TRUNK ROAD INFRASTRUCTURE TECHNICAL SPECIFICATION No.07

SEGMENTAL PAVING

ACT Government
Territory and Municipal Services

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PREFACE

The Australian Capital Territory has adopted the Austroads Guides for provision and management of road and transport infrastructure. The Territory and Municipal Services Directorate has issued a revised series of documents to reflect this development in infrastructure standards and specifications for practice in the ACT.

This present document is part of the ACT Trunk Road Infrastructure Technical Specifications (TRITS) series spanning the broad scope of road infrastructure development and management in the ACT:

- TRITS 01 – Roadworks
- TRITS 02 – Earthworks
- TRITS 03 – Underground Services
- TRITS 04 – Flexible Pavements
- TRITS 05 – Rigid Pavements
- TRITS 06 – Kerbs and Footpaths
- TRITS 07 – Segmental Paving
- TRITS 08 – Incidental Works
- TRITS 09 – Landscape
- TRITS 10 – Bridges and Related Structures
- TRITS 11 – Pavement Marking
- TRITS 12 – Street Lighting
- TRITS 13 – Traffic Signals
- TRITS 14 – Road Signs
- TRITS 15 – Road Furniture

This ACT Trunk Road Infrastructure Technical Specification No. 07 - SEGMENTAL PAVING prescribes the detailed requirements for materials and installation of segmental paving in the ACT. It is issued to clarify any exceptions or additional requirements for implementation in the ACT, and to identify relevant complementary documents.

In many areas of road infrastructure construction and management, the ACT has adopted the relevant specifications of the NSW Roads and Maritime Services (formerly RTA NSW). The relevant RMS documents are identified and referenced in these ACT Trunk Road Infrastructure Technical Specifications.

The works must be carried out according to the referenced RMS specifications with the exception of items detailed in the Technical Exception Clauses.

Where any differences in practice exist between the RMS Specifications and this Trunk Road Infrastructure Technical Specification, the latter will prevail.

The ACT Government replaces RMS where applicable as the Road Authority. ACT replaces NSW where applicable as the place where the work is conducted. Equivalent ACT authorised organisations and legislation replace NSW's where applicable. Roads ACT's athorised representative is equivalent to RMS's principal.

CONTENTS

1 INTRODUCTION

The works covered by this Specification comprise the construction of segmental pavements for pedestrian and vehicular traffic using clay and concrete paving units.

Segmental Paving shall include precast concrete paving, tactile paving, porphyry stone paving and porphyry setts paving.

For the purpose of this Specification, the following definitions apply:

Net Area: The plan area of the top surface of the paving unit bounded by the chamfer or radius.

Concrete paving units, pavers or blocks are units of not more than 0.10 square metres in gross plan area, manufactured from concrete, with plain or dentated sides, with top and bottom faces parallel and with or without chamfered edges.

Concrete paving units are identified by shape as being one of the following types:

(i) Shape Type A

Dentated chamfered units which key into each other on four sides, are capable of being laid in herringbone bond, and by their plan geometry, when interlocked, resist the spread of joints parallel to both the longitudinal and transverse axes of the units.

(ii) Shape Type B

Dentated units which key into each other on two sides, are not (usually) laid in herringbone bond, and by their plan geometry, when keyed together, resist the spread of joints parallel to the longitudinal axes of the units and rely on their dimensional accuracy and accuracy of laying to interlock on the other faces.

(iii) Shape Type C

Units which do not key together and which rely on their dimensional accuracy and accuracy of laying to develop interlock.

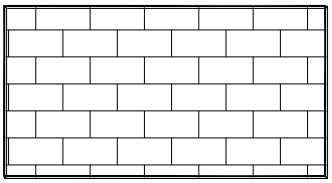
Clay paving units, pavers or blocks are manufactured from clay, shale or argillaceous materials which may be mixed with additives.

Clay paving units, pavers or blocks may have square, bevelled (chamfered), rounded or rumbled edges. They are generally rectangular in shape, with the length twice the width, plus 2mm.

