# Brisbane City Council

# Reference Specifications for Engineering Work

# S150 Roadworks

## Amendment Register

|  |  |  |  |
| --- | --- | --- | --- |
| Ed/Rev Number | Section Number | Description | Date |
| 1.0 |  | Original issue | Oct 2001 |
| 2.0 | 7, 8, 9 & 10 | Complete revision and reissue of the following sections:  Section 7 – Surface Treatments;  Section 8 – Traffic Signs;  Section 9 – Pavement Marking and;  Section 10 – Other Surface Features. | Feb 2005 |
| 2.5 | 8 & 9 | Minor revision of typographical errors from Revision 2.0 | Apr 2005 |
| 3.0 | 9.1 | ‘Blacking out’ clearly identified as an unacceptable practice for line removal | Jan 2008 |
| 9.2 | Modification in type of glass beads and anti-skid material specified. Class ‘B’ glass beads removed, Class ’C’ glass beads added, anti-skid material (crushed quartz) requirements modified |
| 9.3 | Modification and clarification of application rates for drop-on glass beads and anti-skid material, application of raised pavement markers. |
| 9.4 | Revision of road types/descriptions to align with Brisbane City Council Road Hierarchy Plan, clarification of requirements for materials on bicycle facilities. |
| 10.0 | Non-flared gating guardrail end terminals requirements modified |
| 4.0 | 5.3 | Kerb Adaptor requirements revised and updated. | Apr 2014 |
| 7, 8, 9 & 10 | Sections removed to new Reference Specifications for Civil Engineering Works S154 Traffic Signs and Associated Roadside Furniture and S155 Road Pavement Markings |
| 5.0 | 1.2 and 1.3 | Referenced documents list updated | May 2016 |
| 6.0 | 1.3 | Reference to S310 Supply of Dense Graded Asphalt added | June 2018 |
| 1.4 | New definitions added to align with Infrastructure Design Planning Scheme Policy (IDPSP) |
| 2.1 | Hold point for proof rolling of base surface added |
| 3.1 | Base layer thickness and materials changed to align with IDPSP |
| 3.3 | Requirements for joining to existing asphalt pavements added |
| 3.8 | Proof rolling requirements includedF |
| 4 | Table 4.1 amended to align with IDPSP |
| 7.0 | General | Document name changed from ‘Reference Specifications for Civil Engineering Work’ to ‘Reference Specifications for Engineering Work’ | Mar 2021 |
| 5.1 and 6.2 | Expansion joint sealant material specification updated; proprietary product reference removed. |

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## GENERAL

### Section Content

Type of asphalt surfacing; flexible sub-base and base courses; roadworks and surface features such as kerbs, channels, vehicular crossings and the like.

### Standards

|  |  |  |
| --- | --- | --- |
| Australian Standard | AS 1289.5.2.1 | Methods of testing soils for engineering purposes – Soil compaction and density tests – Determination of the dry density or moisture content relation of a soil using modified compactive effort |
| Australian Standard | AS 1289.5.3.1 | Methods of testing soils for engineering purposes – Soil compaction and density tests – Determination of the field density of a soil – Sand replacement method using a sand-cone pouring apparatus |
| Australian Standard | AS 1289.5.3.5 | Methods of testing soils for engineering purposes – Soil compaction and density tests – Determination of the field dry density of a soil – Water replacement method |
| Australian Standard | AS 1289.5.8.1 | Methods of testing soils for engineering purposes – Soil compaction and density tests – Determination of field density and field moisture content of a soil using a nuclear surface moisture–Density gauge – Direct transmission mode |
| Australian Standard | AS 1289.5.4.1 | Methods of testing soils for engineering purposes – Soil compaction and density tests – Compaction control test – Dry density ratio, moisture variation and moisture ratio |
| Australian Standard | AS 1289.5.8.4 | Methods of testing soils for engineering purposes – Soil compaction and density tests – Nuclear surface moisture-density gauges – Calibration using standard blocks |
| Australian Standard | AS 1830 | Grey cast iron |
| Australian Standard | AS 1874 | Aluminium and aluminium alloys – Ingots and castings |
| Australian Standard | AS 2876 | Concrete kerbs and channels (gutters) – Manually or machine placed |
| Australian Standard | AS 3715 | Metal finishing – Thermoset powder coating for architectural applications of aluminium and aluminium alloys |
| Australian Standard | AS 3996 | Access covers and grates |
| Australian Standard | AS 4506 | Metal finishing – Thermoset powder coatings |
| Australian Standard | AS 4680 | Hot-dip galvanized (zinc) coatings on fabricated ferrous articles |
| Australian Standard | AS 4792 | Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process |

