Technical Specification

Transport and Main Roads Specifications
MRTS84 Deck Wearing Surface

July 2019

Queensland Government

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1 Introduction

This Technical Specification applies to the construction of an asphalt deck wearing surface on bridges.

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other Technical Specifications as appropriate.

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

Any work listed in Table 1 shall be undertaken using products and suppliers registered by Transport and Main Roads.

Table 1 – Items requiring use of registered suppliers and products

Clause	Category of Work
5.2	Hot applied bitumen based crack sealant
6	Concrete Surface Primer

A list of current registered products and suppliers is available on the TMR website.

2 Definition of terms

The terms used in this document shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications* and referenced Technical Specifications listed in Table 3.

3 Referenced documents

References used in this Technical Specification include, but are not limited to, documents listed in Table 3.

Table 3 – Referenced documents

Reference	Title
TN175	Technical Note 175: *Selection and Design of Sprayed Bituminous Treatments*, Transport and Main Roads
MRTS11	*Sprayed Bituminous Surfacing Treatments (Excluding Emulsion)*
MRTS17	*Bitumen*
MRTS18	*Polymer Modified Binder (including Crumb Rubber)*
MRTS22	*Supply of Cover Aggregate*
MRTS30	*Asphalt Pavements*
MRTS70	*Concrete*
MRTS77	*Bridge Deck*

4 Quality system requirements

4.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points and Witness Points applicable to this Technical Specification are summarised in Table 4.1.

Table 4.1 – Hold Points, Witness Points and Milestones

Clause	Hold Point	Witness Point	Milestone
4.2	1. Construction asphalt deck wearing surface		Submission of procedure for asphalt deck wearing surface construction
6	2. Application of concrete surface primer		
7	3. Total asphalt thickness	1. Laying of asphalt	
9	4. Acceptance of Equipment Operational Plan		
11.1		2. Laying of asphalt	
11.4	5. Adjustment of surface levels of deck wearing surface		

4.2 Construction procedures

At least 14 days prior to the construction of asphalt deck wearing surface, the Contractor shall prepare and submit to the Administrator the documented procedures for all construction processes in accordance with the quality system requirements of the Contract. **Milestone**

Construction of the asphalt deck wearing surface shall not commence until the Administrator has reviewed the procedure and released the Hold Point. **Hold Point 1**

5 Preparation of concrete surface

5.1 General

The concrete surface shall be thoroughly broomed to remove all loose material. Any deposits of cement mortar, grout or concrete adhering to the surface shall be removed. Any patches of oil or other material which might be detrimental to the adhesion of the primer or waterproofing membrane to concrete shall be removed (e.g. by using a suitable solvent and then allowing an appropriate period before priming).

The gap in the concrete surface at any expansion joints shall be temporarily sealed. The concrete surface directly under a future expansion joint and surrounding bedding material shall be covered to prevent bituminous products adhering to the concrete.

5.2 Joint sealing

For deck unit bridges, all fixed transverse joints at abutments and piers shall be sealed with a registered hot applied bitumen based crack sealant.

For bridges without an in-situ deck all mortar joints between prestressed concrete deck units in the deck surface shall be sealed with a registered hot applied bitumen based crack sealant (refer Clause 1).

The crack sealant shall be bitumen-based. It shall have superior adhesion to concrete surfaces and have good extension characteristics to operate effectively at pavement and deck temperatures between - 15°C and 75°C without damage. It shall form a soft rubber like characteristic at these temperatures and have an extension characteristic of at least 300% at 25°C. The sealant shall have a melting point of at least 170°C.

Registered products that are approved for use as bitumen based crack sealant are listed in Clause 1.1 of Annexure MRTS84.1. Alternative products that are not approved may be submitted to the Administrator for approval, but shall not be used unless approved in writing by the Administrator.

Dimensions of the finished sealant shall be in accordance with the manufacturer's recommendations. Hot applied bitumen based crack sealant shall be mixed, heated and applied strictly in accordance with the manufacturer's recommendations.

5.3 Concrete surface texture

The surface texture of the concrete shall be checked:

a) after the concrete surface is prepared in accordance with Clause 5.1, and

b) prior to priming.

The texture depth shall be measured in accordance with Test Method AG:PT/T250. The average texture depth for each set of tests shall not be less than 0.8 mm and not more than one test in each set shall show a texture depth of less than 0.6 mm. Tests in a set shall be carried out at one metre intervals along a line one metre inside any lane edge. The number of tests in a set shall be ten.

Testing shall not be undertaken on, or partially on, gaps, joints or the like in the concrete surface. Where the surface texture of the concrete does not comply with the requirements of this Clause, the surface shall be roughened by a means approved in writing by the Administrator. Profiler shall not be used for roughening the concrete surface unless approved by the Administrator.

6 Priming the concrete surface

After preparation of the concrete surface, and prior to placement of the corrector course (where used) or waterproofing membrane, the concrete surface shall be primed.

