



# BUILDING HEDGES IN CORNWALL

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## HOW TO BUILD A CORNISH HEDGE

**Slant grounders for proper batter**

**Every stone has seven sides**

**Each stone has its own place**

**Never pick up a stone twice**

**Make your rows and break your rows**

**Ram hard**

**Finally tob off.**

For thousands of years, the methods of Cornish hedging have passed by word of mouth and have never been written down. The Cornish Hedges Library was conceived for the purpose of collecting the knowledge still carried, in the early 1990s, by a dwindling body of hedgers whose practices were linked to the distant past, using the methods that had built the hedges still standing from the previous centuries. Now, for the first time in print, this paper explains the traditional way to build a Cornish hedge, in accordance with the consensus of advice from the older generation of hedgers, including the last of those master craftsmen who won many trophies in the days of the old hedging competitions.

With radical changes in population and employment since the post-war years, some malpractices have crept into the craft. New hedgers often are not properly taught, so tend, with



*An appallingly badly-built new hedge. Topsoil fill, side bulging out, stone unsorted, big stone above small, higgledy-piggledy placing of stone in the courses, big gaps between stones.*



*This ordinary farm hedge, built over 100 years ago and still completely sound, shows a much better use of similar stone.*

good intentions, to build poor hedges. Bad habits are easy for the learner to pick up, and very difficult to get rid of. Inevitably they show themselves in the finished hedge, and may be identified using the Cornish Hedges Library inspection check-list for Cornish Hedges. Hedging work may often be wrongly described in the client's brief specification, if indeed one is provided.

Cornish hedging is both an art and a craft, and is based on sound scientific principles. There is a general inclination on the part of the public not to appreciate the skill involved in building a Cornish hedge, leading people to expect a cheap price. In building to this demand, some contractors have been liable to use a substandard hedging style to save on time and materials. The work may even be given to temporary labouring gangs who through no fault of their own have no idea how to go about it. Too often newly-built hedges, usually along the major changes to main roads or on housing developments, are seen to collapse within a few months. Contract-built hedges have been known to fall into ruin as soon as it rains. At the same time, changes in agricultural practice and the passing away of the older men who did the hedging led to general deterioration and removal of farm hedges. Traditional hedgers' deep concern about these issues led to the establishment of the Cornish Hedges Library (CHL) in 1994, to write down the traditional knowledge before it was too late.

There are many obvious signs of a badly-built hedge:-

- Grounders are wrongly laid on edge instead of on the flat, and not slanted inward to the correct batter.
- Stone is not graded in the rows, with smaller stones being put into the lower rows and larger ones into the top half of the hedge, resulting in the unsupported larger stones collapsing over the smaller ones.
- To make the supply of stone go further, stones are mis-placed with their widest and often flattest side outwards. To the untutored eye this may "look nice", but again this is very unstable.
- Topsoil is used for the earth filling and consolidation is not properly done.
- Soil or turf is sometimes put between the stones, causing them to move as the hedge settles.
- The batter is not properly curved inwards to give the hedge long-term stability.
- Often the top rows, where the stones are the smallest and most difficult to lay securely, are laid with the stones flat or not properly interlocking, so they easily fall off.

As master hedger Hugh Rowe commented on a badly-built hedge, "I'd build it better with a pike." In Cornwall, a pike is a pitch-fork.

***This Advice of Good Practice for Cornish hedges and other stone-faced hedgebanks of similar construction is recorded from the expert knowledge of many experienced practitioners and sets out the procedure and standard of work expected in the proficient performance of the craft.***

Although Cornish hedging is an ancient traditional rural craft and not an exact science there are necessary basic principles. Where these are not understood, hedges are usually found to be unsound in one way or another, and too many transgress every natural law of physics and good hedging. Hedge owners may find the CHL Checklist for inspecting new or restored hedges in Cornwall invaluable in finding out whether a hedge has been properly built or repaired.

If the hedger decides to accept the contract for a cheap job, the customer must be made aware of the disadvantages of substandard work or materials. Hedgers who refrain from

lowering their standard to this demand gain a name for reliable work and help to re-establish Cornish hedging as a skilled and reputable craft.

## HEALTH & SAFETY

The Health and Safety Act 1974 requires that working places must be as safe as is “reasonably practicable”. Unfortunately this simple rule has been complicated by many regulations put out by many different organisations, so much so that no one knows them all. The CHL risk assessment advice note (see Library list) was prepared in discussion with the Health & Safety Executive, and applies to the normal hedging workplaces. A separate advice note regarding work alongside public roads, agreed in discussion with Cornwall Highways Authority, is also available from the Cornish Hedges Library website.

Hedging is physically demanding but, if properly practised, not particularly hazardous work. Although historically professional hedging has been seen to have been done mainly by men and this paper in referring to the hedger uses the generic pronoun 'he', there are women building hedges, taking measures for dressing, lifting and moving heavy stone that rely on skill and sensible practice. While hedging requires manual dexterity, there is no need for brute force. All hedgers must guard against the back trouble which can be incurred by unwise lifting and moving of heavy stones. Deft and careful handling of stones minimises risk to fingers and toes.

## TOOLS

When buying tools, the hedger should go for the best quality available. The extra cost pays for itself several times over in safety and durability. Cheap shovels split, poor quality steel bars bend. It is worth looking out for some of the tools second-hand, as the metal in older tools is likely to be of better strength and temper.

Cornish hedgers use their Cornish shovel and a hedging hammer or a club hammer for most of the work in building hedges. The Cornish shovel is historically an essential part of the craft. It was often made personally to the user's preferences by the local blacksmith. The shovel should have an 11 inch blade although a 10 inch blade may be more suitable for smaller women and teenagers. Nowadays most usually seen is the shield-shape like a playing-card spade, but many of the old hedgers preferred a “Penwith Square”, a flat oblong blade with the two corners slightly rounded off. Opinions vary on the type of hammer but many use an ordinary club hammer for cheapness and convenience. A variety of hedging hammers are available and are used by some hedgers, but are several times the price and just as easily lost.

Good strong steel bars are essential, both long and short. Some hedgers use a tine off a tractor's fork-lift. The long bar needs to be at least 2m (6ft) long, to give easy leverage. The



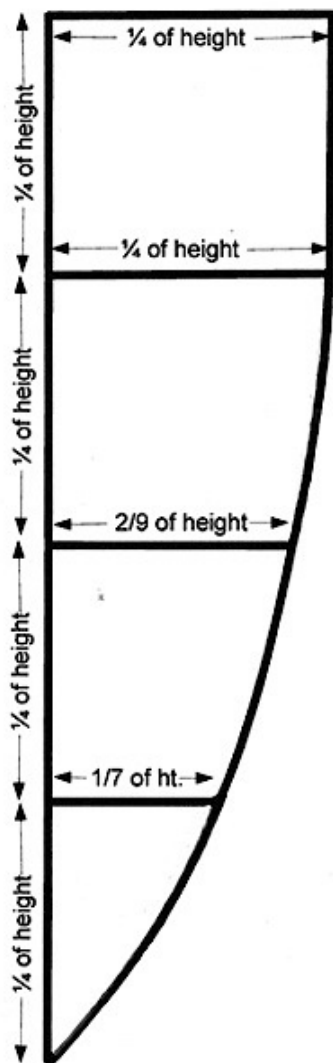
*Hedging tools: Cornish shovel, 5-pronged eavel, mattock, bar, club hammer.*

hedger should also have a pick-axe/mattock (*beddax*), a sledge-hammer and a rammer (a cut-down pickaxe handle is suitable, though many hedgers use their hammer for ramming the fill). If a dressed stone hedge is to be built, a hedging hammer, bolster and other cold chisels are needed.

Most hedgers use a powered digger, owned or hired. For restricted sites where there is no tractor access, a steel pipe tripod works well for moving heavy stones. Made with three 3m (10ft) lengths of 2 inch galvanised steel water pipe, the tripod is used with an endless-chain pulley.

Where there are roots and topgrowth, a hook, slasher, hatchet/billhook and bow-saw are needed, and a long-handled five-pronged fork (*eavel*) to clear the site of browse. It is also used for lifting rab when it is wet and contains a lot of clay, making it difficult to shovel. For hedge work, the five-pronged eavel is better than the four-pronged version.

Short-handled spades or forks are no use in hedging. They do a poor job and are much more tiring and likely to cause back trouble. Three times as much work can be done with a long-handled shovel or eavel as by a spade or garden fork, for the same effort and with less strain on the muscles.



### MAKING A PROFILE FORMER

The batter curve of the recommended profile is drawn in accordance with the majority consensus of information from skilled traditional Cornish hedgers. The profile is designed in a simple form that is easy and cheap for the handyman-welder to make, and that will last a long time. It uses less than £10 worth of mild steel angle, and makes a robust profile easy to handle. Alternatively the profile can be cut from a piece of strong plywood (which has the disadvantage that the hedge cannot be seen through it, unless windows are cut out with a fret saw, making it less robust).

The diagram gives the dimensions to make a steel profile form for any reasonable size of hedge. The numbers are fractions eg  $\frac{1}{4}$  or  $\frac{2}{9}$  of height is one quarter or two-ninths of the height of the hedge. You will need two 2m lengths of 23mm x 23mm x 3mm steel angle and one 2m length of 25mm x 3mm steel flat. (The steel is sold in standard lengths of 2m.) The angle is used for the straight pieces, the flat is used for the curved piece.

In cutting the two lower cross-bars and the lower end of the long straight upright you should angle the hacksaw to make a neat join with the angle of the curved piece of metal strip. It is best to make a jig with strips or blocks of wood nailed down to the bench to pre-bend the curve and hold the pieces in place while welding the joins.

Begin by cutting the longest straight piece of steel angle to the same length as the height



of hedge required, with one end cut square ( $90^\circ$ ) and the other slanting at  $35^\circ$ . Then cut two straight pieces  $\frac{1}{4}$  of the length of the long piece, each with both ends cut square. Then cut one straight piece measuring two-ninths ( $\frac{2}{9}$ ) of the length of the long piece, with one end cut square and the other slanted to fit against the curved piece. Then cut one straight piece one-seventh ( $\frac{1}{7}$ ) of the length of the long piece, with one end cut square and the other slanted to fit against curve. Lastly with the flat steel strip curved into place cut it to correct length. Then weld the pieces together as shown in the diagram.

A bubble level is taken from a cheap level and glued in the angle of the top cross-bar. A couple of coats of a suitable paint gives a good finish.

## LOCAL STONE AND STYLES OF HEDGING

***Preference is given to the local style of hedge, and the new hedge is built to the sequence of rows exemplified in the existing hedge at the arrowed location shown on the plan as agreed with the client.***

This clause strives to preserve local patterns of hedging and their use in new hedges. The first consideration for any Cornish hedge is the stone used in its building. The granites, shales and slates which make up most of our hedging-stone differ throughout Cornwall, together with many altered rocks around the zones of once-volcanic activity. This geological variety gives our hedges much of their fascination, and each district has its local character.

The local distinctiveness and style of our hedges depends more on the type of stone than any other factor. Most of our hedges were built before the coming of mechanised transport, so the hedgers used stone from nearby quarries. Much of today's disquiet among traditional hedgers and interested members of the public is because stone is brought in from a distant quarry or even imported from other countries. Often stone is being used that is alien to the local landscape and style of hedge-building, causing loss of individual styles and patterns of stone work. Written specifications have often been inadequate in being either wrongly drafted or silent on the subject of the stone to be used.

Another problem with the shale being so often used is that young hedgers are not learning to use different stones, so they are not always proficient in many jobs where the customer wants the local stone to be used, or in repairing hedges with existing stone. Unfortunately shale is a relatively easy stone, coming in mainly block-shaped pieces with naturally flat cleavage. Invariably it tempts the builders to lay it like bricks, with the long axis running incorrectly along instead of into the hedge.



*Roadside hedge recently built with stone brought from another part of the county, not compatible with local hedges and landscape.*

Hedgers who wish to work in several localities have to learn to handle different types of stone, some difficult to work with, and different styles of hedging. They may need to gain the help of an experienced hedger in those localities where the desired styles are traditionally used. Most of those styles came about because of the character of the stone available locally. Some were the speciality of the local landed estate, and others were the idiosyncratic style of a local hedger of perhaps several hundred or even thousand years ago. These must not be lost, especially a style properly related to the local stone because it always makes for a better hedge.

***Where a nearby Cornish hedge is being demolished, its stones and fill are regarded as the primary material source.***

The use of machinery on construction sites has led to the practice of completely clearing a site before starting construction works. Unfortunately this usually includes demolishing and carting away the existing Cornish hedges. This is followed, at a later stage in the project, by bringing in new stone for building hedges. This has been seen on virtually all road widening schemes and is usual on industrial and housing development sites. This regrettable and uneconomic practice is the result of poor specifying of the site works. The argument that local stone is not always cheaply or easily obtained does not apply when existing old hedges or stone buildings are already present on the site and are being wastefully cleared away and dumped.

