SETTS PAVING

RESEARCH

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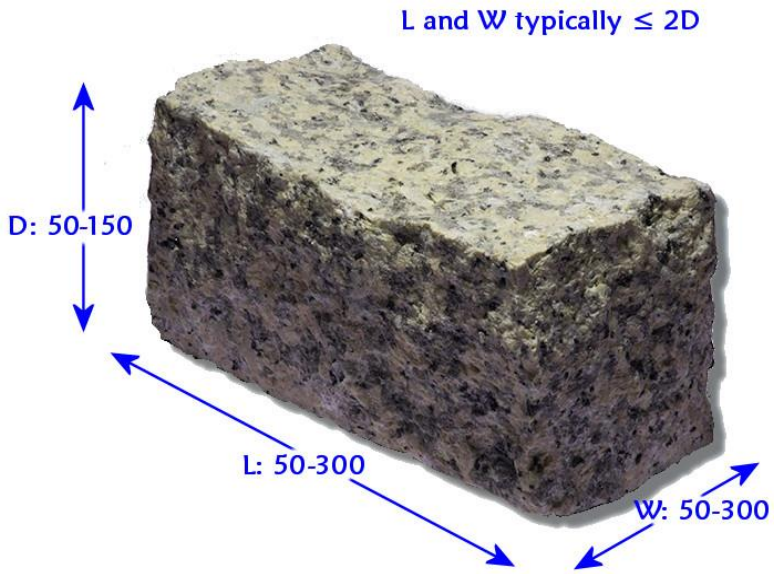
Contents

Introduction:

The terms refer to blocks of natural stone, hewn from a quarry, in a range of sizes and rock types

Although the correct term is 'Setts' - these range from 100x100mm to 200x250mm in size, and have an average depth of 120-150 mm.

To be technically precise (ie: according to BS EN 1342:2001), a sett is a dressed block of stone having plan dimensions that are 50-300mm in length, and a thickness of at least 50mm. The length and/or width should not usually be greater than twice the thickness. However, some decorative setts for garden use may be only 25mm or so thick and 100x100mm or even larger, in plan.



A cube is a type of sett, one which has all three dimensions roughly equal.

Cubes tend to be used for more decorative work, While there are setts and cubed with perfectly accurate sawn faces, most new cubes are split or cropped and there is an urban myth that, somewhere, there exists a cropped ube that has all six sides exactly orthogonal, the 'perfect cube'.

Cubes: length ≈ width ≈ thickness

Setts at Castlefields, Manchester

Setts, they are excellent paving products and will last for many, many years; in fact, some of the stones currently covering the streets of Britain and Ireland have seen over 200 years of continual use.

Their pedigree as a paving unit goes back to the Romans, 2000 years ago, and beyond, and they are characteristic of most of the so-called 'historic' towns and cities of these islands.

They are fast becoming an essential ingredient in the nostalgia business, as the fashionable designers and developers fondly remember their long-

lost days of childhood, sitting on a kerb-stone, twirling sun-softened pitch onto lolly sticks in the streets of post-war Britain.

Cubes in Chester

Cobbles in Durham

Uses and applications

Nowadays, new setts are produced to regular dimensions in a wide variety of finishes, and are often laid in the same manner as modern concrete block paving .

The reclaimed stones can be difficult to lay, mostly because of their inherent randomness, but whether new or reclaimed, when they have been laid correctly, they are a beautiful sight, and make superb paths, patios and driveways, as well as visually stunning areas of civic paving.

As with many other small element paving units, they offer superb possibilities for design.

Their natural colouring, which will not fade as do some concrete dyes, and the range of textured finishes bring an extra dimension to paving design, whether it be the re-creation of traditional cobbled streets or a unique and original design for a public area.

Setts are popular for the creation of impressive large-scale patterns in civic paving schemes, such as the popular European Fan Pattern and

these magnificent guilloche swirls outside St. Georges' Hall on Lime Street, in Liverpool.

Guilloche Setts in Liverpool

Types

There are three main types of rock in the world and they are all used for the production of setts; sedimentary, metamorphic and igneous.

Sedimentary rocks, such as sandstone or siltstone, are relatively easier to cut and shape.

Metamorphic rock, such as Gneiss, Quartzite or Marble, may retain some of the cleavage planes of its sedimentary ancestor, which is not always a desirable trait, and so this type is rarely used.

Igneous setts, such as basalts and granites, are usually much harder and have few, if any, cleavage planes.

Sedimentary setts are still quarried from the Pennine gritstones of Northern England, although more and more hand-hewn setts are being imported from foreign climes, particularly southern Asia, where labour costs are much lower. Many of the UK-produced sedimentary setts are sawn from quarried rock, and may be further processed. This has enabled the development of modular sett paving, which is discussed below.

Hand-hewn setts and cubes

Igneous rock types are particularly popular for cubes, although setts are often hewn from granites, basalts, diorites and gabbros.

Many of the reclaimed igneous setts and cubes are of British or Irish origin, notably the granites of North Wales, Cumbria, Cornwall, Wicklow and Scotland, but more and more of the new materials are imported from other countries.

Igneous rock tends to be denser than sedimentary rock, and its crystalline nature of makes it much harder to cut with hand tools than most of the sedimentary types. It will rapidly abrade standard blades on power saws, and so, if it must be cut with a saw, a diamond blade is strongly recommended. However, on reclaimed materials the dead straight lines created by power sawing looks awry with the natural finish of these units, so we often ' fettle ' a sawn edge (ie, nobble with a hammer) to give it a more natural, hewn appearance.

Sizes and Tolerances:

It can seem that there are almost no limits on the sizes of setts and cubes, but as mentioned previously the relevant standard BS EN 1342:2001 gives some guidance, in that setts should not be more than 300mm (ish) in length or width, and neither of the plan dimensions (length and width) should be more than twice the thickness, which suggests a maximum thickness of 150mm.

