.1.1-Standard Milling: Item 415005-* shall be used as the default milling of asphalt pavements. It should be used when the Division plans to remove existing asphalt pavement without a high level of profile and slope control, or as otherwise shown in the plans.

415.1.2-Fine Milling: Item 415006-* shall be used when the Division intends to overlay the milled surface with a thin lift asphalt course, or as otherwise shown in the plans. It should be used when control of the profile and slope of the milled surface is important.

415.1.2-Micromilling: Item 415007-* shall be used for smoothness correction, bump and/or grade corrections on existing or newly paved surfaces where called for in the plans. It is not intended to be used when standard overlays are to be used.

415.2-CONSTRUCTION:

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415.2.1- General: The plans will designate the area of pavement surfaces to be milled. Milling of roadway shoulders will not be required unless indicated on the plans or required to provide drainage.

415.2.2- Equipment: The equipment for removing the existing pavement shall be a power operated planing machine or grinder. The equipment shall be capable of accurately establishing profile grades along each edge of the machine within plus or minus 1/4 inch (6 mm) by referencing from the existing pavement and able to maintain accurate depth of cut and cross-slope.

The machine shall have a control system providing for uniformly varying the depth of cut while the machine is in motion to prevent cutting of or damage to drainage works, manholes or other appurtenances within the paved area.

At the end of each working day, all equipment shall be removed to a location where it does not present a hazard to traffic, the pavement shall be cleaned by sweeping or flushing.

415.2.3-Milling Residue: The Contractor shall establish a positive and immediate means for removal of milling residue. The machine shall have adequate loading equipment to remove solid residue from the surface and discharge them into a truck or as directed. Residue shall not be permitted to flow across lanes used by the traveling public or into gutters or drainage facilities.

415.2.4-Millings: The removed pavement material shall become the property of the Contractor.

Excess waste material resulting from the operation shall be removed and disposed of in a manner approved by the Engineer.

415.2.5-Milled Surface Opened to Traffic: If the ground area is opened to traffic the following shall apply;

- 1) Any transverse vertical face shall be sloped so as not to present a hazard to traffic;
- 2) Any longitudinal vertical face shall not exceed 2 inches (50 mm);
- 3) The pavement surface shall be cleaned by sweeping or flushing.

415.2.6-Cross Slope: Milling will be accomplished in a manner that eliminates crack or joint faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Auxiliary or ramp lane grinding shall transition as required from the mainline edge to provide positive drainage and an acceptable riding surface.

The operation shall result in pavement that conforms to the typical cross-section and the requirements specified for the final surface finish. However, it is the intention of this specification that the faulting at joints and cracks be eliminated and the overall riding characteristics be restored within the limits specified. To accomplish the smoothness required, milling may not be required on 100 percent of the pavement surface. If directed by the Engineer, any spalling or dislodged unsound pavement due to milling shall be corrected by the Contractor via section 109.4.

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415.2.7-Surface Finish: The milling process shall produce a smooth riding pavement surface that is true to the established line, grade and cross section with the milled area consisting of a longitudinal corduroy-type texture. The milling operation shall be capable of efficiently and accurately establishing profile grades along each edge of the machine within 1/8 inch (3 mm). Transverse joints and cracks shall be made flush with adjacent surfaces. Transverse joints and cracks shall be visually inspected to ensure that adjacent surfaces are in the same plane. Alignment of adjacent sides of the joints or cracks shall be within 1/8 inch (3 mm) of each other to be considered flush.

The transverse slope of the pavement shall be uniform to a degree that no depressions of misalignment of slope greater 1/4 inch (6 mm) in 12 ft. (3.65 m) are present when tested with a straightedge placed perpendicular to the centerline. Straightedge requirements do not apply outside of the milled area. The peaks of the ridges shall be approximately 1/8 inch (3 mm) higher than the grooves.

The finished, milled pavement surface shall be evaluated using MP 401.07.24 except that the volume of glass beads to be used for each test shall be 200 ml (12in³), and only one such test shall be required at each individual test location. The measured diameter for each test shall be equal to or greater than the values shown below:

415005-* - STANDARD MILLING	NA
415006-* – FINE MILLING	9” Dia.
415007-* – MICROMILLING	12” Dia.

Testing shall be performed as soon as practical behind the milling operation in order to not allow gaps to occur between sections being milled and sections being evaluated. Three tests shall be performed within the first 3,000 square yards of milling, and then at a minimum frequency of one test for every 7,500 square yards of milled surface thereafter. If the minimum diameter is not maintained, cease operations until necessary adjustments to the equipment and/or the process are made to meet this requirement. Do not resume milling operations until the Engineer is satisfied with the corrective actions.

Upon resuming operations after any adjustments are made, the first 3,000 square yards shall be evaluated as stated above. Additionally, if the equipment is replaced for any reason, or if mobilization back to the project site occurs at a later date for any reason, the first 3,000 square yards shall be evaluated as stated above.

The Engineer may reduce the testing frequency provided that a uniform texture is consistently maintained meeting the requirements shown above.

415.3-METHOD OF MEASUREMENT:

Pavement milling will be measured by the square yard (square meter) of pavement milled and accepted. The quantity of pavement milling will be determined by multiplying the width specified on the plans by the total length of the finished pavement surface.

415.4-BASIS OF PAYMENT:

The contract price per square yard (square meter) for Fine Milling or Micromilling shall be full compensation for furnishing all labor, materials, tool, equipment and incidentals and for

doing all work involved in milling the existing pavement, removing residue, cleaning the pavement, and testing per MP 401.07.24 in accordance with these specifications and as shown on the plans.

415.5-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
415005-*	Standard Milling	Square Yard (Square Meter)
415006-*	Fine milling	Square Yard (Square Meter)
415007-*	Micromilling	Square Yard (Square Meter)

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 410

**ASPHALT BASE AND WEARING COURSES,
PERCENT WITHIN LIMITS (PWL)**

ADD AS A NEW SECTION:

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). 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) for Square Yard Paving may be obtained by contacting the Materials Control, Soil and Testing (MCS&T) Division:

- 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 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).

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	PG BINDER GRADE
Performance Graded Binders	705.5	Standard grade shall be a PG 64-22.
Coarse Aggregate	703.1 thru 703.3 ¹ and ³ (See MP 401.02.28 for exceptions and additions required for Superpave Items.)	For the top two lifts PG 70-22 ² shall be used on projects specified ≥ 20 million ESALs.
Fine Aggregate	702.3 (See MP 401.02.28 for additions required for Superpave Items)	Any deviation from the above criteria will be specified in contract documents.
Mineral Filler	702.4	

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

Note 2 PG 64-22 Binder may be used in asphalt mixtures placed below the top two lifts.

Note 3 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.

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.

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**TABLE 410.4.2A
DESIGN AGGREGATE GRADATION REQUIREMENTS
FOR MARSHALL MIX DESIGNS**

TYPE OF MIX	Base-I	Base-II (Patch & Level)	Wearing I V	Wearing-I (Scratch-I)	Wearing-III (Scratch-III)
SIEVE SIZE	Nominal Maximum 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 µm)	–	–	–	–	–
No. 50 (300 µm)	–	–	–	–	–
No. 200 (75 µm)	1.0 – 6.0	2.0 – 8.0	2.0 – 8.0	2.0 – 9.0	3.0 – 11.0

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**TABLE 410.4.2B
DESIGN AGGREGATE GRADATION REQUIREMENTS
FOR SUPERPAVE MIX DESIGNS**

Type of Mix	37.5	25	19 ^{Note} (Patch & Level)	12.5	9.5 (Scratch)	4.75 (Scratch)
Standard 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)	0.0 – 6.0	1.0 - 7.0	2.0 – 8.0	2.0 - 10.0	2.0 - 10.0	6.0 – 12.0

Note: 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 μ m) 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 Macrotecture
MP 401.07.25	Evaluation of Pavement with Substandard Properties
MP 401.13.50	Determination of Percent Within Limits

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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 produced 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: 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.

