Australian Asphalt Pavement Association Bitumen Treated Base (BTB) Specification

10.30am – 1pm, Thursday 1 September 2011
Outside Conference Room, 35 Butterfield Street, Herston

Participants

Peter Evans
Cameron Castles
Allan Jones
Louis Diaz Vasquez
Andrew Kennedy
Gavin Soward
Justin Andrea
Pranit Maharaj
Rob Vos
Ian van Wijk
Jonathan Hoffman

Peter Pezet
Steve Mole
Vanish Arya
Chris Cleary
Mike Harris
Phil Hunt
Joanne Cameron
Jill Fitzhenry
Warren Carter (apology)

Agenda

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<td>Agenda Item 1</td>
<td>• Welcome – Peter Evans</td>
<td>10.30am</td>
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<td>Agenda Item 2</td>
<td>• Explanation of role that AAPA has played and intent behind versions 8, 12 &amp; 13 – Rob Vos</td>
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<td>Agenda Item 3</td>
<td>• Response to concerns raised by TMR PMG to draft v.13.1 – Ian van Wijk</td>
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<td>- Areas where PMG comments are agreed and accepted - AGREE</td>
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<td>- Areas where PMG comments need further discussion, but this is not necessary for the current contract – DEFER</td>
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<td>- Areas where resolution is required to allow the current contract to progress – DISCUSS and RESOLVE</td>
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<td>a. Void limits</td>
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Agenda Item 4  
- Discussion on what we can achieve in this meeting and relative priorities

Agenda Item 5  
- Resolution process – balance of time remaining

Meeting Notes:

AAPA’s involvement in the development of the BTB specs:

- Rob Vos provided an overview of the BTB specifications developed by AAPA working group

1. The specs were developed in a short time-frame (2.5 weeks) FROM V.8, V.12, V.13, documenting changes from MRTS30 spec which was developed 12 years ago

2. Spec developed considering performance and learnings from Fulton Hogan / Pioneer with a focus on recovery, availability of base material from local quarries (higher performers, process with greater resilience to flooding), and regional demand

3. V8 developed not sure what the client wanted – key properties – hot mix group - existing/available material produced by local quarries – granular base to meet standard - and rapid reconstruction

4. From feedback from TMR, integrated responses in V12 (decrease voids, denser material, less permeable & add other engineering principles – dense grade asphalt specification)

5. TMR spec / standard / guide note – interpretation of concepts – include seal ( Armour coating T68/06) standard upgrade and sealed density method – put on a sealed surface granular will not work

6. Considered learnings from Nanango – BTB pavements have generally performed well during flooding - cores currently being tested and some exhibiting some stripping – top surface and skid resistance – propose voids of between 6% and 10% - this would allow interconnected voids (permeability) of the production mix

7. Regional contractor accepted density – Marshall density > CV96

8. Client moving back to original job – specification with flexibility - > binder resilience, > normal current BTB - higher bitumen content results in increased costs

9. Need to understand what client wants – performance parameters, traffic loading, failure (stripping) mode – improve properties by adding lime, cement, foam stabiliser – BTB upgrade not full properties as asphalt – not intended as an asphalt – MRT30 full asphalt

- General agreement from group to specification overview
TMR PMG Concerns to Draft V.13.1

• Ian van Wijk two main differences:
  1. Quality and grading aggregate – change in density
  2. Relaxation of void content – aligned to v.12

• Gavin Soward advised two jobs (Nanango & Brisbane) need reasonable impermeable compaction as stripping occurs when water gets in – prone to stripping more than asphalt
  - BTB needs to be compacted – pavement heats up and water tries to get out which destroys integrity – voids reduce water permeability – will be moisture sensitive

