

Concrete Step Barrier Design Guidance

CSB: Bifurcation and Change of Alignment

DRAWINGS CSB/1011 CSB/1012 CSB/1013 CSB/1014

APPLICATIONS

- **Transition to dual barrier**
- **Central reserve crossover**
- **Change of set-back**

Design Guidance Notes

Bifurcation and change of set-back are most commonly used to accommodate bridge piers and other localised hazards (Figure 1). This is required when the pier or gantry leg has insufficient resistance to withstand impact thus requiring a secondary structure as protection. Barrier alignment can be changed to allow CSB to cross the central reserve when set-back changes from one carriageway to the other.

CSB can also be locally widened, to accommodate signs or gantries mounted on CSB, and to interface with bridge piers or gantry bases that are capable of withstanding full impact loads. These issues are discussed further on [Data Sheets DS/CSB/510 and 509](#). The basic rules and construction procedures that control bifurcation, localised widening and rate of change of set-back follow the requirements of TD 19¹. The rate of change of alignment of the CSB traffic face, relative to the highway edge line, should not exceed 1 in 20.

Bifurcation

When CSB bifurcates from a single standard profile to dual standard profiles, the transition is cast using traditional fixed formwork (Figure 2). The transition length will vary according to the type of slip form paving mould used to construct the adjacent sections. Typically, a 14 m taper is required for an asymmetric bifurcation (see Table 1).



Fixed formwork for bifurcation



Asymmetric bifurcation at bridge pier

A bifurcation can either be symmetric or asymmetric. The advantage of asymmetric construction is that it allows the standard profile barrier to be continuously paved, with an adjoining section cast in-situ, minimising disruption to the paving process. Figure 3 shows a complete asymmetric bifurcation.



Asymmetric bifurcation at bridge pier

¹ TD 19 Requirement for Road Restraint Systems

Table 1: Containment performance and working width	Type	Plan	Profile	Typical minimum in-situ length	Britpave drawing No.
	Symmetric bifurcation		 CSB to Dual CSB	7 metres	CSB 1011
	Asymmetric Bifurcation		 CSB to Dual CSB	14 metres	CSB 1012

Change of Alignment of Concrete Step Barrier

When CSB changes its alignment to increase set-back, or crosses the central reserve to take set-back from the other carriageway (Figure 4), the change of alignment should not exceed 1 in 20 (relative to the carriageway edge).

Frequently this crossover detail can be constructed by slip form construction, although consideration must be given to traffic management, paver access and any localised obstructions.



Change of alignment

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 .

Slip formed 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 for subsequent in-situ construction. Cast in-situ barrier is considerably more expensive and slower to form than machine laid construction.