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<td>Ed 1/Rev 0</td>
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Using Specification RMS D&C R76

Foamed bitumen stabilisation uses hot bitumen. Contractors must use safe practices detailed in Specification RMS D&C G22 Work Health and Safety (Construction Works), Government regulations, and Austroads and industry best practices technical guides. Only competently trained crews are to be used for foamed bitumen stabilisation. RMS requires accredited contractors to carry out the work. Refer to the RMS website: www.rms.nsw.gov.au for more details.

Refer to RMS Technical Direction PTD 2015/001 “Foamed Bitumen Stabilisation” for information about the design and construction of foamed bitumen stabilisation.

RMS has developed a form (Foamed Bitumen Stabilisation Record Sheet for Binder Application Rates, RMS Form 5113) to determine the Lime and Bitumen Target Application Rates. The Bitumen Target Application Rates are determined by “volume at 15°C” and at field bitumen temperature in L/m². Contractors must complete this form and forward to the Project Verifier at the end of each shift in accordance with Clause 5.1.

Insitu foamed bitumen stabilisation uses specialised equipment as the bitumen foaming process and delivery is critical to the stabilised material being fit for purpose. The Contractor is to maintain their equipment, including adhering to the manufacturers guidelines for maintaining and replacing the bitumen jets.
INSITU PAVEMENT STABILISATION USING FOAMED BITUMEN

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IC-DC-R76
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FOREWORD

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BASE SPECIFICATION

This document is based on Specification RMS R76 Edition 1 Revision 0.
RMS SPECIFICATION D&C R76
INSITU PAVEMENT STABILISATION
USING FOAMED BITUMEN

1 GENERAL

1.1 SCOPE

This Specification sets out the requirements for the rehabilitation of existing granular pavements by insitu stabilisation with foamed bitumen to a maximum depth of 400 mm, including pavements with bituminous wearing course of up to 80 mm thick.

It includes requirements for:
(a) removal of asphalt and previously bound patches and replacement with granular material, or their incorporation into the stabilised material, as specified;
(b) preliminary pulverisation of existing pavement prior to insitu stabilisation, where specified;
(c) supply of imported material to improve particle size distribution of the insitu material and to top up the existing pavement, where specified;
(d) supply and incorporation of lime and foamed bitumen binders into the pavement material;
(e) compaction and trimming of the stabilised material;
(f) construction of a trial section of pavement, where specified.

This specification is for use for major rehabilitation works.

1.2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

1.2.1 (Not Used)

1.2.2 (Not Used)

1.2.3 Schedules of HOLD POINTS, WITNESS POINTS and Identified Records

The schedules in Annexure R76/C list the HOLD POINTS and WITNESS POINTS that must be observed. Refer to Specification RMS D&C Q6 for definitions of HOLD POINTS and WITNESS POINTS.

The records listed in Annexure R76/C are Identified Records for the purposes of RMS D&C Q6 Annexure Q/E.

1.2.4 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements shown in Annexure R76/D and must be implemented.
1.2.5 Frequency of Testing

The Inspection and Test Plan must nominate the proposed frequency of testing to verify conformity of the work, which must not be less than the frequency specified in Annexure R76/L. Where a minimum frequency is not specified, nominate an appropriate frequency. Frequency of testing must conform to the requirements of RMS D&C Q6.

You may propose to the RMS Representative a reduced minimum frequency of testing. The proposal must be supported by a statistical analysis verifying consistent process capability and product characteristics. The RMS Representative may vary or restore the specified minimum frequency of testing, either provisionally or permanently, at any time.

1.2.6 Referenced Documents

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 2350). For convenience, the full titles are given in Annexure R76/M.

1.3 DEFINITIONS AND ACRONYMS

1.3.1 Definitions

The terms “you” and “your” mean “the Contractor” and “the Contractor’s” respectively.

The following definitions apply to this Specification:

- **Bound material**: A material with significant tensile strength produced from Material To Be Bound mixed with a binder. Bound material is also referred to as stabilised material.

- **Design Lime Target Spread Rate**: The design lime binder application rate expressed in kg/m², obtained by converting the binder content stated in the Nominated Mix Design expressed as a percentage of the dry mass of the material to be stabilised.

- **Expansion ratio**: Ratio of the maximum volume of bitumen in its foamed state to the volume of bitumen once the foaming has completely subsidised.

- **Field Lime Target Spread Rate**: The Design Lime Target Spread Rate to which a tolerance has been added.

- **Fresh joint**: A joint between adjacent runs where the stabilised pavement material of each run has been placed and compacted within 2 hours of the first placed run.

- **Half-life**: Time taken for the foamed bitumen to settle to one half of the maximum volume of bitumen in its foamed state.

- **Joint**: A plane formed in the bound pavement course between different materials, or materials constructed by different construction methods, or materials with different batching times, or materials with different placement times.

- **Material To Be Bound (MTBB)**: The unbound material prior to stabilisation with a binder.
Insitu Pavement Stabilisation Using Foamed Bitumen

### Pavement course
A course consisting of uniform material with uniform structural properties. May be applied to subbase, base and wearing courses.

### Run
An area of pavement within a Lot that is placed continuously (without stopping the plant). The dimensions of a run are:
- continuous longitudinal length; and
- output width from the equipment.

### Shift
A continuous operation of spreading, mixing, compacting and trimming. The shift must be completed within 12 hours of mixing the material.

### Target moisture content envelope
The range of moisture content (on the dry side of the optimum moisture content), as determined to enable required compaction.

#### 1.3.2 Acronyms
- **IRI**
  International Roughness Index of a section as defined in Test Method RMS T188
- **NATA**
  National Association of Testing Authorities, Australia

## 2 MATERIAL TO BE BOUND

### 2.1 TYPES
Material To Be Bound (MTBB) in accordance with this Specification includes:
(a) imported MB20 or MB40 in accordance with Specification RMS D&C 3051;
(b) imported gap graded material complying with RMS D&C 3051 except that particle size distribution must comply with Table R76/E.4;
(c) insitu base and/or subbase material in the existing pavement, which may already have been bound;
(d) any combination of these materials together with existing bituminous seal, or thin asphalt wearing surface which does not exceed 80 mm thick, and/or patching materials where specified to be incorporated into the pavement course.

### 2.2 IMPORTED MATERIAL TO BE BOUND
Imported MTBB must comply with the requirements of RMS D&C 3051.

Frequency of sampling and testing of imported MTBB must comply with RMS D&C 3051.

When imported material is combined with insitu material, the combined material particle size distribution must be in accordance with the mix design requirements in Clause 4.1.
**HOLD POINT**

Process Held: Supply of imported MTBB.

Submission Details: Documentation verifying that either:
(a) imported MB20 or MB40 complies with RMS D&C 3051; or
(b) imported gap graded material complies with R76/E.4 and with RMS D&C 3051 for properties other than particle size distribution.

Release of Hold Point: The Nominated Authority will consider the submitted documents prior to authorising the release of the Hold Point.

### 2.3 CERTIFIED STOCKPILES

Stockpiles of MTBB that have been tested and shown to conform to the requirements of RMS D&C 3051 are designated as Certified Stockpiles.

Prior to the release of MTBB from a Certified Stockpile, provide the Project Verifier with a signed statement certifying that the material from the Certified Stockpile meets the requirements of this Specification and the relevant properties stated in RMS D&C 3051. Include NATA endorsed test results with the statement. Indicate clearly in the statement the quantity of material represented by the test results.

**HOLD POINT**

Process Held: Deliveries of MTBB from a Certified Stockpile.

Submission Details: Details of the stockpile, your statement of conformity and documentation specified in RMS D&C 3051 regarding conformity.

Release of Hold Point: The Nominated Authority will consider the submitted documents prior to authorising the release of the Hold Point.

Once a stockpile has been certified, do not add any further materials to the stockpile until the additional material has been tested and shown to conform to this Specification. Provide the Project Verifier with test certificates verifying the conformity of all such additional material.

