1. BACKGROUND

1.1 Specification Use

The specification is to be used where the Engineer requires a dense graded, open
graded (permeable) mix or a textured surface able to resist high stress, in a
performance-based environment.

This specification is only to be used with the permission of the manager of Transit’s
Engineering Policy Section as it is still under development.

The specification includes three types of asphalt for use as wearing surfaces, which
are summarised below:

1. Table 2a Open Graded Porous Asphalt (OGPA) – a mix for use in free flowing
   high speed areas. This mix is permeable thereby reducing water spray and tyre
   noise. A higher strength option is also included for areas that require more stress
   resistance than normal OGPA. Not suitable for areas with high stress such as
   cornering or intersection approaches.

2. Table 2b Textured High Stress Resistant Asphalt – a mix for use in areas with
   high traffic stresses where there is a high risk of skidding so texture depth is
   required. Stone Mastic Asphalt and some macadam type asphalts are expected to
   meet this specification.

3. Table 2c Dense Graded Asphaltic Concrete (DGAC) – an economical stress
   resistant surface that has a smooth texture suitable for residential roads and other
   areas with an operating speed less than 50 kph and a low risk of skidding crashes.
   May also be used as a wearing course temporarily when constructing very high
   skid resistant surfacings.

Territorial Local Authorities or their consultants should assess the risks associated
with the use of these materials and define the conditions under which each can be
specified.

Specific Network Operational Requirements shall set out the requirements relating to
the existing conditions that are unique to the network (or sections of the network).
Refer to Clause 3.5 of the SOMAC Manual, SMO 32.
1.2 Specification Philosophy

This specification defines the performance requirements for Hot Mix Asphalt (HMA) as a wearing course.

This specification is intended to create a more progressive contracting environment and encourage HMA producers to develop innovative design, production and installation methods which bring added value and meet the performance criteria set by the client.

A number of new performance based test methods have been embraced which are now being routinely used overseas and appear to more accurately predict asphalt performance over its service life. Similarly a number of new tests have been introduced in order to explore alternative means of assessing aggregate quality for use in HMA. It is recognised at this stage that there is very limited New Zealand based data in either of these areas, hence the specification will initially require the reporting of values until appropriate values for NZ are determined. Some of these new tests are specified in the AAPA National Asphalt Specification 2004 (NAS), which may be adopted in New Zealand. These values have not been adopted automatically as New Zealand geology, and hence our aggregates, is different. Results for these new tests that are significantly outside the limits as specified in NAS should be discussed with the Engineer. However if this property can then be adequately managed, with no added performance risk to the Principal, it should not cause the material to be excluded from use.

The specification also introduces a more formal monitoring programme to evaluate true mix performance over the longer term. It is hoped that the new test data correlated with its relationship to performance in the field will aid the establishment of quality and performance values which are both achievable with the indigenous resources we have in New Zealand and are appropriate to the traffic loading and desired pavement life.

2. PERFORMANCE REQUIREMENTS

The Engineer is to include site data including as a minimum pavement depth and traffic loading. Any available data used in the treatment selection process should also be considered for inclusion.

The Contractor is also responsible for the selection of the appropriate method of bonding the new HMA layer to the existing surface, such as a membrane or tack coat.

Maximum Theoretical Specific Gravity (MTSG) and Asphalt Particle Loss tests are standard tests under P/23.

The Engineer is to specify if the binder is to be modified or not within schedule A. This is also to include details of the modified binder’s performance requirements. Several tests are listed in Tables 1 and 2 with no specified compliance criteria. These tests are new to New Zealand and the results shall be reported to the Engineer. These results are also to be forwarded to Transit New Zealand’s Engineering Policy Manager by the Engineer for review. These tests are not contractually binding.
The use of Reclaimed Asphalt Pavement (RAP) within the mix is not specifically excluded by this specification. However the Contractor will need to demonstrate that the performance requirements of this specification can be achieved if they choose to incorporate RAP in their HMA.

