

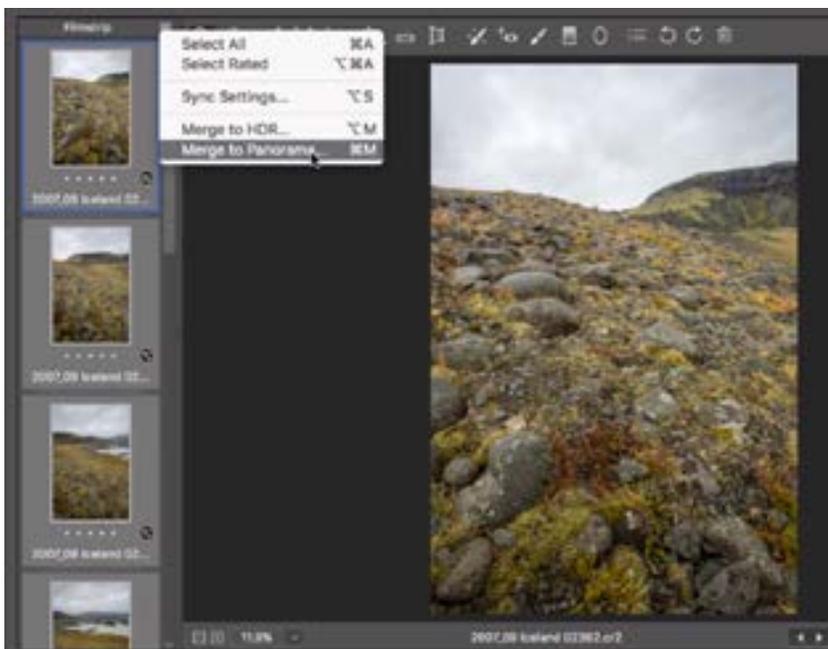


Intermediate Panoramas

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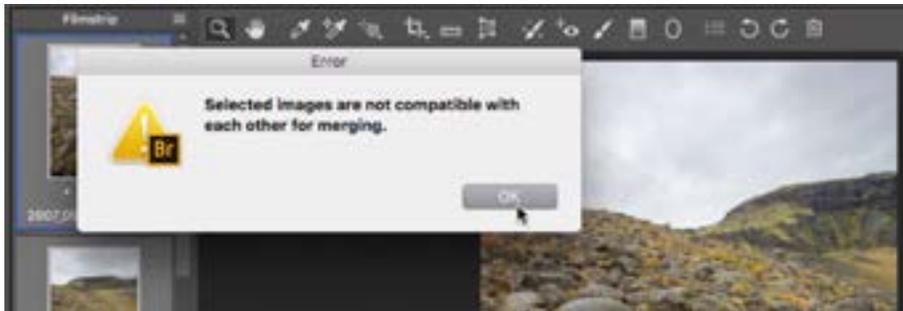
In this lesson, we're going to cover some intermediate panorama stitching techniques. Note that there is a previous Masters Academy lesson on merging panoramas and HDR images that covers the basics. Now we're going to take things a step further.

The best way to stitch a panorama is from Lightroom or Adobe Camera Raw and that's because the end result will be a raw file. Therefore, you can adjust the image after you stitch it instead of needing to adjust the individual images before hand. To merge a panorama from Lightroom, select all of the images and then click on the Photo menu and choose Photo Merge > Panorama. In the video example, we're going to use Camera Raw. To merge a panorama in Camera Raw, we'll select all of the images in Bridge, then click on the File menu and choose to Open in Camera Raw. All of the images will be displayed as thumbnails in a Filmstrip on the left side of the screen. We want all of the images selected so we'll click on the little menu above the Filmstrip and choose Select All. Then we'll click on that same menu and choose Merge to Panorama.



In Camera Raw, we selected all of the images and clicked on the menu to choose Merge to Panorama.

If all goes well, Camera Raw will process the images for a few moments and then present you with a merged pano. However, things don't always go as planned, so let's look at what could go wrong and how to handle it. In the video example, we got an error box that said "Selected images are not compatible with each other for merging." There are a few things that could cause this. If you were shooting hand-held and the lens