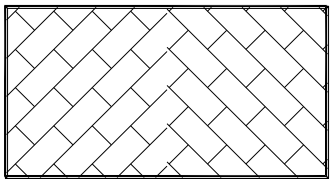
Clay pavers are classified as either Class 1, 2, 3 or 4 according to their intended application, with increasing performance requirements (and thickness) from Class 1 to Class 4.

Laying patterns of pavers are identified as being either Herringbone, Basket-weave, or Stretcher as shown following. Each of these may be laid at either 90o or 45o to the line of edge restraints. A variation of Stretcher is the Zig Zag Running Bond, also shown in Figure 12.1.

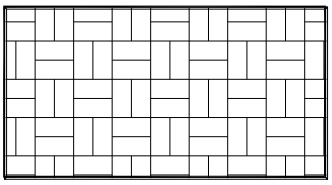
Figure 1-1



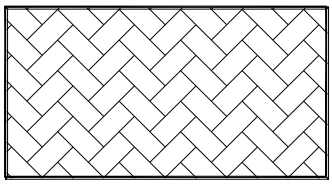
Stretcher



Zig Zag Running Bond



Herringbone



Basketweave

2 REFERENCE DOCUMENTS

2.1 LEGISLATIVE DOCUMENTS

2.2 GUIDELINES

T44 Concrete Masonry Association of Australia : Concrete Segmental Pavements - Guide to Specifying

Paver Note 1 Clay Brick and Paver Institute: Specifying and Laying Clay Pavers.

2.3 RELATED TECHNICAL SPECIFICATIONS

2.3.1 Australian Standards

AS 1428.2 Design for access and mobility – Enhanced additional requirements – Buildings and facilities.
AS 1428.4 Design for access and mobility - Tactile ground surface indicators for the orientation of people with vision impairment.
AS 1478.1 Chemical admixtures for concrete, mortar and grout - Admixtures for concrete
AS 1672.1 Limes and limestones - Limes for building
AS 2349 Method of sampling portland and blended cements
AS 2350 Methods of testing portland and blended cements
AS 2758.1 Aggregates and rock for engineering purposes - Concrete aggregates
AS 3582.1 Supplementary cementitious materials for use with portland and blended cement - Fly ash
AS 3583.1 Methods of test for supplementary cementitious materials for use with portland and blended cement. Determiniation of fineness by the 45 micrometre sieve.
AS 3583.2 Methods of test for supplementary cementitious materials for use with portland and blended cement. Determination of moisture content.
AS 3583.3 Methods of test for supplementary cementitious materials for use with portland and blended cement. Determination of loss on ignition.
AS 3583.8 Methods of test for supplementary cementitious materials for use with portland and blended cement. Determination of sulfuric anhydride content.
AS 3972 Portland and Blended Cement
AS 3661.1 Slip resistance of pedestrian surfaces - Requirements
AS 4455 Masonry units and segmental pavers
AS 4456.1 Masonry units and segmental pavers - Methods of test - Sampling for compliance testing.

AS 4456.2 Masonry units and segmental pavers - Methods of test - Assessment of mean and standard deviation
AS 4456.3 Masonry units and segmental pavers - Methods of test - Determining dimensions
AS 4456.4 Masonry units and segmental pavers - Methods of test - Determining compressive strength of masonary units.
AS 4456.5 Masonry units and segmental pavers - Methods of test - Determining breaking load of segmental paving units
AS 4456.9 Masonry units and segmental pavers - Methods of test - Determining abrasion resistance.
AS 4456.10 Masonry units and segmental pavers - Methods of test - Determining resistance to salt attack
AS 4456.13 Masonry units and segmental pavers - Methods of test. Determining pitting due to lime particles.
AS 3583.8 Methods of test for supplementary cementitious materials for use with portland and blended cement. Determination of sulfuric anhydride content.
AS 3972 Portland and Blended Cement
AS 3661.1 Slip resistance of pedestrian surfaces - Requirements
AS 4455 Masonry units and segmental pavers
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AS 4456.9 Masonry units and segmental pavers - Methods of test - Determining abrasion resistance.
AS 4456.10 Masonry units and segmental pavers - Methods of test - Determining resistance to salt attack
AS 4456.13 Masonry units and segmental pavers - Methods of test. Determining pitting due to lime particles.

