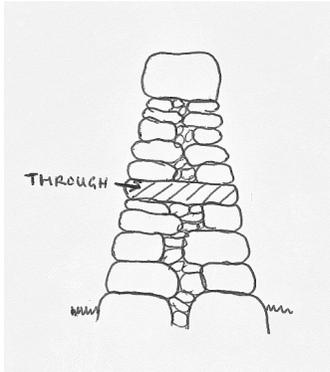


Masterclass - Throughstones

If you have any aspect of walling you'd like me to cover please ask.... To this end I've been asked to cover throughstones as it has been suggested through observation at competitions and examinations that people seem not to have grasped a number of underlying principles. I thought I had covered "throughs" in great detail in "Dry Stone Walling". This raises the alarming possibility that my explanations were not clear or even more worryingly that there are people out there trying to build walls without even having read it. Scary.



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 project 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. On some contract specifications (past and present) 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



Flush throughs, Mynydd Llandegai, Bangor

where protruding throughs are the norm.

Spacing also varies. Ideally they should be set at even centres (equally spaced) normally at 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 5, then they should be at 2m centres; and stone type – with slates and many shales you usually have a plentiful supply



Projecting throughs, Aysgarth, Yorkshire Dales

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 see "Stonechat 11(ish)").

Closer spacing can make building between them awkward, unless you set them in a complete layer.



Complete bands of throughs, Langwathby, Eden Valley

This is an interesting practice found across large swathes of Northern England, not only in the Eden valley as in this example, but also for example 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

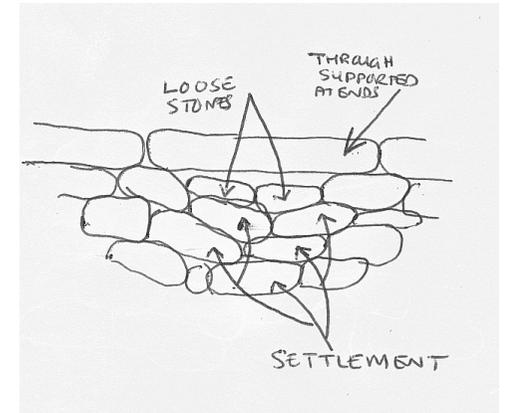
as throughs in general. Whilst they act very well in weight distribution where they cross more than one joint in the face of the wall it is difficult to get them to sit on every stone. Hence some stones below them might be loose, and similarly as the wall settles it will not necessarily settle evenly below the through again leading to loose stones.

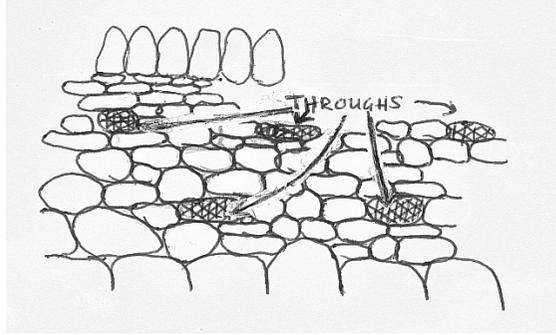
This occurrence is not that unusual in areas using complete bands of slabs. In such instances the throughs are actually preventing the whole of the wall settling as a single unit, and the face can peel away when the stones become loose. This is more of a problem in the Elan Valley where the building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

The fact that in North Wales throughs are set flush with the two faces of the wall has implications on 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 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 1/4 of the wall, then space as normal (i.e. length divided by number available).

Many North Welsh walls have a lack of throughs. Where the walls are built of small stone and are effectively two independent skins separated by a core of hearting (as are many, if not most, limestone and sandstone walls found throughout much of England), this is a serious weakness. However many North Welsh walls are 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 3/4 throughs as described below. Whilst generally these walls would be stronger with throughs, their 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).

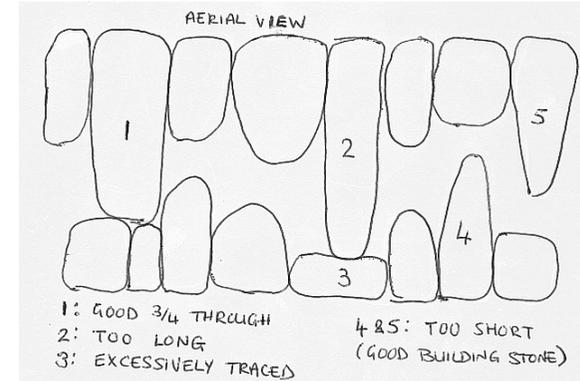
It is not advisable to cross joints through the expedient of setting the through diagonally across the wall (or in North Wales in order to get it flush with both faces). Whilst it will still distribute load it is not as effective against bulging. Technically it will not be binding the two faces as effectively as it could until it is perpendicular to both. The reasons why are a bit complicated but to somewhat 'simplify' it, as the wall settles the through could effectively twist, and in fact will not function properly as a through until it has twisted to be perpendicular with the wall at. By definition where it is will then be bulging and its effectiveness vastly diminished. Confused? Please just take my word for it!

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 we find in North Wales I do not always aim to build the wall level on both sides, rather leaving one side 10cm or so low on one side. I then set the through on one side and somehow prop it up level on the other. It is then possible to see exactly what size and shape of stone(s) required to get it to fit properly on the other 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.

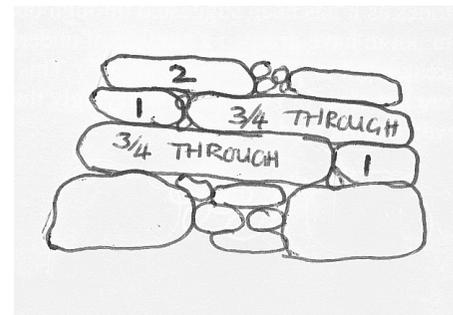
This is where "3/4 throughs" come in. These seem to be the area that causes most concern for the requestor of this article.

The first thing which should be understood, is that 3/4 quarter throughs come in pairs. The second is that 3/4 means just that, no more no less (well maybe just a little, but millimetres

rather than centimetres).

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 3/4 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 – see last edition) negating much of the good the "through" should be doing

You cannot have a single 3/4 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 3/4 throughs care needs also to be taken to ensure that the stone(s) between the face of the wall and the 3/4 throughs are a good fit (1 left), with little if any gap between them and the end of the 3/4 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 mixing full throughs with $\frac{3}{4}$ throughs, mix them up, don't set a couple of full throughs, and then a couple of pairs of $\frac{3}{4}$ s, alternate them. If you have a stone which has to be traced wherever possible do so below a through theoretically it wwill be held in place more effectively.

Simple really, don't get it wrong again, and PLEASE suggest a topic for the next issue.

Sean Adcock