

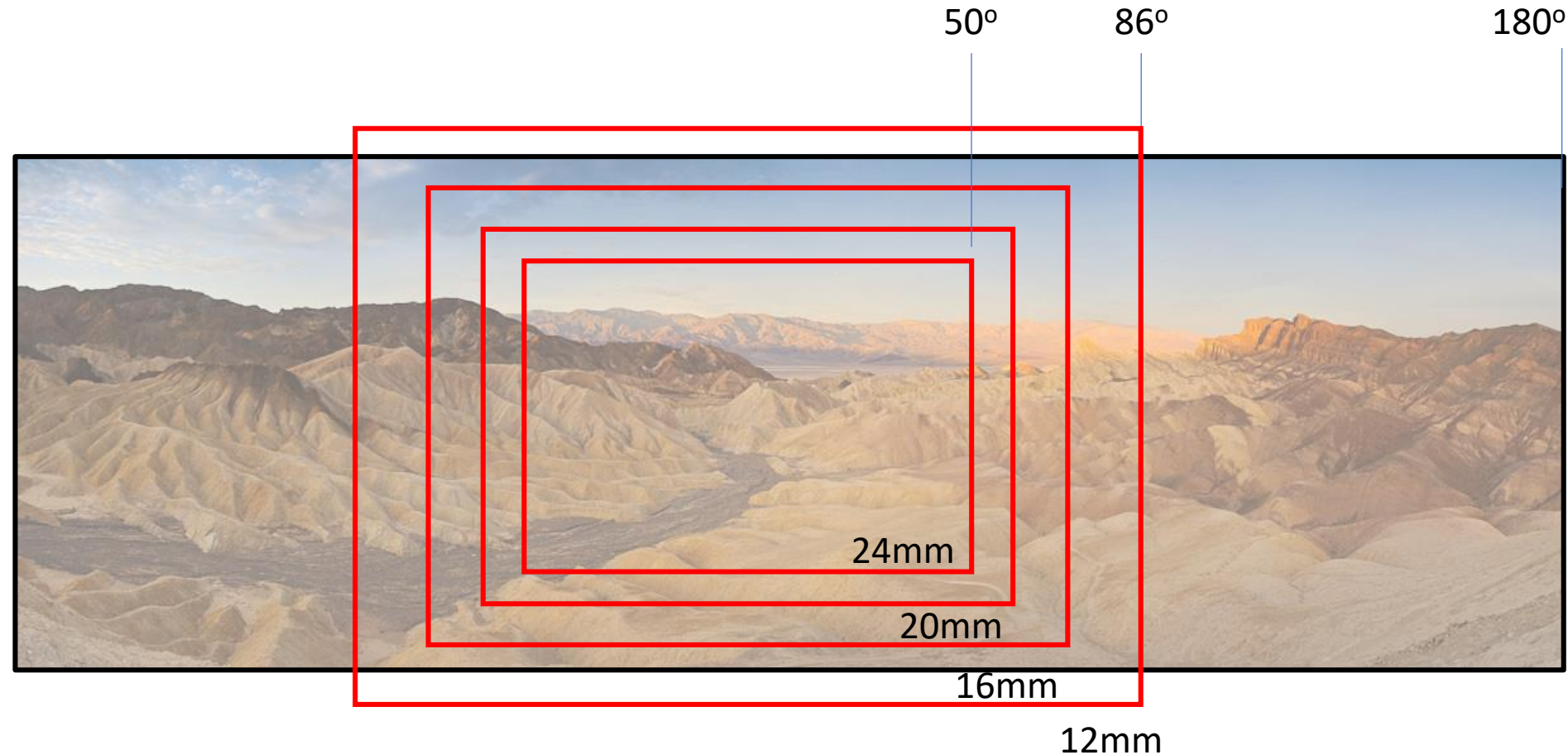
How to Create Handheld Panoramic Images

Dennis Freeman – 4/25/2019

Why do Panoramas?

- A panoramic photograph has a wide format. The ratio between height and length of the photo is 1:2+. The field of view is greater than 100°, and frequently exceeds the angle of human vision (~140°).
- Why not do an iPhone Pano?
 - Less control of perspective (straight lines curve)
 - Only 72 dpi. Need more for large prints and good projectors.
 - JPEG: Raw format has more image information: much wider dynamic range and larger color space. Editing can push the images a lot further, bringing out and rescuing hidden detail in the darkest shadows and brightest highlights.
- Why not use a wide angle lens? (and crop)
 - Wide angle lens may not be wide enough
 - Undesirable lens distortion
 - With larger prints – get more pixels from pano than in single shot.
 - Can use general purpose zoom lens

Wide Angle May Not Be Wide Enough:



Camera Equipment

- **Digital Camera** – Need the exposure (**aperture, shutter speed and ISO**) to be locked. Ideally, want to shoot in full **Manual mode** (preferably a DSLR).
- **Lens** – Zoom lenses are the most useful. Fixed/prime lenses work, but being able to zoom in and out will give you more versatility. Any midrange zoom lens such as a 24-70mm is great.
- **Lens Filters** – Recommend taking filters off your lens. It is OK to keep a clear (e.g. UV) filter on, as long as it is not introducing any vignetting to your images on the wide end. **Remove a circular polarizer** if you have one mounted on your lens, because it will mess up your sky. E.g.:



- Arrange camera in Portrait orientation

Settings

- **Shoot in “Manual” mode**
- **ISO** – turn off “Auto ISO”. Set to fixed value, e.g. camera base ISO (either 100 or 200) for sunny day.
- **Aperture and Shutter Speed** – want everything in focus. Set aperture to preferably f/10+ (depending on nearest foreground object). Then set shutter speed based on the meter reading as explained below.
- **Metering** – try to find a “sweet middle” and set your shutter speed based on entire panorama. Take a couple of pictures and make sure that the images are not too overexposed or underexposed for the brightest and darkest parts of the scene.
- **Shoot in raw** – (optional) Lightroom Classic CC provides a raw pano.
- **White Balance** – set to “Sunny”, “Cloudy”, etc - not “Auto WB”.
- **Lens Focal Length** – wide-angle lenses below 24-28mm (full-frame) and 16-18mm (APSC) can have heavy distortion and vignetting issues that can make it difficult to properly align and stitch images. At the same time, allow wide enough vertical for frame-to-frame misalignment requiring cropping at top & bottom.
- **Set your lens to Manual Focus**

Steps

- **Take a Test Shot in “Aperture Priority” Mode**

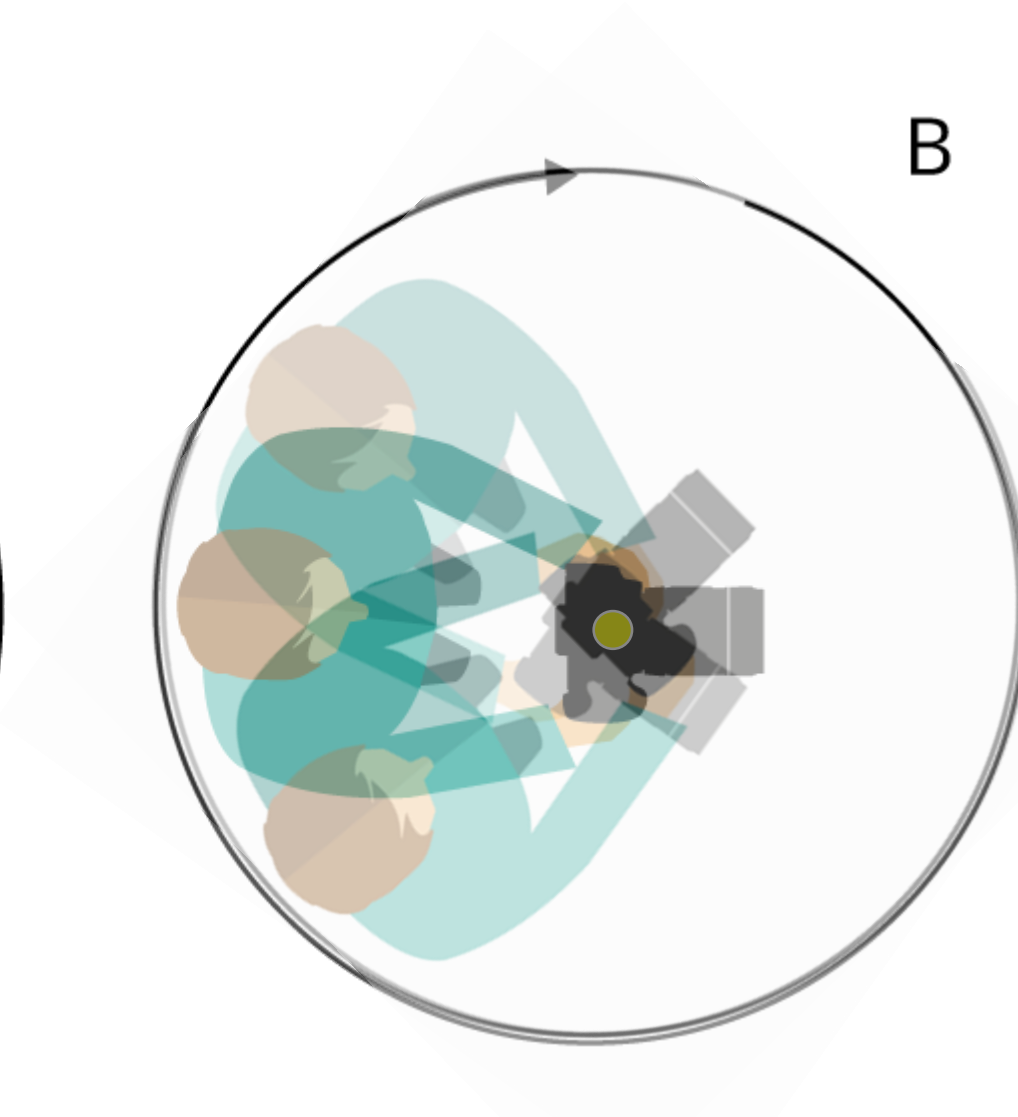
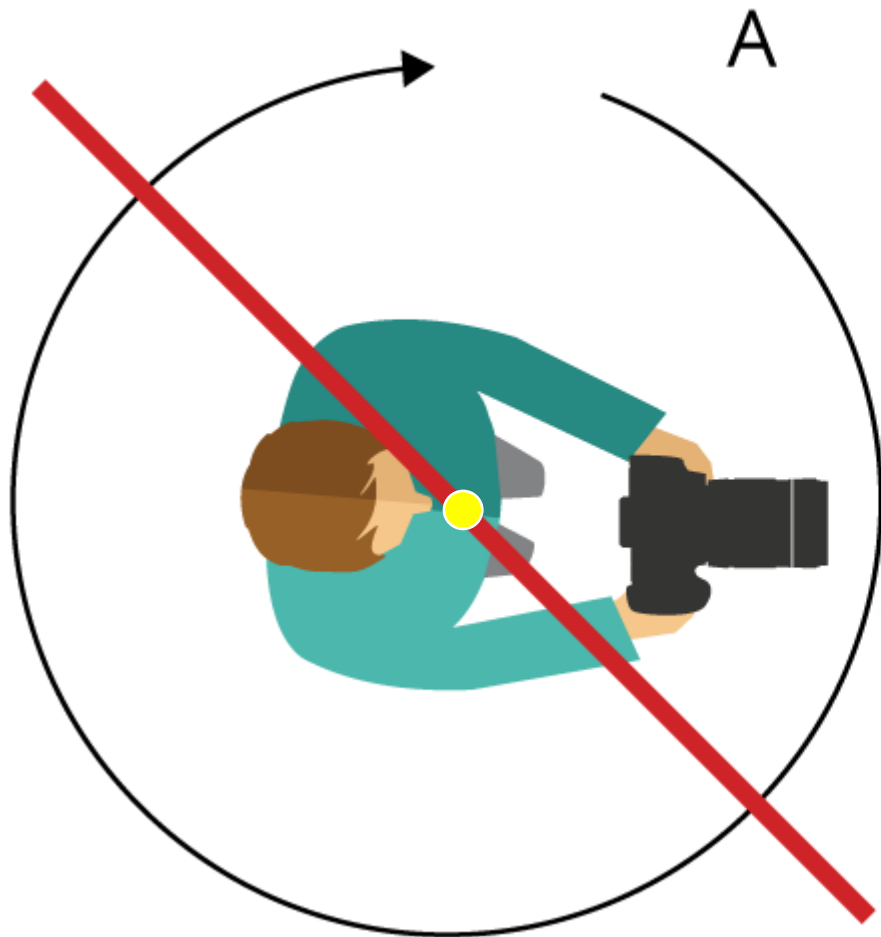
- First, to identify the correct exposure settings, switch to Aperture Priority mode, set the aperture to f/11, focus, then take a test shot of the brightest part of the scene.
- Check that the test shot has enough sharpness in the foreground and the background. If it doesn't, then increase your aperture value, e.g. to f/16, adjust focus, and take another test shot.
- Double-check that there are no blown highlights in your test image. If you do find blown highlights adjust shutter speed or ISO until you get a good test shot.

