PROJECT: ECOLOGICAL AND INNOVATIVE TECHNOLOGIES FOR RECOVERING INDUSTRIAL AREAS FROM LCA AND ENERGY EFFICIENCY POINT OF VIEW

2020-1-RO01-KA203-080223

PHOTOGRAMMETRY

Universitatea Transilvania din Brașov
Centro Tecnológico del mármol, piedra y materiales
Universidad de Sevilla
ROMANIA GREEN BUILDING COUNCIL
Politechnika Poznańska
FPIP CALIFICAT.RO
Rybaki17
Co-funded by the Erasmus+ Programme of the European Union

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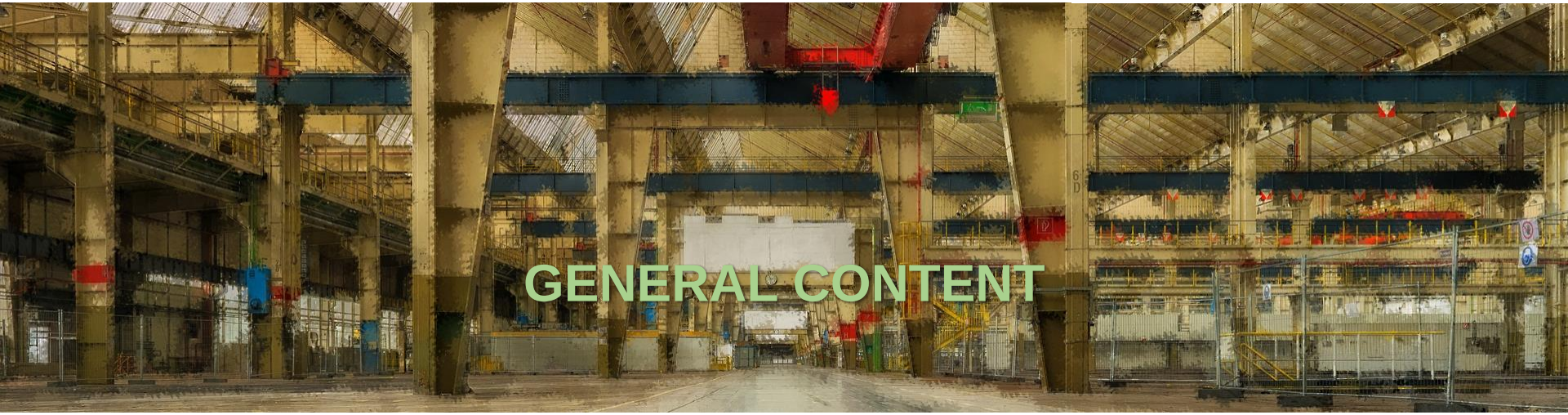

GENERAL CONTENT

1. Take photographs and videos
2. Upload files to a computer
3. Convert photos into a 3D model
4. Edit the model
5. Export the model
6. Change the file format
7. Import the model to Revit
   or
8. Import the model to Archicad

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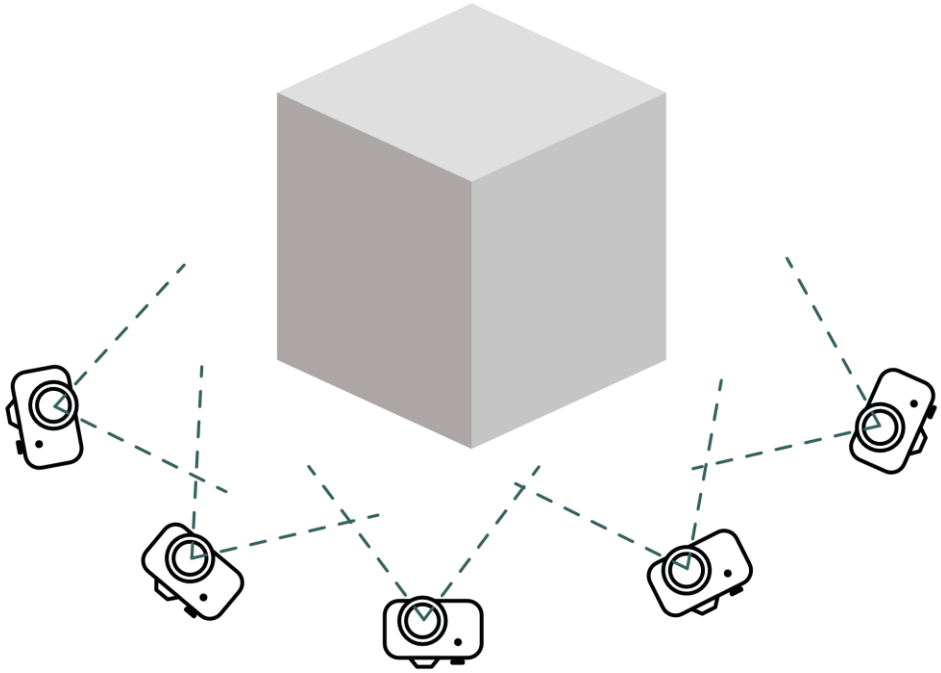
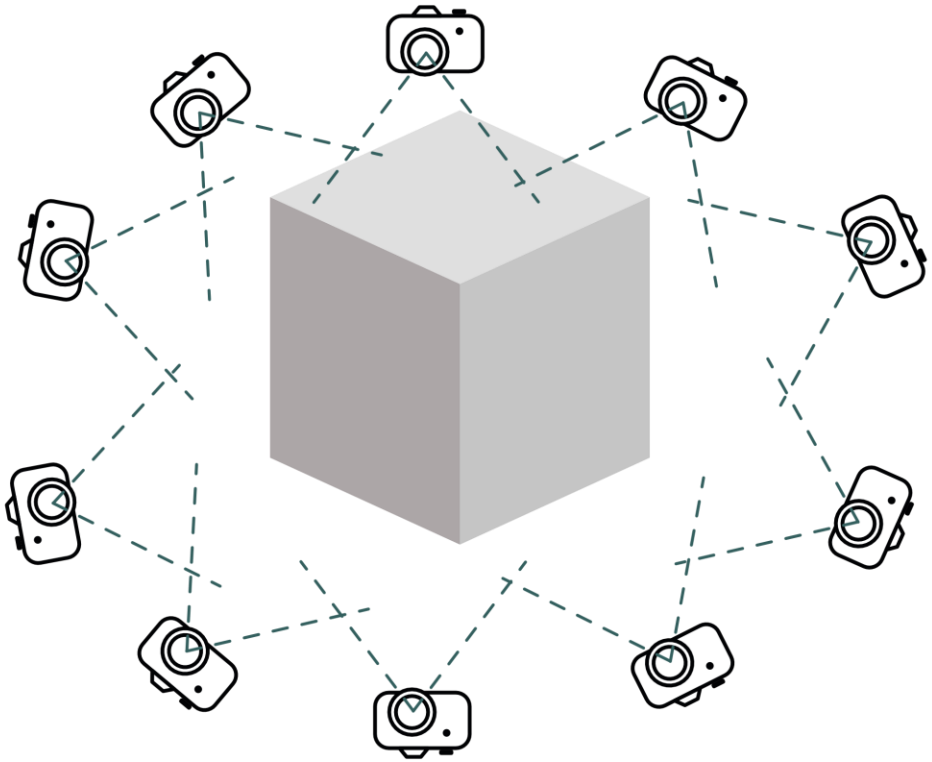
1. Take photographs and videos

- weather without intense sunlight on the photographed area
- take photographs and/or videos with a digital camera or mobile phone without flash
- as much of the façade as possible should be in the frame in each photo
- avoid close-ups

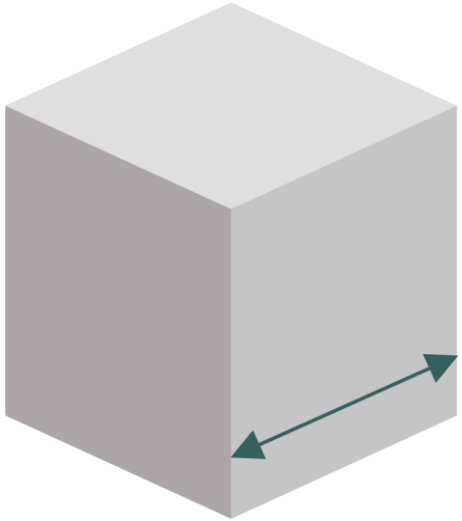
take a photo from different angles and distance to the elevation



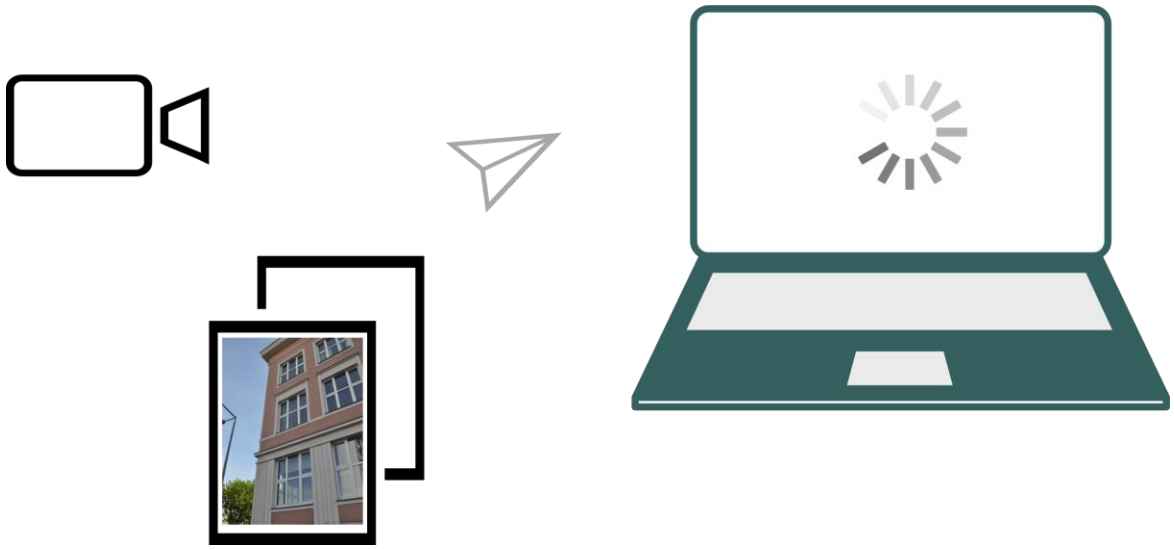
if possible take photos from a drone



measure dimension on the elevation for later scaling of the scan



2. Upload files to a computer



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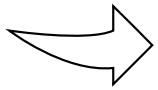
3. Converting photos into a 3D model



PHOTOGRAMMETRY

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Download and install 3DF Zephyr

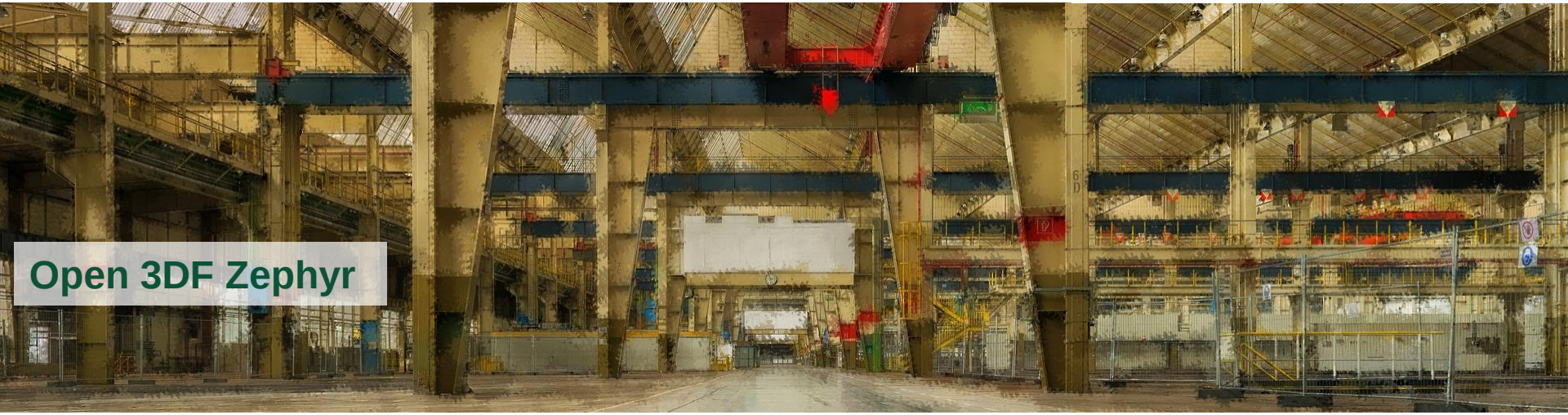
Get a free 3DF Zephyr trial (14 days):

or

Get 3DF Zephyr Free here:

3DF ZEPHYR FREE

PHOTOGRAMMETRY FOR EVERYONE

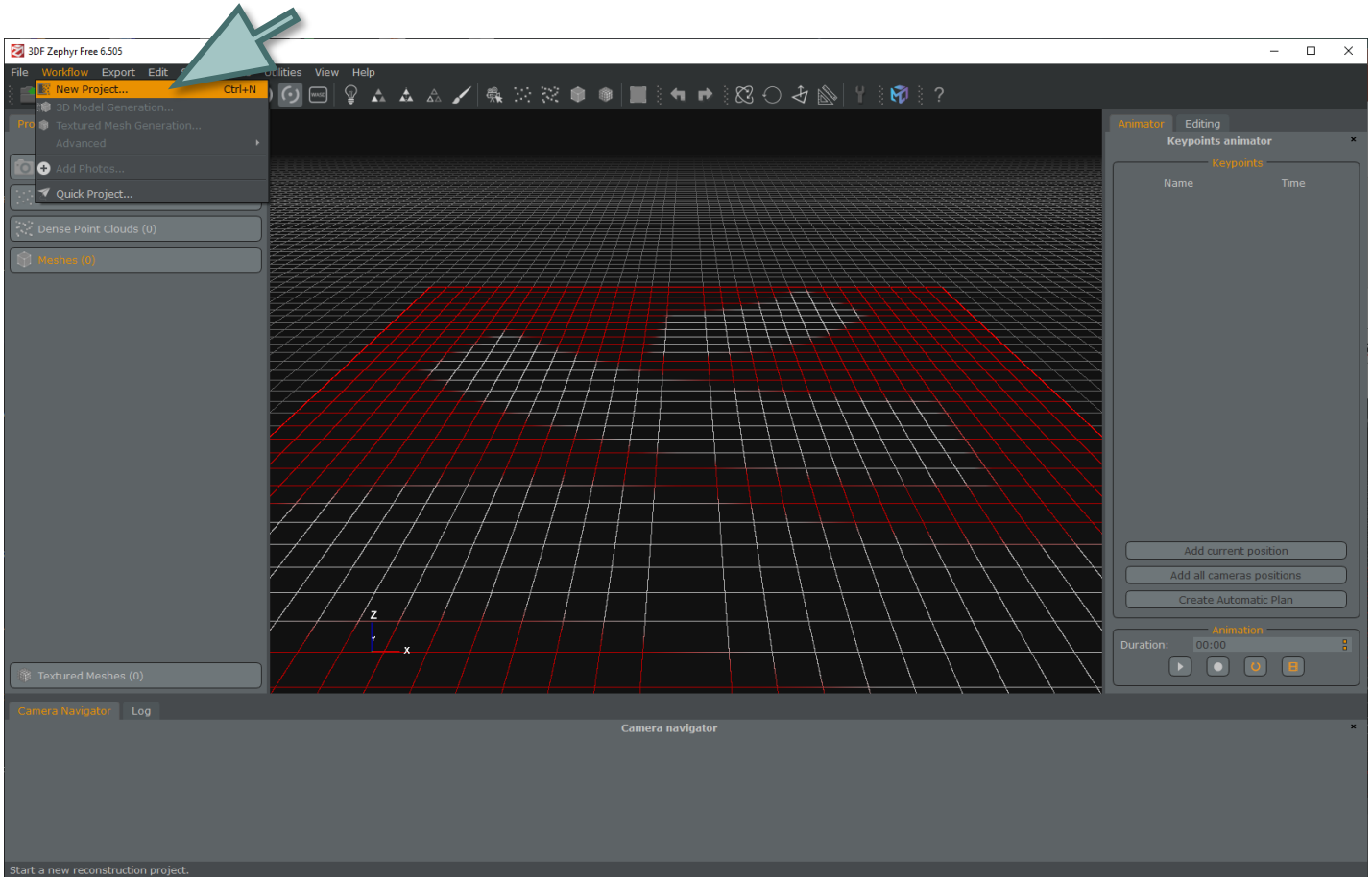


Open 3DF Zephyr

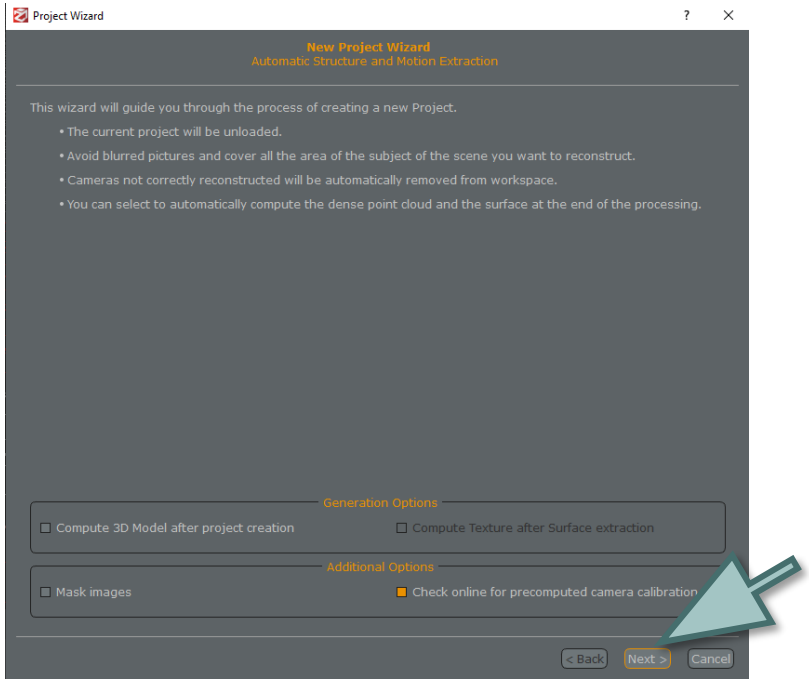
This tutorial is for 3DF Zephyr Free

Start New Project

MENU / Workflow / New Project

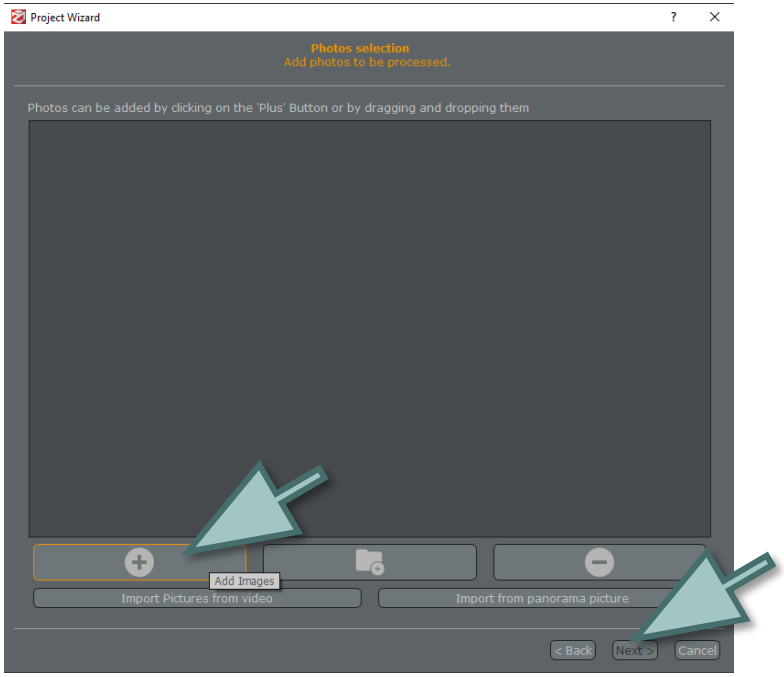


Next

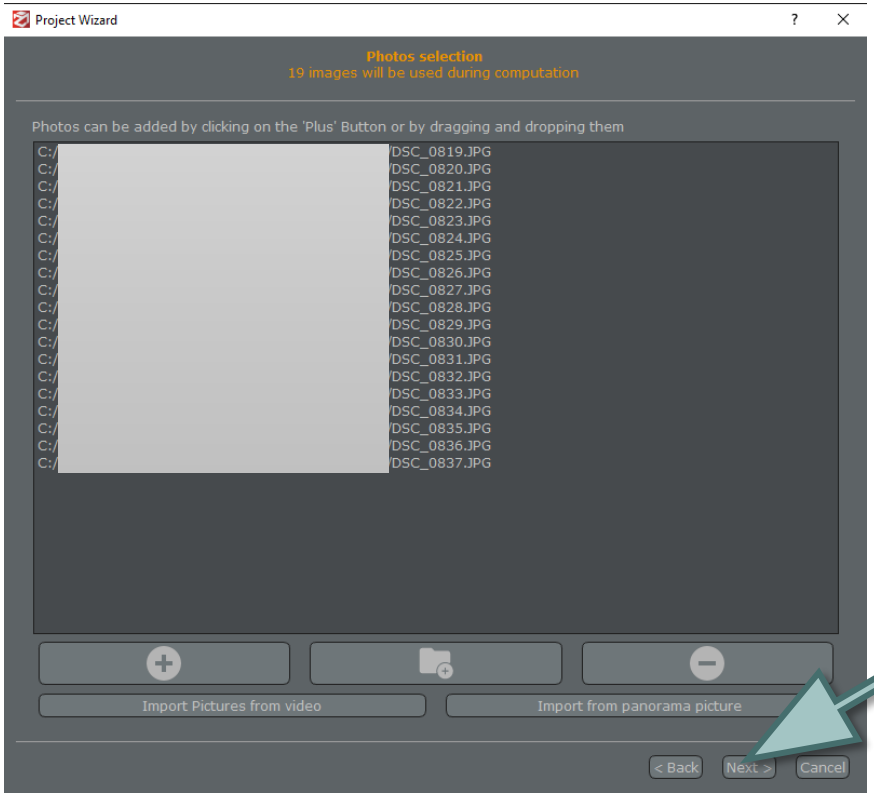


+ to add images

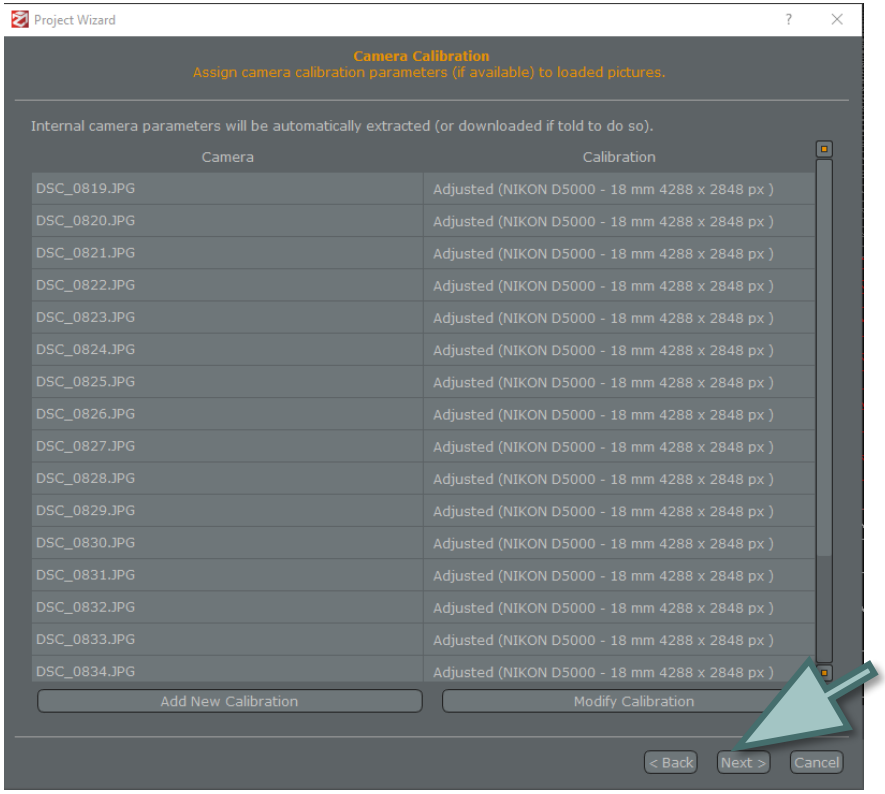
then Next



Next

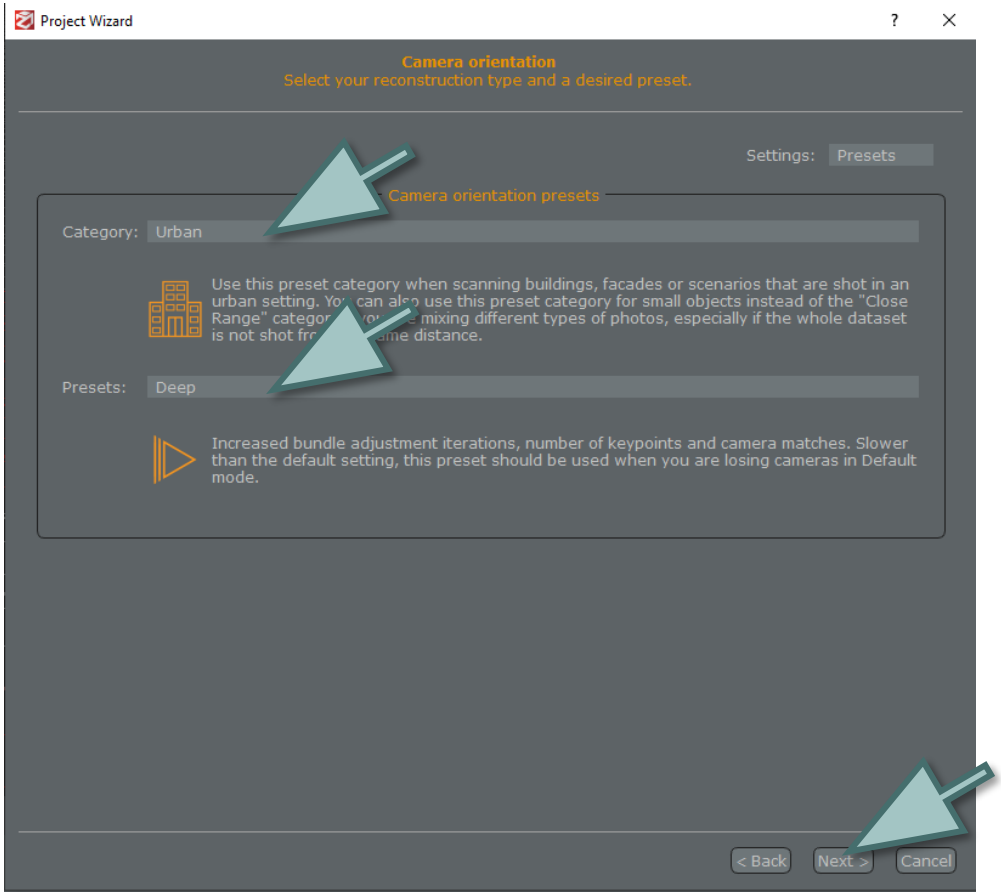

Project Wizard
Photos selection
19 images will be used during computation
Photos can be added by clicking on the 'Plus' Button or by dragging and dropping them
C:/DSC_0819.JPG
C:/DSC_0820.JPG
C:/DSC_0821.JPG
C:/DSC_0822.JPG
C:/DSC_0823.JPG
C:/DSC_0824.JPG
C:/DSC_0825.JPG
C:/DSC_0826.JPG
C:/DSC_0827.JPG
C:/DSC_0828.JPG
C:/DSC_0829.JPG
C:/DSC_0830.JPG
C:/DSC_0831.JPG
C:/DSC_0832.JPG
C:/DSC_0833.JPG
C:/DSC_0834.JPG
C:/DSC_0835.JPG
C:/DSC_0836.JPG
C:/DSC_0837.JPG
Import Pictures from video
Import from panorama picture
< Back
Next >
Cancel

