NOTE TO CONSULTANTS*: This specification section shall be used only when directed by the Park Engineer on Parks projects and the asphalt paving work is happening in City of Seattle Street Rights-of-Way. The related section listed below shall be included as well. No editing of this section other than the header above is required. (*Remove this Note*)

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Work consisting of one or more courses of plant mixed asphalt concrete placed on a prepared foundation or base.

1.02 RELATED SECTIONS:

Section 32 11 23 - Mineral Aggregates

Section 32 11 26 - Sub-grade Preparation for Asphalt Paving

Section 32 11 26.23 - Asphalt Plants & Equipment

Section 32 23 13.16 - Grade Adjustment for Utility Structures

1.03 DEFINITIONS:

A. Hot Mix Asphalt (HMA):

1. Composed of Asphalt and Mineral Aggregate which, with or without the addition of mineral filler and blending sand as may be required in the Contract, mixed in the proportions specified to provide a homogeneous, stable and workable mixture.

B. Leveling or Wearing Courses:

1. HMA Class A, Class B, Class D, Class F or Class G.

C. Pavement Base Course:

1. HMA Class E.

D. Dense Graded HMA:

1. All mixtures with the exception of HMA Class D.

E. Treated Street Surfaces:

1. Cement concrete, asphalt concrete, brick, seal coat or other bituminous surface treatments.

F. Untreated Street Surfaces:

1. Crushed rock, gravel, or oil mat surfaces.

G. Surface Preparation:

1. Preparing existing street surfaces prior to the addition of one or more courses of asphalt concrete or other bituminous Material for treated street surfaces.

H. Roadway Preparation:

1. Preparing existing street surfaces prior to the addition of one or more courses of asphalt concrete or other bituminous Material for untreated street surfaces.

1.04 REFERENCE STANDARDS:

A. American Society for Testing and Materials (ASTM).

1. D 2041 Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.

1.05 DESIGN REQUIREMENTS:

A. Unless otherwise specified in the Contract, asphalt concrete pavement in the Traveled Way, Shoulder, and Auxiliary Lane shall be Asphalt Concrete Class A installed in 2 equal lifts to a total compacted thickness of 3 inches. Each asphalt concrete lift thickness shall be no less than 1¼ inch.

B. HMA pavement patch shall be Class A meeting the requirements of this Section.

C. HMA for temporary pavement patch shall be MC-250.

1. Mineral Aggregate used in MC-250 HMA shall meet the same requirements as the Mineral Aggregate used in HMA Class A.

D. See Section 32 11 23 - Mineral Aggregates for base course Mineral Aggregate limitations.

PART 2 - PRODUCTS

2.01 GENERAL:

A. HMA furnished under these Specifications shall not have been distilled at a temperature high enough to injure by burning or to produce flecks of carbonaceous matter, and upon arrival at the Work, shall show no signs of separation into lighter and heavier components.

2.02 MEDIUM-CURING (MC) LIQUID ASPHALT:

Characteristics	WSDOT Test Method	MC-70	MC-250	MC-800	MC-3000
Kinematic Viscosity at 140°F (cSt)	202	70-140	250-500	800-1600	3000-6000
Flash Point (Tag Open Cup) (Min. °F)	207	100	150	150	150
Water Content (Max. %)	217	0.2	0.2	0.2	0.2
Distillation: volume % of total distillate to 680 °F	211				
to 437°F		0-20	0-10	---	---
to 500°F		20-60	15-55	0-35	0-15
to 600°F		65-90	60-87	45-80	15-75

Residue of 680°F distillation % volume by difference (Min.)		55	67	75	80
Properties of residue from distillation to 680 °F					
Absolute viscosity at 140°F (poise)	203	300-1200	300-1200	300-1200	300-1200
[1]Ductility, 5 cm/min. at 77°F (Min.)	213	100	100	100	100
Solubility in trichloroethylene (Min. %)	214	99.0	99.0	99.0	99.0

A. Notes:

[1] If the ductility at 77°F is less than 100, the Material will be acceptable if its ductility at 60°F is more than 100.

B. The asphalt spraying application temperature at the distributor shall be as specified in "Application of Asphalt" Article.

1. The Material shall not foam when heated to the application temperature.

2.03 RAPID-CURING (RC) LIQUID ASPHALT:

Characteristics	WSDOT TEST METHOD	RC-70	RC-250	RC-800	RC-3000
Kinematic Viscosity at 140°F cSt	202	70-140	250-500	800-1600	3000-6000
Flash Point (Tag Open Cup) (Min. °F)	207	---	80	80	80
Water Content (Max. %)	217	0.2	0.2	0.2	0.2
Distillation: volume % of total distillate to 680°F	211				
to 374°F (Min.)		10	---	---	---
to 437°F (Min.)		50	35	15	---
to 500°F (Min.)		70	60	45	25
to 600°F (Min.)		85	80	75	70
Residue of 680°F distillation % volume by difference (Min.)		55	65	75	80
Properties of residue from distillation to 680°F					
Absolute viscosity at 140°F, poise	203	600-2400	600-2400	600-2400	600-2400
Ductility, 5 cm/min. at 77°F, cm Min.	213	100	100	100	100

Solubility in trichloroethylene Min. %	214	99.0	99.0	99.0	99.0

A. Notes:

1. If the ductility at 77°F is less than 100, the Material will be acceptable if its ductility at 60°F is more than 100.

B. The asphalt spraying application temperature at the distributor shall be as specified in "Application of Asphalt" Article.

1. The Material shall not foam when heated to the application temperature.

2.04 PAVING HMA:

A. Paving HMA shall be PG 64-22 and shall meet the requirements of AASHTO MP1 for performance graded asphalt cement.

2.05 REJUVENATING (RECYCLING) AGENTS:

A. The rejuvenating agent shall be a liquid emulsion of selected resin petroleum oil approved for use by the Materials Laboratory.

B. RA-5.

1. Viscosity @ 140°F.

a. ASTM Test Method: D 2170 or D 2171.

b. Min.: 200 cSt

c. Max.: 800 cSt

2. Flashpoint, COC.

a. ASTM Test Method: D 92.

b. Min.: 400°F

c. Max.: ---

3. Saturates, Wt.

a. ASTM Test Method: D 2007.

b. Min.: ---%

c. Max.: 30%

4. Specific Gravity.

a. ASTM Test Method: D 70 or D 1298.

b. Min.: Report

c. Max.: ---

5. Residue test from RTFC.

a. ASTM Test Method: D 2872.

1) The use of ASTM D 1754 has not been studied in the context of this Specification; however, it may be applicable. In cases of dispute, the reference method shall be ASTM D 2872.

b. Viscosity Ratio = $\frac{\text{RTFC Viscosity at 140°F, cSt}}{\text{Original Viscosity at 140°F, cSt}}$

1) Min: ---

2) Max: 3.

c. Weight Change.

