SECTION 02785

CHIP SEAL COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for applying liquid or emulsified asphalt on a cleaned surface followed with an application of cover material and bituminous flush coat.

B. Cover materials.

1.2 RELATED SECTIONS

A. Section 01455: Materials Quality Requirements

B. Section 01558: Temporary Pavement Markings

1.3 REFERENCES

A. AASHTO M 140: Emulsified Asphalt.

B. AASHTO M 208: Cationic Emulsified Asphalt.

C. AASHTO MP 1: Performance Graded Asphalt Binder

D. AASHTO T 11: Materials Finer Than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing.

E. AASHTO T 19: Unit Weight and Voids in Aggregate.

F. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates.

G. AASHTO T 40: Sampling Bituminous Materials.

H. AASHTO T 96: Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine.

I. AASHTO T 104: Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

J. AASHTO T 278: Surface Frictional Properties Using the British Pendulum Tester.

K. AASHTO T 279: Accelerated Polishing of Aggregates Using the British Wheel.

L. ASTM D 4791: Flat Particles Elongated Particles or Flat and Elongated particles in Coarse Aggregate.

M. ASTM D 5821: Determining the Percentage of Fractured Particles in Coarse Aggregate.

N. UDOT 945: Dynamic Stripping Test of Bitumen-Aggregate Mixtures.

PART 2 PRODUCTS

2.1 PERFORMANCE GRADED PG BINDER - AASHTO MP 1

A. PG58-22 following Section 02745.

B. PG64-22 following Section 02745.

2.2 ANIONIC EMULSIONS

A. RS-2 following AASHTO M 140.

2.3 CATIONIC EMULSIONS - AASHTO M 208

A. CRS-2A following Section 02745.

B. CRS-2B following Section 02745.

C. CRS-2P following Section 02745.

D. LMCRS-2 following Section 02745.

2.4 HIGH FLOAT EMULSIONS

A. HFRS-2P following Section 02745.

B. HFMS-2 following AASHTO M 140.

C. HFMS-2P following Section 02745.

2.5 FLUSH COAT

A. Use one of the following emulsions agreed upon by the Engineer, following Section 02745, diluted two parts concentrate to one part water by the Manufacturer:
   1. CSS-1
   2. CSS-1h
   3. SS-1
   4. SS-1h
   5. HFMS-2P

2.6 COVER MATERIAL

A. Use crusher processed virgin aggregate consisting of natural stone, gravel, or slag meeting the requirements of Table 1.

Table 1

Chip Seal Cover Material Properties		
Unit Weight	AASHTO T 19	100 lb/ft^3, max
One Fractured Face	AASHTO D 5821	95% min.
Two Fractured Faces	AASHTO D 5821	90% min.
LA wear, see Note 1	AASHTO T 96	30% max.
Soundness	AASHTO T 104	10% max.
Flats & Elongates, 1:3 ratio	ASTM D 4791	5% max.
Stripping, see Note 1	Materials MOI 8-945	10% max.
Polishing, see Note 1	AASHTO T 278, T 279	31 min.
Note 1: The Department has the right to waive this requirement if the aggregates have proven acceptable through successful past performance as determined by the Engineer.		

B. Grade with the following limits to meet the specified test standard in AASHTO T 27 and T 11.

Table 2

Sieve Size	Percent Passing		
	Type A	**Type B**	**Type C**
1/2 in	100		100
3/8 in	85-100		70-90
No. 4	0-20	100	0-5
No. 8	0-5	85-100	0-3
No. 16		10-25	
No. 50		0-5	
No. 200	0-1	0-2	0-1

2.7 BLOTTER MATERIAL

A. Refer to Section 02748, article 2.1, B.

2.8 TEMPORARY PAVEMENT MARKERS

A. Refer to Section 01558.

2.9 SOURCE QUALITY ACCEPTANCE- CHIP SEAL COAT ASPHALT EMULSION

A. Refer to Minimum Sampling and Testing Requirements Section 02745.
   1. Provide a separate oil sampler meeting the requirements of AASHTO T 40 for each delivered truck and trailer not equipped with sampling valves that meet AASHTO T 40. Do not place any chip seal coat emulsion from equipment not meeting this requirement.
   2. Take the samples in the presence of Department personnel using their sample bottles.
   3. Clean and dry the oil sampler after each use following applicable environmental regulations.
   4. Do not place chip seal coat emulsion until the respective viscosity test meets the specification following Section 02745.

2.10 SOURCE QUALITY CONTROL - COVER MATERIAL

A. Department samples at a frequency according to Table 3.

Table 3

Stockpiles - Samples and Tests	
Lot Quantity (Ton)	**Number of Samples**
Lot ≥ 2500	5
1500 < Lot < 2500	4
Lot ≤ 1500	3

B. The Department samples for acceptance either at the source of supply or at the project stockpile. If material previously accepted at the supply source is suspect when delivered to the project, the Department retests following Section 01455, article 1.6 “Samples, Tests, and Referenced Cited Specifications.”