Next


Project Wizard
Camera Calibration
Assign camera calibration parameters (if available) to loaded pictures.
Internal camera parameters will be automatically extracted (or downloaded if told to do so).
Camera
Calibration
DSC_0819.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0820.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0821.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0822.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0823.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0824.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0825.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0826.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0827.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0828.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0829.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0830.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0831.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0832.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0833.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
DSC_0834.JPG Adjusted (NIKON D5000 - 18 mm 4288 x 2848 px)
Add New Calibration
Modify Calibration
< Back
Next >
Cancel

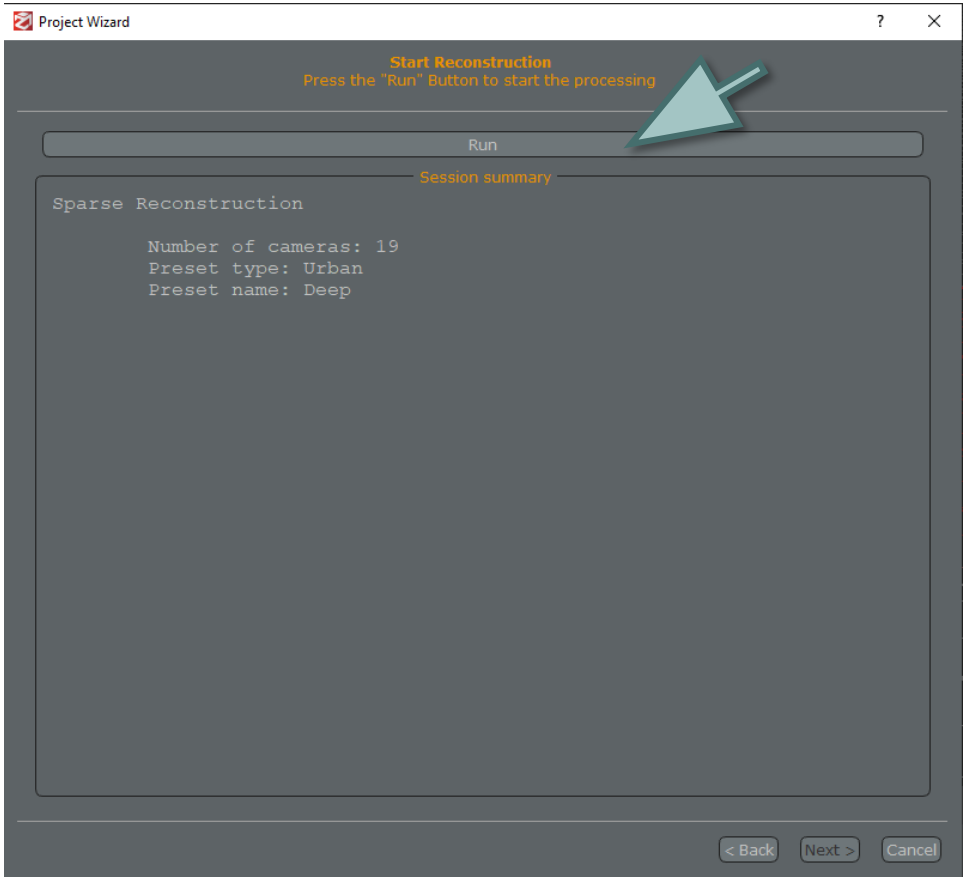
Category: Urban
Presets: Deep

then Next

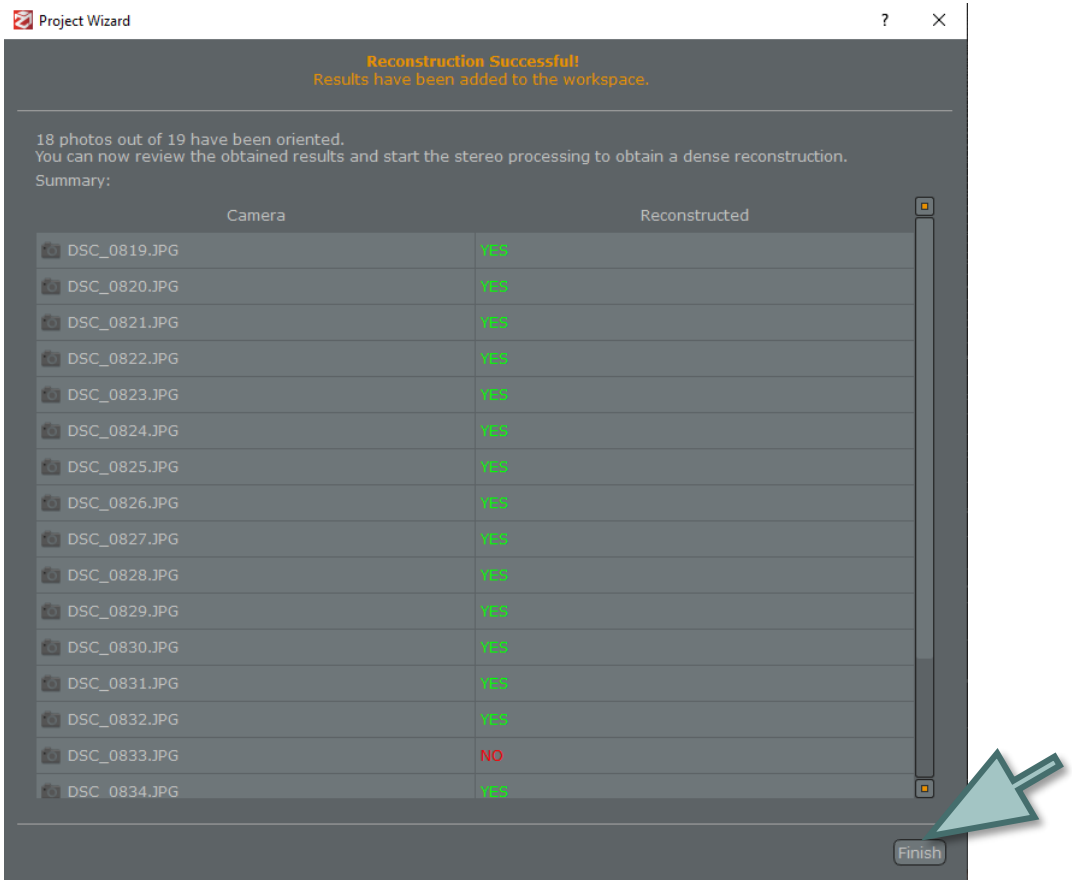


Run

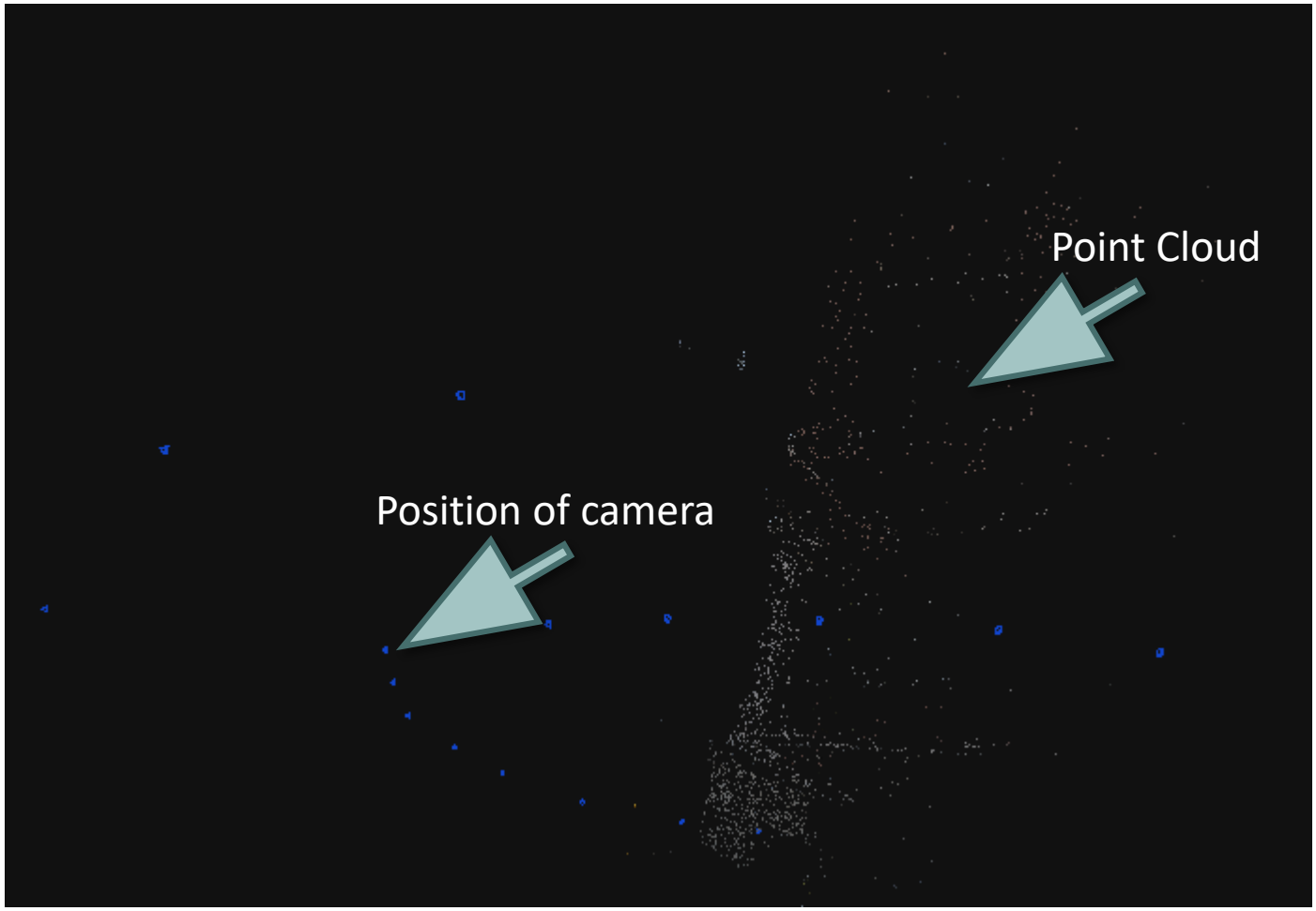
and wait


Project Wizard
Start Reconstruction
Press the "Run" Button to start the processing
Run
Session summary
Sparse Reconstruction
Number of cameras: 19
Preset type: Urban
Preset name: Deep
< Back
Next >
Cancel

Finish


Project Wizard
Reconstruction Successful!
Results have been added to the workspace.
18 photos out of 19 have been oriented.
You can now review the obtained results and start the stereo processing to obtain a dense reconstruction.
Summary:
Camera
Reconstructed
DSC_0819.JPG YES
DSC_0820.JPG YES
DSC_0821.JPG YES
DSC_0822.JPG YES
DSC_0823.JPG YES
DSC_0824.JPG YES
DSC_0825.JPG YES
DSC_0826.JPG YES
DSC_0827.JPG YES
DSC_0828.JPG YES
DSC_0829.JPG YES
DSC_0830.JPG YES
DSC_0831.JPG YES
DSC_0832.JPG YES
DSC_0833.JPG NO
DSC_0834.JPG YES
Finish

First effect



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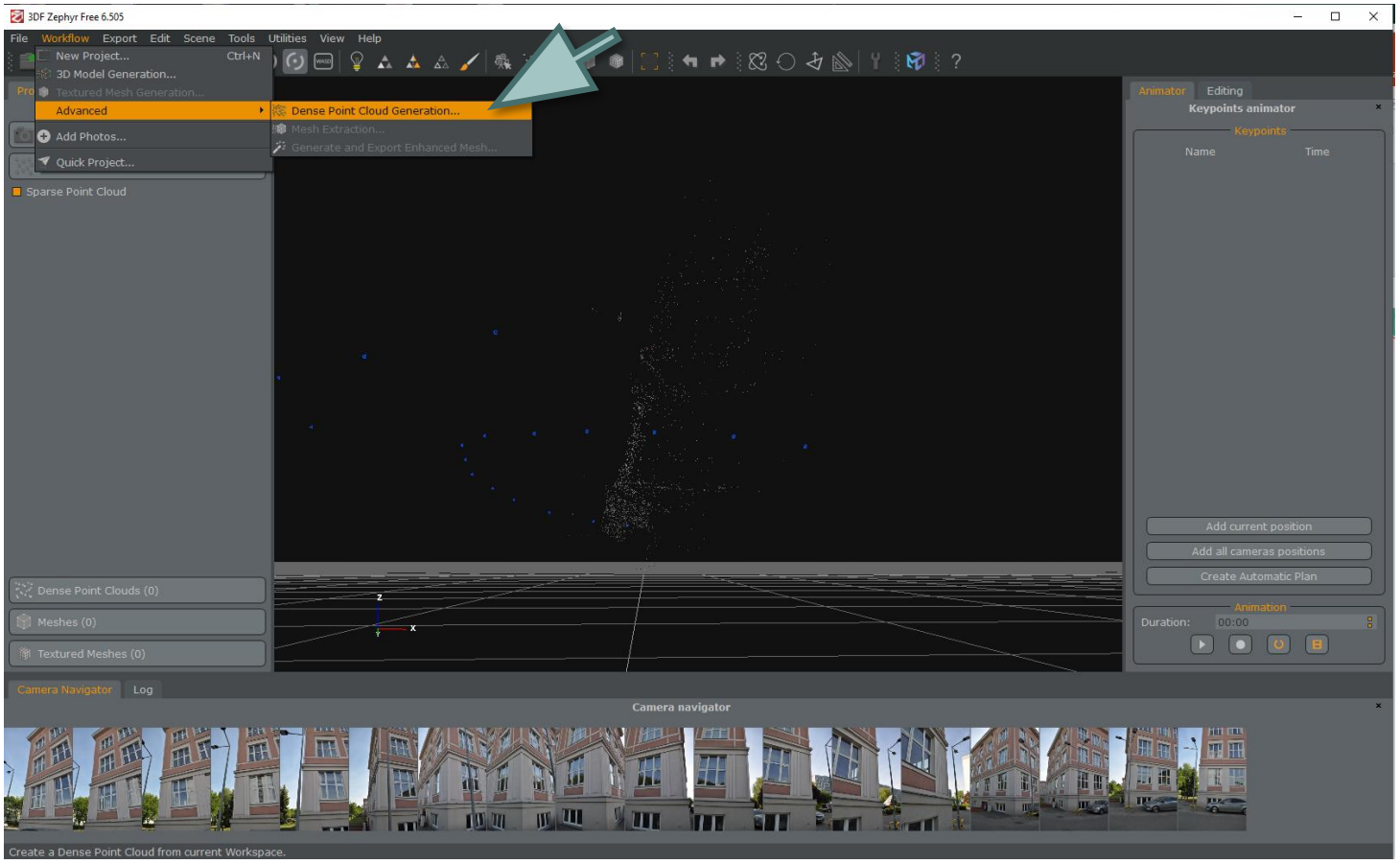
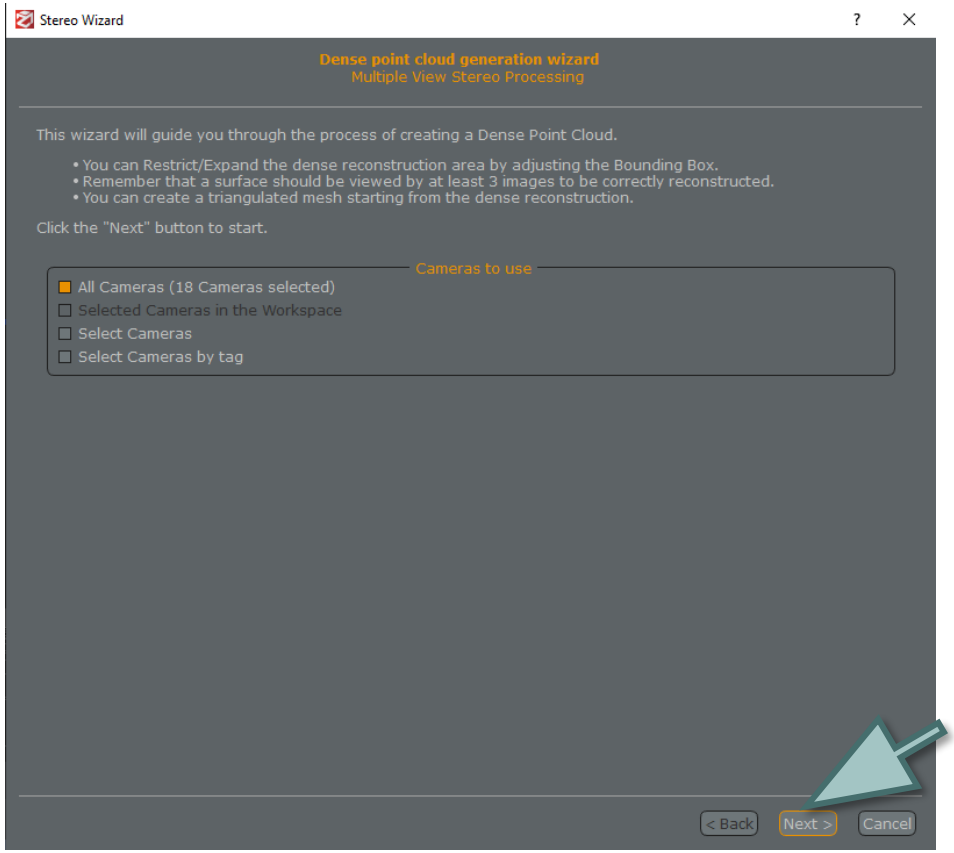
Create dense point cloud

MENU / Workflow / Advanced / Dense Point Cloud Generation

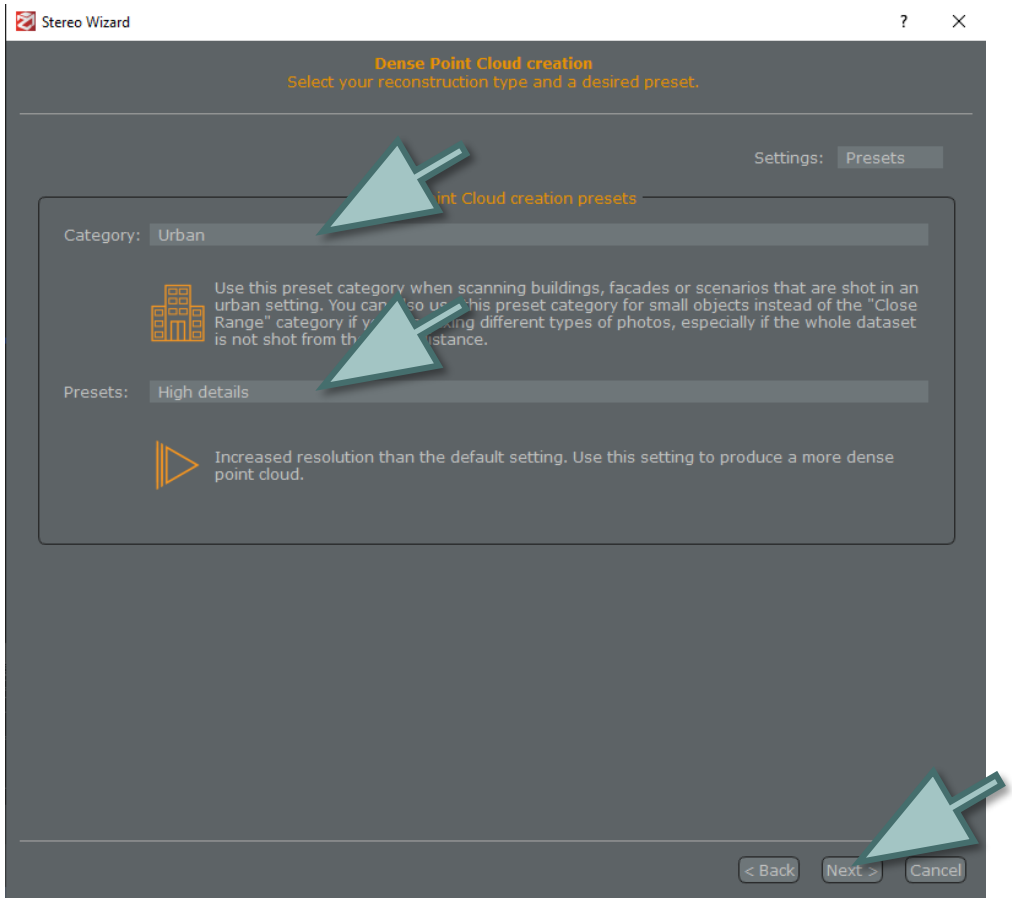


Next


Stereo Wizard
Dense point cloud generation wizard
Multiple View Stereo Processing
This wizard will guide you through the process of creating a Dense Point Cloud.
• You can Restrict/Expand the dense reconstruction area by adjusting the Bounding Box.
• Remember that a surface should be viewed by at least 3 images to be correctly reconstructed.
• You can create a triangulated mesh starting from the dense reconstruction.
Click the "Next" button to start.
Cameras to use
All Cameras (18 Cameras selected)
Selected Cameras in the Workspace
Select Cameras
Select Cameras by tag
< Back
Next >
Cancel

