

How to Create Panoramic Images with a Nodal Slide

Dennis Freeman – 4/25/2019

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.:



Camera Equipment, con't

- **Tripod** –highly recommended for best results. The head needs to be able to pan from left to right with ease.
- Arrange camera in Portrait orientation (requires camera **L-bracket** when using tripod).



- **Cable Release** – optional, but recommended for capturing shake-free images. 2 sec shutter delay is good too.
- **Panoramic Setup** – a full panoramic kit is ideal for best results, especially when there are foreground objects in the panoramic image.

Panoramic Kit

<https://www.bhphotovideo.com/explora/photography/tips-and-solutions/tools-of-the-trade-for-panoramic-photographers>



Ballhead



Tripod

Panoramic Setup

Nodal Ninja, Acratech, Manfrotto, Really Right Stuff.

Nodal Slide



Panning Clamp



<https://shop.nodalninja.com/>

<https://www.acratech.net/nodal-slide-by-acratech-for-accurate-panorama-photography/>

<http://www.reallyrightstuff.com/Single-Row-Pano-Kits>

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.
- **Set your lens to Manual Focus**
- **When using tripod, turn lens Image Stabilization off.**

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”**

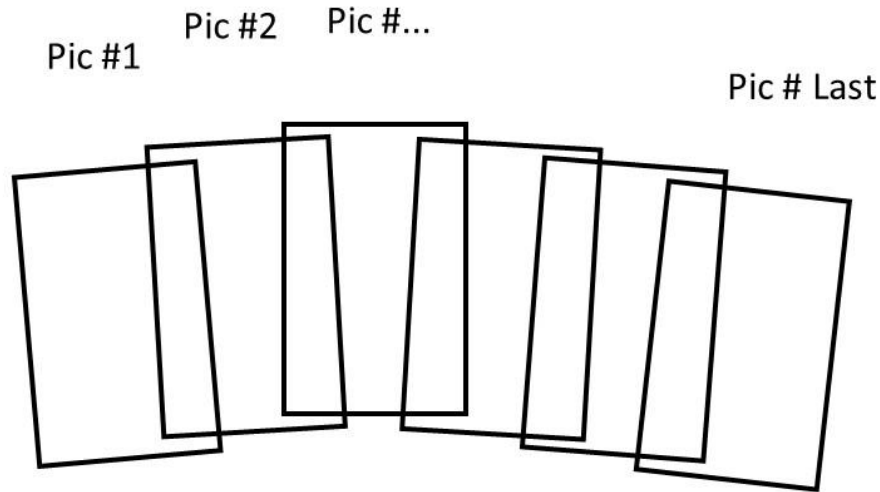
- Apply Aperture, Shutter Speed, and ISO settings
- Set White Balance to fixed value of “Sunny”, “Cloudy”, etc.

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

- Image Stabilization is off when using tripod.

- **Cable Release plugged in to camera or shutter release delayed (e.g. 2 sec)**

You Need a Level Panning Head

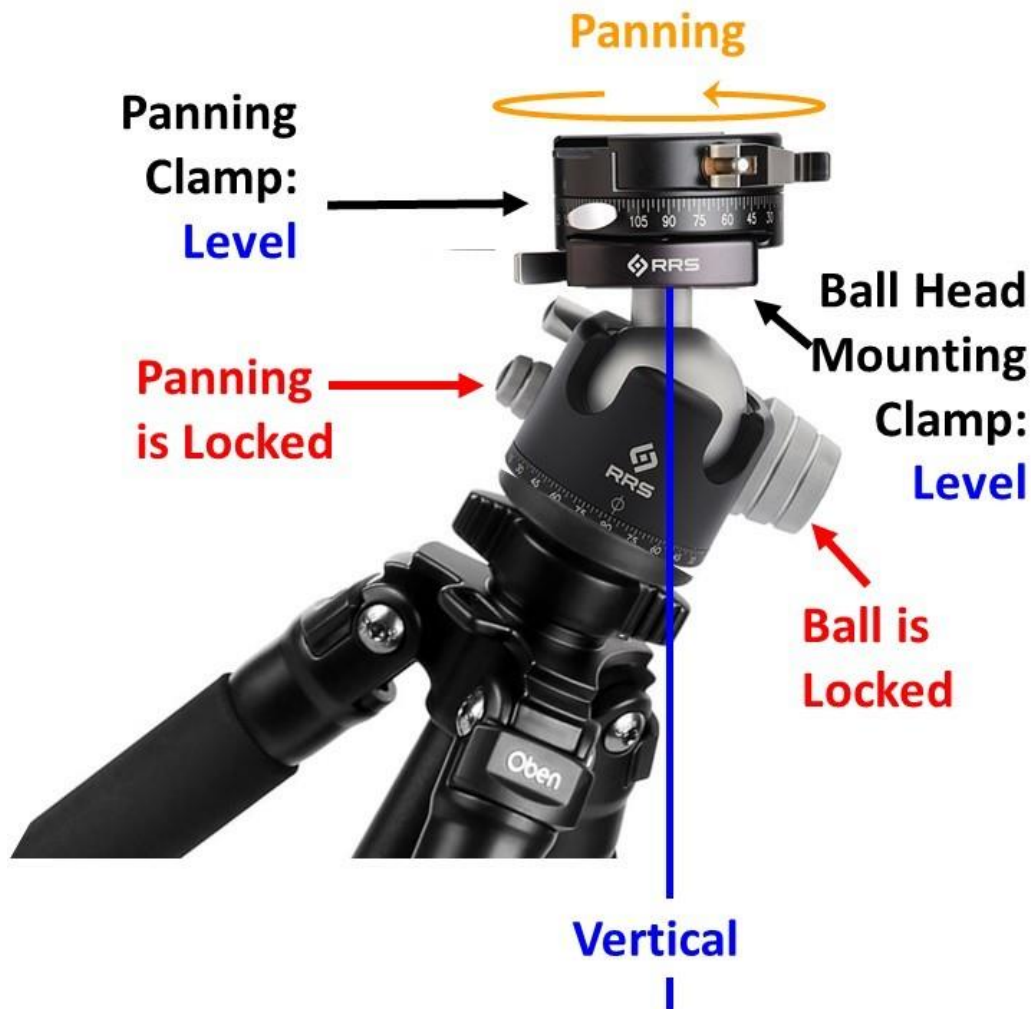


Unlevel tripod
and ball head
causes stitching
problems.



Add the Panning
Clamp to solve ...

Panning Clamp on Top – Ball Head Locked Completely



Deliberate exaggeration, but don't need level tripod.

