Photogrammetry
using Agisoft PhotoScan®

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rule of thumb
garbage in, garbage out

What you will need

digital camera
any camera minimum 5mp sensor

object or building to capture

agisoft photoscan

What you need know

working knowledge of your camera

object or building to capture

basics of 3d terms
        xyz, point cloud, mesh, obj,,,

First of all

Familiarize yourself with the camera.

Important, if you don't know how to use your camera, take time to learn the basics of how to handle and where the controls are.

Make sure you know how to adjust the exporsure or to use exposure compensation so you can make correctly exposed photo.

Correct exposure is a factor, or at least close to the correct exposure.
If you have too dark/bright image, capture those frames again with correction applied.

Lens focal length
Lens focal length should be adequate to cover the given object/buidling. Avoid super wide or super telephoto lens unless your capture is from an aerial drone.

Fixed focal length lens is better.
For zoom lens, set it to the proper focal length and don't change it throughout the capture.

Sharp image is very important.
If you don't have the sharp image, photogrammetry will not work.
If you are capturing indoor, try to use tripod.
And for small object, turntable(lazy Susan) for the object will speed up the capturing process. Mark the turntable so you can turn same amount for the each capture.
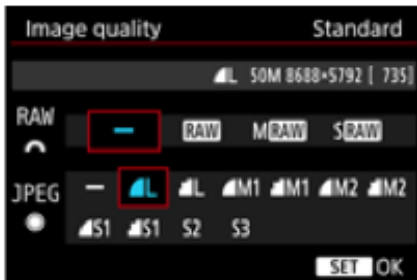
Sensor size/Image size
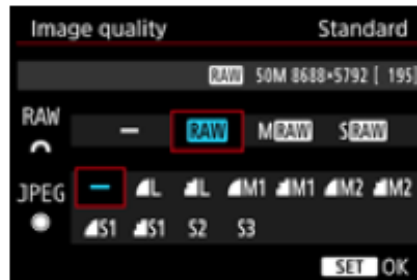If you have a camera that is less then 5 years old, this shouldn't be much of a factor.
5MP sensor size and above is good.
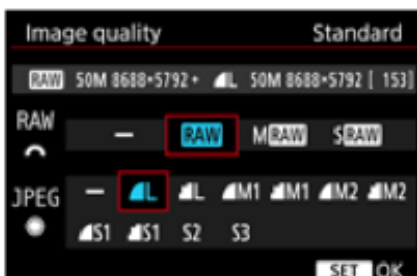If you have DSLR/mirrorless, make sure you set to proper size setting.

This is from Canon DSLR manual that shows many different size of capture. Find the correct setting for your own needs and subject matter. Too big/too small is not good.

Medium quality jpeg will be a good start. Test to make sure that's adequate enough.

Inside object

North facing window is good light source.
Place the object away from the direct sunlit window.
Soft, less contrasty light is best.
When using artificial light source, bounce it off the ceiling so light will be diffused.

Place the object on a plain background so that object can be easily separated.
Plain paper, or table cloth can be placed on top of the table then place the object.
You can cut out the sides of box that can accomodate the object to make a stage like setup.
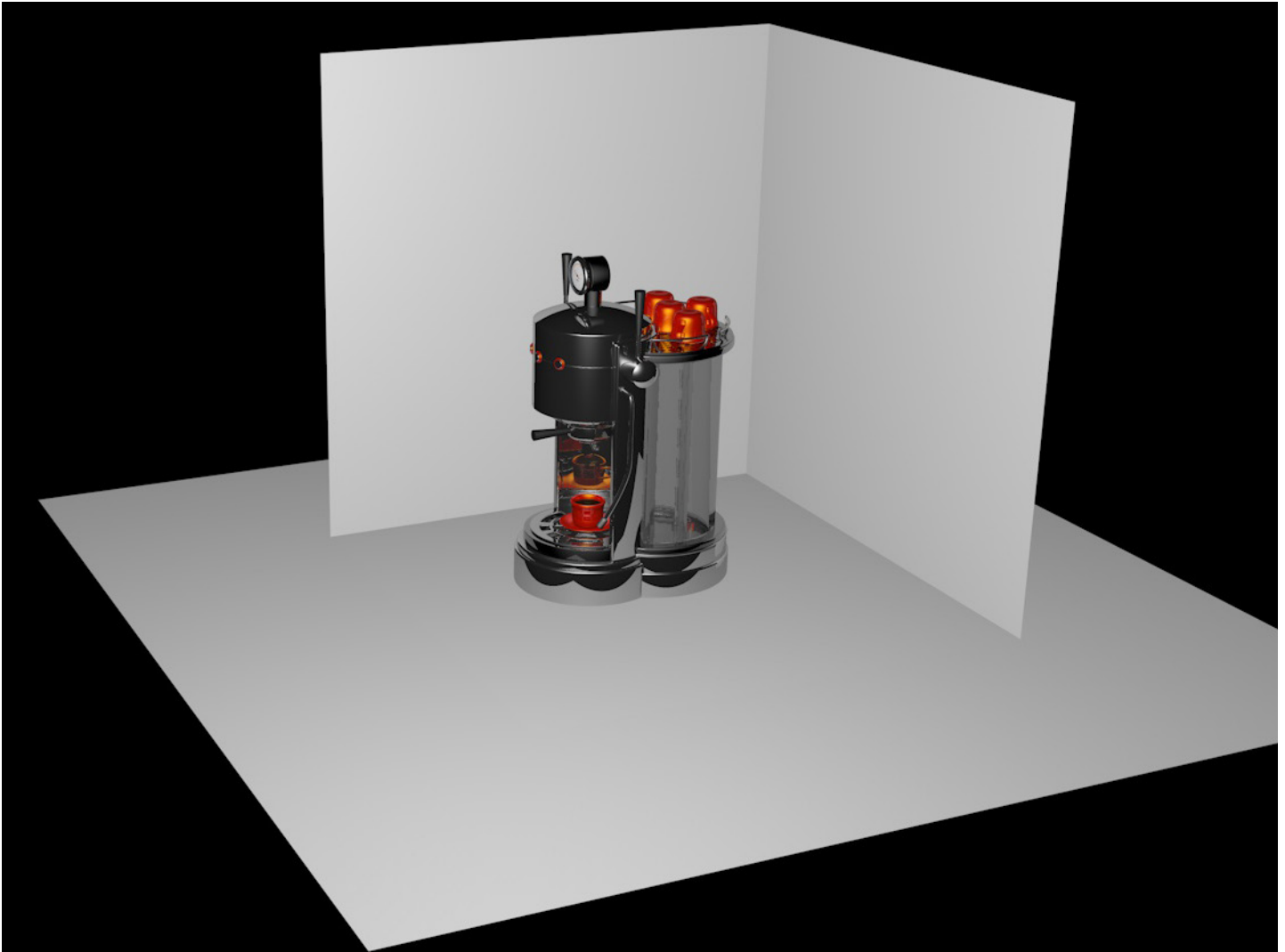
Above set up can be achieved farily easily while inside.
Find the area inside that gets most even light without much shadow.
Then you can set up the camera on a tripod, then capture while rotating the object.
Make sure you capture the top portion of the object. Meaning you will need to adjust the height of the camera position with minimum of two 360 degree turns.

Outside object/building
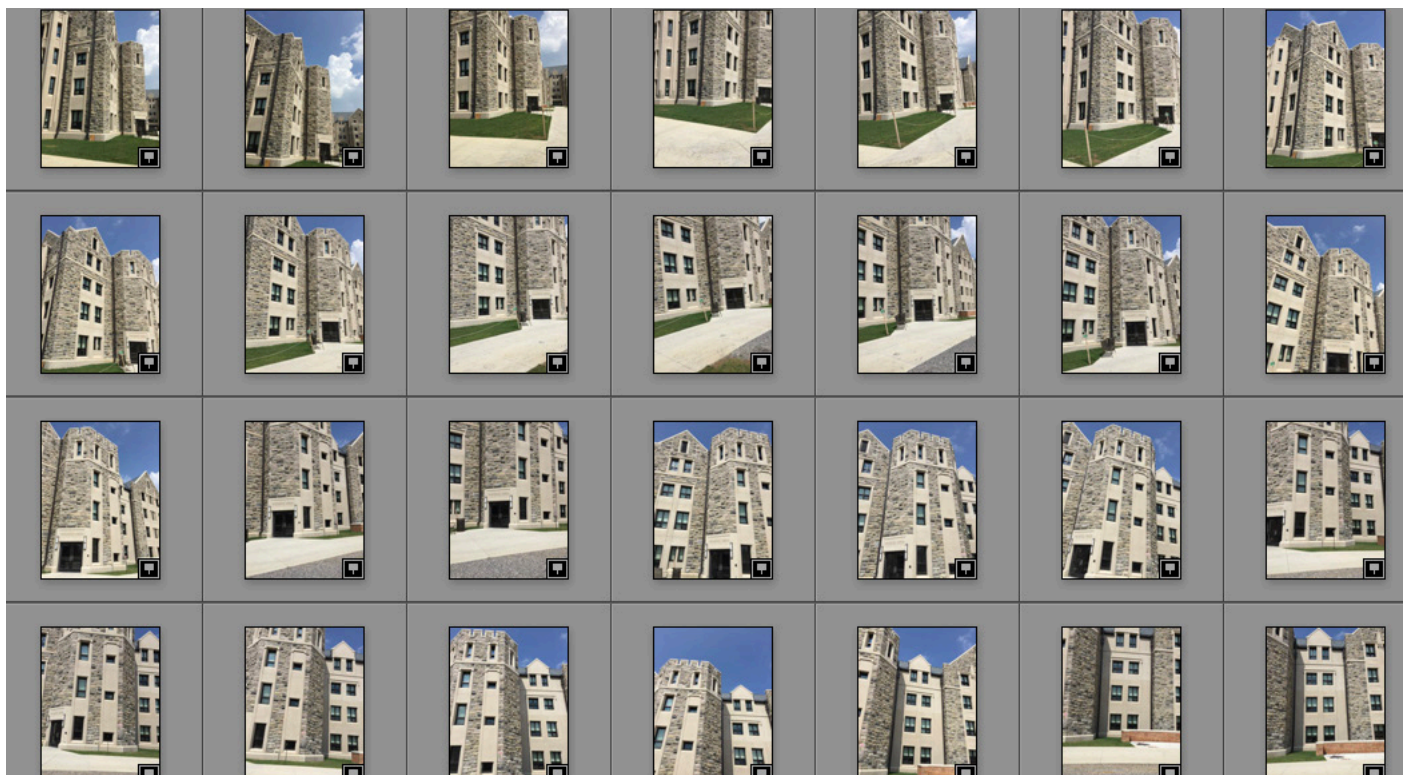
Overcast day is best to photograph for photogrammetry.