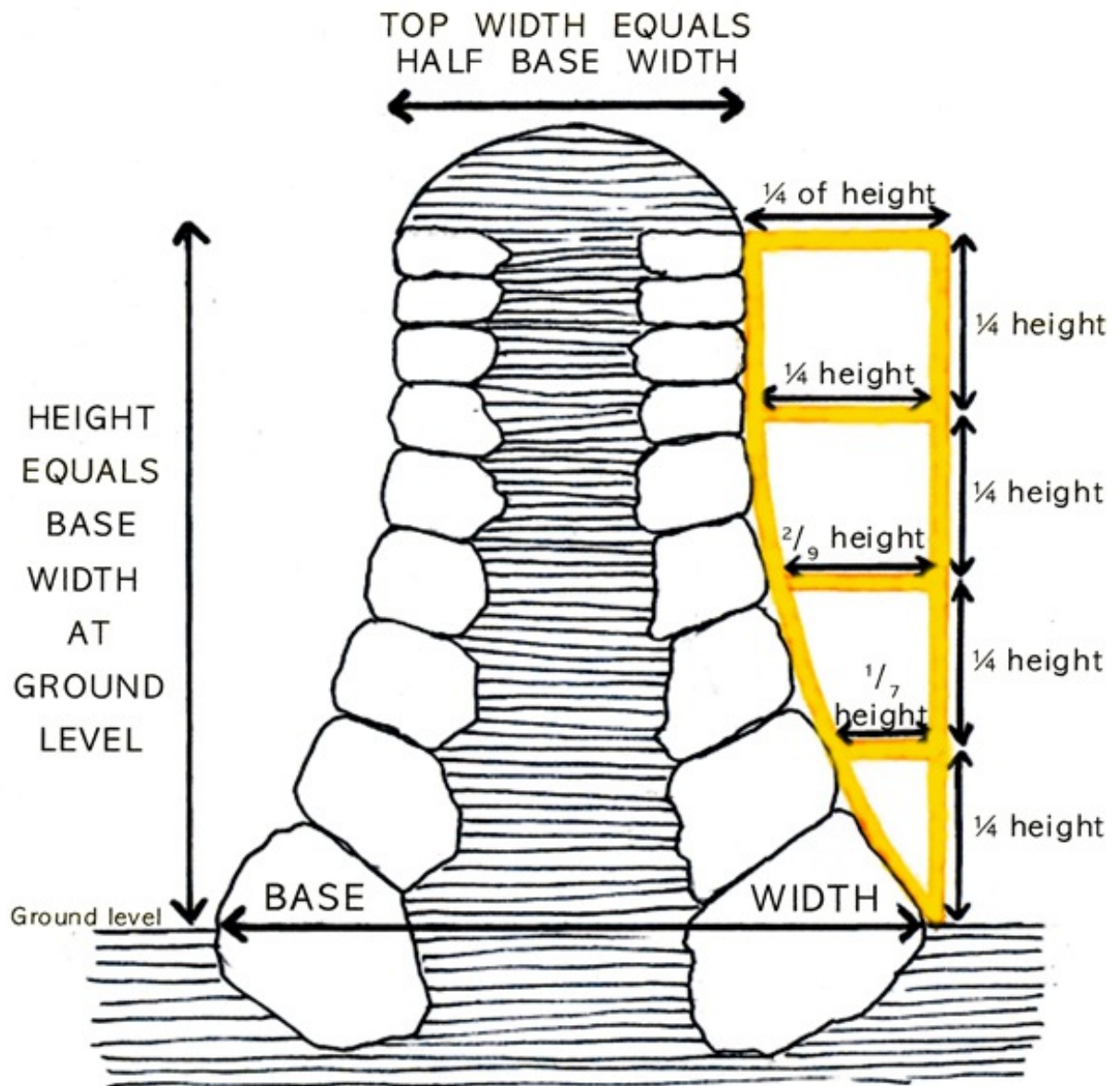
## SIZE OF THE HEDGE

***Unless otherwise agreed in writing, a newly-built hedge is traditionally 5ft (1.5m) in height from ground level to the top of the last stone course. In time this may settle to about 4ft 6in (1.40m). The base is the same width as the height. The top width is half the height. If trees, excepting thorns, are to be planted on the hedge, these top and bottom widths are each increased by one metre, the height remaining unchanged.***

The relationship between the width of the base, the width of the top and the height of the hedge is part of the strength of the hedge but lately has often been ignored, with the top of the hedge being made too narrow, resulting in early collapse. The base width at ground level must never be less than the height of the hedge from ground level to the top of the top course of stone, and the measurement across the top must be half the width of the base.

New hedges were traditionally built to 5ft (1.5m) from ground level to the top of the uppermost course of stone. This was the height specified in the local hedging competitions and allows for the hedge to gradually settle a few inches. The standard 5ft hedge is economical for keeping in traditional farm livestock.

In some cases a lower hedge may be desired for garden frontages. To make an informed choice, the client should be made aware that a higher hedge makes a good baffle against traffic noise and fumes, gives privacy and shelter and is less climbable by intruders, both two- and four-footed. It is less prone to dehydrate in hot summers than is a smaller hedge, gives better protection against flooding, and supports larger shrub and tree growth - important points in view of the climate crisis.



**DIMENSIONS OF FINISHED HEDGE  
WITH BATTER PROFILE MEASUREMENTS**

Where trees are to be planted on top of the hedge, the extra one metre on the width of the hedge allows more space for roots, thus reducing their effects on the stonework. There is about one ton of stone and a ton of fill for every cubic metre of hedge of standard height. On sites where there is an excess of subsoil to be disposed of, hedges may be increased in width to accommodate much of this. Trees such as oak, ash and sycamore can then be planted on the hedge, giving the bonus of attractive screening and shelter for the site and contributing to its green credentials for carbon capture.

## FILL

***The fill for new Cornish hedges is of damp granular or clay-shaley subsoil type of the locality (eg rab, growan, shillet), without peat, leaf-mould or other vegetable matter.***

The earth core component of every Cornish hedge must be of the proper type of material, otherwise the hedge will have a shortened life. Only the subsoil-filled hedge can safely carry a guarantee of 100 years and more before needing repair. Even a well-rammed topsoil fill is likely to produce loosened stonework long before this. Its fertility encourages the bursting action of heavy weeds before the hedge has properly settled. The movement of settling is more disturbing with a topsoil fill as the organic matter within it rots down. New topsoil-filled and badly-built hedges have been seen to collapse as soon as it rains, as the soil swells and gets sloppy.

Any inert soil may be used that is fine enough in its parts to be able to fill tightly all the nooks and crannies behind the stones. Not suitable is any soil containing organic material which in time will decompose, leaving soft spots or spaces in the fill. Ordinary topsoil contains 10-20% organic material which when decomposed will mostly disappear, thus as the soil shrinks weaknesses are created in hedges improperly filled. One experienced hedger, acknowledging that topsoil is nowadays often used, stresses the importance that it should bind together when squeezed in a handful, making a lump that retains the impression of the fingers. This indicates a lower organic content. Topsoil would have to be rammed especially well in at least some attempt to beat the bounce out of it and hopefully prevent excessive settlement. Odd bits of turf and other green-stuff must be kept out of the fill, as they prevent compaction. The same problem occurs with woody material, especially twigs and roots, all of which rots away to almost nothing, leaving a cavity inside the hedge.

The proper material for the fill is the subsoil “rab” found in many parts of Cornwall, which is composed of a mixture of clay/sand and soft shale fragments or rotted granite. When this is packed down tight it sets hard, with the clay binding the decomposed fragments of stone together, giving solid support to the stone hedge sides as they are built. Rab is heavy, inert and less easy to handle than topsoil, but for this very reason makes the best and most permanent fill, with centuries-long stability for the hedge. Well-rammed rab both takes up and lets out water reluctantly, unlike topsoil which more quickly soaks and dries, so a rab-filled hedge properly regulates its moisture content to the right degree of dampness to maintain the hedge's structure and essential plant growth. A notable advantage of rab is that it discourages the lush growth of invasive weeds, which loosen the structure with their heavy roots. The rab-filled hedge will conserve a more natural floral diversity of now often threatened species which need poor soil.

To the north-east of a line between Boscastle and Launceston the underlying subsoil is called the culm measures, being based geologically on the Carboniferous series. This is a different clay soil with few stones, and is not easy to use. Hedging with this clay and the usually small pieces of slate as the most available stone of the district is a special art and can be time-consuming, with a hedge needing perhaps twice as many courses as one built to the same height with more lumpy stone. It is not surprising that there are fewer Cornish hedges in the north-east part of Cornwall, the earth banks being smaller and usually faced with turf, or even non-existent, with an English hedgerow being planted instead. It is no coincidence that there are few Cornish place-names north and east of the stream running down from Jacobstow to Hele Bridge on the Tamar near Launceston.



In West Penwith and in the area around Camborne and Redruth and on Bodmin Moor the local stone is mainly granite, with a mixture of metamorphic rocks often in the form of broken spoil from the mines. The limited depths of subsoil are usually either peaty which, being spongy and organic, is of poor quality for hedge building, or of growan (ow pronounced as in growl). This is granite which has decomposed into its constituent parts with small hard crystalline particles predominating, interspersed with similar material the size of sand. Though not the most sympathetic to use, it makes a long-lasting, stable fill to a well-built hedge. Growan hedges are often topped with peat, which would be very poor fill but makes a good stable capping, once covered with mosses and lichens.

In coastal places some hedges are filled with sand from the nearest beach or dunes, an inorganic fill which with the alkaline content of shell sand gives local character to the hedge flora and fauna. It is not the most reliable for stability if the stonework or the turf topping is damaged, as the exposed sand then quickly dries. A breach can soon form if trespassers climb over the hedge, causing the dry sand filling to slide out.

Although old hedges when demolished may appear to have been filled with topsoil, this is because in time the actions of plant growth and animal life have very gradually introduced humus into the rab. This is one reason the hedge eventually, over centuries, straightens its batter and begins to deteriorate in structural strength (see section headed Batter).

Rab used to be obtained for hedge--building by digging it out of small surface pits, and there is no reason why this method should not be continued where circumstances permit. The vastly superior quality of a rab- or subsoil-built hedge is well worth the trouble. The stonework remains attractively visible and the need for trimming maintenance is greatly reduced or even, in a drier rab hedge tightly-grown with heath or coastal species, avoided altogether. A suitable local poor-soil-loving native flora is established, whereas topsoil leads to infestation with invasive introduced species - and the more the hedge is trimmed by a flail, mulch-manuring and knocking out stones as it goes, the faster they invade. Hedgers should unite in damning the machine which desecrates their completed work.

## MATERIALS FOR REPAIRING GAPS IN HEDGES

***For repairs, existing material is used, with extra stones and fill if needed. The existing pattern of rows is followed. Gaps are cleared down to existing sound hedge structure. Rabbit tunnels are filled.***

Maybe half of Cornwall's hedges have been burrowed by rabbits. Tunnels made in times before myxomatosis, the disease imported over seventy years ago, still exist in many hedges causing weak points in their structure. Livestock, especially modern breeds kept in high grazing densities, cause stones to fall by rubbing themselves on the hedge or by trying to escape from the field, and can quickly enlarge this small damage into a major gap. The old stone rubbing posts should be replaced in pasture fields. People climbing over hedges also cause gaps. During economic changes and pressures since the last war and with the death of the older, skilled hedging generation, many farm hedges have fallen into disrepair. The move towards whole-farm monoculture arable farming, highly unsuited to the land in most parts of Cornwall, has led to widespread removal of hedges and neglect of those remaining. A new problem is the speed with which some badly-built recent hedges collapse.

Although the fallen stone and fill may still be lying by the hedge, with older gaps there is

usually a shortfall and some extra is needed. Many farmers have a stockpile which provides for this, but if stone has to be brought in to repair gaps it should be of the same type and size as in the existing hedge.

For full details of how to repair hedges see papers in the Cornish Hedges Library on repairing Cornish, stone and turf hedges.

## SORTING THE STONE

The stone will have been delivered in a series of heaps alongside where the hedge is to be built. Hopefully it is of the same type and size as that of nearby old hedges. A problem may arise with stone delivered on different days if the smaller stones, which should be at the top of the hedge, are sent several days earlier than the bigger stones, and the hedge building is begun before the latter arrive. The only remedy is to take down that which has been built and to start again. The job should not be begun until all the stone is on site. Some hedgers apply to sort the stone at source, arranging for the larger stone to be delivered first.

The CHL Health & Safety Risk Assessment advice requires that "a zone at the hedge bottom of at least 1m wide along the hedge must be kept clear of stones." The most likely way for a hedger to injure himself significantly is by stepping on a stone unexpectedly, especially if he is carrying a heavy stone at the time. As well as keeping the stone-free zone along the hedge it is wise to practise tidy working, never allowing loose stone to be scattered about all over the place.

Cowboy hedgers try to save time by getting the stone tipped in a pile close to the line of the hedge, leaving it in an unsorted heap and when building the hedge taking the first stones that come to hand. This is bad practice and usually results in unstable hedges. Worse, the workmen are seen scrambling about on the heap of stone searching for a suitable piece, wasting a lot of time and leading to accidents. The time taken in sorting the stone will be more than made up by the speed of building with the right stone coming easily to hand.

The stones should be set out one layer thick, in sorted rows not closer than 1m to the near side of the hedge, leaving room for the hedger to work along the hedge. He will calculate from the sizes of the stones how many rows he will build, and the height of each row. For a short hedge, the rows can be laid out along the full length of the hedge line. For a longer length of hedge or hedges, the rows may be laid out to a suitable length for perhaps several days' work at a time.

Some very experienced hedgers with an eye to speed may get the stone put out in smaller heaps roughly levelled out by the digger and not worry if it is more than a layer thick. They are carefully selective of the order in which they use the stones so that they are always able with a practised eye to take stone from the heap nearest where they are working. Otherwise, by laying out the stone in sorted rows, building is much easier and quicker and the preliminary time taken is always worthwhile. Importantly, in grading and laying it out the hedger's eye has taken in the shape of every stone.

The best hedgers are able to build the stones into the hedge without breaking them. This means using their skill to build the hedge so that they can take the awkward stones in their turn. Only rarely do they get left with a larger stone than they need for the part of the hedge still to be built, requiring it to be split with the sledge. This contrasts with the novice who tends to take the easy stones first, then has to spend a long time wandering around the heaps of stones, to and fro, trying to find a stone that will fit; or he will spend a lot of time unnecessarily breaking and trimming stones. Some hedgers will take a day, too wet for proper hedge building, to spend time dressing some of the most awkward stones in the heaps. In rebuilding an old hedge the stone

should not be broken. It fitted before, and will again. It is an insult to historic stone and the ancient craftsmen to break it through failure of your own skill.

The less experienced hedger is advised always to lay the stone out on the ground in rows, parallel with the line of hedge in order of size. The nearest row of stones is made up of the largest size, those that will be the grounders (the foundation stones in the bottom row). Lay them out not less than a metre away from the near side of the hedge-to-be, with enough space between the stones for easily moving them again. The next row of stones are those next in size, and succeeding rows of diminishing sizes are laid out so that the outermost row is made up of the smallest building stones. A separate heap comprises the small chips and wedges of stone which will be needed to trig (wedge) some of the stones as the hedge is built.

