**REFLECTIVE CRACK CONTROL TREATMENT**

Effective: 1-1-22

 Description. This work shall consist of constructing reflective crack control treatments. Area reflective crack control treatment shall be either System A or C at the option of the Contractor. Strip reflective crack control treatment shall be either System A, B, or C at the option of the Contractor.

 Materials. Materials shall be according to the following.

 Item Article/Section

(a) Reflective Crack Control System ………………………………………..1062

(b) Preparation of Mixture for Cracks, Joints, and Flangeways ………1030.11

(c) Hot-Poured Joint Sealer ………………………………………………1050.02

(d) Bituminous Materials (Note 1) (Note 2) (Note 3) ………………………1032

 Note 1. The asphalt binder used for System A shall be PG 58-22 or PG 64-22.

 Note 2. The primer to be used with System B shall be supplied by the manufacturer of the membrane and shall be compatible with the membrane.

 Note 3. The tack coat to be used with System C shall be SS-1, SS-1h, SS-1hP, NTEA, RS-1, RS-2, CSS-1, CSS-1hP, CRS-1, CRS-2, or

 HFE-90.

 Equipment. Equipment shall be according to the following.

 Item Article/Section

(a) Rollers……………………………………………………………………1101.01

(b) Mechanical Sweeper ...………………………………………………..1101.03

(c) Asphalt-Rubber Processor/Distributor ………………………………1101.17

(d) Mechanical laydown Equipment ……………………………………..1101.18

(e) Aggregate Spreaders ………………………………………………….1102.04

(f) General Use Pressure Distributor ………………………………...1102.05(a)

CONSTRUCTION REQUIREMENTS

 Surface Preparation. The surface on which reflective crack control system is to be constructed shall be clean and dry. Base failures shall be repaired. Cracks, spalls, potholes, or other depressions shall be sealed with an approved crack sealer or filled with mixture for cracks, joints, and flangeways according to Article 406.05.

 When, in the opinion of the Engineer, the existing pavement surface cannot be rendered sufficiently smooth by crack sealing and patching, a binder shall be placed prior to construction of the reflective crack control system. The binder shall be constructed according to Section 406.

 Placing Hot-Mix Asphalt (HMA). When HMA binder or surface course is placed on top of any reflective crack control system, the mixture shall be placed at a maximum temperature of 325 °F (160 °C).’

 Reflective Crack Control System A. The area to be covered with fabric shall be sprayed uniformly with asphalt binder at a rate of 0.25 to 0.30 gal/sq yd (1 to 1.3 L/sq m) as directed by the Engineer. Asphalt binder application shall be accomplished with a general use pressure distributor for all surfaces, except where the distributor does not have room to operate, hand spraying will be allowed. The width of the spray application shall be 2 to 6 in. (50 to 150 mm) wider than the fabric width. The asphalt binder shall be applied at a maximum temperature of 325 °F (160 °C) to avoid damage to the fabric.

 After the asphalt binder has been sprayed, the fabric shall be placed onto the asphalt binder without delay. Every effort must be made to lay the fabric as smoothly as possible to avoid wrinkles. Wrinkles large enough to cause laps of the fabric shall be cut and laid out flat. The fabric shall be broomed or squeegeed to remove air bubbles and make complete contact with the road surface.

 The fabric shall overlap the adjacent fabric panel a minimum of 2 in. (50 mm) and asphalt binder shall be applied by hand to make the joint. The transverse joints shall be made in such a manner to avoid pickup by the paver. The direction of paving shall be in the direction of fabric placement.

 When placed as a strip treatment, the strip shall be 24 in. (600 mm) wide.

 Reflective Crack Control System B. The waterproofing membrane interlayer shall be placed as shown on the plans. Placement of the membrane shall be done only when the temperature is above 40 °F (5 °C) and the pavement surfaces are dry and free of dirt and debris.

 The surface shall be primed according to the manufacturer’s recommendations prior to placement of the membrane. The primer shall be placed at a minimum rate of 300 sq ft/gal (7 sq m/L), shall extend 1 in. (25 mm) wider than the membrane, and shall be allowed to dry until tack free before applying the membrane. Primer shall be placed on both Portland cement concrete and HMA pavement surfaces.

 Any spall greater than 3 in. (75 mm) in diameter which will cause a failure of the material to bond to the pavement or will leave a cavity under the material shall be corrected with a material approved by the Engineer prior to the placement of the waterproofing membrane interlay.

 The membrane shall be installed in nominal 12 in. (300 mm) widths [11 3/8 in. (290 mm) minimum] and shall be centered over the joint or crack within a 1 in. (25 mm) tolerance. Laps will be permitted in the membrane with a minimum overlap of 2.5 in. (63 mm). The membrane shall be installed straight and wrinkle-free with no curled or uplifted edges. Wrinkles over 3/8 in. (10 mm) width shall be slit and folded down.

 Membrane shall be surface dry before placement of the hot-mix asphalt (HMA) overlay. Paving may begin immediately after membrane placement.

 Reflective Crack Control System C. Immediately prior to application of a tack coat, the surface shall be thoroughly cleaned by sweeping.

 When placed as a strip treatment, the strip shall be 24 in. (600 mm) wide. Equipment which meets the approval of the Engineer and applies a uniform application of tack coat, asphalt rubber, and cover aggregate may be used.

(a) Tack Coat. A tack coat shall be applied according to Article 406.05 at a residual rate of 0.05 lb./sq ft (0.244 kg/sq m).