Priming shall not occur until the concrete to be primed complies with Clause 5 in all respects.

The primer shall be a registered product that is suitable for use as a bituminous primer for concrete surfaces (refer to Clause 1). However, not all registered products are suitable for use in all situations as the requirements of the products safety data sheets (SDS) and the manufacturer's recommendations must be considered as part of the selection and application process. The primer shall consist of bitumen and one or more compatible substances in a mixture which performs as a rapid curing prime.

Registered products that are approved for use as concrete surface primer are listed in Clause 1.2 of Annexure MRTS84.1. Alternative products that are not approved may be submitted, in writing, to the Administrator for approval, but shall not be used unless approved in writing by the Administrator.

The primer shall be applied to the surface of the concrete deck using a sprayer with a current Queensland Sprayer Certificate issued by the Queensland Department of Transport and Main Roads. Further, it shall be applied in a safe manner having regard to the SDS for the product, a copy of which shall be provided to the Administrator prior to application of the primer. **Hold Point 2**

The rate of application of the primer shall be as recommended by the manufacturer.

Prior to application of the binder for the waterproofing membrane, the primer shall be cured in accordance with the recommendations of the manufacturer. During this time the primer shall not be trafficked.

7 Asphalt corrector course

A dense graded asphalt corrector course shall be placed to correct the profile caused by the hog of prestressed concrete deck units and / or height differences between concrete deck units.

The standard of asphalt to be used for the corrector course shall be stated on the drawings. Where no indication is given on the drawings, AC10H with A15E binder shall be used unless otherwise approved by the Administrator

The dense graded asphalt corrector course shall comply with, and shall be constructed in accordance with, MRTS30 *Asphalt Pavements*. In particular, the thickness of the corrector course shall comply with the minimum and maximum target layer thicknesses nominated in MRTS30 *Asphalt Pavements* at all points unless otherwise agreed by the Administrator.

The final surface heights of the asphalt corrector course shall achieve a vertical level tolerance of ± 10 mm. More than one layer of corrector may be required in some circumstances to achieve the required surface profile.

The Contractor shall submit the Equipment Operational Plan and the Administrator will confirm the suitability of the Equipment Operational Plan in accordance with the requirements of Clause 9 prior to the commencement of the asphalt corrector course. The laying of asphalt shall be a witness point **Witness Point 1**

Where the total thickness of asphalt required is greater than that shown in the Contract, the Contractor shall advise the Administrator prior to the commencement of construction of the asphalt. **Hold Point 3**

8 Requirements where open graded asphalt surfacing is specified

Wherever an open graded asphalt surfacing is specified on a bridge deck, the deck wearing surface as a whole must comprise an open graded surfacing placed on a dense graded asphalt intermediate course, placed over a dense graded asphalt corrector course (where required).

The thickness and standard of asphalt to be used for the intermediate course shall be stated on the drawings. Where no indication is given on the drawings, 50mm thick AC14H with A15E binder shall be used.

The dense graded asphalt intermediate course shall comply with, and shall be constructed in accordance with, MRTS30 *Asphalt Pavements*.

The waterproofing membrane shall be placed between the open graded asphalt surfacing and the dense graded asphalt intermediate course.

9 Vehicle equipment and plant induced loads on bridge

For each bridge, the Contractor shall prepare and submit an Equipment Operational Plan that provides details about all the proposed vehicles, plant and equipment that will load / traffic the bridge. The Equipment Operational Plan shall include:

a) a list of all vehicles, plant and equipment that will load / traffic the bridge

b) gross maximum (loaded) mass of all individual vehicles, plant and equipment in tonnes, including any incidental mass, fuel and any attachments on vehicles, plant and equipment

c) vibrating frequency (Hz) and nominal amplitude (mm) of vibrating rollers. Preference shall be given to oscillating drum rollers

d) rotational speed (rpm) of the milling drum, milling depth range and number of teeth on the drum of cold milling machines

e) each combination of vehicles, plant and equipment that may occur during the works for the purpose of evaluating the load distribution on the bridge during bridge work, and

f) any additional details requested by the Administrator.

In addition, the Contractor shall submit the proposed program of works, including the proposed times for placing the prime, waterproofing membrane, asphalt and all other bituminous products.

The Contractor shall submit the Equipment Operational Plan to the Administrator at least 20 days prior to the commencement of any bridge work. The Administrator will confirm the suitability of the Equipment Operational Plan. No work related to the deck wearing surface shall commence until the Administrator has approved the Equipment Operational Plan and written advice of this is received by the Contractor **Hold Point 4**

10 Waterproofing membrane

10.1 General

The waterproofing membrane shall consist of one of the following types:

a) Type A – A seal with bitumen binder in accordance with the requirements of Clause 10.3, or

b) Type B – A seal with an S25E polymer modified binder in accordance with Clause 10.4

Unless stated otherwise in Clause 1.3 of Annexure MRTS84.1, a Type B waterproof membrane shall be used.