1) Min: ---

2) Max: ±4%

C. RA-25.

1. Viscosity @ 140°F.

a. ASTM Test Method: D 2170 or D 2171.

b. Min.: 1,000 cSt

c. Max.: 4,000 cSt

2. Flashpoint, COC.

a. ASTM Test Method: D 92.

b. Min.: 425°F

c. Max.: ---

3. Saturates, Wt.

a. ASTM Test Method: D 2007.

b. Min.: ---%

c. Max.: 30%

4. Specific Gravity.

a. ASTM Test Method: D 70 or D 1298.

b. Min.: Report

c. Max.: ---

5. Residue test from RTFC.

a. ASTM Test Method: D 2872.

1) The use of ASTM D 1754 has not been studied in the context of this Specification; however, it may be applicable. In cases of dispute, the reference method shall be ASTM D 2872.

b. Viscosity Ratio = $\frac{\text{RTFC Viscosity at 140°F, cSt}}{\text{Original Viscosity at 140°F, cSt}}$

1) Min: ---

2) Max: 3.

c. Weight Change.

1) Min: ---

2) Max: ±3%

D. RA-75.

1. Viscosity @ 140°F.

a. ASTM Test Method: D 2170 or D 2171.

b. Min.: 5,000 cSt

c. Max.: 10,000 cSt

2. Flashpoint, COC.

a. ASTM Test Method: D 92.

b. Min.: 450°F

c. Max.: ---

3. Saturates, Wt.

a. ASTM Test Method: D 2007.

b. Min.: ---%

c. Max.: 30%

4. Specific Gravity.

a. ASTM Test Method: D 70 or D 1298.

b. Min.: Report

c. Max.: ---

5. Residue test from RTFC.

a. ASTM Test Method: D 2872.

1) The use of ASTM D 1754 has not been studied in the context of this Specification; however, it may be applicable. In cases of dispute, the reference method shall be ASTM D 2872.

b. Viscosity Ratio = $\frac{\text{RTFC Viscosity at 140°F, cSt}}{\text{Original Viscosity at 140°F, cSt}}$

1) Min: ---

2) Max: 3.

c. Weight Change.

1) Min: ---

2) Max: ±2%

E. RA-250.

1. Viscosity @ 140°F.
   a. ASTM Test Method: D 2170 or D 2171.
   b. Min.: 15,000 cSt
   c. Max.: 35,000 cSt
2. Flashpoint, COC.
   a. ASTM Test Method: D 92.
   b. Min.: 450°F
   c. Max.: ---
3. Saturates, Wt.
   a. ASTM Test Method: D 2007.
   b. Min.: ---%
   c. Max.: 30%
4. Specific Gravity.
   a. ASTM Test Method: D 70 or D 1298.
   b. Min.: Report
   c. Max.: ---
5. Residue test from RTFC.
   a. ASTM Test Method: D 2872.
      1) The use of ASTM D 1754 has not been studied in the context of this Specification; however, it may be applicable. In cases of dispute, the reference method shall be ASTM D 2872.
   b. Viscosity Ratio = $\frac{\text{RTFC Viscosity at 140°F, cSt}}{\text{Original Viscosity at 140°F, cSt}}$
      1) Min: ---
      2) Max: 3.
   c. Weight Change.
      1) Min: ---
      2) Max: ±2%

F. RA-500.
1. Viscosity @ 140°F.
   a. ASTM Test Method: D 2170 or D 2171.
   b. Min.: 40,000 cSt
   c. Max.: 60,000 cSt

2. Flashpoint, COC.
   a. ASTM Test Method: D 92.
   b. Min.: 450°F
   c. Max.: ---
3. Saturates, Wt.
   a. ASTM Test Method: D 2007.
   b. Min.: ---%
   c. Max.: 30%
4. Specific Gravity.
   a. ASTM Test Method: D 70 or D 1298.
   b. Min.: Report
   c. Max.: ---
5. Residue test from RTFC.
   a. ASTM Test Method: D 2872.
      1) The use of ASTM D 1754 has not been studied in the context of this Specification; however, it may be applicable. In cases of dispute, the reference method shall be ASTM D 2872.
   b. Viscosity Ratio = $\frac{\text{RTFC Viscosity at 140°F, cSt}}{\text{Original Viscosity at 140°F, cSt}}$
      1) Min: ---
      2) Max: 3.
   c. Weight Change.
      1) Min: ---
      2) Max: ±2%

G. The final acceptance of recycling agents meeting this Specification is subject to the compliance of the reconstituted asphalt blends with the requirements in Section for the class of HMA required.

2.06 CATIONIC EMULSIFIED ASPHALTS

	Type	Rapid Setting				Medium Setting						Slow Setting				Special Track	
Grade	WSDOT Test Method	CRS-1		CRS-2		CMS-2S		CMS-2		CMS-2h		CSS-1		CSS-1h		STE-1	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Test on Emulsions:																	
Viscosity Saybolt Furol S @ 77°F (25°C)	212	---	---	---	---	---	---	---	---	---	---	20	100	20	100	---	30
Viscosity Saybolt Furol S @ 122°F (50°C)	212	20	100	150	400	50	450	50	450	50	450	---	---	---	---	---	---
Storage stability test 1 day %	212	---	1	---	1	---	1	---	1	---	1	---	1	---	1	---	1
Demulsibility 35 m.l. 0.8% sodium dioctyl sulfosuccinate, %[a]	212	40	---	40	---	---	---	---	---	---	---	---	---	---	---	25	---
Coating ability & water Resistance:																	
Coating, dry aggregate	212	---	---	---	---	good	---	good	---	good	---	---	---	---	---	---	---
Coating, after spraying	212	---	---	---	---	fair	---	fair	---	fair	---	---	---	---	---	---	---
Coating, wet aggregate	212	---	---	---	---	fair	---	fair	---	fair	---	---	---	---	---	---	---

Coating, after spraying	212	---	---	---	---	fair	---	fair	---	fair	---	---	---	---	---	---	---
Particle charge test	212	positive		positive		positive		Positive		positive		positive[b]		positive[b]		positive	
Sieve Test, %	212	---	0.10	---	0.10	---	0.10	---	0.10	---	0.10	---	0.10	---	0.10	---	0.10
Cement mixing test, %	212	---	---	---	---	---	---	---	---	---	---	---	2.0	---	2.0	---	---
Distillation:																	
Oil distillate by vol. Of emulsions %	212	---	3	1.5	3	---	20	---	12	---	12	---	---	---	---	---	5
Residue, %	212	60	---	65	---	60	---	65	---	65	---	57	---	57	---	45	---
Tests on residue from distillation test:																	
Penetration, 77°F (25°C)	201	100	250	100	250	100	250	100	250	40	90	100	250	40	90	100	200
Ductility, 77°F (25°C) 5 cm/min., cm	213	40	---	40	---	40	---	40	---	40	---	40	---	40	---	40	---
Solubility in trichlorethylene, %	214	97.5	---	97.5	---	97.5	---	97.5	---	97.5	---	97.5	---	97.5	---	97.5	---

[a]The demulsiblilty test shall be made within 30 days from date of shipment.
[b]If the particle charge test for CSS-1 and CSS-1h is inconclusive, material having a maximum pH value of 6.7 will be acceptable.