Look for accessibility without the trees or fences, get a permission for private property.

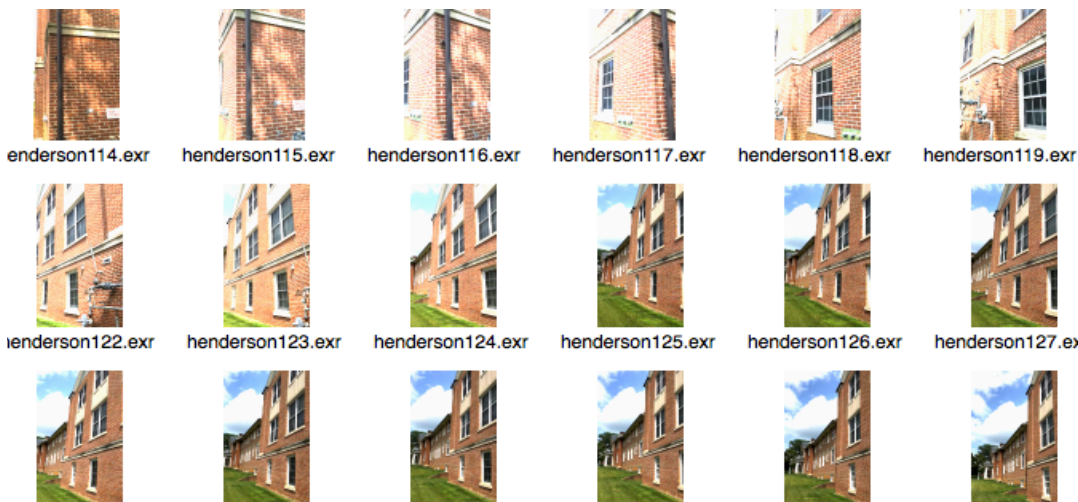When near the road, look out for traffic! Spotter would be ideal.

Preplan the route of your capture. So you don't have to go back and forth on same path for capture.

Also it will be much more organized when you download the picture to your computer.
Clock wise, counter clock wise, with little off path.

If you can't go before hand, search online map for the streets and surroundings for preplan.

Clean, sharp, correct exposed pictures are good start for photogrammetry.

enderson114.exr   henderson115.exr   henderson116.exr   henderson117.exr   henderson118.exr   henderson119.exr

ienderson122.exr   henderson123.exr   henderson124.exr   henderson125.exr   henderson126.exr   henderson127.exr

Sets on the left, even though it's clean and sharp, failed to align in PhotoScan, hence no usuable 3D data. Shoot perpendicular to the building, facade.
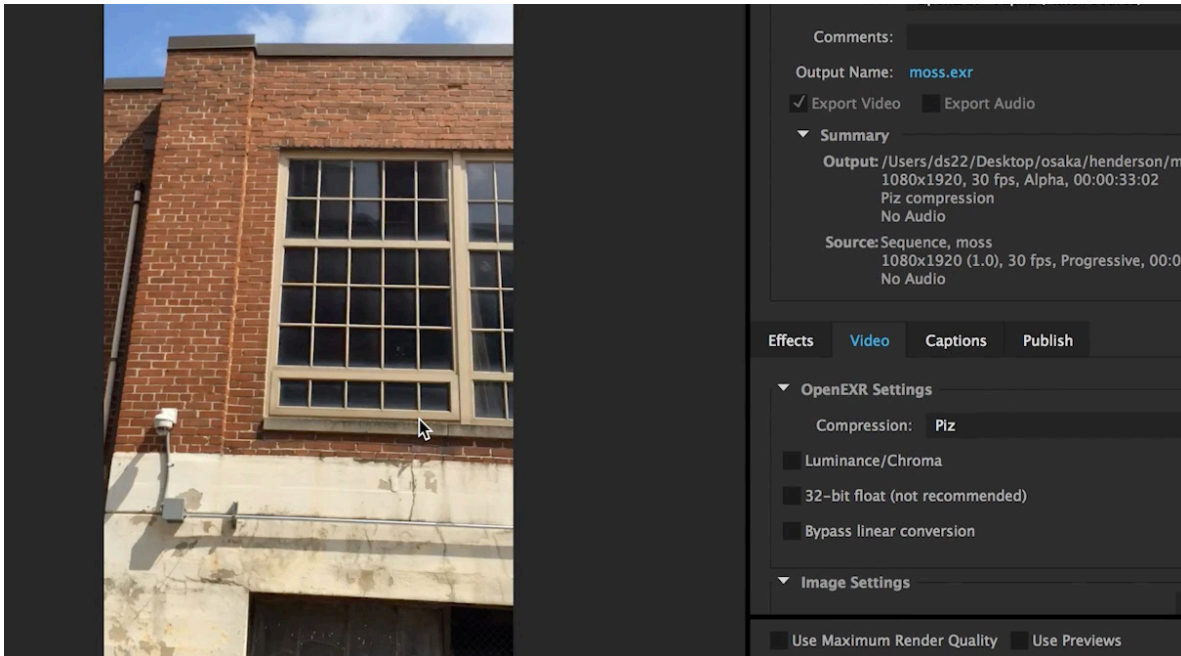
Time-lapse Capture

You can use time-lapse capture mode as an alternative to single frame capture.
Time-lapse video should be exported frame by frame as Photoscan's supported image files (eg. exr)

You want to have more pictures then you think you need.
Often times time-lapse would provide you more frames then you need.

Just having a huge number of pictures will not guarantee the best result.

Export as match preset. Time lapse capture export could have too many photos.

Exported image shouldn't look like this. Since it's shot on the phone and exported out as 16x9 format, there are blank black areas. Images like this will fail to align.

Move around for Capture!

Capturing the object, you have to move around 360 circle so that you will have overlapping areas within the images.

You need to capture enough images!

good

bad
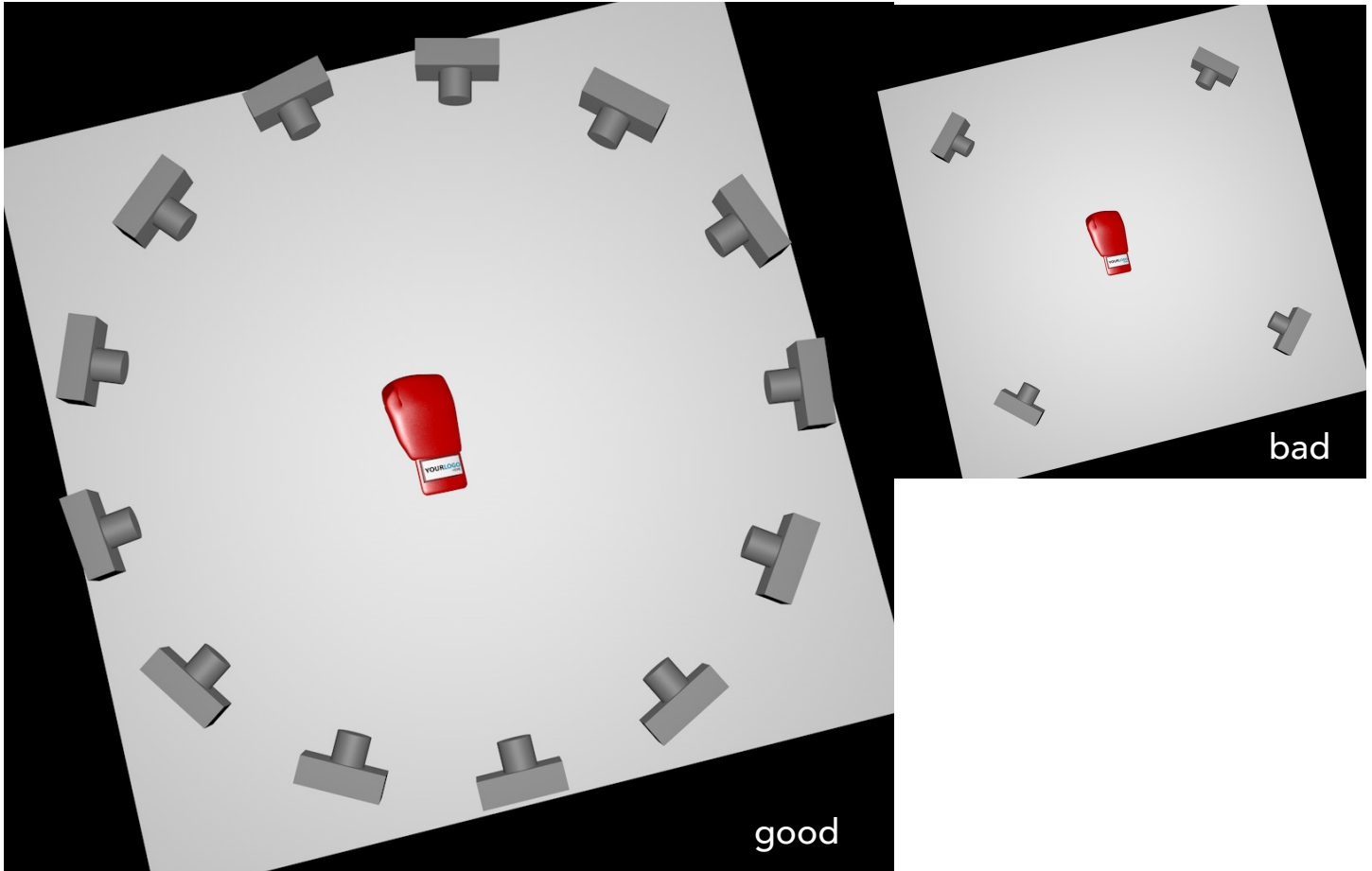
Don't take pictures while standing in one place like you would do for panorama.

