Stitching for scanned images such as maps

In case of digital camera shots, the size of image is the same such as 6,000 (W) x 4,000 (H) pixels.

In general, if each image has different size, a large number of lenses are assigned by Hugin. Hugin stitching assumes to apply to same lens. Therefore, Hugin outputs overlapped images, not flattened.

Before loading image files, make sure if all the sizes of images are the same. If not, make them the same by image cropping.

In images obtained by scanning, a certain portion of the surface is wavy vertically as well as horizontally, not flat, unlike camera shots. This causes unsuccessful stitching result such as broken lines. Make the surface flat as much as possible by putting heavy rectangular board over map on scanner glass.

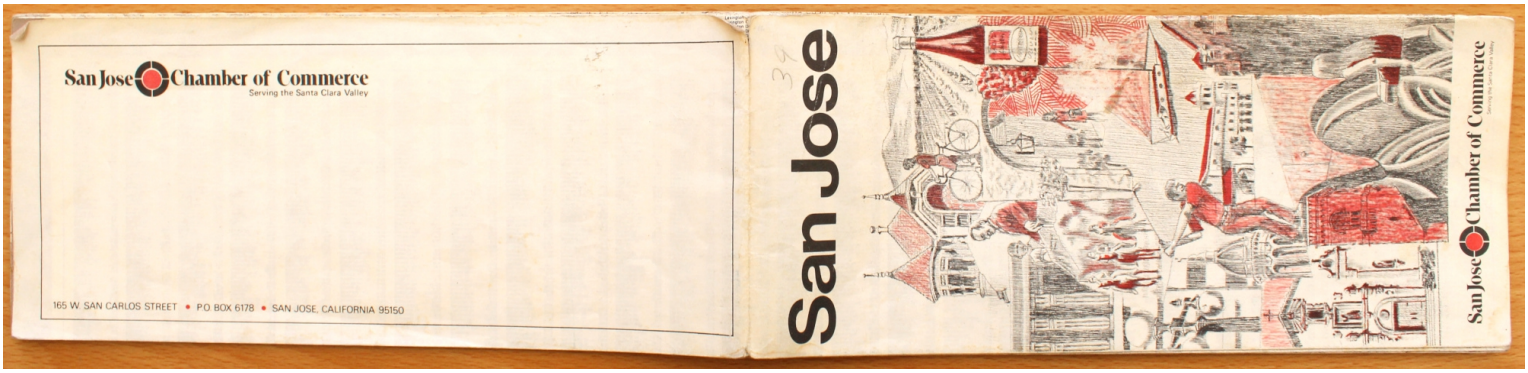
Map is normally folded multiple times to store. Therefore, creases are made and is normally stained.

Such creases can be used an alignment index when scanning.