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:

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- 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 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 feet 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 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.

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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: Although being tested using the limits discussed above, constructed shoulder mats and ramps shall not be subject to compaction penalty. However, incentive criteria for payment in excess of 100% shall still apply. Acceptance of mat density shall be in accordance with 410.13.3.

Lots for joint density between the outside shoulder and travel lanes shall not be subject to payment penalties. However, incentive criteria for bonus payment shall still apply. Acceptance for joint density shall be as per 410.13.4.

Limits and testing for Mixture Acceptance shall apply.

410.7.1.4-Thickness: Thickness testing shall be performed on all traveled lanes and 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 testing shall be performed on all traveled lanes and shoulders. Additionally, Bond Tests will be performed for all surface layers beginning with the Existing Pavement layer and then all intermediate pavement layers called for in the Proposal and Plans. However if a scratch course is called for in the plans, then a bond test will be performed at the scratch course layer and the first new surface pavement layer, not between the existing pavement layer and the scratch course layer.

Corebond strength shall exceed a minimum of 100 psi when tested in accordance to MP 410.07.23 Guide to Determining Interface Bond Shear Strength. If all samples obtained within a lot exceed the minimum requirement, there will be no adjustment for pay. If any of the specimens result in strength below the required amount, the values shall then be evaluated for payment as per 410.13.50 Guide to Statistical Analysis of Material Using Quality Level Analysis-Percent Within Limits. 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 still be recorded as such on the reporting form.

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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 adjusts 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 μm (No. 200) sieve.

The core density is defective, or the cores are defective for asphalt content or gradation of the 75 μm (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 200TN. 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.

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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 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 410.10.3 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-TapSieve 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)

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- 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

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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 70-22, PG 64-22, PG 64-28, and PG 58-28) 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).

410.11-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

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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 AADT, 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.

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-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.

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
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

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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.

(ie 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:

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

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

410.13.4-Joint Density Adjustments: 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.

Bonus adjustment calculated as follows:

$$\mathbf{\$T = \frac{PWL-80}{20} \times 4000}$$

Negative adjustment calculated as follows:

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

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.

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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:

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

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:

410.13.6.1-Tack Coats: Any tack coats applied by the contractor shall be applied in accordance with section 408. It is the intent of the Sections 410.13.6, 410.13.6.1 and Section 408.7 to provide one tack coat application on the existing surface including any milled surfaces.

However, any new intermediate asphalt layers installed shall receive an additional tack coat when such layers have been used for maintaining traffic for two or more weeks prior to placement of any final or intermediate layers. If the contractor chooses not to tack any intermediate layers as described above, then the Bond Strength Pay adjustment factor described in section 410.13.6.2 shall apply.

410.13.6.2-Bond Strength Calculations: If no tack coat is applied in accordance with Section 408, then the following price adjustment will be applied for Bond Strength.

When a lot of Asphalt does not meet the Bond Strength requirements as specified in Section 410.7.1.4 , the price shall be adjusted as follows:

Negative adjustment calculated as follows:

$$\$T = (70 - \text{PWL}) / 70 \times 40,000$$

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

410.13.7.1-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.

410.13.7.2-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.

410.13.7.3-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 shall be applied to the overall payment for the lot.

410.13.7.4-Bond Strength Adjustment: If it is determined that a Bond Strength Adjustment is warranted by Section 410.7.1.4 of this specification the formulas in Section 410.13.6.2 shall be used to calculate the adjustment. This adjustment shall be applied to the overall payment for the lot.

410.14-PAY ITEMS:

Item Number	Description	Unit
410001-090	MARSHALL BASE CRSE, TY I	SY
410001-095	MARSHALL BASE CRSE, TY II	SY
410001-100	SUPERPAVE BASE CRSE, TY 19	SY
410001-105	SUPERPAVE BASE CRSE, TY 25	SY
410001-110	SUPERPAVE BASE CRSE, TY 37.5	SY
410002-090	MARSHALL WEAR CRSE, TY I	SY
410002-095	MARSHALL WEAR CRSE, TY III	SY
410002-100	MARSHALL WEAR CRSE, TY IV	SY
410007-090	MARSHALL SKID PVT, TY I	SY
410007-095	MARSHALL SKID PVT, TY III	SY
410007-100	SUPERPAVE SKID PVT, TY 9.5	SY
410007-105	SUPERPAVE SKID PVT, TY 4.75	SY
410007-106	SUPERPAVE SKID PVT, TY 12.5	SY

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

STANDARD SPECIFICATION

FOR

SECTION 109

MEASUREMENT AND PAYMENT

109.11 THROUGH 109.19-BLANK:

DELETE AND REPLACE WITH THE FOLLOWING:

109.11-SQUARE YARD PAVING ADJUSTMENTS:

For the purposes of Square Yard paving the value of Q the “As Constructed” Quantity in Sections 109.9 and 109.10 shall be calculated using the following formula.

Q = Quantity as per plan thickness calculated by:

$$Q = (L \times W \times 32.27) \times T$$

Where: *L* = Length (mi)
 W = Width (ft)
 T = Plan Thickness (in)

109.12 THROUGH 109.19-BLANK

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: X341-125-0.02 03

FEDERAL PROJECT NUMBER: TIG-0125 (004)

FOR

SECTION 627

ASAP BRIGE

627.1-DESCRIPTION:

This special provision shall define the requirements to be performed by the Contractor and/or agents of the Contractor, in the submittal of the contract plans and the related activities in the construction of a proposed bridge alternate at Mill Branch. The contract for the above referenced project provides 100% foundation design and construction plans for a proprietary system utilizing a Contech (Name PRECAST REINFORCED CONCRETE ARCH-TOPPED BRIDGE/CULVERT, 16' SPAN X 8' RISE) with associated headwalls and wingwalls. An equal Precast Concrete Bridge System Design may also be submitted for WVDOH approval. Items associated with this LL1 alternative are as follows:

- a. Dismantling Structures
- b. Structure Excavation
- c. Foundation Protection
- d. Class B Concrete
- e. Class Dc Concrete
- f. Reinforcing Steel Bar
- g. Hp14x89 Steel Bearing Pile, Pre-Drilled
- h. Wingwall For Concrete Culvert
- i. Construction Layout Stake
- j. Dewatering Device
- k. Precast Reinforced Concrete Arch-Topped Bridge/Culvert, 16' Span X 8' Rise

The alternate proposed bridge design identified in this special provision and in the contract plans as 112, ASAP BRIDGE, MILL BRANCH shall comply with the following requirements.