2.07 ASPHALT FOR SUB-SEALING:

A. Asphalt for sub-sealing shall conform to the requirements of AASHTO M 238 except that the minimum softening point shall be 170°F.

2.08 HOT MELT TRAFFIC BUTTON ADHESIVE:

A. Flash Point, COC: 550°F Min.

1. ASTM Test Method: D 92.

B. Softening Point: 200°F Min.

1. ASTM Test Method: D 36.

C. Brookfield Viscosity, 400°F: 7,500 cP Max.

1. ASTM Test Method: D 2196.

D. Penetration, 100g, 5 sec, 77°F: 10 - 20 dmm.

1. ASTM Test Method: D 5.

E. Filler Content, by weight (Insoluble in 1,1,1 Trichloroethane): 50 – 75%

1. ASTM Test Method: D 2371

2. Filler Material shall be calcium carbonate and shall conform to the following fineness (Percent Passing):

a. Sieve Size No. 100: 100%

b. Sieve Size No. 200: 95%

c. Sieve Size No. 325: 75%

F. Hot melt bitumen adhesive shall develop bond pull-off strength greater than 100 psi between 0°F and 120°F.

2.09 COAL TAR PITCH EMULSION:

A. Coal tar pitch emulsion shall conform to all requirements of Federal Specification R-P-355.

B. The emulsion shall be prepared from straight run, high temperature, coke oven tar meeting the requirements of Federal Specification RC 1424.

C. The emulsion shall be homogeneous and shall show no separation or coagulation of components that cannot be overcome by moderate stirring. It shall be capable of being applied completely by squeegee, brush, or other approved mechanical methods to the surface of bituminous pavements when spread at the specified rates.

2.10 ANTI-STRIPPING ADDITIVE:

A. When directed by the Engineer, asphalt Material shall be treated with an approved heat-stable anti-stripping additive.

B. The anti-stripping additive shall be added to the asphalt at the point of shipment and shall be a percentage designated by the Engineer, not to exceed 1 percent by weight of the asphalt.

C. The anti-stripping additive shall be approved by the SPU Materials Laboratory prior to use.

D. Once designated for use on the Project, the brand, grade, or percentage of anti-stripping additive shall not be changed.

2.11 GRADES OF ASPHALT:

A. The grade of asphalt for tack coats shall be Cationic Emulsified Asphalt CRS-2 or STE-1.

B. The grade of asphalt for sealing joints and other meet lines shall be STE-1.

2.12 CRACK SEALING - RUBBERIZED ASPHALT:

A. Rubberized asphalt for crack sealing asphalt concrete pavement shall conform to AASHTO M 173 (ASTM D 1190) and have a COC flash point (AASHTO T 48) of 400°F minimum.

1. AASHTO M 173 (ASTM D 1190) is modified to delete the Bond Test requirement.

2. AASHTO T 48 is modified to require careful agitation of the rubberized asphalt sample during testing to prevent local overheating.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION - TREATED SURFACES:

A. When an existing treated surface is to be used as a base for one or more courses of new asphalt concrete or other surfacing, the treated surface shall first be prepared as follows:

1. Treated surfaces shall be swept with a power broom until free from dirt and other foreign matter. Hand brooms shall be used to clean omissions of the power broom. Fatty asphalt patches, grease drippings and other objectionable material shall be removed from the existing pavement.

2. Excess asphalt joint filler shall be completely removed and pre-molded joint filler shall be removed to at least ½-inch below the surface of the existing pavement.

3. In order to obtain a base having uniform grade and cross section, all surface irregularities in the existing treated surface shall be corrected prior to placement of the new asphalt concrete or other bituminous surface treatment. Correction shall be by patching and if necessary, pre-leveling unless planing or heater-scarifying is specified. Although patching and pre-leveling may be necessary after planing, such work, after planing, shall be performed only when specified in the Contract or designated by the Engineer.

B Pre-leveling:

1. When a surface of the existing pavement or old base is irregular, it shall be brought to a uniform grade and cross section by pre-leveling.

2. As soon as the existing surface has been thoroughly cleaned, holes and discontinuities in the surface and edges and edge breaks shall be patched.

   a. Asphalt used for patching shall be Class A HMA, heated to the temperature specified in "Heating Of Asphalt Material" Article of this Section.

   b. Before placing the premixed patch Material in the hole, the bottom and edges of the hole shall be tack coated.

   c. The patch Material shall be thoroughly compacted.

3. Patching shall be accomplished prior to pre-leveling or installation of the first asphalt course, whichever is applicable.

   a. Pre-leveling of uneven or broken surfaces shall be accomplished by placing asphalt concrete of the class specified with a motor patrol grader, by hand-raking, by Miller box, or by such other method acceptable to the Engineer.

   b. After placement, the asphalt concrete shall be thoroughly compacted.

4. In some cases spot planing to remove high areas caused by rutting, etc., shall be performed prior to pre-leveling.

   a. Locations to be planed prior to pre-leveling will be indicated in the Contract Documents.

5. Unless specified otherwise in the Contract Documents, pre-leveling Materials shall be the same class of asphalt concrete as the wearing course except that when asphalt concrete Class G is being used to construct the wearing course overlay, asphalt concrete Class A or Class B may, upon approval of the Engineer, be used as an alternate for pre-leveling provided there is no increase in cost to the Owner for substituting one of the alternate mixes.

C Planing Bituminous Pavements:

1. When planing is specified, the surface of designated pavements or the top surface of subsurface courses shall be removed or reshaped by planing to remove irregularities and produce a prepared Sub-grade acceptable for receiving an asphalt concrete overlay.

   a. Planing shall be by the cold milling method unless heater planing is otherwise specified in the Contract Documents.

   b. The planer shall not be used on the final wearing course of new asphalt concrete construction.

2. Planing operations shall be conducted in a manner that do not tear, break, burn, or otherwise damage the surface which is to remain.

a. The finished planed surface shall be slightly grooved or roughened and shall be free from gouges, deep grooves, ridges, or other imperfections.

3. A tapered wedge cut shall be made longitudinally along curb lines sufficient to provide a minimum of 4 inches of curb reveal after placement and compaction of the final wearing course.

   a. A tapered wedge cut shall also be made at transitions to adjoining pavement surfaces (meet lines) where butt joints are indicated on the Drawings.

   b. Butt joints shall be cut in a straight line with vertical faces 2 inches or more in height and shall produce a smooth transition to the existing adjoining pavement.

4. After planing is complete, the planed surfaces shall be swept, cleaned, and if required by the Contract, patched and preleveled.

5. When the planed street surface is opened to traffic prior to asphalt concrete paving operations, the Contractor shall install, maintain and subsequently remove temporary pavement markings as specified in the "Paving Under Traffic" Article of this Section.

6. Tapered sections of Temporary Asphalt (MC 250) shall be placed around each utility casting that protrudes more than 1 inch above the surface in the traveled Roadway, or any other area which can be a safety hazard to vehicular traffic.

   a. These temporary tapered sections shall be removed prior to laying the asphalt overlay.