For a facade, move along the facade to capture the images.
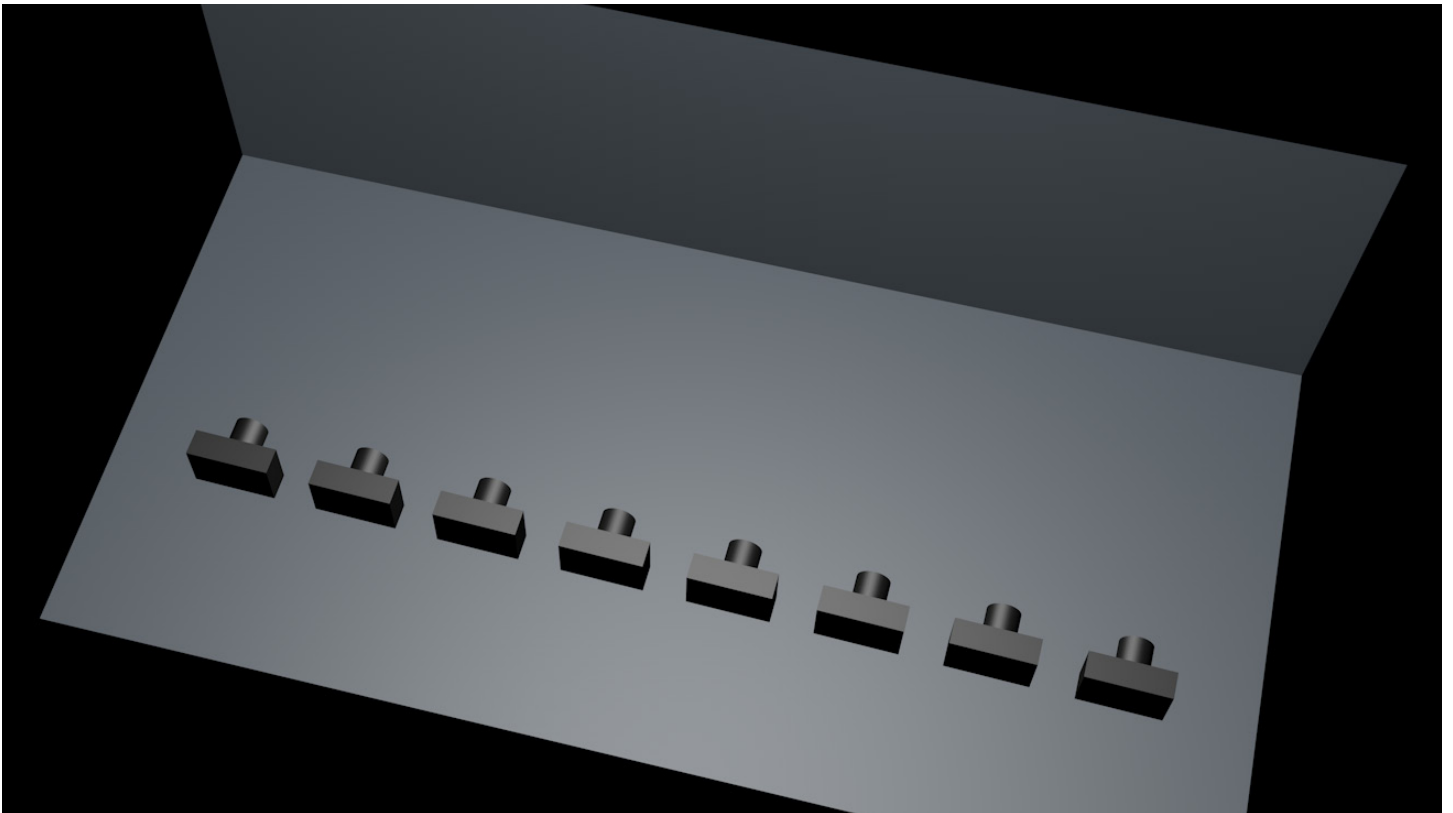
For room or space, capture around, like below illustration.
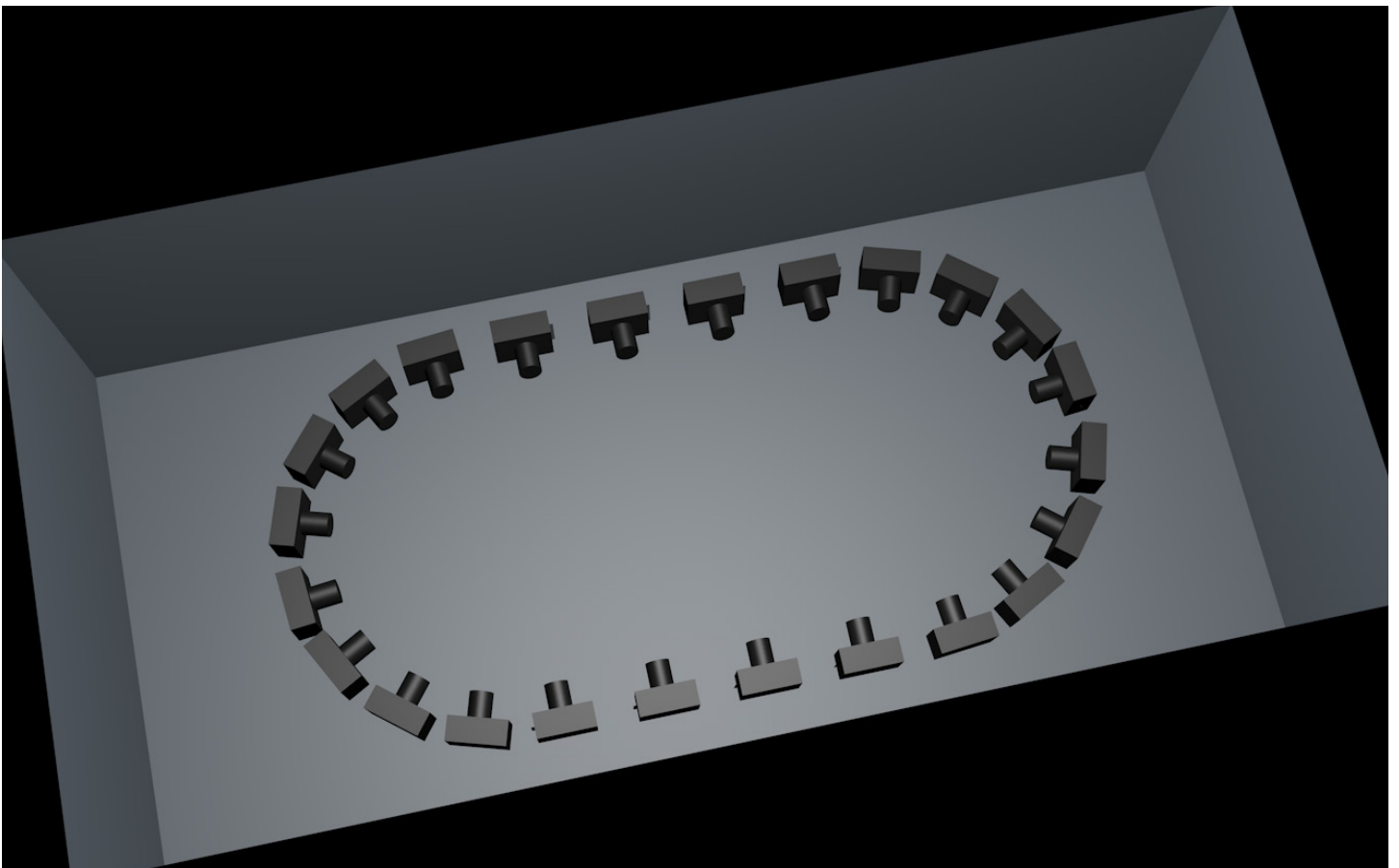
Agisoft Photoscan

General Workflow

1. add photos
2. align photos
3. build point cloud
4. build mesh
5. build texture map

Above steps are almost always same when using PhotoScan. There will be some changes per project, of course.