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1. The superstructure and wingwalls shall be designed by the contractor in accordance with the AASHTO LRFD Bridge Design Specifications, 5th edition, including the 2010 interim revisions. Design calculations and drawings signed and sealed by a West Virginia Licensed Professional Engineer shall be submitted for approval. A minimum LRFR rating factor of 1.00 for HL-93 design live load shall be provided. Rating calculations signed and sealed by a West Virginia Licensed professional engineer shall be submitted for approval.
2. Additional information to be used is the WVDOH BRIDGE DESIGN MANUAL available at the link identified above. Any conflicts with the current WVDOH project development policy and the standard plans including but not limited to Design Directives, current AASHTO LRFD Code, and ASHTO provisions, shall be addressed by the Contractor.
3. The design will provide a minimum span length equal to or greater than the three sided box culvert.
4. The superstructure type, typical section, structural and architectural details including barrier railing shall be identical to the bridge located at Big Branch that is detailed in the project construction plans. No other superstructure type shall be allowed.
5. Substructure architectural details shall be identical to the bridge located at Big Branch.
6. The contractor will be responsible to prepare and submit a Preliminary Hydraulic Study using HEC-RAS. The contractor will submit a request to WVDOH Engineering Division for the existing conditions model. The proposed alternate bridge shall create 0.00 ' increase in backwater as compared to the existing conditions model. The Preliminary Hydraulic Report for the alternative bridge will be submitted to WVDOH Engineering Division for review and comment. A Final Hydraulics Report addressing all WVDOH comments will be submitted to WVDOH Engineering Division for approval before any work can begin on the alternative bridge construction. As part of the Final Hydraulics Report the contractor shall perform a scour analysis per HEC-18 procedures and provide scour protection for Mill Branch as specified in the construction plans.
7. Substructure locations and type to be determined by bidder. Changes to roadway and bridge grades that require additional right of way will not be acceptable.
8. Horizontal alignment for CR 26 shall be considered final.
9. All bidders must base their bid on the quantities shown on the plans for Mill Branch Culvert or alternate Item number 627010-001 ASAP Bridge.
10. In regard to additional project criteria refer to General Notes for County Road 26 over Mills Branch in the contract plans.

627.2-UTILITIES:

The Contractor shall be responsible for verifying the location of all existing utilities whether public or private and preparing relocation plans. Relocation plans shall be provided to the District Utility Coordinator at which time relocations shall be accomplished as per the policy outlined in the *"Accommodation of Utilities on Highway Right of Way and Adjustment and Relocation of Utility Facilities on Highway Projects June 2007"*.

627.3-PERMITS FOR CONSTRUCTION:

All permits as required by the US Army Corps of Engineers (USACE), WV Department of Environment Protection (DEP), are final and provided in the contract documents. Any

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modifications to permits due to an ASAP BRIDGE submission will be at the expense of the contractor. No additional contract time will be allowed to accommodate permit revisions.

627.4-COMPLETION TIME:

The contract completion date was developed to allow time to complete construction of this project and relocate utilities.

627.5-TRAFFIC CONTROL:

The traffic control shall be in accordance with the *"Manual on Traffic Control for Streets and Highways, 2006 Edition"*. The traffic control plan and cases are provided in the plan notes and paid for by various items. Any deviation in the traffic control plan must be approved by the Engineer.

627.6- MATERIALS, INSPECTION AND TRAFFIC CONTROL:

All materials and inspection shall be as per the current *"WVDOH Standard Specifications Roads and Bridges"* and supplemental.

627.7-METHOD OF MEASUREMENT:

The quantity of work for "ASAP Bridge" will be measured and paid for as lump sum.

627.8-BASIS OF PAYMENT:

The Contractor will submit a payment schedule for approval by WVDOH at preconstruction, to be used as a basis for bi-monthly progress payment schedule.

627.9-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
627010-001	ASAP Bridge	Lump Sum

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

FOR

SECTION 627

STRIP SEAL EXPANSION JOINT ASSEMBLY

627.1 – DESCRIPTION:

The work shall consist of removing the existing expansion joint assembly, and/or of furnishing and placing Modified Class K Concrete and a new strip seal assembly at the locations indicated on the plans. The construction shall be in accordance with this Specification and in reasonably close conformity with the Plans or as established by the Engineer.

627.2 – MATERIALS:

627.2.1 - STRIP SEAL GLAND:

The strip seals shall not be any part of the load bearing riding surface and shall be recessed below the normal riding surface throughout the normal limits of joint movement. They shall have a shape, which promotes self-removal of foreign material during normal joint operation. Special conditions such as doglegs, tees, and crosses shall be shop fabricated in a mold under heat and pressure.

The strip seals glands shall meet the material requirements of Section 708.2 of the Specifications.

627.2.2 - STEEL PRODUCTS:

All steel components of the strip seal assembly shall meet AASHTO Designation M270 and the requirements of Section 615 of the Specifications unless otherwise noted herein or in the plans. One half inch minimum diameter steel anchors shall be attached to the steel retainers for positive anchorage within the Modified Class K Concrete. The retainers shall maintain a

minimum cross sectional thickness of 3/8" and shall be manufactured from extruded or hot rolled steel.

The steel retainers shall have a shape suitable to mechanically lock the sealing element in place to form a watertight seal throughout the normal movement cycle. The steel retainers shall allow the sealing element to be replaced from the bridge deck surface without removal of the retainers.

All steel surfaces that come in contact with the strip seal gland shall be blast cleaned in accordance with Structural Steel Painting Council Specification SP6.

The adhesive lubricant used to install the strip seal gland into the locking steel retainer shall be a one-part moisture curing polyurethane compound, meeting the requirements of ASTM D-4070.

627.2.3 - STRUCTURAL CONCRETE:

Bridge Deck applications shall be Modified Class K Concrete. The Modified Class K Concrete shall be in accordance with the specifications for Class K Concrete in Section 601 of the Specifications except that the coarse aggregate shall be AASHTO Size No. 8 crushed stone or crushed gravel conforming to Section 703 of the Specifications.

627.2.4 - REINFORCING STEEL:

Reinforcing steel bars when used in Bridge Deck applications shall be epoxy coated and shall be in accordance with Section 602 of the Specifications.

627.3 - SHOP DRAWINGS:

The Contractor shall field verify all plan dimensions to insure accuracy of expansion joint fabrication prior to submission of shop drawings.

The Contractor shall design and develop the sequencing of all work as required by the plans and prepare shop drawings of sufficient detail to fabricate all structural steel components necessary for completion of the contract. Sequencing details and shop drawings shall be submitted to the Engineer for review and approval prior to fabrication.

627.4 - PREPARATION OF JOINT:

When applicable, the Contractor shall remove the existing expansion joint assembly to the limits shown in the plans. The opening left by the removal of the joint shall meet the dimensional requirements shown in the plans. If additional concrete is needed to extend the deck to obtain the required joint opening, this work and material shall be included in this item.

The Contractor to the satisfaction of the Engineer shall inspect the portion of the existing expansion joint assembly to remain in place as shown in the plans. If, in the opinion of the Engineer, the remaining steel assembly has been separated from the anchor studs or the anchor studs are no longer bonded to sound concrete, the Contractor shall cut the deck, remove those portions of the existing steel and studs, and fill the void with Modified Class K Concrete to the limits shown for placing the new joint. The repair material shall be fully cured prior to pouring the concrete headers. These repairs, if required, shall be included in this item unless otherwise shown in the plans.

Care shall be taken to not damage the reinforcing bars or their bond to the existing concrete. Any bars missing or damaged beyond repair, in the opinion of the Engineer, shall be replaced with new epoxy coated bars of comparable size. These bars shall be coupled to sound rebars once the damaged portions have been removed. These repairs, if required, shall be done in accordance with Sections 104.3 and 109.4 of the Specifications unless otherwise shown in the plans.