D. Tack Coat:

1. A tack coat of asphalt, applied at the rate of 0.02 to 0.08 gallons per square yard of retained asphalt, shall be applied by a mechanical distributor meeting the requirements of Section 32 11 26.23 - Asphalt Plants and Equipment, to all surfaces on which any course of asphalt concrete is to be placed or abutted including prior to pre-leveling.

2. The distributor Equipment shall be capable of distributing asphalt uniformly over an area in controlled amounts and shall be equipped with hand operated spray Equipment for use only on inaccessible and irregularly shaped areas.

3. When asphalt concrete pavement Class D is being constructed, the tack coat shall be applied to the existing surface at a rate of 0.12 to 0.20 (0.08 to 0.12 residual) gallons per square yard.

4. Where the new asphalt concrete abuts a curb or gutter, cold pavement joint, trimmed meet line, or any metal surface, a thin tack coat of asphalt shall be applied on the vertical face of the abutting surface by hand painting prior to paving.

5. The application on the contact surfaces shall be thin and uniform in order to avoid an accumulation of excess asphalt in puddles.

6. The Contractor shall not apply the tack coat on vertical contact surfaces above the finished height of the asphalt concrete being placed.

3.02 SURFACE PREPARATION - UNTREATED SURFACES:

A. Untreated Roadway surfaces, including intersections and side Roadway approaches which are to receive asphalt concrete pavement or other surfacing shall be shaped to a uniform grade and cross-section, conforming as nearly as possible to that which exists except:

1. When new lines and grades are indicated in the Contract or staked by the Engineer; or

2. Where the height of the centerline crown above the gutterline or edge of Roadway, exceeds 2 percent of the distance of half the Roadway width, then the crown and adjacent Roadway shall be corrected by excavation, or scarifying and blading, to bring about a cross section having a revised crown height 2 percent of half the Roadway width distance.

a. For this item, lines and grades will not be set by the Engineer.

B. The basis for establishing final line and grade in such cases shall be curbs, curbs and gutters, existing pavement, or pavement edges or other existing street improvements.

C. Existing driveways shall be graded as necessary to provide a smooth transition to the final grade of the new pavement surface including such grading as may be necessary to permit driveway adjustment with Class A HMA.

D. Where no curbs or curbs and gutters exist and where none are presently required, sub-grade preparation shall extend one foot on each side of the Roadway beyond the final asphalt paving width indicated on the Drawings or to such greater width as the Engineer may require.

1. At street intersections the minimum radius of curve at edge of pavement shall be 20 feet.

E. The grade shall be shaped so that all frame castings for manholes, monument boxes, gate valve boxes, catch basins, etc. within the Roadway section to be treated extend above the prepared surface, such that the casting is flush with the final surface.

1. Where existing asphalt or cement concrete pavement is being met with new asphalt surfacing, sufficient existing Material shall be removed to permit the forming of a butt joint.

2. The end results shall be a smooth level Roadway surface as specified in “Surface Smoothness” Article of this Section.

F. Those areas and surfaces which are to be prepared for the placement of asphalt concrete pavement or other surfacing shall be considered Sub-grade for the new construction.

1. See Section 32 11 26 - Sub-grade Preparation for HMA Paving.

2. Excess native Material deemed suitable by the Engineer shall be stockpiled by the Contractor or bladed to the Roadway edge and used as needed for fill or Shoulder restoration following completion of the paving.

3. The scarified or excavated Material shall be used to the fullest extent possible as sub-base Material prior to the placement of new crushed rock.

4. If there is a surplus of stockpiled Material after construction is complete, the Contractor shall clean up the stockpile site and remove and dispose of the surplus Material.

G. During the operation of blading and rolling, water shall be applied in the amount and at locations designated by the Engineer.

H. When, in the opinion of the Engineer, insufficient Roadway Sub-grade Material is available, the Contractor shall furnish, place, and compact a maximum of 2 inches of Mineral Aggregate Type 1 on the Sub-grade.

1. The Material shall not be placed unless specifically ordered in writing by the Engineer.

I. The Contractor shall insure that a 6 inch minimum depth of selected and suitable native Material, or procured crushed rock base acceptable to the Engineer is provided for the asphalt paving.

J. The full width of the Roadway shall be sprinkled with water, when ordered by the Engineer, to alleviate dust and to keep the Sub-grade Material moist as an aid to compaction.

K. Immediately before the prime coat of asphalt is applied, the Roadway surface shall be stable and unyielding, in dry to medium damp condition, free from irregularities and Material segregation, and true to line, grade, and cross section.

L. In the event the compacted aggregates are of such gradation as to resist penetration of the asphalt, the Contractor shall loosen no more than the upper ½ inch of surface and regrade it without compaction immediately before the prime coat application.

1. Following the application of aggregate on the prime coat, rolling shall be performed as specified above.

3.03 PRIME COAT TREATMENT:

A. Unless otherwise specified in the Contract Documents, a prime coat treatment of asphalt complying with the requirements of “Application Of Asphalt” Article of this Section for existing gravel, crushed rock, or oil mat streets shall be applied prior to paving with asphalt concrete.

B. The prime coat shall be applied over the entire area of proposed asphalt pavement construction, and asphalt concrete pavement shall not be placed until the prime coat has cured for a full 5 days.

C. The Contractor shall maintain the completed prime coat by blading or brooming until the asphalt concrete is placed. Should any holes, breaks, or irregularities develop in the Roadway surface after the prime coat has been applied, they shall be patched or

repaired in accordance with "Surface Preparation - Untreated Surfaces" Article of this Section, immediately in advance of placing the asphalt concrete pavement.

D. Immediately prior to tacking and placing the asphalt concrete pavement, the surface of the prime coat shall be swept clean of all dirt, dust, and other foreign matter.

E. In areas used as turnouts or which receive heavy service, the Engineer may order a change in the Sub-grade elevation to provide a greater depth of pavement.

F. The Contractor shall prepare untreated Shoulders and traffic islands by blading and compacting to provide a sound base for paving.

1. The prime coat treatment shall be omitted, and the asphalt concrete pavement shall be constructed on the prepared Sub-grade after tacking in accordance with "Tack Coat" Paragraph of "Surface Preparation - Treated Surfaces" Article of this Section.

G. When prime coat treatment is not required, the Contractor shall prepare the untreated Roadway as specified above except for the prime coat of asphalt and aggregate. The asphalt concrete pavement shall be constructed on the prepared Sub-grade and tacked in accordance with "Tack Coat" Paragraph of "Surface Preparation - Treated Surfaces" Article of this Section.

3.04 CRACK SEALING:

A. When the Work requires "Crack Sealing", all cracks and joints shall be cleaned with a stiff-bristled broom and compressed air.

B. After cleaning, all cracks less than ¼ inch in width shall be filled with straight CSS-1 emulsified asphalt and topped with sand.

C. All cracks and joints at least ¼ inch and less than ¾ inch in width shall be filled with either a sand slurry or rubberized asphalt.

D. Cracks ¾ inch and larger in width shall require preparation by routing prior to cleaning and then shall be filled with a sand slurry.