### References

|  |  |  |  |
| --- | --- | --- | --- |
| Queensland Department of Transport and Main Roads | Test Method | Q146 | Degree of saturation of soils and crushed rock |

Refer to the following other Reference Specifications for Engineering Works:

|  |  |
| --- | --- |
| S110 | General Requirements: General technical requirements and interpretation of terminologies |
| S120 | Quality. Process control testing |
| S140 | Earthworks: Protection of trees, protection of existing services, site clearing, bulk earthworks, preparation of subgrade, and trenching. |
| S145 | Installation and Maintenance of Utility Services: Requirements for installation of services and utilities utilising trenching and boring |
| S154 | Traffic Signs and Roadside Furniture: Installation of traffic signs and associated road furniture |
| S155 | Road Pavement Markings: Installation of road pavement markings |
| S200 | Concrete Work: Concrete supply, placing, curing, reinforcement, in situ concrete surfaces |
| S300 | Quarry Products: Base and sub base material |
| S310 | Supply of Dense Graded Asphalt |
| S320 | Laying of Asphalt: Placement and compaction of asphalt pavement |

### Definitions

Base course: That portion of the pavement immediately supporting the surfacing. It is and principally intended to directly support the traffic loads.

Pavement: That part of the road placed above the subgrade for the support of, and to form a running surface for, vehicular traffic. The pavement comprises one or more layers of material referred to as surfacing, base course and sub-base course.

Roads subject to light traffic loading: These roads have pavements designed for the 20 year design traffic loading up to TL20 of 1 x 106 ESA. These roads will typically have granular pavements with thin asphalt surfaces.

Roads subject to heavy traffic loading: These roads have pavements designed for the 20 year design traffic loading greater than TL20 of 1 x 106 ESA. These roads will typically have full-depth asphalt pavements on a granular working platform.

Sub-base course: That portion of the pavement below the base course to provide additional thickness of material required above the subgrade. It is principally intended to distribute to the subgrade the loads from overlying courses.

Subgrade: The prepared formation on which a pavement or slab is constructed or the top portion of earthworks immediately below the pavement or slab. Subgrade is considered to be the top 150 mm in cuttings and the top 300 mm in embankment unless stated otherwise.

## QUALITY

### Inspection

Witness points

*Refer annexure*. Give sufficient notice so that inspection may be made at the following stages:

* Bedding material prepared for kerb and channel.
* Placing sub-base and base.
* Completion of each compacted layer.
* At the commencement of asphalt surfacing.
* Pavement marking set out ready for marking.

Hold points

*Refer annexure*. Do not proceed without approval. Give sufficient notice so that inspection may be made at the following stages:

* Proof rolling of the completed base surface.
* Surfaces prepared for priming, sealing or surfacing.

### Samples

General

*Refer annexure*. Submit to the testing authority samples of the following:

* Each type of imported fill.
* Each type of excavated material, which is to be re-used for constructing flexible pavement in the Works.

Identification

Attach a tag to each sample showing relevant information including description, source and nominal size of material.

### Contractor’s Submissions

Imported materials: Notify the supplier, source and description of all imported materials. Submit certification or test results, which establish the compliance of imported materials.

Recycled products: Notify the nature, source, proportions and method of incorporation of any added fillers or binders.

