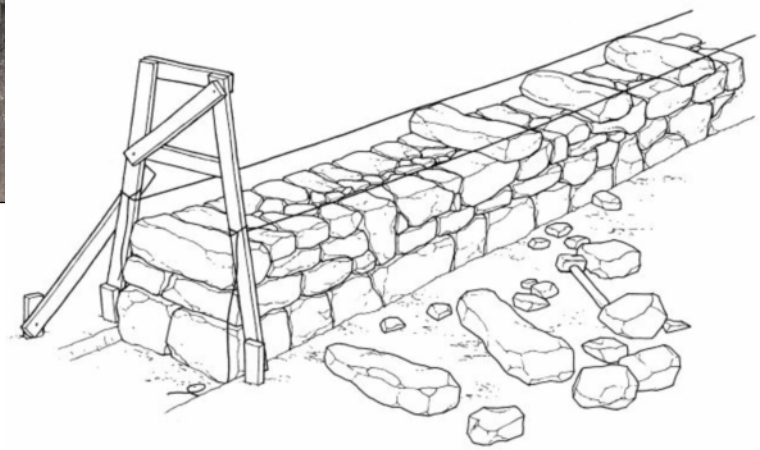
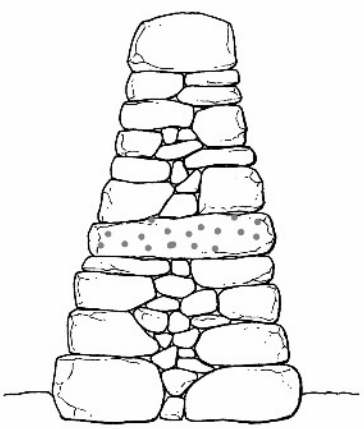
Throughstones – *Sean Adcock*

Sean Adcock is a waller from North Wales, a DSWA(UK) certified Master Craftsman, winner of over 30 walling competitions (twice a runner up in the UK's Supreme Championship). He edits *Stonechat* and is *a*uthor of numerous other publications including *Stonework – How not to Build a Dry Stone Wall* (essential reading for all amateur wallers and probably a few pros) and The Conservation Volunteers *Dry Stone Walling* - often referred to as the walling bible. Sean kindly granted permission for this article, edited for Australian conditions, one of several technical pieces downloadable from his website.





A *throughstone* is, as its name suggests, a stone which completely traverses the width of a wall. Its function being to tie the two faces of the wall together and to distribute the weight of the wall above them more evenly to the wall below. In North Wales they are set flush with face of the wall. In other parts of the country they protrude through the face of the wall (usually from both faces, but occasionally from just one). Explanations for these differences are legion. For example it is argued that set flush they prevent sheep from using them to gain purchase when trying to get over the wall; if cattle are present they will rub on protruding *throughs* potentially destabilising the wall; protruding they will still function as *throughs* if the wall settles and widens.

Throughs *(cont.)*

Protruding throughs—Yorkshire

On some contract specifications they protrude so that they can be seen to be present, however just because a stone protrudes doesn't necessarily mean that it runs all the way across a wall. It is not completely unknown to find shorter stones protruded in order to maintain a regular pattern in areas where protruding *throughs* are the norm.

Spacing also varies. Ideally they should be equally spaced at about 1m intervals along the length of a wall. However this will of course vary according to availability; if you are repairing 10m of wall and only have five, then they should be at 2m centres; and stone type—with slates and many shales you usually have a plentiful supply and will often reduce centres to around 60-75cm to help compensate for all the "tracing" (long axis of stone along the line rather than into the centre of the wall). Closer spacing can make building between them awkward, unless you set them in a complete layer.

Complete layer of throughs (coverband under copes)

This is an interesting practice found across much of the Yorkshire Dales. This method provides some food for thought. In terms of weight distribution it should work very well; in addition it should provide a solid uniform base for the top of the wall reducing potential settlement (similar to building a dry wall on a concrete footing). There can theoretically be problems associated with such an approach. If there is any settlement below the *throughs* they will form more of a uniform slope than if they were spaced, increasing the possibility of the wall above them effectively sliding off. Other potential problems relate more to the use of slabs as *throughs* in general. Whilst they act very well in weight distribution where they cross more than one joint in the face of the wall it is difficult to get them to sit on every stone. Hence some stones below them might be loose, and similarly as the wall settles it will not necessarily settle evenly below the *through* again leading to loose stones.

