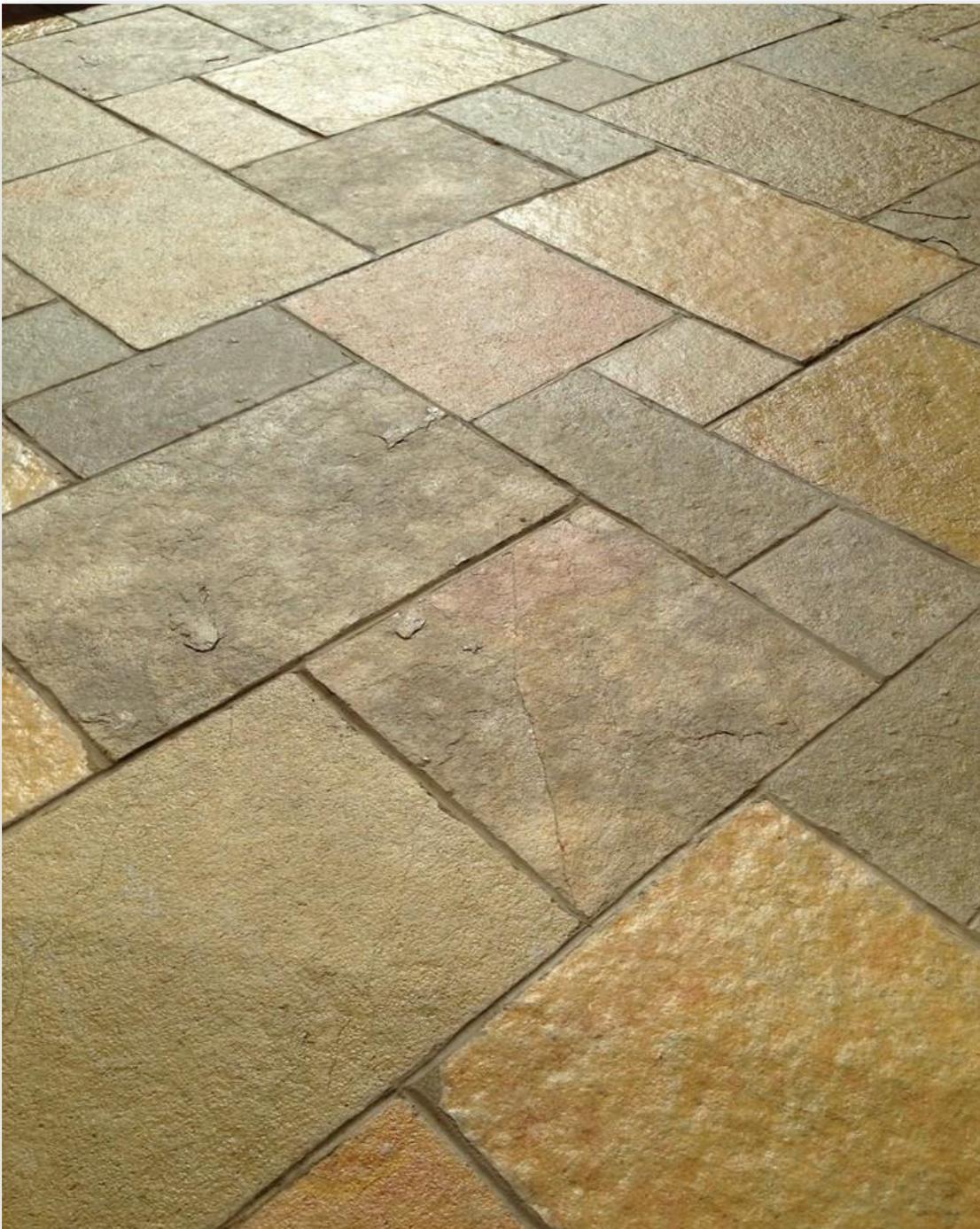


Westcrete

Landscaping & building materials

Natural Stone: Laying Your First Patio



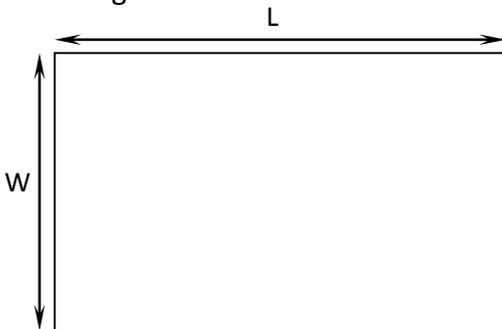
Preparing the Job

Calculating the area

The first thing to be done before any landscaping and patio project is started is to work out, as accurately as possible the area of paving that is required. Fairly obviously regular shapes such as rectangles and circles are easier to find the area of than irregular ones. Invariably though no one has a perfectly clear cut and straight edged area that they want to pave, and therefore getting a decent approximation of the area to be covered is somewhat more difficult.