Sub-base and base delivery: Submit a delivery docket at the time of delivery for each truckload of sub-base and base material. Endorse it to show the location of the material in the Works. Information should include:

* Empty and loaded mass of vehicle.
* Date and time of dispatch.
* Supplier and location of mixing plant.
* Registration number of the vehicle.
* Nature of material.

## FLEXIBLE PAVEMENT

### Materials

*Refer annexure.*

Material properties: Refer to *S300 Quarry Products*.

Base course for roads subject to light traffic: Use Class 1 material. Provide a minimum 100 mm thick course.

Sub-base course for roads subject to light traffic: Use Class 2 material (or alternatively Class 1 material) to construct a minimum 100 mm thick top layer. Use Class 3 material (or alternatively Class 2 material) to construct subsequent sub-base courses as required to obtain design pavement thickness.

Working platform for roads subject to heavy traffic: Use Class 1 material. Provide a minimum 150 mm thick course. Where specified use Class 2 material (or alternatively Class 1 material) to construct an additional 150 mm thick sub-base courses. Use Class 3 material (or alternatively Class 2 material) to construct subsequent sub-base courses as required for subgrade improvement.

Unsealed roads and shoulders: Class 1 or Class 2 soil aggregate.

Material maximum size: Do not use Class 1 crushed rock exceeding 25 mm nominal size in base courses where surfacing is spray seal or asphalt less than 50 mm thick.

Stabilised or modified materials (where specified): Incorporate stabilising agent (cement and mix in place using approved specialised plant or mix off-site in a suitable batching plant.

Pavement widening or rehabilitation: Select paving materials to match the characteristics of the existing pavement profile. Use low or high permeable material as appropriate to minimise differential permeability.

### Placing Base, Subbase and Working Platform

General

Material separation: Place materials of different grading or from different sources in separate layers or separate sections of the work.

Spreading: Spread material in uniform layers. Do not segregate the material.

Layer thickness: 100-150 mm (after compaction) to suit the construction process. Use equal layers in multi layer courses.

Moisture content of underlying layers: Adjust the surface moisture content of underlying layers to prevent new material losing moisture.

Joints

Plan the spreading and delivery to minimise the number of joints. Offset joints in successive layers by at least 300 mm.

Existing road surface as subgrade

Carry out minor reshaping to improve vertical alignment as directed. Do not otherwise lower or excavate the existing roadway. After final shaping of the metal box, scarify the existing pavement forming the subgrade before placement of the pavement material.

### Junctions with Existing Pavements

Granular Pavement: Where the pavement is to be joined to an existing granular pavement, remove a strip of the existing pavement at least 300 mm wide for its full depth and trim the edge to an angle of approximately 45° in steps of maximum height 150 mm before placing new pavement material.

Asphalt Pavement: Where the pavement is to be joined to an existing full depth asphalt pavement, cut back into the existing asphalt by at least 100 mm. Extend each subsequent layer of structural asphalt into the existing pavement by at least 100 mm. The surface layer of asphalt is to extend into the existing pavement at least 150 mm beyond the upper most structural layer placed. Treat each layer as a cold joint as detailed in *Reference Specification S320*.

### Base, Subbase and Working Platform Compaction

Compaction

Modified maximum dry density: To *AS 1289.5.2.1*.

Minimum relative compaction: 95% of modified maximum dry density, to *AS 1289.5.4.1*. *Refer annexure.*

Conformance criteria: Refer to *S120 Quality Clause 6.2*.

Field dry density: To *AS 1289.5.3.1*, *AS 1289.5.3.5* or *AS 1289.5.8.1*. If using *AS 1289.5.8.1*, calibrate the surface moisture-density gauge in accordance with *AS 1289.5.8.4* before use on site.

Moisture content

General: During spreading and compaction, maintain materials within the range of - 2% to + 1% from the optimum moisture content (modified compaction) appropriate to each material.