MTBB supplied from Certified Stockpiles will generally not require any further testing.

If subsequent inspection and/or testing of the material at the stockpile or at the point of delivery indicate that the properties of the material have changed since certification, for example, due to segregation, contamination or weathering, stop further deliveries of the material, and undertake further sampling and testing of the stockpile. The conformity or otherwise of the material will then be reassessed, on the basis of these test results.

Each delivery docket must identify the Certified Stockpile from which the material is supplied.

### 2.4 SITE STOCKPILES

Delivery of MTBB to site stockpiles must comply with the requirements of Clause 2.5. If the material has not been sourced from a Certified Stockpile, the site stockpile must be certified in accordance with Clause 2.3 prior to using the material.
Place the site stockpiles of MTBB only at the locations shown on the Design Documentation drawings.

You are responsible for preparation of the stockpile sites.

When stockpiling MTBB on site, comply with the following:

(a) Place stockpiles on firm, even, well-drained ground or over a constructed floor.

(b) Install and maintain around the stockpiles appropriate erosion and sedimentation controls in accordance with Specification RMS D&C G38 for the duration of the deed;

(c) Construct stockpiles in a manner which does not result in segregation. Place the material in horizontal layers, with each new additional layer fully within the boundary of the underlying layer. Do not push the stockpile into a cone shape. Stockpiles must be of uniform shape with side slopes neither steeper than 1.5 horizontal to 1 vertical, nor flatter than 3 horizontal to 1 vertical.

   The total height of any stockpile must not exceed 4 m, unless specified otherwise in the Design Documentation.

(d) The worked face of any stockpile must be the full face of the stockpile.

(e) Keep the stockpile material sufficiently damp to avoid loss of fines and to keep dust levels down.

(f) Keep the stockpiles separated from each other and maintain them to prevent the stockpiled materials from becoming intermixed, or contaminated with foreign material.

(g) In the context of sampling and testing, the stockpile may be constructed in either one of the following two ways:

   (i) the stockpile is built up continuously until it is complete, and once complete, no further material is added to the stockpile, with each stockpile constituting a separate Lot;

   or

   (ii) the stockpile is built up incrementally, and any further material added to the stockpile previously verified as conforming is considered to be a new Lot, with the new material first tested and verified as conforming before it is added to the stockpile.

(h) Clearly and uniquely identify each stockpile by signposting, stating the type and quantity of material present in the stockpile. For the purposes of this Specification, the maximum Lot size for Certified Stockpiles is 4,000 tonnes;

(i) On completion of Works, clear the stockpile locations of all surplus material and re-vegetate the area in accordance with Specification RMS D&C R178.

Include in the PROJECT QUALITY PLAN details of the procedures for the construction, operation and restoration of stockpile sites, and measures to be taken to meet the requirements of this Clause.

2.5 **DELIVERY OF IMPORTED MATERIAL TO BE BOUND**

Transport MTBB in vehicles which are so constructed that loss of material does not occur. The delivery vehicles used must be suitable for the ground conditions at the Site.
The material must be kept suitably damp to prevent segregation or loss of fines during transit and must, at the time of delivery, have a moisture content (uniformly distributed) not greater than the optimum moisture content as determined by either Test Method RMS T111 or T162.

MTBB delivered to the Site which is unsuitable for reasons such as segregation or contamination is deemed to be nonconforming and must not be used in the Works.

Include in the PROJECT QUALITY PLAN the methods for preventing segregation and/or loss of fines during transport.

3 OTHER MATERIALS

3.1 BINDERS

3.1.1 General

For the purpose of this specification, the primary and secondary binder are bitumen and lime respectively.

Use only the binder type or class stated in the accepted nominated mix design in the Works.

Include in the PROJECT QUALITY PLAN details of all binders proposed for use in the Works, together with supporting test results traceable to the materials supplied.

Sample and test the binder(s) at the frequency stated in Annexure R76/L. Detail in the PROJECT QUALITY PLAN the method of sampling the binder.

3.1.2 Lime

Lime can be either hydrated lime or quicklime, and must comply with the requirements of Specification RMS D&C 3211. Where quicklime is used instead of hydrated lime, adjust the target spread rate in accordance with Clause 5.6.3.

Transport lime in watertight containers and protect the lime from moisture until use. Do not use lime that has become caked or lumpy in the Works.

3.1.3 Bitumen

Bitumen must be Class 170 bitumen, or other bitumen specified in the Design Documentation, and must comply with the requirements of Specification RMS D&C 3253.

3.2 FOAMING AGENT

3.2.1 General

A foaming agent may be added to the bitumen to improve its foaming properties.

3.2.2 Material Requirements

The foaming agent if in liquid form must, after agitation and when ready for use, remain free from skinning, precipitation or any other form of deterioration.
The foaming agent must be homogeneous.

Provide details of a reproducible laboratory test to determine the concentration of the active component of the material. Specify an average value for the concentration of the active component, and an acceptable minimum value above which the material is considered to be effective.

### 3.2.3 Delivery

All containers used to deliver the bitumen foaming agent must be in an undamaged condition.

Mark each container clearly and durably with the following information:

(a) name of manufacturer and/or supplier;
(b) product name or trade name (if any);
(c) product reference number or identification number;
(d) batch number;
(e) date of manufacture;
(f) “use by” date.

### 3.2.4 Conformity

With each delivery, provide a certificate from the manufacturer that the product delivered conform to the design formulation of the product.

### 3.3 Water

Water for use in the Works must be free from deleterious amounts of materials such as oils, acids, alkalis, organic matter and any other material which could affect the chemical reactions.

Water that is not taken from a town water supply system must comply with the requirements shown in Table R76.1.

<table>
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<th>Test Method</th>
<th>Upper Limit</th>
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<tr>
<td>Chloride ion (mg/L)</td>
<td>T1004</td>
<td>600</td>
</tr>
<tr>
<td>Sulfate ion (mg/L)</td>
<td>T1014</td>
<td>400</td>
</tr>
<tr>
<td>Undissolved solids (% by mass)</td>
<td>AS 3550.4</td>
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Where recycled water is proposed for use, the water must meet the above requirements and those in Specification RMS D&C G36, with the maximum concentration of 1,000 thermo-tolerant coliforms per 100 mL when tested in accordance with Test Method RMS T1015.

Include in the PROJECT QUALITY PLAN details of the water proposed for use in the Works, including the water source.
3.4 SAFETY

3.4.1 General

The binders and foaming agent must not contain any known component which, when handled in accordance with accepted road making practice, would cause any person to be exposed to any injurious substance above the legal concentration limit.

3.4.2 Safety Data Sheets

Include in the PROJECT QUALITY PLAN the Safety Data Sheets (SDS) for the binders and foaming agent proposed for use in the nominated mix design and procedures for their safe handling.

3.4.3 Hot Bitumen

Provide Safe Work Method Statements (SWMS) for working with hot bitumen.

Refer to the Austroads Bituminous Materials Safety Guide for guidance on safe handling procedures of hot bitumen.

4 MIX DESIGN

4.1 MIX DESIGN REQUIREMENTS

Nominated mix designs must comply with the mix design requirements stated in RMS Technical Direction PTD 2015/001 “Foamed Bitumen Stabilisation”.

In particular, the foamed bitumen must have the following characteristics:

(a) minimum expansion ratio (ER) of 10;
(b) minimum half-life (HL) of 20 seconds.

4.2 NOMINATED MIX DESIGN

4.2.1 General

You must nominate the mix designs.

4.2.2 (Not Used)

4.2.3 Mix Design Nominated by the Contractor

Submit to the Project Verifier, at least 10 working days prior to the commencement of Works, the proposed mix design for acceptance, including the completed Table R76/E.1.
HOLD POINT

Process Held: Use of each Contractor nominated mix design.

Submission Details: At least 10 working days prior to commencement of the trial section of pavement construction, or commencement of the pavement works, submit to the Nominated Authority details of your nominated mix design(s) and test results verifying conformity of the nominated mix design(s).