Obviously, there are exceptions. Some reclaimed materials would not meet these precise sizing requirements, and, occasionally, local tradition will result in the use of setts that are larger than the maximum stated dimensions - some setts being laid in Scotland are 200mm thick, for example.

Setts are hewn natural stone and so there is almost inevitably some 'inaccuracy' in the planned dimensions.
These inaccuracies are regulated by having a permitted tolerance, a specified maximum variation in size, and because the different finishes available affect the dimensional accuracy, the 'rougher' finished such as cropped/hewn are given more leeway than that for, say, a sawn or textured finish. Although there are 'complications' which are sketchily outlined in the standard, generally speaking cropped/hewn setts and cubes are allowed a tolerance of ±15mm, while sawn/textured setts and cubes are only allowed ± 5mm.

This tolerance leads to a somewhat informal method of material specification for cubes. Given the rather generous tolerances, cubes are often described by a pair of values which indicate the minimum and maximum sizes, in centimetres.

So, the most popular sized cube, which has ideal sizes of 10x10x10 cm, is assumed to have a plusmn;1cm tolerance and is therefore described as a 9-11 cube, that is, cubes with sides that will be between 9cm and 11cm.

This 9-11 cube has a 'length' of 10.5cm....

...and a 'width' of 9cm - so, it's a 9-11

When ordering new cubes, it's usual to specify this dual-number reference, which is explained in the table below.

Ideal size (mm)	Specification
60x60x60	5 ~ 7
80x80x80	7 ~ 9
100x100x100	9 ~ 11
125x125x125	11 ~ 13
150x150x150	14 ~ 16

It's worth noting that, with cubes, when the laying pattern is to be a fan or bogen, there will be a requirement for some larger/smaller rectangular cubes and some trapezoidal cubes to complete the patterns, and this is normally stated in the specification so that the supplier can include up to 10% off these 'oddball' cubes.

Finishes

Some of the popular 'finishes' for sedimentary setts are depicted below. Reclaimed sedimentary setts, if they have a discernible finish left on their upper surface, tend to have the picked and punched finishes more commonly associated with igneous-sourced setts - see below.

Rough punched sandstone

long format riven Caithness Slate

Sandstone sawn six sides

Tumbled Yorkstone

Back in the days before the bureau-Euro-crats came up with the European Standard BS EN 1342, the old British Standard (BS435:1975 Specification for dressed natural stone kerbs, channels, quadrants and setts) had three simple finishes:

- Fine Picked - also known as 'Bush Hammered'; fairly smooth, good non-slip surface
- Fair Picked - moderately smooth; less worked than fine picked
- Rough Punched - self-explanatory! Roughly hewn with high spots chiselled off

... which was straightforward and easily understood.

Now we have to use...

- Hewn - unworked, commonly referred to as 'cropped'
- Coarse Textured - ± 2mm maximum difference between high points and low spots on surface
- Fine Textured - ± 0.5mm maximum difference between high points and low spots on surface

...confusion sometimes arises because bush-hammering, a popular finish for pedestrian areas, might be coarse or fine textured, as might flame texturing.

The standard also gives prominence to a texture referred to as "Dolly Point" which seems to be some coarse bush-hammer like finish popular in Italy.

Bush hammered basalt

Flame textured granite

Hewn or cropped setts....

...can result in an uneven pavement

Color

There is a phenomenal range of colours available, virtually any colour you can imagine, but finding it can be quite a task. The problem isn't helped by many suppliers giving delusional names to their offerings. Midnight Glacier probably sounds wonderful to a marketing droid, but doesn't actually tell me what colour the stone is.

Even when these aspirational names are rejected, one person's mid-grey is another's dark grey, so colour is always best judged from actual samples.

Dark grey, silver grey, red and yellow granites

Buff, tan, brown and grey sandstones

Coverage

Coverage rates are quite variable, given the random nature of the stone used for setts and cubes, but for guidance only....

Type of Stone	Dimensions (L x W x D)	m^2 per Tonne	Single edging (Lin m)	Approx nr per T
Granite cubes	50x50x50mm	9.0m^2	150m	2,800
	80x80x80mm	5.7m^2	63m	700
	100x100x100mm	4.5m^2	40m	350
	150x150x150mm	3.0m^2	18m	100
Granite setts	100x100x50mm	8.8m^2	75m	680
	200x75x150mm	3.9m^2	35m	165
	200x150x100mm	2.9m^2	26m	120
	300x100x200mm	2.0m^2	19m	62
Gritstone setts	150x125x100mm	4.8m^2	32m	110
	200x150x150mm	3.2m^2	19m	70
	275x100x200mm	2.4m^2	20m	75

Patterns

Although it is possible to lay setts and cubes in almost any configuration or design, there are four key patterns that are seen time and time again with sett work in Europe. These are: -

- Coursed
- Random
- Fan
- Bogen

Coursed

This is without doubt the most popular pattern and much of the 18th and 19th century sett work laid to the streets and squares of towns and cities is laid to this pattern. It's the traditional 'cobbled streets' pattern, with the courses running at 90° to the direction of traffic (transverse), and it often features a longitudinal (running in same direction as traffic flow) channel at each edge, as shown in the photograph opposite.

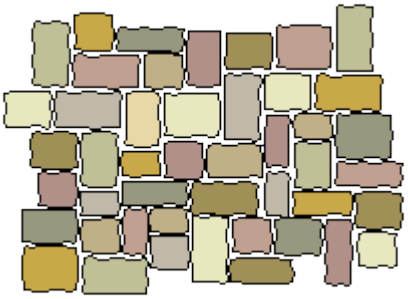
A coursed pattern is very simple to lay. The newly-quarried and sawn stone sett paving now widely available, is cut to accurate rectangles and is ideally suited to being laid in courses.
Reclaimed setts and hand-hewn materials are much more irregular and so need to be laid to a taut string line to ensure the courses remain parallel and true to level. Coursework looks even better when cambered.

