Guidance Notes on

FLEXIBLE TRANSITION JOINTS

Produced by

THE BRIDGE JOINT ASSOCIATION

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INTRODUCTION

During the 1990s, The Highways Agency announced that all future road bridges under their management with spans up to 60 metres should preferably be constructed as **integral bridges.** As a result, the concrete bridge industry set up a number of research projects to determine the most viable and economic methods to undertake the design and construction of this hitherto relatively unknown bridge type. The Concrete Bridge Development Group, for example, sent out a working party to North America, where integral structures had been the norm for many years, to study and discuss the major design and construction issues.

Over the next decade, major advances were made in UK although the opportunity to build new bridges was curtailed due to Government policies at the time. However, sufficient was learnt for industry to report back that there were difficulties in selecting a suitable joint for use with integral bridges. The Bridge Joint Association became aware of these difficulties and therefore decided to use their considerable experience and knowledge to propose a joint that could be used by the UK bridge industry.

This document defines their findings and views.

SCOPE

This guidance note covers the use and installation of external joints for Integral Bridges. By definition Integral Bridges do not have joints within the structure. Interaction between the structure and adjacent road surfacing and sub-base may cause movement in the road surfacing. Installation of movement joints 'outside' of the bridge structure enables this movement to be taken up in the joint so avoiding damage to the asphalt road surfacing.

THE BRIDGE JOINT ASSOCIATION

The Bridge Joint Association members are the leading UK Specialist manufacturers and installers whose principal aim is to raise and maintain standards within the industry.

The effectiveness of bridge expansion joints is very significant in the life expectancy of bridges. Recognition of the need for high standards of waterproofing to prevent the ingress of water and salt into bridge structures has focused attention on the importance of bridgejoints. The members use their combined knowledge and experience to address these and other issues of common interest in the industry.

OBJECTIVES OF THE BRIDGE JOINT ASSOCIATION

The Association's main objectives are:

1. To foster research and technical development.

2. To maintain and improve standards of design, manufacture and installation.

3. To co-operate with Government Departments and Agencies, Public Authorities and others who are concerned with the use of bridge joints.

4. To represent the interests of the UK bridge expansion joint industry in the preparation of British Standards, European Standards and other developments within the European Union.

Notes:

a) *In furthering the objectives of the Association as set out above, neither Members nor the Association shall be required or recommended to observe any restriction, act or practice which would or might make this Association registerable under the Restrictive Trades Practices Act or the Competition Act.*

b) *The Bridge Joint Association wishes to emphasise that the contents of this report are the collective views of members and are believed to be accurate. However, all readers and users of this publication should carry out any necessary checks on each specific contract in terms of technical relevance and health and safety issues as BJA cannot accept any liability, however caused.*

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THE FLEXIBLE JOINT

1. DEFINITIONS

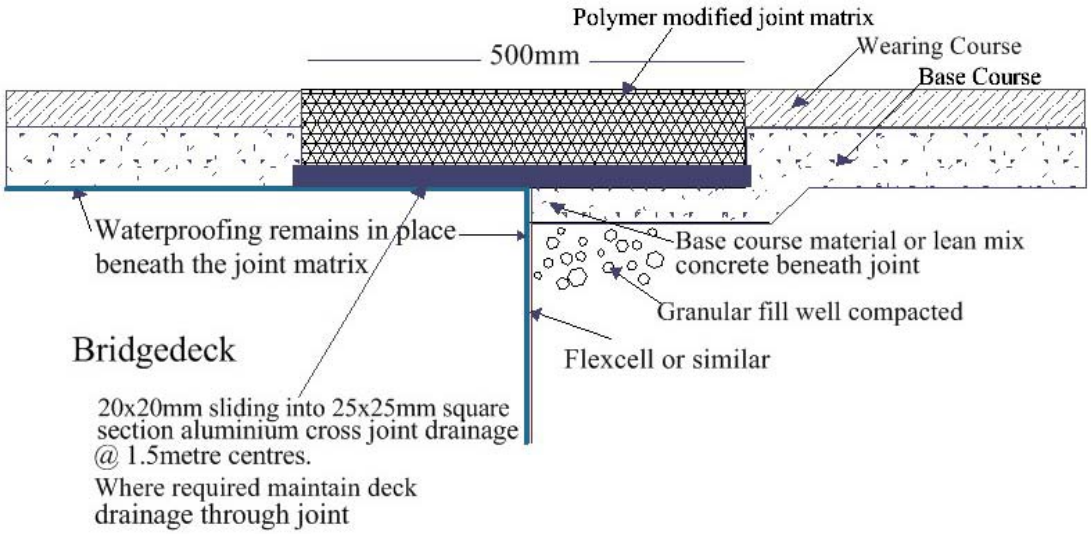
Integral Bridges also known as Portal Bridges. Generally these are bridges without joints. The bridge spans from one abutment to another without intermediate joint. The design may have provision for movement bearings over supports (semi-integral bridges) or the movement may be taken up within the structure, but the deck will span as a continuous structure without joints. Maintaining continuity of the bridge deck and removing joints should give the advantage of reducing or eliminating leakage and ingress of damaging salty water. There may be interaction of the bridge structure with adjacent road surfacing and soil fill resulting from settlement, traffic action and temperature effects.