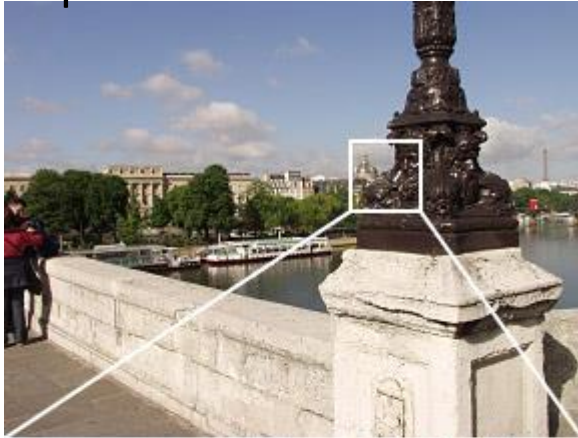
Just level the mounting clamp on the ball head (using bubble or separate level), lock everything down.

Attach Panning Clamp.

Next set is Nodal Slide – but why?

When Rotate about Camera Body

Shoot image for left side of pano

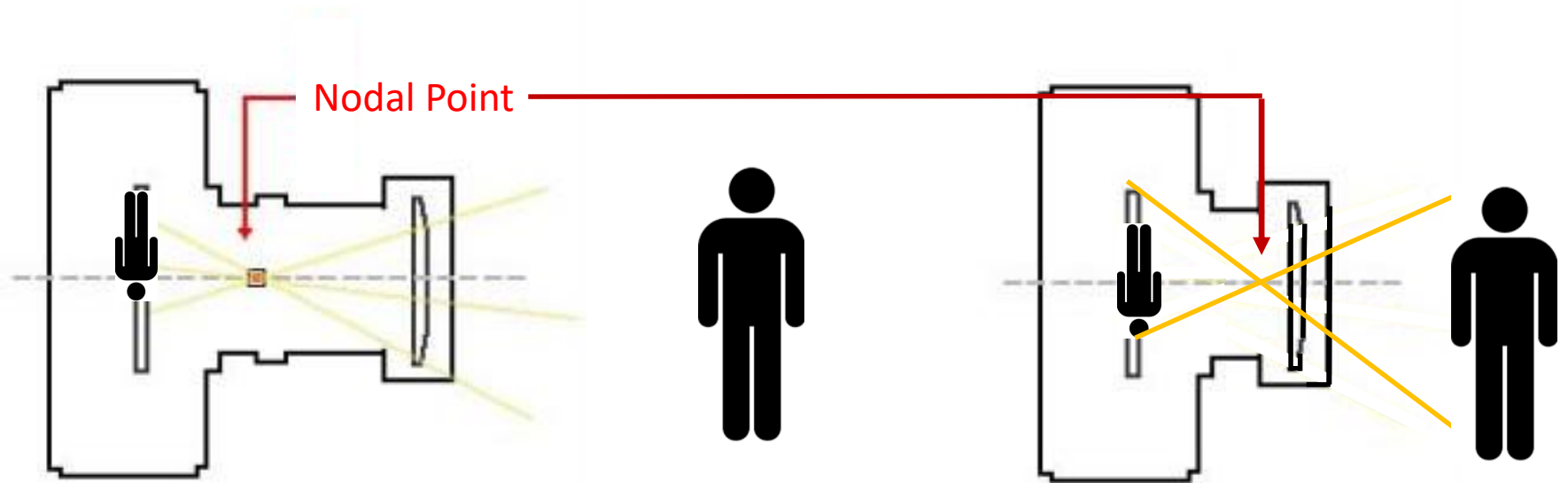


Shoot image for right side of pano



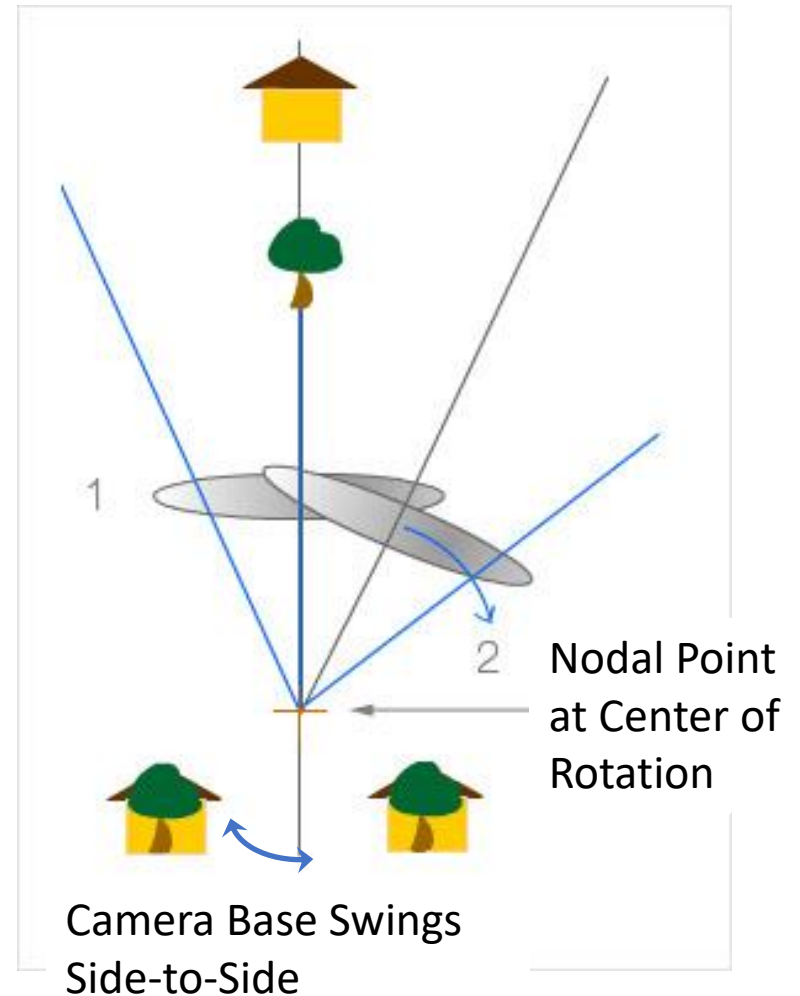
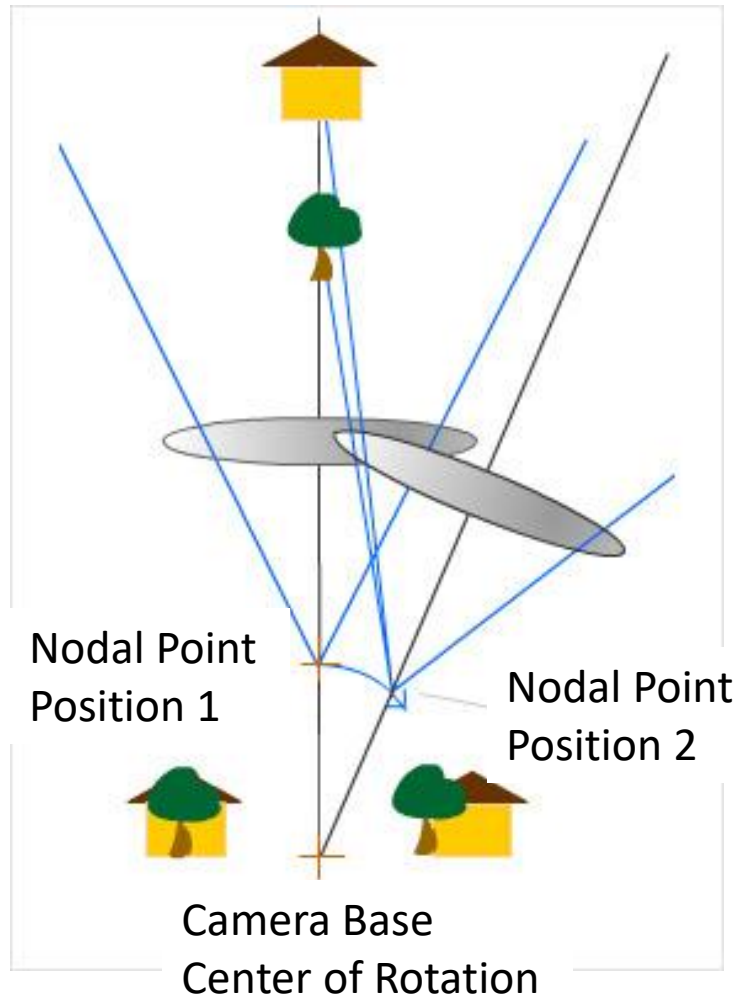
Foreground statue has moved to the left against the background