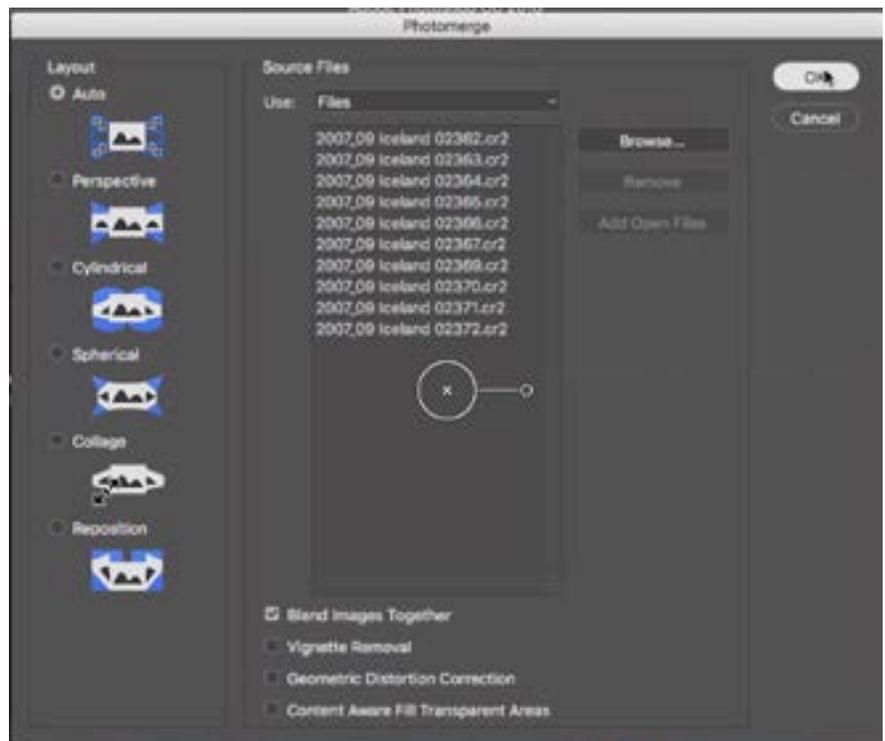


One of the errors you might get when merging a pano is “Selected Images are not compatible...”

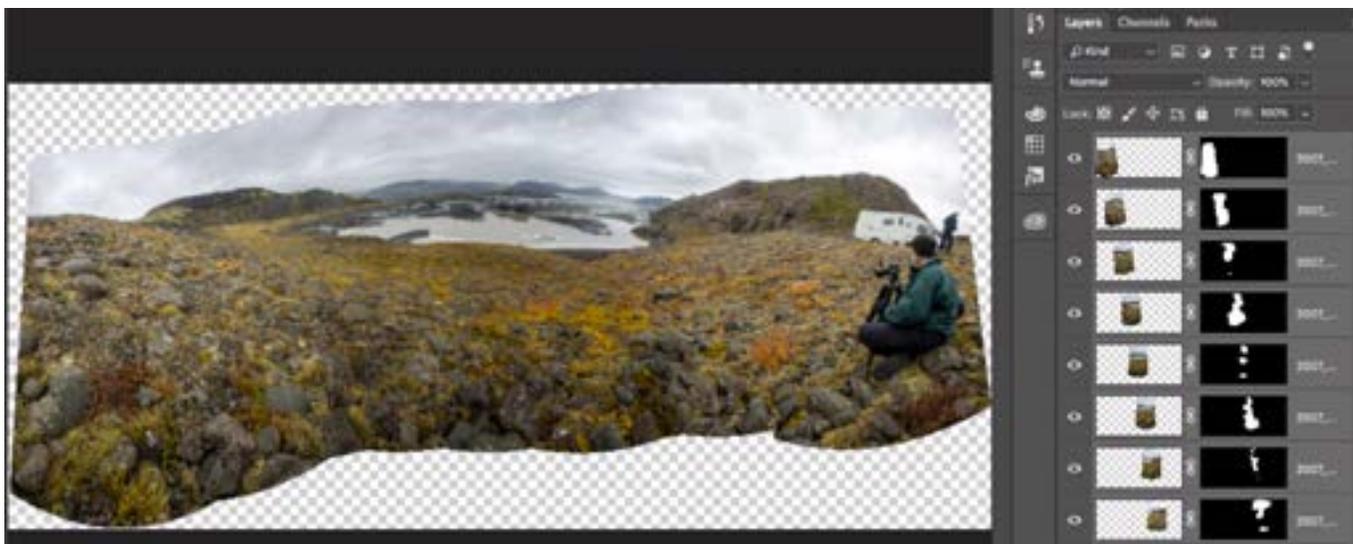
zoomed in or out a little while you were shooting the pano, it could cause this error. You can tell if this happened by looking at the camera settings for each image. They will be listed beneath the Histogram in Camera Raw.

Another instance where you might get this error is if you were not in manual mode for your exposure or if you were not using the auto exposure lock (AEL) setting.