E. Application of Sand Slurry.

1. The sand slurry shall consist of approximately 20 percent CSS-1 emulsified asphalt, approximately 2 percent Portland cement, water (if required), and the remainder clean U.S. no. 4 - 0 paving sand.

2. The mixture shall be poured into the cracks and joints until full.

3. The following Day, any cracks or joints which are not completely filled shall be topped off with the slurry.

4. After sealing, the filler shall be broomed or squeegeed flush with the existing pavement surface and allowed to cure prior to constructing the asphalt concrete overlay.

F. Application of Rubberized Asphalt.

1. The sealant Material shall meet the requirements of "Crack Sealing - Rubberized Asphalt" Article of this Section, and shall be applied in accordance with the manufacturer's recommendations.
2. These recommendations shall be submitted to the Engineer by the Contractor prior to the start of this type construction and shall include recommended heating time and temperature, allowable storage time and temperatures after initial heating, allowable reheating criteria, and application temperature range.
3. The cracks shall be completely dry before being filled with the rubberized asphalt.
4. Filling shall be controlled to confine the Material within the crack or joint.
   a. If, in the opinion of the Engineer, the Contractor's method of filling results in an excessive amount of sealant on the pavement surface, filling shall be stopped and the method changed.
   b. Any overflow shall be cleaned from the pavement surface.

3.05 HEATING OF ASPHALT MATERIAL:

A. The asphalt shall be heated to a maximum of 350°F.

B. The asphalt shall be heated in a manner that avoids local overheating and provide a continuous supply of asphalt Material to the mixer at a uniform temperature ±25°F from the temperature specified.

3.06 TEMPERATURE OF ASPHALT:

A. The temperature of paving asphalts in storage tanks when loaded for transporting to destination shall not be greater than 400°F.

3.07 PREPARATION OF AGGREGATES:

A. The aggregates shall be stockpiled according to the requirements of Section 02060 – Mineral Aggregates.

B. The aggregates shall be removed from stockpile(s) in a manner to ensure a minimum of segregation when being moved to the asphalt plant for processing into the final mixture.

3.08 MIX DESIGN:

A. Once the crushing operation has stabilized, a representative sample will be obtained from the stockpiled aggregates. A sample of the stockpiled blending sand, if needed, will also be required at this time.

B. The Contractor shall submit for approval at least 15 working Days in advance a production mix gradation which shall be the basis for the job mix formula for the mix design.

1. The proposed gradation may vary from the production values from aggregate production to reflect anticipated plant operations and adjustments as necessary to ensure compatibility.
2. Paving operations shall not proceed until a mix design is approved by the Engineer.
3. The Contractor's submittal shall also include a mix design from an ASTM or AASHTO accredited test laboratory approved by the Engineer based on the requirements of Section 32 11 23 - Mineral Aggregates.

C. Additional time will be required, and a separate mix design submittal required, if the Contractor has requested that more than one source of asphalt cement be approved.

D. When old asphalt concrete is proposed for inclusion in the mix, the Contractor shall submit a design for approval, including representative samples taken in the presence of the Engineer, and the approximate proportions of the various Materials (old asphalt concrete, new aggregate, recycling agent, and new paving asphalt) to be used.

1. Upon tentative approval of the approximate proportions proposed by the Contractor, the Materials shall be proportioned together for a job mix design.
2. Approval of the mix design will be based upon meeting the requirements of Section 32 11 23 - Mineral Aggregates, for the specified class of HMA, unless indicated otherwise in the Contract Documents.
3. In addition, for mix design approval, the blend of recovered paving asphalt plus recycling agent and additional paving asphalt shall meet the requirements for PG 64-22.
4. The Contractor shall allow 15 Working Days for approval of this design beginning when the Material has been received by the SPU Materials Laboratory.
5. Additional time may be required if the mix design is found unacceptable, or if the Contractor requests more than one recycling agent or paving asphalt source approval.

E. The Contractor is also advised that production of the asphalt concrete shall not commence until the job mix design has been established and approved.

F. The Contractor shall obtain the Engineer's approval prior to changing the source of asphalt cement during the production of asphalt concrete as specified above.

G. Blending of asphalt from different sources will not be permitted.

3.09 MIXING:

A. The prepared aggregates shall be combined in the mixer in the amount of each fraction of aggregates as specified. The asphalt Material shall be measured or gauged and introduced into the mixer per the approved mix design submittal.

B. After the required amounts of aggregate and asphalt Material have been introduced into the mixer, unless the Contract Documents specify otherwise, the Materials shall

be mixed until a complete and uniform coating of the particles and a thorough distribution of the asphalt Material throughout the aggregate is ensured.

C. When discharged, the temperature of the mix shall not exceed 325°F except that the temperature for mixes designed for asphalt concrete Class D shall not exceed 260°F.

D. A maximum water content of 2% in the mix, at discharge, will be allowed providing the water causes no problems with handling, stripping, or flushing.

E. Storing or holding of the asphalt concrete mixture in acceptable storage facilities will be permitted during the daily operation but in no event shall the Materials be held for more than 24 hours.

1. Materials held for more than 24 hours after mixing shall be rejected and disposed of by the Contractor at no expense to the Owner.

2. The storage facility shall have a visible device located at the top of the cone or about the third point to indicate the amount of Material in storage.

3. No Material shall be accepted from the storage facility when the Material in storage is below the top of the cone of the storage facility, except at the end of the Working Day.

3.10 APPLICATION OF ASPHALT:

A. Upon the properly prepared Roadway surface, Cationic Emulsified Asphalt (CRS-2) shall be applied at the following rate:

1. In non-shaded areas: 0.35 to 0.40 gallon per square yard.

2. In shaded areas: 0.38 to 0.45 gallon per square yard.

B. The asphalt spraying application temperature at the distributor shall be between 140°F and 185°F. The Engineer may vary the rate of asphalt application that will give the best results.

C. To ensure uniform distribution of asphalt prior to beginning the asphalt application, the distributor bar shall be operated over a pit or vat. To avoid gaps and ridges at transverse junctions of separate applications of asphalt, the Contractor shall spread sufficient building paper over the treated surface to make sure that the spray jets function normally when the untreated surface is reached.

D. The pattern of application of shots, and width and length of application of shots of asphalt Material shall be such as to provide proper coverage of crushed Material within the times specified, provide proper widths to such dimensions as to facilitate an acceptable coverage of crushed cover stone, and provide lapping of subsequent adjacent applications.

E. Asphalt shall be applied to spandrels of intersections and driveways immediately ahead of, or immediately behind the adjacent longitudinal street application.

F. Omissions (skips) by the distributor shall immediately be covered by hand application with the same grade of hot asphalt.

G. Any one spread of asphalt shall cover no more area than can be covered with Mineral Aggregate within 3 minutes from the time of application, upon any part of the spread.

H. Asphalt shall be spread toward the source of Mineral Aggregate to avoid injury to the freshly treated surface. No asphalt shall be spread until adequate supplies of Mineral Aggregate are on hand at the Project Site.