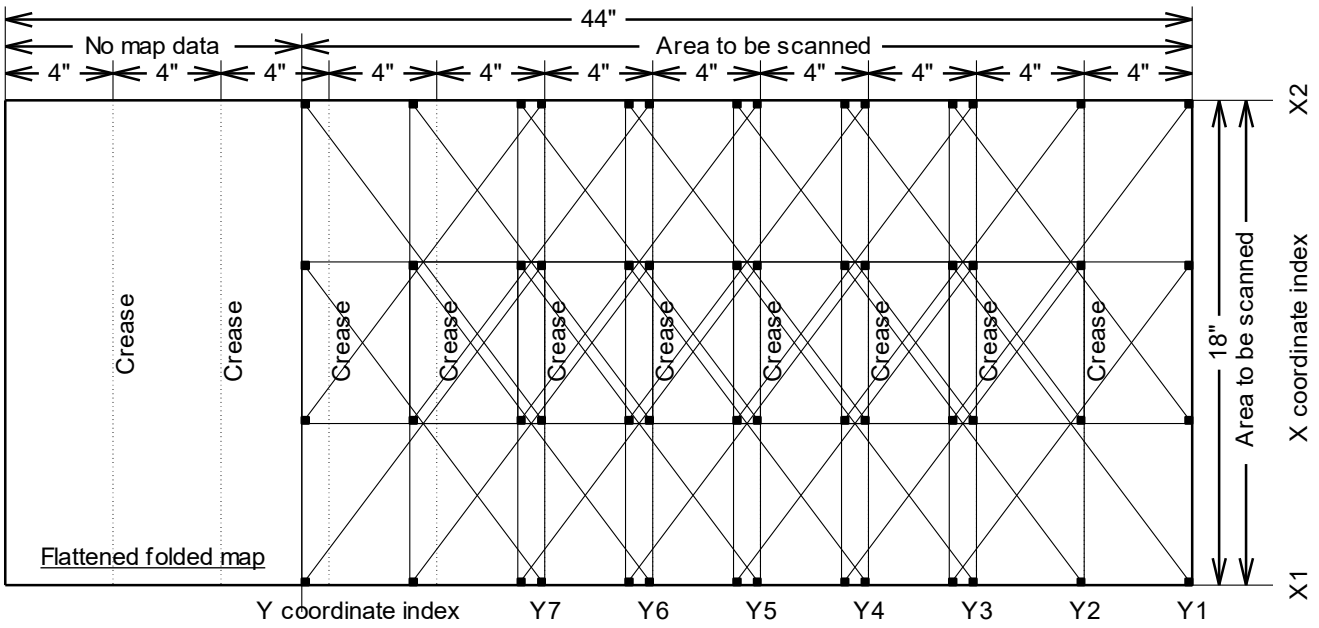
All the scanned images must be rotated to be holding right angle horizontally and vertically before stitching.

As an example, I applied a folded map of San Jose printed in 1975 that I bought at San Jose Community (not International at that time) Airport in 1976 in the middle of the way to visit Olivetti Corporation of America, Harrisburg, PA. having a µPD1205 development related meeting.

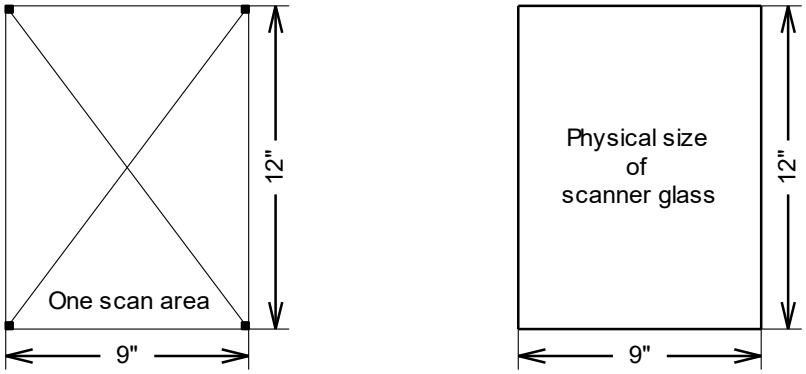
The sales price was 39 cents!



Example of scanning map



6 17	13 27
5 16	12 26
4 15	11 25
3 14	10 24
2 13	9 23
1 12	8 22
0 11	7 21
Stack# vs. (X,Y)	