Rectification

If a section of pavement material fails to meet the required conformance criteria as specified in *Reference Specification S120 Quality Clause 6.2*, remove the non-complying material, replace with new pavement material, and recompact.

Level corrections

High areas: Grade off.

Low areas: Remove to a minimum depth of 75 mm, replace with new material and recompact.

### Finishing Base Surfaces

Final trim

Grade and trim the base course surface to the specified tolerances to produce a hard, dense, tightly packed surface free of lenses, compaction planes and caking.

Traffic on uncompleted work

Give notice before opening the pavement to traffic before the work is completed. Provide adequate means of protection.

### Tolerances

Surface level

General: Provide finished sub-base and base surfaces, which are evenly graded between level points, free draining and conform to the required tolerances.

Smoothness: As normally produced by a grader blade (except for batters without topsoil).

Tolerances: The limits in the Table 3.1 apply to the finished surface unless overridden by the requirements for the finished level and thickness of the surfacing.

Table 3.1 – Tolerances

| Item | Level tolerance | |
| --- | --- | --- |
| Absolute | Relative to a 3 m straightedge\* |
| Sub base | +10 mm - 30 mm | 10 mm |
| Base | ±10 mm | 5 mm |

\* Limits to incorporate due allowance for design shape where relevant

Crossfall

Measurement: Measure crossfall at sub-base and base transversely to the centreline. Ensure that the two selected points are more than 2 m apart.

Requirement: Do not depart from the corresponding design crossfall by more than 0.2% absolute. Maintain positive drainage slope towards pavement drainage system.

Other ground surfaces

Absolute level tolerance: ±50 mm, provided the area matches adjacent construction.

Horizontal surfaces

Absolute tolerance: ±50 mm, except where alignment with an existing road structure is necessary. Join new construction to the existing work in a smooth manner.

### Degree Of Saturation

General: Where directed by the Superintendent, determine degree of saturation of the pavement layer if excessive moisture content is suspected. Sources of water entry during the construction phase may include inadequate pavement surface drainage, exposure of surface to rain, pavements left primed but not sealed for extended periods, use of high moisture content for compaction, and excessive watering of the pavement.

Test method: Determine degree of saturation in accordance with *DTMR Q146*. Perform test within a period of 6 hours prior to the placement of the next pavement layer or surfacing.

Moisture content limits: Limit the maximum degrees of saturation to 65% for Class 1 material, and 70% for Class 2 and Class 3 materials. Where the moisture content limits are exceeded during construction, dry back pavement prior to covering with the next layer of pavement or surfacing.

### Proof Rolling

General: All pavement layers must be capable of withstanding proof rolling to verify their stability. Where directed by the Superintendent, carry out proof rolling of subbase layers.

Requirement: Test the finished base for perceptible surface deformation by proof rolling in the presence of the Superintendent.

Test method: Use a truck with a single rear axle with dual tyres with a loaded axle mass of 9 tonnes or a truck with tandem rear axles with dual tyres with a total loaded mass on the tandem axles of 16.5 tonnes. Use a minimum 600 kPa tyre pressure. Testing for perceptible surface deformation is exempt from the requirement for NATA accreditation.

Corrective Action: In areas of perceptible surface deformation, remove and replace the material, or undertake other corrective action to the satisfaction of the Superintendent.

## ASPHALT SURFACING

Use Brisbane City Council standard asphalt types in accordance with Table 4.1. *Refer annexure*.

Table 4.1 – Mix design applications

|  |  |  |
| --- | --- | --- |
| Mix type | Nominal aggregate size | Typical applications |
| 1*(1)* | 5 mm | Thin wearing course, footpaths, sheet patching, and overlays in local residential streets. |
| 2*(1)* | 10 mm | Surfacing course for roads subject to light traffic where 30mm (nominal) thick asphalt surface is specified. |
| 3*(1)* | 14 mm | Surfacing course for roads subject to light traffic where 50mm (nominal) thick asphalt surface is specified. Surfacing courses for roads subject to heavy traffic. May be used for structural layers. |
| 4*(1)* | 35 mm | Unsuitable for final surfacing. Generally used as structural layers for deep lift asphaltic concrete pavements. |

(1) Denotes dense graded asphalt

## CONCRETE KERBS and CHANNELS

### General

Scope: Kerbs, channels, mowing strips and other linear elements.

