INTRODUCTION

This Technical Note provides a description of Ultra Thin Asphalt (UTA) and explains changes to previous specification requirements for mix design and placement of UTA, aimed at improving overall performance. A summary of technical requirements with suggested applications and limitations of UTA is also provided.

UTA DESCRIPTION

UTA is a highly textured asphalt surfacing placed at a maximum thickness of 25 mm (average thickness of 15 to 20 mm) over a water resistant bituminous bond coat of Polymer Modified Binder (PMB) emulsion (Figure 1). UTA is a mixture of aggregate, filler and fibre with a modified binder. The fibre in the UTA is added to prevent draindown of the binder during transport and placement.

UTA is placed with a purpose built mechanical paver that incorporates a full width spray bar immediately forward of the auger and that is designed to apply both the bond coat and the asphalt surfacing in a single pass. Tandem steel wheel rollers are used to compact the asphalt and embed it into the bond coat.

As the UTA is only an average of 15 to 20 mm thick, the water resistant bond coat forms an integral part of the UTA surfacing. As the bond coat is immediately covered with hot UTA, the emulsion is still in a very fluid state so that it permeates upwards into the UTA by capillary action by about 5 to 8 mm. Once cured, the PMB modified emulsion forms a strong bond between the UTA aggregates in contact with the existing pavement surface.

Attributes of UTA surfacing are:

- Provides a surface with high macrotexture;
- Enables high paving production rates (compared with dense graded asphalt) due to the thin depth of placement;
- Rapid reduction in temperature allowing it to be opened to traffic within 10 to 20 minutes after placement;
- Produces a quiet surface compared to sprayed seals;
- Moderately flexible and water resistant with similar performance properties to a sprayed seal treatment;
- Lower cost, compared to an asphalt overlay of 30 mm or more;
- Non structural surfacing, which requires the existing pavement to be in a sound structural condition for maximum performance; and
- Expected life of 10 years when placed over a structurally sound pavement where typically the life of UTA is determined by the onset of ravelling.

BACKGROUND

UTA was first used in Victoria in 1993 in a number of trials and quickly gained acceptance for widespread use over the next 10 years, where a total of 3.6 million square metres of pavement was treated in predominantly urban areas. However, an unacceptably high proportion of premature failures led to an investigation in 2005 into the causes of this unexpected performance. These failures were typically in the form of ravelling (Figure 3) and once ravelling commenced deterioration progressed rapidly. This suggests that preventative maintenance is required soon after visual evidence of fine aggregate particles become dislodged by traffic.
Limited testing of the UTA indicated that poor performance of UTA was primarily due to insufficient binder, with binder contents in some cases well below the specified minimum. In addition whilst UTA had in a number of locations been placed in thicknesses exceeding 30 mm or without the bond coat there was no evidence to suggest that these were the primary causes of early distress. However, a reduction in life would nevertheless be expected.

**VICROADS STANDARD SPECIFICATION**

VicRoads Standard Specification Section 410 differs in some respects from previous guidelines and local project specifications. To improve the reliability in performance of UTA, the following requirements are included in VicRoads Standard Specification 410:

- PMB is to be used for both the UTA mix and for the water resistant bond coat;
- A slightly coarser and narrower grading envelope for the UTA aggregates and a reduction in the Flakiness Index limit from 35 (dense graded asphalt) to 25 to provide a stronger and more open graded aggregate matrix;
- Minimum binder content of 5.3%;
- Introduction of a mix design procedure to replace the previous “recipe” approach by requiring verification of air voids content, binder film thickness and asphalt particle loss against specified test limits, aimed at producing a more durable and free draining mix;
- Binder Paste Drain Off to be below 0.3%;
- A standardised approach for determining the minimum rate of application for the water resistant bond coat based on the texture of the existing surface;
- A requirement for the average layer thickness to be between 15 to 20 mm, with a maximum thickness at any point of 25 mm. A surface correction (regulation) course of dense graded asphalt should be applied to achieve the specified maximum UTA thickness;
- Requires a purpose built paving machine to be used such that the bond coat can be uniformly placed with the UTA in a single pass;
- Verification that the rates of application of the bond coat for each paving run meet design rate of application within ± 0.1 L/m²; and
- Requirement for use of two tandem (6 tonne minimum) steel drum rollers for each paving operation to achieve full embedment of the UTA asphalt into the bond coat before cooling.

**SURFACE PREPARATION PRIOR TO PLACEMENT OF UTA**

As UTA is a very thin surfacing, it will not produce a satisfactory result over a pavement with extensive failed areas, potholes, and cracks unless repairs are carried out beforehand. Dense graded asphalt regulation or cold planing is required to correct low areas and surface ruts greater than 10 mm deep to achieve a fully drained surface prior to placement of UTA. Trapped water in the UTA can result in stripping of the binder from the aggregate and premature ravelling. UTA is not to be used for regulation as excessive thickness may lead to premature ravelling.

UTA will not effectively seal cracks in an existing surface other than hairline cracks. Isolated wider cracks may be treated with crack sealant, however if cracking is more general, application of a Strain Alleviating Membrane (SAMI) is required. A SAMI preferably with a geotextile, Interlayer may be required prior to placement of UTA, to form a composite treatment.

**TYPICAL APPLICATIONS FOR UTA**

Typical applications for UTA are:

- Resurfacing of sound urban pavements (except in areas of excessive tyre and/or breaking stress such as heavily trafficked signalised intersections, roundabouts and some types of commercial entrances) where it is not possible to raise the surface level (e.g. low kerb and channel) but there is a desire to avoid removal and replacement of the existing asphalt wearing course because of practical or economical considerations;
- As part of a composite treatment comprising an overlay of a SAMI with a geotextile to treat severely cracked pavements in urban locations.

UTA offers many of the properties of Open Graded Asphalt (OGA) supplied under VicRoads Standard Specification Section 417. OGA is more expensive than UTA but has superior properties for texture and noise and water spray reduction. UTA will not reduce noise and water spray to the same extent as OGA, but has overall properties appropriate for many locations.

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