Specialised Asphalt Mixes – John Rebbechi

Open Graded Asphalt. The first trials of OGA were placed in 1974 as a wearing course at four different traffic situations - urban arterial road, through carriageway of a freeway, and on off-ramps of a freeway. Following initial observations of success, some 4000 tonnes were placed on the Tullamarine Freeway in the following year. His report in 1986 at an AAPA conference on "Twelve Years History of Open Graded Asphalt Performance" previews experience of such a product. Click on the following link to download John's report: Open Graded Asphalt History – 1986

A further report by John in 2007 on the long-term performance of OGA made a number of conclusions, the key ones being:

1. OGA is used as the preferred surfacing on urban Freeways and on the basis of reduced tyre noise and increased safety through reduced water spray and superior skid resistance.
1. The functional life of OGA was of the order of 3–6 years with regard to both water spray and noise suppression.
2. The life of OGA surfacing, placed to current VicRoads specifications (with some exceptions), is typically 12–15 years.

Stone Mastic Asphalt. The first trial of SMA was placed in early 1990. With only a short production run, the contractor did not fully achieve the design objectives, and the trial was only partially successful. The next serious attempt was in early 1993 where SMA was placed on the South Eastern Arterial and the Hume Highway. These were judged successful and subsequently over 15,000 tonnes were placed on major arterials around Melbourne in the period following. Click on the following link to download a report by John at an AAPA Breakfast Workshop in 1996 on the topic "New Fashioned Flexible Pavements": Stone Mastic Asphalt report 1996

- Note: In December 2006, VicRoads updated its specification to address the high incidence of flushing of SMA. Industry appeared reluctant to suggest improvements to the specification to address the poor performance. VicRoads amongst other changes, mandated the use of PMB rather than Class 320 bitumen, increased density requirements and modified the SMA grading for high stress locations. The changes appear to have been successful.

Crumb Rubber Asphalt. The first trials of CRA (then called scrap rubber) wearing course in Victoria were placed by the CRB in 1976. The trials were not particularly successful and interest lapsed. A second trial was conducted in 1979 and placed over a cracked, plain joined concrete pavement. The mix showed excellent resistance to reflective cracking. His report in 1983 at an AAPA conference on "Use of Scrap Rubber in an Asphalt Overlay to Reduce Reflective Cracking" provides background on the trials. Click on the following link to download John's report: Crumb Rubber Asphalt

Ultra Thin Asphalt The original UTA concept was introduced into Australia by Boral in 1993 as "Novachip" as an alternative to a sprayed bituminous seal with the advantage of providing a smooth ride and reduced traffic noise levels. It was also called a "paver laid seal" as the binder (typically 0.9 L/m^2 of polymer modified emulsion binder) was used to hold the lower layer of aggregate in place, as in a sprayed seal, while the surface voids were filled with further bitumen bound aggregate that provided the surface texture and ride quality of asphalt.

The use of UTA in VicRoads has evolved from Novachip with variations to tack coat, grading and binder content as well as use in combination with SAMI and geotextile reinforced seal (GRS) waterproofing/crack sealing treatments.

John's AAPA report in 2004 on "Ultra-Thin Asphalt" provided a good history of its introduction into Australia and reviews concerns with the performance of UTA in some locations.

- Note: After a run of very poor performance of this surfacing (i.e. very bad ravelling), VicRoads reviewed its specification in 2006 resulting in changes that increased the cost of this surfacing and hence making it no longer cost effective. The causes of the poor performance are debatable…some say if was VicRoads amending the grading, other say it was the reduction in binder by manufactures to reduce costs. **The specification was withdrawn in 2016.**

Lean Mix Asphalt is a less expensive Size 20 asphalt made from lower quality aggregates with a more open grading envelope, and a lower bitumen content that normal asphalt. LMA may be considered as an alternative to normal asphalt for shape correction where greater depths of material are required to meet correct geometric standards, but where no significant increase in pavement strength is required. This material may also be used as an alternative to unbound crushed rock for pavement construction in highly trafficked areas to resist potholing and ravelling or where linemarking may be required during construction.

Such a product was first used on the SEMARL project in 1985 where a significant change in pavement crossfall was required to match in with the existing freeway pavement at Toorak Road.

Warm Mix Asphalt technologies involve additives and/or production processes which allow the temperature at which asphalt mixes can be produced and placed to be reduced; typically, by 20–50 °C below that of hotmix asphalt (HMA). The reduction in energy associated with asphalt production at lower temperatures results in a reduction in greenhouse gas emissions. Reducing greenhouse gas emissions that contribute to global warming is a current requirement of government.

Despite the successful outcomes of the large number of field trials in the USA, there is still some concern regarding long-term performance of WMA in Australia and more research is needed. A review of Overseas Trials of Warm Mix Asphalt Pavements and Current Usage by Austroads Members was conducted and Technical Report No. AP-T215-12 on the review was issued in November 2012.

WMA Validation Trials. A national validation project was undertaken by VicRoads, AAPA and Austroads in 2010 in Melbourne. The validation project formed part of an Austroads warm mix asphalt project which comprised a literature study, review of environmental aspects, and laboratory and field testing of a validation site. Although satisfactory results were reported, only thin nominally 40 mm thick surfacings were tested. Refer the Austroads publication *AP-T214-12: Field Validation of Warm Mix Asphalt Pavements* first issued in May 2007.

- In July 2012, VicRoads issued a WMA Specification Section 409 based on the findings of the validation trials. Initially its use was permitted on a case-by-case basis in asphalt mixes containing polymer modified binder (PMB). However, in 2021, Section 409 was withdrawn and its content transferred to Section 407. **Section 407 was renamed to 'Dense Graded**

Asphalt' as the former title 'Hot Mix Asphalt' was considered inappropriate with the inclusion of WMA. For a mix to be considered a warm mix asphalt, it should be produced at temperatures less than 155°C for asphalt containing a PMB and less than 145°C for mixes that contain bitumen. A VicRoads ***Technical Basis for Warm Mix Asphalt*** was issued in January 2013.

WMA technology is now accepted in Australia and Victoria as lower production temperatures would reduce fuel use at the plant, leading to reduced emissions, etc. Lower placement temperatures have the added benefit of less fuming and hence safety for Workers whilst still maintaining a workable mix.

Regulation Gap Graded Asphalt. It was developed in circa 1994 by Pioneer as a 5 mm SMA with the idea of producing a mix for light traffic, school grounds, playgrounds, etc. that had the same course texture when machine or hand laid. It was also found to be useful for thin regulation work. VicRoads subsequently specified the product in June 2014 and gave it the RGGA name. It is made from a gradation of aggregates from 7 mm and smaller and can be used as a regulation material under sprayed seals and asphalt overlays.