Release of Hold Point: The Nominated Authority will consider the submitted documents prior to accepting the Contractor nominated mix design and authorising the release of the Hold Point.

4.3 SUPPLEMENTARY INFORMATION

For each mix design, submit to the Project Verifier, at least 10 working days prior to the commencement of work, the following supplementary information:

(a) Imported Material To Be Bound
   (i) Details of imported MB20 or MB40 and test results verifying conformity to RMS D&C 3051.
   (ii) Details of imported gap graded material (if applicable) and test results verifying conformity to R76/E.4, and to RMS D&C 3051 for properties other than particle size distribution.

(b) Insitu Material To Be Bound
   (i) Optimum moisture content and maximum dry density, including associated test results.
   (ii) Target moisture content envelope.

(c) Lime
   (i) Brand(s), grade(s) and source.
   (ii) Compliance certificate, including test results verifying conformity to RMS D&C 3211.

(d) Bitumen
   (i) Class and source.
   (ii) Compliance certificate, including test results verifying conformity to RMS D&C 3253.
   (iii) Foaming properties of bitumen in accordance with Test Method RMS T153 without addition of foaming agent, and after addition of foaming agent.

(e) Foaming Agent
   (i) Brand, grade and source.
   (ii) Form, whether solid, liquid or paste.
   (iii) Chemical and physical properties.
   (iv) Recommended dosage rate. The dosage rate quoted must be a percentage of the mass of bitumen at 15°C.
   (v) Recommended method and duration of mixing with bitumen.
   (vi) Effective life once mixed with the bitumen.
Recommended shelf life.
Compliance certificate, including test results verifying conformity to Clause 3.2.

(f) Water
(i) Source.
(ii) Test results verifying conformity to Clause 3.3.

(g) Bound Material
(i) Data including test results verifying that the bound material complies with the mix design requirements (refer Clause 4.1).
(ii) Mix proportions for lime, bitumen, foaming agent and water, expressed as a percentage by dry mass of MTBB.

Any required testing must be carried out in the 12 months immediately preceding the date of submission of the test results to the Project Verifier. All phases of any particular test must be carried out in the same laboratory.

4.4 VARIATION TO NOMINATED MIX DESIGN

If you vary the source, nature or type of any constituent material, or the proportion of any of the constituent materials, by more than 10% from the nominated quantity in the accepted Contractor nominated mix design, submit a new nominated mix design for acceptance in accordance with Clause 4.2.3.

The Hold Point for Clause 4.2.3 will again apply.

5 CONSTRUCTION

5.1 GENERAL

Carry out insitu pavement stabilisation in a manner which will:
(a) prevent segregation or loss of material;
(b) produce a product which is homogenous between joints and edges;
(c) prevent the development of laminations, lenses, pockets, lumps or granules of incompletely mixed pavement material in the pavement.

The entire process from spreading of lime, incorporation of foamed bitumen, mixing with the insitu material, shaping, compacting and trimming must proceed continuously until completion.

Complete RMS Form 5113 and submit to the Project Verifier at the completion of each run.

5.2 EQUIPMENT

5.2.1 General

Include in the PROJECT QUALITY PLAN:
Insitu Pavement Stabilisation Using Foamed Bitumen

5.2.2 Bitumen Tanker

The bitumen tanker supplying hot bitumen to the stabiliser must be able to maintain the bitumen temperature for foaming and be equipped with a calibrated dipstick to determine the volume of bitumen in the tanker when parked on a level surface.

The bitumen temperature at the tanker must be between 170°C and 190°C during the stabilisation process.

5.2.3 Stabiliser

The stabiliser must be purpose built for the insitu mixing of pavement materials, capable of mixing to the depth specified, pulverising the existing unbound pavement and/or patches, mixing the pulverised pavement material and distributing both the binder and moisture uniformly to the full depth and over the total area.

The mixing equipment must include the following:

(a) fully enclosed mixing chamber;
(b) minimum engine power capacity of 370 kW for width over 2.0 m, and 300 kW for width up to 2.0 m, to ensure adequate mixing of materials;
(c) computer controlled calibrated bitumen flow meter to determine binder application rate for process control;
(d) bitumen injection systems linked to the ground speed to ensure an accurate application throughout the runs, irrespective of the speed of the equipment;
(e) separate “on” and “off” controls for each jet on the bitumen injection bar, to maintain uniform application transversely for overlapping runs;
(f) temperature gauges to verify bitumen temperature in the injection system;
(g) heating system for the bitumen injection bar and supply lines to maintain bitumen temperature;
(h) self-cleaning bitumen jets;
(i) fitted with a test jet for sampling, to ensure the flow of bitumen and achievement of the required expansion ratio and half-life of the bitumen;
(j) capable of applying moisture uniformly during mixing through a series of nozzles on a spray bar located inside the mixing hood.

Each nozzle on the spray bar must be independently controlled to ensure a uniform transverse moisture distribution in overlapping runs.

Replace any spray jets, mixing tools, blades or tynes which are worn out or damaged so as to maintain the mixing efficiency demonstrated during the trial section of pavement (refer Clause 5.13).

5.3 Weather Conditions

Do not carry out pavement stabilisation when any of the following apply:
5.4 EXISTING PAVEMENT

5.4.1 Existing Wearing Course

Remove and dispose of existing wearing courses which are thicker than 80 mm in accordance with Specification RMS D&C R101 unless specified otherwise. Where the existing wearing course does not have to be removed, it can be incorporated into the pavement course after pulverisation.

Imported MTBB may be required to top up the levels after removal of the existing wearing course.

5.4.2 Existing Patches

Where asphalt and cementitious stabilised patches are to be incorporated into the pavement course, include in the PROJECT QUALITY PLAN the procedures for their pulverisation and their uniform mixing with adjacent pavement material.

Otherwise, remove and replace the patches with granular material meeting the requirements of RMS D&C 3051. Include in the PROJECT QUALITY PLAN the method of removal of patches and their replacement with imported pavement material(s).

5.4.3 Preliminary Pulverisation

Where pulverisation of the existing pavement prior to stabilisation is required, carry out the preliminary pulverisation to the specified depth. Leave the pulverised material at their original location where practical. You may lightly compact the loose material after pulverisation.

Include in the PROJECT QUALITY PLAN the procedures for the pulverisation of the existing pavement and its uniform mixing with other pavement material.

5.5 PLACING OF IMPORTED MATERIAL TO BE BOUND

5.5.1 Increase in Finished Surface Levels

Where an increase in surface level over that of the existing pavement is specified, place a layer of imported MTBB over the existing pavement in order to achieve the required finished surface levels.

Describe in the PROJECT QUALITY PLAN the procedure to determine the quantity of imported MTBB required, taking into account any bulking following incorporation of binder, and minimising the amount of bound material that needs to be trimmed after compaction.
5.5.2 Spreading and Mixing Imported MTBB

Spread and mix the imported MTBB into the existing pavement material, with sufficient passes of the mixing equipment to ensure uniform distribution of the imported MTBB, and partially compact the mixed material prior to carrying out stabilisation.

5.6 SPREADING AND MIXING OF SECONDARY BINDER

5.6.1 General

Include in the PROJECT QUALITY PLAN the procedures, and inspection and test plan, for spreading and mixing of lime.

5.6.2 Alternative Construction Method

Any proposed procedure for incorporation of lime by methods other than spreading the lime on the pavement in advance of mixing is termed an Alternative Construction Method.

HOLD POINT


Submission Details: Details of the procedures, and inspection and test plan, for spreading and mixing of lime, and documents verifying calibration of the spread rate at a demonstration or during construction of the trial section of pavement.

Release of Hold Point: The Nominated Authority will consider the submitted documents prior to authorising the release of the Hold Point.

5.6.3 Design and Field Target Spread Rates of Lime

Determine the Design Target Spread Rate of lime in kg/m² from the accepted nominated mix design and the specified (compacted) pavement course thickness using Table R76/E.2.