The Contractor shall protect from damage all materials, which are to remain in place. Materials damaged due to the Contractor's operations, as determined by the Engineer, shall be repaired or replaced at no additional cost to the Department and to the satisfaction of the Engineer.

627.5 – INSTALLATION:

The steel retainers must be placed and aligned to the correct "grades" and elevations. The temporary support method used to achieve this alignment is subject to the Engineer's approval.

Remove all loose and unsound concrete from the surface within the joint area. Blast clean the joint area, steel retainer and anchorage in accordance with the Structural Steel Painting Council Specification SP10 immediately prior to placement of the Modified Class K Concrete. The joint area must be clean and dry at the time of the Modified Class K Concrete pour.

The strip seal gland shall be installed in one piece at each location and shall extend to an elevation of at least 6" higher than the curb elevation at the parapet or safety curb areas, or as shown in the plans. The Contractor shall be aware that the strip seal gland installation will be severely restricted at joint openings of less than 1.5". Field splicing of the strip seal gland is not permitted.

After installation is completed, the manufacturer's representative shall certify to the Engineer, in writing, that the strip seal assembly was installed in accordance with the Manufacturer's requirements.

627.6 - WATERTIGHT INTEGRITY TEST:

When designated in the Plans, the following shall apply:

When at least five days have passed after the joint system has been fully installed, the Contractor shall test the entire (full-length) joint system for watertight integrity. He shall employ a method satisfactory to the Engineer. The entire joint system shall be covered with water, either ponded or flowing, for a minimum duration of 15 minutes. The concrete surfaces under the joint shall be inspected, during this 15 minute period and also for a minimum of 45 minutes after the supply of water has stopped, for any evidence of dripping water or moisture. Water tightness shall be interpreted to be no free dripping water on any surface on the underside of the joint. Patches of moisture shall not be cause for non-acceptance.

Should the joint system exhibit evidence of water leakage at any place whatsoever, the Contractor shall locate the place(s) of leakage and he shall take any and all measures necessary to stop the leakage. The Engineer will approve measures deemed necessary by the Contractor.

In the event that measures to eliminate leakage have to be taken, a subsequent water integrity test shall be performed subject to the same conditions as the original test.

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627.7 - ACCEPTANCE CRITERIA:

Unless approved by the Engineer, the Contractor’s work will be deemed unacceptable if any of the following criteria are not met:

- a. The Contractor fails to store, handle, mix, or install the materials according to the Manufacturer's recommendations and as specified herein.
- b. Degradation of material properties under field conditions is detected. The Contractor shall replace any material showing degradation.
- c. If applicable, the joint fails the "watertight integrity test". If failure occurs, repairs shall be conducted in accordance with the test requirements.
- d. If the strip seal gland needs to be resealed for whatever reason, the Contractor will do it.
- e. If the finished joint system contains shrinkage cracks sufficient to cause debonding, or if the system became damaged during construction or by traffic prior to final acceptance, the joint system shall be removed and replaced by the Contractor.
- f. All work done as a result of the acceptance criteria shall be done at no additional cost to the Department.

627.8 - METHOD OF MEASUREMENT:

Strip seal assembly will be measured in place along the centerline of the joint in linear feet.

627.9 - BASIS OF PAYMENT:

The removal of existing concrete and the old expansion device, to the limits shown in the plans, and the placement of specified materials to rebuild the expansion device shall be included in the payment for the items below. The quantities, determined above, will be paid for at the contract unit price bid for the items below, which price and payment shall be full compensation for furnishing all materials and doing all the work herein prescribed, including all the Manufacturer's cost, labor, tools, equipment, supplies and incidentals necessary to complete the work.

627.10 - PAY ITEM:

Item Number	Description	Unit
627016-*	REMOVE AND REBUILD EXPANSION JOINT, STRIP SEAL	LF (Meter)
627025-*	STRIP SEAL EXPANSION JOINT SYSTEM BEHIND APPROACH SLAB	LF (Meter)

* - Sequence number

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**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SPECIAL PROVISION**

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

FOR

SECTION 102

BIDDING REQUIREMENTS AND CONDITIONS

ADD THE FOLLOWING TO THE END OF THE SECTION:

102.17-GRANT FUNDING PROJECT:

The Contractor is advised that this project has grant funding associated to it and will award Sections of work that are within its approved funding amount.

102.17.1-Sections of Work: The contract includes a number of Sections, as shown in the Plans. The work necessary to complete the Section shall be in accordance with the applicable Specifications and/or details included in the Contract Documents.

102.17.2-Award of Contract: The Contractor shall submit a bid for every Section of work; any proposal not having bids for all Sections will be deemed irregular. The successful bidder shall be the lowest bidder of the total of all Sections.

102.17.2.1-Accepted Sections: Within 15 days after the Award of Contract, the Engineer will notify the Contractor which Sections shall be accepted. Accepted Alternate Sections shall become part of the Contract and are in full-force and effect as though originally in the Contract Documents.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 105

CONTROL OF WORK

105.6 – COOPERATION WITH UTILITIES:

ADD THE FOLLOWING SUBSECTION TO THE PROPOSAL:

105.6.1 – Division Owned Utilities: It will be the Contractor's responsibility to locate WVDOH owned utilities (electrical service lines, conduit, signal, etc.) within the project limits. This work shall be incidental to the project.

Department owned utilities or components that are cut, damaged, or destroyed by any work performed as part of the project shall be replaced by the Contractor at no additional cost to the Department.

Lighting, traffic signal, overhead sign plans, etc. if available, may be obtained by contacting Traffic Engineering Division at 304-558-3063.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 105

CONTROL OF WORK

105.6 – COOPERATION WITH UTILITIES:

ADD THE FOLLOWING SUBSECTION TO THE PROPOSAL:

105.6.1 – Division Owned Utilities: It will be the Contractor's responsibility to locate and identify WVDOH owned utilities (~~electrical service lines, conduit, signal, etc.~~) within the project limits where those utilities would be interrupted or damaged by performing work. WVDOH owned utilities are typically limited to electrical wiring used to power various devices and systems such as, but not limited to, roadway lighting, sign lighting, traffic signals (including lead-in cables to advance high speed induction loops), dynamic message signs (DMS), closed circuit television (CCTV), roadway weather information system (RWIS), weigh in motion (WIM) and advance warning flashers. This work shall be incidental to the project.

Department owned utilities or components that are cut, damaged, or destroyed by any work performed as part of the project shall be replaced by the Contractor at no additional cost to the Department.

Lighting, traffic signal, overhead sign plans, etc. if available, may be obtained by contacting Traffic Engineering Division at 304-558-3063.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 105

CONTROL OF WORK

105.3-CONFORMITY WITH PLANS AND SPECIFICATIONS:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING.

105.3-CONFORMITY WITH PLANS AND SPECIFICATIONS:

All work performed and all materials furnished shall be in reasonably close conformity with the lines, grades, cross sections, dimensions and material requirements, including tolerances, shown on the Plans or indicated in the Specifications.

Should the Engineer determine the materials, or the finished product do not conform to the Specifications or the Plans, the Engineer will then make a determination if the work will be accepted and remain in place in accordance with 106.3.1 and 106.7. In this event, the Engineer will document the basis of acceptance by contract modification which will provide for an adjusted payment. All nonconforming material or construction judged to be inadequate for the use intended shall be either reworked or removed and replaced at no expense to the Division.