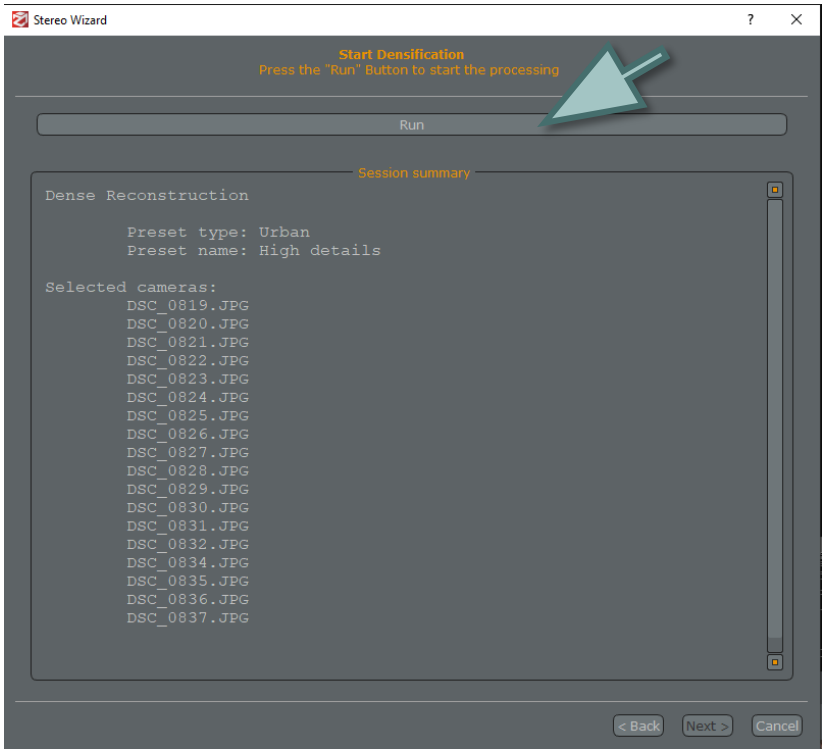
Category: Urban
Presets: High details

then Next

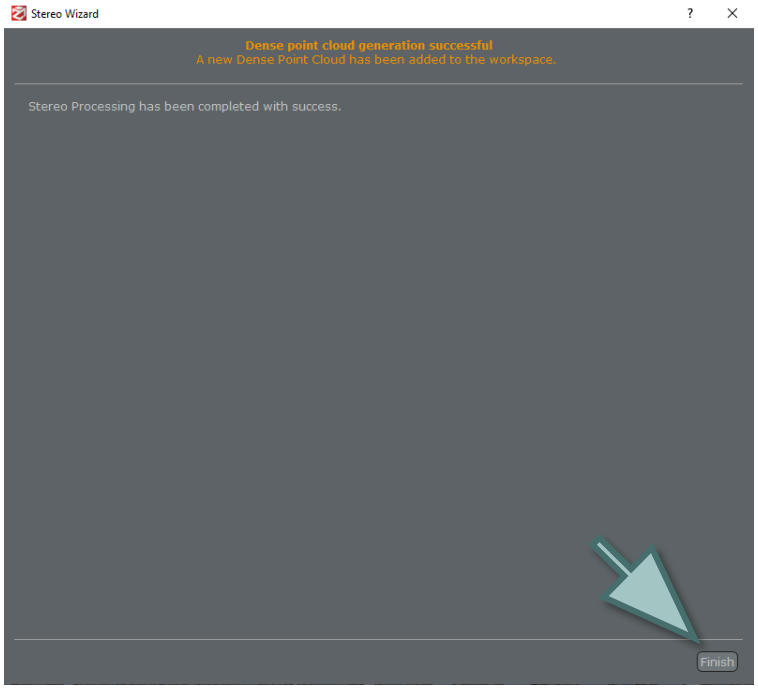


Run

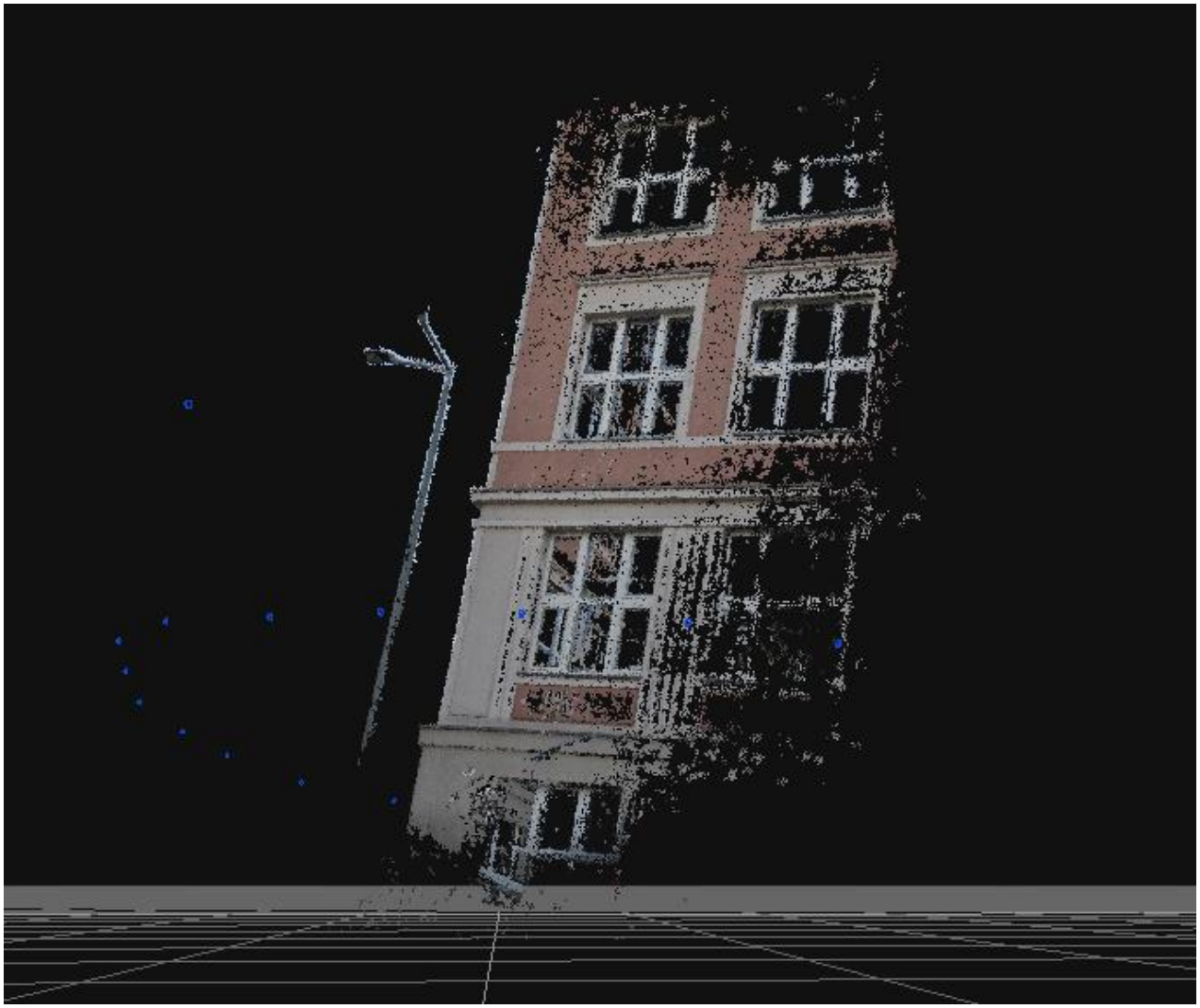
and wait



then Finish

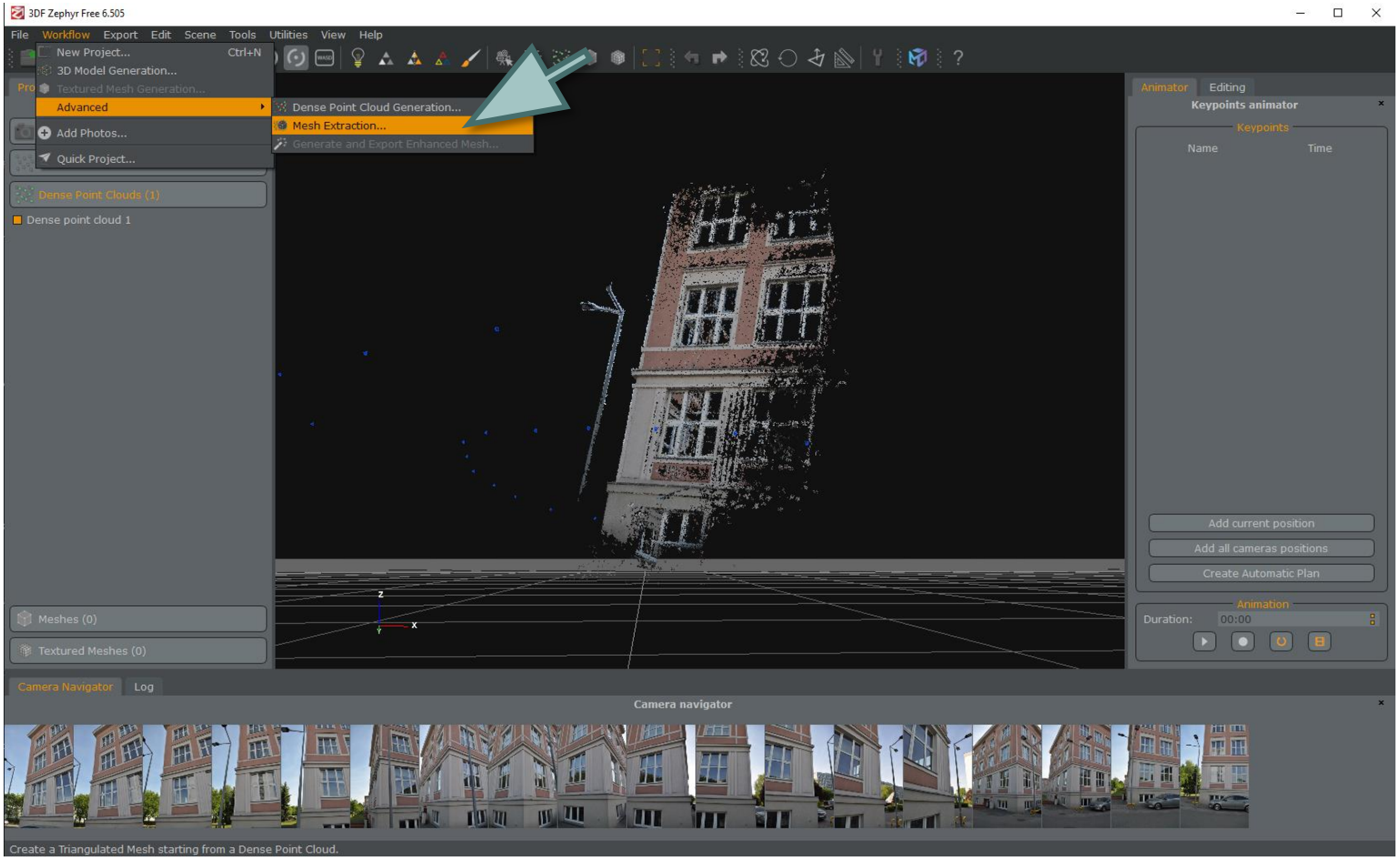


Dense point cloud



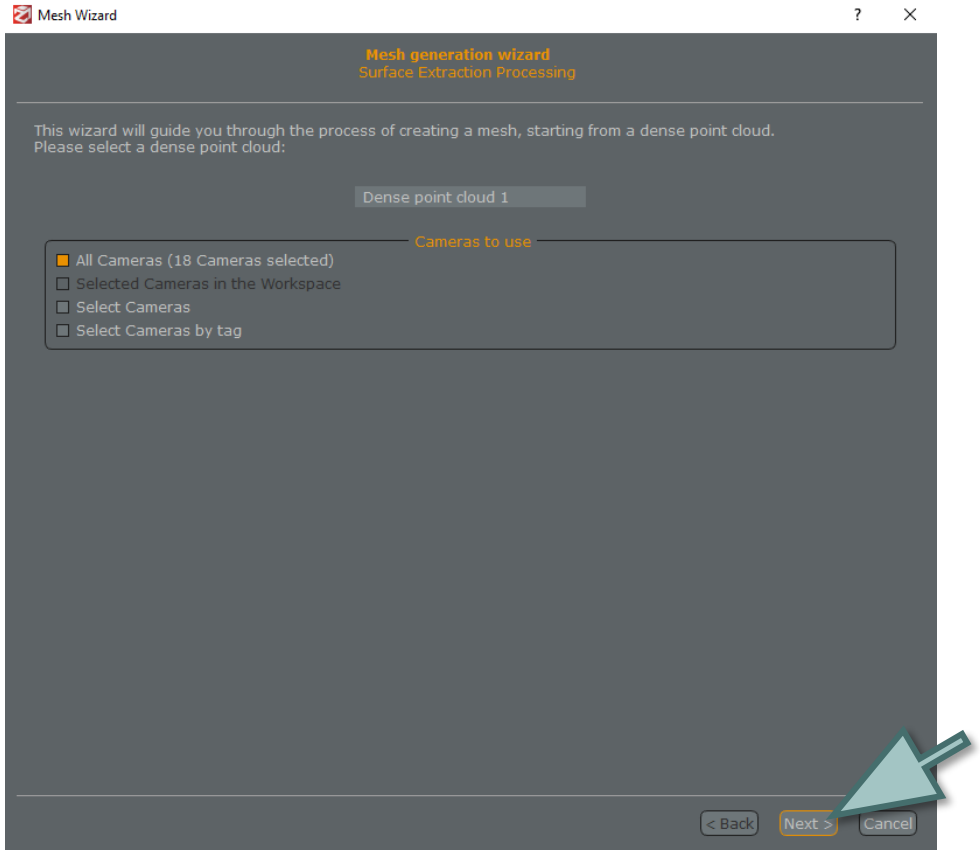
Create the mesh

MENU / Workflow / Advanced / Mesh Extraction



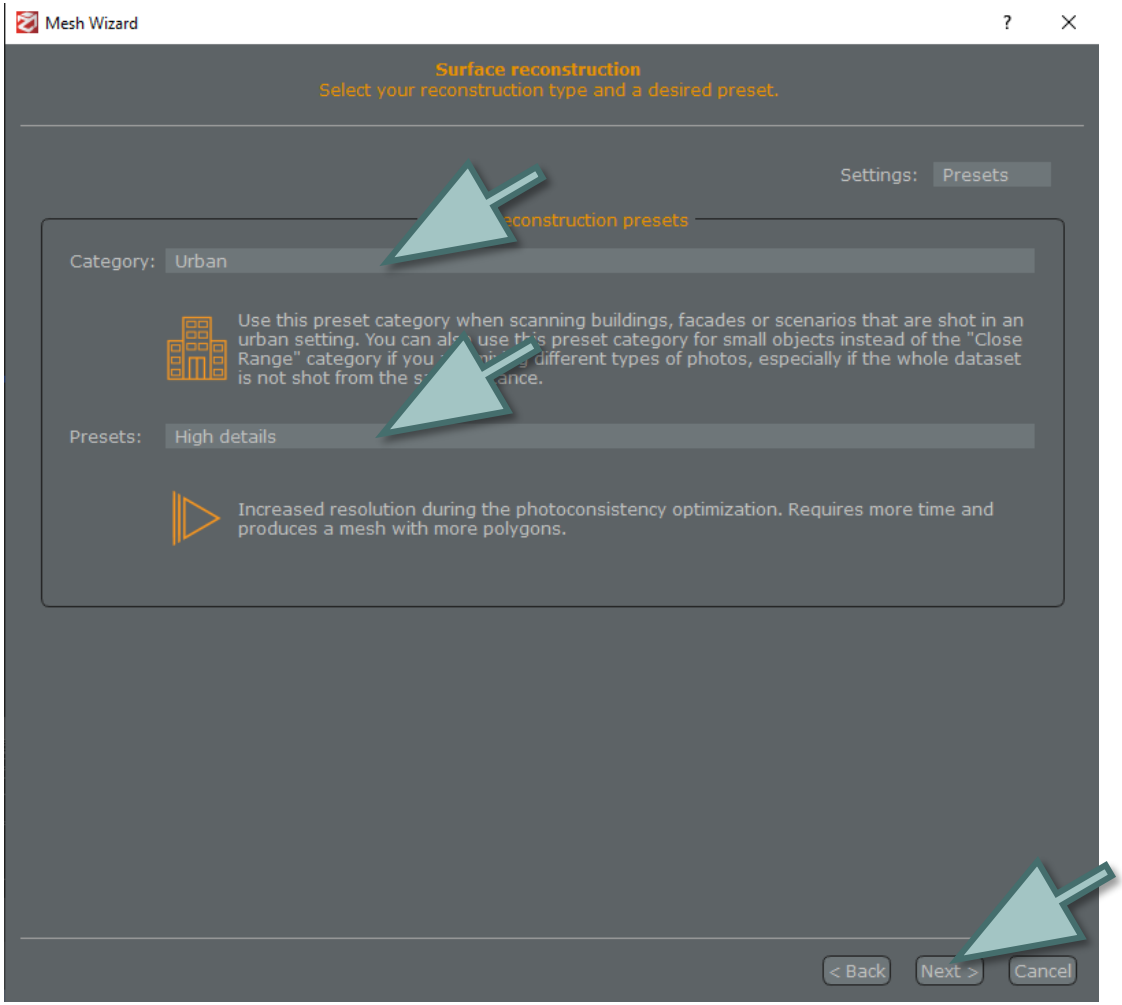
PHOTOGRAMMETRY

Next


Mesh Wizard
Mesh generation wizard
Surface Extraction Processing
This wizard will guide you through the process of creating a mesh, starting from a dense point cloud.
Please select a dense point cloud:
Dense point cloud 1
Cameras to use
All Cameras (18 Cameras selected)
Selected Cameras in the Workspace
Select Cameras
Select Cameras by tag
< Back
Next >
Cancel