2.3.2 Other Standards

BS EN 12878 British Standard: Pigments for the colouring of building materials based on cement and/or lime. Specifications and methods of test

3 TESTING

A Testing Authority shall be employed by the Contractor to carry out all testing. The Authority shall hold a current NATA (National Association of Testing Authorities) Registration for the relevant tests, and a copy of results shall be forwarded to the Superintendent without delay.

4 MATERIALS

4.1 FIRED CLAY PAVING UNITS

Clay paving units shall be manufactured from clay, shale or other argillaceous materials which may be mixed with additives. They shall be solid units, pressed or extruded, cut or moulded then dried and fired to achieve the specified properties, dimensions and edge treatment. Clay segmental pavers shall comply with the requirements of AS 4455.

Recycled pavers may be used , provided they meet all the criteria set out in this section.

(i) Sampling

Sampling for clay paving units shall be carried out in accordance with AS 4456.1. For the purpose of sampling in accordance with AS 4456.1 a lot is defined as maximum 1000$m^2$of paving in gross plan area for each paver type and/or manufacturer.

(ii) Samples

Submit two samples of each different type and/or source of paving for approval by the Superintendent prior to ordering. Samples to be indicative of the paver to be supplied for each different type of paving.

(iii) Dimensional Tolerances

Dimensional tolerances shall be in accordance with Table 4-1 for each class of pavement.

(iv) Breaking Load

When measured in accordance with ASNZS 4456.5, the characteristic breaking load of segmental paving units shall be as shown in Table 4-1. Slip/Skid Resistance.

(v) Slip/Skid Resistance

Slip resistance shall be as shown in Table 4-1 and determined in accordance with AS/NZS 3661.1.

(vi) Resistance to Salt Attack

Paving units shall have a durability class of Exposure as defined in AS 4456.10.

(vii) Pitting Due to Lime

When tested in accordance with AS4456.13, the liability of clay paving units to pitting due to the expansion of lime particles shall not be worse than Moderate as defined by AS4456.13.

(viii) Abrasion Resistance

Abrasion resistance shall be as shown in Table 4-1 and determined in accordance with AS 4456.9.

(ix) Surface Coatings

Surface coatings shall not be applied to clay paving units without the prior written approval of the Superintendent.

(x) Appearance

Clay paving units shall be sound, firm, dense, free of distortion, dimensionally stable and consistent, with a smooth upper surface and with unrumbled units having unbroken arrises, chamfered or radiused as specified evenly all round. Units which exhibit cracking, bloating or are considered by the Superintendent to be excessively porous, brittle or friable shall be liable to rejection. Paving unit colours shall fall within the colour range of the approved sample units over the full area of the pavement.

(xi) Laying Pattern

Unless otherwise specified, clay pavers for road pavements shall be Class 4, minimum 65mm nominal thickness, and placed in herringbone laying pattern.

4.2 CONCRETE PAVING UNITS

Except as modified by this Section of the Specification, the materials and manufacture of concrete paving units shall comply with the requirements of TRITS 10 – Major Concrete Works and AS 4455.

Recycled pavers may be used, provided they meet all the criteria set out in this section.

(i) Cement

Cement shall comply with AS 3972. Colour shall be added to achieve the desired paver colour.

(ii) Lime

Lime shall comply with AS 1672.1.

(iii) Fly Ash

Fly ash shall comply with and used in accordance with AS 3582.1.

(iv) Pigments

Pigments shall comply with British Standards BS EN 12878.

(v) Aggregate

Aggregate shall comply with AS 2758.1.

(vi) Water

Water shall be free from injurious quantities of material harmful to concrete.

(vii) Admixtures

Any chemical admixtures used in the concrete shall comply with AS 1478.1.

(viii) Tolerances on Dimensions

Tolerances on dimension of concrete paving units shall be as shown in Table 4-1. Dimensions and assessment of mean and standard deviation shall be determined in accordance with AS 4456.2 and AS 4456.3.