To get around this, we will need to merge the pano in Photoshop instead of Camera Raw or Lightroom. From Bridge, we will again select all of the images, we'll go to the Tools menu and choose Photoshop > Photomerge. The Photomerge dialog will appear. We'll leave the default settings and then click OK. A few status bars will appear and then Photoshop will present us with the end result, which is a series of layers (one for each image) containing layer masks, which have been implemented to blend the images into a final pano.



The Photomerge dialog in Photoshop.



The result of merging a panorama using Photoshop's Photomerge feature.

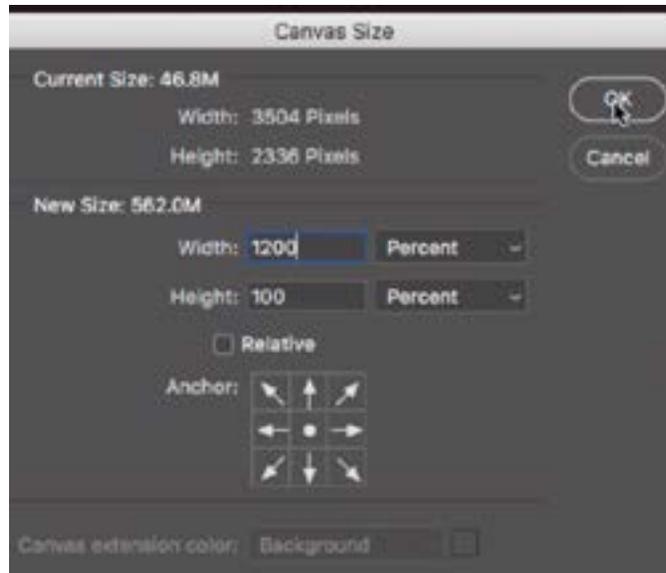
It's important to know that this end result is not a raw file. This means that we'll be limited in how we can adjust the pano after merging. We can't recover highlight or shadow detail like we could with a raw file, and if we attempt to adjust the white balance, it's not going to look as good as if we had done it ahead of time.

With some problematic panos, you might get an error with Photoshop's Photomerge as well as the Lightroom/Bridge pano merge feature. If that happens, don't give up just yet! In an instance like this, we can follow the same steps that Photoshop does automatically in merging a pano. We will just do them manually (while still getting a little help from Photoshop), in three steps. First, we will select all of the images in Bridge and then go to the Tools menu and choose Photoshop > Load Files into Photoshop Layers. This will create a single Photoshop document with each image as a separate layer. This is the first step that Photoshop would take when using the Photomerge command.



After "Loading into Photoshop Layers," we'll get one document with each image as a separate layer.

Next, we want to get some working space around the image so we'll go to the Image menu and choose Canvas Size. This will let us see and adjust the width and height of the document. We're going to set the measurement unit menu to percent, set the width to 1200 percent (this is a really wide pano) and then click OK.



We're adding space on the left and right sizes of the canvas via the Canvas Size dialog.

Now, if Photoshop were doing this automatically, this is the stage in which it would use the Auto-Align Layers command, but this is the command that is causing the error. For this reason, we're going to align the images manually. We need to choose a base image to start with and we'll choose the image containing the most important part of the scene. In the video example, it's the image containing the sun and the contrasting mountains. We'll turn off the visibility of all other layers. Then, we will turn on the visibility of the layer containing the adjacent part of the image and use the Move Tool to manually align the layers. It will be difficult to achieve perfect alignment by doing this visually, so we'll use a trick. We'll set the blending mode of the overlying layer to Difference. With Difference mode, any area where the active layer matches the underlying layer will display black. Anywhere it doesn't match, it will display various colors. This will allow us to move the layer around, trying to get the entire layer to display black (meaning everything is perfectly aligned). We can also use the arrow keys to move the layer in tiny amounts. After the two layers are lined up as closely as possible, we will set the blending mode back to Normal.

Next, we're just going to repeat that process, turning on the next layer and lining it up using the same method. We will need to make sure that the layer we're moving around is positioned above the other visible layers in the Layers panel. We'll continue this process for all of the other layers in the document.