I. Curbs:

1. Where earth curbs or no curbs exist, the application of asphalt shall extend 4 inches beyond the gutter line.
2. Where concrete curb and gutter exist, the application shall lap onto the gutter section, but shall not exceed 2 inches.
3. Where concrete curb exists, the application shall be placed as closely as possible to the vertical surface without excessive splash onto the curb.
4. Where concrete curb or curb and gutter exist, the distributor shall be equipped with a splash board designed to prevent spraying thereon.

J. All castings shall be covered with heavy building paper and weighed down with sand or crushed Material.

K. Hand sprayers shall be used to apply asphalt around castings, and to areas where coverage is insufficient.

3.11 SPREADING AND FINISHING:

A. The asphalt concrete mixture shall be laid at a temperature of not less than 250°F and ot less than the asphalt pavement manufacturer's recommended temperature whichever is greater, upon an approved surface, then spread and struck off to the grade and elevation established.

B. Asphalt pavers complying with Section 32 11 23.26 - Asphalt Plants and Equipment, shall be used to distribute the mixture.

C. The nominal compacted depth of any layer of any course shall not exceed the following depth limits:

1.	E	0.25 foot (3") - 0.35 foot (4¼")
2.	A & B (Base Course)	0.25 foot (3") - 0.35 foot (4¼")
3.	A, B, & F	0.16 foot (2") - 0.25 foot (3")
4.	G	0.10 foot (1¼") - 0.10 foot (1¼")
5.	D	0.08 foot (1") - 0.08 foot (1")

D. When more than 1 course is necessary to meet the final paving grade, the first course shall include any widening of the existing Roadway and pre-leveling of the existing pavement surface.

1. The pre-leveling course or courses shall be constructed so that the final wearing course has a uniform compacted depth and conforms to the finished grade and cross section elevations specified.

E. Construction of 1 course upon another shall not proceed until the underlying course has completely cooled and set.

F. No hauling shall be done over freshly placed pavement.

G. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing Equipment impractical, the paving may be done with other Equipment or by hand.

H. The placing of asphalt mixtures at night will not be permitted.

I. When the asphalt mixture is being produced by more than one asphalt plant, the Material produced by each plant shall be placed by separate spreading and compacting Equipment.

J. The internal temperature of the mix should not be less than 185°F upon achieving density requirements in accordance with the applicable Specifications.

1. Should the Contractor not achieve specification densities at temperatures of 185°F or above 185°F, the Contractor will be permitted to continue to compact with steel wheeled rollers or a pneumatic tired roller provided that future compaction operations are adjusted to meet the density requirements at the aforementioned temperature.

2. The vibratory roller, in the vibratory mode, shall not be used under any circumstances whenever the internal temperature of the mixture is below 175°F.

3.12 UTILITY ADJUSTMENTS:

A. Utility castings shall be adjusted to finished grade prior to the construction of rigid base pavement or the final wearing course (Section 32 23 13.16- Grade Adjustment of Utility Structures.)

3.13 COMPACTION EQUIPMENT AND METHODS:

A. Immediately after the asphalt concrete mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted.

1. The completed course shall be free from ridges, ruts, humps, depressions, objectionable marks, or irregularities and in conformance with the line, grade, and cross-section shown on the Drawings, or as established by the Engineer.

2. If necessary, the mix design may be altered to achieve desired results.

B. Compaction shall take place when the mixture is in the proper condition so that no undue displacement, cracking, or shoving occurs.

1. Areas inaccessible to large compaction Equipment shall be compacted by mechanical or hand tampers.

a. Where hand tamping of new asphalt is required, the Contractor shall use a flat bottomed tool weighing a minimum of 40 pounds.

2. Any asphalt concrete that becomes loose, broken, contaminated, shows an excess or deficiency of asphalt, or is in any way defective, shall be removed, replaced, and immediately compacted to conform with the surrounding area.

C. The type of rollers to be used and their relative position in the compaction sequence shall generally be the Contractor's option, provided specification densities are attained.

1. An exception shall be that the pneumatic tired roller shall be used between October 1 and April 1.

2. Coverage with a vibratory or steel wheel roller may precede pneumatic tired rolling.

3. When HMA pavement Class D is being constructed, the use of pneumatic rollers will not be required.

D. Vibratory rollers shall not be operated in the vibratory mode when the internal temperature of the mix is less than 175°F or when checking or cracking of the mat occurs at a greater temperature.

E. Vibratory rollers in the vibratory mode are also prohibited on bridge decks, brick bases, and block bases.

3.14 COMPACTION CONTROL:

A. For HMA Class A, Class B, Class E and Class F, where paving is in the traffic lanes, including lanes for ramps, truck climbing, weaving, speed changes, and left turn channelization, and the specified compacted course thickness is greater than 0.10 foot, the acceptable level of compaction shall be a minimum of 91 percent of the maximum density as determined by ASTM D-2041.

1. The level of compaction attained will be determined as the average of not less than 5 nuclear density gauge tests taken on the Day the mix is placed (after completion of the finish rolling) at randomly selected locations within each lot.

2. The quantity represented by each lot will be no greater than a single Day's production or approximately 400 tons, whichever is less.

3. Control lots not meeting the prescribed minimum density standard shall be removed and replaced.

4. In addition to the randomly selected locations for tests of the control lot, the Engineer reserves the right to test any area which appears defective and to require the further compaction of areas that fall below acceptable density readings. These additional tests shall not impact the compaction evaluation of the entire control lot.

B. Cores may be used as an alternate to the nuclear density gauge tests.

1. When cores are taken by the Engineer at the request of the Contractor, the request shall be made by noon of the first Working Day following placement of the mix.

2. The Engineer shall be reimbursed for the coring expenses at the rate of $85 per core when the core indicates the acceptable level of compaction within a lot has not been achieved.

C. At the start of paving, if requested by the Contractor, a compactability test section shall be constructed to determine the compactability of the mix design.

1. Compactability shall be based on the ability of the mix to attain the specified minimum density.

2. Following determination of compactability, the Contractor is responsible for the control of the compaction effort.

3. If the Contractor does not request a test section, the mix will be considered compactable.

D. HMA Class A, Class B, Class E and Class F, constructed under conditions other than listed above shall be compacted on the basis of a test point evaluation of the compaction train.

1. The test point evaluation shall be performed in accordance with instructions from the Engineer.

2. The number of passes with an approved compaction train, required to attain the maximum test point density, shall be used on all subsequent paving.

3.15 LONGITUDINAL AND TRANSVERSE JOINTS:

A. The placing of the top or wearing course shall be as nearly continuous as possible, and the roller shall pass over the unprotected end of the freshly laid mixture only when the laying of the course is discontinued for such length of time as to permit the mixture to become chilled.

1. When this work is resumed, the previously compacted mixture shall be cut back to produce a slightly beveled edge for the full thickness of the course.

B. Where a transverse joint is being made in the wearing course, strips of heavy wrapping paper shall be used. The wrapping paper shall be removed and the joint trimmed to a slightly beveled edge for the full thickness of the course prior to resumption of paving.

C. The Material which is cut away shall be wasted and new mix shall be laid against the fresh cut. Rollers or tamping irons shall be used to seal the joint.