(ix) Slip/Skid Resistance

Slip resistance shall be as shown in Table 4-1 and determined in accordance with AS 3661.1.

(x) Abrasion Resistance

Abrasion resistance shall be as shown in Table 4-1 and determined in accordance with AS 4456.9.

(xi) Net Area

The net area of any paving unit shall not be less than 75% of the gross plan area.

(xii) Flexural Strength

When measured in accordance with AS 4456.5, the characteristic flexural strength of segmental paving units shall be as shown in Table 4-1.

(xiii) Breaking Load

When measured in accordance with AS 4456.5, the characteristic breaking load of segmental paving units shall be as shown in Table 4-1.

(xiv) Sampling

Sampling for compliance testing shall be in accordance with AS 4456.1. For the purpose of sampling in accordance with AS 4456.1 a lot is defined as maximum 1000m2of paving in gross plan area for each paver type and/or manufacturer.

(xv) Appearance

Concrete paving units shall be sound, firm, dense, dimensionally stable and consistent, with a smooth unblemished upper surface and with unrumbled units having unbroken arrises, chamfered or radiused as specified evenly all round. Units which exhibit cracking, "boniness" or are considered by the Superintendent to be excessively porous, brittle or friable shall be liable to rejection. Paving unit colours shall be uniform and shall match that of approved sample units over the full area of the pavement.

(xvi) Production

Paving units shall be mechanically vibrated in separate moulds and retained within the mould for 24hrs before stripping. Concrete shall be constantly cured.

(xvii) Samples

Submit two samples of each different type and source of paving for approval by the Superintendent prior to ordering. Samples to be indicative of the paver to be supplied for each different type of paving.

(xviii) Laying Pattern

Unless otherwise specified, concrete pavers for road pavements shall be placed in a herringbone laying pattern and shall be in accordance with the requirements for the appropriate road application as shown in Table 12.1.

(xix) Tactile Indicator Tiles

Tactile indicator tiles are to be in accordance with AS 1428.2 and AS 1428.4. Tiles are to be precast concrete slightly lighter in colour than the main paving tiles material but with required raised dot and ridge patterns.

Table 4-1

Application	Characteristic breaking load [iii] (kN)	Characteristic flexural strength[3] (MPa)	Min. Thickness (mm)	Shape (type)	Dimensional deviations (Category from AS 4455)	Slip resistance (co-efficient of friction)	Abrasion resistance (mean abrasion index)
Residential Driveways							
Residential	5	2	No limit	Any	DPA1 or DPB1	0.4	7
Industrial [i]	5	3	No limit	Any	DPA1 or DPB1	0.4	7
Public Footpaths							
Low Volume	3	3	No limit	Any	DPB2	0.4	5
High Volume [i]	5	3	No limit	Any	DPB2	0.4	3.5
Roads - Traffic Categories (TC)							
Minor TC 2d ($\leq 10^5$ ESA)	5	3	80	Any	DPB2	0.4	5
Collector TC 2c ($>10^5$ ESA, $\leq 10^6$ ESA)	5	3	80	A	DPB2	0.4	5
Industrial Pavements[ii]	10	4	80	A	DPB3	0.4	7

Notes on Table 12.1

(i) Capable of taking occasional 8.2t axle loads.

(ii) The resultant joint width is a combination of paver dimensional deviation and laying procedures.

(iii) At 28 days for Concrete paving units

Hold Point 12.1	
Process Held:	Commencement of paver placement.
Submission Details:	At least five (5) working days prior to ordering segmental paving units the Contractor shall submit two samples of each paver type and test results for each paver type stating source of paver and demonstrating conformance to Table 4-1.
Release of Hold Point:	The Superintendent will examine each paver type and associated documentation prior to authorising the release of the Hold Point.

4.2.1 Granular Base and Subbase

Base and subbase materials shall comply with the requirements of TRITS 04 – Flexible Pavements.

4.2.2 Bedding Sand

Bedding material shall be clean washed sand of a grading complying with the limits prescribed in Table 4-2.