- **Select “Manual Mode”**

- Apply Aperture, Shutter Speed, and ISO settings
- Set White Balance to fixed value of “Sunny”, “Cloudy”, etc.

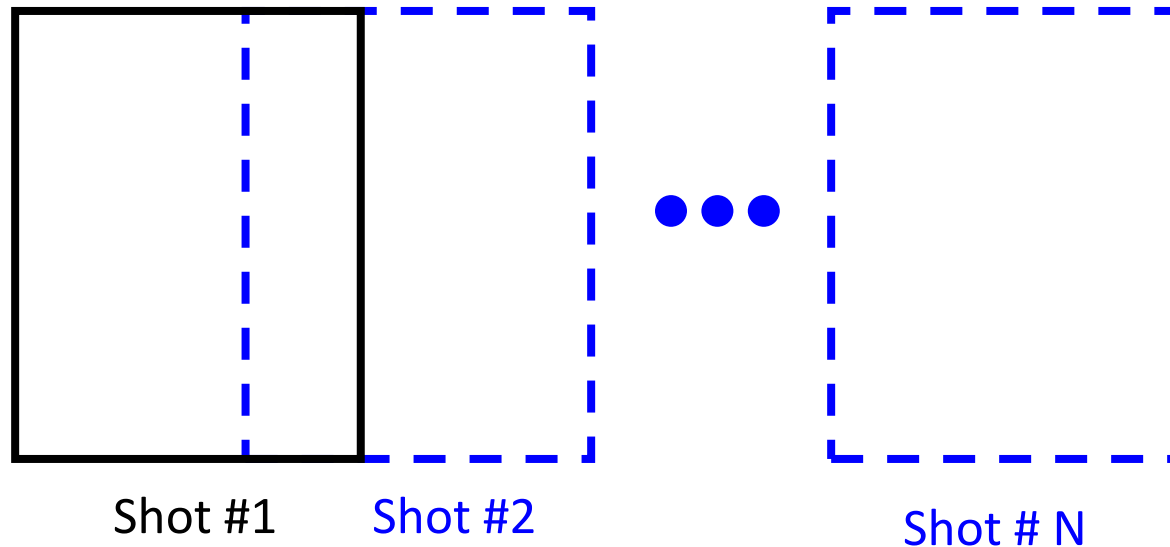
- **Make sure that the focus is on manual and set properly.**

Rotate About Camera, Not Body



Steps, con't

- Start from the left side of the pano – keep camera level.
- Take a shot and remember a spot in the image that is going to be the left edge of the 2nd image, providing for ~30% - 50% overlap.

