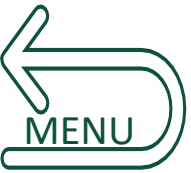


# 2D scan → 3D model



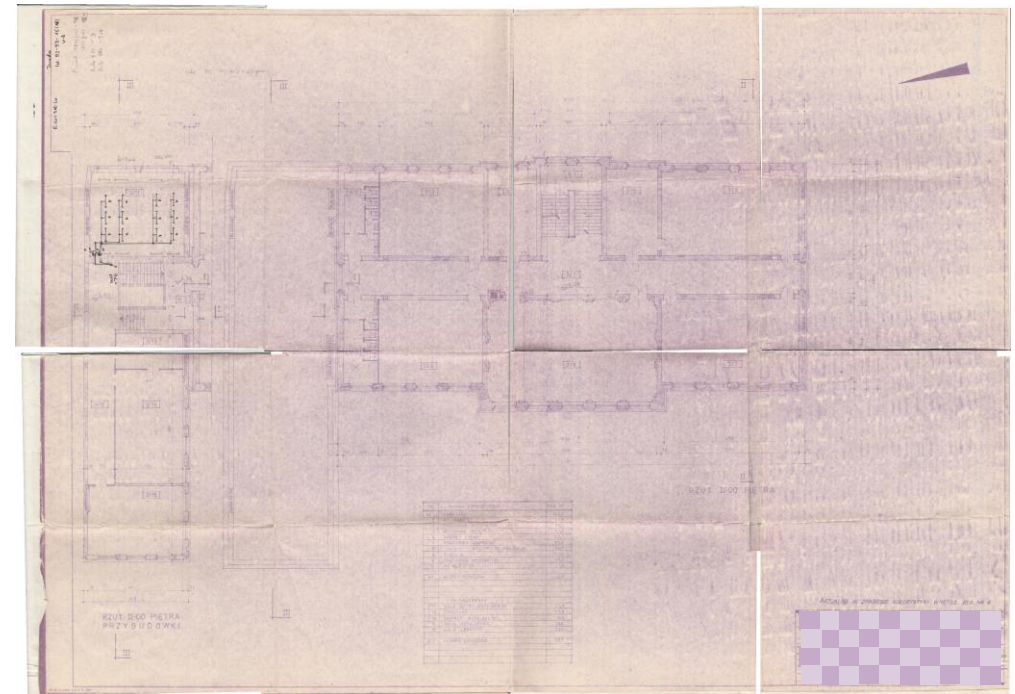
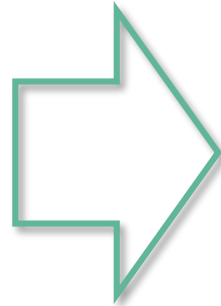
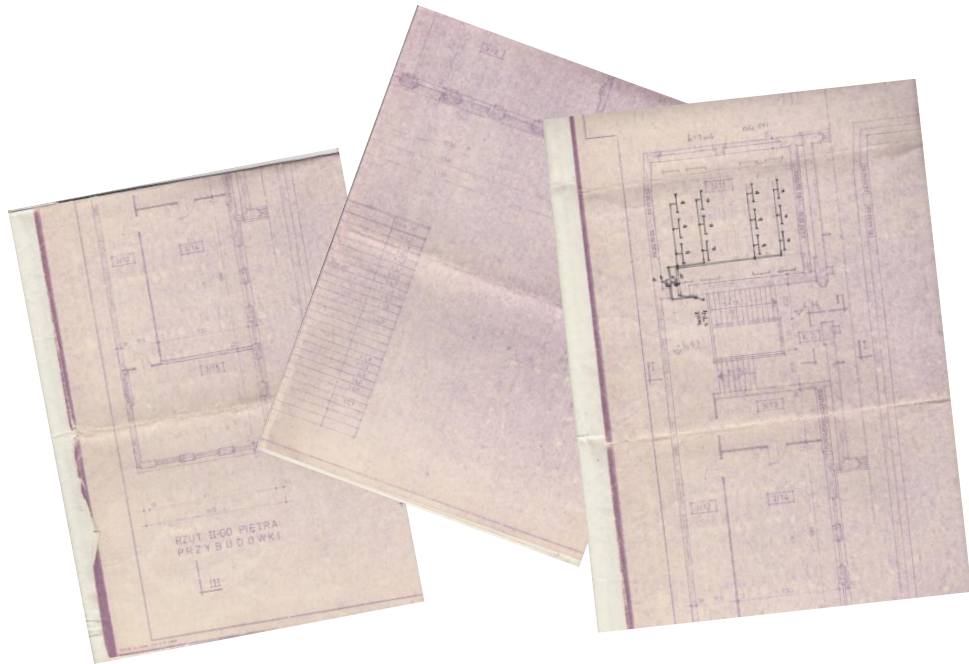
The use of 2D documentation for the inventory of building

# 1 Scanning of drawing documentation

if there is a problem with scanning a large format sheet of paper

you can scan a smaller format

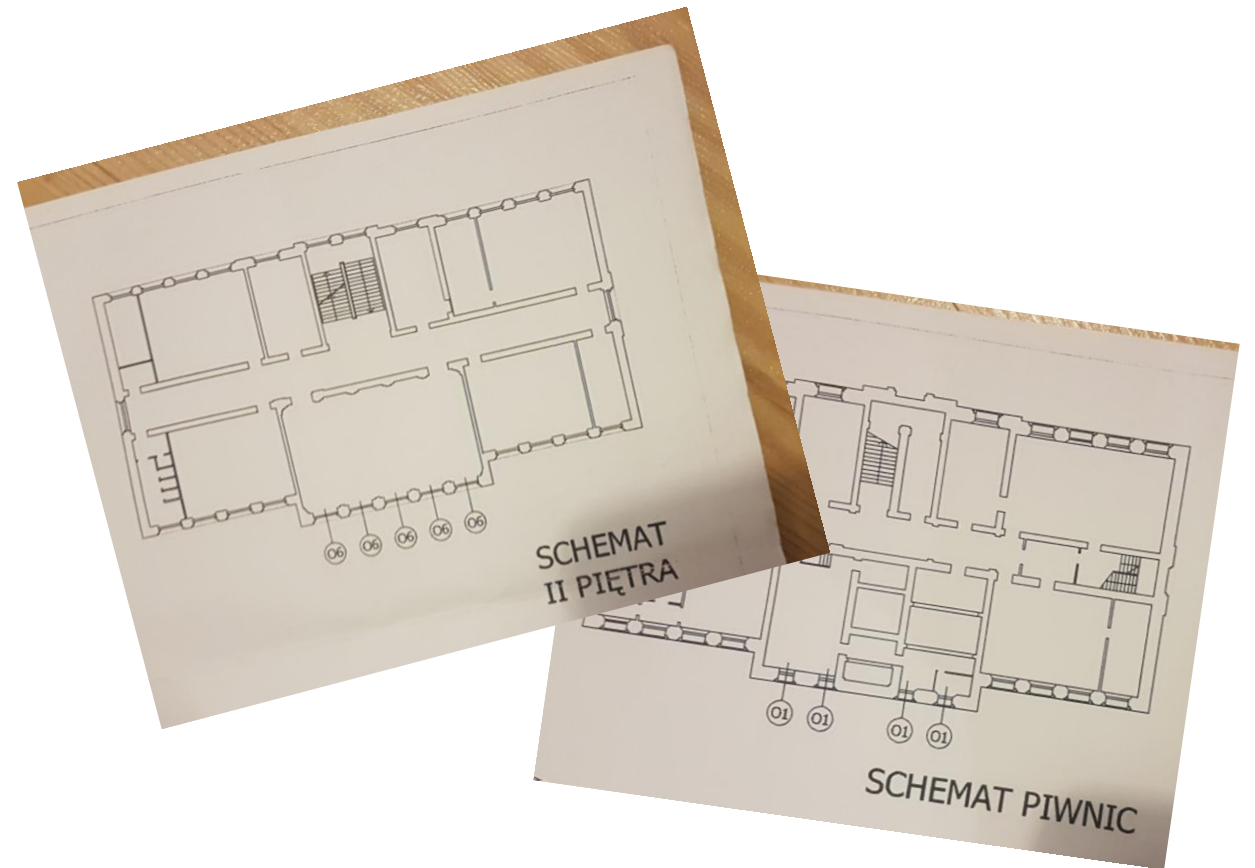
and put the images together in a graphics editing program



## 2 Photographs

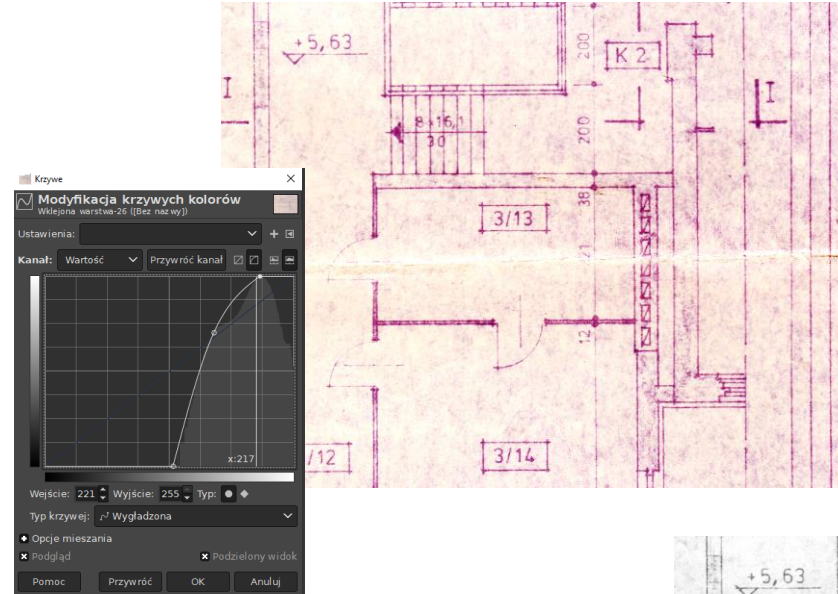
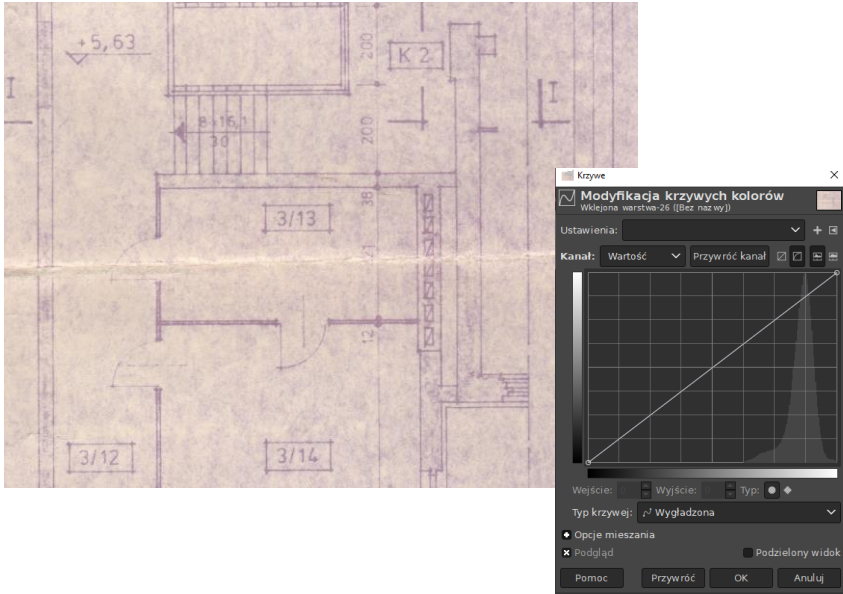
photographs of small schemes

- take pictures without flash in good light
- try to take photos without perspective
- place the camera parallel to the page

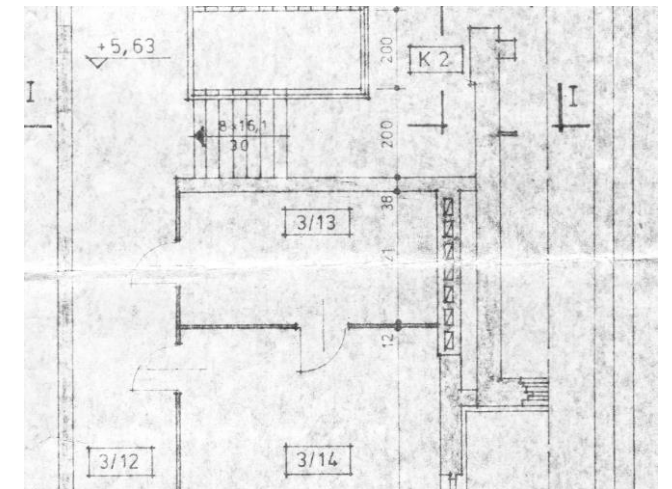


# 3 Graphic correction

modify the colour curve settings to improve brightness and contrast



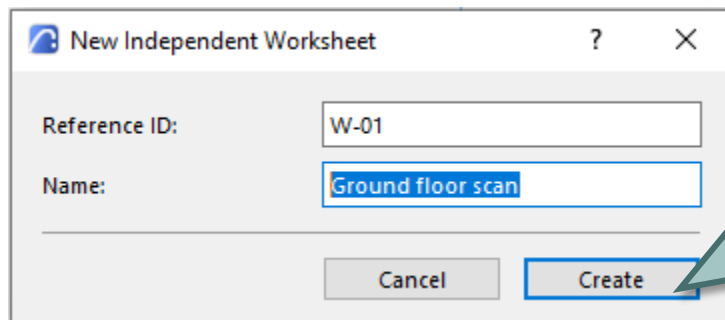
you can change the colour to shades of grey



save file as PNG format

# 4 Import of scans as trace reference

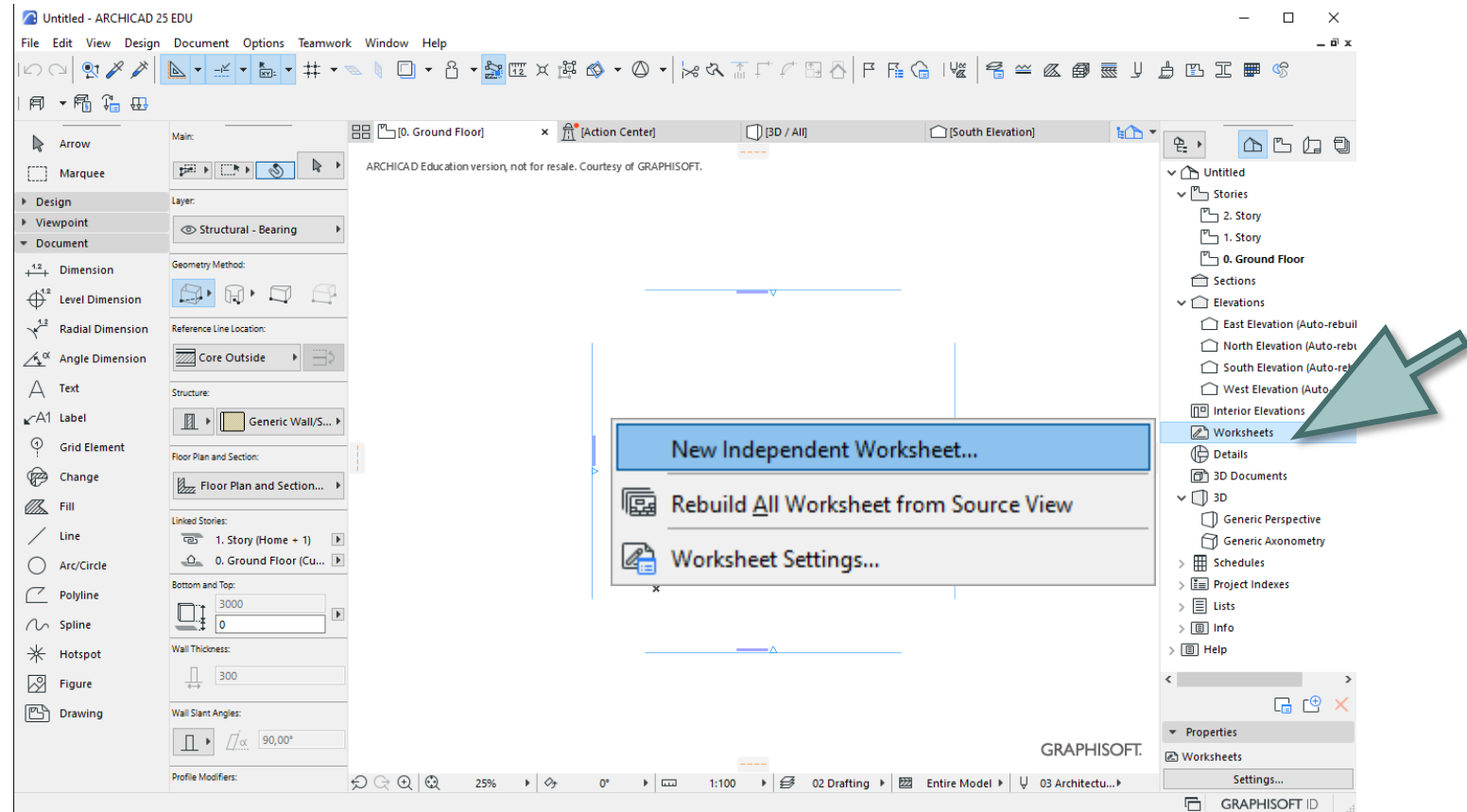
- open new file in Archicad
- right click on „Worksheet”
- create New Independent Worksheet
- enter a drawing name



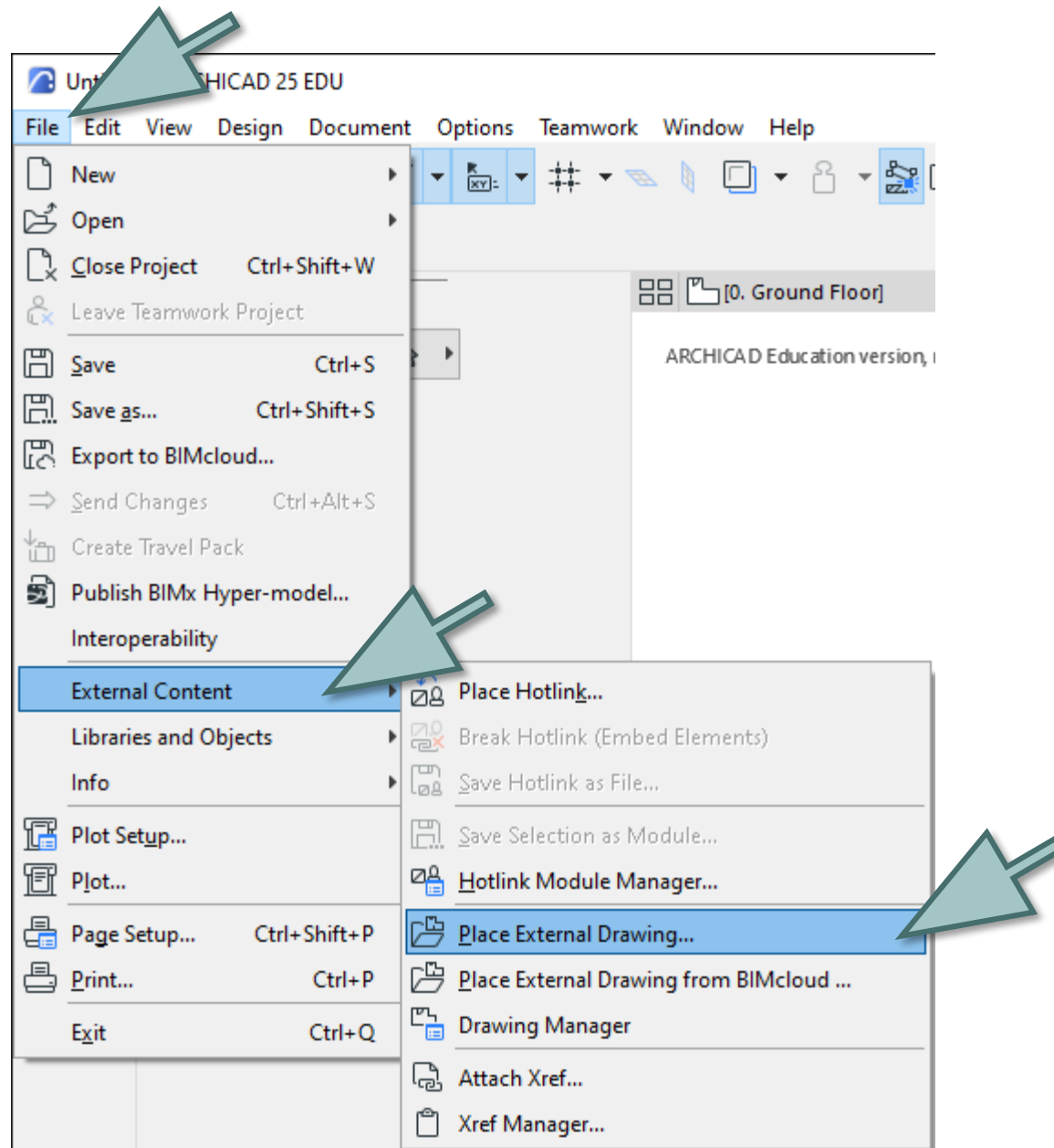
New Independent Worksheet

Reference ID:

Name:

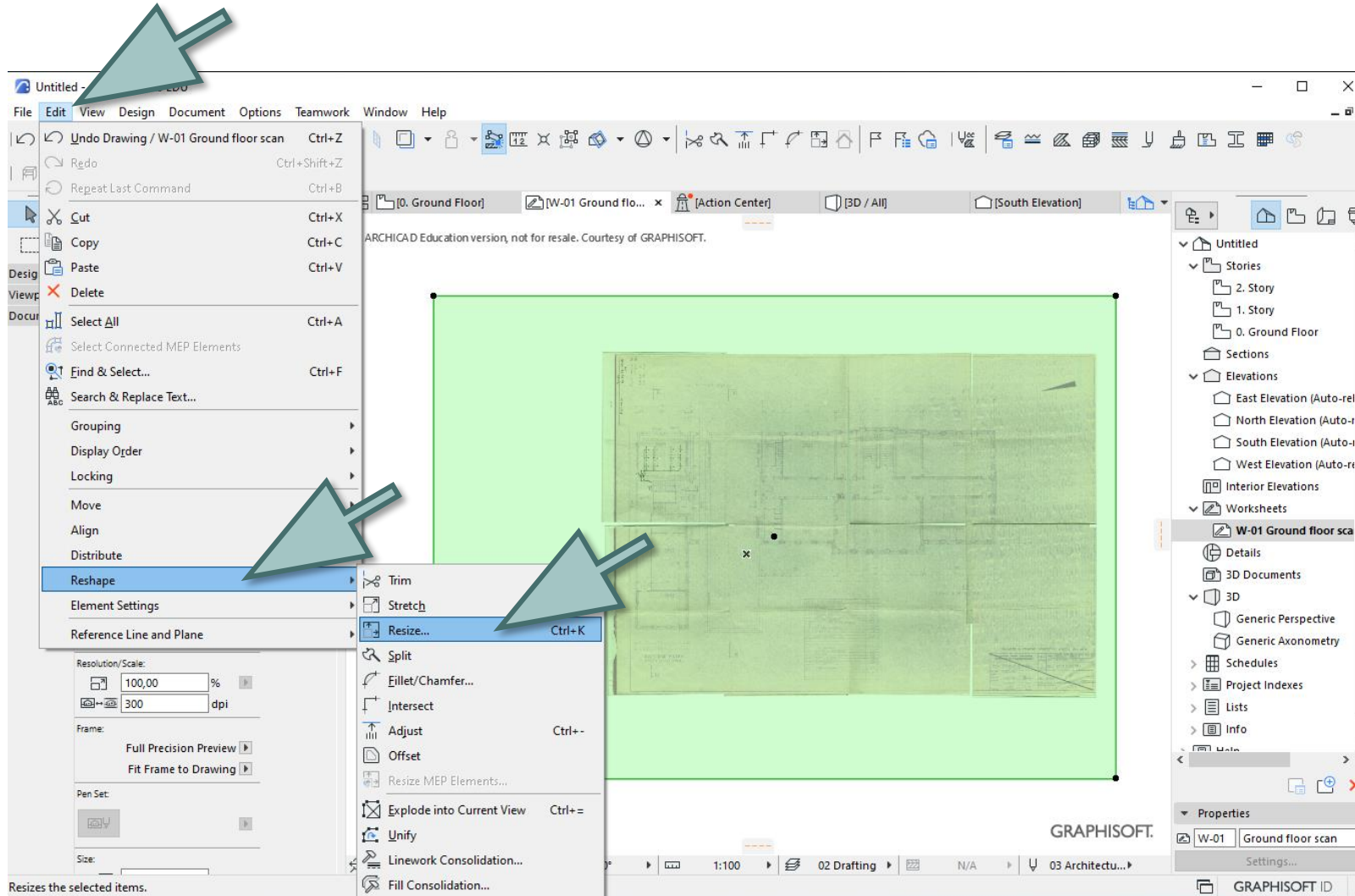


- open the new Worksheet
- import PNG drawing

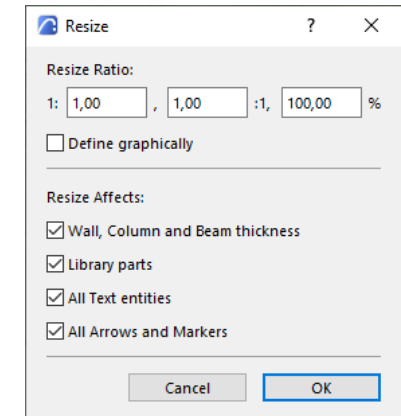




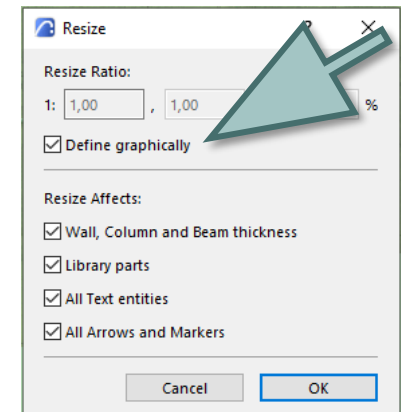
- scale using dimensioning on the drawing



- You can use the ratio

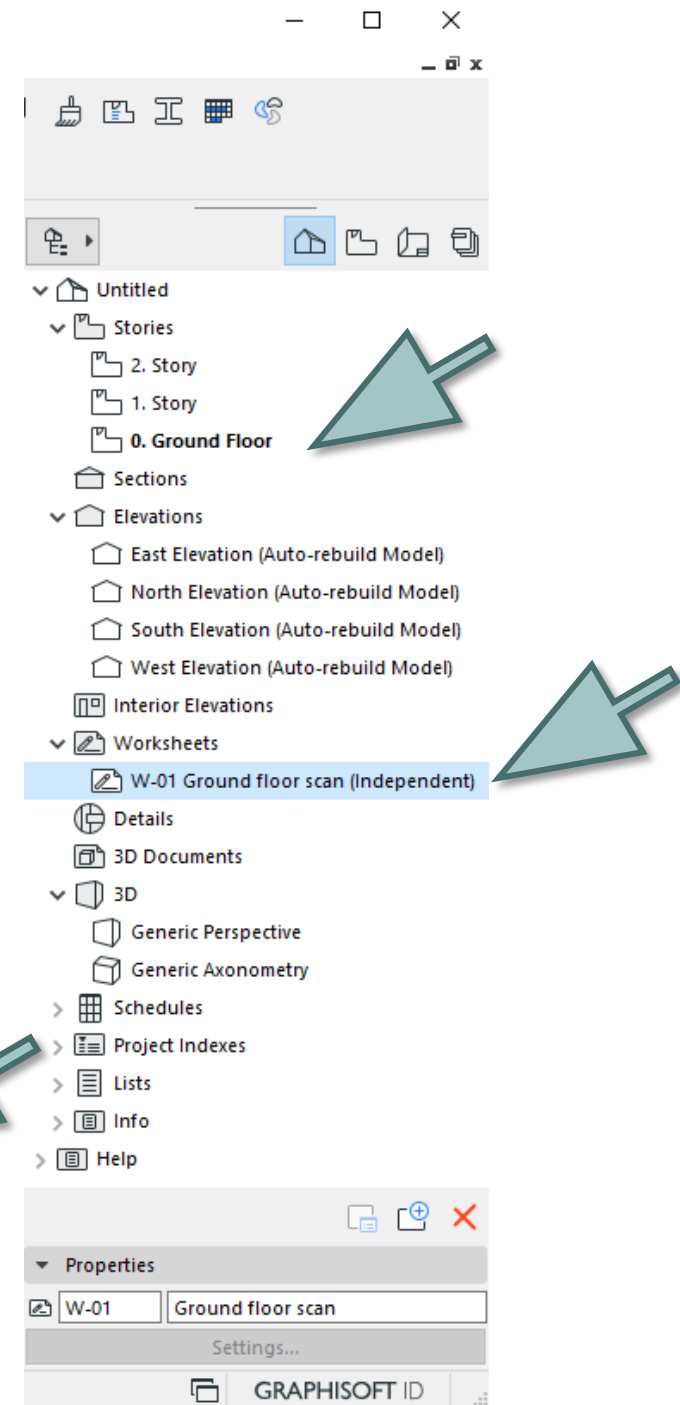
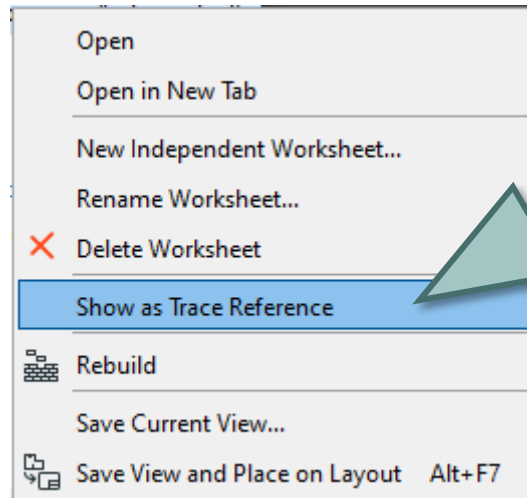


- or define graphically

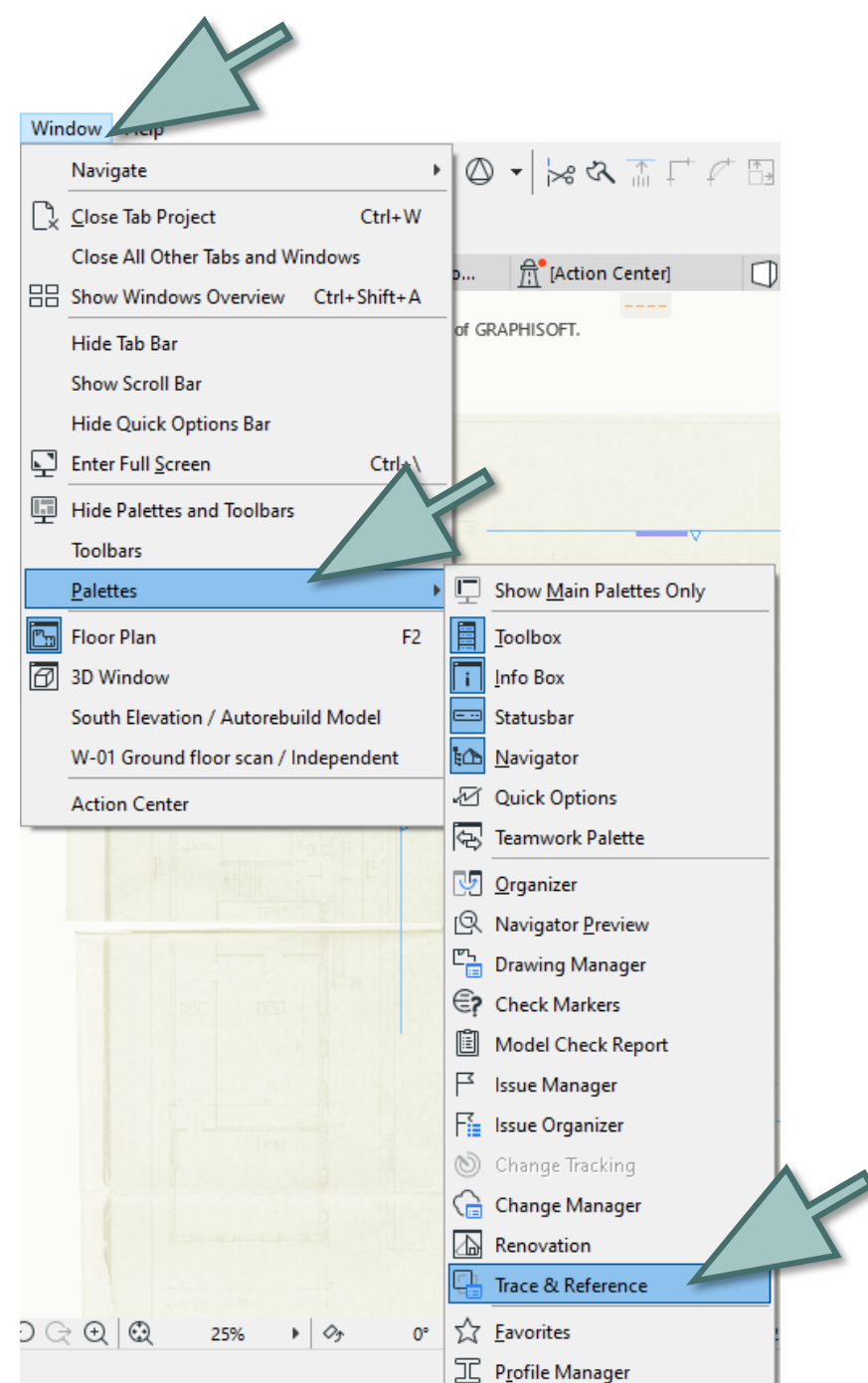


# 5 Using the trace reference

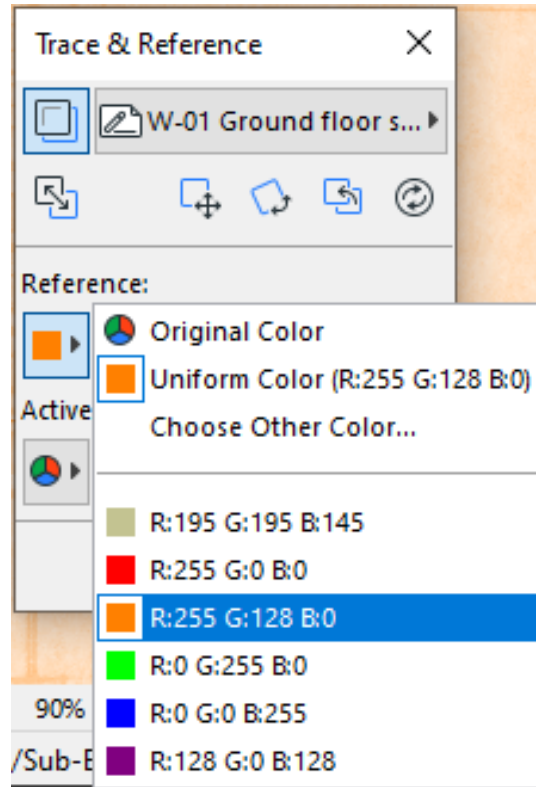
- open the story level
- right click on Worksheet
- select „Show as Trace Reference”



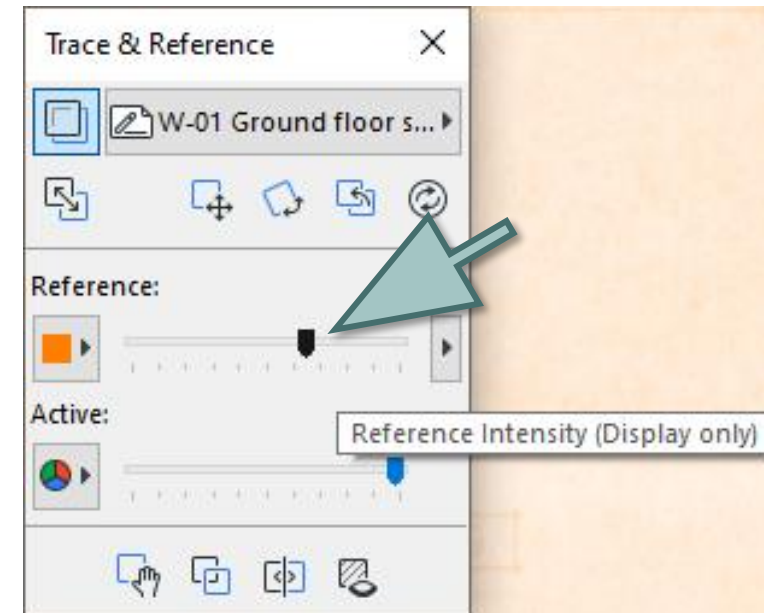
- open the Pallet of Trace & Reference



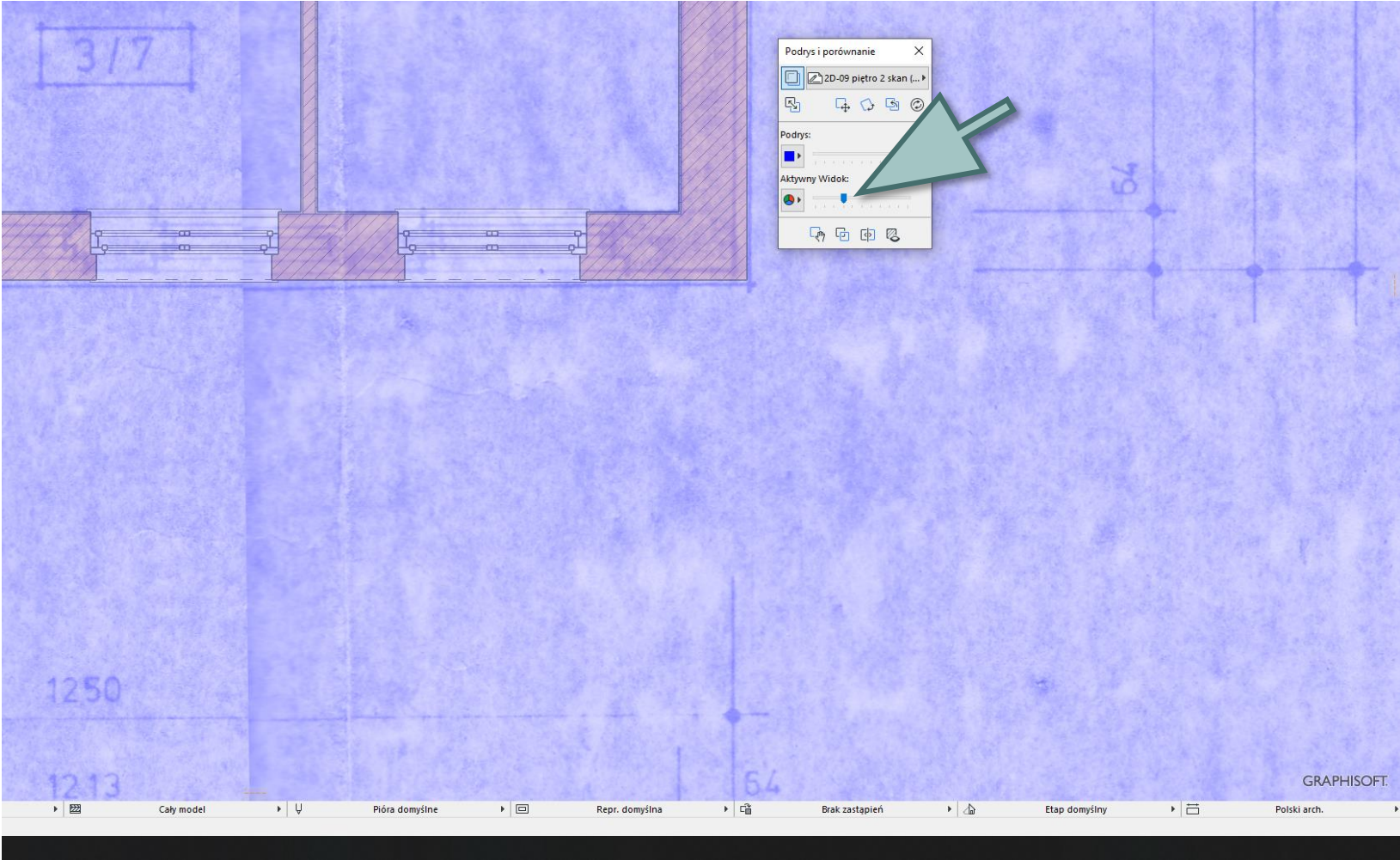
- You can change the colour of the drawing