Map – Scanner Relationship

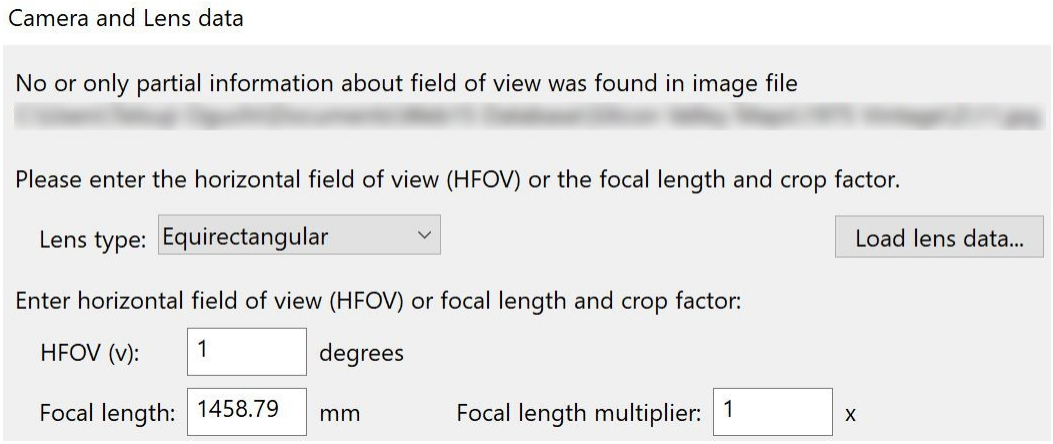
In this example,

A map is scanned 14 times and 14 image files, “11.jpg” through “17.jpg and ”21.jpg” through “27.jpg” (Notation of 27.jpg; X=2, Y=7; (X,Y).jpg etc.) are made keeping sufficient scan area overlay to ease Hugin stitcher processing.

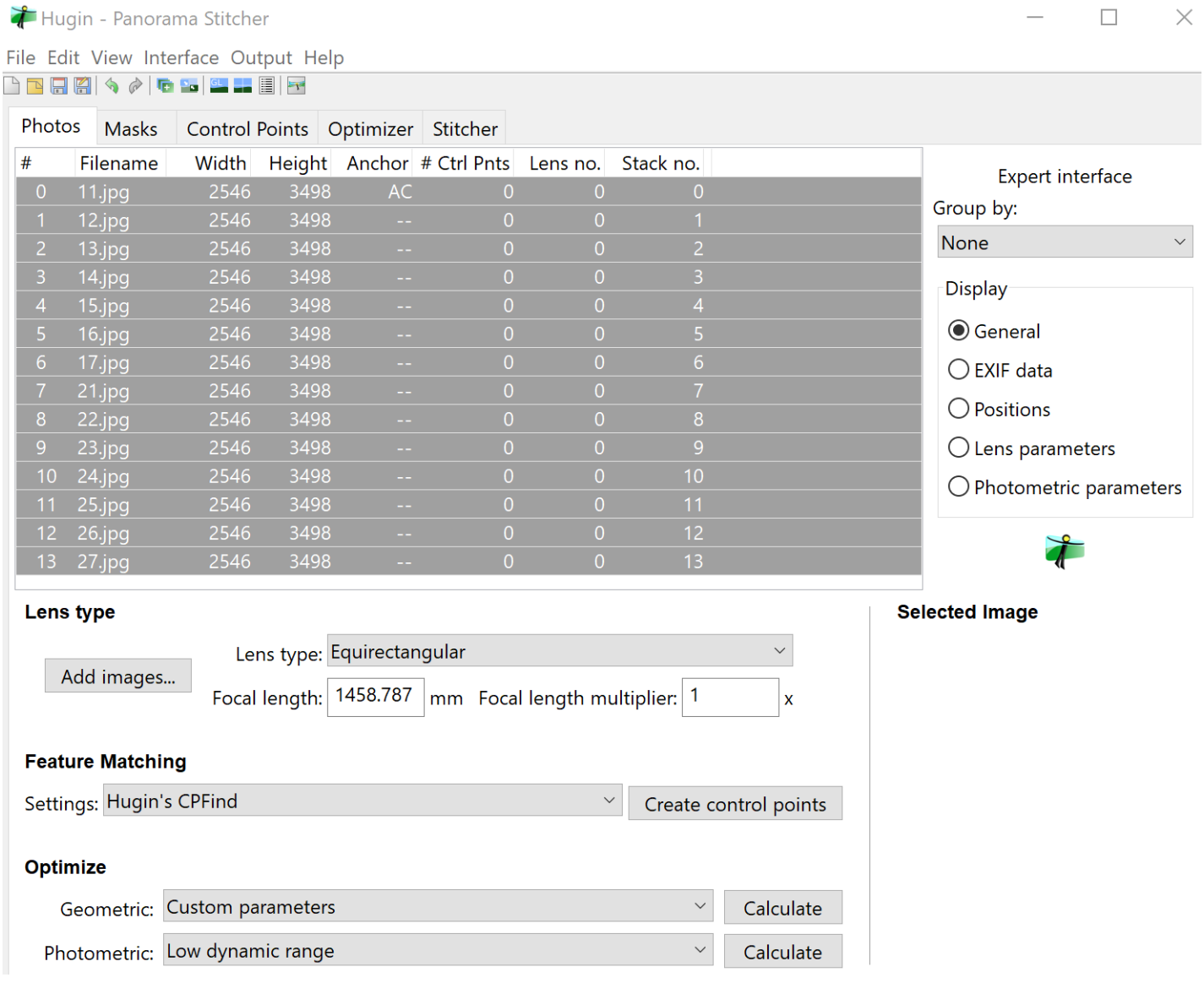
Sequence of Hugin Stitcher Handling

Run Hugin.

