

CITY OF MUSKEGON

SPECIAL PROVISION  
FOR  
**FOG SEAL**

DV

1 of 4

10-18-24

**a. Description.** This work consists of an application of a fog seal. A fog seal is a light application of a quick-setting emulsified asphalt diluted with water. Ensure all work and materials are in accordance with the standard specifications, except as modified herein.

**b. Materials.** Furnish materials in accordance with subsection 904.03 of the Standard Specifications for Construction with the following alternative:

1. Asphalt Emulsion. Furnish Cationic Quick Setting Emulsified Asphalt (CQSEA) meeting the requirements of Table 1 in this Special Provision.

Dilute asphalt emulsion, at a maximum of one part asphalt emulsion to one part water, at the emulsion plant.

**c. Equipment.** Use equipment that is safe, environmentally acceptable, and capable of producing a quality product.

1. Pressure Distributor. Ensure the pressure distributor has the following characteristics:

- A. Has a ground speed computer-controlled device interconnected with the asphalt emulsion pump such that the specified application rate is supplied at any speed.

- B. Can maintain the asphalt emulsion at the specified temperature.

- C. Has spray bar nozzles capable of producing a uniform fan spray and with shutoff control that is instantaneous, with no dripping.

- D. Can maintain the specified application rate within  $\pm 0.015$  gallons per square yard (gal/syd) for each load.

2. Miscellaneous. Furnish a power broom and all necessary hand tools, thermometers, etc. Ensure distributors and power brooms are equipped with at least one visible approved flashing, rotating, or oscillating amber light.

**d. Pre-Paving On-Site Meeting.** A pre-paving meeting between the Engineer and Contractor will be held prior to beginning work. The agenda for this meeting will include a review of the following:

1. Work schedule,
2. Traffic control plan,
3. Equipment calibration and adjustments,
4. Condition of materials and equipment, and

5. Quality control plan (JMF, Yield Check Methods, etc.).

**e. Construction.** Place the longitudinal construction joint at the edge of metal of the driving lane; at a location requiring a minimal overlap onto the driving lane; or at a location requiring a minimal overlap of the new longitudinal joint resulting from milling and resurfacing.

Where corrugations are present longitudinal joints are to be constructed at the outside edge of the far side of the corrugation on the first pass. Place the longitudinal joint at the outside edge of the opposite side of the corrugation for the second application.

If applying fog seal to a chip seal, begin the application of the fog seal within 48 hours of the completion of the chip seal work on the project, but not on the same day as the application of chip seal. Once the fog seal application has begun, work must continue to completion except for: work restrictions outlined in the contract, state holidays, weekends, or inclement weather as defined in the following paragraph.

Apply the fog seal only when the pavement and air temperature is 55 °F or above. Do not apply the fog seal if there is forecast of greater than 50 percent chance of rain within 2 hours of application. Do not apply the fog seal if temperatures are forecast to be below 32 °F within 24 hours from the time of application.

Use pressure sufficient to apply emulsion at a uniform rate, but without splattering or drilling from the spray bar. Adjust nozzle angle and spray bar height to ensure correct spray pattern.

Apply fog seal at a rate of 0.10 to 0.15 gallons of diluted material per square yard of pavement treated, with a target rate of 0.12 gal/syd. If the target rate of 0.12 gal/syd is not the optimum application rate due to the gradation of the coarse aggregate or due to existing surface conditions of the pavement, the Contractor shall notify the Engineer immediately and prior to application. Ensure the fog seal application results in a uniform coverage of emulsion just sufficient to flow into and seal the pavement pores, small cracks, and voids. The asphalt emulsion application rate, as determined by a yield check, must not exceed a tolerance of  $\pm 0.015$  gal/syd from the established JMF application rate.

If a condition is identified that causes an unsatisfactory fog seal, stop all production work and perform corrective action immediately at no additional cost to the contract. If there are adverse environmental conditions, furnish the Engineer an action plan that clearly demonstrates how the fog seal operation will be adjusted for the actual environmental conditions.

Allow the Engineer access to all work in progress for the purpose of quality assurance review and testing.

**f. Quality Control.** Establish, maintain, and follow an effective QC system in accordance with current Department procedures. The QC system must detail plans, procedures, and organization necessary to furnish and apply a fog seal that complies with the contract. Follow the QC system until work is accepted.

Establish, maintain, and follow a Contractor Quality Control (CQC) plan sufficient to ensure that the warranty related treatment complies with the contract. The CQC plan must cover all fog seal operations. Submit a copy of the plan to the Engineer, at the preconstruction meeting, for approval. Follow the approved plan throughout the project.

Include the following information, at a minimum, in the CQC plan:

1. Materials to be used on the project.
2. Sampling and testing methods used to determine compliance with material specifications.
3. Equipment to be used on the project.
4. Calibration method used to determine compliance with the application rates.
5. Procedures for pavement preparation.
6. Controls implemented by the Contractor to ensure that the fog seal material is cured or set up satisfactorily before opening to traffic.
7. Procedures implemented by the Contractor for monitoring initial acceptance requirements.

**g. Documentation.** Furnish the Engineer a daily report including the following information:

1. Control section, project number, county, route, Engineer;
2. Date, air temperature, pavement temperature, humidity;
3. Asphalt emulsion temperature;
4. Beginning and ending stations;
5. JMF: application and dilution rates (asphalt emulsion);
6. Yield checks on asphalt emulsion (3 per day, minimum);
7. Length, width, total square yards; and
8. Contractor's signature.

Furnish asphalt emulsion documentation in accordance with current Department acceptance procedures.

**h. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	Pay Unit
Fog Seal.....	Square Yard

**Fog Seal** includes placement of the asphalt emulsion including surface preparation, stationing, and documentation.

**Table 1: Cationic Quick Setting Emulsified Asphalt (CQSEA)**

	Requirements
	CQSEA
Viscosity, Saybolt Furol, <i>AASHTO T59/ASTM D7496</i> :	
At 25 °C, sec	20–100
Storage Stability Test, <i>AASHTO T59/ASTM D6930</i> , 24 hr, % Difference, max	1
Particle Charge Test, <i>AASHTO T59/ASTM D7402</i> (a)	Positive
Sieve Test, <i>AASHTO T59/ASTM D6933</i> , % max (Distilled Water)	0.10
Residue, min	60
Tests on Distillation Residue:	
Penetration, 25 °C, 100 g, 5 sec, dmm, <i>AASHTO T49/ASTM D5/D5M</i>	40–90
Ductility, 25 °C, 5 cm/min, cm, min, <i>AASHTO T51/ASTM D113/D113M</i>	40
Solubility in Trichloroethylene, % min, <i>AASHTO T44/ASTM D2042</i>	97.5
Ash Content, % max, <i>ASTM D128</i>	2
a. If Particle Charge Test is inconclusive, material having a maximum pH of 6.7 is acceptable.	