The effect of this interaction with the carriageway surfacing may cause cracking where the asphalt is unable to absorb the movement induced by the bridge structure and/or soil fill.

It is recommended that provision is made for movement joints at the deck end(s) or deck end abutment(s) as appropriate. These are 'external joints' located outside of the structure so that the problem of leakage and ingress of salty water is prevented.

2. INSTALLATION

2.1 <u>Flexible Transition Joint Detail in Carriageway Integral Bridges</u>
<u>20-60 metre span (± 20mm movement range)</u>



2.1.1 For new works, locate end of structure/deck end where it interfaces with soil fill/base course. Joint location to be marked out by client/engineer.

2.1.2 Position a 6mm plywood board 500mm wide symmetrically over 'joint gap', longitudinal to deck end. This is to protect the waterproofing layer. The board should be fixed by pinning, on the non-deck side, to prevent movement of the board during the application of surfacing material.

2.1.3 Apply asphalt surfacing over the board.

2.1.4 Cut a test/exploratory hole in an area off the deck to determine position of board.

2.1.5 Starting at a position off the deck and over the road surfacing/soil fill area make a vertical cut corresponding to the edge of the protective board. The saw cut should be made vertically to a depth corresponding to the known depth of the asphalt over the protective board.

2.1.6 Assuming the board is 500mm wide, make a second saw cut in a position corresponding to 10mm short of the edge of the board located over the deck area. The saw cut should be made vertically through the asphalt surfacing to a depth approximately 10mm less than the known depth of asphalt. This should be done such that the saw cut makes contact with the protective board but does not penetrate through.

2.1.7 Remove the asphalt materials between the saw cuts using a pneumatic breaker tool.

2.1.8 Remove all debris and detritus.

2.1.9 Remove the board taking care not to damage the waterproofing.

2.1.10 Remove all projections, nibs, and uneven areas by scabbling tools or similar.

2.1.11 Clean the internal surfaces of the joint recess with air blast and wire brushing (light grit blasting may also be used). Avoid using gas torches, hot compressed air lance etc.

2.1.12 Protect waterproofing from excessive heat

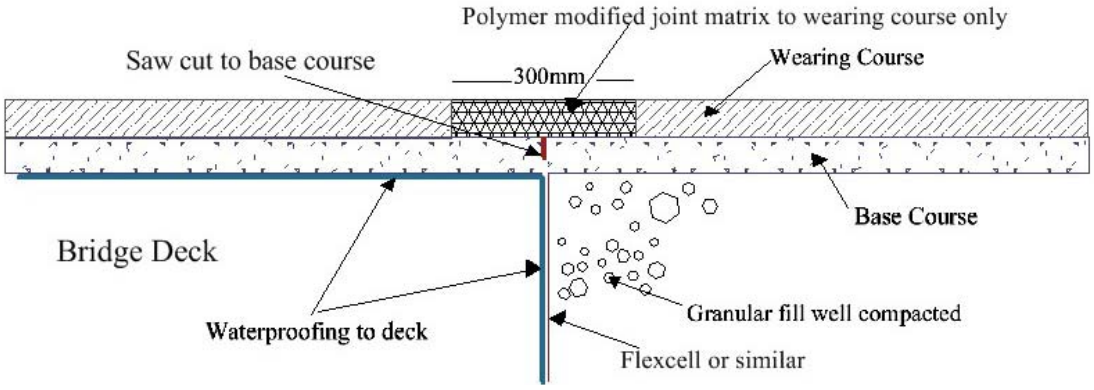
2.1.13 Install joint drainage to channel away sub-surface water as appropriate (not normally required if adequate deck drainage is present).

2.1.14 Apply tanking etc. in accordance with manufacturer's recommendation.

2.1.15 Apply aluminium flashing strip over the gap (if present).

2.1.16 Fill the joint recess with stone/binder mixture in accordance with manufacturer's recommendation. Maximum short term exposure 200ºC.

2.2 Flexible Transition Joint Detail in Carriageway Short Span Integral Bridges
20 metre max (± 5mm movement range)



2.2.1 Locate the position of the deck end or abutment/deck interface as appropriate.

2.2.2 Make a saw cut in the asphalt over the line of the deck end. This acts as a crack inducer. The depth should extend approximately 40mm below the base of the joint recess. Do not penetrate the waterproofing layer. If the base course thickness prevents this make the saw cut shallower as appropriate.

2.2.3 Make an additional two vertical saw cuts symmetrically either side of the line of the deck end 300mm apart and to a minimum depth of 40mm or to the base course layer whichever is deeper.

2.2.4 Break out the asphalt using a pneumatic breaker tool and remove the debris.

2.2.5 Clean the internal surfaces of the joint recess.

2.2.6 Apply tanking as per manufacturer's recommendation.

2.2.7 Fill the recess with stone and binder mixture as per manufacturer's recommendation.

REFERENCES AND FURTHER READING

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