VOLUME 2 HIGHWAY STRUCTURES: DESIGN (SUBSTRUCTURES) MATERIAL

SECTION 2 SPECIAL STRUCTURES

PART 8

BD 29/17

DESIGN CRITERIA FOR FOOTBRIDGES

SUMMARY

This Standard specifies design criteria for footbridges for use by pedestrians, cyclists and equestrians.

INSTRUCTIONS FOR USE

1. Remove existing Contents pages for Volume 2.
2. Insert new Contents pages for Volume 2 dated May 2017.
3. Remove BD 29/04 from Volume 2, Section 2, Part 8 and archive as necessary
4. Insert BD 29/17 in Volume 2, Section 2, Part 8.
5. Please archive this sheet as appropriate.

Note: A quarterly index with a full set of Volume Contents Pages is available separately from The Stationery Office Ltd.

HIGHWAYS ENGLAND

BD 29/17
Volume 2, Section 2
Part 8

TRANSPORT SCOTLAND

LLYWODRAETH CYMRU
WELSH GOVERNMENT

DEPARTMENT FOR INFRASTRUCTURE
NORTHERN IRELAND

Design Criteria for Footbridges

Summary: This Standard specifies design criteria for footbridges for use by pedestrians, cyclists and equestrians.

1. INTRODUCTION

General

1.1 This Standard deals mainly with geometric and user requirements. Other design aspects such as strength and properties of materials are covered by other documents within the DMRB Series.

1.2 This Standard supersedes standard BD 29/04. It is to be used where appropriate in conjunction with the relevant Parts of the Eurocodes as implemented by the Overseeing Organisation except where otherwise specified by this Standard.

1.3 The major changes to this document are as follows:

a) Removal and replacement of references to BS 5400 with references to the Eurocodes.

b) Removal and replacement of references to other withdrawn, obsolete or superseded standards with references to other current documents.

c) Minimum widths referred to in Chapter 12 have been updated in line with current guidance.

Implementation

1.4 This Standard must be used forthwith on all projects for the design, construction, assessment, operation and maintenance of motorway and all-purpose trunk roads (and all roads in Northern Ireland) except where procurement of works has reached a stage at which, in the opinion of the Overseeing Organisation, its use would result in significant additional expense or delay progress (in which case the decision must be recorded in accordance with the procedure required by the Overseeing Organisation)

Definitions

1.5 For the definition of the general highway terms used in this Standard such as “highway types” (trunk road, motorway etc) and “components of the highways” (carriageway, verge etc) refer to BS 6100; Subsection 2.4.1.

1.6 Particular terms used in this standard are defined as follows:

Desire Line	Line likely to be taken by pedestrians, cyclists or equestrians finding the shortest route between two points.
Goal orientated users	Users making a journey to reach a specific destination.
Recreational users	Users making a journey for leisure purposes.
Bridleway	Public right of way open to pedestrians, equestrians and cyclists.
Cyclist	A pedal cyclist.
Footway	A footway forms part of the road reserved for pedestrians.
Cycle Lane/Cycleway	A marked part of the footway or footbridge for use by cyclists.

Scope

1.7 This Standard specifies non-structural criteria for the design of footbridges for use by pedestrians, cyclists and equestrians, in urban and rural areas, which may be constructed of steel, aluminium alloy, reinforced or prestressed concrete, timber or other agreed materials.

1.8 Designers should be aware of the requirement to consider the needs of all users. The selection of specific design features that would exclude some users must be fully justified. (For example use of stairs instead of ramps will prevent use by wheel chair users)

1.9 Guidelines for the selection of other suitable forms of pedestrian crossings are outside the scope of this Standard. However, TA 91 (DMRB 5.2.4) “Provision for Non-Motorised Users” (Ref. 4) contains advice on the selection of appropriate NMU crossings.

