



Technical Direction

Bridge

BPC 2003/02 – REV 1

Waterproofing Membranes for Concrete Bridge Decks

| Summary: | Audience: |
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| This Technical Direction mandates waterproofing of concrete bridge decks and sets out design and detailing provisions of waterproofing membranes. | <ul style="list-style-type: none">• Asset Managers• Designers• Consultants• Contractors |

Background

Concrete bridge decks are not waterproof and asphalt overlays over concrete decks are also permeable. Some cracks may occur in concrete deck slabs due to shrinkage. Water seepage through the cracks may cause corrosion of the steel reinforcement and may lead to durability issues in the decks and other concrete or structural steel elements supporting the deck, such as troughs or box girders.

The water ingress into bridge decks can be prevented or minimised by the use of an appropriate waterproofing membrane over concrete deck slabs. It should be noted that deck slab cracks due to poor design (such as inadequate reinforcement and poor detailing) or poor construction practices (such as inadequate compaction of the concrete) may result in structural issues which cannot be mitigated by waterproofing the deck slab.

Information

This Bridge Technical Direction is a revised version of Bridge Policy Circular BPC 2003/02.

Approvals:

| | | | |
|-----------------------|-----------------|------------------------|---|
| Owner: | Joseph Canceri | Review Date: | |
| Authorised by: | Wije Ariyaratne | Effective Date: | 19 February 2003 (1 st issue) 27 April 2016 (Rev 1) |

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For all bridges owned or those that will become the property of the Road and Maritime Services, the following provisions apply:

- a) A waterproofing membrane must be used on deck slabs of new bridges;
- b) A waterproofing membrane must be re-installed where the existing membrane is damaged during resurfacing of existing bridges;
- c) The waterproofing membrane must be either:
 - Sprayed bituminous waterproofing membrane conforming to Specification B344; or
 - Preformed sheet or liquid applied membranes conforming to Specification B343;
- d) The design drawings must show details of the waterproofing membrane adopted including the treatment of the membrane at deck joints and drainage outlets. In case of preformed sheet or liquid applied membranes, the drawings must also show the treatment of the membrane at kerbs and median, as well as the installation sequence and overlapping details (for preformed sheets only) to account for bridge grade and cross falls;
- e) The drawings must note that curing compounds and surface finish of the concrete substrate be compatible with the waterproofing membrane used;
- f) Asphalt overlays must be compatible with the proposed waterproofing membranes.

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Sprayed Bituminous Waterproofing Membranes

This type of waterproofing membrane must be designed, supplied and installed in accordance with Specification B344. The following apply:

- The combined system (ie waterproofing membrane and wearing surface) must be selected from the types specified in Annexure B344/E of Specification B344;
- For combined systems containing asphalt overlays, the nominal size of the aggregate in the waterproofing membrane must be 10 mm. The asphalt overlay must be applied in two (2) layers with thickness conforming to Specification R116.
- The bitumen binder of the membrane must be polymer modified Class S15E, S20E, S45R or S15RF conforming to Specification 3252;

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Preformed Sheet and Liquid Applied Waterproofing Membrane Systems

These waterproofing membrane systems are suitable for bridges where construction constraints such as time and temperature preclude the use of sprayed bituminous waterproofing membranes.

The initial costs of supply and installation of these waterproofing membrane systems are higher than those of the sprayed bituminous waterproofing membranes, however the whole of life costs associated may be reduced where they are properly designed and installed.

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These waterproofing membranes are not breathable, therefore they must not be installed while the concrete slabs are still moist. Care must be taken in detailing the end of the membrane, such as at kerbs, drainage and deck slabs, to prevent water ingress underneath the membrane causing delamination.

Only dense graded asphalt overlays must be used with this type of waterproofing membranes, in accordance with Specification R116.

The thickness of the asphalt overlay plays an important role in the durability of the waterproofing membrane systems. The minimum thickness of the asphalt overlay must be 70 mm but must not be less than the thickness stipulated in the approval conditions of the proposed waterproofing membrane. However, thicker asphalt overlay may be required for heavily trafficable bridges and further advice should be sought from Bridge Engineering.

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Reference:

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| Specification 3252 | Polymer Modified Binder for Pavements |
| Specification B343 | Preformed and Liquid Applied Waterproofing Membrane Systems |
| Specification B344 | Sprayed Bituminous Waterproofing Membranes |
| Specification R116 | Heavy Duty Dense Graded Asphalt |