

asphalt

applications

11



Construction and surfacing
of footways and cycleways
using asphalt



Asphalt
Information
Service

Introduction

The main use of asphalt* in the UK is in the construction of roads, from motorways to private access roads, but asphalt is being increasingly used on footways due to the lower risks of trip-hazards and cracking that it provides compared with rigid modular paving units like flags and slabs. Also, with the expansion of cycling facilities in the UK, asphalt has become increasingly recognised as the most appropriate surfacing choice for cycleways.

Footways are a vital part of the urban environment, including housing developments, and clearly must be constructed and maintained so that users can progress in safety and comfort. Cycleways also require special consideration in their design, construction and maintenance to ensure an even running, safe surface is provided.

Where reference is being made to European Standards it is considered essential that initial reference should be made to the UK National Guidance Document published by BSI as Published Document PD 6691¹.

The terminology used in this guide for the structural elements of the pavement, as illustrated here, is that adopted for use in European Standards for Asphalt mixtures^{2,3,4}. Surface course was previously known as wearing course, binder course was known as basecourse and base was known as roadbase.

Benefits of asphalt

Asphalt provides a number of benefits when used on footways and cycleways, namely:

- a relatively quick and straightforward form of construction, with the surface being useable soon after laying;
- an even finish and neat appearance;
- a joint-free surface, thereby reducing hazards such as tripping;
- an even surface to make cycling easier, while providing adequate skid resistance;
- a highly durable surface, useable in all weathers, which requires very little maintenance;
- can be easily reinstated when maintenance works on underlying service pipes or cables is necessary, and
- available in a range of colours and textures to blend in aesthetically with the surrounding environment and landscape.

General

The guidance given in this Information Sheet relates mainly to new footway construction. Additional guidance on cycleways, either shared with the footway or the roadway, is noted as necessary. General guidance on resurfacing an existing paved area is given in another Information Sheet in this series⁵.

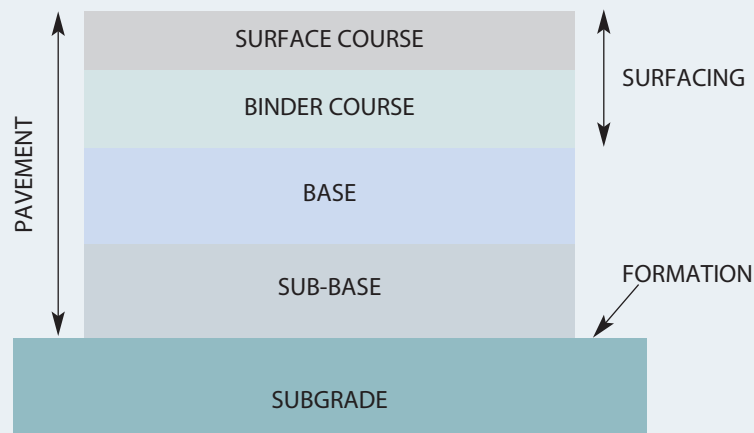
One of the principal causes of early failure of footways and cycleways arises from road vehicle over-run of paved structures not designed for such loading. Clearly, where a cycleway is part of a road and is to be regularly traversed by or shared with vehicle traffic, the structural design should be appropriate for that traffic. This situation is not dealt with in this Information Sheet and normal road design manuals should be consulted. However, both footways and cycleways can be affected by vehicle over-run, either planned (e.g. at crossovers providing vehicle access to adjacent properties) or unplanned (e.g. accidental vehicle over-run or from inconsiderate parking). These circumstances are dealt with in the following guidance.

Important note: Most public highway authorities have their own minimum standards for the design of footways for which they are responsible and may similarly have their own standards for cycleways. These should be consulted and followed wherever appropriate and particularly where such facilities are to be adopted by the authority. Failure to do so could result in rejection of the finished construction.