With coursework, it's important that the vertical joints are staggered, whether the setts are new and close-jointed or reclaimed and mortar/pitch jointed.

Different sett widths help to create a more random and natural appearance to the work.
New setts are often supplied in standard widths, but a range of widths can be specified if desired. Reclaimed materials often have to be sorted into compatible widths before laying each course, which adds to the labour costs, but makes for a much more visually appealing finish.

Random

Unlike the straight 'rows' of a coursed pattern, a random layout is basically a jumble of stones positioned wherever they will fit. This method of laying was typically used only on low status work, such as industrial yards, stables, haul roads and other places where the presence of a hard surface was far more important than appearance, and/or where the budget was tight. Often, areas paved in a random pattern utilised the poorer quality setts, the rejects and odd sizes from a prestige job nearby or even reclaimed materials that was considered worn.



Setts laid in random pattern

The running joints should be kept to a minimum (around 600-900mm ideally, with setts) and the corners of 4 setts should never meet at a single point.
It can be a bit of a brain-teaser working out which stone will fit where, and the end results can look somewhat higgledy-piggledy, especially as the jointing tends to vary between butt-jointed (ie, setts in direct contact with immediate neighbours) to wide joints of 75mm or so.
The joint width is a good indicator of the quality of workmanship used to lay the paving - the wider the joints, the poorer the job.

Randon laid setts, although some of the blocks of this laminar stone have split in-situ, enhancing the random look

European Fan Pattern

This pattern, also known as Belgian pattern or Florentine pattern amongst others, is the most complicated pattern to set out, and only really works with cubes or setts of smaller plan dimensions. However, it is such a visually pleasing layout that it's easy to see just why it has been so popular for so long.
It is a frequently used pattern in Europe and is a fairly common choice of pattern for Pattern Imprinted Concrete , although it looks far better in the natural materials than in coloured concrete.

Ideally, it needs a large area to do it full justice, and should be at least 3 metres wide when used as a driveway, otherwise the pattern becomes 'lost'. However, the smaller setts, such as the 100x100mm and smaller units, give excellent results over comparatively small areas.
Fans laid with contrasting colours, eg a silver-grey granite and a black basalt, can look stunning when given the space for the pattern and colour to be appreciated.

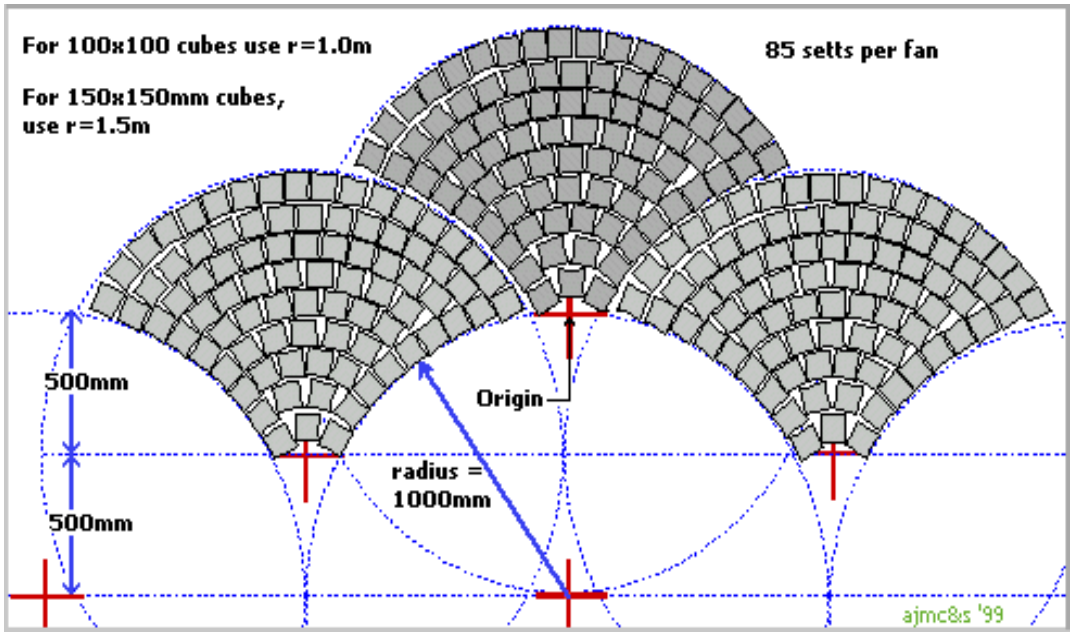
The idealised setting-out pattern reproduced below can be adapted for most square paving units, including block paving and flags, as well as setts and cubes. If the paving unit is 'n' mm in width, then the radius, r, should equal 10n. This 'rule of thumb' will need tweaking for any given

setts as the dimensional accuracy, size range and scale of fan will all affect how 'tidy' the completed fan looks when laid and jointed.

In practice, a number of wedge-shaped or trapezoidal setts are needed to prevent the joints becoming too wide, and a professional sett layer will usually rough-out a serviceable fan before preparing a template from which to work.

Lack of cutting or wedge-shapes results in wide joints

Fans are usually mocked-up to check scale, contrast and joint width



Setting out for a European Fan pattern

Large scale fans may have outer bands established first

Standard scale fans are often laid using a template frame

Bogens

It's worth noting that there is often some confusion in Britain and Ireland regarding these "arc" patterns. The layout shown above is a fan: there are a number of repeating 'shapes' that interlock and cover a larger area. However, on the continent, one of the more popular layouts is the *bogen* also known as a *segmental arc* or even *radial-sett paving,* which is often mistaken for a fan but is actually a series of stacked arcs. Bogen layout is complex and requires the skills of an experienced artisan as the setts at the ends of the arcs, where one arc meets its neighbour, need to be somewhat smaller than those in the centre of each arc.