Table 4

Cover Material (Type A, B, and C) Acceptance Schedule For Gradation (Percent passing)				
Sieve Gradation Size	Pay Factor*	Acceptance Band Type A	Acceptance Band Type B	Acceptance Band Type C
	Cover Material	Average of Tests	Average of Tests	Average of Tests
1/2 inch	1.00 0.95 0.90 0.85 Reject	100.0 99.0 98.0 97.0 < 96.9		100.0 99.0 98.0 97.0 <96.9
3/8 inch	1.00 0.95 0.90 0.85 Reject	85.0 - 100 84.0 - 84.9 83.0 - 83.9 82.0 - 82.9 < 81.9		70.0 - 90.0 69.5 - 91.5 69.2 - 92.0 68.0 - 92.0 <67.9 and >92.1
No. 4	1.00 0.95 0.90 0.85 Reject	0 - 20 20.1 - 21 21.1 - 22 22.1 - 23 > 23.1	100.0 99.0 98.0 97.0 < 96.9	0 - 5.0 5.1 - 5.5 5.6 - 6.0 6.1 - 7.0 > 7.1
No. 8	1.00 0.95 0.90 0.85 Reject	0 - 5 5.1 - 5.5 5.6 - 6.0 6.1 - 7.0 > 7.1	85.0 - 100 84.0 - 84.9 83.0 - 83.9 82.0 - 82.9 < 81.9	0.0 - 3.0 3.1 - 3.5 3.6 - 4.0 4.1 - 5.0 > 5.1
No. 16	1.00 0.95 0.90 0.85 Reject		10.0 - 25.0 9.5 - 25.5 9.0 - 26.0 8.5 - 26.5 < 8.4 and > 26.6	
No. 50	1.00 0.95 0.90 0.85 Reject		0.0 - 5.0 5.1 - 5.5 5.6 - 6.0 6.1 - 7.0 > 7.1	
No. 200	1.00 0.75 0.50 Reject	0.0 - 1.0 1.1 - 1.5 1.6 - 2.0 >2.1	0.0 - 2.0 2.1 - 2.5 2.6 - 3.0 > 3.1	0.0 - 1.0 1.1 - 1.5 1.6 - 2.0 >2.1

* use the lowest individual pay factor for combined gradation

PART 3 EXECUTION

3.1 PREPARATION

A. Clean the surface of all dirt, sand, dust, and other objectionable material to the satisfaction of the Engineer.

B. Protect all structures from being spattered or marred including guardrail, guide posts, concrete barriers, parapet walls, etc.

3.2 LIMITATIONS

A. Complete all work, excluding bituminous flush coat, between May 15 and August 31.

B. Do not place any chip seal coat if the Engineer determines that excess moisture is present in the pavement structure.

C. Place seal coat when:
   1. Pavement temperature is between 70 degrees F and 136 degrees F.
   2. Air temperature is 70 degrees F and rising in the shade.

D. Apply bituminous flush coat material no later than 7 days after the application of the cover material, or as directed by the Engineer.

E. Apply bituminous flush coat material when the air temperature in the shade is 50 degrees F and rising.

F. Do not apply bituminous flush coat material during fog, rain, or other adverse conditions.

G. Complete all chip seal operations, including sweeping during daylight hours.

3.3 COVER MATERIAL STOCKPILE

A. Construct on a clean area to minimize contamination.

B. Construct to facilitate uniform dampening. Avoid excess moisture.

3.4 TEMPORARY PAVEMENT MARKER APPLICATION

A. Refer to Section 01558, Temporary Pavement Markings

3.5 ASPHALT MATERIAL /COVER MATERIAL APPLICATION

A. Use a distributor equipped with a hydrostatic system capable of maintaining a tolerance of ± 0.03 gal/yd^2.
   1. Spray the application at a rate sufficient to obtain 60 to 70 percent chip embedment after the completion of rolling operations as determined by the Engineer.
   2. Application rates may vary throughout the project depending on existing conditions.
   3. Equipment is subject to inspection and approval by the Engineer.

B. Apply the asphalt emulsion at a minimum temperature of 145 degrees F.

C. Provide blotter material meeting the requirements of Section 02748 and application equipment approved by the Engineer at the Project location prior to beginning seal coat work.

D. Place building paper adjacent to the transverse construction joint prior to starting each spraying operation. Maintain the control valve to act instantaneously, both in start-up and cut-off.

E. Locate longitudinal joints within 6 inches of the traffic lane line location or within 12 inches of the center of a traffic lane. Construct the meet lines with no skips or voids between adjacent passes. Avoid a double thickness of cover material.

F. Spread the cover material maintaining a tolerance of ± 1.0 lb/yd^2.
   1. Equipment is subject to inspection and approval by the Engineer.

G. Calibrate the spreader at the beginning of each day and as often as required.

Approximate Spread Rates

Unit Weight lbs/ft^3	**Application Rate lbs/yd^2**
60 - 65	17.0
65 - 70	18.4
70 -75	19.8
75 - 80	20.7
80 - 85	22.1
85 - 90	23.5
90 - 95	24.9
95 - 100	25.8

3.6 SURFACE ROLLING

A. Use a minimum of two pneumatic-tire rollers in a longitudinal direction to roll surface after the cover material has been spread.

B. Use a minimum of three passes to seat the cover material.
   1. A pass is defined as traveling in one direction only. Two passes is rolling forward and back.

C. Control bleeding with blotter material and as directed by the Engineer.

D. Set the roller speed to prevent bouncing or skidding. Reduce roller speeds during directional changes to prevent tearing of the surface. Repair all damage done to the seal coat by the rollers.

E. Synchronize the speed of the distributor and chip spreader with that of the rolling operation.

F. Sweep excess cover material off the roadway after the emulsion has set. Remove excess cover material to the satisfaction of the Engineer before opening the roadway to traffic.

3.7 BITUMINOUS FLUSH COAT APPLICATION

A. Clean the surface of all dirt, sand, dust, lose chips, and other objectionable material to the satisfaction of the Engineer.

B. Apply the bituminous flush coat at a rate of 0.11 gal/yd^2. Keep traffic off the flushed surface until the bituminous material has set sufficiently to prevent tracking or pick-up.

C. Provide vendors bill of lading certifying the material was diluted in accordance with paragraph A of article 2.5, "Flush Coat." The Department may sample and test this material for specification compliance.

3.8 TRAFFIC CONTROL

A. Refer to Section 01554.

END OF SECTION