1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide external paving, as documented and as follows:
- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- Resistant to expected impacts in use.
- Set out with joints accurately aligned in both directions.
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- General requirements.

1.3 STANDARDS

Slip resistance
Classification: To AS/NZS 4586 for the documented classifications.
Slip resistance measurement of completed installations: To AS/NZS 4663.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given below apply.
- Absolute level tolerance: Maximum deviation from design levels.
- Bedding: Mixtures of materials which are applied to substrates in a plastic state and dry and cure to adhere pavers to substrates.
  - Adhesive bedding: Paving adhered by a cementitious adhesives bed.
  - Mortar bedding: Paving adhered in a cementitious mortar bed.
- Cementitious adhesives (C): Adhesives in which the binders are hydraulic, e.g. Portland cement, with aggregates and organic additives.
- Lippage: Height deviation between adjacent pavers or other surface features.
- Pavers: Units made from clays, stone, precast concrete and/or other inorganic raw materials generally over 20 mm thick used as coverings for floors and supported over continuous substrates.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.
- Substrates: The surface to which a material or product is applied.
- Soldier course: A course of whole or trimmed rectangular pavers at the pavement restraint edge.
- Terrazzo tiles – cementitious: Manufactured cementitious terrazzo tiles formed in a suitable machine to give sufficient compaction and density to the finished surface, and moisture cured before grinding and honed at the place of manufacture. Thickness usually 35 mm.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Substrate immediately before paving.
- Trial set-outs before execution.
- Control joints before sealing and grouting.
1.6 TOLERANCES

Completed paving
General: Conform to the Surface level tolerances table.

Surface level tolerances table

<table>
<thead>
<tr>
<th>Item</th>
<th>Level tolerance</th>
<th>Absolute</th>
<th>Relative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicular pavements</td>
<td>± 5 mm</td>
<td>5 mm</td>
<td></td>
</tr>
<tr>
<td>Pedestrian pavements</td>
<td>± 10 mm</td>
<td>10 mm</td>
<td></td>
</tr>
</tbody>
</table>

Lippage:
- Unpolished pavers: < 2 mm.
- Polished pavers 300 x 300 mm or less: 1 mm, with 5% not exceeding 1.5 mm.
- Polished pavers over 300 x 300 mm: 1.5 mm, with 5% not exceeding 2 mm.

1.7 SUBMISSIONS

Execution
Grouting: Submit proposals for grouting methods and materials.
Margins: If it appears that minor variations in joint widths or overall dimensions will avoid cut pavers, submit a proposal.

Materials
Product conformity: Submit current assessments of conformity as follows:
- Marking and classification of adhesive to AS 4992.1.

Samples
General: Submit labelled samples of pavers, grout and sealants, illustrating the range of variation in colour and finish.

Sample panels
General: Prepare a sample panel of each type of finish as follows:
- Size: ≥ 2 m².
- Include samples of junction details and trim.
- Preserve each panel until related work is complete.

Tests
Type tests: Submit results, as follows:
- Type test slip resistance of pavers to AS/NZS 4586.
Site tests: Submit results, as follows:
- Site slip resistance test of completed installation to AS/NZS 4663.
- Salt efflorescence of paver prototype testing.

2 PRODUCTS

2.1 MARKING

Identification
General: Deliver materials to the site in the manufacturer’s original sealed containers or packaging, legibly marked to show the following:
- Manufacturer’s identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern. Provide technical data sheets if not shown on labels.
- Handling and installation instructions.
- Material safety data sheets.

### 2.2 ADHESIVES

**General**

Standard: To AS 2358 or AS 4992.1.

**Type**

General: Provide adhesives compatible with the materials and surfaces to be adhered.

Prohibited uses: Do not provide the following combinations:

- Organic PVC-based adhesives and organic natural rubber latex adhesives in damp or wet conditions.
- PVA (polyvinyl acetate) based adhesives in wet areas or externally.

### 2.3 MORTAR

**Materials**

- Cement: To AS 3972.
- Type: GP.
- White cement: Iron salts content ≤ 1%.
- Off-white cement: Iron salts content ≤ 2.5%.
- Lime: To AS 1672.1.
- Sand: Fine aggregate with a low clay content selected for grading, sharp and free from efflorescing salts.
- Water: Clean and free from any deleterious matter.

Measurement of volume: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

**Bedding mortar**

Proportioning: Select proportions from the range 1 cement:3 sand – 1 cement:4 sand to obtain satisfactory adhesion. Provide minimum water.

Mixing: To AS 3958.1 clause 2.15.

Gauging: Site gauged by volume.

### 2.4 GROUT

**Type**

Portland cement based grout: Mix with fine sand. Provide minimum water to achieve workability.

- Proportion: 1 cement:3 sand.

**Pigments**

Pigments for coloured grout: Provide colourfast pigments compatible with the grout material. For cement-based grouts, provide inorganic mineral pigments or lime-proof synthetic metallic oxides compatible with cement.

**Water**

General: Clean and free from any deleterious matter.

### 2.5 PAVING

**Standard**

Masonry units, pavers and flags: To AS/NZS 4455.2.

**Sandstone flagging**

Description: Provide sound stone flags of uniform quality. Reject flags with any of the following defects liable to affect strength and durability: Vents, cracks, fissures, seams, porous inclusions, foreign material, loose surface material or discoloration.

Matching: Select for optimum matching of colour and pattern.

