

SUB-GRADE TESTING

Sub-grade Strength	Weak	Moderate	Strong
Walking & heel test footprints	Walking leaves distinct footprints	Heel leaves an impression	Neither walking nor heel leaves an impression
Driveways (light vehicle traffic only)	175mm base material	125mm base material	75mm base material
Pedestrian use only	75mm base material	50mm base material	No base material required, just sand

EXCAVATION EXAMPLE

Paver thickness (driveway)	60mm
Bedding sand (compacted)	30mm
Base Course (moderate sub-grade firmness)	125mm
= TOTAL EXCAVATION DEPTH	
(below finished paving level)	215mm

BASE COURSE MATERIAL

- Should be crushed rock including particles of all sizes.
- No particles should have a diameter more than one third of the thickness of the required base course layer.
- It should contain no soil or plant material.
- Lay geotextile fabric first where soft clay, which might push into and through the base course material.
- For layers of 100mm thick or more, use 40mm all in aggregate.

3. Preparing the Base Course

This should also be laid in layers no thicker than 100mm and compacted to a uniform dense condition, especially around manholes and kerbs. The finished texture of the base course should not allow bedding sand to filter through. The final surface of the base course should match the contour of your finished paving with no bumps, and no holes deeper than 10mm.

4. Placing the Edging

Edging is important to prevent sideways movement of pavers, and to stop bedding sand leaking out.

Edging options

- Soldier Course of either standing or flat pavers (see [Illustration 3](#))
- Paving Kerb – segmented raised kerbing
- Paving Edge – concealed, underground PVC strip
- Haunching – concealed concrete strip (see [Illustration 4](#))

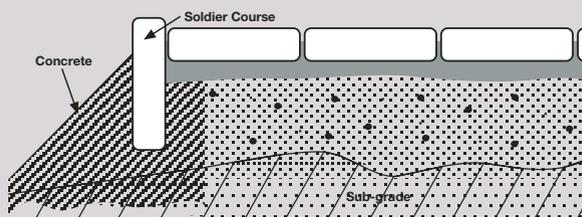


Illustration 3: Soldier course of standing pavers

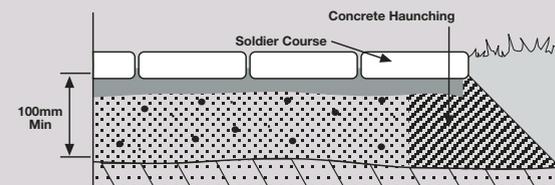


Illustration 4: Concealed haunching

5. Preparing the Bedding Sand Base

Bedding sand supports your pavers, but will not hide irregularities in the base course. It should be coarse river sand (not beach sand), and damp but not wet.

1. Don't compact bedding sand directly. It compacts under the pavers. To test how much the thickness will reduce, spread some sand over a small area. Lay a paver on top and thump that with a rubber hammer. The resulting reduction in sand thickness will tell you how much your sand compacts.
2. Pave in manageable sized areas. Spread sand only over an area you know you can finish in one session and get to without walking on. Spread the sand to slightly more than the depth your rubber hammer test indicated would produce a compacted sand depth of between 20mm and 30mm. You will usually need to start with the uncompacted sand bed between 5mm and 10mm thicker than its compacted depth.

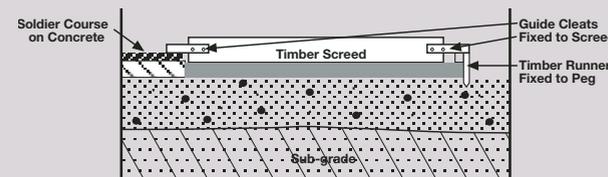


Illustration 5A: Screed on runners

3. Screed the sand to a uniform level. As with any screeding, you need temporary guides or runners at each side to run your screed board on.

If you have already laid a Soldier or Kerb course, you may be able to use that to support your runners. If the area to be paved is too wide you'll need to drive pegs, and fix your runners to them, just like concrete boxing (see [Illustrations 5A and 5B](#)).

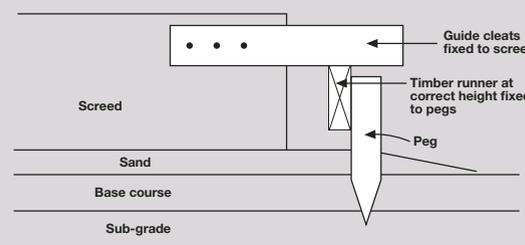


Illustration 5B: (Detail) Not to scale

6. Laying the Pavers

1. Start from the straightest convenient edge, and lay your pavers with a space of 2mm to 4mm between them. Some pavers have spacer nibs which achieve that automatically. The space allows joint sand to penetrate around the pavers. Always start at the bottom of sloped areas.
2. Lay all full pavers first: then cut and lay any pieces. Cut pavers with a diamond concrete saw, paver splitter (both available from hire centres) or, for small areas, a bolster.
3. Don't run vehicles over the paving until it's completely finished. To get a loaded wheelbarrow across, lay heavy planks down as running boards.