(b) Asphalt-Rubber Mixture. For the asphalt-rubber mixture, the Contractor has the choice of using either a vulcanized rubber in asphalt with a diluent (Mixture 1) or a crumb rubber blend in asphalt which has been treated with an extender oil (Mixture 2).

(1) Mixture 1. The percentage of vulcanized rubber shall be 33 ± percent by weight (mass) of the asphalt cement in Mixture 1.

 The temperature of the asphalt shall be between 350 and 400 °F (175 and 200 °C) before addition of the vulcanized rubber. The material shall be carefully combined and mixed and reacted for a period of time as required by the Engineer which shall be based on laboratory testing by the asphalt-rubber supplier or contracting agency.

 The temperature of the asphalt-rubber mixture shall be above 325 °F (160 °C) during the reaction period.

 After the reaction between asphalt binder and rubber has occurred, the viscosity of the hot asphalt-rubber mixture may be adjusted for spraying and/or better “wetting” of the cover material by the addition of a diluent. The diluent shall not exceed 7.5 percent by volume of the hot asphalt-rubber mixture.

 If a job delay results after the full reaction has occurred, the material may be allowed to cool and be slowly reheated to an acceptable spraying temperature just prior to application. However, because of the polymer reversion that can occur when crumb rubber is held for prolonged high temperatures, the material shall not be reheated to temperatures above 325 °F (160 °C). Additional diluent up to a maximum of 3 percent by volume of the hot asphalt-rubber mixture may be sued after reheating of the material.

(2) Mixture 2. The percentage of crumb rubber blend shall be 25 ± 4 percent by weight of the asphalt binder. Prior to adding the crumb rubber blend, the asphalt and extender oil shall be mixed in such quantities to produce an absolute viscosity of 600 poises (60 Pa·s) at 140 °F (60 °C) when tested according to the requirements of AASHTO T 202. The asphalt oil blend shall first be heated to 400 °F (200 °C) minimum and be thoroughly mixed before beginning incorporation of the crumb rubber blend. The crumb rubber blend shall be added as quickly as possible, and the mix shall be given adequate circulation and agitation during the addition-mixing process to provide for proper dispersion. As soon as the mixing of the rubber is complete, Mixture 2 may be applied to the roadway. However, if the material is not to be used within one hour of mixing, the temperature shall be reduced to below 325 °F (160 °C) and reheated on the project site.

(c) Application of Asphalt-Rubber Material. Asphalt-rubber shall be placed only under the following conditions.

(1) The pavement surface temperature is not less than 60 °F (15 °C) and rain is not imminent;

(2) The pavement surface is clean and dry;

(3) The wind conditions are such that excessive blowing of the spray bar fans is not occurring, and

(4) All construction equipment such as asphalt-rubber distributor, aggregate spreader, haul trucks with cover aggregate, and rollers are in position and ready to commence placement operations.

The asphalt-rubber mixture shall be applied at a temperature of 290 to 325 °F (140 to 160 °C) at a rate of 0.6 ± 0.05 gal/sq yd (2.7 ± 0.2 L/sq m) [based on 7.5 lb./hot gal (0.9 kg/hot L)]. Transverse joints shall be constructed by placing building paper across and over the end of the previous asphalt-rubber application. Once the spraying has progressed beyond the paper, the paper shall be removed immediately and disposed of as directed by the Engineer. Longitudinal joints shall be lapped a minimum of 4 in. (100 mm).

(d) Application of Cover Material. Cover material shall be applied immediately to the asphalt-rubber after spreading at a rate of 30 to 40 lbs./sq yd (16 to 22 kg/sq m). If steel slag is used for over material, the spread quantity shall be increased in proportion to its higher specific gravity.

 At the time of application to the asphalt-rubber, cover aggregate shall not contain any free moisture.

(e) Rolling. At least three pneumatic-tired rollers shall be provided to accomplish the required embedment of the cover material. At some project locations or where production rates indicate, fewer rollers may be utilized as directed by the Engineer.

 Sufficient rollers shall be sued for the initial rolling to cover the width of the aggregate spread with one pass. The first pass shall be made immediately behind the aggregate spreader, and if the spreading is stopped for any reason, the spreader shall be moved ahead or off to the side so that all cover material may be immediately rolled. Four complete coverages with rollers shall be made with all rolling complete within two hours after the application of the cover material.

(f) Opening the Completed Asphalt-Rubber membrane Interlayer to Traffic. Except when it is necessary that hauling equipment must be on the newly applied membrane, traffic of all types shall be kept off the membrane until it has had time to set properly. The speed of all hauling equipment shall not exceed 15 mph (25 km/hr.) when traveling over a membrane which is not adequately set. The minimum traffic free period shall be at least two hours.

(g) Removing Loose Cover Aggregate. Following placement of the system, the loose cover aggregate shall be removed with a mechanical sweeper without dislodging any embedded aggregate.

(h) Placement of HMA. The placement of the HMA overlay shall be delayed as directed by the Engineer for sufficient time to allow for adequate evaporation of the diluent or extender oil. A minimum of two hours shall elapse.

 Method of Measurement. Area reflective crack control treatment will be measured for payment in place and the area computed in square yards (square meters). Strip reflective crack control treatment will be measured for payment in feet (meters) along the joint or crack.

 Basis of Payment. This work will be paid for at the contract unit price per square yard (square meter) for AREA REFLECTIVE CRACK CONTROL TREATMENT or per foot (meter) for STRIP REFLECTIVE CRACK CONTROL TREATMENT.