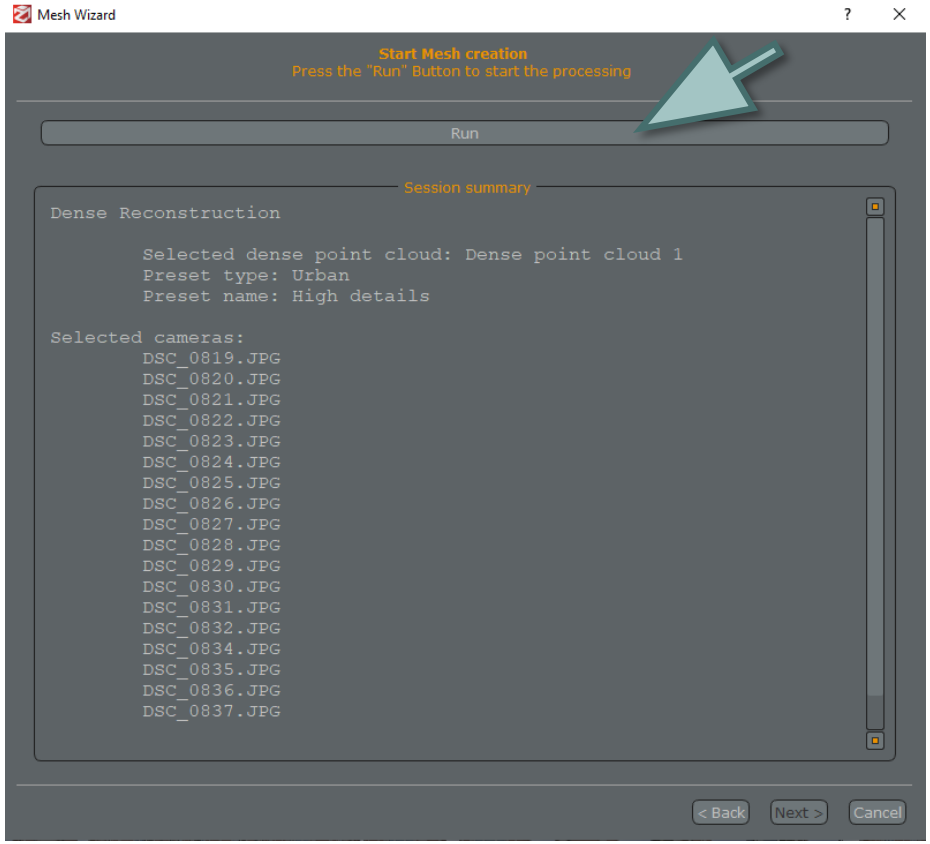
Category: Urban
Presets: High details

then Next

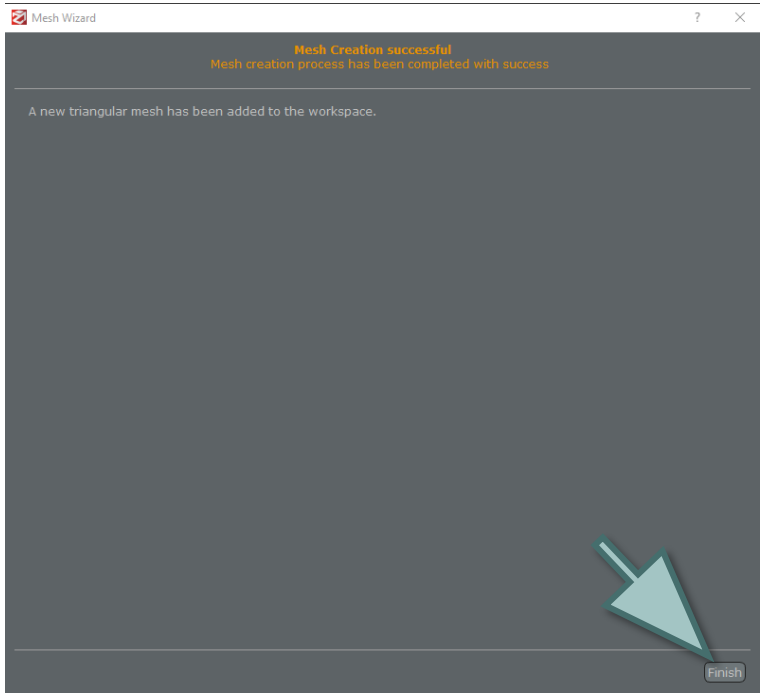


Run

and wait



then Finish



Mesh

PHOTOGRAMMETRY

4. Edit the model

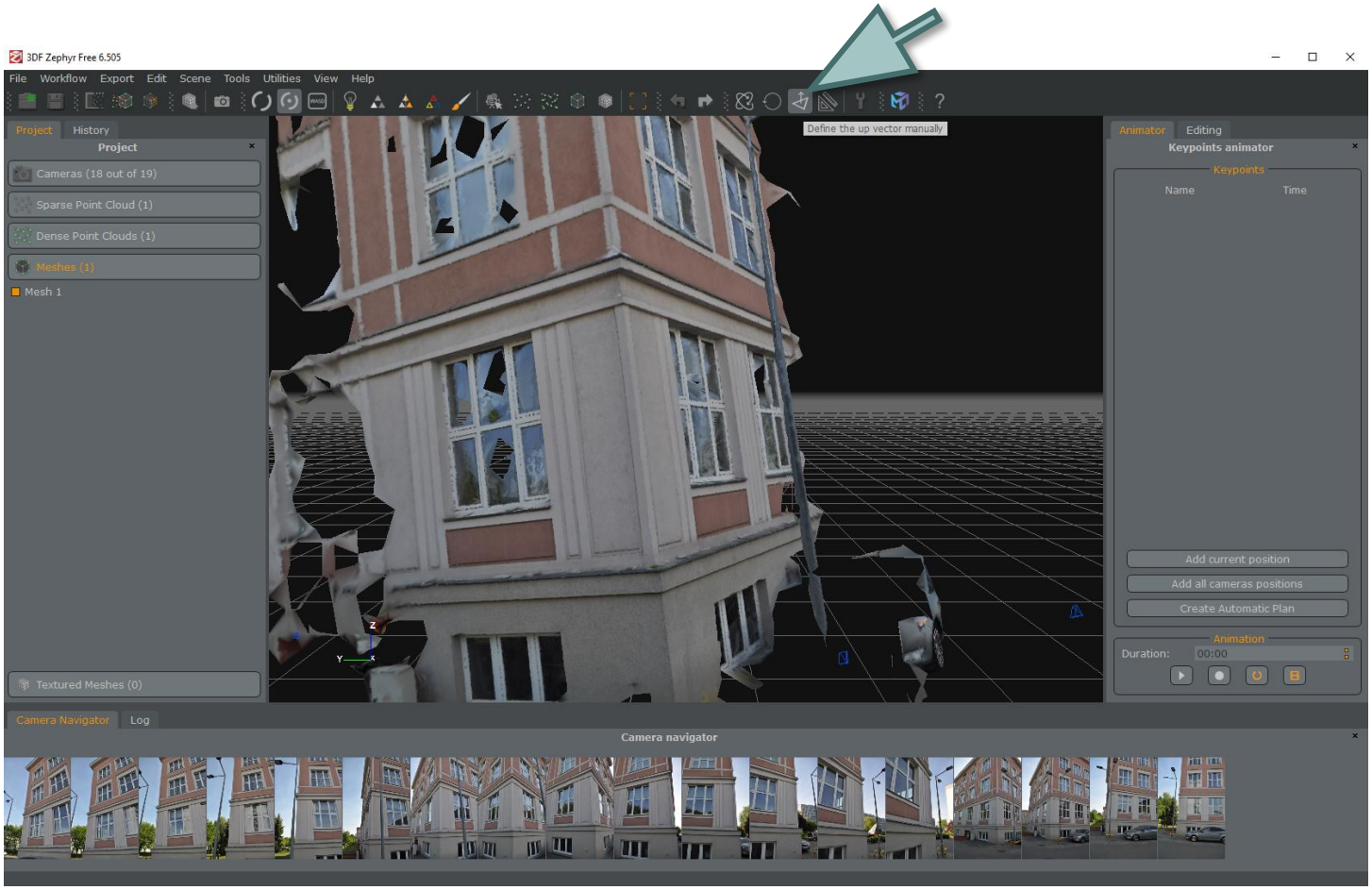
Define the vertical direction

Scale the model

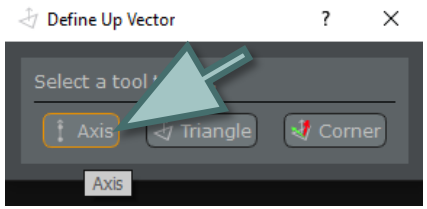
Define the vertical direction

click the left mouse button and move the mouse to rotate

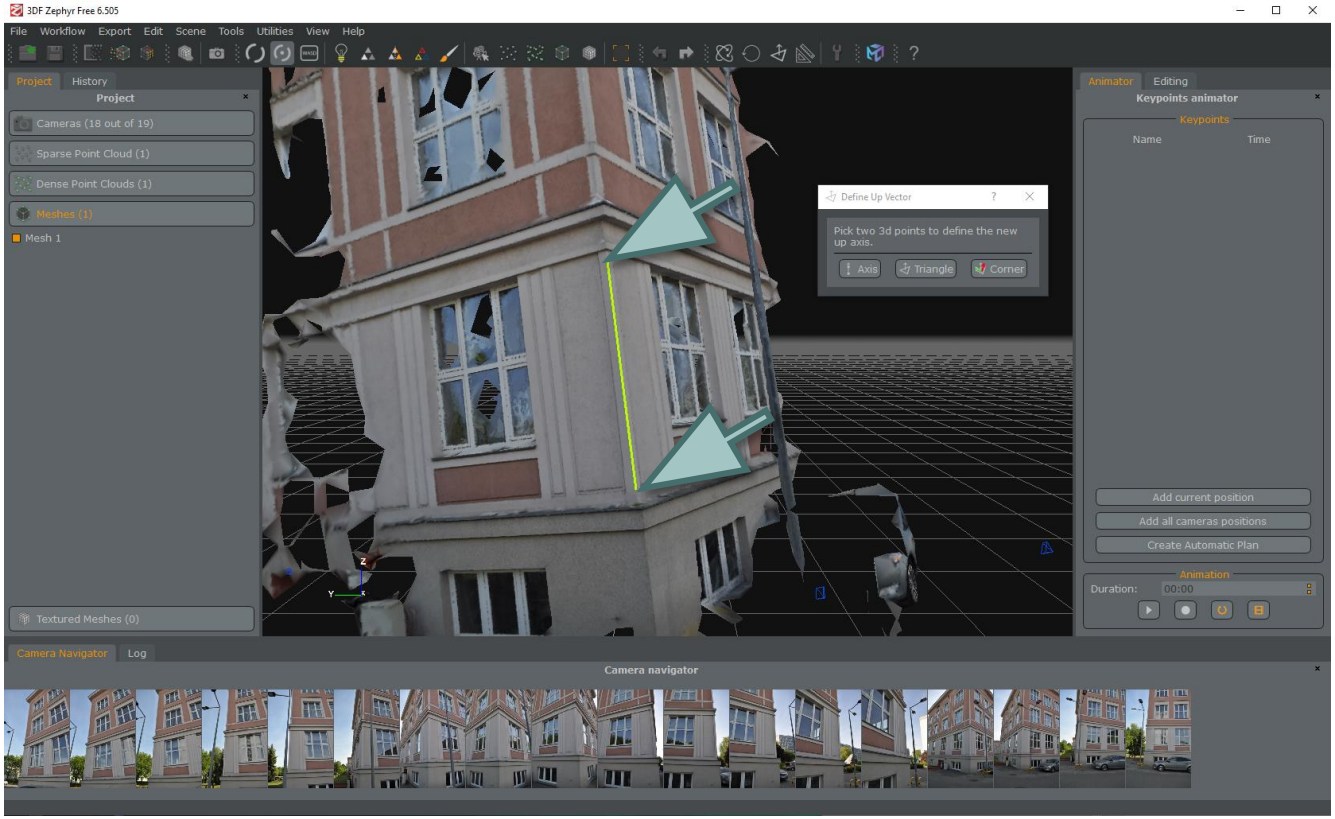
scroll to scale



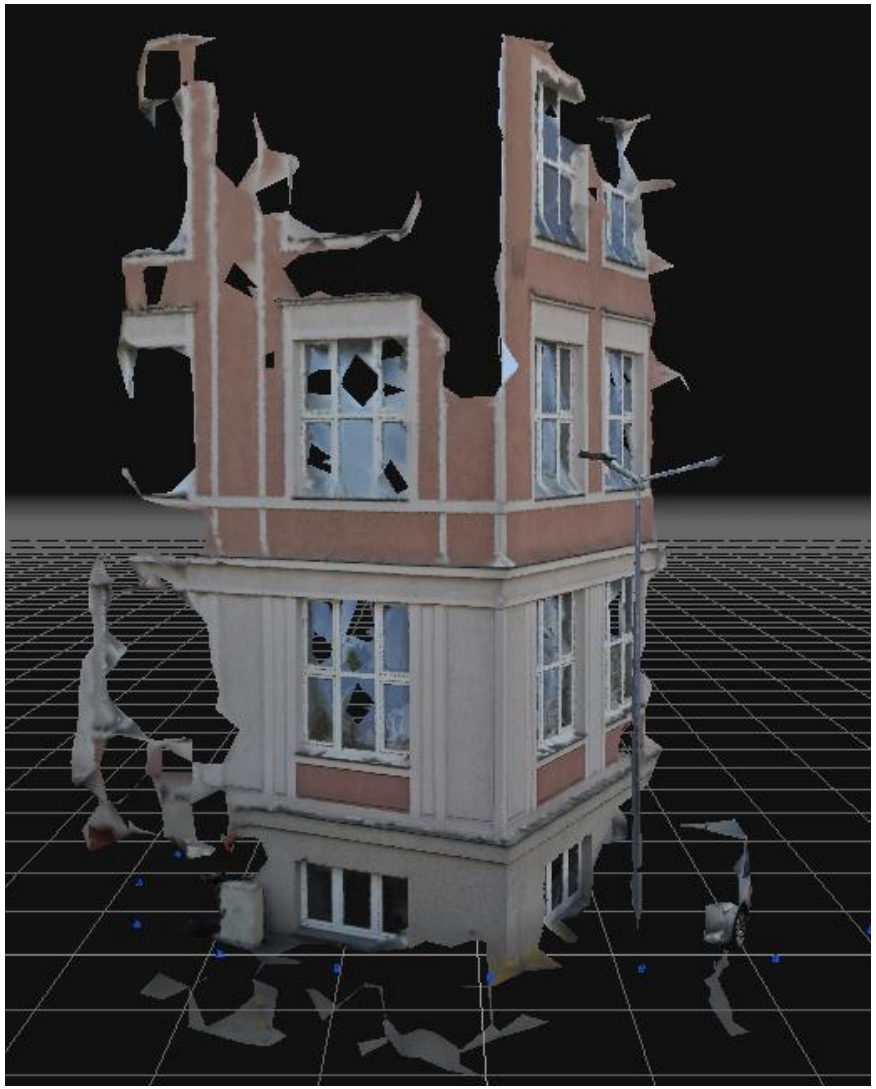
Axis



and click on two corner points to select the vertical edge



Effect

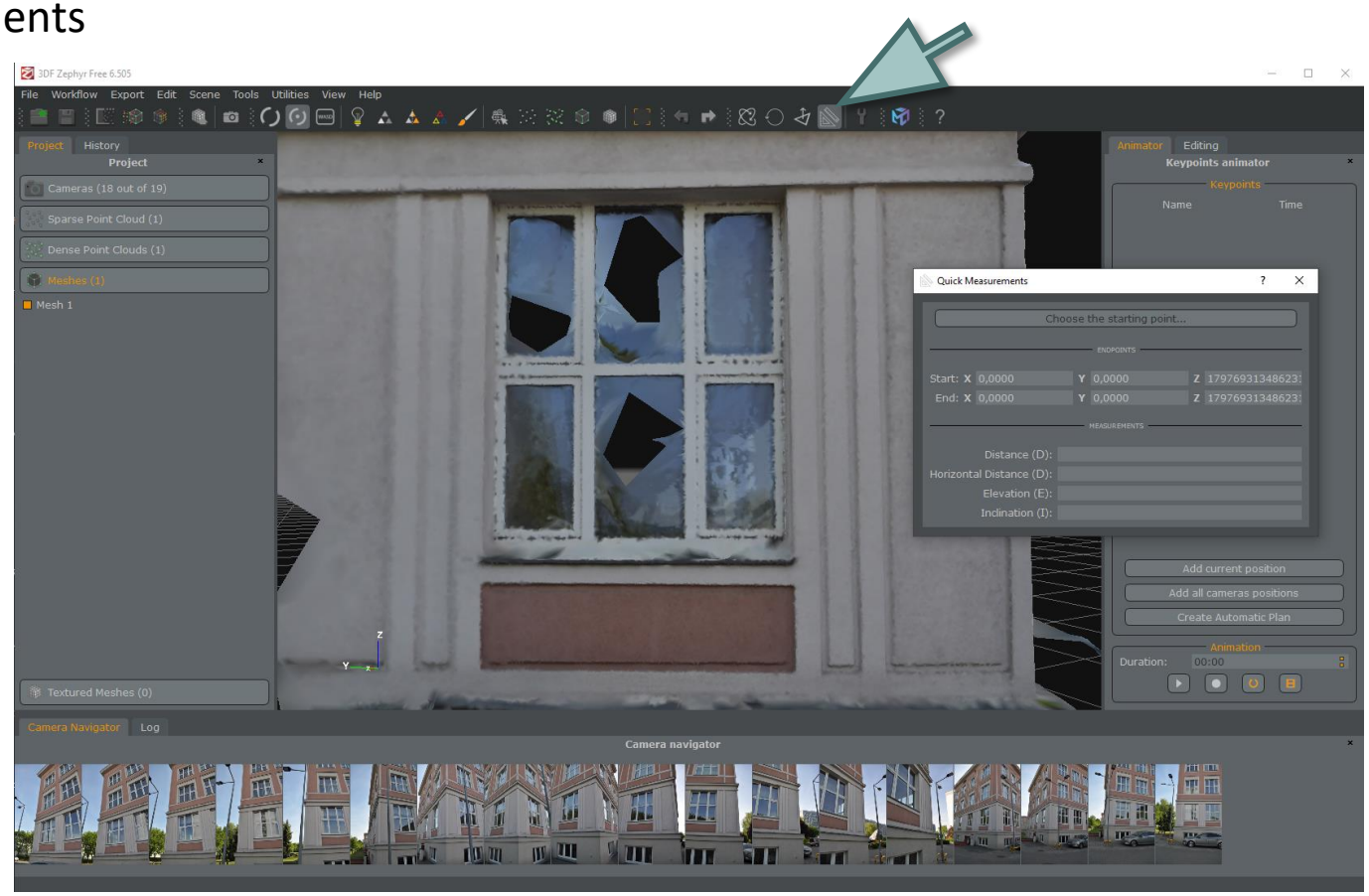


PHOTOGRAMMETRY

Scale the model

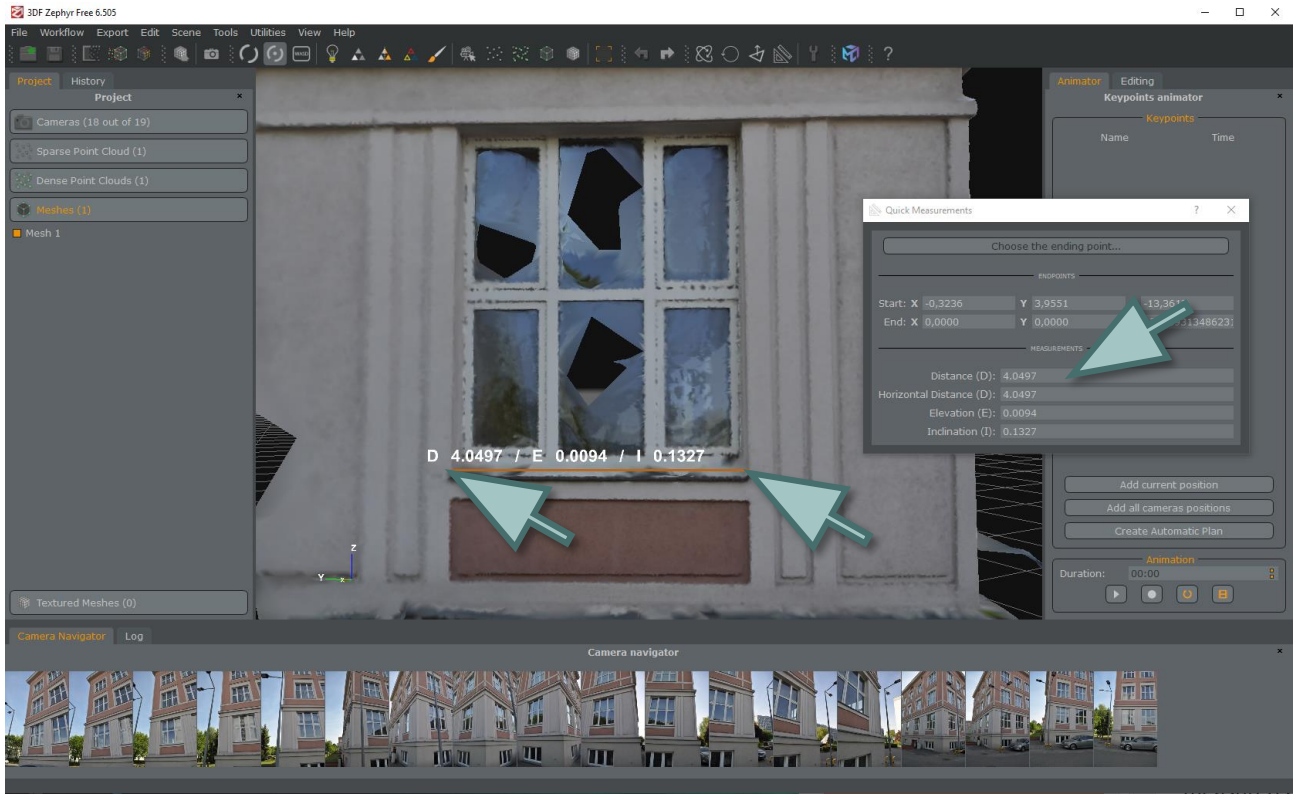
rotate and scale the model to see the window straight ahead

then Quick Measurments



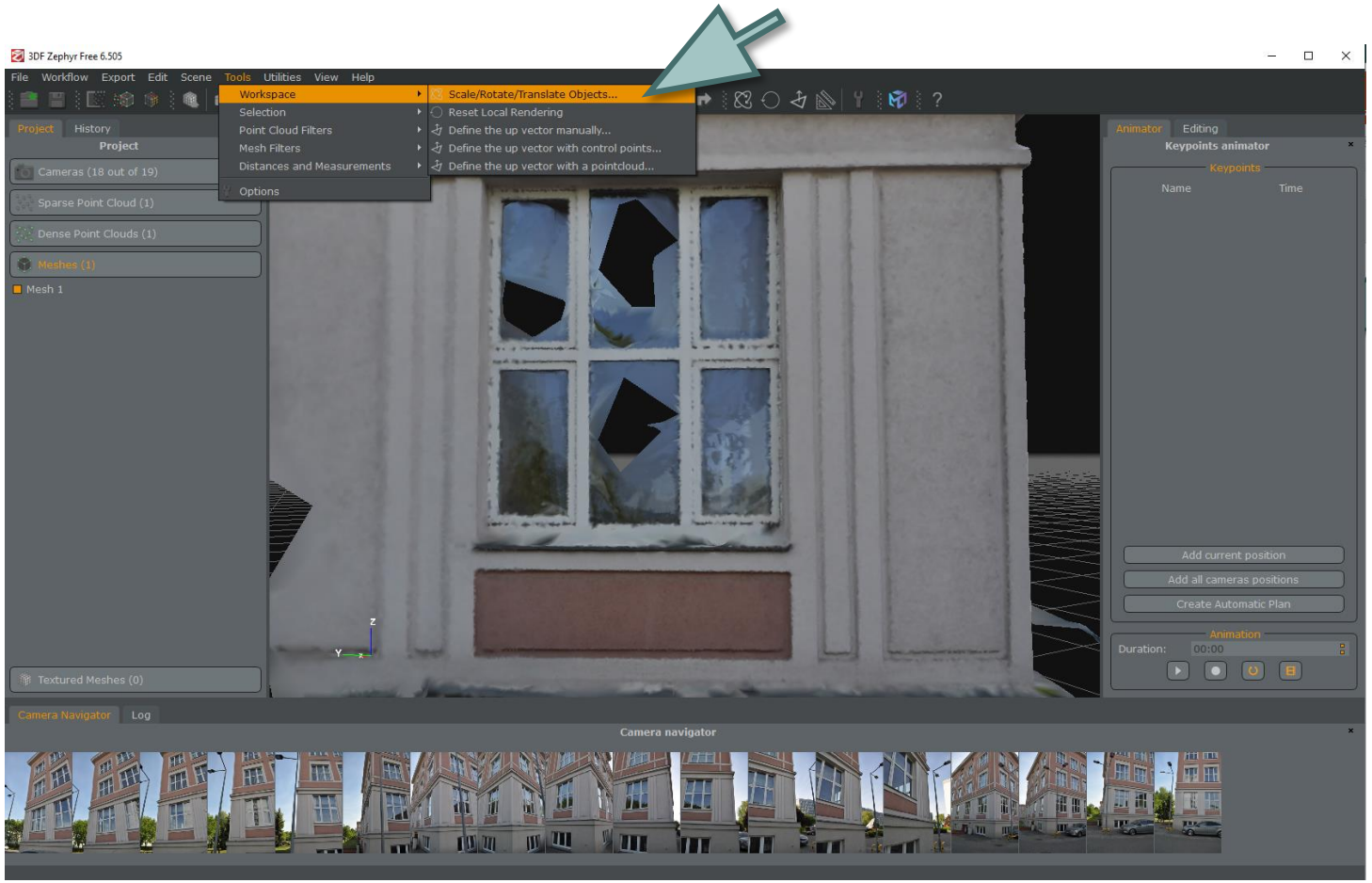
PHOTOGRAMMETRY

- click two points on the edge of the window and read the distance
- measured actual width of the window: 1.95 m
- calculate the scale: 1.95 / 4.05 = 0.48



PHOTOGRAMMETRY

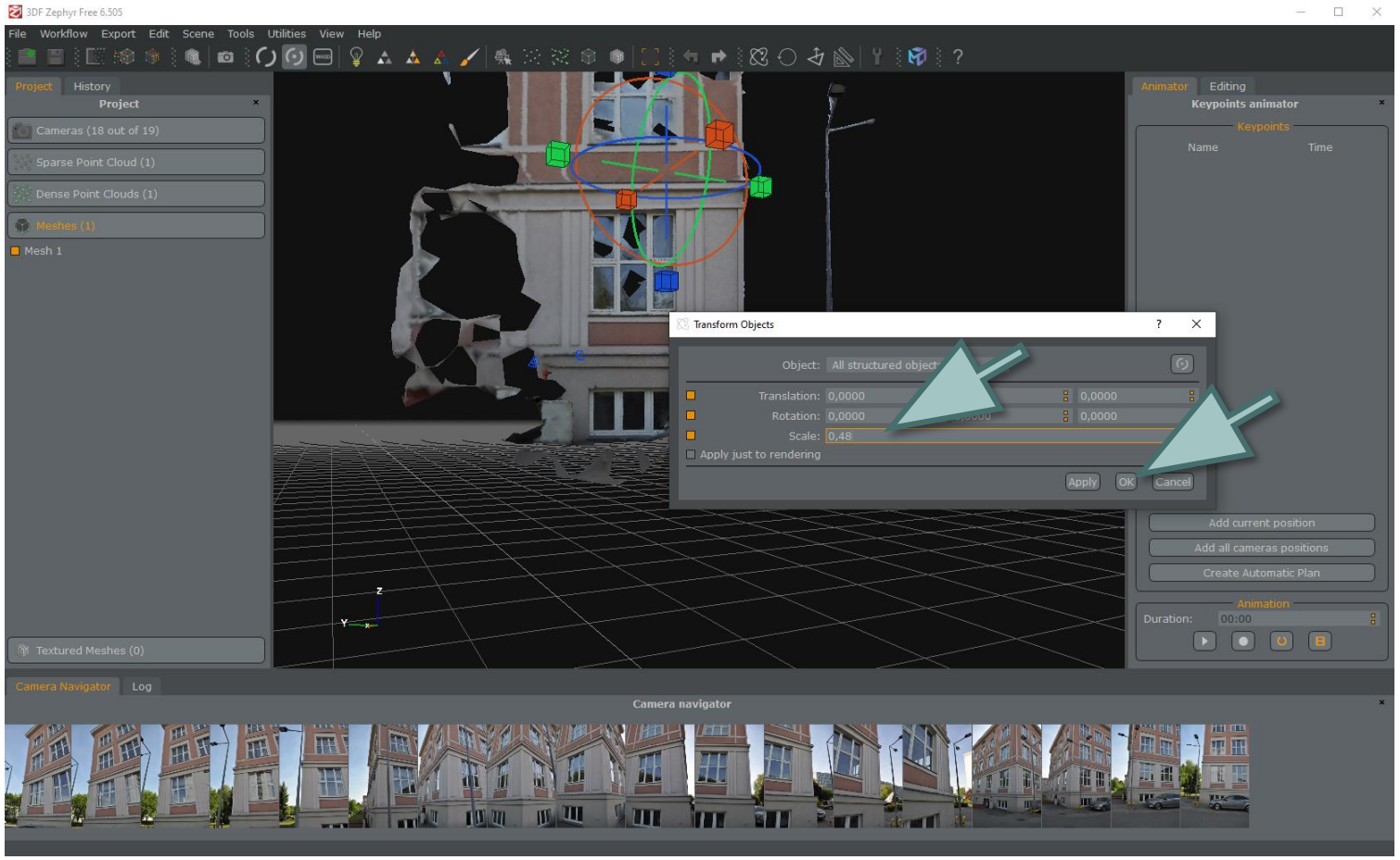
MENU / Tools / Workspace / Scale…



PHOTOGRAMMETRY

enter 0.48

then OK



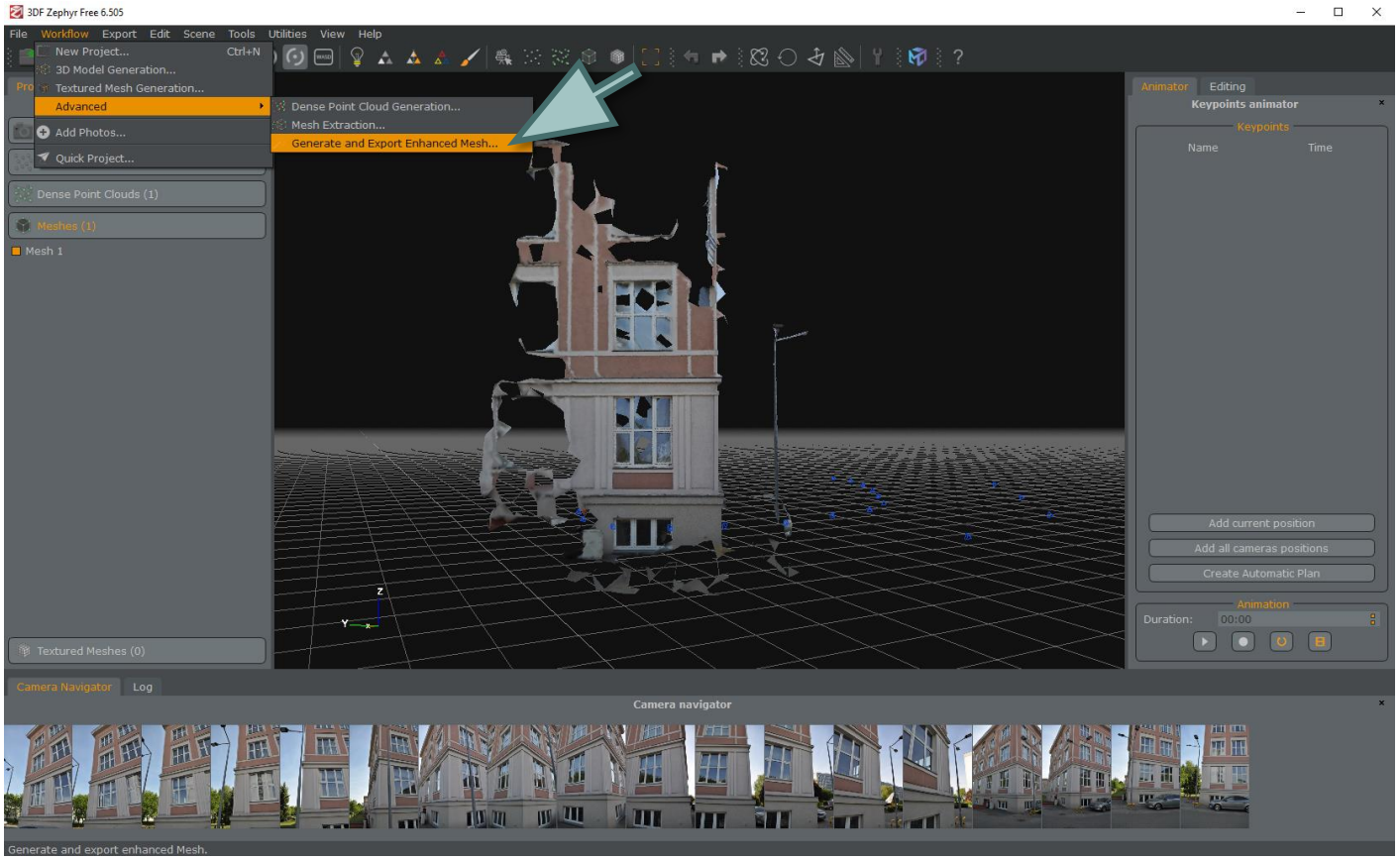
measure the window width again to check if it is scaled properly