Fan layout - note individual, repeating fans interlocking arcs

Bogens - a series of stacked and

Traditionally, bogens are incredibly strong layouts as the arcs work to dissipate forces over a much larger area. Their development and use reached a peak when horse-drawn traffic dominated the streets, but since the advent of modern vehicles, their use has been gradually demoted to one of aesthetics. However, they remain popular in continental Europe and there has been a sign of renewed interest in both Britain and Ireland since the price and availability of imported granite setts became more favourable in the early years of the 21st century.

Bogens at Belfast City Hall

Laying Setts

1- Flexible Construction

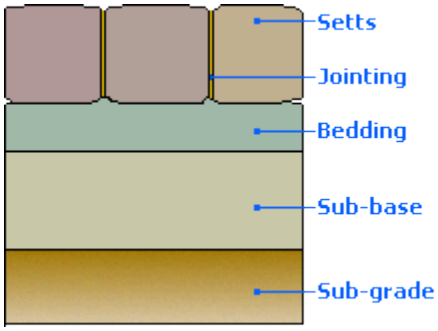
Flexible construction refers to the fact that small amounts of movement within the pavement are tolerated, unlike the monolithic slabs of solid paving constructed with a rigid specification. For our purposes, flexible sett paving can be defined as sett work laid on a non-setting unbound bedding material and having its joints sealed with a non-setting unbound medium.

Traditionally, all sett paving would have been 'flexible' but during the 20th century, it was usurped by the obsession with cements and cement-based mortars. There has continued to be a small amount of flexible work undertaken with setts, but prior to the development of economic sawing processes to produce regular-shaped setts and cubes, it tended to be the cheaper, less prestigious work that was laid in this manner, leaving the up-market 'quality' work to be laid as rigid pavements with solid jointing.

Flexible sett paving laid to a vehicle crossing

As with all paving work, the actual construction used depends on the use to which the pavement will be put, predicted traffic loads, and existing ground conditions, amongst other factors, and so it's not possible to give a single specification that is suitable for all purposes. Areas expecting heavy use, such as carriageways, loading areas, etc, should be designed by an engineer who is familiar with site conditions. For residential driveways, paths and patios, it's possible to utilise a typical specification from a similar block paved project.

Basic Construction

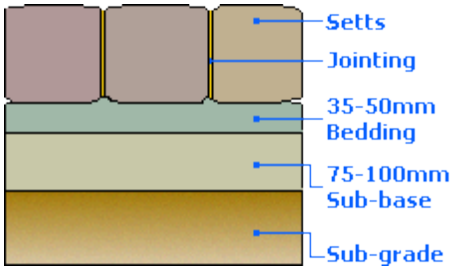


A flexible sett pavement consists of the setts themselves, bedded onto a laying course, over a sub-base formed on a prepared sub-grade. This basic structure is illustrated opposite

The depth of dig is determined by the planned end use for the pavement.

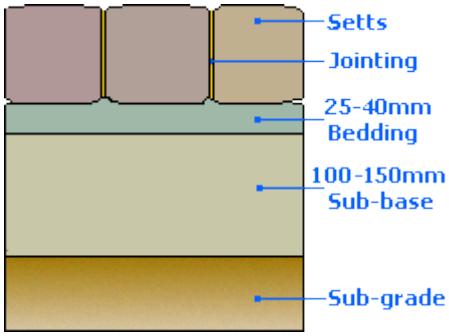
For paths, patios and other areas of light, pedestrian traffic the depth of excavation below finished level is...

Depth of setts + 35-50mm + 75-100mm



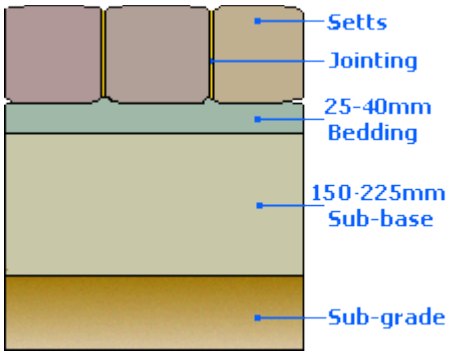
For driveways and hardstanding's the depth of excavation below finished level is...

Depth of setts + 25-40mm + 100-150mm



For pavements anticipating loads up to 7.5 Tonnes, low-speed carriageways, lay-bys, taxi-ranks etc., the depth of excavation below finished level is...

Depth of setts + 25-40mm + 150-225mm



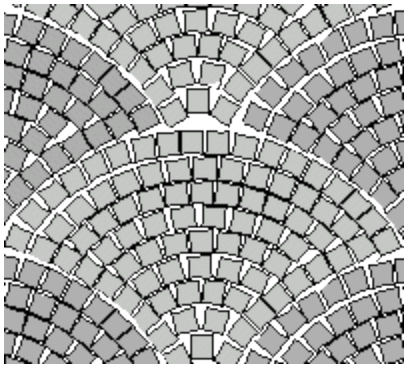
Bedding

For flexible sett pavements, the bedding course should consist of a 25-40mm deep layer of a grit sand. Alternatively, a 5mm down hardstone grit, sometimes referred to as 'Splitt' can be used.

The bedding layer is spread and levelled out over the area to be paved, lightly compacted with a vibrating plate and then screeded to a laying course before placing of the setts. The degree of compaction possible with any given bedding material needs to be determined beforehand, as grain size, moisture content and site conditions can all affect the amount of compaction possible.