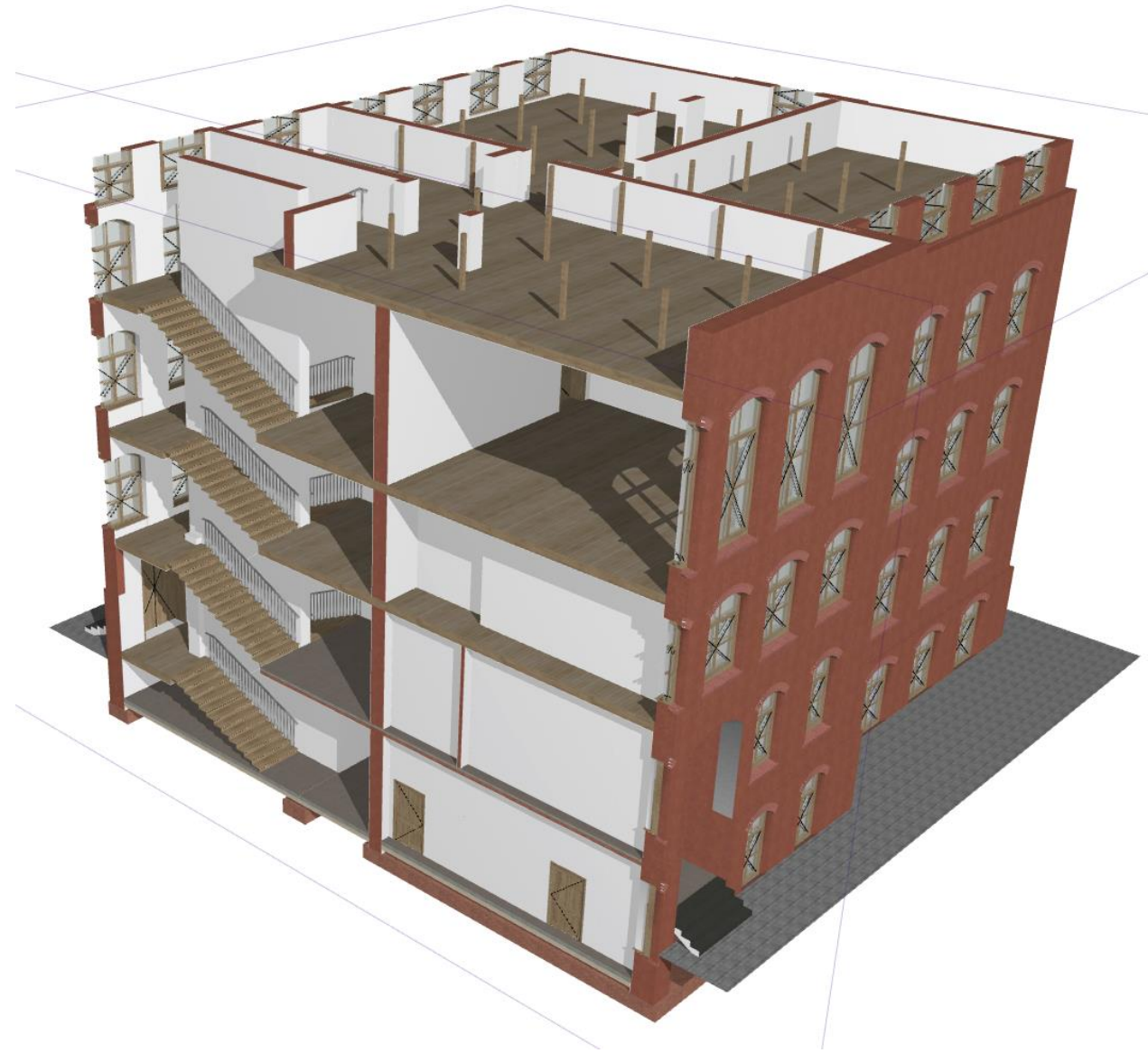
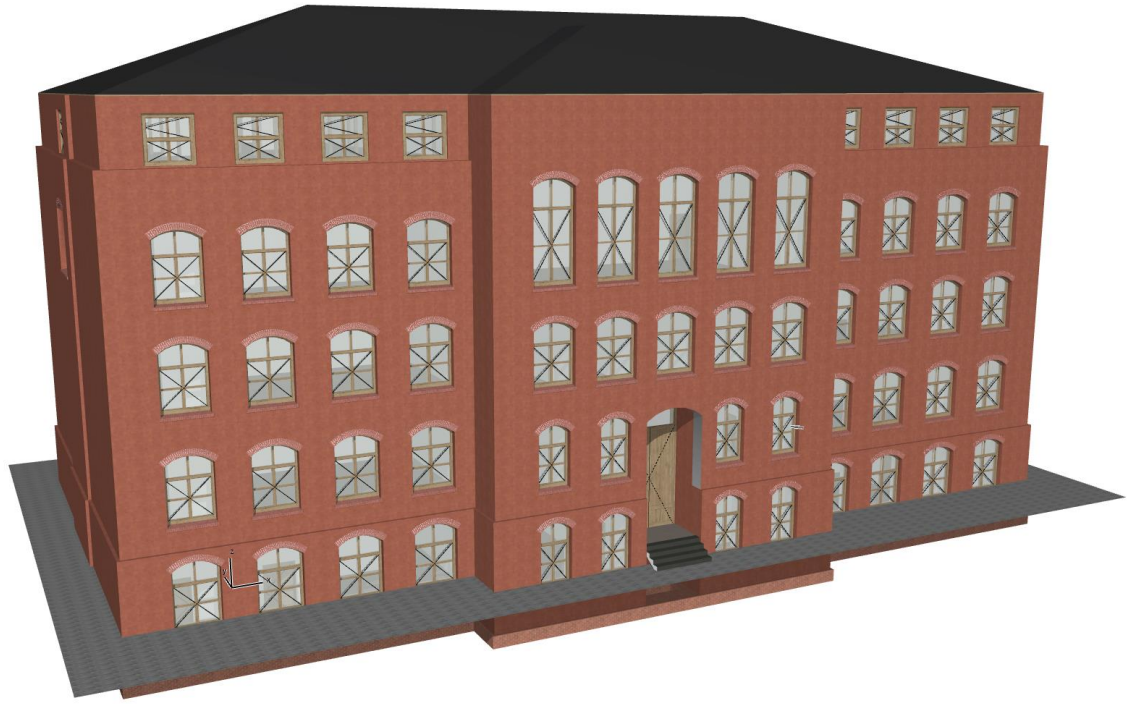


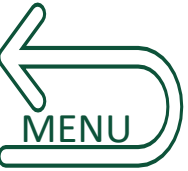
and transparency of the drawing



You can change also the transparency of the model







# Photogrammetry



The use of photogrammetry for the inventory of building



# Take photographs and videos



weather without intense sunlight on the photographed area

# 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

# 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

# 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



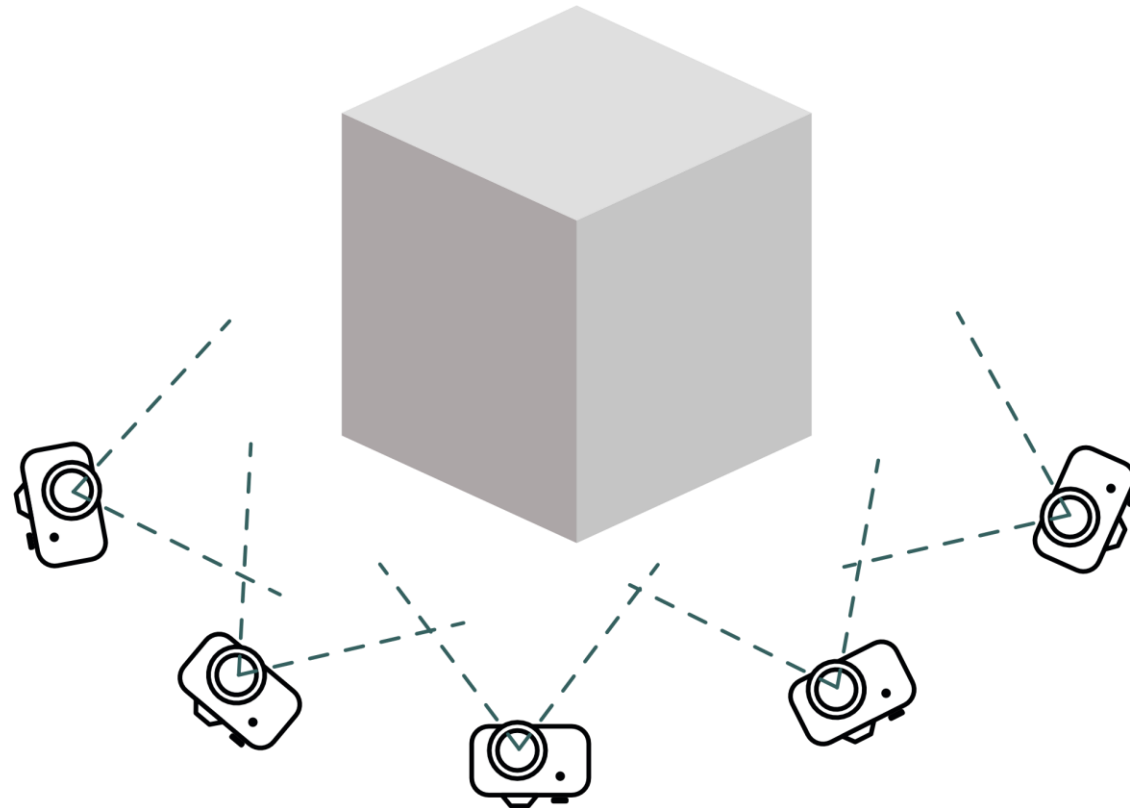
as much of the façade as possible should be in the frame in each photo



avoid close-ups

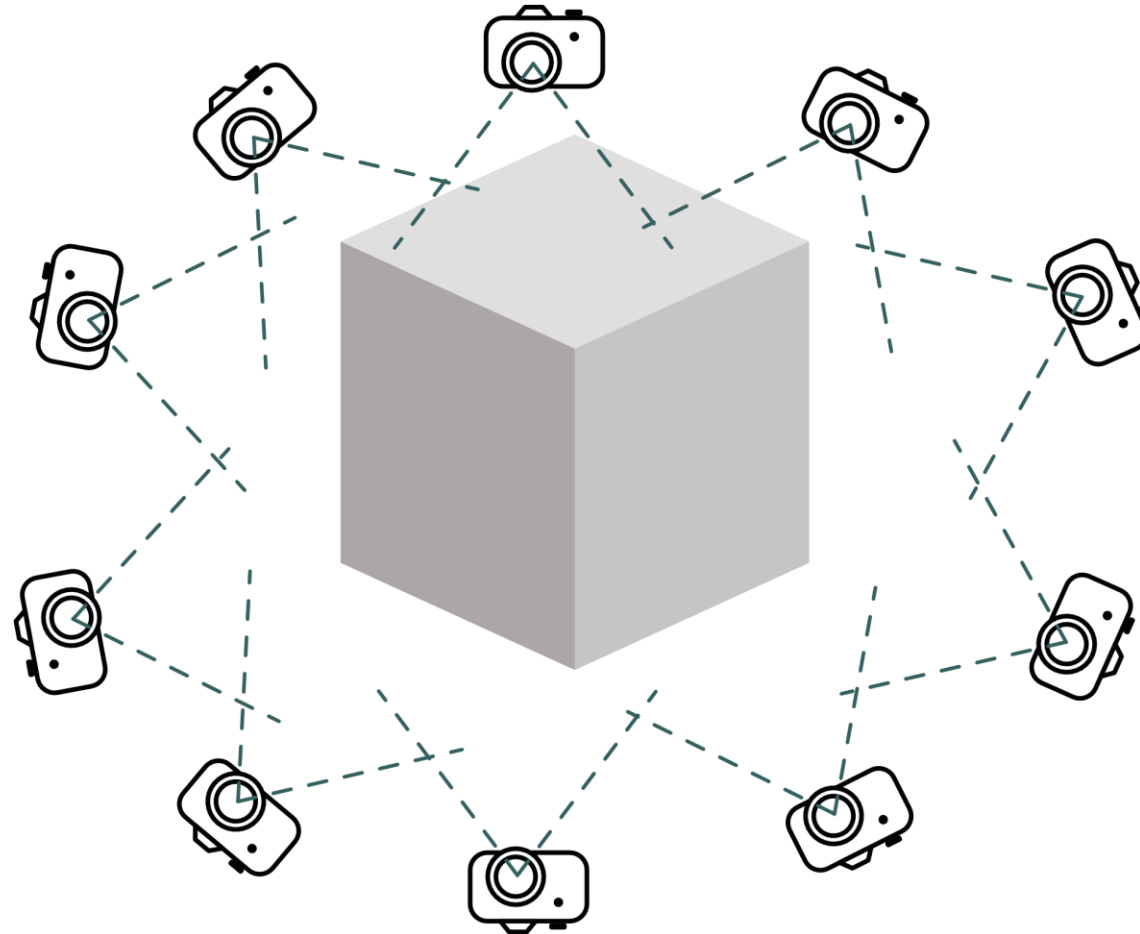
# Take photographs and videos

take a photo from different angles and distance to the elevation

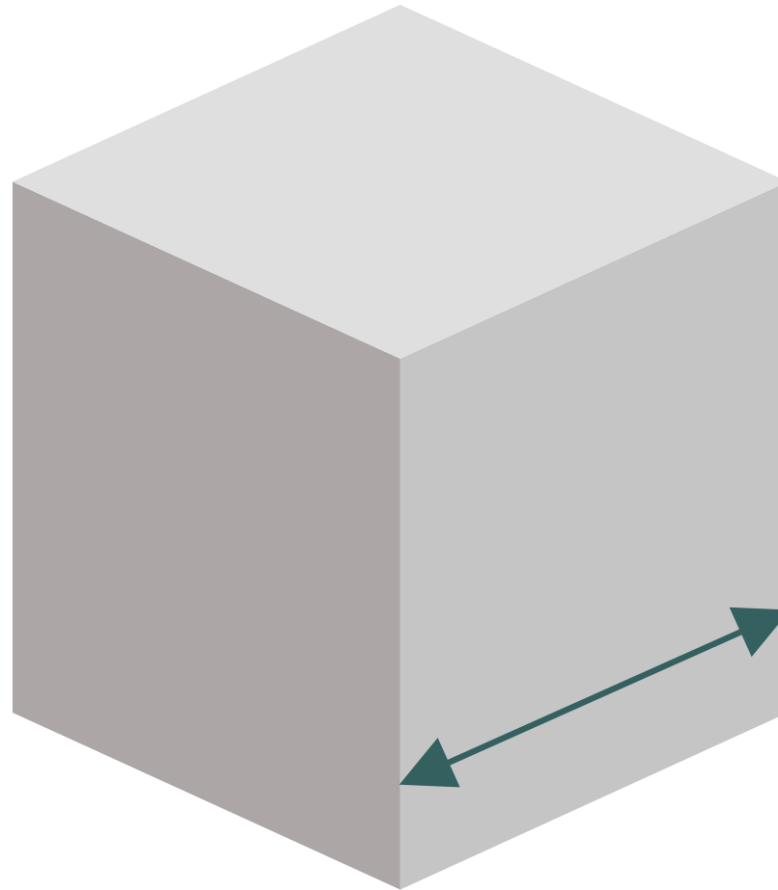


# Take photographs and videos

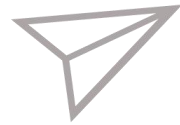
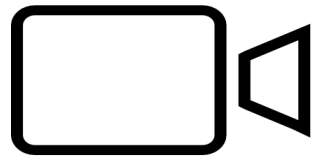
if possible take photos from a drone



Measure dimension on the elevation  
for later scaling of the scan

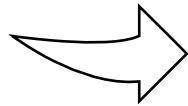


# Upload files to a computer





## Converting photos into a 3D model



# Download and install 3DF Zephyr

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



or

Get 3DF Zephyr Free here:



**3DF ZEPHYR FREE**  

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**PHOTOGRAMMETRY FOR EVERYONE**



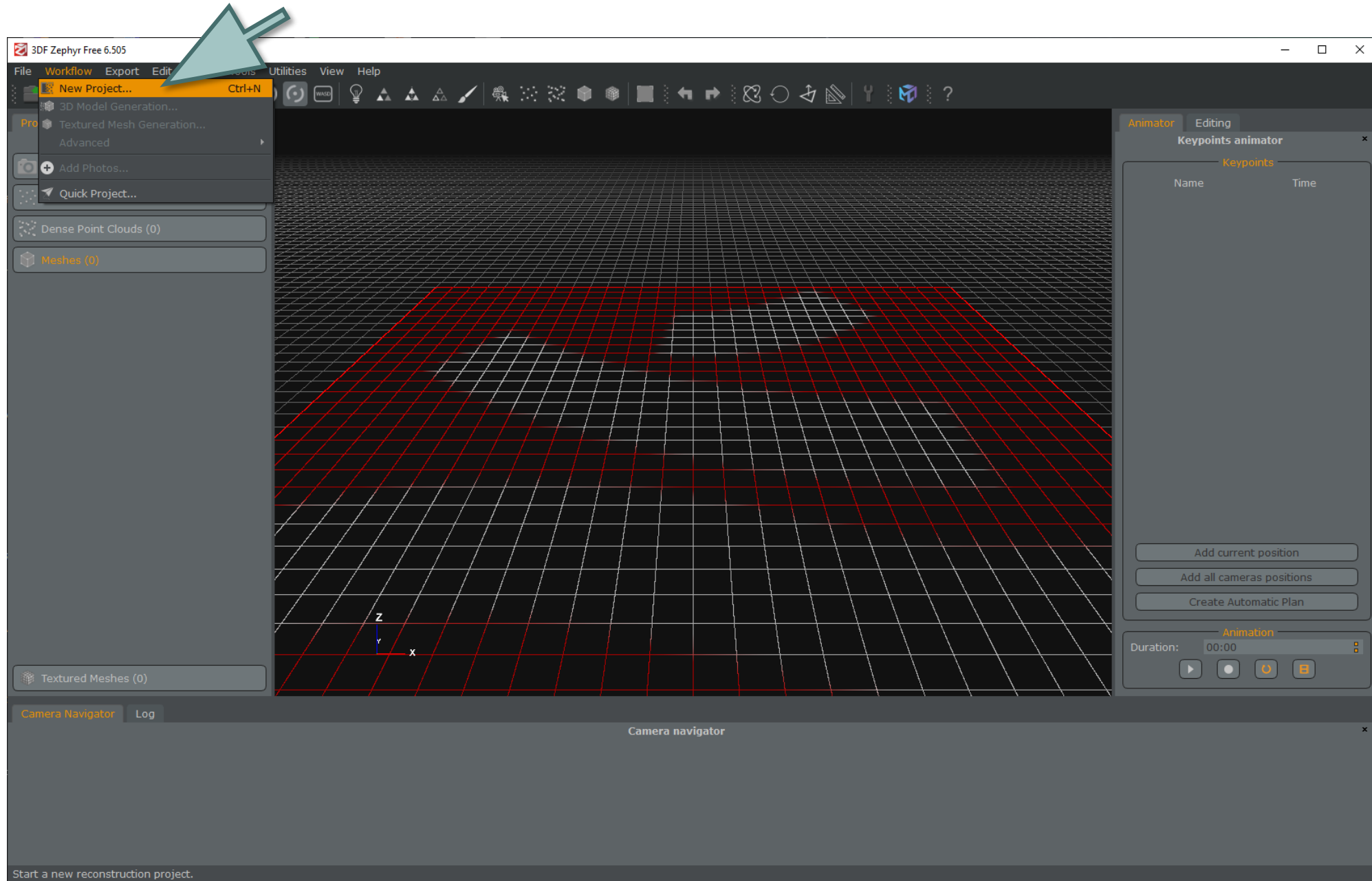
# Open 3DF Zephyr

This tutorial is for 3DF Zephyr Free

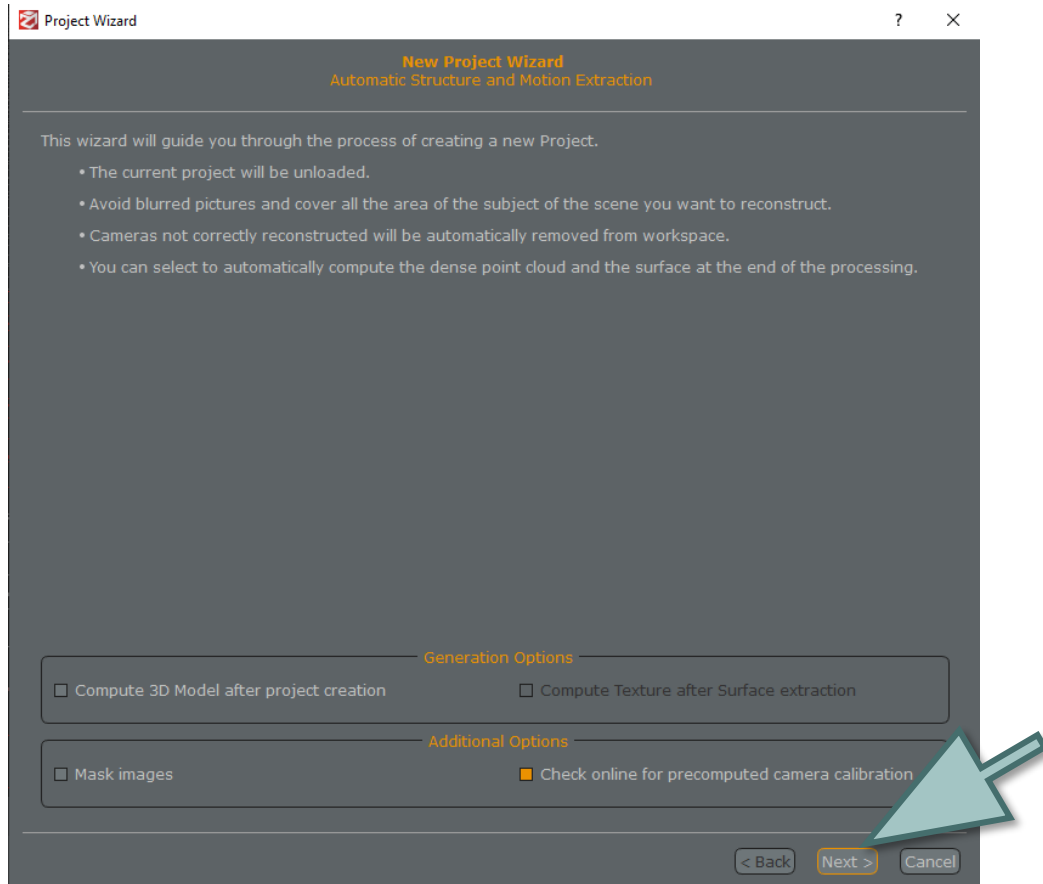


# Start New Project

MENU / Workflow / New Project

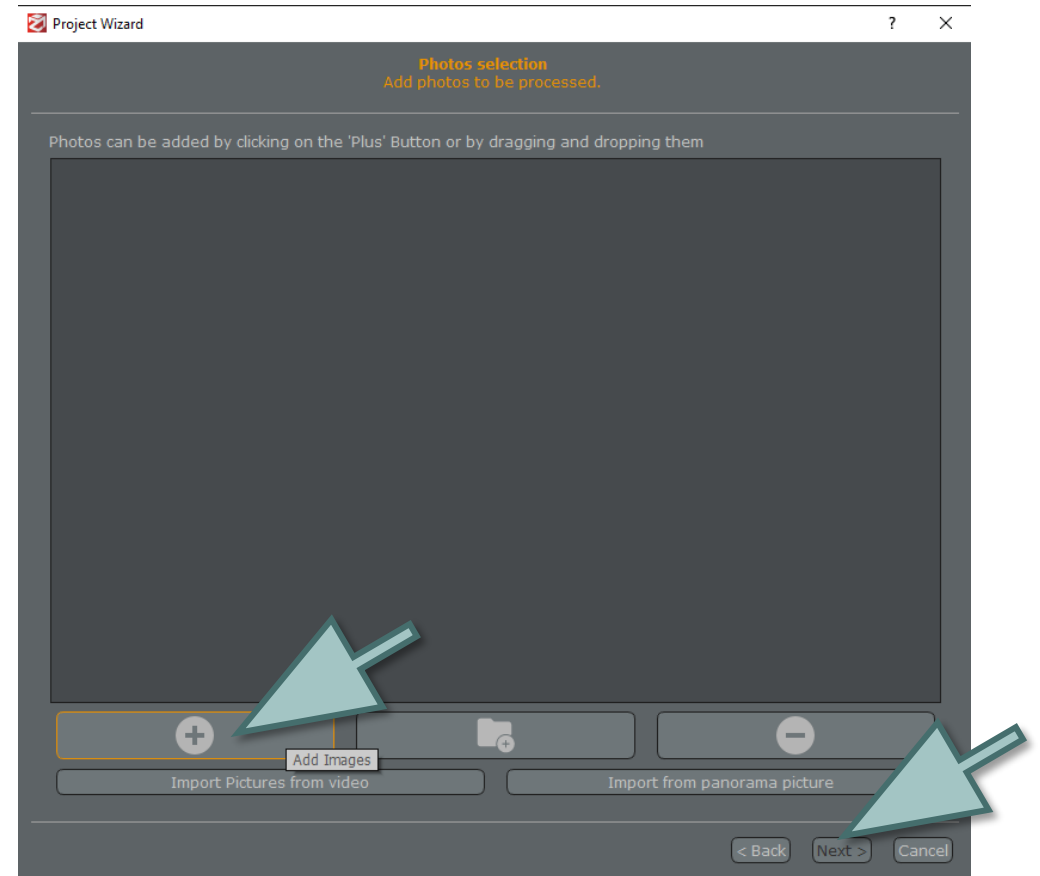


# Next

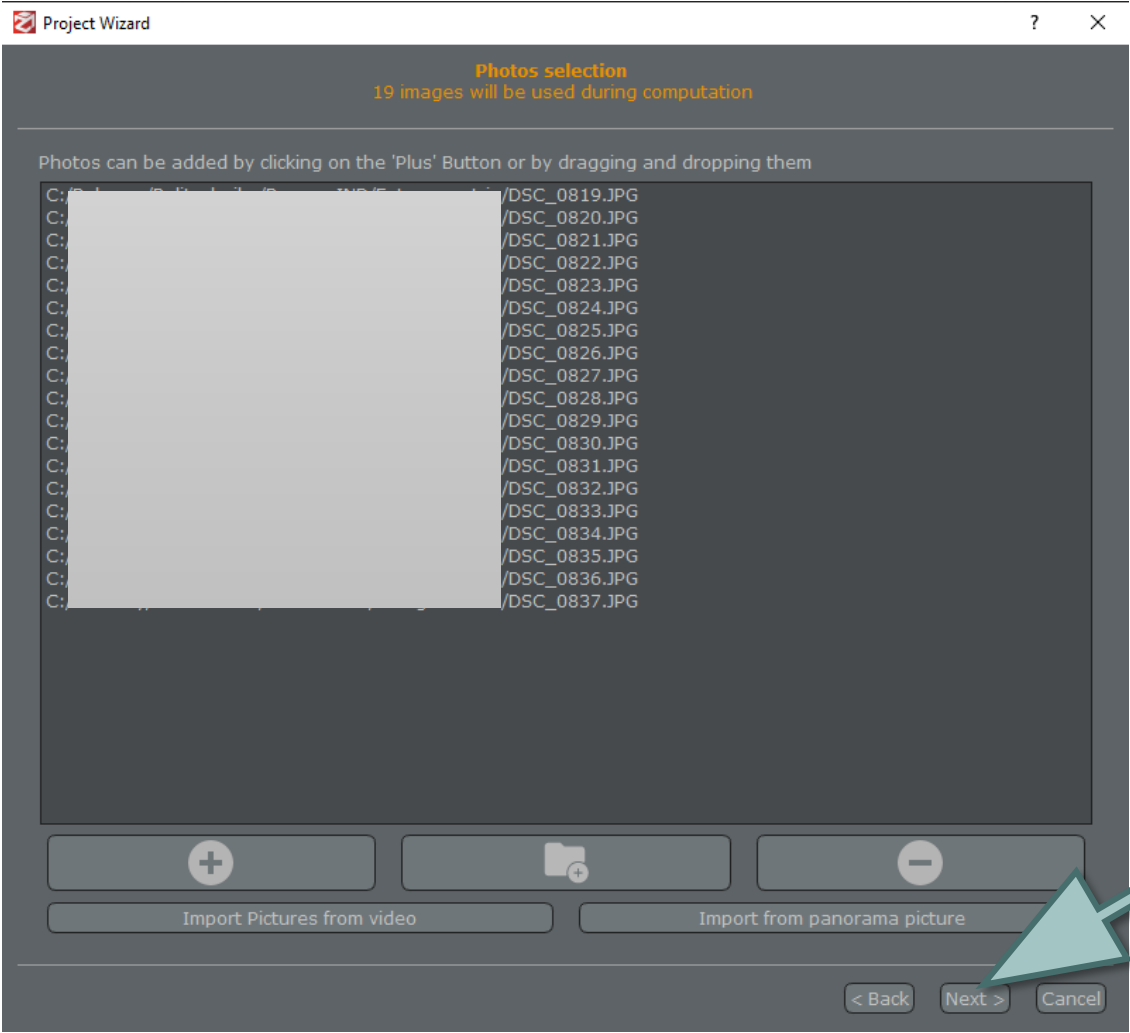


+ to add images

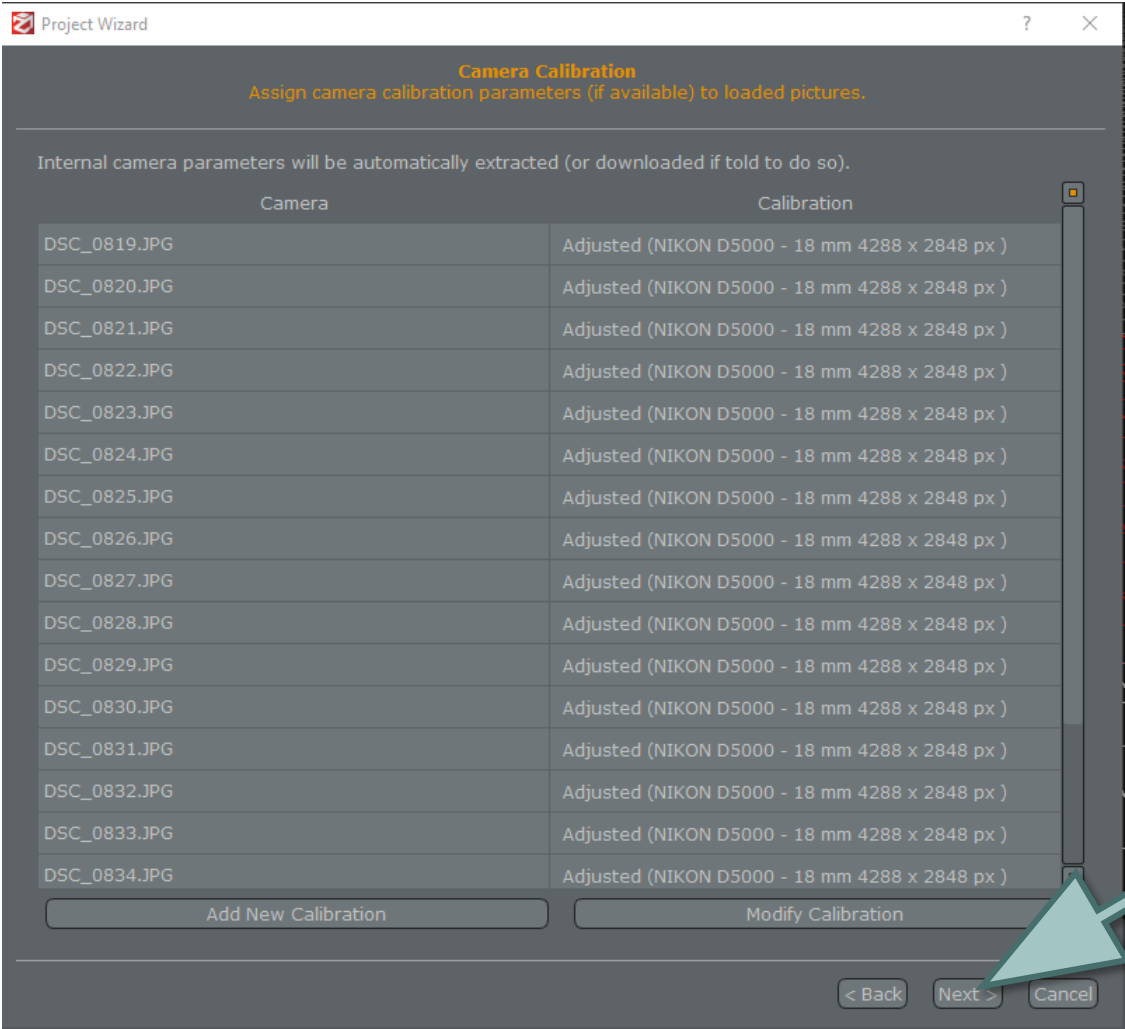
then Next



# Next



# Next



Category: Urban  
Presets: Deep

then Next

Project Wizard

Camera orientation  
Select your reconstruction type and a desired preset.

Settings: Presets

Camera orientation presets

Category: Urban

Use this preset category when scanning buildings, facades or scenarios that are shot in an urban setting. You can also use this preset category for small objects instead of the "Close Range" category if you are mixing different types of photos, especially if the whole dataset is not shot from the same distance.

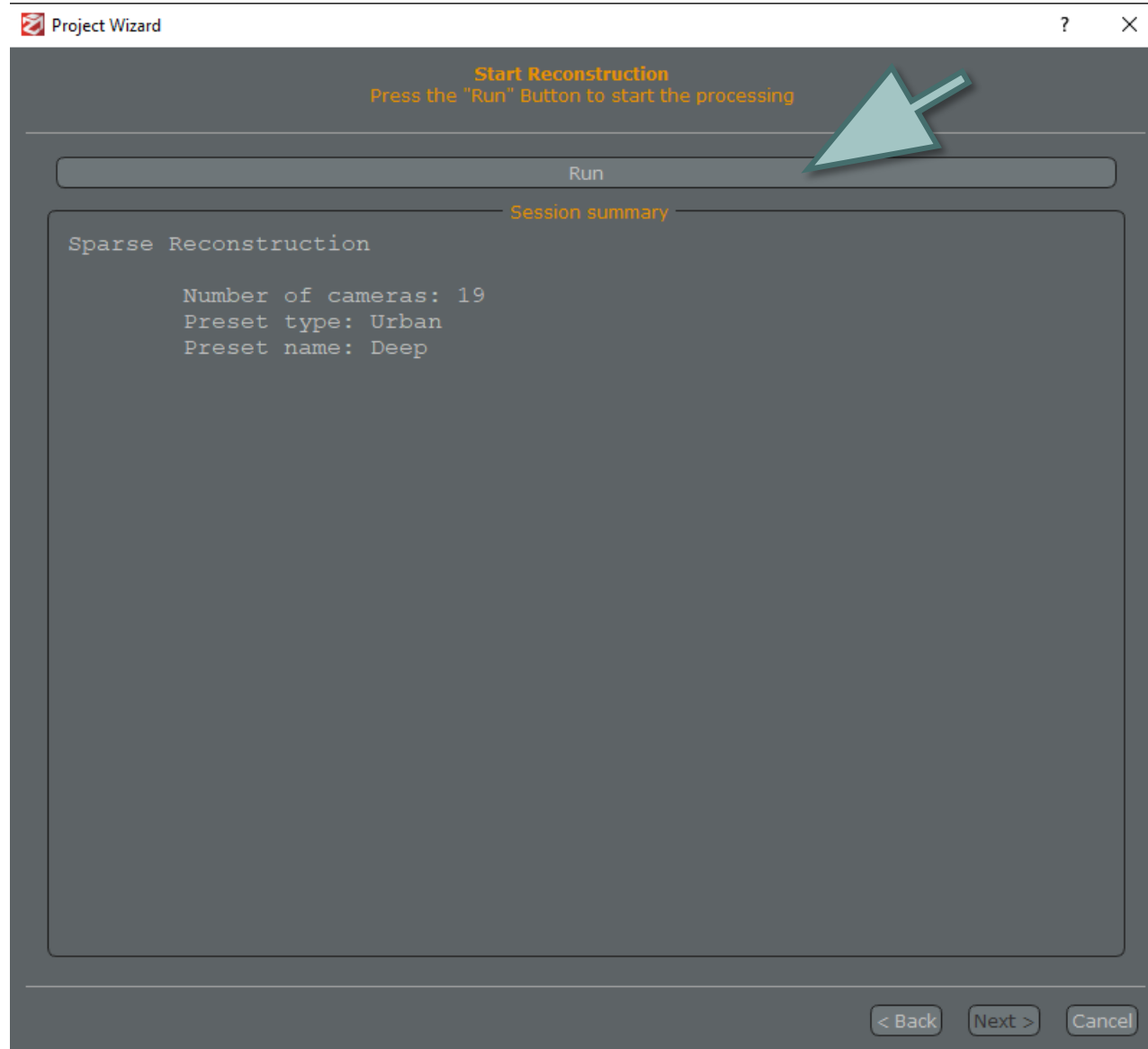
Presets: Deep

Increased bundle adjustment iterations, number of keypoints and camera matches. Slower than the default setting, this preset should be used when you are losing cameras in Default mode.

< Back Next > Cancel

Run

and wait





















# 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.

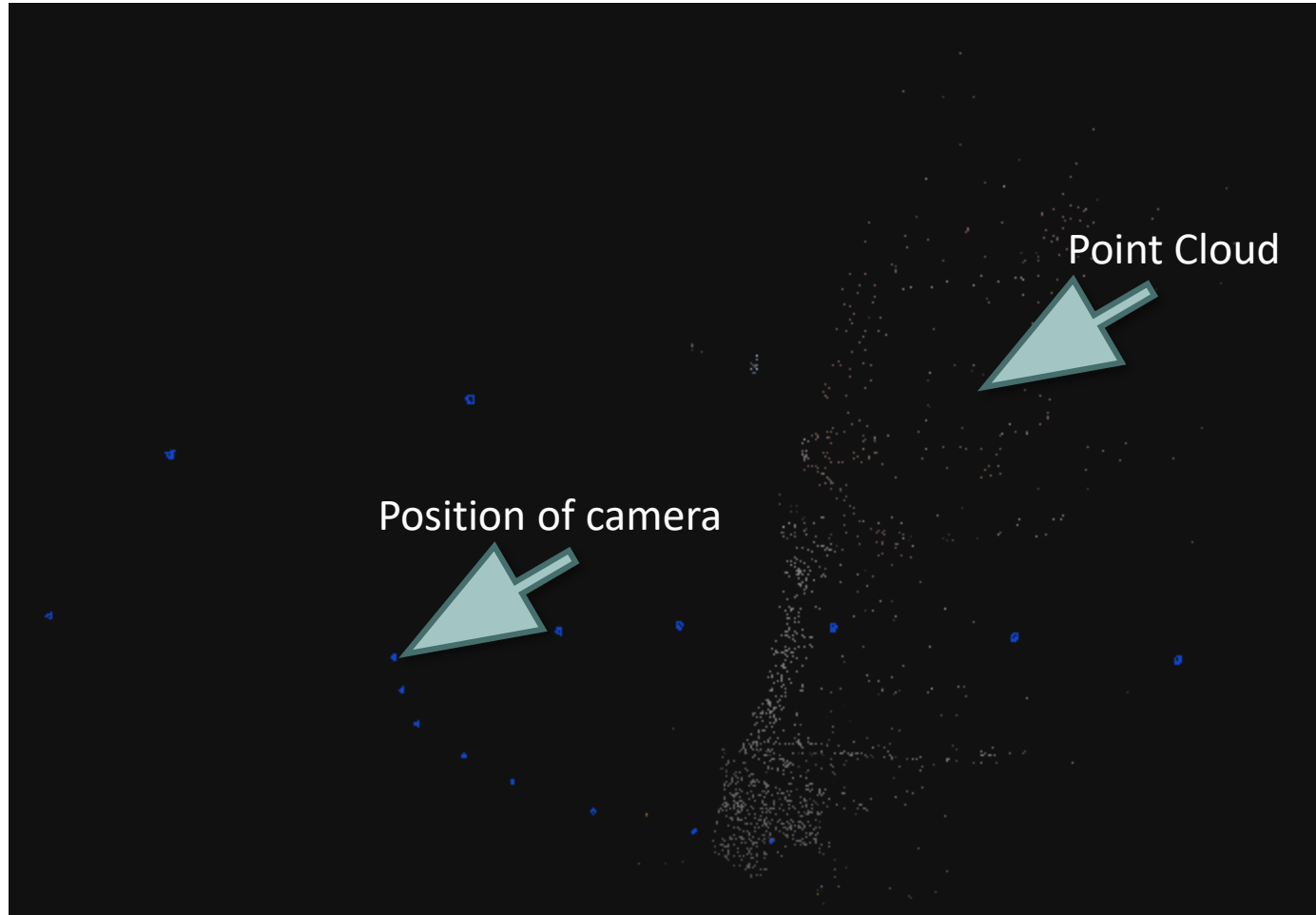
Summary:

| 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**

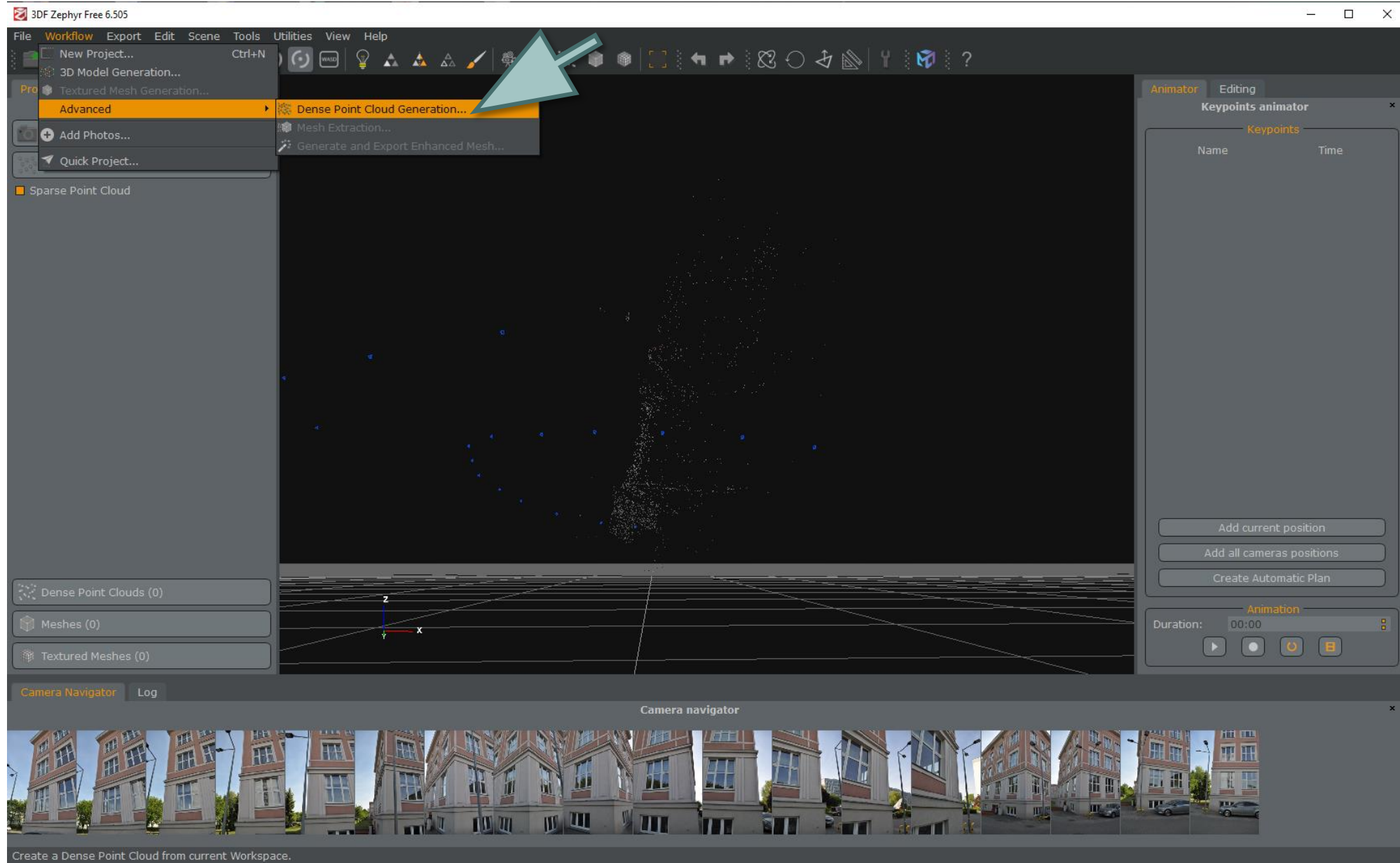


# First effect



# Create dense point cloud

MENU / Workflow / Advanced / Dense Point Cloud Generation



Create a Dense Point Cloud from current Workspace.