5. Export the model

export the model to import it into a 3D modeling program

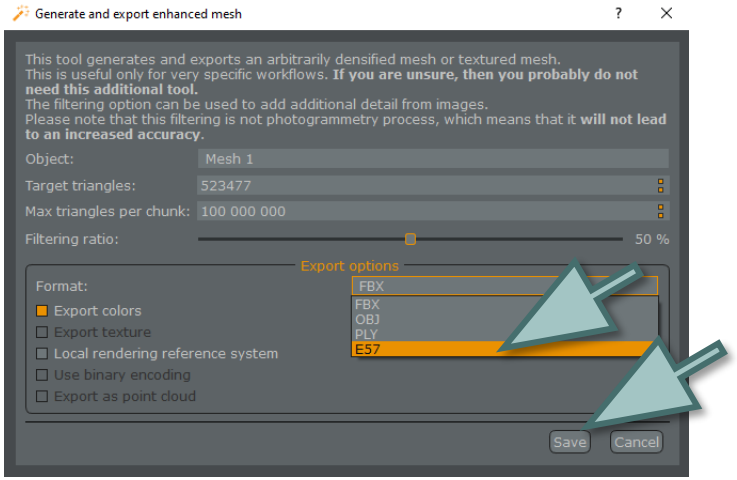
Export the model

MENU / Workflow / Advanced / Export Mesh …



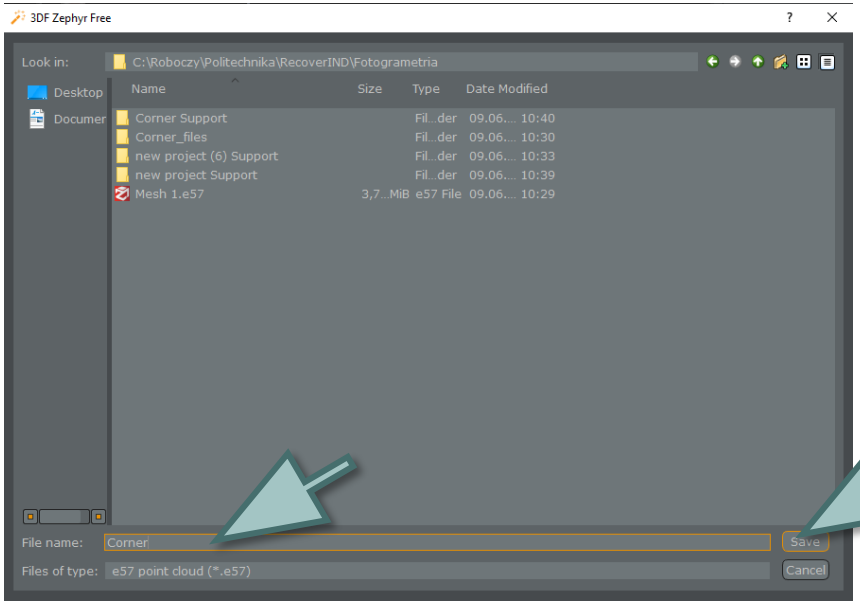
select format: E57

then Save



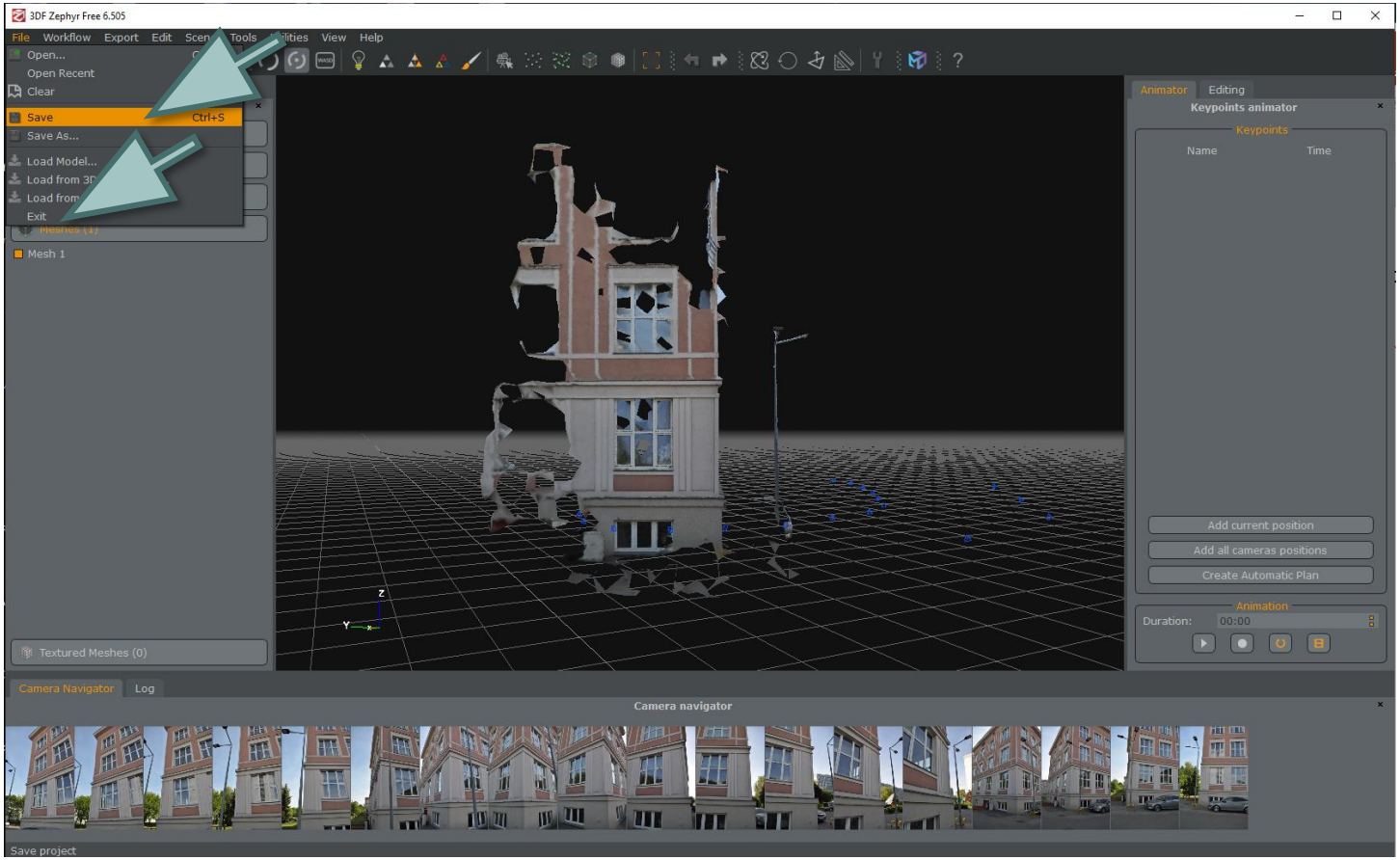
enter the name

then Save



Save the file

then Exit

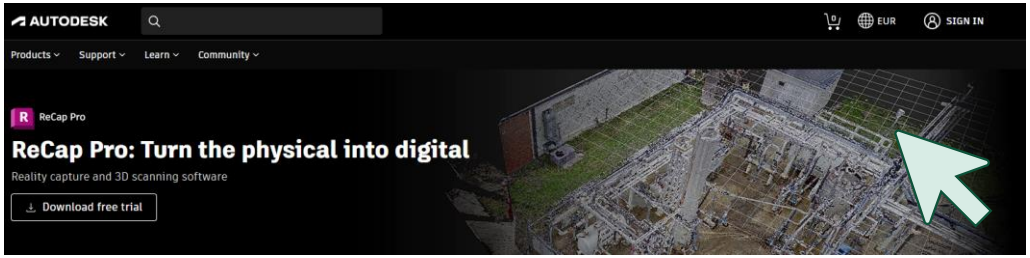


6. Change the format

- E57 format can be directly imported as a point cloud into Archicad
- in order to import the point cloud into Revit you need to change its format to RCP

Download and install Autodesk Recap

Information about Autodesk Recap:



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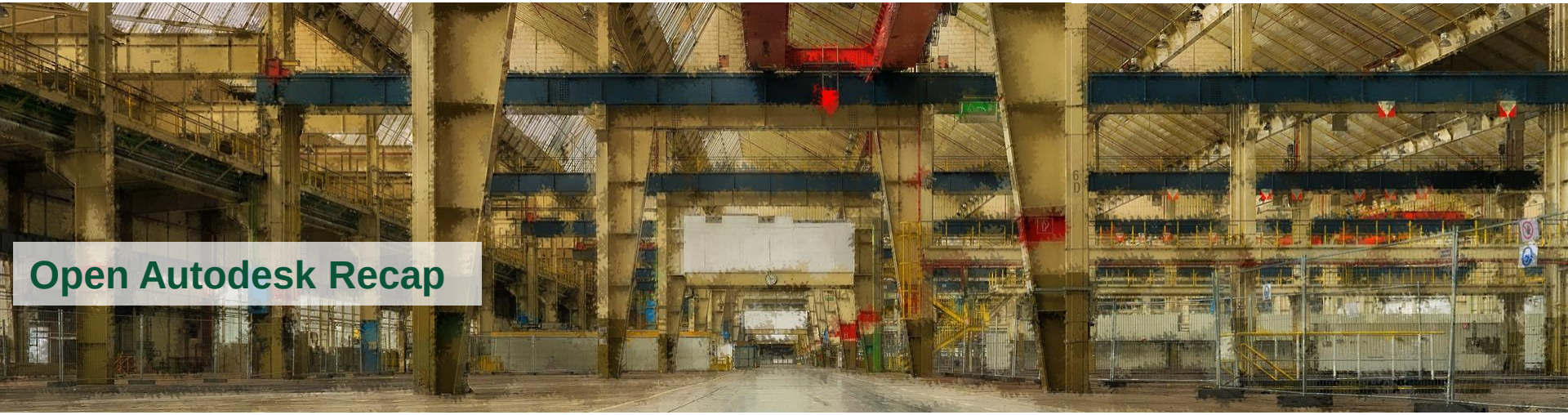
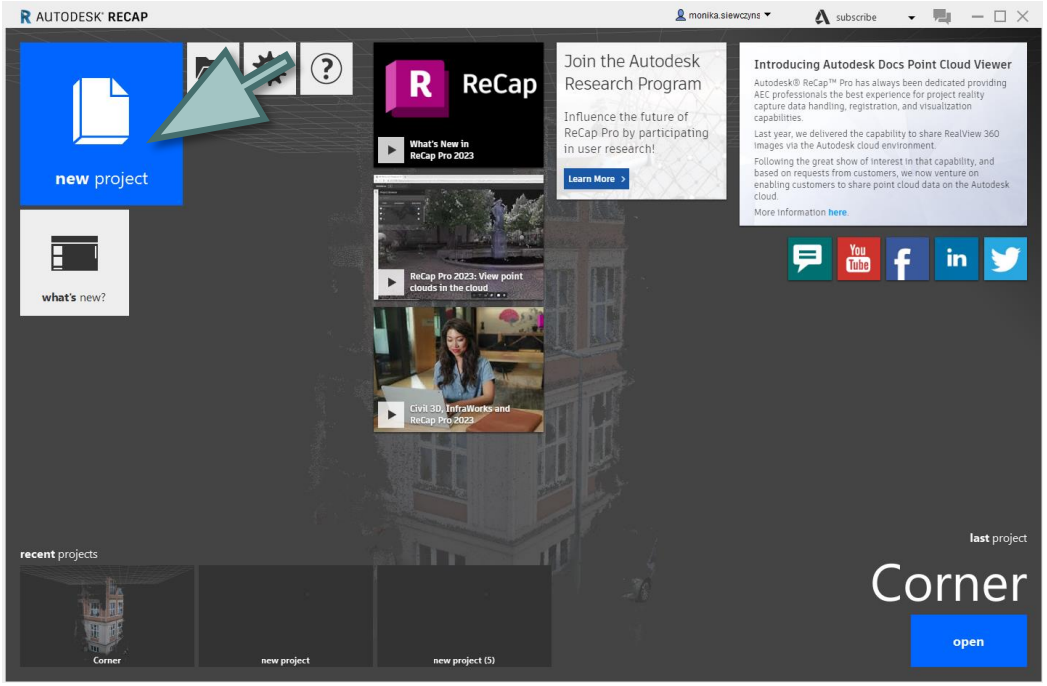