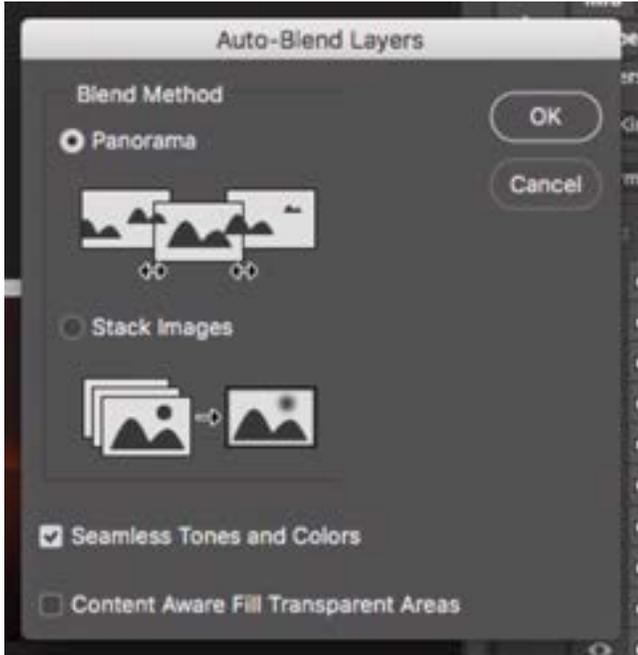


When we set a layer to Difference mode, it will appear black in all areas where the active layer is the same as the underlying layer. We'll see colors in the areas where the two layers differ.

All of the layers should now be aligned, but we still don't have a seamless panorama because the layers are not blending into one another. To make the layers blend seamlessly, we'll go to the Edit menu and choose Auto-Blend Layers. A dialog will appear where we can choose between Panorama and Stack Images. We'll make sure it's set to Panorama and make sure the "Seamless Tones and Colors" check box is turned on before clicking OK. Photoshop will merge the images together, creating and implementing a mask for each layer. At first, it may look as if there are seams in the panorama, but know that these are not actually in your file. If you zoom in to view the image at 100%, you will see that they are no longer visible. They will also disappear if you flatten the image.



The layers are aligned but they are not blending into each other and we can see the seams between each image.

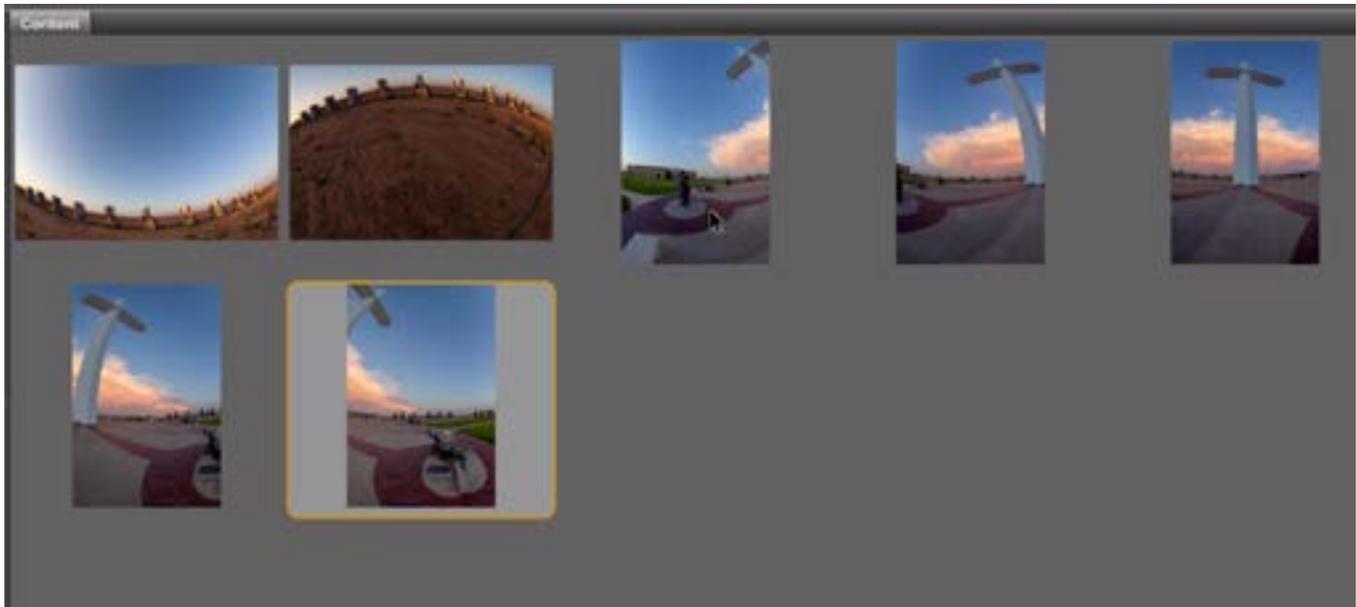


Left: In the Auto-Blend Layers dialog, we are choosing the Panorama option and making sure that the “Seamless Tones and Colors” check box is turned on. **Above:** After blending the layers, you might see seams between each layer, but these are not actually in the file and will not be visible when viewed at 100% or after flattening the document.