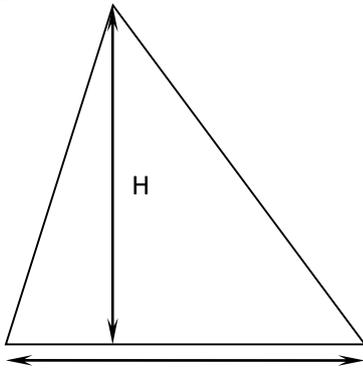
The number one rule to finding the area of an irregular shape is to split it down into regular counterparts, underestimating and overestimating as little as possible. Initially though, you need to know how to find the area of 4 major shapes, these being a rectangle, a triangle, a circle and a trapezium. If you already know these, feel free to read on from the diagrams below:

Rectangles



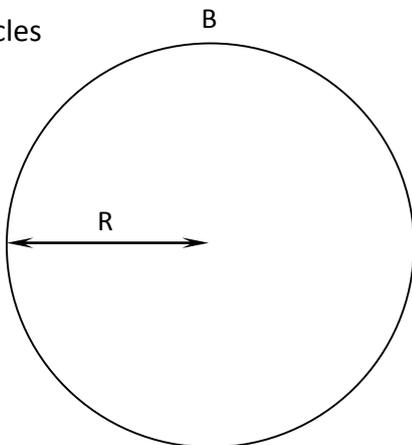
The easiest of the four to calculate. A rectangle's area is simply found by multiplying the Width and the length ($W \times L$) i.e. a patio spanning across the front of a house, 5m (16.4') and coming away from the wall 10m (32.8') would have a total area of 5m x 10m so 50 square meters or 538 square feet.

Triangles



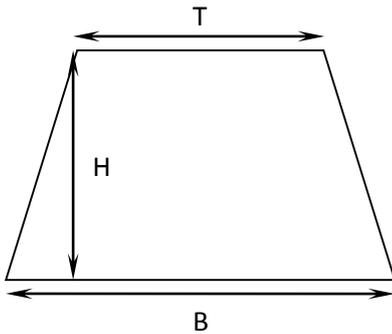
A triangle's area is found by measuring the base (B) and the height (H) and then multiplying them together, this value then has to be divided by 2, so $(H \times B) \div 2$ is the area of a triangle. It is worth noting that any side of the triangle can be the base. But the height MUST always be measured between the base and the opposite corner like the diagram to the left.

Circles



Circles only require one measurement to be made before their area can be calculated, the length between the centre of the circle and the edge known as the radius. This then needs to be multiplied by pi (a Greek number that approximates to 3.14) and then by itself so the area of a circle is found by doing $3.14 \times R \times R$

Trapeziums

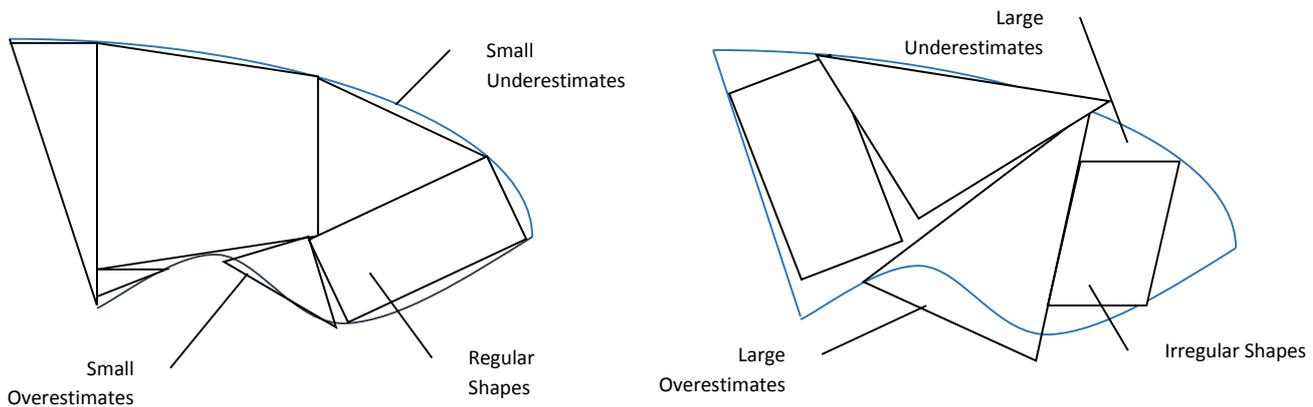


Finding the area of a trapezium is similar to that of a triangle the base (B) and height (H) has to be found, and then the Top (T) also needs to be measured. The way to work out the area though, is exactly the same. Add T & B then divide this by 2 finally multiply H to find the area of the trapezium. (Area = $\frac{1}{2}(a+b) \times h$)

One final thing that may need to be done is calculating sections of circles. This is simple enough, just estimate what fraction of a circle it is (half, quarter etc.) and take the corresponding amount of the full circle's area.

