Perspective Correction

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PERSPECTIVE CORRECTION

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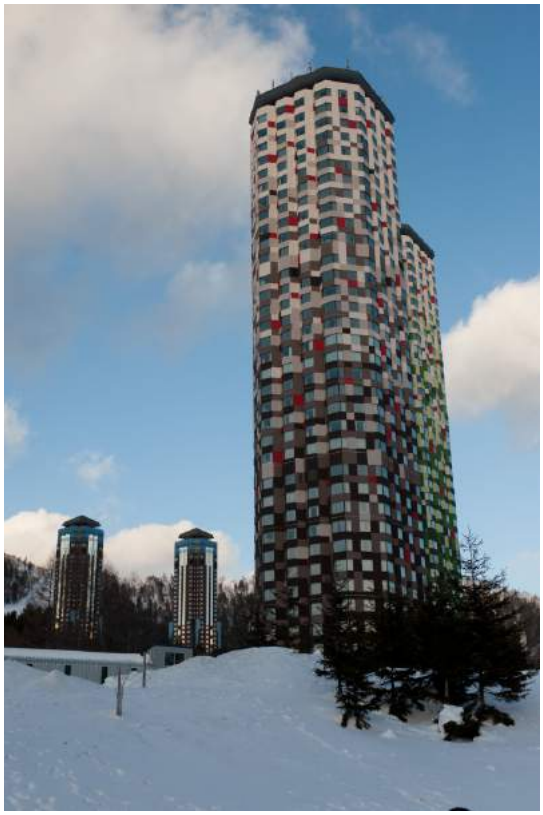
If you photograph large objects (such as buildings) with the axis of your camera lens at an angle to the face of the building you will probably get an image with perspective distortion. The sides of the building might appear to be compressed at the top and the building may appear to be leaning away from you. This effect is likely to be most noticeable if you stand close to the building and photograph it with a wide-angle lens, or if your camera is lower than the base of the building (as in the example I will use later).

There are several ways to try to minimise perspective distortion when you are taking photographs:

- Stand as far back from the building as practical and use a normal or short telephoto lens.
- Use a PC (Perspective Correction) lens. These are usually expensive.

If neither of these options are practical, and you have noticeable perspective distortion in an image there are several software approached to correcting it. If you are shooting RAW (as you should be!) you can do perspective correction in Adobe Camera Raw or in LIghtroom (and some other software). Once an image is opened Photoshop you can do additional perspective correction or you may choose to do all the perspective correction in Photoshop.

If you know that you will be using any one of the perspective correction methods described on the following pages it is a good idea to leave some space around the building in the captured image because you will loose some of the original image through cropping. Depending on how you apply the perspective correction the cropping may be automatic or you may have to do it manually.



To illustrate some perspective correction techniques I will use this image which shows several forms of distortion. The three buildings all appear to be leaning away form the camera causing noticeable narrowing at the top of the closest building, the rear buildings (particularly the one on the left) is leaning to the right, and the foreground is very dominant.

The image will also need other adjustments as parts of it are under-exposed but that is best left until after the perspective corrections have been made.

Correcting perspective distortion in Lightroom

The option for perspective correction in Lightroom are similar to those in Adobe Camera Raw (although there are not quite so many controls available here). The basic procedure Is:

- Find your image in the Grid view in the Library module and select it.
- Swap to the Develop module by pressing D on the keyboard or selecting it from the menu bar at the top right of the scene.
- Select the Lens Corrections panel on the righthand side of screen, select the Basics tab and check Enable Profile Corrections:

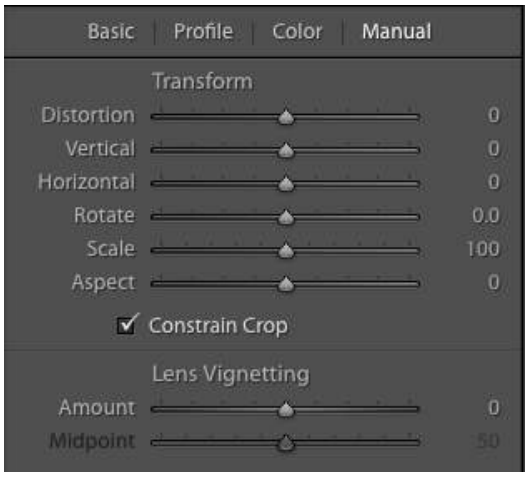
Experiment with the available options (Auto, Level, Upright and Full) to see which gives the best result for your image. For example, on my image, Auto gave this result:

“Full” gave this result - with and without the “Constrain Crop” box checked:

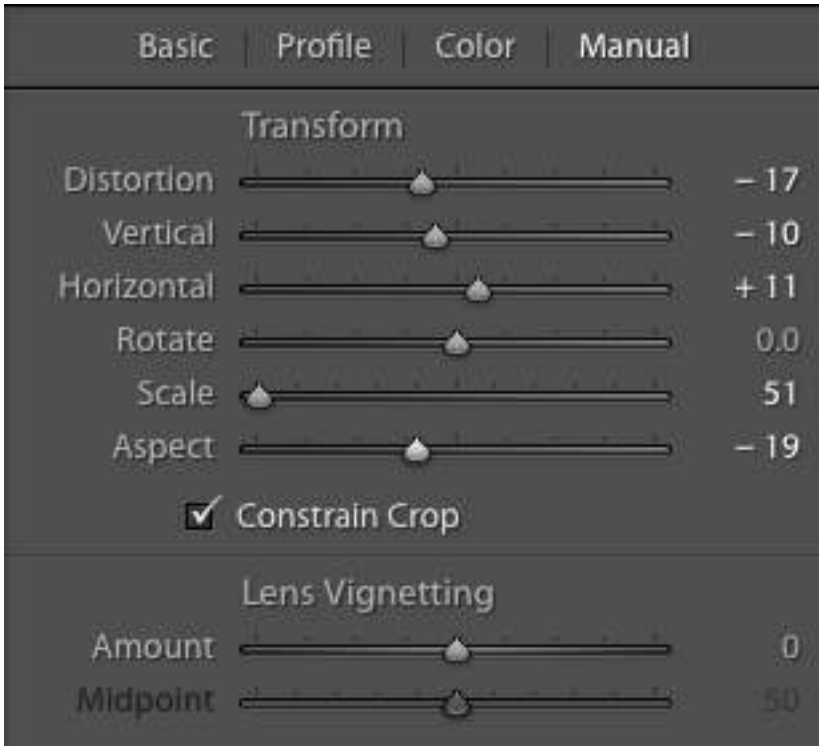
The result on the left is probably as good as you can expect from a ‘one-click’ correction. It’s not perfect, but the image does look better than the original.

You can see in the above example why you need to leave some space around the subject when you photograph it - some cropping (automatic or manual) will have to be applied. In some cases, you can avoid cropping by using ‘content-aware fill’ to filling the parts of the image that are missing, but that’s another tutorial.

If none of the one-click options give a satisfactory result you can switch to the Manual tab in the Lens Correction panel to either fine tune the previous adjustments or start the adjustments from scratch.

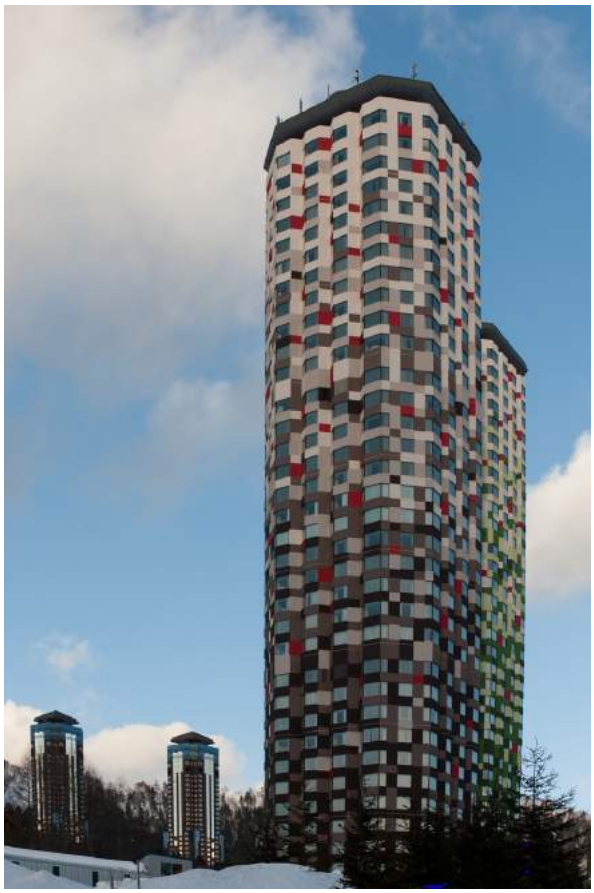


If the original image has a range of complex distortion issues (as in the example I have been using here) it can be a bit of a challenge to balance the effects of adjusting the various sliders in this panel. However, it can be worth a try. I made the following adjustments:



The result was:

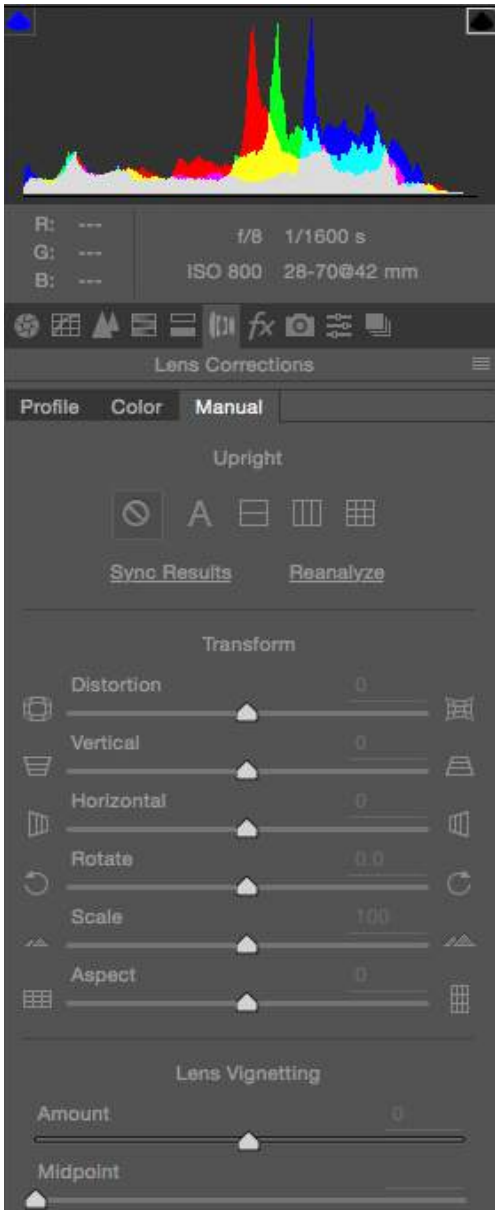
"Full" auto adjustment



Additional Manual adjustments as shown in panel above.