Let's start!
You should have downloaded all the pictures you captured and organized in a folder.
Launch PhotoScan. You want to save the project after each step!!!

1. Workflow> Add Photos(Folder)...
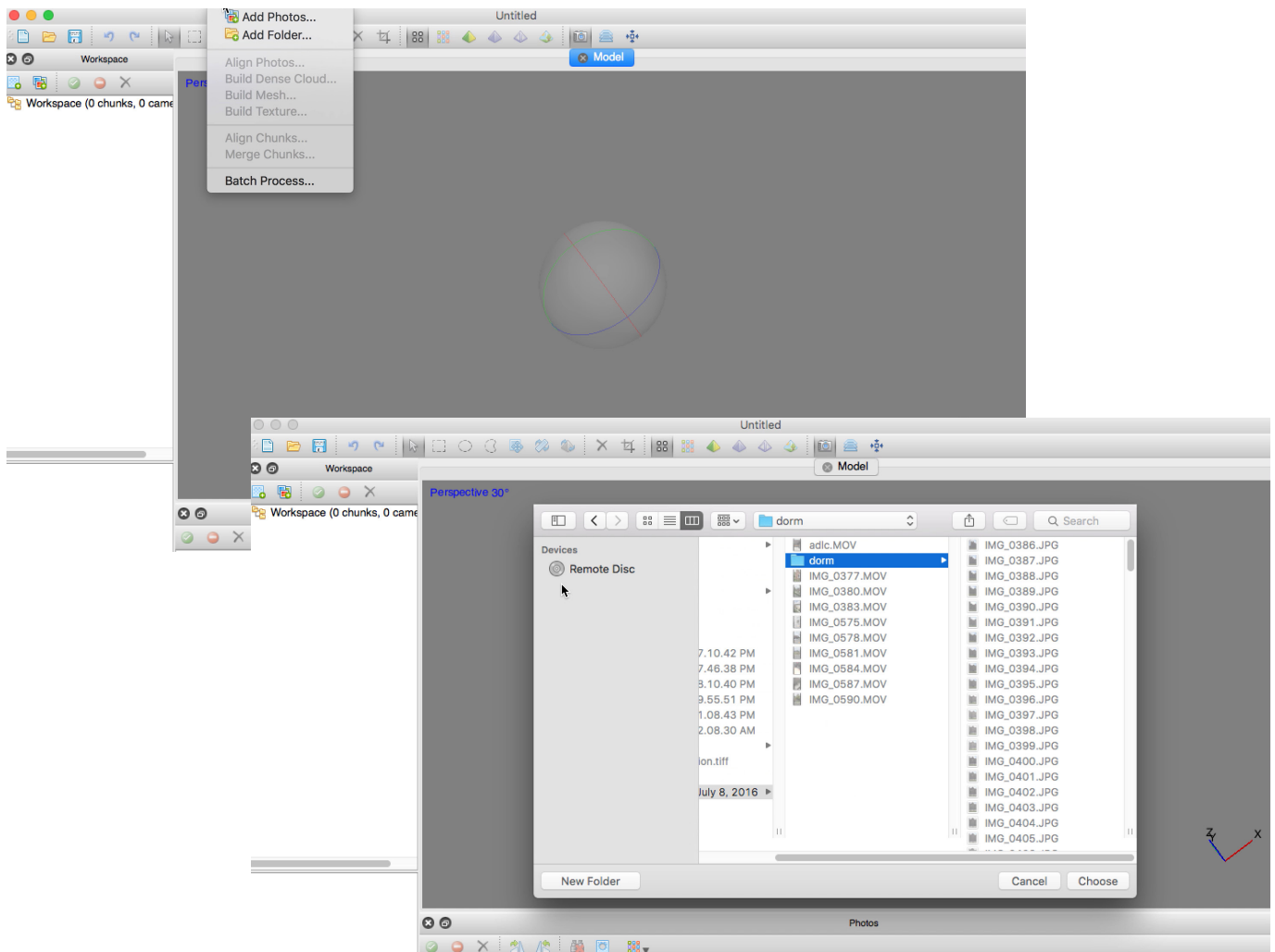
2. Workflow> Align Photos...
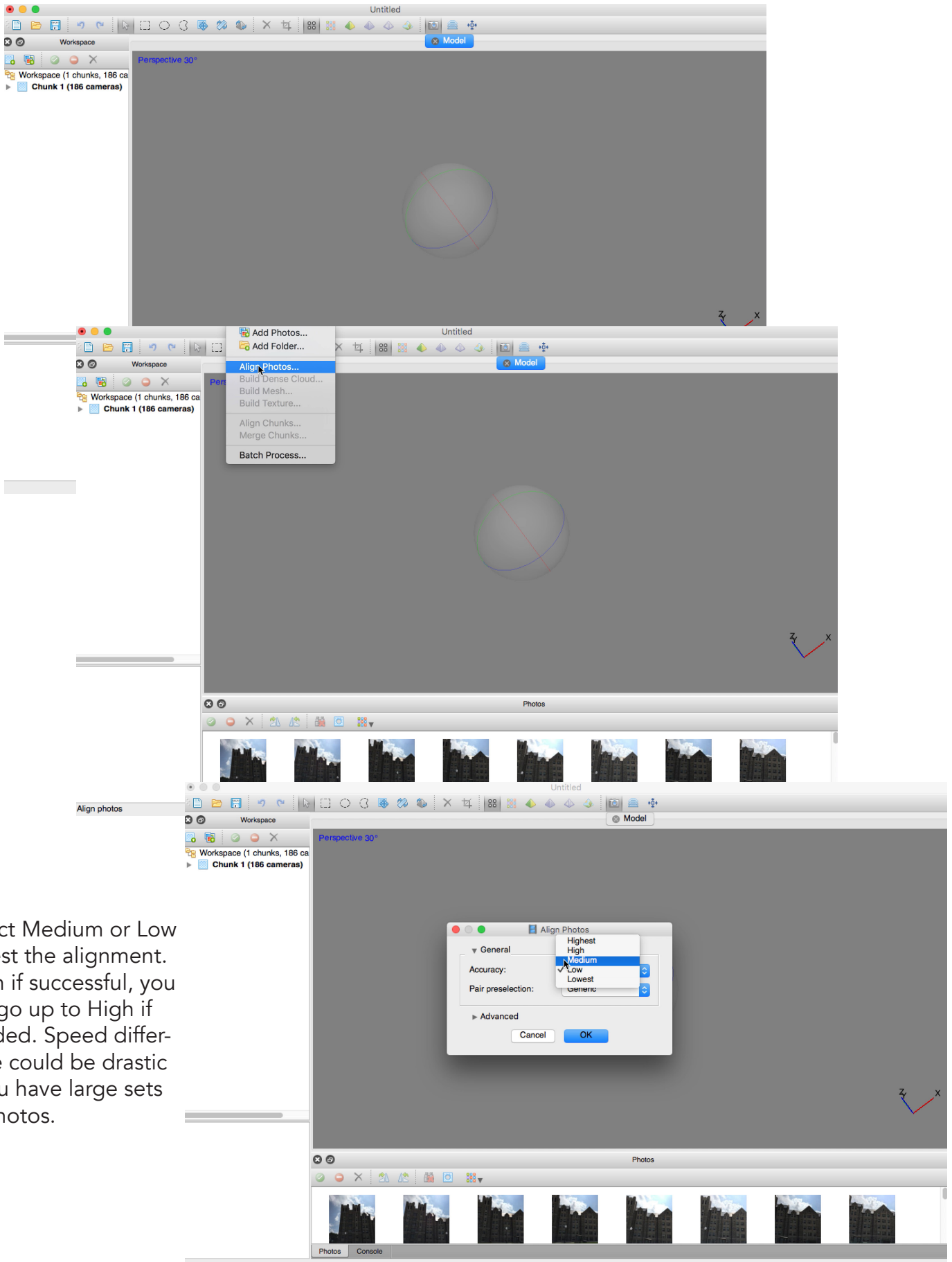