This occurrence is not that unusual in areas using complete bands of slabs. In such instances the *throughs* are actually preventing the whole of the wall settling as a single unit, and the face can peel away when the stones become loose. This is more of a problem where the building stone is rounded compared to where the stone is flatter and hence effectively more stable per se.

On balance complete bands of *throughs* are probably a good idea however the problems associated with slab *throughs* should be born in mind whenever they are used and special care taken with their setting. Where there is a plentiful supply, or for taller walls (normally over 1.4m high) you will often find more than one band. The spacing between individual stones in any one band is the same as for a single band, but the bands themselves are staggered.

Single rows are normally set around half way up the wall (including coping), but this can vary depending on the actual length of available stone, local tradition and presumably whim. Similarly double rows would normally be set around 1/3 and 2/3 way up. It should be born in mind that stones near the top of the wall have little weight of stone above them and so have a limited role to play in terms of preventing bulges by tying faces, or weight distribution.

If *throughs* are set flush with the two faces of the wall this can have implications for where they are set in terms of height. If the *through* is of a type of stone that will not dress to length easily (big knobbly granite for example); or is likely to disintegrate/crack if you do try (such as weather worn, thin, shales) then they are set at whatever height is most suitable for their length. They might actually project slightly, but I do mean slightly: much more

Throughs *(cont.)*

than a couple of centimetres would be pushing it. As far as their distribution is concerned it is important that they are still evenly placed along the length of the wall. I have dismantled several walls where the only gap in a length is immediately alongside a nice piece of wall with literally 4 or 5 *throughs* in the first metre or so. As a result the piece without *throughs* has not moved or settled anywhere near as much as the piece next to it causing a fault line between the two and no doubt contributing to the catastrophic failure of the gap. As to their actual spacing along a length I would ignore counting any in the bottom or top ¼ of the wall, then space as normal (i.e. length divided by number available).

Where the walls are built of small stone and are effectively two independent skins separated by a core of hearting (as are many limestone walls), the lack of *throughs* can be a serious weakness. However in some cases the walls can be built with a lot of stone which stretches half way *through* the wall effectively knitting the two faces together, in a way not dissimilar to using *¾ throughs* as described below. Whilst generally these walls would be stronger with *throughs*, there absence is not necessarily a serious weakness.

At last we get to setting the stones.

Ideally the wall should be built so that the two faces are level. Think ahead and try to work out where you want to place the *through* so that you can try and avoid the creation of a joint on one side or the other. As with normal stones a *through* should cross the joint of the two stones it sits on; achieving this on both sides can be problematic. Moving the stone slightly to one side or the other doesn't affect the spacing enough to matter and is better than creating a joint. Two stone joints are not disastrous as long as you do cross them before they become running joints. Bear in mind the example above, a joint immediately alongside a *through* is probably technically a greater fault than a simple running joint (subject to confirmation by a mechanical engineer).

It is not advisable to cross joints through the expedient of setting the *through* diagonally across the wall . Whilst it will still distribute load it is not as effective against bulging. Technically it will not be binding the two faces as efficiently as it could if perpendicular to both. As the wall settles the diagonal *through* could effectively pivot on a vertical axis, and not function properly as a *through* until it is perpendicular with the wall. By definition the wall will then be bulging, its thickness now defined by the length of the realigned *through*.

Levelling both sides of the wall also ensures that the *through* itself is set level across the wall. Sloping throughs effectively try to shed the stones sitting on them. They tend to be more effective at doing this than a single sloped face stone as the stone at the top end of the slope can effectively end up giving the stone at the bottom end of the slope a bit of a push.

Generally it is thought important to make sure that you do not leave any voids under the *through*. A well packed *through* will distribute weight better and with some stone types will help reduce the chance of the *through* being snapped or cracked by the weight of stone on top of it.

