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Interim Advice Note 96/07

The UK Highways Agency (HA) has recently (August 2007) published Interim Advice Note 96/07 (IAN) to provide guidance for dealing with those bridge decks where thin asphalt surfacing (less than 120mm) or application of waterproofing to concrete less than 28 days old is deemed necessary or desirable.

Over recent years there has been significant growth in the number of instances where owners, agents or contractors have attempted to utilise thinner surfacing or the practice of over-coating 'younger' concrete, to achieve performance improvement, cost reduction, lower 'dead loads' and/or shorter construction programmes. As experience has developed, so has a better understanding of what features play a part in the success or failure of installations that adopt these two new approaches.

The IAN represents a move by the UK Highways Agency to capture current best practice and, thereby, promote and facilitate these changes to the previous approach.

The IAN begins by acknowledging that as surfacing thickness reduces two issues become very important. First, is whether to retain an Additional Protective Layer[1] (APL) at the expense of reducing the thickness in the stronger more stable binder course and wear course. Second, is that the bond strengths - substrate to waterproofing and waterproofing to asphalt surfacing - specified in BD47/99[2], are only appropriate in situations where the asphalt surfacing is 120mm minimum.

Also identified are a number of other features that it is felt have contributed to the spate of failures of thin surfacing applications on the UK network. For example;

- inadequate sub-surface drainage
- weak bond at the concrete/waterproofing interface
- weak bond at the waterproofing/asphalt surfacing interface
- excessive thickness of waterproofing membranes
- low compressive modulus of waterproofing system
- porous asphalt
- low fatigue resistance of the asphalt

The IAN then goes on to offer practical guidance on how to reduce the risk of failure by addressing these items. The clear message is that the specification and installation of drainage, waterproofing system and asphalt surfacing must be informed and managed as all play an integral part in the effective performance of the carriageway.

Obviously, it is advisable to read the document in its entirety but from the point of view of specification and installation of the waterproofing system, the following points are emphasised.

- the waterproofing system should have a BBA HAPAS Roads and Bridges Certificate in accordance with the Specification[3] clause 2003
- appropriate concrete preparation is vital for all waterproofing systems and grit blasting is fundamental to it sprayed waterproofing membranes should not exceed 3mm in thickness
- APL should only be used if the membrane has not been approved for use without it
- When the waterproofing system is to receive an asphalt layer with coarse aggregates the waterproofing system should include a thick tack coat.

Furthermore, 'Table 1' in the IAN specifies a range of improved bond strengths at a range of surfacing thickness and ambient temperatures. In some instances the values are more than double those called for in BD47/99.

The second part of the IAN deals with the question of 'young' concrete. Again, the potential problems are identified and these are;

- blow/pin holing and blistering
- reduction in bond
- incomplete cure of the waterproofing system
- shrinkage and load induced cracking

As part of a risk management strategy the benefits of fully bonded systems are emphasised as they limit the effects of any localised problems. Further guidance includes the mandatory use of a BBA HAPAS approved waterproofing system and careful checks to ensure that bond strengths stipulated in the earlier referred to 'Table 1' are achieved. Namely, sufficient use of pull-off tests on the waterproof membrane prior to laying of surfacing.

The use of flame drying is recommended as a means to assist in lowering the surface moisture content down to a proposed maximum of 6%. Whilst the need for wariness of interpreting moisture content readings too hastily is highlighted.

A further note of caution is sounded on the matter of full cure of the primers and the advisability of checking that this has occurred before the waterproof membrane is applied.

In the opinion of the BWA, IAN 96/07 is a valuable contribution towards the development of good practise in the utilisation of thin surfacing on bridge decks and more rapid waterproofing of new and repair concrete. More widespread recognition of the issues pertaining to both will increase the number of positive outcomes and encourage greater adoption of these two technically and financially beneficial approaches.

Notes:

[1] APL's, pigmented red, have been used in the UK for 20 years to provide protection for the membrane during construction activities and compacting of asphaltic base course and to indicate proximity of asphalt primer to waterproofing membrane during road refurbishment. They are a mix of bitumen and fine sand. In recent times questions have arisen about its performance in-service, particularly, its physical stability.

[2] BD47199 can be found in the Design Manual for Roads and Bridges, clause 2.3.4, Waterproofing and Surfacing of Concrete Bridge Decks

[3] Manual of Contract Documents for Highway Works Volume 1, The Specification for Highway Works