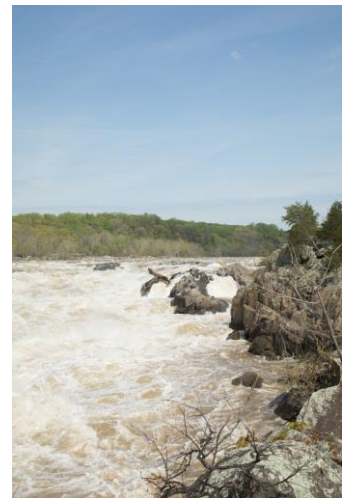
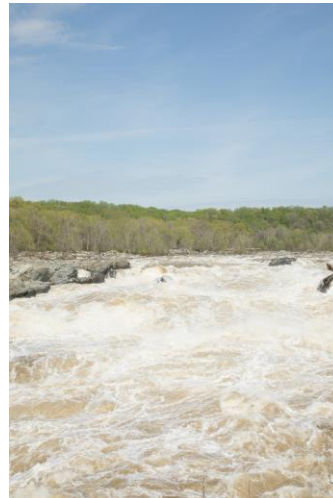
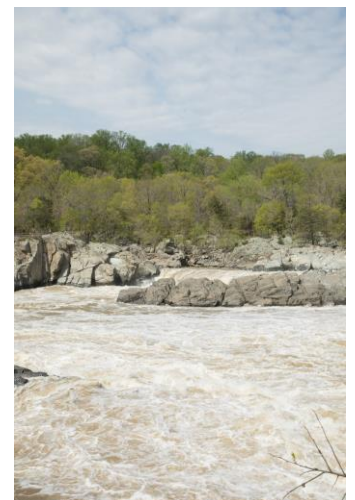
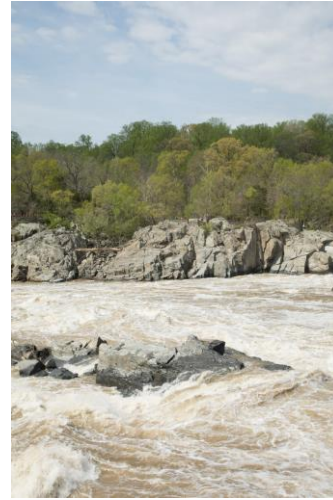


- Rotate camera to right and take 2nd shot, remembering a spot in the image that is going to be the left edge of the 3rd image ...

Example #3: Great Falls, Olmsted Island, MD

- Canon 5D Mark IV full-frame camera
- Canon 24-105mm f/4L lens at 43mm focal length
- **Handheld** – tried to keep it as level as possible
- Portrait orientation
- Manual Mode, f/20, 1/160 sec., ISO 400, WB: “Sunny”
- 7 shots, overlapped by ~30%
 - Group of people on left avoided