7. Compacting the Pavers

Your pavers now need to be consistently compacted over the whole area. Include a minimum of three passes with compactor each at 90 degrees to each other.

1. For a small area, use a rubber hammer on a short length of heavy timber: say a piece of 150 x 50mm. For most other jobs, use a plate compactor.
2. When the pavers are all compacted, sweep joint sand over the whole area and compact again. The compactor will drive the sand into the joints. Keep sweeping and compacting until all joints are filled.
3. Joint sand should be fine dry plaster sand with angular particles that lock well together. It is also sold as paving sand and some types incorporate a weed preventative.

Maintenance

In most cases maintenance will be minimal. If some pavers settle unevenly, or if underground services need to be exposed, your paving may require re-laying. To do this simply follow the procedures given above. It would pay to add a layer of weed matting below the sand layer to stop any weeds that could grow up and between your pavers. Where paving is cleaned or has water running across it the joint sand may require topping up periodically. To enhance the appearance of your paving special sealers are available. These may require reapplication over time. Ask at your PlaceMakers Firth Centre.

NOTE: Building or landscaping work may have to comply with the New Zealand Building Code and your local Council requirements. Talk to the building inspectors at your council. They can provide helpful details of such matters and say whether or not a permit is required for the work you wish to do.

Wet Cast Paving

Choose your site carefully, noting potential problems such as drains, trees and electrical wiring.

Check the height of the surface to be paved, take measurements and draw plans. Set the paving below the floor level and slightly sloped away from the house, or areas that you would want to keep water away from.

Choose your pavers and design, measure up and order.

If the ground is firm and well compacted excavate to a depth of 75mm, then move to next step. If soft or a filled site, excavate 75-100mm deeper and add 75-100mm of top course and compact well with a plate compactor.

Now set up string-lines to give you lines to follow for both height and gapping.

Now you can choose one of two laying methods:

1. Spread and level a fine loose bedding sand, dampen and lightly compact. Then screed level and choose your laying pattern. This method is quick, easy and if the levelling is done well, gives a great finish.
2. Prepare a mix of sand and cement with water to put on the base. Roughly level and then tap your pavers down into it. Remember, where they sit they stay. This method requires more work, as precision laying is far less forgiving. Once the sand and cement mix hardens, your pavers can't be easily lifted or moved.

NB: It is critical to allow a minimum gap of 8mm between pavers, although a 10mm to 15mm gap is recommended.

This gap allows you to have some flexibility if there are any minor height discrepancies and also removes the effect of any slight size variations that may occur in hand made pavers.

Some pavers may need cutting. You can hire a suitable saw from hire centres or use an angle grinder with a masonry blade. Always read and familiarise yourself with the operating instructions of any machinery used and take all safety precautions.

Do not use compaction equipment over pavers

Hose off pavers, let them dry, then use either pave joint sand, mortar pointing, or pavelock grouting sand. It is important to follow the product directions. If compaction is required, go over pavers with a rubber mallet.

Use dry sand and cement mix to trowel an edge from the top of the paver, away at a 45 degree angle to give the pavers a border, or haunch, to hold them in place.

LAYING PAVING STONES

YOUR COMPLETE HOW TO GUIDE

GETTING STARTED

Do you want a more interesting and durable approachway to your property? Concrete pavers are a practical way to lay hard-wearing paths, patios, courtyards and driveways, without just pouring plain concrete. Pavers can be laid in stages, and even better, they can be lifted if drains, cables or pipes underneath ever need servicing.

Let's Make a Plan

Do a scale drawing of the area you want to pave. From that, estimate the quantities you need. Remember, some extra materials will be required for cutting, depending on the size and shape of the area you're paving.

Ideas & Inspiration



Materials

Buy all your pavers from one place and from the same batch if possible, to avoid differences in colour that can result from different batches. If you can't buy all in one batch, mix the pavers up before laying. Please note: pavers may also display a "whitening" otherwise known as efflorescence effect. This is a characteristic of many masonry products and does diminish over time. If you have any trouble working out the quantities of each paver you need, PlaceMakers offers a free estimation service.

Like any building job, you've got to get the foundations right. Extensive areas of paving, particularly where large areas of soft topsoil have to be dug out, require large volumes of materials. There are four main materials:

- Pavers
- Bedding sand
- Base course material (usually)
- Joint sand.