Table 4-2

AS Sieve Size (mm)	Percentage Passing by Mass
9.500	100
4.750	95-100
2.360	80-100
1.180	50-85
0.600	25-60
0.300	10-30
0.150	5-15
0.075	0-10

Bedding sand shall be non plastic and shall be free of deleterious quantities of soluble salts and other contaminants which may cause, or contribute to efflorescence.

Bedding sand shall be of uniform moisture content when spread. It shall be covered when stored on site to protect it from rain penetration.

Where cement stabilised bedding is specified, 4% to 6% of cement by volume is to be thoroughly and evenly mixed in with the bedding sand prior to spreading. The volume of mixed material shall not exceed that required for the area of paving units to be laid in a period of 4 hours. Adequate precautions shall be taken to protect the sand cement mixture from adverse weather conditions.

4.2.3 Jointing Sand

Material for filling unbound joints shall be sand of a grading complying with the limits given in Table 4-3.

Table 4-3

AS Sieve Size (mm)	Percentage Passing by Mass
2.36	100
1.18	90-100
0.60	60-90
0.30	30-60
0.15	15-30
0.075	5-10

Jointing sand shall be free of deleterious quantities of soluble salts and other contaminants which would cause surface staining.

Jointing sand shall be dry when spread. It shall be covered when stored on site to protect it from rain penetration.

Sand used for bedding is not suitable for joint filling.

4.2.4 Expansion Jointing

Expansion joint material shall be 10mm thick self expanding cork filler complying with the requirements specified in TRITS 05 unless specified otherwise. The jointing material shall be of a width equal to the paving units against which it is to be laid.

4.2.5 Bedding Mortar for Pavers

Bedding mortar shall be properly mixed mixture of 1 part cement and 3 parts sand with sufficient water for total hydration of the cement to occur. A mixture of washed sand and fatty sand or fatty sand only may be used depending on the laying technique proposed. If only washed sand is proposed to be used the Contractor shall take other precautions to ensure adhesion of the pavers to the slab. The proposed mortar mixture (and details of the laying technique) shall be submitted to the Superintendent for approval at least 14 days prior to commencement of laying of pavers.

The volume of mixed mortar bedding shall not exceed that required for the area of paving units to be laid in a period of 2 hours. Adequate precautions shall be taken to protect the mortar from adverse weather conditions.

5 EARTHWORKS AND SUBGRADE PREPARATION

Earthworks and subgrade preparation shall be carried out in accordance with the requirements of Section 2 of this Specification.

Where tree root control measures have been specified, spread approved root control granules containing dichlobenil at the rate of lkg per cubic metre of soil. Mechanically till the subgrade and chemical to provide an intimate mixture to a minimum depth of 100mm.

6 BASE AND SUBBASE LAYERS

Base and subbase pavement layers shall be constructed in accordance with the requirements of Section 4 of this Specification, and tolerances on levels shall be such that the finished pavement complies with the requirements of Section 8.1.

Lean mix concrete base shall be constructed in accordance with the requirements of TRITS 05 – Rigid Pavements.

7 BEDDING

7.1 PREPARATION OF BEDDING SAND

Sand shall have a uniform moisture content in the range 4% - 8% when spread. The sand bedding shall be spread loose in a uniform layer. The depth shall be determined by on site trials prior to spreading and shall be such that after compaction, a thickness of 25mm, ± 5mm is achieved. Under no circumstances shall bedding be used for levelling.

7.2 SCREEDING

The spread sand shall be carefully maintained in a loose condition and protected against pre compaction from any cause, including rain, both prior to and following screeding. Any pre compacted sand or screeded sand left overnight shall be removed and replaced.

For the manual placing of paving units, the bedding sand shall be maintained at a uniform loose density. For mechanised laying, the bedding sand shall be uniformly and firmly, but not fully, compacted.

Following spreading, the sand shall be lightly screeded to the pre determined loose depth only slightly ahead of the laying of the paving units. Under no circumstances shall sand be screeded in advance of laying to an extent to which paving will not be completed on that day.