By setting out in this order, the row nearest the hedge will always be the next one to be used, which painlessly forms each course in diminishing order of size. Laying out the stones carefully like this helps to memorise the various faces of each stone with its destination in the hedge in mind. While the stone is being laid out the different faces are looked at, so that later on the selecting of stones is helped by knowing the shape of the sides lying hidden from view. An experienced hedger will never put down a stone he has picked up, because he knows exactly where and how it will be laid. The novice hedger will learn this skill by remembering the shapes from when he set out the stones. Time spent sorting, laying out and studying the stone is essential. It saves a lot of time in building and results in a far better hedge.

Hedgers may be able to have an arrangement with their local quarry where they can go and sort the stone that they need for a particular job. Although this sorted stone is perhaps double the cost of unsorted stone, it is often worth it in the long run because time is saved and there is less wastage.

## HANDLING STONE



*Using a stone as a fulcrum to rest the bar on while levering up a large stone to adjust its position. Note, the shadow makes this look like a triangular stone, but of course it is not. The shape must be stable to rest on or the bar will move or slip off.*

We say in Cornwall, "If you can move a stone a quarter of an inch you can move it anywhere." This is because all that is needed to roll or pivot the stone is to take its weight for a moment. The secret of moving a large stone is to "let some air under it", because once a stone has been lifted enough to wedge a smaller stone under one side, the natural suction is removed and the character of the underside of the stone can be seen and read. A small stone is then placed underneath as a pivot at a strategic point and the large stone is swivelled or walked along by levering with a bar, using a strong stone as a fulcrum (to rest the bar on). At each step the pivotal point has to be repositioned by moving the small stone beneath.

Other large stones may be more quickly moved by rolling them over and over with the aid of the bar and fulcrum. The stone used as a fulcrum must be of a suitable shape so the bar will not slip off it or move it when taking the weight of the large stone. It must be hard enough not to crack or crumble under pressure as the bar bears down across it.

A large stone should not be dropped down on its widest, flattest side, as this makes for heavier work in first lifting it, once it has settled into the ground. Although today the use of a digger or tractor fore-end loader makes moving stone much easier, the skills of rolling and pivoting are important in the final positioning of larger stones.

Certainly there was never any need to use brute force in handling stone, and there is even less need today, no matter what temptation there might be at the time. There is no joy in having to retire early with a strained back. Heavy stones may be moved by the use of a long bar. Others light enough to be lifted should be rolled to the foot of the hedge first, then positioned between the hedger's feet and raised off the ground using bended knees with a straight back. The stone should be lifted by straightening the knees. When the stone is at about thigh level, it should be as close to the body as convenient, even resting on the thighs or the muscles of the abdomen. In walking with it, the knees should be slightly bent so that if the grip on the stone is lost and it falls to the ground, it will miss the feet. If the grip is partially lost, it may be better to put the stone to the ground and start again than to carry on precariously or to make an awkward grab to regain hold. Always take time and thought before moving or lifting any stone too heavy to pick up easily. Have a look at the CHL Health & Safety advice note on handling stone.



*Carrying a stone supported against the hip and thigh. Note back is straight and knees slightly bent.*

## MOVING STONE WITH THE TRIPOD

If all the stone supplied is large and any row above the grounders contains stones too heavy to lift without risk, a mechanical aid to lifting is essential. If the use of tractor or digger is impracticable on the site, a low-cost aid to handling heavy stones is to use a tripod. A good example is that pictured here, made out of three 10ft x 2 inch galvanised steel water pipes. One end of each pipe was flattened and drilled to take a 1 inch hole. A 1" diameter bolt was put through the ends of the three pipes to make a tripod. The feet are designed to grip firmly into the ground. The stone is suspended by a length of chain from an endless-chain pulley. (Test certificate required.)



*Apex of the tripod showing hook attached by one-inch bolt through flattened ends of galvanised pipe.*

In raising the stone, care must be taken to place the three legs of the tripod on firm ground and suitably distanced from each other. Otherwise there might be a risk of toppling the tripod over. On loose or awkward ground the legs should be fastened down.



To move a stone along, the tripod is placed with its centre somewhat in advance of the stone. An indentation is made with the cold chisel on either side of the stone so the dogs (lifting hooks) will grip as the chain takes up. As the pulley operates to raise the stone just clear of the ground, the stone swings into the centre of the tripod and is deposited there. The chain is slackened and the tripod is moved forward a foot or two and the process repeated until the stone is in the desired position. To place a heavy stone above the row of grounders (foundation stones), for the final move the tripod legs would need to straddle the row, bringing the centre of gravity into the right place to raise the stone and deposit it on top.

Safe use of the tripod should be learnt on site from an experienced hedger.

The following series of illustrations shows the use of the tripod being demonstrated to apprentices.



1. The endless-chain pulley block is hooked on to the tripod.



2. The lifting tackle is hung on the pulley hook.



3. The tripod is positioned with centre a little ahead of the stone, which can be seen between the near tripod pole and the instructor's left leg.





4. A notch is made in the stone each side to give a grip for the hooks.



5. Hooks placed in the notches ready to grip.



6. Taking up the slack on the chains.



7. Hooks gripping the stone.





8. Raising the stone just clear of the ground with the endless-chain pulley. Notice that everyone stands clear.



9. The stone has swung into the centre of the tripod and is lowered to the ground, ready to unhook, move the tripod forward and repeat the process until the stone is in its final position.

## DIGGING THE TRENCH TO LAY GROUNDERS.

***A trench the width of the hedge base is dug out, ideally down to subsoil, not less than 6 inches (15cm ) deep.***

***Excavated turf and topsoil are piled separately from subsoil and fill, for use in topping the hedge.***

Following delivery and sorting of the stone, the turf and vegetation along the strip where the hedge is to be built is dug out in a manner to preserve the thick tobs (tubbans, sods, turfs). The turf/green growth is removed complete with roots in a layer about 15 cm (6") thick. These tobs or chunks of excavated topsoil, turf and other plants are put to one side to be used to top off the new hedge; this is to restart the natural wildlife in it, and in time to make roots to bind the hedge-top together. If the trench is dug out by hand the tobs are best cut diamond-shaped, as these knit together better by interlocking when laid on the finished hedge top. If the grass cover is poor the tobs may tend to fall apart, but the thicker the lumps that can be preserved, the better. Thin turf like that sold for making lawns is no use for topping a Cornish hedge.

Setting out the line of the trench is done either with a line or with sticks from a nearby hedge or by the placing of stones, every 3m (10ft) or so. Some hedgers use a line, while others maintain that a line should not be used in building a Cornish hedge because it gets in the way and slows the job down. Some may use a line to cut the trench, then remove it. Most skilled Cornish hedgers can build a straight hedge without using a line. There is an example of a straight new hedge beside the main Penzance-Helston road in Ashton built without a line by

Dennis Roberts of St Keverne. While a high specification for a town hedge may require a line to be used, much of the charm of the Cornish landscape is due to many older hedges not being perfectly straight. Hedges at domestic frontages are often required to be curved in to the gateway and this too may be done by using the eye.

Ideally the topsoil is removed down to the subsoil or 'country' level. In practice, in most parts of Cornwall the subsoil is not so far below the surface and the soil at 15-20 cm (6 or 8 inches) deep should be firm enough to bear the hedge. In softer ground the excavation has to be deeper. Exceptionally, boggy places may require extra stone to be packed into the trench to make a firm base for the grounders.

If the topsoil has already been removed as it might be on a construction site, the trench is excavated to about 75-100mm (3 or 4 inches). The excavated rab is cast into the centre of the trench between the two rows of grounders as a start for the filling of the hedge. For farm hedges the grounders must be set deep enough to stop them moving outwards when the field is ploughed.

The width of the trench must be the same as the ultimate height of the hedge plus a working margin either side to allow room for setting in the grounders. The trench may usefully be dug by a mechanical digger. It is finished with a level bottom, making the laying of grounders easier. Where the country is rocky, the excavator may be unable to clear such a tidy trench and more hand-work in fitting the grounders will be necessary.



*A new Cornish hedge at Ashton built without using a line.*  
Photo: Mark Kelmanson

## LAYING THE GROUNDERS

***The largest stones are used for grounders (foundation stones) and are seated in the trench bed with their biggest and lumpiest side downward. No stone or fill packing is inserted under grounders before laying.***

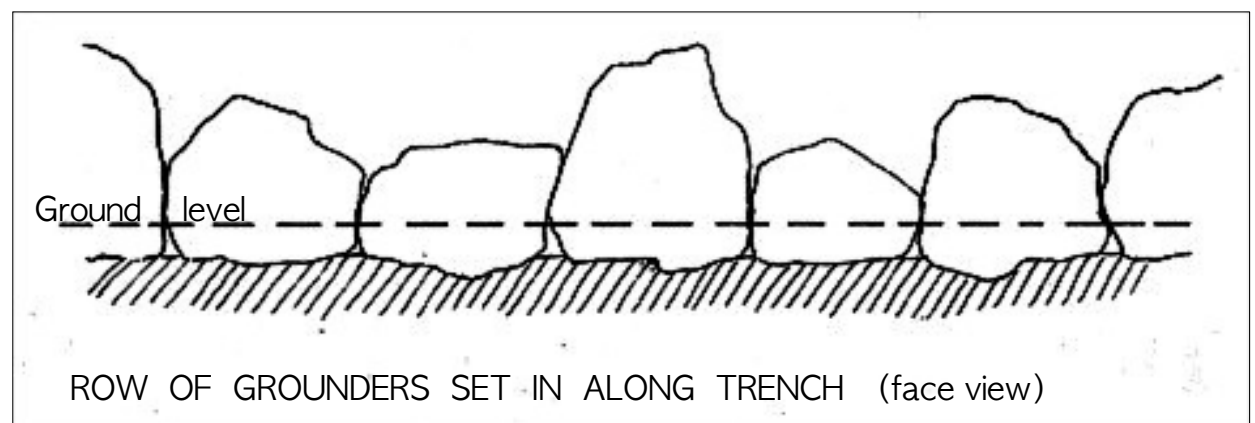
Working on both sides, a row of grounders is laid along each side of the trench, seated in the trench bottom so that the slanted-back face of the stone emerges at ground level along the base-width line of the finished hedge. Measuring from the outer face of the grounder on one side of the hedge to the outer face of the grounder on the other side, the measurement at ground level is the same as the proposed height of the finished hedge from ground level to the top of the top course of stone. (See diagram page 7).

Grounders should be laid with their lumpiest side downward and their flattest face available to the front. With large grounders, today the tractor with a bucket or a mechanical digger may be employed. Sometimes the tripod is more convenient, especially on restricted sites.



The underside of the grounder is always laid directly on to the undisturbed soil in the bottom of the trench. This is achieved by digging or scraping the soil out to accommodate the shape of the grounder's bottom, never by using loose fill or stones to pack under it. The only exception is in deep boggy spots where extra stone may have to be packed into the bottom of the trench before laying the grounders.

With oddly-sized stone it is more important that each grounder should be resting on a solid unyielding base, than that the tops should be level. Choose the grounders so as to vary their height evenly along the hedge, alternating higher and lower tops. (See diagram).



If the hedge runs along the contour on sloping ground, select the bigger stones for the grounders along the lower side. This will usually be enough to level up the two sides of the hedge.

***Grounders are set in to the correct angle, interlocking with each other. For the typical newly built 5ft (1.5m) hedge, this is the angle of Cornish shovel blade to haft (35 degrees approx).***

The grounders are selected and laid to the correct angle and so that the touching sides interlock. The angle at which the grounders are slanted back is all-important to achieving an effective batter. The well-known Cornish entertainer Jethro, recalling how his father, master hedger Hugh Rowe, had taught him to build, remarked about a high hedge: "The grounders lay back so far it was frightening."

For the typical hedge, about 1.5m (5ft) newly-built height, traditionally the grounders are laid slanting inwards at the same angle as the head of the old-style Cornish shovel to its hilt. Note that this old method applies to the traditional Cornish shovel. The modern shop-bought shovel has a straight handle that is likely to be set at a different angle to the blade. In practise a skilled hedger can set the angle of the stones correctly by eye, but a learner is advised to use the traditional profile former, which is set to the angle of the old blacksmith-made Cornish shovel and can be made to size for different heights of hedge. (See page 4).

Hedges (and retaining walls in the same style) are built to various heights, typically from 0.5m (20ins) up to 2.5m (8ft) high. The measurements for the curve of the batter profile are

calculated so that a profile former may be made for any height of hedge. For the more usual heights the formers should be strongly made of steel or aluminium, but for the odd job to an unusual measurement a cheap former can be easily made out of plywood.

***At least half the fill between the two rows of grounders is free of stones exceeding 25mm (1"). This is rammed hard around each grounder in successive consolidated layers not more than 100mm (4") with the stonier part of the fill being put to the middle and well rammed.***

The centre of the hedge should be filled as the work on the grounders proceeds on both sides. The fill is traditionally rab (clay-shale subsoil). Nowadays the available material tends to be variable in type and quality.

The fill should be rammed hard, using the end of an iron bar (the rounded/flat, not the pointed/bevelled end), around the base of each grounder. This has to make sure that they will not move when the heavy weight of the hedge comes on them. Then the centre of the hedge is filled, putting in layers of not more than 100mm (4") and each layer consolidated by walking over it, pressing down hard with the heels, ramming into the crevices between grounders with the end of the bar, then pounding down hard with the sledge-hammer used like a battering-ram. It should be rammed so hard that nothing "gives". The rammed layers are continued until level with the top surface of the grounders. Where the grounders are of uneven heights, fill only to the height of the lower stones at this stage. No fill is allowed to lie on the tops of the stones.

***Grounders may only be laid on edge as facers (shiners), if the width and depth of the stone are each more than one-quarter of the height of the stone. Facers are at least 15cm (6") thick at the top. No facer should be laid alongside another, but with ordinary grounders between.***

If the grounder is very flat, the temptation to put it on its edge must be dismissed because it is likely to move later on. Similarly a very large flat surface should not be left uppermost because it will be difficult to key in the next row on it. The only exceptions are for those hedge styles which use boulders around 1m (3ft) high, and perhaps more than half this in width, and where the hedge is less than 1.5m (5ft) high; here the sheer size and weight allows for the stones, to be put "on edge" as facers (or shiners), as the principal part of the hedge, and more nearly upright, but still with their outside face set inwards at an angle of about 10-20 degrees from the vertical.

