2016 ROAD AND BRIDGE SPECIFICATIONS

DIVISION II—MATERIALS

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GUIDELINES – Use with asphalt plant mix in Bristol, Salem, and Staunton districts. {2007-c211hg0}

cn211-000100-00 **POLISHING AGGREGATE IN ASPHALT CONCRETE** - **Section 211—Asphalt Concrete** of the Specifications is amended as follows:

Section 211.02—Materials is amended by replacing (e) with the following:

Fine or coarse aggregate that tend to polish under traffic will not be permitted in any final surface exposed to traffic except as permitted within the limits of Section 211.04(a) and (b) of the Specifications and as designated by the Engineer or as permitted elsewhere in these Specifications.

Section 211.04—Asphalt Concrete Mixtures is amended by replacing (a) and (b) with the following:

Asphalt concrete mixtures shall conform to Table II-14 and the following:

(a) **Types SM-9.0A, SM-9.0D, SM-9.0E, SM-9.5A, SM-9.5D and SM-9.5E asphalt concrete** shall consist of crushed stone, crushed slag, or crushed gravel and fine aggregate, slag or stone screenings or a combination thereof combined with asphalt cement.

NOTE: For all surface mixes, except where otherwise noted, no more than 5 percent of all aggregate retained on the No. 4 sieve and no more than 20 percent of the total aggregate may be polish susceptible. At the discretion of the Engineer, a SM-9.5AL may be specified and polish susceptible aggregates may be used (without percentage limits).

(b) **Types SM-12.5A, SM-12.5D, SM-12.5E, IM-19.0A, IM-19.0D, and IM-19.0E asphalt concrete** shall consist of crushed stone, crushed slag, or crushed gravel and fine aggregate, slag or stone screenings or a combination thereof combined with asphalt cement.

NOTE: At the discretion of the Engineer, an intermediate mix may be designated as either a SM-19.0A or SM-19.0D. For SM-12.5 and SM-19.0 surface mixes, no more than 5 percent of the aggregate retained on the No. 4 sieve may be polish susceptible. All material passing the No. 4 sieve may be polish susceptible. No more than 35 percent of the total aggregate composition (polish and non-polish susceptible) shall be passing the No. 8 sieve. At the discretion of the Engineer, a SM-12.5AL may be specified and polish susceptible aggregates may be used (without percentage limits).

10-7-09; Reissued 7-12-16 (SPCN)

cq211-030100-00

GUIDELINES – For asphalt maintenance projects in Bristol district coal counties only when called for by the District Maintenance Engineer. {2007-cu211000a}

SM-22.5 ASPHALT CONCRETE MIXTURES (Bristol District Coal Counties Only) — When asphalt concrete mix types SM-22.5 A, D, or E are specified in the Schedules, **TABLE II-13—Asphalt Concrete Mixtures: Design Range** of the Specifications shall be amended to add the following to the table:

TABLE II-13
Asphalt Concrete Mixtures: Design Range[1]

Mix Type	Percentage by Weight Passing Square Mesh Sieves										
	2 in	1 ½ in	1 in	¾ in	½ in	3/8 in	No. 4	No. 8	No. 30	No. 50	No. 200
SM-22.5 A,D,E			95-100	Max. 90	60-84			19-38			2-8

10-21-08; Reissued 7-12-16_(SPCN)

GUIDELINES — Use when requested by the Designer.{2007-S208B00}

SP208-000100-00

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
SECTION 208—SUBBASE AND AGGREGATE BASE
Crushed Hydraulic Cement Concrete (CHCC)

July 12, 2016

SECTION 208—SUBBASE AND AGGREGATE BASE MATERIAL of the Specifications is amended as follows:

Section 208.02—Materials is replaced with the following:

(a) **Subbase material** may consist of any mixture of natural or crushed gravel, crushed stone or slag, **crushed hydraulic cement concrete (CHCC)**, and natural or crushed sand; with or without soil mortar. Subbase material may be used in a stabilized or unstabilized form.

(b) **Aggregate base material** may be designated as Type I or Type II as follows:

Type I shall consist of crushed stone, crushed slag, crushed hydraulic cement concrete (CHCC), crushed gravel or any combination of these material: with or without soil mortar or other admixtures. Crushed gravel shall consist of particles of which at least 90 percent by weight of the material retained on the No. 10 sieve shall have at least one face fractured by artificial crushing.

Type II shall consist of gravel, stone, or slag screenings; fine aggregate and crushed coarse aggregate; sand-clay-gravel mixtures; crushed hydraulic cement concrete; or any combination of these materials; with or without soil mortar or other admixtures. Aggregate base materials Type I or II may be used in a stabilized or unstabilized form.

(c) **Crushed Hydraulic Cement Concrete** shall not be used as Subbase or aggregate base material when any subsurface drainage system, such as standard underdrains (UD-4 or UD-5) and /or a stabilized open graded aggregate drainage layer (OGDL) is present, except when the CHCC is cement stabilized.

Section 208.03(b) Atterberg Limits is amended to include the following:

Plasticity: Subbase and aggregate base materials shall be either non-plastic (PI=0) or shall conform to Table II-11 of the Specifications when tested according to VTM-7. If the material is classified as non-plastic (PI=0), according to VTM-7, the Liquid Limit requirement will be waived. Exceptions to this provision are noted as follows:

1. 100% CHCC and 20% or less CHCC Blends will be tested and subject to penalty as noted in Table II-11 of the Specifications for the plasticity index, excluding Liquid Limit penalties.

2. Greater than 20% CHCC Blends will follow testing guidelines as set forth in Section 208.06 (b) for Atterburg limits.

Section 208.03 is amended to add the following:

(h) **Deleterious Material:** The quantity of deleterious materials present in stockpiles of Crushed Hydraulic Cement Concrete, to be used in blending with virgin aggregates or as 100 percent CHCC, shall not exceed the following values:

MATERIAL	PERCENT BY WEIGHT *(MASS)*
Asphalt Concrete	5.0
Glass and Metals	5.0
Wood, Plastic, Brick and other foreign matter	0.5

Section 208.04—Job-Mix Formula is replaced by the following:

(a) The Contractor shall submit, or shall have the source of supply submit, for the Engineer's approval, a job-mix formula for each mixture to be supplied for the project prior to starting work. The formula shall be within the design range specified in Table II-9 of the Specifications. If unsatisfactory results or other conditions make it necessary, the Contractor shall prepare and submit a new job-mix formula for approval.

(b) A job mix formula shall be submitted for the engineer's approval for each category of CHCC mixture used. Designated categories shall indicate the mixture percentage of CHCC used according to the following criteria:

1. **Category 1**: 100% CHCC

   Category 2: 20% or less CHCC (□ 20%)

   Category 3: greater than 20% CHCC but less than 100% CHCC (>20%<100%)

2. The quantity of CHCC in the mix shall be expressed as a percentage of the total mix.

Section 208.06—Acceptance is amended to include the following:

The following applies specifically to the use of Crushed Hydraulic Cement Concrete (CHCC) mixtures in addition to the acceptance criteria specified in this section:

1. **100% CHCC** shall conform to this special provision.