Select Medium or Low to test the alignment. Then if successful, you can go up to High if needed. Speed difference could be drastic if you have large sets of photos.
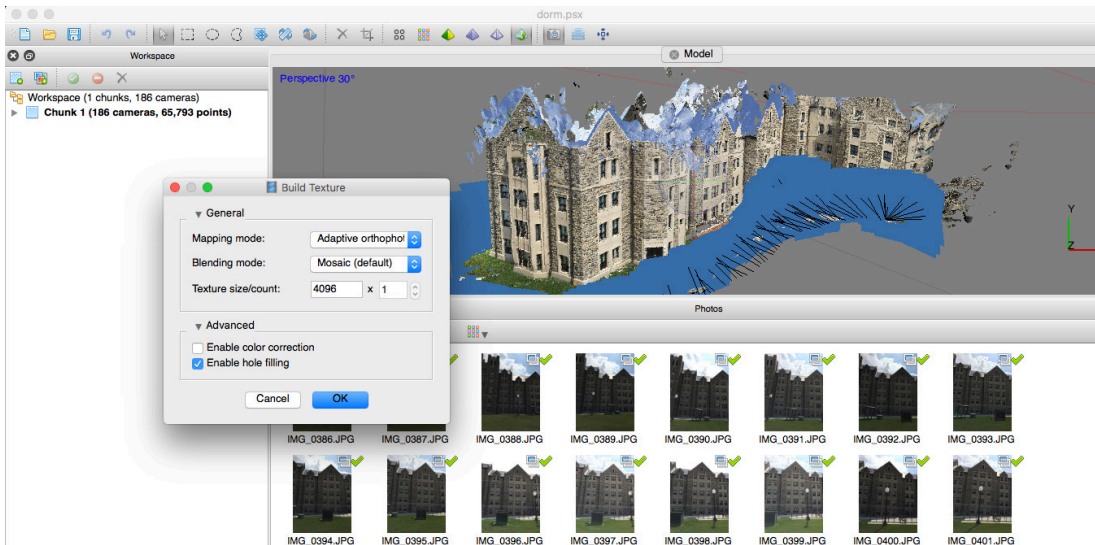
3. Workflow> Build Dense Cloud...
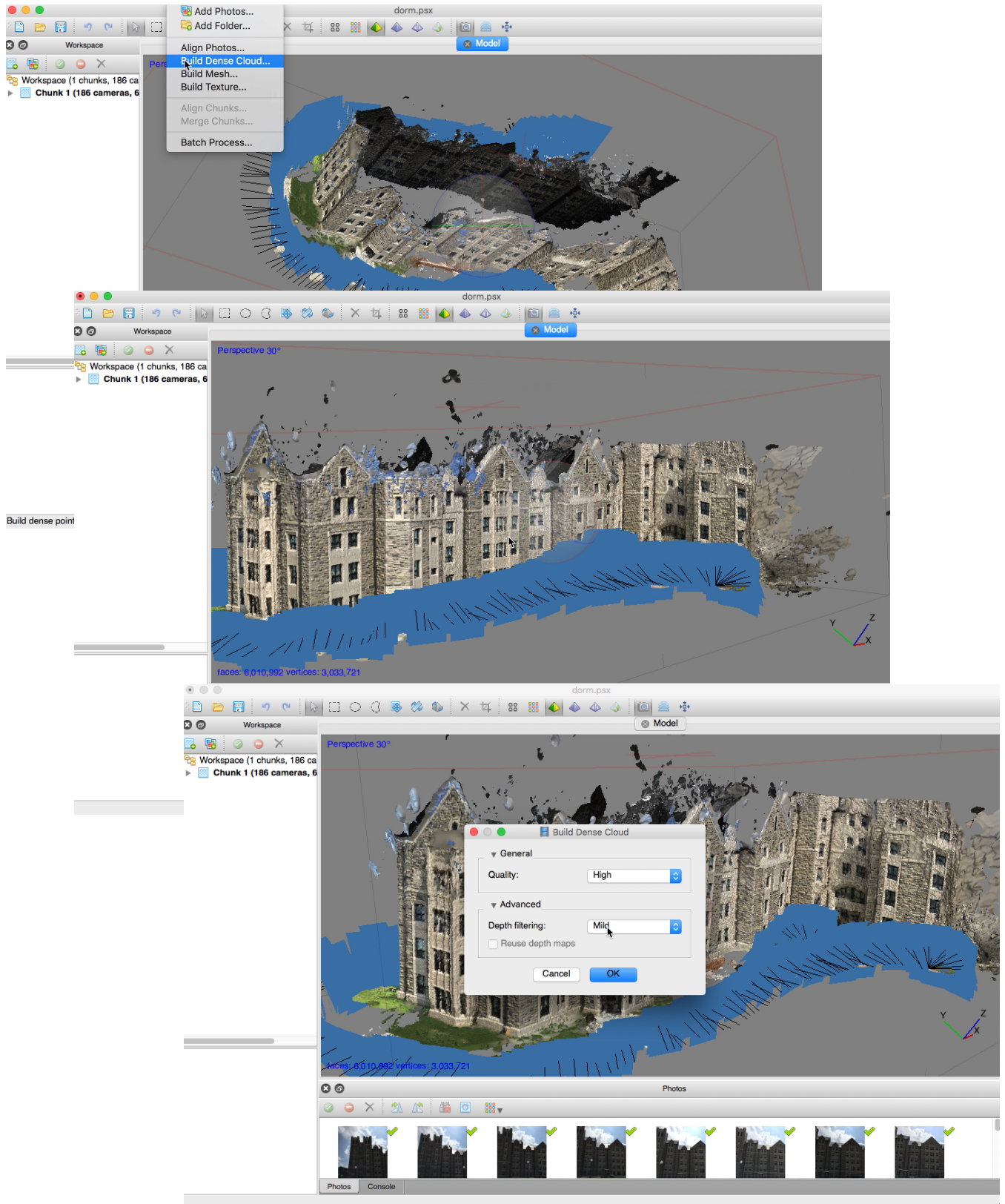