7 Overlapped Photos (Great Falls, MD)

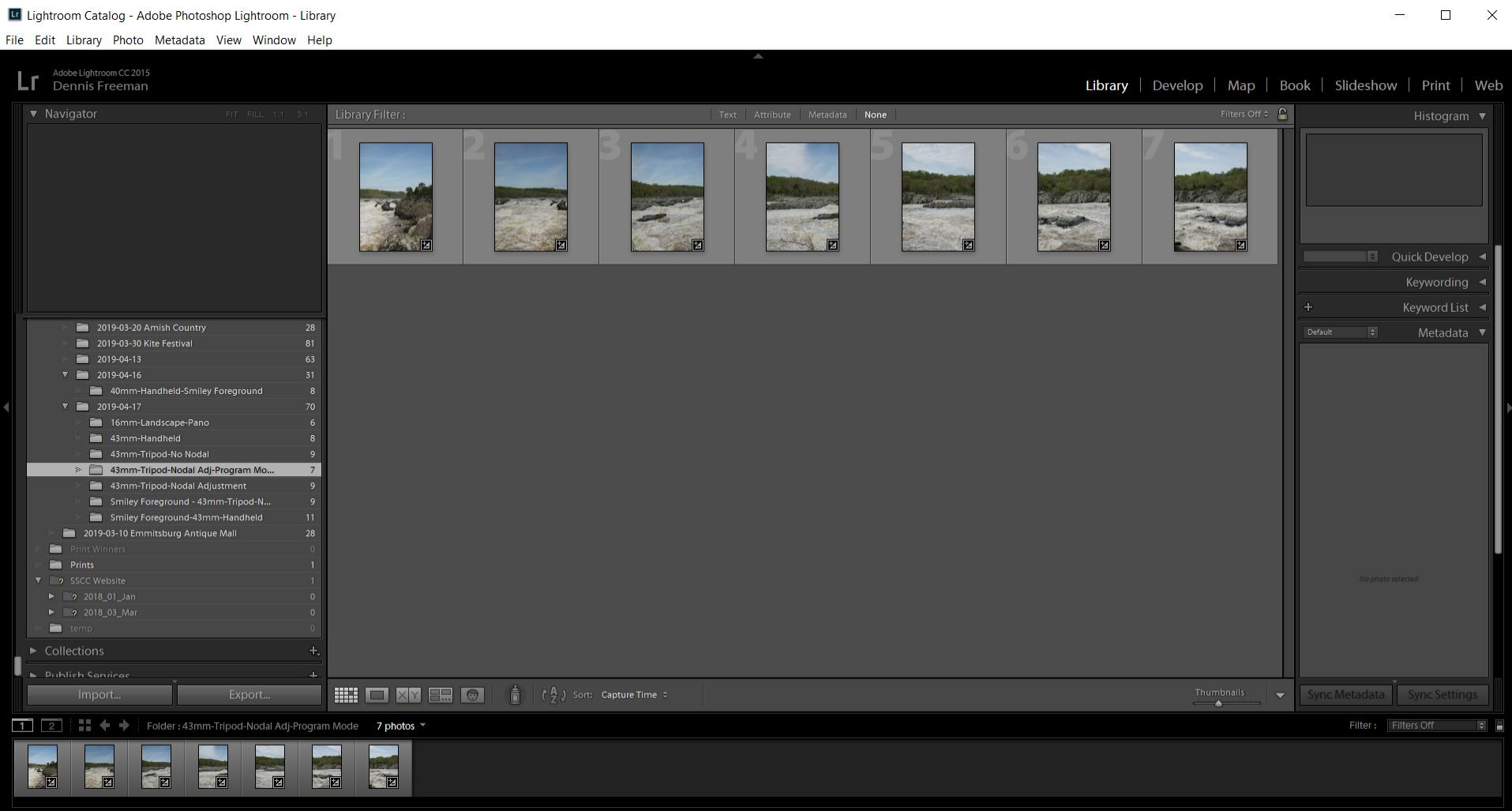


Apply Panorama Software

- **Photo Stitching Software to Create Panoramas**

- Hugin
- Microsoft Image Composite Editor
- PTGui Pro
- AutoPano Pro
- **Panorama** Stitcher
- iFoto Stitcher
- Adobe Lightroom Classic CC
- Adobe Photoshop CC
- Lightroom Classic
- Me: **Lightroom Classic CC:**
 - In image folder select all images to be used in pano (all will turn light gray when selected)
 - Select **Photo > Photo Merge > Panorama**
 - Select a projection.
 - After preview is displayed, click on “Merge”

Open Image Folder



Select All (click on #1, Shift-click on #7): They turn light gray.

Lr Lightroom Catalog - Adobe Photoshop Lightroom - Library

File Edit Library Photo Metadata View Window Help

The screenshot displays the Adobe Photoshop Lightroom Library grid. The interface includes a top menu bar with 'File', 'Edit', 'Library', 'Photo', 'Metadata', 'View', 'Window', and 'Help'. Below the menu is a toolbar with icons for various functions. The main grid shows 7 photos, numbered 1 through 7. Photos 1 through 7 are all selected, indicated by a light gray background. The photo on the left is a landscape with a river and rocks. The photo on the right is a close-up of a river with rocks. The bottom status bar shows 'Folder: 43mm-Tripod-Nodal Adj-Program Mode' and '7 photos / 7 selected / 1K3A4637.CR2'. The right sidebar contains a histogram and various panels for metadata and settings.

Adobe Lightroom CC 2015
Dennis Freeman

Library | Develop | Map | Book | Slideshow | Print | Web

Navigator FIT FILL 1:1 3:1

Library Filters: Text Attribute Metadata None Filters Off

2019-03-20 Amish Country 28
2019-03-30 Kite Festival 81
2019-04-13 63
2019-04-16 31
40mm-Handheld-Smiley Foreground 8
2019-04-17 70
16mm-Landscape-Pano 6
43mm-Handheld 8
43mm-Tripod-No Nodal 9
43mm-Tripod-Nodal Adj-Program Mo... 7
43mm-Tripod-Nodal Adjustment 9
Smiley Foreground - 43mm-Tripod-N... 9
Smiley Foreground-43mm-Handheld 11
2019-03-10 Emmitsburg Antique Mall 28
Print Winners 0
Prints 1
SSCC Website 1
2018_01_Jan 0
2018_03_Mar 0
temp 0

Collections +
Publish Services +

Import... Export...

