THE ART OF CONVERGENCE

MARK REEVES FRPS

Mark Reeves discusses the aesthetics of verticals in photographing buildings.

Back in the day when I first learned darkroom photography, I had an excellent tutor called Walter who was always telling us to "Make sure your verticals are vertical". This maxim has stayed with me to this day, and has usually served me well as my photography progressed but there are, of course, times when an architectural photographer may wish to ignore the advice completely.

Walter was mainly trying to make sure that we beginners held our cameras level when shooting and that we correctly aligned negative and paper when printing. But there is much more than that to the consideration of verticals.

Simple physics - as well as everyday experience - tells us that parallel lines appear to get closer together the further away from us they are; just look along any straight road, pavement or railway track. But this convergence also applies to the parallel walls of buildings, which means that keeping the verticals vertical can sometimes be a bit of a challenge.

Photographing buildings usually implies working in a built-up environment and this often imposes limits on where we choose to stand when making images. Busy roads, private land, other buildings and people can all conspire against our attempts at producing photographic masterpieces. As a result, we're often not able to stand exactly where we would like, nor to use the ideal focal length for the particular composition we have in mind. So, inevitably we have to compromise. But as soon as we tip our cameras upwards in order to include the top of a building in the frame, then the camera's sensor or film is no longer parallel to the face of the building. As a result, the building is closer to the bottom of the sensor than it is to the top, hence we lose our parallel verticals and get convergence.

How can we avoid this problem? Well, we have several options.

Move backwards and use a longer focal length

By moving further away from the subject the convergence will be reduced, though not eliminated altogether unless we can move back far enough that we can get the whole building in the frame while pointing the camera horizontally. Of course, moving sufficiently far back is very often impossible when working in a town or city, either because there is no space behind us or because all kinds of stuff like street signs, street lamps, overhead cables and trees then enter the field of view.

The image below (figure 1) of the 110m-high Forth Bridge was taken with a zoom lens at 211mm. As can be seen, because I was around 1km away from the bridge, and despite the fact that I was standing at ground level, there is no noticeable convergence in the main vertical columns.

Use a wider-angle lens

Although a wider-angle lens exaggerates convergence it can also mean that we may get the whole building in the frame without having to tip the camera upwards. The downside of this approach is that the bottom half of our frame will capture far more foreground than we really want. We then have to crop it out which means that we will have wasted a whole load of pixels.

In figure 2 we see an image taken with a 16mm lens on a full-frame camera. The wide angle meant that I could still get the top of the

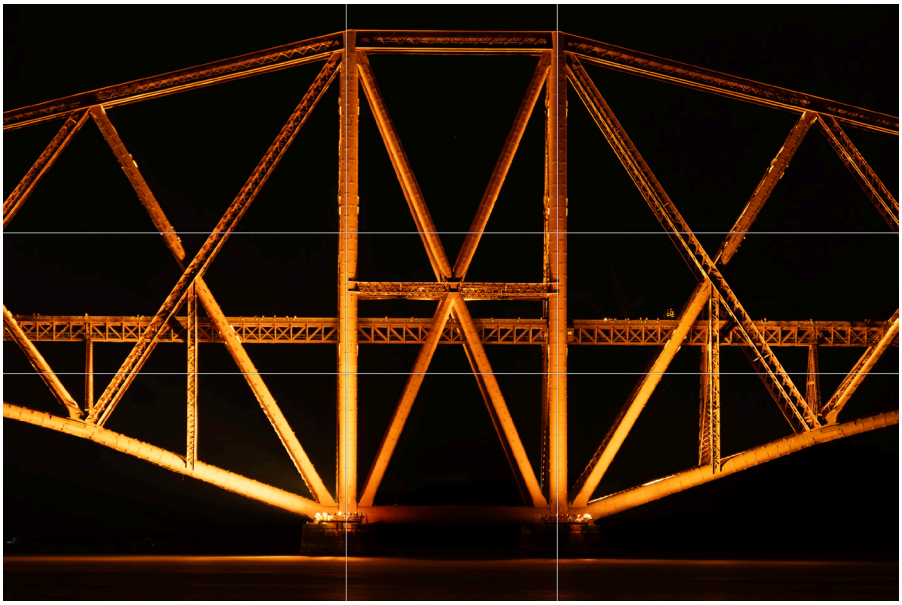

Figure 1 Taken at ground level, from approx. 1km away, with an effective focal length of 211mm, there is no noticeable convergence in the verticals of the Forth Bridge