~~Each supplemental agreement containing an adjusted price will also have added the sum of Two Hundred Dollars to each adjusted price, for the Divisions administration costs, to be deducted from monies due the Contractor.~~

When a price adjustment is necessary for non-conforming accepted material, an additional two hundred dollars, for the Division's administration costs, will be added to each individual causal occurrence of adjusted payment.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 207

EXCAVATION AND EMBANKMENT

207.2-MATERIALS:

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

Materials shall meet the requirements specified in 715.11 and 716.

207.2.1-Quality Control Testing: Quality control of the select material for backfill is the responsibility of the Contractor as specified in 106.1.

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

The Contractor shall notify the Engineer prior to construction of the test data for all compaction testing on the forms as set forth in MP 700.00.24 and maintain records of the equipment used to compact the material in accordance with 716.3.2.3. Completed test data forms shall be provided to the Engineer at or immediately after the time of testing.

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

207.2.2-Acceptance Testing: Acceptance sampling and testing of subgrade material is the responsibility of the Division, except for furnishing the necessary materials. Quality control sampling and testing performed by the Contractor may be used by the Division for acceptance.

207.2.3-Acceptance Procedure: Material conforming to the specification requirements will be accepted at full contract price. Acceptance of subgrade materials shall be in accordance with 207.2.4.

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207.2.4-Sampling and Testing: Frequency of sampling and testing shall be in accordance with the contractor's quality control plan. The minimum sampling and testing frequencies for gradation shall be as indicated in Attachment 1 of MP 307.00.50. The material shall be sampled in accordance with MP 700.00.06. The minimum sampling and testing frequency for compaction will be in accordance with MP 717.04.21.

207.2.5-Acceptance Plan:

207.2.5.1-Compaction: Compaction of embankment and subgrade shall meet the requirements set forth in 207 and 716.

207.2.5.2-Gradation: Acceptance for gradation shall be on the basis of test results on consecutive random samples from a lot. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. Generally at the beginning of the project, the average shall be started on the second sample in accordance with MP 300.00.51. A subplot is the quantity of material represented by a single gradation test. In the case where only one sample is taken, this subplot shall be considered the lot. When the average, or when the most recent three consecutive individual test values fall outside the limits specified in 716.1 and 716.1.1.2, the lot of material represented will be considered nonconforming to the extent that the last of its sublots is nonconforming. When this occurs, the last subplot shall have its price adjusted in accordance with Table 207.16.1. In the case where the average is nonconforming and the last subplot contained is conforming, then there would be no price adjustment. In no event, however, shall a subplot of material have its price adjusted more than once, and the first adjustment, which is determined, shall apply.

207.2.5.3-Degree of Nonconformance: When a subplot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming, and this value shall be multiplied by its appropriate multiplication factor as set forth in Table 207.2.4.2 to determine the degree of nonconformance of that sieve.

TABLE 207.2.5.3	
Nonconforming Sieve Size	Multiplication Factor
3 in. (75 mm)	1.0
No. 200 (75 µm)	1.0

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

When the total degree of nonconformance has been established and it is 12.0 or less, the material will be paid for at an adjusted contract price as specified in Table 207.16.1.

When the degree of nonconformance is greater than 12.0, the nonconforming subplot shall be resolved on an individual basis, requiring a special investigation by the Engineer to determine the appropriate course of action to be followed. Pending resolution of the

matter, additional lifts of select material for backfill shall not be placed over the nonconforming material

207.17-BASIS OF PAYMENT:

ADD THE FOLLOWING TO THE SECTION:

207.17.1-Price Adjustment: Subgrade material not conforming with the gradation requirements as described in 207.2.5.2 will be paid for at the adjusted contract price base on the degree of nonconformance as specified in Table 207.17.1

TABLE 207.17.1

ADJUSTMENT OF CONTRACT PRICE FOR GRADATION NOT WITHIN SPECIFICATIONS	
Degree of Nonconformance	Percent of Contract Price to be Reduced
1.0 to 3.0	2
3.1 to 5.0	4
5.1 to 8.0	7
8.1 to 12.0	11
Greater than 12	*

* The Division will make a special evaluation of the material and determine the appropriate action.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 212

STRUCTURE, ROCK, AND WET EXCAVATION

212.2-MATERIALS:

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

Select material for backfilling shall be crushed stone, gravel, slag, or any combination thereof meeting the requirements of 703. The grading shall be such that 100 percent of the material passes the 2 inch (50 mm) sieve and 0 to 5 percent passes the No. 16 (1.18 mm) sieve. Any of the standard coarse aggregate sizes from AASHTO No 4 through AASHTO No. 8, as shown in Table 703.4, would comply with the above gradation requirement.

Controlled low strength material shall meet the requirements of 219.

Quality Control of select material for backfilling is the responsibility of the Contractor as specified in 106.1.

Engineering fabric shall be fabric for subsurface drainage or separation meeting 715.11.

212.2.1-Quality Control Testing: Quality control of the select material for backfill is the responsibility of the Contractor as specified in 106.1.

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

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

212.2.2-Acceptance Testing: Quality control sampling and testing performed by the Contractor shall be used by the Division for acceptance

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212.2.3-Sampling and Testing: Frequency of sampling and testing shall be in accordance with the Contractor’s quality control plan. The minimum sampling and testing frequencies for gradation shall be as indicated in Attachment 1 of MP 307.00.50. The material shall be sampled in accordance with MP 700.00.06. The minimum sampling and testing frequency for compaction will be in accordance with MP 700.00.24.

212.2.4-Acceptance Procedure: Material conforming to the specification requirements will be accepted at full contract price. Material failing to comply with the quality requirements of Table 704.6.2B shall not be incorporated into the work.

Acceptance of the material for compaction and for gradation shall be in accordance with 212.2.4.

212.2.4-Acceptance Plan:

212.2.4.1-Compaction: Compaction of random material and select backfill material shall meet 212.10.

212.2.4.2-Gradation: Acceptance for gradation shall be on the basis of test results on consecutive random samples from a lot. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. Generally at the beginning of the project, the average shall be started on the second sample in accordance with MP 300.00.51. A subplot is the quantity of material represented by a single gradation test. In the case where only one sample is taken, this subplot shall be considered the lot. When the average, or when the most recent three consecutive individual test values fall outside the limits specified in 212.2, the lot of material represented will be considered nonconforming to the extent that the last of its sublots is nonconforming. When this occurs, the last subplot shall have its price adjusted in accordance with Table 212.12.1. In the case where the average is nonconforming and the last subplot contained is conforming, then there would be no price adjustment. In no event, however, shall a subplot of material have its price adjusted more than once, and the first adjustment, which is determined, shall apply.

212.2.4.2-Degree of Nonconformance: When a subplot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming, and this value shall be multiplied by its appropriate multiplication factor as set forth in Table 212.2.4.2 to determine the degree of nonconformance of that sieve.

TABLE 212.2.4.2

Nonconforming Sieve Size	Multiplication Factor
2 in. (50 mm)	1.0
No. 16	1.0

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

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When the total degree of nonconformance has been established and it is 12.0 or less, the material will be paid for at an adjusted contract price as specified in Table 212.12.1.

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

207.12-BASIS OF PAYMENT:

ADD THE FOLLOWING TO THE SECTION:

212.12.1-Price Adjustment: Select material for backfill not conforming with the gradation requirements as described in 212.2.4.2 will be paid for at the adjusted contract price base on the degree of nonconformance as specified in Table 212.12.1.