Laying

The setts are normally hand laid, one at a time. In most cases, a staggered joint pattern is used, although decorative patterns are sometimes used. The setts are carefully placed on the screeded bed and will often be individually settled with a small rubber mallet or sett hammer, using a taut string line or a straight-edged timber as a guide to line and level. Once a larger area is laid and all the cutting and piecing-in work has been done, a vibrating plate compactor is used to consolidate the setts in masse.



Fan or radial pattern

When a flexible jointing system is used, partial joint filling often takes place as the setts are laid to ensure even joint width and stability of the setts while laying is completed. Final jointing usually takes place during the consolidation work.

It is most important that the sett layer stands back from the work occasionally to check surface profile; what looks right to a string line or in close proximity, can look awful from 10 metres back. It is best to defer final jointing until the surface profile is satisfactory or 'sweet' to the eye.

Transverse half-bond pattern

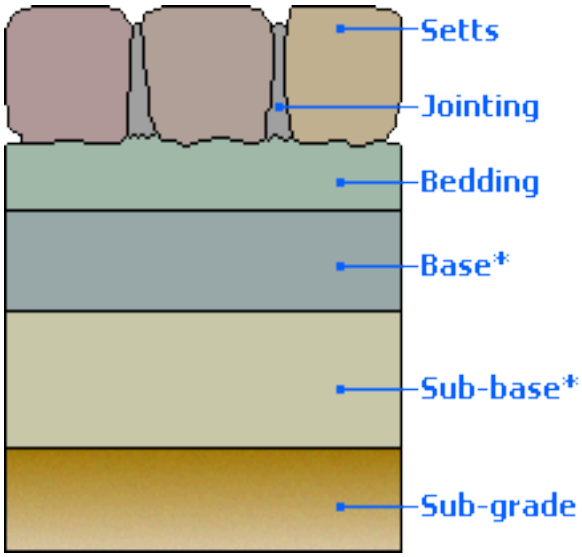
Cubes laid in bogen pattern

2- Rigid Construction

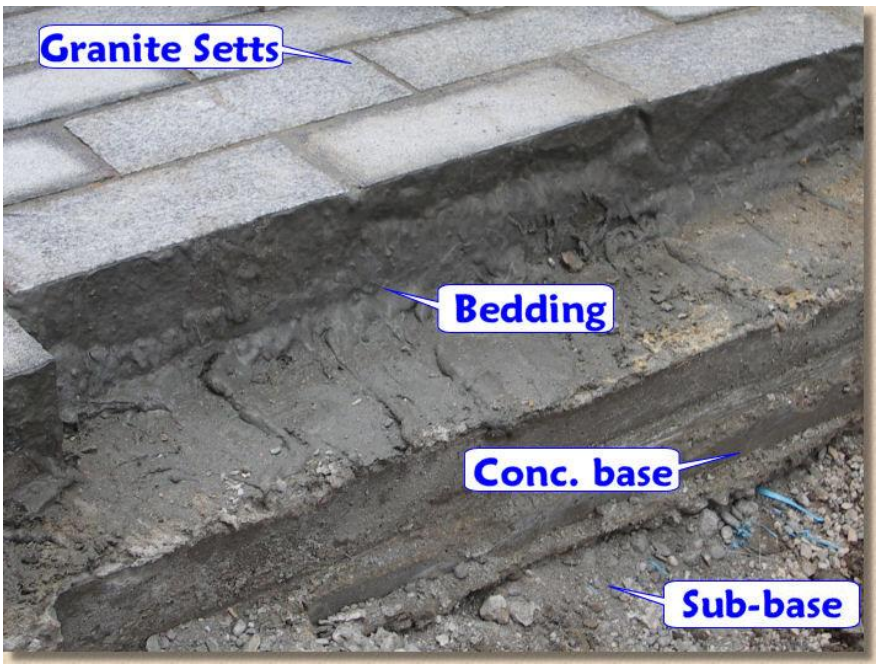
Rigid refers to the fact that there is no movement in the paving.
Most often, the setts are laid on a concrete or cementitious bedding layer, with joints that are intended to be solid and immovable. Large areas of rigid sett paving are usually broken up into discrete bays by Movement Joints at regular intervals although this will be determined by the actual layout of the work.

The planned use of the rigid sett pavement will determine the exact structure of the work; light-use areas, such as patios, driveways and pedestrian only areas, may consist simply of the setts laid on a cementitious bedding layer over a prepared sub-grade, while trafficked areas will normally include a sub-base layer of DTp1 or similar, and/or a

base layer of concrete (Cement Bound Material or CBM) or dense bitumen macadam (DBM). Any base or sub-base will be designed by an engineer who will take into account such factors as anticipated loadings, traffic levels and ground conditions.



Construction layers for a rigid sett pavement. Optional layers are marked with an asterisk, thus*



Typical sett construction - the jointing slurry has been allowed to run over the leading edge, but the bedding can still be discerned

Preparation

Decide where the pavement is to run, and/or consult the site layout plan. Mark out the extent of the pavement with sand guide-lines or aerosol spot-marking paint, if required. Determine how excavated spoil will be carted away from the site and the materials brought in, making sure that access will be maintained during the works.

It is a good idea to dig wider than the planned width of a pavement. An extra 50-100mm at the edges of a patio or driveway makes handling much easier, but for larger projects, such as forecourts or carriageways, an extra 300-500mm may be required.

With sett pavements for vehicular traffic, such as driveways or carriageways, the construction is traditionally cambered (i.e. slightly higher in the centre than at the edges, as most roads are) to assist rapid drainage to the edges and subsequent run-off into gullies. Patios and pedestrian areas may be set out as a flat plane, rather than cambered.