Any depressions in the screeding sand exceeding 5mm shall be loosened, raked and rescreeded before laying pavers.

Hold Point 12.2

Process Held:	Commencement of bedding sand placement .
Submission Details:	At least one (1) working day prior to proposed placement of bedding sand the Contractor shall submit all test / survey results demonstrating conformance of material properties of base , subbase and sand, and compaction and level for baseand subase layers.
Release of Hold Point:	The Superintendent will consider the submitted documents and may carry out surveillance and audit, prior to authorising the release of the Hold Point.

7.3 LAYING AND FINISHING

Install pavers on the screeded sand bed in the location, pattern and detail as indicated on the drawings. Neatly diamond saw cut pavers as necessary adjacent to edges, lights, manholes etc. Maintain constant bond with joint widths typically 2mm unless noted otherwisePaving units shall be laid with 2mm to 5mm gaps between adjacent units such that jointing sand will readily penetrate to the full depth of the paving units. All joints shall be correctly aligned and no contact shall exist between adjacent paving units. The pavers shall be mixed between various pallets to ensure that any colour variation from one pallet of pavers to the next is evenly distributed over the entire paved area.

The first row of units shall abut against an edge restraint with the required joint gap, and shall be laid at a suitable angle to the edge restraint to achieve the required visual orientation of paving units in the completed pavement.

In each row, all full units shall be laid first.

Closure units shall be cut and fitted subsequently. Such closure units shall consist of not less than 25% of a full unit.

All units are to be cut using a power diamond saw unless prior written approval is obtained from the Superintendent for the use of other means of cutting.

Infill spaces between 25mm and 50mm wide with 32MPa concrete with a maximum aggregate size of 10mm. Dry packed mortar may be used to infill smaller spaces. In all cases, the infill is to extend for the full depth of the adjoining paving units. Concrete and mortar shall be coloured to match the paving units, with due allowance being made for the effects of weathering.

Access chambers, drainage gullies and similar penetrations through the pavement shall be finished against the paving with a concrete surround or apron designed to suit and fit the laying pattern, otherwise complying with the requirements for edge restraints.

Where pavers are placed over an isolation, contraction or expansion joint in an underlying concrete pavement, a joint is to be provided in the pavers. The joint shall consist of 10mm thick preformed jointing material of bituminous fibreboard.

On completion of subsequent bedding compaction and joint filling operations, all joints shall have widths within the range 2-4mm.

Construction traffic on paving prior to mechanical compaction shall be limited to foot or barrow traffic using overlay boards to prevent disturbance to underlying units.

After laying, mechanically compact the area using a high frequency, low amplitude flat plate compactor having a minimum plate area of 0.25m2 and an energy output sufficient to compact the bedding sand beneath the paving units. The compactor shall be fitted with an approved roller attachment or a section of carpet securely fitted to the underside of the plate to prevent damage to the surface of the paving units.

Initial compaction shall consist of at least two coverages of the area, but shall continue until level differences between units has been eliminated. Do not compact within 1 metre of the working face.

Any units which are structurally damaged during bedding compaction shall be removed and replaced. The pavement shall then be recompacted for at least one metre surrounding each replacement unit.

After initial compaction, spread jointing sand over the finished surface in a thin layer and apply further coverage of the compactor to induce the sand into the joints. After compaction, ensure that all spaces between paving units are filled with jointing sand by brooming as necessary.

For road pavements or where specified, additional compaction shall then be carried out using between 5 and 10 passes of a pneumatic tyred roller or its equivalent, having a gross weight of not less than 10 tonnes.
Remove surplus sand and thoroughly clean the finished surface of mortar stains and the like on completion.

7.4 JOINTING

Expansion jointing material shall be pressed firmly against the clean face of the adjoining restraint and paving units pushed firmly against the jointing to prevent intrusion of stones and other contaminants.

7.5 EDGE RESTRAINTS

Concrete edge restraints shall be constructed in accordance with TRITS 06 – Kerbs Footpaths and Minor Works.

