

Guide for

Structural design of pavements constructed with clay or concrete block pavers

Committees responsible for this British Standard

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- Brick Development Association
- British Aggregate Construction Materials Industries
- British Cement Association
- British Ceramic Research Ltd.
- British Precast Concrete Federation Ltd.
- Cementitious Slag Makers' Association
- County Surveyors' Society
- Department of Transport
- Institution of Highways and Transportation
- Interpave (the Concrete Block Paving Association)
- Landscape Institute
- National Paving and Kerb Association
- Society of Chemical Industry
- Stone Federation

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Foreword

The design of pavements using clay or concrete block pavers is hampered by the lack of data on the performance of highway pavements in the United Kingdom with this type of surfacing. The information given in this standard is the current state of the art.

Few of the pavements laid to-date have reached the end of their design life, however, premature failures have been uncommon. Current UK experience is based on the application of clay and concrete block pavers on roads with traffic speeds up to 30 miles/h (50 km/h).

Research has indicated that block paving behaves in a similar manner to conventional flexible pavement construction materials. This similarity has been used as a basis for this standard and has been proven in several design projects worldwide over a period of approximately 15 years.

The Technical Committee has studied the performance of pavements in the UK, looked at overseas practice and the extensive work carried out in laboratories worldwide and at the Transport and Road Research Laboratory (TRRL). The results of these studies give no unequivocal evidence on the relative structural performance of clay and concrete block pavers compared with more traditional pavement construction materials.

A surface deflection overlay procedure and a component overlay design method are recommended for determining whether an existing pavement can be overlain with clay or concrete block pavers. The surface deflection method is based upon the method described in TRRL Reports 833, 834 and 835¹⁾. The component overlay method was first introduced by The Asphalt Institute, Maryland, USA and has been used in the British Ports Federation heavy duty pavement design manual and in many other pavement design procedures.

The design recommendations have been based on the principle that the roadbase will remain intact for the design life which is based on traffic damaging power. During the design life, maintenance of the surface may be required in the form of lifting and relaying the pavers on sand to correct for surface deformations exceeding current design tolerances. This is more likely where there is channelized traffic.

Designers should note that this is a structural design guide to provide guidance on the sub-base and roadbase thicknesses beneath the pavers, necessary for the anticipated traffic. Surface characteristics such as skid resistance, surface irregularity, ride quality and noise are not considered in this standard.

The agreement of the appropriate highway authority is required before any type of clay or concrete block paver can be used on a highway which is to be adopted by that authority.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ Available from TRRL, Wokingham Road, Crowthorne, Berkshire RG 11 6AU.

1 Scope

This British Standard provides guidance on the design of pavements surfaced with clay or concrete block pavers manufactured and laid in accordance with BS 6677 and BS 6717. It sets out the design procedures for pavements constructed with clay or concrete block pavers. It applies to all pavements subjected to the usual road spectrum of axle loads up to 18 000 kg and trafficked by up to 12 000 000 cumulative standard axles, including both highway pavements and industrial pavements where the traffic is similar in character to highway vehicles. It specifically excludes very heavy duty pavements such as those in ports.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard, the definitions given in BS 6100 apply, together with the following.

2.1

paver

either clay pavers or concrete block pavers

NOTE Clay pavers should comply with BS 6677-1 and concrete block pavers should comply with BS 6717-1.

2.2

laying course (bedding course)

layer of material on which pavers are bedded

2.3

subgrade

upper part of the soil, natural or constructed, that supports the loads transmitted by the overlaying road structure

2.4

subgrade improvement layer (capping layer)

layer of granular or treated material at the top of the subgrade to provide an improved foundation for the pavement

2.5

sub-base

one or more layers of material placed immediately above the subgrade

2.6

roadbase

one or more layers of material placed above the sub-base that constitute the main structural elements of a flexible or a composite pavement

2.7

cement bound material (CBM)

material to which cement has been added. The material is compacted to form a roadbase

2.8

stabilized material

material to which cement, bitumen or other binding material has been added

2.9

channelized traffic

traffic where the vehicle track width and the traffic lane width are virtually the same

NOTE Normal lane widths in a highway do not constitute channelized traffic.

2.10

dynamic loading

the spectrum of loads normally occurring on highway pavements at vehicle speeds exceeding 30 miles/h (50 km/h)

2.11

standard axle

an axle carrying a load of 8 200 kg (18 000 lb)

2.12

cumulative traffic

the number of standard axles a pavement is designed to carry, measured in million standard axles (msa)

2.13

commercial vehicles

commercial vehicles having an unladen weight exceeding 1.5 t

3 General design criteria

3.1 Basis of design

The design of new pavements is based upon the method given in TRRL Report 1132 *The structural design of bituminous roads*. In the case of overlay design, either a surface deflection method or the component overlay method, is used according to the type of pavement to be overlain.

3.2 Special cases

The design method described in clause 4 can be applied directly to the majority of pavements. However in some cases, unusual or particularly onerous loading effects or other conditions will need to be taken into account, e.g. the following.

- a) Where channelized traffic is expected, the traffic figures should be multiplied by three before carrying out the design, to allow for the increase in the concentrated application of loads at a particular point on the pavement. Normal lane widths in a highway do not generally constitute channelized traffic but channelized traffic can develop on any road, e.g. on steep hills or approaches to traffic signals.