"Photos" tab
- Load 14 files scanner generated.
- Enter 1 to specify HFOV(v) (Horizontal Field Of View) and "Equirectangular" as "Lens type".
 (Digital camera images include the camera dependent HFOV(v) in image files but scanned images do not)



- Select all image files to apply the following settings.
  - Select "Equirectangilar" as "Lens type".
  - Select "Custom parameters" as "Geometric" of "Optimize". "Optimizer" tab appears beside "Photos" tab.



"Optimizer" tab
- Select all image files loaded.
- Click "Reset" and reset all.
- Check box of "Hfov (v)" of "Lens Parameters"

Photos | Masks | Control Points | Optimizer | Stitcher

Geometric optimizer

Any variables below which are marked [x] will be optimized.
Unmarked variables [ ] will act as references or anchors.

Optimize now!

Reset

☑ Only use control points between activated images.

☐ Ignore line control points

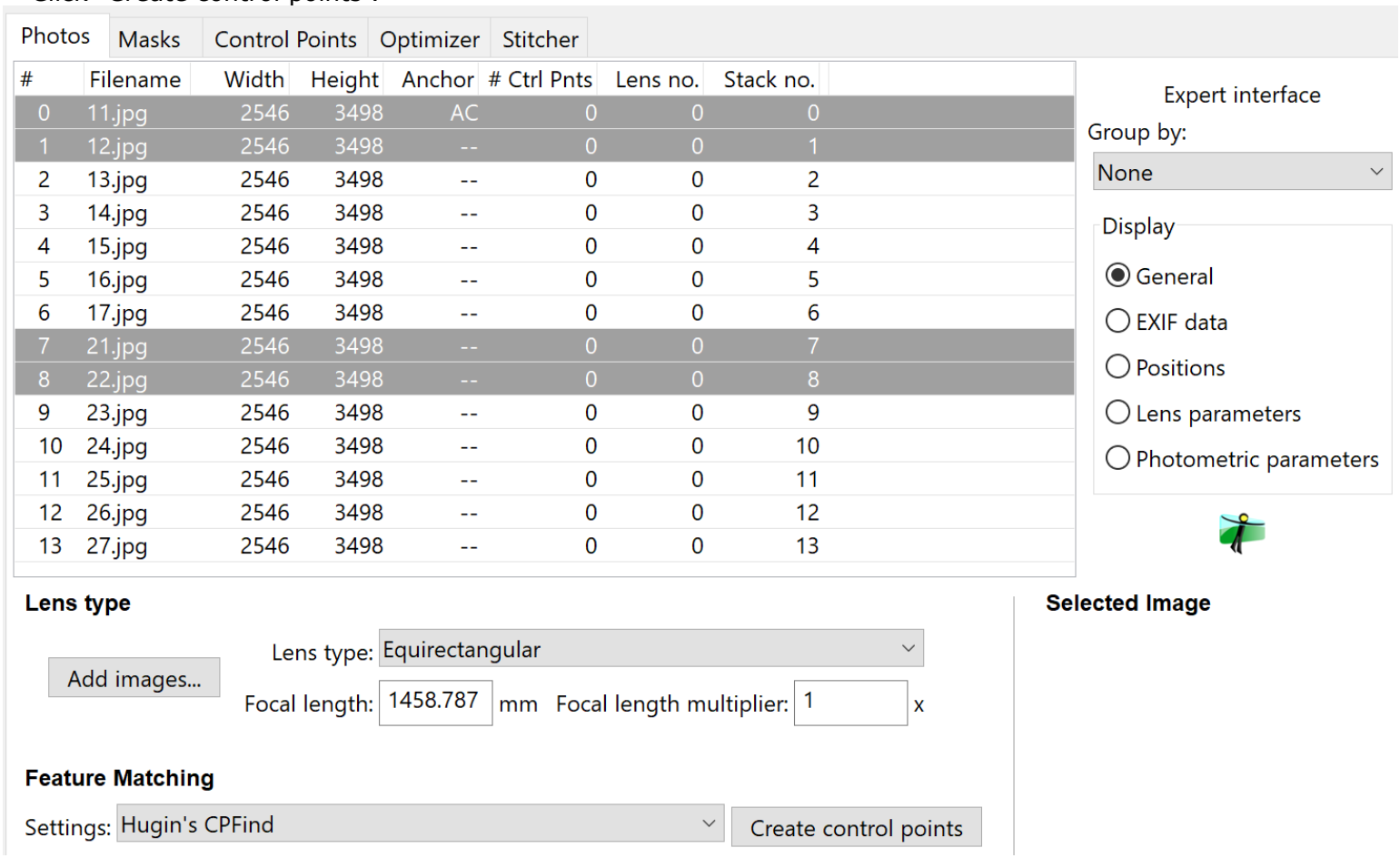
Image Orientation

#	Filename	Yaw (y)	Pitch (p)	Roll (r)	X (TrX)	Y (TrY)	Z (TrZ)	Plane yaw	Plane pitch	Camera translation
0	11.jpg	☐0	☐0	☐0	☐0	☐0	☐0	☐0	☐0	☐ not active
1	12.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
2	13.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
3	14.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