Prior to the commencement of the stabilisation work, submit to the Project Verifier the completed Table R76/E.2.

Add a minimum tolerance of 0.2 kg/m² to the Design Target Spread Rate to obtain the Field Target Spread Rate. Where quicklime is used, multiply the Field Target Spread Rate for hydrated lime by a factor of 0.76. These steps are shown in RMS Form 5113.

5.6.4 Spreading of Lime

Spread lime at a controlled rate, using vehicles fitted with load cells or other forms of weighing systems capable of providing a recordable output of the rate at which the lime is applied.

Spreading must be visually uniform throughout each spreader run.

Include in the PROJECT QUALITY PLAN the method of continuous monitoring of spread rate and the calibration method.

If quicklime is used, it must be fully slaked prior to mixing by adding water. Include in the PROJECT QUALITY PLAN details of the process of slaking of quicklime and an inspection and test plan for
verifying that the quicklime is fully slaked. Adjust the moisture content if required to conform with the target moisture content envelope.

5.6.5 Consistency of Spreading

Initially, verify the consistency of spreading by conducting tray tests in accordance with Test Method RMS T136 during construction of the trial section of pavement (refer Clause 5.13), or the first Lot of pavement construction if a trial section of pavement is not required.

Perform one tray test in accordance with RMS T136 for every 100 m run of the initial pavement construction, with at least two tests per run, and compare the spread rate determined by RMS T136 with that determined using load cells. The first tray test must be undertaken within 30 m of the start of the run.

If the spread rate as determined using load cells is not within ±10% of that determined by RMS T136, continue with the tray tests for all subsequent Lots until there is consistency to within ±10% between the spread rate determined using load cells and that determined by RMS T136.

5.6.6 Mixing of Lime

Where lime is mixed with the pavement material before the incorporation of foamed bitumen, the spread lime must be mixed into the pavement material to no more than 90% of the stabilised pavement thickness.

During the lime mixing process, water may be added to ensure that the moisture content of the pavement material is within the target moisture content envelope (refer to Clause 5.9).

Include in the PROJECT QUALITY PLAN details of the mixing operation, proposed width of passes and nominated depth of mixing to ensure uniform distribution of lime is achieved.

Where visual inspection indicates that the lime is not uniformly mixed with the pavement material and/or the moisture distribution throughout the pavement course is variable, carry out additional passes with the mixing equipment to improve the uniformity of:

(a) material being stabilised; and/or
(b) distribution of lime; and/or
(c) distribution of moisture.

Level and lightly compact the mixed material prior to the addition of foamed bitumen.

5.7 Application and Mixing of Primary Binder

5.7.1 General

Prior to mixing, all bitumen foaming equipment must be heated to ensure that the mix produced is at a constant temperature from the start to finish of the work.

5.7.2 Design and Field Target Application Rates of Bitumen

Determine the Design Target Application Rate of bitumen in kg/m² from the accepted nominated mix design and the specified (compacted) pavement course thickness using Table R76/E.3.

Prior to the commencement of the stabilising work, submit to the Project Verifier the completed Table R76/E.3.
Convert the Design Target Application Rate of bitumen in kg/m² to the Application Rate, measured by volume at 15°C, by dividing it by a factor of 1.04. Obtain the Field Target Application Rate, measured by volume at field temperature, by multiplying it with the factor in Table 1 of RMS Form 5113. These steps are shown in RMS Form 5113.

5.7.3 **Mixing of Bitumen**

Where a foaming agent is to be used, incorporate the agent into the bitumen in accordance with the manufacturer/supplier’s recommendations, prior to determining the expansion ratio and half-life. Include in the PROJECT QUALITY PLAN details of the method and duration of mixing the foaming agent with bitumen.

Before mixing commences, determine the foamed bitumen expansion ratio and half-life (in accordance with RMS T153) using the external inspection jet of the stabiliser. Test each bitumen tanker load. If the tanker is held overnight, repeat the tests at the start of tanker discharge. Provide test results immediately to the Project Verifier.

Do not undertake stabilisation when the foaming characteristics do not meet the values specified in Clause 4.1.

Apply the foamed bitumen immediately after the lime spreading and within the same shift as the lime spreading.

Incorporate foamed bitumen to the full pavement depth in one mixing pass.

Include in the PROJECT QUALITY PLAN the method of continuous monitoring of application rate, and the calibration method.

Where visual inspection indicates that the foamed bitumen is not uniformly mixed with the pavement material and/or the moisture distribution throughout the pavement course is variable, carry out additional passes with the mixing equipment to improve the uniformity of:

(a) material being stabilised; and/or
(b) distribution of foamed bitumen; and/or
(c) distribution of moisture.

Cease mixing if bitumen streaks or blotches or bitumen rich agglomerations form in the mixed material.

5.8 **Spillage of Binders and Foaming Agent**

Remove, as soon as possible and not later than 12 hours, any spillage of binder and foaming agent on the Site or at any loading location.

Include in the PROJECT QUALITY PLAN your procedures for dealing with spillage of binder and foaming agent in accordance with RMS D&C G36 and the relevant SDS.

Do not incorporate spilled bitumen, foaming agent or lime into the pavement material.

5.9 **Moisture Content**

Taking into account the bitumen content, develop a work method and target moisture content envelope that will ensure that:
(a) there is adequate moisture in the pavement material to achieve the specified compaction;
(b) the pavement is capable of carrying the traffic load without shoving or ravelling on completion of compaction.

Moisture must be uniformly distributed throughout the depth immediately prior to compaction. Adjust the moisture content of the material until it is within the target moisture content envelope.

Include in the PROJECT QUALITY PLAN the procedure to incorporate water in the MTBB and to achieve a uniform distribution of water and within the target moisture content envelope.

### 5.10 COMPACTION

Commence compaction immediately after mixing of the foamed bitumen into the pavement material. Compaction must be a continuous operation and must be completed within the same shift as the mixing.

Compact the stabilised pavement to its full depth over the entire area, except for the areas adjacent to fresh joints, as stated in Clause 5.11.2.

Include in the PROJECT QUALITY PLAN details of the procedure to be followed to ensure that the specified compaction is achieved.

### 5.11 JOINTS

#### 5.11.1 General

Include in the PROJECT QUALITY PLAN details of the locations and types of construction joints, treatment of overlaps and irregular shaped Lots, locations of unsupported edges, and compaction rolling pattern.

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**HOLD POINT**

**Process Held:** Stabilisation of pavement material.

**Submission Details:** Locations and types of construction joints, treatment of overlaps and irregular shaped Lots, locations of unsupported edges and compaction rolling pattern.

**Release of Hold Point:** The Nominated Authority will consider the submitted documents prior to authorising the release of the Hold Point.

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#### 5.11.2 Fresh Joints

A joint is deemed to be fresh when the pavement material adjacent to both sides of the joint has been stabilised within 2 hours.

A fresh joint does not constitute a Lot boundary.

Where a fresh longitudinal joint between adjacent runs is to be compacted, do not compact material mixed in the first run that is within 300 mm of the joint until the adjacent material in the second run is ready for compaction. Keep the joint moist until the start of the second run.

The moisture content in the vicinity of the joint must be within the target moisture content envelope.
5.11.3 Transverse and Longitudinal Construction Joints

Plan and carry out the work in a manner which minimises the number of joints.

The layout of joints must conform to the following requirements:

(a) Transverse joints must be formed at right angles to the road centreline.

(b) Longitudinal joints must:
   (i) not be located at wheel paths;
   (ii) be formed within ±100 mm of separation lines of travel lanes;
   (iii) be located at a minimum distance of 300 mm away from the edge lines and located within the shoulder area.

5.11.4 Stabilisation Adjacent to Joints

Carry out stabilisation in a manner which ensures that there is no unbound material between joints.

Ensure consistent distribution of binder and mixing and compaction at the joint.