2. **20% or Less CHCC Blends** shall conform to this special provision.

3. **Greater than 20% CHCC Blends** shall conform to the following:

   a. The virgin aggregate portion of the blend will be tested for Atterberg limits, prior to CHCC blending.

   b. Price adjustments for Liquid Limit and the Plasticity Index of the virgin aggregates used in the blend with CHCC shall be according to Table II-11 of the Specifications.

   c. No additional testing for Liquid Limit or Plasticity Index will be required on the final blended product.

4. All shipments of products containing CHCC must be designated on the shipping ticket (scale ticket) by the use of the letter "R". Examples: [22R, 21AR and 21BR] for: Aggregate Base material, Type I or Subbase materials.

GUIDELINES — For use on Asphalt Schedule Work - Plant Mix projects. Include SP315-000100-01.{2007-S211HP0}

SP211-000100-01

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
SECTION 211 – ASPHALT CONCRETE

July 7, 2017

SECTION 211 – ASPHALT CONCRETE of the Specifications is amended as follows:

Section 211.03(a) – SUPERPAVE mixes is amended by inserting the following:

For SM-9.5 and SM-12.5 mixes, the minimum asphalt contents shall be based on the following unless otherwise approved by the Engineer:

Bulk Specific Gravity of the Total Aggregate	Minimum Design AC Content Mix Type (%)	
	SM-9.5	SM-12.5
Less Than 2.65	5.5	5.3
2.65 - 2.74	5.4	5.2
2.74 - 2.85	5.3	5.1
Greater Than 2.85	5.2	5.0

Section 211.09 – Adjustment System is amended to replace the third paragraph with the following:

If the total adjustment for a lot is greater than 25 points, the Contractor shall remove the failing material from the road. If the total adjustment is 25 points or less and the Contractor does not elect to remove and replace the material, the unit price for the material will be reduced 3% of the unit price bid for each adjustment point the material is outside of the process tolerance. The Engineer will apply this adjustment to the tonnage represented by the samples. If the Engineer applies adjustment points against two successive lots, the Contractor shall ensure plant adjustment is made prior to continuing production.

Section 211.09 – Adjustment System is amended to replace the last paragraph with the following:

The Engineer will reduce the unit bid price by 1.0 percent for each adjustment point applied for standard deviation.

If the standard deviation of A.C for SM, IM, and BM mixes is within the ranges of 0.0 – 0.15, and there are no adjustment points assigned for any sieve sizes as noted in Table II-16, the Engineer will increase the unit bid price for AC mixture by 5%.

GUIDELINES – Use when requested by the Designer for asphalt projects. {2007-S315AA0}

SP211-000400-00

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
COLD CENTRAL PLANT RECYCLING MATERIAL

August 7, 2015; Reissued July 12, 2016

I. DESCRIPTION

These specifications cover the requirements for Cold Central Plant Recycling Material (CCPRM). Cold Central Plant Recycling (CCPR) is a process in which recycled asphalt concrete pavement is processed and stabilized using foamed asphalt or emulsified asphalt at a plant and then placed using conventional asphalt paving equipment. **CCPRM shall not be used as a final riding surface.**

II. MATERIALS

1. **Stabilizing Agent (Emulsified or Foamed Asphalt)** – All liquid asphalts used for stabilizing agents shall be emulsions or PG binders (List Nos. 50 and 50.1) on the VDOT Materials Division's Approved List. Emulsified asphalts shall conform to Section 210 of the Specifications; liquid asphalts shall be a neat (i.e., not modified) asphalt that meets Section 211.02 of the Specifications.

2. **Water** – Any water used for mixing shall meet Section 216 of the Specifications.

3. **Crushed Reclaimed Asphalt Pavement (RAP) Material** – RAP material shall meet Section 211.02(j) 4. of the Specifications and **TABLE 1** herein.

TABLE 1
CRUSHED RAP PROPERTIES

Tests	Method	Limit
Deleterious Materials: Clay Lumps and Friable Particles in Aggregate	AASHTO T 112	0.2% maximum
Maximum Sieve Size, 1.5 inches (37mm)	AASHTO T 27	100% Passing,

4. **Aggregate** – Based on the results of the job mixture design(s) or other requirements of this provision, the Contractor shall determine if additional aggregate is required. If the Contractor determines additional aggregate is needed any additional aggregate shall meet Section 203 of the Specifications and **TABLE 2** herein, and it shall be graded to produce a product which meets the specification requirements given in **TABLE 3.** The percentage of additional aggregate used in the mixture shall not exceed 50 percent.

5. **Other Additives** – If necessary, additional additives may be used to meet the requirements in **TABLE 4**. In the case where an additional additive is used, the type and dosage must be described in the Job Mix Formula(s) submitted to the Department.

TABLE 2 AGGREGATE PROPERTIES		
Tests	**Method**	**Limit**
Los Angeles Abrasion Value	AASHTO T 96	45% maximum loss
Sand Equivalent	AASHTO T 176	45% minimum
Maximum size, 100% Passing, Sieve Size	AASHTO T 27	1.5 inches (37mm)
Water absorption	AASHTO T 85	3% maximum

III. Job-Mix Formula

A job-mix formula (JMF) for CCPRM shall be submitted to the Engineer for approval no less than 30 calendar days prior to the start of CCPRM operations. More than one JMF may be required. The gradation of each JMF shall fall within the bands shown in **TABLE 3. If gradation fails to meet the requirements, the Department at its discretion reserves the right to require appropriate measures that may include stopping the work.**

TABLE 3 CCPRM DESIGN RANGE		
	Percentage by Weight Passing Square Mesh Sieves (in)	
Sieve Size	**Lower**	**Upper**
1.5”	100	100
3/4"	--	--
3/8”	--	--
No. 4	--	--
No. 200	2	9

Values based on AASHTO T 27 using washed, pulverized materials, prior to stabilization.

For CCPRM using Foamed Asphalt, cement can be used as a portion of the material passing the No. 200 sieve.