• MH advised that the reasons for selection of BTB was to:
  1. reduce moisture sensitivity
  2. reduce the overlay depth with a modulus higher than granular, to enable thinner overlay depths
  3. provide a trafficable surface – volume of traffic not an issue – BTB will perform independent to traffic – shoulders strip just as badly as traffic lanes
  4. construction expediency
  5. cost compared with dense graded asphalt – cost effective ie cheaper than AC, more expensive than granular
  6. Roma and 18D compared to SE Queensland:
    ▪ has significantly lower rainfall, lower traffic volumes (around 1600veh/day, 30%CV’s)
  7. 18D design:
    ▪ Free drained cross-section , with table drains
    ▪ Armour coat seal and crumbed rubber or similar second seal proposed

• Performance of BTB discussed. Whilst BTB in South Burnett appears to have performed well, stripping issues with BTB were observed on a major project in the Brisbane area
  - Gavin Soward stressed need to get compaction in BTB – traffic volumes have no impact on stripping – BTB will perform independently of traffic - shoulders just as badly stripped as traffic lanes – issue with the compaction – pavement heats up, allowing water to get in and trap destroying integrity – lower voids reduce water permeability
  - Stripping doesn’t relate to load – no reliable tests, exacerbated by water – if water gets in, it takes a long time to get out – foaming process low binder content – equipped to achieve this – could be considered desirable result – uniform coating
- look at process make sure outcome has low binder contents- field stabiliser foam bitumen – foaming in an asphalt plant – no decision until see proposals
- Risk cost benefits – mix design not adequate – foam bitumen option meets all the needs - demonstrates resistance and reduced sensitivity – if compaction can’t be achieved higher risk that water will get in and deteriorate pavement
• Peter Evans added that there is a different mechanism with foam bitumen to cope with fines - no decision for government to take risk on National Highway – funding reduced after TNRP - open graded asphalt at Warwick – no funding – cold mix and seal
• Allan Jones stated that there are fundamental issues associated with bituminous binder mixed with aggregates that are across all products including asphalt, bitumen treated base, foam bitumen etc. There are additional specific issues related to the specific products. Fundamental issues include load speed, pavement temperature, voids in the mineral aggregate, binder film thickness, air voids, aggregate properties, filler properties, residual binder type and properties,
• Ian van Wijk - void content between 4% - 6% - at 4% bitumen less than 6% - in-line with v.8 void content – grading – relaxation on void content
• Rob Vos - Engineering properties change when adding lime / concrete – BTB improved granular product - foam asphalt and stripping — look at data - strip variation – depends on material properties – do not strip the same – BTB propensity to stripping - principle is to keep water out – make as dense as possible – Bitumen Stone Mastic mix on road changes viscosity in hot mix (better, quicker coating, gives better compaction), foam bitumen mixed with lime – BTB has been used extensively in South Africa but not since 1995 (major stripping failure with Cape Town airport) – now specify 4.5% binder – availability of rock source - sourced from local quarries – properties may differ depending on quality of aggregate
• Ian van Wijk – In line with V.8, void content – grading – relaxation of void content
• Allan Jones:
  - Modulus of unbound materials is stress dependant, which depend on substrate conditions and containment.
  - Modulus is only one aspect of structural pavement design and cannot be considered in isolation (higher modulus asphalt mixes are not necessarily beneficial). Optimal design depends on a number of integrated factors such as modulus, fatigue, rut resistance, permeability, durability, etc.
  - Stripping (loss of adhesion between the binder and the aggregate usually in the presence of water) has been a major issues on Australian airports since the 1970s, in NSW in the 1990s and in Queensland in the 1990s. Stripping does not depend on loading and, to date, there is no reliable testing for stripping. Long term exposure to water has a major affect. Current practice in reduce the length of exposure by having low voids (to reduce the entry of water) or high voids (to allow it to escape quickly (open graded asphalt)).
• Rob Vos - SARG 2010 National Foam Bitumen Project – feedback from ARRB & significant knowledge – NSW add water to foaming agent
• Allan Jones – foam in an asphalt plant – no decision until seen a proposal
• PE good knowledge of conventional methods
