

# Concrete Step Barrier Design Guidance

## CSB: Kerbs

DRAWINGS CSB/509 CSB/ 510 CSB/ 2000

### APPLICATIONS

- **Concrete step barrier with kerb**
- **Steel step barrier with kerb**

### Design Guidance Notes

On bridges, there may be a requirement to provide a kerbed central reserve to allow services to cross the bridge with the kerb in front of the traffic face of concrete or steel step barrier. However, level carriageway up to the traffic face of the barrier is preferred and kerbs should only be used if they cannot be avoided. It should be noted that the height of the barrier is taken from the surface immediately adjacent to the barrier, not the adjacent carriageway.

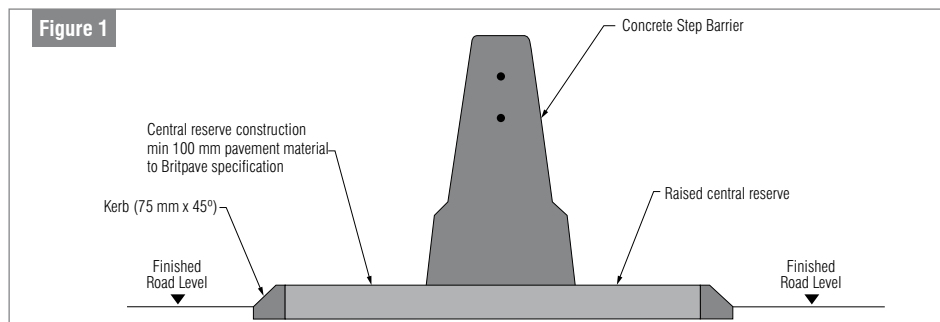
Concrete Step Barrier (CSB) systems can act as a kerb line for drainage purposes.

A review of the videos for the test shows that:

- The impact trajectory of the vehicle is unaffected by the presence of the kerb;
- The vehicle front bumper only had a minimal lift due to the absorption of the kerb height within the vehicle's suspension.

### Raised Verges and Central Reserves at Underbridges

For central reserves, the raised width must be limited to the maximum required to accommodate any required Motorised Unit route or Vehicle Restraint System (VRS). The maximum kerb height provided must be 75 mm.



CSB with kerb

When considering the use of kerbs or surface water drainage channels in front of the step barrier, the safety aspects must be evaluated by the Design Organisation<sup>1</sup>. The provision of kerbs in front of CSB is permitted by the Highways Agency up to a maximum height of 100 mm, battered at 45°. Where kerbs are required, the Highways Agency's preference is to limit kerb height to 75 mm as it is considered this will not adversely affect the stability of vehicles prior to impact. A kerb height of 75 mm fully battered at 45° (Figure 1) should allow an errant vehicle to mount the kerb and impact the barrier without becoming unstable.

It is recommended that any change in height between kerb and no kerb is applied over a 10 m transition in the barrier.

A TB32 test (1.5t car with an impact speed of 110 km/h) conducted to BS EN 1317<sup>2</sup> on a vertical concrete barrier with a kerb showed that a 100 mm high kerb located in front of the barrier with a 600 mm set back did not increase the damage to the test vehicle.

For Cross-sections above bridge decks where the VRS is a parapet, a raised verge 600 mm minimum width and with a desirable maximum kerb of 75 mm must be provided between the paved width and adjacent parapets. The maximum kerb height can be raised to a height not exceeding 100 mm where it can be shown that significant benefits result.

CSB installed on non buried structures will usually be embedded CSB. For further guidance on installation of CSB on bridges refer to the Britpave Barrier Guidance Note: [The use of the Concrete Step Barrier at Bridges \(BP/35\)](#). For guidance on the use of steel step barrier (SSB) at bridges, refer to the Britpave Guidance Note: [Anchorage of Steel Step Barrier on bridges](#).

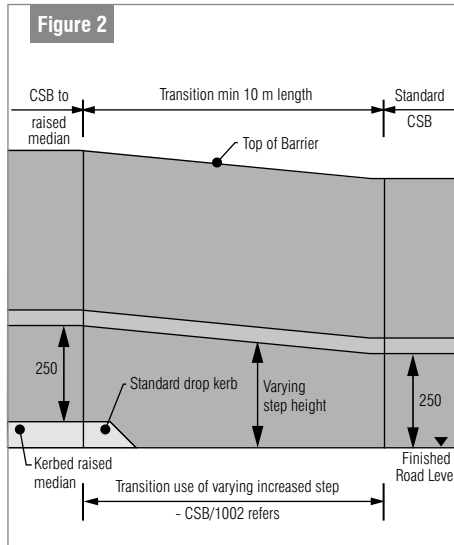
<sup>1</sup> HA 83 Safety Aspects of Road Edge Drainage Features

<sup>2</sup> BS EN 1317-2: Road Restraint Systems. Performance classes, impact test acceptance criteria and test methods for safety barriers

## Raised Median

When CSB is used to accommodate a raised median, a possible solution is shown in Figure 2.

Standard CSB is used with a transition length of 10 m with a varying profile section to achieve the change in level. The transition adopts a varying step height.



Transition to raised median