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

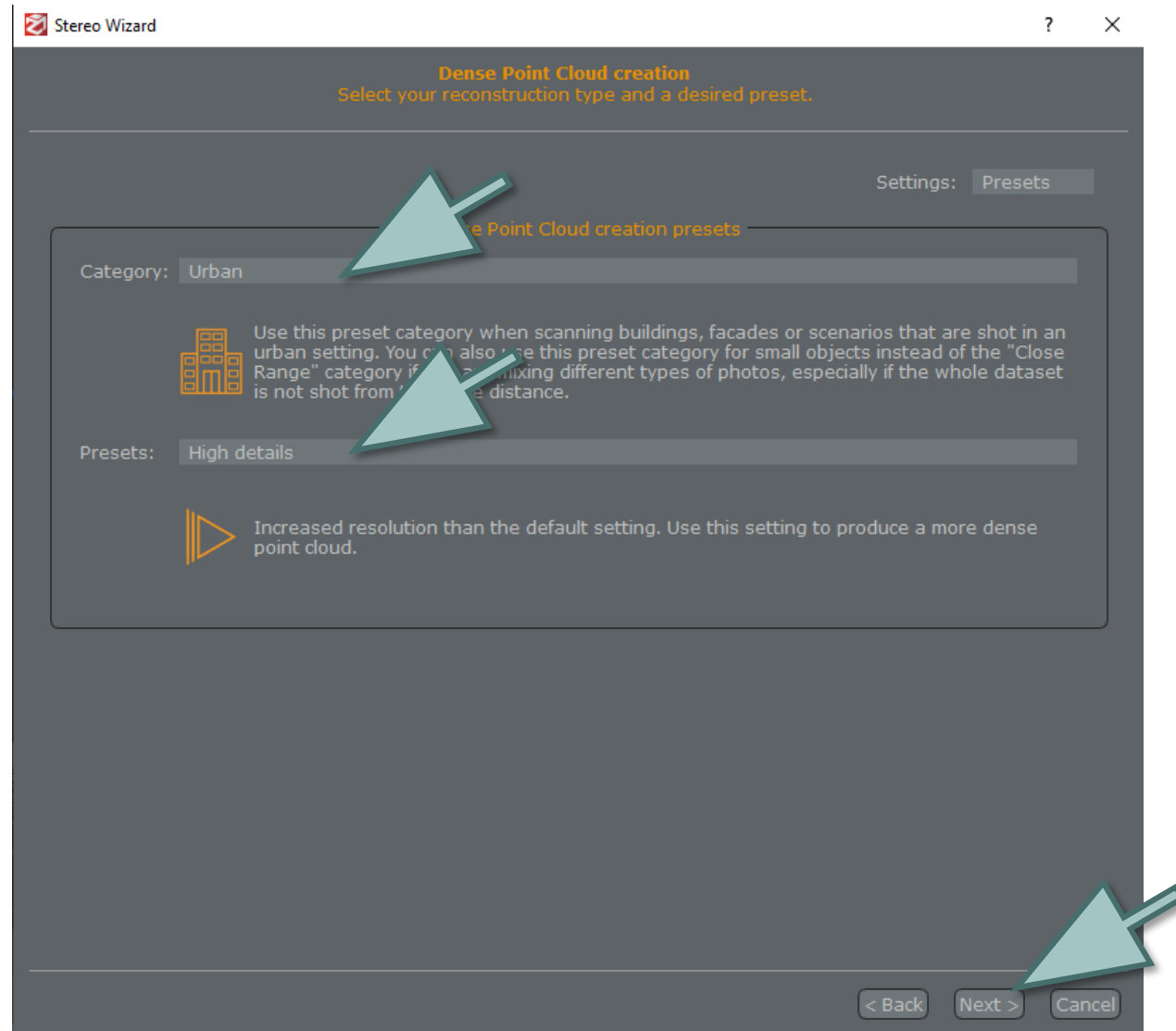
---

< Back Next > Cancel



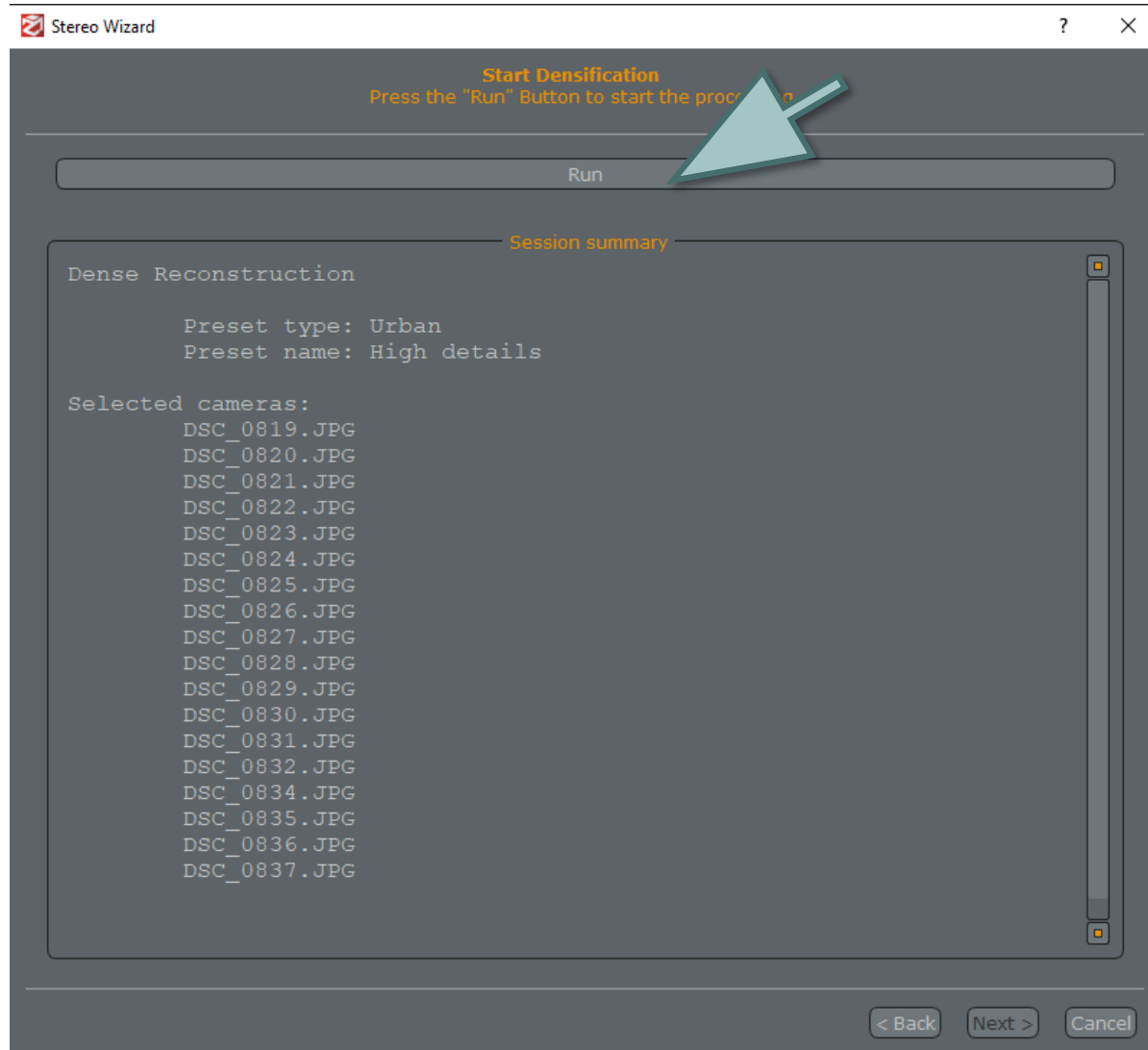
Category: Urban  
Presets: High details

then Next

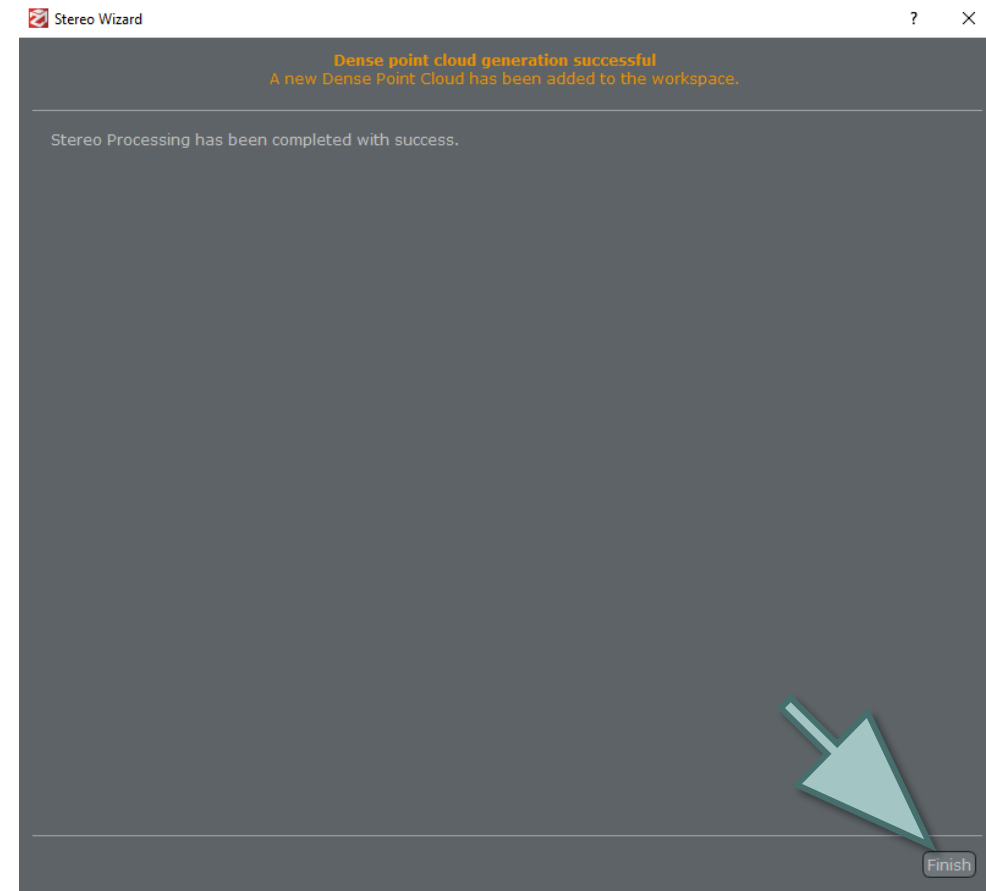


Run

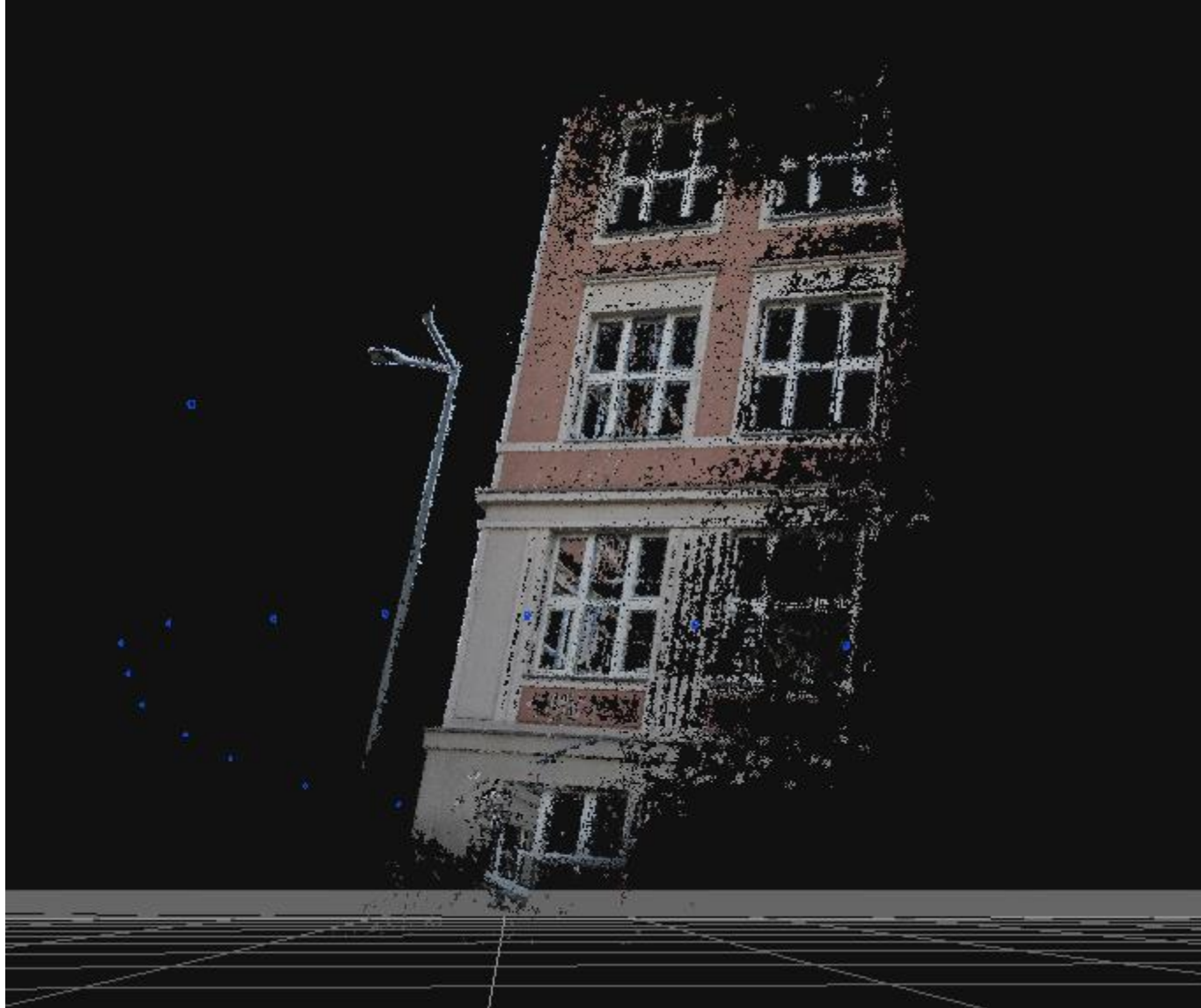
and wait



then Finish



# Dense point cloud



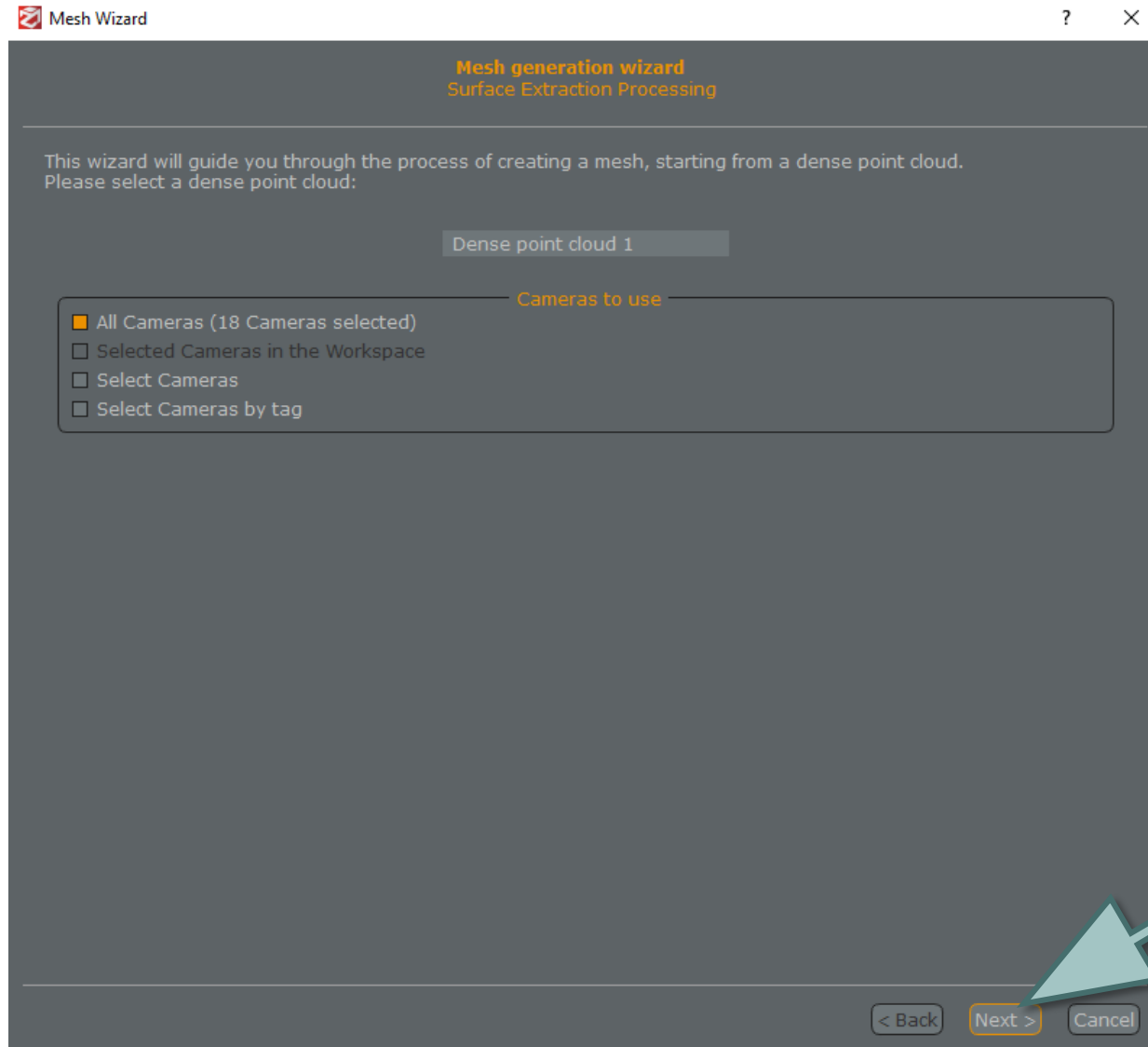
# Create mesh

MENU / Workflow / Advanced / Mesh Extraction

The screenshot displays the 3DF Zephyr Free 6.505 software interface. The top menu bar includes File, Workflow, Export, Edit, Scene, Tools, Utilities, View, and Help. The 'Workflow' menu is open, showing options like 'New Project...', '3D Model Generation...', and 'Advanced'. The 'Advanced' submenu is expanded, highlighting 'Mesh Extraction...' with a teal arrow. Other options in the submenu include 'Dense Point Cloud Generation...' and 'Generate and Export Enhanced Mesh...'. The main 3D view shows a point cloud of a multi-story building. The left sidebar contains a 'Dense Point Clouds (1)' section with 'Dense point cloud 1' and a 'Meshes (0)' section. The right sidebar features an 'Animator' panel with 'Keypoints animator' settings, including a table with columns for 'Name' and 'Time', and buttons for 'Add current position', 'Add all cameras positions', and 'Create Automatic Plan'. Below this is an 'Animation' section with a 'Duration' of '00:00' and playback controls. At the bottom, a 'Camera navigator' panel shows a panoramic view of the building. A status bar at the very bottom reads 'Create a Triangulated Mesh starting from a Dense Point Cloud.'

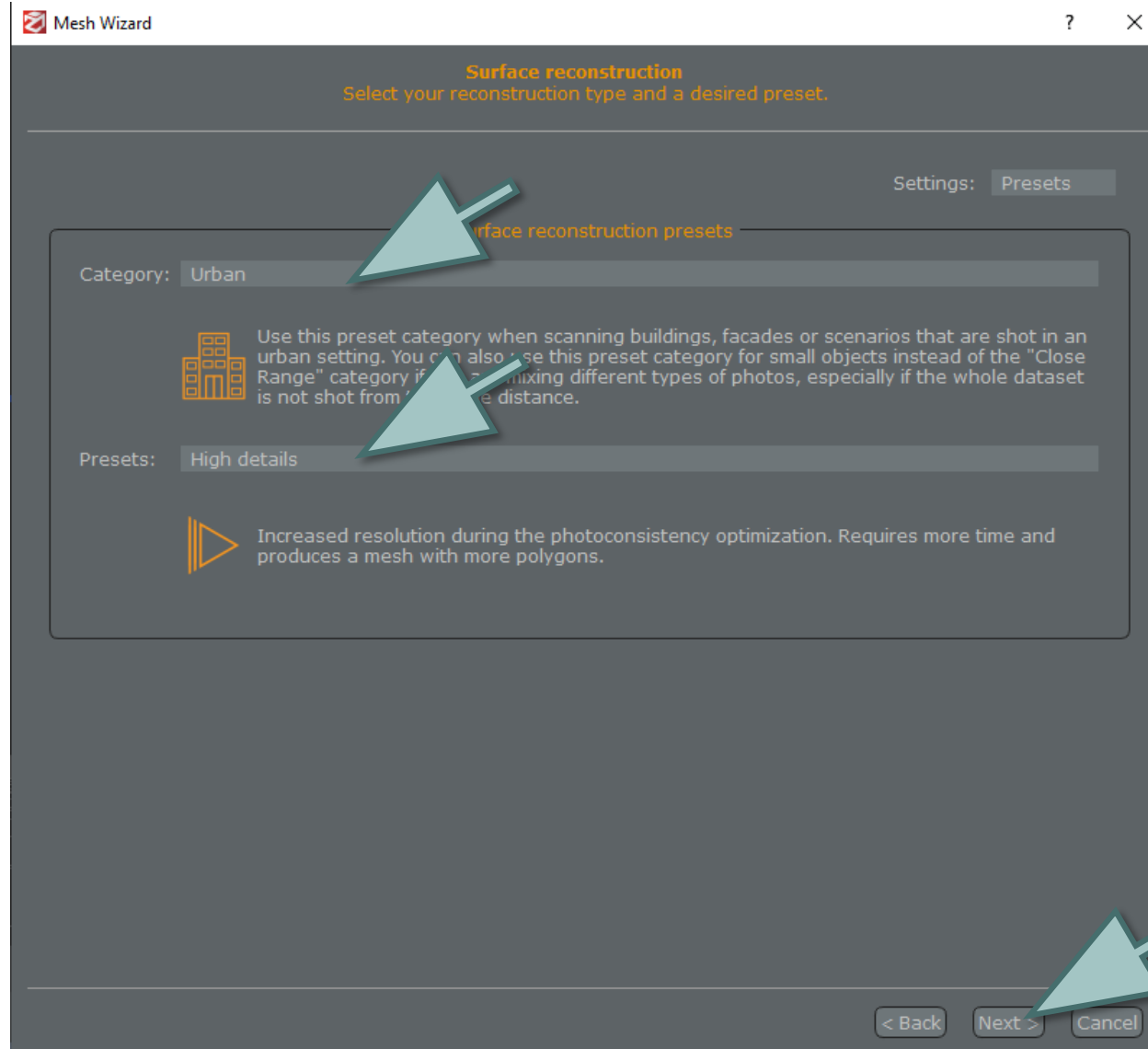


Next



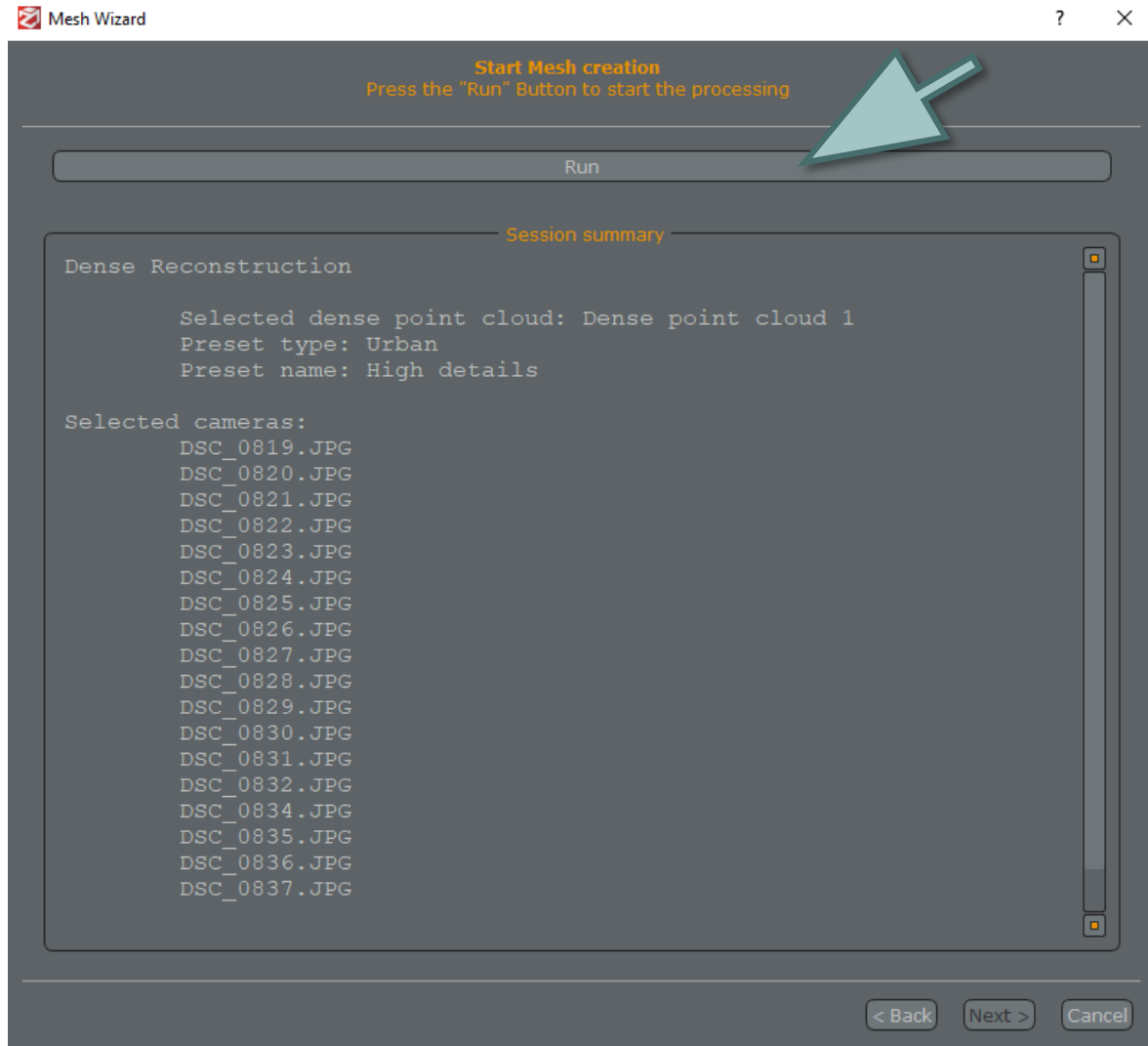
Category: Urban  
Presets: High details

then Next

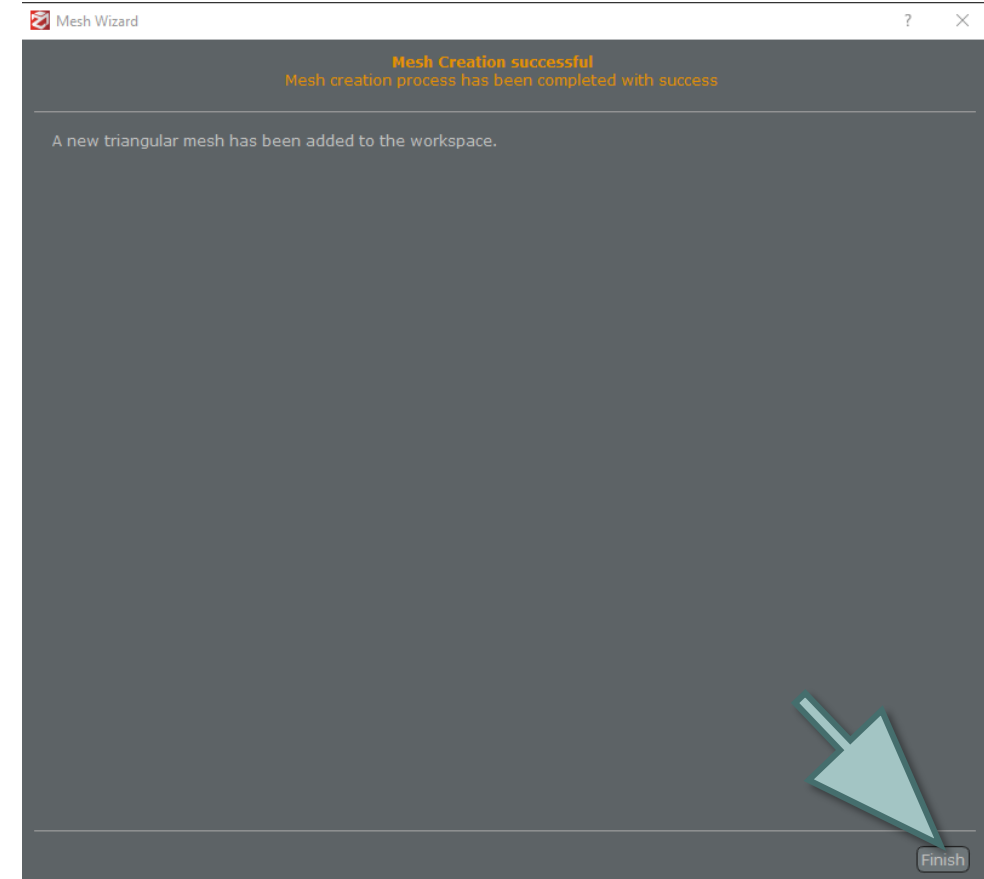


Run

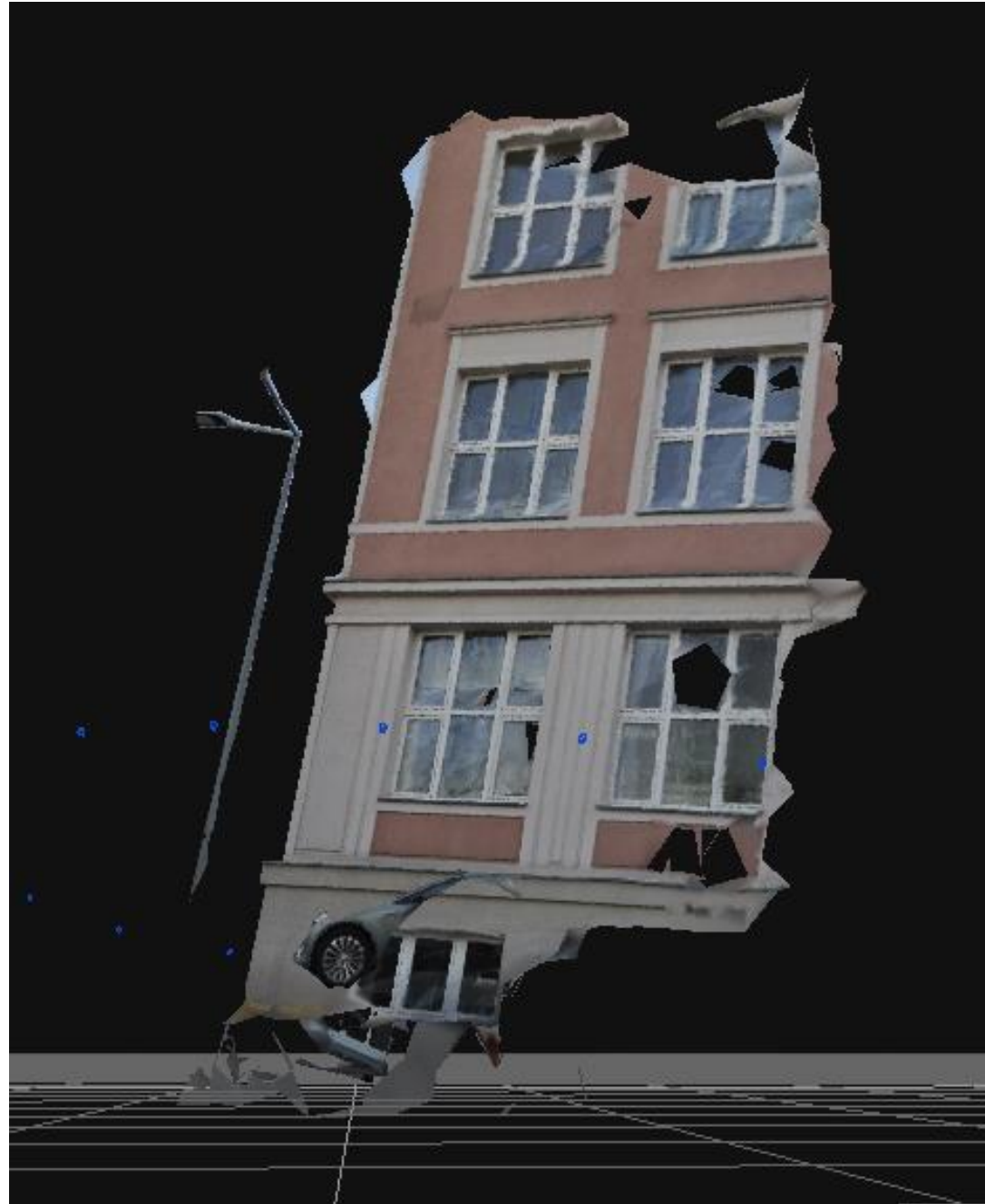
and wait



then Finish

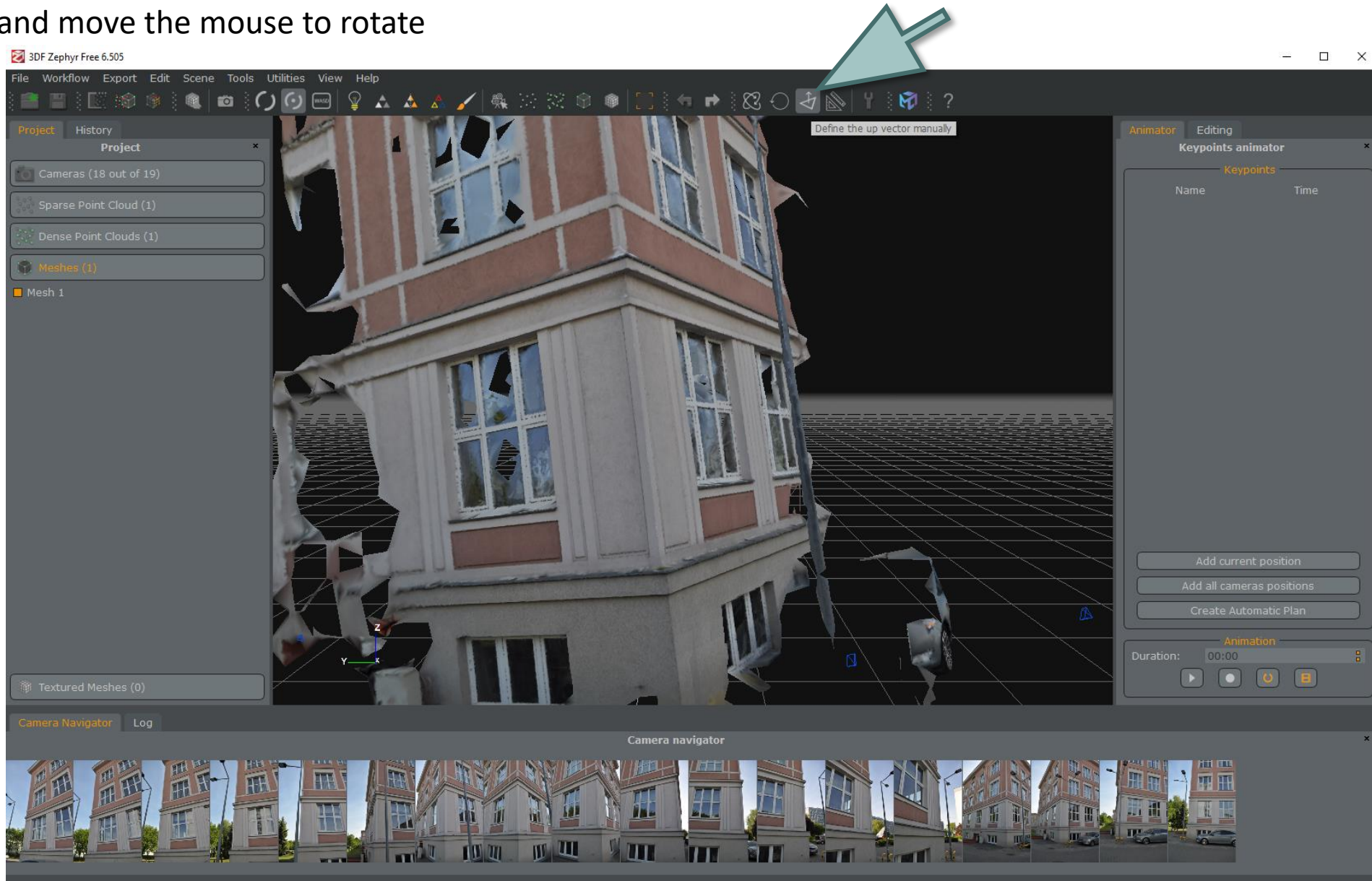


# Mesh

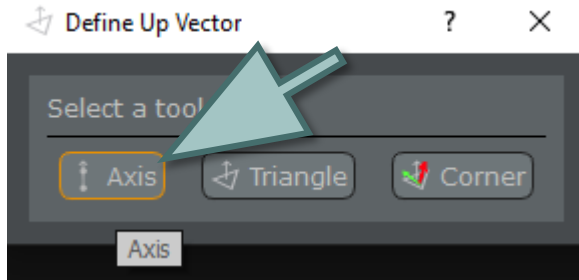


# Define the vertical direction

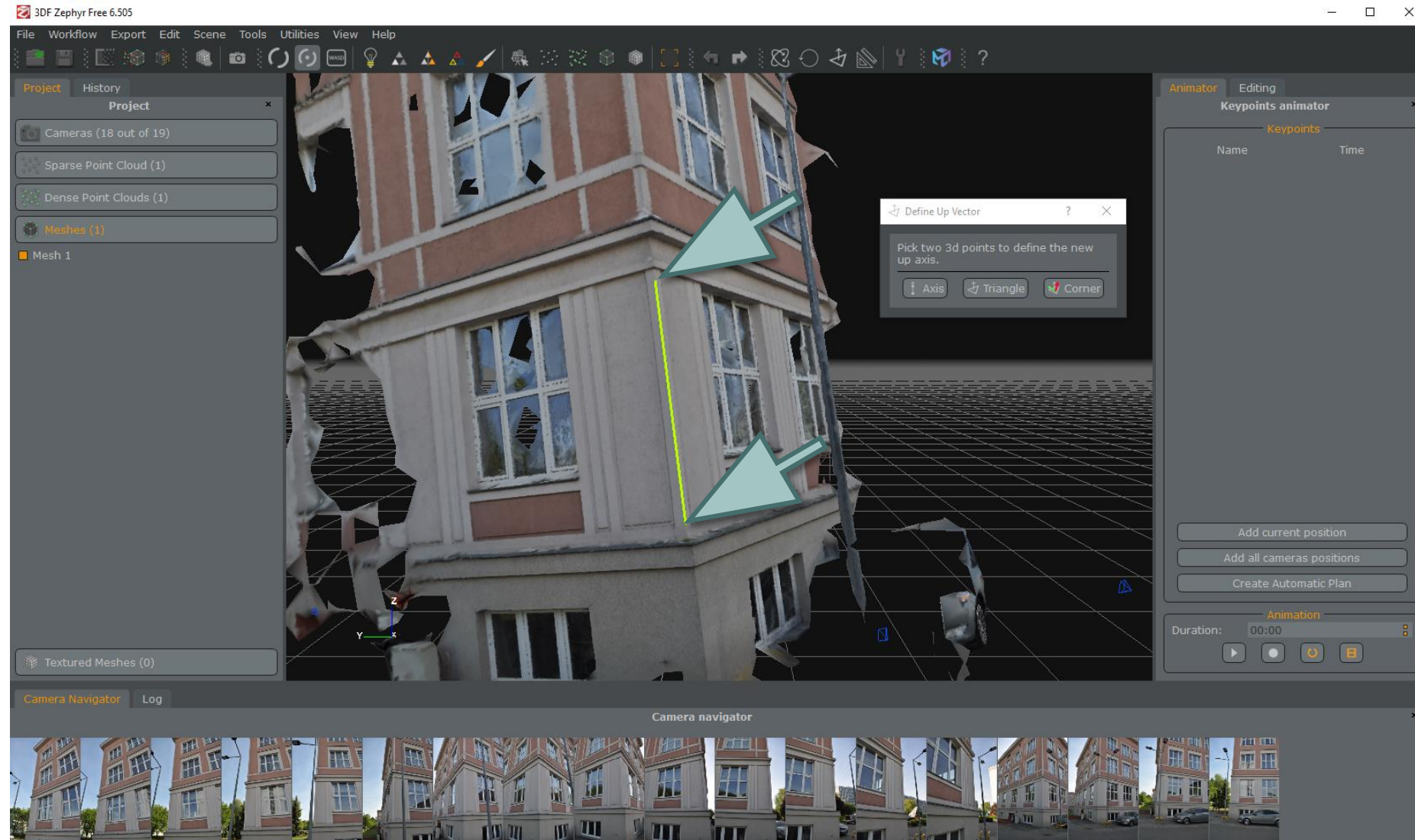
click the left mouse button and move the mouse to rotate  
scroll to scale