4	15.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
5	16.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
6	17.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
7	21.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
8	22.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
9	23.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
10	24.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
11	25.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
12	26.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active
13	27.jpg	☑0	☑0	☑0	☐0	☐0	☐0	☐0	☐0	☐ not active

Lens Parameters

#	Filename	Lens type (f)	Hfov (v)	a	b	c	d	e	g	t
	Lens 0	Equirectangular	☑1	☐0	☐0	☐0	☐0	☐0	☐0	☐0

"Photos" tab
- Select #0, #1, #7, #8.
- Click "Create control points".



Continue creating control points for four adjacent image files as follows looking at the table below.
- Select #1, #2, #8, #9.
- Click "Create control points".
- Select #2, #3, #9, #10.
- Click "Create control points".
- Select #3, #4, #10, #11.
- Click "Create control points".
- Select #4, #5, #11, #12.
- Click "Create control points".
- Select #5, #6, #12, #13.
- Click "Create control points".

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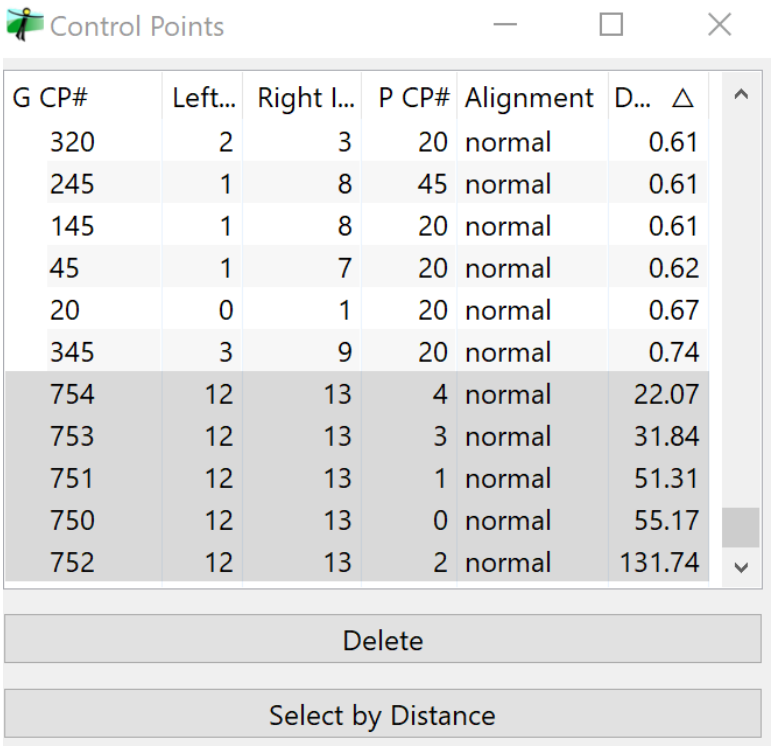
Stack# vs. (X,Y)	