Split flagging thickness: Minimum 50 mm, maximum 75 mm.

Face size: Utilise smaller sizes for pathways and larger sizes for open areas and maintain traditional stone flagging appearance.
Stone setts
Description: Igneous stone cubed cobble style setts.

2.6 OTHER MATERIALS

Tactile ground surface indicators
Standard: To AS/NZS 1428.4.1.

Control joint types
General: As documented in the Control joints schedule.

Divider strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: Two-pack self-levelling flexible mould resistant, one-part silicone or polyurethane sealant applied over a backing rod. Finish flush with the paver surface.
- Floors: Trafficable, shore hardness more than 35.
Back ing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3 EXECUTION

3.1 SUBSTRATES

Drying and shrinkage
General: Before paving, allow at least the following times to elapse (for curing and initial shrinkage) for these substrates:
- Concrete slabs: 28 days.
- Toppings on slabs: A further 21 days.

3.2 PREPARATION

Trial set-out
General: Prepare a trial paving set-out to each area as follows to:
- Maximise the size of equal margins of cut pavers.
- Locate control joints.
- Note minor variations in joint widths to eliminate cut pavers at margins.

Ambient temperature
General: If the ambient temperature is less than 5 or more than 35 °C, do not lay pavers.

Substrates
General: Make sure substrates are as follows:
- Clean and free of any deposit or finish which may impair adhesion or location of pavers.
- Projections are hacked off and voids and hollows are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3 mm of the surface and expose the aggregate then apply a bonding treatment.

Fixtures
General: Before paving make sure that fixtures interrupting the surface are accurately positioned in their designed or optimum locations relative to the paving layout.

3.3 PAVING GENERALLY

Variations
General: If necessary, distribute variations in hue, colour, or pattern uniformly, by mixing pavers or paving batches before laying.

Paving joints
Joint widths: Set out pavers to give uniform joint widths of 6 to 12 mm.
Margins
General: Provide whole or purpose-made pavers at margins where practicable, otherwise set out to give equal margins of cut pavers. If margins less than half paver width are unavoidable, locate the cut pavers where they are least conspicuous.

Protection
Traffic: Keep pedestrian and vehicular traffic off paving until the bedding has set and attained its working strength.
Cleaning: Keep the work clean as it proceeds and protect finished work from damage.

3.4 MORTAR BEDDING

Preparation of pavers
Suction: Soak porous pavers in water for half an hour and then drain until the surface water has disappeared.

Bedding
General: Use bedding methods and materials which are appropriate to the paver, the substrate, the conditions of service, and which leave the paver firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Mortar beds
Substrate preparation: Either lightly dust the screeded bed surface with dry cement and trowel level until the cement is damp, or spread a thin slurry of neat cement, on to the paver back. Do not provide mortar after initial set has occurred.

Sandstone flagging
Mortar bed thickness: Minimum 50 mm to maximum 60 mm.
Laying pattern: Random, with smaller stones filling the gaps to produce roughly uniform joint widths.
Lay flags and fill joints in one operation.

Stone setts dry bed
Description: Lay and tamp setts on to a dry sand and cement mix, compact and moisten as follows:
  - Bed: 1 cement:3 sand, screeded to the level required to allow setts to be firmly tamped.
  - Select the top side of the sett for surface uniformity and tap into the mix to the pre-compaction position.
  - Compact with a hand ram or mechanical compactor.
  - Water spray the surface and allow the bedding to harden.
  - Grout joints.

3.5 ADHESIVE BEDDING

Preparation of pavers
Adhesive bedding: Fix pavers dry.

Bedding
General: Use bedding methods and materials which are appropriate to the paver, the substrate, the conditions of service, and which leave the paver firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Thick adhesive beds
General: Provide on substrates with deviations up to 6 mm when tested with a 2 m straight edge, and with pavers having deep keys or frogs.
Nominal thickness: 6 mm.

Adhesive bedding application
General: Apply adhesive by notched trowel to substrates and direct to pavers if required, to provide evenly distributed coverage of more than 90% after laying.
Pattern of distribution of adhesive: Conform to AS 3958.1. Verify by examining one paver in ten as work proceeds.
Grouting: Allow the adhesive to cure for the period recommended by the manufacturer before grouting.
3.6 MOVEMENT JOINTS

General
General: Provide control joints as follows:
- Location:
  - Over structural control joints.
  - At internal corners.
  - Close to external corners in large paved areas.
  - Around the perimeter at abutments.
  - At junctions between different substrates.
  - To divide large paved areas into bays, maximum 5 m wide, maximum area 16 m².
  - At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.
- Depth of joint: Right through to the substrate.
- Sealant width: 6 to 25 mm.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

3.7 GROUTED JOINTS

Grouted joints
General: Commence grouting as soon as practicable after bedding has set and hardened sufficiently. Clean out joints as necessary before grouting.
Face grouting: Fill the joints solid and tool flush. Clean off surplus grout and wash down as the grouting proceeds.

3.8 COMPLETION

Spare pavers
General: Supply spare matching pavers of each type for future replacement purposes. Store the spare materials on site.
Quantity: At least 1% of the quantity installed.

Cleaning
Completion: Clean progressively and leave pavements clean on completion.

Operation and maintenance manuals
General: Submit a manual describing care and maintenance of the paving, including procedures for maintaining the slip-resistance grading stating the expected life of the slip-resistance grade.