Include in the PROJECT QUALITY PLAN details of overlap and/or cutting back of previously stabilised material to ensure a consistent distribution of binder, mixing and compaction at the joint.

5.11.5 Disposal of Cutback Material

Dispose of all cutback material. Do not incorporate cutback material into subsequent pavement courses.

Include in the PROJECT QUALITY PLAN the method of disposal of waste material.

5.12 TRIMMING

5.12.1 General

On completion of compaction, carry out trimming to produce a surface which is parallel to the finished wearing surface.

Include in your PROJECT QUALITY PLAN details of your method of trimming and survey control to ensure that the pavement course thickness is not reduced during trimming to the extent that it is nonconforming with respect to thickness as specified in Clause 7.4.

Trimming must be completed within the same shift as mixing and compaction.

Carry out trimming in preparation for a prime, primerseal or seal only when the surface can be cut without causing damage to the pavement surface.

5.12.2 Pavement Surface After Trimming

Include in the PROJECT QUALITY PLAN a procedure which ensures that, after trimming, the finished surface of the pavement is a tightly bound matrix of coarse and fine material without a slurry of fines.

No roller marks must remain on the pavement surface after trimming.
5.12.3 Disposal of Trimmed Material

Dispose of all trimmed material. Do not incorporate trimmed material into subsequent pavement course.

Include in the PROJECT QUALITY PLAN the method of disposal of the trimmed material to waste.

5.13 TRIAL SECTION OF PAVEMENT

5.13.1 General

Construct a trial section of pavement at an agreed location, using the same materials, equipment and methods described in the PROJECT QUALITY PLAN. When an Alternative Construction Method as stated in Clause 5.6.2 is proposed, demonstrate compliance with the requirements of Clause 5.6.2 during the trial.

The trial section of pavement must be between 100 m and 200 m long or any other length accepted by the Project Verifier for the proposed Lot width.

Demonstrate that, for the work at the trial section of pavement, the specified compaction, course thickness and levels as well as the specified pavement properties can be achieved.

**WITNESS POINT**

Process Witnessed: Construction of trial section of bound pavement.

Submission Details: Notification of the construction of the trial section of pavement at least 3 working days prior to commencement.

**HOLD POINT**

Process Held: Construction of bound pavement.

Submission Details: Documentation, including test results, verifying that the trial section of pavement conforms to the specified requirements.

Release of Hold Point: The Nominated Authority will consider the submitted documents prior to authorising the release of the Hold Point.

5.13.2 Nonconformities

If there are nonconformities in the trial section of the pavement, the Project Verifier may require the construction of a further trial section of pavement before releasing the Hold Point. The Project Verifier may also require your proposed disposition to include modifications to the equipment and/or methods of construction.

Treat any nonconforming trial section of pavement in accordance with Clause 7.11.
5.13.3 New Trial Section

The Project Verifier can require a new trial section of pavement to be carried out when you make changes to plant, equipment, method of construction, materials, mix, rate of work or when any material or work does not comply with this Specification.

5.14 Protection of Work

5.14.1 Adequate Drainage

Provide adequate drainage of all working areas throughout the period of construction to avoid ponding or scouring.

5.14.2 Trafficking of Newly Placed Pavement

Except for construction plant and vehicles carrying out the construction or testing of a particular section of pavement, do not allow traffic to travel over the spread material prior to completion of mixing.

Do not traffick the stabilised pavement within 3 hours of compaction.

Do not allow the surface to dry up to the extent that excessive dust will be generated by traffic.

5.14.3 Temporary Roadways and Detours

Provide temporary roadways or detours in accordance with Specification RMS D&C G10 during construction of the pavement.

Where it is not practicable to provide temporary roadways or detours, the pavement may be constructed in stages; with only part of the width of the pavement being constructed at each stage so that traffic may use the remaining width not under construction.

Include in the PROJECT QUALITY PLAN details of the procedures to comply with this Clause.

5.15 Bituminous Seal

Spraying of bituminous seal can only commence when the bound pavement surface is sufficiently firm, neatly and tightly bound without a slurry of fines, and ready to receive the sprayed bituminous seal without punching of the sealing aggregates into the bound pavement layer.

Assess the surface of the base course by ball penetration test in accordance with Test Method RMS T271 prior to applying a bituminous seal.

Apply either a prime, primerseal or seal on the bound pavement surface. Application of prime, primerseal or seal must be in accordance with either Specification RMS D&C R106 or D&C R107.
HOLD POINT

Process Held: Priming, primersealing or sealing of surface of bound pavement course.

Submission Details: Conformity reports verifying that each Lot conforms with respect to specified level, thickness, surface deviation and compaction, and notification that the bound pavement course is ready for sprayed sealing.

Release of Hold Point: The Nominated Authority will consider the submitted documents prior to authorising the release of the Hold Point.

6 SURVEY

6.1 GENERAL

Carry out survey in accordance with Specification RMS D&C G71.

During the progress of the Work, carry out surveys to determine the levels at:
(a) bottom of the bound pavement course; and
(b) top of the bound pavement course.

Determine the levels using a survey staff (or reflector) with a flat base of area between 300 mm$^2$ and 4,000 mm$^2$. Allow for seal thickness in determining the levels. Where the survey is undertaken for a sealed surface, remove any loose foreign matter, including loose aggregates, before the survey and determine the levels by deducting the Average Least Dimension of the cover aggregate of the seal.

6.2 SURVEY OF FINISHED SURFACE LEVELS

6.2.1 Finished Surface Levels Not Shown on Design Documentation Drawings

Where the bound pavement course finished surface levels must be compared with existing surface levels to assess conformity, survey the existing surface levels before the spreading and mixing of binder.

Where an increase in surface level over that of the existing pavement is specified, either:
(a) obtain by survey the existing surface levels before spreading and mixing of binder and again, after trimming, obtain by survey the bound pavement surface level, to assess conformity; or
(b) obtain by survey the levels at recoverable points on the existing pavement surface before and after stabilisation.

Survey locations must be along a 100 m line, at a constant offset which is not greater than 4.5 m from the road centreline, and can be on either side of the road centreline. Select and survey the end points of each line so as to be recoverable to an accuracy of ±100 mm.

Describe the method of selection of the 100 m line in the PROJECT QUALITY PLAN.

Record the levels at 10 equidistant points along the line, both before placing imported MTBB and after trimming of the stabilised material. The average of the increase in level at these 10 points is the increase in surface level at that sampling location.
Obtain the average increase in level at 2 sampling locations per Lot to assess whether the increase in level conforms to the nominated increase in level specified. A Lot must not exceed one day’s stabilisation work or a surface area of 5,000 m² and must be surveyed at two sampling locations (100 m lines).

6.2.2 Finished Surface Levels Shown on Design Documentation Drawings

Where finished surface levels are shown on the Design Documentation drawings, survey the bound pavement course finished surface level to assess conformity.

6.3 SURVEY FOR THICKNESS

On completion of mixing but prior to compaction, measure the levels at the bottom of the bound pavement course at the locations where samples will be taken for compaction assessment (refer Clause 7.3).

Following compaction and trimming to final levels, measure the levels at the top of the bound pavement course at the same corresponding locations (within ±50 mm in the horizontal plane).

7 CONFORMITY

7.1 GENERAL

Each Lot must comply with the following requirements. Nonconforming Lots must be dealt with in accordance with Clause 7.11.

7.2 BINDER APPLICATION RATE

7.2.1 Lime Spread Rate

Submit the following information to the Project Verifier on completion of each spreader run:

(a) Chainages and offsets of start and finish locations.
(b) Width of spread.
(c) Quantity of lime spread. If monitored by both tray tests and load cells concurrently, provide information for both.
(d) Calculated actual lime spread rate, expressed as a percentage of the Field Target Spread Rate (measured in kg/m²), initially for each 100 m length (refer Clause 5.6.5) and subsequently for each 200 m length once consistency of spreading has been established.

When measuring at 200 m lengths, combine any length less than 200 m with the length preceding it, and determine the spread rate as an average over the combined length.