Now that you are familiar with what calculations may need to be done, let's move onto actually calculating the area of your project. It is impossible to cover every eventuality as all areas will be different in size and shape, however, the main thing to remember is to get as close to the edges of the area you are calculating as possible.

The example below shows on the left an irregular shape that has been split up well, and on the right one that has been split up poorly.



The two images are both a bit on the extreme side, you may not need to be as accurate as the image on the left; however, you almost certainly would want to be more accurate than the one on the right. The better the approximation, then the more accurate you can be when ordering. But spending weeks measuring isn't necessary as when you get to the laying stage (chapter 2.3) you will see that you still have plenty of time to be happy with how your patio looks before it is a permanent feature.

How we will help?

When you have taken your measurements or even a rough sketch of the area then bring as much detail as you can to us and we will aid in calculating or just double check the area for you free of charge as part of the quotation service. In some cases and if you are really unsure then it may be possible to do a site visit to aid in the measuring process.

Don't Forget that we are here to help you and give as much assistance needed so that you feel confident in proceeding on with your patio planning.

It is always helpful to provide measurements in metric and to assist you in converting reference can be made from the table below.

Imperial		Metric	
1 inch [in]		25.4 millimetre [mm]	
1 foot [ft]	12 in	0.3048 metre [m]	304.80 mm
1 yard [yd]	3 ft	0.9144 m	
1 Cubic Ft		0.0283 Cubic m	
1.Sq. ft		0.093 Sq m	
1 Pounds [lbs]		0.4536 Kilogram [kg]	
1 CWT [Hundredweight]		50.8 kg	

Preparing the Ground

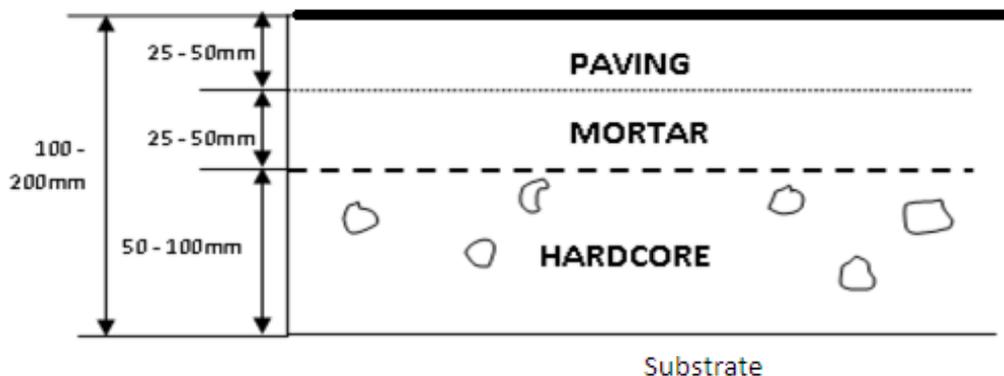
Once the area you are planning on paving has been decided upon then it is time to start preparing the ground. How you will do this depends primarily on what is currently in place in the area you are planning on landscaping, but the final result should be the same. What you have to bear in mind is that the area you are paving does not want to rise above the surrounding area, this means you need to dig into the ground a minimum of 100mm (4 inches) this allows space for the sub-base(covered in 1.3) the mortar and the paving slabs.

First of all you are likely to be in one of two categories:

- A. A brand new landscaping project, going over grass or soft earth.
- B. A replacement project where an old patio will have to be removed before the new is put in place.

The second requires one extra step which is taking up the old patio slabs, but these old slabs can come in handy because they can be broken up and used as the sub-base.

It is fairly simple to do the initial preparation on the ground as it doesn't require a great level of accuracy, anywhere between 100 - 200mm deep is fine because any area where it is a little deeper than necessary will be filled with hardcore anyway. The diagram below gives an idea of the layers that your completed patio will have, remember this is a natural stone patio so even the paving slabs are going to be composed of varying thicknesses.



As can be seen, the preparation of the land does not need to be perfect, as long as it is above the minimum depth. It is also worth noting that the variation in paving slabs is significant and this can be compensated by increasing or decreasing the quantity of mortar depending on the thickness of the paving slabs.