Nodal Point is Offset from Camera



Nodal Point is the optical center of the lens. It can move with focal length changes. It needs to be the center of rotation too.

Removing Parallax



Rotate Camera about Nodal Point



No change in foreground/background alignment

Compare Pano Stitching



Careless rotation yields alignment issues (or failure of program)

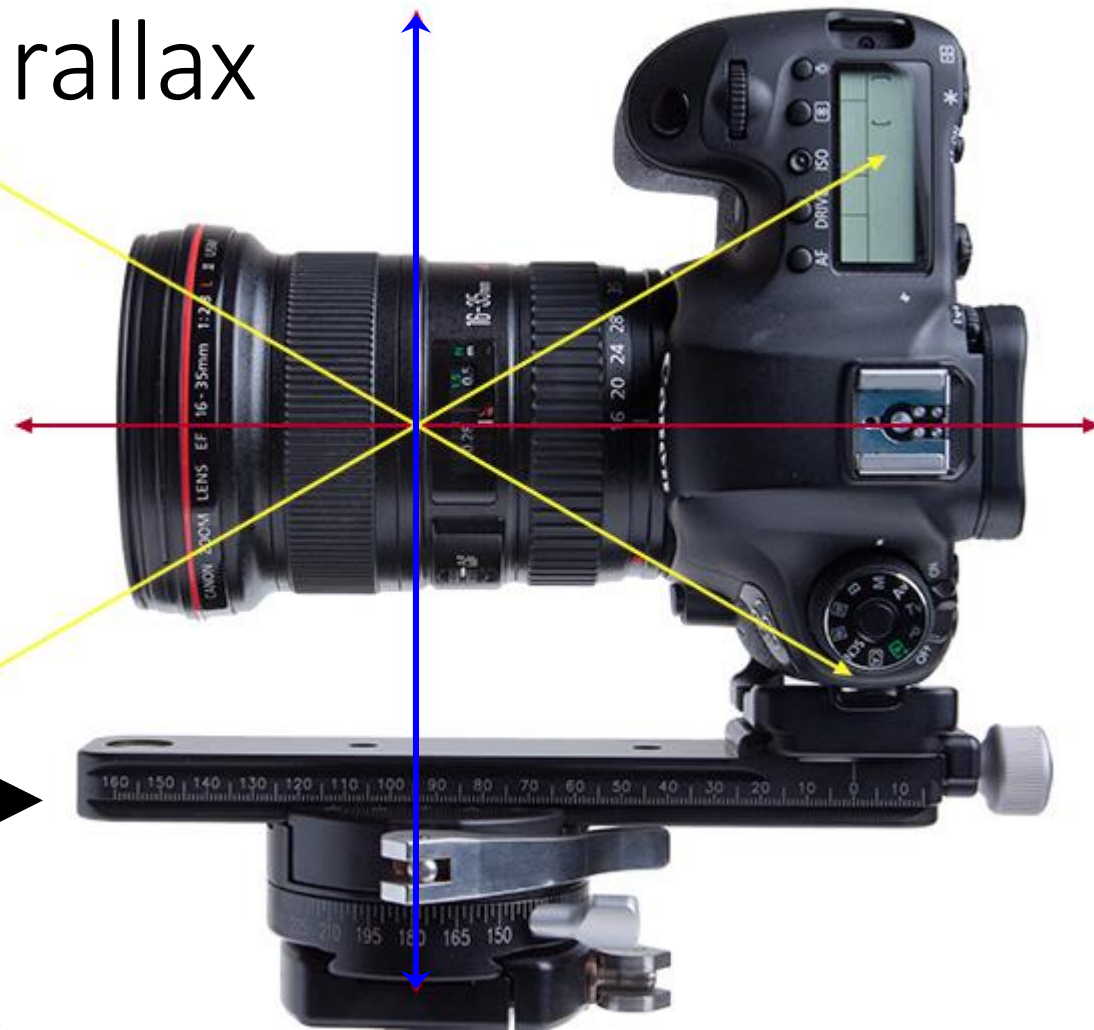


Rotation about nodal point provides consistent image feature positions and success.

Eliminating Parallax

Tripod topped by Ball Head.
Ball Head topped by
Mounting Clamp.
Mounting Clamp topped by
Panning Clamp.
Panning Clamp topped by
Nodal Slide.