Stones should only be used as facers where the width and depth of the base of the stone are more than a quarter of its height. For less skilled hedgers the base width and depth of a facer should be more than a third of its height. No facers should be laid next to each other: ordinary grounders must



*Poor use of large facer in foreground set upright with another beyond and alongside it which is moving outward at the top, so stones above will fall down.*

be put between, preferably several before the next facer is used.

Traditionally, stones of this size and shape would have been used as a 'tombstone' hedge, that is, set upright into the ground in a row, with large filler stones between where necessary. They would seldom have been used as facers or otherwise in a Cornish hedge. There is currently something of a fashion for building with huge facers at intervals along the hedge and small stones between, perhaps because it gives a bizarre, decorative appearance. The problem is that the size of the facers prevents the curved batter, so even if they remain stable the rows of small stones between, batter-less, are likely to bulge outwards and fall. To make matters worse, where the rows of small stones butt up to the side of the facer it forms in effect a long, weak running-joint down which they are liable to move. If these very large flat stones have to be used as facers, the stone used as fillers between them should be large enough to provide its own massive stability, as is seen in old hedges built with large moor-stone boulders, (the shape and size in which they were dug up out of the moorland ground). When the stone is of this magnificent size and flat shape, new tombstone hedges should be built. Otherwise for Cornish hedging large flat stone should be broken up for use as ordinary grounders and fillers.

***For new hedges, a stone culvert not exceeding 6 ins (15cm) diameter may be built through the hedge where excessive ponding at a low spot might be problem. Big adjacent grounders and paving must deter undermining.***

In hilly Cornwall with its heavy rainfall, our hedgebanks play a major part in preventing run-off from gathering and making floods. Nowadays the bigger fields mean that the remaining hedges are even more important for this than they used to be. The uninterrupted flow of storm water down a field that has been recently ploughed carries with it a large load of topsoil which causes problems when it is deposited on roads or in streams. Our hedges keep the topsoil in the fields where it belongs, provided that the hedge itself is not breached. Cornish hedges pond up the water running off the land on the up-hill side of the hedge, allowing it to sink away gradually and harmlessly. The grounders of older hedges are usually quite deeply set and the rab core consolidated, so the only way that water can get past in a hurry is via gateways, rabbit and mouse holes, or over the top. New hedges tend to be built on the topsoil and with topsoil core, perhaps not the best compacted or settled with time, and often with gaps between the stones left by un-skilful or hasty building. The passage of water through such a hedge takes with it some of the soil core and can make a breach in the hedge.

The remedy for a new hedge in a position likely to pond a lot of rainwater from run-off is to build-in culverts that are big enough to take some of the water without being so large as to cause problems further downhill. Culverts of 15cm (6") width are a good compromise, and are laid at the low spots of the hedge where water is likely to accumulate. This depends on the orientation of the hedge, the amount of ground uphill of the hedge and the permeability of the soil.

The culvert should be built using suitable shapes from the stone that has been provided for building the hedge, or if not suitable from chosen shapes of a similar stone. A larger culvert may have to be built if the hedge spans a small stream or running ditch. Here the size of the culvert will depend on the width of the flow, but it is built to the same principle.



*Small ditch culvert in old field hedge near St. Just.*

Two grounders on each of the opposite sides of the hedge have to be laid with enough space between for the stones of the culvert. The stones forming the floor of the culvert are set right through the width of the hedge with their tops level with the field each side. A large stone is laid across outside the mouth of the culvert on each side of the hedge, set with its flat top level with the floor of the culvert; that is, at ground level. This helps to prevent undermining as the water funnels into the culvert. The stones forming the sides of the culvert are laid on the floor stones, leaving a 15cm (6") gap for the water to pass, and about the same height. Finally stones are placed across these, forming the roof of the culvert. It is important that the culvert is built strongly enough to take the huge pressure from the hedge above it.

Usually there is no need for culverts, as a well-built Cornish hedge can provide an effective flood-prevention service without harm to itself. Unless maintained, a culvert will in time block up with debris and silt.

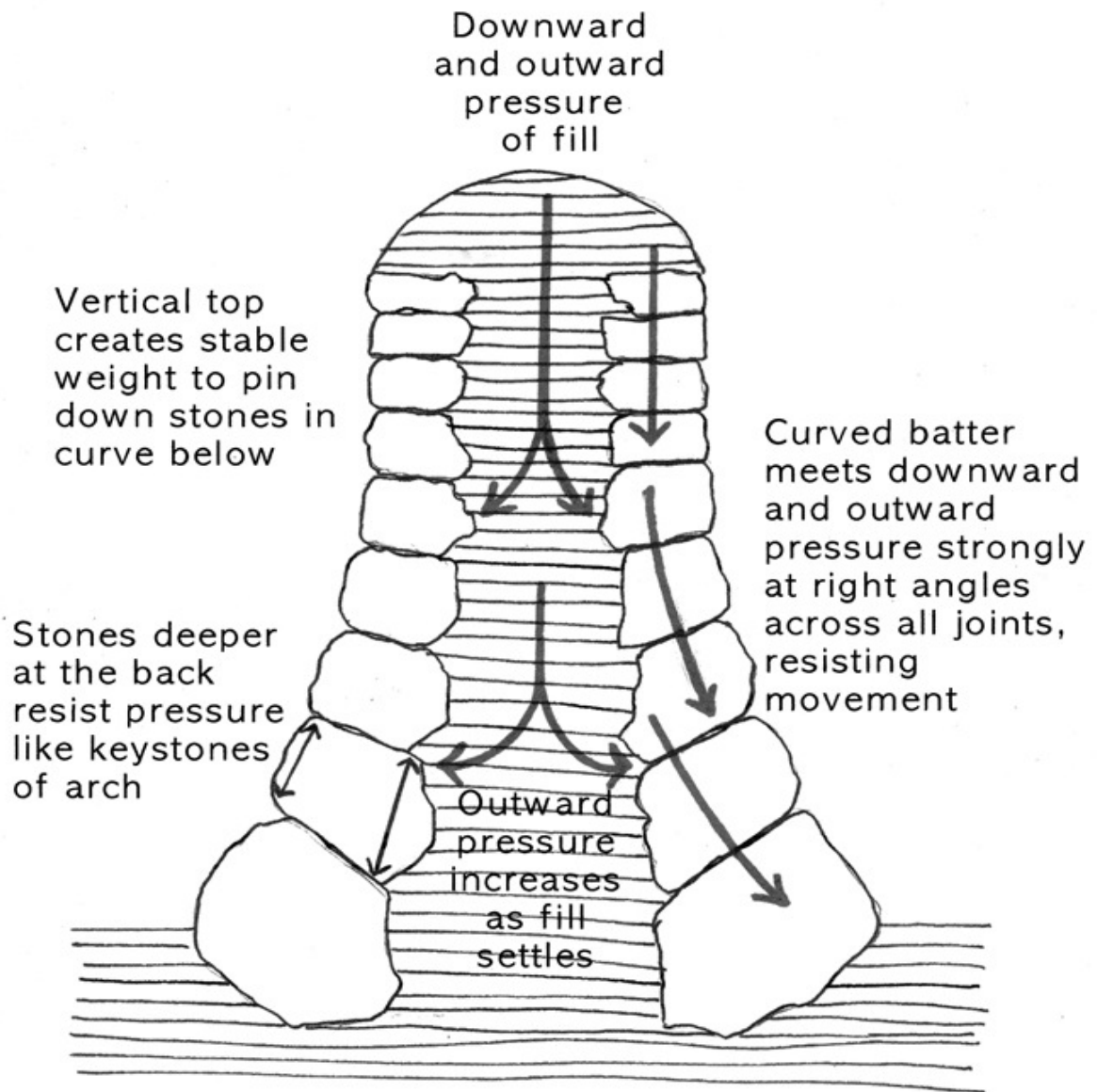
## BATTER

***The batter is built in an inwards (concave) curve. At a quarter of the hedge height, the inward batter on each side of the hedge is one-seventh of the base width (ie the width of the hedge at this point is just over three-quarters of the base width). At half of the hedge height the batter is two-ninths of the base width. The inward curve continues up to three-quarters of the hedge height, the batter getting less with each row so at this height the inward batter on each side of the hedge is one-quarter of the base width (ie the whole width of the hedge is half the base width). Thereafter the face of the hedge is vertical to the top.***

Building to a proper batter is, along with the rab fill, the most important part of building a hedge. However tightly a Cornish hedge is built, it is a flexible structure and will settle somewhat as time goes by. The downwards pressure of the top half of the hedge and settlement of the fill tends to push the lower part outwards. The curved batter resisting this pressure can be likened to the way that a stone arch holds itself together. As the weight of the vertical top settles and pins down the stones below, the combined downward and outward pressure tightens the curve, locking the stones harder together.

The amount of curve in the batter has been handed down from hedger to hedger over many generations of Cornishmen. The late Cyril Roberts, in explaining that the batter must be properly curved, said "A good hedge will put a sheep on its back," ie if it tries to run up the side it will somersault off again. Another champion hedger Roy Neale agreed on this question of the inwardly curved batter, "You want to have a good hollow belly in it. That's the strength of your hedge." Since the hedging competitions were discontinued from lack of competitors, the knowledge of building a good batter has declined so that hedges are built where the curve is no longer enough to serve the purpose of stopping the stones from bursting outwards. Ignorant hedgers often use a straight-sided A-shaped frame, and hedges have even been seen built to an outward curve like the side of a barrel. Now that so many hedgers use a topsoil fill, a deep inward curve to the batter is more than ever essential, as the soft soil inevitably slumps more than a good hard rab. It is the combination of a poorly-compacted topsoil fill and the lack of a proper batter that is the main cause of so many newly-built hedges collapsing shortly after completion.





## HOW THE TRADITIONAL CURVED BATTER MAKES A STRONG HEDGE

There are too many hedgers now who know only of a straight A-shaped taper. Unfortunately this does not function as a proper batter and a straight side at whatever angle builds a structural weakness into the hedge which inevitably shortens the period before it begins to bulge and needs repair. Some hedgers nowadays seem not to know the purpose of a batter at all and build the sides vertical or even curving outwards like a barrel. Some deliberately narrow their hedges at the top so that they have less filling and compacting to do, but this also produces an unsound job and should never be accepted.



*Correct batter on a 5ft retaining hedge over 100 years old. Recent removal of green cover not a good idea but shows the stonework still in perfect condition.*

standard 1.5m (5ft) hedge starts with the grounders set back at the same angle as the shovel head was fixed to its wooden haft. They emphasised that the shovel had to be one of the hand-made, now superseded models. This angle has been measured on classic old blacksmith-made Cornish shovels and found to be about 35 degrees.

The next point of unanimous agreement is that the height of the hedge equals the width of the base, and that the width of the top of the hedge has to be half the base width. There was discussion about how the final top width of the hedge was met. The general agreement is that the batter should be a gently decreasing curve from the ground up to three-quarters of the hedge height, and that the width of the hedge at three-quarters of the height should be half the base width, with the top quarter of the hedge vertical. This vertical top quarter was emphasised by all the best hedgers, and borne out by testing many superb examples of long-standing hedges, including those built in their

A well-built hedge with proper curved batter and compacted rab fill can be guaranteed for over 100 years, and (barring inflicted damage or inappropriate trimming) will probably last three centuries or more without attention.

A misunderstanding commonly arises from the fact that very old hedges tend to lose their batter as the stones settle very slowly outwards in time. Eventually, after several hundred years, the hedge may no longer appear to have been built with the traditional curved batter. This gives a false impression that older hedges were built with a straight batter.

The batter recommended here is confirmed from the practice and statements of professional hedgers over the later decades of the 20th century, particularly older men who had worked before the last war and had direct links to the craft back in the 19th century. Traditional hedgers still practising until the 1980s and '90s, and others in their retirement, were asked about the design of the batter. Examination was made of profiles or formers that hedgers inherited from their predecessors. It is clear from the testimony of these craftsmen that the traditional batter for the



*This well-built 4ft hedge has already kept its batter for nearly a century and has never lost a stone in that time.*



youth by these craftsmen, some well on in their nineties when interviewed, or by their fathers.

However, where the sheep are very agile, the top quarter is built so that at the top the hedge sides lean outwards by one-tenth of the hedge height each side. This is achieved by using good long-shaped stones, set with the long axis running into the hedge, for the top two or three rows, or sometimes a row of projecting coping stones is set in.

There may be local idiosyncrasies but good hedgers do not differ much in respect of this proper batter.

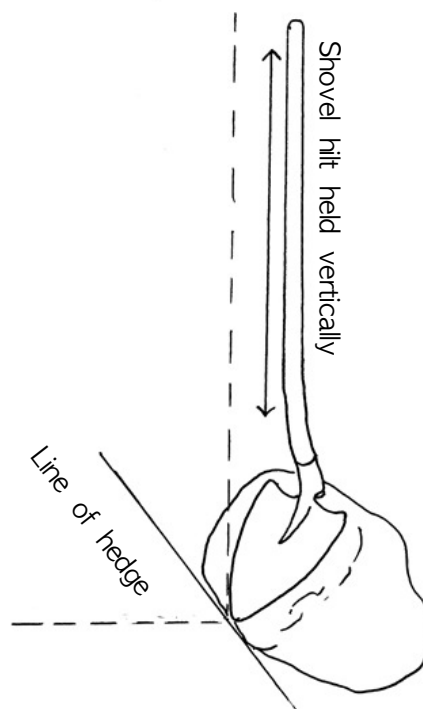
In mid-Cornwall some hedgers favoured the “5-4-3-2-1” method. This calculation provided, with the typical 1.5m (5ft) hedge, for the batter to be 5 inches in the first foot up from the bottom of the hedge, 4 inches in the next foot, 3 in the next and so on until the top foot which is nearly vertical. Although this does produce a curved batter, other hedgers point out there is not quite enough curve in the lower half of the hedge, and that the inwards top does not deter hill breeds of sheep. If set back more than about 1 in 12, opinion suggested it would be likely to create an outward movement high in the hedge and in failing to maintain an even downward pressure at 90 degrees between the courses could cause bulging three or four rows down.