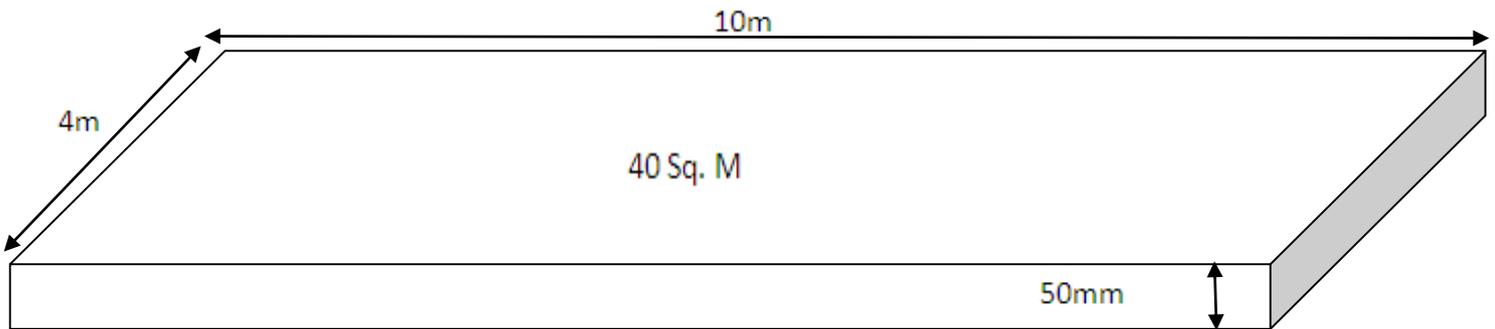


***Where you have soft ground it is worth considering a geotextile membrane below the hardcore to provide additional sub base strength and stabilisation. This will also allow the water to filter through.**

How much Hardcore (Sub-base) do I need?

The amount of hardcore needed as a sub-base normally ranges between 50-100mm in depth. At Westcrete we sell hardcore also known as scalpings in bulk bags and loose. The table below provides you with a method of calculation to work out the coverage you require.

APPROX. BULK BAG COVERAGE CALCULATIONS			
20mm Scalpings (Hardcore)	Depth	Area Sq. M	Area Sq. Yds
	50mm / 2"	10	12
	75mm / 3"	7.5	9
	100mm / 4"	5	6



As an example using the diagram above the total area is 40 sq. metres and would require a total of 4 bulk bags to cover at a 50mm depth.

The method used to calculate the area of the rectangle (chapter 1.1) is by multiplying the width (4m) by the length (10m) giving to a total area of 40 sq. metres.

It is usual to order aggregates in tonnes however if you prefer you can order in cubic metres. The table below will assist you in calculating the tonnage required and the equivalent in cubic metres.

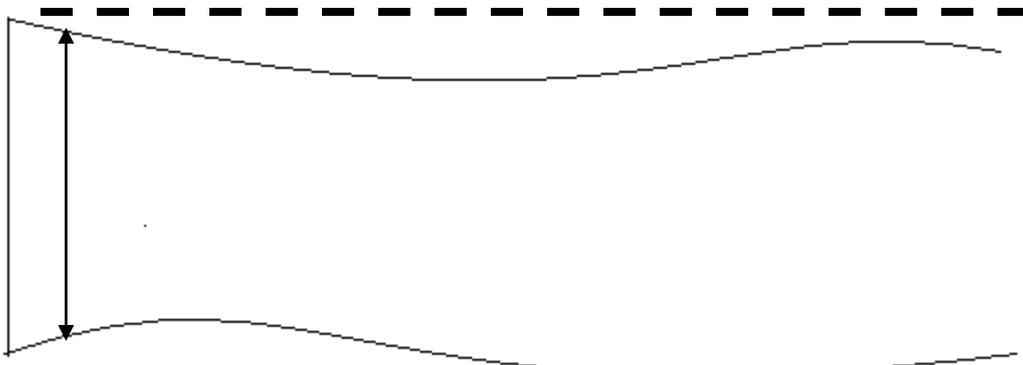
Weight of 20mm Scalpings (Hardcore)	Per cubic metre	Per cubic yard
	1800kg (1.8 Tonnes)	1400kg (1.4 Tonnes)

To calculate the volume of the sub-base of the diagram above the method used is by multiplying the length (10m) x width (4m) x depth (0.05m). The total volume equates to 2 cubic metres.

With the table above now you can work out the quantity of hardcore needed with the total volume being 2 cubic metres the total weight required will total 3.6 Tonnes.