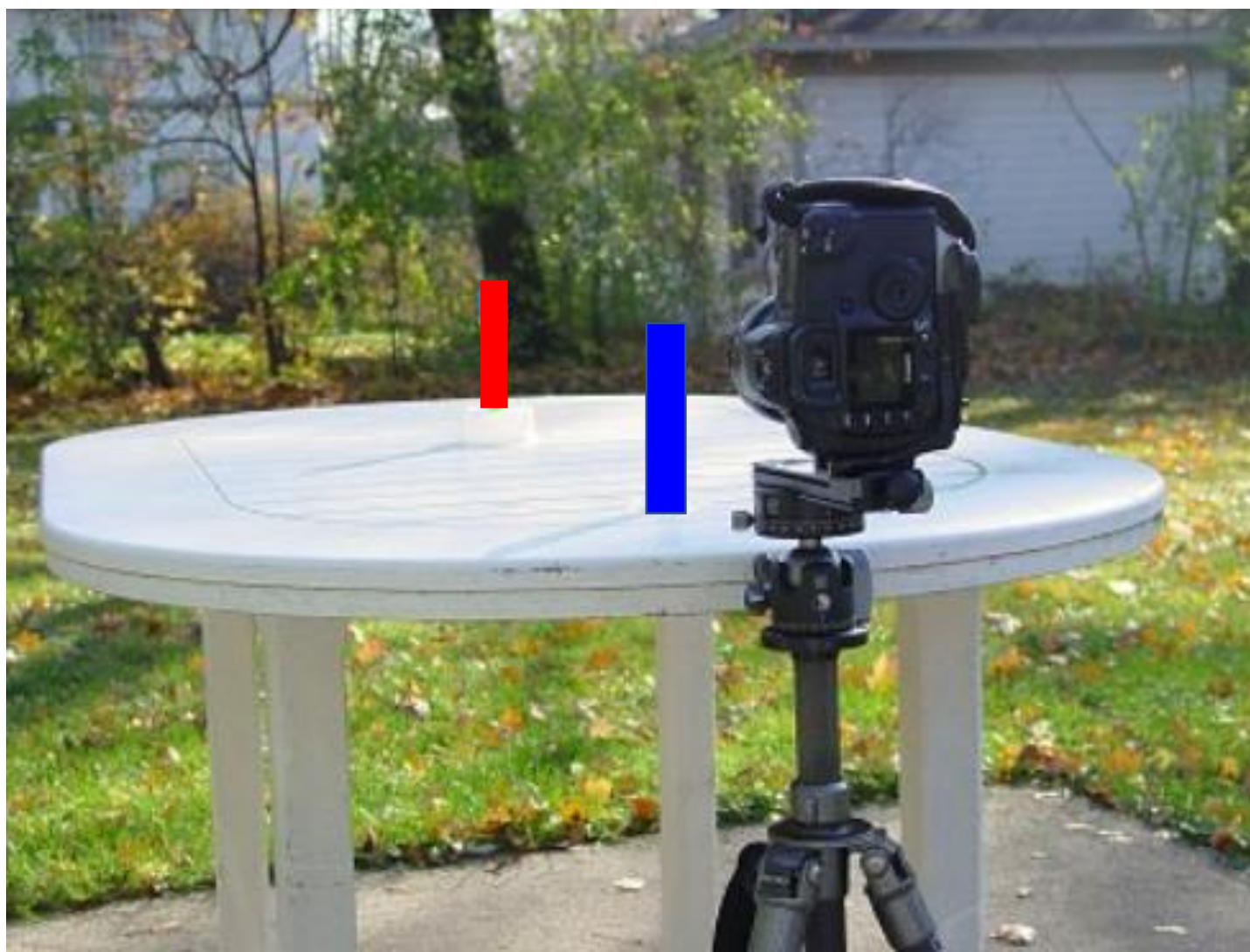
Use Ball Head to level the
Panning Clamp and Nodal
Slide. ➡



- Vertical **blue** line: axis of rotation
- Horizontal **red** line: lateral centerline of lens axis
- Diagonal **yellow** lines: light rays cross in the optical center of the lens

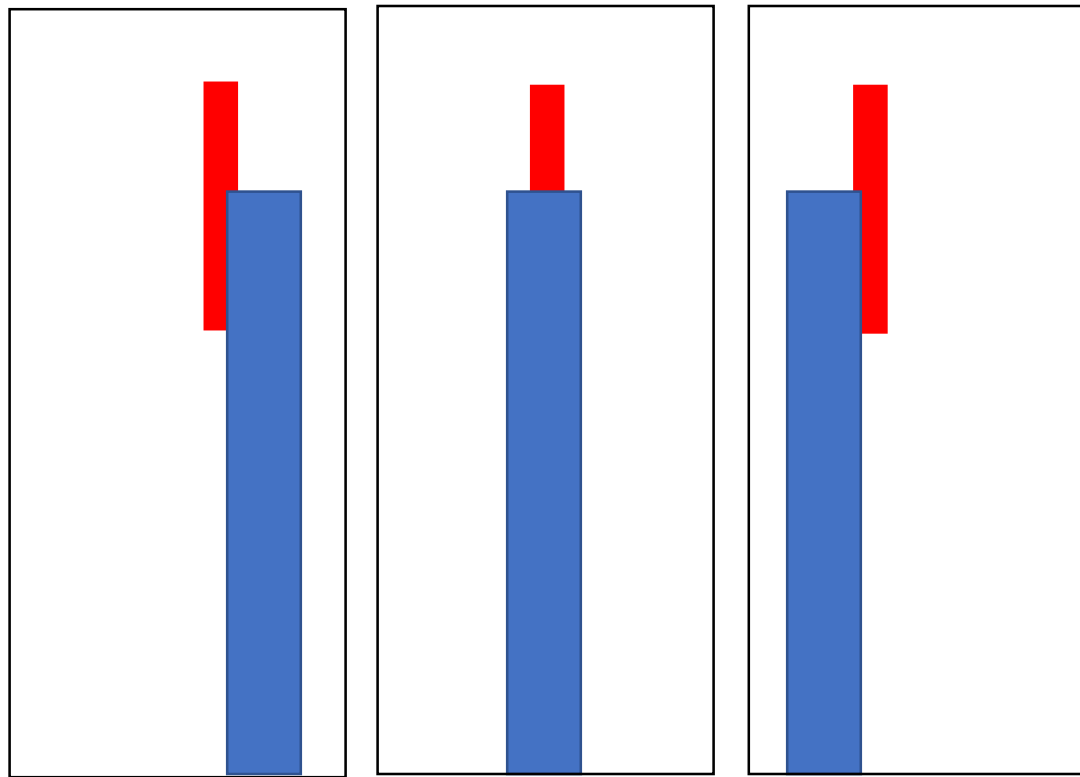
Finding the No-Parallax Setting

- Find two vertical objects; one near, one far. Position your equipment so that these objects line up in the viewfinder.
- Level your equipment.
- Mount and center your camera on the nodal slide.
- Select a focal length (you may wish to build a list for several focal lengths)
- Start out by positioning the approximate center of your lens over the axis of rotation.
- Now pan left.
- If the rear object appears to shift to the left, then you are ahead of the No-Parallax Point. Slide the nodal slide forward and try again.
- If the rear object appears to shift to the right, you are behind the No-Parallax Point. Slide the nodal slide back and try again.
- When the optical center of the lens is directly over the axis of rotation, the rear object will not appear to move relative to the front object.
- Record your results so that your setup can be re-created.
- See following images that illustrate:





Nodal Slide Too Far Back

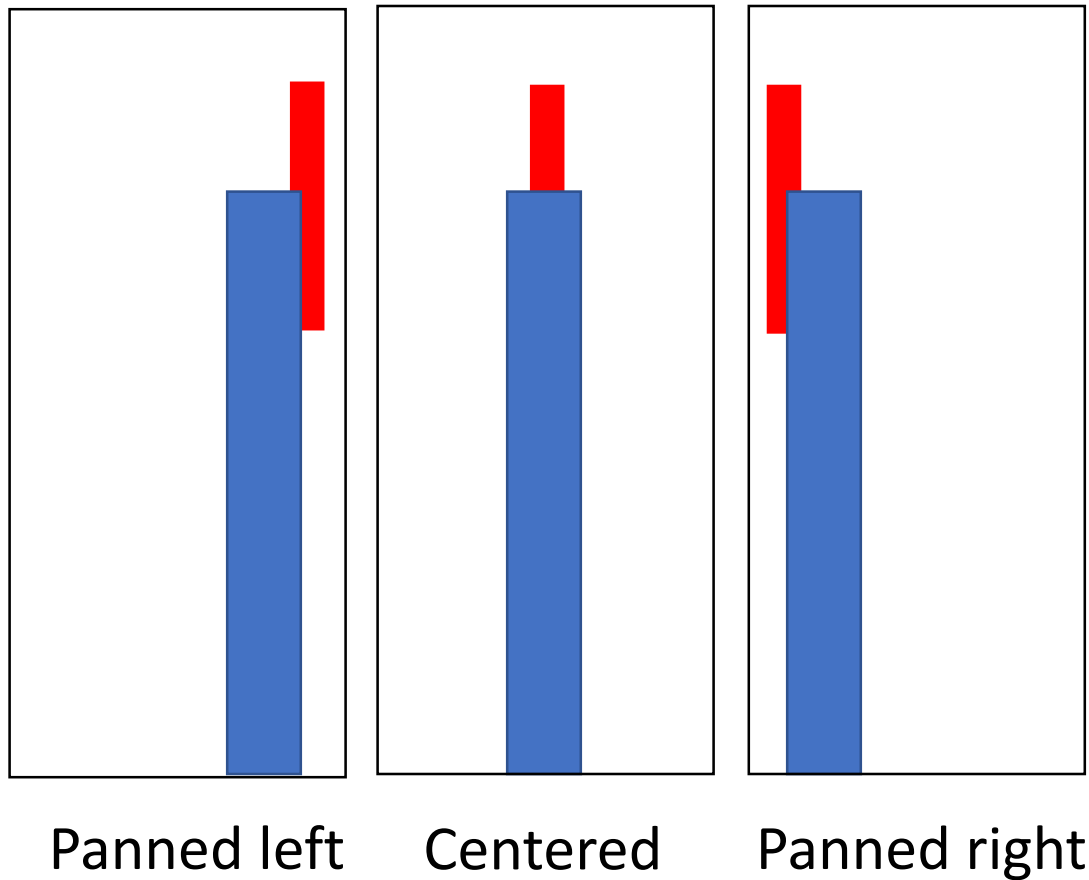


Panned left

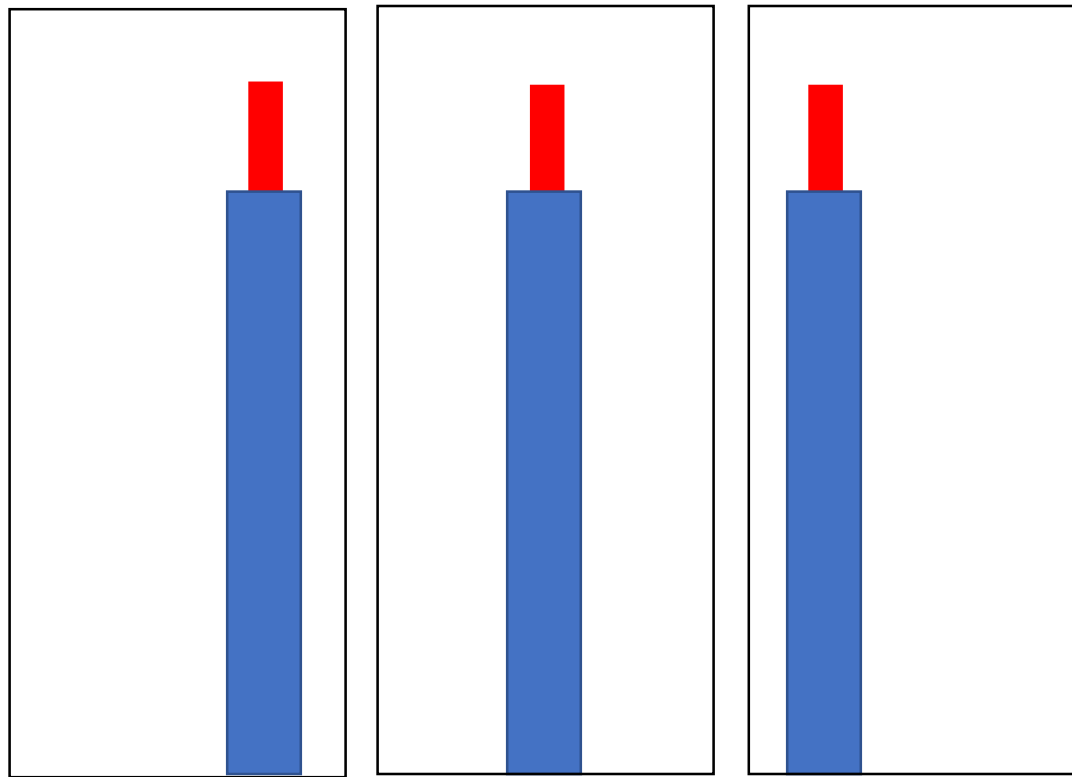
Centered

Panned right

Nodal Slide Too Far Forward



Nodal Slide Just Right



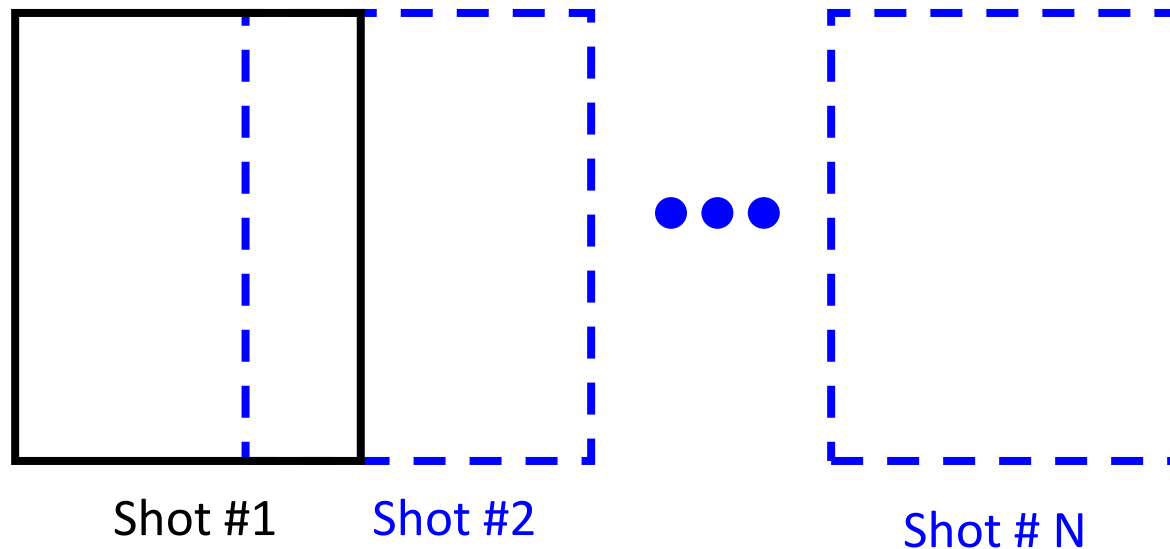
Panned left

Centered

Panned right

Steps, con't

- Start from the left side of the pano
- 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.

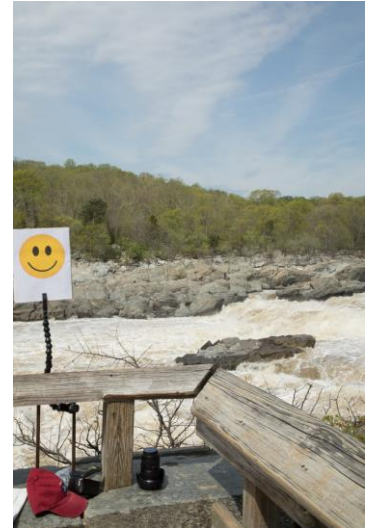


- Rotate camera to right and take 2nd shot, remembering a spot in the image that is going to be the left edge of the 3rd image ...

Example: Great Falls, Olmsted Island, MD

- Canon 5D Mark IV full-frame camera