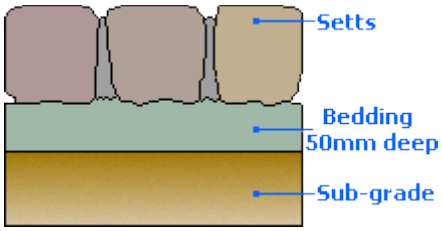
Sub-grade

Remove all weeds and other unwanted organic matter from the surface of a 'green' site - this is known as a 'site strip'. Reduce dig to formation level - this is the level at which the actual construction of the pavement begins. Excavate any soft spots and fill with compacted sub-base material. If the area of the paving is troubled with weeds, the exposed sub-grade may be treated with a general weedkiller such as Glyphosate, but it is unlikely any weed will be able to penetrate the upper layers.

The depth of dig is determined by the planned end use for the pavement.

For paths, patios and other areas of light, pedestrian traffic the depth of excavation below finished level is...

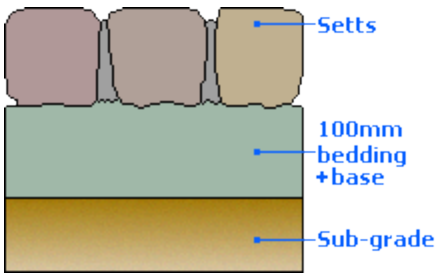
Average depth of setts + 50mm



For driveways, hardstanding's and other low-speed private pavements the depth of excavation below finished level is...

Average depth of setts + 100mm

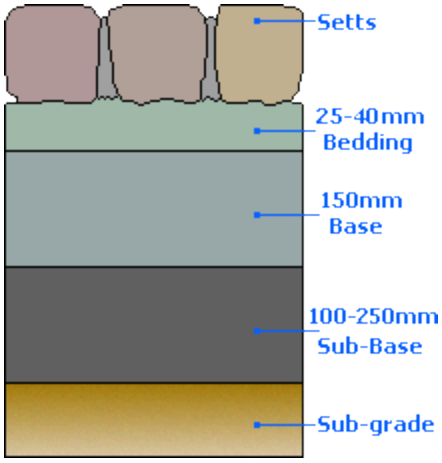
(Note: A sub-base may also be required.)



For public or commercial pavements, or any site anticipating loads above 5 Tonnes, carriageways, lay-bys, taxi-ranks etc., the depth of excavation below finished level is...

Average depth of setts + 25-40mm + 150mm + 150mm

(Note: base and sub-base thickness of 150mm has been assumed).



If an edging or kerb is required, this is the point to construct it. Brick edgings, stone kerbs or channels, or setts laid lengthways are all suitable, but, as the setts are to be laid on a concrete bed and solidly jointed, an edging is not essential. However, a channel course along the edges of driveways helps add authenticity.

Sub-base Course

(optional)

This will normally only be required for heavy load applications as a preparatory or improvement layer for the laying or base course. It may be omitted completely if the existing sub-grade is deemed satisfactory, or it may consist of a 30-50mm 'blinding' of granular material or lean-mix concrete, just to prepare the ground for a more robust base or laying course. Most commonly, it will be a layer approximately 100-150mm thick.

Any low spots in the sub-grade can be filled with granular material, crushed hardcore, crushed stone or compacted bedding material. If the area to be paved is such that it requires raising or elevating to a higher level, then the lift should be constructed as a sub-base layer, rather than building-up with bedding material. The finished surface level of any sub base, should be accurate to within 20mm.

Base Course

(optional)

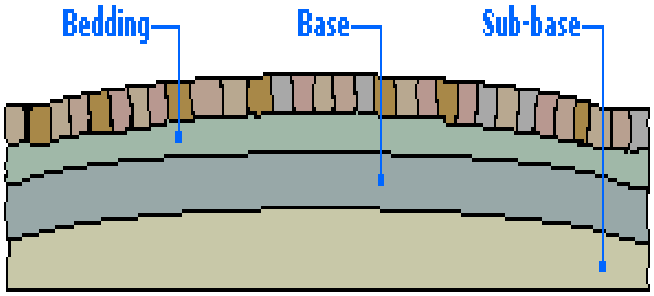
Again, this layer will normally only be required for carriageway or heavy load applications. The base course should consist of a compacted layer of concrete or cement bound material 100-150mm thick, or a layer of Dense Bitumen Macadam 70-100mm thick.

However, a base course has to be designed to take account of local ground and traffic conditions, as laid down in the *Design Manual for Roads and Bridges* , and so, should be designed by an engineer familiar with the site conditions.

If a mass concrete, or cement bound material is used for the base layer, it should be given adequate time to achieve a modicum of strength before being subjected to the additional loads of the bedding and paving layers. Normally, a cementitious base layer such as described here would be given 3-7 days to begin the curing process before construction work on the rest of the pavement proceeded.

When a Dense Bitumen Macadam is used, it should be laid to the usual working practices, and properly compacted before being used.

A base layer should always be laid to the profile of the pavement, so that, for example, a pavement that is to have a cambered surface should have a cambered base layer, accurate to ± 20mm.



Bedding layer

Traditionally, setts were bedded on ash or clinker material on top of the sub-base or base course. In some situations, the ash/clinker would be enhanced with a sprinkling of lime, or possibly a cement, but often it was clean ash or clinker, thoroughly compacted with a hand panel.

Nowadays, the usual method is to bed reclaimed setts on a "lean-mix" concrete, a cementitious bedding mix, lime mortar. On larger commercial or civic projects, a specified bedding mix may be preferred, using particular selected aggregates and replacing all or part of the cement content with Pulverised Fly Ash (PFA). This will be done at the discretion of the Resident Engineer.