Figure 2 Using a wide-angle lens allowed the camera to be held almost horizontal while still getting the top of the building in the frame. Many of the pixels needed to be cropped away to produce the final image

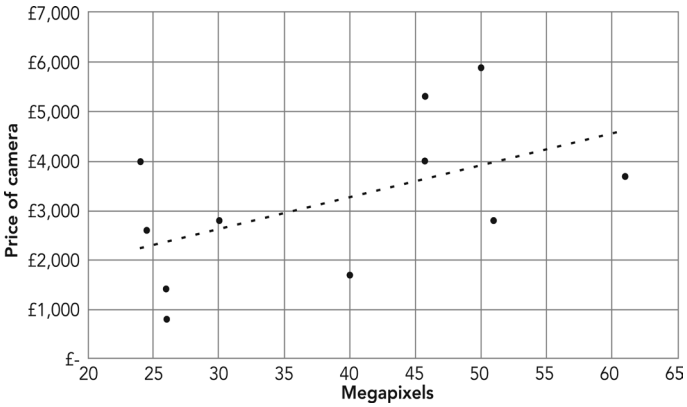

Figure 3 The price of pixels - camera price vs sensor size

building in the frame whilst holding the camera close to horizontal, thus avoiding converging verticals. To produce my final image, however, I had to crop away much of the foreground and other parts of the file, thus reducing my initial 60 megapixels down to just over 30MP!

This might seem like a small issue but pixels are expensive. Plotting a range of Fujifilm, Canon, Nikon and Sony cameras on a chart of camera price against number of sensor pixels (see figure 3), there is a reasonably strong correlation indicating an average price of around £60 per megapixel. So having a large sensor in order to then regularly crop away 30MP looks like an expensive option compared to some of the alternatives!

Correct the convergence in post-processing

Often this is our only option but, as with every solution, it has its downsides. Not only does it require extra processing work but the processing itself also leads to a degree of quality degradation (because it involves stretching the top of the image) and wastage of pixels (because we then discard the top corners of the image). And the wastage of pixels can be more significant than we might expect as illustrated in figure 4.

It is true, of course, that many common image editors now feature tools to enhance the resolution of our images but, good though some of them are, the results are unlikely to be as good as getting as much as possible right in the camera.

Use a tilt-shift lens

A tilt-shift lens is a specialist lens that can slide vertically (or horizontally) on its mount which enables it to 'look' upwards whilst the camera remains pointed horizontally. In this way building tops can be photographed whilst convergence is avoided. See figure 5.

If the subject is particularly close or particularly tall then using the shift function to create a vertical panorama may be required. But, because the alignment of the camera is not changed between frames, there is no change in perspective from one shot to the next and the successive images can

