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

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OVERVIEW OF PAVING PROCESS

STEP 1: Materials

STEP 2: Tools

STEP 3: Prepare base course

- Set out
- Excavate
- Level
- Stamp

STEP 4: Lay kerbs

- Lay kerbs

STEP 5: Place bedding sand and screed

- Place bedding sand and screed
- Screed

C* Check levels
C** Check lines, patterns and individual block levels
Must complete steps 5, 6, and 7 in one day

**STEP 6:** Lay, compact pavers

Start at lowest level, move up the slope

**STEP 7:** Place jointing sand

Smooth → Lay pavers → Compact → Sweep in jointing sand → Compact
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.

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

SABS-approved pavers recommended.
1.2 Calculating paver quantities

Measure radius ($r$) in metres

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

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

Allow enough un-paved space around tree trunks to allow water to reach roots.

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

Add 10% more for cutting, wastage!

Pavers are sold per square metre ($m^2$).
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

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

Measure total length of edging around paved area:

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
- Crowbar
- Screeding board (±3.5m long)
- Rails or pipes (25mm diameter)
- Hosepipe for curves
- Construction crayons
2.4 Paver cutting

Masonry saw (diamond blades)

Splitter

Permanent marker IS permanent
2.5 Paver handling

Paver cart: best practice

Stack neatly to avoid damaging pavers

Wheelbarrow

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
- Eye protection
- Ear protection
- Knee pads
- Tight-fitting gloves
- Face mask

**Cutting pavers or kerbs**
- Ear protection
- Eye protection
- Face mask

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

**Hard-hat where required**
3.1 Site inspection

- **Slope paving away** from garage floor level

- **Finished base level:**
  - 20mm + paver thickness below finished level
  - ie. 25mm damp bedding sand will compact to ±20mm

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

- Check slopes, levels
  - Minimum slope of 1 in 50 in one direction, 1 in 100 in the other to ensure water run-off

- **Don’t guess where underground utilities are!**
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 24 hours: no water? Soil is porous enough.

Don’t lay pipes in wide shallow trenches
Don’t cover pipes with loose sand

Use spirit level to check slopes and levels, in BOTH directions

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
### 3.3 Setting out

- **Perfectly square corner**
  - Use 3, 4, 5m method for square corners

- **Curves**
  - Use hosepipe to outline curve, place stakes at $\frac{1}{2}$ metre intervals along arc

- **Opposite sides parallel?**
  - Yes if both diagonals are equal

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

- **Add extra width if edge restraints will be concreted in**
3.4 Base course

1. Excavate by hand or use grader

2. Check levels
3.4 Base course

Tamp well to compact
(larger areas: mechanical compactor)

3

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

4

Check levels again

Check for soft spots
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

- **Bedding sand**
- **6:1 sand:cement mortar bed**
- **Concrete haunching behind each joint**

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

Hidden restraint

Ride-over edge

Kerbs are always required, even in NO TRAFFIC situation
STEP 4: LAYING EDGE RESTRAINTS OR KERBS

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

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Bedding sand must not be TOO DRY (sand particles fall apart) or TOO WET (moisture squeezes out between fingers)
### STEP 5: PLACING BEDDING SAND

#### 5.3 Levelling off bedding sand

Start from the lowest point.

- Use screed board to pull sand into place, level surface.
- Slightly damp sand.
- Pull, don’t saw.
- Screed board must be:
  - Good quality timber
  - Straight, not bowed
  - Strong enough to remain straight under pressure of sand

**Don’t:**
- Add cement to bedding sand
- Compact bedding sand layer
- Add extra water before/after placing
5.4 Removing rails, smoothing surface

Carefully pull screeding rails out before paving, use wooden float to smooth edges, pipemarks, footprints.

Add sand: indentations, around edges.

Don’t allow anyone to walk over bedding sand.
6.1 Laying patterns

Don’t mix patterns, choose one and stick with it!
**STEP 6: LAYING PAVERS AND COMPACTING**

### 6.2 Header course and starting the pattern

Start laying header course (if required) first

Start paving from lowest point, work uphill

Lay full pavers in pattern

Leave gaps for cut pavers; cut, place later

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.

- Don’t stand on laying edge.

Cut X into top surface of paver above rodding eye, etc.
6.4 Marking pavers for cutting

- Measuring pavers for cutting
- Place full paver to touch kerb
- Mark bottom paver
- Remove both
- Place top paver here
- Place cut piece here
- Split bottom paver on marked line
- Split bottom paver on marked line
- Write number in sequence on piece to be placed
- Maintain 3 mm joints!

Don’t cut pieces smaller than 25%

- Place hosepipe where curve is to go
- Mark pavers using hosepipe as guideline
6.5 Cutting and fitting edge pieces

Keep up with main pavers!

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

Double-cut pavers to avoid narrow slivers

Header course

Double cut

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

Edge restraints
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
- Don’t cut slivers

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

Sweep all debris from pavers before compaction

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

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

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.

Chipped corner
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

Don’t use cement

Use bentonite or proprietary sealers
STEP 7: PLACING JOINTING SAND

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.
STEP 8: MAINTENANCE

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.

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.

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.

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