Mortared brick or paver unit edging or header courses shall be set on a 100mm minimum thickness bed of cement mortar. Jointing and bed mortar shall be made from 4 parts sand to 1 part cement and mixed

thoroughly with the correct amount of water. Thoroughly clean all areas of stains, mortar droppings and the like.

Faces of edge restraints abutting pavers shall be vertical.

Unless otherwise shown on the drawings, contraction joints, 20mm depth shall be formed every 5m of edge restraint length.

After the concrete has hardened and not earlier than three days after placing, unless otherwise directed by the Superintendent the spaces at the back of the edge restraint shall be backfilled with earth, compacted in layers not greater than 150mm thick, then topsoiled to meet surrounding of design levels.

7.6 OPENING TO TRAFFIC

As soon as practicable after the filling of joints, construction vehicles may use the pavement, and should be encouraged to traverse the greatest possible area of pavement to assist in the development of 'lock-up'. Traffic shall be guided so as not to pass within a distance of 1 metre of the working face or other unrestrained edge. Excess joint filling sand shall be removed prior to opening of traffic.

The pavement shall be inspected regularly by the Contractor during the Defects Liability Period to ensure all joints remain completely filled.

8 CONFORMANCE CRITERIA

8.1 TOLERANCES ON LEVELS AND GRADES

The finished surface of completed paving shall be within ± 10mm of design level at all points.

The level on the finished surface of the base course for road pavements to be overlain with segmental paving shall be trimmed within + 10mm or - 0mm of design levels.

Changes of grade both longitudinally and transversely shall be eased over to avoid protruberance of adjoining units. The minimum length of ease shall be 3 unit lengths. Subject to easing constraints, the surface shall not deviate more than 5mm from a 3 metre straight edge. Sand bedding material shall not be used as a levelling material to compensate for base finishing outside the above tolerances.

Paving abutting a gutter to which it drains shall be laid to finish 4 6mm above the edge of the gutter. Other paving edges shall be laid to finish within -0mm to +2mm of the level of abutting paving or structures.

The difference in level (lipping) between adjacent paving units shall not be more than 2mm. The finished surface of the base material shall drain freely without ponding.

8.2 SAMPLING AND TESTING

All sampling and testing of materials supplied and work carried out under this section of the Specification shall be performed in accordance with the relevant Australian Standards or as otherwise specified.

Work under this Specification shall be subdivided into lots or discrete work areas. The Superintendent shall have the right to reject a lot which is visually non-homogeneous and/or non-representative.

The specified testing shall be taken at the random test locations established in each lot in accordance with the specified minimum testing frequency in Section 8.3.

The test/s then taken shall be considered to represent the total volume of material placed within the lot.

8.3 FREQUENCY OF TESTING

The frequency of testing shall be appropriate to verify conformance and shall not be less than that stated in Table 8-1. Where no minimum frequency of inspection or testing is stated, the Contractor shall nominate appropriate frequencies in their Inspection and Test Plan(s).

The Contractor shall include in the management review of the Quality System, a review of the appropriateness of the frequency of testing nominated in the Inspection and Test Plan(s). Such review shall take into account the frequency of nonconformance detected, including nonconformance remedied by simple reworking.

Table 8-1

Clause	Characteristic Analysed	Test Method	Minimum Frequency Of Testing
Paving units			
12.04	Compressive Strength:	AS 4456.3	One per Contract each type or 1 per lot (1000m^2)
12.04	Breaking Load and Flexural Strength	AS 4456.5	One per Contract each type or 1 per lot (1000m^2)
12.04	Abrasion resistance	AS 4456.9	One per Contract each type or 1 per lot (1000m^2)
12.04	Slip / skid resistance	AS 3661.1	One per Contract each type or 1 per lot (1000m^2)
12.07.6	Level tolerance	Survey	Every 20 square metres
12.07.6	Surface profile	Deviation from 3m Straight Edge	10 per 200m^2
12.07.3	Jointing	Measure	All joints
Bedding Sand			
12.04.4	Particle size distribution;	AS 1141.11	One per Contract or change in material
	Jointing Sand:		
12.04.5	Particle size distribution;	AS 1141.11	One per Contract or change in material
Base Surface			
12.07.6	Level tolerance	Survey	Every 20 square metres
12.07.6	Surface profile	Deviation from 3m Straight Edge	10 per 200m^2

8.4 NONCONFORMING WORK

A nonconformance report shall be submitted to the Superintendent for any nonconformance detected. Work shall not proceed on any nonconforming item until the Superintendent has approved the disposition for the nonconformance.