Correcting perspective distortion in Adobe Camera Raw

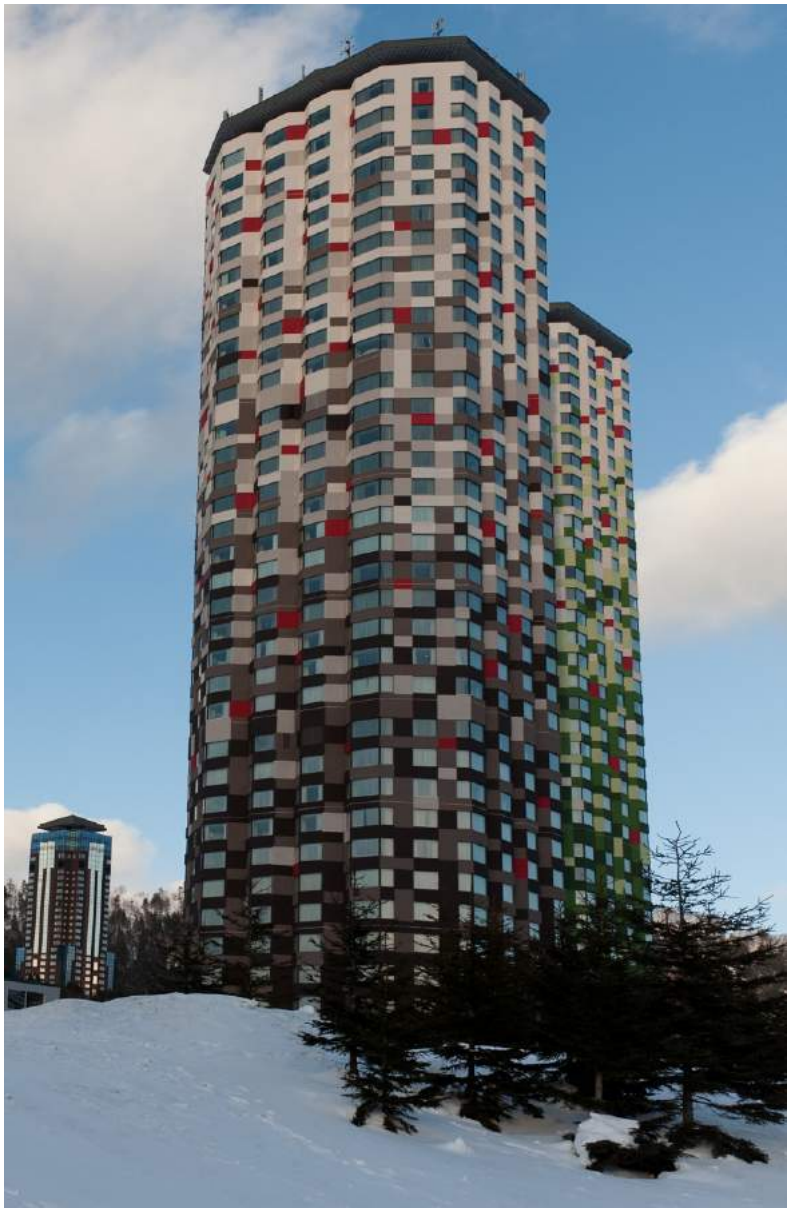
The options available here are the same as in Lightroom. Open the image in ACR and select the Lens Correction panel (the sixth icon from the left under the histogram):



In the “Upright” section of the panel there are four options for automatic correction:

The icons give your Automatic, Level, Vertical and Full (level and vertical) corrections with one click. If you are not satisfied with these automatic adjustments you can fine tune them with the options available under “Transform” (which gives the same option as the “Manual” adjustments in Lightroom described previously. For example:

When you get the perspective as close as you can to the desired correction you will have to crop the image:



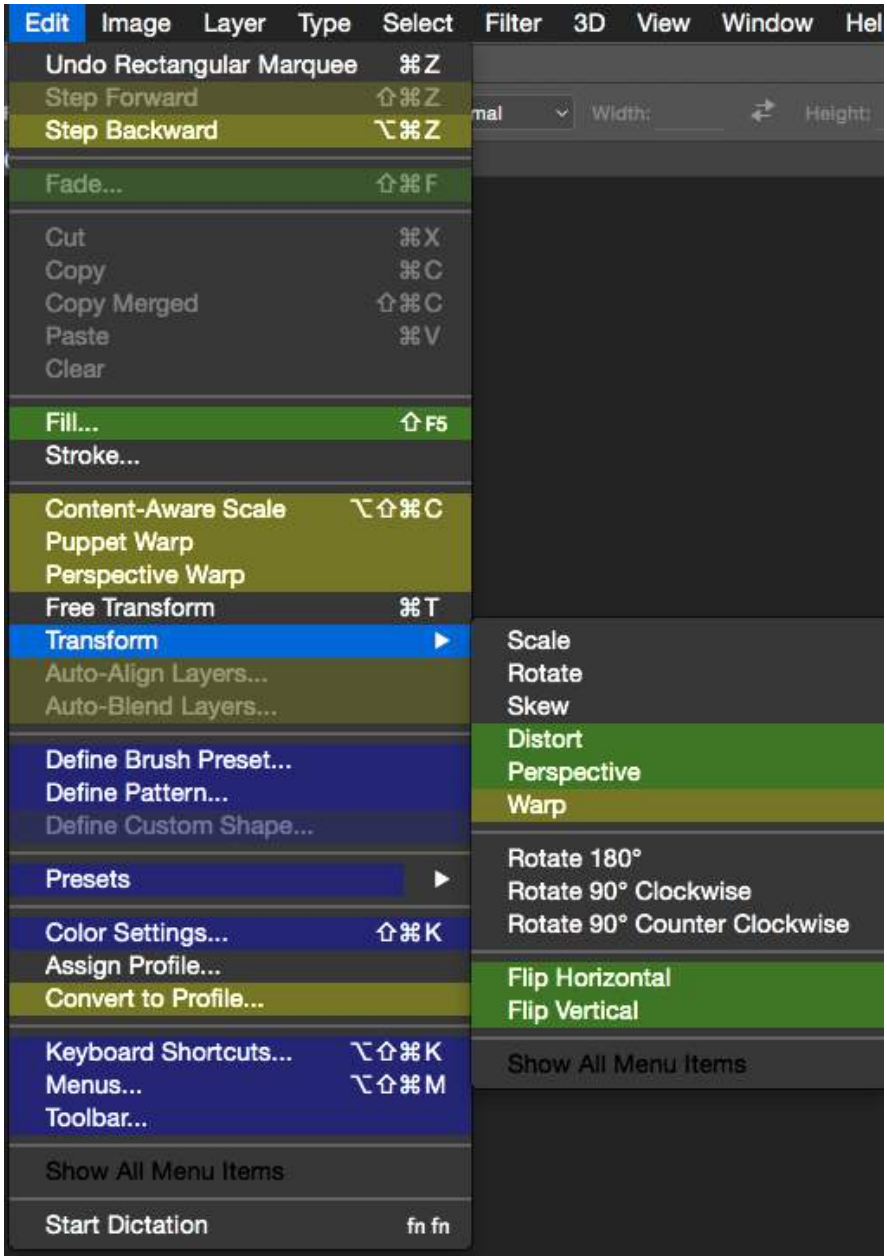
As was the case with the adjustments in Lightroom, this complex image was a bit too much for the available adjustments to fix completely and you could spend a lot of time trying to get it just right.

One of the difficulties with this image was that the buildings are at different distances fro the camera so the distortion caused by the 40mm lens was different for each of the buildings. As yo will see in some later examples, if the perspective distortion is in a single plane it is much easier to correct.

For challenging images it might be easier to try the perspective corrections in Photoshop, or to do an auto adjustment in Lightroom or ACR and then fine tune the corrections in Photoshop.

Correcting perspective distortion in Photoshop CC

The perspective distortion adjustments in Photoshop are found under the Edit menu:



There are two approaches that you can use. The option shown above is to select **Edit>Transform>Perspective** and then make adjustments by grabbing the 'handles' at the corners or on the sides of the image space and dragging them to alter the perspective.With a complex image this can take bit of juggling but it can give very good results as yo have more control than was possible in either Lightroom or ACR. As you make these adjustments, various parts of the image will be dragged outside the image area or compressed within it so you will have to do some cropping after the perspective adjustments are complete. Here is the result I achieved before and after cropping:

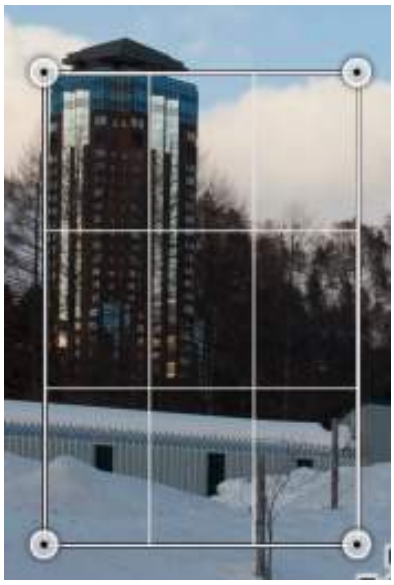
With this approach it has been possible to correct the perspective of the foreground and background buildings almost independently. At the same time, it was possible to retain a bit more of the surroundings, particularly the foreground snow, than was possible with the other correction methods.

The other options under the Edit>Transform menu (Skew, Distort, Warp, etc) are also worth trying for images with relatively simple perspective distortion but they tend not to be as useful as “Perspective” for more complex images such as the example I have been using.

An alternative approach is to select **Edit>Perspective Warp** (which is not the same as Edit>Transform>Warp). This is a little more complicated but it can be worth trying for difficult images and once you have used it a few times it is relatively easy.

When you select Edit>Perspective Warp the cursor changes to this:

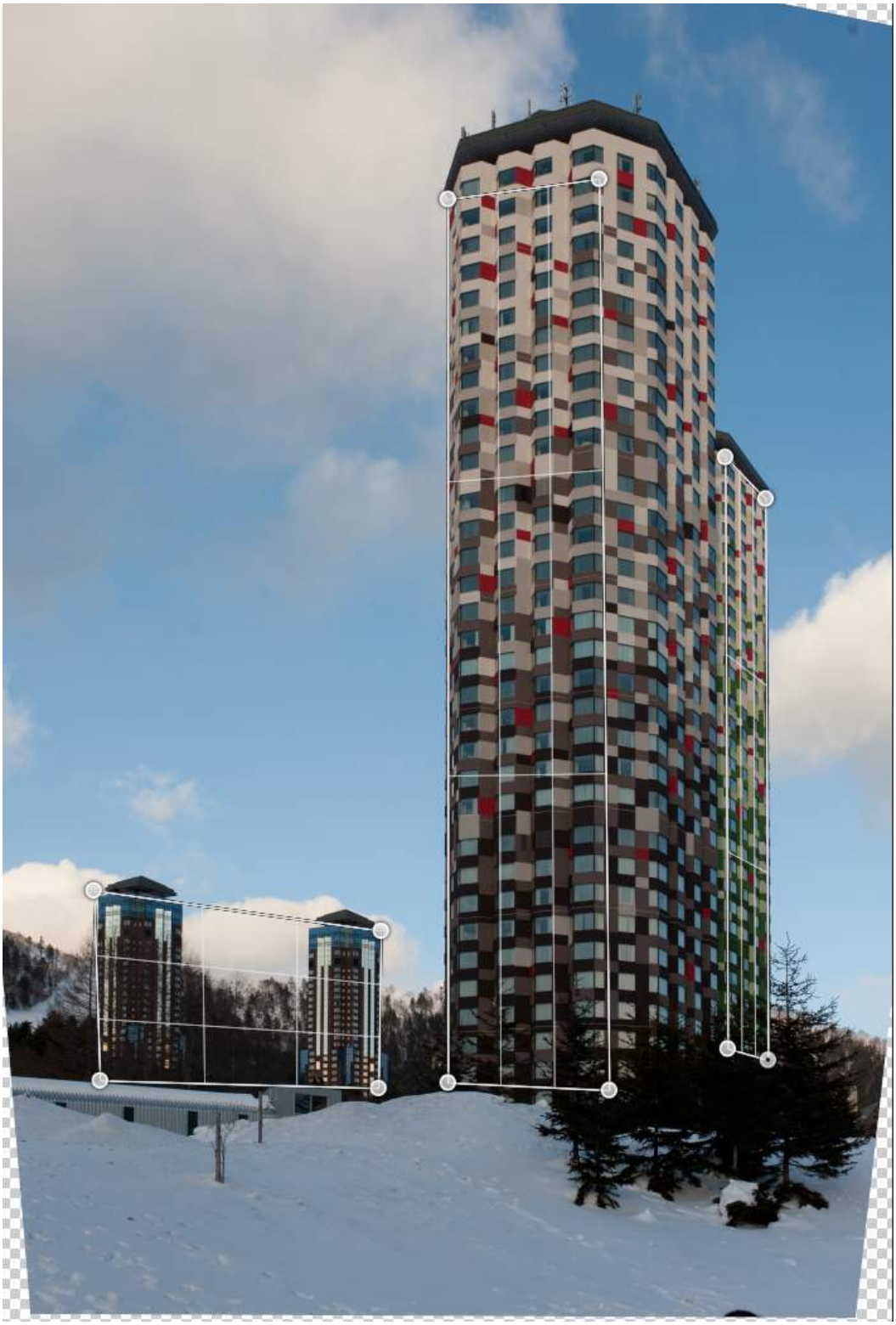
If you click the cross-hairs on a corner of an area of the image that you want to adjust and drag over the approximate area it generates an adjustment rectangle that is called a “quad shape” like this:



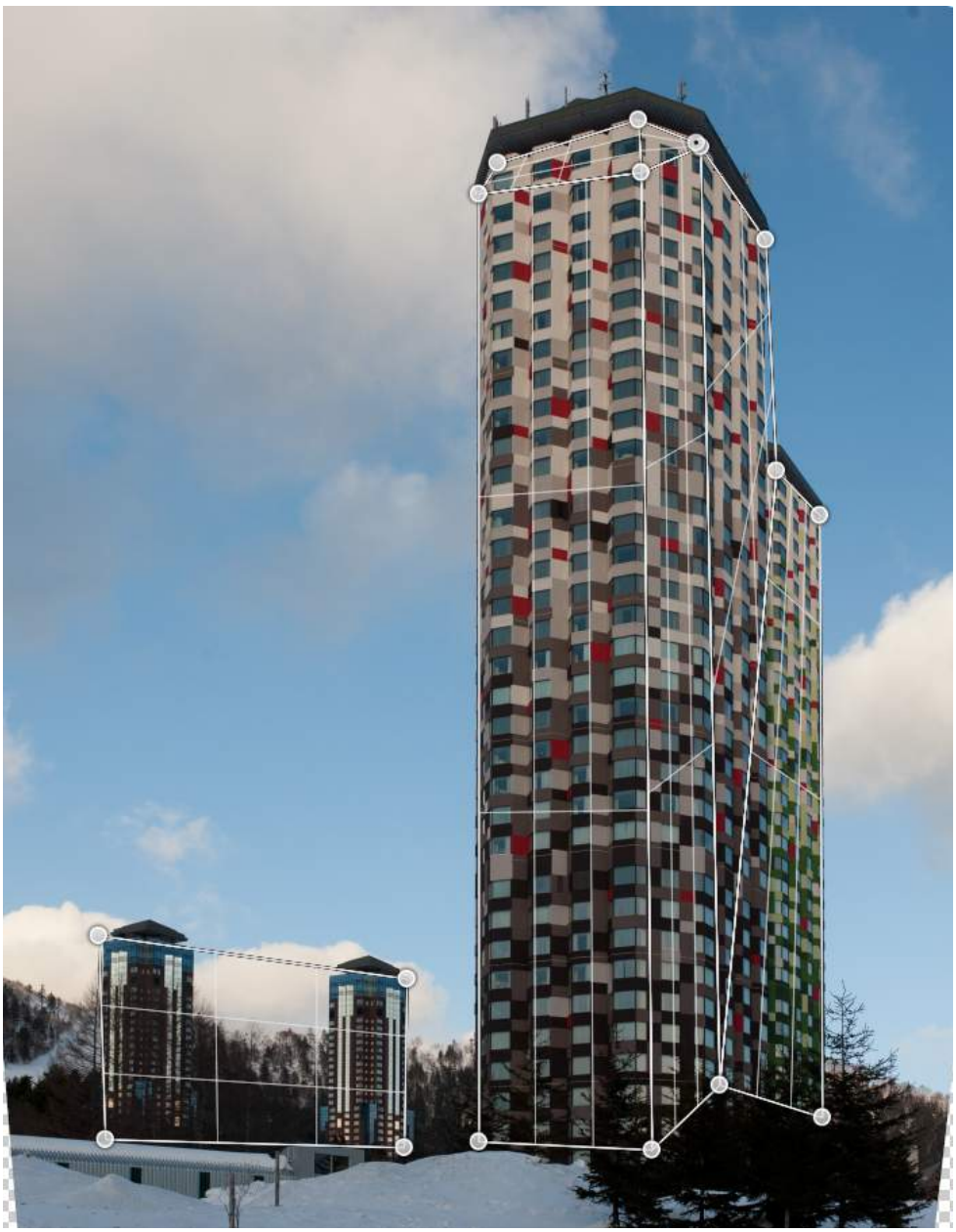
You can then drag the corners of this rectangle until they are positioned at the corners of the area you want to adjust - such as this:

As you are dragging the corners of the quad shape the cursor changes to an arrow and pin symbol.

You can create several quad shapes to outline different areas of the image, like this:



If any of these quad shapes overlap they will automatically merge so that eventually you have an outline of the all the areas you want to adjust, like this:



When all the required areas have been selected with the quad shapes just hit enter/return and the corner markers will change from white to black. You can now click on a corner of one of the quad shapes and drag it to correct the perspective of the area outlined by that shape. As you adjust each area, parts of the image outside that particular quad shape will change but the area inside any

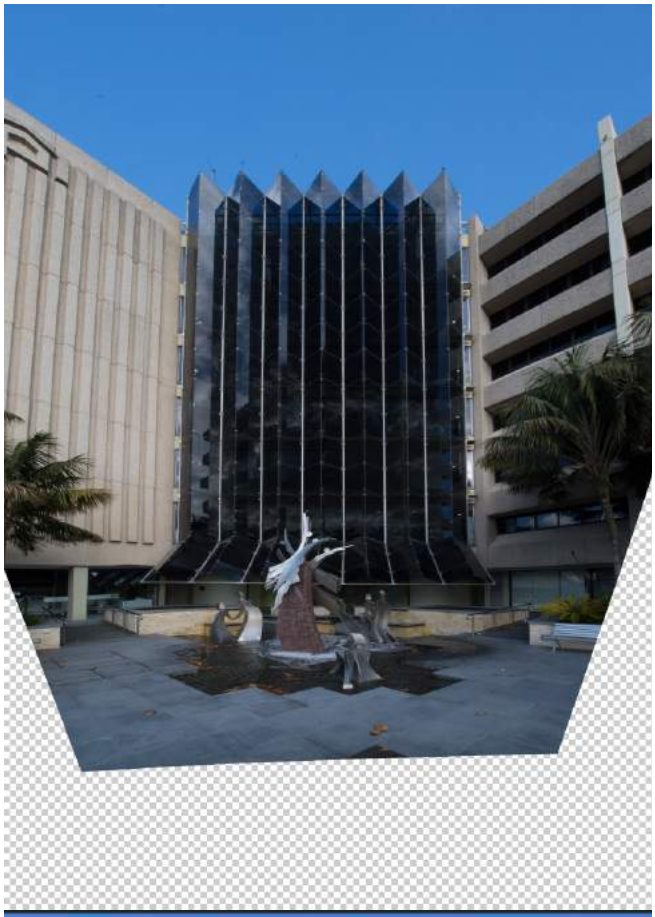
other quad shapes will not change. This gives you great control and the ability to get a result such as this:

With the image I have been using in these examples, one of the difficulties was that the four buildings were each at different distances from the camera and, therefore, were distorted in different ways in the original image. This made it almost impossible to get a satisfactory perspective correction with a simple technique such as the Auto or Full corrections in Lightroom or ACR. A more common situation might be that you will be photographing a single building and this should simplify the correction process.