“Optimizer” tab

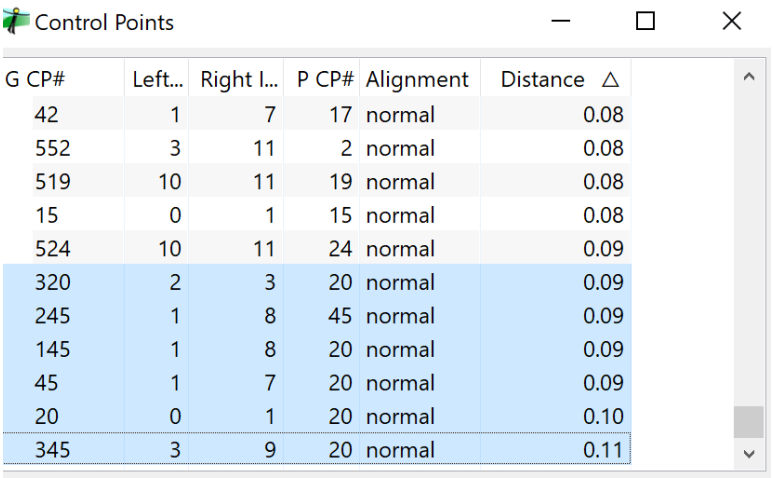
- Click “Optimize now!”.

Click “View” > “Control point table”. “Control point table” sub-window appears.



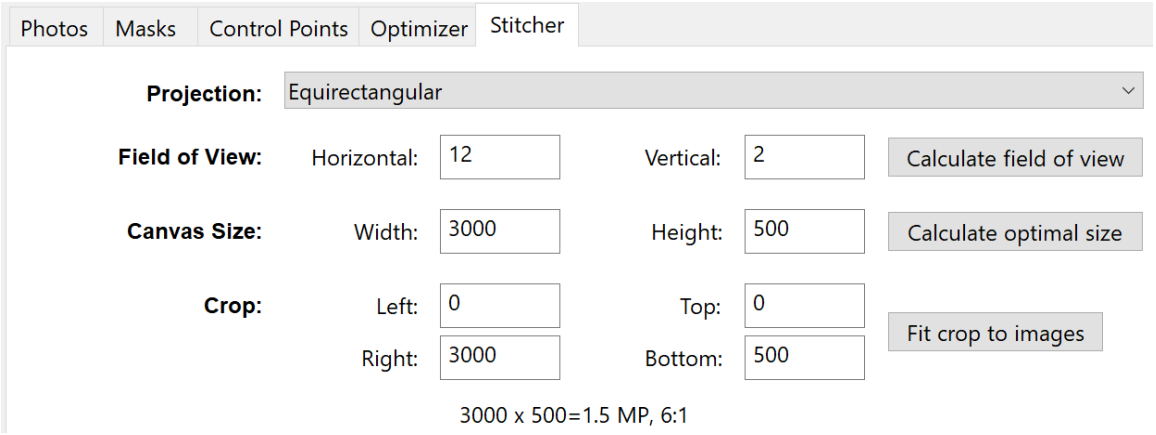
If too big numbers are listed on “Control point table” as above, delete (CP#750 to CP#754) because they are ghosts improperly produced.

- Click “Optimize now!” again.

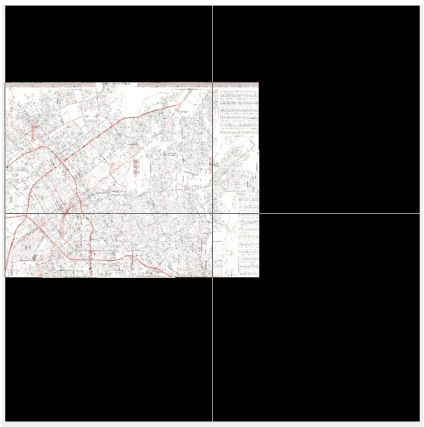


Smaller “Distance Δ” should be produced.