The Contractor shall establish, as part of the JMF, a target percent passing for the 1.5”, 3/4", 3/8”, No. 4 and No. 200 sieves. The JMF(s) shall be created using either existing materials obtained directly from the project site (prior to the start of construction) or from an existing stockpile of Reclaimed Asphalt Pavement (RAP). Sampling shall be conducted at a maximum of once per 2500 lane-feet when sampled from the road. When sampling from a stockpile, material shall be taken from various locations around the stockpile and combined to produce a representative sample. Each JMF shall provide as a minimum the following mix design parameters:

1) Target field density,

2) Percent by weight of all stabilizing agent(s) to be added to the recycled mix,

3) Percent by weight of water (at room temperature) required,

4) Expansion ratio and half-life characteristics and temperature of asphalt binder at the time of dosage into foaming chamber (for mixtures using foamed asphalt), minimum curing time/set time for the emulsified asphalt and temperature of emulsified asphalt at the time of dosage into the mixture (for mixtures using emulsified asphalt), and

5) Target gradation for sieve sizes 1.5", ¾", 3/8", No. 4 and No. 200 (including any aggregate to be added).

If a change in source materials is made during construction, the Contractor shall create a new JMF(s) and submit it to the Engineer for approval prior to use. The JMF(s) shall meet the criteria of Table 4 at the approved stabilizing agent(s) content.

TABLE 4
CCPRM MIX DESIGN CRITERIA

Item	Test Method	Criteria	Fabrication / Conditioning Procedure
Emulsified Asphalt Stabilized Materials			
1	Moisture Density Relations AASHTO T 180, Method D	Determined by Design	
2	Marshall Stability Test ASTM 5581 (6 inch specimens), AASHTO T 245 (4 inch specimens)	2500 lbs minimum (6 inch (150mm) diameter specimen), or 1250 lbs (4 inch (100mm) diameter specimen)	Three (3) specimens shall be produced at 75 blows per side (or 30 gyrations per AASHTO T 312) and cured at 140ºF (60°C) to constant mass, hold specimens at 104ºF (40°C) for 2 hours in a forced draft oven immediately prior to testing.
3	Retained Stability ASTM 5581 (6 inch specimens), AASHTO T 245 (4 inch specimens)	70% of results of #2	An additional three (3) specimens shall be produced at cured at 140ºF (60°C) to constant mass. Specimens shall then be vacuum saturated to 55-65%, 77ºF (25°C) water bath for 23 hours and 104ºF (40°C) water bath for an additional hour immediately prior to testing
4	Raveling Stability (ASTM D 7196)	Maximum 2%	Specimens shall be produced using a gyratory at 20 gyrations and cured at 50ºF (10°C) for 4 hours at 50% humidity.
5	Thermal Cracking (Indirect Tensile Test, AASHTO T 322)	The critical cracking temperature must be less than or equal to the pavement temperature given for the project climate area and pavement depth by LTPPBind.	See Notes 1 through 7 below.
Foamed Asphalt Stabilized Materials			
1	Moisture Density Relations AASHTO T 180, Method D	Determined by Design	

TABLE 4
CCPRM MIX DESIGN CRITERIA

Item	Test Method	Criteria	Fabrication / Conditioning Procedure
2	Dry Indirect Tensile Strength (ITS), AASHTO T 283 Section 11	45 psi minimum	Three (3) specimens shall be produced using 75 blows per side (or 30 gyrations per AASHTO T 312) compacted at or below OMC and cured as follows: 4 inch (100 mm) diameter specimens, oven dry at 104ºF (40°C) for 72 hrs and cool to ambient temperature for 24 hrs; 6 inch (150 mm) diameter specimens, air dried for 24 hours, then an additional 48 hours at 104ºF (40ºC) in sealed plastic bag, cool to ambient temperature for 24 hrs.
3	Retained Indirect Tensile Strength, AASHTO T 283 Section 11	Minimum, 70% of the Dry ITS	An additional three (3) specimens shall be produced and cured according to Item 9, and then submerged in 77ºF (25ºC) water bath for 24 hours prior to testing.
4	Expansion Ratio. Wirtgen 2012 Cold Recycling Manual	10 times when Aggregate Temperature is 50ºF to 77ºF (10 ºC to 25 ºC) 8 times when Aggregate Temperature is greater than 77ºF (25 ºC)	
5	Half-Life – Wirtgen 2012 Cold Recycling Manual	6 second minimum	
All materials (emulsified asphalt and foamed asphalt) shall be controlled following Item 1.			
1	Materials Gradation Test (AASHTO T 27), prior to stabilization	Gradation to control field production.	

Notes:

1. Specification temperature shall be chosen using current FHWA LTPPBind software, using the weather station closest to the project. The required temperature shall be the coldest temperature at the top of the recycled layer, using 98% reliability.

2. Samples shall be compacted to 150 mm diameter and at least 115 mm height, compacted to within 1% of design air voids at the design stabilizing agent content. Compacted samples shall be cured at 140ºF (60 ºC) no less than 48 hours. Before testing, sample mass shall be checked every two (2) hours until change in mass between successive checks does not exceed 0.05%. After curing, two specimens shall be sawcut from each compacted sample to 50 mm in height. Perform bulk density testing after sawcutting.

3. Three specimens are required at each of the three (3) testing temperatures.

4. Select two testing temperatures that bracket the specification temperature above. For example, if the specification temperature is -13ºF (-25 ºC), then two of the selected testing temperatures shall be -4ºF and -22ºF (-20 ºC and -30 ºC). A temperature of 14ºF or -40ºF (-10 ºC or -40 ºC) shall be used as the third testing temperature.

TABLE 4 CCPRM MIX DESIGN CRITERIA			
Item	**Test Method**	**Criteria**	**Fabrication / Conditioning Procedure**
5. The tensile strength test shall be performed on each specimen directly after the tensile creep test (at the same temperature as the creep test). 6. The critical cracking temperature is defined as the temperature at the intersection of the thermal stress curve (derived from the creep data) and the tensile strength line (the line connecting the average tensile strengths at the three testing temperatures). 7. To meet this specification, the critical cracking temperature predicted by the Indirect Tensile Test must be less than or equal to the pavement temperature given for the project climate area and pavement depth by LTPPBind.			

IV. QUALITY CONTROL PLAN

The Contractor shall be responsible for developing and implementing a Quality Control Plan to ensure that operational techniques and activities are controlled to provide a homogeneous and finished material of acceptable quality meeting this provision. Contractor sampling and testing shall be performed to control the processes and ensure material compliance with this special provision. The Contractor shall provide the Quality Control Plan (according to this special provision) and Job Mix Formula(s) to the Department for approval no less than thirty (30) calendar days prior to the start of CCPRM operations.

For each CCPRM project, a project specific Quality Control Plan is required, and shall include the following (minimum) information:

1. A description of the Contractor's Quality Control organization, including the number of full-time equivalent employees or Sub-Contractors with specific Quality Control responsibilities, including an organizational chart showing lines of authority and reporting responsibilities.

2. A listing by discipline with the name, qualifications, duties, responsibilities and authorities for all persons proposed to be responsible for Construction Quality Control.

3. A Quality Control Sampling, Testing and Analysis Plan with methods that include a description of how random locations for testing and sampling are determined;

4. Identification and description (including any accreditation) of the laboratory(s) to be used for each type of testing. Lab shall meet Section 106.07 of the Specifications.

