

Date: July 15, 2011

To: MAG Specification and Detail Committee members

From: Jeff Benedict

RE: case 11-27 section 335 "Hot asphalt rubber seal (chip)

Purpose: to bring specification into current practice and technologies. Elimination of extender oils and insertion of some current practices of blending the rubber binder.

Revisions: many to binder and elimination of versions of asphalt rubber binder. There is only one version in this specification

SECTION 335

PLACEMENT AND CONSTRUCTION OF HOT ASPHALT-RUBBER SEAL

335.1 DESCRIPTION GENERAL:

This work shall consist of applying an application of asphalt-rubber binder, a combined mixture of hot paving grade asphalt and ground-tirecrumb rubber modifier. It shall be immediately covered with a cover material.

The work involves furnishing and placing all materials on existing pavement surfaces in accordance with this specification.

~~This specification includes the two approved processes for the production of Asphalt Rubber. Method A uses ground reclaimed vulcanized rubber and a extender oil. Method B uses ground reclaimed vulcanized rubber and a kerosene diluent. Either method is acceptable based on proper compliance with the specifications and certifications of materials.~~

335.2 MATERIALS:

The asphalt, ~~granulated~~ rubber, ~~binder~~ extender oil, and ~~kerosene~~ shall comply with Section 717. Sand Blotter shall comply with Section 333. Cover material shall be precoated and comply with Section 716 ~~(PRECOATED)~~. ~~Tack coat shall comply with Section 329. Flush Fog seal coats~~ shall comply with Section 333.

335.2.1 Certification and Quality Assurance: Prior to application, the Contractor shall submit certification of compliance to the Engineer at least 7 days prior to application for all materials to be used in the work. For example: Asphalt-rubber binder designs (section 717), cover material test results (section 716), sand blotter material (section 333), fog seal coats (section 333), and any additional materials used on the project.

335.3 EQUIPMENT:

335.3.1 General: The method and equipment for combining the crumb rubber modifier and hot paving grade asphalt shall be so designed and accessible that the Engineer can readily determine the percentage by weight of each of two materials being incorporated into the mixture.

All equipment shall meet requirements of Section 330 with the following modifications:

(A) Pneumatic-tired rollers: At least three pneumatic-tired rollers shall be used. Each roller shall carry a minimum of 5,000 pounds on each wheel and a minimum of 90 psi in each tire. Rollers shall not travel in excess of 12 mph.

(B) Distributor: The distributor must be equipped with a mechanical mixing device.

335.3.2 Mechanical Pre-Blender: Crumb Rubber modifier and the hot paving grade asphalt ~~(and extender oil in Method A)~~ for the asphalt-rubber binderblend may be pre-blended prior to introduction of the blend into the distributor.

The mechanical pre-blender shall be equipped with an asphalt totalizing meter in gallons and a flow rate meter in gallons per minute.

335.4 MIXING:

~~The percentage of rubber shall be 22% plus or minus 2% by weight of the total mixture. Mixing shall continue in the temperature range of 250 degrees F. to 450 degree F. until the consistency of the mixture approaches that of a semi-fluid material (i.e., reaction is complete). At the lower temperature, it will require approximately 30 minutes for the reaction to take place after the start of the addition of rubber. At the high temperature, the reaction will take place within approximately five minutes. Therefore, the temperature used will depend on the type of application and the~~

~~methods used by the Contractor. Viscosity of the asphalt rubber shall be more than 500 centipoises and less than 4000 centipoises at the time of application (ASTM D 2994). Mixing shall be done in accordance with section 717. Application shall proceed immediately upon the asphalt-rubber binder requirements being met, reaching the proper consistency.~~

~~**335.4.1 Adjustment to Spraying Viscosity with Diluent:** After the full reaction described in MIXING Section 335.4 has occurred, the mix can be diluted with a kerosene type diluent. The amount of diluent used shall be less than 7.5 percent by volume of the hot asphalt rubber composition as required for adjusting viscosity for spraying or better wetting of the cover aggregate. Temperature of the hot composition shall not exceed the kerosene initial boiling point at the time of adding diluent.~~

335.5 CONSTRUCTION:

Prior to placing the hot asphalt-rubber ~~binderseal coat~~, soil and other objectionable materials shall be removed from the pavement surface, ~~and a tack coat applied as specified in Section 329.~~

The application rate of the hot asphalt-rubber ~~binder mixture~~ shall be 0.55 to ~~0.65~~ 0.70 gallons per square yard ~~or as directed by the Engineer based on field conditions.~~ Material shall be applied at temperatures of ~~350~~ 375 degrees F. to ~~400~~ 425 degrees F. ~~for Method A and 300 degrees F. to 350 degrees F. for Method B.~~ The application of the cover material shall follow as close as possible behind the distributor truck.