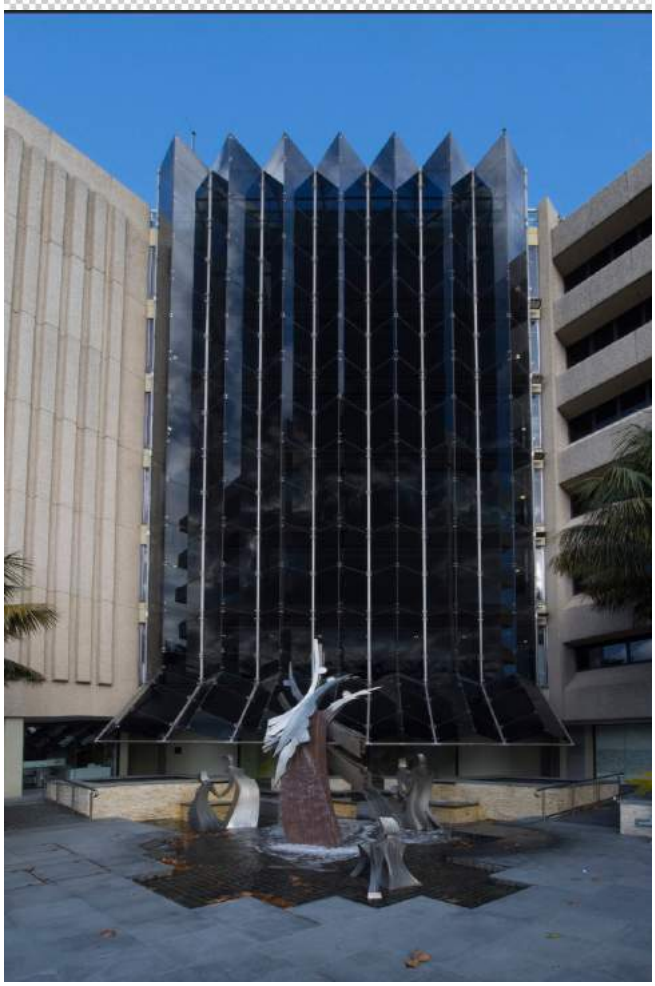
In the next example I photographed a fountain outside the Newcastle Permanent building using a 14mm lens on a full-frame camera. It is quite obvious that the perspective distortion of the building detracts considerable from the image.

Original capture with 14mm lens.

Perspective correction in Lightroom using the auto “Full” adjustment.

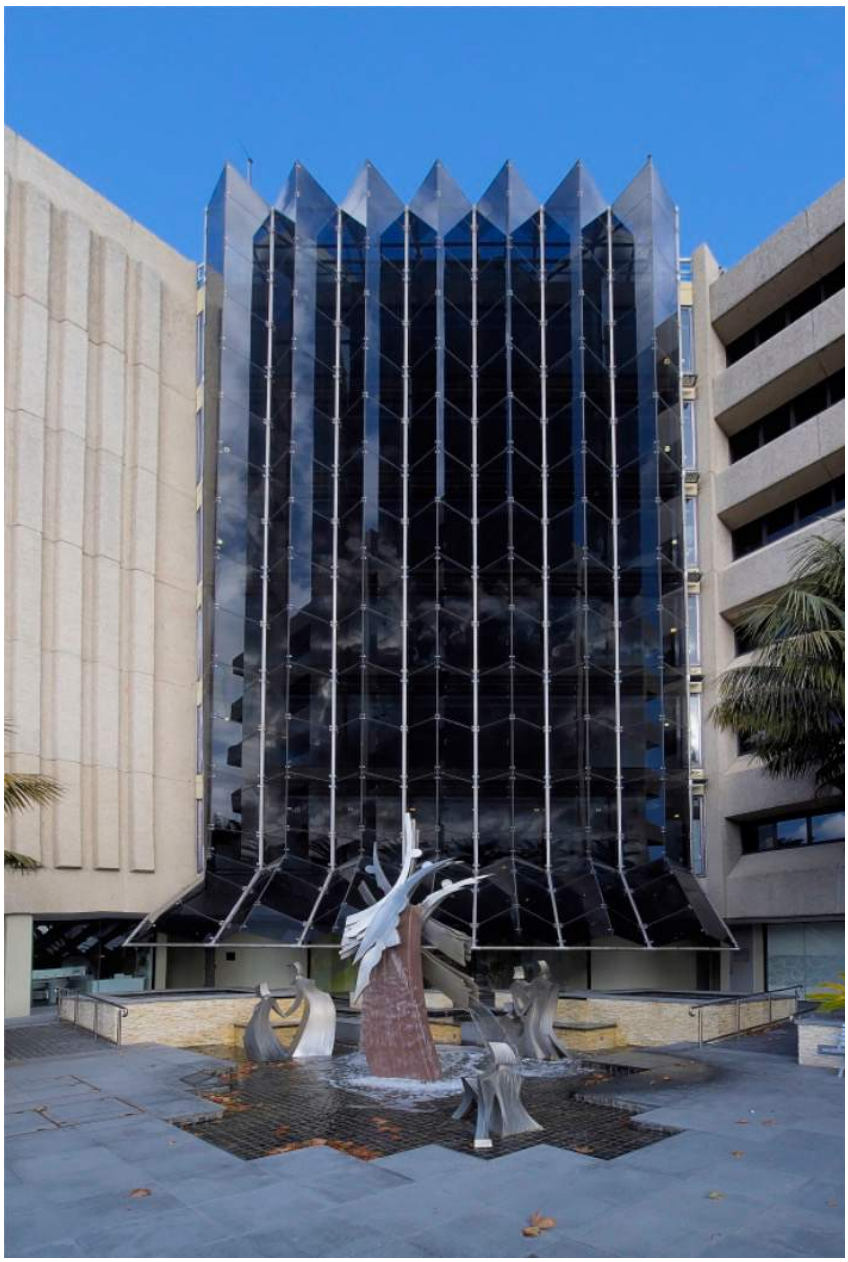


Perspective correction in Photoshop with Edit>Perspective Warp.