5. Specify documentation for Quality Control activities;

6. Procedures to meet contract requirements for corrective action when Quality Control criteria are not met.

7. Procedures to protect stabilized material from receiving excessive moisture from weather events (i.e. rain, fog, etc.) and corrective actions when criteria are not met.

8. Contingency Plan including:

(1) Inclement weather

(2) Equipment breakdowns

(3) Materials shortages

(4) Deficient density of installed CCPRM

(5) Material doesn't break or cure in timely manner

(6) Gradation is outside tolerance(s)

(7) Production modifications based on changes in ambient and/or material temperature.

V. ACCEPTANCE

1. **Gradation –** CCPRM acceptance for gradation will be based on a mean of the results of eight tests performed on pre-stabilized samples taken in a stratified random manner from each 4,000-ton lot (8,000-ton lots may be used when the normal daily production of the source from which the material is being obtained is in excess of 4,000 tons).

   A lot will be considered to be acceptable for gradation if the mean of the test results obtained is within the tolerance allowed for the job-mix formula as specified in TABLE 5. If a lot does not conform to the acceptance requirements for gradation, the Department will determine adjustment points in conformance with Section 211.09 of the Specifications. In addition, variability will be determined according to Section 211.09 of the Specifications.

2. **Stabilizing Agent Content** – The Contractor will provide with each gradation sample, a computer printout of the stabilizing agent content percentage/rate of the plant at the time of sampling. If the dosage rate is outside 0.20 percentage points, then paving/production shall stop and the Contractor shall take corrective measures to bring the dosage rate within tolerance of the approved JMF. In addition, a daily summary of the stabilizing agent content percentage/rate will be provided to the Department.

3. **Moisture Content** – Moisture content will be reported for each Asphalt Content test. After drying as noted if (a) above, the following equation shall be used:

$$\% \text{ Moisture} = \frac{\text{Original Mass} - \text{Final Mass}}{\text{Final Mass}} \times 100$$

4. **Marshall Stability –** When emulsified asphalt is used as the stabilizing agent, acceptance for Marshall Stability will be based on results of samples taken in a stratified random manner at a frequency of at least one per day or one per 1,000 tons per mix per day if more than 1,000 tons are produced daily. If the results are less than the established job-mix target, the following pay adjustment will be applied for the tonnage represented by the results:

% of Job-Mix Target Marshall Stability	% of Payment
99.0 to 100.0	100
95.0 to 98.9	95

90.0 to 94.9	90
Less than 90.0*	90% pay and Cease Production

* The Contractor shall immediately cease production and notify the Department when results fall below 90.0% of the approved job-mix target. The Contractor shall make any necessary corrective actions to the mix and provide verification to the Engineer that it conforms to the approved job-mix formula. Should the results fall below the minimum specified in Table 4, the material represented by the failing results shall be removed and replaced at no cost to the Department. With approval of the Engineer, subsequent paving operations can resume.

5. **Dry Indirect Tensile Strength -** When foamed asphalt is used as the stabilizing agent, acceptance for Dry Indirect Tensile Strength will be based on results of samples taken in a stratified random manner at a frequency of at least one per day or one per 1,000 tons per mix per day if more than 1,000 tons are produced daily. If the results are less than the established job-mix target, the following pay adjustment will be applied for the tonnage represented by the results:

% of Job-Mix Target Dry Indirect Tensile Strength	% of Payment
99.0 to 100.0	100
95.0 to 98.9	95
90.0 to 94.9	90
Less than 90.0*	90% and Cease Production

* The Contractor shall immediately cease production and notify the Department when results fall below 90.0% of the approved job-mix target. The Contractor shall make any necessary corrective actions to the mix and provide verification to the Engineer that it conforms to the approved job-mix formula. Should the results fall below the minimum specified in Table 4, the material represented by the failing results shall be removed and replaced at no cost to the Department. With approval of the Engineer, subsequent paving operations can resume.

6. **Half-Life and Expansion Ratio –** The Contractor shall verify and provide reports to the Department confirming that each load of asphalt binder used for foaming meets TABLE 4.

7. **Testing Records** – The Contractor shall prepare separate test reports meeting the requirements of AASHTO R 18. Records documenting the test results from **TABLE 4** shall be provided to the Engineer, unless specified otherwise.

TABLE 5 Process Tolerance						
Tolerance on Each Laboratory Sieve and Asphalt Content: Percent Plus and Minus						
No. Tests	**1 ½”**	**3/4"**	**3/8”**	**No. 4**	**No. 200**	

1	0.0	8.0	8.0	8.0	2.0	
2	0.0	5.7	5.7	5.7	1.4	
3	0.0	4.4	4.4	4.4	1.1	
4	0.0	4.0	4.0	4.0	1.0	
5	0.0	3.6	3.6	3.6	0.9	
6	0.0	3.3	3.3	3.3	0.8	
7	0.0	3.0	3.0	3.0	0.8	
8	0.0	2.8	2.8	2.8	0.7	
12	0.0	2.3	2.3	2.3	0.6	

VI. TESTING

The Contractor shall perform Asphalt Content testing and report the results as extractable asphalt or weight after ignition (VTM-102). In addition, a RAP correction factor shall be determined according to VTM-102. For production samples, testing shall be conducted at a rate of 1 sample per 1,000 tons and the material shall be cured to constant weight in an oven at 225° F (107° C) until the weight loss in a two hour period does not exceed 0.02% by weight (i.e., for a 5000 gram sample, the sample does not lose more than 1 gram in a two hour period). There will be no price adjustment for asphalt content.

VII. EQUIPMENT

1. **CCPRM Plant:** The plant shall be capable of homogeneously incorporating all stabilizing agent(s) and materials up to the sizes shown in **TABLE 3**. The plant shall be capable of delivering the amount of additives to within +/- 0.2% of the required amount by weight of the pulverized bituminous material, except that a capability of adding up to 5% water by weight of the pulverized bituminous material is mandatory. Automated systems shall be used to regulate the application of stabilizing agent(s) and water and shall adjust automatically to the mass of the material being processed. When using foamed asphalt, the plant shall also be outfitted with a test or inspection nozzle at one end of the spray bar that can produce a representative sample. The plant shall be capable of maintaining the temperature of the liquid asphalt at a minimum of 300°F. The plant shall be equipped with the means for the operator to verify the stabilizing agent(s) and water are being evenly distributed and that the correct dosage rates of each are being applied. The plant shall have the ability to print out stabilizing agent(s) and water quantities used during production. The equipment shall be operated according to the manufacturers' recommendations.

2. **Plant Scales:** Scales shall be approved according to Section 109.01 of the Specifications.

3. **Trucks, Truck Scales and Automatic Printer System:** Shall conform to Section 109.01 of the Specifications.