The calculated actual average spread rate of a mixing run (assessed by tray test or load cell) must be within ±5% of the Field Target Spread Rate of the nominated mix design, and each individual test result (tray test at every 100 m or load cell assessment at every 200 m) must be within 0% to +10% of the Design Target Spread Rate.

Submit to the Project Verifier at the end of each day the total tonnage of lime used, the area stabilised and the calculated actual spread rate.
7.2.2 Bitumen Application Rate

Submit the following information to the Project Verifier on completion of each spreader run:

(a) Chainages and offsets of start and finish locations.
(b) Width of bitumen spray and depth of mixing.
(c) Dosage of foaming agent used.
(d) Dip taken from bitumen tanker on level ground, and measured bitumen temperature at start of run.
(e) Results of checking of nozzles for blockage.
(f) Dip taken from bitumen tanker on level ground, and measured bitumen temperature at end of run.
(g) Quantity of bitumen used, determined from dips taken from bitumen tanker.
(h) Calculated average actual bitumen application rate for each mixing run, expressed as a percentage of Design Bitumen Target Application Rate by mass.

The average actual bitumen application rate (kg/m²) of each mixing run must be within 0% to +10% of the Design Bitumen Application Rate.

Submit to the Project Verifier at the end of each day the total tonnage of bitumen used and the area stabilised.

7.3 Compaction and Moisture Content

Determine the sampling locations for each Lot in accordance with RMS D&C Q6. Each Lot must be visually homogenous.

For each sampling location, obtain the insitu density and take samples for determining the field moisture content and the maximum wet density in the laboratory.

7.3.1 Insitu Density

Carry out insitu density tests in accordance with Test Method RMS T173 on the stabilised material within 2 hours after completion of compaction.

The depth of testing is as follows:

(a) **Pavement course \( \leq 250 \text{ mm thick}: \)**

   as close to the bottom of the stabilised pavement course as the probe will allow.

(b) **Pavement course \( > 250 \text{ mm}: \)**

   (i) at depth “Y”, equal to 150 mm;
   (ii) at depth “X”, which is as close to the bottom of the stabilised pavement course as the probe will allow, or at the maximum extension of the probe (300 mm) where the course thickness exceeds 300 mm.

(Refer to RMS T173 showing which part of the layer the dimensions “X” and “Y” refer to.)

Determine the wet density \( D_z \) for the lower part of the stabilised pavement course in accordance with RMS T173.
Repair nuclear density test holes with freshly mixed material identical to that of the surrounding pavement. Compact the repair material within 2 hours of placing to the same extent as that of the surrounding pavement. Detail in the PROJECT QUALITY PLAN the method of repairing test holes.

### 7.3.2 Maximum Wet Density

The location of the sample for the determination of maximum wet density must be the same as that for the determination of insitu density.

Determine the maximum wet density in accordance with RMS T162 on a sample taken prior to compaction. Compact the sample within 3 hours of sampling.

Record and report the time of commencement of mixing of the material at the sampling location and the time of sampling.

### 7.3.3 Relative Compaction

Calculate the relative compaction in accordance with Test Method RMS T166.

Determine the characteristic value of relative compaction in accordance with RMS D&C Q6 and report to one decimal place.

**For pavement course \( \leq 250 \text{ mm thick} \)**, the characteristic value of relative compaction, based on the wet density measured as close to the bottom of the course as the probe will allow, must be \( \geq 106\% \).

**For pavement course \( > 250 \text{ mm thick} \):**

(a) the characteristic value of relative compaction, based on the wet density measured as close to the bottom of the stabilised course as the probe will allow, or at the maximum extension of the probe (300 mm), where the course thickness exceeds 300 mm, must be \( \geq 104\% \); and

(b) the individual value of relative compaction, based on the calculated wet density \( D_Z \) for the lower part of the stabilised pavement course, must be \( \geq 99\% \).

Record and report the following:

(i) test locations;

(ii) relative compaction result(s) for the pavement depth at each location; and

(iii) characteristic value of relative compaction of each Lot.

### 7.3.4 Field Moisture Content

At each test location where an insitu density test is to be performed, take a sample for the determination of field moisture content. Take samples immediately after the mixing of foamed bitumen but prior to compaction.

Determine the moisture content in accordance with Test Method RMS T120, T121 or T180.

The field moisture content must be within the target moisture content envelope as specified in Clause 5.9.

### 7.4 THICKNESS

After final trimming, the bound pavement course thickness at any point as determined in accordance with Clause 6.3 must be 10 mm to 30 mm above the thickness shown in the Design Documentation.
7.5 **SURFACE LEVELS**

After final trimming, the pavement surface must be parallel to the design finished surface.

The surface levels after final trimming must be between 0 and 10 mm above the finished surface levels shown on the Design Documentation drawings.

7.6 **SURFACE DEVIATION**

After final trimming, test the surface with a 3 m straight edge laid in any direction.

Include in the PROJECT QUALITY PLAN details of the planned locations for taking straight edge measurements.

The surface of the bound pavement course must not deviate from a 3 m straight edge laid in any direction by more than 5 mm. Additionally, there must be no abrupt change of levels in the transition from the pavement to fixed structures such as a bridge deck, or adverse changes that will affect surface pavement drainage.

7.7 **RIDE QUALITY**

Measure the ride quality of the finished pavement surface within 2 weeks after the prime, primerseal or seal has been applied and swept, with either:

(a) a calibrated NAASRA Roughness Meter in accordance with Test Method RMS T182; or

(b) a laser profilometer in accordance with RMS T188.

Include in the PROJECT QUALITY PLAN details of the equipment to be used for measuring the ride quality of the finished pavement surface, and associated calibration data.

Where the NAASRA Roughness value over a 100 m survey interval is equal to or exceeds 65 counts/km (equivalent to IRI, value of 2.5 m/km), the pavement course constructed for that length must be either reworked, or removed and replaced.

7.8 **WIDTH**

Measure the width of bound pavement between the outside edges of the bound pavement course.

The width of bound pavement must not be less than the width shown on the Design Documentation drawings.

7.9 **BASE SURFACE ASSESSMENT**

At each location where an insitu density test is performed, determine the average ball penetration value, \(Pen\), at the surface of the base course in accordance with RMS T271.

The test location for the ball penetration test must be within 0.5 m of the density test location, and each of the 5 test points required by RMS T271 for a test location must be on surfaces undisturbed by the density test sampling and subsequent repair.

Calculate the characteristic value of \(Pen\) for a Lot in accordance with RMS D&C Q6 Clause L3.2.

Conformity of a Lot for base surface assessment is achieved where:
(a) the value of $Pen$ at each test location is less than 3.0 mm; and
(b) the characteristic value of $Pen$ for a Lot as calculated above is less than 2.5 mm.

7.10 CERTIFICATE OF CONFORMITY

Submit weekly to the Project Verifier a signed certificate verifying conformity with the requirements of Clause 7.

Where appropriate, submit with the certificate a summary of test results from a laboratory accredited by NATA. Additionally, submit daily to the Project Verifier the moisture content and relative density test results.

Highlight any nonconforming Lots.

7.11 TREATMENT OF NONCONFORMING LOTS

7.11.1 General

Where a Lot is nonconforming, submit to the Project Verifier a Nonconformity Report and your proposed disposition for the Lot.

Nonconforming Lots not accepted must be either rectified or replaced.

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<th>HOLD POINT</th>
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<tr>
<td>Process Held: Rectification or replacement of a nonconforming Lot.</td>
</tr>
<tr>
<td>Submission Details: Nonconformity Report and details of your proposal to rectify or replace the Lot.</td>
</tr>
<tr>
<td>Release of Hold Point: The Nominated Authority will consider the submitted documents prior to authorising the release of the Hold Point.</td>
</tr>
</tbody>
</table>

7.11.2 Rectification

Where rectification by re-stabilisation is proposed, in conjunction with an appropriate NATA registered laboratory, prepare and submit to the RMS Representative a re-stabilisation proposal which takes into account the effects of the binder already incorporated in the rejected Lot.