3. LAYOUT

Location

3.1 Where a footbridge crosses a dual carriageway carrying traffic with permitted speeds in excess of 30 mph, both carriageways should be crossed with a single span to avoid the need for a support in the central reserve.

Where it is proposed to use intermediate piers then this shall be justified and agreed with the Overseeing Organisation at 'Options Phase' and that appropriate levels of protection are specified as part of the design.

3.2 Where a separate footbridge is installed alongside a road bridge it should be detailed such as to deter attempts by persons to cross between. This may be effected by making the gap between the structures at least 2m wherever possible. Where this cannot be provided, adequate alternative safety precautions shall be taken to minimise the risk of persons falling through the gap.

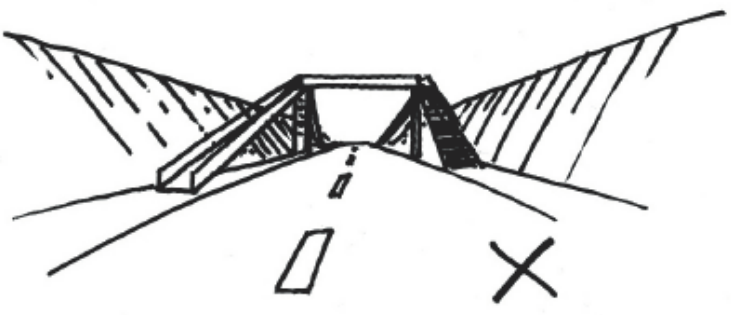
3.3 Where a separate footbridge is located close to a highway bridge such that an errant vehicle could impact the footbridge, the design of the footbridge shall include protection.

3.4 The position of a footbridge should be chosen to maximise the use of the topography so as to avoid or minimise the need for stairs and ramps. See Figure 1.

Figure 1 (ref para. 3.4)

3.5 Where a paved approach to the ramp or stairs of a footbridge is located immediately adjacent to the carriageway, it should, as far as practicable, taking account of risks to all users, be sited in such a way that pedestrians walking towards the bridge face oncoming traffic.

3.6 When a road, other than a motorway, is in cutting or has other ground modelling which provide side slopes on one or both sides, these should be used as far as is practicable to provide access to the footbridge by incorporating ramps in the side slopes. See Figure 2.



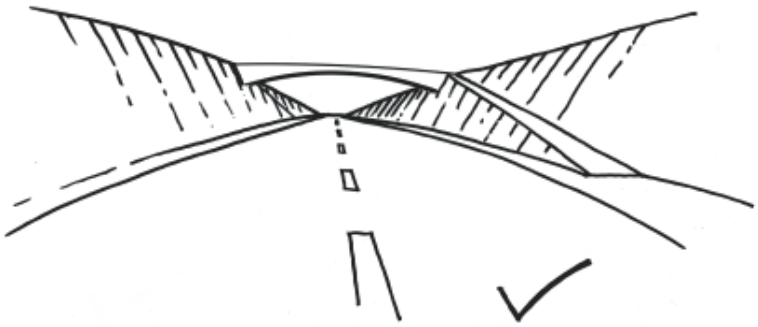


Figure 2 (ref para.3.6)

3.7 When the footbridge is in a cutting, particularly when visible on the skyline, the cutting slope should if possible extend at least up to deck level, using a false cutting if necessary. In such situations, where the footpath is within the cutting, the steps and ramps should be built into the face of the cutting. Alternatively, where the footpath is outside the cutting at original natural ground level, the access to the deck should be linked gradually into the footpath.

