Date: July 15, 2011

To: MAG Specification and Detail Committee members

From: Jeff Benedict

RE: case 11-24 section 337 “Crack sealing”

Purpose: To add an updated section with clear limits of its use and scope of crack sealing. The MAG did not have any specifications for crack sealing. Crafco, a major vendor was consulted and helped write the specification. We then reviewed it and had agency members review.
This reflects a major change to the current MAG section.

SECTION ~~336~~337

Crack Sealing and Crack Filling

~~336~~337.1 GENERAL:

This work shall consist of an application of hot applied, single component polymer modified asphalt rubber, supplied in solid form used to seal or fill cracks or joints in asphalt concrete or portland cement concrete pavements. Cracks or joints that will be sealed shall be a minimum of ¼ inch wide at time of work, and have a maximum width of 1-1/2 inches ~~wide~~.

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

~~336~~337.2 MATERIALS:

Materials shall be a premixed, single component mixture of asphalt cement, aromatic extender oils, polymers, and granulized rubber in a closely controlled manufacturing process. Materials will conform to the following specifications when heated in accordance to ASTM D5078 to the Manufactures maximum safe heating temperatures.

Test	Specification
Cone Penetration (ASTM D5329)	20-40
Resilience (ASTM D5329)	30% Minimum
Softening Point (ASTM D113)	210°F (99°C) Minimum
Ductility, 77F (25C) (ASTM D113)	30 cm Minimum
Flexibility (ASTM D3111 *Modified)	Pass at 30°F (-1°C)
Flow 140°F (60°C) (ASTM D5329)	3 mm Maximum
Brookfield Viscosity, 400°F (204°C) (ASTM D2669)	100 Poise Maximum
Asphalt Compatibility (ASTM D5329)	Pass
Bitumen Content (ASTM D4)	60% Minimum
Tensile Adhesion (ASTM D5329)	400% Minimum
Maximum Heating Temperature	400°F (204°C)
Minimum Heating Temperature	380°F (193°C)

*Specimen bent 90° over a 1-inch mandrel within 10 seconds

~~336~~337.2.1 CERTIFICATION AND QUALITY ASSURANCE:

Prior to application, the Contractor shall submit certification of compliance to the Engineer for all materials to be used in the work.

~~336~~337.3 EQUIPMENT:

The melter applicator unit shall be a self-contained double boiler device with the transmittal of heat through heat transfer oil. It must be equipped with an on board automatic heat controlling device to permit the attainment of a predetermined temperature, and then maintain that temperature as long as required. The unit shall also have a means to vigorously and continuously agitate the sealant to meet the requirements of Appendix X1.1 of ATSM D6690. The sealant shall be applied to the pavement under pressure supplied by a gear pump with a hose and wand and direct connecting applicator tip. The pump shall have sufficient pressure to apply designated sealant at a rate of at least three (3) gallons (11.4 L) per minute. Melter applicators shall be approved for use by the sealant manufacturer.

~~336~~337.4 APPLICATION:

The sealant shall be applied in the crack or joint reservoir uniformly ~~solid~~ from bottom to top and shall be filled without formation of entrapped air or voids.

The crack or joint shall be slightly overfilled then leveled with a 3" sealing disk or v-shaped squeegee to create a neat band aid extending ± 1" on each side of the crack or joint for surface strength and waterproofing. The band aid shall not be more than 1/8 inch in thickness above the pavement surface.

If the pavement being sealed will be overlaid with Hot Mix Asphalt within six months of sealant application, cracks shall be routed, and sealant placement shall be recessed ¼" (6 mm) in the crack or joint reservoir with no over band. If routing is not used, the sealant over band thickness and width should be kept as narrow and thin as possible.

~~336~~337.5 CLEANING AND PREPARING CRACKS OR JOINTS:

Prior to application of polymer modified asphalt rubber, all cracks or joints shall be cleaned out of any debris and dust. As directed by the Engineer, final cleaning of the ~~Cracks~~ cracks or joints shall be ~~cleaned~~ by blowing or vacuuming. Routing Cracks and joints ~~may~~will~~will~~ extend crack sealant life and performance. Most cracks in Maricopa County have less than 1/8" movement over the course of a year. On cracks that have spacing which creates more than 1/8" movement it is recommended that cracks be routed.

~~336~~337.5.1 ROUTING:

Routing operation should be used to create a sealant reservoir. Cutting should remove at least 1/8" (3 mm) from each side and produce vertical, intact surfaces with no loosely bonded aggregate. Joints and cracks should be routed to a ¾" (19mm) W x ¾" (19mm) D configuration for a typical application. ~~A low profile~~

~~configuration of 1 ½" (40mm) W x 3/8" (10mm) D may be used in colder climates however studies also suggest a 2:1 maximum ratio for enhanced thermal movement performance. If crack sealing is performed on a previously chip sealed or slurried surface, the low profile configuration depth should be 5/8" (15mm) D. The pavement should be sound enough to resist significant spalling during cutting. Final reservoir width should not exceed twice the cutter width or 1 ½" (38mm) maximum.~~

~~336~~337.5.2 BLOWING:

Final cleaning shall use high pressure 90 psi (620 ~~kpa~~kPa) minimum, dry, oil free compressed air to remove any remaining dust. Both sides of the crack or joint shall be cleaned. Surfaces will be inspected to assure adequate cleanliness and dryness.

~~336~~337.5.3 VACUUMING:

Final cleaning shall thoroughly clean cracks and joints to a minimum of 1". The vacuum unit shall use high pressure 90 psi (620 ~~kpa~~kPa) minimum, dry, oil free compressed air to remove any remaining dust, directly attached to a vacuum unit to collect the dust and residue. Both sides of the crack or joint shall be cleaned. Surfaces will be inspected to assure adequate cleanliness and dryness.

~~336~~337.6 OPENING TO TRAFFIC:

Material shall not be exposed to traffic until fully cured. If sealed area must be open to traffic a blotter material can be applied to surface of polymer modified asphalt rubber.

~~336~~337.6.1 BLOTTER:

On two lane roads or where traffic may be likely to come in contact with the hot sealant before it cures, a blotter or specialized detackifying material may be required to prevent asphalt bleed and/or pickup of sealant by vehicular traffic. Blotter material should be compatible with crack sealant and any surface treatment being used.

~~336~~337.7 PAVEMENT TEMPERATURES

Polymer modified asphalt rubber shall be applied when pavement temperature exceeds 40°F (4°C). Lower temperatures may result in reduced adhesion due to the presence of moisture or ice. If pavement temperature is lower that 40°F (4°C), it may be warmed using a heat lance that puts no direct flame on the pavement. If installing at lower pavement temperatures that 40°F (4°C), extreme care should be used to insure that cracks or joints are dry and free from ice and

other contaminates. Product temperatures should be maintained at the maximum heating temperature recommended by the manufacture. If installing at night, ensure that dew is not forming on the pavement surface. Applied product should be checked by qualified personnel to ensure that adhesion is adequate.

~~336~~337.8 MEASUREMENT:

The cleaning and sealing of cracks and joints shall be measured by the lineal foot.

~~336~~337.9 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 to complete the work as prescribed and as directed by the Engineer.

No payment will be made for materials rejected due to improper placement, improper proportions of materials. Or material found to be defective or out of specifications.