The terminology used in this guidance is that accepted as standard in this country and is illustrated on the next page in Figure 1



Figure 1
Highway Pavement



* The term 'asphalt' is used in this publication and unless accompanied by a descriptor for example "Asphalt Concrete" (AC), 'Hot Rolled Asphalt' (HRA) or 'Stone Mastic Asphalt' (SMA), is applied in its generic sense to refer to the range of mixtures used in the UK.

Drainage

The importance of adequate surface and/or sub-soil drainage should not be underestimated, as if it is inadequate, early structural failure may occur.

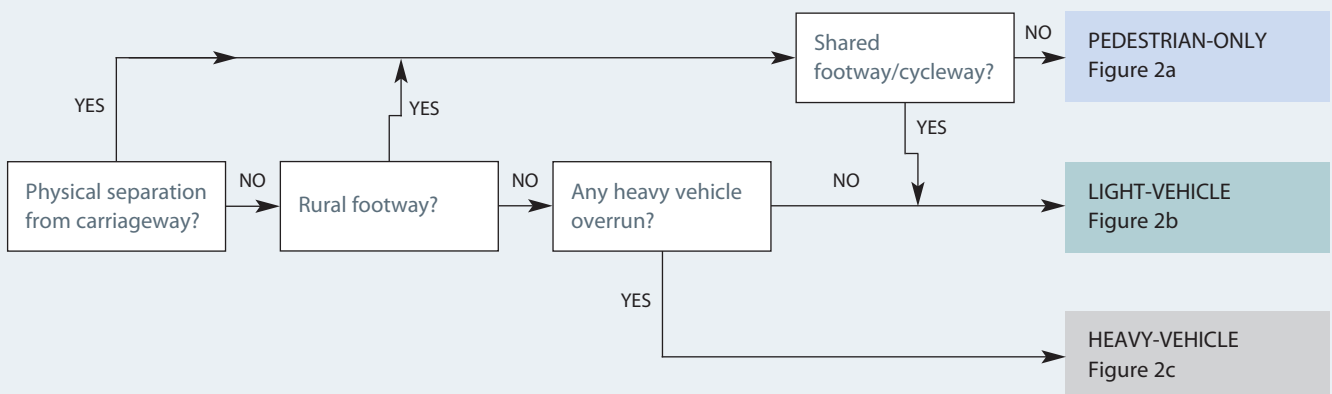
Footway drainage will often generally be incorporated into that of the adjacent highway, but where this is not appropriate or applicable a simple separate drainage system may be required. Such a system should be sufficient to keep the water table below formation level and deal adequately with stormwater. However, this drainage system will require regular maintenance to ensure long-term performance.

Longitudinal gradients and/or cross-falls should be sufficient to ensure disposal of surface water. A longitudinal gradient of 5% or more and a cross-fall of 3% or more are recommended.

Design

As has been previously indicated, use of footways and cycleways by road vehicles is a major reason for their premature failure and the risk of such over-running must be taken into consideration when designing the construction and specifying the pavement materials.

Designs are given below for three construction categories, selected using the following flowchart, which is based on TRL Application Guide 26⁶



'Pedestrian only' footways are not designed to support vehicle use, except very occasionally by small cleaning and maintenance vehicles (typically pedestrian controlled). Cycleways, however, are placed in the 'light-vehicle' category to allow for the more frequent use of such cleaning and maintenance vehicles.

Figure 2a
'Pedestrian-only
category pavement
thicknesses'

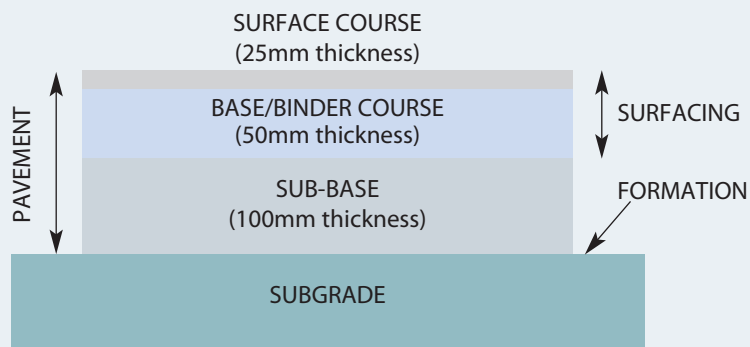


Figure 2b
'Light vehicle
category pavement
thicknesses'