TABLE 212.12.1

ADJUSTMENT OF CONTRACT PRICE FOR GRADATION NOT WITHIN SPECIFICATIONS	
Degree of Nonconformance	Percent of Contract Price to be Reduced
1.0 to 3.0	2
3.1 to 5.0	4
5.1 to 8.0	7
8.1 to 12.0	11
Greater than 12	*

* The Division will make a special evaluation of the material and determine the appropriate action.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 218

SLOPE AND FOUNDATION PROTECTION

218.2-MATERIALS:

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

Materials shall meet the requirements specified in the following Sub-sections of Division 700:

MATERIALS	SUBSECTION
Cement for Grout	701.1 or 701.3
Sand for Grout	702.1.1 through 702.1.5 and 702.6, or 702.2
Stone for Riprap	704.2
Stone for Gabions	704.3
Gabions	715.23
Reinforcement	709.3, 709.4
Shot Rock	704.8
Engineering Fabric for Erosion Control	715.11

The stone for crushed rock slope protection shall meet the requirements of 704.6, Class 7, except 704.6.3. Acceptance for Gradation of Class 7 aggregate shall be by visual inspection. ~~will be on the basis of the producers written certification the material meets the requirements. The certification for Class 7 material shall include a description of the crushing operation indicating the screens used.~~ An alternate to this gradation shall be AASHTO size No. 1. Certified test data from the producer showing the AASHTO No. 1 material meets the gradation requirements of 703.4, when tested from samples obtained at a minimum frequency of one sample per half day of stockpiling, and does not exceed a weighted loss of 30 percent when subjected to five cycles of the Sodium Sulfate Soundness Test, ASTM C 88, will be acceptable.

Stone for foundation protection shall conform to the requirements of riprap stone, except for size and shape.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

STANDARD SPECIFICATION

FOR

SECTION 307

CRUSHED AGGREGATE BASE COURSE

307.1-DESCRIPTION:

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

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

307.2-MATERIALS:

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

The crushed aggregate base course shall be composed of materials meeting the requirements of 704.6 for the class shown on the Plans except that 704.6.3 shall not apply.

307.2.1-Quality Control Testing: Quality control of the crushed aggregate base course is the responsibility of the Contractor as specified in 106.1.

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

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

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

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

307.2.4-Acceptance Procedure: Material conforming to the specification requirements will be accepted at full contract price. Material failing to comply with the quality requirements of Table 704.6.2B shall not be incorporated into the work.

Acceptance of crushed aggregate base course for compaction and for gradation shall be in accordance with appropriate portions of 307.2.4.1.

307.2.4.1-Acceptance Plan:

307.2.4.1.1-For Compaction: Acceptance for compaction shall be on a lot by lot basis. A lot shall consist of a single layer of not more than 2,000 linear ft. (600 meters) per width being placed. A lot shall be divided into five approximately equal sized sublots. One nuclear moisture and density measurement in accordance with applicable portions of 717 shall be made at a random location within each of the five sublots. The random locations shall be determined in accordance with MP 712.21.26. If the result of five density tests on a lot indicates that at least 80 percent of the material, in accordance with 106.3.1 (West Virginia AP-A), has been compacted to the specified target percentage of dry density, the lot will be accepted. If less than 80 percent has been compacted to the specified target percentage of dry density, no additional material shall be placed on that layer until it has been reworked to meet the specified requirements. Reworking and retesting shall be at the expense of the Contractor. When the Division performs the testing in the evaluation of reworked lots, the testing will be at the expense of the Contractor at the unit cost specified in 109.2.2.

Compaction of shoulder aggregate on resurfacing projects adjacent to asphalt or concrete pavement shall be based on visual inspection to assure that the surface of the shoulder has been compacted to the level of the finished pavement surface.

Compaction of Class 7 aggregate shall be based on visual inspection to assure that the aggregate particles are arranged in a stable manner.

307.2.4.1.2-For Gradation: Acceptance for gradation shall be on the basis of test results on consecutive random samples from a lot. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. Generally at the beginning of the project, the average shall be started on the second sample in accordance with MP 300.00.51. A subplot is the quantity of material represented by a single gradation test. In the case where only one sample is taken, this subplot shall be considered the lot. The material shall be sampled and tested in accordance with 307.2.3. The gradation test results shall be plotted on a control chart in accordance with MP

300.00.51. When the average, or when the most recent three consecutive individual test values fall outside the limits of Table 704.6.2A the lot of material represented will be considered nonconforming to the extent that the last of its sublots is nonconforming. When this occurs, the last subplot shall have its price adjusted in accordance with Table 307.9.1. In the case where the average is nonconforming and the last subplot contained is conforming, then there would be no price adjustment. In no event shall a subplot of material have its price adjusted more than once, the first adjustment shall apply.

Acceptance for Gradation of Class 7 aggregate shall be by visual inspection.

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

TABLE 307.2.4.2

NONCONFORMING SIEVE SIZE	MULTIPLICATION FACTOR
2 in. (50 mm)	1.0
1 ½ in. (37.5 mm)	1.0
¾ in. (19 mm)	1.0
No. 4 (4.75 mm)	1.0
No. 40 (425 µm)	1.5
No. 100 (150 µm)	2.0
No. 200 (75 µm)	2.5

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

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

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

307.2.5 – Recycled Asphalt Pavement (RAP): Recycled Asphalt Pavement (RAP) may be substituted for Class 10 Shoulder Stone material on roadways where edge line pavement markings exist or are installed. Materials testing will be waived, however the Top Size gradation shall not exceed 1 ½ inches (37 mm) or the maximum shoulder placement thickness as defined on the Plans (whichever is less). Approval shall be by visual inspection by the Engineer.

Payment for RAP shoulder material substitution shall be at the same unit bid price for Shoulder Stone Material in the Contract documents.

CONSTRUCTION METHODS

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 604

PIPE CULVERTS

604.2-MATERIALS:

ADD THE FOLLOWING TO THE TABLE:

MATERIAL	SUBSECTION
Crushed Aggregate Backfill	704.6 Class 1 or Class 2

604.2.1-QUALITY CONTROL TESTING:

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

604.2.1-Quality Control Testing: Quality control of the granular material and crushed aggregate backfill is the responsibility of the Contractor as specified in 106.1.

A revised unit price for calculation purposes in 307.9.1 will be established based on the unit bid cost minus the cost of the pipe.

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

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

604.2.2-Acceptance Testing: Quality control sampling and testing performed by the Contractor shall be used by the Division for Acceptance.

604.2.3-Sampling and Testing: Frequency of sampling and testing shall be in accordance with the contractor's quality control plan. The minimum sampling and testing

frequencies for gradation shall be as indicated in Attachment 1 of MP 307.00.50. The material shall be sampled in accordance with MP 700.00.06. The minimum sampling and testing frequency for compaction will be in accordance with MP 717.04.21.

604.2.4-Acceptance Plan:

604.2.4.1-Compaction: Compaction of backfill material shall meet 604.8.

604.2.4.2-Gradation: Acceptance for gradation shall be on the basis of test results on consecutive random samples from a lot. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. Generally at the beginning of the project, the average shall be started on the second sample in accordance with MP 300.00.51. A subplot is the quantity of material represented by a single gradation test. In the case where only one sample is taken, this subplot shall be considered the lot. When the average, or when the most recent three consecutive individual test values fall outside the limits specified in Table 704.6.2A, the lot of material represented will be considered nonconforming to the extent that the last of its sublots is nonconforming. When this occurs, the last subplot shall have its price adjusted in accordance with Table 604.13.1. In the case where the average is nonconforming and the last subplot contained is conforming, then there would be no price adjustment. In no event, however, shall a subplot of material have its price adjusted more than once, and the first adjustment, which is determined, shall apply.