8-bit vs. 16 bit When an image is opened in 16-bit, Photoshop uses thousands and thousands of brightness levels when it blends the images together. This creates a much smoother panorama than one that was merged in 8-bit (with only 256 brightness levels). This is especially noticeable in smooth areas like skies. Before merging a pano, I will make sure that the images are being opened in 16-bit. After merging the pano, we can switch the image back to 8-bit without a loss of quality.

To set the bit depth setting in Lightroom, open Lightroom’s Preferences and click on the External Editing tab at the top. Here, there will be a bit depth setting and this is where you choose whether your images should open in 8-bit or 16-bit when they are sent to Photoshop

In Camera Raw, click on the line of text at the bottom of the screen and it will tell you if the image will be opened in 8-bit or 16-bit. If you’d like to change it, click on the line of text and the Workflow Options dialog will appear. Here, you can specify whether the image should be opened in 8-bit or 16-bit.



Here are two sets of panoramas that were shot with a fisheye lens. The distortion is going to create problems when merging that we will need to compensate for.

Fisheye panoramas: Technique 1 Panos that are shot with a fisheye lens can present their challenges because of the large amount of distortion. In the video example, we got an error that read “Some images were unable to be merged” when we chose to merge from Camera Raw. When we chose OK, the Panorama Merge Preview dialog opened and we attempted to choose different Projection options, but none of them seemed to work out better. Here is another option. We’ll select all of the individual images in Bridge and we’ll go to the Tools menu and choose Photoshop > Photomerge. In the Photomerge dialog, we’ll make sure that the Layout option is set to Auto and we’ll turn on the following three check boxes:

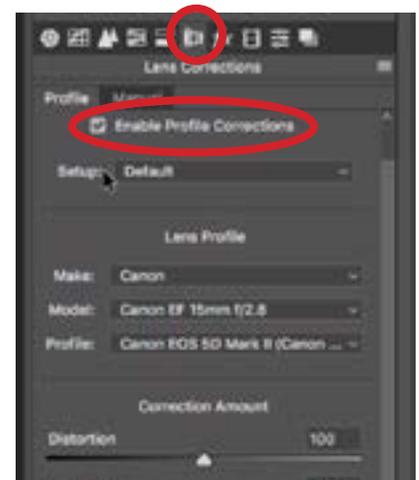
- Blend Images Together
- Vignette Removal
- Geometric Distortion Correction

Then we’ll click OK. The combination of settings chosen will likely do a better job at merging a fisheye panorama. After merging, there are further techniques that we can use to straighten things out and correct for distortion.



Above is the result of merging a fisheye panorama with Auto setting selected and the top three check boxes turned on.

Fisheye panoramas: Technique 2 There is another route that we can take when merging a fisheye panorama and that is correcting for distortion before merging the individual images. We'll select the individual images and open them in Camera Raw. With the images selected, we'll open the Lens Corrections panel on the right side of the interface. We'll make sure the Profile tab is selected and then we'll turn on the "Enable Profile Corrections" check box. This will straighten out the fisheye image, but the problem is that part of the content gets cut off on either side. We need to try to correct for this. We'll activate the Crop Tool (at the top of the ACR interface), click on the crop ratio menu and make sure the