The cover material shall be preheated immediately prior to application and precoated as specified in Section 716 - PRECOATED. The temperature of the precoated chips shall be in accordance with Section 330.

Hot asphalt-rubber ~~binderseal~~ with hot precoated cover aggregate shall be placed only when the ambient temperature is at least 60 degrees F. and rising, on a dry surface and there is no imminent threat of rain.

The rate of application of the cover material shall be from ~~25~~ 18 to ~~35~~ 25 pounds per square yard for the ~~1/4 inch nominal size Low Volume Chip~~ or ~~30~~ 28 to ~~40~~ 35 pounds per square yard for the ~~3/8 inch nominal size High Volume Chip~~, or as directed by the Engineer.

The rolling of the cover material shall proceed immediately after application in order to insure maximum embedment of the aggregate. Sufficient rollers shall be used 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. If the spreading is stopped for an extended period, the spreader shall be moved ahead or off to the side so that all cover material may be immediately rolled. Three (3) complete passes with rollers shall be made with all rolling completed within one (1) hour after the application of the cover material.

The Contractor shall sweep all joint edges clean of overlapping cover material prior to the adjacent application of asphalt-rubber ~~binder material~~. Transverse joints shall be made by placing building paper over the ends of the previous applications. The joining application shall start on the building paper. Once the application process has progressed beyond the paper, the paper shall be removed and disposed of to the satisfaction of the Engineer. All reasonable precautions shall be taken to avoid skips and overlaps at joints and to protect the surfaces of adjacent structures, trees and shrubs, etc., from being spattered or marred. Correction of any such defects will be required at no additional cost to the Contracting Agency.

Traffic will not be permitted on the surface until ~~after sweeping operations have finished and~~ the cover aggregate has set. Traffic control shall be in accordance with Section 401 as supplemented by the Contracting Agency.

At signalized intersections, an application of 2 to 5 pounds of sand ~~blotter~~ per square yard shall be applied through the intersection and for a distance of 200 feet each way from the near curb returns after rolling and before opening a lane to traffic. Sand Blotter shall meet requirements of section 333.

After sweeping and prior to striping, a ~~fog seal flush~~ coat shall be applied to the asphalt-rubber ~~seal treatment~~ consisting of 0.05 to 0.10 gallons per square yard according to Section 333. The application of the ~~fog seal flush~~ coat may be delayed to facilitate curing or to avoid placement under unfavorable high temperature conditions.

Note: The fog seal~~flush~~ coat shall not be applied to the area 200 feet either side of and through signalized intersections.

335.6 MEASUREMENT:

Certified weight slips of all materials shall be delivered to the Engineer before the materials are applied.

Certified weight slips of any bituminous material being weighed back in for credit shall be delivered to the Engineer for the next day.

Quantities of materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items actually used on the project.

- | | | |
|-----|--|-------------------|
| (A) | Hot Precoated Chips <u>Cover Material (Precoated)</u> | Ton |
| (B) | Asphalt Rubber <u>Binder</u> | Ton |
| (C) | Emulsified Asphalt (<u>Fog Seal</u>) | Ton (diluted) |
| (D) | Sand Blotter | Ton (surface dry) |

335.7 PAYMENT:

Payment will be full compensation for furnishing and placing all materials specified and used, with no allowance for waste, and shall include labor, equipment, tools, and incidentals necessary to complete the work as prescribed in the specifications -and as directed by the Engineer.

Asphalt cement for precoating chips will be included in the price per ton for hot precoated chips.

No payment will be made for materials rejected due to improper placing, improper proportions of materials, or materials found to be defective.