Where rectification by an alternative to re-stabilisation is proposed, submit to the RMS Representative:

(a) your proposed alternative, supported by pavement design calculations;
(b) NATA endorsed test certificates and a report of the investigations carried out; and
(c) proposed method of carrying out the work.

7.11.3 Removal and Replacement

Removal and replacement of pavement course must comply with the requirements of this Specification.

7.11.4 (Not Used)
ANNEXURES R76/A TO R76/B – (NOT USED)
ANNEXURE R76/C – SCHEDULES OF HOLD POINTS, WITNESS POINTS AND IDENTIFIED RECORDS

Refer to Clause 1.2.3.

C1 SCHEDULE OF HOLD POINTS AND WITNESS POINTS

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</table>

C2 SCHEDULE OF IDENTIFIED RECORDS

The records listed below are Identified Records for the purposes of RMS D&C Q6 Annexure Q/E.

<table>
<thead>
<tr>
<th>Clause</th>
<th>Description of Identified Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Documentation verifying conformity of imported MTBB</td>
</tr>
<tr>
<td>2.3</td>
<td>Certification of stockpiles</td>
</tr>
<tr>
<td>3.1.2</td>
<td>Certificates of lime</td>
</tr>
<tr>
<td>3.1.3</td>
<td>Certificates of bitumen</td>
</tr>
<tr>
<td>3.2</td>
<td>Certificates of foaming agent</td>
</tr>
<tr>
<td>3.3</td>
<td>Certificates of water</td>
</tr>
<tr>
<td>4.2.3</td>
<td>Accepted Contractor nominated mix design details</td>
</tr>
<tr>
<td>4.3</td>
<td>Supplementary Information and test results</td>
</tr>
<tr>
<td>4.4</td>
<td>Variation to accepted Contractor nominated mix design</td>
</tr>
<tr>
<td>5.6.2</td>
<td>Details of Alternative Construction Method</td>
</tr>
<tr>
<td>5.6.3</td>
<td>Completed Table R76/E.2 and calculations</td>
</tr>
<tr>
<td>5.7.2</td>
<td>Completed Table R76/E.3 and calculations</td>
</tr>
<tr>
<td>5.9</td>
<td>Target moisture content envelope</td>
</tr>
<tr>
<td>Clause</td>
<td>Description of Identified Record</td>
</tr>
<tr>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5.11.1</td>
<td>Locations and types of joints, treatment of overlaps and irregular shaped Lots, locations of unsupported edges and compaction rolling pattern</td>
</tr>
<tr>
<td>5.13.1</td>
<td>Conformity documentation for trial section of pavement</td>
</tr>
<tr>
<td>7.4</td>
<td>Thickness of bound pavement course</td>
</tr>
<tr>
<td>7.10</td>
<td>Certificate of conformity</td>
</tr>
</tbody>
</table>
ANNEXURE R76/D – PLANNING DOCUMENTS

Refer to Clause 1.2.4.

The following documents are a summary of documents that must be included in the PROJECT QUALITY PLAN. Review the requirements of this Specification and other contract documents to determine any additional documentation requirements.

<table>
<thead>
<tr>
<th>Clause</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4</td>
<td>Procedures for construction, operation and restoration of stockpile sites</td>
</tr>
<tr>
<td>2.5</td>
<td>Methods to prevent segregation and/or loss of fines during delivery of imported MTBB</td>
</tr>
<tr>
<td>3.1.1</td>
<td>Details of binders</td>
</tr>
<tr>
<td>3.1.1</td>
<td>Method of sampling the delivered binder</td>
</tr>
<tr>
<td>3.3</td>
<td>Details of source of water</td>
</tr>
<tr>
<td>3.4.2</td>
<td>Safety Data Sheets and procedures for safe handling of materials</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Details of proposed equipment and methods for preliminary pulverisation of the existing pavement, spreading of lime, injection of foamed bitumen, mixing with the unbound material, compacting and trimming. Method of work adjacent to concrete structures</td>
</tr>
<tr>
<td>5.4.2</td>
<td>Method of treatment or removal of existing patches</td>
</tr>
<tr>
<td>5.4.3</td>
<td>Procedures for pulverisation of the existing pavement and its uniform mixing with other pavement material</td>
</tr>
<tr>
<td>5.3</td>
<td>Procedures for cessation of operations in the event of adverse weather conditions</td>
</tr>
<tr>
<td>5.5.1</td>
<td>Procedure for spreading imported MTBB</td>
</tr>
<tr>
<td>5.6.1</td>
<td>Procedures for spreading and mixing of lime</td>
</tr>
<tr>
<td>5.6.4</td>
<td>Method of monitoring of lime spread rate and calibration</td>
</tr>
<tr>
<td>5.6.4</td>
<td>Method of slaking of quicklime</td>
</tr>
<tr>
<td>5.6.6</td>
<td>Details of mixing, width of passes and nominated depth</td>
</tr>
<tr>
<td>5.7.3</td>
<td>Details of mixing of foaming agent with bitumen</td>
</tr>
<tr>
<td>5.7.3</td>
<td>Method of monitoring of bitumen application rate and calibration</td>
</tr>
<tr>
<td>5.8</td>
<td>Procedures for dealing with spillage of binder and foaming agent</td>
</tr>
<tr>
<td>5.9</td>
<td>Procedure for incorporation of water and achievement of uniform distribution of water</td>
</tr>
<tr>
<td>5.10</td>
<td>Procedures for compaction</td>
</tr>
<tr>
<td>5.11.1</td>
<td>Locations and types of construction joints, treatment of overlaps and irregular shaped Lots, locations of unsupported edges and compaction rolling pattern</td>
</tr>
<tr>
<td>5.11.4</td>
<td>Details of overlap of joints and/or cutting back of previously stabilised material</td>
</tr>
<tr>
<td>5.11.5</td>
<td>Method of disposal of cutback material</td>
</tr>
<tr>
<td>5.12.1</td>
<td>Method of trimming and survey control to produce required pavement thickness</td>
</tr>
<tr>
<td>5.12.2</td>
<td>Procedure to produce required pavement surface after trimming</td>
</tr>
<tr>
<td>5.12.3</td>
<td>Method of trimming and disposal of trimmed waste material</td>
</tr>
<tr>
<td>5.14</td>
<td>Procedures for protection of work</td>
</tr>
</tbody>
</table>
### Clause Description

<table>
<thead>
<tr>
<th>Clause</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.15</td>
<td>Procedure to ensure that the finished surface is ready to receive sprayed bituminous seal</td>
</tr>
<tr>
<td>6</td>
<td>Method of surveying levels</td>
</tr>
<tr>
<td>7.3.1</td>
<td>Method of repairing test holes</td>
</tr>
<tr>
<td>7.6</td>
<td>Locations of straight edge measurements</td>
</tr>
<tr>
<td>7.7</td>
<td>Details of equipment for measuring ride quality and calibration data</td>
</tr>
</tbody>
</table>
ANNEXURE R76/E – DETAILS TO BE PROVIDED BY THE CONTRACTOR

E1  CONTRACTOR NOMINATED MIX DESIGN

Table R76/E.1 – Contractor Nominated Mix Design Details

<table>
<thead>
<tr>
<th>Nominated Dry Density of MTBB (t/m³)</th>
<th>Design Lime Application Rate (% by mass)</th>
<th>Design Bitumen Application Rate (% by mass)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:

(1) Percent by dry mass of MTBB.