604.2.4.3-Degree of Nonconformance: When a subplot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming, and this value shall be multiplied by its appropriate multiplication factor as set forth in Table 604.2.4.3

Nonconforming Sieve Size	Multiplication Factor
1 ½ in. (37.5 mm)	1.0
¾ in. (19 mm)	1.0
No. 4 (4.75 mm)	1.0
No. 40 (425 µm)	1.0
No. 200 (75µm)	1.0

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

When the total degree of nonconformance has been established and it is 12.0 or less, the material will be for at an adjusted contract price as specified in Table 604.13.1.

When the degree of nonconformance is greater than 12.0, the nonconforming subplot shall be resolved on an individual basis, requiring a special investigation by the Engineer to determine the appropriate course of action to be followed.

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604.13-BASIS OF PAYMENT:

ADD THE FOLLOWING SUBSECTION:

604.13.1-Price Adjustment: Crushed aggregate backfill not conforming with the gradation requirements as described in 604.2.4.2 will be paid for at the adjusted contract price base on the degree of nonconformance as specified in Table 604.13.1.

TABLE 604.13.1	
Adjustment of Contract Price for Gradation not Within Specifications	
Degree of Nonconformance	Percent of Contract Price to be Reduced
1.0 to 3.0	2
3.1 to 5.0	4
5.1 to 8.0	7
8.1 to 12.0	11
Greater than 12	*

*The Division will make a special evaluation of the material and determine the appropriate action.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 609

SIDEWALKS

609.2-MATERIALS:

ADD THE FOLLOWING TO TABLE:

MATERIAL	SUBSECTION
Bed Course Material	704.6-Class 1 or Class 2

609.2-MATERIALS:

ADD THE FOLLOWING SENTENCE TO THE END OF SECTION 609.2:

Concrete shall meet the requirements of 601, Class B, or 501.

609.2.2-Bed Course Material:

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

609.2.2-Quality Control Testing: Quality control of bed course material is the responsibility of the Contractor as specified in 106.1.

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

The Contractor shall design a quality control plan detailing the methods by which the quality control program will be conducted. This plan, prepared in accordance with the guidelines set forth in the appropriate portions of MP 307.00.50, shall be submitted to the

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Engineer at the preconstruction conference. The work shall not begin until the plan is reviewed for conformance with the contract documents.

609.2.3-Approved Products Listing:

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

609.2.3-Acceptance Testing: Quality control sampling and testing performed by the Contractor shall be used by the Division for Acceptance.

ADD THE FOLLOWING SUBSECTIONS TO SECTION 609.2:

609.2.4-Sampling and Testing: Frequency of sampling and testing shall be in accordance with the contractor's quality control plan. The minimum sampling and testing frequencies for gradation shall be as indicated in Attachment 1 of MP 307.00.50. The material shall be sampled in accordance with MP 700.00.06.

609.2.5-Acceptance Plan:

609.2.5.1-Gradation: Acceptance for gradation shall be on the basis of test results on consecutive random samples from a lot. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. Generally at the beginning of the project, the average shall be started on the second sample in accordance with MP 300.00.51. A subplot is the quantity of material represented by a single gradation test. In the case where only one sample is taken, this subplot shall be considered the lot. When the average, or when the most recent three consecutive individual test values fall outside the limits specified in Table 704.6.2A, the lot of material represented will be considered nonconforming to the extent that the last of its sublots is nonconforming. When this occurs, the last subplot shall have its price adjusted in accordance with Table 609.2.4.2. In the case where the average is nonconforming and the last subplot contained is conforming, then there would be no price adjustment. In no event, however, shall a subplot of material have its price adjusted more than once, and the first adjustment, which is determined, shall apply.

609.2.5.2-Degree of Nonconformance: When a subplot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming, and this value shall be multiplied by its appropriate multiplication factor as set forth in Table 609.2.5.2.

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Table 609.2.5.2

Nonconforming Sieve Size	Multiplication Factor
1½ in. (37.5 mm)	1.0
¾ in. (19 mm)	1.0
No. 4 (4.75 mm)	1.0
No. 40 (425 µm)	1.0
No. 200 (75µm)	1.0

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

When the total degree of nonconformance has been established and it is 12.0 or less, the material will be paid for at an adjusted contract price as specified in Table 609.10.1.

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

609.10-BASIS OF PAYMENT:

ADD THE FOLLOWING SUBSECTION TO THE SECTION:

609.10.1-Price Adjustment: Bed course material not conforming with the gradation requirements as described in 609.2.5.1 will be paid for at the adjusted contract price based on the degree of nonconformance as specified in Table 609.10.1.

Table 609.10.1
Adjustment Of Contract Price For Gradation Not
Within Specifications

Degree of Nonconformance	Percent of Contract Price to be Reduced
1.0 to 3.0	2
3.1 to 5.0	4
5.1 to 8.0	7
8.1 to 12.0	11
Greater than 12	*

* The Division will make a special evaluation of the material and determine the appropriate action.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 626

RETAINING WALL SYSTEMS

626.5.3-Select Granular Backfill:

626.5.3.2-Quality Control Testing:

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

626.5.3.2-Quality Control Testing: Quality control of the select granular backfill material for backfill is the responsibility of the Contractor as specified in 106.1.

626.5.3.3-Sampling and Testing

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

626.5.3.3-Sampling and Testing: Frequency of sampling and testing shall be in accordance with the contractor's quality control plan. The minimum sampling and testing frequencies for gradation and plastic limits shall be as indicated in Attachment 1 of MP 307.00.50. The material shall be sampled in accordance with MP 700.00.06. The minimum sampling and testing frequency for compaction will be in accordance with MP 717.04.21 Material failing gradation requirements during placement shall be evaluated immediately and may be subject to retesting to verify the angle of internal friction at the expense of the contractor.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 703

COARSE AGGREGATE

703.1-CRUSHED STONE:

INSERT THE FOLLOWING SUBSECTION

703.1.5-LIMESTONE ANTI-SKID AGGREGATES

703.1.5.1 LIMESTONE-Limestone: When evaluated for anti-skid material shall be representative of the individual bench from which the stockpile is produced. Once the stockpile is produced, every 10,000 tons the producer shall contact the district for sampling. Limestone for anti-skid material shall meet the applicable requirements for coarse aggregate in the Standard Specifications with the addition of MP 703.00.29 Skid Aggregate as Determined by Insoluble Residue in Carbonate Aggregates. The requirement of a minimum of 10% +200 (75 μ m) silica.

703.1.5.2-DOLOMITE LIMESTONE-Dolomitic Limestone, (Dolomite): When evaluated for anti-skid material shall be representative of the individual bench of from which the stockpile is produced. Once the stockpile is produced, every 10,000 tons the producer shall contact the district for sampling. Dolomitic Limestone, (Dolomite) for anti-skid material shall meet the applicable requirements for coarse aggregate in the Standard Specifications with the addition that ASTM C1271 and ASTM C1301 shall be performed in order to determine the elemental magnesium content. Dolomite shall contain a minimum of 10% elemental magnesium.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 716

EMBANKMENT AND SUBGRADE MATERIAL

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716.1.1.2-Granular Material:

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

716.1.1.2-Granular Material: Granular material shall be considered as natural or synthetic mineral aggregate, such as broken or crushed rock, gravel, sand, or slag. Shale or fly ash shall not be considered granular material. Granular material shall have not more than 25 percent by weight of grains or particles passing the No. 200 (75 μ m) sieve (determined by AASHTO T-27) and the plasticity index shall not be more than 6 (determined by AASHTO T-90).

