A STEP-BY-STEP GUIDE TO PERFECT PAVING
INTRODUCTION
Flexible concrete block paving is a pavement structure that maintains contact with and distributes loads to subgrade. The base course relies on aggregate interlock, particle friction and cohesion for stability. Where required, soil stabilisation may be used.

Advantages of using concrete pavers include:
- Standard sizes are available, with tight length, width and height tolerances
- Aesthetics: shapes, colours, textures
- Easy to cut
- Do not shrink
- Give good traction

Once laid, concrete pavers are:
- Dense and durable
- Able to withstand severe weather and heavy loads without losing colour or structural integrity
- Easy to clean
- Relatively easy to remove to improve drainage or repair utilities below pavers

For more detail on laying paving, see SANS 1200-MJ:1984 Standardized specification for civil engineering construction - Laying of paving

SABS-approved pavers and kerbs:
SANS 1058:2012 ed 2.1 Concrete block paving
SANS 927:2007 Precast concrete kerbs, edgings and channels
OVERVIEW OF PAVING PROCESS

STEP 1: Materials

STEP 2: Tools

STEP 3: Prepare base course

STEP 4: Lay kerbs

STEP 5: Place bedding sand and screed

C* Check levels
C** Check lines, patterns and individual block levels

Set out  Excavate  Level  Stamp  Lay kerbs  Place bedding sand  Screed
STEP 6: Lay, compact pavers

Must complete steps 5, 6 and 7 in one day

Start at lowest level, move up the slope

STEP 7: Place jointing sand

STEP 8: Maintenance
1.1 Choosing the right pavers for the application

The pavers must be strong enough for the application, eg. foot or domestic traffic, heavy duty transport.

- Interlocking pavers give better performance under heavy traffic.
- Typical dimensions: 200mm x 100mm x 50mm
- Chamfers help water drain, reduce chipping and spalling.
- 45° bevelled edge around top surface of paver.
- Spacers or lugs provide uniform gaps for jointing sand.

Dimensional tolerances:
- Length and width: ± 2mm, height: ± 3mm
- Spacers or lugs: not more than 3mm

SABS-approved pavers recommended.
1.2 Calculating paver quantities

Paving around trees with shallow root systems will give problems, and requires regular maintenance.

Measure radius \( r \) in metres

\[ r^2 \times 3.14 = \text{square metres of area to be paved} \]

\[ L \times W = \text{square metres of area to be paved} \]

Add 10% more for cutting, wastage!
1.3 Choosing edge restraints

Kerbs can be exposed or hidden but are essential to stop paving from spreading and losing interlock. Match type of edge restraint to type of traffic.

- Heavy-duty (HD) kerbs
- Light-duty (LD) kerbs
- Mountable kerbs

Measure total length of edging around paved area:

\[
\text{Number of units} = \frac{\text{Total length of edging, m}}{\text{Length of kerb unit, m}}
\]

Add 10% more for cutting, wastage!

SABS-approved kerb units recommended.
1.4 Ordering bedding and jointing sand, cement

**Bedding sand**
Always use good quality well-graded washed river sand, ± 6 to 7% moisture.
Order 2.5m³ of bedding sand per 100m² of paving.

**Jointing sand**
Use fine plaster sand, 100% dry.
Order approximately 10% of bedding sand.

**Cement**
Only required for concreting kerbs, or for subgrade stabilisation.
Use general-purpose (CEM II or CEM III) cement with SABS mark
For subgrade stabilisation, order 1.5 bags (75kg) per m²

**NEVER add cement to bedding or jointing sand**
2.1 Setting out

Spirit level, tape measure, carpenter’s square, stakes, string line

2.2 Excavating

Shovel (round-nose), spade (square-blade), hand tamper, pick

Wheelbarrow
2.3 Base course and paver laying

- Metal rake
- Wooden float
- Rubber mallet
- Nails
- Mason’s chisel
- Chalk line
- Construction crayons
- Screeding board (±3.5m long)
- Rails or pipes (25mm diameter)
- Hosepipe for curves
2.4 Paver cutting

Masonry saw (diamond blades)

Splitter

Permanent marker IS permanent
2.5 Paver handling

Paver cart: best practice

Wheelbarrow

Stack neatly to avoid damaging pavers

Paver cart

NOT good practice: broken pavers, corners
2.6 Mechanical equipment

Jumping jack tamper for compacting base course

2.7 Finishing

Stiff-bristled broom

Plate compactor or vibrator for compacting pavers
2.8 Safety equipment

- **Laying pavers**
  - Safety boots
  - Safety boots
  - Ear protection (power compactor)
  - Ear protection (power compactor)
  - Face mask
  - Face mask
  - Hard-hat where required

- **Cutting pavers or kerbs**
  - Tight-fitting gloves
  - Knee pads
  - Eye protection
  - Ear protection
  - Face mask

- **Excavating, compacting base course and pavers**
  - Safety boots
  - Ear protection (power compactor)
  - Face mask
3.1 Site inspection

- **Finished base level:**
  - $20mm +\text{ paver thickness below finished level}$
  - ie. $25mm$ damp bedding sand will compact to $\pm 20mm$

- **Mark existing utilities on plan to avoid damage to water pipes, electrical wiring, communication lines, sewers during excavation, compaction, etc.**

- Don’t guess where underground utilities are!