Profile: To *Standard Drawings BSD-2001, BSD-2002 and BSD-2003*. *Refer annexure*.

Hand placed (in situ) concrete: Grade N25.

Precast concrete: Grade N25.

Machine placed (slip formed or extruded) concrete: Grade S32, minimum cementitious content of the concrete is 320 kg/m3 for all roads.

Surface finish: A mortar surfacing is required on extruded work and a comparable finish required for other placing methods.

Placing and curing: The provisions of *S200 Concrete Work Clause 6.0* do not apply. Provide kerbs and channels with no cracks greater than 0.3 mm wide (other than at control joints) and without impairment of slip resistance.

Excavation limit: When excavating the existing pavement to construct the kerb and channel, limit excavation to the minimum required for a mechanical compactor and kerb machine. Excavate at least 75 mm past the back of the kerb.

Pre-wetting: Wet the bedding material immediately before laying concrete without resulting in free water remaining on the surface.

Bedding. Construct bedding from the same pavement material or approved free draining non-plastic material with permeability not less than the adjoining pavement material. Continue pavement at least 75 mm past the extremities of the kerb to ensure stability of the pavement edge. Extend bedding to the bottom of the pavement box, but the minimum bedding thickness must not be less than 75 mm.

Contraction or shrinkage control joints: Install between expansion joints at regular intervals not exceeding 4 m. Construct joints by forming grooves 40 mm deep by 6 mm wide in all exposed surfaces of the concrete kerb and channel. Provide grooves normal to the top surface and square to the alignment of the concrete kerb and channel. Where relevant, locate joints to line up with contraction joints in adjacent structures.

Expansion joints: Provide expansion joints between the concrete kerb and channel and any abutting structures (such as bridges, rigid pavements and concrete slabs), or where directed. Where relevant, locate joints to line up with the expansion joints in adjacent structures. Construct joints by installing 10 mm thick compressible packing for the full width and depth of the concrete kerb and channel. Seal surface of joint with a polyurethane sealant suitable for sealing continuous and pronounced cyclic movements in concrete joints.

All other requirements: *To AS 2876*.

### Placing Concrete

Machine placing

Slump: Use the maximum slump that will maintain shape without support immediately after laying.

Hand placing

Maximum Length: No more than 20 metres in contiguous lengths (including vehicular entrances and kerb ramps).

Cast together: Cast the kerb and channel simultaneously.

### Kerb Adaptors

#### General

Standard: Comply with the relevant *Standard Drawings BSD-8111, BSD-8302, BSD-8113 and BSD-8114* regarding placement and shape.

Acceptable materials: Fabricated steel galvanised to *AS 4680*. Ferrous hollow sections galvanised to *AS 4792*. Cast iron to *AS 1830*. Aluminium casting to *AS 1874*.

Adaptors may be powder coated to *AS 4506* (metals other than aluminium) or *AS 3715* (aluminium).

Installation: Saw cut 300 mm opening in kerb and fix kerb adaptor flush with the top of kerb in accordance with *Standard Drawing BSD-8114*. Fill gaps on sides with N25 concrete.

Scope of application: Use Class D load rated (heavy duty) full depth kerb adaptor on all road hierarchy classification. Refer Section 5.3.3 for load testing requirements and methodology. Permanent markings to be in accordance with *AS 3996* for the relevant information required.

Responsibility: Roofwater drains are the responsibility of the property owner. The property owner is responsible for the restoration of the affected kerb, verge and footpath at installation.

#### Location

New work: Near the lower boundary of each lot, which drains towards the road, and clear of existing or planned service pits and meters.

Reconstruction: At each existing roofwater outlet.