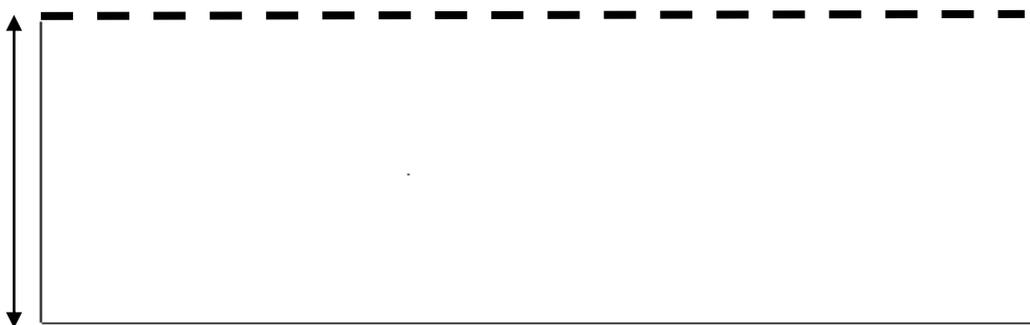
Adding the Hardcore

When adding the hardcore always make sure you have a level and firm substrate to prevent a miscalculation and the need to purchase more hardcore.



Uneven, Irregular, Unstable or Soft Surfaces

As the diagram above shows that due to the substrate being uneven and/ or unstable some of the hardcore would be 'lost' and therefore the calculated amount required would be incorrect and more hardcore will be needed to level the area.



Level Surface

Once the hardcore is placed on a level surface it needs to be level and then thoroughly compacted down to form a firm base to work on. Methods of compaction include rolling and the use of vibrating plates.

Once compacted, the level of the hardcore/ scalplings should be checked. Any deviations from the required level should be corrected by raking off or topping up as appropriate and then finally re-compacted to the correct level.

Ready to Start?

When you have decided what natural stone you will be using for your patio you may need to think about the following so you are fully prepared to start the job!

Calibrated or Non-Calibrated

Calibration is the process whereby the stone is put through a machine to achieve flags of approximately the same thickness. The stone will retain its natural riven surface but will show the calibration tool marks on the underside. (See image below RHS)



Non Calibrated Indian Stone can vary from anything between 15-40mm in thickness making it harder to lay the slabs as this involves making sure your paving is level once bedded. (See image above LHS) The mortar bed will need to be adjusted to suit the thickness of the paving.

Tip for You!

The Non Calibrated Paving may cost less for the product but can sometimes cost more in labour.

Cutting

Natural Stone products come in a variety of shapes and sizes and theoretically speaking cutting can be minimised but this not always the case. If your project involves a lot of cutting we advise the hire of a powered cutting tool incorporating a diamond tipped blade (advise the hire shop of what you are intending to cut, and ensure that a suitable diamond tipped blade is selected). Its use will ensure accurate clean cuts are achieved but please use with care and also make sure that your hire shop issues you with full instructions and relevant safety equipment including goggles & dust mask.

Sizes & Joint Widths

All dimensions quoted are nominal and are for guidance only. It is recommended to dry laying natural stone paving prior to commencing full installation of the project to satisfy that planned paved areas and features such as circles meet with the installer's satisfaction. The nominal paving sizes and quoted usually allow a nominal 8-14 mm joint width. When laying random paving and circles with their fettled edges joint widths may, depending on the paving type and laying pattern chosen, vary between 8mm to 25mm.

Colour Variation

The beauty of natural stone is its colour variation and texture however this will vary between batches so for larger jobs you may want to consider buying enough for the complete project and avoid buying more from a later batch.

Natural stone paving is coloured by nature and significant variations in colour will be found when comparing individual paving stones in a pack. Only when the paving flags are viewed as a mass area will the overall colour effect be seen.

Samples can be an uncertain area as almost every piece of natural stone can vary in colour and texture so it may not be representative of the product. We would however recommend you see a sample of the product in the crate before purchase.

Buying from photos, catalogues, websites or seeing one or two sample paving flags is not advised unless you have previous experience of the products being purchased.

We recommend that natural stone paving is always at first 'dry laid' prior to permanent installation so as to gain the consumers and / or the contractor's acceptance of colour, quality and texture.

Which Side is Up?

The sides of the flags are usually tapered inwards, so that the top surface of the flag is slightly larger than the underside. This helps ensure accurate fitting, allowing joints to maintain at a standard width, and also ensures that any mortar jointing is firmly held in place.



Top surface should normally have, neat, square edges. These are usually hand-trimmed, and are known as 'fettled', which refers to the slightly-less-than-perfect nature of the edges, emphasising the natural origin of the stone and distinguishing it from the dead-straight, machine cut or moulded accuracy of manufactured products.

Tip for You!

Lay two pieces on the floor side by side, if the joint looks like an upside down "V" then that is the correct way up.

Mortar, Mixes & Methods

What is Mortar?

Mortar is a workable paste of Sand and cement and is used in this instance to lay paving securely. A recommended Mortar ratio to use when laying a patio would be 5 Sharp Sand: 1 Cement, this will provide a firm bond between paving and the sub-base (scalpings).

The sands and the cement have to be carefully mixed by hand or in a mechanical mixer before adding any water. Make sure you don't use dirty water, as this could damage the final strength of the mortar.