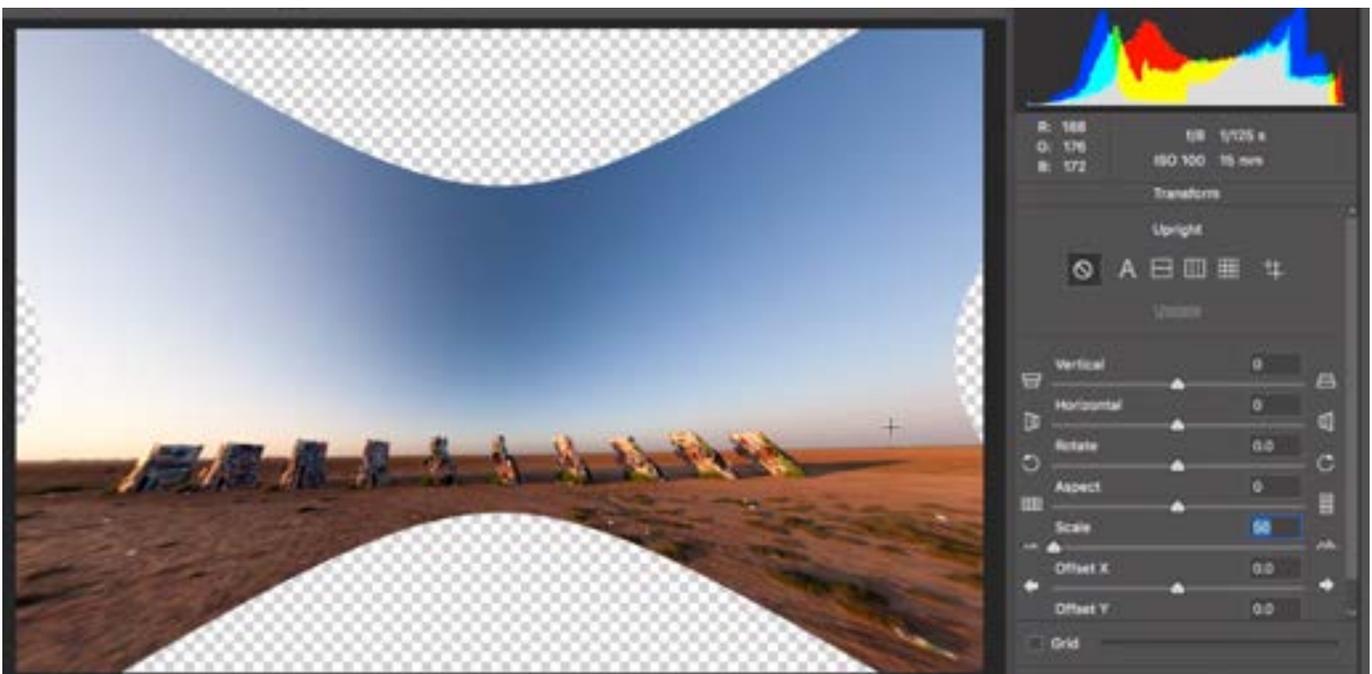
In the Lens Corrections panel, we are turning on the "Enable Profile Corrections" check box.



Left: The original image. Right: The same image with the Profile Corrections setting on.

Constrain to Image setting is turned OFF. Note that in Lightroom, this setting will be located on the right side of the interface when the Crop Tool is active. If this setting were turned on, we'd never be able to see anything beyond the edges of the image, where there might be some empty space.

We will then go to the Transform settings and drag the Scale slider to the left until all of the important content in the image becomes visible again. We will also get some empty space and that's ok. We'll click the Open Images button in the bot-



In the Transform settings, the Scale slider is being moved to the left until all important content comes back into the frame.

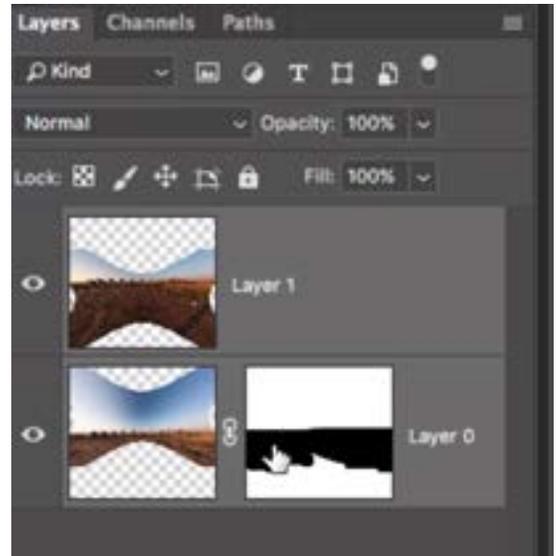
tom right corner of Camera Raw. This will open the images as separate Photoshop documents, and we want them all in one document. We'll drag the layers, one by one, into a single document. We will use the Move Tool to best align the layers, using the Difference blending mode to get a better idea of when they are lined up perfectly. After lining up the images, we have areas in the layers that are extending beyond the boundaries of the document frame. We'll expand the canvas to include those areas by going to the Image menu and choosing Reveal All. This will expand the canvas to include anything that's extending beyond the edge.



The top layer is set to **Difference mode** so that we can best see when the layers are lined up accurately.