Included in the 2018_Supplement_to_the_2016_Specifications page 12

SS208-002016-01 July 7, 2016; Issued October 5, 2016

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SECTION 208—SUBBASE AND AGGREGATE BASE MATERIALS

SECTION 208—SUBBASE AND AGGREGATE BASE MATERIAL of the Specifications is amended as follows:

Section 208.06—Acceptance is amended by replacing the sixth paragraph with the following:

If the liquid limit exceeds 30 or the plasticity index exceeds 6 for Type I base material or No. 19 subbase material; or the plasticity index exceeds 9 for Type II base material or subbase materials No. 20, 21, 21A, 21B, or 22 on any individual sample; that portion of the lot from which the sample was taken will be considered a separate part of the lot and the Contractor shall remove that portion from the roadway.

Included in the 2018_Supplement_to_the_2016_Specifications page 12

SS210-002016-02 July 7, 2017

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 210 – ASPHALT MATERIALS

SECTION 210 – ASPHALT MATERIALS of the Specifications is amended as follows:

Section 210.02(g) – **Polymer Modified Cationic Emulsified Asphalt** is replaced with the following:

Polymer Modified Cationic Emulsified Asphalt shall conform to AASHTO M316 except for the Penetration requirement at 77 ºF which shall be a minimum 70 and maximum 140. The softening point shall have a minimum value of 100ºF.

Section 210.07(c)1b – CSS-1h is renamed **CQS-1h** and is replaced with the following:

CQS-1h (Quick Set) shall be tested the same as Cationic Emulsions, with the addition of "Quick set Emulsified Asphalt Setting Time (VTM-89)."

Section 210.07(c)1c(2) – CRS-2 Latex is replaced with the following:

CRS-2 Latex

(a) Tests on Emulsions

- Saybolt Furol Viscosity
- Sieve Test (if necessary)
- Particle Charge Test
- Residue by Evaporation

(b) Tests on residue by Evaporation

- Penetration
- Ring and Ball Softening Point
- Elastic Recovery
- Ductility, 25ºC, 5 cm/min

Section 210.07(d) – Non-Tracking Tack is replaced with the following:

Non-Tracking Tack:

Certified Test Reports for Non-Tracking Tack shall be based upon the results of tests performed, as specified below:

1. Tests on Non-Tracking Tack:
    - Residue by Distillation
2. Tests on residue by distillation:
    - Ring and Ball Softening Point
    - Penetration

Included in the 2018_Supplement_to_the_2016_Specifications page 13

SS211-002016-02 August 3, 2017

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 211—ASPHALT CONCRETE

SECTION 211—ASPHALT CONCRETE of the Specifications is amended as follows:

Section 211.01—Description is replaced with the following:

Asphalt concrete shall consist of a combination of mineral aggregate and asphalt material mixed mechanically in a plant specifically designed for such purpose.

An equivalent single-axle load (ESAL) will be established by the Engineer, and SUPERPAVE mix types may be specified as one of the types listed as follows:

Mix Type	Equivalent Single-Axle Load (ESAL) Range (millions)	Minimum Asphalt Performance Grade (PG)[1]	Aggregate Nominal Maximum Size[2]
SM-9.0A	0 to 3	64S-16	3/8 in
SM-9.0D	3 to 10	64H-16	3/8 in
SM-9.0E	Above 10	64E-22	3/8 in
SM-9.5A	0 to 3	64S-16	3/8 in
SM-9.5D	3 to 10	64H-16	3/8 in
SM-9.5E	Above 10	64E-22	3/8 in
SM-12.5A	0 to 3	64S-16	1/2 in
SM-12.5D	3 to 10	64H-16	1/2 in
SM-12.5E	Above 10	64E-22	1/2 in
IM-19.0A	Less than 10	64S-16	3/4 in
IM-19.0D	10 to 20	64H-16	3/4 in
IM-19.0E	20 and above	64E-22	3/4 in
BM-25.0A	All ranges	64S-16	1 in
BM-25.0D	Above 10	64H-16	1 in

[1]**Minimum Asphalt Performance Grade (PG)** is defined as the minimum binder performance grade for the job mixes as determined by AASHTO T170 or AASHTO M332.
[2]**Aggregate Nominal Maximum Size** is defined as one sieve size larger than the first sieve to retain more than 10 percent aggregate.
Note: SM = Surface Mixture; IM = Intermediate Mixture; BM = Base Mixture

Asphalt concrete shall conform to the requirements for the mix type designated on the plans or elsewhere in the Contract for use.

At the Contractor's option, an approved Warm Mix Asphalt (WMA) additive or process may be used to produce the asphalt concrete (AC) mix type designated.

Table II-13 – Asphalt Concrete Mixtures: Design Range is replaced with the following:

TABLE II-13
Asphalt Concrete Mixtures: Design Range

	Percentage by Weight Passing Square Mesh Sieves										
Mix Type	**2 in**	**1 1/2 in**	**1 in**	**¾ in**	**½ in**	**3/8 in**	**No. 4**	**No. 8**	**No. 30**	**No. 50**	**No. 200**
SM-9.0 A,D,E					100[1]	90-100	90 max.	47-67			2-10
SM-9.5 A,D,E					100[1]	90-100	58-80	38-67	23 max		2-10
SM-12.5 A,D,E				100	95-100	90 max.	58-80	34-50	23 max		2-10
IM-19.0 A,D,E			100	90-100	90 max.	--	--	28-49			2-8
BM-25.0 A,D		100	90-100	90 max.	--	--	--	19-38			1-7
C (Curb Mix)					100	92-100	70-75	50-60	28-36	15-20	7-9

[1]A production tolerance of 1% will be applied to this sieve regardless of the number of tests in the lot.

Table II-14 – Mix Design Criteria is replaced with the following:

TABLE II-14
Mix Design Criteria

Mix Type	**VTM (%) Production**	**VFA (%) Design**	**VFA (%) Production**	**Min. VMA (%)**	**Fines/Asphalt Ratio**	**No. of Gyrations N Design**
SM-9.0A [1,2]	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.0D [1,2]	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.0E [1,2]	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.5A [1,2]	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-9.5D [1,2]	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-9.5E [1,2]	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-12.5A [1,2]	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
SM-12.5D [1,2]	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
SM-12.5E [1,2]	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
IM-19.0A [1,2]	2.0-5.0	69-76	64-81	13.0	0.6-1.2	65
IM-19.0D [1,2]	2.0-5.0	69-76	64-81	13.0	0.6-1.2	65
IM-19.0E [1,2]	2.0-5.0	69-76	64-81	13.0	0.6-1.2	65
BM-25.0A [2,3]	1.0-4.0	67-87	67-92	12.0	0.6-1.3	65
BM-25.0D [2,3]	1.0-4.0	67-87	67-92	12.0	0.6-1.3	65

[1]Asphalt content should be selected at 4.0% air voids for A & D mixes, 3.5% air voids for E mix.
[2]Fines-asphalt ratio is based on effective asphalt content.
[3]Base mix shall be designed at 2.5% air voids. BM-25A shall have a minimum asphalt content of 4.4% unless otherwise approved by the Engineer. BM-25D shall have a minimum asphalt content of 4.6% unless otherwise approved by the Engineer.