Open Autodesk Recap

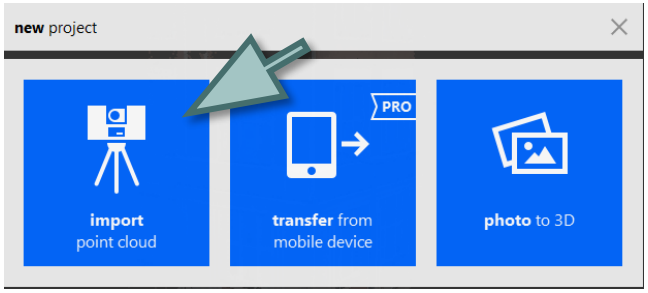
Import point cloud

open file *.e57 using Autodesk ReCap software



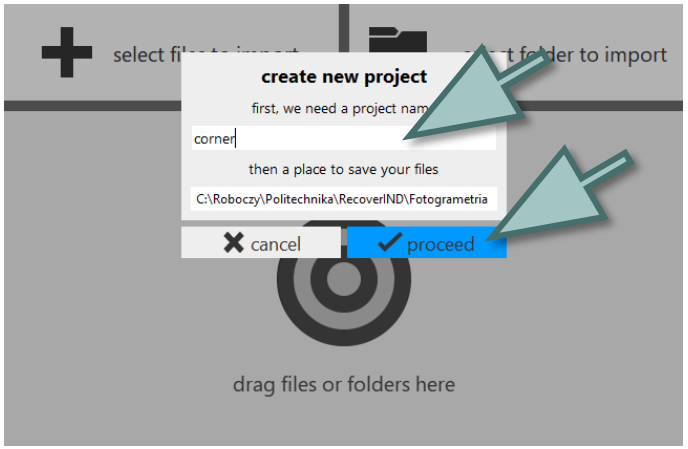
new project

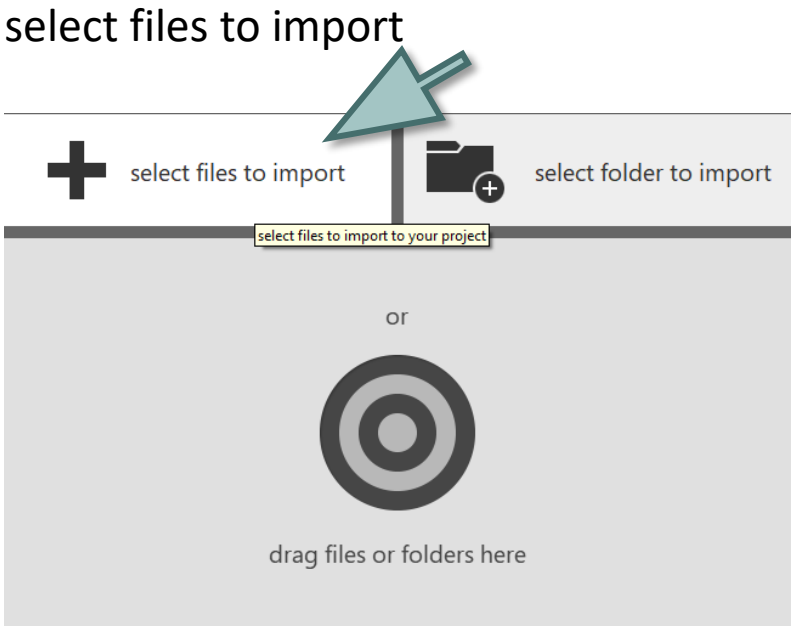
then import point cloud



enter the name

then proceed

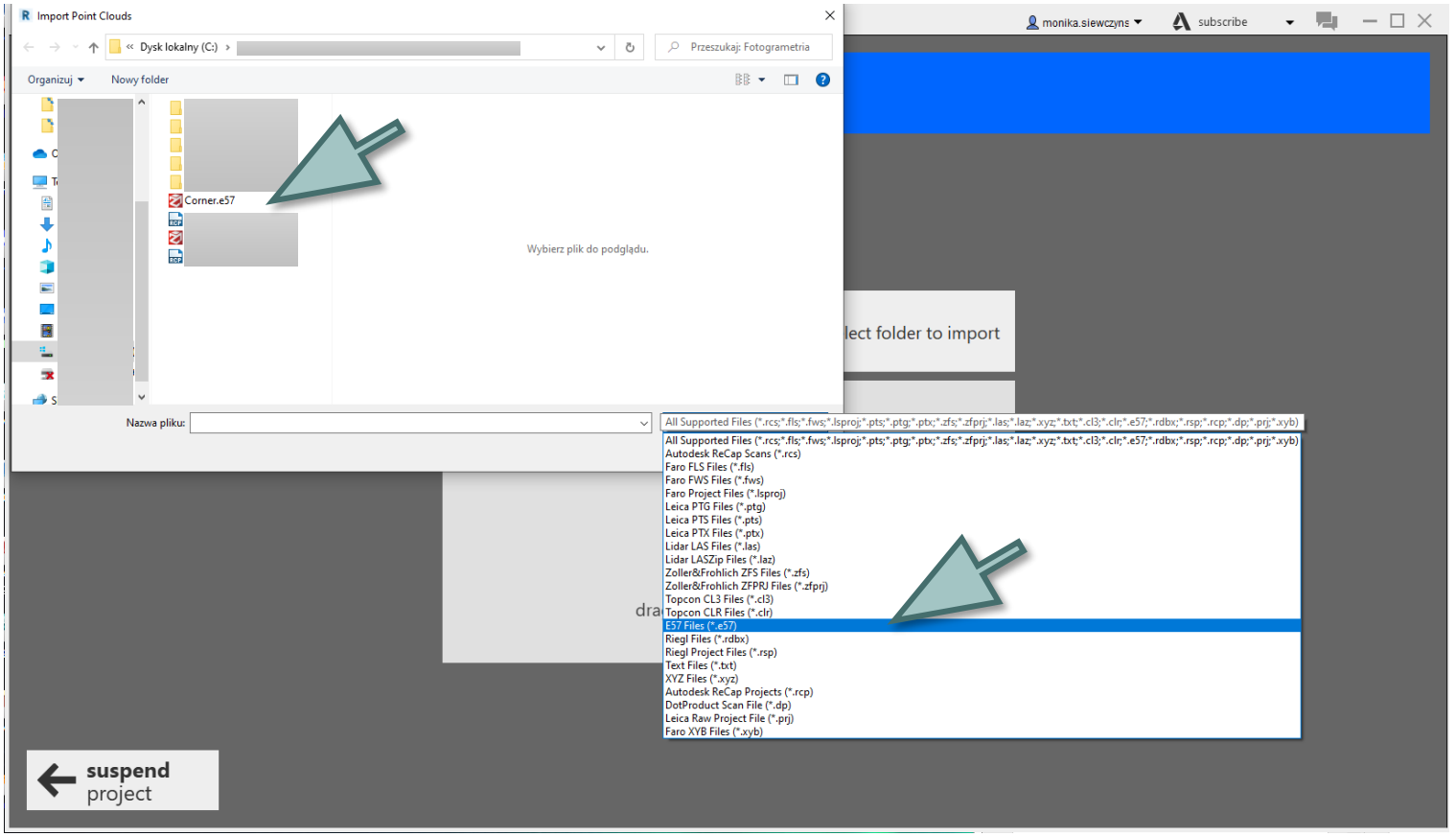




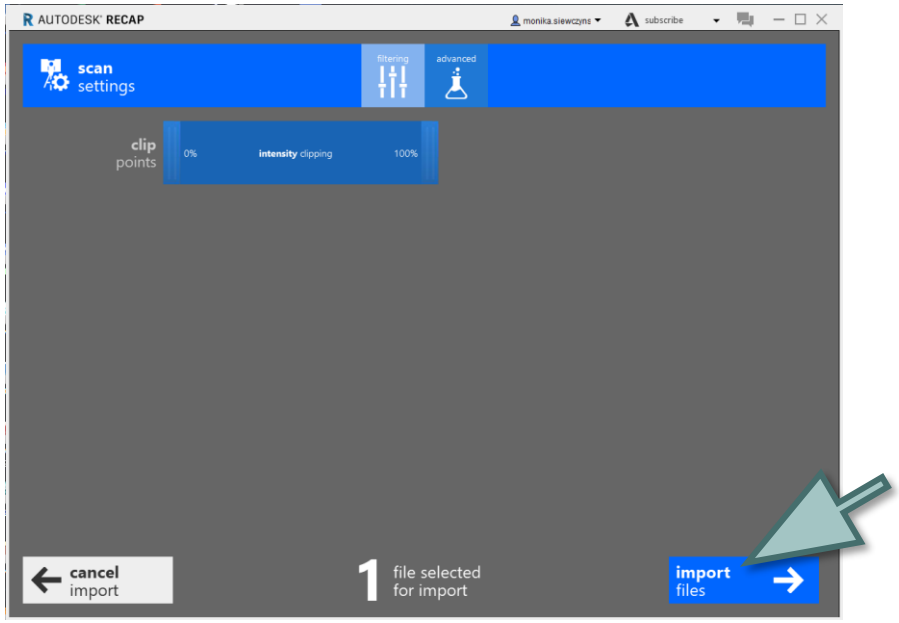
select the file type: E57

then select the file

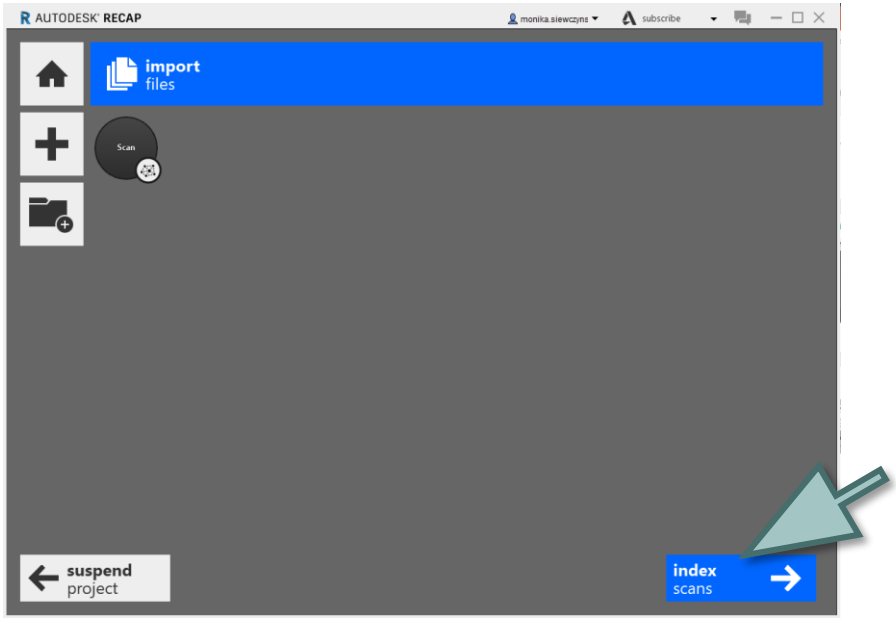
and open



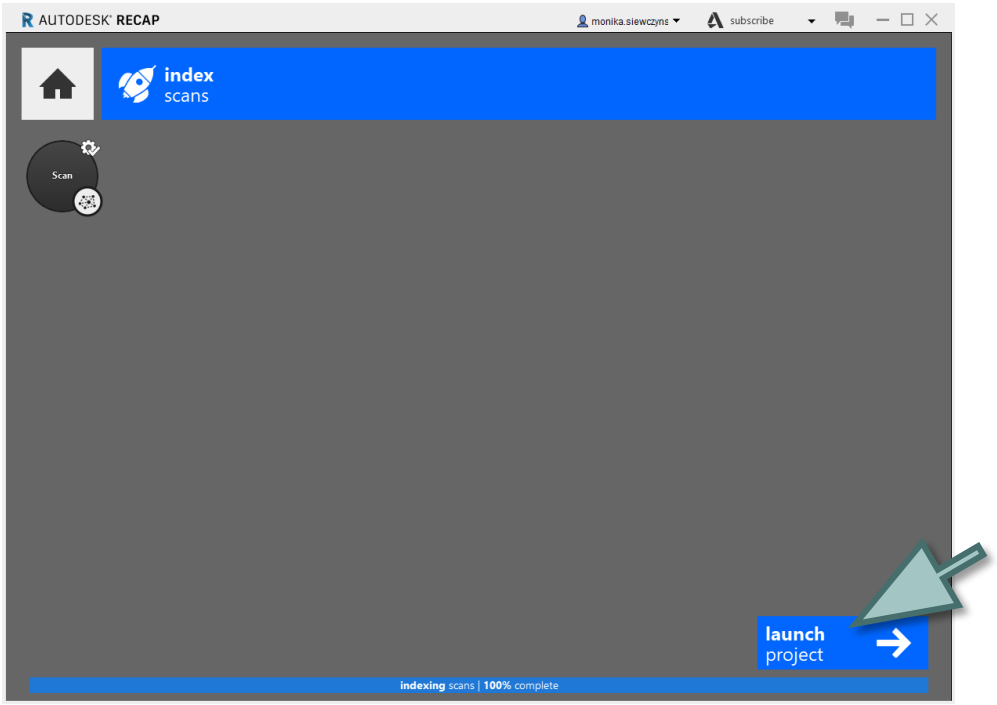
import files



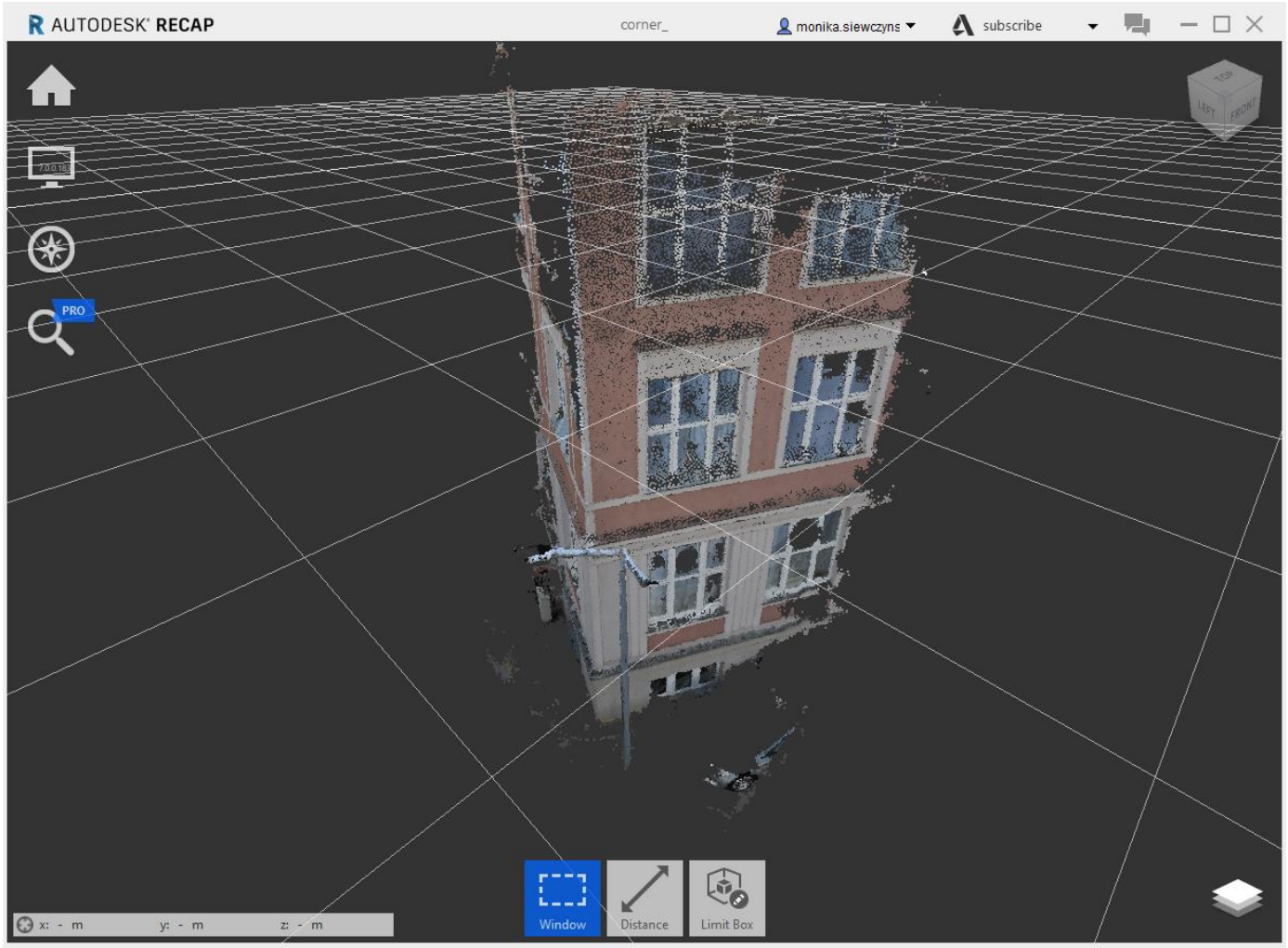
index scans



launch project

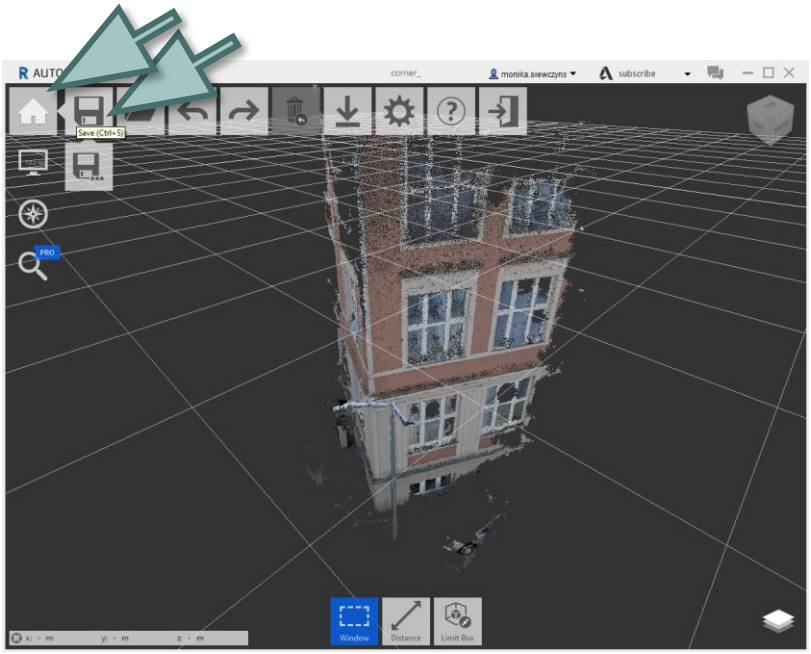


Effect

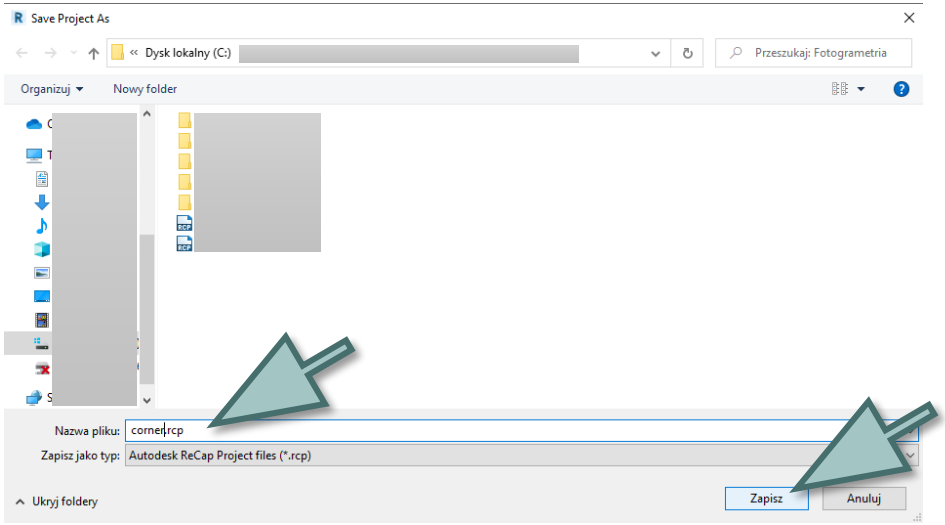


PHOTOGRAMMETRY

Export file to the format for Revit



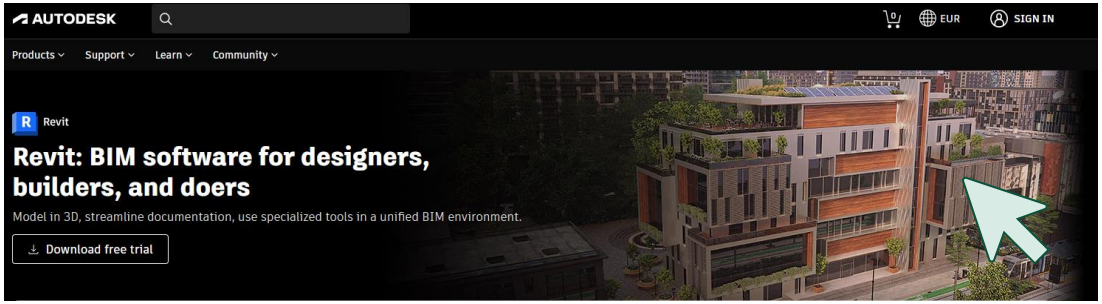
save the file



close Recap

Download and install Autodesk Revit

Information about Autodesk Revit:



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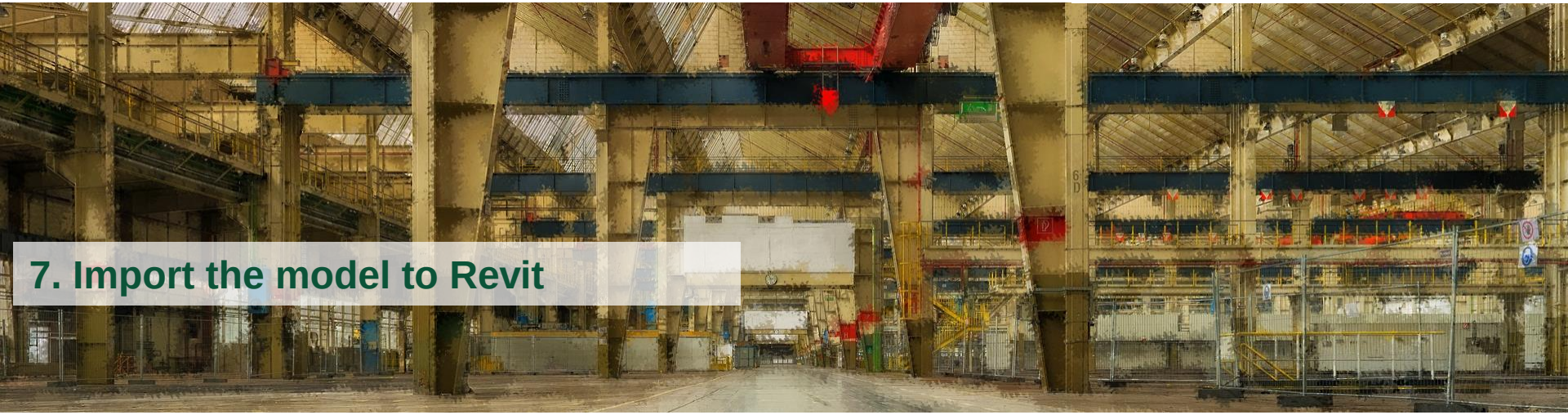
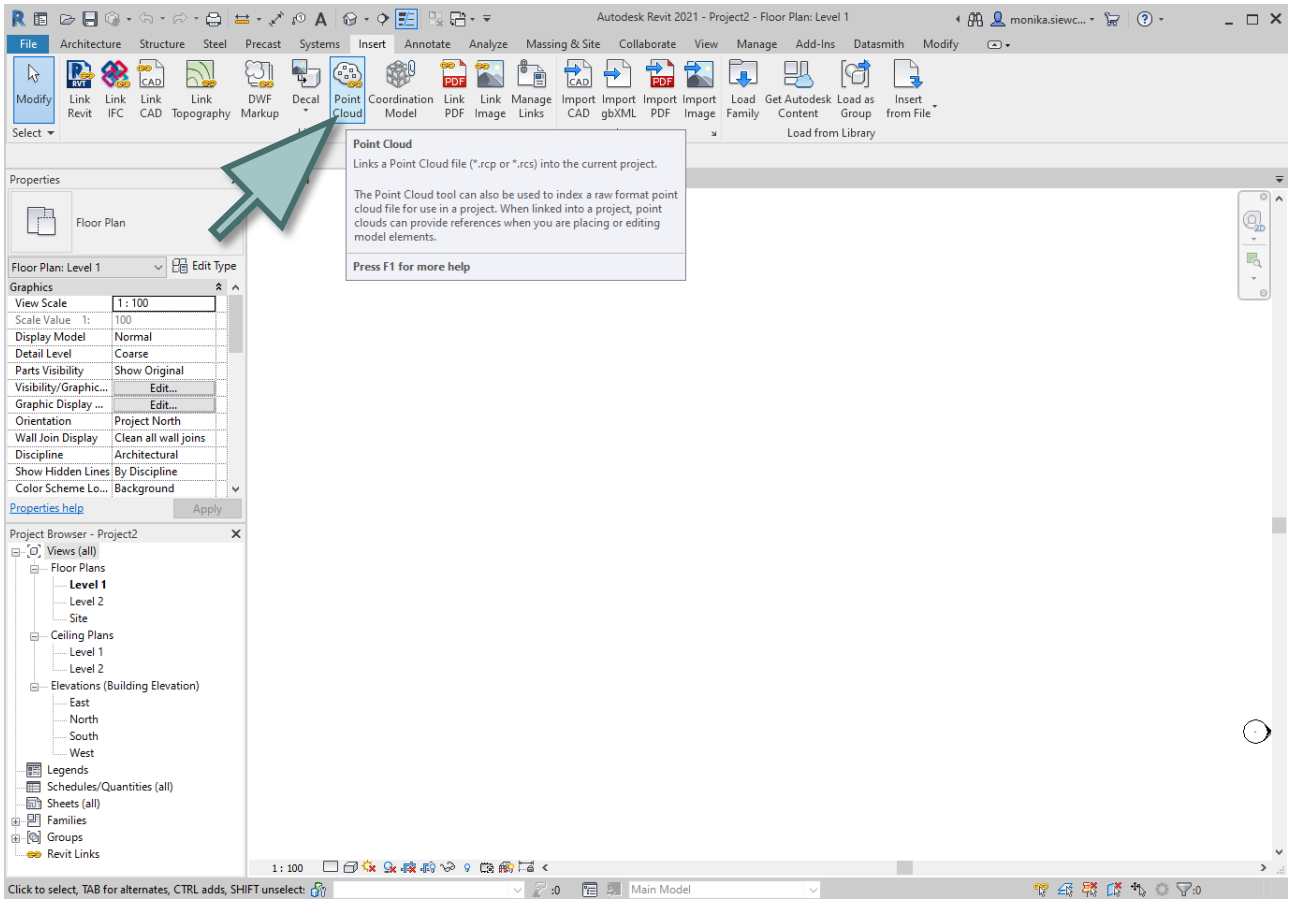