A truly strange calculation was given in the standard hedge specification issued by the Highways Department of Cornwall County Council in 2004, which specified a batter built to a 40-metre radius. This requires the hedger to measure out a circle with a diameter of 80 metres, then to copy a section of the circumference the height of the hedge, turn it upright at 90 degrees, then use that short bit of curve as a guide to the batter. Apart from the absurdity of expecting the hedger actually to follow this procedure, the resulting curve does not produce a proper batter.

Hedgers on the job sometimes use a double-sided profile which is set up at each end of the length of hedge, perhaps with strings running between, though these get in the way and most good hedgers can build to the profiles



*Rare photograph of the winner at a Cornish hedging competition around the end of the 19th century shows the hedge built to the traditional batter curve. The hedger's shadow shows the curve exactly fitting the batter recommended by recent champion hedgers.*



SETTING ANGLE OF GROUNDER  
WITH  
TRADITIONAL CORNISH SHOVEL

by eye, checking with a hand-held profile now and then. Sometimes, even if a profile is on site, it is ignored, either because the hedger is so good that the profile former is not needed, or because the hedger is not skilled enough to make a good batter, even with a profile to help him. Rumour has it that a hedger's son who inherited his father's formers remade them with a straight profile because he found building to a curved profile too difficult. This is one of the ways that bad practice has been introduced. Another is the notion that doing a cheap job means not building to a batter. In fact it costs no more and takes no longer to build to a proper batter than to a bad shape.

## SELECTING THE STONES

The late Cyril Roberts of St Keverne, champion hedger, remarked to the author "You have to see the job finished before you start, and work accordingly." A good hedger can look at a heap of stone lying on the ground and visualise the hedge it will build. This gives him a guide as to where each stone will fit in the hedge. The object of sorting the stone before beginning to build is to facilitate selecting the right stone to use.

Traditionally the hammer is not often used to break or to dress stone in building or repairing Cornish hedges, but only to knock off a *prill*, a tiny corner or edge on a stone which prevents a snug lie. As one hedger wisely said, "You use the stones you have got, and not the ones you haven't got." Broadly speaking, stone may be dressed for high-specification domestic hedges but not for agricultural or other general work. It is much quicker and safer to sort the stone properly beforehand than to keep dressing stones to shape and size. The continual concussion of hitting hard Cornish stone is bad for the hand and wrist. Some new hedgers seem to use their hammers all the time, instead of developing their eye for fitting the stone in its existing shape. They may have been taught dry stone walling methods from outside the county which are unsuited to Cornish stone and traditional styles.



*The beauty of this typical old country-built West Penwith hedge lies in the weathered shapes of the granite moorstone smuggled together by the hedger's skill.*

The true skill of Cornish hedging was founded in the use of moor-stone in its natural state (broken down eroded and weathered stone as it is found in the environment) and is essential when using metamorphic rock too hard to break easily or well with a hammer. Not for nothing are Cornish miners defined as "hard rock" miners. Most of this skill of the old hedgers who built by eye was in sorting and using the natural pieces of stone in proper coursing, each stone interlocked with its neighbour. Our prehistoric hedges, rebuilt many times with the same stones over the thousands of years, contain stone that has never been hit by a hammer, and it would be an insult to start doing it now.

The West-country hedgers' saying that "every stone has seven sides" has much truth in it. A lump of stone, being more or less a cube, in theory has six sides with four rotations to each, totaling twenty-four different orientations; but usually there are no more than about seven useful ways of placing the stone in the hedge. With awkwardly-shaped stones there will be fewer, even

when a place is specially made to receive the stone, or occasionally in bad cases perhaps none without adjusting the shape with a hammer. In the slate country on the North Coast they say that "every stone has five sides, four to build with and one to throw it away into the hedge", meaning if it does not fit, it should be added to the fill. This is because the choices with shale or slate stones, with their two parallel faces, are different. Many hedgers, re-using old hedging stone or re-building a gap, will carefully sort the stone so that they can see the original face of each; this is done by identifying the signs of weathering, lichens etc, on the outside face. They will seek to build with the same face outwards, which reduces to four the possible different ways, or just two if the stone is placed with the longer dimension of its face vertical as it is best laid.

An experienced hedger with inherited aptitude finds this understanding of the stone's shape easy. One young person put it that "you have to think upside down" to match the solid shape of the stone to the inverse shape of the space into which it must fit. Novices finding the concept difficult may not persist enough in rotating the stone to discover its correct position and so are not using stones in the way that they should go. As a general rule, the skilled hedger lays every stone with its longest axis set into the hedge. With long narrow stones, this results in the smallest face of the stone, maybe only 10cm (4") wide, showing in the face of the hedge. Some hedge inspectors might mistakenly condemn a stone which is laid thus, thinking it is just a small stone no longer than wide, but this suspicion can be refuted by the solidity of the stone in its seating in the hedge and the overall quality of the building.

Most hedgers work on a run of hedge face about 4m (4yds) long which gives a good range of possibilities of placing stones, without requiring the hedger to walk too far forth and back. Two hedgers building one hedge usually prefer working on opposite sides. An experienced hedger, just laying the stones, can keep two skilled helpers fully employed selecting and handing stones to him. He will be working on a length which he will keep in his mind's eye all the time; so whatever stone he is handed, he will know instantly where to put it.

## MAKING THE FILLER ROW

***As few stones as possible are used to even-up gaps between tops of grounders. Fillers are laid with longest side into the hedge, slanting in at the same angle as the grounders, and levelling up the top of each row of grounders horizontally along the hedge, ready for the next row.***

With the grounders laid and the middle filled to the tops of the lower stones and properly rammed, the next row is laid on both sides of the hedge. This is called the filler row because its stones fill in the uneven gaps between the tops of the grounders, the level top of this row being the same height as the top of the highest grounder. Where the grounders are very assorted in height and shape, the stones in the filler row are liable to be of a variety of sizes. The bigger the filler-stone used to even-up the spaces between the tops of unevenly-sized grounders, the better, rather than a lot of small ones. The hedger takes this opportunity to use some of the stones (especially



*A well-fitting filler stone between two grounders.*



the triangular shapes) that would otherwise prove to be awkward in the subsequent rows.

The filler stones are laid slanting in at the same angle as the grounders, with the longest axis into the hedge and the face flush and even with the face of the grounders. The thicker end of the filler stone, if it has one, is laid inwards, the hedger seeking to introduce the stone so that the grounders wedge it in behind; but the result must look as if the filler stones have been laid between the grounders and not behind them, otherwise the next row will not fit properly. The job is especially difficult when facers are used as grounders as the filler stone may gradually sink behind and push the facer outwards.

The finished filler row creates a seating for the first level row of stones. The top of the filler row is to the height of the highest grounder and should be level along the length of the hedge. Some stones will be laid horizontally above the smaller grounders, levelling to the top of the filler to either side of it. The tops of the filler stones slant downward into the hedge at the same angle as the tops of the grounders.

### MAKING THE FIRST LEVEL ROW

The next row above the grounders and fillers is the first of the straight, level rows. The stone in this row is of the next biggest to the size of the grounders and fillers. This row is laid with the lower edge of each stone's face placed carefully to the upper edge of the grounder or filler below it. The faces are laid exactly flush like this to stop the more agile breeds of sheep climbing up the hedge, as they easily make use of a tiny ledge of 12mm ( $\frac{1}{2}$ ").



*Courses from bottom up: grounders, fillers, two rows laid flat, two rows pitched.*

The stone is laid with its longest axis running into the hedge, with the face and top slanting inwards slightly less than the grounders. By placing the thicker end of the stone inwards, the stones are keyed in and the top of this row presents this slightly lessened slant to the seating for the next row. The novice hedger needs to check this angle carefully with the profile former to make the batter curve.

Making a properly curved batter is difficult when very tall grounders are used. This is why the grounders should be laid with their largest bulk below, within the hedge's foundations, to give stability and enable the batter to curve correctly above ground level.

The character of this row depends on the proportion of large and/or oddly-shaped stones still remaining after the grounders and fillers are laid. With large stone in the first row

above the fillers, the curve of the batter may be less smooth; the stone has to be laid at the angle which meets the curve again at the top of the course. If there is a lot of large irregular stone this row may need its own fillers to level the seating for the subsequent row of stone.

Normally the first straight row above the filler row can be made with the stone laid either on the flat, vertically, or diagonally for herringbone, depending on the predominant size and shape of the larger pieces in the stone heap.

## RAMMING THE FILL

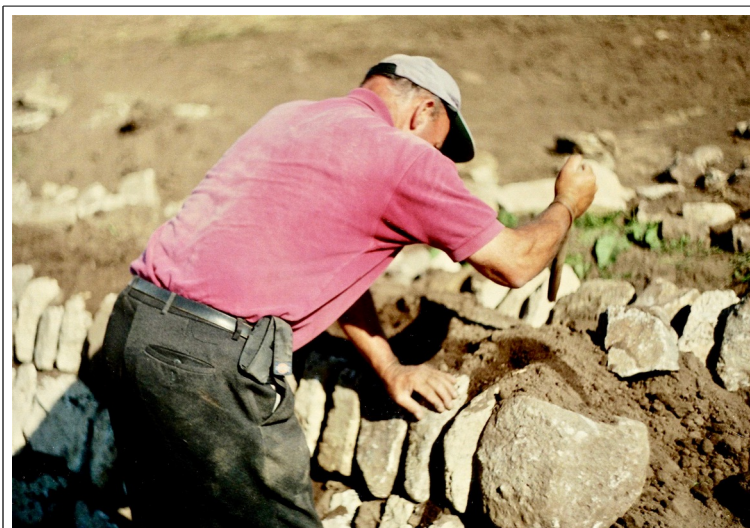
***Fill is well-rammed around back of each stone while filling to top of each row in layers not more than 10cm (4"), well-consolidated.***

As each row is laid, the fill is added in layers of no more than 10cm (4") at a time before being rammed down tight with the rammer. Adding at about 6cm (2½") can actually be quicker because the rab consolidates easier. Any larger pieces of stone in the fill are put towards the centre of the hedge and well rammed down. It is especially important to ram the rab into the crevices at the back of the stones. There is skill in tightly filling the cracks without moving the stones, disturbing the essential stone-to-stone contact or forcing the stones apart. Rab rams down nice and solid, unlike topsoil which always has that slightly fluffy or bouncy feel to it. This ramming of the fill is vitally important to the stability of the hedge, and cannot be over-emphasised; a rule of thumb from an old hedger is that every stone must have at least twenty consolidating thumps on the fill behind it.

The most thorough way of ramming is to start off by holding the club hammer by its head and ramming down with the end of the hilt behind the bottom of the stone, steadying the stone with the other hand. Then, when the fill is firm around the stone, switch to holding the club hammer by its handle and ramming vertically with the top of its head. As each layer is

added, the fill is first rammed into the crevices with the hammer's hilt, then pounded down with its head.

Hedgers in a hurry sometimes add the fill in 150mm (6") layers for speed but almost inevitably fail to consolidate it properly. Today's hedging contracts usually fail to specify that rab must be used as fill, with the result that as hedgers are free to use topsoil, they do so because it is more easily obtained. It is easier than rab to handle, but is more difficult to consolidate properly and inevitably results in a looser hedge, often with a short life.



*Ramming the fill at the back of the stones. Large stone (right, foreground) is being used like a book-end to hold the edgers in place while fill is rammed, before continuing the row.*

If topsoil is used, extra hard ramming is essential, with the fill added in shallow layers, along with building to a proper batter and expert laying of the stones, if the hedge is not to fall

down very soon. The quality of the topsoil also makes a big difference. The 'poorer' the soil, the better, with as little organic content (humus) as possible and no roots, twigs, half-rotted compost, green-stuff etc. The soil must bind into a lump that feels hard in the hand when squeezed, holding the impression of the fingers when the hand is opened. Strict attention to these points can go far to offset the disadvantage of the topsoil, but it will never make as tight a hedge as the rab, and its subsequent maintenance will be far more problematical.

A non-authentic but quick method of ramming, sometimes employed by the busy farmer for his own hedges, is sparingly to tip the fill on to the top of the hedge with a small tractor bucket so that the continuous heap is along the middle, clear back from both hedge faces. Then, as each stone is laid, the fill is brought forward by hand to the rear of the stone to make a layer 10cm (4") thick, and rammed into the crevices. When a convenient length, about 4-6m (4-6yds), has been built, the hedger climbs on top of the hedge; having a short aluminium ladder is useful. Facing the outer edge of the hedge, he steps carefully sideways bringing the soles of his boots together on the top row of stones, with his boot-heels pressing down the fill behind each stone. As he does this on each stone in turn, he feels through his feet whether the stone has been correctly bedded and rammed in, or whether it makes a small movement indicating that it was wrongly positioned. Although seeming simple, there is skill in placing the feet correctly, and in putting right the stones which are badly laid. Stones larger than 15cm (6") in height require consolidating by hand until the fill is high enough behind the stones to use the heels. Each layer of fill down the centre of the hedge must be well tramped down.

For a hedger who is not naturally agile or well-balanced, it may be dangerous to climb on the hedge. Badly-laid and wobbly stones are also a hazard underfoot. Treading is reckoned to be not as good as proper hand-ramming. Using the digger bucket to press down the fill does not do an effective job in packing around each stone, and is not recommended.

## HOW TO LAY THE STONE

The Cornish hedger has an empathy with the stones and will often say that each will tell him where it wants to go in the hedge. One hedger told the author "I know it's time to pack up and go home if the stones stop talking to me," signalling the end of a good day's work.

Before beginning to build, the skilled hedger has in his mind a mental picture of the completed hedge and of the stones in it, related to the heap of stones on the ground. Every so often he will use the length of his shovel handle to check the height of the rows as he builds them, but the rest is by eye and by memory. He remembers the shape of the ground underneath the hedge, to keep his rows running parallel with the country. He remembers the shapes of the stones he has sorted and laid out. He remembers especially the shape of the previous stone of the row he is building, and the shape of the tops of the stones in the row below, pre-visualising what he is going to come to next in the row he is making. He watches also the tops of the stones he is laying, always looking ahead so as to avoid problems in the next row. He is able mentally to fit stones into the row he is making before he picks them up, and his mind will be working always a metre or so ahead and in the row to come above. He will judge the batter by eye, perhaps checking occasionally with the hand-held profile. He will lay each stone by turning it in his hand as he picks it up and putting it confidently into place with a thump because he knows beforehand that it will fit. This "eye for stone" is mostly inherent and is honed with practice. Rarely, some people seem to be shape-blind and will never achieve success, but many have a



natural ability while others can come to it in time with the right training and experience.

