SERIES 1100
KERBS, FOOTWAYS, CYCLEWAYS AND PAVED AREAS

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KERBS, FOOTWAYS, CYCLEWAYS AND PAVED AREAS

1100 (02/21) Kerbs, Footways, Cycleways and Paved Areas General

1 (02/21) This Series is part of the Specification for Highway Works. Whilst this Series is particularly relevant to the subject matter in its title it shall be read in conjunction with the general requirements in Series 000 and 100 and with all other Series relevant to the specification for the particular works to be undertaken.

2 (02/21) The term cycleways in this Series shall exclude those that are of integral construction with the vehicle carriageway. Cycle lanes are not included.

1101 (02/21) Precast Concrete and Natural Stone Kerbs, Channels, Edgings and Quadrants

1 (02/21) Precast concrete kerbs, channels, edgings and quadrants shall conform to BS EN 1340 and meet the minimum required performance/class in Table 11/1.

Table 11/1 (02/21) **Minimum Requirements for Precast Concrete Kerbs, Channels, Edgings and Quadrants**

Property	Minimum Required Performance/Class when tested in accordance with BS EN 1340
Bending Strength	Class 2
Slip/Skid Resistance	Unpolished skid resistance value (USRV) of 45
Durability (Bending Strength)	Class 2
Weathering Resistance	Class 3
Abrasion	Class 4

2 (02/21) Natural stone kerbs, channels, edgings and quadrants shall conform to BS EN 1343 with coarse textured surfaces and meet the minimum required performance/class in Table 11/2.

Table 11/2 (02/21) **Minimum Requirements for Natural Stone Kerbs, Channels, Edging and Quadrants**

Property	Minimum required performance/class for natural stone when tested in accordance with BS EN 1343
Flexural strength	Value from BS EN 1343
Slip/skid resistance	Unpolished skid resistance value (USRV) of 45
Durability (retained flexural strength)	98% after 56 cycles+
Weathering resistance (retained flexural strength)	98% after 25 cycles with de-icing salt
Water absorption (max)	0.3% or 0.2% as described in contract specific Appendix 11/1

3 (02/21) The dimensions and type designations of precast concrete kerbs, channels, edgings and quadrants shall be as detailed in contract specific Appendix 11/1.

4 (02/21) Precast concrete kerbs, channels, edgings and quadrants shall be laid and bedded in accordance with BS 7533-6 for raised kerbs and quadrants or in accordance with BS 7533-4 for flush kerbs and channels as detailed in contract specific Appendix 11/1, either:

(i) on a race of fresh concrete;

(ii) bedded onto a mortar race on top of an edge beam of hardened concrete class C25/30;

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(iii) onto a mortar bedding on a carriageway base; or,

(iv) suitably bedded on the surface layer of the road pavement

5 (02/21) All precast units laid on a mortar bed or bedded onto plastic concrete shall be backed with fresh concrete. The backing is shown in BS 7533-7 Annex D.

6 (02/21) Concrete for bedding on a race and backing shall be strength class C6/8 or standardised prescribed concrete ST1 to Clause 2602.

7 (02/21) Concrete for mortar bedding shall be C.4 Type A to BS 7533-7.

8 (02/21) Precast concrete kerbs, which are to be bonded to the pavement surface shall be bonded using a proprietary synthetic resin compound or with a proprietary modified strengthened mortar.

9 (02/21) Proprietary synthetic resin compounds and proprietary modified strengthened mortars shall be specifically designed for this purpose, resilient and compatible with the pavement materials.

10 (02/21) Proprietary bonding materials shall be used in accordance with the manufacturer's recommendations for this specific application.

11 (02/21) Precast concrete kerbs to be bonded to the pavement surface shall not be less than 100 mm in width at the base.

12 (02/21) The height of precast concrete kerbs to be bonded to the pavement surface shall not exceed their width.

13 (02/21) Precast concrete kerbs bonded to the pavement surface shall be bonded to the pavement surface over their full width.

14 (02/21) The back of precast concrete kerbs bonded to the pavement surface shall not be less than 100 mm from the unsupported pavement edge.

15 (02/21) Precast concrete kerbs bonded to the pavement surface shall be capable of withstanding a static push-off load of 10 kN/m applied parallel to the pavement surface at right angles to the kerb.

(02/21) **Joints**

16 (02/21) Joints shall be provided in kerbs, channels, edgings and backing, which are laid on or adjacent to concrete pavements to coincide with the pavement transverse contraction and expansion joints.