7. Import the model to Revit

Open Autodesk Revit

Open new file

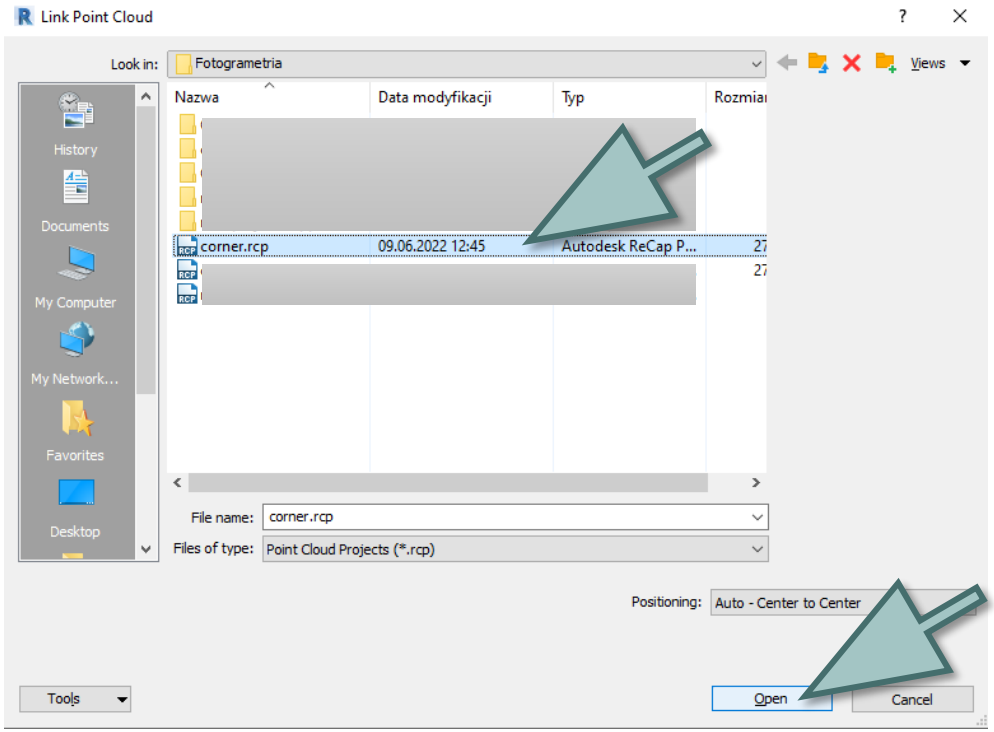
MENU / Insert / Point cloud



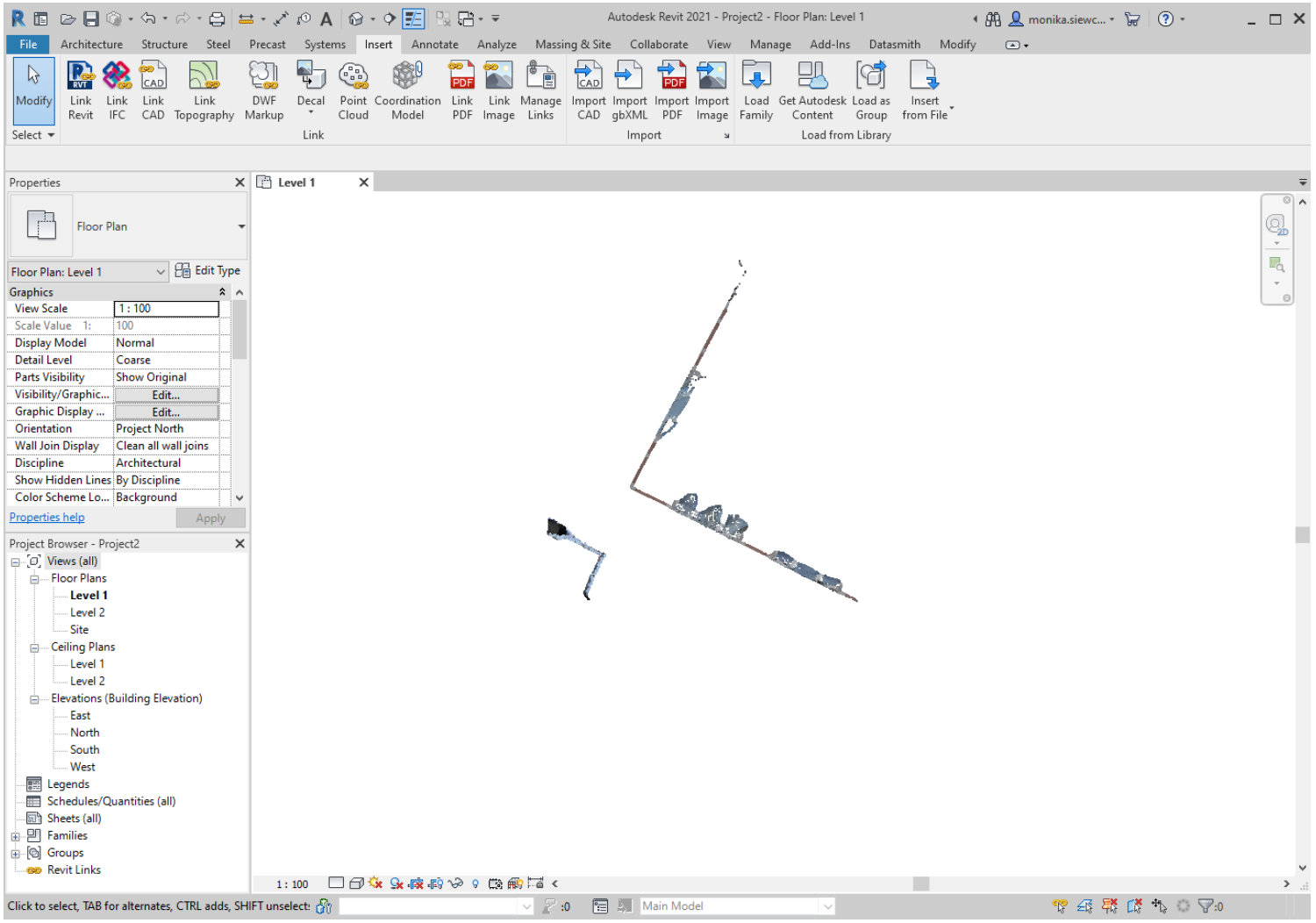
PHOTOGRAMMETRY

select the RCP file

then Open

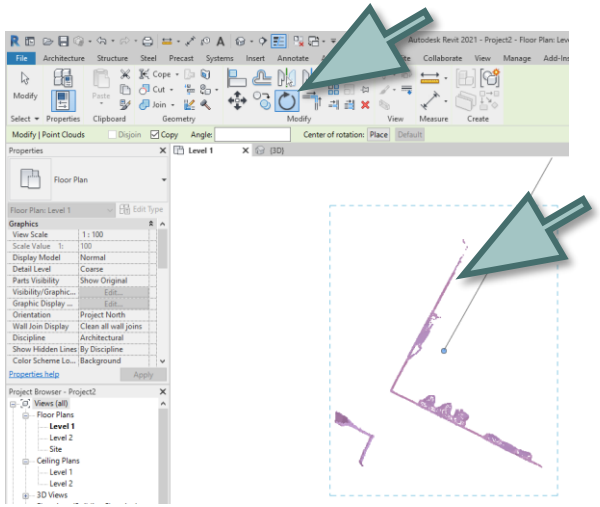


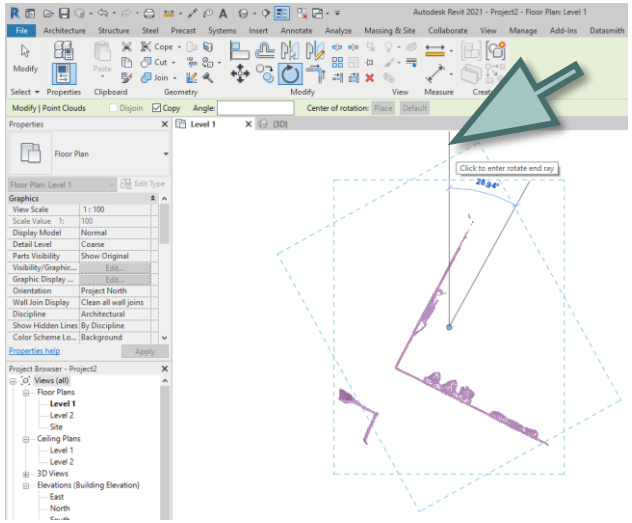
Effect

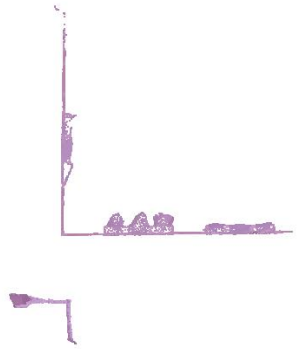


PHOTOGRAMMETRY

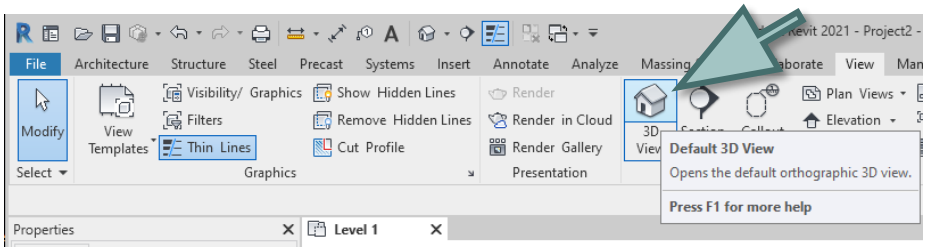
select and rotate the model





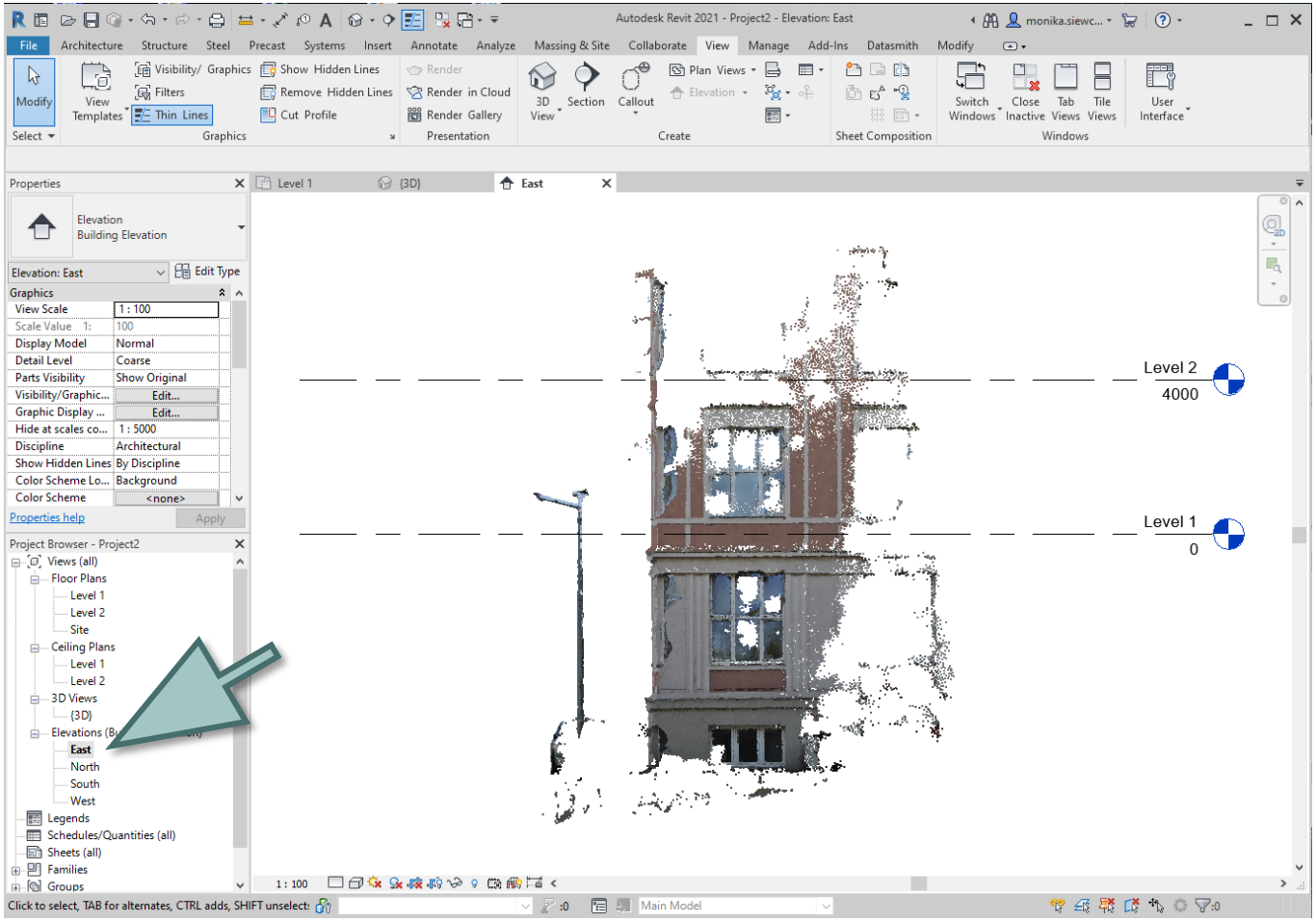


open 3D view



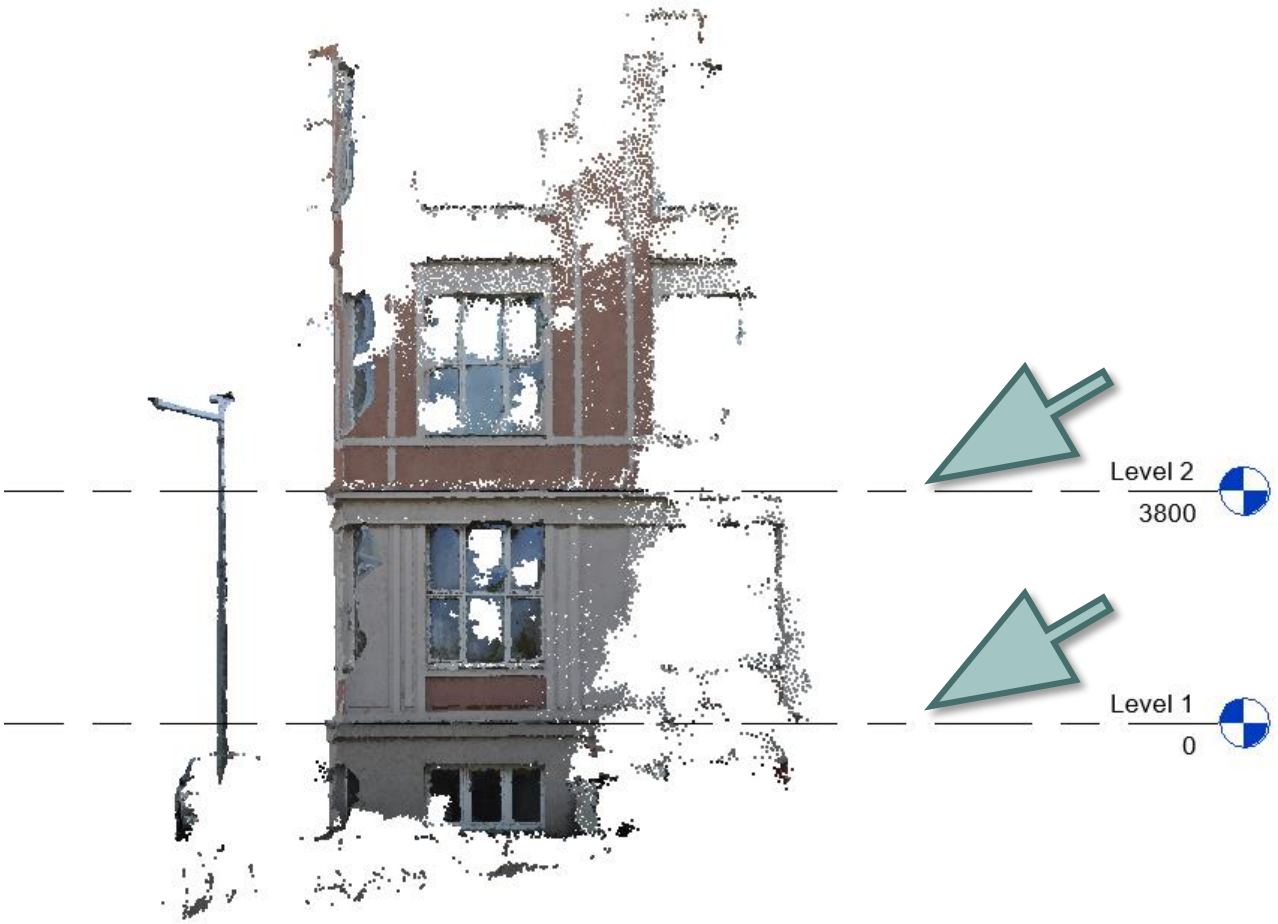
PHOTOGRAMMETRY

open the elevation view

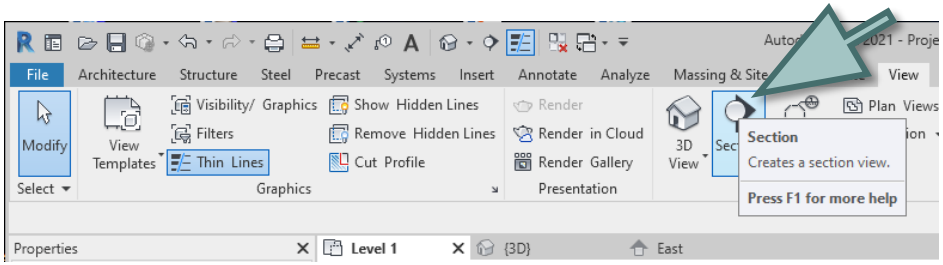


PHOTOGRAMMETRY

move the model
and change the levels if needed

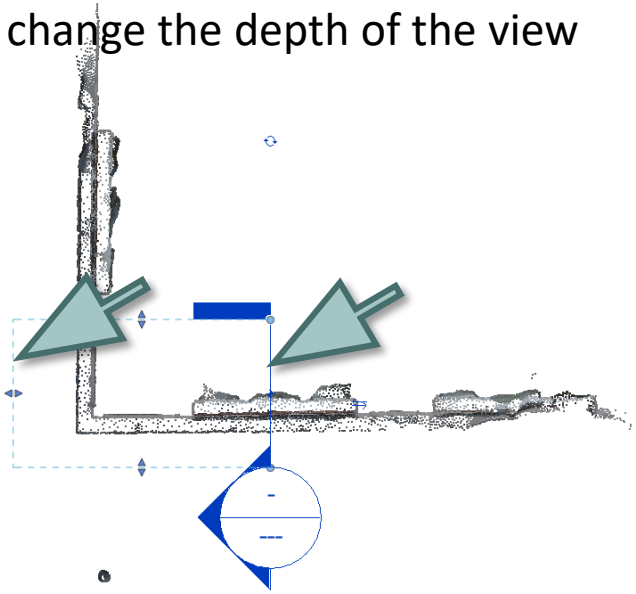


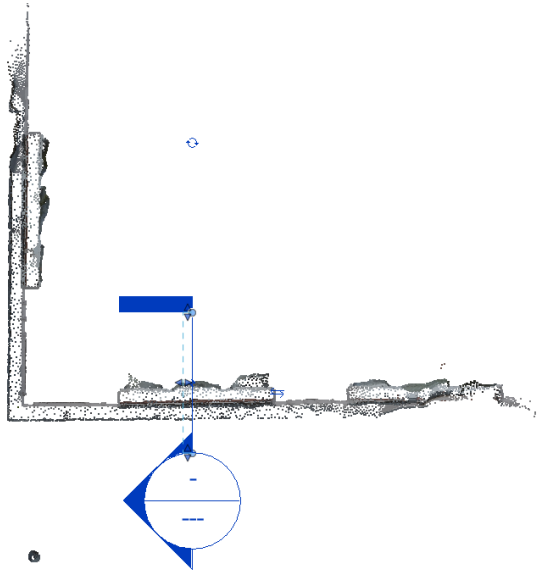
open the horizontal view



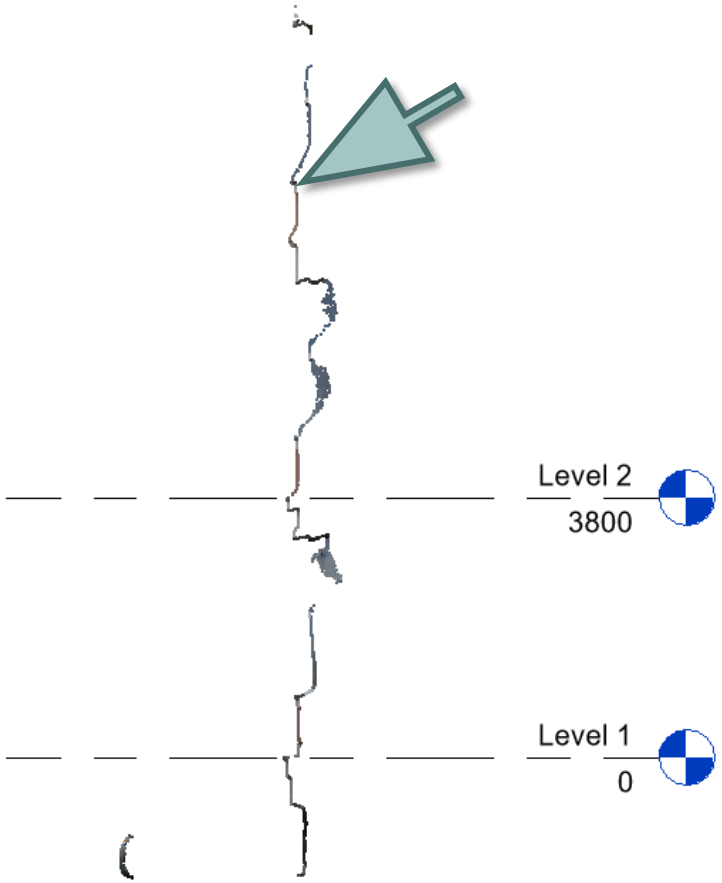
create the vertical section in the area of window

and change the depth of the view



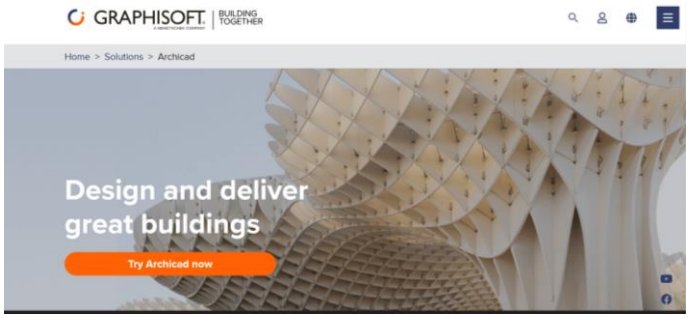


use the shape to create the virtual twin



Download and install Graphisoft Archicad software

About the program Graphisoft Archicad:



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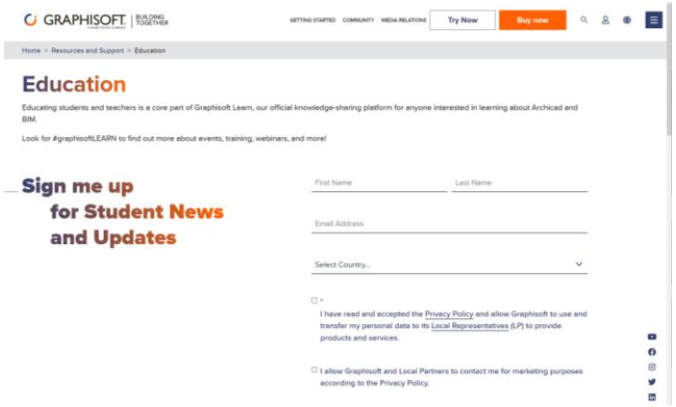


