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1.0 GENERAL

1.1 SECTION CONTENT
Transport and laying of hot mix asphaltic concrete, including preparation of the base surface.

1.2 CROSS REFERENCES
Refer to the following other Reference Specifications:
- S110 General Requirements: General technical requirements and interpretation of terminologies.
- S120 Quality: Quality control testing.
- S150 Roadworks: Mix design applications, placing base course.
- S330 Sprayed Bituminous Surfacing: Priming and primer sealing.
- S340 Supply of Stone Mastic Asphalt. Manufacture of stone mastic asphalt. (This specification is under development).

2.0 QUALITY

2.1 QUALITY SYSTEM
The supplier must maintain a Quality Assurance System with third party accreditation to AS/NZS/ISO 9002. The supplier must notify the Contractor or Superintendent within two days of becoming aware that process control tests relevant to the work have fallen outside the specified limits.

2.2 INSPECTION
Witness points
Refer annexure. Give sufficient notice so that inspection may be made of the following stages:
- Materials or areas ready for tests.
- Testing including any rolling pattern trial.
- Each pavement layer placed and compacted.
- Automatic level control devices in place.
- Surfaces prepared for tack coating, priming, sealing or surfacing.
- Commencement of asphalt surfacing.

2.3 TESTS
General
Methods: Use the specified Australian Standard or Queensland Department of Main Roads test methods.
Testing authority: Use a testing facility registered by NATA for the test required.

Process control tests
Perform sampling and testing of the type and frequency necessary to adequately control the work. Comply with the minimum requirements of S120 Quality Clause 7.1. Refer annexure.
Compliance assessment tests
The Contractor or Superintendent may carry out compliance assessment testing using a testing laboratory registered with NATA for the particular test.

2.4 CONTRACTOR’S SUBMISSIONS

Test program
On request, submit details of the supplier's inspection and test program covering all specified properties of the materials. On request, submit details of recent test results demonstrating sustained compliance of the work and similar work with the required properties. Refer annexure.

Deliveries
Delivery docket: Submit a delivery docket at the time and place of delivery for each truckload of material showing:
- Empty and loaded mass of the vehicle.
- Date and time of dispatch.
- Supplier and location of mixing plant.
- Registration number of the vehicle.
- Size and type of asphalt mix.
- Class of binder.
- Temperature of load at mixing plant.
- If required, laboratory stamp or other mark certifying compliance with the specified properties.

Laying program and rolling pattern
On request, submit laying program and rolling pattern prior to commencement of work. Refer annexure.

3.0 TOLERANCES

General
Sampling frequency: In accordance with S120 Quality Clause 7.1.
Conformance criteria: In accordance with S120 Quality Clause 7.2.

Finished surface level
General: Provide a finished surface that is free draining and evenly graded between level points.

Edges abutting gutters: Within + 5 mm or flush with the level of the actual gutter edge or lip of channel.

Crossfall: Measure crossfall between any two points more than 2 m apart transversely to the centreline. Do not depart from the corresponding design crossfall by more than 0.2% absolute. Maintain positive drainage slope towards pavement drainage system.

Primary vertical tolerance: + 10 mm, - 0 mm at any point on the surface layer.

Deviation from a 3 m straightedge: Maximum 5 mm except where due allowance for design shape dictates otherwise.
Horizontal surfaces
Absolute tolerance: ± 50 mm, except where alignment with an existing road structure is necessary. Join new construction to the existing work in a smooth manner.

Roughness
Definition: Roughness is a measure of ride quality or smoothness of a road surface. The vertical irregularities in the longitudinal profile of a road are assessed in terms of the displacement of a standard test vehicle relative to the axle as the vehicle travels over the surface at a standard speed.

Requirements: Achieve target surface roughness of the final pavement layer to within the values specified in Table 3.1. Do not exceed the maximum limits specified in Table 3.1 for new construction and pavement rehabilitation work. Refer annexure.

Test method: Queensland Department of Main Roads test method Q708.
Test lot: Minimum length 100 m, maximum length 500 m.