D. The longitudinal joint in any one layer shall be offset from the layer immediately below by not more than 6 inches nor less than 2 inches.

1. All longitudinal joints constructed in the top layer shall be at a lane line or edge line of the Traveled Way.

2. On one-lane ramps a longitudinal joint may be constructed at the center of the traffic lane, subject to approval by the Engineer, if:

   a. The ramp must remain open to traffic, or,

   b. The ramp is closed to traffic and a hot lap joint is constructed.

E. If a hot lap joint is allowed, the following requirements shall be met.

1. Two paving machines shall be used.

2. A minimum average compacted density of 92 percent of the maximum density shall be achieved throughout the traffic lane.

3. Construction Equipment shall not impact any uncompacted mix.

F. Immediately following the compaction of the top wearing course, meet line joints where the new asphalt concrete abuts existing asphalt concrete pavements, Portland cement concrete pavements, oil mats, concrete curbs and gutter, etc., shall be sealed with STE-1 Asphalt per “Connections with Existing Facilities” Article of this Section.

3.16 CONNECTIONS WITH EXISTING FACILITIES:

A. Where construction of new asphalt concrete pavement connects with an existing Roadway surface, driveway, bridge, railway crossing, or other similar facility, the Contractor shall provide a smooth riding transition between the new and existing surface.

1. Such work may require the modification of the existing Roadway profile by burning, planing or milling in order to achieve the desired smooth riding transition or may require other adjustment of the connecting surface.

B. Where butt joints are required at the meet lines of new construction and existing surfaces, the existing abutting pavement shall be trimmed by chipping, planing, milling or such other acceptable method in order to insure a minimum depth of 2 inches of compacted asphalt concrete at the point of connection.

1. Meet lines shall be trimmed straight and the edges vertical.

2. Waste Material resulting from such trimming or chipping shall be disposed of by the Contractor.

3. Butt joints will be required only at locations designated on the Drawings.

4. Unless the existing Roadway profile requires modification by planing, all other connections shall be made by shimming or feathering to provide the necessary smooth riding connection.

C. Where the transition is to be made by shimming or feathering, it shall be accomplished at the time the final course is being constructed by raking out the oversize aggregates of the asphalt concrete mix being used.

1. The Contractor shall not leave the asphalt open graded when feathering and shimming down to an existing surface.

2. If approved by the Engineer, shimming and feathering may be accomplished at a later date.

    a. In such case, HMA Class G shall be used.

D. Surfaces to be in contact with the new asphalt shall be tacked in accordance with "Tack Coat" Paragraph of "Surface Preparation - Treated Surfaces" Article of this Section.

E. Meet lines shall be sealed while the new asphalt concrete is still warm by painting with Special Tack Coat (STE-1) asphalt and then immediately covering the asphalt paint strip with clean, dry paving sand complying with Section 32 11 23 - Mineral Aggregates.

3.17 SURFACE SMOOTHNESS:

A. The completed surface of all courses shall be of uniform texture, be smooth, have a continuous "plane" crown and grade, and be free from defects of all kinds.

1. The completed surface of the wearing course shall not vary more than 1/8-inch from the lower edge of a 10-foot straightedge placed on the surface parallel to the centerline.

2. The transverse slope of the completed surface of the wearing course shall vary not more than ¼-inch in 10 feet from the rate of transverse slope shown on the Drawings.

B. When deviations in excess of, but not more than twice, the above tolerances are found, pavement surface shall be corrected by the addition of asphalt concrete mixture of an appropriate class, to low places, or the removal of Material from high places by grinding with an acceptable grinding machine.

1. The repair method shall be submitted to the Engineer for approval.

2. The corrected deviation shall be sealed.

3. All areas in which the surface of the completed pavement deviates more than twice the allowable tolerances described above shall be removed and replaced.

4. If deviations are found which exceed the allowable tolerances but are not in excess of twice the allowable tolerances described above, and, in the opinion of the Engineer, correction by means of any of the methods specified above do not produce acceptable results as to smoothness and serviceability, the Engineer may accept the completed pavement and shall deduct from monies due or that may become due to the Contractor the sum of $500.00 for each and every section of single traffic lane 100 feet in length in which any deviations as described above are found.

    a. Under these circumstances, the decision whether to accept the completed pavement or to require corrections as described above shall be vested entirely in the Engineer.

C. Where grinding or filling does not allow for an acceptable Pavement Structure, removal and replacement of the wearing course of asphalt concrete will be required.

1. Correction of defects shall be carried out until there are no deviations anywhere greater than the allowable tolerances.

D. When Portland cement concrete pavement is placed on HMA pavement, the surface tolerance of the HMA pavement shall be such that no elevation lies above the proposed finished grade minus the specified depth of Portland cement concrete pavement.

1. Prior to placing the Portland cement concrete pavement, any such irregularities shall be brought to the required tolerance by grinding or other means acceptable to the Engineer, at no expense to the Owner.

3.18 ASPHALT CONCRETE DRIVEWAYS:

A. The Contractor shall complete the necessary earthwork and provide a 3 inch compacted HMA, Class A over 6 inches of compacted Mineral Aggregate Type 2.

3.19 WEATHER LIMITATIONS:

A. Asphalt for prime coat shall not be applied when the ground temperature is lower than 50°F.

B. HMA Class D shall not be placed when the air temperature is less than 60°F.

C. Asphalt concrete shall not be placed on any wet surface, or when weather conditions prevent the proper handling or finishing of the bituminous mixtures.

D. HMA shall not be placed when the average surface temperatures are less than:

1. Less than 0.10 feet compacted thickness.

a. Surface course: 55°F

b. Sub-surface course: 55°F

2. 0.10 to 0.20 feet compacted thickness.

a. Surface course: 45°F

b. Sub-surface course: 35°F

3. 0.21 to 0.35 feet compacted thickness.

a. Surface course: 35°F

b. Sub-surface course: 35°F

4. More than 0.35 feet compacted thickness.

a. Surface course: N/A

b. Sub-surface course: 25°F, Only on dry Sub-Surface Courses, not frozen and when air temperature is rising.

3.20 PAVING UNDER TRAFFIC:

A. The Contractor shall keep intersections open to traffic at all times except when paving through the intersection.

1. Such closures shall be kept to the minimum time required to place and compact the mixture and shall include advance warning to traffic of the intersection closure.

2. Work shall be scheduled so that consecutive intersections shall not be closed at the same time.

3. The asphalt shall cool to ambient temperature before any traffic is allowed on the new pavement.

4. Traffic shall not be allowed on newly placed asphalt until approval has been obtained from the Engineer.

5. The installation of advance warning signs, detours, and the maintenance of traffic shall be as specified in Section 01 55 80 - Temporary Traffic Control, and the “Traffic Control Manual for In-Street Work”.