Section 211.04(e)4 – Type E(HP) asphalt mixtures is inserted as follows:

Type E(HP) asphalt mixtures shall consist of mixes incorporating a neat asphalt material with a high polymer modification (approximately 7.5%) complying with AASHTO M332 for PG 76E-28(HP) with the exception that Multiple Stress Creep and Recovery (MSCR) shall have a $J_{nr3.2}$ maximum value of 0.1 kPa^{-1} when tested according to AASHTO T350. The minimum MSCR %

recovery at 3.2 kPa shall be 90%. The MSCR test for J_{nr} and % recovery shall be run at 76°C. The viscosity shall be less than or equal to 3.0 Pa-s, however the Engineer may increase this limit to 5.0 Pa-s if the binder supplier and contractor agree that the binder is suitably workable. HP designated mixtures shall not contain more than 15% RAP material.

Section 211.05 – Testing is amended by deleting the eighth and ninth paragraphs.

Included in the 2018_Supplement_to_the_2016_Specifications page 16

SS212-002016-01 May 13, 2016; Issued July 12, 2016

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SECTION 212—JOINT MATERIALS

SECTION 212—JOINT MATERIALS of the Specifications is amended as follows:

Section 212.02(h) **Gaskets for pipe** is replaced with the following:

Gaskets for pipe and box culvert sections shall conform to the following: Rubber gaskets for ductile iron pipe and fittings shall conform to AWWA C111. Rubber gaskets for concrete and metal pipe shall conform to ASTM C443. Rubber gaskets for plastic pipe shall conform to ASTM F 477. Flexible cellular sponge or expanded rubber gaskets for metal pipe shall conform to ASTM D1056. Gaskets for box culvert sections shall conform to ASTM C1677. All gaskets shall conform to the ozone cracking resistance described in Section 237.02 of the Specifications.

Included in the 2018_Supplement_to_the_2016_Specifications page 16

SS223-002016-02 August 23, 2017

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SECTION 223—STEEL REINFORCEMENT

SECTION 223—STEEL REINFORCEMENT of the Specifications is amended as follows:

Section 223.02(e) **Corrosion Resistant Reinforcing Steel, Class I** is replaced with the following:

Corrosion Resistant Reinforcing Steel, Class I shall conform to AASHTO M 334M/M 334-17 Type 1035 CS with a minimum chromium content of 9.2% or UNS (Unified Numbering System for Metals and Alloys) Designation: S24100.

Section 223.02(f) **Corrosion Resistant Reinforcing Steel, Class II** is replaced with the following:

Corrosion Resistant Reinforcing Steel, Class II shall conform to AASHTO M 334M/M 334-17. UNS Designation: S32101.

Section 223.02(g) **Corrosion Resistant Reinforcing Steel, Class III** is replaced with the following:

Corrosion Resistant Reinforcing Steel, Class III shall conform to AASHTOM 334M/M 334-17 . UNS Designations: S24000, S30400, S31603, S31653, S31803, and S32304.

Included in the 2018_Supplement_to_the_2016_Specifications page 16

SS232-002016-02 May 22, 2017

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SECTION 232—PIPE AND PIPE ARCHES

SECTION 232—PIPE AND PIPE ARCHES of the Specifications is amended as follows:

Section 232.02(c)1 – **Corrugated steel culvert pipe and pipe arches** is replaced with the following:

Corrugated steel culvert pipe and pipe arches shall conform to AASHTO M36 except that helically formed pipe shall be tested in accordance with AASHTO T249 at the rate of one test per week per corrugation machine per work shift. The Contractor shall maintain records of such test for a period of 24 months. Pipe shall be fabricated from materials conforming to AASHTO M218 for galvanized pipe, AASHTO M274 for aluminum coated pipe, AASHTO M246 for polymer coated pipe and AASHTO M289 for aluminum zinc alloy coated pipe. Steel spiral rib pipe shall be of smooth wall spiral rib construction. When connecting bands or flared end sections are required, helically formed pipe shall have rerolled ends with a minimum of two annular corrugations. End sections shall be produced in accordance with AASHTO M36 from materials conforming to the applicable requirements of AASHTO M218 for use with galvanized pipe, AASHTO M274 for use with aluminum-coated or polymer coated pipe, or AASHTO M289 for use with aluminum zinc alloy-coated pipe.

Joints shall be installed as specified on the plans, in the event the joint is not specified, it shall be a leak-resistant joint.

Section 232.02(c)4a – Steel encasement pipe is replaced with the following:

Steel encasement pipe shall conform to ASTM A139 or ASTM A53 with a minimum wall thickness of 0.500 inch and shall have beveled edges suitable for welding or be threaded. The hydrostatic test for such pipe will not be required.

Section 232.02(c)7 – Concrete-lined corrugated steel pipe is deleted, and paragraphs 8 and 9 are renumbered to 7 and 8, respectively.

Section 232.02(l) – Polypropylene (PP) Pipe is replaced with the following:

Polypropylene (PP) Pipe: PP corrugated culvert and storm drain pipe shall conform to AASHTO M330, and shall be double wall pipe (Type S) for nominal diameters of 12 inches through 30 inches, inclusive, and shall be triple wall pipe (Type D) for nominal diameters of 36 inches through 60 inches, inclusive. The Department will not permit the use of polypropylene pipe less than 12 inches or greater than 60 inches in diameter. Fittings and joining systems shall also meet AASHTO M330.

Section 232.02(m) – Pipe Joints is inserted as follows:

Pipe joints shall meet the requirements of AASHTO PP-63 for Soil-Tight, Silt-Tight, Leak-Resistant or other special design, except that leak-resistant joints shall not require infiltration or exfiltration testing in the field, and joints shall be on VDOT Materials Division Approved List for pipe joints. Pipe Joint systems shall be submitted to the Materials Division certifying the system

meets the requirements for Soil-Tight, Silt-Tight, Leak-Resistant or Special Design in order to be on the approved list.

Section 232.02(n) – Pipe to Structure Connections and Waterstops is inserted as follows:

Manufactured pipe connection systems for connecting pipe to drainage structures shall be submitted to the Materials Division certifying the system meets the requirements for Soil-Tight, Silt-Tight, or Leak-Resistant in order to be on the approved list. When resilient connectors for silt tight connections are specified for concrete pipe to concrete structures, the connectors shall meet the requirements of ASTM C1478. When resilient connectors for leak resistant connections are specified for flexible pipe to concrete structures, the connectors shall meet the requirements of ASTM F2510.