When mixing by hand, the sand and cement should either be heaped up on a mixing board or in a wheelbarrow and repeatedly turned over and over until thoroughly mixed. The colour of the dry mix will change as the cement is distributed throughout - there should be no 'streaking' of cement and no clumps of pure sand or pure cement.

Once the dry ingredients are mixed, the water can be added. If any additives are being used, such as our Mortar Admix, they are normally added to the water, and then mixed in, rather than being directly added to the dry ingredients. A "well" is formed in the centre of the mixed heap and water carefully added to it and then the dry material is folded in. This method is repeated until the required consistency is attained.

***Don't forget to add your plasticiser Mortar Admix which provides a more workable mix.**



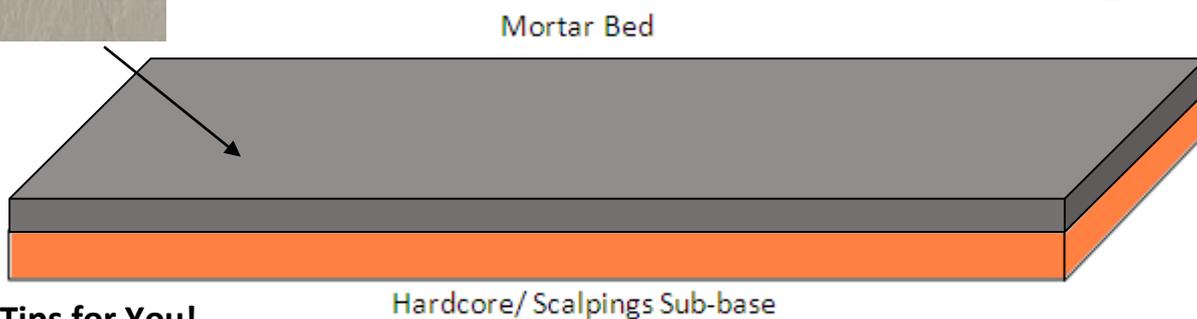
Why use Mortar Admix?

It is an air entraining liquid plasticising admixture which forms extremely stable air bubbles in mortar mixes

- Reduces bleeding
- The admix improves workability and freeze/thaw resistance in both dry and wet mortars
- Easier tamping down and alignment
- Improves trowel ability
- Makes using the mortar less tiring
- Replaces lime in mix, hence reduces possibility of lime bloom and efflorescence.

Method of Laying Mortar

Full Mortar Bed Layout



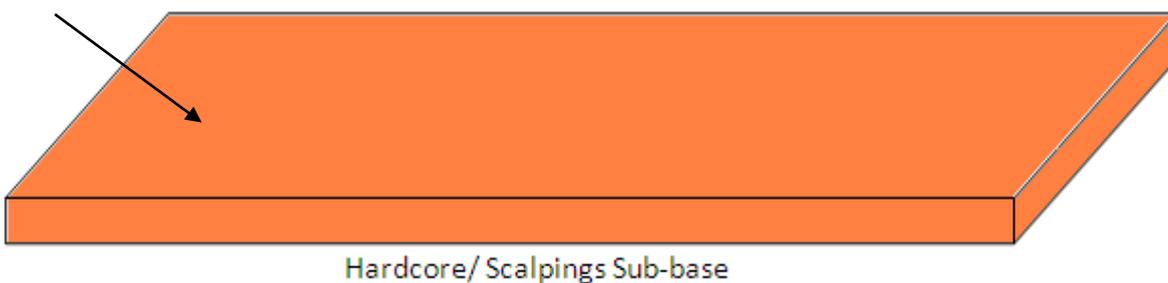
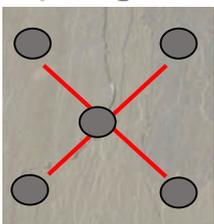
Tips for You!

Make sure the mortar is deep enough to allow you to finely set the slabs to a set level.

Do not walk on the paving for at least 24 hours-48 hours.

The '5 Spot' Laying Method - **Not Recommended**

Spotting



The '5 spots' of mortar method of laying paving is not recommended by professional landscapers and can cause significant problems once the job has been completed.

- Voids can fill with water and can create subsidence or instability in the finished patio. The resident water pools under the paving can cause staining in the face of more porous paving such as Fossil Sandstone.
- Voids are created beneath the flags which can cause them to fracture when loaded through lack of support.
- The voids can become infested by insects or burrowing animals which can again create subsidence or instability in the finished patio.
- The mortar spots are more likely to promote flags to rock when traversed.



Flagstones laid on a full bed of semi-dry or moist mortar don't suffer this problem. There is less moisture present to be wicked to the surface, and even if some wicking does take place due to extreme porosity of the stone and/or high ambient temperatures, the **whole** of the flag is supported by the mortar bed, so there is no evidence on the surface.

Jointing mortar and Compounds

Mortar pointing is the most common method used for sealing the joints between each slab.