Depth Filtering to Mild for the detailed surface like in this building.
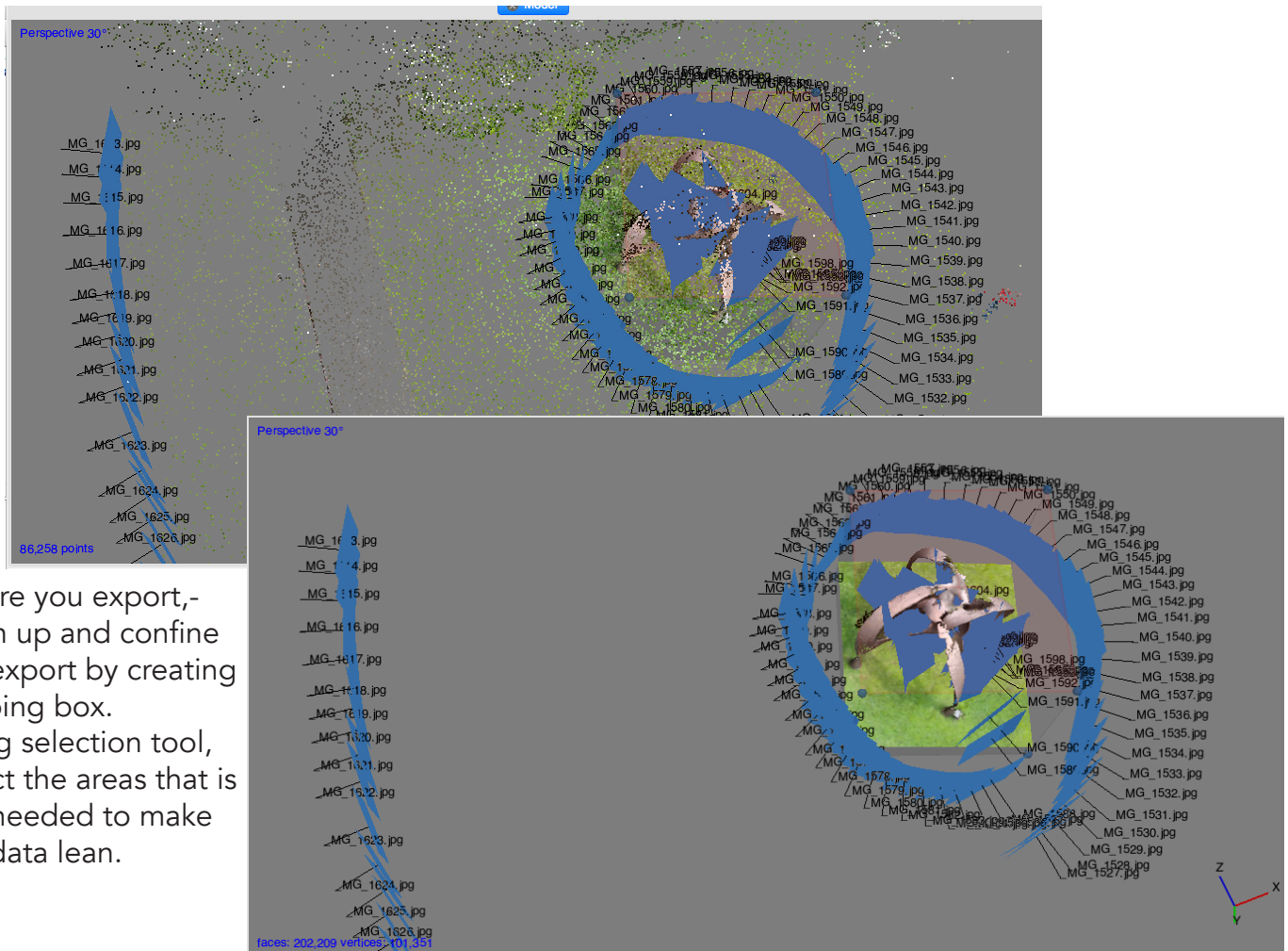
4. Workflow> Build Mesh...
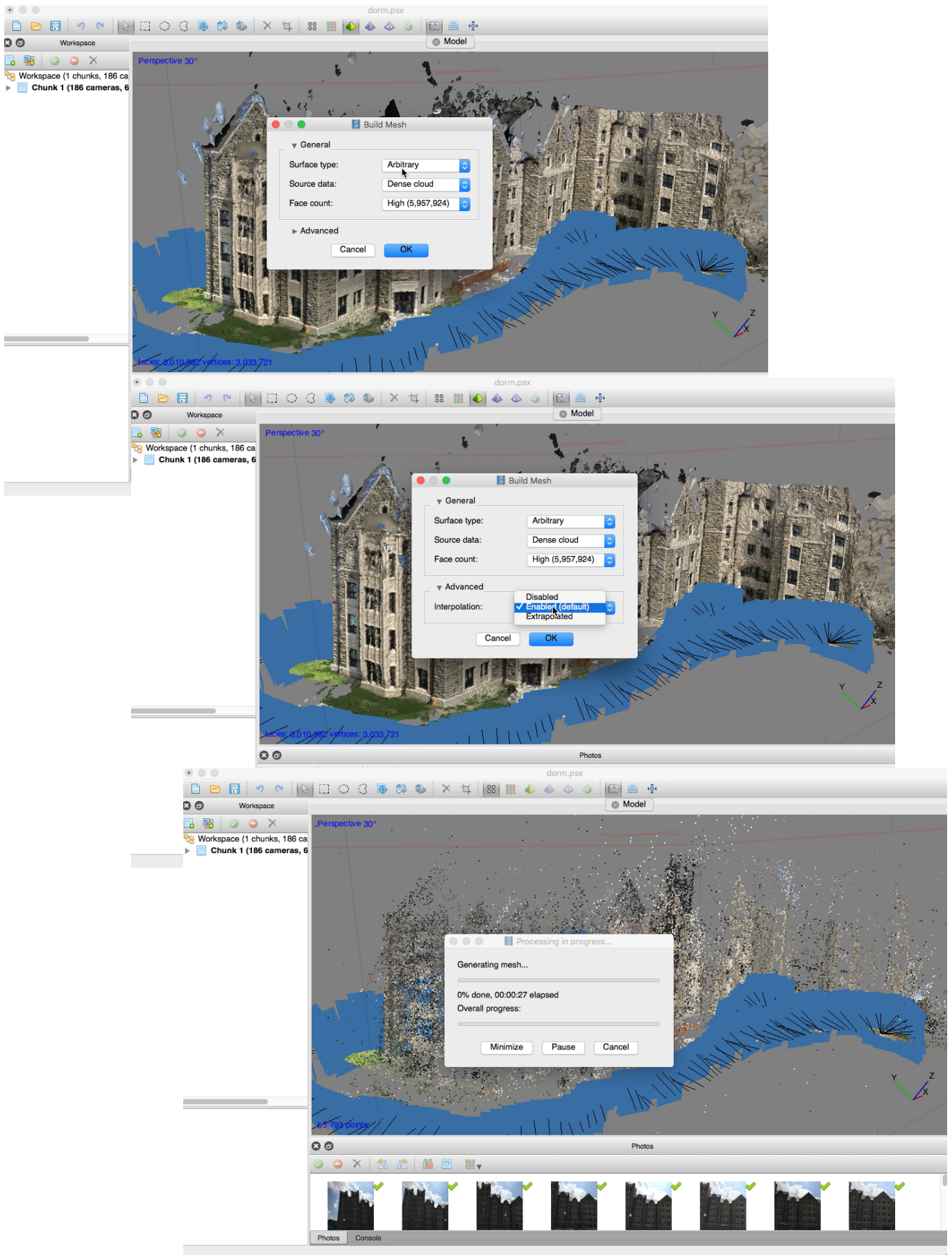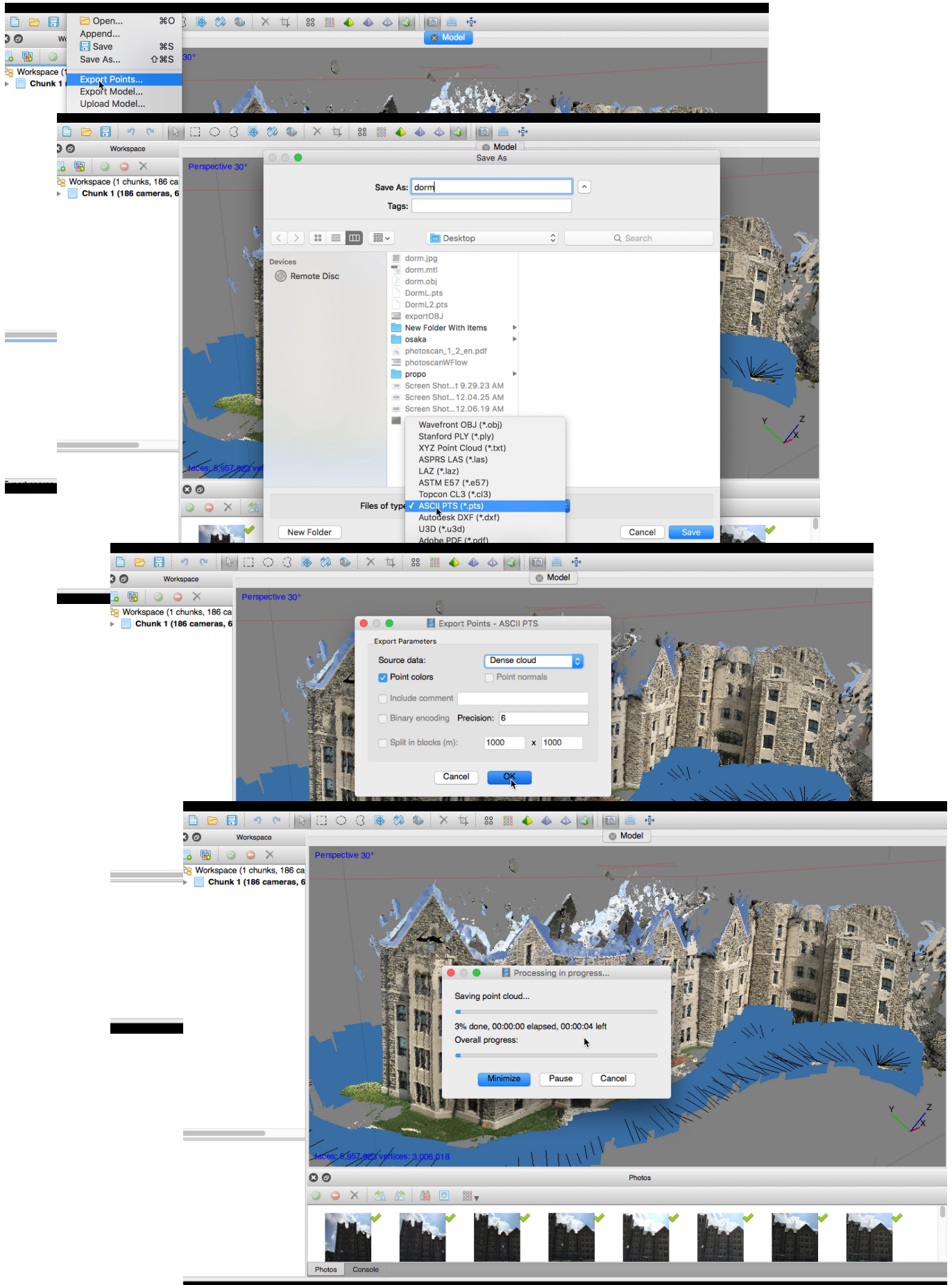
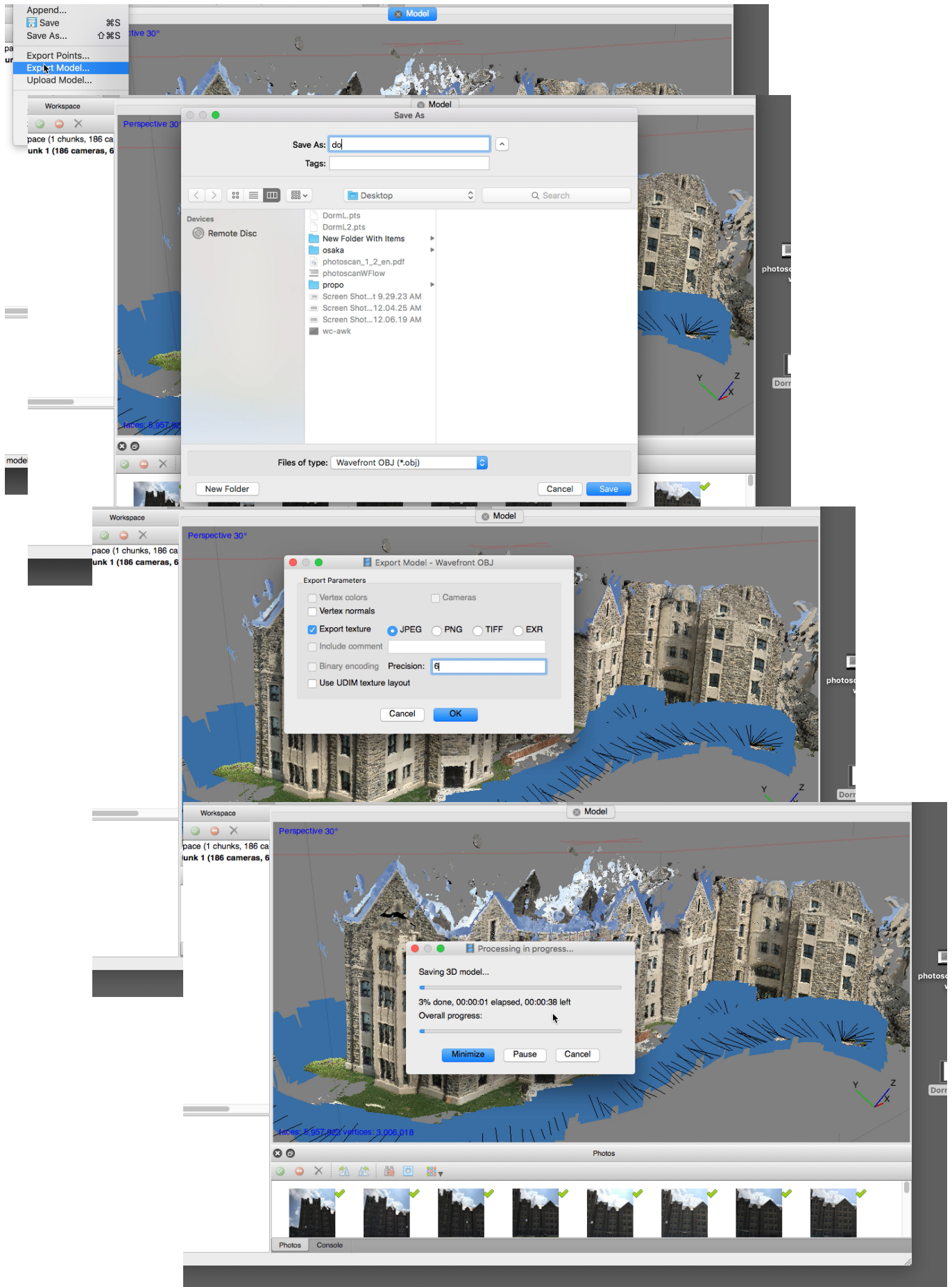## 5. Workflow> Buid Texture...