When waterstops are specified, they shall meet the requirements of ASTM F2510, Section 4.1 Materials and Manufacture and Section 4.2 Mechanical Devices. The waterstop shall have a 1 inch minimum keylok anchor embedded into the concrete or mortar connection on pipe sizes below 18 inch diameter and 1.5 inch for pipe 18 inches and greater in diameter. There shall be a minimum 2 inches of concrete or mortar connection around the rubber gasket to permit proper consolidation around the gasket. All waterstops shall be secured to the pipe with a take-up clamp before applying mortar.

Included in the 2018_Supplement_to_the_2016_Specifications page 18

SS242-002016-01 February 1, 2017

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SECTION 242—FENCES

SECTION 242—FENCES of the Specifications is amended as follows:

Section 242.02(c)**2 – Posts for temporary silt fences** is replaced with the following:

Posts for temporary silt fences shall be a nominal 2 by 2 inch oak, or steel having a weight of at least 1.25 pounds per linear foot.

Included in the 2018 Supplement to the 2016 Specifications page 18

SS244-002016-01 July 5, 2016; Issued October 5, 2016

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SECTION 244—ROADSIDE DEVELOPMENT MATERIALS

SECTION 244—ROADSIDE DEVELOPMENT MATERIALS of the Specifications is amended as follows:

Section 244.02(l) **Rolled Erosion Control Products** is replaced by the following:

(l) **Rolled Erosion Control Products:**

1. **Rolled Erosion Control Products (Standard EC-2)** shall conform to Table II-22C and the following requirements. EC-2 products shall be designed for use on geotechnically stable slopes and channels as detailed herein.

a. **EC-2, Type 1** shall be a relative short-term single-net erosion control blanket or open weave textile. EC-2, Type 1 shall be one of the following materials: (1) an erosion control blanket composed of processed degradable natural or polymer fibers mechanically-bound together by a single degradable synthetic or natural fiber netting to form a continuous matrix; or (2) an open weave textile composed of processed degradable natural or polymer yarns or twines woven into a continuous matrix. EC-2, Type 1 shall typically have a 12-month functional longevity from the date of installation, be designed for use on up to 1V:3H slopes and channels, with shear stresses up to 1.50 pounds per square foot.

b. **EC-2, Type 2** shall be a relative short-term double-net erosion control blanket. The blanket shall be composed of processed natural or polymer fibers mechanically bound between two natural fiber or synthetic nettings to form a continuous matrix. EC-2, Type 2 materials shall typically have a 12-month functional longevity from the date of installation, be designed for use on up to 1V:2H slopes and channels, with shear stresses up to 1.75 pounds per square foot.

c. **EC-2, Type 3** shall be an extended term erosion control blanket or open weave textile. EC-2, Type 3 blankets shall be one of the following materials: 1) an erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically-bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix; or 2) an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix. EC-2, Type 3 material shall typically have a 24-month functional longevity from the date of installation, be designed for use on slopes up to 1V:1.5H and channels, with shear stresses up to 2.00 pounds per square foot.

d. **EC-2 Type 4** shall be a long-term erosion control blanket or open weave textile. EC-2, Type 4 blankets shall be one of the following materials: (1)

an erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically-bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix; or (2) an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix. EC-2, Type 4 material shall typically have a 36-month functional longevity from the date of installation, be designed for use on up to 1V:1H slopes and channels, with shear stresses up to 2.25 pounds per square foot.

2. **Permanent Rolled Erosion Control Products (Standard EC-3)** shall be permanent turf reinforcement mats conforming to Table II-22D and the following:

   a. **EC-3, Type 1** shall be a non-degradable mat of sufficient thickness, strength and void space for permanent erosion protection and vegetation reinforcement on geotechnically stable slopes with gradients up to 1V:1.5H, channels with design shear stresses up to 6.0 pounds per square foot, and on other areas where design flow conditions exceed the limits of sustainability for mature natural vegetation.

   b. **EC-3, Type 2** shall be a non-degradable mat with sufficient thickness, strength and void space for permanent erosion protection and vegetation reinforcement on geotechnically stable slopes with gradients up to 1V:1H, channels with design shear stresses up to 8.0 pounds per square foot, and other areas where design flow conditions exceed the limits of sustainability for mature natural vegetation.

   c. **EC-3, Type 3** shall be a non-degradable mat with sufficient thickness, strength and void space for permanent erosion protection and vegetation reinforcement for use on geotechnically stable slopes up to 1V:0.5H, channels with design shear stresses up to 10.0 pounds per square foot, and other areas where design flow conditions exceed the limits of sustainability for mature natural vegetation.

GUIDELINES: For projects with silt fence, riprap bedding and soil stabilization material, drainage fabric, pavement underdrain, wall drain, moisture barrier, dewatering bag, pavement interlayer, or low-perm liner for SWM facilities.

SS245-002016-05 February 26, 2018

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SECTION 245—GEOSYNTHETICS AND LOW PERMEABILITY LINERS

SECTION 245—GEOSYNTHETICS AND LOW PERMEABILITY LINERS of the Specifications is amended as follows:

Section 245.03—Testing and Documentation is amended by replacing the third paragraph with the following:

Property values in these specifications represent minimum average roll values (MARV) in the weakest principal direction unless direction is otherwise specified; permittivity values specified are minimum; AOS and panel vertical strain values are maximum; mass per unit area, UV degradation, and asphalt retention values are typical.

Section 245.03(e) – Prefabricated Geocomposite Pavement Underdrain is replaced with the following:

Prefabricated Geocomposite Pavement Underdrain: Prefabricated geocomposite pavement underdrain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Prefabricated geocomposite pavement underdrain shall conform to the following:

1. **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the pavement environment and shall have a thickness of not less than 3/4 inch. Outer surfaces shall be smooth to prevent excessive wear of bonded filter fabric.

Physical Properties	Test Method	Requirements
Compressive strength panel vertical strain and core area change	ASTM D1621/ D2412/D6364	Min. 40 psi at 20% deflection after 24 hrs at 0 deg F and at 125 deg F
Water flow rate (after 100 hr at 10 psi normal confining pressure gradient of no more than 0.1)	ASTM D4716	Min. 15 gal/min/ft width for 12-in specimen length

2. **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein.

Section 245.03(f) – Geocomposite Wall Drains is replaced with the following:

Geocomposite Wall Drains: Prefabricated geocomposite wall drain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Geocomposite wall drains shall conform to the following:

1. **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the roadway. Outer surfaces shall be smooth to prevent excessive wear of bonded filter fabric.