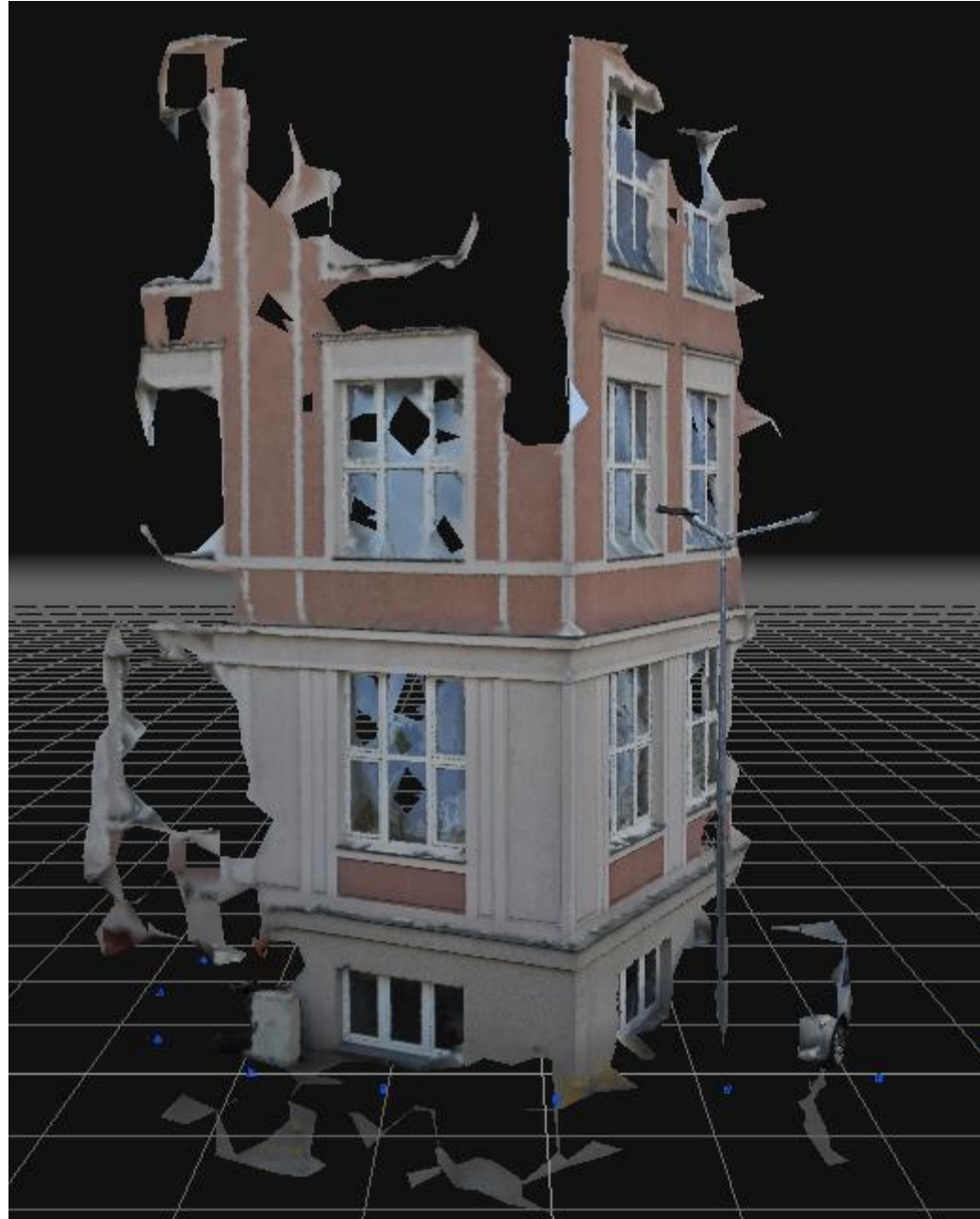
# Axis



and click on two corner points to select the vertical edge



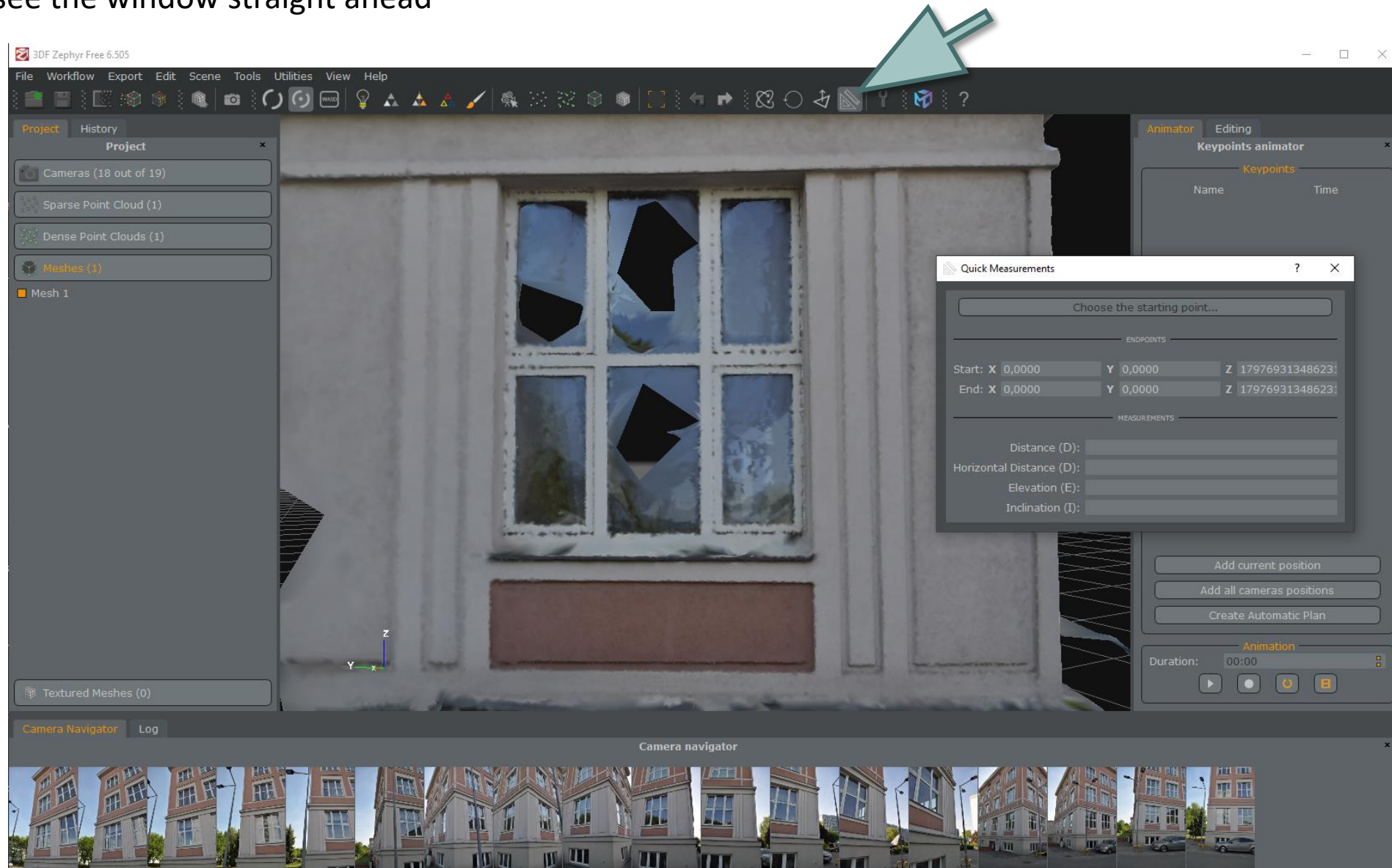
# Effect



# Scale the model

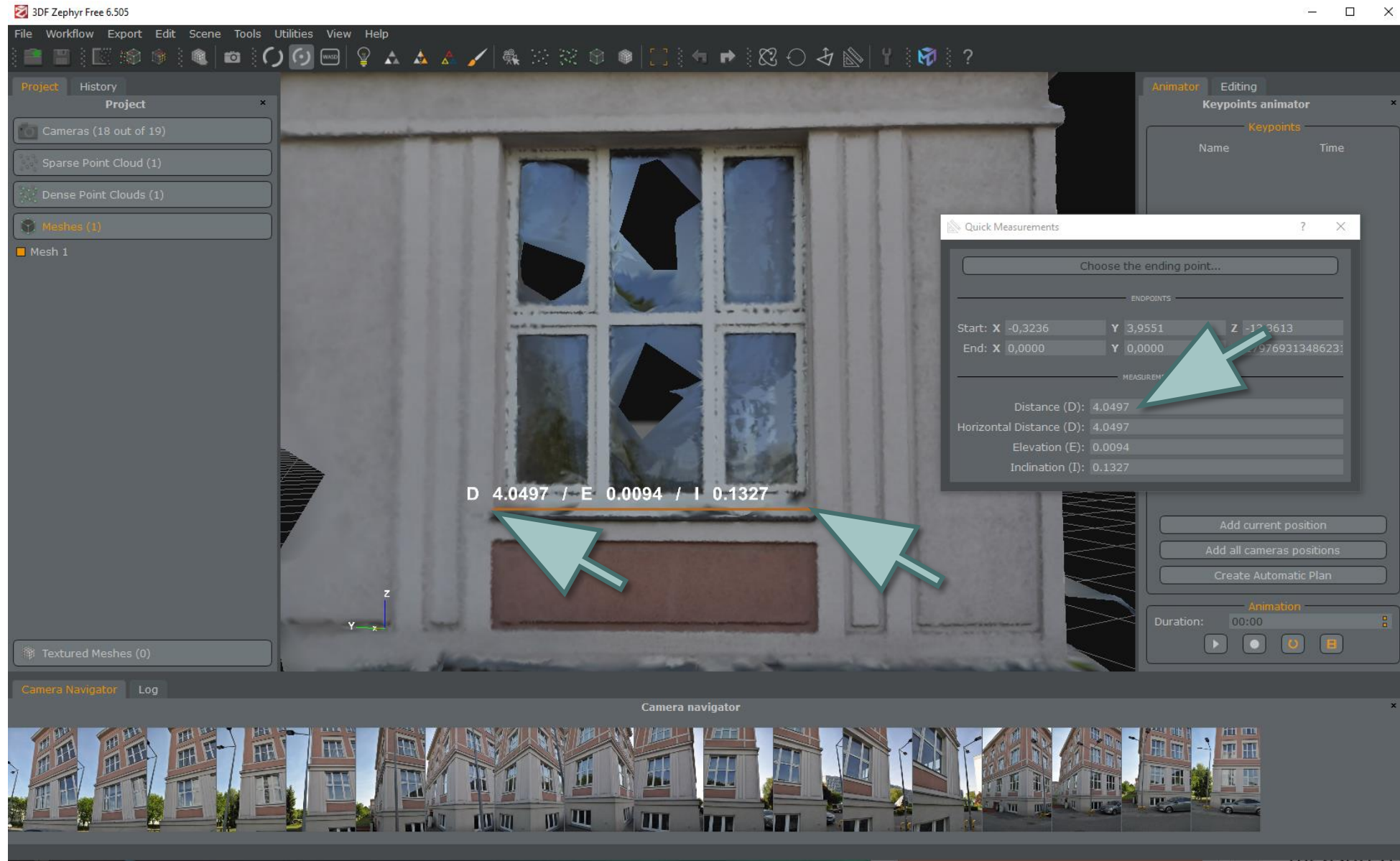
rotate and scale the model to see the window straight ahead

then Quick Measurements

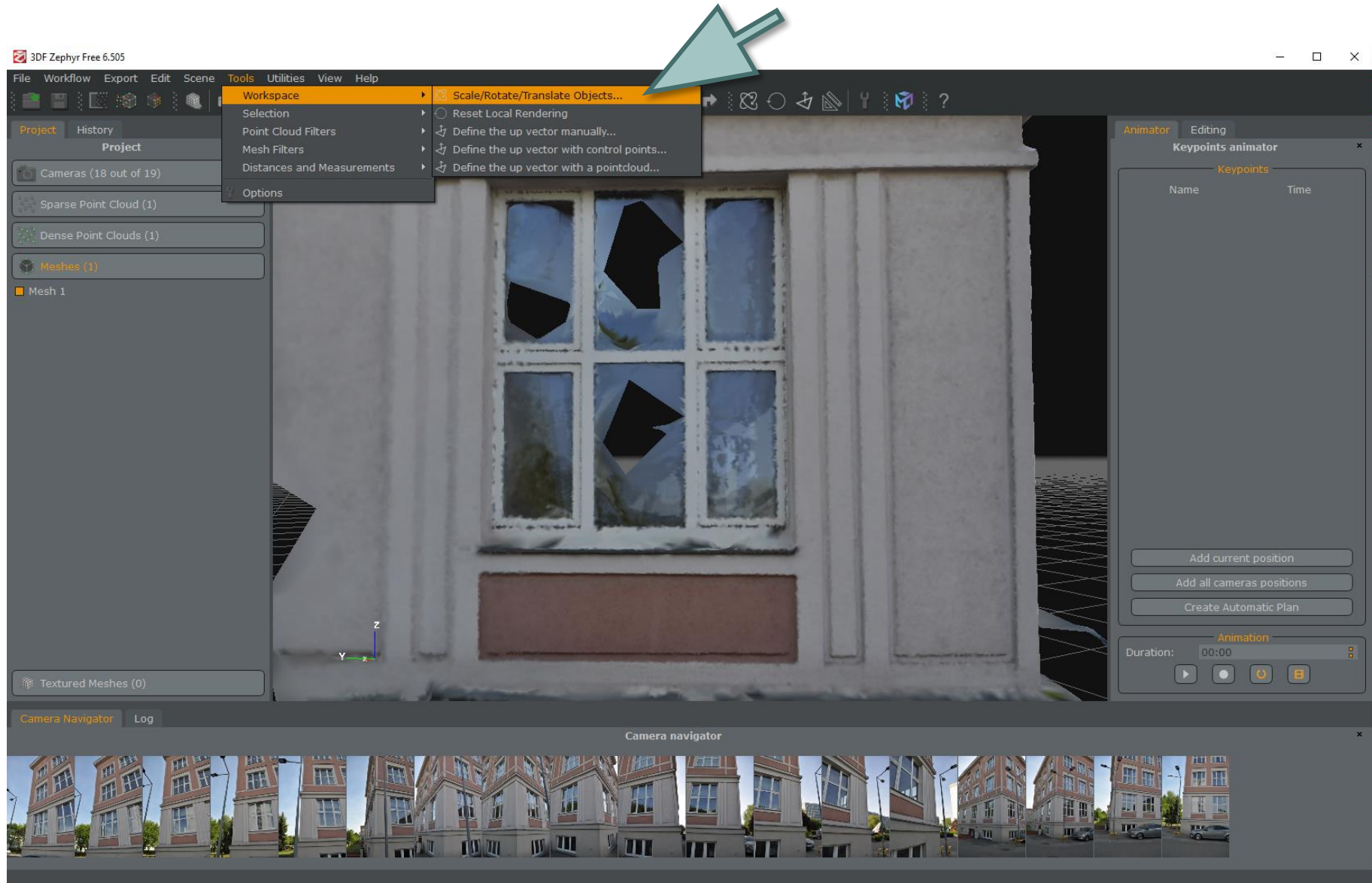




- click two points on the edge of the window and read the distance
- measured actual width of the window: 1.95 m
- calculate the scale:  $1.95 / 4.05 = 0.48$

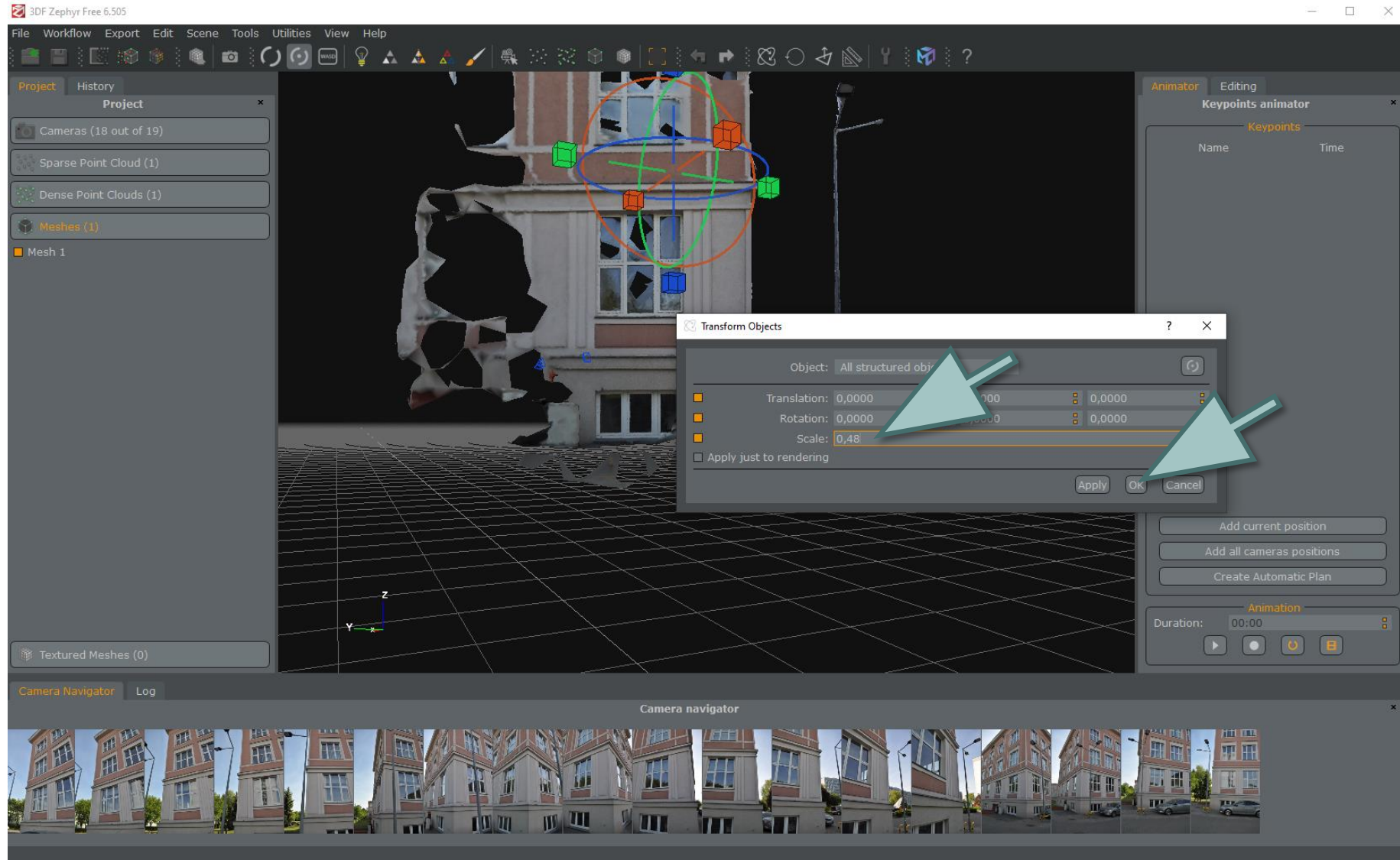


# MENU / Tools / Workspace / Scale...



enter 0.48

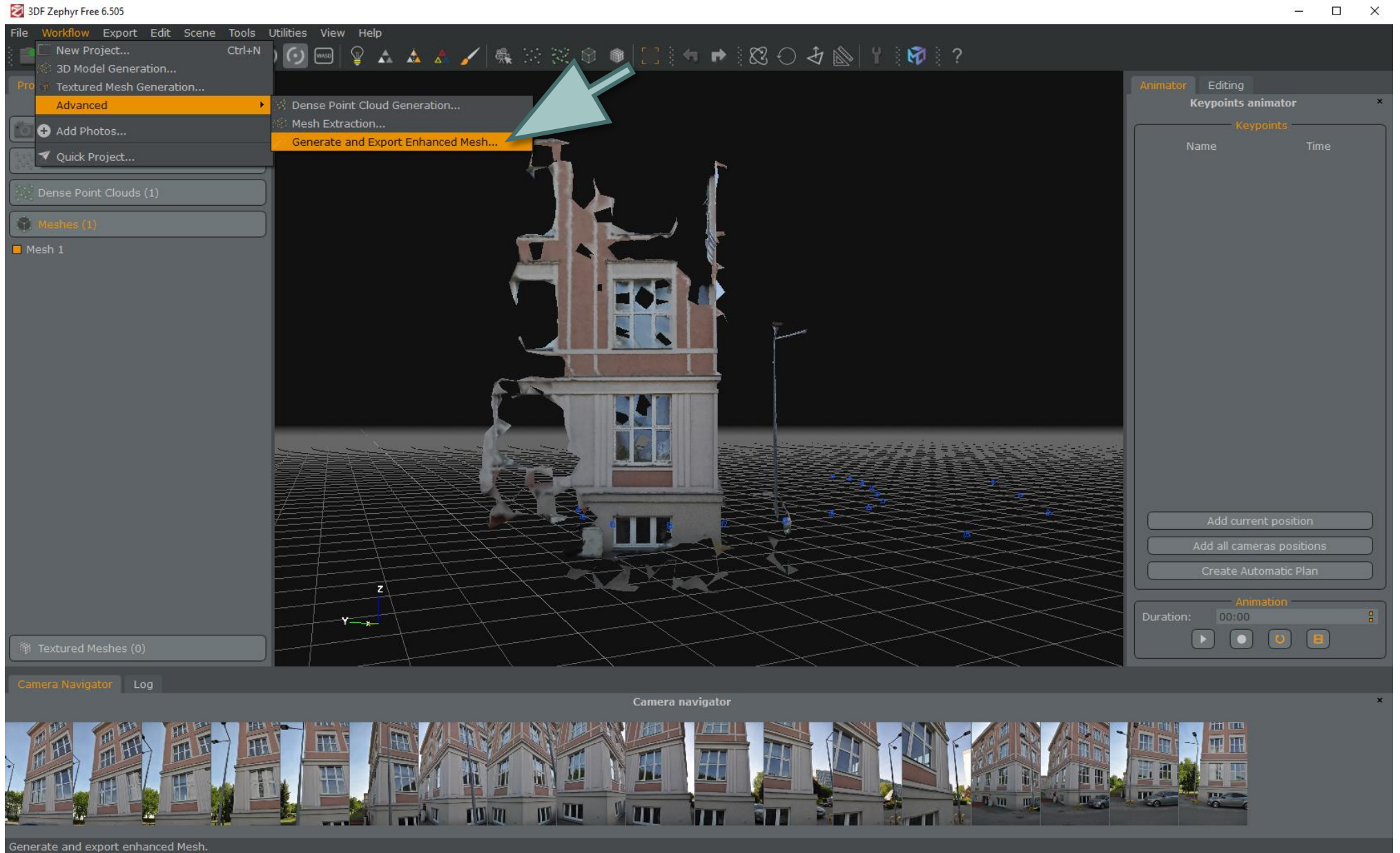
then OK



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

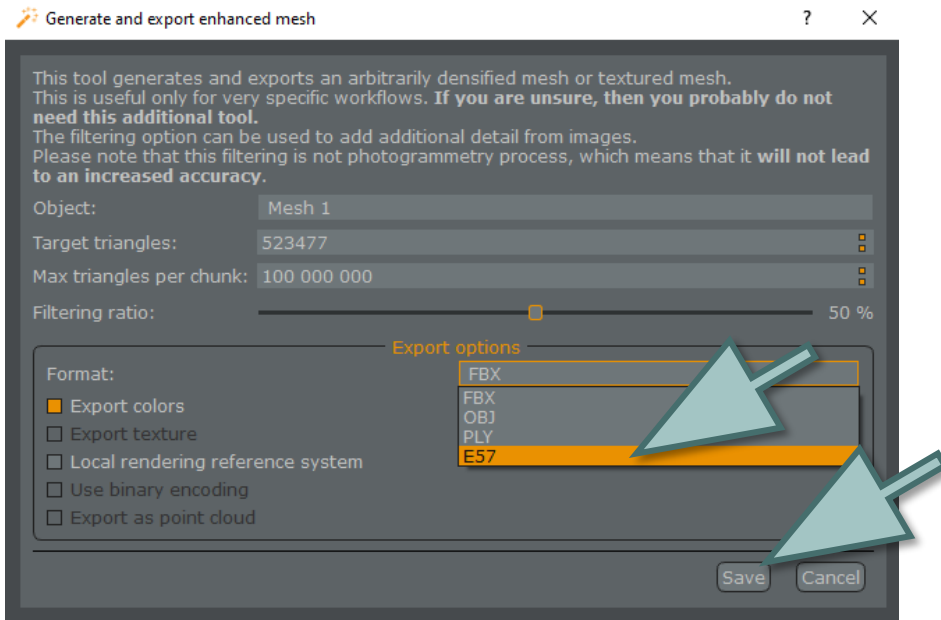
# Export the model

MENU / Workflow / Advanced / Export Mesh ...



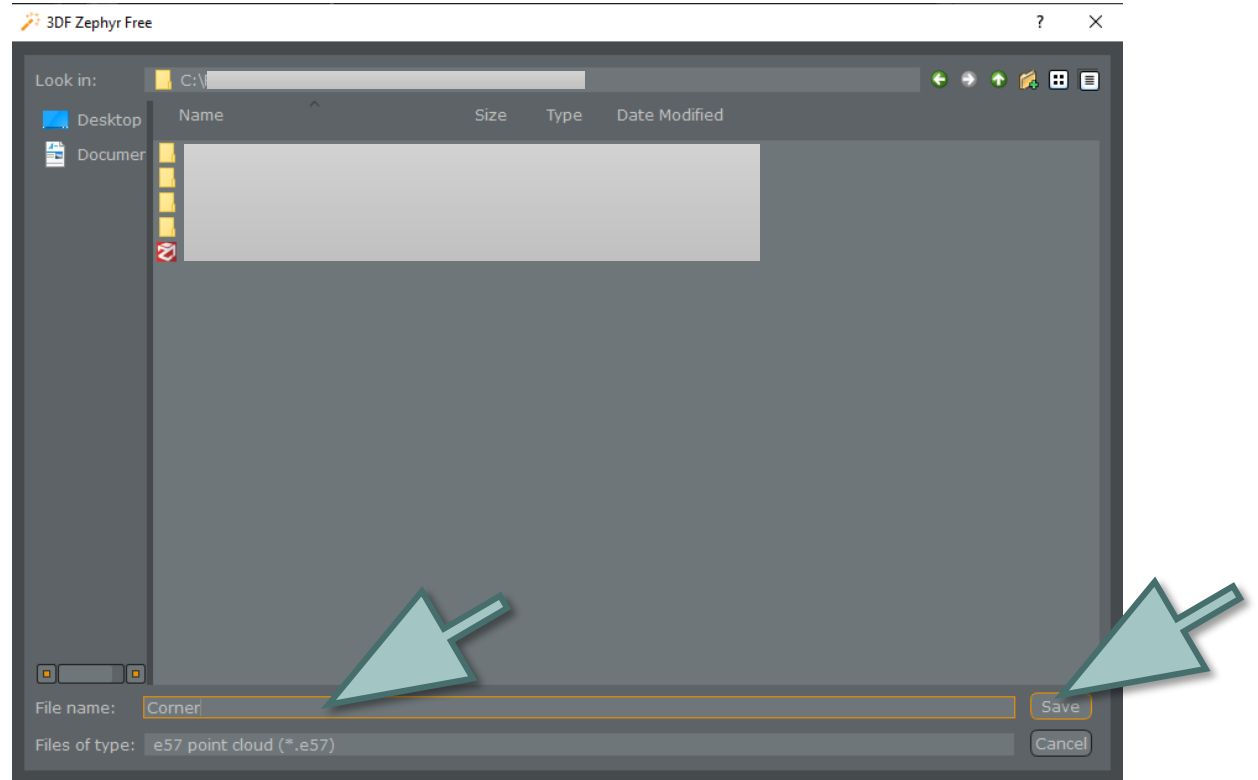
select format: E57

then Save



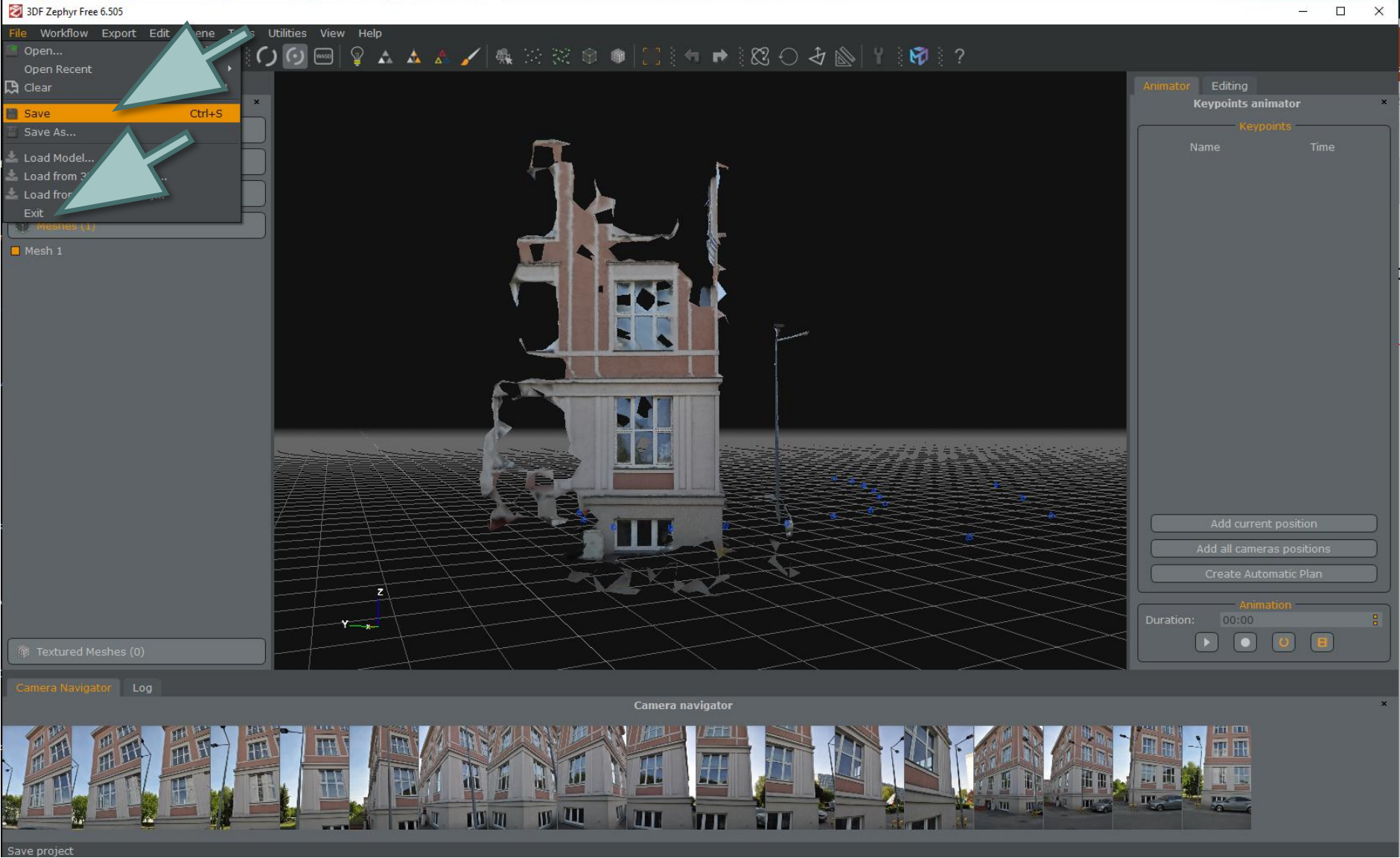
enter the name

then Save



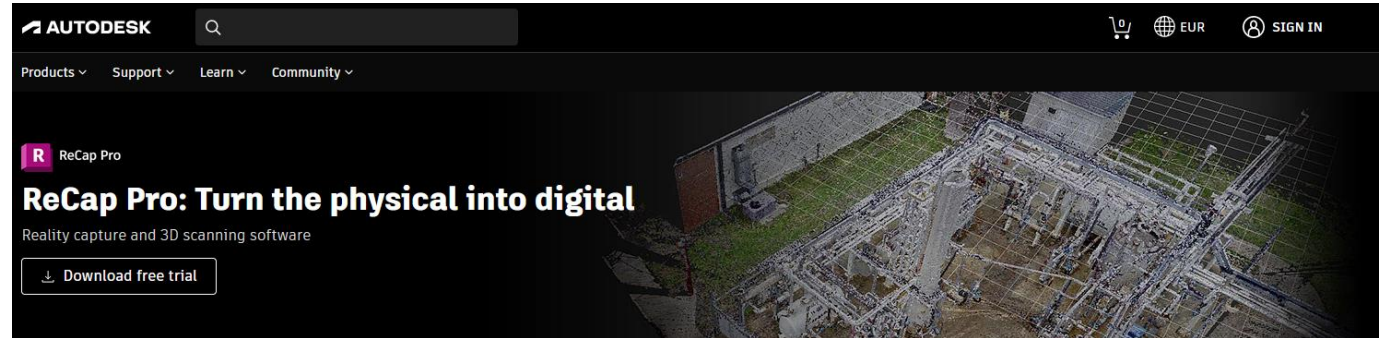
Save the file

then Exit



# Download and install Autodesk Recap

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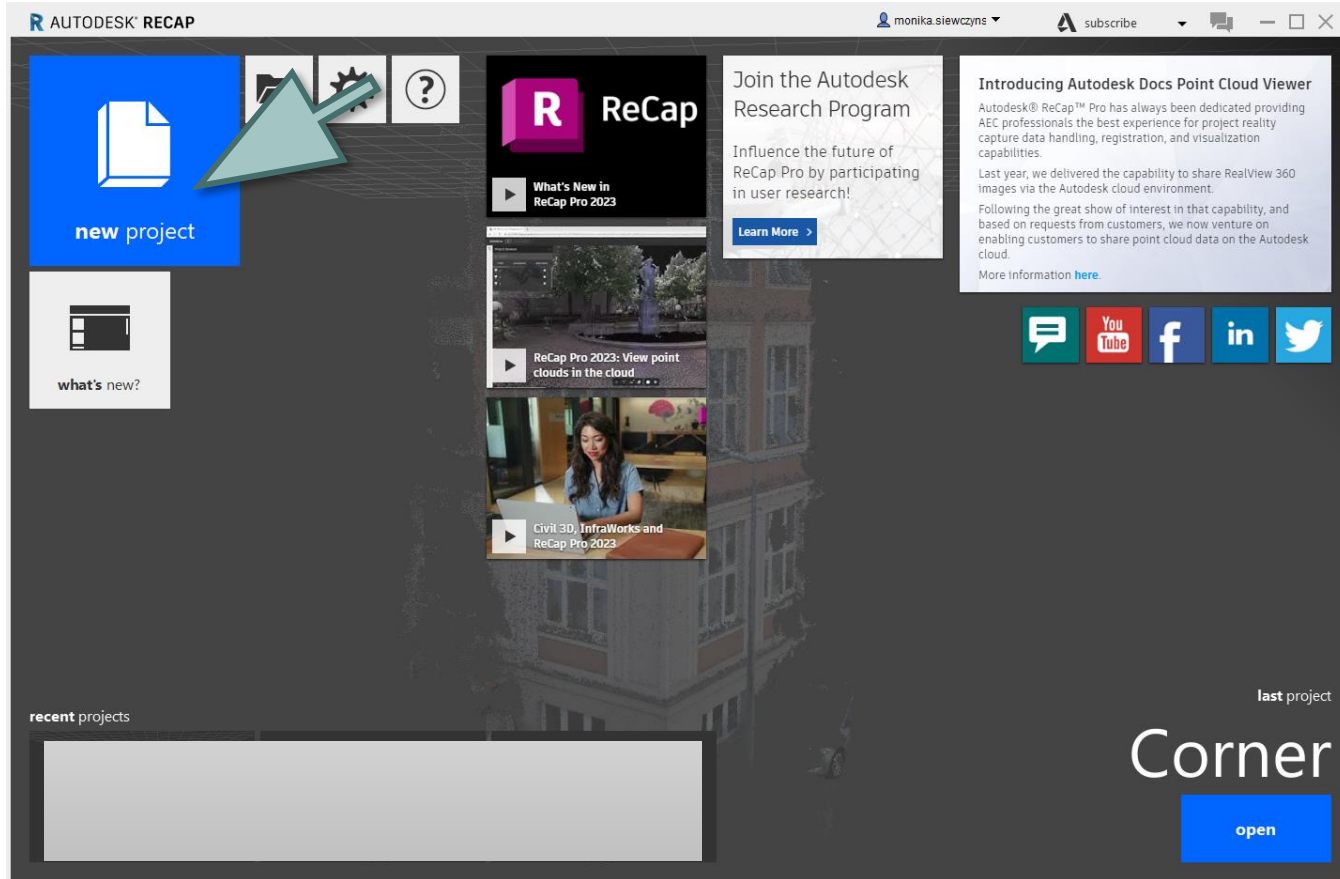
# Open Autodesk Recap