17 (02/21) Joints in kerbs, channels, edgings and backing coinciding with joints in concrete pavements shall be the same width as the joint sealing grooves of the pavement.

18 (02/21) Joints in kerbs, channels, edgings and backing coinciding with joints in concrete pavements shall be caulked and sealed as detailed in Clauses 1016 and 1017.

19 (02/21) Concrete foundations to kerbs, channels and edgings laid adjacent to a concrete pavement shall be provided with joint filler board complying with Clause 1015 placed vertically through the full extent of the concrete foundation at positions coinciding with the pavement joints.

20 (02/21) At expansion joints in bridge decks, the kerb joints shall be as detailed in contract specific Appendix 11/1.

(02/21) **Geometry**

21 (02/21) For curves of radius 15 m or less, kerbs of appropriate radius shall be used as per BS EN 1340.

(02/21) **Surface Levels and Horizontal Alignments**

22 (02/21) The surface level of units of kerb, channel, edging and quadrant shall not deviate from the design level ± 6 mm, nor the longitudinal surface regularity deviate more than 3 mm when checked with a 3 m straight edge.

23 (02/21) Horizontal alignment of kerbs shall meet the requirements of Clause 702.

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1102 (02/21) In-Situ Asphalt Kerbs

1 (02/21) The materials for, and making and placing of in-situ asphalt kerbs shall meet the requirements of BS 5931. In addition, in-situ asphalt kerbs shall be laid by a machine capable of producing a dense, smooth-surfaced kerb to true line and level.

2 (02/21) A bond coat shall be applied to the receiving surface prior to the kerb laying operation unless kerb formation is integral part of the creation of the asphalt surface and a hot joint is achieved.

3 (02/21) The bond coat shall meet the requirements of and be applied in accordance with Clause 920 including surface preparation.

4 (02/21) In situ tensile bond testing shall be carried out in accordance with Type 3 specimen protocol to BS EN 13596.

5 (02/21) The in-situ tensile bond between the kerb, the bond coat and the substrate shall not be less than 0.5 MPa when tested at 23°C during dry weather conditions.

6 (02/21) Kerbs shall be constructed to the dimensions detailed in contract specific Appendix 11/1 with a width of not less than 500 mm if applied to an existing cold asphalt surface.

(02/21) **Joints**

7 (02/21) Joints shall be provided in kerbs which are laid on or adjacent to concrete pavements to coincide with the pavement transverse contraction and expansion joints.

8 (02/21) Joints in kerbs coinciding with joints in concrete pavements shall be the same width as the joint sealing grooves of the pavement.

9 (02/21) All joints shall be caulked and sealed in compliance with Clauses 1016 and 1017.

10 (02/21) At expansion joints in bridge decks, the kerb joints shall be as detailed in contract specific Appendix 11/1.

(02/21) **Trial Length**

11 (02/21) Prior to commencing the installation process, a trial length of not less than 15 m of the type of the in-situ asphalt kerb detail shall be formed in accordance with BS 5931.

1103 (02/21) In-Situ Concrete Kerbs, Channels and Edge Details

1 (02/21) In-situ concrete kerbs, channels and edge details shall be formed in accordance with BS 5931.

2 (02/21) The machine used shall be capable of forming dense kerbs or surface water channels or edge details with regular sides, arises and chamfers, finished to a fine surface free from blow holes and dragging and constructed to the dimensions detailed in contract specific Appendix 11/1.

3 (02/21) The concrete shall be cured by one of the methods specified in Clause 1027.

4 (02/21) In-situ concrete kerbs, channels and edge details shall be designed to meet the requirements of Table 11/3.

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Table 11/3 (02/21) **Minimum Requirements for Test Specimens of In-Situ Concrete Kerbs, Channels and Edge Details**

Property	Minimum required performance/class when tested in accordance with BS EN 1340
Bending strength	Class 2
Slip/skid resistance	Unpolished skid resistance value (USRV) of 45
Durability (bending strength)	Class 2
Weathering resistance	Class 3
Abrasion	Class 4

(02/21) **Testing Requirements**

5 (02/21) For each 500 linear metres laid or 4 days production, a set of specimens prepared in accordance with BS EN 1340 from the supplied material shall be tested to meet the requirements of Table 11/3 by a laboratory accredited in accordance with Clause 105.