- Canon 24-105mm f/4L lens at 43mm focal length
- Tripod, Ballhead, **Panning Clamp, and Nodal Slide**
- Portrait orientation
- Manual Mode, f/20, 1/160 sec., ISO 400, WB: “Sunny”
- **Calibrated the Nodal Slide to 102 mm to eliminate parallax at 43mm focal length**
- **Included “Smiley” Foreground object.**
- 7 shots, overlapped by ~30%
 - Group of people on left avoided
- Lightroom Panorama with Cylindrical & Perspective projections.
 - Cropped, Clarity, Vibrance Adjustments

7 Overlapped Images at Great Falls

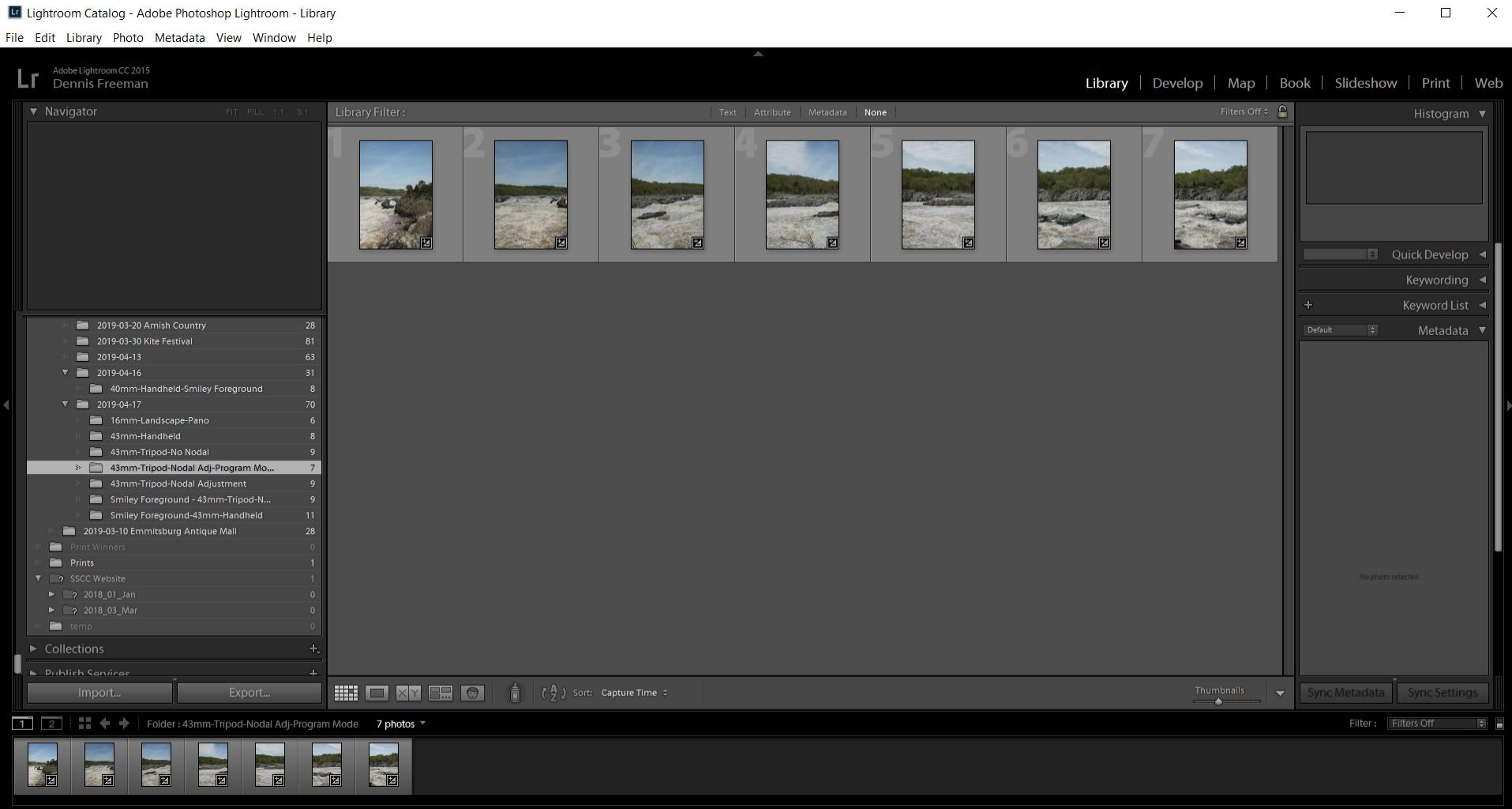


Apply Panorama Software

- **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 metadata fields.