Choosing an area to use when auto-blending Now in this example with the cars at Cadillac Ranch, one of the layers shows the cars extending outward and another layer shows the cars pushing inward. This is just a difference in distortion because of the way the lens was angled in the two shots. It won't be uncommon that you will have an area of one image that you like better than that same area

in a different image and you will need to specify which image Photoshop should use to fill in that area. In our example, we went to the Edit menu, chose Auto-Blend layers and then ended up with the cars pushing inward. I actually wanted the opposite, which is the cars extending outward. Here is how to specify that you don't want an area in a particular layer to be included in the final merge. Turn off the visibility of all other layers. Then add a layer mask to the layer with the undesirable area and paint over that area (on the layer mask) in black. This will completely hide the area. In our case, we're going to paint with black over the area that includes the cars leaning inward. Then we'll turn on the visibility of the other layer[s] and try the merge command again. We'll go to the Edit menu and choose Auto-Blend Layers. Now, because the undesirable area was hidden, Photoshop could not use it in the merge. Note that this technique can be useful for any panorama merge, not just fisheye panoramas.



A layer mask was used to hide the undesirable area, making sure that Photoshop does not include it when auto-blending the layers.



The Crop Tool is being used to crop out any transparent areas.

Finally, we will use the Crop Tool to crop out any transparent areas around the edges of the image. With the Crop Tool active, there will be a “Delete Cropped Pixels” check box in the Options Bar above the main image window. If you turn this check box on, any content outside of the crop rectangle will be discarded. If you keep this setting off, you will be able to go back later and “uncrop,” bringing back any areas that were outside of the crop rectangle.



All of the individual images in this panorama are undistorted. After merging, however, we ended up with distortion.

Fixing distortion caused by stitching a panorama Sometimes, you'll shoot a panorama and the individual images look fine, but the final merge has some distortion. To demonstrate this, we'll use a panorama shot at a temple complex. We merged the images in Camera Raw and experimented with the Projection settings to see which looked best. (In this case, it was the Cylindrical setting.) The Boundary Warp slider will bend the picture based on the shape of its edge, making it closer and closer to a rectangular document. Because we're going to bend the picture to correct for distortion, we'll leave the Boundary Warp slider at zero and then click the Merge button. We'll be prompted to name the new panorama and then click Save. Then the merged pano will open in Camera Raw.

We want to open the image in Photoshop to make further adjustments, but if we simply click the Open Image button, the image will lose the quality of a raw file. Instead, we'll hold down the Shift key so the Open Image button turns into the Open Object button. We'll click this so the image opens as a Smart Object in Photoshop. (To do this in Lightroom, go to the Photo menu and choose Edit In > Open as Smart Object in Photoshop.) In Photoshop, the layer thumbnail will have a little icon on top of it, indicating that it is a Smart Object. We could double-click on the

Smart Object to open the image back in Camera Raw so that we can make further adjustments while still retaining the quality of a raw file.

To correct for the distortion, we'll go to the Filter menu and choose Adaptive Wide Angle. The Adaptive Wide Angle window will take over the interface and it will automatically try to correct for some of the distortion. We can also guide the tool to correct things in the way that we want. Toggle the Preview check box at the bottom of the screen to see a before and after view of the distortion correction. Because this is a filter, it can't change the dimensions of your picture, so it can't make it wider or taller. We CAN use the Scale slider to scale the entire image down so that it all fits within the document frame.

Now we can work on correcting specific areas that are distorted. In the example image, some of the lines of the buildings are curved where they should be straight. The Constraint Tool is the top most tool on the left side of the interface and it is usually active by default. This is the tool that we'll use. We're going to click and drag on a surface that should be a straight line and you'll see that the line will bend to match the photograph. When we release the mouse button, Photoshop will attempt to straighten that part of the photograph and everything else around it. We can repeat this with other areas of the image that are distorted.



Using the Constraint Tool (active by default), we drew out a line over an edge that was curved (but supposed to be straight). When we released the mouse button, Photoshop straightened out the edge and surrounding areas.

After merging a pano, you might also get lines that are supposed to be vertical but are actually curved or bowing outward or inward. We can correct for this within the Adaptive Wide Angle window as well. We'll use that same Constraint Tool, clicking and dragging up a surface/edge that is supposed to be perfectly vertical. Before we release the mouse button, however, we will hold down the Shift key, which will change the color of the guide line. When we release the Shift key and the mouse button, the targeted surface will become perfectly vertical. (This also works for horizontal surfaces.)



