

Pavements constructed with clay, natural stone, or concrete pavers —

Part 7: Code of practice for the construction of pavements of natural stone setts and cobbles

ICS 93.080.10

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee B/507, Paving units and kerbs, to B/507/2, Paving units and kerbs — Natural stone, upon which the following bodies were represented:

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

The following organizations were also represented in the drafting of the standard, through the subcommittee:

- British Slate Association
- Department of the Environment, Transport and the Regions (Building Research Establishment)
- Ministry of Defence

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Foreword

This part of BS 7533 was prepared by Technical Committee B/507.

BS 7533 consists of 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 5: Guide for the design of pavements (other than structural aspects)¹⁾;

Part 6: Code of practice for laying natural stone, precast concrete and clay kerb units;

Part 7: Code of practice for the construction of pavements of natural stone setts and cobbles;

Part 8: Guide for the structural design of lightly trafficked pavements of precast concrete flags and natural stone slabs¹⁾;

Part 9: Code of practice for rigid laying of clay pavers¹⁾;

Part 10: Natural stone setts — Guide for the structural design of trafficked paved areas¹⁾;

Part 11: Code of practice for the maintenance and reinstatement of pavements of concrete, clay and natural stone¹⁾.

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its 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 19 and a back cover.

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¹⁾ In preparation.

1 Scope

This part of BS 7533 gives recommendations for the laying of natural stone setts and cobbles intended for pavements, roads, industrial areas and other paved surfaces subjected to all categories of static and vehicular loading and pedestrian traffic.

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 812-105.1, *Testing aggregates — Methods for determination of particle shape — Flakiness index.*

BS 812-120, *Testing aggregates — Method for testing and classifying drying shrinkage of aggregates in concrete.*

BS 4551-1, *Methods of testing mortars, screeds and plasters — Physical testing.*

BS 7533-10, *Pavements constructed with clay, natural stone or concrete pavers — Part 10: Natural stone setts — Guide for the structural design of trafficked paved areas.*²⁾

BS 7533-11, *Pavements constructed with clay, natural stone or concrete pavers — Part 11: Code of practice for the maintenance and reinstatement of pavements of concrete, clay and natural stone.*²⁾

BS EN 1342, *Setts of natural stone for external paving — Requirements and test methods.*

DIN 18555-4, *Testing of mortars containing mineral binders — Hardened mortars — Determination of linear and transverse strain and of deformation characteristics of masonry mortars by the static pressure test.*

DIN 18555-6, *Testing of mortars containing mineral binders — Determination of bond strength of hardened mortar.*

Specification for Highway Works. 2002, London, The Stationery Office.

3 Terms and definitions

For the purposes of this part of BS 7533, the definitions given in BS EN 1342 and the following apply.

3.1

cobble

natural stone element rounded by erosion

3.2

creep

horizontal movement of paving units resulting from the action of deceleration, cornering forces or gravity

NOTE The principal cause of creep is vehicular traffic.

3.3

edge restraint

device that prevents lateral movement of setts and prevents loss of material from the laying course, roadbase, or sub-base where applicable

3.4

intermediate restraint

device used to restrain setts at intervals within a paved surface

3.5

interlock

effect of frictional forces between setts that prevents them moving in relation to each other

²⁾ In preparation.

3.6**laying course**

layer of material on which setts are bedded

3.7**laying face**

working edge of the surface course at which setts are laid

3.8**roadbase**

one or more layers of material placed above the sub-base that constitute the main structural elements of a flexible or composite pavement upon which the laying course is laid

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

3.9**regulating layer**

layer of compacted material upon which the laying course is laid, which ensures the laying course thickness is in tolerance

3.10**sub-base**

one or more layers of material placed immediately above the subgrade

3.11**subgrade**

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

3.12**surface course**

layer of setts that acts as the wearing surface of the pavement

3.13**inboard cutting**

cutting the sett to break the bond to allow the cut at the edge to be greater than one third of a sett

3.14**complementary fitting**

sett used at the end of alternative rows of setts or cobbles to break bond to avoid the need to cut setts

3.15**laying pattern**

arrangement of setts to form specific patterns either for structural requirements or visual effect

3.16**jointing material**

material used to fill in the joints between setts

3.17**joint width**

size of the filled space between adjacent setts or between setts and edge restraint