Care is taken to lay every stone according to the batter. Each stone must be laid to stone, with no earth or turf between the courses. Adjoining stones should lock into each other as much as possible and the stone in the next row should fit neatly across the joint and hold it in place. Only by laying each stone so that it interlocks and knits with its six neighbours, the stones touching it above, below and to either side, will the action of the compacted fill and curved batter work properly and bind the side of the hedge tightly together. Stones that are not keyed in with each other will gradually work outwards and start a gap in the hedge. One of the tests of a good new hedge is that no stone below the top row can be loosened and removed by hand.

As the rows are laid, each stone is slanted to follow the batter and is laid with, as far as is possible, its smallest face outwards. This is so that it cannot come out of the hedge by itself. It is particularly important for stones in the two or three rows above the grounders, where the batter is at its most curved, to be bigger at the back than at the face (ie shaped like the keystone of an arch) and laid with the deeper dimension vertical, so the courses lock against the pressure from within as the hedge settles. (See diagram page 20).



*Stones correctly laid with broken joints, stone above join, making a strong hedge.*

Two wide or two narrow stones should not be laid alongside each other; the widths should be mixed, otherwise problems will be created in later rows. One of the important points in selecting and laying stones in each row is to have a thought all the time to building the next row. It is no good having fitted the stones brilliantly to the previous row if they later have to be pulled apart because the seating for the next row has been ignored.



*Stones wrongly laid stone above stone with vertical running joints making a weak structure.*

When put down in its row, the stone has to fit into the stones below and beside it, like a three-dimensional jigsaw puzzle. If it does not, or seems to want to rock on one point, it is the wrong stone for that place. Perhaps a small point, or 'prill', may have to be knocked off with the hammer to make the stone sit comfortably, but remember that "every stone has its place, and every place its stone", or to quote another old saying, "There's never a nick but there's a nog to fit it." Each stone the unskilled hedger breaks will result in having to break another to fit when he comes to the place where the first stone would have fitted. He will end with a lot of broken bits of rubble and unused awkward stones. A good hedger can visualise exactly how the courses will go, just by looking at the heap of stones that will be used, and does not resort to breaking many stones. This is a matter of pride in his own skill of fitting every stone, of respect for the stones themselves, of risk reduction, and of time taken in building. Again it must be emphasised that "you use the stones you've got" and avoid having to make stones you haven't got.

An experienced hedger will know what is meant by, "If a stone looks awkward, you put another alongside". Always in building a hedge there are what we call "ugly stones". These are



*Two "ugly stones" strongly built into an old field hedge in West Penwith. Note good solid well-shaped stones are used around them.*

stones of awkward shape which are very difficult to fit in when laying the rows. The solution is deliberately to build places for each of them in its proper row, otherwise they will be left over at the end of the job. These may have to be trigged (wedged) behind to hold them in place. An ugly stone needs clever neighbours to offset its problems. Having laid it on a suitable place below and with a good neighbour to one side, it may still need a special choice of stone for its neighbours on the other side and above. The neighbours should be chosen for their shape, not just angled oddly to fit because this would cause a problem with the next stone and so on. An ugly stone's problems should stop with the stones immediately touching it.

Sometimes very ugly stones may have to be corrected by a hammer, but this is a costly activity and should only be done if there is no alternative, and if the stone is of a type that will cleave satisfactorily. The awkward stones are often of

particularly hard rock, very difficult to break and then liable to shatter. Many an ugly piece of elvan has finished up in the fill, rather than holding up the work.

On the other hand there are what we call "easy stones". These are stones that are shaped so that they will, when turned the correct ways, fit in many different places on the hedge. The temptation is to use them first but this would create an impossible situation with all the awkward stones left for later on. The easy stones must be distributed through the work to help with the awkward stones and keep a regular appearance to the face of the hedge. It is as if every stone has its proper place, and for every place there is really only one stone that should go there. Of course this is not always true, but it is a maxim to be borne in mind, especially in repairing a gap, where every stone has previously fitted neatly into its place in the hedge.

## MAKING THE COURSED ROWS OF STONE

***All rows are straight and horizontal and follow the run of the ground.***

The courses should not wander up and down. Every stone in a course should be near enough the same height, so that the top and bottom of each course are parallel. Unlike some dry-stone walling, in Cornish hedging the courses are always laid parallel with the run of the ground. The rammed earth fill prevents any tendency for downhill movement even on steep slopes.

***Each row of stone is smaller than the row below.***

Stone comes in all sorts and sizes. Naturally if you put a big stone on top of a small one, it will have a tendency to fall over. It is more sensible to put a smaller stone on top of a big one,



if you want it to stay there, and this simple principle is used in building Cornish hedges. First you need to know how many courses you are going to build. This depends on the sizes of the stone and the height of the hedge above the filler course. Having decided this, the stone is sorted into the heights needed for each course.

***Stones are laid with the longest face running inwards into the hedge.***

This is necessary to give stability to the hedge, but is often ignored by less skilled hedgers working to a poor specification, or those doing a cheap job and trying to make the stone go further. In Cornish hedging there are no “through-stones” reaching from one side to the other (as in drystone walls) because our hedges are built as a flexible structure where each side has to be independent of the other. To build each side strongly, the stones are laid with their longest axis inward. A very long stone should not be placed above a much shorter one in the row below as it may later sink at the back and disturb the stones around it.

Ignorant specifications have been seen showing most of the stones laid the wrong way, with their longest axis along the face of the hedge. One misguidedly tried to amend the fault with particularly long stones (imaginatively called "bonding stones" but with nothing to bond to) laid at regular intervals with their longest axis inward. As the topsoil fill settles, here is a hidden weakness ready to destroy the hedge as each of the so-called "bonding" stones sinks at the back end and levers the narrow lines of stone above and below out of place. When the batter is also deficient it is not long before the lines of stone, with not even their length to hold them into the hedge for a while, begin to fall out.

***Stones are pitched (laid vertically) unless the stone is better laid on the flat or herringbone.***

"Pitchers" or "edgers" are stones that are laid with the longer dimension of the face upright, like books in a bookshelf. With a chunky type of stone this may be only an inch or so higher than wide, but still makes a difference to the strength of the hedge. The Cornish word for hedge is *kee* or *kea*, from the same root as the word quay. Old accounts use the word *kee* for both hedge and quay. The older quays in Cornwall are built with stone laid in pitched courses, clearly demonstrating that this is the strongest way of using stone as it defies the battering of sea and wind.



*Three rows of pitched granite, with well-broken joints.*

For most types of stone, pitched hedges are inherently stronger than where stone is laid flat or herringbone. The well-known exception is in the slate areas of North Cornwall where the herringbone pattern is the popular way of building with the shape of material which is available, though also many slate hedges are pitched. The herringbone pattern is sometimes used elsewhere but is suitable only with stone that is flat or shaped like a saucer.

Granite moorstone hedges may have all but the two top rows laid on the flat if the lumps of stone are large and tending towards a wider, flatter shape. When laying stone on the flat it is

important to remember that the longest axis is laid into the hedge. Some of the shales found in Cornwall are also better laid flat than pitched if the stones are large, and this can be confirmed by looking at older hedges in the locality concerned. Recently-built hedges are not a safe guide because many have been poorly built.

***Rows of stone are staggered. Each overlap is more than one-quarter of the running length of the stone. Pitched and herringbone courses interlock stone-to-notch with the rows of stone below.***



*A bad running joint already opening up in this very poorly-built new hedge. Another running joint at right of picture means the whole section between them is already bulging and is going to fall out soon.*

The stones in all the rows are laid so that the middle of each stone sits above the join between the two beneath. Of course the hedging stone is usually too irregular in shape to allow an exactly central fit as in a brick wall, but the overlap must be at least one quarter of the width of the stone's outer face. This "breaking the rows" makes sure that there is not a vertical running joint making a crack or weakness running up through the hedge structure.

Carew, writing in 1602 said that "In looking at the few fragments of 'dry walling' that remain, one cannot but admire the thoughtful way in which the stones were laid - perhaps thousands of years ago - so as to 'break the joints' and bind each other." He also observed that most of the stones in each row ran with the country, with each row running parallel with the ones below and above. This is called "making your rows" and these two terms make up the hedging maxim: "Make your rows and break your rows".

***Every stone fits together with the stones alongside and with the rows below and above, with no gaps. All stones are laid in contact stone-to-stone with no fill or turf between.***

Novice hedgers must be warned not to give way to the temptation of putting a layer of earth or turf between the rows, saying it is to "level up" or "bed the stones in". This builds a serious weakness into the hedge because it destroys the purpose of having a batter.

Inserting a layer of earth or turf allows the stones to slide outwards under the pressure of settlement, eventually turning the curve inside-out and collapsing the hedge. More usually this hedger does not bother to build to a batter at all, so with the padding between the stones preventing their grip on each other the hedge is likely to bulge out and fall quite soon.



*If earth fill is wrongly placed between the courses like this the stones will move outward, causing collapse.*



***All stones are load-bearing, and laid so as to be incapable of individual extraction.***



*If any stone (excepting in the top row) can be removed by hand, it has not been properly built into the hedge.*

The reason for laying stone-on-stone is that every stone is then load-bearing and, excepting those in the top row (in freshly-built hedges with topsoil perhaps the top two rows), cannot be pulled out by hand. The stones are also gripped by their neighbours to each side as their surfaces knit and interlock. A hedge that is built badly enough to allow stones to be pulled out is certain to be substandard in other ways.

***Trigging (wedging a stone with a small one) is kept to a minimum, at the back only and no stone is trigged twice. Hard stone, and not fill, is used for trigging.***

Where a stone projects inwards beyond the stones below, it may need to be supported by another stone tightly wedged below it on the inside of the hedge. Small stones used in this way are called trigs. Some ugly stones may require a trig. Trigging should not be used as a means of getting away with a badly-laid, rocking stone. It is a traditional description of a bad hedger when it is said that “he has to trig his stones both ends”.



*Trig (beneath stone at centre of picture) wrongly used on outside of hedge.*

Stones must never be trigged from the outside. No stone should be trigged (wedged) twice; otherwise the stone will tend to be pushed out of place by the fill as the hedge consolidates.

Only hard stones that will not crush are used for trigs. The trig must be of adequate size and suitably stable shape and is so wedged that it will not move when the hedge settles.

***A row of projecting stones may be laid below the top course as coping stones to deter sheep or deer. No other stones protrude outside the line of hedge face.***

In sheep country, and especially along much of the north coast cliffs, a row of projecting coping stones is set into the top of the hedge to prevent the stock escaping over the hedge. Coping stones were also laid in hedges around the parks of big houses, for example Godolphin and Trelowarren, to keep in deer.

For hill breeds of sheep, the coping stones are set in at 1.2m (4ft) from the ground and topped off by 0.4m of turf (18") to hold them down. They are laid in at a slight angle, sloping upwards out of the hedge, checking the tendency to slide or work themselves outwards. About 150mm (6") projects outside the hedge face, with at least twice as much inside the hedge.

Apart from coping stones, no other stone should project outside the hedge face as it would provide a step for animals or people to climb up. People should not be encouraged to climb over the hedge except at a stile, because only a tiny defect in the hedge will soon be discovered by sheep. Several animals escaping over the defect quickly make it into an open gap.



*An old slate hedge with large slabs laid in as coping to prevent sheep from climbing over.*

***In the absence of coping stones, the top two courses are pitched or laid Jack-and-Jill (herringbone) as done locally.***



*Unusually well-built recent hedge of shale laid on the flat (horizontally). The top two courses of stone are pitched ('edgers') to make a strong hedge top.*

With the shales and slates, when the stones available for the two top rows are more than about 75mm (3") thick, they should be pitched. If they are thinner than this, then they may be laid herringbone (in two opposite slanting rows), although frequently they may be pitched even if they are only 10mm (1/2") thick. A herringbone hedge is sometimes finished with a pitched row of bigger or thicker pieces of slate. Whether pitched or herringboned, the stones in the top row must be well laid with their longest axis into the hedge and wedged tightly together, as they dislodge easily if one of them gets loose. The bottom of each stone in the upper row must be laid fitting into the notches between the stones of the lower row. This is important, otherwise the stones will easily work loose. The fill must be rammed hard and levelled right up, ready for topping the hedge off with topsoil and turf.

The reason for this is that stones laid on the flat are less secure than stones pitched (edgers) or laid herringbone, and in the two topmost rows especially so. Most hedgers agree that the top row should not be laid flat because the stones are easily dislodged and it takes longer for the turf to grow into the hedge and bind them together.

Granite and the metamorphic rocks (usual in mining country) because of their natural lumpy shape are never laid herringbone style, but always pitched especially in the upper rows.



*Slate 'pitchers' or 'edgers' must be fitted stone-to-notch between courses.*



## COURSED ROWS OF DRESSED STONES

***In traditional Cornish hedging, use of the hammer is limited to occasionally knocking off an awkward projection to make a stone fit better. For high-class Cornish hedge frontages and other exhibition work, the hammer may be used to give the stone a neat rectangular look (the width of each stone less than its height).***



*Straight diminishing courses of sorted and partially dressed stone. The varied widths and irregular shapes, while dressed sufficiently to fit well, are particularly attractive at this house frontage. Unusually the grounders are long level slabs of stone - note wider stones across the joints.*

High-specification work, as for new hedges at prestige sites in towns or in the traditional hedging competitions, can involve dressing the stones, for which the hammer is used. Nowadays more of this type of work is in demand for domestic frontages, and is often of a standard which requires the stones to be pitched vertically with the widths of the stones in each course not differing by more than 10-20mm ( $\frac{1}{2}$ - $\frac{3}{4}$ " ). Even with the best of granite hedging-stone, this requires dressing the stones to get the correct size and regular shape. Some hedgers dress, or partially dress, the pitchers (edgers) in the top two rows of stone on all their hedges.