6. Cleanup for export

Before you export,- clean up and confine the export by creating clipping box.
Using selection tool, select the areas that is not needed to make the data lean.
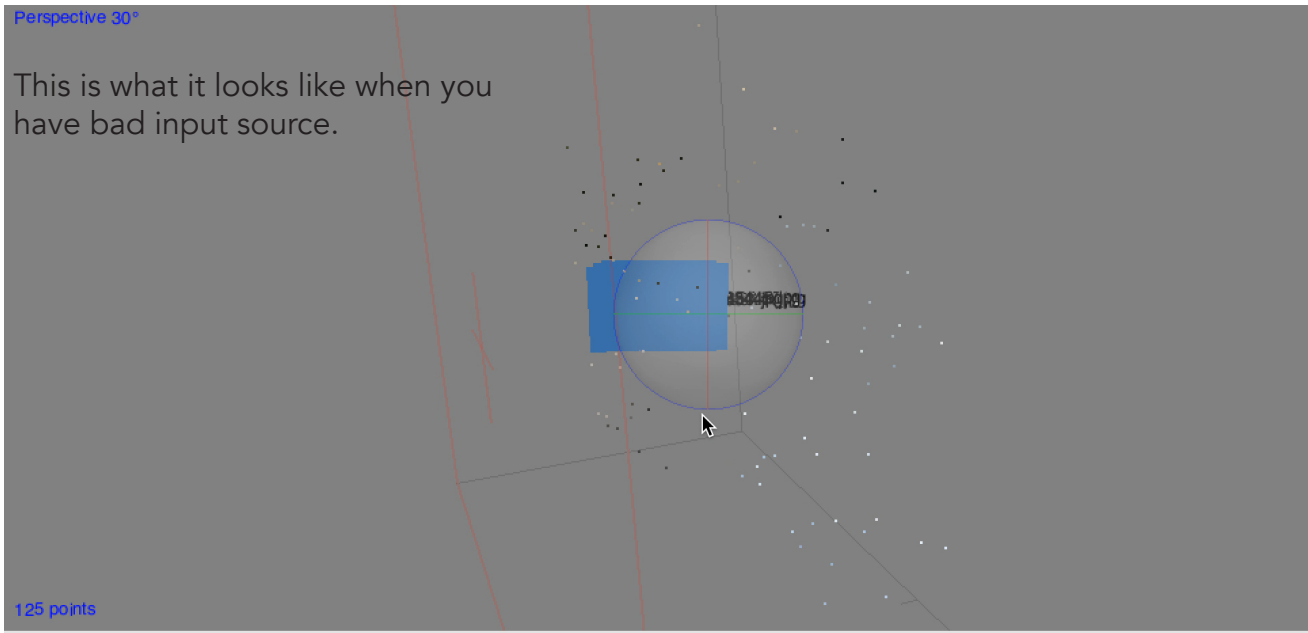
7. File> Export Points...

8. File> Export Model...

9. Examples of Good

10. Examples of Bad

This is what it looks like when you have bad input source.