3.18**laying course material**

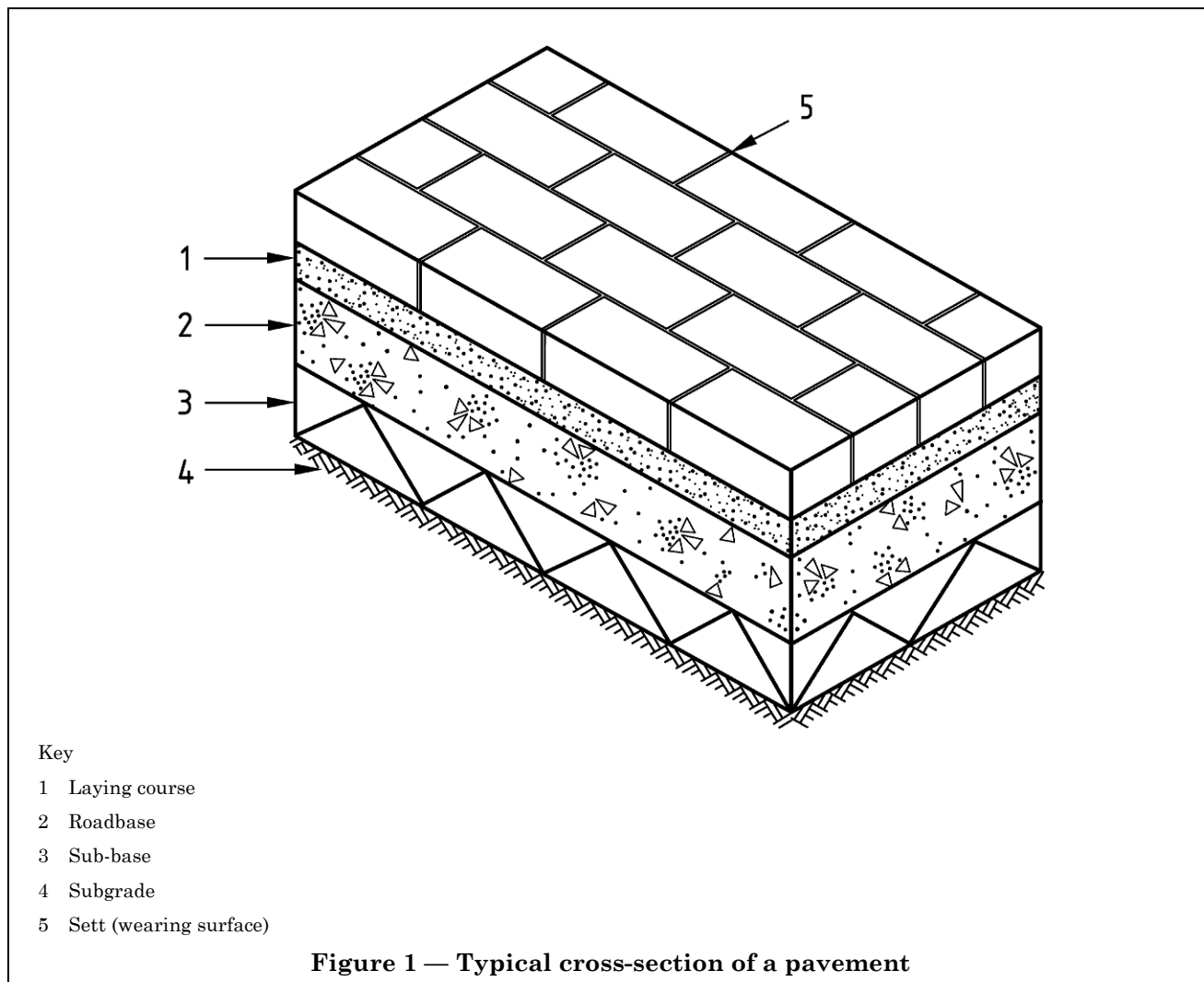
fine aggregate or fine concrete into which setts are bedded

3.19**bedding mortar**

blend of fine aggregate and cementitious binder

4 Structure of pavement

A typical cross-section of a pavement is shown in Figure 1.



5 Construction of subgrade, sub-base and roadbase

The overall thickness of the construction of subgrade, sub-base or roadbase should be determined in accordance with BS 7533-10³⁾. It should give adequate frost protection to the subgrade.

The subgrade, sub-base and roadbase, when present, should be prepared so that:

- a) they provide a construction platform;
- b) surface levels are within the tolerances given in Annex A;
- c) longitudinal falls and crossfalls of the completed pavement allow water to drain avoiding ponding, as detailed in Annex B;
- d) the roadbase, regulating layer and/or sub-base is adequately compacted to achieve density in accordance with the *Specification for Highway Works*;
- e) provision is made to prevent the sand laying course material migrating into the drainage systems;

³⁾ In preparation.

f) the extent of the site preparation includes provision for adequate foundations and backing for any edge restraint in accordance with the *Specification for Highway Works*;

g) any trenches across the works are permanently reinstated to prevent local settlement.

Work should not take place when the subgrade is waterlogged or frozen.

Where an existing road or footway surface is to be overlaid, it should be checked for structural adequacy as recommended in BS 7533-10. It should be milled to tolerance in accordance with Annex A or additional bituminous material added to regulate the surface to tolerance prior to spreading the laying course.

6 Materials

6.1 Laying course material

6.1.1 Flexible construction

6.1.1.1 Fine aggregate for use with sawn side setts (e.g. sandstone)

Naturally occurring sand, either from the Quaternary geological series or sea dredged, should be selected and graded according to use as recommended in C.1.1. The laying course should contain no cementitious material, as this may detract from the flexible nature of the pavement.

6.1.1.2 Fine aggregate for use with cropped side setts (e.g. granite)

Crushed igneous rock should be selected as recommended in C.1.2.

6.1.2 Rigid construction

6.1.2.1 General

The compressive strength of the material should be measured by producing samples made in a 100 mm cube mould from actual mixes being used on site. These should be stored under wet hessian in the open, close to the site. The cubes should be tested to determine the strength of the in situ material at appropriate age, depending on when the area is opened for use. The minimum strength should satisfy design requirements and achieve the desired strength before being opened to vehicles.

6.1.2.2 Fine concrete

6.1.2.2.1 Moist mix

A mixture of crushed rock as recommended in C.2.1, 5 mm all-in aggregate, and Portland/PFA cement or Portland blast furnace cement should be used. When compacted into a cube mould the mixture should satisfy the requirements given in C.2.1. The compaction of the sample for testing should be achieved using a mechanical hammer.

6.1.2.2.2 Plastic mix

A mixture of crushed rock as recommended in C.2.1, with Portland/PFA cement or Portland blast furnace cement should be used. When compacted, using hand-tamping techniques, into a cube mould the mixture should satisfy the requirements given in C.2.1.

6.1.2.2.3 Modified fine concrete

The mixes described in 6.1.2.2.1 and 6.1.2.2.2 may have chemicals added to them to enhance their properties, for example to give better adhesion or elasticity.

6.2 Joint filling material

6.2.1 Flexible construction

6.2.1.1 Sawn side setts (e.g. sandstone)

The aggregate should be in accordance with the grading of Table C.1.