Table 3.1 - NAASRA roughness counts

<table>
<thead>
<tr>
<th>Road classification</th>
<th>Pavement type</th>
<th>Target NAASRA roughness (counts/km)</th>
<th>Maximum limit - new construction</th>
<th>Maximum limit - after rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local access</td>
<td>A or B</td>
<td>≤ 70</td>
<td>110</td>
<td>130</td>
</tr>
<tr>
<td>Neighbourhood access</td>
<td>C</td>
<td>≤ 70</td>
<td>90</td>
<td>110</td>
</tr>
<tr>
<td>District access</td>
<td>D</td>
<td>≤ 60</td>
<td>90</td>
<td>110</td>
</tr>
<tr>
<td>Suburban route</td>
<td>D</td>
<td>≤ 60</td>
<td>90</td>
<td>110</td>
</tr>
<tr>
<td>Industrial access</td>
<td>E</td>
<td>≤ 60</td>
<td>100</td>
<td>120</td>
</tr>
<tr>
<td>Arterial route - minor</td>
<td>F</td>
<td>≤ 50</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>Arterial route - major</td>
<td>G</td>
<td>≤ 50</td>
<td>70</td>
<td>90</td>
</tr>
</tbody>
</table>

4.0 PREPARATION

4.1 CLEANING
Immediately before priming or tack coating remove loose stones, dust and foreign material from the base surface or existing surfacing using a power broom or blower. Keep traffic off the cleaned surface.

4.2 PROTECTION
Protect adjacent surfaces during spraying of bituminous material. Protect freshly sprayed surfaces from contamination. Where required, clean adjacent surfaces or replace and make good.

4.3 PRIMING AND PRIMER SEALING
Prime or primer seal the granular base before any asphalt surfacing course is placed, generally in accordance with the requirements of S330 Sprayed Bituminous Surfacing Clause 6.6 and Clause 6.7.
4.4 POTHoles
Trim to a regular shape and a uniform depth of at least 75 mm. Tack coat the edges and bottom, and patch with asphaltic concrete.

4.5 COLD PLANING
Definition: Cold planing, or profiling, is the controlled milling of pavement surfaces using a revolving drum, having spirally set teeth, incorporated in a heavy self propelled unit.

Planning: Prepare for resurfacing by cold planing the pavement surface. Determine job requirements such as area, depth of cut, and location of services (pit covers and the like). Refer annexure.

Correcting pavement shape: Take out ruts, bumps, depressions or other uneven areas of pavement to allow a uniform thickness of new asphalt surface to be placed.

Deteriorated asphalt surfacing: Remove old asphalt which is fatty, bleeding, ravelling, cracked or otherwise deteriorated, prior to placing new surface.

Slope and camber: If required, correct the slope or crossfall of a pavement.

Edge planing: Remove asphalt adjacent to kerb and channel or adjoining asphalt surfaces to enable asphalt to be placed without creating height differences and to produce a smooth riding pavement joint.

Texturing: Where asphalt resurfacing is to be placed in areas of high shearing stresses, such as roundabouts and intersections, cold plan to provide a well textured surface to create a strong bond to the new surface.

Edge ramps: Where the cold planed surface is open to traffic and where the change in level exceeds 30 mm, provide suitable edge ramps by placing asphalt wedges. Limit the maximum slope for longitudinal edges to 1V in 5H. Limit the maximum slope for transverse edges to 1V in 10H for low speed roads and 1V in 20H for roads with traffic speeds over 75 km/h.

4.6 TACK COATING
Tack coat: A light application of a liquid bituminous material (3 parts bitumen emulsion to 2 parts water, by volume or weight) on or against existing asphalt, concrete or sealed surfaces, to promote the adhesion of a subsequent asphalt layer to that surface.

Timing: Apply tack coat 30 - 120 minutes before asphalt surfacing is placed. If the pavement structure consists of a number of asphalt layers and where the elapsed time exceeds 3 days between the construction of these layers, tack coat surfaces between the layers.

Application: Cover the surface uniformly at an application rate of 0.10 - 0.30 L/m² of residual bitumen. Vary rate to suit the site conditions. Refer annexure.
5.0 PLACING AND COMPACTION

5.1 PRELIMINARY TRIAL

Requirement: Where directed, carry out a trial of the procedure for the laying operations if the rate of laying asphalt exceeds 60 tonnes per hour. Refer annexure.