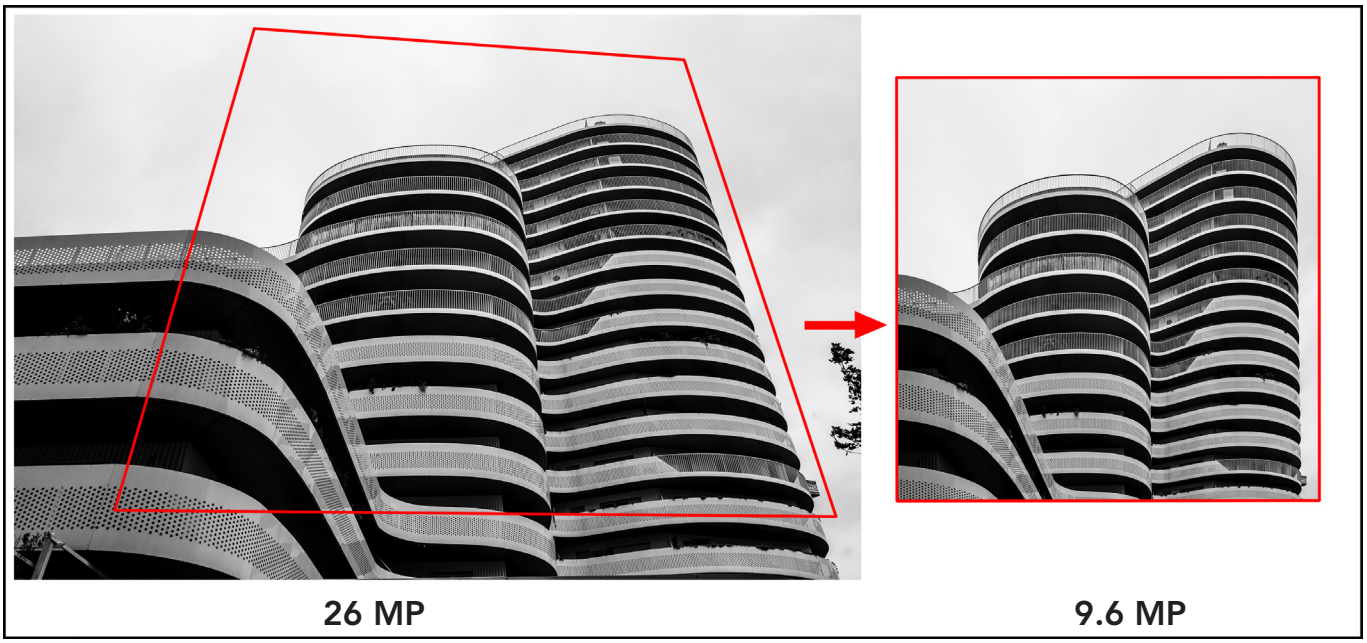

Figure 4 Correcting the verticals in this 26 megapixel file reduced it to less than 10 megapixels

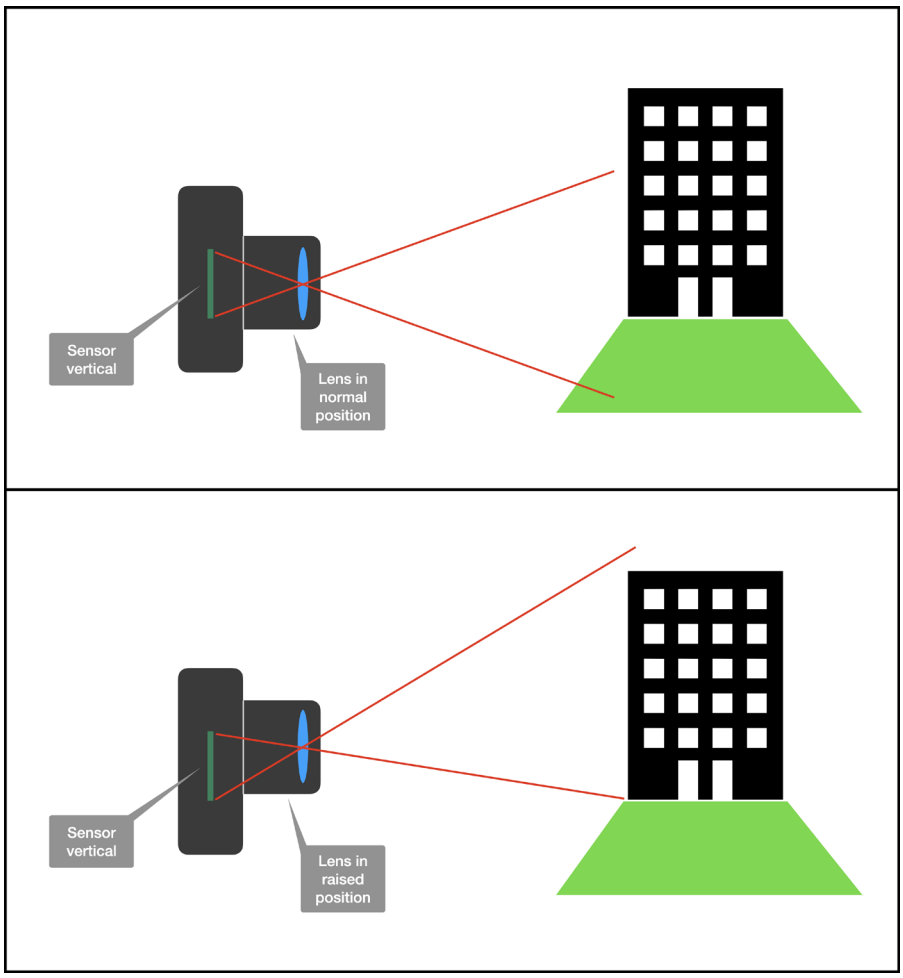

Figure 5 With a tilt-shift lens, the camera is able to 'look' upwards while the sensor remains parallel to the building.

Figure 6 A vertical panorama of two images taken using a shift adaptor

easily be aligned and combined perfectly for blending. The square image at figure 6 was actually created by a vertical panorama of two horizontal 3x2 images whose join is indicated by the dotted red line.

The downside of using a tilt-shift lens, of course, is that (yet) another piece of kit is needed - and these lenses aren't cheap. A less expensive solution is to buy a tilt-shift or a shift adaptor such as those supplied by Fotodiox (see notes at the end). These enable ordinary lenses to be used as a shift lens and can fit a wide range of lenses to a wide range camera mounts.