Physical Property	Test Method	Requirements
Compressive strength at 20% deflection	ASTM D1621/ D2412/D6364	Min. 40 psi after 24 hrs at 0 degree F and at 125 degree F
Water flow rate (after 100 hr at 10 psi normal confining pressure and gradient of no more than 1.0)	ASTM D4716	Min. 15 gal/min/ft width (for 12-in specimen length)

2. **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over both sides of the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein, except that grab strength requirement shall meet AASHTO M288 Table 1, Class 2.

Section 245.03(h) – Dewatering Bag is replaced with the following:

Dewatering Bag: A nonwoven geotextile sewn together to form a bag that can be used in lieu of a de-watering basin for the purpose of filtering out suspended soil particles. The bag shall be capable of accommodating the water flow from the pump without leaking at the spout and seams.

Physical Property	Test Method	Requirements
Grab strength @ Elongation >50%(CRE/Dry)	ASTM D4632	Min. 250 lb (min)
Seam strength	ASTM D4632	90% Specified grab strength
Puncture	ASTM D6241	Min. 150 lb
Flow rate	ASTM D4491	Min. 0.189 ft3/sec/ft2(min)
Permittivity	ASTM D4491	Min. 1.2 sec-1
UV resistance	ASTM D4355	Min. 70% at 500 hr
AOS	ASTM D4751	Max. 100 sieve

Section 245.03(i) – Pavement Interlayer is replaced with the following:

Pavement Interlayer products shall be listed on the Materials Division Approved List No. 63. All interlayer material shall be from National Transportation Product Evaluation Program (NTPEP)-compliant manufacturers, and shall be evaluated through NTPEP; tests not covered by the NTPEP Geosynthetics Work Plan shall be performed by independent, certified laboratories and submitted to the State Materials Engineer. Testing for products not covered by NTPEP shall be on a minimum 3-year cycle also. Terms defined by ASTM D4439 shall apply herein, except when they conflict with terms defined by Section 101.

For Paving Fabric, Paving Mat, Paving Grid, and Composite Paving Grid, the Contractor shall provide asphalt retention rates (ASTM D6140), material properties specified herein, and manufacturer's recommendations for tack application to the Engineer at the preconstruction meeting. The total minimum tack coat application rate sprayed in the field shall meet the manufacturer's recommendations, but shall be clearly totaled at the pre-construction meeting as the components of the asphalt retention rate and the additional rate based on the anticipated surface condition of pavement.

1. **Paving Fabric, Type I & II:** All paving fabrics shall meet the requirements of the table below, and have 50% retained strength after 500 hours of UV exposure when tested in accordance with ASTM D4355.

Property	Test Method	Type I	Type II
Mass per unit area, min (oz/yd^2)	ASTM D5261	4.5	4.1
Grab Tensile Strength, min (lbs.)	ASTM D4632	120	101
Grab Tensile Elongation, min (%)	ASTM D4632	50	50
Melting point, min (°F)	ASTM D276	320[1]	320[1]

[1]320 is the softening/melt point of polypropylene. See Section 318.03 for more on placement temperature.

2. **Paving Mat; Type I, II, and III:** Materials used for paving mat shall be a hybrid of two or more of the following material types: fiberglass, polyester, or polypropylene. Paving mat shall meet the requirements of the table below.

Property	Test Method	Type I	Type II	Type III
Tensile Strength, min (lb/in)	ASTM D5035	280	140	45
Ultimate Elongation, max (%)	ASTM D5035	5	5	5
Melting Point, min (°F)	ASTM D276	320[1]	320[1]	320[1]
Mass/Unit Area, min (oz/yd^2)	ASTM D5261	7.0	4.0	4.0

[1]320 is the softening/melt point of polypropylene, which is lower than either polyester or fiberglass. See Section 318.03 for more on placement temperature.

3. **Paving Grid: Type I, II, & III:** Materials used for paving grids shall be comprised of fiberglass and shall meet the requirements of the table below. Some paving grids are self-adhesive and some require nails for installation. Tack coat required for the installation of the overlay shall be specified with the paving grid. Refer to manufacturer's recommendations for tack coat type and application rate.

Property	Test	Type I	Type II	Type III
Tensile Strength, min (lbs/in)[1]	ASTM D6637, Method A, modified	560 x 1,120	560	280
Aperture size, min (in)	Calipered	0.5	0.5	0.5
Elongation, max (%)	ASTM D6637	3	3	3
Mass per area, min (oz/yd^2)	ASTM D5261	16	10	5.5
Melting Point, min (°F) (fabric component – if applicable)	ASTM D276	420[2]	420[2]	420[2]

[1]For Type I, machine and cross direction respectively. Strengths for Type II and III are in both directions

4. **Composite Paving Grids: Type I, II, & III:** Composite paving grids shall consist of a fiberglass, polyester, or polyvinylacetate (PVA) paving grid integrated with a nonwoven geotextile and meet the requirements of the table below.

Property	Test	Type I	Type II	Type III
Tensile Strength, Min (lbs/in)[1]	ASTM D6637, Method A, modified	560 x 1,120	560	280
Aperture size, Min (in)	Calipered	0.5	0.5	0.5
Elongation, Max (%)	ASTM D6637	5	5	10
Mass per area, Min (oz/yd^2)	ASTM D5261	16	10	5.5
Melting Point, Min (°F) (fabric component)	ASTM D276	320[2]	320[2]	320[2]

[1]For Type I, machine and cross direction respectively. Strengths for Type II and III are in both directions.
[2]320 is the assumed softening/melt point of PVA. See Section 318.03 for more on placement temperature.

5. **Pavement Repair and Bridge Deck Waterproofing Strip Membrane: Materials used for strip membranes shall be comprised of** composite self-adhering rubberized asphalt attached to a pavingfabric, a paving mat, or a paving grid and meet the requirements of the table below.

Property	Test Method	Type I
Strip Tensile Strength, min (lb/in)	ASTM D882	50
Puncture Resistance, min (lbs)	ASTM E154	200
Permeance-Perms, max	ASTM E-96 Method B	0.05
Pliability - 1/4" Mandrel 180º Bend at -25 ºF	ASTM D146	No cracks in fabric or rubberized asphalt

Section 245.03(k) – Fabric for Use in Turbidity Curtains is inserted as follows:

Fabric for Use in Turbidity Curtains: This fabric shall consist of synthetic fabric coated with suitable elastomeric or polymeric compound. The coating shall have a high resistance to weathering, hydrocarbons, fresh and salt water, and temperature extremes. The curtain shall form a continuous vertical and horizontal barrier for the entire width and length of each section. Seams, if required, shall be either vulcanized welded or sewn and shall develop the full strength of the fabric.

The curtain fabric shall meet the minimum requirements noted below:

Physical Properties of Turbidity Curtain Fabric

Physical Property	Requirement
Weight (oz/yd^2)	
Type I	18
Type II	22
Type III	22
Grab Tensile Strength (ASTM D 4632)	300 lbs
UV Inhibitor	Required