Sort: Capture Time

Thumbnails

Sync Metadata Sync Settings

Filter: Filters Off

1 2 3 4 5 6 7

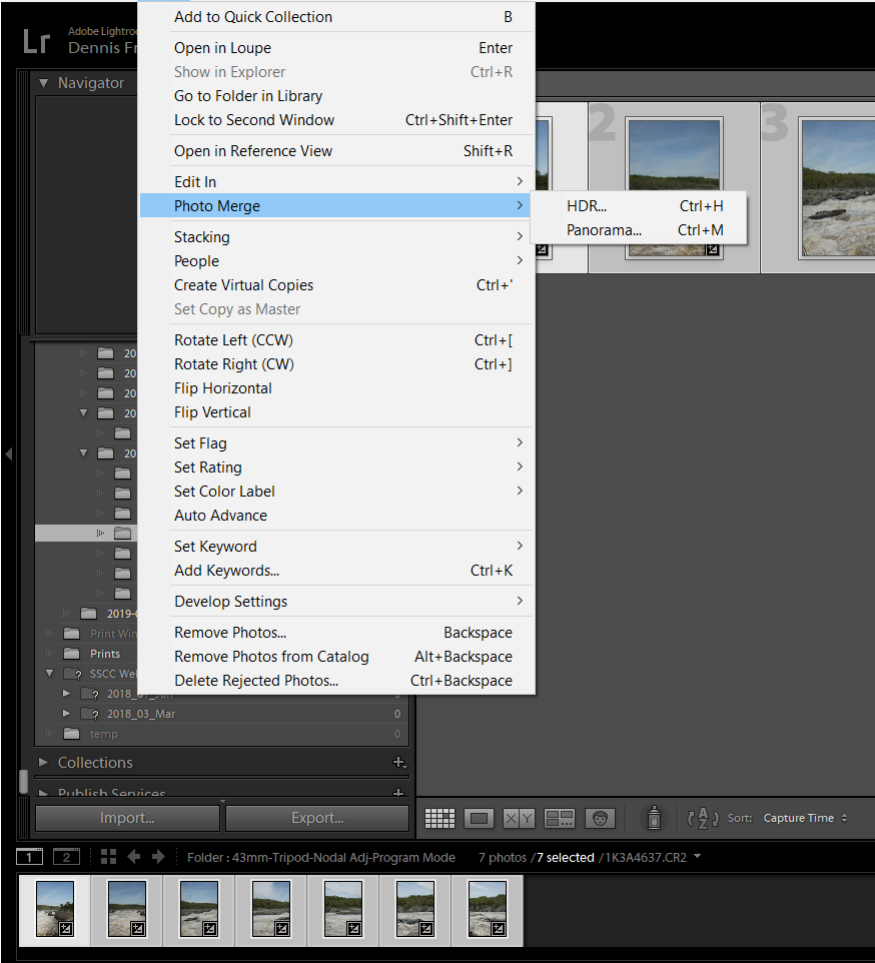
Folder: 43mm-Tripod-Nodal Adj-Program Mode 7 photos / 7 selected / 1K3A4637.CR2

ISO 100 43 mm 1/9.0 1/250 sec
7 0 0 0 0 0

Custom Quick Develop
Keywording
Keyword List
Default Metadata
Preset None
File Name < mixed >
Sidecar Files JPG
Copy Name
Folder 43mm-Tripod-N...
Metadata Status Has been changed
Title
Caption
Copyright
Copyright Status Unknown
Creator DENNIS FREEMAN
Sublocation
Rating
Label
Capture Time
Capture Date April 17, 2019
Dimensions 4480 x 6720