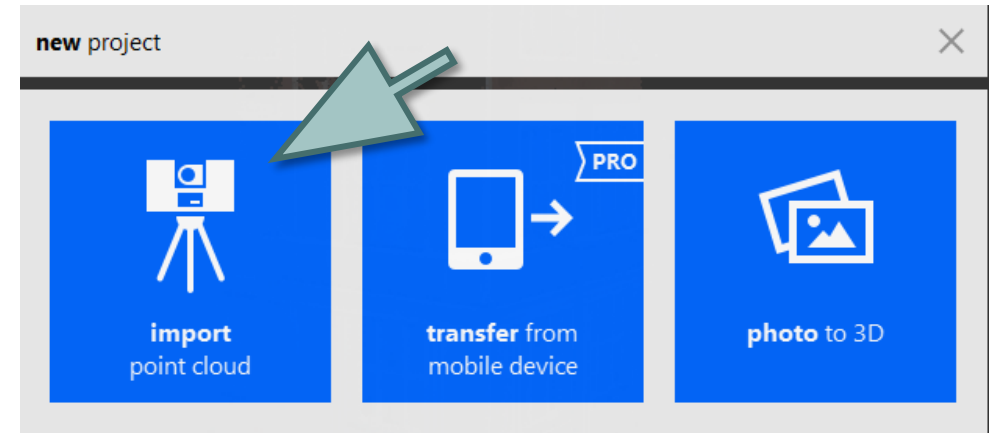
# Import point cloud

open file \*.e57 using Autodesk ReCap software



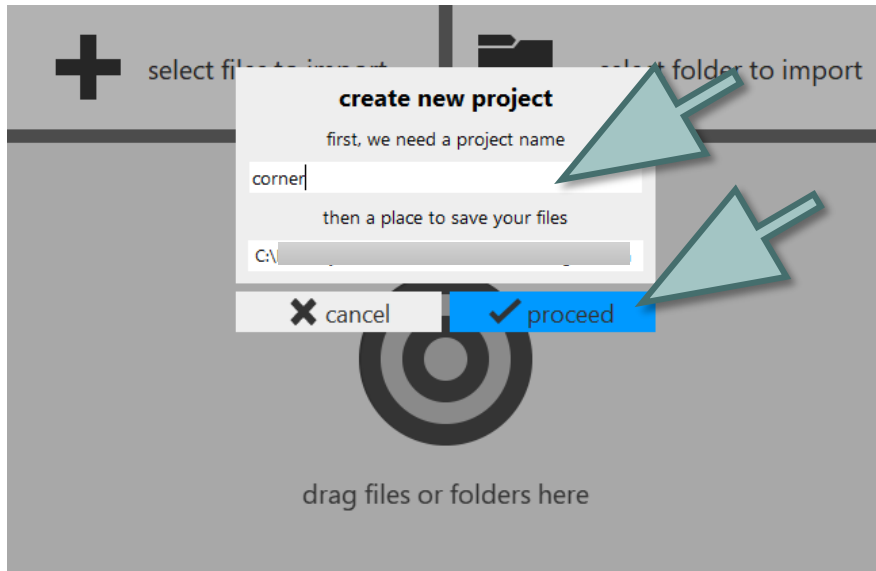
new project

then import point cloud

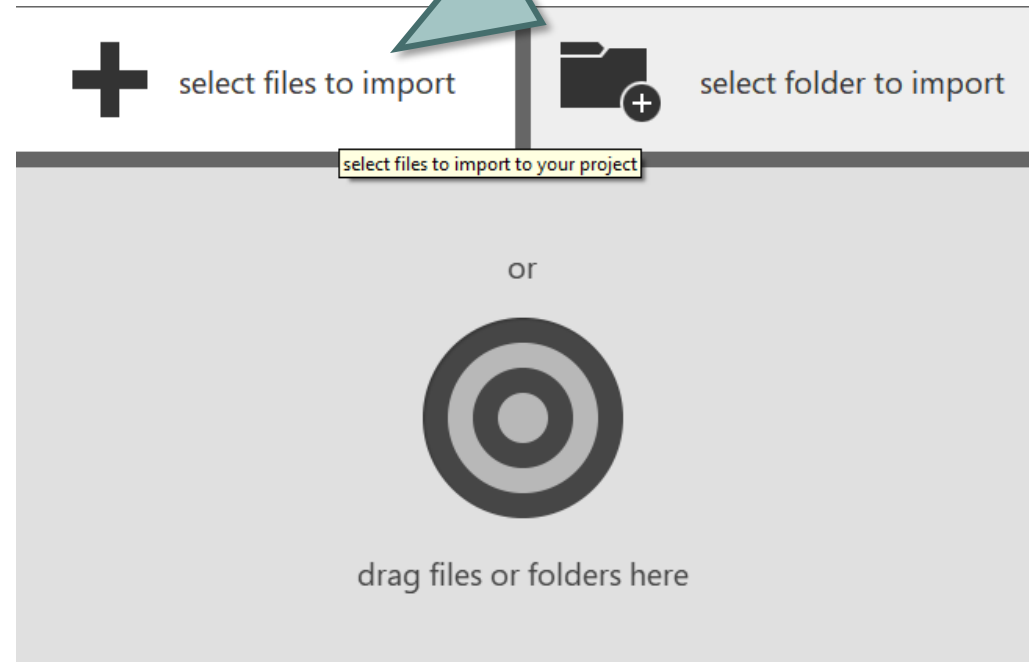


enter the name

then proceed



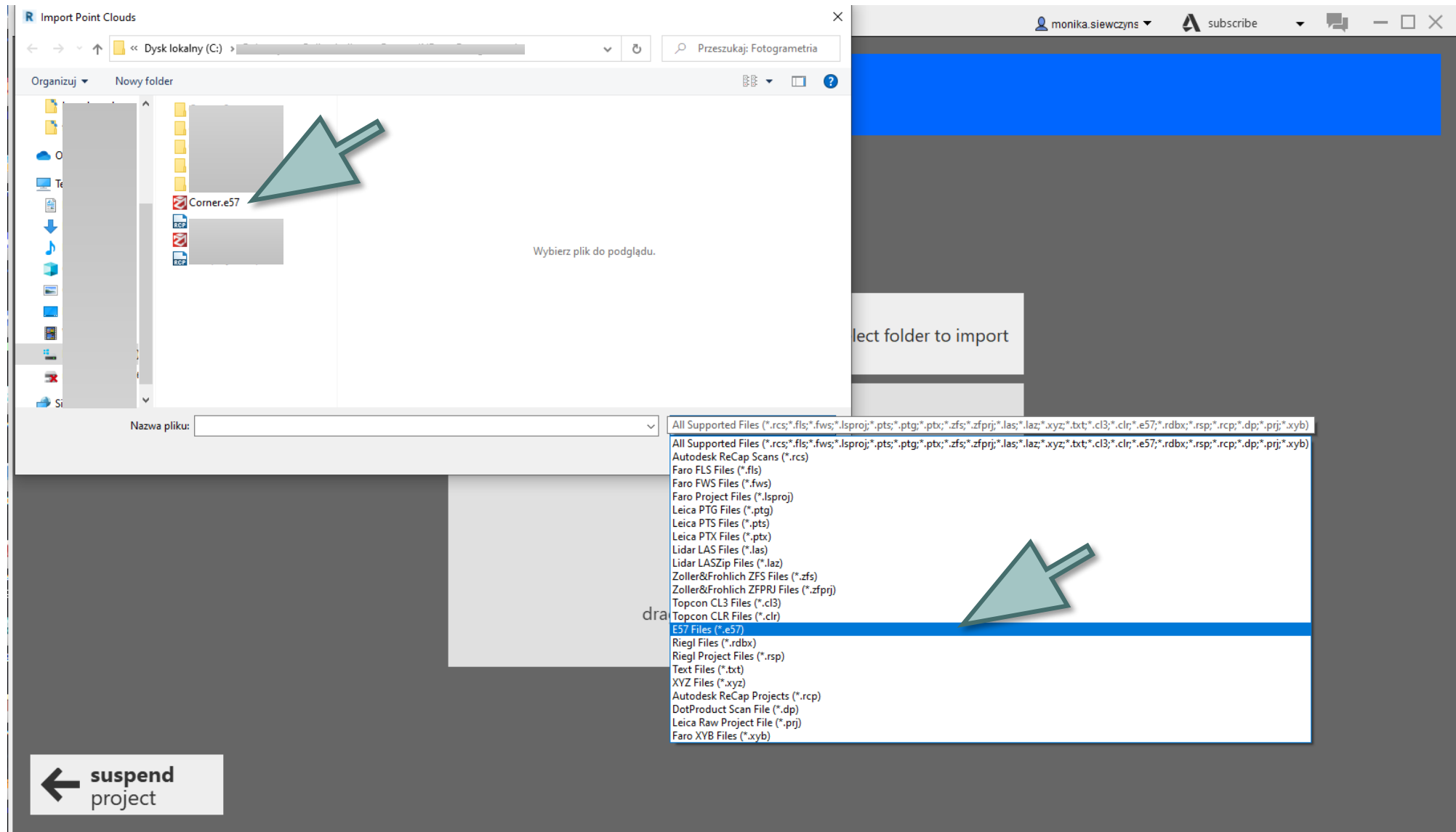
select files to import



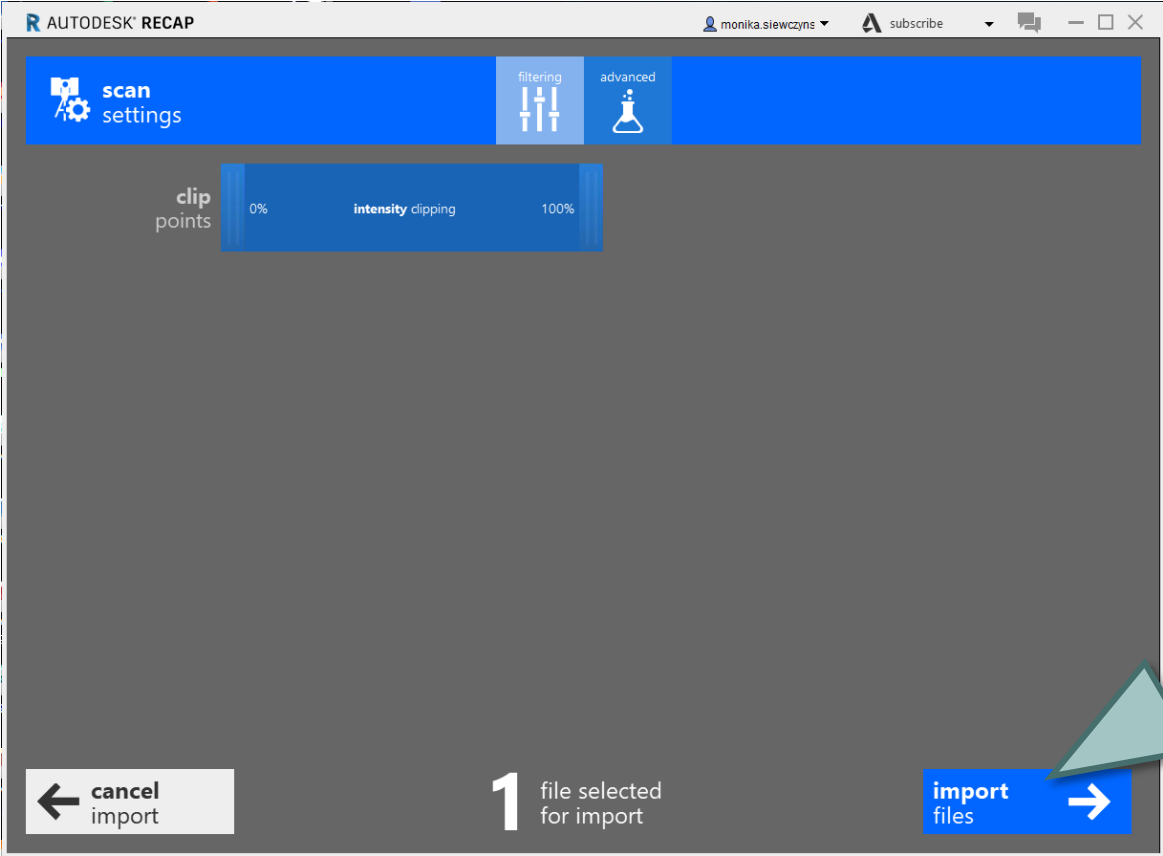
select the file type: E57

then select the file

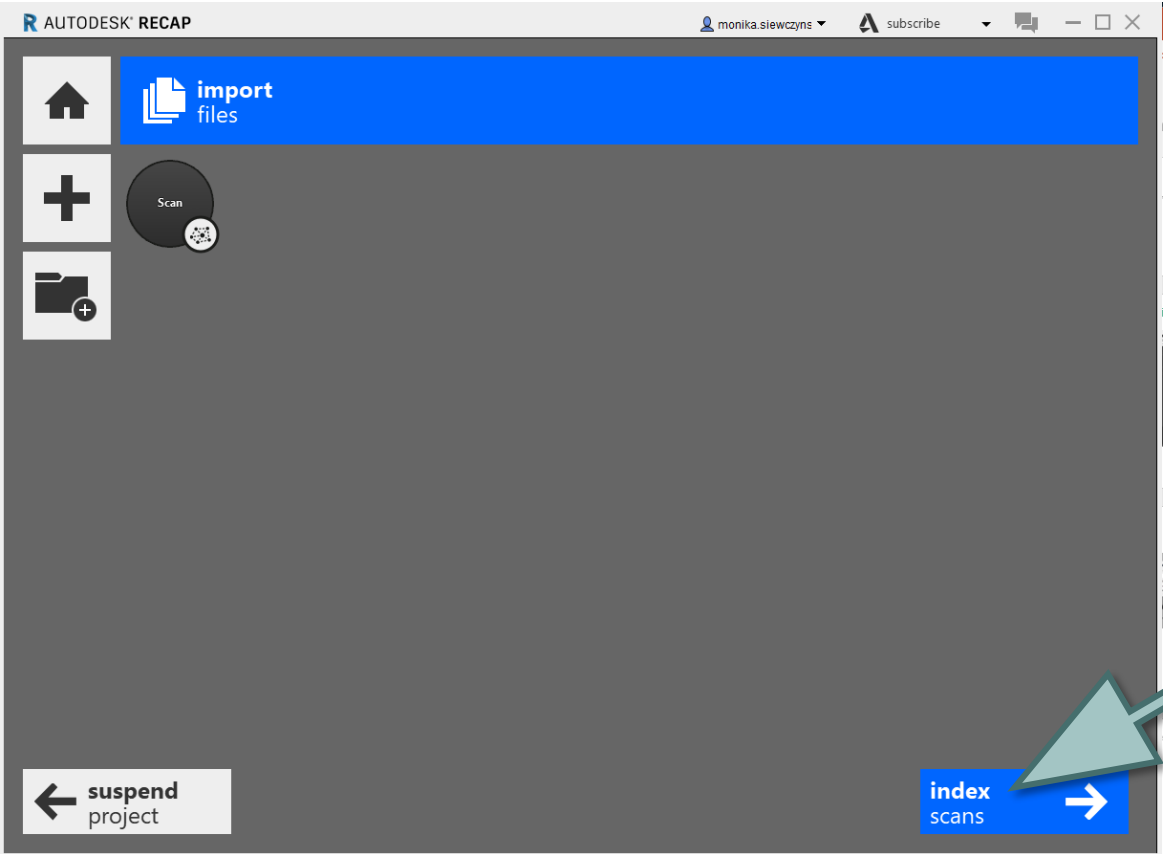
and open



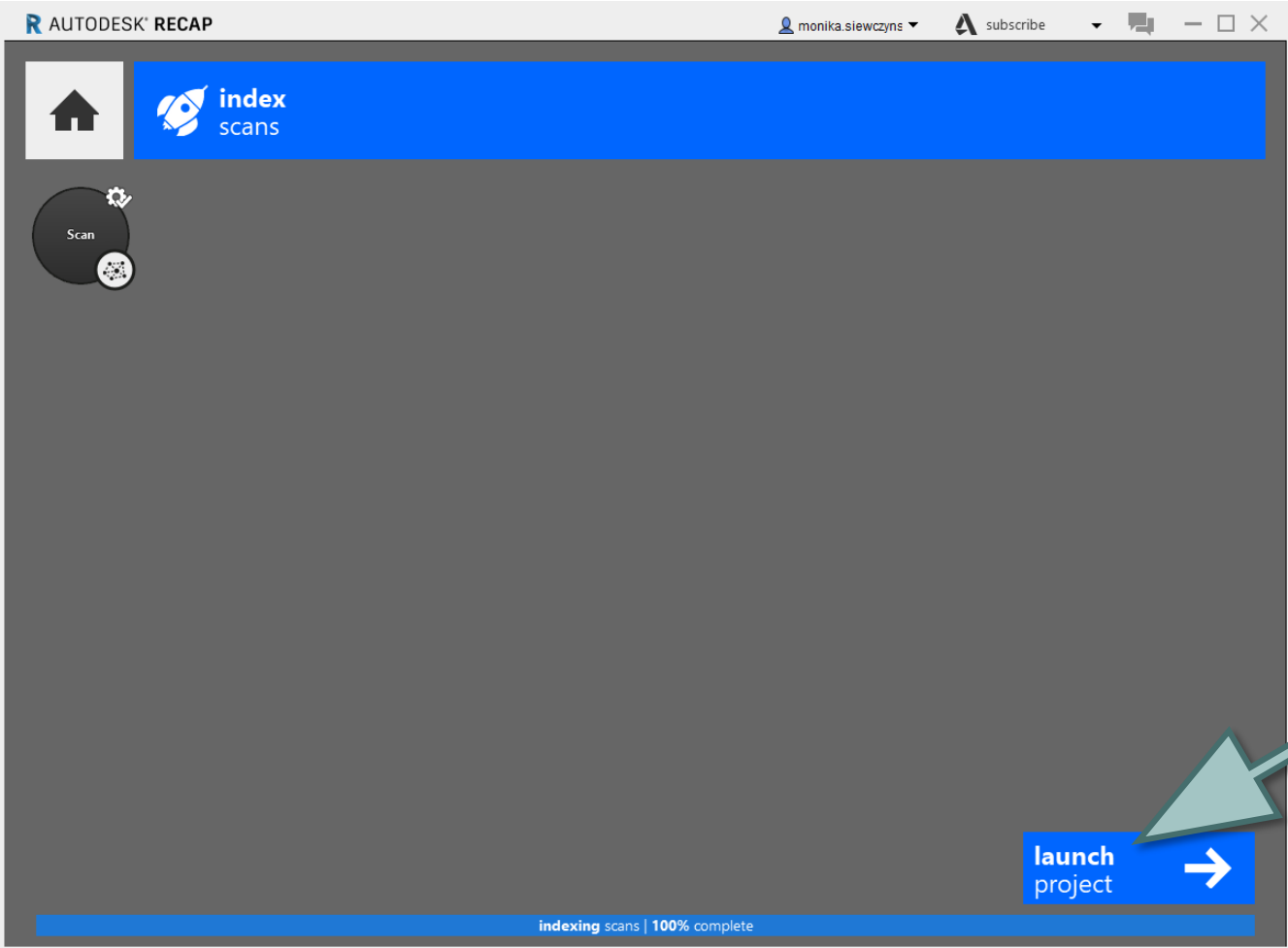
# import files



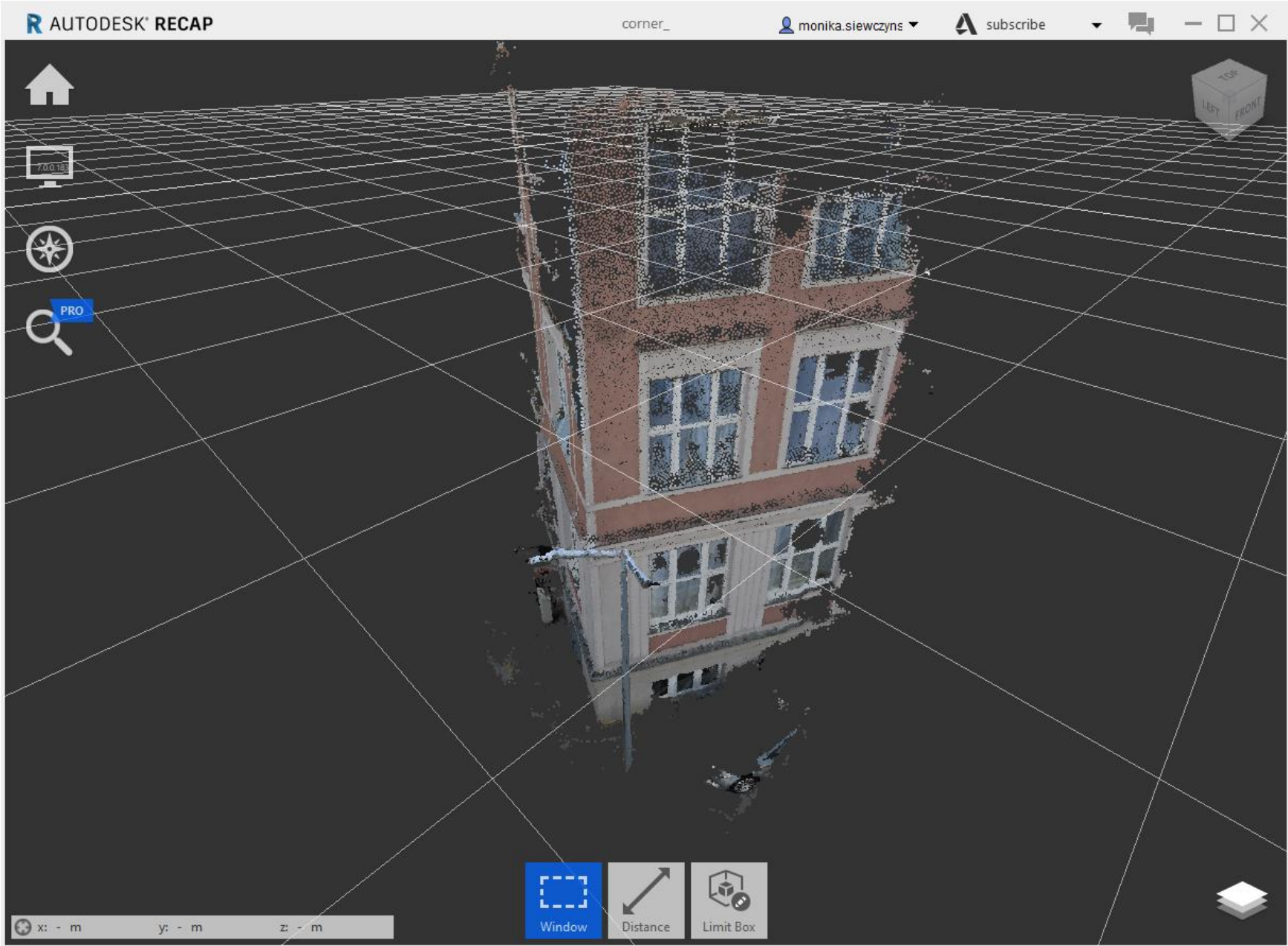
# index scans



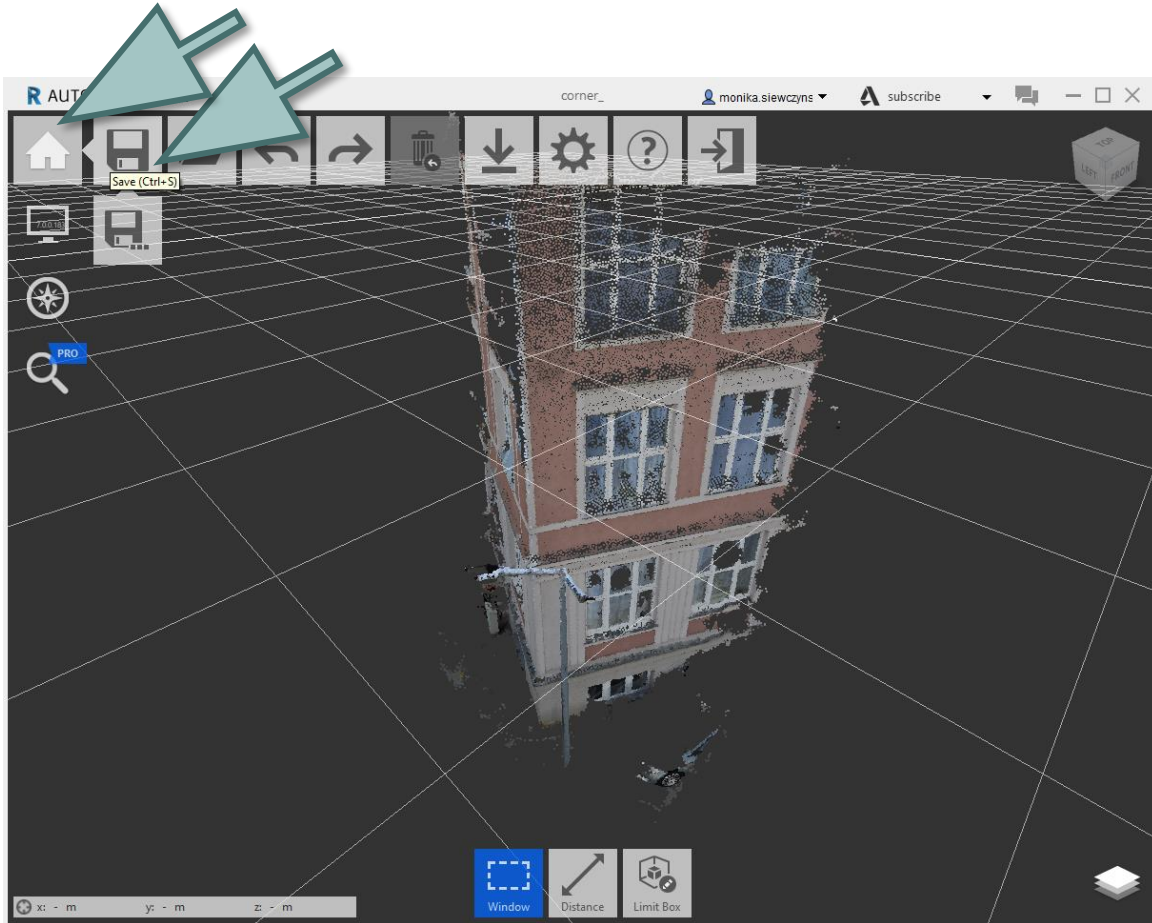
# launch project



# Effect

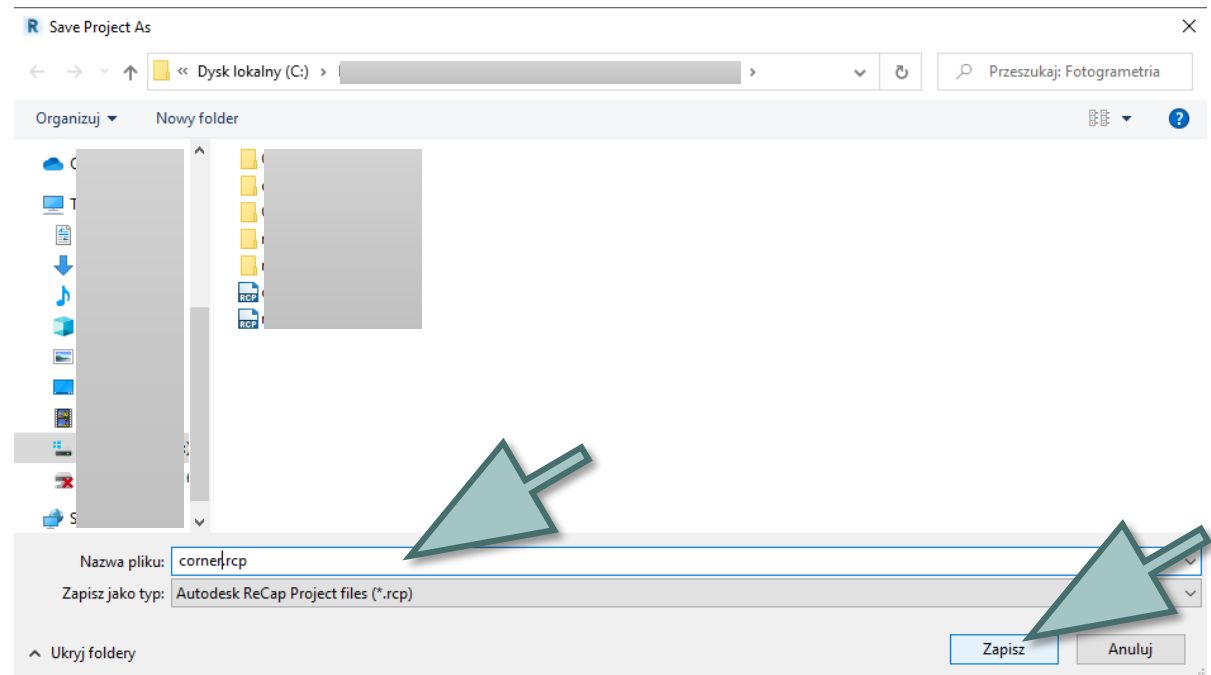


# Export file to the format for Revit



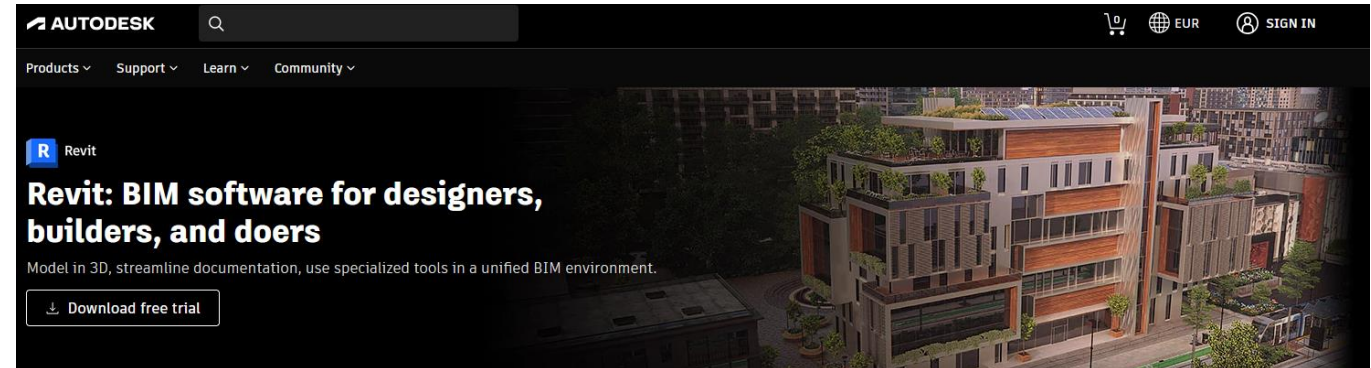
close Recap

save the file



# Download and install Autodesk Revit

Information about Autodesk Revit:



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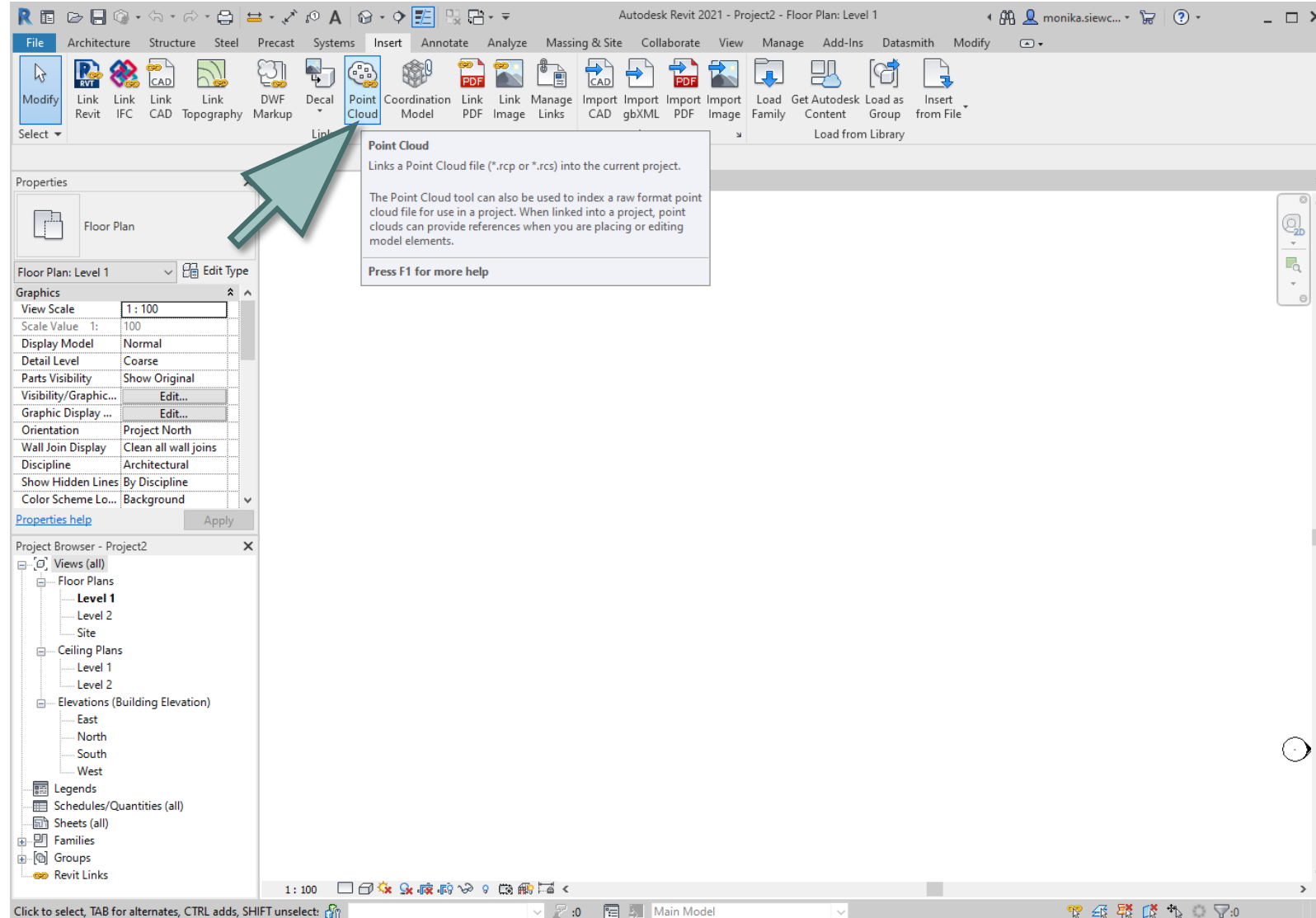


# Open Autodesk Revit



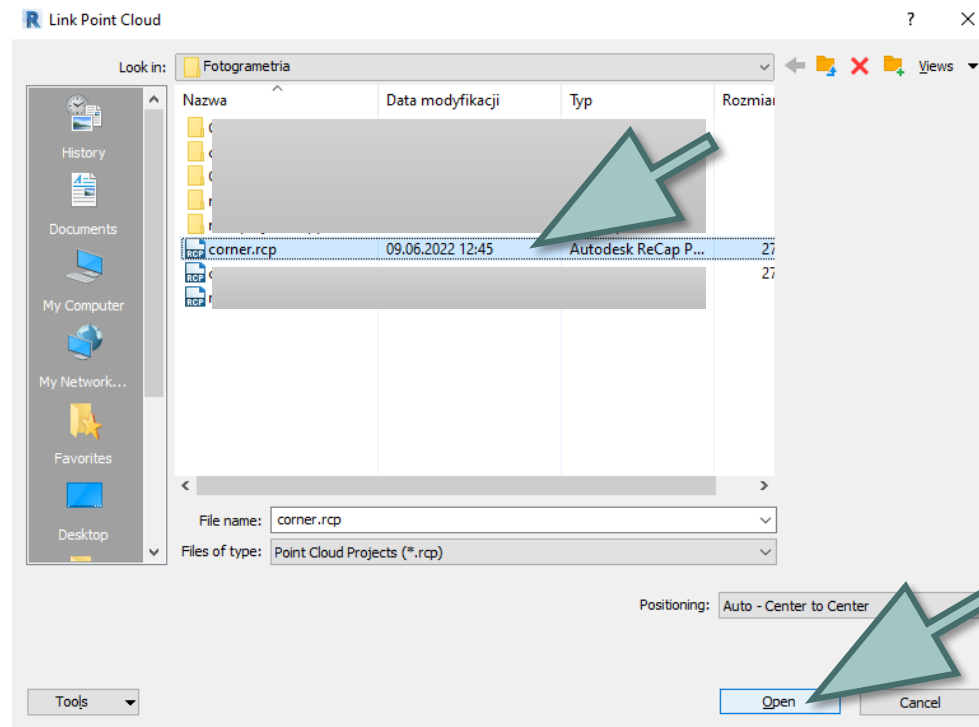
# Open new file

MENU / Insert / Point cloud

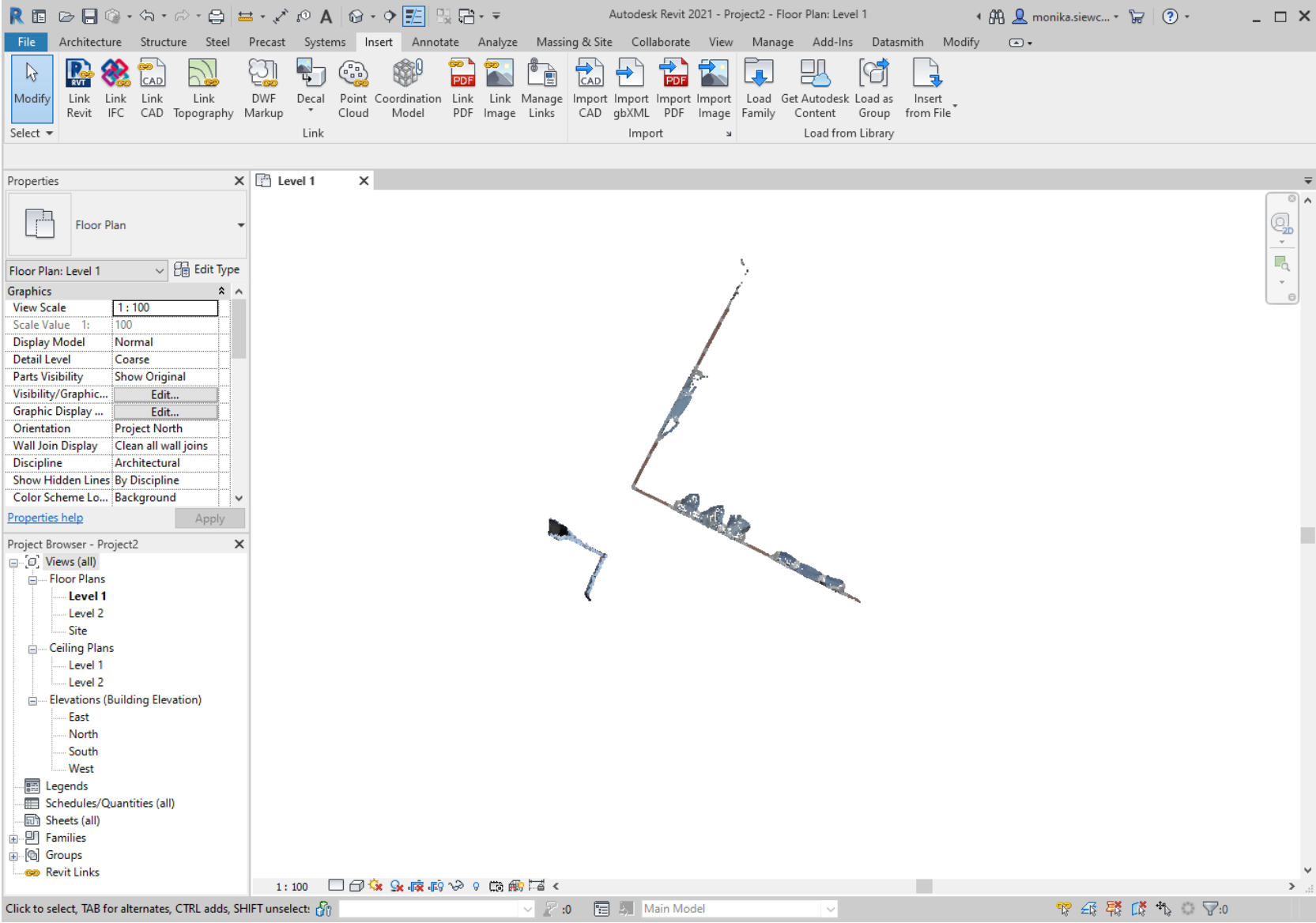


select the RCP file

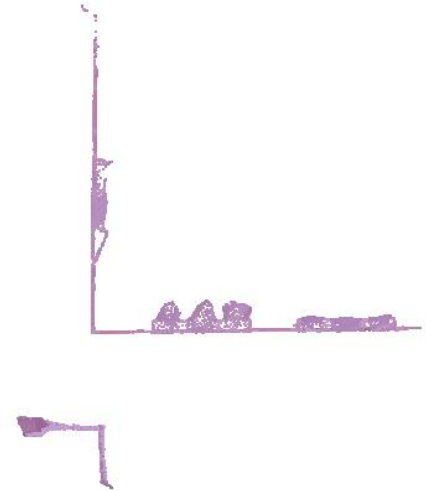
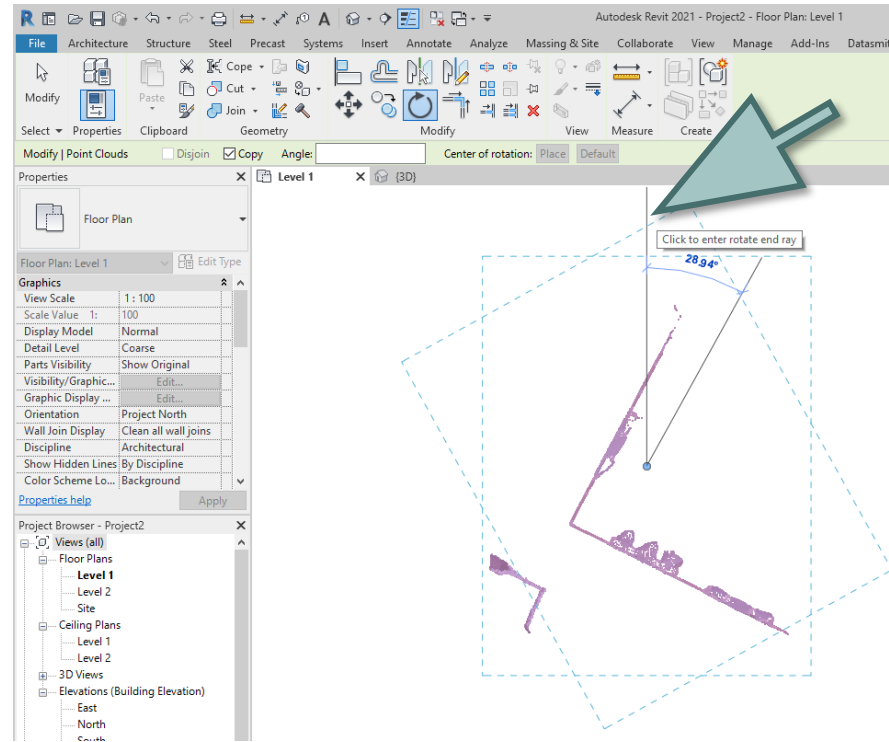
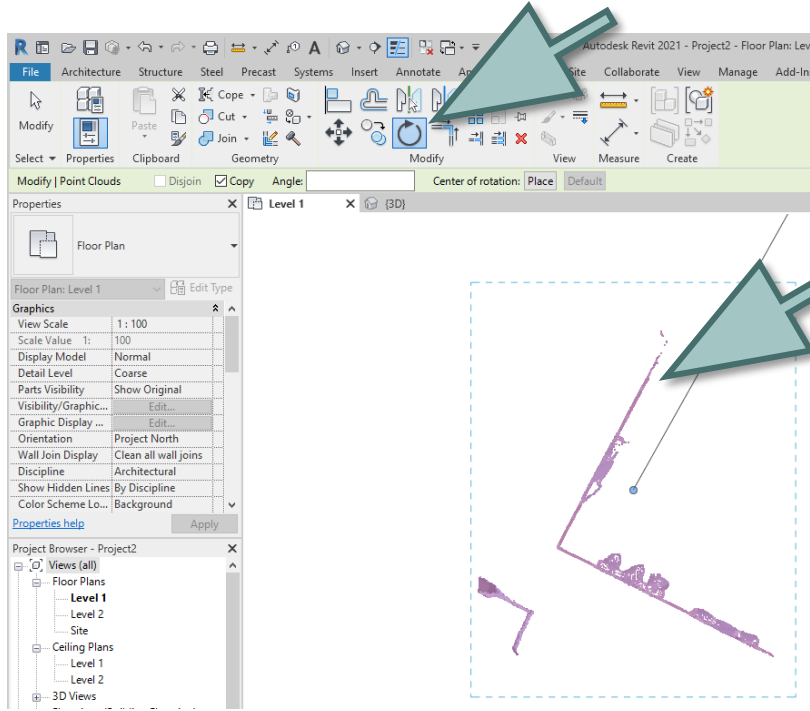
then Open