Mortar silo used on larger projects to dispense a consistent bedding material

For light-use pavements, a 4:1 moist mix of coarse sand with cement is usually adequate for a bedding layer. On commercial or public projects, there is a trend towards using pre-batched mortars to ensure consistency. These may be delivered to site in 25kg packs or in 10-16 Tonne silos, depending on the scale of the works.

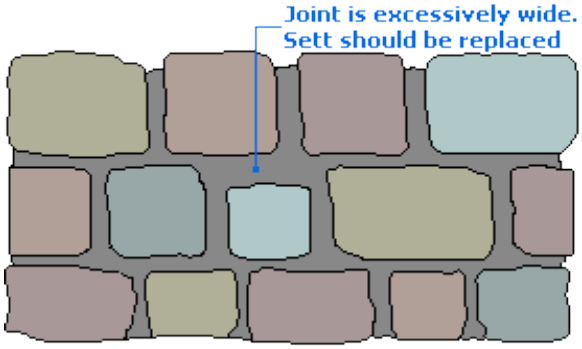
For a rigid construction, new hewn setts are laid on a cementitious bed. Because of the variable depth of reclaimed stones, it's not usually possible to prepare a screeded bed, although it can sometimes be done with more regularly sized cubes and setts.

Bond bridge or slurry primer

Increasingly, especially with new materials, contractors and DIYers are using this technique to ensure the setts adhere to the bedding and do not come loose. It relies on using a chemically-enhanced cementitious goo daubed on the underside of the setts to literally glue the units to the bed.

Alignment

While newly cut setts tend to be fairly regular in size, allowing relatively tight joints, reclaimed materials tend to be much more variable, and so it is not uncommon to see joints ranging from 10-30mm in width, although, once joint width is getting over 25mm, it is better that the setts are re-sorted or re-dressed to make the course width more regular.

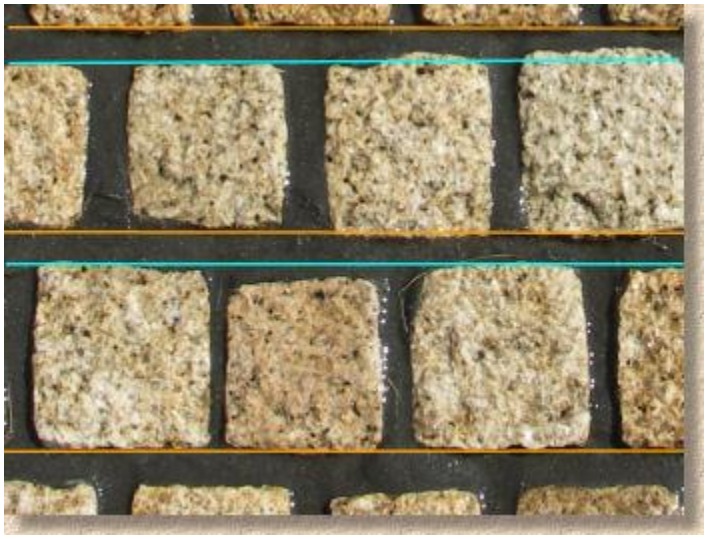


The setts should be laid to a taut line, to aid coursing and levelling accuracy. Basically, a string line is stretched from one edge of the paving to the opposite edge and parallel to the line of courses. The individual setts are then laid on the bedding mix and tapped down with a mallet until they are just touching the string line, and as close to the preceding course as possible.

Setts are laid to a taut string line to guide accurate alignment and level

Reclaimed setts often have variable joint width to accommodate variation in the setts

Setts are traditionally laid with one edge just touching the string line. Normally this is the leading edge but occasionally the back edge is used by some street masons for reasons that escape me! This has the effect of creating running joints that are NOT precise. The leading edge of one course, which will be truly aligned, lies opposite the back edge of the following course, which may be uneven due to the permitted tolerance within both new and reclaimed setts.



Leading edges (shown as yellow) are precisely aligned while back edges (shown red) are somewhat ragged

Sawn setts such as these gorgeous Glasgow Nidgers have joints of more-or-less constant width

While this may (and does) result in somewhat uneven joints, it has to be accepted that it does produce the best-looking finished pavement.

The alternative would be to carefully sort each and every sett into accurately matched widths (known as gauges), which would massively increase labour costs and has the effect of detracting from the rustic, natural appearance of cropped or reclaimed setts.

Where accurate and true joint width is considered essential for aesthetic reasons, then sawn, rather than cropped or riven, setts should be used.

Laying

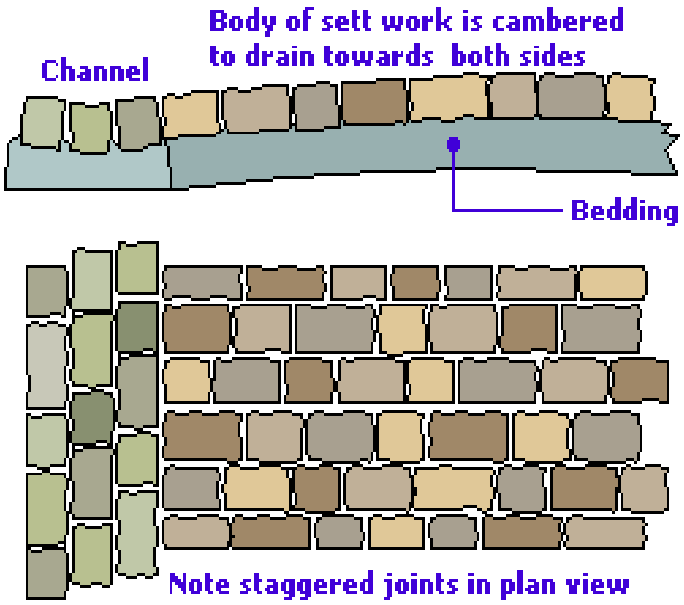
Prepare bed

Place Sett and tap down to level

Check level with line guide

A semi-dry cementitious bedding material should be spread out approximately 25-50mm thicker than the required depth and then levelled-off with a trowel to prepare an individual bed for each sett that will be 10-20mm high.