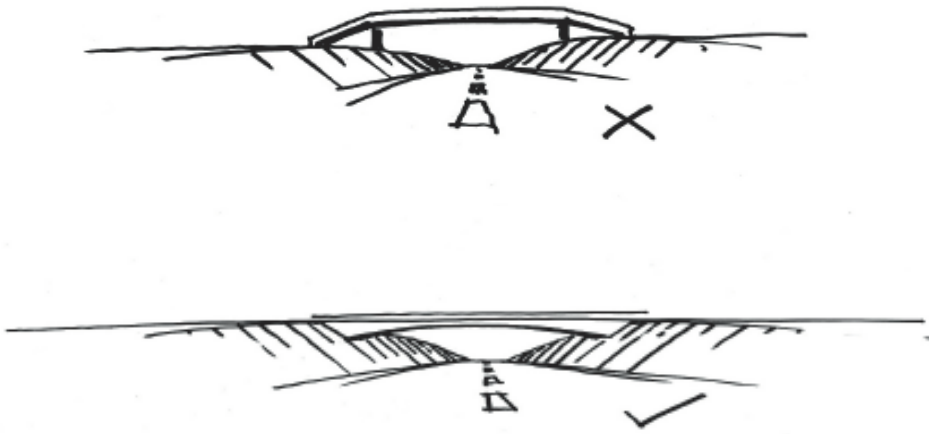


Figure 3 (ref para. 3.7)

3.8 Where a footbridge is installed to provide a crossing point for an existing rural footpath, bridleway or byway, any diversion of that route should commence as far from the carriageway or crossing point as is practicable to minimise the total route length and maintain the desire line to the footbridge. This will make the path more pleasant for users, provide better accessibility and help exploit the topography. However, rural footpaths frequently follow field boundaries and historic rights of way and care should be taken to avoid diversions that cut directly across fields. Further guidance on the diversion of existing Rights of Way can be found in Section 3 of TA 91(DMRB 5.2.4) “Provision for Non-Motorised Users” (Ref. 2).

3.9 To encourage use, rural footpaths, bridleways and byways shall not be diverted to run beside unscreened, busy roads.

Access

3.10 Access to the deck of a footbridge shall be provided by both ramps and stairs, unless ramps alone would provide the most direct route to the deck, in which case the stairs may be omitted. Access by stairs alone should only be considered in exceptional circumstances in consultation and the agreement of the Overseeing Organisation and local access and disability groups. Access shall be as short and direct as practicable and follow the desire line of the main pedestrian flow wherever possible, avoiding long detours and unnecessary climbing.

3.11 Ramp geometry should be as simple as is practical, ideally following directly the desire line. The design shall accommodate the needs of all users. The choice of gradients, landings (rest areas) and the radii of turns and manoeuvring space shall include the needs of equestrians, cyclists and mobility-impaired users.

3.12 Footbridge access stairs and ramps can have an adverse visual impact that should be minimised. Opportunities to build access into contours of the landscape should be taken.

3.13 The design shall encourage users to cross at a footbridge, rather than crossing at grade. This may be achieved by such provisions as suitable guardrails, fencing or appropriate planting which prevent them from crossing the carriageway at road level.

3.14 The design shall stop motor vehicles being driven onto the footbridge. This may be achieved by restricting access through the use of spaced bollards or a system of staggered horizontal rails. The method of restriction adopted shall be appropriate to its environmental setting and shall allow the passage of all non-motorised users of the footbridge. Restrictions shall be adequately marked in contrasting colour to assist visually impaired persons. Further information can be obtained from Inclusive Mobility (Ref. 8), and the Sustrans information sheet Access Controls (Ref. 6).

3.15 The design of the footbridge and surrounding environment shall minimise the visual and environmental impact of the bridge and access ramp/stairs. This may be achieved by using existing hedgerows or treelines. Where there are no trees in the area of the footbridge, landscaping with trees should be considered, especially in flat country. See Figure 4. Any proposed planting should be discussed if necessary with a landscape architect and should take into account the effect on any future maintenance liabilities for the structure. Planting schemes should be designed to avoid creating an enclosed area which might cause anxiety or a risk to users' personal security, or which may eventually cause trip or slip hazards to users such as those from root and branch growth or leaf-fall.

Figure 4 (ref para. 3.16)

3.16 The design shall ensure that it is not possible for rubbish and detritus to accumulate in inaccessible or confined spaces.