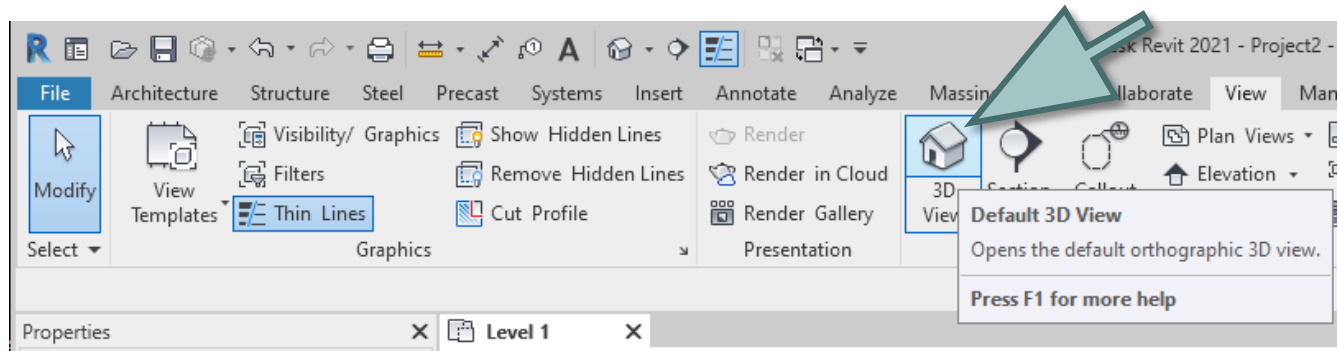
# Effect



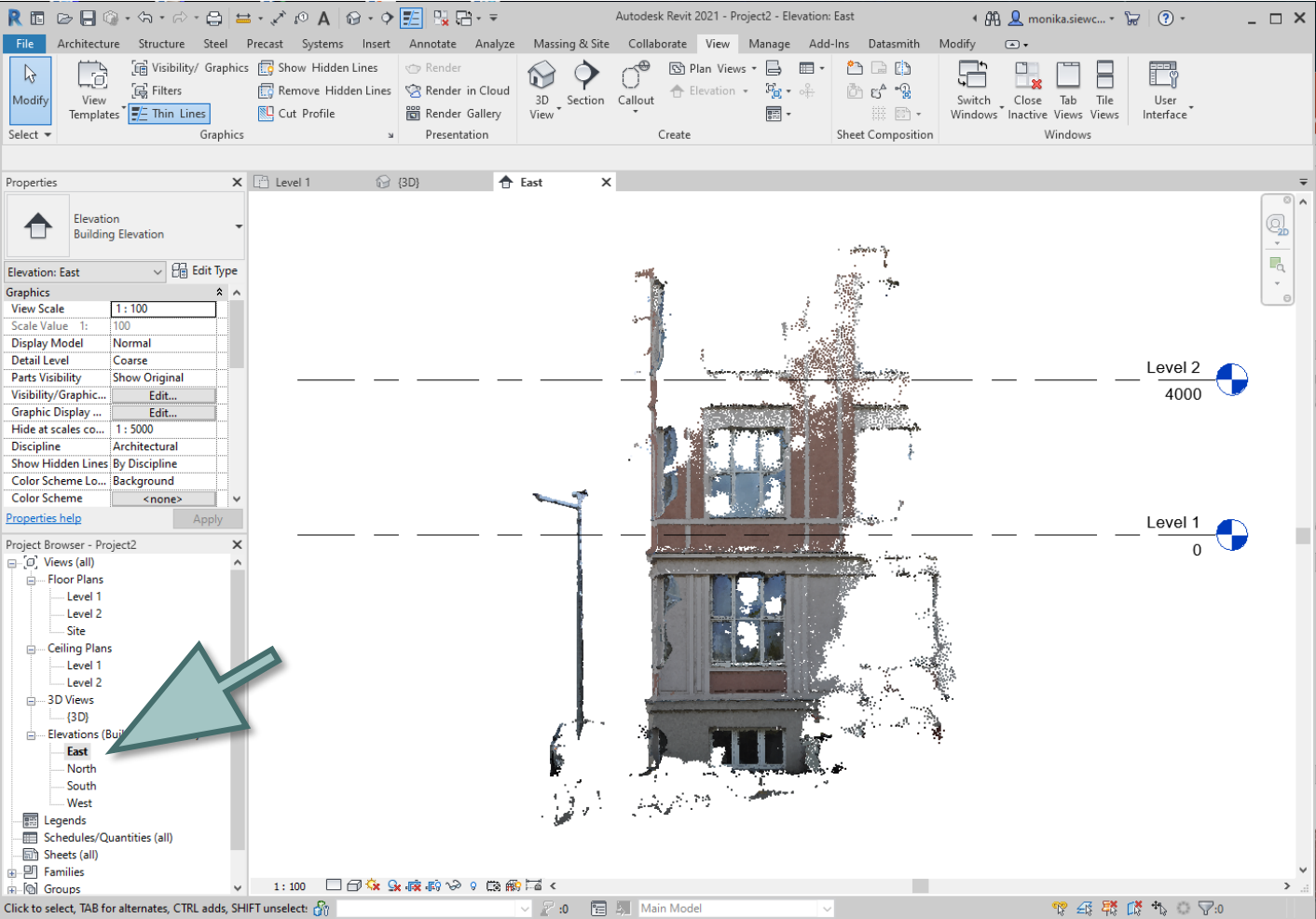
# select and rotate the model



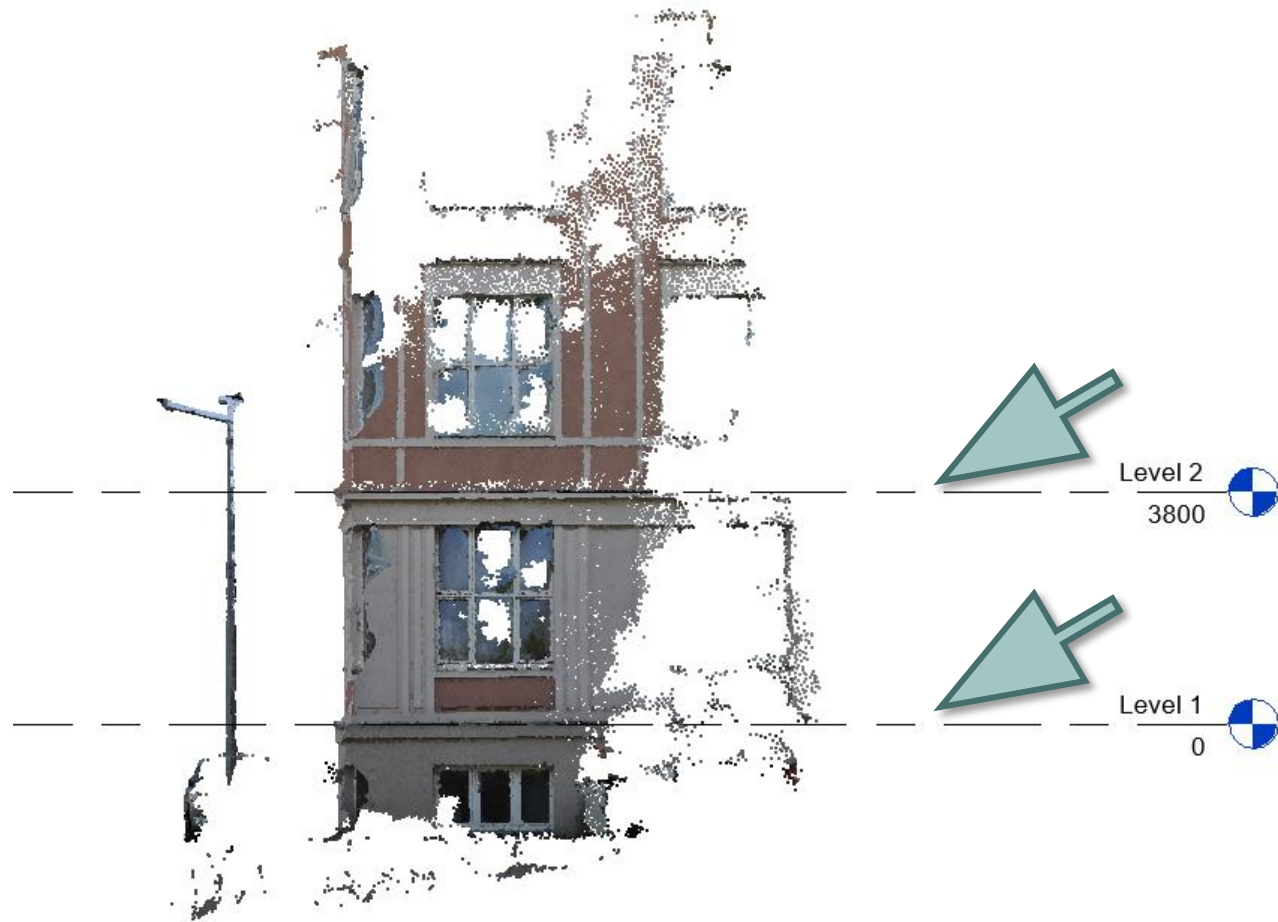
open 3D view



open the elevation view

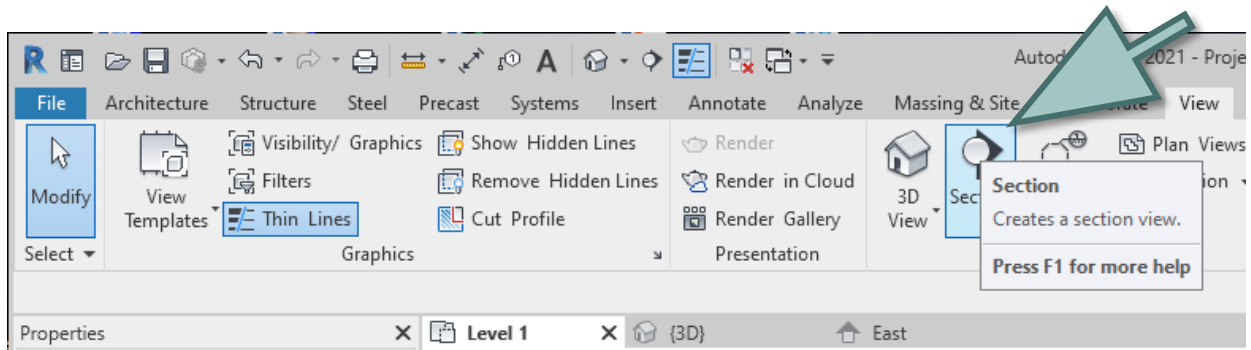


move the model  
and change the levels if needed



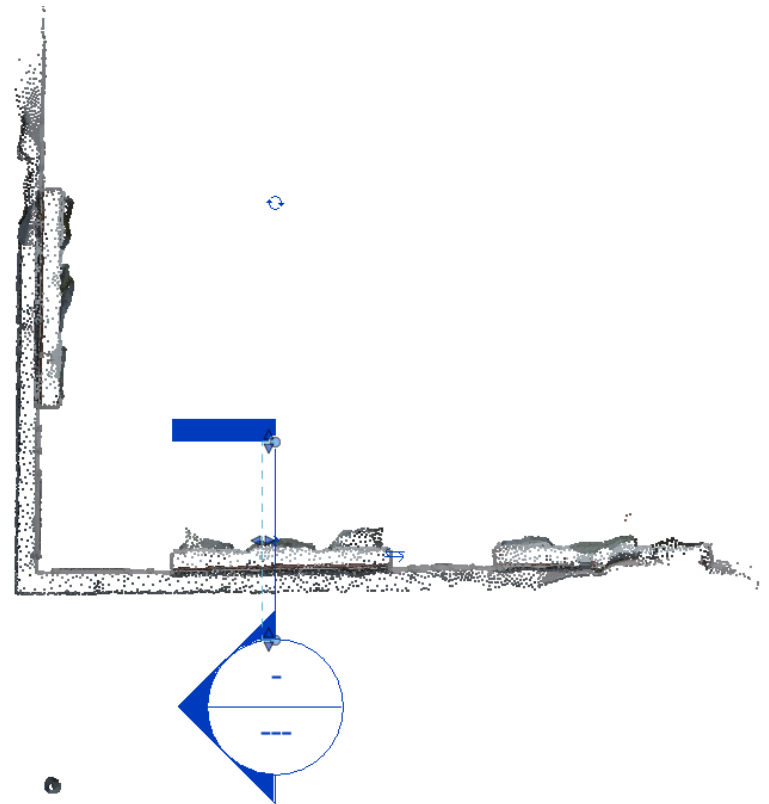
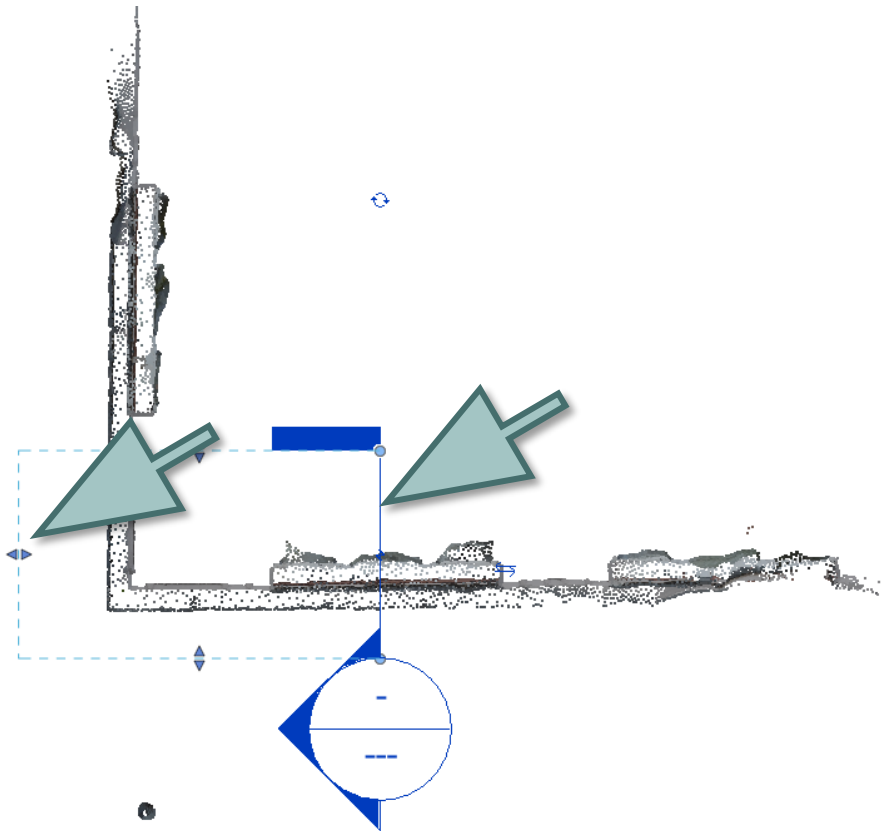


open the horizontal view

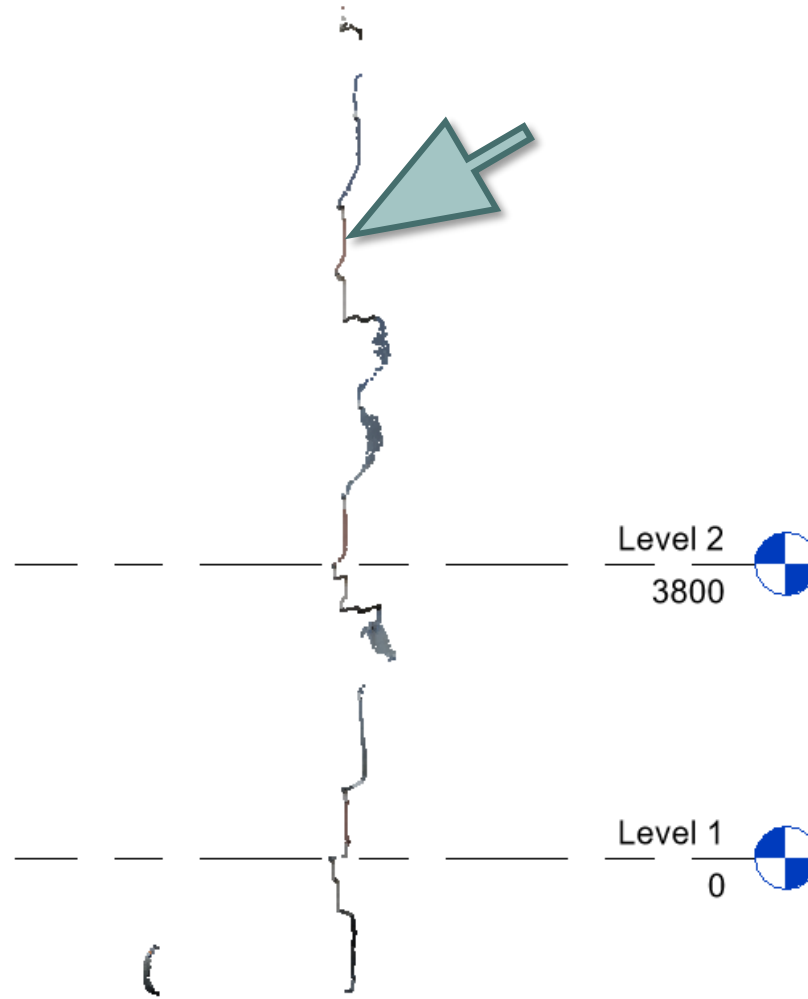


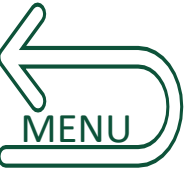
create the vertical section in the area of window

and change the depth of the view

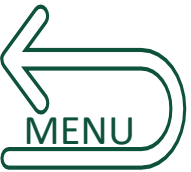


use the shape to create the virtual twin





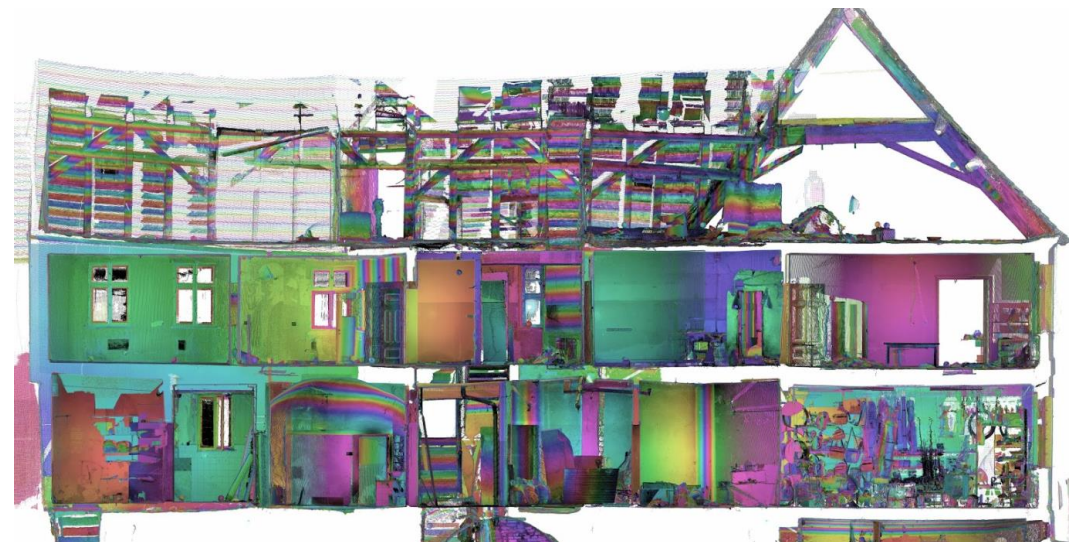
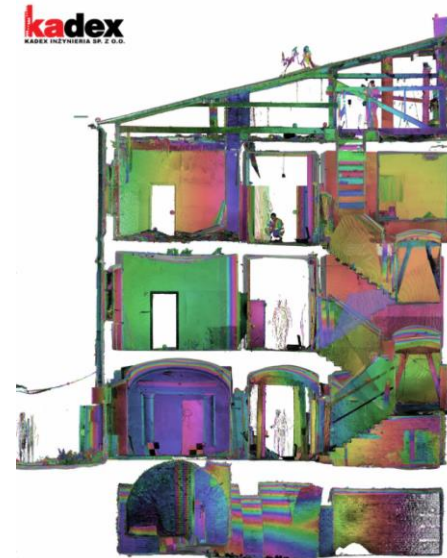
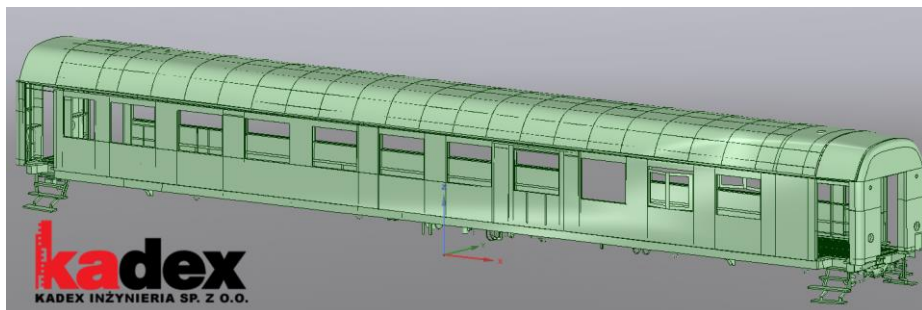
# 3D scan



The use of 3D scanning for the inventory of building

# Laser scanning

- Spatial
- 3D model
- Small amount of time



# 1 Laser scanning of building



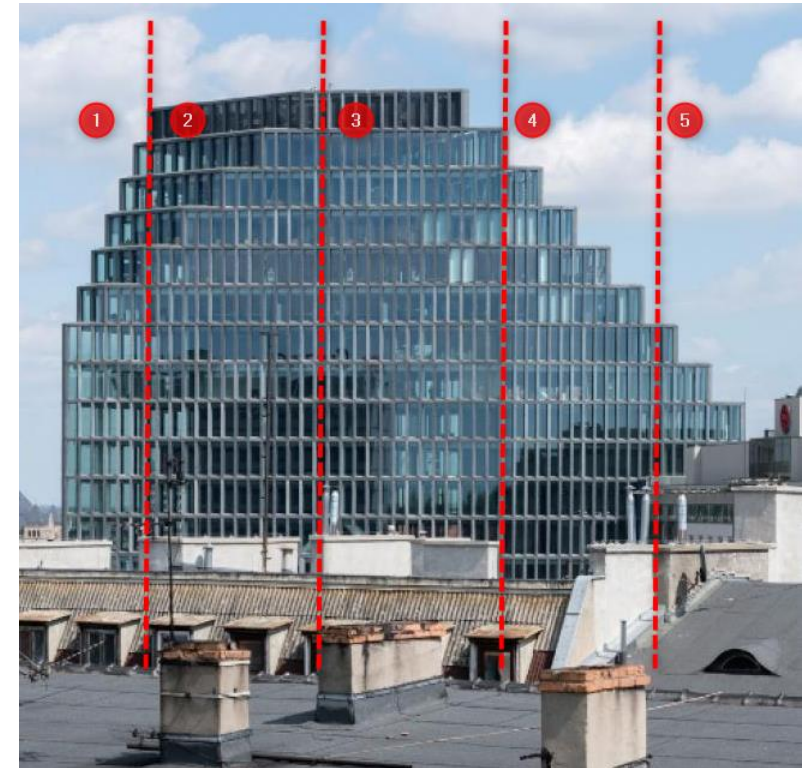
Elevation of building has been scanned from 5 different stations



Why 5 different positions of scanner?



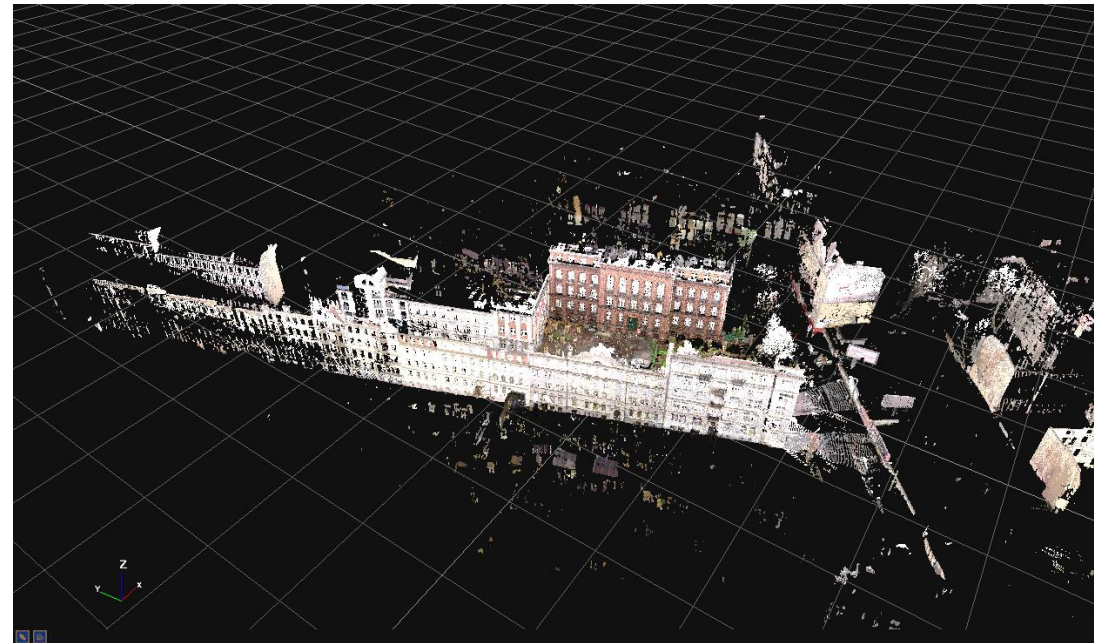
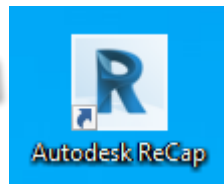
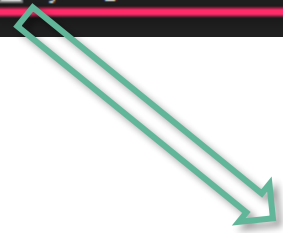
Shadow Elimination



In case of bigger building a numerous of scanning stations might be required to inventor a whole building

## 2 Outputs of scanning

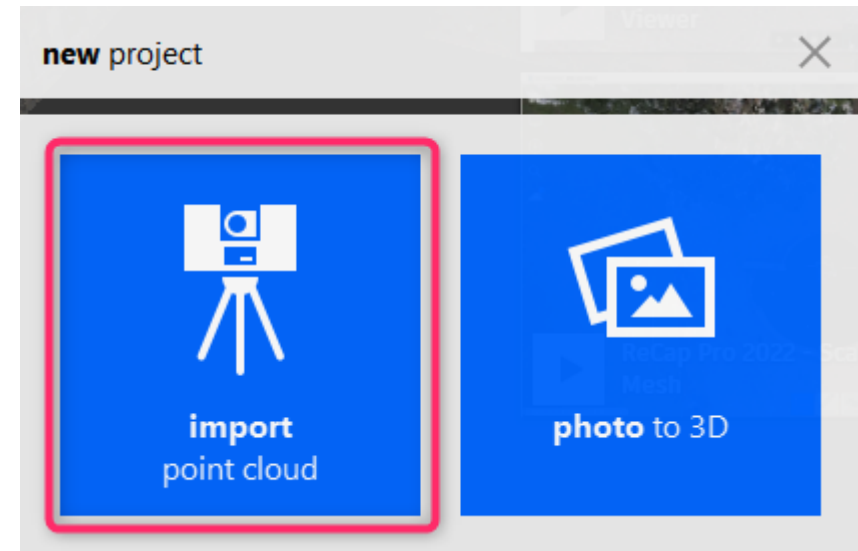
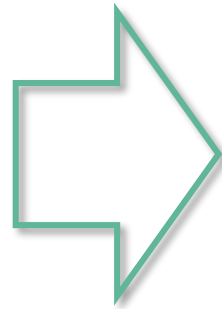
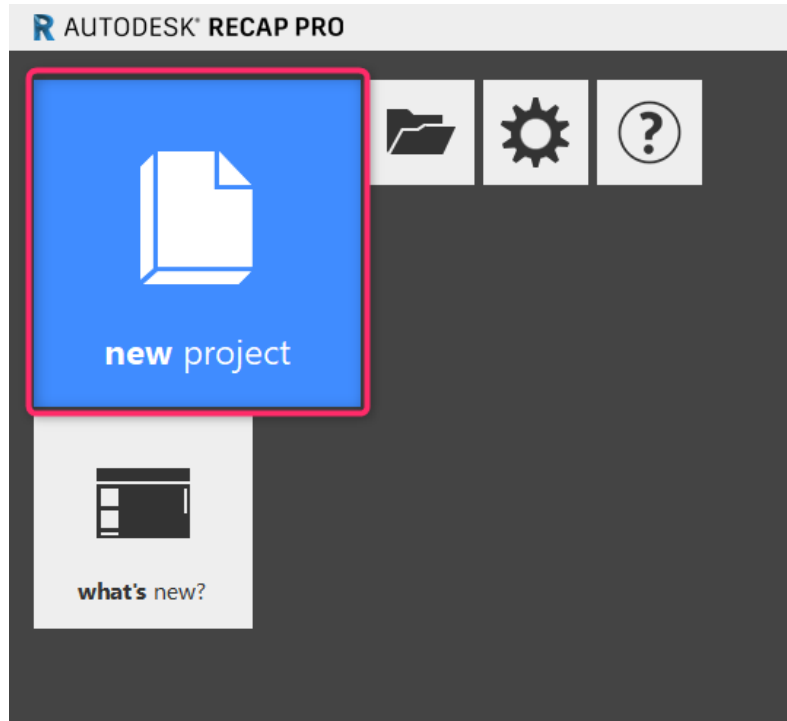
|              |                  |                             |              |
|--------------|------------------|-----------------------------|--------------|
| Rybaki.pod   | 18.01.2022 09:14 | Plik POD                    | 815 855 KB   |
| Rybaki.pts   | 18.01.2022 09:04 | Plik PTS                    | 3 167 507 KB |
| Rybaki       | 13.01.2022 12:06 | Autodesk ReCap Project file | 2 980 KB     |
| Rybaki_1.e57 | 18.01.2022 09:16 | Plik E57                    | 2 738 182 KB |



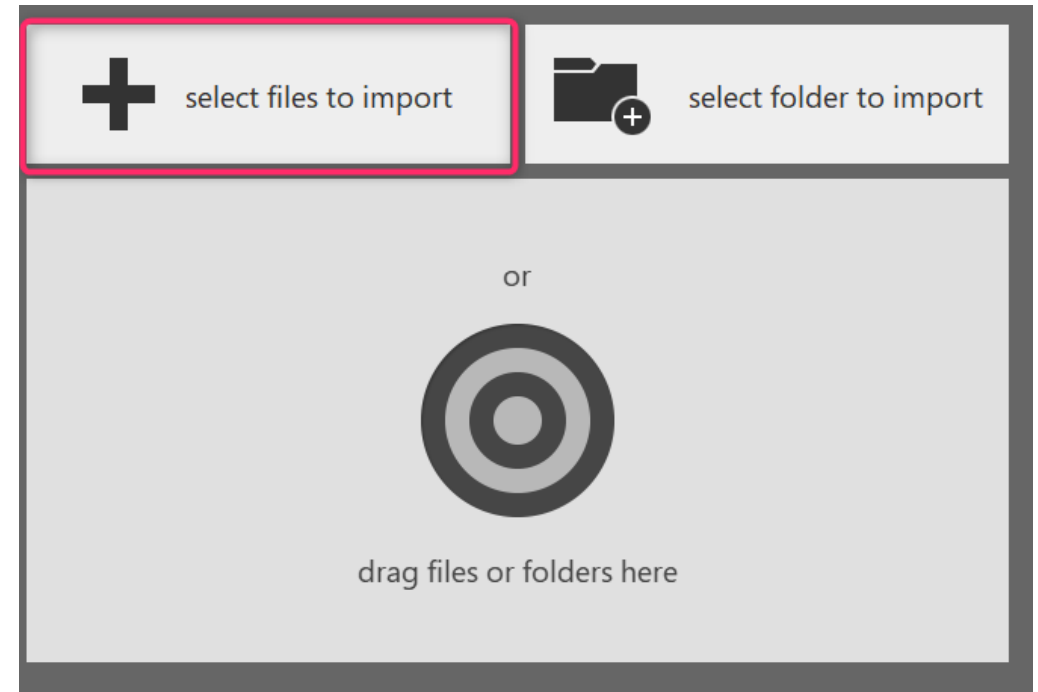
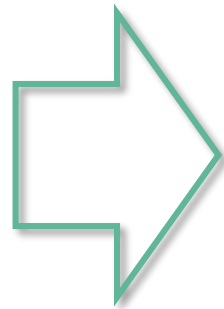
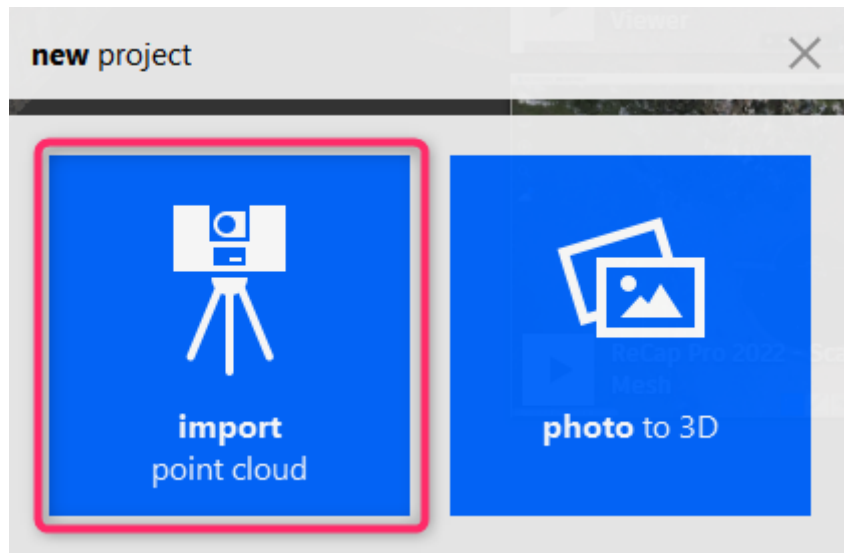


# 3 Import point cloud

How to open file \*.e57 using Autodesk ReCap software ?

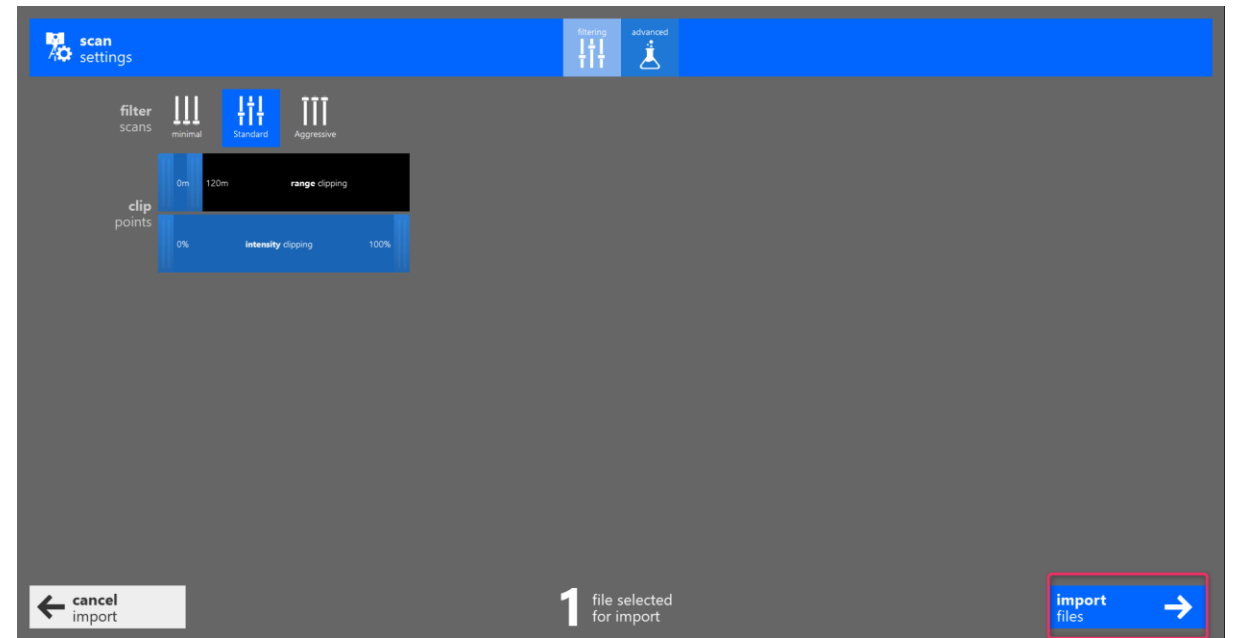
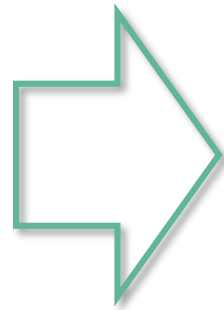
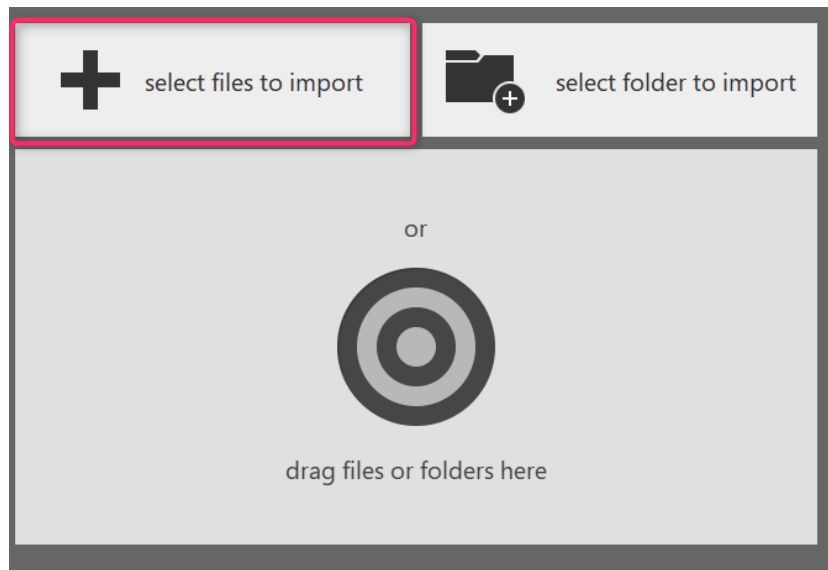


How to open file \*.e57 using Autodesk ReCap software ?