Put out only enough bedding mix to extend the paving one course at a time. This is sometimes known as 'windrow bedding'.



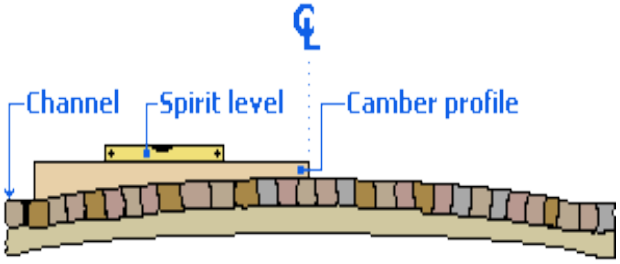
With the exception of decorative work requiring a stack bond or other specific pattern, it is important to stagger the longitudinal joints on subsequent courses. This is not merely for aesthetic reasons, but is done to create a greater degree of interlock within the pavement surface, so that any force exerted on an individual stone is dissipated over a number of courses.

Wider areas of sett work should be cambered, i.e., made slightly higher in the centre of a course than at the ends - see diagram opposite.

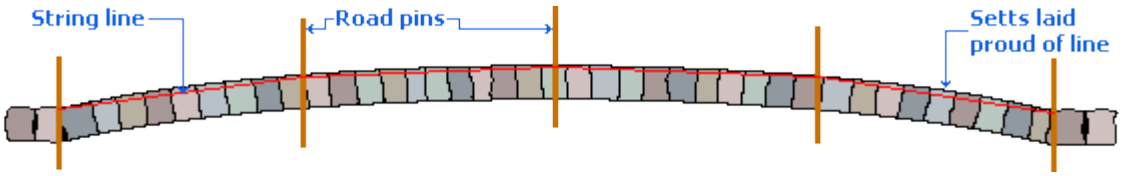
Cambering

There are a few different methods for creating a camber within a sett pavement. On projects of a regular pavement width, a camber template may be created out of timber ply and used as a surface profile guide, laid over each course of setts and used to check level accuracy.

This method is suitable for widths up to around 3.0 metres - pavements wider than that require a camber template that is unwieldy and prone to buckling under its own weight.



For wider pavements, a string line may be used with its surface level set by means of intermediary steel pins at, say, quarter-width, half-width, and three-quarter-width. It is important that the relative position and uplift added to each of the pins is regular. For example, on a 6m wide pavement, intermediary pins may be set at 1.5m, 3.0m and 4.5m - if, on a subsequent course, the inter-pins were established at 1.2m, 3.6m and 5 m, this could result in a distorted camber that could be noticeable within the body of the completed pavement.



This method relies on some interpretation and extrapolation by the sett layer, but is part of the craft and should not be beyond the capabilities of a skilled streetmason. It is important that the sett layer stands back from the pavement every couple of courses or so to ensure the camber is regular and that there are no obvious high-spots or hollows.

Jointing

Once a reasonable section of the setts have been laid and checked for alignment as well as finished profile, the joints between adjacent setts can be partially filled to about one-third depth with the bedding mix , which should be packed in tightly with a pointing bar, or can be watered in with a watering can and rose. Make sure none of the bedding mix or other cementitious material is left behind on top of the setts; it will set and stain them.

Normally, rigid sett work has the joints pointed with a cement mortar, although pitch/bitumen was once popular and is the jointing of choice for authenticity and heritage projects.

The more up-to-date take is to use a resin mortar which is quick, reliable and stain-free.

On larger jobs, this preliminary jointing is used to prevent further movement of the setts until final sealing is undertaken at the end of the project. However, we have always preferred to keep 'up-to-date' as far as practical with jointing as it reduces the chance of detritus, litter or other deleterious material falling into the open joint, which then involves extra labour to clean out before final sealing.

Advantage and Disadvantage

The 'domed' surface of the "Hovis-loaf" type reclaimed setts can be awkward to walk on, especially in high-heeled .

The irregular nature of the surface can also make access difficult for hand-pushed garden tools such as non-pneumatic tyre wheelbarrows, and lawnmowers.

Even relatively flat-topped setts can be difficult to traverse if the jointing is recessed.

The newer sawn setts have wonderfully smooth and level faces, and being laid butt-jointed as is concrete block paving, they present no hazard whatsoever, regardless of which footwear one is wearing.

Properly constructed sett paving is more or less completely impermeable and therefore must be adequately drained to gullies or other suitable drainage points .

Once complete, it should require no maintenance other than the occasional sweep with a broom to remove accumulated dust, etc. Some of the imported sandstone setts can be something of an algae-magnet, so regular cleaning may be required or it may be considered worthwhile to treat them with a suitable sealant .

Relatively expensive - good work costs good money. There are plenty of chancers who claim they can lay setts and then proceed to bollix the job because they simply do not have the relevant experience, and it's that experience those costs. While the setts themselves can be found from £30 per square metre (and upwards) a top-class street mason or sett-layer will often charge £40-£60 per m^2 to lay them.

When laid well, or when laid to a fan pattern, they can look stunning. All too often the reclaimed or hand-hewn setts are laid slap-dash and then have plain 'white' mortar slapped all over them as an attempt at pointing.

Time consuming and labour intensive.... not to be undertaken by the faint hearted.

If you are employing a paving company to lay reclaimed or hand-hewn setts for you, insist on seeing some previous work in the same materials; the skills required in laying irregular setts are not the same skills used with block paving or the regular-dimensioned sawn setts.

Concrete Sett Paving