6 (02/21) Kerbs, channels and edge details shall be capable of withstanding a static push-off load of 10 kN/m applied parallel to the pavement surface at right angles to the kerb.

(02/21) **Surface Levels and Horizontal Alignments**

7 (02/21) The longitudinal surface regularity shall not deviate by more than 5 mm when measured with a 3 m straight edge.

8 (02/21) For kerbs, channels and edge details constructed before the adjacent road pavement surface, the surface level adjacent to the future road surface shall not deviate from the design level by more than ±5 mm.

9 (02/21) For kerbs, channels and edge details constructed after the adjacent road pavement surface, the surface level shall not deviate from the finished level of the adjacent pavement surface by more than +0-10 mm.

(02/21) **Joints**

10 (02/21) Joints shall be provided in in-situ concrete kerbs, channels, and edgings, which are laid on or adjacent to concrete pavements to coincide with the pavement transverse contraction and expansion joints.

11 (02/21) Joints in kerbs, channels and edgings coinciding with joints in concrete pavements shall be the same width as the joint sealing grooves of the pavement.

12 (02/21) Joints in kerbs, channels and edgings with joints in concrete pavements shall be caulked and sealed as detailed in Clauses 1016 and 1017.

13 (02/21) Concrete foundations to kerbs, channels and edgings laid adjacent to a concrete pavement shall be provided with joint filler board complying with Clause 1015 placed vertically through the full extent of the concrete foundation at positions coinciding with the pavement joints.

14 (02/21) At expansion joints in bridge decks, the kerb joints shall be as detailed in contract specific Appendix 11/1.

(02/21) **Trial length**

15 (02/21) Prior to commencing the installation process, a trial length of a minimum length of 15 m of the type of the in-situ concrete kerb, channel or edge detail shall be formed in accordance with BS 5931 to demonstrate compliance with the requirements.

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1104 (02/21) Footways, Cycleways and Paved Areas – Precast Concrete Flags and Natural Stone Slabs

(02/21) **Precast Concrete Flags**

1 (02/21) Precast concrete flags shall conform to BS EN 1339 and the requirements of Table 11/4.

Table 11/4 (02/21) **Minimum Requirements for Precast Concrete Flags**

Property	Minimum required performance/class when tested in accordance with BS EN 1339
Bending strength	Class 2
Slip resistance (for pedestrian use only)	Unpolished slip resistance value (USRV) of 40
Skid resistance (for vehicle use)	Unpolished skid resistance value (USRV) of 45
Durability (characteristic bending strength)	Class 2
Weathering resistance	Class 3
Abrasion resistance	Class 4

2 (02/21) Type designations and thicknesses shall be as detailed in contract specific Appendix 11/1.

(02/21) **Natural Stone Slabs**

3 (02/21) Natural stone slabs shall conform to BS EN 1341 and the requirements of Table 11/5

Table 11/5 (02/21) **Minimum Requirements for Natural Stone Slabs**

Property	Minimum required performance/class for natural stone slabs when tested in accordance with BS EN 1341
Flexural strength	Value from BS EN 1341 Annex
Slip/skid resistance	Unpolished skid resistance value (USRV) of 45
Durability (flexural strength)	98% retained after 56 cycles
Weathering resistance (flexural strength)	98% retained after 25 cycles with de-icing salts
Water absorption (maximum)	0.3%

4 (02/21) Type designations, thicknesses and performance class for flexural strength of natural stone slabs shall be as detailed in contract specific Appendix 11/1.

(02/21) **Installation Requirements**

5 (02/21) Precast concrete flags and natural stone slabs shall be laid in accordance with BS 7533-4 with a minimum mortar thickness of 25 mm.

6 (02/21) The foundation and base material shall be as detailed in contract specific Appendix 11/1.

7 (02/21) The laying course and jointing material type (e.g. sand or mortar) shall be as detailed in contract specific Appendix 11/1.

8 (02/21) The required cross falls and bond shall be as detailed in contract specific Appendix 11/1 with joints at right angles to the kerb.

9 (02/21) On circular work where the radius is 15 m or less, precast concrete flags and natural stone slabs shall be radially cut on both edges to the required line.

10 (02/21) Surface tolerances for footways, cycleways and paved areas surfaced with precast concrete flags and natural stone slabs shall meet those provided in Clause 1114.

11 (02/21) The surface regularity for footways, cycleways and paved areas surfaced with precast concrete flags and natural stone slabs shall meet those provided in Clause 1115.