A matter of perception

Just one more thing to be aware of when making images with vertical verticals; sometimes they will look wrong, even if they are technically perfect. Most of us see buildings (and perhaps other tall rectangles such as double-decker buses) every day of our lives and although we don't notice it most of the time, all their verticals converge. As a result, if we see an image of a building with true verticals our brains sometimes tell us that something is wrong. In my experience there is no rule about when this will happen so if correcting images in post-processing just be aware of it and perhaps don't necessarily tweak your verticals to be totally 100% true as allowing them to converge just slightly might look better.

Embrace the convergence

Do we really always need to avoid converging verticals? Certainly not! Instead of avoiding them we can choose to exaggerate convergence to artistic effect. And the wider the angle of the lens that we use the greater that exaggeration and drama will be. It won't suit all buildings or compositions but it can work wonders with others, as in figure 7; a fairly unremarkable building seen with normal perspective but brought to life by a 21mm lens.

To see what the building looks

like with normal perspective, scan this QR code with your phone:

Avoid verticals altogether

Finally, of course, there are some buildings which can be photographed very successfully with an almost total disregard to the verticals. This is because either they don't actually have any or many verticals - such as a lot of buildings designed by the likes of Frank Gehry or Zaha Hadid - or because the building can be photographed in such a way that the lack of verticals just doesn't matter. In my photograph of the V&A Dundee (see figure 8), the outer edges of the building are vertical in reality but, because of the strikingly unusual design of the building, there is no reason for most viewers of the image to know or suspect that. So most of us - even those who know the building well - quite readily accept the image without questioning its geometry ●

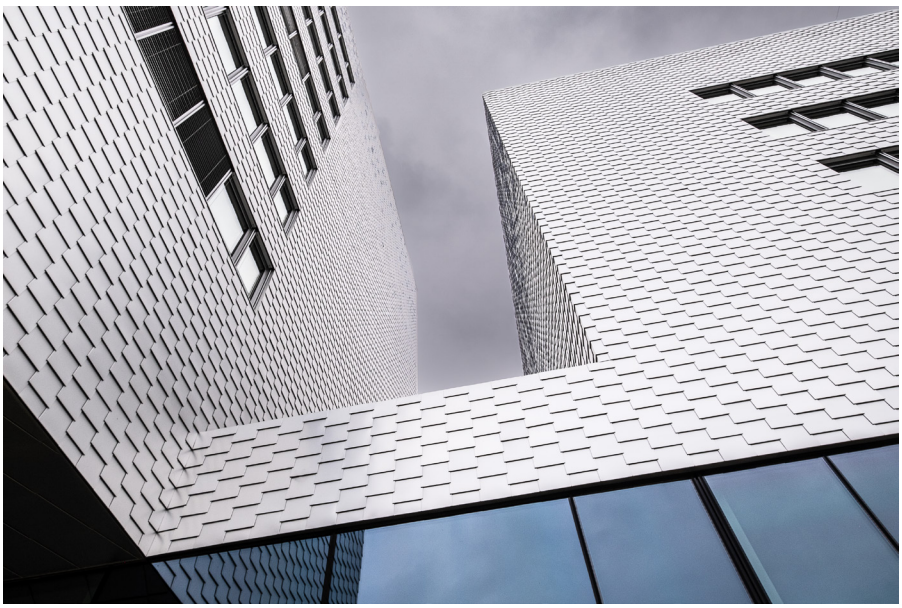

Figure 7 Seen with normal perspective, this building wasn't particularly eye-catching. This image was taken at 21mm equivalent.

Figure 8 The V&A Dundee photographed with 15mm equivalent lens. The outer edges of the building are, in fact, vertical but it doesn't matter in this photograph - not to me at least!

Notes on shift adapters

A tilt-shift lens or adaptor allows the lens to slide up and down relative to the camera and also to tilt up and down for other purposes. A shift adaptor only allows sliding movement.

I bought my shift adaptors from Fotodiox for around $130 each including shipping from the USA. I use one with a used Canon FD lens which I bought for under £50 and the other with a used Nikkor AF lens which cost me £200. By way of comparison, at the time of writing a used Canon TS-E 24mm tilt-shift lens is for sale on the Wex website at £954.

See more of Mark's work

Mark Reeves is vice-chair of the Landscape Group. You can see more of Mark's work on his personal website at *markreevesphotography.co.uk* or by following the link in the QR code.