Concrete Step Barrier Design Guidance
CSB: Localised Widening

DRAWINGS CSB/503 CSB/504 CSB/1100

APPLICATIONS

- **Interface with impact resisting gantry bases**
- **Interface with impact resisting bridge piers**
- **Accommodating large signs or traffic lights**
- **Transition from CSB to WCSB**

For guidance on the interface with gantry bases and bridge piers that are not designed for impact loading refer to Data Sheet DS/CSB/507.

Design Guidance Notes
Localised Widening

A taper detail should be used to locally widen the CSB (Figure 1) or provide transition from a standard profile CSB to wide profile CSB (WCSB). In this case, the base width increases from 542 mm to 942 mm; the increase must be provided at a maximum rate of change of 1 in 20, relative to the edge line.

Localised widening

The widening can either be symmetric or asymmetric. A symmetric change results in a reduced length of taper. However, the designer needs to ensure that set-back to either face is not reduced below the minimum.

The entire taper must be cast using traditional fixed formwork. Typical taper lengths are given in Table 1. Localised widening to accommodate larger traffic signs, (eg matrix or traffic information signs) or connection to bridge piers or gantry bases follows the same principles. However the length of taper will depend upon the change of barrier width needed to match the structure. Further guidance is provided on Data Sheet DS/CSB/511.

Sign gantry bases and bridge piers that have been designed to withstand impact loading do not require the additional protection provided by a safety restraint system.

CSB is a non-deformable safety barrier system that does not require any load transfer connection at its interface with the structure. A plain, dowel free, expansion joint is all that is required between the end of the CSB and the adjoining face of the structure. This joint should typically be 20 mm wide and should be filled with a compressible filler to prevent unwanted material from penetrating the joint.

Gantry Bases and Bridge Piers

Where CSB meets the structure the profile of the traffic face should be matched to the profile of the structure. The structure support will be required to withstand impact loading (eg for bridge supports BD 60[1] and for gantries BD 51[2]) and will usually be provided with a concrete collar if it has insufficient strength.

Figure 2 shows a typical detail for CSB in the verge. The traffic face is matched to the profile of the gantry base, but additional thickening of the CSB profile is not required.

For CSB in the central reserve, the end section of barrier should taper to allow both CSB faces to match the profile of both faces of the structural support (Figure 3 overleaf). Tapers are discussed in more detail on Data Sheet DS/CSB/507

CSB interface with structure in verge

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CSB interface with gantry base in central reserve

Where a change in profile is required from the step profile to a vertical or near vertical traffic face on the gantry base or pier then this should be provided in accordance with the end unit detail as set out in Drawing CSB/1100. The transition from CSB to vertical should be provided within a minimum 2 m length of concrete safety barrier, with a minimum 0.5 m length adjacent to the gantry base/pier matched in profile. In the central reserve, it is necessary to widen the unit to match the base profile of both structure faces. The end detail should be such that there is no step on the traffic face at the interface between the CSB and the pier/gantry base.

Access requirements for the slipform paving equipment dictate that it will be necessary to construct an in-situ section of concrete barrier both on the approach to and departure from the structure, using fixed formwork. Typically, if no profile change is required, the minimum length of this section will be 5 m for approaches and 2 m for departures. Use of taper details and transitions in the profile face will usually require a longer in-situ length to be formed.

Cost, Construction and Programme Implications

Cast in-situ sections are best constructed following initial set of the adjacent machine laid barrier which acts as a stop-end .

Slipformed barrier construction can continue from an existing CSB section. However, access restrictions dictate that it cannot terminate directly into an obstruction. Typically a 5 m section should be omitted and subsequently completed in-situ.

Cast in-situ barrier is considerably more expensive and slower to form than machine laid construction and should be specified and detailed separately.

Table 1: Containment performance and working width	Type	Plan	Profile	Typical minimum in-situ length	Britpave drawing No.
	Symmetric widening		CSB to WCSB	4 m (200 mm change in width per face at 1 in 20)	CSB 1013
	Asymmetric widening		CSB to WCSB	8 m (400 mm change in width at 1 in 20)	CSB 1014

[1] BD 60 The Design of Highway Bridges for Vehicle Collision Loads
[2] BD 51 Portal and Cantilever Signs/Signal Gantries

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