- Check slopes, levels:
  - Minimum slope of 1 in 50 in one direction, 1 in 100 in the other to ensure water run-off:
    - **Slope paving away from garage floor level**
    - **Slope 1:100**
    - **Slope 1:50**

- Slope paving away from garage floor level.
3.2 Checking slopes and drainage

Extra drainage required?
Large volume of stormwater runoff, muddy areas, persistent puddles, lush vegetation, wet basement walls, rising damp?
Check “drainability”:
• Dig 30 x 30cm hole, 60cm deep
• Fill with water
• Allow to drain, fill again

After 48 hours: standing water?

Improve drainage
• Dig 30cm deep trench, 10cm wider than pipe, slope 10mm per metre
• Lay 5cm gravel in bottom of trench
• Lay perforated PVC agricultural drainpipe, wrapped in bidum to stop sand/root blockage
• Cover pipe with gravel up to base course level

After 24 hours: no water? Soil is porous enough.
3.3 Setting out

Use 3, 4, 5m method for square corners

Clear vegetation, check levels again, mark out where paving will go

Add extra width if edge restraints will be concreted in

Curves: use hosepipe to outline curve, place stakes at ½ metre intervals along arc

Opposite sides parallel?

Yes if both diagonals are equal
3.4 Base course

1. Excavate by hand or use grader

2. Check levels
3.4 Base course

3. Tamp well to compact (larger areas: mechanical compactor)

4. Check levels again

Check for soft spots

Base uneven, not well-compacted? Paving will take up same contours!
3.5 Base stabilisation

**Why stabilise base course?**
- Improve, densify poor subgrade
- Specified by engineer
- Trafficking by heavy vehicles
- Around fixtures, manholes, drains, etc.

1. Spread dry cement evenly over surface
2. Dig in using TLB or spades until no grey streaks are evident
3. Compact using hand tamper or mechanical compactor as soon as possible after mixing in
4. Sprinkle with water (moist, not soggy) to activate cement hydration
4.1 Kerbing options for HD and LD applications

All kerbing MUST be in place before levelling bedding sand or laying pavers.
4.2 Kerbing options for garden paths and landscaping

Hidden restraint; first paver concreted into place

Paver or kerb laid on edge into concrete

Kerb level with paving

Ride-over edge

Kerbs are always required, even in NO TRAFFIC situation
4.3 Existing building walls as edge restraints

Why does paving need edge restraint?
No edge restraint:
• Pavers move apart
• Structural integrity is breached

No kerbing is required where walls act as edge restraints
4.4 Placing kerbs

- Place 7 to 10cm layer concrete/dagha on outer edge
- Lay kerb unit into wet concrete/dagha
- Use dagha to fill gaps between kerb units

Use rubber mallet to tap units firmly into place, backfill, tamp until pavers are stable

Check that tops of kerbing units are level
5.1 Placing rails

Use rails (or pipes) to ensure even thickness of bedding sand.
- Lay rails on subbase, screed-board length (3m) apart
- Use screed-board to pull bedding sand until thin line shows (top surface of rail)

Don’t use plastic sheeting. Placing bedding sand on plastic:
- Badly affects particle interlock, base structure
- DOES NOT stop weeds from growing
- Stops water from draining through paving

Typical bedding sand layer: 25mm uncompacted
(Compaction typically reduces this to ±20mm)
5.2 Bedding sand moisture content

Quick moisture content check:
Squeeze a fistful of sand

Open your hand:
Moisture is correct if sand forms a cohesive ball

Bedding sand must not be TOO DRY (sand particles fall apart) or TOO WET (moisture squeezes out between fingers)
5.3 Levelling off bedding sand

Screed board must be:
- Good quality timber
- Straight, not bowed
- Strong enough to remain straight under pressure of sand

Start from lowest point, move UP the slope

Don’t:
- Add cement to bedding sand
- Compact bedding sand layer
- Add extra water before/after placing

Pull, don’t saw

Start from lowest point

Slightly damp sand

Use screed board to pull sand into place, level surface
5.4 Removing rails, smoothing surface

- Carefully pull screeding rails out.
- Before paving, use a wooden float to smooth edges, pipemarks, and footprints.
- Add sand: indentations, around edges.
- Don’t allow anyone to walk over bedding sand.
6.1 Laying patterns

- **Stretcher bond**
- **Herringbone**
- **Basket weave**

*Don’t mix patterns, choose one and stick with it!*
6.2 Header course and starting the pattern

Start laying header course (if required) first

Start paving from lowest point, work uphill

Leave gaps for cut pavers; cut, place later

Lay full pavers in pattern

Full and cut pavers: 3 to 4mm joint all around
No paver touches any adjacent paver
6.3 Laying pavers

- Stack pavers within easy reach for efficient paving.
- Cut X into top surface of paver above rodding eye, etc.
- Don’t stand on laying edge.