Trial section: Site area of not less than 1000 m². Determine the rolling pattern and the number of roller passes to achieve an acceptable compacted layer.

Rolling pattern. Do not vary the established rolling pattern without prior approval of the Superintendent.

5.2 PLACING

Weather restrictions

Weather: Place asphalt surfacing on a pavement surface that is essentially dry and free of any surface water. Do not place asphalt during periods of heavy or continuous rain or when rain is likely to fall during the laying and compaction of asphalt.

Temperature and wind speed: Low pavement temperature and high wind speed adversely affects the compaction of thin layers of asphalt. If the pavement temperature falls below 25°C and wind speed exceeds 25 km/h, supply at least one additional roller and/or increase the asphalt discharge temperature.

Discharge temperatures

Discharge temperature: Temperature of asphalt at the time of discharge from the delivery vehicle into the receiving hopper of the paver. Vary the discharge temperatures to suit.

Layer thickness ≤ 40 mm: Maintain discharge temperature range 135 - 175°C.

Layer thickness > 40 mm: Maintain discharge temperature range 125 - 175°C.

Mechanical placement

Paver operation: Commence asphalt placement immediately following discharge of the asphalt into the receiving hopper. Adjust operating speed of the paver to achieve continuous asphalt laying to the maximum practicable extent. Do not leave spreader box in contact with the previously laid asphalt for any prolonged periods whilst awaiting asphalt delivery. Do not allow asphalt to segregate or to accumulate along the sides of the receiving hopper. Achieve uniform appearance with no evidence of segregation in the finished mat.

Laying pattern: Lay the main paving runs first. Plan the placing operation to minimise the number of joints.

Layer thickness: Comply with the limits specified in Table 5.1 when selecting target thickness of each layer chosen to suit the construction process and the thickness of the compacted asphalt course.
### Table 5.1 - Layer thickness limits

<table>
<thead>
<tr>
<th>Mix type</th>
<th>Nominal aggregate size</th>
<th>Structural layer</th>
<th>Surfacing layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>5 mm</td>
<td>Not suitable</td>
<td>Min 15 mm</td>
</tr>
<tr>
<td>2*</td>
<td>10 mm</td>
<td>Not suitable</td>
<td>Min 25 mm</td>
</tr>
<tr>
<td>3*</td>
<td>18 mm</td>
<td>Min 40 mm</td>
<td>Min 40 mm</td>
</tr>
<tr>
<td>4*</td>
<td>35 mm</td>
<td>Min 70 mm</td>
<td>Max 100 mm</td>
</tr>
</tbody>
</table>

* Denotes dense graded asphalt

**Hand spreading**

Execution: Take asphalt directly from the receiving hopper (or other approved location), distribute immediately into place using shovels, spread to the required loose depth using metal rake or board rakes (lutes), and roll immediately.

Limitations: Confine hand spreading operations to the correction of minor surface irregularities, to work on or very close to drainage channels, to work in tapers, and to work in other areas normally inaccessible to pavers.

### 5.3 COMPACTION

**Execution**

Surface preparation: Before commencing compaction, correct promptly any irregularities in line or level. Trim lane edges to a straight line.

Compaction: Compact asphalt surfacing uniformly as soon as it will support rollers without undue displacement.

Rolling temperatures: At the commencement of rolling, maintain minimum mix temperatures of 115°C and 105°C for the respective layer thicknesses of ≤ 40 mm and > 40 mm. Vary the rolling temperatures to suit. Complete rolling while the mix temperature is above 95°C.

Surface finish: Provide a surface uniform in appearance and free from depressions in which water can lie.

**Testing**

Test methods: Perform a field bulk density test for each test site using one of the following methods.

