

Concrete Step Barrier Design Guidance

Standard Profile CSB

DRAWINGS CSB/1000 CSB/1001

APPLICATIONS

- Meets the requirements of TD 19
- Double-sided central reserve safety barrier
- Protection of obstruction located in verge
- Dual barrier

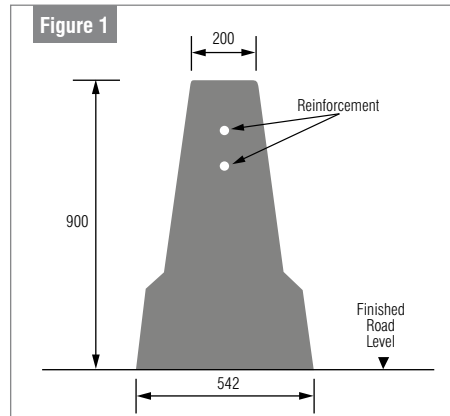
Design Guidance Notes

The proven performance of concrete barriers on the M25 demonstrates significant safety benefits to both road-users and maintainers. TD 19¹ responds to this and requires the use of rigid concrete safety barriers for motorway central reserves where AADT exceeds 25,000 vehicles per day. The standard profile Concrete Step Barrier (CSB) described here (Figure 1) meets the requirements of TD 19 by providing a Containment Performance Class of H2 and a Working Width of W2 on both faces.

CSB is designed to withstand impact from an errant vehicle and redirect it along the face of the barrier in the same direction as the traffic flow. Modern impact-absorbing technology in vehicle design ensures that the passenger cage remains as rigid as possible during impact. During a minor impact, contact between the vehicle and barrier is generally confined to the tyres and step at the base of the barrier. The vehicle is guided and safely redirected away from the barrier, allowing the driver to regain control. Thus in most cases, the vehicle will continue relatively undamaged on its journey. Compliance with BS EN 1317² Test TB 11 and TB 51 is provided by CSB as described in Data Sheet DS/CSB/516.



Wire strands feeding through mould



CSB typical cross section

Standard profile CSB is a slipformed barrier 900 mm high above road level with an overall base width of 542 mm. Slipforming is a high-output automated process that reduces manual handling operations. Typically standard profile CSB can be slipformed at a rate of 400 linear m per eight hour shift, equivalent to 200 m³ of concrete. Reinforcement is provided by two continuous wire strands or lapped H20 reinforcement. It is placed in advance along the line of the barrier and fed through the front of the slipform mould (Figure 2).

Saw cuts should be provided at 3 m intervals to limit the formation of random cracking. Occasional cracking may occur away from the control cuts but this will not detrimentally affect the performance or durability of the barrier. The cuts should be formed as soon as practicably possible after slipforming (Figure 3).

¹ TD 19 Requirement for Road Restraint Systems

² BS EN 1317-2: Road Restraint Systems

Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers



Figure 3

Saw cutting CSB

Wire strand is the preferred reinforcement type as:

- Connection of strand is simple
- Deployment of strand is rapid and simple
- Strand requires less manual handling than reinforcement
- It is cost effective

The need to provide a fully hardened central reserve will be dependent on project requirements such as width of the central reserve, location of existing services and drainage. A fully hardened central reserve will minimise maintenance requirements and therefore reduce future traffic congestion. It will also improve worker safety and eliminate hazards associated with soft-zones.

Central Reserve, with a Temporary Level Difference Between Carriageways ≤ 100 mm

When the barrier is required to accommodate a temporary level difference between carriageways of up to 100 mm, this can be achieved by constructing the standard (or widened) profile CSB in a deeper base (Figure 4). This option can be used, for example, to allow for the future overlay of the lower carriageway. The barrier is approved for use in this fashion by the Highways Agency, provided that the resulting height of the step above carriageway level on the low side is no greater than 350 mm in the temporary case (i.e. 100 mm greater than the standard profile CSB step dimension).

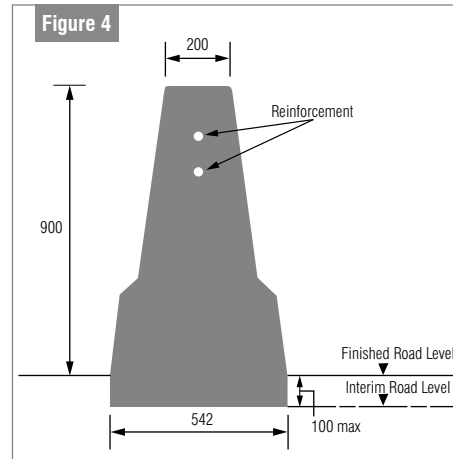


Figure 4

CSB with deep base

The temporary increase in the step height above carriageway should be for a maximum period of 12 months. Agreement for a longer period in this temporary condition should be obtained.

Where space and drainage requirements permit the, level difference between carriageways should preferably be accommodated in the soft central reserve zone or on the side of the non-traffic face, thereby allowing installation of the standard profile CSB (Figure 5). A variable profile barrier (VCSB) and dual barrier to accommodate significant level differences between carriageways are described on [Data Sheets DS/CSB/ 505 and 506](#).



Figure 5

Standard use of CSB in central reserve