There is a skill in dressing stone to whatever shape and size is required, and experience tells how to judge the natural cleavage of a stone, that is, the way it breaks along the line of least resistance. Advantage is taken of this to strike with the hammer or cold chisel in a way that flakes or cracks the piece off neatly. Different types of stone have different cleavage planes, while some have virtually none at all. Some of Cornwall's metamorphic rocks, eg 'blue elvan', can be extremely hard and are handled by the traditional skill of building Cornish hedges by sorting, not by breaking, the stone. Granite, though hard, is suitable for dressing, having a chunky cleavage without much bias in any one direction. Shale and slate, which are comparatively soft and have a straight cleavage plane, are usually easy to trim into a neat shape.

In dressing stone there is always a risk to thumbs and eyes. Use of the hammer must be precisely controlled, while making sure that the fingers and thumb of the hand steadying the stone are out of harm's way. A hedger's hammer with a well-shaped head and good balance is better for this purpose than an ordinary club-hammer. Never use the wrong tool for dressing stone. Never use the hedge as a base for dressing stone. The safest way for the novice is to place the stone in a cradle of larger stones to hold it and use hammer and cold chisel, but this does slow the work down. Dressing with the hammer, using the natural cleavage, is a more practised skill than using a cold chisel, but there are cases where even the skilled will prefer the enhanced accuracy of the chisel.



*Experienced hedger dressing stone with a club hammer.*



Because of the danger of flying chips, safety spectacles are usually advised for learners nowadays. Goggles may be safer for the eyes but are awkward to work with and so are indirectly a hazard in themselves. Most experienced hedgers close their eyes protectively at the moment of impact while dressing stone, and knowing how to angle and regulate the blow minimises the risk.

## RANDOM ROWS OF UNDRESSED STONE

***Only where randomised coursing has been specified in writing are the rows of stone laid other than in straight, horizontal lines. The stone is sorted sufficiently so that the assorted sizes are evenly distributed and the average size of the stones diminishes towards the top of the hedge. The stones of all shapes and sizes are laid neatly interlocking, with no gap larger than a tennis-ball, and not more than two gaps as big as this allowed to occur in any 6m run of hedge. The two top rows are pitched or herringbone.***

Today many hedgers lay all their stones in “random coursing”. Often this is either stated in the contract specification or is permitted by default in an inadequate specification, or by having no specification at all. Some types of stone lend themselves more easily to random coursing. Random coursing done properly with suitable stone is satisfactory but more often than not it is used to cheapen the contract and save money. A cheap job may seem a good idea, but as most hedgers know, the resulting hedge ends up by being poorly-built and needing repair before long. As one hedger commented on a cheaply-built random hedge, “It looks as if someone threw stone at it from a yard away.” Increasingly, random coursing is used because younger hedgers have not learnt proper coursing.

With ordinary Cornish hedging stone the grounders usually differ a lot in their sizes, so the filler courses may appear to be laid randomly because of the irregularity of shape of the stones that have to fit between the tops of the grounders. In granite country where the hedger has had to accommodate a lot of large, irregular-shaped stone the hedge may at first glance appear random for up to nearly half its height as this large stone is used first, then followed by the level, diminishing rows of pitched stone. Although the stone in the lower rows may be unevenly sized and shaped, this is not random coursing as the grounders and fillers are brought up level before the next row of stone, which again, if large and irregular, is levelled with its fillers. There is a horizontal line between each course.



In random coursing no strictly horizontal line can be traced along the hedge between courses. Although the stone is laid roughly in rows no attempt is made to level the top of the

row as it is laid. The stones of each row fit into the undulations of the row below. The stones are only brought up to a level, horizontal seating for the last two rows at the top of the hedge to be laid in pitched or herringbone courses.

Unfortunately random coursing is seen as being easier to do than proper horizontal coursing, but the truth is that it just makes it easier to build a bad hedge. In fact the skill required is the same as for any Cornish hedging. Proper random coursing should be seen as simply an alternative pattern or style, requiring the same degree of craftsmanship.

To build a good random hedge the stone needs to be sorted to a certain extent. The rule of smaller stones above larger has to be followed throughout. The largest stone is used for grounders as in the standard Cornish hedge, and all stone diminishes in size towards the top of the hedge. In other words, no stone larger than the grounders is put into the next row, and no stone larger than those in this row into the next above, and so on. At the same time the hedger has an eye to portioning out the larger stones in each row so as to spread them evenly in the hedge face, with somewhat smaller stones (though still larger than the next row above) between. This ensures that the average size of the stones diminishes evenly towards the top of the hedge. At the same time the variable sizes of all the stones in each row are well mixed, avoiding laying any two of the same size or shape together. The whole hedge face has a harmonious appearance with all sizes of stone evenly distributed, so no stone catches the eye as being awkwardly-placed or too big for where it is.

The hedger should build in layers in sequence to avoid leaving awkward gaps, and avoid ending up with lots of slivers or awkward stones. He should use different shapes next to each other to break up the coursing, but must beware of running joints which easily appear where the neighbouring stones in a row are of different heights. The orientation of all the stones must be the same, usually laid flat with the longer dimension of the face horizontal. If the shape of any stone gives it a visual slant (as with crookedly triangular shapes) it must be laid so as to minimise this effect, and the next stones to it must correct the impression, not carry it on.



*Any gap between stones larger than a tennis ball creates instability and will let rabbits get into the hedge. If it admits a hand, it's too big.*

The odd-shaped pieces of stone must be fitted so that they neatly interlock, with few holes or gaps between and none larger than will admit a tennis ball. This is for stability, in preventing stones moving or fill from seeping out of the hedge, and to prevent rabbits from gaining access. To keep rats out, no gap should be wider than 35mm (1 1/4").

The stones are laid with their longest axis into the hedge, with stone-to-stone contact and keyed in with each other, as always in Cornish hedging. Meanwhile the stone has to be laid to

the normal curved batter. It is no small skill to build a proper random hedge with the stone showing a balanced arrangement and grading gradually smaller towards the top of the hedge, while following all the essential rules for stability as in the standard coursed hedge.

## FILLING THE HEDGE

***Sufficient fill, containing less than one-tenth of stones exceeding 25mm (1"), is dumped along the hedge centre. Leaving the stonier part of the fill in the middle, enough for a layer not more than 100mm (4") is dragged by hand to the back of each stone, and well consolidated.***

In laying either the level rows or the random stonework it is essential, as with laying the grounders, to ram the fill as hard as possible. Compaction of the fill is vital for the long life of the hedge, and there is no mechanical substitute for ramming the fill by hand behind every stone and into each individual crevice.

Each layer of fill should not exceed 10cm (4") in depth before ramming. Unfortunately it is tempting to put layers of 15-23cm (6"- 9") thick but this causes problems in getting it compacted around the backs of the stones, with the result that the ramming is not done properly. If the fill is tipped on to the hedge by mechanical means it is all too easy to put too much on. The ridge of loose fill dumped along the centre top of the hedge has to be judged to a nicety, especially as the hedge grows narrower, to ensure that no more is put in than will spread out to the maximum 10cm (4") depth before ramming.

***Hard compaction is essential.***

In ramming with the handle of his hammer (or other ramming tool), the hedger is always feeling for the soft spots. Compaction should be so thorough that if all the stone facing were removed as soon as built, the hedge core would still stand up with the shapes of the stones in it. A poorly-compacted hedge fill is liable to sink by more than 10%, moving stones out of their place and leading to an early collapse.

## RABBIT DETERRENT

***For new rural hedges, a layer of plastic-covered wire netting should be laid on the rab across the hedge top under the top course of stone. The wire must not protrude from the hedge face.***

This is to stop rabbits from burrowing down into the hedge, and also strengthens the top of the hedge. It can be used for this purpose in an urban situation where there may be a problem with people scrambling over the hedge. The ordinary wire netting is cheaper but does not last nearly as long underground as the plastic-coated galvanised wire netting.

The netting should be laid no nearer than 6" to the face of the hedge, with the cut ends turned under, so there is no fear of sharp ends of wire protruding from the hedge once the turf capping is put on. They could inflict nasty wounds to livestock rubbing their heads on the hedge, or to children climbing on it, with a danger of tetanus.

## TOPPING OFF

***Fill top is domed so that the centre height above the top course is one-third of the width of the hedge top.***

After the top row of stones is laid and consolidated, the centre of the hedge is heaped up with soil in a domed shape so that, as the hedgebank beds down and settles with the action of the seasons, the top of the hedge will still be 20 cm (8") above the top row of stones. A row of 15cm (6") thick tobs, kept from the digging-out of the trench for the hedge, is laid along the top row of stones on both sides of the hedge. Then the hedger builds up the centre of the hedge with 10cm (4") layers of the topsoil saved from the excavating, smacking each domed layer down with the shovel to consolidate it and finally topping it with turf. Pegs can be cut from nearby brushwood to hold down the tobs until they knit. When finished the depth of this domed top at the centre of the hedge is one third of the hedge width.



*Tobs are laid on the domed top of the hedge and pegged down.*

Turf dug out along the line of the trench should be sufficient to top the hedge. If not, extra turf may have to be taken from along the hedge site or from a nearby source, with permission from the landowner. Depending on the quality of the source, this can boost the conservation value of the hedge, bringing in a variety of wildlife to age the hedge's population by up to a ten year head start.

The new fashion for some landowners or their agents to specify the sowing of grass, meadow or wild flower seed on the new hedge must be resisted by the hedger. He should advise that topping the hedge with thick tobs of the existing grass and topsoil in the traditional way binds the hedge sooner and more effectively. Using turf from the same site or nearby results in many more species of plants and animals, and these will be the ones that are properly native and local to the spot and can therefore be expected to thrive. Sown varieties imported to the site tend to disappear after a year or two as the local species overtake, so the effect has been mainly cosmetic and an unnecessary expense.

***To encourage wildlife in rural hedges, small pieces of turf the size of a golf ball are rammed into crevices every third row upwards and the same distance along the length of the new work.***

The plants and seeds in the turf help the hedge to knit together quicker, and give a good start to the colonisation of the hedge with wildlife. The pieces of turf can come from anywhere close by and no special care need be taken to get particular plants. On the other hand, great care must be taken to avoid introducing roots or seeds of invasive weeds into the new hedge. As long as none of these are present, this method of introducing the natural wildlife to the new hedge is much preferred to other methods and is easier and cheaper. However, if the



surrounding land is in a rye grass ley or is infested with invasive weed species, it would be preferable to introduce wild flower seed collected locally, or suitable, reputedly sourced wild flower seeds as sold for re-establishing flower meadows.

There is a notion that the old hedgers would sometimes have a 'signature' flower they would always plant or sow in their completed hedge - a touch of charm it would be nice to promote, as long as suitable flowers are chosen. Ideally they should be self-seeding but not invasive, eg forget-me-not, alkanet, pink purslane, columbine, white violet.

***Some hedgers place the turf grass-side down to stop the grass drying out. This is also done if thorns or trees are planted on the hedge top.***

Some hedgers will lay the tobs topside down; this has two purposes, firstly to hide the grass so that the cattle will not pull the fresh tobs off to eat it, and secondly to keep the grass alive during a period of dry weather. Turf should always be put upside down where thorns are to be planted, and the thorns planted through the turf. This helps to keep their roots damp, a problem for dry newly-planted hedgetops.

***In repairing gaps, nearby thorn growth is layered across the gap before turf is put on.***

Layering is where a nearby thorn branch is pulled down, partly cut through near the base if necessary, and weighed with a stone or pegged down into the earth on top of the hedge in the middle of the repaired gap. Sometimes a nick is made in the bark underneath the point of pegging-down. The branch then roots itself and grows up as a new bush in the gap.

## PLANTING

***If the top of the hedge is planted with hawthorn and/or blackthorn, the plants are 30/40cm (12"/16") tall, transplanted 1+1 or pot-grown, and planted 40cm (16") apart in one row through the turf in winter, then pruned to 20cm (8"). Plants of native origin and local provenance are used if available.***

Some hedgers, proud of their stonework, say that Cornish hedge tops should not be planted. Most hedges will grow their own native hedgerow on top by natural regeneration, giving locality to the landscape and necessary shelter in this county's Atlantic climate.

Where the hedge is built primarily as a livestock barrier, the top of the hedge may be planted with hawthorn or blackthorn, according to which species predominates in the locality. In heathland areas, seedling gorse is often to be found growing naturally, and this is useful for planting on the hedgetop. Western Gorse (*Ulex gallii*) is preferred to European Gorse (*Ulex europaeus*) as it is more spreading in habit and less likely to rock in the wind and displace the top rows of stones.

Plants should be sourced from Cornish native stock, containerised, well-grown and not more than 0.5m (20") in height. Although bare-rooted plants are cheaper to buy and plant, these have less chance of surviving. The thorns should be planted 40cm (16") apart in one row

through the turf. Many nurseries recommend closer planting and in two rows, but they are confusing the planting on top of a Cornish hedge with the planting of an English hedgerow on ground level, and besides have an interest in selling more plants. Planting only along the centre line reduces the risk of roots dislodging the upper rows of stones.

Immediately after planting, the plants should be pruned to 20cm (8") above ground to improve drought-resistance. The tops of hedges, especially new ones, are very dry, and unless planted during the months of November and December, plants may have difficulty in surviving. Putting the turf upside down (see above) helps. If rabbits are rampant, protecting tubes may be necessary on the plants for several years.

## CLEARING UP

### ***Remaining fill and soil is levelled off and the site left tidy.***

Finally the site is cleared and restored to its original profile, with soil and spare turf raked along the foot of the hedge and trodden in. Surplus vegetative and woody material is deposited in an un-farmed area nearby to allow survival of invertebrates and other wildlife. It should not be burned. No seeding or planting is needed other than specified above.

All loose left-over stone, stone-chips and other material must be gathered up and removed from the site. If the site is on a roadside, the road surface must be swept clean after each day's work.

The new hedge may be protected by erecting a barbed wire fence, either offset to 1m from the hedge or as close to the hedge as possible (depending whether the hedge is to be trimmed behind the wire or outside it), with treated posts 3m (10ft) apart. One strand of wire is usually enough for adult cattle, two for lowland sheep breeds but three, or pig netting with top and bottom barbed, for the hill breeds of sheep. Alternatively half-round stakes may be built horizontally through the hedge at two courses below the top, trimmed to project one metre each side of the hedge. Some hedgers may object to this practice as weakening the hedge's structure when the stakes eventually rot. One strand of barbed wire or electrified plain wire for cattle (or two for hill sheep) is attached to the underside.

