

## TECHNICAL NOTE

# Asphalt Surfacing of Concrete Bridge Decks

# 105

## INTRODUCTION

This Technical Note provides information regarding asphalt surfacing of concrete bridge decks. The Note also includes a discussion of surface texture (macro-texture) requirements on bridges in high speed zones.

This Technical Note does not apply to bituminous surfacing of timber or steel bridge decks and specialist advice should be sought for these situations.

Sprayed seals are uncommon as wearing surfaces on concrete decks in Victoria. Specialist advice should also be sought for these situations.

## WHY SURFACE A CONCRETE BRIDGE DECK?

Concrete bridge decks can be used as the wearing surface for roads and there are many examples around Victoria where the surface of the deck is used in this manner. Refer Figure 1. This type of deck must be constructed to ensure that sufficient surface texture is provided and the longitudinal profile provides a smooth ride for motorists.



Figure 1: Concrete wearing surface

Bituminous surfacing may be applied to bridge decks for various reasons. These include:

- assisting in regulating the surface and to provide a smooth ride for road users
- protecting the bridge deck from wear and tear due to traffic
- protecting the bridge deck from water ingress and subsequent damage, and
- providing a consistent surface texture along the roadway.

## TEXTURE FOR WEARING SURFACE

It is generally accepted that in high speed zones there can be an increased crash risk if the road surface has low texture.

VicRoads guidelines include a minimum initial sand patch surface texture for long term surfacing treatments of 1.2 mm. This guideline is applicable to facilities in high speed zones with an operating speed of 90kph and higher and with more than 1000 vpd.

## SELECTION OF SURFACE

Concrete decks in high speed zones with greater than 1000 vpd will generally require a wearing course typically consisting of 30mm of Open Graded Asphalt (OGA) or 35mm of Stone Mastic Asphalt (SMA) or 20mm Ultra Thin Asphalt (UTA). Both OGA and UTA are placed on a layer of 30mm of Dense Graded Asphalt (DGA) which is provided to protect the deck during future resurfacing.

A DGA wearing course will generally be suitable for other concrete bridge deck locations. The type of DGA should be selected in accordance with VicRoads Code of Practice 500.22 *Selection and Design of Pavements and Surfacing*. In this case, the selection is based on traffic volume and proportion of heavy vehicles.

## STEPS IN PLACEMENT

### General

Bridge decks should be surfaced using the following steps:

- Cleaning, repair and preparation of concrete surface
- Application of prime, or primerseal. Most decks with an asphalt wearing course are pretreated with a prime only. Where a primerseal is used it must be an emulsion primerseal rather than a cutback primerseal to avoid cutters from cutback bitumen affecting the asphalt layers, and
- Application of tack coat, asphalt regulation if required, and asphalt wearing course.

Further details are provided below.

### Preparation of Concrete Deck

Where a bituminous surfacing is proposed for a concrete deck, the concrete curing compound must be compatible with the bituminous materials. Where an incompatible curing compound e.g. a chlorinated compound, is used it must be removed prior to bituminous surfacing.

The concrete deck should be swept clean of any loose material. Any oil deposits should be removed using a suitable solvent such that the bituminous materials will adhere to the surface.

The concrete deck surface should be completely dry to ensure that moisture vapour does not blister the bituminous surfacing.

Any gaps over expansion joints should be temporarily filled and/ or covered to ensure the gap is not filled with aggregate or asphalt during surfacing works.

Where the concrete deck has larger cracks (larger than micro cracking), specialist advice should be sought for preparation works and repair of the cracks should be undertaken.

### Prime

The deck should be primed using an emulsion prime or cutback bitumen prime to overcome any residual cement dust and ensure good bonding of the asphalt layers. Typical application rates of 0.2 to 0.3L/m<sup>2</sup> (residual) are usually used. Specialist advice should be sought to confirm the required application rate. Polymer modified primes should not be used as these are too viscous for concrete decks.