- Core sampling of the asphalt surface layer in accordance with Queensland Department of Main Roads test methods Q302A, Q303 and Q306A/Q306C. Test method 306A must not be used for samples taken from areas within the pavement that are coarsely segregated or poorly compacted. Test method 306C must be used for these areas.
- In situ density measurement using a nuclear gauge (non-destructive measurement method) in accordance with Queensland Department of Main Roads test method Q314. At least 6 core samples in a test lot must be taken for the purpose of field calibration and validation. For nominal layer thickness less than 50 mm, use a thin layer nuclear gauge only. Refer annexure.

Sample preparation: To AS 2891.2 or Queensland Department of Main Roads test method Q303 and Q303B.
Mix maximum density: To AS 2891.7 or Queensland Department of Main Roads test method Q307A.

Compaction standard: Achieve target characteristic values of 91 - 92% as specified in S120 Quality Clause 7.1.

5.4 JOINTS

General
Planning: Plan the placing to minimise the number of joints. Locate joints in areas of least stress, away from traffic wheel paths. Make joints that are well bonded and sealed and provide a smooth riding surface across the joint.

Hot joints: The technique is feasible when using two pavers in echelon or very short paving runs. Do not expose edges for more than 15 minutes. Form exposed edges of each spreader run while hot to a straight line with a dense face inclined between vertical and 45°. Leave the outer 100 - 200 mm of the first paver run uncompacted until the adjoining asphalt is placed. Roll over to achieve a seamless joint.

Warm joints: Lay adjoining run with the uncompacted asphalt overlapping the previously laid run by between 25 mm and 75 mm. Prior to rolling, push back the overlapping material to the line of the joint to form a ridge along the edge of the newly laid asphalt.

Cold joints: Form clean and straight joint by employing appropriate machine cutting or hand cutting methods. For long lengths, trim back joint by sawing or using a cutting wheel (trimming angle of 45° or 60°) mounted on a piece of heavy equipment such as a steel wheel roller. Jack hammering may be suitable for small areas. Tack coat the cut edges before placing the adjoining asphalt.

Longitudinal joints
General: Construct a longitudinal joint parallel to the pavement centreline if the width of the pavement is such that more than one paving run is necessary.

Location: In multiple layer work, offset joints in successive layers by at least 100 mm, except for longitudinal joints on a crowned pavement. Position longitudinal joints in the wearing course to coincide with the lane line.

Transverse joints
General: Construct a transverse joint after the completion of a day’s paving operation or where a delay in the paving operation allows material temperature to fall below 90°C or where the paving operation is stopped for more than 20 minutes.

Location: Construct to a straight vertical face for the full depth of the layer, and offset in adjoining spreader runs and layer to layer by at least 2 m.

Temporary ramps
Provide temporary asphalt ramps down to the level of the adjacent road surface if traffic is required to run on the new asphalt work at the end of a day’s laying operations. Construct ramp to provide safe passage for traffic at the allowable speed limit. Cut ramp back to from a transverse joint prior to laying the adjoining run.
Abutting structures

Place asphalt surfacing to match the level of abutting surfaces such as kerbs, gutters, edge strips, manholes, or adjoining pavement in the same manner as for longitudinal and transverse joints. Fill spaces left unfilled between the spreader run and abutting edges with sufficient material to the proper height before compaction. Where an existing service pit requires raising at a later date, cover the pit temporarily with a suitable separation fabric (such as hessian bags) during the spreader run. Remove separation fabric before reconstructing the service pit.

Matched junctions

General: If asphalt surfacing is to match an existing pavement, bridge deck, rail or other fixture, place the material to provide a smooth riding surface across the junction. Where necessary, remove sufficient of the existing pavement for this purpose. Where it is necessary to taper the thickness of a layer to provide a smooth riding junction, terminate the layer at a chase cut into the existing pavement 20 mm deep and 400 mm wide. Where necessary, remove coarse particles from a layer of tapering thickness using hand raking.

Tack coat: Where the thickness of the layer tapers to less than twice the nominal size of the mix, tack coat the area upon which material of such thickness is to be placed.

Surface finish

Provide a surface uniform in appearance and free from depressions.

5.5 DEFECTIVE SURFACING

Rejection

Extent: Remove areas of rejected asphalt surfacing, including defective joints and finish, to the full depth of the layer, and replace with complying surfacing.

Joints: Treat edges of remedial work as specified for cold joints.