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1105 (02/21) Footways, Cycleways and Paved Areas – Bituminous Mixtures

1 (02/21) Bituminous mixtures used in surface course and binder course for footways, cycleways and paved areas shall be constructed using the materials and layer thicknesses detailed in contract specific Appendix 11/1.

2 (02/21) The foundation shall be as detailed in contract specific Appendix 11/1.

3 (02/21) Bituminous mixtures shall be made in accordance with Series 900.

4 (02/21) Bituminous mixtures shall be laid and compacted in accordance with BS 594987.

5 (02/21) Compaction of bituminous mixtures shall meet the end product specification requirements specified in Clause 1113.

6 (02/21) Surface tolerances for bituminous surfaced footways, cycleways and paved areas shall meet those provided in Clause 1114.

8 (02/21) The surface regularity of bituminous surfaced footways, cycleways and paved areas shall meet those provided in Clause 1115.

1106 (02/21) Footways, Cycleways and Paved Areas – In-situ Concrete

1 (02/21) In-situ concrete for footways, cycleways and paved areas shall be constructed using the materials and layer thicknesses detailed in contract specific Appendix 11/1.

2 (02/21) In-situ concrete for footways, cycleways and paved areas shall be made, laid and cured in accordance with Series 1000.

3 (02/21) The foundation shall be as detailed in contract specific Appendix 11/1.

4 (02/21) The surface finish shall be as detailed in contract specific Appendix 11/1.

5 (02/21) Joint details shall be as detailed in contract specific Appendix 11/1.

6 (02/21) Maximum joint spacing shall be as detailed in contract specific Appendix 11/1.

7 (02/21) Surface tolerances for concrete surfaced footways, cycleways and paved areas shall meet those provided in Clause 1114.

8 (02/21) The surface regularity of concrete surfaced footways, cycleways and paved areas shall meet those provided in Clause 1115.

1107 (02/21) Footways, Cycleways and Paved Areas – Concrete Block Paving

1 (02/21) Precast concrete paving blocks shall be chamfered and conform to BS EN 1338, meeting required performance/class in Table 11/6.

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Table 11/6 (02/21) **Requirements for Concrete Block Paving**

Property	Minimum required performance/class when tested in accordance with BS EN 1338
Tensile splitting strength	The characteristic tensile splitting strength T shall not be less than 3.6 MPa. None of the individual results shall be less than 2.9 MPa, nor have a failure load less than 250 N/mm of splitting length
Slip/skid resistance	Unpolished skid resistance value (USRV) of 45
Durability – strength	Not less than the characteristic tensile splitting strength
Durability – slip/skid resistance	Not less than the initial slip/skid resistance
Abrasion resistance	Class 4
Weathering resistance	Class 3

2 (02/21) The shapes, dimensions and colours of precast concrete paving blocks shall be as detailed in contract specific Appendix 11/1.

3 (02/21) Precast concrete paving blocks shall be laid in accordance with BS 7533-3 or BS 7533-9 as applicable.

4 (02/21) The foundation and base layers shall be as detailed in contract specific Appendix 11/1.

5 (02/21) The laying course and jointing material type (e.g. sand or mortar) course shall be as detailed in contract specific Appendix 11/1.

6 (02/21) The layout of blocks and details at edges, chamber covers, gullies and other openings shall be as detailed in contract specific Appendix 11/1.

7 (02/21) Surface tolerances for footways, cycleways and paved areas surfaced with precast concrete paving blocks shall meet those provided in Clause 1114.

8 (02/21) The surface regularity for footways, cycleways and paved areas surfaced with precast concrete paving blocks shall meet those provided Clause 1115.

1108 (02/21) Footways, Cycleways and Paved Areas – Clay Pavers

1 (02/21) Clay pavers shall conform to BS EN 1344 with chamfers meeting the minimum required performance/class in Table 11/7.

Table 11/7 (02/21) **Requirements for Clay Pavers**

Property	Minimum required performance/class when tested in accordance with BS EN 1344
Transverse breaking load	Class T4
Slip/skid resistance	Unpolished skid resistance value (USRV) of 45
Freeze/thaw resistance	Class FP100 (freeze thaw resistant)
Abrasion resistance	Class A2

2 (02/21) The shapes, dimensions and colours of clay pavers shall be as detailed in contract specific Appendix 11/1.

3 (02/21) Clay pavers shall be laid in accordance with BS 7533-3 or BS 7533-9 as applicable, with tolerances as detailed in Clause 1114.