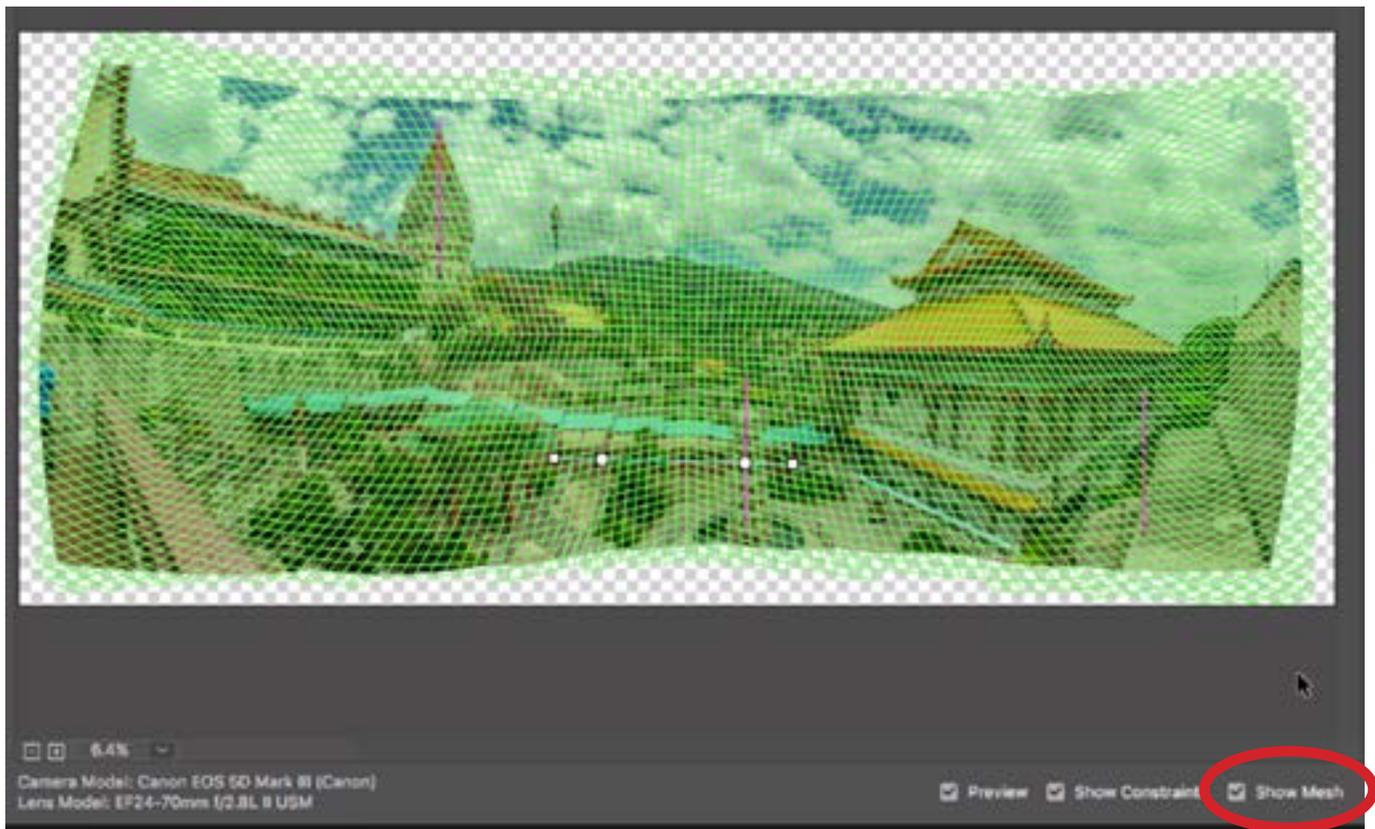
If you hold down the Shift key while using the Constraint Tool, you can drag out a line on a surface you want to be perfectly vertical (or horizontal).

After we switch a surface from curved to straight, the angle may not be perfectly to our liking. To fix this, we can click and drag on one of the white dots along the line in order to rotate the angle. After drawing out a guide line, you can also right click on the line to get a little menu. Here, we can choose what kind of line it should be: Horizontal, Vertical or Arbitrary.



After straightening out a surface using the Constraint Tool, you can drag the circular handles to change the angle.

When you are creating guide lines in the Adaptive Wide Angle filter, it's basically creating a mesh behind the scenes. To see how the image is being distorted (or undistorted), turn on the Show Mesh check box at the bottom of the screen. We'll make as many changes as needed and then click OK.



You can view the way the image is being distorted by turning on the Show Mesh check box at the bottom of the Adaptive Wide Angle dialog.

Note that the Adaptive Wide Angle filter is more geared toward correcting distortion in panoramas and not single-shot images. For a regular image, I'd recommend using the Lens Corrections settings in Lightroom or Camera Raw.

Because this is a raw file, we can always come back and make changes to the filter settings by double-clicking on the name of the filter under the layer thumbnail in the layers panel.