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Stack pavers within easy reach for efficient paving.

Don’t stand on laying edge.
6.4 Marking pavers for cutting

- Place hosepipe where curve is to go
- Mark pavers using hosepipe as guideline
- Write number in sequence on piece to be placed

- Measuring pavers for cutting
  - Place full paver to touch kerb
  - Mark bottom paver
  - Remove both
  - Place cut piece here
  - Split bottom paver on marked line
  - Split bottom paver on marked line
  - Maintain 3 mm joints!

**X** Don’t cut pieces smaller than 25%
6.5 Cutting and fitting edge pieces

Where joint is required right across paving, use masonry saw AFTER laying

Less than ¼ paver?

Double-cut pavers to avoid narrow slivers

Cut two width-way pavers rather than one length-way unit

Double cut

Header course

Edge restraints

Keep up with main pavers!
6.6 Cutting pavers to a curve

Pavers laid in concrete as edge restraint
Alternate cut and non-cut units for smoother edge

- Leave at least 10 mm on outer edge uncut
- Cut equal slices off BOTH sides
- Don’t force cut pavers into place
- Allow for 3mm joint when marking

Depending on paver size and radius of curve, you may need to cut every paver

Don’t cut slivers
6.7 Initial compaction

Sweep all debris from pavers before compaction

To avoid damaging textured pavers, fix conveyor belting onto vibrating plate before compacting

Use mechanical compactor to vibrate pavers into bedding sand, level surfaces

Keep compactor at least 1.5m from laying edge
6.8 Checking pavers after initial compaction

Check pavers; mark broken/chipped and high/low pavers. Wait till compactor has moved further away/stopped.

High or low paver: remove paver, adjust bedding sand, drop paver back into place.

Damaged paver: remove and discard, drop in new paver.
**STEP 6: LAYING PAVERS AND COMPACTING**

**6.9 Checking and adjusting lines and pavers**

After initial compaction and before spreading jointing sand, correct alignment, line up pavers using crowbar

If necessary, re-compact these areas
7.1 Placing and sweeping in jointing sand

Place small piles of very dry fine sand on compacted paving

Sweep sand evenly across paving, into joints

Don’t push wheelbarrow over laying edge
Don’t add cement to jointing sand
7.2 Final compaction

Thoroughly compact and vibrate jointing sand into joints - keep going till no more open joints appear

Before leaving site, inspect, resand/compact where necessary

Resand/compact again after heavy rains if sand has been washed out

To extend paver life, resand within first six months

Don’t wash sand into joints: “bridge” collapses later

Jointing sand

Bedding sand

Joint fully compacted with dry sand

End of day: sweep excess sand into pile, cover with tarp
7.3 Stabilising jointing sand

Stabilise jointing sand only:
- On steep slopes (>1 in 20)
- Around down pipes
- Along roof overhangs with no gutters

Use bentonite or proprietary sealers

Don't use cement
7.4 Temporary edge restraint

At day end, finish paving at angle, place temporary edge restraint across front of laying edge.

Cover laying edge with plastic if rain is expected overnight.

Push edge restraint up against laying edge, secure.

To avoid obvious “day-end” lines in finished paving, stop paving at an angle.
**Settlement:** Remove paver/s carefully, adjust and/or add more sand, replace pavers.

**Weeds:** Seeds drop into joints, germinate after rain. Remove carefully by hand, or spray paving surface with proprietary weed killer.

**Resand and vibrate:** After six months, or after first heavy rain.

**Efflorescence:** Whitish natural mineral leaching out of pavers will disappear with time, usually after two rainy seasons. Can be removed using acid wash – **expert use only**.

**Utility repairs:** During laying, mark pavers over underground services. Remove jointing sand, pry up first few blocks (two screwdrivers). Place removed pavers aside, clean. Repair drain or clear pipes. Replace base material, compact, place bedding sand layer. Replace removed pavers, brush dry sand into joints. If possible, resand, vibrate complete area.

**Stain removal:**
Cover oil stains with cat litter asap – oil is absorbed, litter is then brushed off. Other stains: scrub with hard brush and proprietary detergent, wash off with clean water.

**Surface sealants (not recommended):**
- High initial cost
- Abrasion removes sealer from surface
- Regular maintenance required