The prime must be fully cured before any further works are undertaken. Curing time depends on the type of prime, application rate and weather. A minimum of 4 hours curing for quick dry emulsion primes, to a few days for cutback bitumen primes should be expected. No traffic should be allowed on the prime during curing to avoid damage. Refer Figure 2. Damaged areas must be rectified. The cured prime should provide a consistent colour.

Prior to application of the tack coat and asphalt, the surface should be inspected for blisters or bubbles. Any blisters or bubbles must be repaired prior to the asphalt being placed.



Figure 2: Pick up of prime by construction traffic

### Application of Tack Coat

The primed surface must be swept clean. A tack coat is required prior to placement of asphalt. The tack coat should be a cationic rapid setting type of emulsion and applied in accordance with VicRoads Standard Section 407 *Hot Mix*

*Asphalt*. Care should be taken to ensure pick up of the tack coat does not occur. Damaged areas should be rectified.

### Application of Asphalt Regulation Course

Some types of bridge deck (e.g. prestressed concrete beams) have an inherent hog or sag and level changes in the concrete deck necessitating regulation. The deck should be regulated with asphalt to provide a consistent level surface.

Regulation Gap Graded Asphalt may be used for regulation where the level correction is between 10mm to 30mm. A Size 10mm Type H DGA should be used for regulation between 25mm to 35mm thick.

### Application of Asphalt Wearing Course

The asphalt layers should be placed in accordance with the contract requirements.

Care needs to be taken in the selection of construction equipment for asphalt works on concrete bridge decks. Where large or heavy equipment is expected further specialist advice should be sought from bridge structure specialists. Normally rollers should only be operated in static mode, as vibratory rolling is not permitted.

During placement, the asphalt layer will cool extremely quickly because concrete bridge decks are good heat conductors. It is therefore very important to have the rollers working closely behind the asphalt paver.

Where an asphalt wearing course is placed over a regulation layer of asphalt, a tack coat between these layers is required.

In locations where OGA is used a free-draining edge is required.

### DENSITY TESTING

Compaction of the asphalt layer is normally demonstrated by taking cores, or using a nuclear density gauge. Coring is not recommended on bridge decks since reinstatement of the core cannot guarantee the replacement of the waterproof layers, and there is a risk of damaging the deck.

The asphalt placed on the concrete deck should be considered a separate lot, and excluded from test lots of density testing of asphalt on adjacent pavement sections. Refer Figure 3.

Compaction may be demonstrated using approved procedural basis as provided in VicRoads Standard Section 407, Clause 407.22(c).

### FUTURE ASPHALT MAINTENANCE WORKS

At some stage the wearing surface will need to be removed and replaced with a new asphalt layer. Note that great care should be taken when removing the wearing surface, as removal using cold planning machines includes risk of damaging the concrete deck. Controlled cold planning using a fine tooth profiler may reduce the risk of damaging the deck.

The exposed surface should be inspected for any damaged areas to the deck, and repaired prior to placement of the new surface.

### CONTACT OFFICERS

For further information on bituminous surfacing of concrete bridge decks, please contact the following:

Cassandra Simpson: Ph 9881 8928  
 Email cassandra.simpson@roads.vic.gov.au  
 John Esnouf : Ph 03 5434 5015  
 Email john.esnouf@roads.vic.gov.au

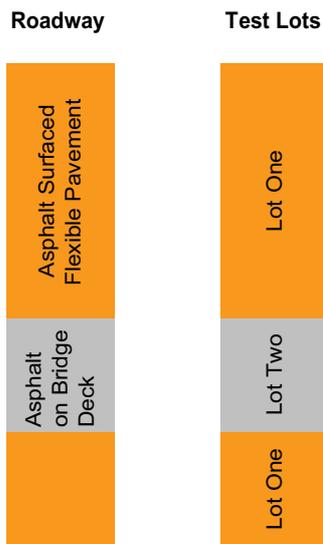


Figure 3: Example of lot testing

### REFERENCES

- VicRoads Code of Practice 500.22 *Selection and Design of Pavements and Surfacing*
- VicRoads, Standard Section 407 – *Hot Mix Asphalt*



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