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 650

MOWING

ADD THE FOLLOWING SECTION:

650.1 – MOWING:

Mowing is an important aspect of roadside management; proper mowing creates a safe and appealing roadside for the motorist.

The personnel and equipment typically used to maintain the facilities landscaping will be reassigned during the construction project. The Contractor will be responsible for the mowing and maintaining of the grass on this project. The areas and limits of mowing have been previously established and are distinguishable at the facility, or as directed by the Engineer.

650.1.1 – Frequency of Mowing: The Contractor shall mow grass to a height of 3 inches (minimum) to 4 inches (maximum), when vegetation reaches a maximum height of 8 inches.

650.1.2 – Weather Conditions: The grass shall not be cut when weather conditions are such that it is not reasonable to expect the entire job will be completed within two consecutive days. No cutting shall be done when the ground is soft and ruts will be left by the mowing equipment.

650.1.3 – Equipment: The Contractor shall use only properly equipped tractors and mowing equipment. The cutting blades on all mowers must be sharp and in proper operating condition to prevent damage to the turf.

650.2 – PAY ITEM:

No direct payment will be made for this work, but shall be included under 672002-001, Construct Building, Rest Area.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 685

BRIDGE CLEANING

ADD THE FOLLOWING:

685.1 DESCRIPTION:

The cleaning work shall consist of three phases of cleaning. Phase-One will be a pre-wash cleaning, followed by two-phase water cleaning. All pre-wash cleaning shall be performed prior to any water cleaning and all water cleaning shall be performed prior to abrasive blast cleaning and/or painting operations. Phase one shall consist of cleaning specified areas by dry methods. Phase-Two shall consist of plain water cleaning of the specified areas. Phase-Three shall consist of a cleaning solution wash of the specified areas. With approval of the Engineer, the Contractor may break this work up into sections or bays.

685.1.1-Phase One: This phase will consist of cleaning by dry methods all loose dirt and debris from the abutment seats, pier caps, diaphragms, flanges, bridge deck, curbs, parapets, and expansion joints prior to any washing operations. Collection may include the use of brooms, brushes, shovels, wheelbarrows, buckets, vacuums, or other suitable means.

685.1.2-Phase Two: This phase will consist of washing completely with low pressure plain water, the entire bridge deck, curbs, parapets, sidewalks and expansion joints. All drains shall be thoroughly flushed and shall be free flowing. All debris and trash shall be removed from the drains. At the nozzle end, the washing equipment shall have a minimum pressure of 3000 PSI and a maximum pressure of 4500 PSI.

685.1.3-Phase Three: This phase will consist of washing all structural steel and selected concrete areas, and any other areas as noted in the plans, with a mixture of low pressure water and a solution of a commercial brand of soluble salt remover. All structural steel members, railings, drain pipes; bearings and other miscellaneous steel items that have previously been painted shall be washed. Selected concrete areas are to include concrete abutment seats and pier caps. The contractor is to place special emphasis on the top surface of all flanges, connection plates, bearings, and excessively rusty or pitted areas. Any areas of the structure that exhibit mineral deposits of black iron oxide called "black rust" after

final abrasive blasting are still contaminated with chlorides and will need additional abrasive blasting followed by another washing with the soluble salt remover solution.

685.2-METHODS:

This pressure washing shall be accomplished with a low pressure washer at a minimum pressure of 3000 PSI and a maximum pressure of 4500 PSI, at the nozzle end with the nozzle 4" to 8" from the surface. The low pressure water medium will serve two purposes: (1) As a vehicle or carrier for the Soluble Salt Remover; and, (2) Remove all surface abnormalities such as rust scale, peeling paint, or blistered paint that would prevent the soluble salt remover from coming into contact with the salt contamination. Typically, low pressure water washing is not capable of removing intact coating material. The nozzle type shall be a rotary nozzle. The contractor shall follow the Manufacturer's recommendations or specifications for method and rate of application of the Soluble Salt Remover.

685.3-TESTING OF STRUCTURAL STEEL:

The maximum level of chloride contamination shall be 5 micrograms/cm². Testing method shall be in accordance with The Society for Protective Coatings (SSPC) Technology Guide 15 Section 5.2.5, Latex Sleeve Methodology. In the first 150 sq ft of cleaning the contractor is to determine by sufficient testing of the most deteriorated areas (after rust has been removed), the rate of application, nozzle pressure, nozzle distance from surface, and dilution ratio of mixture to achieve the desired level of cleanliness. Thereafter, the contractor is to perform test in areas designated by the Engineer to insure that the entire structure has attained the specified level of cleanliness. The Engineer is to verify the degree of cleanliness. The Engineer's decision shall be final.

685.3.-The Soluble Salt Remover: The soluble salt remover shall be chosen from West Virginia Division of Highways Approved Source List. The Soluble Salt Remover shall meet or exceed the following specifications:

Material shall contain zero VOC's.

Material shall have a minimum shelf life of 24 months.

Material shall be suitable for hand washing spot areas, and for application by pressure washing at any pressure.

Material shall be biodegradable.

Material shall leave no chemical residue or surface film.

Material shall have PH 3.3 ±0.5

685.4-GENERAL CONTRACTOR RESPONSIBILITY:

The Contractor's washing sequence and plans shall not allow the possibility of recontamination of the steel structure before blast cleaning and/or painting operations are completed. No cleaning shall be performed when temperatures are such that freezing could occur or that it is anticipated that temperatures could drop to freezing while the structure is wet. Equipment, methods and materials shall meet the approval of the Engineer. Water shall be from an approved source of drinking water.

All wash water shall be filtered with a 200 openings per square inch or finer mesh material to catch particles of paint and debris. When washing over the railroad, roadways, navigational waterway, parking lots etc., all wash water shall be channeled outside the travel way by

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impermeable tarpaulins so as not to allow wash water to fall on vehicles or within railroad right of way.

Wash water does not need to be contained after filtering and channeling outside the travel way. During all cleaning operations the contractor shall protect the public (vehicular, railroad, marine, pedestrian, residence etc.) from fugitive materials by the use of tarpaulins or other suitable means.

Paint chips, dirt and debris, as well as dirt and debris containing paint chips, shall be treated and disposed of as hazardous waste unless Toxicity Characteristic Leaching Procedure (TCLP) analysis for the eight Resource Conservation and Recovery Act (RCRA) metals confirm material is non-hazardous. Non-hazardous waste material shall be disposed of in accordance with local state and federal regulations. A copy of the land fill disposal receipt shall be given to the Engineer.

Dirt and debris from Phase Two as well as dirt & debris from the bridge deck, curbs and expansion joints in Phase One shall be handled and stored separately from other waste materials. Testing and disposal shall be in accordance with the above paragraph.

685.5-BASIS OF PAYMENT:

Payment for the above described work, including all material, equipment, labor and any other incidental work necessary to complete this item, will be considered completely covered by the contract unit price for the item below.

685.6-PAY ITEM:

ITEM	DESCRIPTION	UNIT
685001-001	BRIDGE CLEANING	LS