Where the hedge is below 1.5m (5 ft) high, a fence should be temporarily set out 0.6m (2 ft) to stop cattle from rubbing the top row away before it is set. Smearing the unset tops along the top of the hedge with dung discourages cattle disturbing them. Hedges that are repaired or built in the autumn are normally set by the time housed cattle are let out in the spring. A stone rubbing-post put up in the open field is the best way to save the hedges from the attentions of itchy livestock. These once common landscape features should be re-established, thus saving the farmer much of the cost of mending his hedges.



*Stone rubbing-post for livestock saves wear and tear on hedges.*

## BUILDING GATEWAYS AND JOINING OTHER HEDGES

If the new hedge is to join on to the end of an existing one, care must be taken to avoid any gap between the new grounders and the old. Subsequent courses must interlock with the existing hedge courses, as in repairing a gap (see Cornish Hedges Library “Repairing Cornish, Stone and Turf Hedges”). If joining another hedge at 90°, the courses must end neatly and tightly against the face of the existing hedge, care being taken to maintain the correct batter in the new hedge.

If the new hedge has a free-standing end, the grounders across the end of the hedge must be laid first. Starting with the two corners, substantial, solid and squarish stones must be used, then the other grounders are put in between. As the hedge is built up, the better stone is used for the quoins (corner stones). This is because the end of the hedge has to support itself and the rest of the hedge. In a gateway the gate post should always be set before the hedge end is built. Otherwise in digging the hole for the post, the setting of the grounders is weakened.



1. Granite gatepost ready to set. Normally about a quarter of the length should be set into the ground. With a lumpy bottom end like this, a little less will do.



2. The tripod is positioned over the hole dug to receive the gatepost.



3. The pulley chain is hooked to a strong strap around the gatepost.



4. The chain block takes the weight as the gatepost is guided into position with long bars.





5. The strop has been moved higher up the post for the pulley to raise it.



6. The gatepost is straightened as it settles into the hole.



7. The hole is filled in and the soil well rammed.



9. The finished gatepost.



8. A flat-topped stone is set in at ground level on the gate side of the post.



The end of the hedge should be built to the curved batter just the same as the rest of the hedge, and the space between the hedge and gatepost blocked afterwards with several loose stones jammed in. An exception to this practice is where large boulders have been dug up and set as huge gateposts, being drilled for the gate irons. These massive gateposts, once bedded in properly, are big and heavy enough to act as permanent hedge ends and the hedge can be built right up to the boulder.



*Hedge end rounded off into gateway. The hedger has made a neat job but has lost the curved batter.*

If the hedge ends as a gateway and the quoins are built square with the end of the hedge, vehicles manoeuvring through the gate are liable to damage them; a better practice is to build them in rounded form. This needs more skill but is less critical in requiring good stones. In building a gateway, it is sometimes better to use small stones instead of rab as a fill, even bedding down the stones with a lime mortar. This is more often seen in slate country where large enough stone for hedge-end stability may be hard to come by.

Great care should be taken in the siting of gateways, bearing in mind the need for ease of approach, usage all round the year and to accommodate changes in tractors and implements,



*Hedge-end in slate country built with lime mortar to stabilise gateway opening and make a firm housing for gate fastenings.*

crop rotations and breeds of different farm animals. Especially note the lie of the land, avoiding the soft wet places or where there is surface water run-off from the fields, or draughty places where prevailing winds blow through. Remember that many existing gateways in Cornwall have been there for several thousand years, serving much smaller fields of which there is nowadays little or no evidence. They may seem not to be specially placed today, but there may be subtle advantages in their siting which are still important though not immediately apparent.

## HEDGE PATTERNS AND STYLES OF BUILDING

Whether the rows above the grounders are laid flat, vertically (pitched) or diagonally (herringbone) should depend on the nature of the stone and the local style of hedge building. Traditionally opinions vary widely throughout Cornwall, and are strongly held. Usually there is a sound reason for a local style based on the type of stone which is available nearby. A general principle is that a stone should be "laid in its own bed", in other words the natural grain in the

stones should all run the same way in each given course or row of stone.

Where there is a hedging style which has been used by a landed estate in most of its hedges, the reason for it is more likely to be associated with the type of stone from a quarry owned by the estate than by a particular whim of the landowner, although this may have played a part. Today we have the problem of large organisations imposing inappropriate hedging styles throughout Cornwall, in obvious conflict with local style.

The more subtle differences in style are sometimes difficult to appreciate, yet they may be necessary if the hedge is to be built strongly with the stone available. There is a small but real difference between the traditional hedging style at Zennor and at Pendeen, only five miles away. There are changes in hedging styles where the underlying geological structure changes, varying the local quarry's hedging-stone and the nature of the clearance stone used for field hedges. Granite comes in different sorts, then gives way to the shales and slates, or to the elvan and quartz stones which, having no regular cleavage plane or shape, are a challenge to the hedger to build a proper hedge that lasts.

## USING SLATE AND OTHER FLAT STONE

Where the stone is of a type with a majority of thin flattish stones or slates 150-200mm (6"-8") across and less than about 75mm (3") thick, necessarily different styles have evolved. The stones are usually laid vertically (called pitchers or edgers) like books in a bookcase, or herring-bone fashion (called Jack-&-Jill, Darby-&-Joan, Kersey-way, cow-&-calf or John-upon-Joan. (Kersey-way is probably named after a herringbone twill cloth originating in the village of Kersey in Suffolk).

The herringbone style is where the row of stone is laid on the slant at anything from about 30 - 50 degrees from the horizontal and the next row at the same angle in the opposite direction. With this difficult type of stone, a good herringbone style of hedge may be built up to 25cm (10") lower than where the rows are laid flat, because of the increased stability of the top row. Hedges which are not alongside fields can be built of smaller stones because they do not get rubbed by farm livestock. Exceptions to this are for roads where cattle and sheep are often driven along, and for hedges which are liable to have people climbing over them. Pitching the top two rows of slate is best for deterring people from climbing, being unkind to the hands and knees.

Old hedges were sometimes built of surprisingly small pieces of slate, laid herringbone style in many double rows. This style relies on the stones being of similar shape and size within each row. It is an easy style to build in a rough way, with each stone leaning on its neighbour but, to make a proper hedge, care must be taken to interlock each stone into the notch between the edges of the stones of the row below. To do this keying-in, the hedger must have an appreciation of the shape of each stone and of the space it has to go into, and select them



*Pitched slate. Note good interlocking courses, no earth or turf between.*





*'Jack-and-Jill' herringbone slate hedge. Some errors in laying. Angling the slates a little more steeply and regularly would have improved stone-to-notch interlocking and made slates less likely to slide outwards.*

accordingly. It is important to keep the stone at the same angle all along the hedge in each row, and for each row to be kept level and tight all the way along.

With the herringboning of small flat stone, the need for proper batter and for good ramming of the rab fill are even more important for the future stability of the hedge than where larger stone is used. This style is sometimes abused by a bad habit of putting a thin layer of turf or fill between the rows instead of sorting the stones and interlocking them by laying a smaller one above a larger one and vice-versa. A well-built herringbone-style hedge will last as long as any other, but a

poorly-built one will fall down in a surprisingly short time, much sooner than other styles.

## HEDGES ON STEEP SLOPES

Building hedges on steeply sloping ground can be a challenge to a new hedger. Preparation and the laying of grounders and fillers is no different and the courses should be laid "with the country", that is parallel with the ground, whatever the slope. When laid with the country, the job is no different from building on an ordinary level field. If courses are laid level, a problem is created, especially in the upper rows of edgers, as the rows tend to end in a loose stone.

Whether courses are laid with the country or level depends on the size and shape of the stone, the style of building and the slope of the ground. Cornish hedges are easily laid with the country even on slopes of 15 degrees or more (about half the angle of a Cornish shovel). Where the land is extremely steep and the stone is of a slithery nature, such as slate, the rows may rarely be laid level. Generally, the lumpier the stone, the easier it is for the hedge to be laid with the country, no matter what the slope.

Laying the courses level on steep slopes is a dry-stone-walling concept, reasoning that building with the country is weaker because there may be a tendency for any stone that becomes loose to work itself out downhill, or in extreme cases for the wall to slump. In Cornish hedging with the rammed earth fill this is not relevant, and the hedge will remain stable on any slope as the properly-laid grounders naturally make a stepped foundation, giving the strength needed. Cornish stone hedges similarly have stable grounders and the weighty and abrasive nature of most Cornish stone ensures that it can be laid with the country without fear of any slippage.

## BUILDING A STONE HEDGE

Stone hedges in Cornwall are built differently to the dry stone walls found in some other parts of Britain. Traditionally no stone is dressed or broken in building Cornish field hedges. It was used direct from the country in the form of 'moor-stone', just as it turns up with the plough,

and from the spoil heaps left by mining operations. Stone hedges are built wherever in the county there is shallow soil and plenty of surface stone, which tends to be the hard-rock areas.

Typically the stone hedge is built in the same way as the Cornish hedge, only with small stones used for the fill in place of rab. Because of this flexible stone core, the outer stone facing is built to a curved batter exactly as in the Cornish hedge. The instructions for making a profile-former for the Cornish hedge also apply to the stone hedge.

Like the Cornish hedge with earth fill, the stone hedge with stone fill relies on its batter for stability. It cannot have 'through-stones', as in dry stone walls, because these would actually destroy the hedge's integrity as the two sides settle independently.



*Stone clearance hedge near St Just-in-Penwith.*

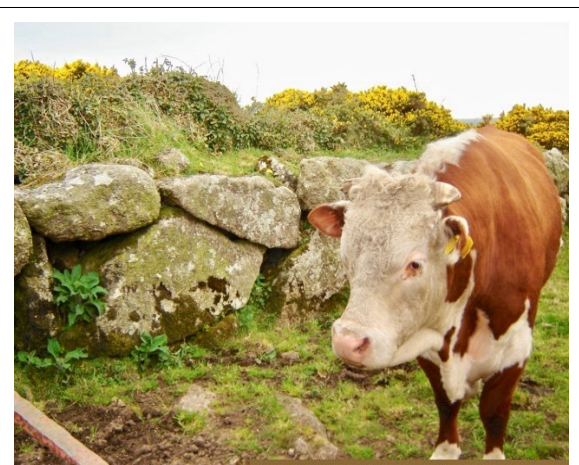


*Tombstone hedge near Newmill.*

At Botallack, and elsewhere in Cornwall, some stone hedges are built with stones the size and shape of a grapefruit, while here and there on the coast actual beach pebbles have been used.

At the other extreme, 'tombstone' hedges are made of a single line of boulders 1-2m (3-6ft) high set up on edge into the ground. Between these extremes are many natural styles of boulder and stone hedge, using the available shapes and sizes of stone to best advantage.

Single-stone hedges, built only one stone wide, are not common, but occur in different parts of Cornwall, usually in granite country, especially in West Penwith and on Bodmin moor. They are similar to those built in West Scotland and usually date from the 17th-19th centuries in the more recent re-enclosures. Single-stone hedges look fragile, and a sheep will not climb them for fear of being injured by their collapse. There are few built today, although a hedger skilled in the use of stone would have no problems with their construction. One difficulty today is their vulnerability to damage by people, as it is almost impossible to climb over them without dislodging stones.



*Moorstone boulder hedge near Madron.*



The best way for a hedger to learn how to build stone hedges is to examine old stone hedges in the immediate area and build to the same pattern and method. It would be very sad if the many different types of stone hedge in Cornwall were to be infiltrated by standard dry stone walls. About a century ago, some dry stone wallers were imported in to Bodmin Moor with the result that in places on the moor, dry stone walls are to be seen alongside stone hedges and Cornish hedges. People see them and get the mistaken impression that dry

stone walls are traditional to ancient Cornwall. There is a danger of this idea spreading now there is so much interest in the craft of dry stone walling. There is even an unfortunate tendency for incomers to Cornwall to refer to our Cornish hedges and stone hedges as 'walls'. This is not to cast any slur on the craft of dry stone walling, but there are good reasons for the different regional traditions, based on the local geology.



*Singlestone hedge (6 feet high) at Zennor.*

A 150-page book on building and repairing dry stone walls called "Dry Stone Walling" is available from the Dry Stone Walling Association. It contains a wealth of information which is practical and easy to understand; but the edition published in 2002 should be read with caution in regard to hedges in Cornwall. Sometimes the author confuses stone hedges, where the core of the hedge is loose stone, with Cornish hedges, which have an earth core. As an outsider, he may be forgiven for mistaking the boulders cleared from fields at Zennor about thirty years ago and put on the prehistoric hedges as being part of the hedges themselves, but he does betray in other ways a lack of basic knowledge regarding Cornish hedging.

Mistakenly, he describes the reason for the concave batter in terms of being a "supposed theory" and fails to point out that a correct concave batter is essential to ensure that settlement tightens the stone cladding. He writes that "some Cornish hedgers pack a layer of soil on top of the stones to help bed in the next course" but fails to point out that this would be a wholly bad

practice and encourage the hedge to bulge out and collapse. He undervalues the importance of using rab as fill, suggesting a soil and rubble mix as used for the Welsh *cloddiau*. He wrongly states that "the more regular the stone, the more poorly it binds, and trimmed granite hedges have a tendency to collapse outward or inward as the bank settles". Obviously the examples that he was basing his opinion on were badly built with poor fill not properly rammed or with a wrong batter.



*Stone hedge with small field-picked stones used as fill and capping. The capping on this type of hedge is sometimes of rab or of peat.*



The suggestion that facers might be used on their flat as through-stones higher up the hedge shows a complete lack of understanding of the flexible structure of a Cornish hedge. Despite these criticisms, the author is to be congratulated for pulling together so much information from other different parts of Britain. The book is useful reading for those who work with stone, as long as they understand the basic differences between dry stone walling and our hedges in Cornwall.

## BUILDING A TURF HEDGE

In Cornwall turf hedges are built where there is not enough local stone to build Cornish hedges, or where the underlying stone is of a poor character or too difficult to quarry. Where limited stone is available the turf hedge may be partially clad with stone. For methods of building please see Cornish Hedges Library "Building a Turf Hedge".

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