4 (02/21) The foundation and base layers shall be as detailed in contract specific Appendix 11/1.

5 (02/21) The laying course and jointing material type (e.g. sand or mortar) course shall be as detailed contract specific Appendix 11/1.

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6 (02/21) The layout of pavers and details at edges, chamber covers, gullies and other openings shall be as detailed in contract specific Appendix 11/1.

7 (02/21) Surface tolerances for footways, cycleways and paved areas surfaced with clay pavers shall meet those provided in Clause 1114.

8 (02/21) The surface regularity for footways, cycleways and paved areas surfaced with clay pavers shall meet those provided in Clause 1115

1109 (02/21) Grass Concrete Paving

1 (02/21) Grass concrete paving shall consist of a reinforced perforated in-situ concrete slab or a precast panel system in accordance with contract specific Appendix 11/1.

2 (02/21) Perforations shall be formed in in-situ grass concrete paving as detailed in contract specific Appendix 11/1.

3 (02/21) Precast concrete panels shall conform to the shape, dimensions and colour detailed in contract specific Appendix 11/1.

4 (02/21) The concrete used to form the precast panels shall have a minimum compressive strength class of C28/35 to BS 8500-1.

5 (02/21) The precast panels, when tested in accordance with BS EN 1339, shall have a minimum characteristic bending strength class of 3.

6 (02/21) The water absorption when tested in accordance with BS EN 1339 shall meet the requirements of class 2 of table 4.1.

7 (02/21) The layout of precast panels and details at edges, chamber covers, gullies and other openings shall be as detailed in contract specific Appendix 11/1.

8 (02/21) Grass concrete paving shall be laid on a bed of Type 1 unbound mixture conforming to Clause 803, laid in accordance with Clause 802, as detailed in contract specific Appendix 11/1.

9 (02/21) In addition, panels shall be bedded on a layer of sand conforming to 0/4 Fine Aggregate.

10 (02/21) Perforations shall be filled to 30mm below the top surface with soil meeting the requirements of sub-Clauses 3004.8 to 3004.11.

11 (02/21) The soil shall be seeded with grass meeting the requirements of Clause 3005.

1110 (02/21) Access Steps

1 (02/21) Access steps shall be provided when identified in contract specific Appendix 11/2 and where identified in contract specific Appendix 1/10 the Contractor shall undertake the design of the access steps or access steps elements.

2 (02/21) The access steps shall meet the requirements of BS EN ISO 14122-1 and BS EN ISO 14122-3, contract specific Appendix 11/2 and the performance requirements described hereafter.

3 (02/21) For the purpose of this Clause the term ‘access steps’ shall mean access steps provided for highway maintenance purposes to communication cabinets and other roadside items and includes landings and guardrails.

4 (02/21) For the purpose of this Clause the term ‘machinery’ referred to under BS EN ISO 14122-1 and BS EN ISO 14122-3 shall mean communication cabinets and other roadside items.

5 (02/21) The alignment and location for access steps shall enable the safe access to and egress from any communication cabinet and other roadside items.

6 (02/21) The steps shall be located, where possible, such that they will not require removal for access to services or supplies including motorway communication systems.

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(02/21) **Durability**

7 (02/21) The access steps shall achieve a serviceable life to the requirements of contract specific Appendix 11/2.

8 (02/21) The serviceable life shall be obtained without the requirement for any maintenance other than that resulting from accidental damage and routine maintenance.

(02/21) **Materials for Construction In-situ**

9 (02/21) Material for in-situ construction of access steps shall conform to BS EN ISO 14122-3 section 4 and requirements stated in contract specific Appendix 11/2.

10 (02/21) All components of the steps shall be resistant to theft, tampering and fire.

11 (02/21) Where two or more materials are used they shall be compatible and include measures to avoid galvanic action and avoid differential movement.

12 (02/21) Materials shall be able to resist corrosion provoked by the surrounding atmosphere and ground conditions to achieve its serviceable life.

13 (02/21) Materials listed in Table 11/8 shall meet the detailed requirements listed in Table 11/8.