PHOTOGRAMMETRY

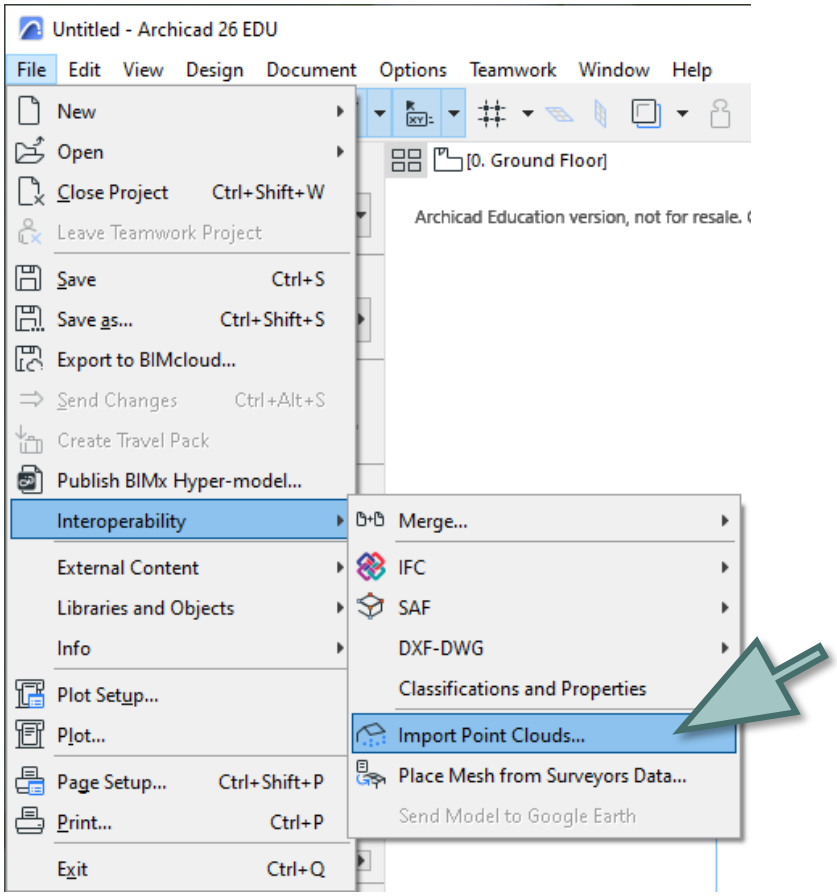
8. Import the model to Archicad

Open Graphisoft Archicad

PHOTOGRAMMETRY

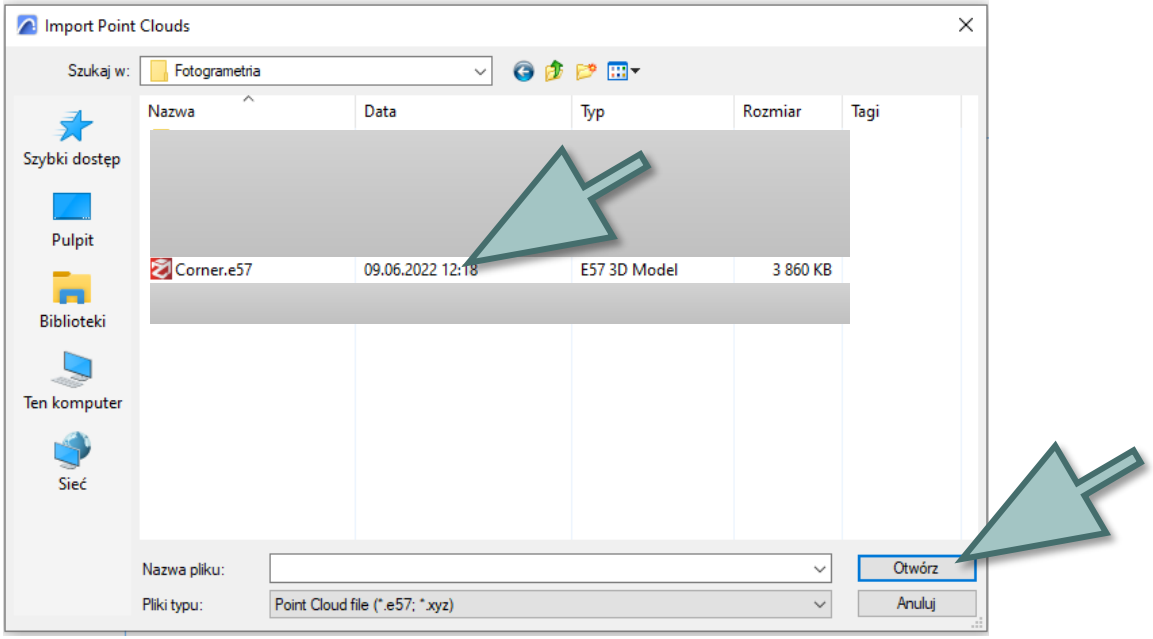
Open a new file

MENU / File / Interoperability / Import Point Clouds

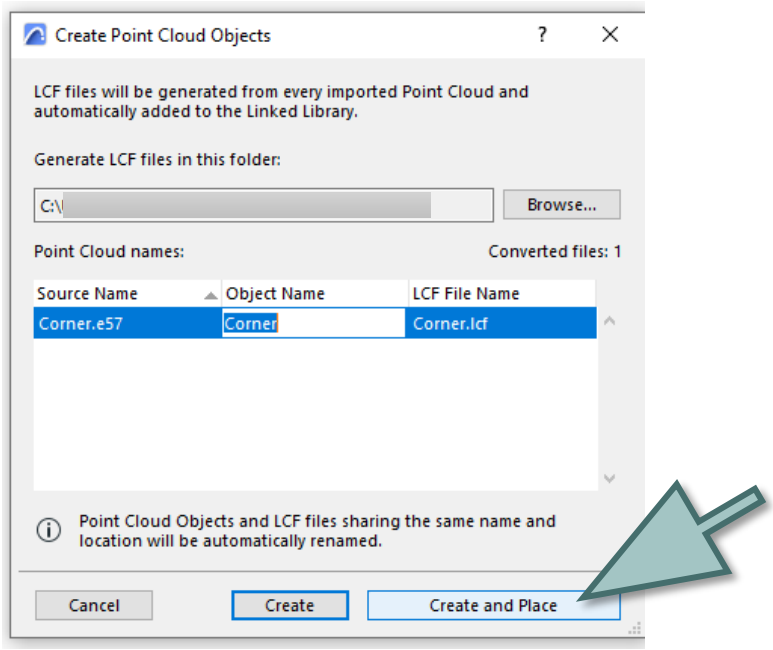


select the file E57

then Open

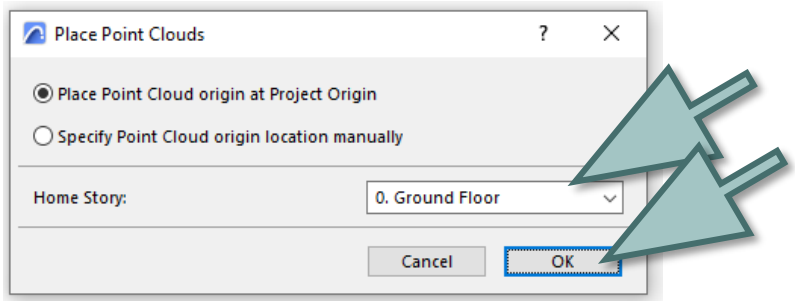


Create and Place

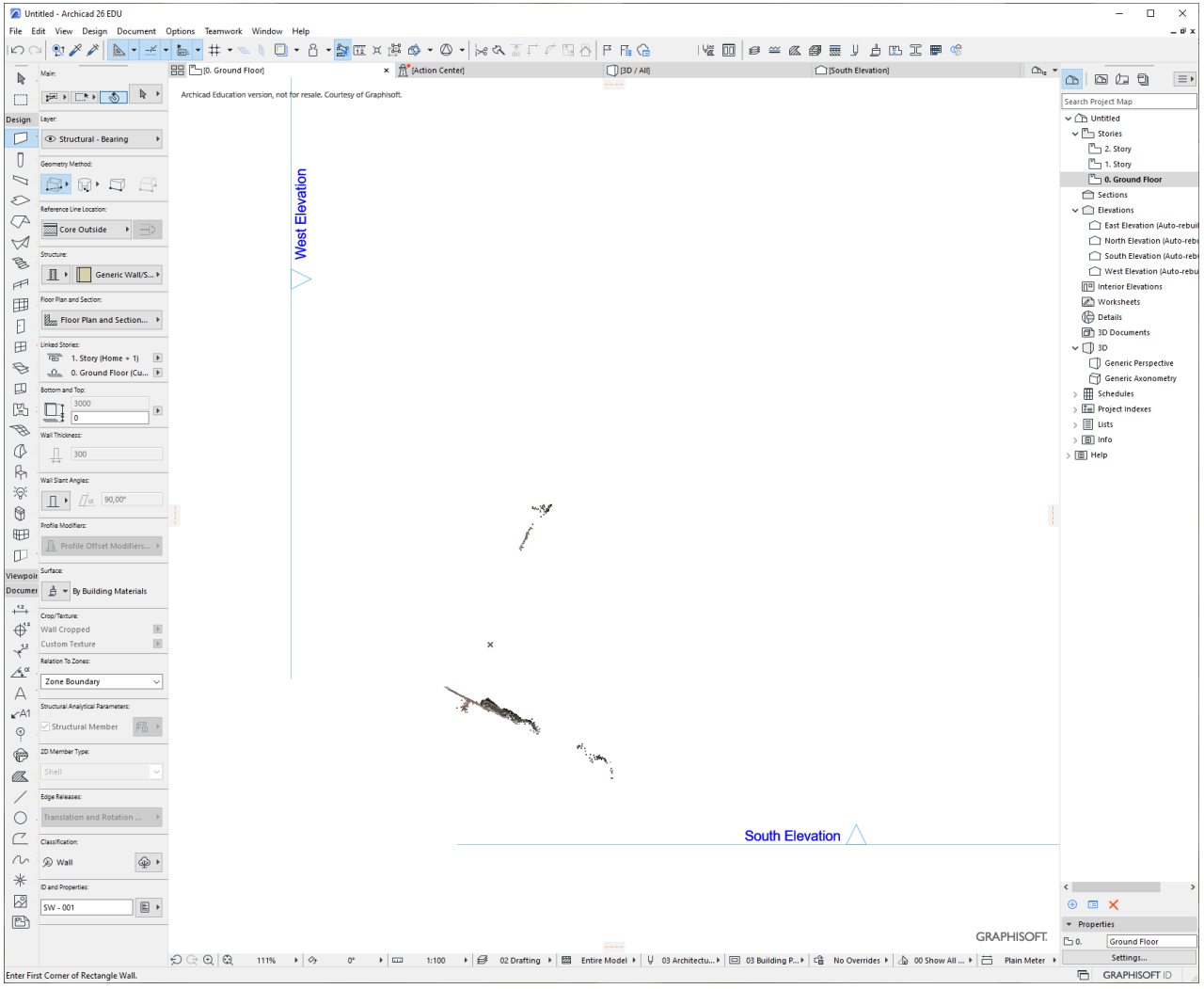


Select the Home Story

OK

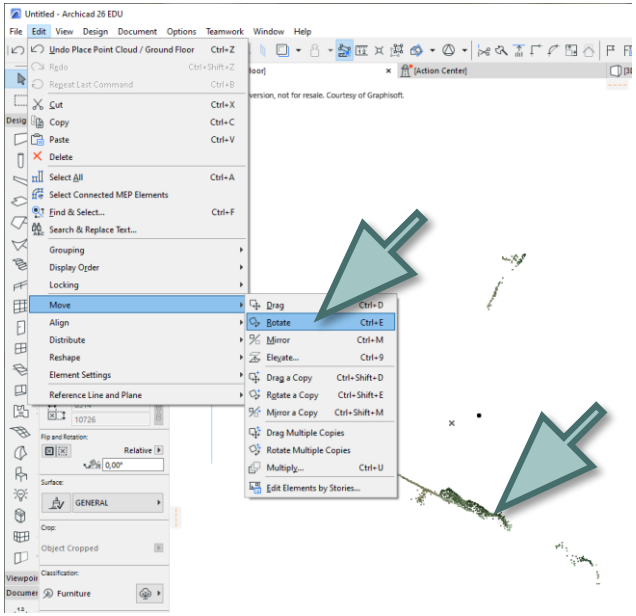


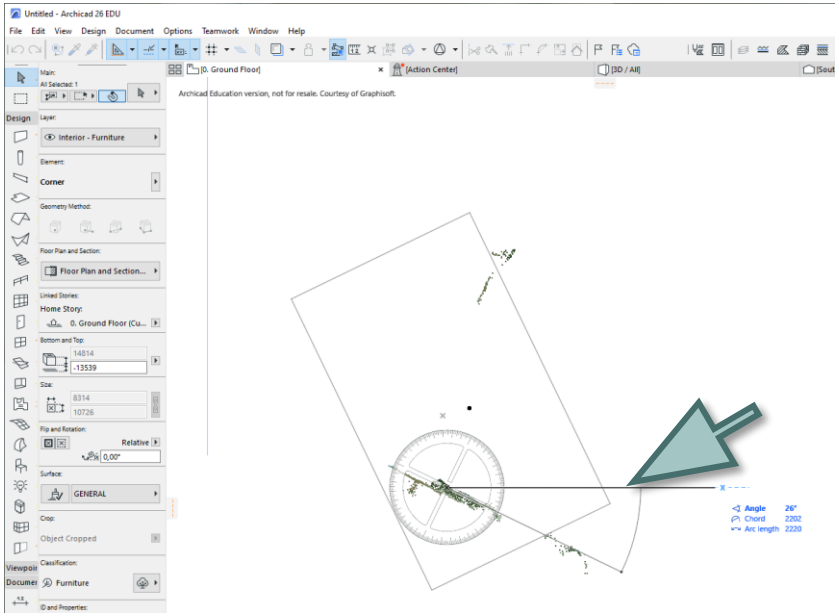
Effect



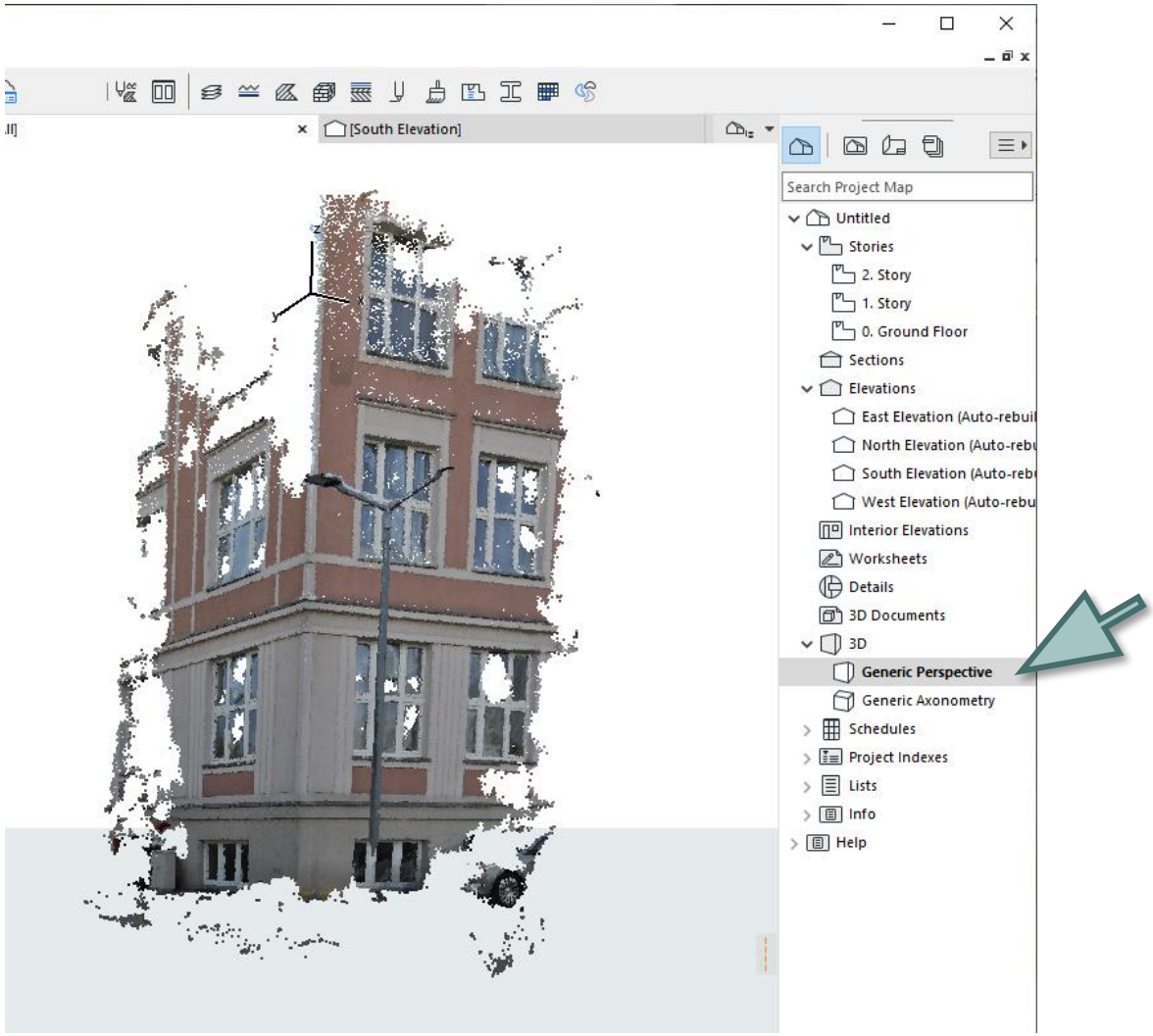
PHOTOGRAMMETRY

select and rotate the model with the Rotate tool (Ctrl+E)

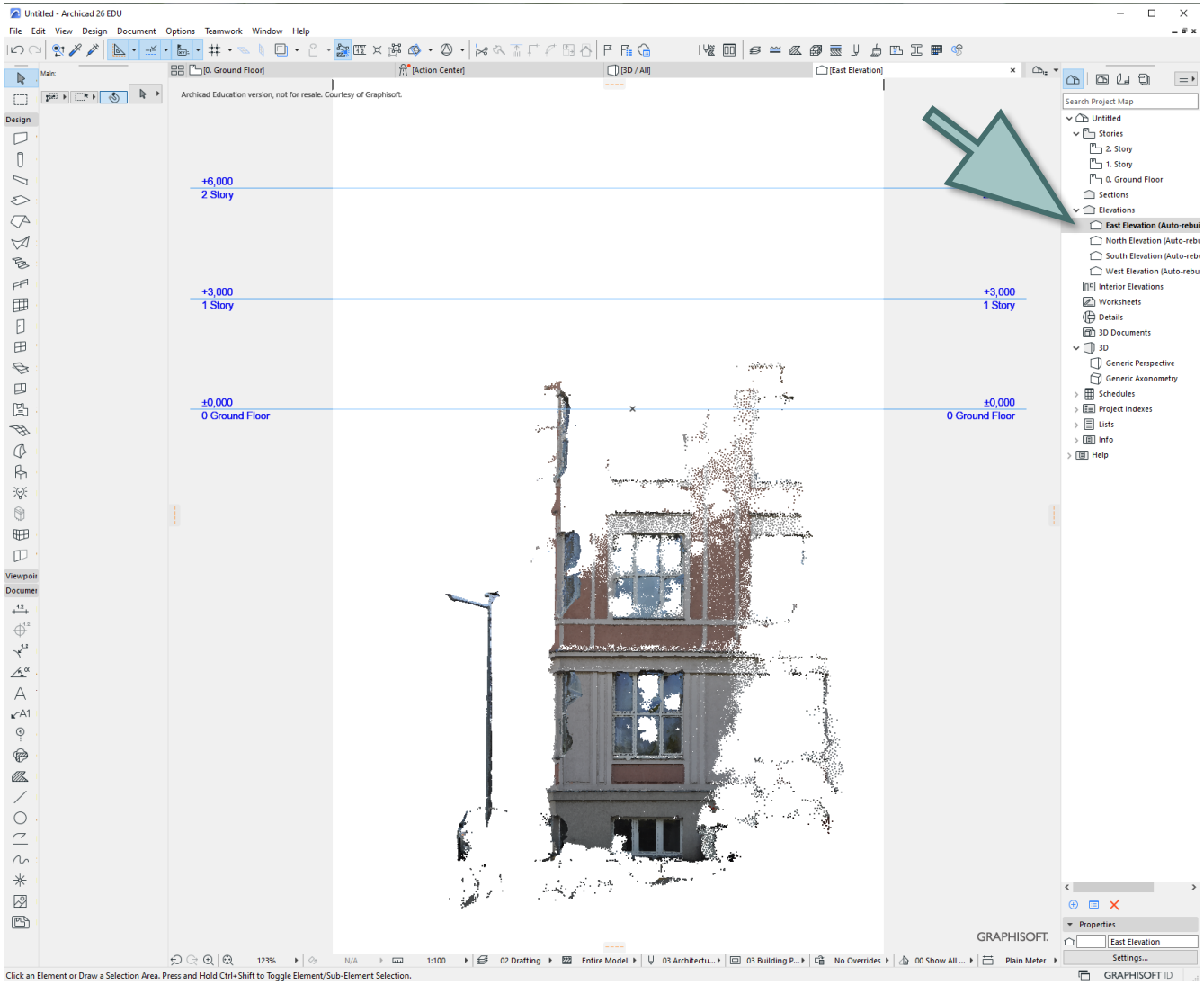




Open 3D view

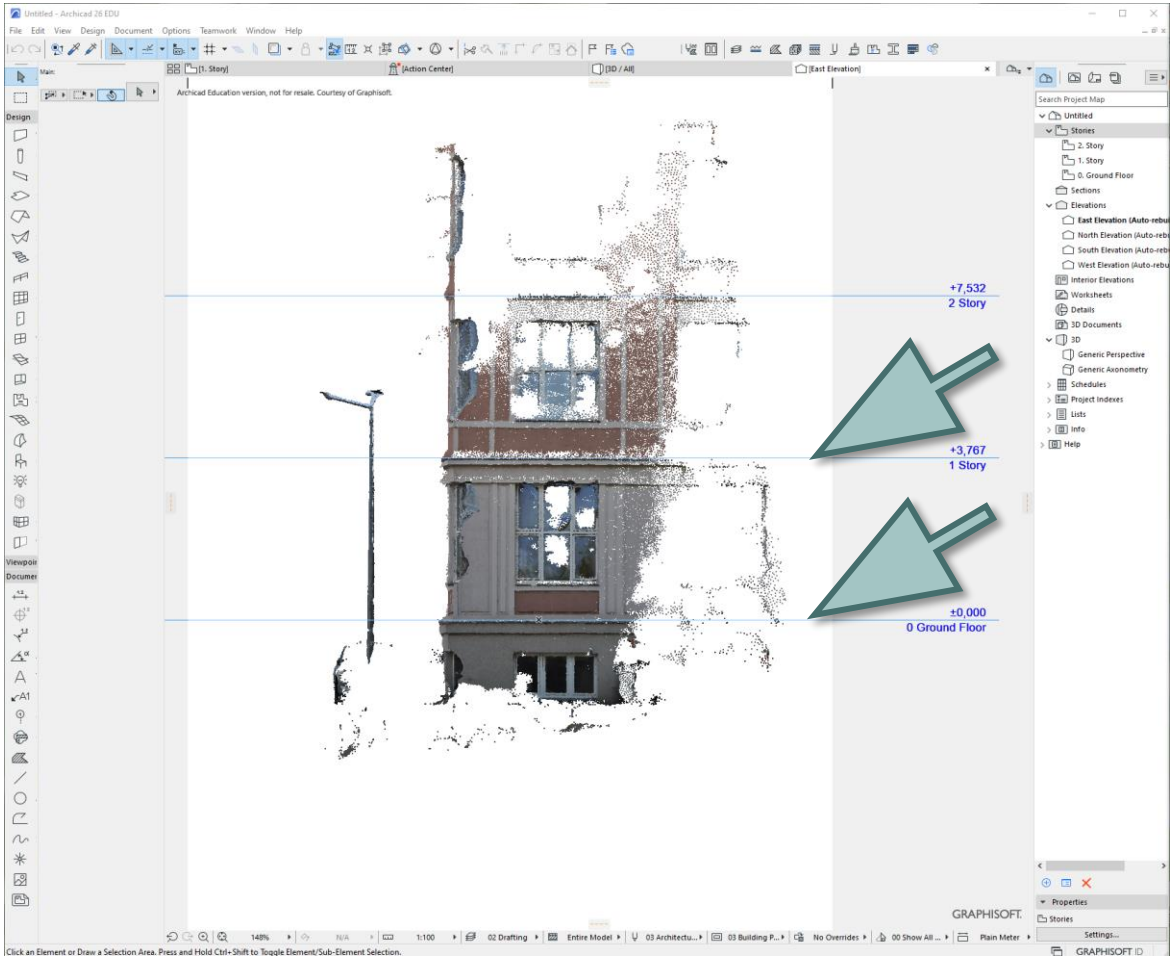

[South Elevation]
Search Project Map
Untitled
Stories
2. Story
1. Story
0. Ground Floor
Sections
Elevations
East Elevation (Auto-rebuil
North Elevation (Auto-rebu
South Elevation (Auto-rebu
West Elevation (Auto-rebu
Interior Elevations
Worksheets
Details
3D Documents
3D
Generic Perspective
Generic Axonometry
Schedules
Project Indexes
Lists
Info
Help

Open elevation view



PHOTOGRAMMETRY

Move the model (Ctrl+D)
and, if necessary, change the position of the levels (Ctrl+7)

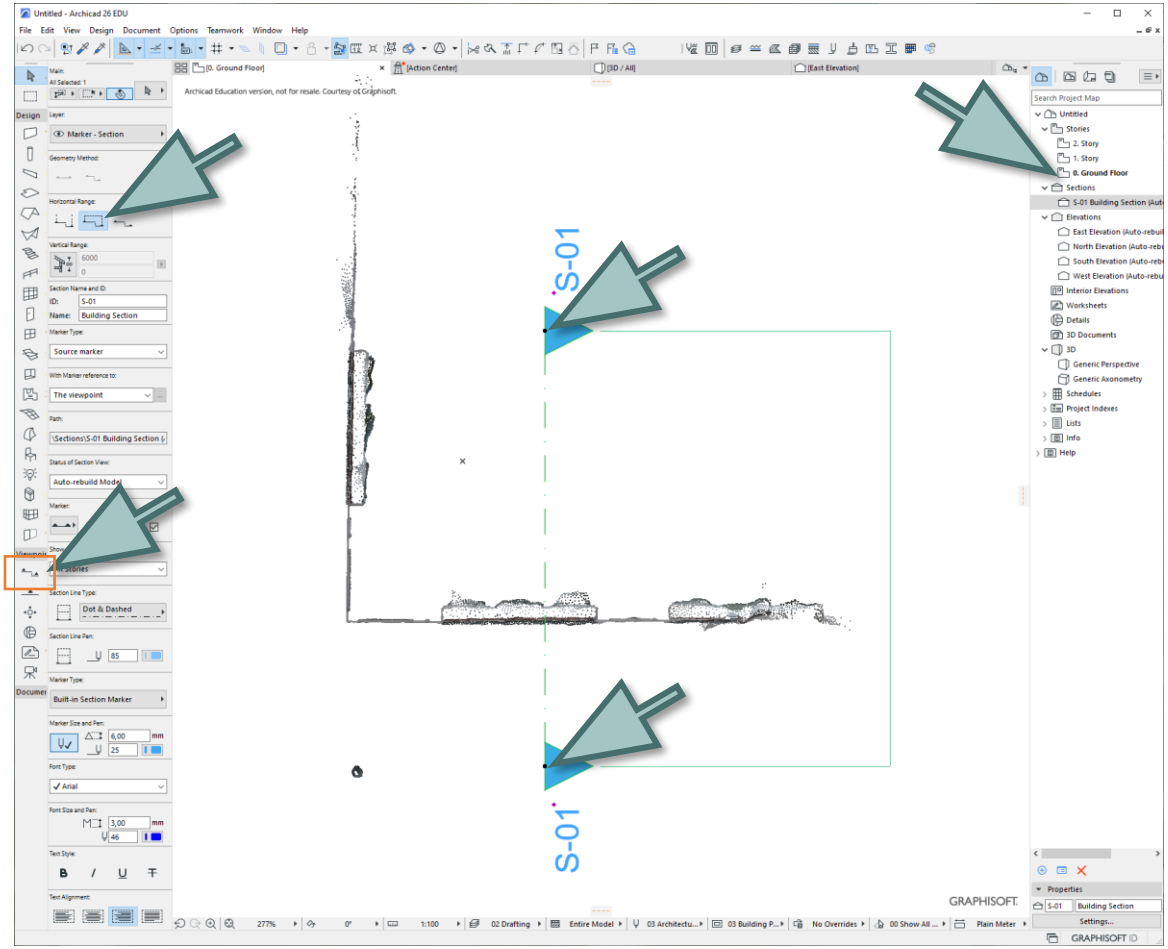


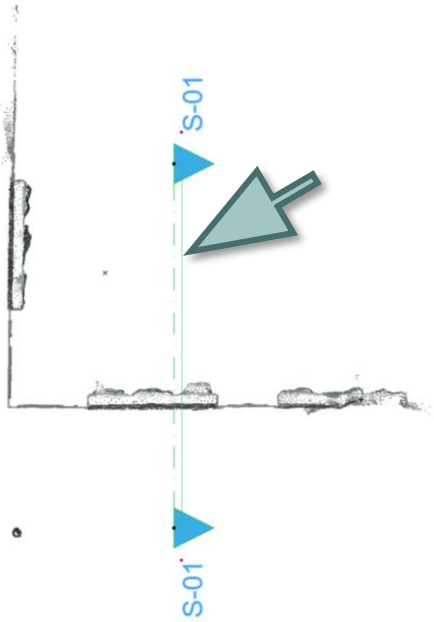
PHOTOGRAMMETRY

Open story view

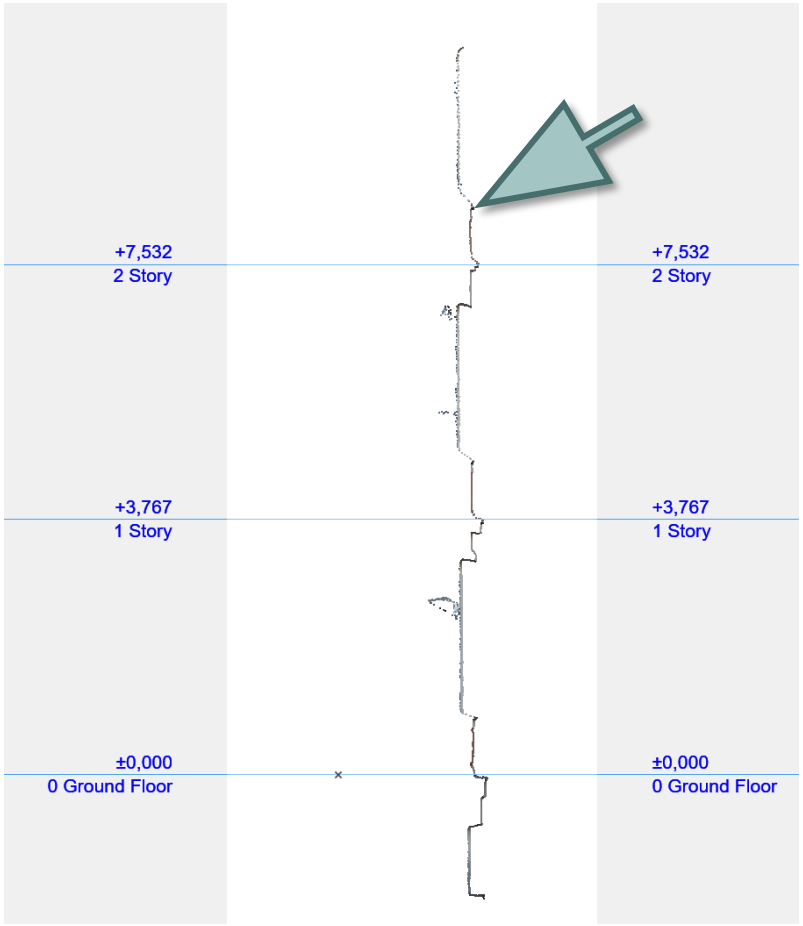
create a vertical section in the window area

and change the depth of the view





use the shape to create a virtual twin



PHOTOGRAMMETRY

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ECOLOGICAL AND INNOVATIVE TECHNOLOGIES FOR RECOVERING INDUSTRIAL AREAS FROM LCA AND ENERGY EFFICIENCY POINT OF VIEW

2020-1-RO01-KA203-080223

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