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

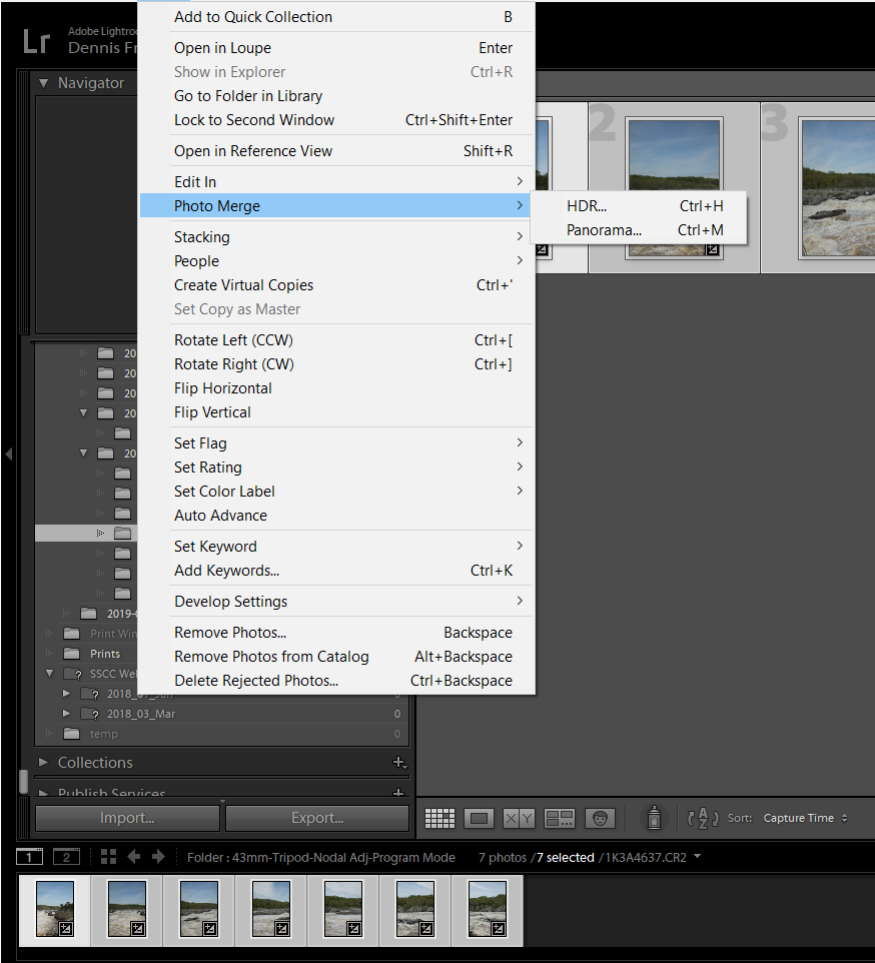
Filter: Filters Off

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

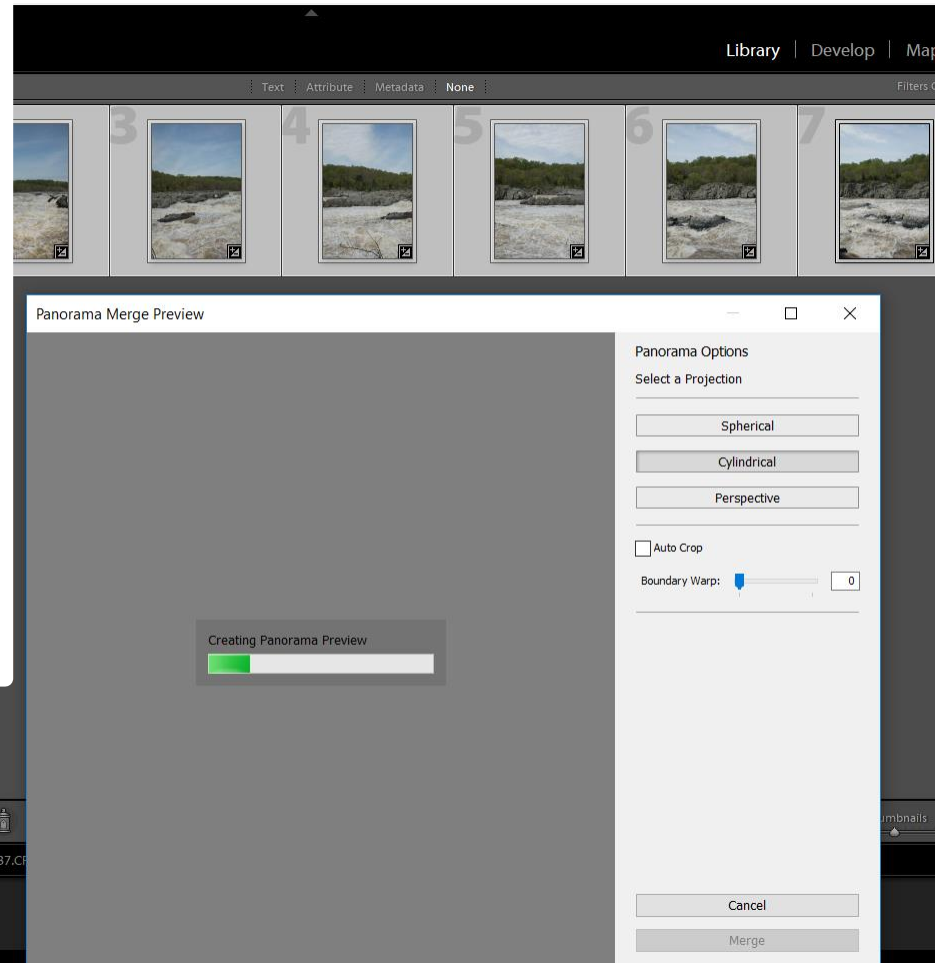


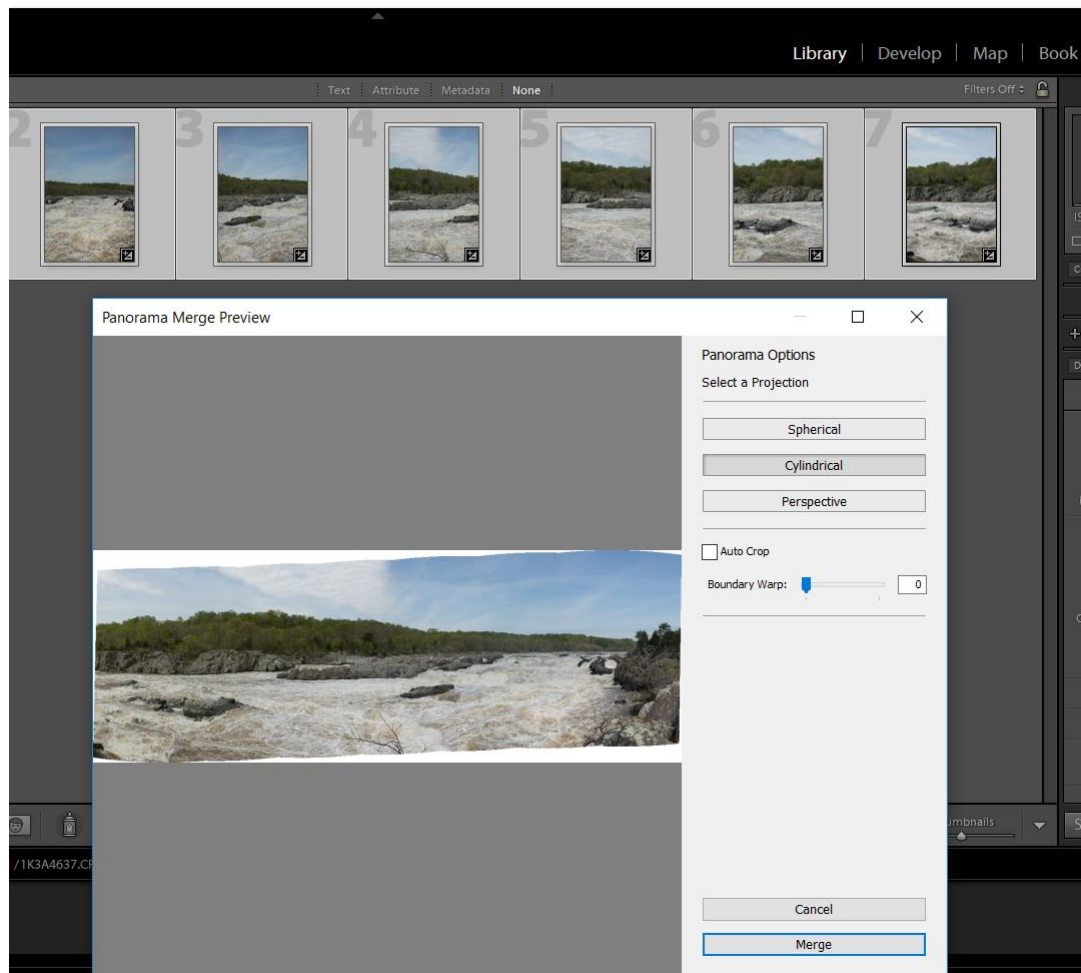
Click on

> Photo > Photo Merge > Panorama

Select “Cylindrical” or “Perspective”