B. Temporary pavement markings:

1. During paving operations, center line stripes shall be maintained throughout the Project Site by applying temporary pavement marking tape each day to the Roadway that was paved that day.

a. Temporary centerline striping shall consist of placing strips of pressure-sensitive pavement marking tape at 10-15 foot intervals along the center line.

b. Temporary marking tape shall be placed in sets of two 12-inch long strips of yellow 4-inch wide marking tape set 4 inches apart and parallel to the center line with each set of 1-foot double line spaced 10 to 15 feet along the center line of the Roadway.

c. Additional temporary striping shall be installed wherever designated by the Engineer.

2. Temporary stop bars shall consist of a 12-inch wide stop bar made up of three parallel 4-inch strips of temporary pavement marking tape placed at locations designated by the Engineer.

a. All other temporary pavement markings utilizing pavement marking tape shall be designated by the Engineer.

3. Temporary pavement markings shall be maintained in serviceable condition by the Contractor during the interval of time it is in use.

a. Layout and marking in preparation for application and the application and removal of the temporary striping shall be the Contractor’s responsibility.

4. Pressure-sensitive pavement marking tape used on the wearing course prior to installation of permanent lane markers, traffic buttons, or permanent paint

striping shall be removed from the pavement current with, or immediately subsequent to, the installation of permanent pavement markings.

a. Damage to the pavement resulting from removal of temporary marking tape, including the use of high heat sources, shall be repaired by the Contractor at no expense to the Owner.

C. Permanent pavement markings.

1. The Engineer will do the layout for permanent lane markings.

2. Within 5 days, weather permitting, after the preliminary layout of pavement marking control points has been completed by the Engineer, the Contractor shall install all permanent pavement markings.

3. Installation shall be pursued vigorously thereafter until all permanent pavement markings and traffic channelization work is complete.

3.21 SEALING OF DRIVING SURFACES:

A. Any wearing course or other pavement course to be used for the driving surface will be evaluated by the Engineer to determine whether a fog seal is required.

B. Determination will be made when the results of nuclear or core density testing show that a seal is needed, or when the Surface Course is HMA Class D.

C. The Contractor shall apply a fog seal of CSS-1 at the rate 0.05 to 0.10 (0.03 to 0.05 residual) gallons per square yard prior to opening to traffic.

3.22 ANTI-STRIPPING ADDITIVE:

A. The Contract, or the Engineer's approval of the Contractor's proposed mix design per this Section, may require an anti-stripping additive be added to the asphalt Material in accordance with “Anti-Stripping Additive” Article of this Section.

3.23 SHOULDERS:

A. Shoulders, if required, shall be constructed to the lines, grades, and cross-sections specified.

B. Material for building up Shoulders shall be Mineral Aggregate Type 1.

3.24 ASPHALT CONCRETE SIDEWALK:

A. Asphalt walkways shall be constructed with a 4 inch section of compacted crushed rock Mineral Aggregate Type 2 Base Course and covered with 2 inch compacted Class A HMA Surface Course.

3.25 ASPHALT CONCRETE PAVEMENT PATCHING:

A. The minimum dimension in any HMA pavement repair area shall be 3 feet.

B. The preparation and compaction of the Sub-grade shall be completed prior to patching in accordance with Section 32 11 26 - Sub-grade Preparation.

C. Before the patch is constructed, all pavement cuts shall be trued so that the marginal lines of the patch form a rectangle with straight edges and vertical faces.

1. The use of a concrete saw will not be required unless specified in the Contract.

2. Non-rigid pavement shall be precut full depth prior to removal by use of an asphalt cutting wheel, saw cutting, or line drilling at the Contractor's option to ensure a neat straight line.

D. The Contractor shall restore pavement cuts with patching.

E. Rigid Pavement Resurfaced With HMA:

1. HMA or bituminous plant mix shall not be placed until the cement concrete has met the requirements of applicable specification Sections.

2. The edges of the existing asphalt pavements and castings shall be painted with STE-1 cationic special tack emulsion immediately before placing the asphalt patching Material (see "Prime Coat Treatment" Article of this Section for prime coat requirements.)

3. The HMA pavement shall then be placed, leveled, and compacted to conform to the adjacent paved surface.

4. Immediately thereafter, all joints between the new and original HMA pavement shall be painted with STE-1 asphalt emulsion and be covered with dry paving sand before the asphalt solidifies.

5. Sealing of HMA patches shall be in accordance with the requirements of "Sealing of Driving Surfaces" Article of this Section.

F. Asphalt Concrete on Granular Base:

1. After the Sub-grade and Base Course have been prepared, HMA Class A pavement shall be placed to a thickness of the existing asphalt pavement depth, or to a minimum of 3 inches, whichever depth is the greater, and compacted in the manner specified in this section.

   a. The finished surface shall be in the same plane as existing Roadway surface with smooth transition between the two surfaces.

2. Restoration of asphalt concrete Roadway pavement on granular base shall consist of "Mineral Aggregate Type 2" to a compacted depth of 6 inches. "HMA Class A Pavement" shall be compacted as specified in "Compaction Equipment and Methods" and "Compaction Control" Articles of this Section.

3. Restoration of MC 800 paved Roadway surfaces, or seal coats, on a granular base shall consist of Mineral Aggregate, Type 2 compacted to 4 inch thickness and "HMA Class A pavement" to a 3 inch compacted thickness.

4. Restoration of HMA driveways shall be the same as specified above for MC 800 pavements.

G. Temporary Pavement Patching:

1. The Contractor shall furnish, place and maintain a 2 inch minimum thickness crushed rock surfacing and a 2 inch minimum thickness MC 250 patch over trench areas.
2. Such temporary asphalt patching will be required where Roadway or walk is needed for vehicular or pedestrian traffic and permanent pavement cannot be placed immediately.
3. The trench backfill shall be compacted as specified in appropriate Sections and the MC 250 tamped and leveled to coincide with adjacent surfaces.
4. In the event that the temporary surface subsides after the initial placement, additional MC 250 and crushed surfacing shall be applied and maintained as necessary to maintain a surface level with existing pavement.
5. Prior to final restoration of the pavement, the Contractor shall remove the temporary asphalt and crushed rock, clean the exposed face of the existing pavement, and restore the pavement.

3.26 SAMPLING AND ACCEPTANCE:

A. Certification of Shipment.

1. Bituminous Materials may be accepted by the Engineer based on the *Manufacturer's Certificate of Compliance* in the form of a Notice of Asphalt Shipment.

   a. This certification (Form 350-053 supplied by WSDOT will be provided by contacting the SPU Materials Laboratory at 206.386.1236) shall be supplied in triplicate at the time of shipment of each truck load, truck and trailer, or other lot of asphalt.

   b. All information required on the form shall be completed.

   c. The original copy shall be mailed on the Day of shipment to the SPU Materials Laboratory, the duplicate to the consignee; and the triplicate with the shipment.

B. Samples and cores.

1. When requested by the Engineer, the HMA Supplier shall ship, by prepaid express or US mail, samples of asphalt that represent current production to the SPU Materials Laboratory.
2. Where samples have been taken from the uncompressed asphalt concrete, new Material shall be placed and compacted at no additional expense to the Owner.
3. When cores are taken by the Engineer at the request of the Contractor, the Owner shall be reimbursed for the coring expenses.

END OF SECTION