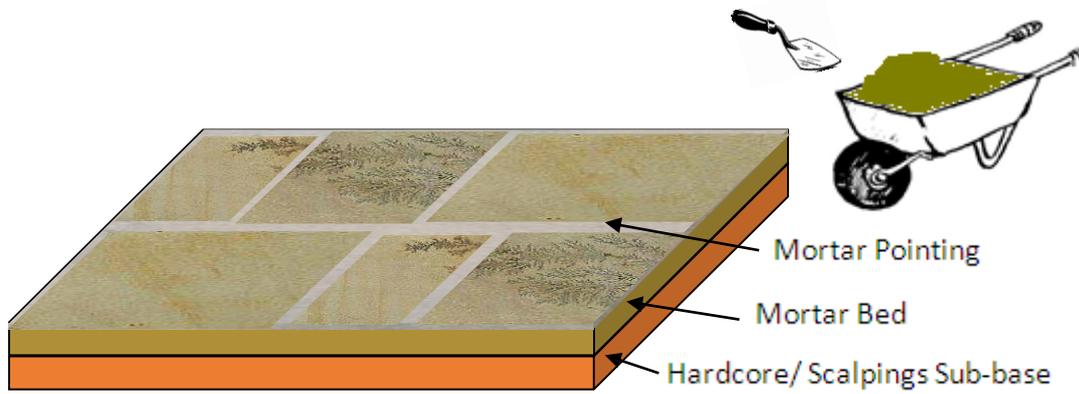
Preparing the mix

The following is needed to make a mortar most commonly used for paving:

The ratio required is 4 Building Sand to every 1 Cement giving you a 4:1 mix.

***Don't forget to add your plasticiser which provides a more workable mix.**

It should be just damp enough so that it clumps into a ball when compressed in the hand, but no water should dribble out between the fingers. Not wet enough so it stains the slabs.



Pointing Process

To begin with load a certain amount of mortar onto a brick trowel and trim any overhang to avoid the mortar spillage and stains on the paving. Next thing to do is using the loaded brick trowel along the joint you wish to point and then using a smaller pointing trowel; feed the mortar into the joint, making sure you are extra careful to avoid excessive staining on the edges of the slabs.



- Pack down the mortar with the edge of the pointing trowel until the section of joint is filled. Move along the joint and repeat the operation until the entire joint has been filled with mortar.
- Next, strike (polish) the mortar by running the edge of the pointing trowel at a slight angle along the top of the filled joint.
- Allow the mortar to become quite dry, say 1 hour or thereabouts on a fine, but not hot, day. Use a soft brush to sweep across the joint to dust off any mortar left on the surface of the slabs.



No need to worry



Don't forget we sell **Cemstrip**, an environmentally friendly cement remover, removing ingrained dirt, grease and stains from paths and patios.

The mortar should start setting within 2 hours, faster in summer, slower in winter. It should be protected from foot traffic for at least 48 hours and from vehicles for at least 5 days

Time a Factor?



Geofix Paving Jointing Compound is a quick and easy way of applying a permanent rigid joint with no special machinery or equipment required with minimal effort compared to using traditional mortar.

! Make sure paving area is dry and clean before opening the compound.

Once vacuum bag is open you have approx. 30-60 mins before product is unusable!

3 Simple Steps.....

1. Opening the bag and sprinkle the compound over the paving area.
2. Using a soft brush, pushing the compound into the joints at a 45 degree angle.
3. Geo-Fix Paving Jointing Compound is easily finished by compacting with a pointing tool saving valuable time compared to traditional wet pointing.



It is a cement free and applied dry it does not leave the unsightly and difficult to remove cement stains associated with traditional mortar.

Unlike mortar joints Geo-Fix Paving Jointing Compound is totally resistant to freeze-thaw cycles and will not crack or pop out with frost.

! Make sure that your paving area uses a free draining sub base!

Protecting your Patio

Understanding Sealants

When a patio is laid you have an option of using a sealer to help keep the paving looking pristine and helps prevent mould growth. Long lasting protection from water damage.

Sealants can have a powerful effect on the appearance of paving, and that effect may well be permanent and irreversible. That's why all sealants should be tried out in a reserved corner or on surplus paving before applying it to a wider area.

Impregnators

These sealants actually penetrate the stone itself, providing a longer life-time as the protection is contained within the stone, and not simply on the surface. This sealant allows the stone to 'breathe' and so retained moisture can escape.

