

PROFESSIONAL COLUMN: *Waller and Dyker, Spring 2009*

Curves

I suppose around the fourth or fifth time Alison casually mentions that she's had several requests for more technical articles and needs someone to write the long absent professional column it's time to bow to the inevitable and apply finger to keyboard.

Firstly there's the problem of what to write about. There are only so many ways you can describe a wheel, let alone try to re-invent it. The basics of most aspects of the craft are dealt with at least competently in the British Trust for Conservation Volunteers' "Dry Stone Walling" which should be all newcomers, or relative newcomers, first port of call; and many more experienced wallers come to think of it. In addition it's worth having a look at the North Wales Branch's "Stonechat" which can be found in the Branches' section of the DSWA website, many of the articles and more can also be found at www.dry-stone.co.uk if you're able to unearth them buried somewhere in the books section of the site. It should also be said that the DSWA's own "Techniques and Traditions" is not exactly bereft of information.

So what to cover? I think given the limitations of space it might be an idea to try to concentrate on some key aspects, especially where faults/errors occur, and try to identify where the most common mistakes are made. Forewarned is forearmed. This article and any that follow are meant to supplement the aforementioned sources, to be used in conjunction with them not replace them.

So where to start? I've recently looked at several curves built for the 'Advanced' craftsman certificate, so I'm a little inspired, but it's in at the deep end as I personally think they are amongst the hardest structures to get right. Here I shall deal specifically with line and batter.

Where to start? In this instance quite literally with the footings as they really do influence how things develop.

Curves are not necessarily even or symmetrical, you can have elliptical curves, but they are all smooth, no straight bits or flat points. There are mathematical ways curves can be marked, but they are a bit too complicated to go into here (a look at <http://www.design-technology.info/graphics/page12.htm> will give an insight into the basics; <http://www.bookrags.com/research/ellipse-wom/> blows your mind, even for those of us with Diplomas in Mathematics). Using a rope or similar to mark the foundation trench, is a good starting point. Just ensure it curves smoothly, and then lay the stones! Easy? This is usually done 'by eye', remember to check frequently from both ends. Also bear in mind that if you're using large and irregular stone of varying thicknesses rather than namby-pamby limestones and flat gritstones the taller stones will have to be set in slightly compared to shorter stones. As their top is further up the batter so the curve is further in, it might only be half an inch but as subsequent building will follow them getting this wrong frequently leads to flat points higher up.

Take care to get the curve right at the transition point from/to straight walls. The curve should be tangential to these points; common faults are to curve in too sharply effectively kinking the wall, or to curve out creating a small bulge.

If you do not wish to build the curve by eye you can install profile bars. These can be set along the line of your rope, or after setting the footings. These will give you fixed points where you know the curve ought to be. Setting the right batter is a problem. The apparent angle of a slope changes depending on the angle you view it from. The angle of batter is at right angles to the tangent of the curve at any given point, if you eye one bar to another you are not looking tangentially and if you match the angle of the bars they cannot be at the same angle. The more bars (and/or longer the curve) the greater the incremental error and your batter will increase/decrease (depending on inside or outside of curve) steadily around the curve. So one side becomes more vertical, the other more sloped. An adjustable spirit level can be useful in avoiding this. Getting the bubble right is problematic (in terms of setting the bubble, getting the bars to co-operate, and the amount the bubble can move between the lines especially on cheaper levels) at least you should avoid the incremental error. Bear in mind that the level needs to be at right angles to the tangent of the curve, aimed at the focus of the curve (foci in ellipses, centre of a circle, etc). The angle of the bar changes relative to the vertical as you move around it.

Fixed frames can remove some of these problems, although bars are more practical here, maybe you could use a frame to get the angle of the bars correct, something I have to admit to not having previously considered.

I prefer to set bars at regular intervals around a regular curve, especially longer ones, breaking it up into manageable portions, effectively allowing me to aim at fixed points which I know to be in the right place with the right batter. I also tend to use lines. If the bars are at a set distance then, if for example, the curve is 2cm from the (straight) line at the mid-point between 2 bars, then all the stones at the mid-point should be 2cm from the line. Similarly all the stones 30cm from a bar in any direction should be the same relative distance from the line. The line is also useful in that as you move from a bar to the centre point the distance between each stone and the line should gradually increase. In reality it's a little more complicated as the shapes of stone, where joints actually occur etc., will affect the actual points where stones should be set. Nonetheless the basic principles hold true. How often to set bars is a personal thing bear in mind if you use too many they can just get in the way.

Common faults here are to head in too straight a line between 2 bars, creating a 'thrupenny bit' (showing my age - old 12 sided 3d coin) rather than a curve. Alternatively the line kicks out slightly from each bar creating a cauliflower or crenulated curve. Effectively the same mistakes noted earlier for the transitions from straight to curve.

Finally some observations about working by eye, which are perhaps equally applicable to working with bars, but without lines. I have seen very few curves with a consistent batter throughout or the same batter on both sides. It is often the case that the batter on the inside of a curve is much nearer the vertical than the outside. Whilst this fault is not as noticeable or as aesthetically displeasing as the equally common flat spot, it is probably a far more serious structural weakness. I suspect its occurrence is due to the fact that whilst the batter on the outside can be clearly seen the inside of the curve cannot, the wall itself gets in the way and you can't actually see it. For some reason people then tend towards more vertical. Changes in batter along a length are likely to relate to the problem of viewing angle noted earlier for profile bars. Having an adjustable angle level can be useful here, problems noted earlier notwithstanding, as you can just hold it up to the wall at any point whenever it takes your fancy. Checking the width of the wall regularly can also help, as long as you make allowances for height variations, and actually have the batter even on both sides in the first place. Of course if you are going wrong on one side and measure from this you will cause the other side to go wrong. Perhaps another reason for the vertical/over battered combination.

Remember to check frequently from all directions, if it looks wrong from one but right everywhere else then it is likely something IS going wrong, working out what it is and rectifying it if even possible unfortunately comes down to experience alone. Hopefully if you are aware of what can go wrong you will avoid the worst excesses from the outset.

Got a headache yet? Well you wanted technical, or at least someone did, blame them! Any specific request c/o Alison please otherwise you will get whatever takes my fancy.

Craig Arbennigol

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