3 CONTRACT QUALITY PLAN

The method of mix design chosen by the Contract shall be based on a recognised mix design method with justification for changes.

The Mix Control Envelope (MCE) set out in the Contract Quality Plan (CQP) shall follow industry best practice and shall not result in limits greater than those set out in other Transit specifications for similar products.

4 SITE ACCEPTANCE

The site acceptance clauses have been modified from the P/17 Performance Based Specification for Bituminous Reseals.

5 ACCEPTANCE TESTING

5.1 Accreditation

IANZ or ISO accreditation is not available as yet for most of the new tests specified in P/23.

5.2 OGPA Binder Content Optimisation

The Binder Drain Down test is used to get optimum bitumen content for penetration grade bitumen, in the design phase. When using a polymer modified binder, the binder content should be slightly higher than when using a penetration grade bitumen. It is suggested that designers plot a graph of Binder Content versus air voids, abrasion loss and draindown on the same graph. The design binder content should then be chosen as close as possible to air voids of 20 % and draindown of 0.3, less a small tolerance to account for plant variations.

An example of this graph is shown in Figure 1.

Further explanation is also contained in APRG 18 “Selection and Design of Asphalt Mixes”, in Chapter 4.

5.3 Macrotexture

No macrotexture is specified for DGA however this may be added to Schedule A if required by the relevant TLA.

Sand circle testing will be undertaken at any time necessary during the maintenance period to determine if a site has any macrotexture non-compliant areas.

5.4 Hydraulic Permeameter

Hydraulic permeameter testing is intended to be used as a substitute for coring to check for density. Checking density is primarily to check that the HMA is waterproof
and so this test has been replaced with a more direct check of the HMA’s water resistance.

As most HMA covered by this specification is expected to be laid in layers less than 40 mm deep, coring is often impractical. For deeper layers the Consultant may choose to check density by coring, however this must be identified in the contract specification.

6 PRODUCTION AND CONSTRUCTION TRIAL

Laydown trials are an arrangement within the contract between Contractor and Engineer. A range of:

- Textures
- Density / Voids
- Rolling Patterns
- Etc, are to be produced.

The final decision is to be made by the Contractor on what to use. The Contractor proposes to the consultant what they intend to use. The Engineer accepts the proposed target values or provides comments for the Contractor to consider modifying their proposal.

Disputes relating to the laydown trails should be directed to the P/23 working group.

7 COMPLIANCE ASSESSMENT

A visual inspection 12 months after completion of the Contract, shall be sufficient to determine whether or not there is evidence of significant ravelling, shoving, flushing or cracking.

This visual inspection should be completed by both the Engineer and the Contractor in the last month of the maintenance period. The Principal may also choose to attend.

As part of this inspection, the latest high speed data survey for each site should also be checked to ensure that these long term performance criteria have been met.

Whenever possible this inspection should include a daytime inspection of the trafficked lanes, which normally requires some level of traffic control.
Figure 1 – Example Plot of Binder Content vs air Voids and Binder Draindown for OGPA Binder Content Optimisation. (Reproduced from APRG 18)

Appendix A to P/23 Notes

Field Permeability Testing for Open Graded Porous Asphalt

Permeability of Open Graded Porous Asphalt (OGPA) shall be checked after laying by placing a 150 mm diameter ring on the OGPA matt, sealing between the ring and the matt with a suitable silicon product.
The ring shall have sufficient mass and differences between internal and external diameters that it shall require the water to flow through the voids in the OGPA matt. A correctly sized CBR surcharge ring has normally been used for this test in the past.

Add 300 ml of water to the inside of the ring to saturate the matt. Once the level of this water has dropped flush with the top of the matt, add a further 150 ml of water to the ring in one quick pour and record the time with a stopwatch for this water to drain flush with matt surface again.

Repeat with two more 150 ml portions, added separately and record the times as detailed above. The period between adding 150 ml portions of water to the ring should be kept to a minimum with the only delay being to record the drainage times.

The average of the three readings should be compared to the limit specified in this specification’s Table 1.

The position of each test should be recorded as part of the QA records.