Our Recommendations and Reasons

Product	Description	Benefits	Limitations
Everbuild 405 Path & Patio Seal	Acrylic coating used to seal and protect patios, paths, natural stone, concrete and block paving from the effects of the sunlight, water, oil, petrol and fungal/ moss growth.	<ul style="list-style-type: none">• Solvent free formulation- non-flammable, low odour• Improves appearance of dull paths/stone• Acts as a dust proofer and facilitates easier cleaning• Dramatically improves water and rain resistance• Prevents unsightly mould growth	<p>Do not use if rain is imminent</p> <p>Do not apply below 5°C</p> <p>Use only as directed. Store only in original container</p>
Geo-Fix Stone Protector	Specially developed to provide highly effective long lasting protection on natural stone and mineral surfaces. The product is totally invisible and will not change the colour or appearance of the stone.	<ul style="list-style-type: none">• Solvent free formulation- non-flammable, low odour• Can be used internally or externally• Dramatically improves water and rain resistance• Does not alter appearance of surface to which it is applied	<p>Do not apply to non-porous surfaces</p> <p>Do not apply this product if rain is imminent</p>

! Coverage of the Sealer will vary dependent on how porous the slab is!

Applying the Sealer



There are several different methods of applying sealants. Many of the 'heavier' sealants are best applied using a squeegee, which ensures the whole of the surface is coated but prevents 'pooling' of liquid sealant in low spots.

Other sealants may be applied by roller (as in paint roller) or via a sprayer.



Less successful but still effective is application by brush.

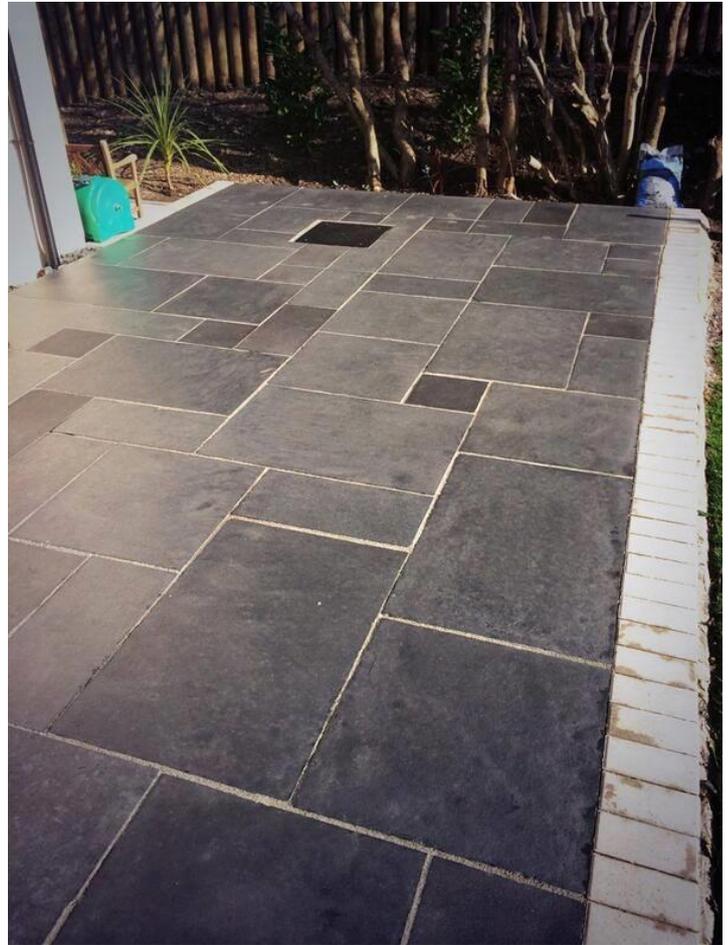
The surface to be sealed **MUST BE DRY**. Moisture on the surface, within the joints or even a bit of damp within the paving itself can cause some sealants to turn 'creamy', effectively ruining the finished appearance.

Surfaces must be clean, dry, and free from grease, dust, detritus, algae and loose material.



How to get rid of Algae on Paving?

The green is an algae. It tends to thrive in a damp and permeable surfaces where it can colonise. Algae are colonies of very simple plants. It flourishes where the rainwater can dissolve a tiny amount of basic minerals from the substrate, which it then absorbs and use to promote their growth. As long as it remains as simple algae colonies, then it's fairly easy to get rid with the **Everbuild Fungicidal Wash**.



Looks Great! Everbuild Path & Patio Sealer used to provide a Low Sheen Finish to improve appearance of the natural stone

Keeping Weeds at Bay

There is sadly no such thing as a weed-free surface. If detritus is allowed to accumulate on a surface, it will only be a matter of time before weeds start to break out. There are however ways to minimise weed growth.

The more regular trafficking, by foot or by wheels, will limit the ability of weeds to rebuild in an area, but for those areas subject to little or no traffic there are a few ways to keep those darn weeds at bay!

Brushing regularly helps to disrupt developing weeds before they are fully established.



Sealing the paving will prevent weeds settling into the pavement structure. However, even the very best sealant cannot prevent the build-up of detritus.