Footways in the 'heavy-vehicle' category require special attention in specifying them, as their design will be affected by various factors including type and strength of sub-grade, drainage conditions, and moisture content of sub-grade. However, footways anticipating such loading are likely to be adopted for maintenance by Local Authorities and as such, specifications and guidelines for their design, construction and maintenance should be in place and consulted.

Figure 2c
'Heavy vehicle
category pavement
thicknesses'



Materials

Sub-base

Suitable materials are Clause 803 Type 1, Clause 804 Type 2 and Clause 807 Type 4 (asphalt arisings) unbound mixtures⁷ or other locally available materials of known satisfactory quality such as crusher run, hardcore and quarry scalplings. The material should be spread, shaped and well compacted to provide an even surface to the required levels and falls. If construction is associated with new carriageway works it will probably be more practicable to 'carry-over' the sub-base formation from the main construction, which will in most cases upgrade the permissible trafficking category of the footway.

Asphalts

Guidance on the specification of suitable materials for base, binder course and surface course are contained in TRL Application Guide 26. However, the materials quoted in this document and specifically in Table 5, are specified according to the now obsolete British Standards which were applicable to asphalt mixtures. Table 1 below identifies the Asphalt mixtures quoted in Table 5 of the TRL guide, and translates them to the designations used in the European Standards and more importantly PD 6691. It is the annexes of PD 6691 which provide guidance to the asphalt producer on the formulation of the target grading and binder content on which the production specification for each of the mixtures is based.

Table 1
Materials options
for flexible
construction

Materials	Specification & Specification Guidance
Sub-base, Clause 803 Type 1, Clause 804 Type 2 and Clause 807 Type 4 (asphalt arisings) Unbound mixtures ⁷	MCHW Volume 1 Series 800, Volume 2 Series NG 800
HRA 50/14 binder course HRA 55/10F surface course	PD 6691 Annex C
AC 20 dense binder course AC 14 close graded surface course AC 6 dense surface course AC 6 medium surface course AC 3 fine graded surface course	PD 6691 Annex B
SMA 10 surface course	PD 6691 Annex D
Permanent cold-lay surfacing materials	TRL 611 ⁸

The choice of material will depend on cost, appearance, durability and hence maintenance requirements, the likelihood of disturbance, total thickness and ease of laying. Guidance on the laying of these mixtures is provided in BS 59498⁹. Certain Local Authorities may also specify non-standard materials which have historically proved to be satisfactory. In addition, proprietary materials are popular, such as SMA-type company branded materials, and coloured asphalts¹⁰.

Construction

Sub-grade should be levelled and compacted prior to sub-base construction. Where possible, the levels, profiles and cross-falls should be set as accurately as possible by the top of the sub-base layer in order to ensure correct and uniform thickness of subsequent asphalt layers. Surface finish is particularly important for dedicated cycleways to ensure ride quality, but should not be underestimated as a requirement for pedestrian comfort also. Machine laying of asphalt layers is recommended wherever possible to provide a consistent, well compacted surface. Generally the mode and the equipment used for laying and compaction will be determined by site constraints and this in turn will have an influence on the choice of materials employed. Further reference to applicable Local Authority specifications will indicate requirements for edgings, kerbs and similar construction details to provide full restraint of the pavement structure.

Laying

Recommendations for the laying of the various asphalt materials mentioned above are given in British Standard BS 594987⁹, as are the recommended surface regularity tolerances of the final surface.

It is strongly advised that all surfacing work is entrusted to well-established specialist surfacing contractors and not to itinerant or casual callers. A list of specialist surfacing contractors in any area, who are members of the Mineral Products Association, is available from the address given on this information sheet.