With some of the more irregular stone I do not always aim to build the wall level on both sides, rather leaving one side 10cm or so low. I then set the *through* on the high side and somehow prop it up level on the other. It is then possible to see exactly what size and shape of stone(s) is required to get it to fit properly on the low side. The *through* is then removed, or set just to one side, whilst the level is built up with the selected stones and the *through* then reset in place. This is not as easy as it sounds and generally for beginners it is far preferable to level the wall and set the *through* even with a joint.

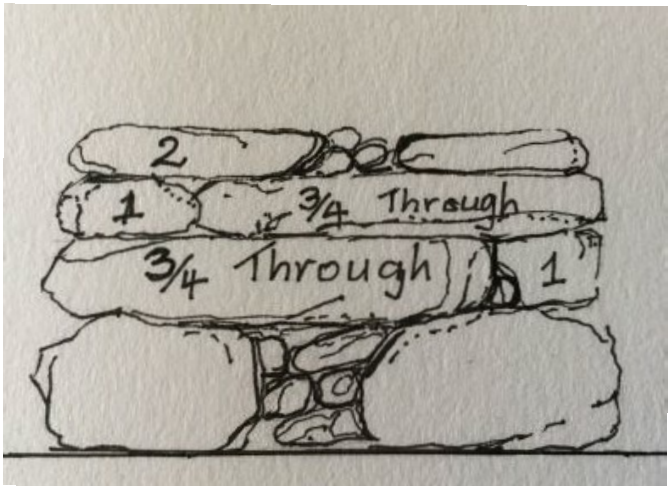
What happens if you don`t have a *through(s)*? If we strip out a 10m gap and only have two *throughs* setting them around 2-3m from either side of the gap isn`t really going to do much for the strength of the wall. It will be better than nothing but only just.

This is where *¾ throughs* come in. The first thing that should be understood, is that *¾ throughs* come in pairs. The second is that ¾ means just that, no more no less (well maybe just a little, but millimetres rather than centimetres).

Plan view:

1 good ¾ through
2 too long
3 excessively traced
4 & 5 too short—good building stones

Throughs *(cont.)*



Dealing with these points in reverse order. Each of the pair of stones when placed on one side of the wall (projecting or otherwise) stretches three quarters of the way into the wall, no more no less. If it is much less than ¾ it is just a good building stone; if it is much more, then stone placed between its end and the second face of the wall will necessarily be either very small or excessively traced (long axis along wall) negating much of the good the *through* should be doing

You cannot have a single *¾ through*, all by itself it is just a long building stone. It might be a good stone which has some binding function and some weight distribution function, but it obviously falls short (metaphorically and physically) of being a *through*.

The pair of *throughs* should be set as shown left. The top stone should sit firmly on the lower stone in order that friction between the two is maximised. This increases the ability of the pair of stones to act as one, thus binding both faces. Subsequent to the setting of the *¾ throughs* care needs also to be taken to ensure that the stone(s) between the face of the wall and the *¾ throughs* are a good fit (1 left), with little if any gap between them and the end of the *¾ through*. In addition the stone between the face of the wall and the top stone should be tied in securely. Good length building stones should be set on top of them to hold them securely (2), so that they are not merely compromising much of the good work done by placing the *through*

I used to prefer a method where the two stones are set alongside each other, ensuring good contact along their length. It`s difficult to evaluate exactly how this method works vis a vis the first method with regard to weight distribution, however it is unlikely to bind the two faces much more than good building stones. The friction between the two stones is not likely to be anywhere near as good as in the former method, hence the two stones will not act as one. Consequently it is far better to sit one on top other.

Just a couple more thoughts. If combining *full throughs* with *¾ throughs*, mix them up, don`t set a couple of *full throughs*, and then a couple of pairs of ¾s – alternate them. If you have a stone which has to be traced wherever possible do so below a *through* so that theoretically it will be held in place more effectively.

Two of Sean Adcock's projects

Left: Two metre garden wall
Below: Building a folly, Mendocino Stone Zone, California