Table 11/8 (02/21) **Access Step Materials**

Material	Requirements	
	General	Detailed
Paving slabs of flags	Clause 1104	-
Engineering bricks	BS EN 771-1	Class B Compressive strength ≥ 75 N/mm² Water absorption (% by mass) ≤ 7.0 Freeze/thaw resistance category F2 Active soluble salts content category S2
Mortar	BS EN 1996-2 BS EN 998-2	Durability designation M or S
Bedding sand	BS EN 12620	Designation 0/4 mm
Precast concrete edgings	Clause 1101	-
Concrete landings	Series 1700 BS 8500	Exposure class: reinforced – XC3 or XC4, XD3, XF2 unreinforced – XF2 Minimum strength class C25/30 or greater Maximum aggregate size – 20 mm
Ancillary concrete	Clause 2602	Bedding and backing to precast concrete edgings ST2 Backing to steps ST2
Fill material	Series 600, Table 6/1	Class 1 general fill
Galvanised steel guardrails	BS EN 10255	-

(02/21) **Modular and Preformed Steps**

14 (02/21) Preformed concrete steps shall comply to BS EN 14843.

15 (02/21) Preformed stairs shall conform to BS 4592.

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(02/21) **Particular Access Step Criteria**

16 (02/21) Unless otherwise stated in contract specific Appendix 11/2 the design of access steps shall conform to the requirements of Table 11/9.

Table 11/9 (02/21) **Access Step Criteria**

Item	Standard	Requirement
Steps		Minimum clear width 800mm
Steps		Maximum protrusion above ground: Step rise height + 50mm
Steps	BS EN ISO 14122-3	At least one guardrail unless the width of the steps is greater or equal to 1200 mm when two guardrails are required
Steps	BS EN ISO 14122-3	A rise and going which achieves the safety requirements formulae of the standard
Steps		Maximum pitch 45 degrees
Steps		A change in horizontal direction of not less than 30 degrees after a the lesser of a maximum of 16 steps or a climbing height of 6 m, utilising a landing
Steps		Step goings and landings shall be solid
Drainage		No areas of standing water on the steps
Risers		Open risers not permitted
Knee rails		Required on all landings and steps

(02/21) **Environment Requirements**

17 (02/21) The access steps shall conform to the environmental requirements stated in contract specific Appendix 11/2.

18 (02/21) The access steps shall have a non-intrusive appearance and be suitable for the location.

19 (02/21) The alignment of the steps shall minimise the impact on the environmental assets in the soft estate.

1111 (02/21) Installation of Unbound and Hydraulically Bound Mixtures

1 (02/21) Installation of unbound and hydraulically bound mixtures for footways, cycleways and paved areas shall be in accordance with Series 800.

1112 (02/21) Not Used

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1113 (02/21) End Product Specification for Compaction of Bituminous Layers

1 (02/21) The end product compaction of the bituminous surface layers shall be determined by the air voids content to satisfy the requirements in Table 11/10.

Table 11/10 (02/21) **Air Voids Content Limits**

Material	Average of 6 density gauge consecutive readings	Mean of core pairs maximum in-situ air void content
Dense asphalt concrete binder course and 14 mm close graded asphalt concrete surface course used as a binder course	Maximum 7%	Maximum 9%
Other asphalt materials	Maximum 6%	Maximum 8%

2 (02/21) Air voids content shall be monitored by a correlated density gauge operated in accordance with BS 594987 at 20 m spacings.

3 (02/21) The average in-situ void content calculated from any six consecutive gauge readings shall not exceed the values in Table 11/10.

4 (02/21) For the material from each mixing plant, one pair of 100 mm nominal diameter cores shall be taken from every 500 linear metres laid and the void content determined in accordance with sub-Clause 6.

5 (02/21) The average in-situ void content of a pair of cores shall not exceed the values in Table 11/10.

6 (02/21) The in-situ air voids content shall be calculated in accordance with BS EN 12697-8.

7 (02/21) When the material contains applied chippings the air voids content shall be calculated from the whole layer including chippings.

8 (02/21) The maximum density ρmax shall be determined to BS EN 12697-5 using Procedure A in water using sampled material or the core pairs.

9 (02/21) The bulk density ρ shall be determined to BS EN 12697-6 using the procedure specified by BS EN 13108-20 for the material type.

10 (02/21) Where these requirements for the air voids content are not met a minimum length of 15 m for the full depth and width, of the defective material shall be removed and replaced with fresh material laid and compacted to this specification.

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1114 (02/21) Horizontal Alignments and Surface Levels of Pavement Courses and Formation

1 (02/21) The design levels of pavement courses shall be calculated from the vertical profile and crossfalls detailed in contract specific Appendix 11/1.