#### Load Testing

Apparatus:

* A testing jig in accordance with *Standard Drawing BSD-8115*.
* A hydraulic test press capable of applying a load of up to 50 kN.
* A dial gauge (with extendable arm) capable of measuring permanent set and deflection to an accuracy of 0.1 mm.
* Load bearing block to correspond to the shape of the top surface of the kerb adaptor and maintain a 10 mm minimum clearance from the outer edge of the kerb adaptor. Refer to Figure 5.1.

Figure 5.1 – Load bearing block positioning

|  |  |
| --- | --- |
| Figure of Kerb Adaptor Test (Elevation)  The detail contained within this Brisbane City Council Reference specification is of a technical nature and as such is not accessible. For assistance accessing and interpreting this Reference specification please contact Council on 07 3403 8888. | Figure of Kerb Adaptor Test (Plan View)  The detail contained within this Brisbane City Council Reference specification is of a technical nature and as such is not accessible. For assistance accessing and interpreting this Reference specification please contact Council on 07 3403 8888. |
| Elevation | Plan |

Load classification:

* In accordance with Table 5.1.

Table 5.1 – Load classification

|  |  |
| --- | --- |
| Loading condition | Class D (heavy duty) |
| Application | All road hierarchy classification |
| Nominal wheel load (kg) | 8000 |
| Serviceability design load (kN) | 140 |
| Ultimate limit state design load (kN) | 210 |

Note: The load classification table is in accordance with AS 3996.

Test loads:

* All kerb adaptors shall be designed to load class D (heavy duty) in accordance with Table 5.1 or Table 3.1 of *AS 3996*.
* For circular opening[[1]](#footnote-1) (CO) <250 mm, the test loads shall be the serviceability and ultimate design loads given in Table 5.1 or Table 3.1 of *AS 3996* multiplied by the appropriate factor.
* The Factor is the clear opening[[2]](#footnote-2) area, in mm2, of the top surface divided by ().
* Test loads are calculated to be:



Setup Procedure:

1. Fit appropriate attachments (side formers and base plate) to testing jig.
2. Slide movable plate to firmly secure the kerb adaptor in the jig, and then tighten nuts on movable plate.
3. Place the testing jig assembly in the hydraulic press unit, with vertical axis of the load bearing block perpendicular to the test surface. Position dial gauge and pointer arm to record the maximum deflection at the underside of the test surface.

Testing Procedures:

Measurement of deflection due to the serviceability design load:

1. Before the load is applied, take an initial deflection reading at the geometric centre of the kerb adaptor.
2. Apply the load at a rate of between 1 kN/s to 5 kN/s up to the serviceability test load. With the load applied, take a second deflection reading at the geometric centre.
3. Determine the deflection as the difference between the initial deflection reading and the second deflection reading.

Measurement of permanent set due to the serviceability design load:

1. Before the load is applied, take an initial deflection reading at the geometric centre of the kerb adaptor.
2. Apply the load at a rate of between 1 kN/s to 5 kN/s up to the serviceability test load. Maintain the load on the kerb adaptor for a minimum of 5 seconds and then release. Repeat this step five (5) times. Take a second deflection reading at the geometric centre.
3. Determine the permanent set as the difference between the initial deflection reading and the second deflection reading.

Sustaining the ultimate limit state design load for a set time:

1. Immediately following the permanent set measurement procedure, apply the ultimate limit state test load at the same rate.
2. Maintain the load for a minimum of 30 seconds.

Acceptance criteria:

* The deflection limit and permanent set must not exceed the limits stated in Table 5.2.
* Sustaining the ultimate limit state test load without collapse or other similar forms of structural failure.

Table 5.2 – Serviceability Load Permanent set and Deflection Limits

|  |  |  |
| --- | --- | --- |
| Class | Maximum Deflection | Maximum Permanent Set |
| D | 15 mm | 1 mm |

### Tolerances

General requirement: Channels do not pond water and the kerb line has no noticeable kinks in line or level.

Vertical alignment: ± 10 mm from the design level at any point.