Lightroom Catalog - Adobe Photoshop Lightroom - Library

File Edit Library **Photo** Metadata View Window Help

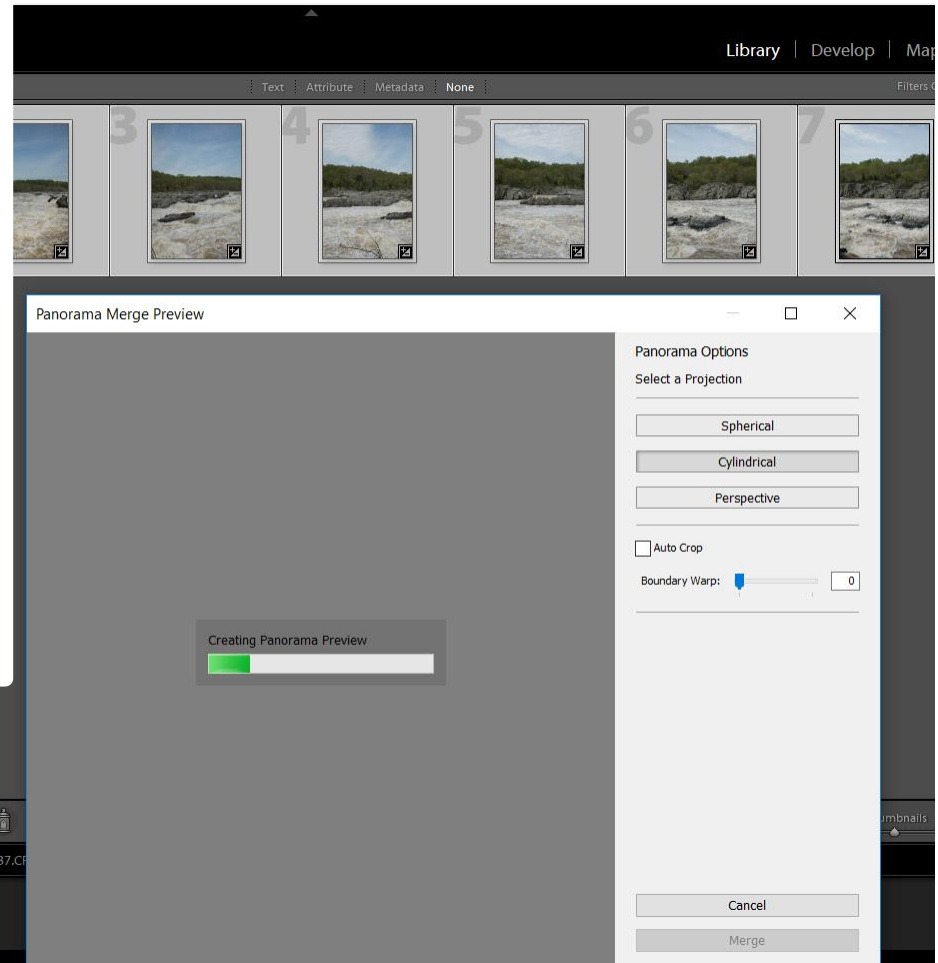


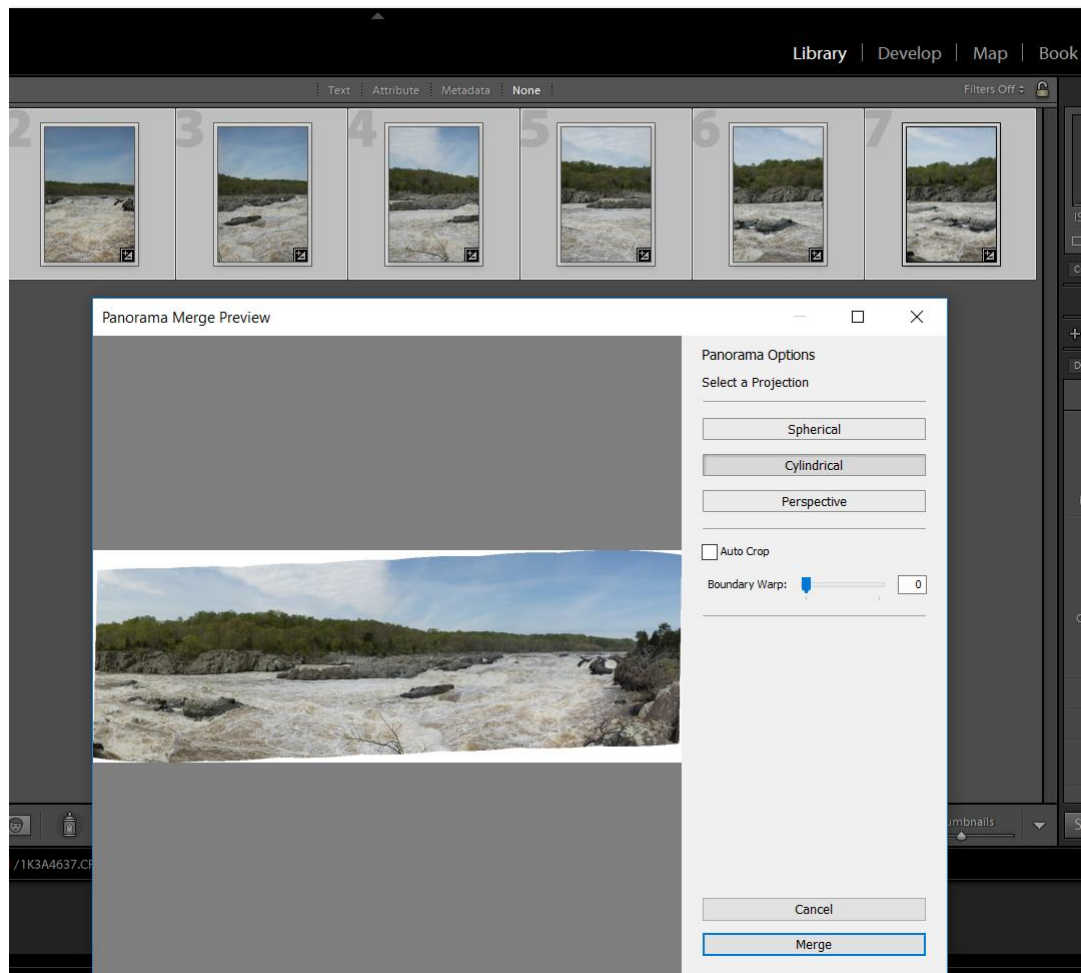
Click on

> Photo > Photo Merge > Panorama

Select “Cylindrical” or “Perspective”

Wait for preview ...





Click on Merge if it looks good

Lightroom: Select a Projection

- **Spherical:** Aligns and transforms the images as if they were mapped to the inside of a sphere. This projection mode is great for really wide or multirow panoramas.
- **Perspective:** Projects the panorama as if it were mapped to a flat surface. Since this mode **keeps straight lines straight**, it is great for architectural photography. Really wide panoramas may not work well due to excessive distortion near the edges of the resulting panorama.
- **Cylindrical:** Projects the panorama as if it were mapped to the inside of a cylinder. This projection mode works really well for wide panoramas, but it also keeps vertical lines straight. **(Selected in example)**

Handheld Pano

Annoying
People



Post-processing: crop, clarity, vibrance



Example #2: Great Falls, Olmsted Island, MD

- Canon 5D Mark IV full-frame camera
- Canon 24-105mm f/4L lens at 43mm focal length
- **Handheld** – tried to keep it as level as possible
- Portrait orientation
- Manual Mode, f/20, 1/160 sec., ISO 400, WB: “Sunny”
- **My buddy “Smiley” joined for his portrait.**
- 7 shots, overlapped by ~30%
 - Group of people on left avoided