2 (02/21) The level of any point on the constructed surface of the pavement courses shall be the design level subject to the appropriate tolerances stated in Table 11/11.

3 (02/21) Compliance with sub-Clause 1 of this Clause shall be checked by taking measurements of the surface levels of all courses on a grid of points located as detailed in Appendix 11/1.

Table 11/11 (02/21) **Construction Tolerances for Footways, Cycleways and Paved Areas**

Parameter	Tolerance
General tolerance requirements relevant to all paved area types	
Horizontal alignment accuracy	Requirements for horizontal alignments including edge strips shall be as Clause 702.
Kerbs and edging strips (vertical tolerance) including combined kerb and drainage systems	Requirements as Clause 1101.
Formation level	Subgrade surface within +10 mm to -30 mm of design level.
Subbase thickness	Not more than 10 mm less than specified in contract specific Appendix 11/1.
Surface course level tolerance	Within +5 mm or -0 mm of the adjacent kerb, edging strip or any ironwork.
Specific tolerance requirements for bituminous paved area types	
Subbase surface level	Where the footway, cycleway or paved area is surfaced in bituminous material the compacted subbase surface shall be within +10 mm and –20 mm of its design level. Where segmental surfacing or in-situ concrete is used the subbase shall be within ± 10 mm of its design level.
Binder course	The compacted binder course level shall be within +/-10 mm of the design level.
Bituminous thickness	The total thickness of bituminous material shall not be more than 5 mm less than specified.
Specific tolerance requirements for block/slab paved area types	
Tolerance requirements other than those above shall be as detailed in the British Standard referenced in the relevant Clause above.	

4 (02/21) For footways, cycleways and paved areas excluding those with flexible surfacing, the maximum allowable difference between the surface and the underside of a 1 m straight edge and wedge complying with BS 8420 when placed parallel with, or perpendicular to, the footway/cycleway shall be 3 mm.

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1115 (02/21) Surface Regularity of Bituminous Surfaced Footways, Cycleways and Paved Areas

1 (02/21) The longitudinal regularity of the completed surface of the footway/cycleway surface course shall meet the limits stated in Table 11/12.

Table 11/12 (02/21) **Maximum Permitted Number of Surface Irregularities**

Irregularity Limits	4 mm		7 mm	
Length (m)	300	75	300	75
Permitted number of surface irregularities	60	27	6	3
Additional requirement	No more than 5 irregularities shall be permitted in any 5 m			
Additional requirement	No irregularity exceeding 10 mm			

2 (02/21) Compliance with Table 11/12 shall be checked by a rolling straight edge along any line or lines parallel to the edge of the footway/cycleway on sections of 300 m at regular intervals as stated in contract specific Appendix 11/1.

3 (02/21) Sections shorter than 300 m forming part of a longer pavement shall be assessed using the number of irregularities for a 300 m length pro-rata to the nearest whole number.

4 (02/21) Where the total length of pavement is less than 300 m, the measurements shall be taken on 75 m lengths.

5 (02/21) A straight-edge 3 metres long, shall be used to check longitudinal surface regularity in the following cases only:

(i) for lengths of less than 75 m; and

(ii) where the use of the rolling straight-edge or equivalent apparatus is impracticable.

6 (02/21) The maximum allowable difference between the surface and the underside of the straight edge, when placed parallel to, the footway/cycleway shall be 3 mm.

7 (02/21) The footway/cycleway surface shall be checked for transverse surface regularity using a 1 m straight edge and wedge complying with BS 8420 placed at right angles to the centre line.

8 (02/21) The maximum transverse deviation of the footway/cycleway surface shall be 3 mm.

1116 (02/21) Rectification of Bituminous Surfaces of Footways, Cycleways or Paved Areas

1 (02/21) Where bituminous surfaced footways, cycleways, or paved areas do not comply with the Specification for regularity, surface tolerance, thickness, material property or compaction, the full extent of the area which does not comply with the Specification shall be removed and replaced with fresh material laid and compacted in accordance with the Specification.

2 (02/21) The area rectified shall be the full width of the footway/cycleway, and at least 5 m long if binder course, or 15 m if surface course.

3 (02/21) Where the number of surface irregularities exceeds the limits in Table 11/12, the area to be rectified shall be a minimum of 75 m long and the full width of the footway/cycleway.

1117 (02/21) Footways, Cycleways and Paved Areas – Permeable Block Paving

1 (02/21) Permeable block paving shall be constructed with concrete block paving complying with the requirements of Clause 1107 or clay pavers complying with the requirements of Clause 1108.

