

## Eurocodes: Traffic Loading & Design Assumptions

### Introduction

This fact sheet details the assumptions used in the design of box culverts for compliance with Eurocodes. It is primarily aimed at providing information on the Road Loading options available together with some clarification on Durability requirements which have been adopted by the BPDA as standard. This fact sheet offers interim advice whilst the BPDA Standard Specification is revised for compliance with Eurocodes. This document is specific to precast segmental box culverts supplied by BPDA members.

### Traffic Loads on Highway Structures

Road Category (HA Interim Advice Note 124/11)	Prior to March 2010	Eurocode loading	Traction and Braking	$\alpha$
Motorways / Trunk Roads/ Principal Roads	HA / 45 Units HB <i>BS 5400-2</i>	LM1-3 <i>BS EN 1991-2</i>	Yes	1.0
Other Public Roads / Estate Roads	HA / 30 Units HB <i>BS 5400-2</i>	LM1-3 <i>BS EN 1991-2</i>	Yes	0.8
Light traffic / Field loading (3T-16T Vehicle)	Field Loading <i>BCA Specification</i>	Category G 120kN axle load (2 x 60kN wheels) <i>BS EN 1991-1</i>	No	*

\*A  $\alpha$  value of 0.4 in combination with LM1 can be considered equivalent

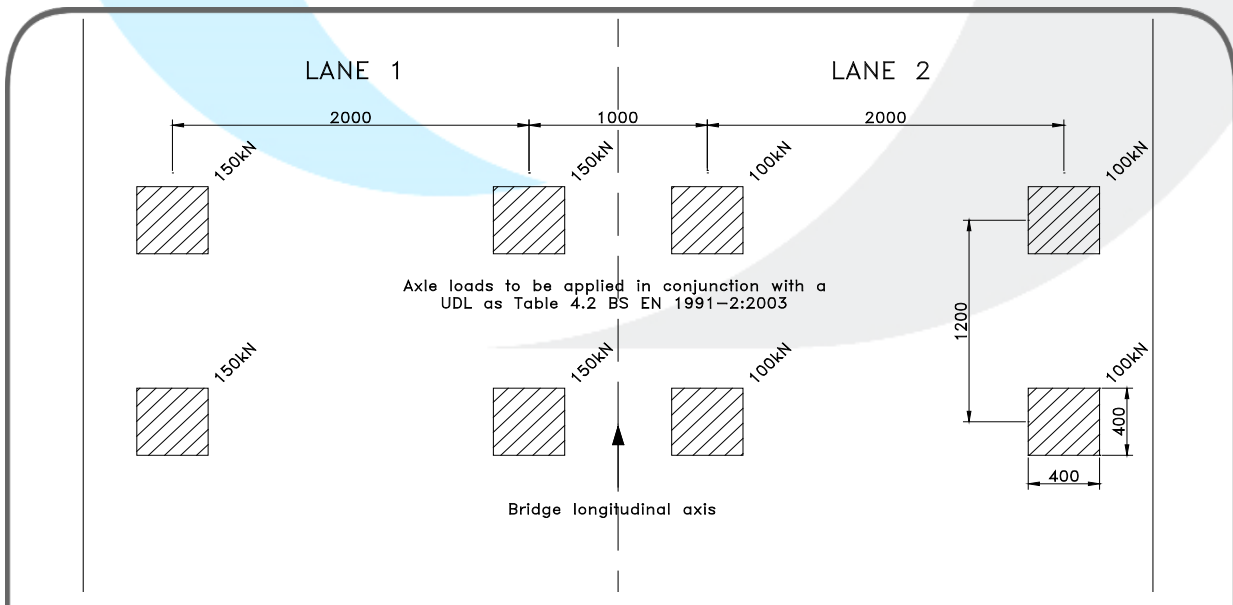
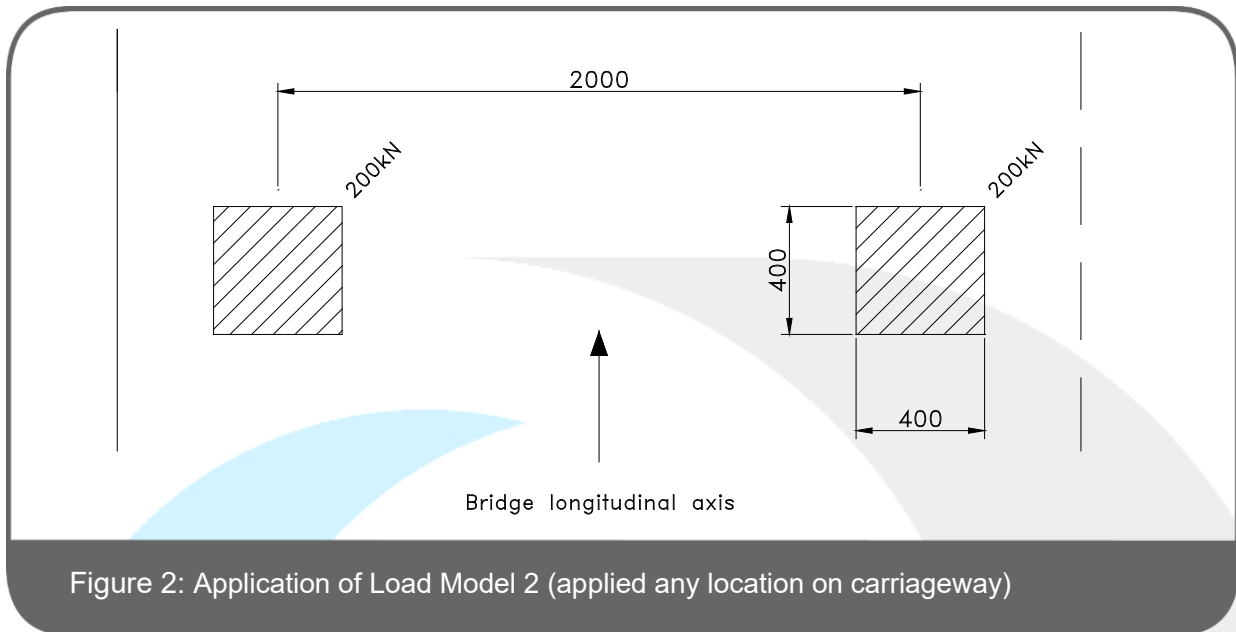