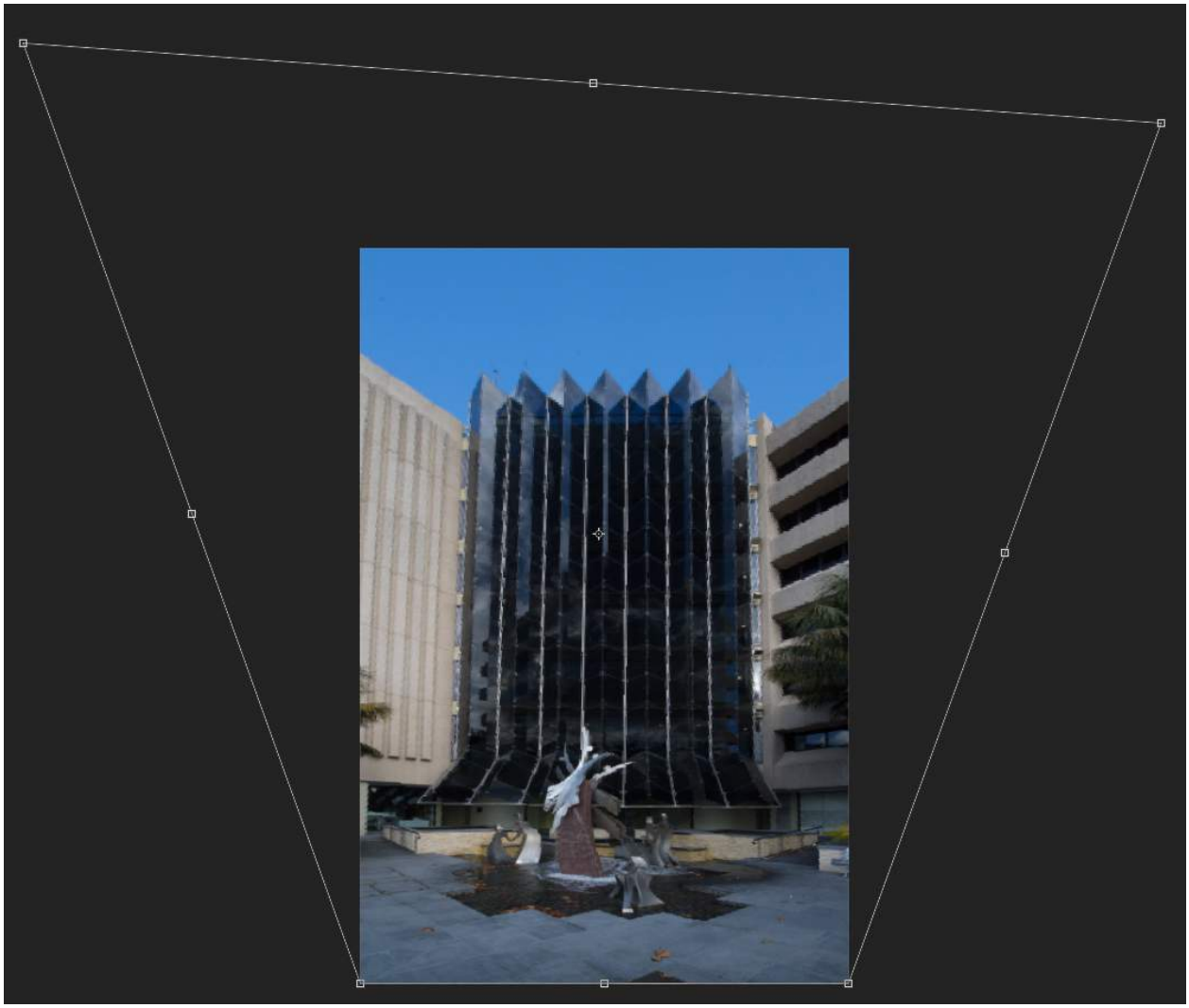
Above image further corrected with Edit>Transform>Distort (to stretch vertically) then cropped.

As a final correction, Edit>Perspective Warp was used again to correct the distortion in the light area on the left and then the exposure was adjusted to give:



Again, the result is not perfect but it is a considerable improvement on the original.

The Edit>Perspective Warp adjustments are the most complex of the perspective correction methods I have been outlining in these notes. In some cases, Edit>Perspective Warp will be the only satisfactory approach because of the need to independently alter the perspective in different parts of the image. This was the case with the example I used earlier (the four buildings in the snow). However, for simpler images, such as the one immediately above, it is always worth trying a simple approach first. The first thing you might try with images such as this is Edit>Transform>Distort. On the previous image it gave this result:



This Edit>Transform>Distort adjustment was achieved by dragging just the three handles at the top of the image.

The final result after cropping was:

Effect of focal length on perspective distortion

Wide-angle lenses produce more perspective distortion than normal or telephoto lenses. This is illustrated in the following example where two different focal length lenses were used to capture the main subject at about the same size in the frame. Obviously I was standing closer to the subject with the shorter focal length lens.

24mm lens

60mm lens

Summary

Mild perspective distortion can be caused by a less-than-perfect lens. The easiest way to correct this is to shoot in RAW and enable lens profile corrections in whatever RAW converter you are using (e.g. LIghtroom or ACR).

Strong perspective distortion usually results from standing too close to the object that you are photographing, particularly if you are using a wide-angle lens. The three approaches to use when trying to correct this are:

- An “automatic” correction such as Lens Correction>Full in Lightroom.
- A manual correction in LIghtroom or ACR.
- Manual corrections in Photoshop using one of the Edit>Transform>… options

If the perspective distortion is severe and/or there are different types of distortion in different parts of the image you should try Edit>Perspective Warp.

You will need to practice all these techniques and be prepared to experiment to find the best approach to use for each individual image.

Please email me if there is anything in these notes that you think needs correcting or clarifying.

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