Wait for preview ...

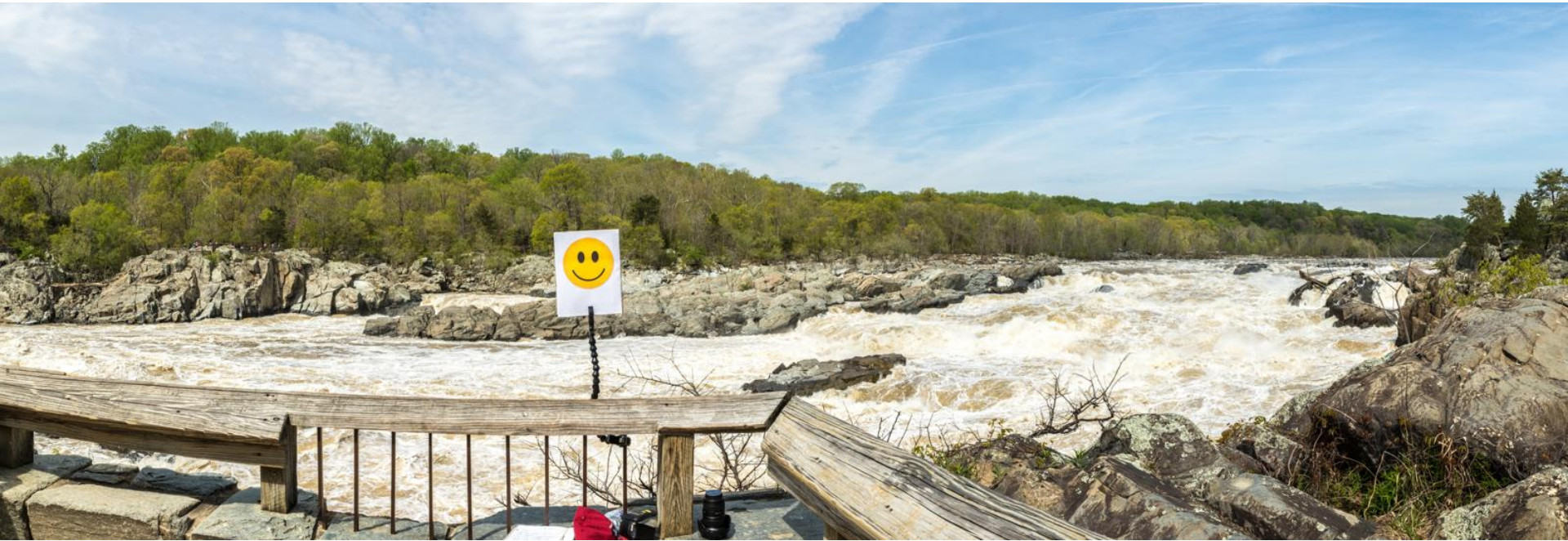




Click on Merge if it looks good

Object in foreground

Foreground Smiley Good, but wooden bannister warped.



Lightroom – Pano with “Cylindrical” Projection

The End

Foreground Smiley Good, Wooden Bannister Good.



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