9 MEASUREMENT AND PAYMENT

Payment shall be made for the activities associated with completing the work detailed in this Specification in accordance with Pay Items 1200P1 and 1207P1 inclusive.

The pay items applicable to particular activities are listed in the Specifications for these activities.

A lump sum price for any of these items shall not be accepted.

If any item for which a quantity of work is listed in the Contract has not been priced by the Contractor, it shall be understood that due allowance has been made in the prices of other items for the cost of the activity which has not been priced.

The Contractor shall allow in the pay items generally for the costs associated with all testing required to prove conformance of the works as specified.

Excavation and preparation of subgrade is measured and paid in accordance with TRITS 02 – Earthworks. Subbase and base materials are measured and paid in accordance with TRITS 04 – Flexible Pavements.

Kerb and/or gutter and miscellaneous minor concrete work not included in the pay items are measured and paid in accordance with TRITS 06 – Kerbs Footpaths and Minor Works.

Pay Item 1200P1 Segmental Paving

The unit of measurement shall be on a plan area basis by type of pavement surface. The measurement of this item is by gross area including manhole / pit covers.

This pay item shall include all setting out, supply of bedding mortar or sand, jointing sand supply, laying, cutting pavers at interfaces with different pavement types, structures, posts etc., vibration and compaction as required.

1200P1.1 Segmental Paving – Road Pavements
1200P1.2 Segmental Paving – Other Than Road Pavements
1200P1.3 Tactile Pavers (Type A)
1200P1.4 Tactile Pavers (Type B)

The unit of measurement shall be the linear metre measured along the length of the edge strip.
This pay item shall include all activities involved in the excavation forming, concreting, contraction joints, backfilling and compaction adjacent to the completed edge strip.

10 SCHEDULE OF HOLD POINTS

Hold Points	Clause	Description
12.1	4.1, 4.2	Paver samples and conformance testing
12.2	0, 7	Subbase, base and bedding sand conformance

11 REFERENCES

ACT Government 2012, *Trunk road infrastructure technical specifications*, ACT Government, Canberra, ACT.

British Standardards Institution 2005, *BS EN 12878:2005: Pigmets for the colouring of building materials based on cement and/or lime. Specificatoins and methods of test*, BSI Group, Chiswick, London.

Standards Australia 1994, *AS/NZS 3661: Slip resistance of pedestrian surfaces*, Standards Australia, Sydney, NSW.

Standards Australia 1997, *AS/NZS 1672: Limes and limestones*, Standards Australia, Sydney, NSW.

Standards Australia 1998, *AS/NZS 3582: Supplementary cementitious materials for use with Portland and blended cement*, Standards Australia, Sydney, NSW.

Standards Australia 2008, *AS/NZS 4455: Masonry units, pavers, flags and segmental retaining wall units*, Standards Australia, Sydney, NSW.

Standards Australia 2003, *AS/NZS 4456: Masonry units and segmental pavers and flags*, Standards Australia, Sydney, NSW.

Standards Australia 2005, *AS/NZS 1478: Chemical admixtures for concrete, mortar and grout*, Standards Australia, Sydney, NSW.

Standards Australia 2009, *AS/NZS 1141: Methods for sampling and testing aggregates*, Standards Australia, Sydney, NSW.

Standards Australia 2009, *AS/NZS 1428: Design for access and mobility*, Standards Australia, Sydney, NSW.

Standards Australia 2009, *AS/NZS 2758: Aggregates and rock for engineering purposes*, Standards Australia, Sydney, NSW.

Standards Australia 2010, *AS/NZS 2972: General purpose and belnded cements*, Standards Australia, Sydney, NSW.

12 STANDARD DRAWINGS