Figure 1: Application of Load Model 1 for General Verifications CI 4.3.2 (1) (a)



**Notes:**

LM3 should be determined for the individual project in accordance with BS EN 1991-2 and NA 2.16 however it is generally not critical on short spans up to 5m.

Values of  $\alpha$  correspond to classes of road traffic. For common applications EN 1991-2 Cl 4.3.1 Note 2 permits a moderate reduction of  $\alpha$  factors (10-20%)

Light traffic is consistent with 'Field loading' used by the BPDA Standard Specification and commonly used for Off Road applications.

'General Effects' are considered for flexure and shear.

### Early Age Thermal Cracking

Early thermal cracking need not be considered for precast segmental construction where the segments are monolithic and of 3m length ( $L_j$ ) or less. Additionally it is not applicable to precast concrete box culvert sections that are cast monolithically under strict quality controlled factory conditions in unrestrained moulds.

### Fatigue

Fatigue verification for road bridges (culverts considered as similar structures) is not necessary where

- The clear span to overall depth ratio of the slab does not exceed 18
- Buried arch and frame structures have a cover depth of 1.00m for road and 1.50m for railway bridges

*Ref: BS EN 1992-2 Table NA.1 cl 6.8.1*

### Stability

Considerations of stability as regards overturning and sliding do not influence the design for culvert strength and are not generally considered by BPDA members. It is assumed they will be undertaken by the engineer responsible for the works which incorporate the box culverts.



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