2 (02/21) Permeable block paving shall be laid in accordance with BS 7533-3.

3 (02/21) The laying course and foundation layers shall be as detailed in contract specific Appendix 11/1.

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4 (02/21) The layout of pavers and details at edges, chamber covers, gullies and other openings shall be as detailed in contract specific Appendix 11/1.

1118 (02/21) Polymeric Kerbs, Islands and Lane Separators

1 (02/21) Polymeric kerbs, islands and lane separators shall be manufactured from recycled plastomeric or elastomeric materials processed with functional additives and the Contractor shall supply to the Overseeing Organisation the results of testing carried out at production stage by a laboratory meeting the requirements of Clause 105. The testing shall demonstrate that the kerbs, islands and/or lane separators meet the specification requirements.

2 (02/21) The type designations of polymeric kerbs, islands and lane separators shall meet the description in contract specific Appendix 11/1.

3 (02/21) The product shall meet the performance requirements in Table 11/13.

Table 11/13 (02/21) **Minimum Requirements for Polymeric Kerbs, Islands and Lane Separators**

Property	Test method	Minimum required performance/class
Bending Strength	BS EN 1340	2.8 MPa
Slip/skid resistance	BS EN 1340	Unpolished skid resistance value (USRV) of 45
Abrasion	BS EN 1340	Class 4
Resistance to impact damage See Note 1	BS EN 1317-2	Acceleration severity index (ASI) ≤ 1.9,
Weathering resistance – resistance to UV light	BS EN 14836	Maintain the above properties after test specimens are subjected to artificial weathering. See Note 2.
Weathering resistance – resistance to freeze-thaw with de-icing salts	BS EN 1340	Class 3

Note 1 Resistance to impact damage from heavy goods vehicles at angles and speed to direction of traffic as detailed in Table 1 of BS EN 1317-2. Damage can include scuffing, gouging and deep penetration.

Note 2 The following properties are to be determined after the artificial weathering: breaking strength; abrasion; and slip/skid resistance.

4 (02/21) Kerbs shall not be less than 100 mm in width at the base.

5 (02/21) The height of the kerbs above the road surface shall not exceed their width.

6 (02/21) Lane separators shall not be less than 500 mm in width at the base.

7 (02/21) The height of lane separators shall not exceed their width.

(02/21) **Installation**

8 (02/21) Polymeric kerbs, islands and lane separators shall be secured to the road surface in accordance with the manufacture's installation instructions.

9 (02/21) The materials used for Polymeric kerbs, islands and lane separators shall withstand temperatures of 60°C for a period of 24 hours, without incurring damage to their integrity and functionality.

10 (02/21) The fixing system shall resist impacts from 44 t vehicles at impact angles between 10° to 90° at 80km/h without the kerb being displaced from the surface.

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1119 (02/21) Footways, Cycleways and Paved Areas – Natural Stone Setts

1 (02/21) Natural stone setts shall conform to BS EN 1342 with chamfers and meeting the performance/class in Table 11/14.

Table 11/14 (02/21) **Minimum Requirements for Natural Stone Setts**

Property	Minimum required performance/class for natural stone setts when tested in accordance with BS EN 1342
Compressive strength	130 MPa in accordance with BS EN 1926
Slip/skid resistance	Unpolished skid resistance value (USRV) of 45
Durability (retained compressive strength)	98% after 56 cycles
Weathering resistance (retained compressive strength)	98% after 25 cycles with de-icing salts
Water absorption	0.3%

2 (02/21) The shapes, dimensions and colours of natural stone setts shall be as detailed in contract specific Appendix 11/1.

3 (02/21) The foundation and base layers shall be as detailed in contract specific Appendix 11/1.

4 (02/21) The laying and jointing of natural stone setts in either bound or unbound construction shall be in accordance with BS 7533-7.

5 (02/21) Natural stone setts, in either bound or unbound construction, shall be laid in accordance with BS 7533-7 as detailed in contract specific Appendix 11/1.

6 (02/21) The layout of units and details at edges, chamber covers, gullies and other openings shall be as detailed in contract specific Appendix 11/1.

7 (02/21) Surface tolerances for footways, cycleways and paved areas surfaced with natural stone shall meet those provided in Clause 1114.

8 (02/21) The surface regularity for footways, cycleways and paved areas surfaced with natural stone shall meet those provided in Clause 1115.

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