Where specified, Type A or B waterproofing membranes shall be placed in the following locations unless shown otherwise of the drawings:

a) Where the surfacing course is dense graded asphalt or stone mastic asphalt and the bridge deck slab is cast in-situ, the waterproofing membrane shall be placed on the primed concrete deck slab. Any asphalt corrector course, if required, shall be placed over this membrane prior to paving the surfacing course.

b) Where the surfacing course is dense graded asphalt or stone mastic asphalt and there is no cast in-situ deck slab (such as transversely stressed deck unit bridge deck), the waterproofing membrane shall be placed over the asphalt corrector course.

c) Where the surfacing course is open graded asphalt, the waterproofing membrane shall be placed over the dense graded asphalt intermediate course immediately below the open grade asphalt surfacing course.

The cover aggregate used for the waterproofing membrane Type A and Type B shall be precoated aggregate conforming to the requirements of aggregate Category B as specified in MRTS22 *Supply of Cover Aggregate*. Cover aggregate shall be minimum 10 mm nominal size unless otherwise shown on the drawings.

10.2 Design of Type A and B waterproofing membranes

The Contractor shall be responsible for the design of the binder application and aggregate spread rates to be used. The design binder application rate and aggregate spread rate shall be determined in accordance with the requirements of the department's Technical Note TN175 *Selection and Design of Sprayed Bituminous Treatments* and achieve an application rate:

- not less than 1.5 L/m², and
- for high shear applications (refer Clause 10.4) not more than of 1.8 L/m².

In so doing, the Contractor shall:

a) give due consideration to any additional requirements stated as per Clause 12

b) consider the traffic to which the waterproofing seal will be subjected, and

c) consider any embedment into any asphalt.

The requirements of Clauses 6.1.3 and 6.3 of MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)* shall also apply. The definitions and roles of the Seal Designer and a Seal Designer's Delegate shall be as defined in Clause 2 of MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)* and apply to the waterproofing membrane.

10.3 Type A waterproofing membrane

Type A waterproofing membranes shall consist of a single application of binder and cover aggregate. It shall only be used where it is not practical to use a Type B waterproofing membrane where supply of a polymer modified binder is difficult, such as in remote areas.

The binder shall be Class 170 bitumen that complies with the requirements of MRTS17 *Bitumen*. The binder and cover aggregate shall be applied in accordance with the requirements of Clause 10.5.

10.4 Type B waterproofing membrane

Type B waterproofing membranes shall consist of a single application of binder and cover aggregate. Type B Waterproofing membranes are suitable where the deck wearing surface is located in a high shear environment (e.g. where there are high horizontal shear forces induced by braking and / or cornering traffic, where there is a steep gradient or on the approaches to a signalised intersection).

The binder shall be a polymer modified bituminous binder conforming to PMB Class S25E in accordance with the requirements of MRTS18 *Polymer Modified Binder (including Crumb Rubber)*. The binder and cover aggregate shall be applied in accordance with the requirements of Clause 10.5.

Type B waterproofing membrane shall not be trafficked unless otherwise approved by the Administrator.

10.5 Application of binder and spreading of cover aggregate

The binder and cover aggregate used for the Type A and Type B waterproofing membranes shall be applied in accordance with the requirements of MRTS11 *Sprayed Bituminous Surfacing Treatments (Excluding Emulsion)*.

10.6 Protection of kerbs, parapets, scuppers, rails and other road / bridge furniture

Kerbs, parapets, scuppers, rails and other road / bridge furniture shall be protected during the spraying of primer and binder to prevent adherence of any overspray.

11 Asphalt

11.1 General

All asphalt shall be supplied and constructed in accordance with the requirements of MRTS30 *Asphalt Pavements*.

The laying of asphalt shall be a witness point. **Witness Point 2**

11.2 Tack coat

A tack coat shall be applied in accordance with the requirements of MRTS30 *Asphalt Pavements*.

11.3 Asphalt Designation

The standard of asphalt to be used in the surface course shall be stated on the drawings. Where no indication is given on the drawings, AC14H with A15E binder shall be used.

> The asphalt used for the deck wearing surface should be consistent with that used for the adjoining pavements. Where the adjoining road surface is a sprayed seal, an AC14H mix would typically be used for the final surface of the deck wearing surface.

11.4 Excessive hog

In cases of excessive hog, adjustment of the deck wearing surface levels in order to preserve the minimum thickness of the dense graded asphalt surfacing layer over prestressed units may be necessary. Adjustment of the deck surface levels shall not be carried out unless prior approval has been given by the Administrator. **Hold Point 5**

12 Additional requirements

The requirements or MRTS84 *Deck Wearing Surface* are varied by the supplementary requirements given in Clause 2 of Annexure MRTS84.1.