References

Important: When referring to any of the documents listed it is essential to check that it is the latest/current edition of that document. This can be readily confirmed by checking the currency of the document on the appropriate website.

- 1 PD 6691 - **Guidance on the use of BS EN 13108 Bituminous Mixtures - Material specifications**. BSI, London.
- 2 British (European) Standard BS EN 13108-1 **Bituminous mixtures - Material specifications - Part 1: Asphalt Concrete**, BSI, London.
- 3 British (European) Standard BS EN 13108-4 **Bituminous mixtures - Material specifications - Part 4: Hot Rolled Asphalt**, BSI, London.
- 4 British (European) Standard BS EN 13108-5 **Bituminous mixtures - Material specifications - Part 5: Stone Mastic Asphalt**, BSI, London.
- 5 **Resurfacing of roads and other paved areas**, Information Sheet 3, Mineral Products Association, London.
- 6 **Application Guide AG26 (Version 2) - Footway and cycle route design, construction and maintenance guide** - 2003. www.trl.co.uk/library/reports/publications/
- 7 Design Manual for Roads and Bridges, Volume 1 **Specification for Highway Works Clause 803 Type 1, Clause 804 Type 2 and Clause 807 Type 4 (asphalt arisings) unbound mixtures**. HMSO, London www.standardsforhighways.co.uk/mchw/vol1/index.htm
- 8 **TRL Report TRL611 - A guide to the use and specification of cold recycled material for the maintenance of road pavements** - 2004. www.trl.co.uk/library/reports/publications/
- 9 British Standard BS 594987 **Asphalt for roads and other paved areas - Specification for transport, laying and compaction and type testing protocols**, BSI, London
- 10 **Decorative and coloured finishes for asphalt surfacings**, Information Sheet 4, Mineral Products Association, London.
- 11 **BSI website for the purchase of European and British Standards and Public Documents**. www.bsiglobal.com/upload/Standards%20&%20Publications/shop.html



Information sheets in this series

- 1 The construction and surfacing of car parking areas including private drives and permeable hardstandings
- 2 The construction and surfacing of parking areas for medium and heavyweight vehicles
- 3 Resurfacing of roads and other paved areas using asphalt
- 4 Decorative and coloured finishes for asphalt surfacings
- 5 Choosing a surfacing contractor
- 6 Asphalt surfacings for high stress areas
- 7 Use of asphalt in the construction of games and sports areas
- 8 Farming applications of asphalt
- 9 Miscellaneous uses of asphalt
- 10 Airfield uses of asphalt
- 11 Construction and surfacing of footways and cycleways using asphalt
- 12 European Asphalt Standards and their application in the UK.

Booklet

'What's in a Road?'

A general review of pavement construction and the different materials that are used for the construction and maintenance of asphalt roads.

Enquiries for orders for 'What's in a Road?' should be addressed to the Mineral Products Association, details on next page.

Topics in Asphalt

- Asphalt - Road materials with quality
- Roads are 'green' with asphalt

Publications

Apart from this and the other information sheets and booklet dealing with uses of asphalt and pavement construction, a range of other publications is available from the Mineral Products Association covering aggregate production and processing, lime, ready-mixed concrete, sand and gravel and slag. A full list of these publications may be obtained from the address shown on the next page.

Further advice

General advice on the use of asphalts may be obtained from the Mineral Products Association at the address given on this information sheet. For detailed guidance on any site-specific matter, advice should be sought from local specialist surfacing contractor members of the Mineral Products Association.



The Mineral Products Association is the trade association for the aggregates, asphalt, cement, concrete, lime, mortar and silica sand industries.

Mineral Products Association

Gillingham House
38 - 44 Gillingham Street
London SW1V 1HU
Tel +44 (0)20 7963 8000
Fax +44 (0)20 7963 8001
mpaasphalt@mineralproducts.org
www.mineralproducts.org



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