• Gavin Soward advised by adding a little water to BTB there is no change to the mix – not foam – looks like asphalt (BTB + cup water) – greater densification of material, better coating and compaction - % density – 1% more – 93% max density - options to consider – Asphalt, BTB (compaction ≥ 93%), and Foam Bitumen (different process – meet permeability / traffic / speed of construction) – increase binder content means increase costs – cost v risk
• Chris Cleary – Additional investment of $3m 6% voids – armour coat part of cohesive process - 20 – 24” less than Brisbane – issue focus on stripping, not pavement failure – drainage sealing reduces likelihood -final seal heavy modulus binder, better materials – cost fundamental question – compaction issues in the past,  voids in south west
• Peter Evans -Roma v’s Brisbane – different conditions – 90% voids – sucking binder out of seal – higher risk – not prepared to take unacceptable risk – variable materials at local quarries – maximum learnings – try a few products – controlled risk – investment needs to be safe – can manage smaller failures (ordinary maintenance trials) if complete failure – risk small trials and evaluate eg Nanango – reliability lasted 12 years – increase binder content – prepare to invest in binder to ensure it doesn’t fail
• Gavin Soward – Risk failing to understand additional costs – 1. Compacted BTB, 2. DG20 – 28, 3. Foam Bitumen option overlay – conventional method more cost effective – stripping depends on material type – successful performance relies on effort in compaction / permeability
• Rob Vos – Need to know what does Roma want – A/Regional Director Dave Grosse confused stripping issue and SE Busway (SMA) not waterproof – different issue – layers underneath – moisture getting in to SMA and not escaping – BTB w/ higher voids
• JH – Boral plant ready to produce mix – work on construction / permeability – view proof in field and trial how performs and get it to work
• SM – 600t trial at Roma – compaction testing that day (1/09/11) – density and permeability
• IV – If voids ≥6% consider increasing binder content – 4.5%-5% - less than 6% good compaction – target void 4%-4.5% - refine adequate compaction > 93%, upper limit - filed voids max 7%
• SM – In South Burnett trials at Kilkivan – lot of rain – looking at geometrics of pavement design – if able to drain, quite a different product
• MH – Bitumen spraying on site – seal increase chance of not sealing moisture – official trials – add bitumen – difference to achieve field compaction
• SM – Report – laboratory compaction density, void density
• RV – For maximum density – water absorption – go to Marshall process- binder content 42%
- GS – Test results next step – another trial – what could be added to increase compaction – anything better in process to improve
- SM – Compaction – binder content – minimum roll – what can you compact material to
- PE – Controlled trial – plan what might be testing regime / strategy
- SM – Nanango – not re-learning, 1st time learning
- MH – Additional testing – Nanango – deflection etc – more bitumen is that right approach – proceed with trials and identify where failed – acknowledge contractor delayed significantly a couple of months – back on track on trials – high production – 2 shifts 24hrs/day – don’t want to slow down
- AJ
  1. There are no available reports on the work at Nanango, including what was constructed, essential quality assurance information, performance studies etc. Frequent requests have been made for these reports and records, but none have been available to date.
  2. It is understood that Tom Waters looked at the BTB pavements (this was before my time as D(P&M) but he advised that he dis not see any of the primary reports on specifications, design, construction etc.
- RV – Material South Burnett – wheel tracker ARRB – empirical test to identify stripping which other tests don’t
- Layer thickness 2.5% ⇒ 4 to 5 – temperature control and thickness
- AJ – Bituminous binders properties remain a critical issue for all projects in Queensland, including this project. Point of delivery sampling and testing is vital.
- GS – Audit testing / surveillance – input from E&T – supply engineers from Pavements branch to help with test – if testing doesn’t come up to standard – Boral will look at adding more binder
- RV – AAPA spec – some time before becoming TMR spec – objective to develop key parameters – BTB spec developed just for Roma project specific to enable TMR develop simple spec – testing rigorous
- IV – Use BTB specs as basis – finalise as project document – compare results for the future
- RV – Acknowledged AAPA’s thank to encourage feedback on process – innovative – risk sharing – provide better service – spirited debate
- VA – Roma – performance issues – lack of data for BTB – contractual – research and trails – don’t know how BTB will perform/behave – manage risks – learn