3.17 There should be no concealed areas or recesses on the bridge that may cause bridge users to become concerned about their personal security while crossing.

Appearance

3.18 The appearance of a footbridge shall be appropriate for its site. It should be aesthetically pleasing, both from the viewpoint of the user travelling across it and the driver travelling below, it shall enhance the environment around it and encourage people to use the bridge.

3.19 The appearance of footbridges shall follow the advice given in the HA publication "The Appearance of Bridges and Other Highway Structures" (Ref. 7) particularly chapter 12, and the more general advice in BA 41 (DMRB 1.3.11) "The Design and Appearance of Bridges".

3.20 The design of footbridges which will have a significant visual impact on their local environment, or which are situated in areas requiring special consideration such as Conservation Areas, Areas of Outstanding Natural Beauty, Heritage sites etc, may require additional consultation with the Design Council CABE. (The relevant bodies for Scotland and Wales are the Royal Fine Arts Commission for Scotland and the Design Commission for Wales. In Northern Ireland please consult the Overseeing Organisation.) The need for consultation with these bodies shall be discussed at an early stage with the Overseeing Organisation.

3.21 Visual clarity of the structure and all of its elements is essential. To this end the mounting of signs or signal equipment on the bridge structure or in its immediate environment, which create an impression of clutter, should be avoided. Where the provision of gantry signs in close proximity to a footbridge is unavoidable their interaction should be taken into account from the earliest stages of design. Because the plane of the sign is fixed relative to the road alignment, the line of the footbridge should follow this to avoid awkward clashes in angle.

6.7 Where the ramp is steeper than 1 in 20, for safety reasons there should be a significant change either of direction (30 deg or more) or in horizontal alignment (e.g. offset by at least one ramp width), at least at every 3.5m rise of the ramp at an intermediate landing.

6.8 For ramps of gradient steeper than 1 in 20, successive sloping ramps in one line may be used in agreement with the Overseeing Organisation where either no other arrangement of ramps is possible on the site or where it provides more encouragement to pedestrians to use the footbridge by shortening the walking distance

6.9 The footway, cycleway or equestrian approaches to the footbridge or ramps shall not, for the purpose of design to this Standard, be regarded as part of the footbridge structure.

Spiral and Curved Ramps

6.10 The effective gradient for spiral and curved ramps shall comply with the requirements for plain ramps. The effective gradient and governing dimensions shall be measured 900mm from the edge of the walkway surface on the inside of the curve. The minimum inside radius of walkway surfaces for curved and spiral ramps shall be 5.5m.

Landings

6.11 For straight or spiral ramps of gradient 1 in 20, landings shall be provided at equal intervals of maximum rise 2.5m. For gradients flatter than 1 in 20, intermediate landings are not required.

6.12 For straight ramps of gradient steeper than 1 in 20, horizontal landings shall be provided at intervals producing a rise of no more than 650mm between landings.

6.13 The length of a landing shall not be less than 2m measured for straight ramps on the centreline of the ramp or for spiral ramps circumferentially at 900mm from the walkway edge on the inside of the curve.

Stairs

6.14 Access stairs to footbridges shall comply with the dimensional and safety requirements of BS 5395 for ‘public’ stairs, except as amended below (see also Figure 6):

(a) The number of risers in a single flight shall not be more than 13.

(b) A maximum of three successive flights may be used in line, provided any adjacent flights provide a change in direction of at least 30 degrees.

(c) The risers and treads of each step in a flight of stairs shall be uniform.

(d) Risers shall not be variable in height over their width.

(e) The riser shall be not more than 150mm

(f) The tread width shall be not less than 300mm and not greater than 350mm.

(g) Landing lengths shall be not less than 2m measured along the centre line of the stairs, or not less than the width of the stairs, whichever is the greater.

Further guidance can be obtained from Inclusive Mobility (Ref. 8).