E2  BINDER APPLICATION DETAILS

Table R76/E.2 – Lime Spreading Details

<table>
<thead>
<tr>
<th>Pavement Section</th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
<th>(A × B × C) / 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominated Dry Density of MTBB (t/m³)</td>
<td>Stabilised Pavement Thickness (mm)</td>
<td>Design Target Application Rate (% by mass)</td>
<td>Design Target Spread Rate (kg/m²)</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

(1) From Table R76/E.1.
(2) From Design Documentation.
(3) Design target application/spread rate are based on use of hydrated lime. If quicklime is used, the target spread rate must be adjusted for the lime type by multiplying by a factor as shown in RMS Form 5113.
(4) Percent by dry mass of MTBB.
(5) A tolerance of 0.2 kg/m² is added to the design target spread rate in kg/m² to give the field target spread rate in accordance with Clause 5.6.3 and as shown in RMS Form 5113.
# Table R76/E.3 – Bitumen Application Details

<table>
<thead>
<tr>
<th>Pavement Section</th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
<th>(A × B × C) / 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominated Dry Density of MTBB (t/m³) (1)</td>
<td>Stabilised Pavement Thickness (mm) (2)</td>
<td>Design Target Application Rate (% by mass (3))</td>
<td>Design Target Application Rate (kg/m²)</td>
</tr>
<tr>
<td></td>
<td>(A × B × C) / 100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

(1) From Table R76/E.1.
(2) From Design Documentation.
(3) Percent by dry mass of MTBB.
(4) The field target application rate by mass is first converted to that by volume at 15°C. The application rate is then converted to that at the bitumen temperature at the time of foaming in accordance with Clause 5.7.2 and as shown in RMS Form 5113.

# Table R76/E.4 – Particle Size Distribution of Imported MB20 or MB40 or Gap Graded Material

(delete or complete as appropriate)

<table>
<thead>
<tr>
<th>Sieve Size (mm)</th>
<th>Percentage Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.5</td>
<td></td>
</tr>
<tr>
<td>19.5</td>
<td></td>
</tr>
<tr>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>4.75</td>
<td></td>
</tr>
<tr>
<td>2.36</td>
<td></td>
</tr>
<tr>
<td>1.18</td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>0.425</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>0.075</td>
<td></td>
</tr>
</tbody>
</table>

# ANNEXURES R76/F TO R76/K – (NOT USED)
## ANNEXURE R76/L – MINIMUM FREQUENCY OF TESTING

<table>
<thead>
<tr>
<th>Clause</th>
<th>Characteristic Tested</th>
<th>Test Method</th>
<th>Minimum Frequency of Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Properties of imported MTBB</td>
<td>RMS D&amp;C 3051</td>
<td>As per RMS D&amp;C 3051</td>
</tr>
<tr>
<td>3.1.2</td>
<td>Quality of hydrated lime or quicklime</td>
<td>RMS D&amp;C 3211</td>
<td>As per RMS D&amp;C 3211</td>
</tr>
<tr>
<td>3.1.3</td>
<td>Quality of C170 bitumen</td>
<td>RMS D&amp;C 3253</td>
<td>As per RMS D&amp;C 3253</td>
</tr>
<tr>
<td>3.2</td>
<td>Quality of foaming agent (if required)</td>
<td>As per Clause 3.2</td>
<td>1 per contract per source</td>
</tr>
<tr>
<td>3.2</td>
<td>Quality of water:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chloride ion concentration</td>
<td>RMS T1004</td>
<td>1 per contract per source</td>
</tr>
<tr>
<td></td>
<td>Sulphate ion concentration</td>
<td>RMS T1014</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Undissolved solids</td>
<td>AS 3550.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concentration of thermo-tolerant coliforms</td>
<td>RMS T1015</td>
<td></td>
</tr>
<tr>
<td>5.7.3</td>
<td>Expansion ratio and half-life</td>
<td>RMS T153</td>
<td>1 per day (at the commencement of incorporation of bitumen binder) and 1 per change of bitumen tanker</td>
</tr>
<tr>
<td>7.2.1</td>
<td>Lime spread rate</td>
<td>As per Clause 7.2.1</td>
<td>Tray test: 1 per Lot; and where required to verify load cell spread rate, 1 per 100 m spreader run</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Load cell assessment: 1 per 200 m for each spreader run</td>
</tr>
<tr>
<td>7.2.2</td>
<td>Bitumen application rate</td>
<td>As per Clause 7.2.2</td>
<td>1 per mixing run</td>
</tr>
<tr>
<td>7.3.1</td>
<td>In-situ density</td>
<td>RMS T173</td>
<td></td>
</tr>
<tr>
<td>7.3.2</td>
<td>Maximum wet density</td>
<td>RMS T162</td>
<td>As per RMS D&amp;C Q6 for specified relative compaction</td>
</tr>
<tr>
<td>7.3.3</td>
<td>Relative compaction</td>
<td>RMS T166</td>
<td></td>
</tr>
<tr>
<td>7.3.4</td>
<td>Field moisture content</td>
<td>RMS T120, T121 or T180</td>
<td></td>
</tr>
<tr>
<td>7.4</td>
<td>Pavement course thickness</td>
<td>As per Clause 6.3</td>
<td>At each location as defined in Clause 6.3</td>
</tr>
<tr>
<td>7.6</td>
<td>Deviation from straight edge</td>
<td>As per Clause 7.6</td>
<td>1 per 20 m²</td>
</tr>
<tr>
<td>7.7</td>
<td>Ride quality</td>
<td>RMS T182 or T188</td>
<td>Continuous reading per Lot</td>
</tr>
<tr>
<td>7.8</td>
<td>Width</td>
<td>As per Clause 7.8</td>
<td>1 per 20 m</td>
</tr>
<tr>
<td>7.9</td>
<td>Base surface</td>
<td>RMS T271</td>
<td>At each location as defined in Clause 7.9</td>
</tr>
</tbody>
</table>
ANNEXURE R76/M – REFERENCED DOCUMENTS

Refer to Clause 1.2.6.

**RMS Specifications**

- RMS D&C Q6 Quality Management System (Type 6)
- RMS D&C G10 Traffic Management
- RMS D&C G22 Work Health and Safety (Construction Works)
- RMS D&C G36 Environmental Protection
- RMS D&C G38 Soil and Water Management
- RMS D&C G71 Construction Surveys
- RMS D&C R101 Cold Milling of Road Pavement Materials
- RMS D&C R106 Sprayed Bituminous Surfacing (with Cutback bitumen)
- RMS D&C R107 Sprayed Bituminous Surfacing (with Polymer Modified Binder)
- RMS D&C R178 Vegetation
- RMS D&C 3051 Granular Base and Subbase Materials for Surfaced Road Pavements
- RMS D&C 3211 Cements, Binders and Fillers
- RMS D&C 3253 Bitumen for Pavements

**RMS Test Methods**

- RMS T111 Dry Density/Moisture Relationship of Road Construction Materials
- RMS T120 Moisture Content of Road Construction Materials (Standard Method)
- RMS T121 Moisture Content of Road Construction Materials (Sand Bath or Hot Plate Method)
- RMS T136 Rate of Spread of Dry Powder Binders
- RMS T153 The Half-Life and Expansion Ratio of Foamed Bitumen
- RMS T162 Compaction Control Test (Rapid Method)
- RMS T166 Relative Compaction of Road Construction Materials
- RMS T173 Field Wet Density of Road Construction Materials (Nuclear Gauge in Direct Transmission Method)
- RMS T180 Moisture Content of Road Construction Materials (Microwave Oven Method)
- RMS T182 Road Roughness Testing
- RMS T188 Project Ride Quality (Vehicular Laser Profilometer)
- RMS T271 Ball Penetration Test
- RMS T1004 Quantitative Determination of Chloride Ion in Water
- RMS T1014 Quantitative Determination of Sulphate Ion in Water
- RMS T1015 Microbiology of Water Used in Road Works (Thermotolerant Coliforms)
RMS Forms & Technical Directions

RMS Form 5113  Foamed Bitumen Stabilisation Record Sheet for Binder Application Rates
PTD 2015/001  Foamed Bitumen Stabilisation

Australian Standards

AS 3550.4  Waters – Determination of solids – Gravimetric method

Austroads

Bituminous Materials Safety Guide