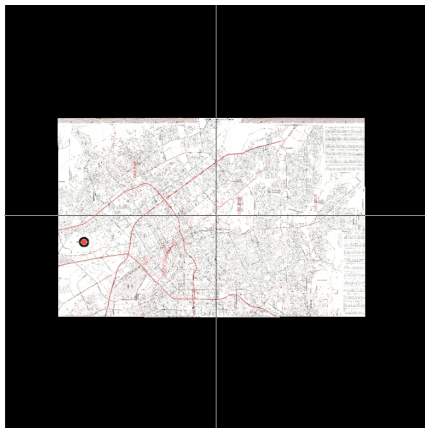
Click “Stitcher”.



- Click “View” > “Fast Panorama preview window”.
- On “Stitcher”, adjust “Horizontal” and “Vertical” of “Field of View”.
- On “Fast Panorama preview window”, click “Move/Drag”. Cross hair cursor appears.
- Move the map at center.
- Adjust “Horizontal” and “Vertical” of “Field of View” repeatedly to get a appropriate size of the map display.



Cross hair cursor appears



Move the map at center

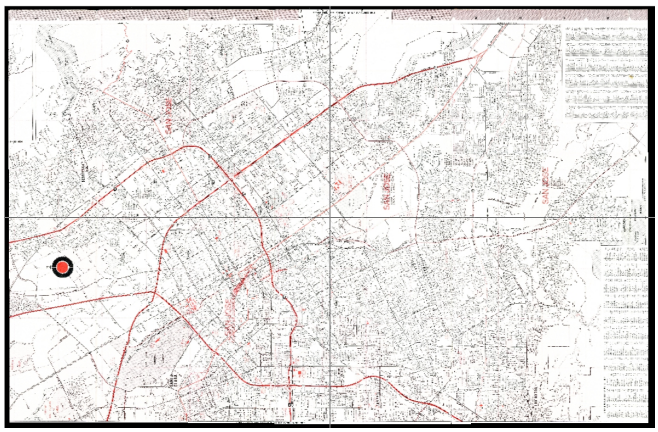
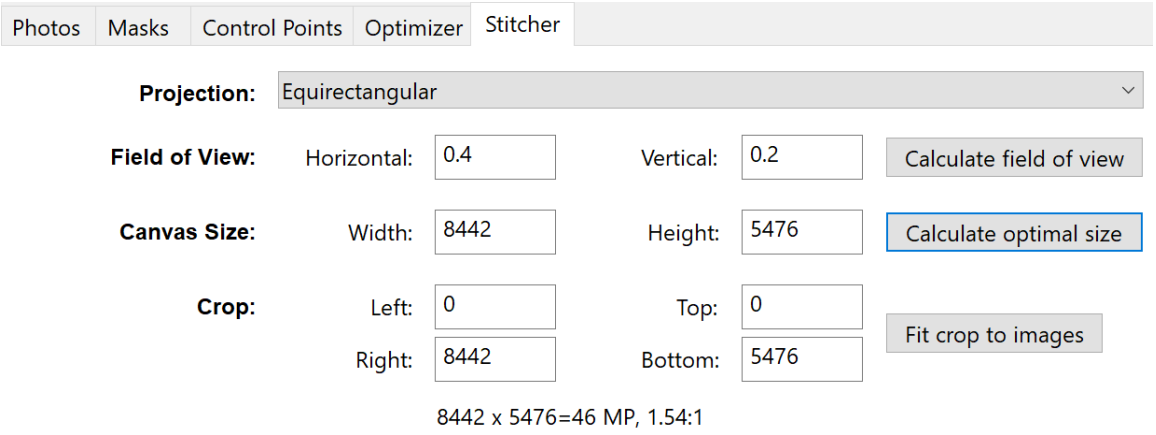


Image size adjusted by updating “Field of View”

- Click “Calculate optimal size” to get optimized canvas size of the map image.



Although only two digits are displayed on “Field of View”, actual numbers specified contains decimal fractions. Detailed adjustment is required.

- Click “Stitch!”.

A map stitched in this example