(See Illustration 1)

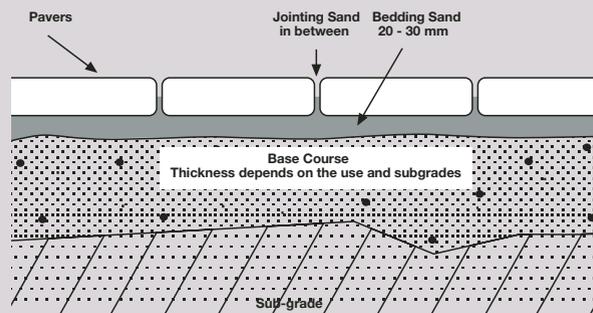


Illustration 1

Ordering and Sorting Materials

On smaller sites, piles of materials can crowd the area you want to pave. If that's the case, take delivery of the later stage materials only as you are ready to use them. That means digging out and laying the base course material first, then get the bedding sand and pavers delivered.

Tools

✓	Tape measure	✓	Broom
✓	Pencil	✓	Screed board
✓	Stringlines	✓	Plate compactor (hired)
✓	Spirit level		
✓	Spade	✓	Concrete saw/Paver splitter/Bolster (hired)
✓	Shovel	✓	Weed matting (optional)
✓	Rake		

Choosing the Right Paver

Criteria

Weight of traffic

Some pavers can only withstand pedestrian use. Others will take light vehicle traffic. Even stronger pavers will handle heavy vehicles. Check the specifications with PlaceMakers.

Paver shape and size

Your choice should suit the size and shape of the area being paved.

Laying pattern: Again, this should suit the area being paved.

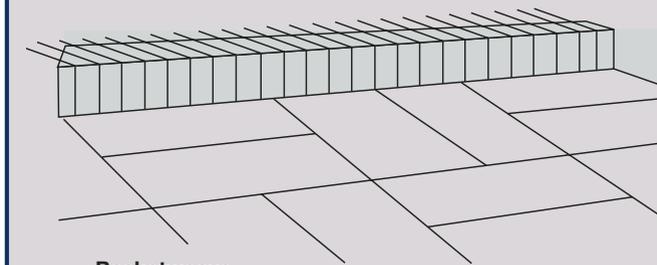
Laying options include: 45 degree herringbone, stretcherbond, basketweave, soldier courses along the edges (see Illustration 2).

Check the manufacturer's recommendations.

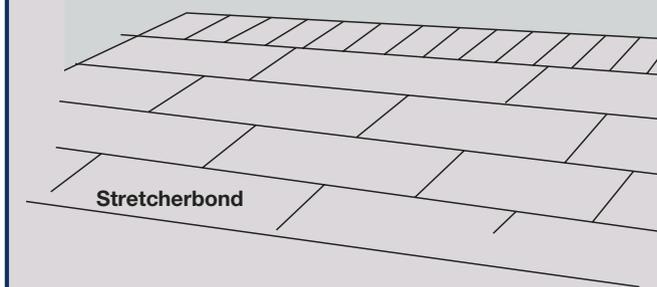
Dry Cast Paving

1. Digging Out

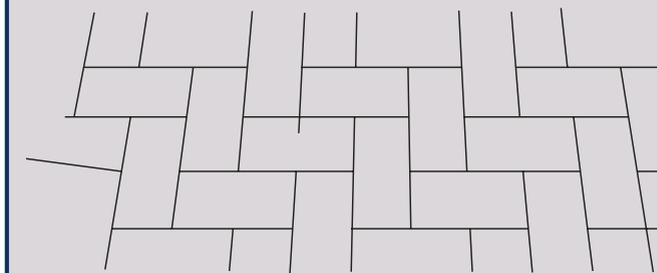
- Determine the finished level of the highest part of your paving. Against buildings, that should be at least 150mm below the level of concrete floors, or below the ground level under timber floors. From there, your paving should slope between 15mm to 30mm per metre away from the building. This prevents puddling or running under buildings.
- Dig out the area to be paved to the combined depth of the three layers, i.e. pavers depth plus bedding sand and base course depths.
 - Paver thickness is set by the expected weight of traffic.
 - Bedding sand is to be laid loose but compacted to achieve a depth of 30mm.



Basketweave



Stretcherbond



Herringbone

Illustration 2: Various Patterns

- Base course is the only variable. It is the foundation of your paving. The thickness of the base course depends on the firmness of the underlying ground, or "sub-grade." Soft sub-grade has to be dug out deeper because it needs a thicker base course than hard sub-grade. To test the sub-grade, dig down to about 200mm in several places within the planned paved area, then test the hardness of the sub-grade by walking on and stamping your heel into it. Refer to tables over-page.

2. Preparing the Sub-grade

Even after excavating, the sub-grade might have holes that need filling to bring it up to the desired level. Fill these with base material, and compact in layers no more than 100mm thick using a plate compactor or a rammer for small areas. Thorough compaction is vital especially at edges. The finished sub-grade level should be within 20mm of the contour of the finished paving.

Produced in association with



The Building Research Association of New Zealand

Please Note:

Whilst the advice and recommendations contained in this brochure have been produced with proper care, they are offered only with the objective of assisting those interested in home improvement projects and PlaceMakers does not accept responsibility for the advice, recommendations, etc. contained herein.

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