



## BRIDGE POLICY CIRCULAR BPC2007/05

### ***DESIGN OF INTEGRAL BRIDGES***

#### **Background**

Integral bridges, that are bridges without deck expansion joints, when properly designed offer advantages including improved riding surfaces, reduced deck joint maintenance costs, elimination of problems from leaking deck joints and reduced initial bridge cost.

Integral bridge construction is not always suitable because the bridge configuration may result in effects over time such as structural damage to the bridge and deformation of the approach embankments and pavements. This circular provides design requirements and limitations on this type of bridges for RTA or those that will become property of RTA.

In formulating the design requirements and limitations in this circular, reference has been made to UK Design Manual for Roads and Bridges Advice Note BA42/96 and to VicRoads draft Bridge Technical Note 2007/014 *Design of Integral Bridges and Semi-Integral Bridges*. Reference has also been made to design practices in the USA.

This circular gives design requirements and limitations for bridge length, alignment, skew, approach slabs and wing walls. Subsequent circular/s will address requirements for piles, backfill and preferred integral abutment and other details.

Consideration needs to be given to soil-structure interaction in the design of integral bridges.

In accordance with BPC 2004/06, integral bridge elements, components and their connections shall be designed in accordance with AS 5100-2004. The requirements of this circular are additional to those of AS 5100-2004.

#### **Policy**

The following design requirements and limitations apply to the design of integral bridges:

1. The maximum superstructure length excluding approach slabs shall be 70 metres.
2. The horizontal alignment shall preferably be straight but, if on a curve, the radius of the curve shall not be less than 750 m.

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3. The skew shall be limited to the following values:

<u>Bridge Length</u>	<u>Maximum Skew</u>
≤ 50 m	30 degrees
> 50 m and ≤ 70 m	20 degrees

4. Approach slabs shall conform to the following:

- (a) Details, except as required by this circular, shall be in accordance with BPC 2004/10;
- (b) The minimum length shall be in accordance with BPC 2004/10 with the additional requirement that it shall exceed one and a half times the depth of the abutment, measured from the underside of the approach slab to the underside of the abutment headstock/sill beam;
- (c) Placed on a double layer membrane to reduce sliding friction, with each layer being minimum 300 µm thick polyethylene damp course membrane with high impact resistance conforming to AS 2870;
- (d) The double layer membrane to be placed on a nominal 50 mm thick correction layer of compacted sand; and
- (e) Dowels connecting the approach slab to the abutment shall be in accordance with BPC 2004/10 with the additional requirement that their total design strength shall be greater than the sliding resistance of the approach slab.

5. Wing walls attached to abutments should be kept as small as possible to minimise the amount of structure and earth that moves with the abutment during thermal movements of the superstructure.

**References:** BPC 2004/06

**Effective date:** 1/08/2007

**Approved:** **Wije Ariyaratne**  
**Principal Bridge Engineer**

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