These images will not work!
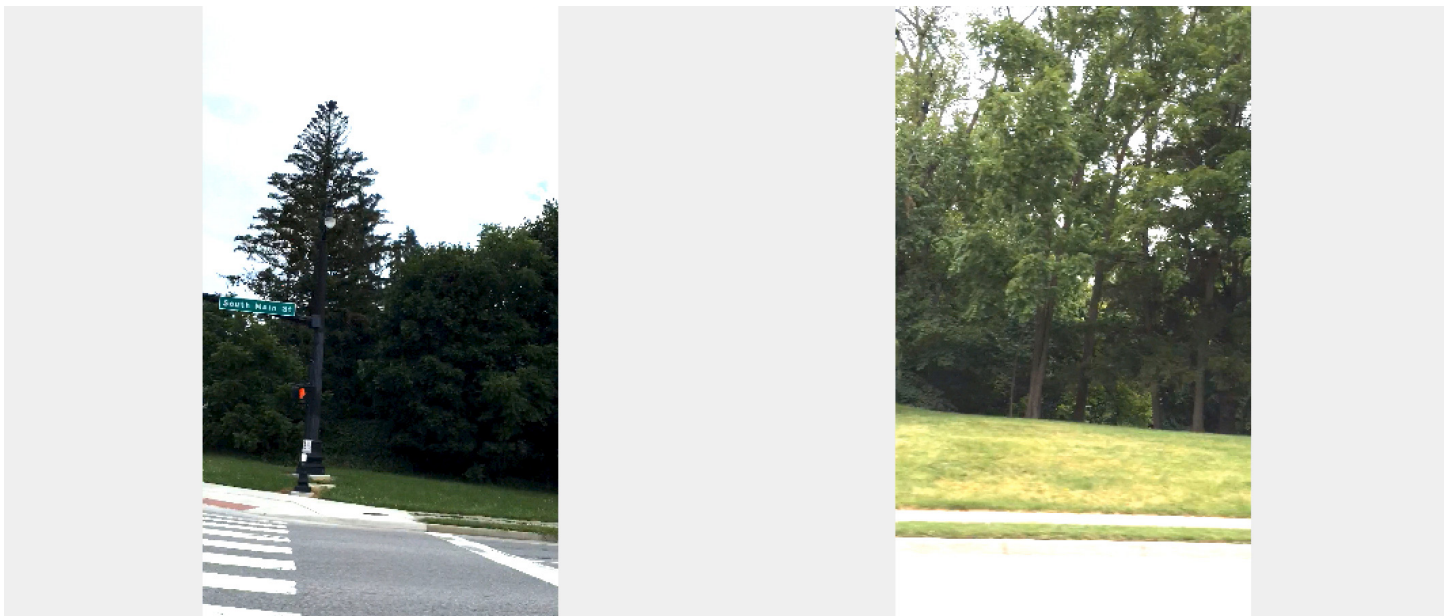
Just having many images won't guarantee the success.
Garbage in, Garbage out.
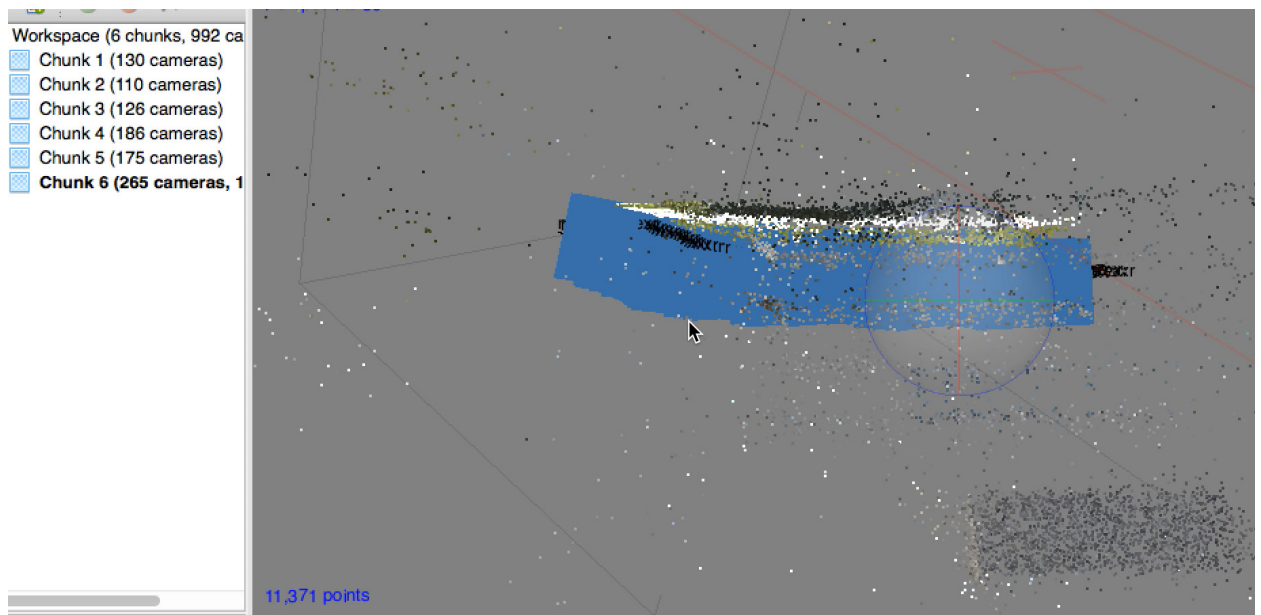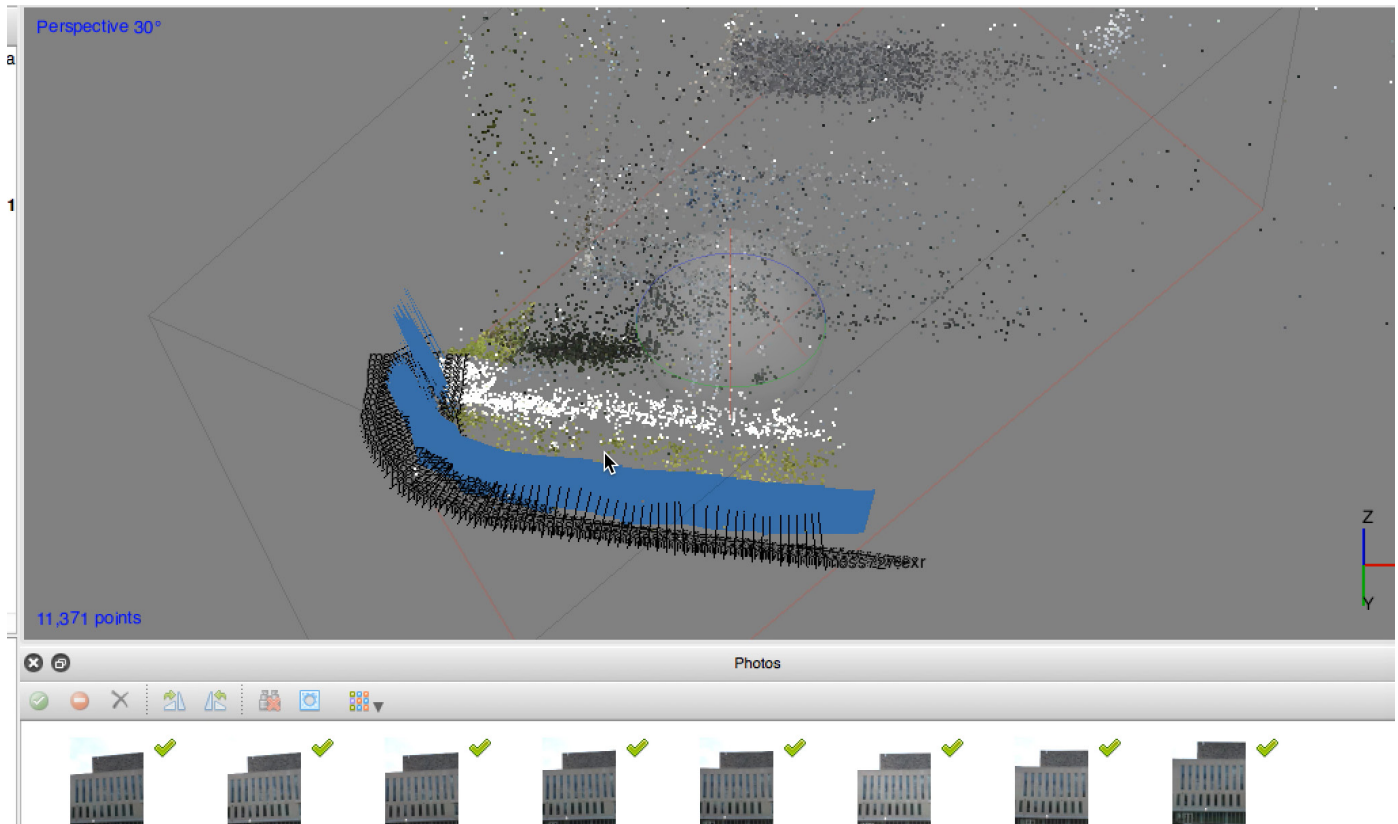
You can divide up to different chunk to build up the bigger model.
Still bad photos will result in bad result. In this case, not usable at all.

11. Quick tip

If you move or rename the original images, then select image, right click to Change Path... to correct the file path.

Context menu:
Open in New Tab
- Enable Cameras
- Disable Cameras
- Remove Cameras
- Move Cameras ▶

Reset Camera Alignment
Align Selected Cameras
Estimate Image Quality...
Check Image Paths...
Filter Photos by Selection
Invert Selection

Import Masks...
Export Masks...
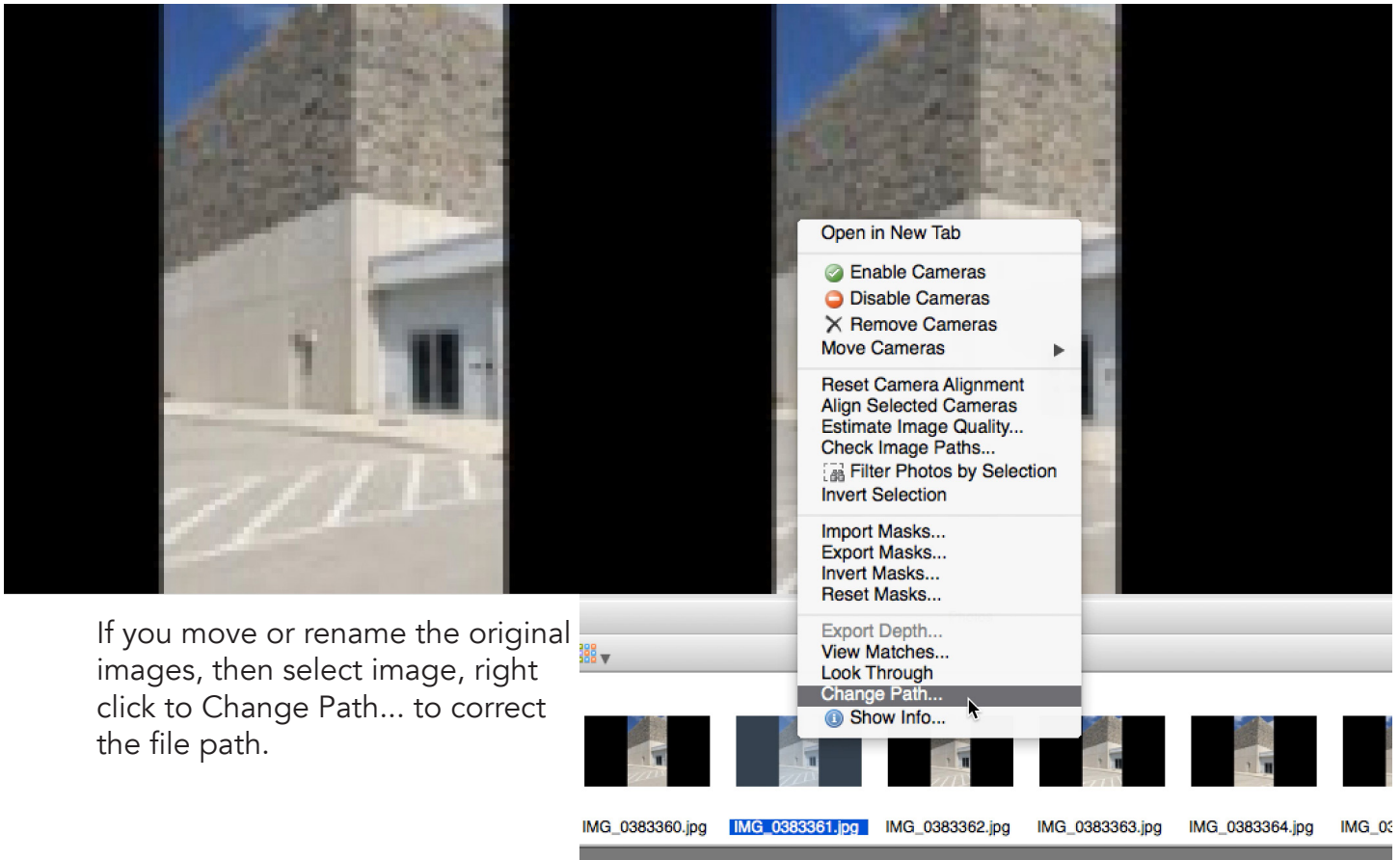Invert Masks...
Reset Masks...

Export Depth...
View Matches...
Look Through
Change Path...
Show Info...

IMG_0383360.jpg   IMG_0383361.jpg   IMG_0383362.jpg   IMG_0383363.jpg   IMG_0383364.jpg   IMG_03