Horizontal alignment: ± 25 mm from the design alignment at any point.

Deviation from a 3 m straightedge laid in parallel to the centreline: Maximum 5 mm at any point.

Profile dimensions: The overall width does not differ by more than 15 mm and the dimension at any point does not differ by more than 5 mm.

## CONCRETE SLABS

### General

Scope: Footpaths, bikeways, vehicular crossings, kerb ramps, median infills and other like elements.

Formwork: Provide formwork to sides, construction joints and ends. Class 3 surface finish to AS 3610.

Concrete: All concrete to be N25 or N32 grade (refer to Standard Drawings).

Placing and curing: The provisions of *Reference Specification* *S200 Concrete Work Clause 6.0* do not apply. Provide concrete with no cracks greater than 0.3 mm wide (other than in control joints) and with unimpaired slip resistance and colour uniformity.

### Joints

Spacing: Space to match service pits and other discontinuity in cross-section.

Construction joints: Locate at contraction or expansion joints.

Contraction or shrinkage control joints: Unless specified otherwise, maximum spacing in unreinforced or nominally reinforced concrete is 4 m. Use weakened plane joints to at least one-third depth and 6 mm wide. Saw cut or use crack inducers with a life of 25 years. Bolster cut joints must be to half depth and faired to surface with a radius of 5 - 6 mm. Where relevant, locate joints to line up with contraction joints in adjacent structures or edge restraints.

Expansion joints: Unless specified otherwise, the maximum spacing in un-reinforced or nominally reinforced concrete is 16 m. Provide additional expansion joints between the concrete slab and abutting edge restraints. Form joints with full depth 10 mm closed cell close linked polyethylene foam 85 – 150 kg/m3 (with 10 mm removable top section) securely taped to the end form. Seal surface of joint with a polyurethane sealant suitable for sealing continuous and pronounced cyclic movements in concrete joints.

### Tolerances

Pavement edges: Shape new pavement surface to match existing features such as pit covers or driveways to within 5 mm.

Absolute level tolerance: ±25 mm.

Maximum deviation relative to a 3 m straightedge: 5 mm.

Discontinuity in pavement surface levels: For pedestrian areas 1.5 mm, for roadways 2 mm.

Maximum deviation of edge from design alignment: 25 mm.

Width: - 0 mm, + 35 mm.

Thickness: - 5 mm, + 30 mm.

Maximum deviation from a 3 m straightedge placed on vertical, or sloping surfaces required to be straight: 10 mm.

Drainage: All surfaces must be free draining.

## SURFACE TREATMENTS

### General

This clause applies to coloured treatments, texturing, decorative, and high friction surfacing systems on asphalt and concrete surfaces. The requirements for Coloured Surface Treatments have been moved to *Reference Specification S155 Road Pavement Marking*.

## TRAFFIC SIGNS

### General requirement

This clause applies to supply of traffic signs, poles and fitments. The requirements for Traffic Signs have been moved to *Reference Specification S154 Traffic Signs and Roadside Furniture*.

## PAVEMENT MARKING

### General

This clause applies to installation of general longitudinal and transverse pavement marking. The requirements for Longitudinal and Transverse Pavement Markings been moved to *Reference Specification S155 Road Pavement Marking*.

## OTHER SURFACE FEATURES

### General

This clause applies to the supply and installation of guide posts and steel beam guardrail and end terminals. The requirements for Road Edge Guide Posts, Steel Beam Guardrail, Guardrail End Terminals and Energy Absorbing Bollards have been moved to *Reference Specification S154 Traffic Signs and Roadside Furniture*.

1. Circular Opening is the diameter of the largest circular that can be inscribed in the unobstructed opening in the frame with any removable supporting beams retained in place. (Section 1.4 of AS 3996) [↑](#footnote-ref-1)
2. Clear Opening is the dimensions of the unobstructed opening for access, in service, without removable supporting beams in place. (Section 1.4 of AS 3996) [↑](#footnote-ref-2)