Handheld – Object in foreground

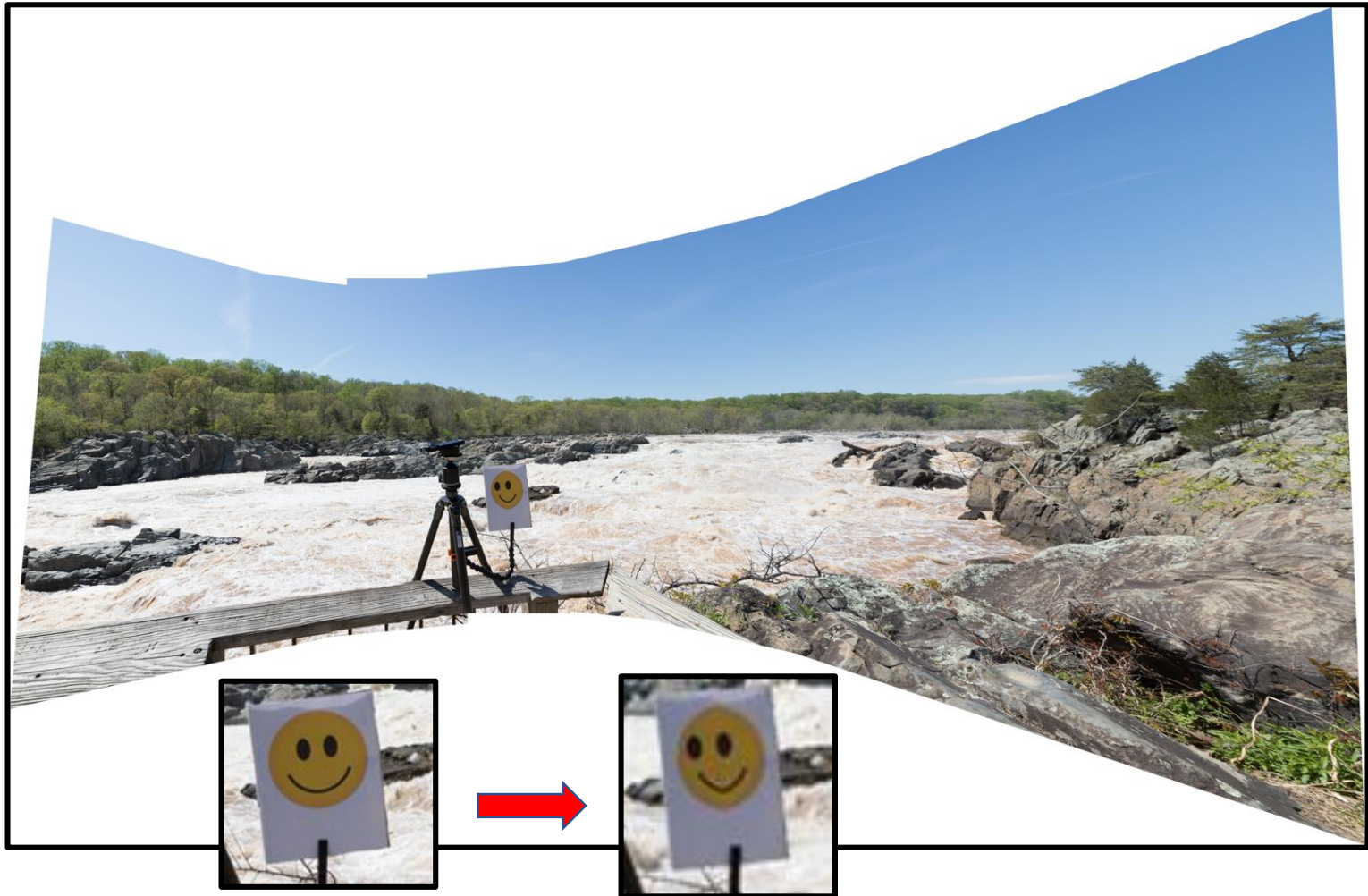
Foreground Smiley OK, but wooden bannister warped.



Lightroom – Pano with **“Cylindrical”** Projection

Handheld – Object in foreground

Straightens wooden bannister, but Smiley is upset.

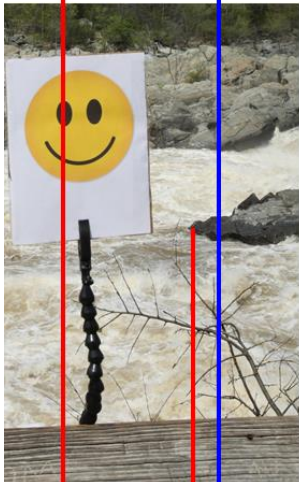


Lightroom – Pano with **“Perspective”** Projection

Why is Smiley messed up?



- Camera parallax during rotation has moved foreground objects against their backgrounds between individual images.
- Smiley is shifted closer to rock in 2nd image.
- Stitching software having trouble identifying tie points between images.



- Shifting and warping isn't right.
- Some subjects aren't the best when doing handheld panoramas. Try avoiding foreground objects. The following example does this:

Panorama at Lake Artemesia



You needn't go far for a handheld panorama subject. Here is a ten image panorama from Lake Artemesia in College Park - actually Berwyn Heights. ([Lake Artemesia Map](#)) Note that there aren't any foreground objects that span multiple images. Just a bush in the right image, and a bit of a bush in the left image. They aren't involved in the overlap stitching, and this scene would be fine with just a handheld camera.

How to Fix Parallax



- If you really want to be able to do panoramas without cherry picking your venue to avoid foreground objects then you have to bite the bullet and remove parallax.
- Gearing up can solve this. The details are covered in another presentation.

