

Pavements constructed with clay, natural stone or concrete pavers —

Part 1: Guide for the structural design of heavy duty pavements constructed of clay pavers or precast concrete paving blocks

ICS 93.080.20

Confirmed July 2008

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The preparation of this British Standard was entrusted to Technical Committee B/507, Paving units and kerbs, upon which the following bodies were represented:

- Brick Development Association
- British Cement Association
- British Ceramic Research Ltd.
- British Precast Concrete Federation Ltd.
- Cementitious Slag Makers' Association
- Country Surveyors' Society
- Department of the Environment, Transport and the Regions (Highways Agency)
- Institution of Civil Engineers
- Institution of Highways and Transportation
- Interlay, the Association of Block Paving Contractors
- Interpave, the Concrete Block Paving Association
- Landscape Institute
- Society of Chemical Industry
- Stone Federation

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Civil Engineering Test Equipment Manufacturers' Association
- Institution of Structural Engineers
- National Federation of Clay Industries Ltd.
- National Paving and Kerb Association

This British Standard, having been prepared under the direction of the Sector Committee for Building and Civil Engineering, was published under the authority of the Standards Committee and comes into effect on 15 February 2001

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The following BSI references relate to the work on this standard:
Committee reference B/507
Draft for comment 98/108845 DC

ISBN 0 580 33235 7

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

This part of BS 7533 has been prepared by Technical Committee B/507. It supersedes BS 7533:1992, which is withdrawn.

BS 7533 will be published in the following parts:

- *Part 1: Guide for the structural design of heavy duty pavements constructed of clay pavers or precast concrete paving blocks;*
- *Part 2: Guide for the structural design of lightly trafficked pavements constructed of clay pavers or precast concrete paving blocks;*
- *Part 3: Code of practice for laying precast concrete paving blocks and clay pavers for flexible pavements;*
- *Part 4: Code of practice for the construction of pavements of precast concrete flags or natural stone slabs;*
- *Part 5¹⁾: Guide for the design of pavements (other structural aspects);*
- *Part 6: Code of practice for laying natural stone, precast concrete and clay kerb units;*
- *Part 7¹⁾: Code of practice for the construction of pavements of natural stone setts;*
- *Part 8¹⁾: Guide for the structural design of lightly trafficked pavements of precast concrete flags and natural stone slabs.*
- *Part 9¹⁾: Code of practice for laying clay pavers.*

Annexes A, B and C are informative.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 15 and a back cover.

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¹⁾ In preparation.

1 Scope

This British Standard provides guidance on the design of flexible pavements surfaced with clay or concrete block pavers manufactured in accordance with BS 6677-1 and BS 6717-1 respectively and laid in accordance with BS 7533-3. It applies to all pavements subjected to the usual road spectrum of axle loads up to 18 000 kg and trafficked by between 0.5 million standard axles (msa) and 12 msa, including both highway pavements and industrial pavements where the traffic is similar in character to highway vehicles. It specifically excludes heavy duty pavements with traffic exceeding 12 msa and other applications such as aircraft pavements and those in ports and specialized industrial areas.

NOTE 1 For design guidance for traffic levels of up to 0.5 msa, reference should be made to BS 7533-2.

NOTE 2 This design method can also be used for pavements constructed with stone blocks having the dimensions, tolerances and characteristics consistent with the relevant requirements for clay and/or concrete pavers.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 594-1, *Hot rolled asphalt for roads and other paved areas — Part 1: Specification for constituent materials and asphalt mixtures.*

BS 594-2, *Hot rolled asphalt for roads and other paved areas — Part 2: Specification for the transport, laying and compaction of rolled asphalt.*

BS 1377-4:1990, *Methods of test for soils for civil engineering purposes — Part 4: Compaction-related tests.*

BS 4987-1, *Coated macadam for roads and other paved areas — Part 1: Specification for constituent materials and for mixtures.*

BS 4987-2, *Coated macadam for roads and other paved areas — Part 2: Specification for transport, laying and compaction.*

BS 6677-1, *Clay and calcium silicate pavers for flexible pavements — Part 1: Specification for pavers.*

BS 6717-1, *Precast concrete paving blocks — Part 1: Specification for paving blocks.*

BS 7533-2, *Pavements constructed with clay, natural stone or concrete pavers — Part 2: Guide for structural design of lightly trafficked pavements constructed with clay or concrete block pavers.*

BS 7533-3, *Pavements constructed with clay, natural stone or concrete pavers — Code of practice for laying precast concrete paving blocks and clay pavers for flexible pavements.*

Department of Transport *Specification for Highway Works*, 1986 edition. Department of the Environment, Transport, and the Regions, London: The Stationery Office.

3 Terms and definitions

For the purposes of this part of BS 7533 the following terms and definitions apply.

3.1

paver

either a clay paver or a concrete block paver

3.2

laying course

layer of material on which pavers are bedded

3.3

subgrade

upper part of the soil, natural or constructed, that supports the loads transmitted by the overlying pavement

3.4

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

3.5

sub-base

one or more layers of material placed immediately above the subgrade

3.6

roadbase

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

NOTE The roadbase can be a bituminous material and/or cement bound material.

3.7

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.

3.8

dynamic loading

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

3.9

standard axle

axle carrying a load of 8 200 kg

3.10

cumulative traffic

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

3.11

commercial vehicle

vehicle having an unladen weight exceeding 1.5 t

3.12

flexible pavement

pavement, constructed with pavers jointed with sand laid on a laying course, which is assumed to behave in a flexible manner

4 General design criteria

4.1 Basis of design

The design of new flexible pavements is based upon the method given in TRRL Report LR 1132 [1]. In the case of overlay design either a surface deflection method or the component overlay method should be used according to the type of pavement to be overlain.

4.2 Special cases

The design method described in clause 5 can be applied directly to the majority of flexible pavements. However, in some cases unusual or particularly onerous loading effects or other conditions should 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 location 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, approaches to traffic signals and pinch points within traffic calming measures.
- b) Where speeds in excess of 30 mile/h (50 km/h) are expected, the cumulative traffic should be multiplied by two before carrying out the design to allow for dynamic loading effects.
- c) Where both channelized traffic and speeds in excess of 30 mile/h (50 km/h) occur only the higher multiplier, i.e. three, should be applied.
- d) Pavements constructed over frost-susceptible soils should have an overall thickness of non frost-susceptible material of not less than 450 mm.