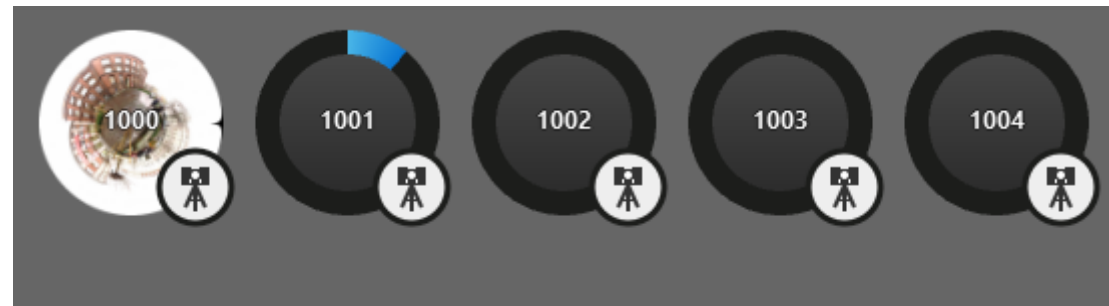
|              |                  |                             |              |
|--------------|------------------|-----------------------------|--------------|
| Rybaki.pod   | 18.01.2022 09:14 | Plik POD                    | 815 855 KB   |
| Rybaki.pts   | 18.01.2022 09:04 | Plik PTS                    | 3 167 507 KB |
| Rybaki       | 13.01.2022 12:06 | Autodesk ReCap Project file | 2 980 KB     |
| Rybaki_1.e57 | 18.01.2022 09:16 | Plik E57                    | 2 738 182 KB |

# How to open file \*.e57 using Autodesk ReCap software ?



|               |                  |                             |              |
|---------------|------------------|-----------------------------|--------------|
| Rybak_i.pod   | 18.01.2022 09:14 | Plik POD                    | 815 855 KB   |
| Rybak_i.pts   | 18.01.2022 09:04 | Plik PTS                    | 3 167 507 KB |
| Rybak_i       | 13.01.2022 12:06 | Autodesk ReCap Project file | 2 980 KB     |
| Rybak_i_1.e57 | 18.01.2022 09:16 | Plik E57                    | 2 738 182 KB |

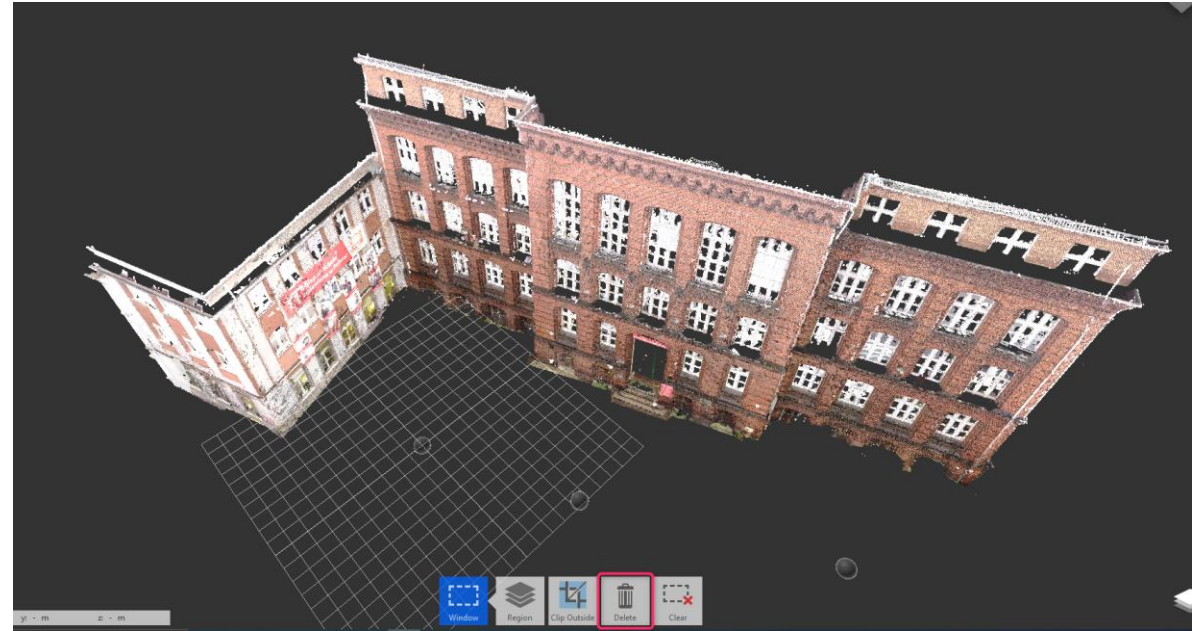
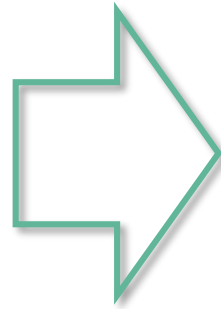
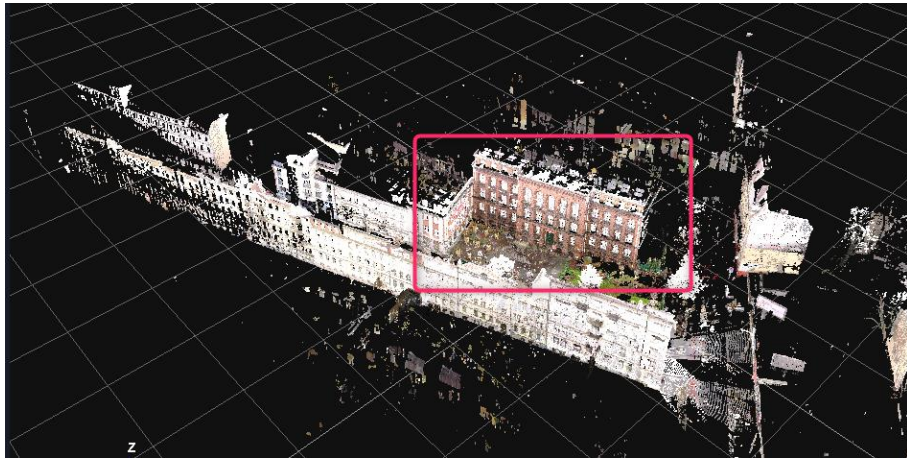
How to open file \*.e57 using  
Autodesk ReCap software ?



All 5 stations needs to be imported  
– it can be time-consuming!

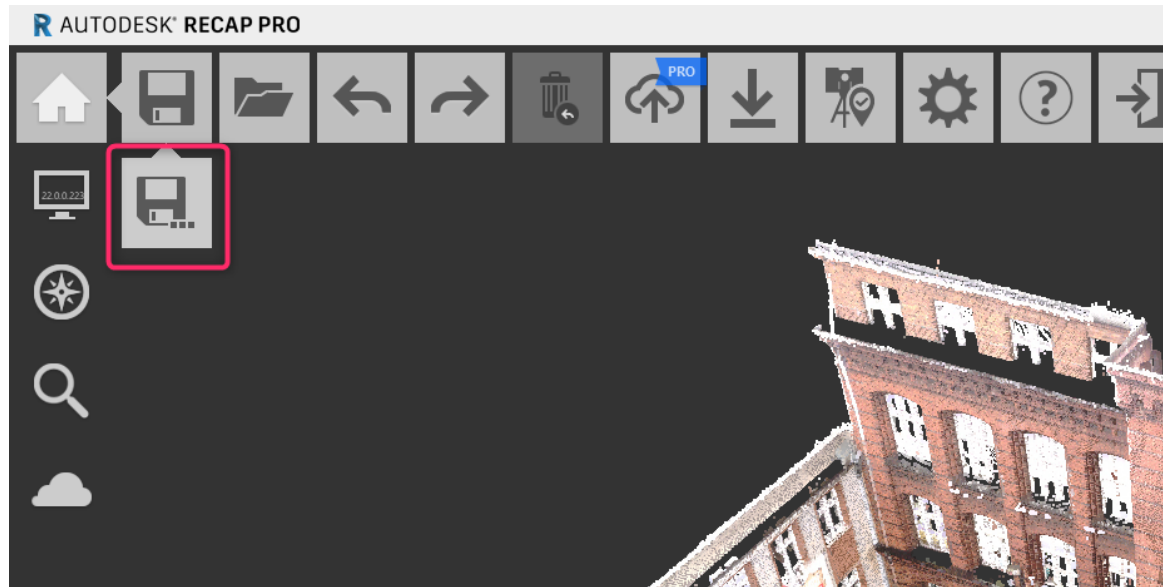
# 4 Point cloud editing

Data cloud to be edited.  
All redundant points to be removed



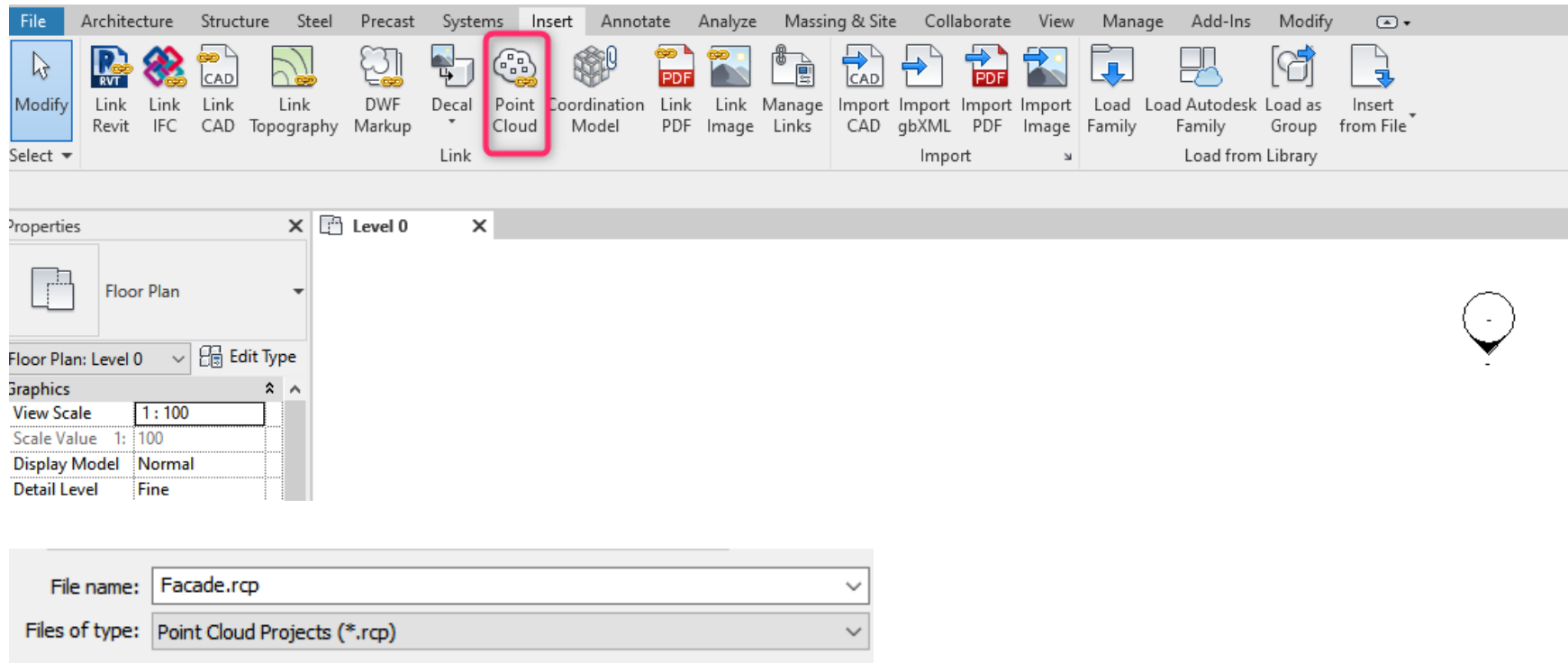
# 5 Export point cloud

Filed to be exported in line with Autodesk Revit requirements

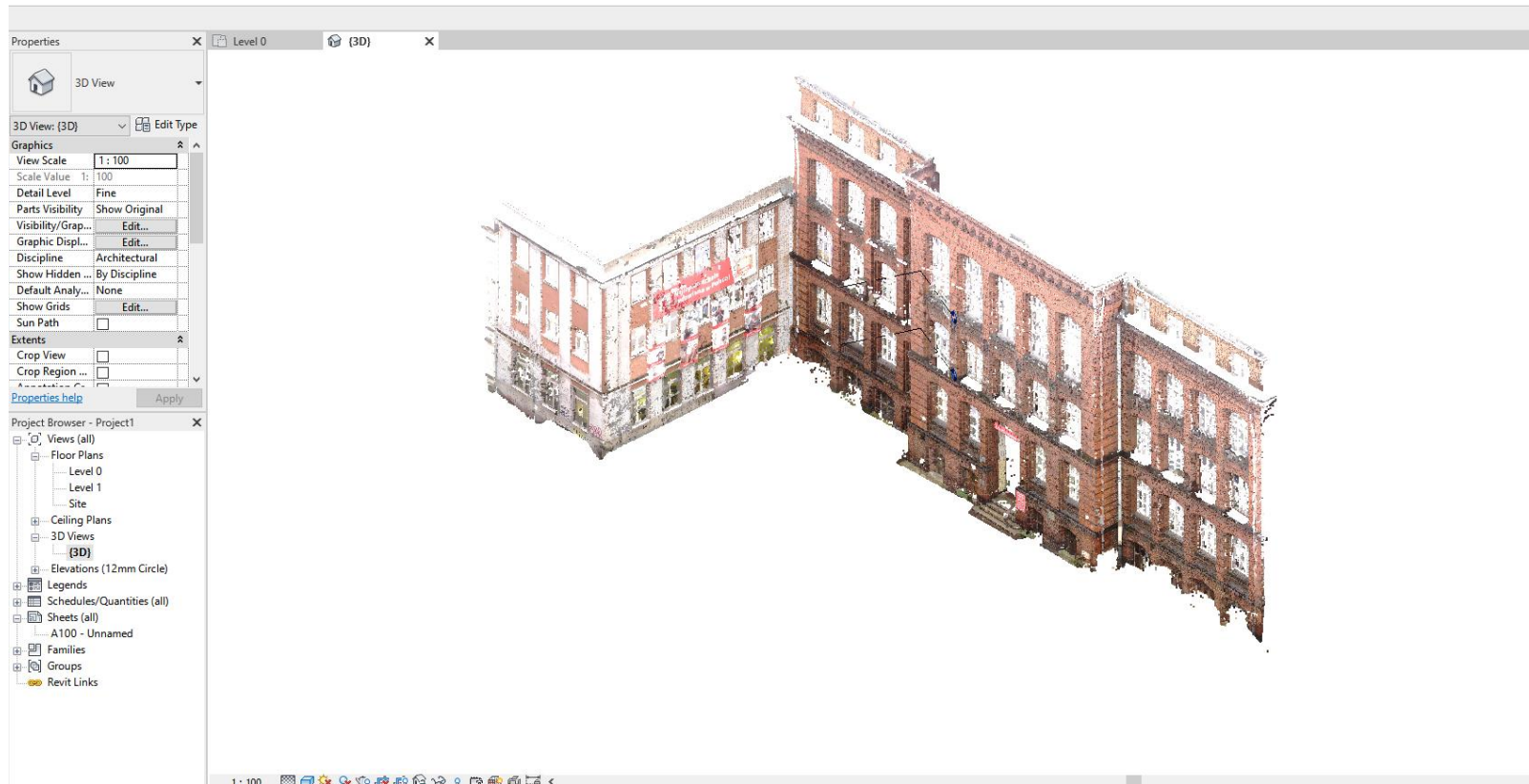


# 6 Import point cloud

So prepared file can be imported to Autodesk Revit software



So prepared file can be imported to Autodesk Revit software

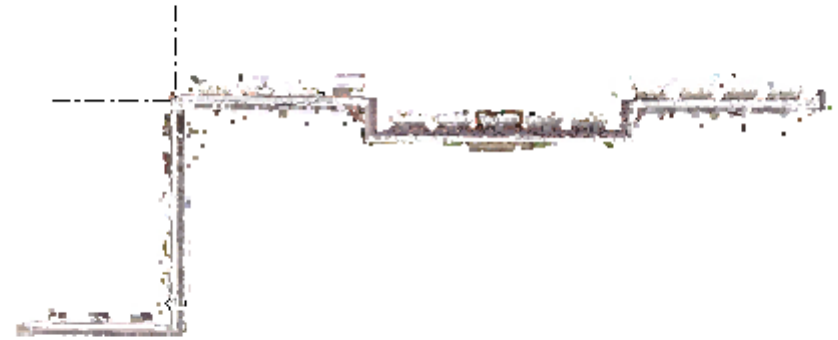




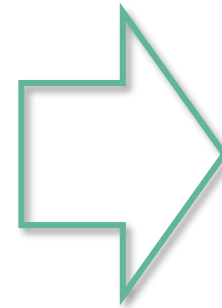
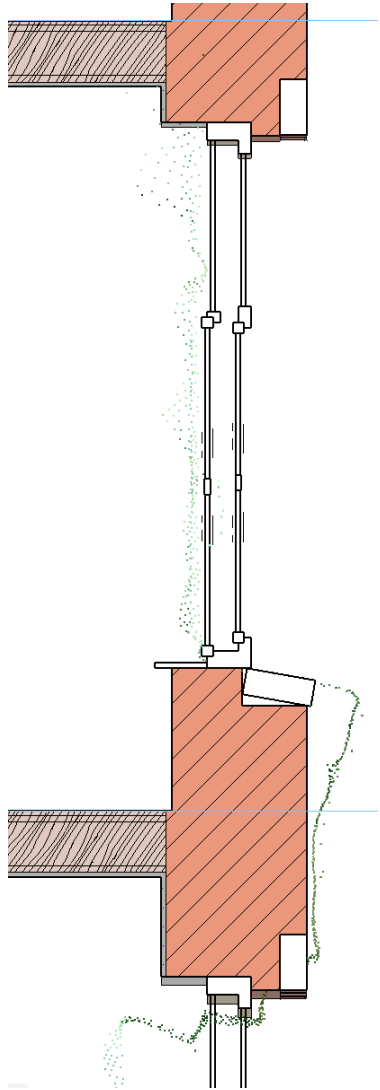
# 7 Scale and change position of point cloud

Point cloud to be suited to orthogonal coordinate system and agreed grid lines

Note: Scaling of object can be required

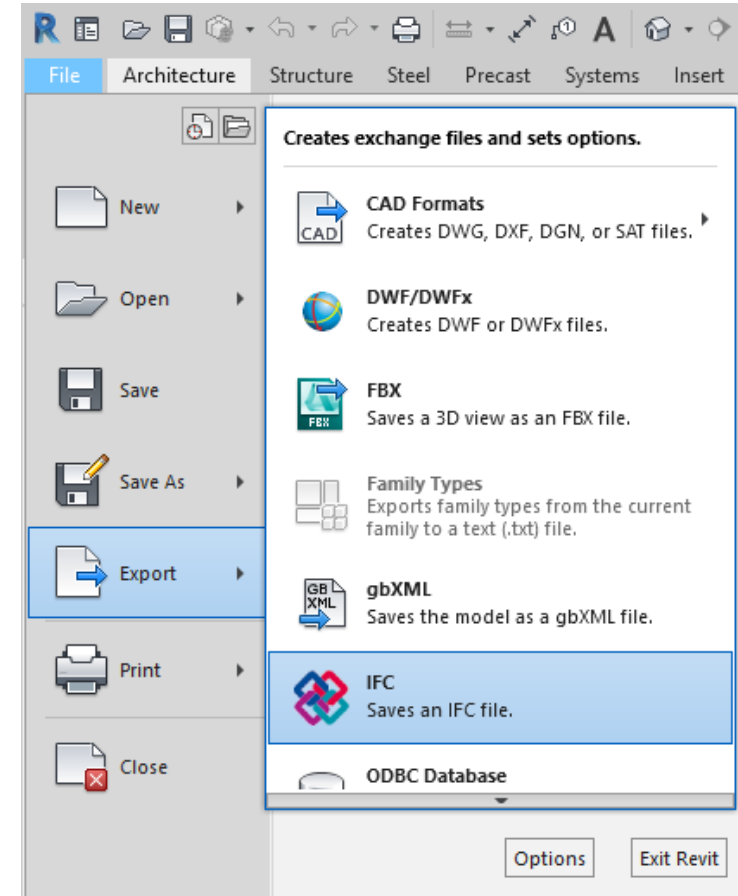


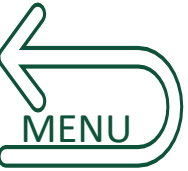
# 8 Use the point cloud for 3D modeling



# 9 IFC export

IFC model and documentation in other required formats can be made on the base of imported point cloud.

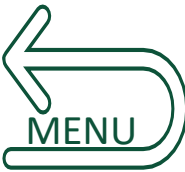




# BIM



# BEM

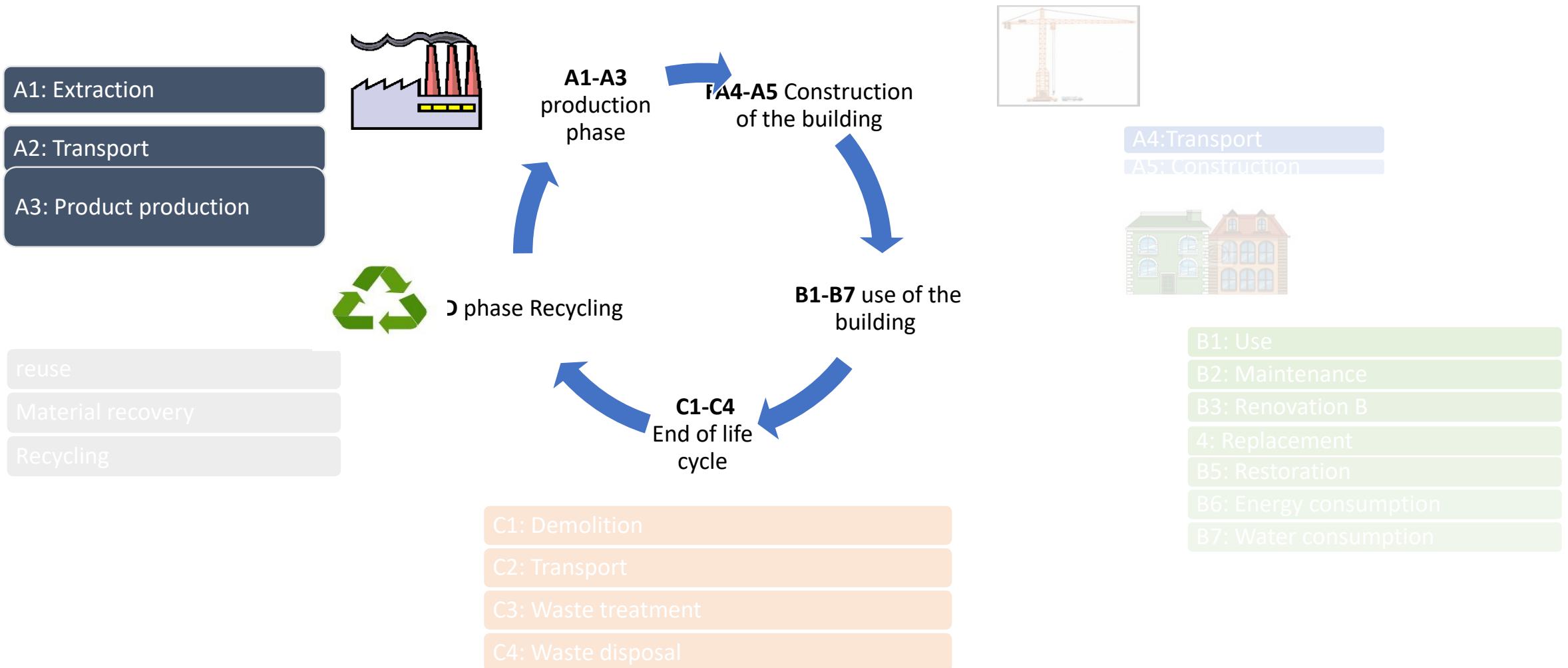


Building energy assessment in BIM

# LIFE CYCLE ASSESSMENT (LCA)



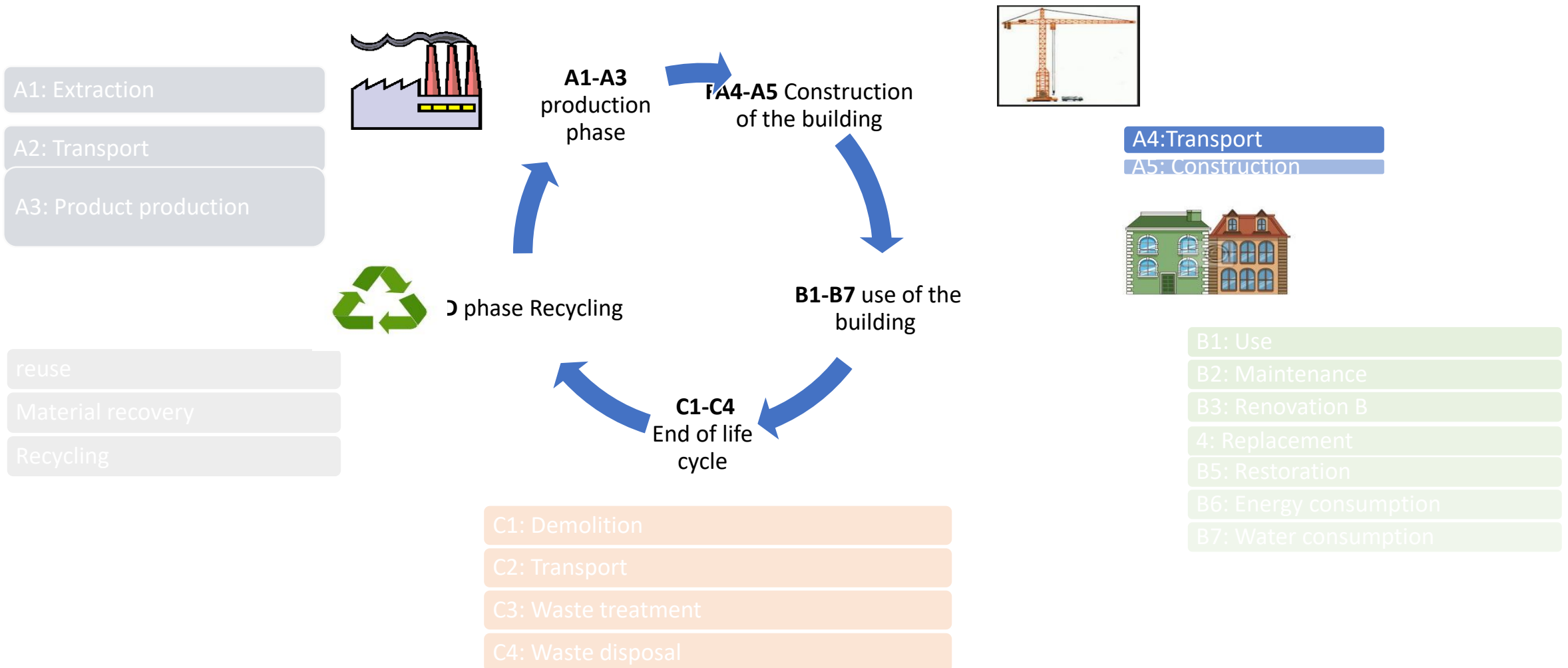
Life Cycle of the building according to standard EN15978



# LIFE CYCLE ASSESSMENT (LCA)



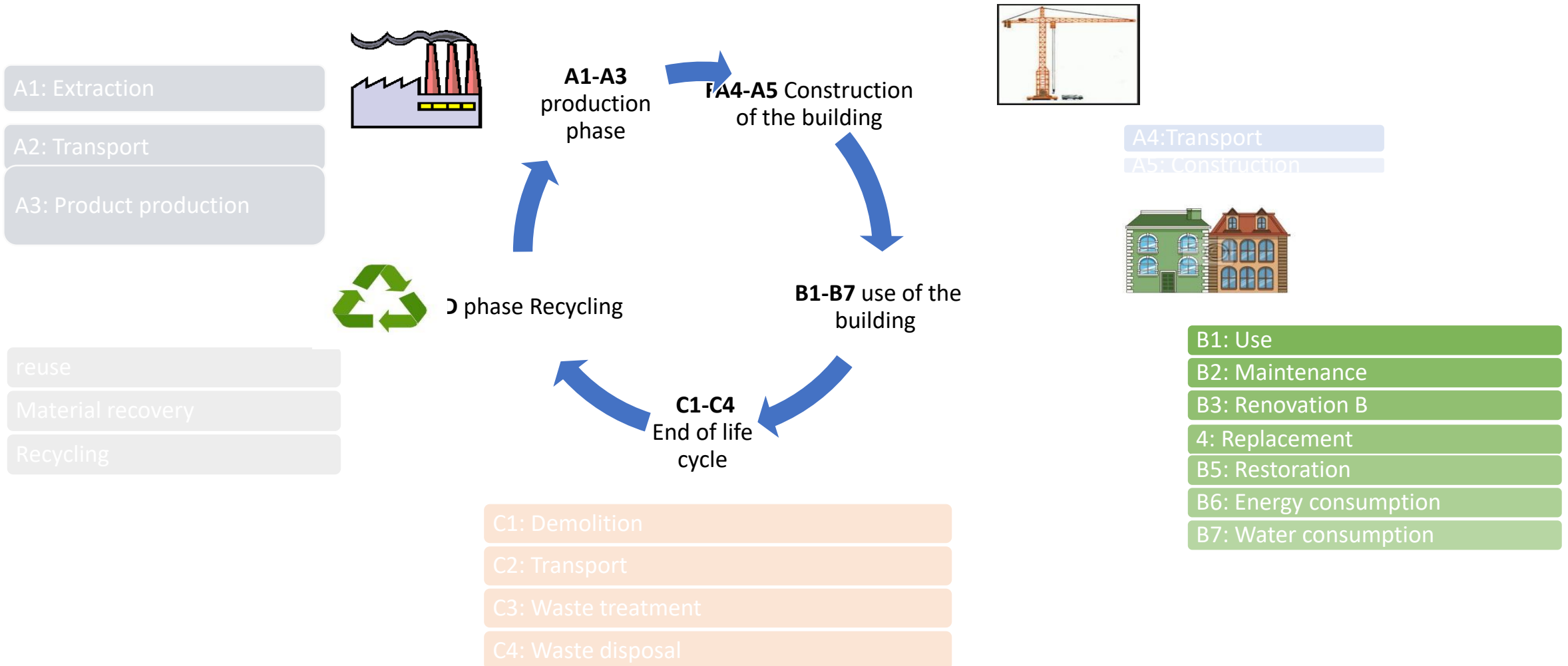
Life Cycle of the building according to standard EN15978



# LIFE CYCLE ASSESSMENT (LCA)



Life Cycle of the building according to standard EN15978

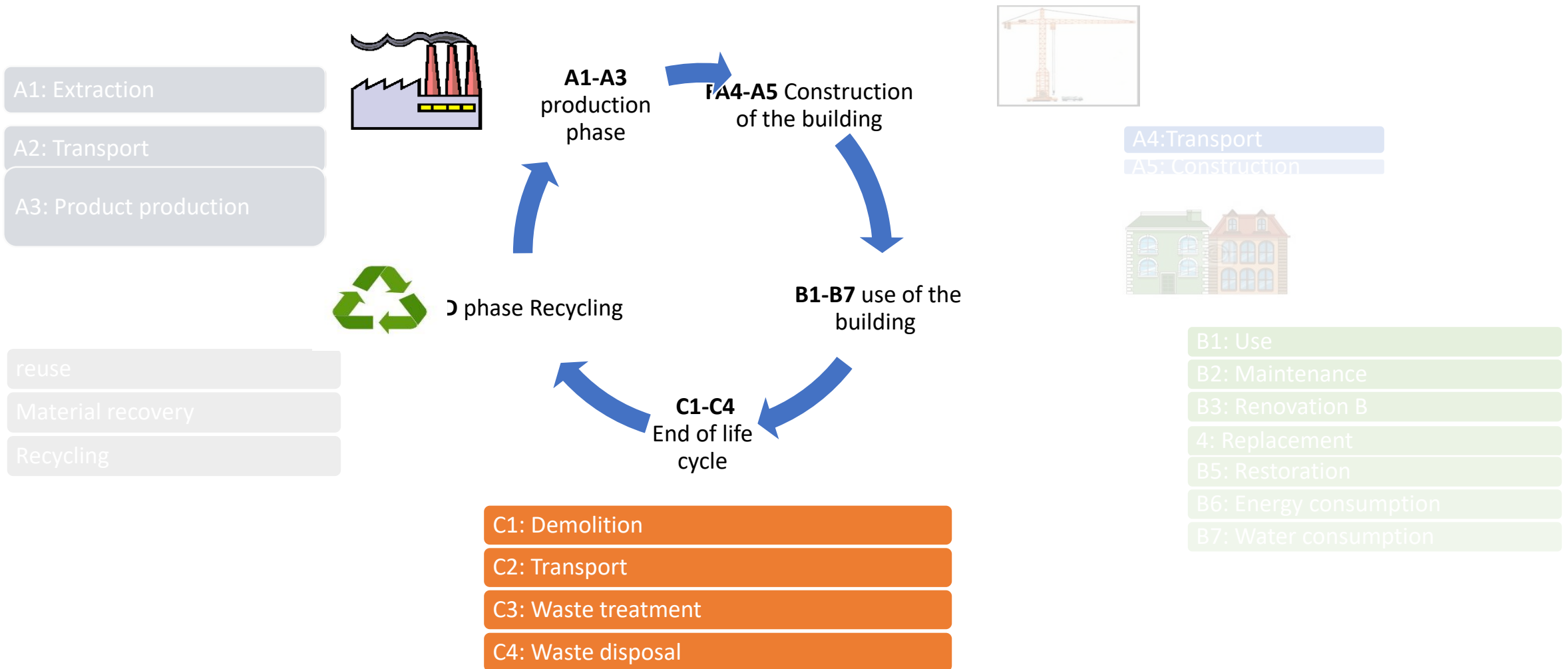




# LIFE CYCLE ASSESSMENT (LCA)



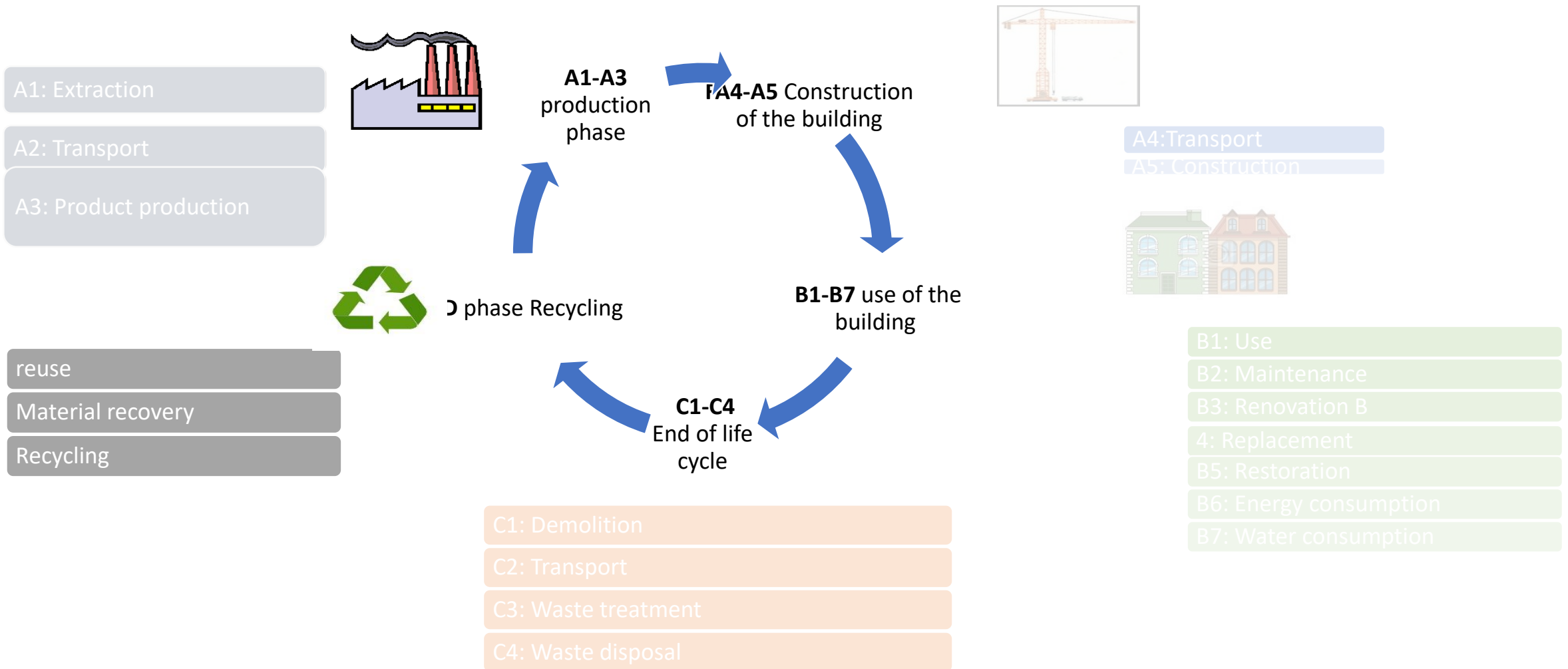
Life Cycle of the building according to standard EN15978



# LIFE CYCLE ASSESSMENT (LCA)



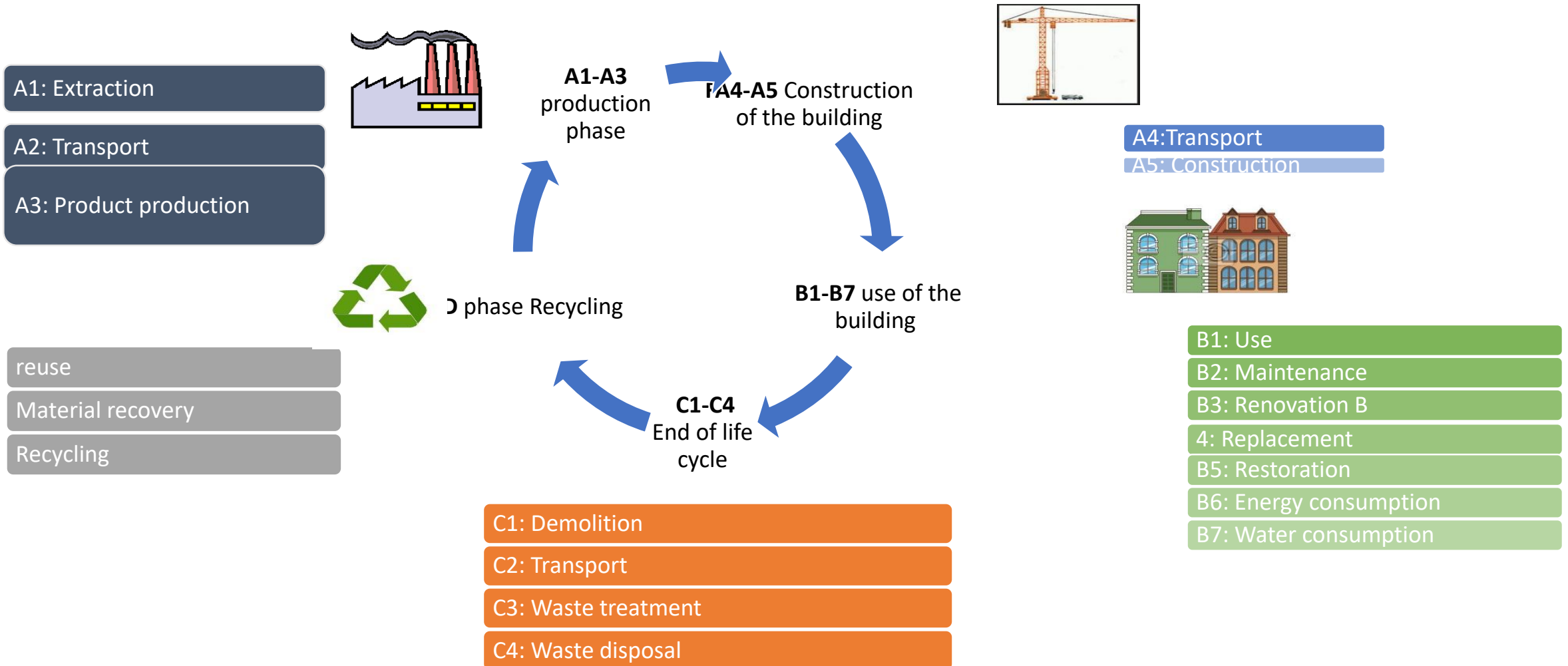
Life Cycle of the building according to standard EN15978



# LIFE CYCLE ASSESSMENT (LCA)

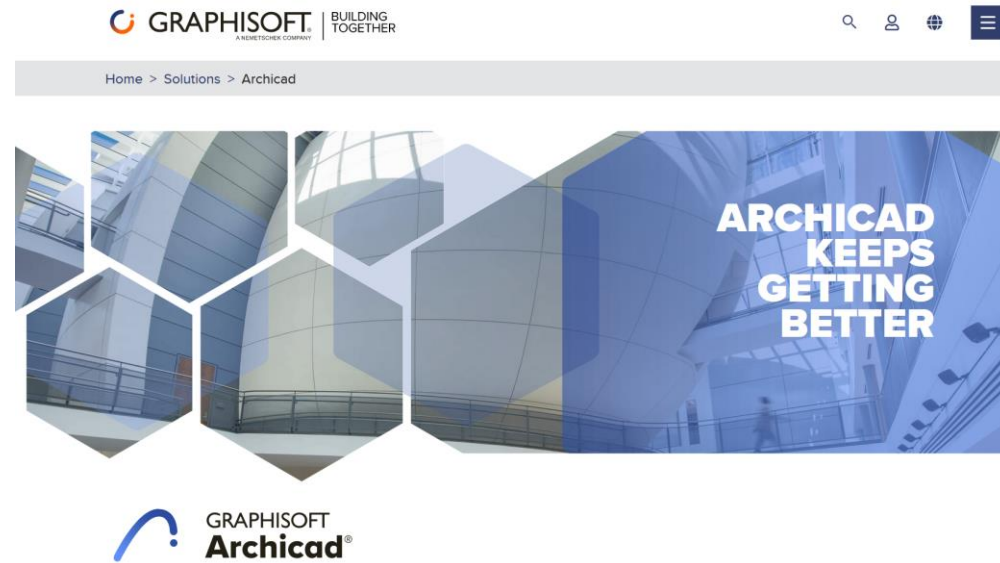


Life Cycle of the building according to standard EN15978

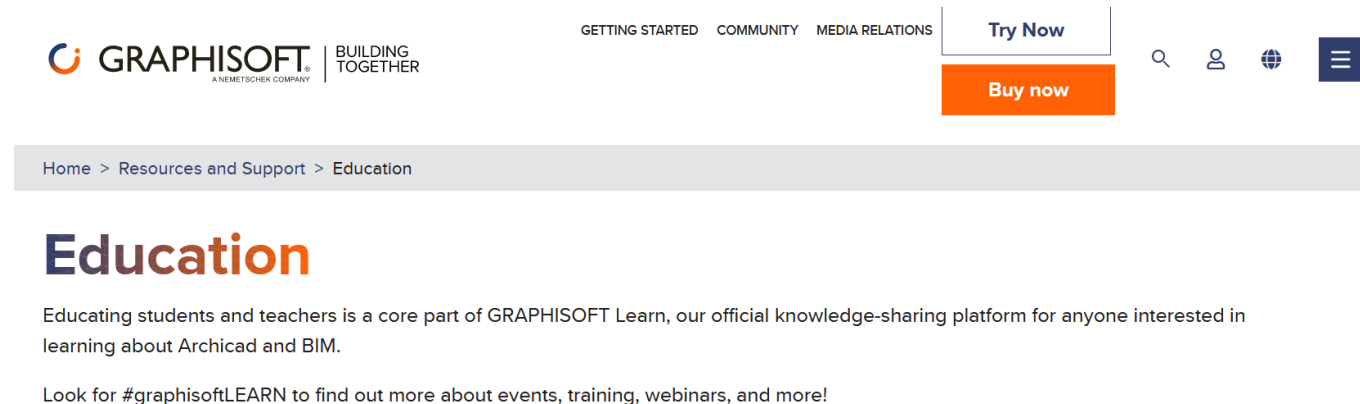


# Download and install Graphisoft Archicad

Information about Archicad:



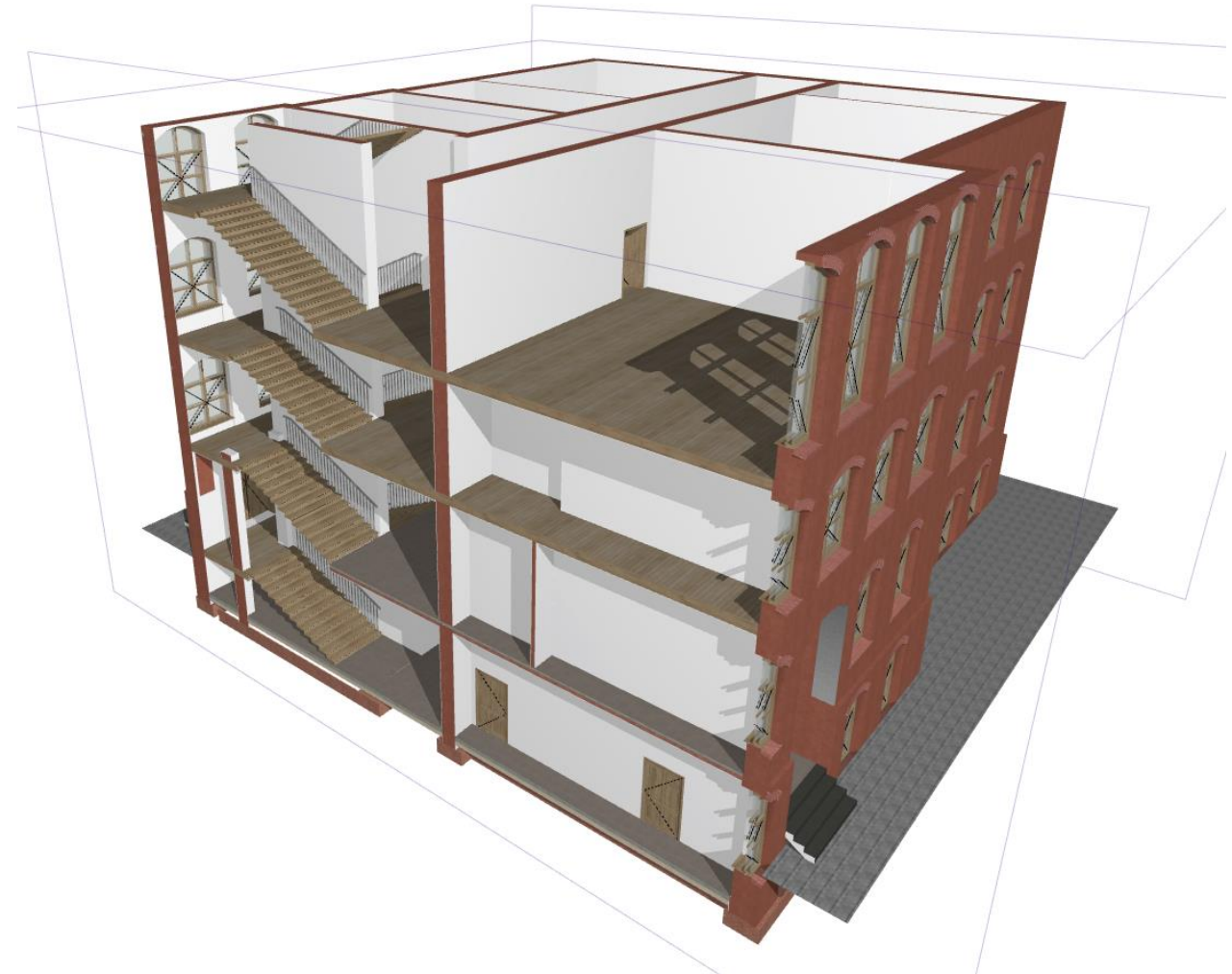
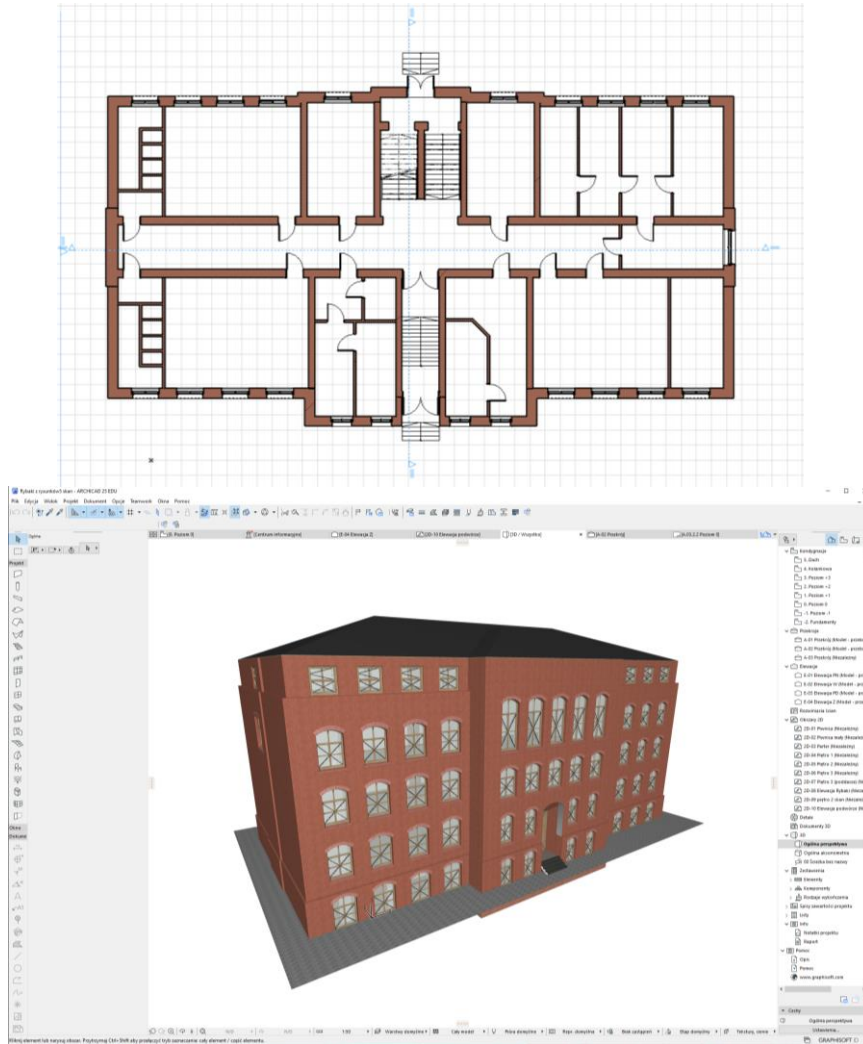
Get your free educational licence here:



# Open Graphisoft Archicad

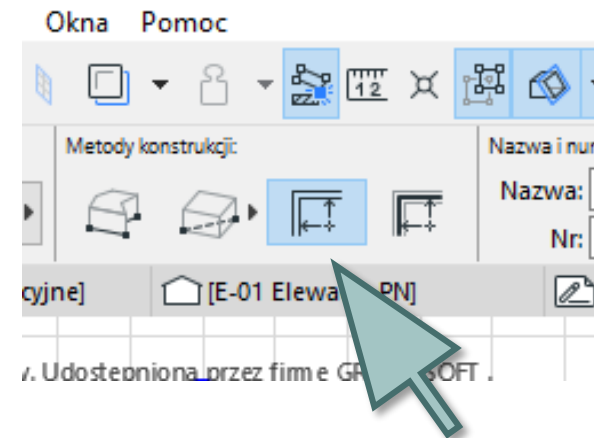
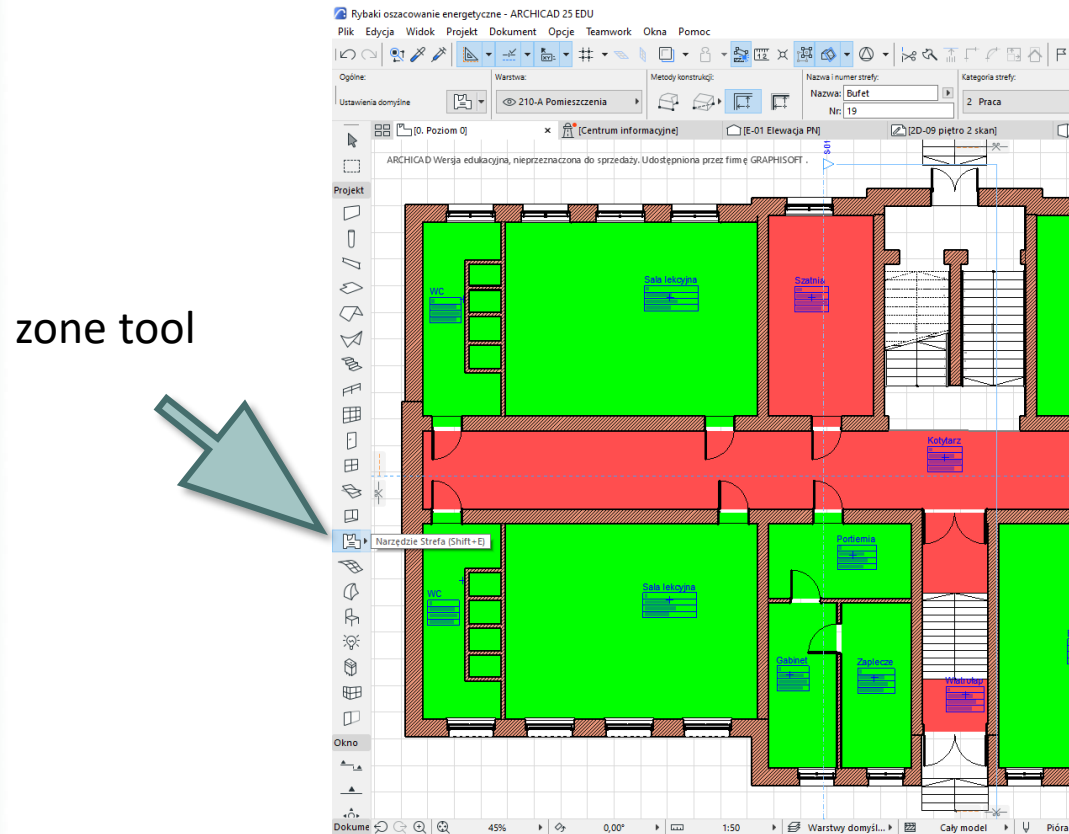


# Model the building in Archicad



# 1 Internal zones of rooms

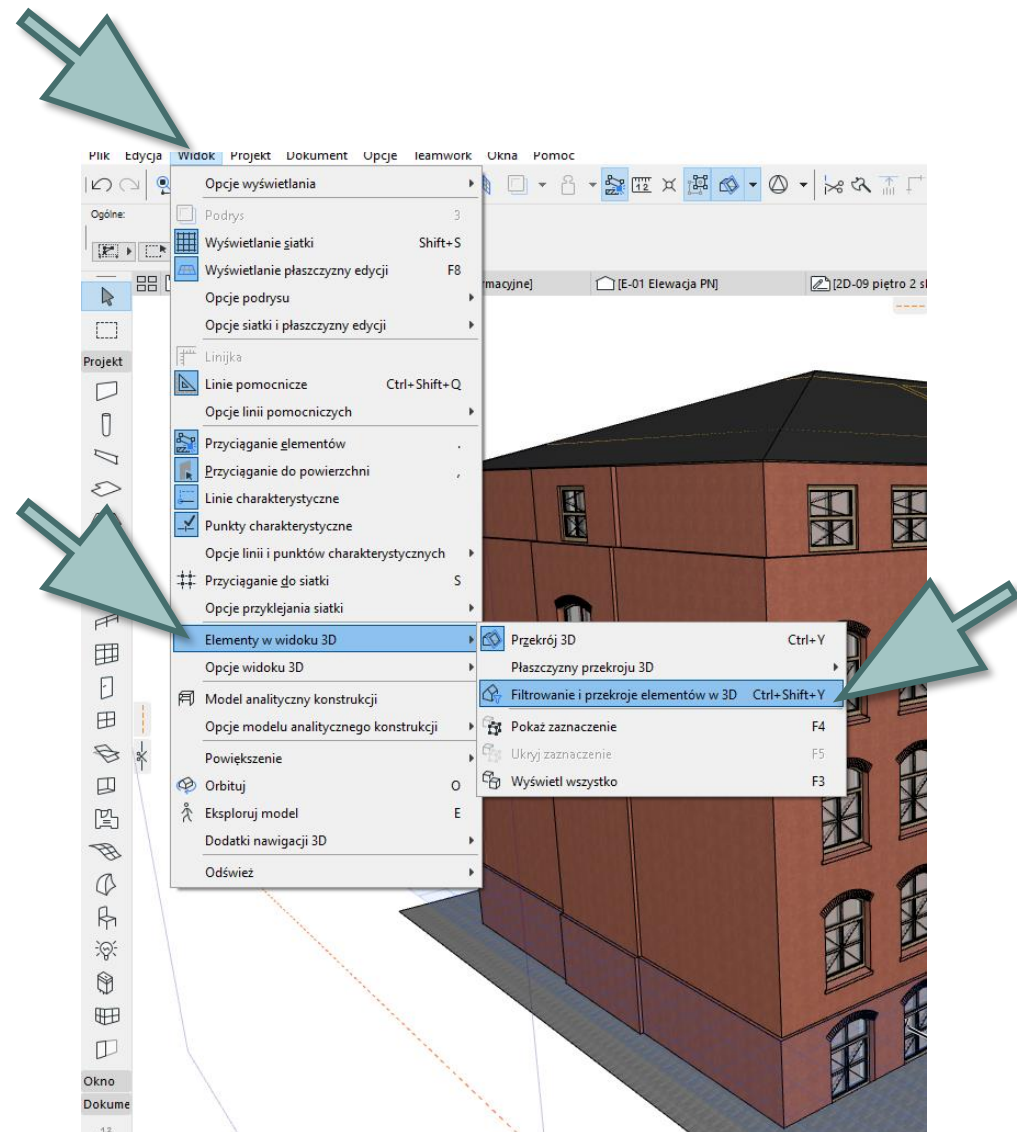
use the **zone tool** to create a zone in each conditioned space in the building by using only the **inner edge of the zone structure**.



internal tool  
edge of the construction of zones

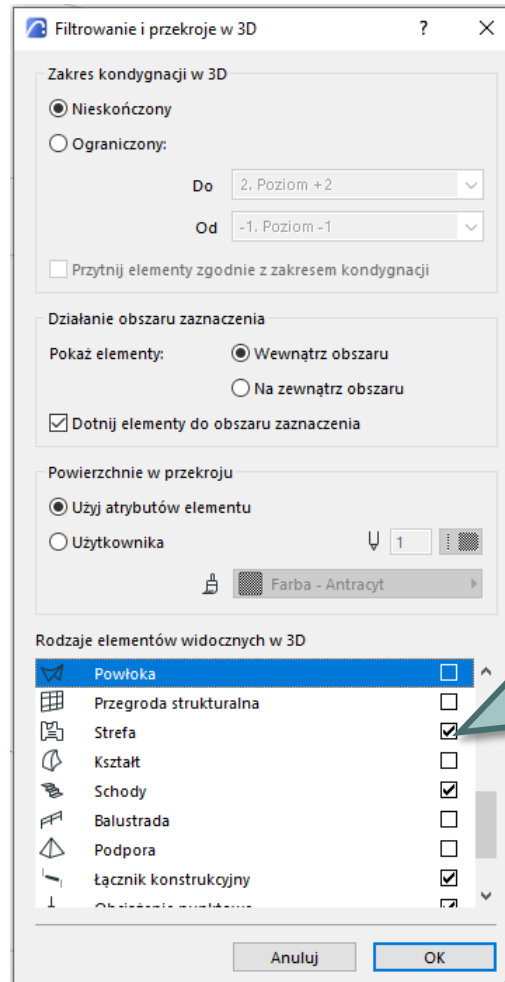
When inserting zones on a plan view check that they are completely surrounded by zone boundaries.

- open the **3D View** tab
- right click on it
- open the "Filtering and Sections window elements in 3D"





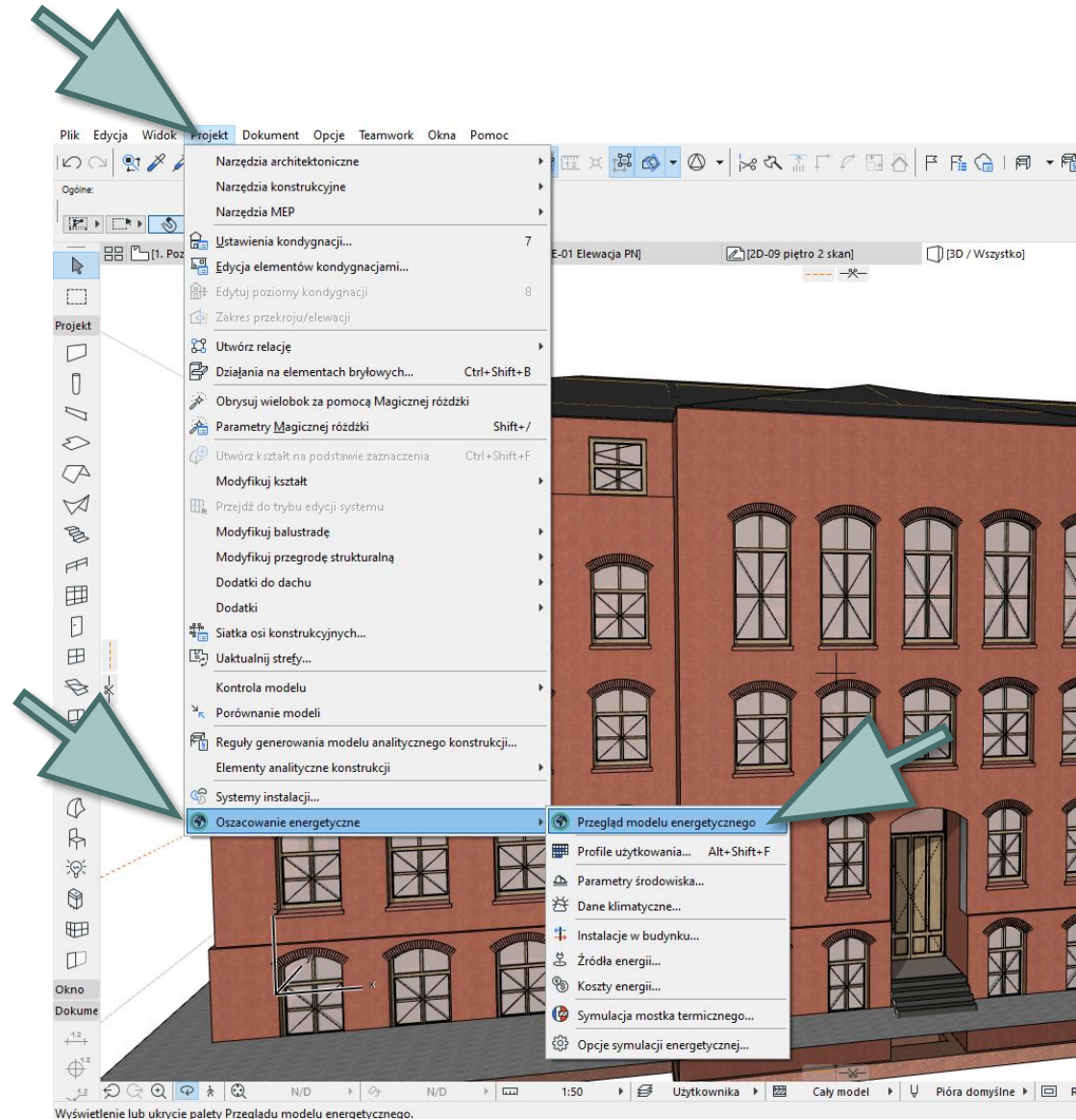
- select visible zones

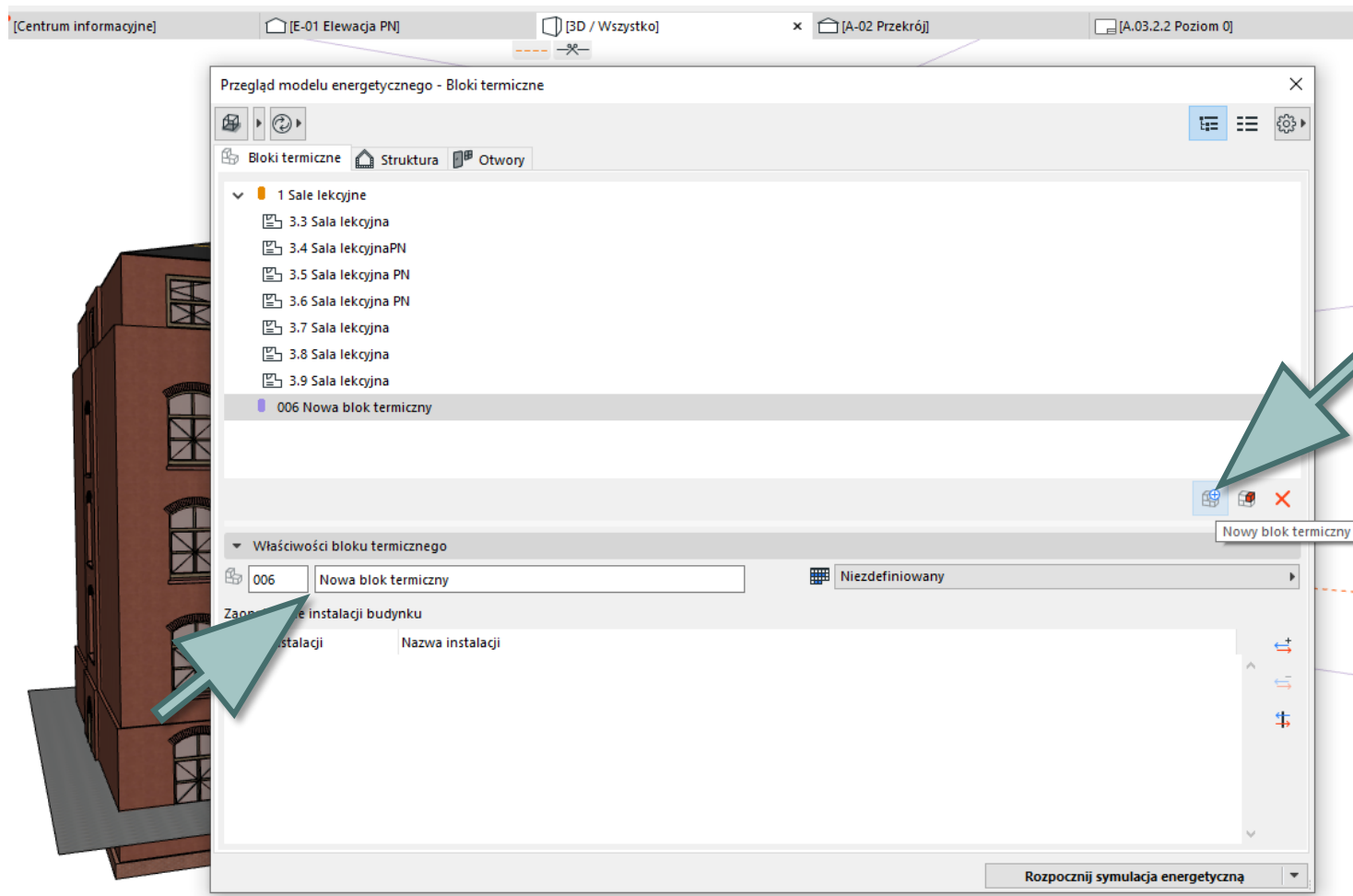


## 2 Thermal blocks

For **Energy Assessment purposes**, these Zones should be grouped into thermal blocks using the Thermal Blocks option in the Energy Model Overview palette

- open the **Project** tab
- energy evaluation
- review of the energy model

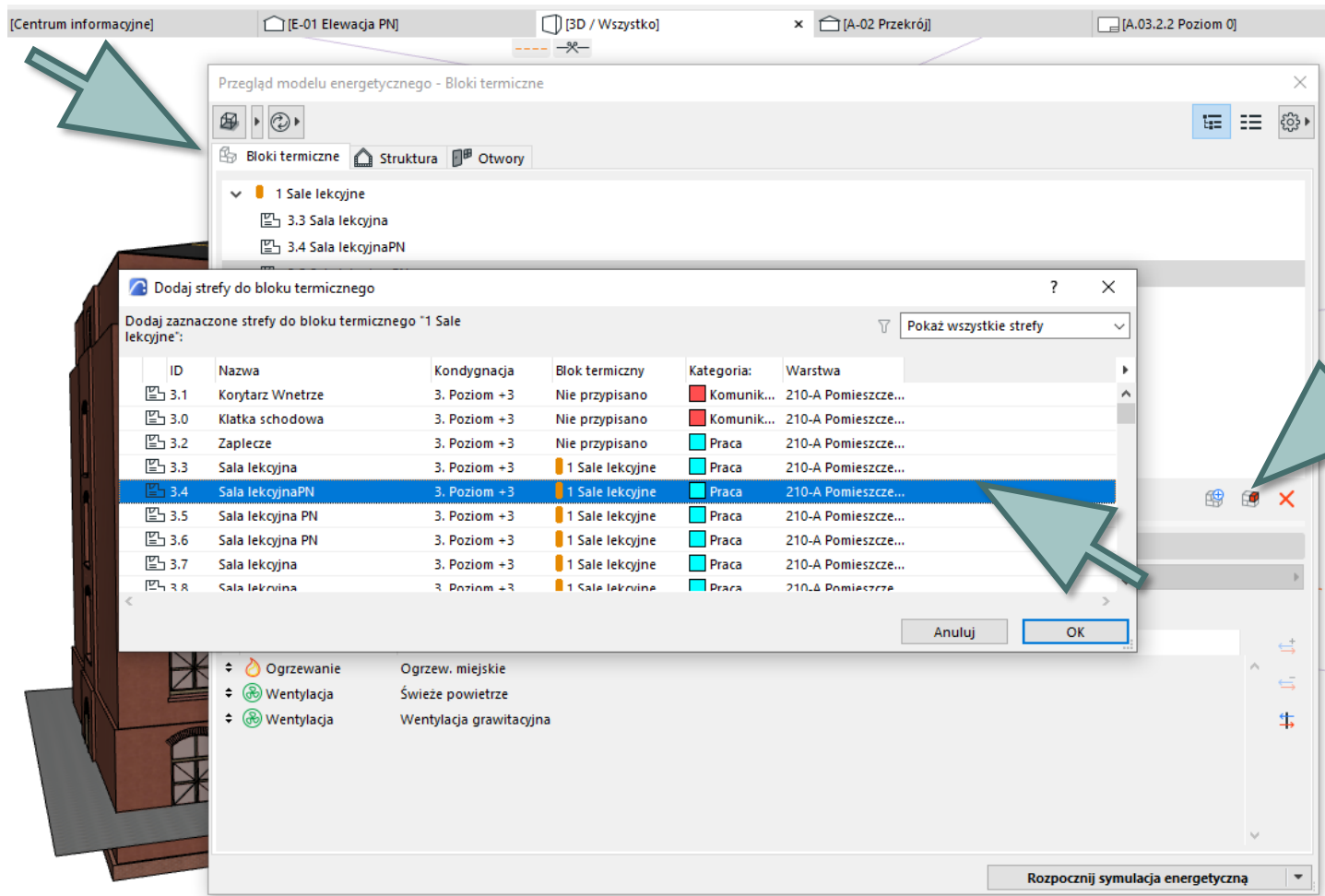




Create a thermal block

- use the **New thermal block button**

- the name and ID can be entered in the list



Assigning a Zone to a thermal block:

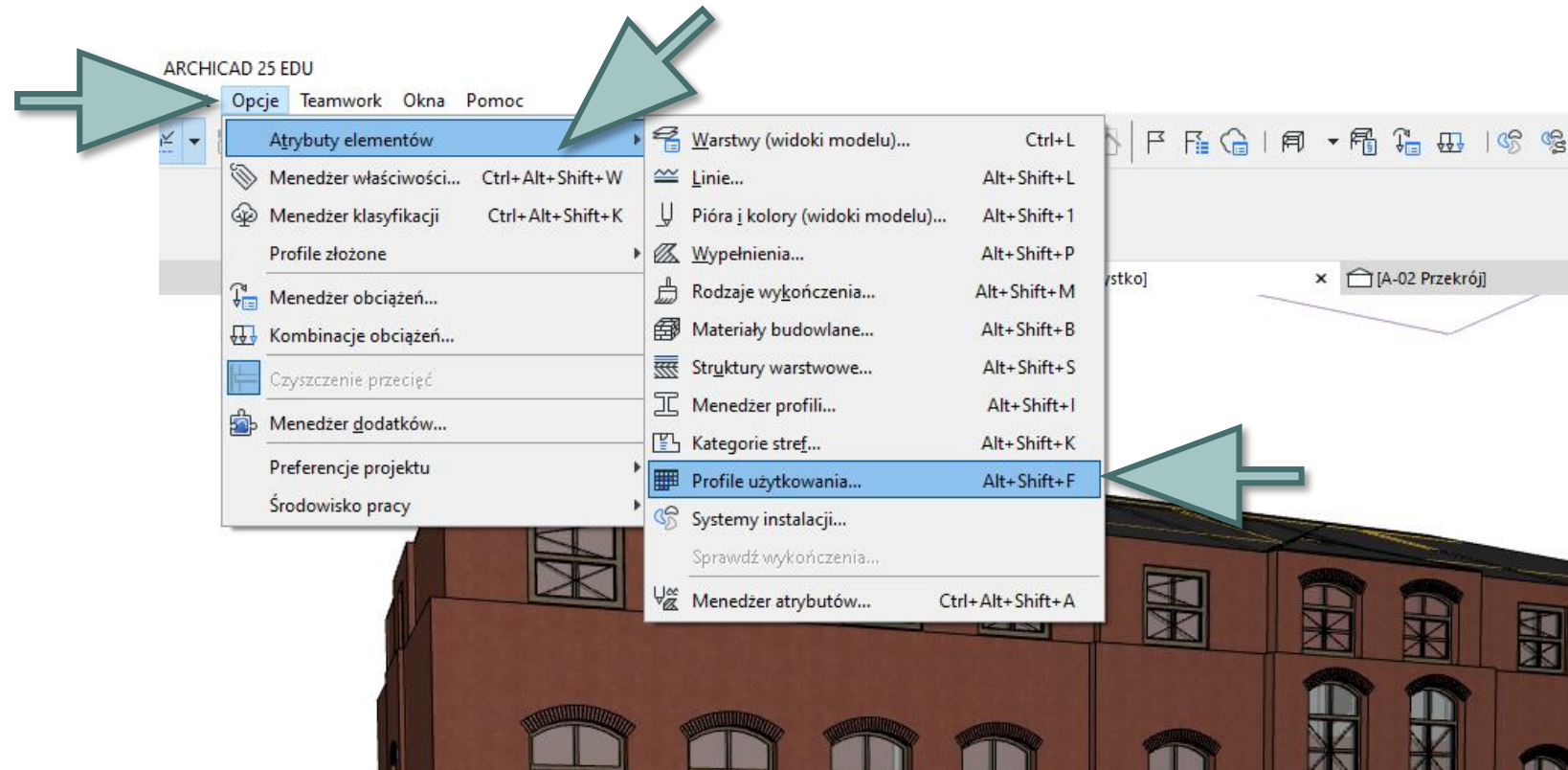
- use the **Add Zones** to thermal blocks option(in list view)

**Note:** The zones do not have to be adjacent to each other to be combined into one thermal block.

# 2.1. Thermal blocks – user profile

Setting properties of thermal blocks:

- use the command **Options> Element Attributes> Usage Profiles**



A separate user profile can be assigned to each thermal block.

- select available profiles or create your own
- define a daily schedule with the following data, by hour, for a full year (8760 hours in total)
- determine the heat output
- demand for hot water
- enter the moisture demand

**DOSTĘPNE PROFILE UŻYTKOWANIA**

- Audytorium/sale wykładowe
- Biblioteki (czytelnie)
- Biblioteki (księgozbiory otwarte)
- Biblioteki (księgozbiory zamknięte i magazyny)
- Biura otwarte
- Pomieszczenia niemieszkalne

**Dane użytkownika**

Sposób użytkowania: Pomieszczenia niemieszkalne

Ciepło oddawane: 100,00 W na osobę

Zapotrzebowanie na ciepłą wodę: 60,00 l/dobę na osobę

Obciążenie wilgotnościowe: 10,00 g/dobę, m<sup>2</sup>

Uwaga: Określ harmonogramy dobowe profilu "Audytorium/sale wykładowe" i ustaw w odpowiedniej kolejności.

| Harmonogram dobowy | Powtarzalność    | Okres    | W użytku [god] |
|--------------------|------------------|----------|----------------|
| dzień dydaktyczny  | Pon. Wt. Śr. ... | Cały rok | 6264           |
| dzień wolny        | Sob. Nd.         | Cały rok | 2496           |

Dodaj    Usuń    Edytuj harmonogramy dobowe...    Brak użytkownika: 0

Anuluj    OK

Set the required indoor temperature range:

Click: edit daily schedules

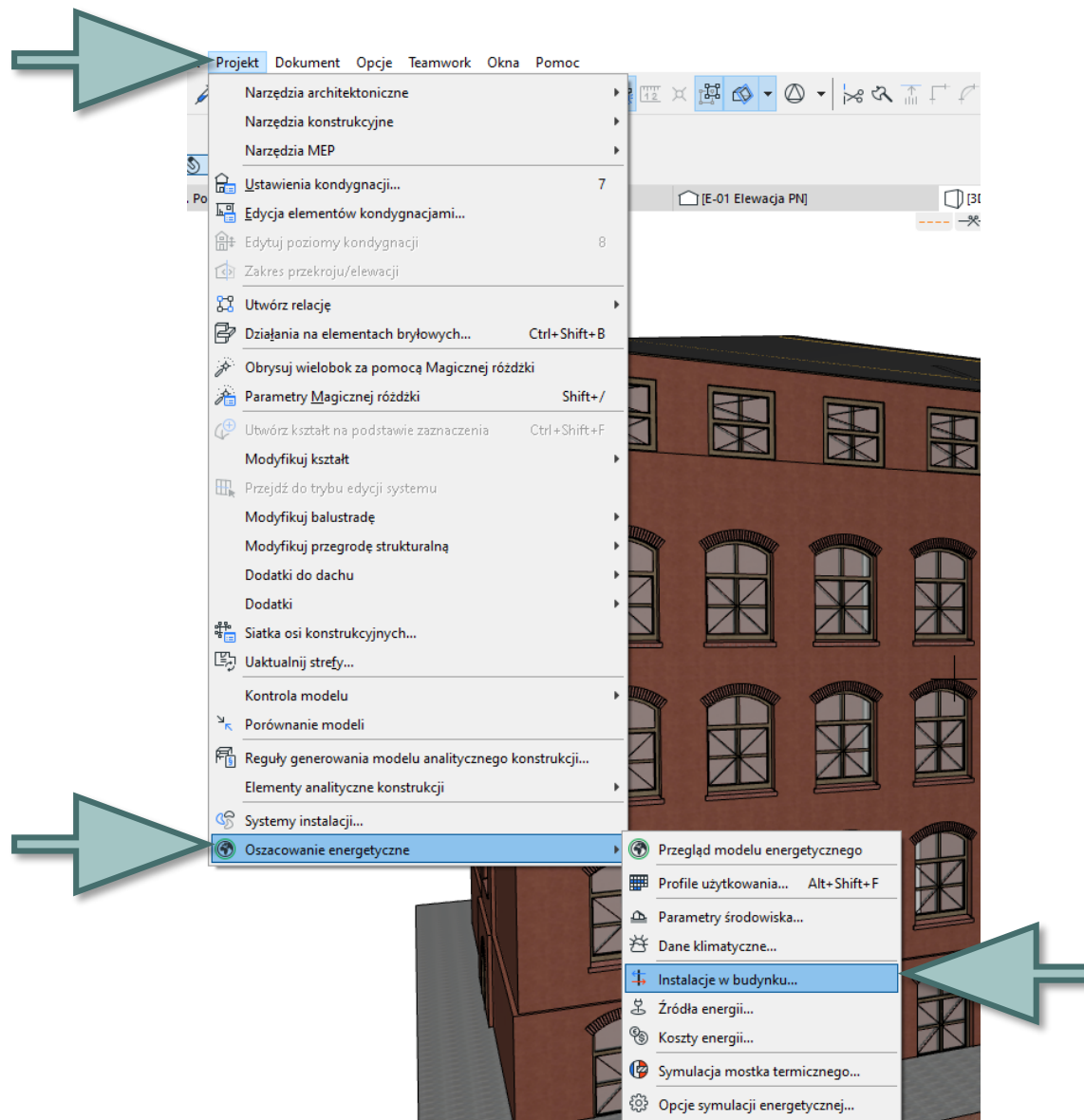
The image displays two overlapping software windows. The background window, titled "Profile użytkownika", lists available profiles such as "Audytorium/sale wykładowe" and "Biblioteki (czytelnie)". The foreground window, titled "Edytor dobowych profili użytkownika", is focused on editing the "dzień dydaktyczny" profile. It features a 24-hour graph showing indoor temperature (°C) and heating load (W/m²). The temperature graph shows a minimum of 18.00°C and a maximum of approximately 24°C. The heating load graph shows a peak of about 120 W/m². The right-hand side of the editor window contains control panels for "Temperatura wewnętrzna" (Indoor Temperature) and "Wewnętrzny odzysk ciepła" (Internal Heat Recovery). The "Minimum" temperature is set to 18,00°C. The "Liczba użytkowników" (Number of users) is set to 1,00 m² per person, "Oświetlenie" (Lighting) is set to "Żarówki tradycyjne" (Traditional incandescent), "Moc" (Power) is 10,00 W/m², and "Urządzenia" (Appliances) is 1,00 W/m². A green arrow points to the "Edytuj harmonogramy dobowe..." button in the main window, and another green arrow points to the "Minimum" temperature input field in the editor window.

set the appropriate temperature

# 2.2. Thermal blocks - Installations in the building

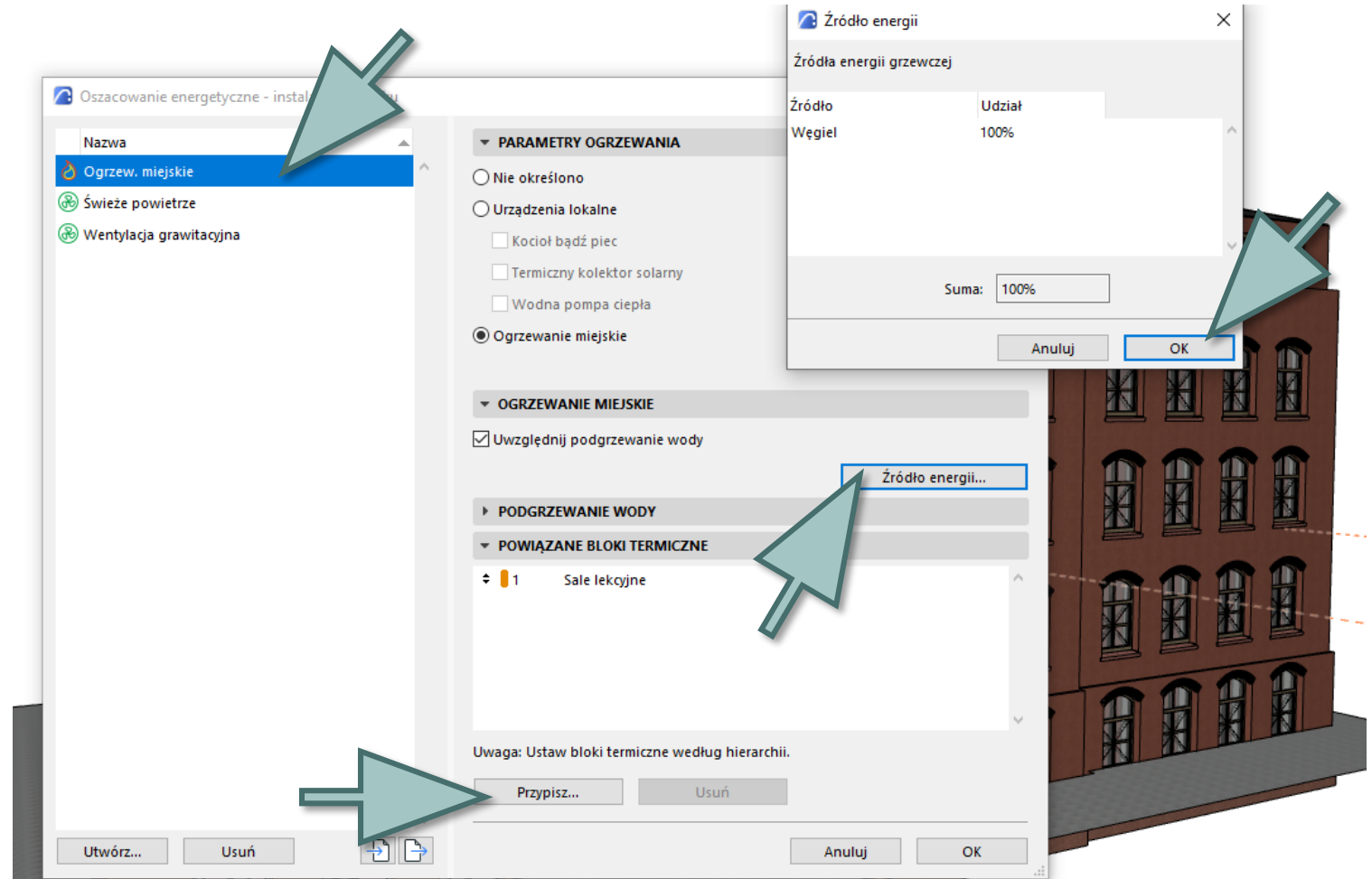
open a dialog with **Project> Energy Assessment> Installations in the building**

Use this dialog to configure the building installation settings that will provide comfortable indoor conditions (as set in the User Profile window) for the building model thermal blocks.



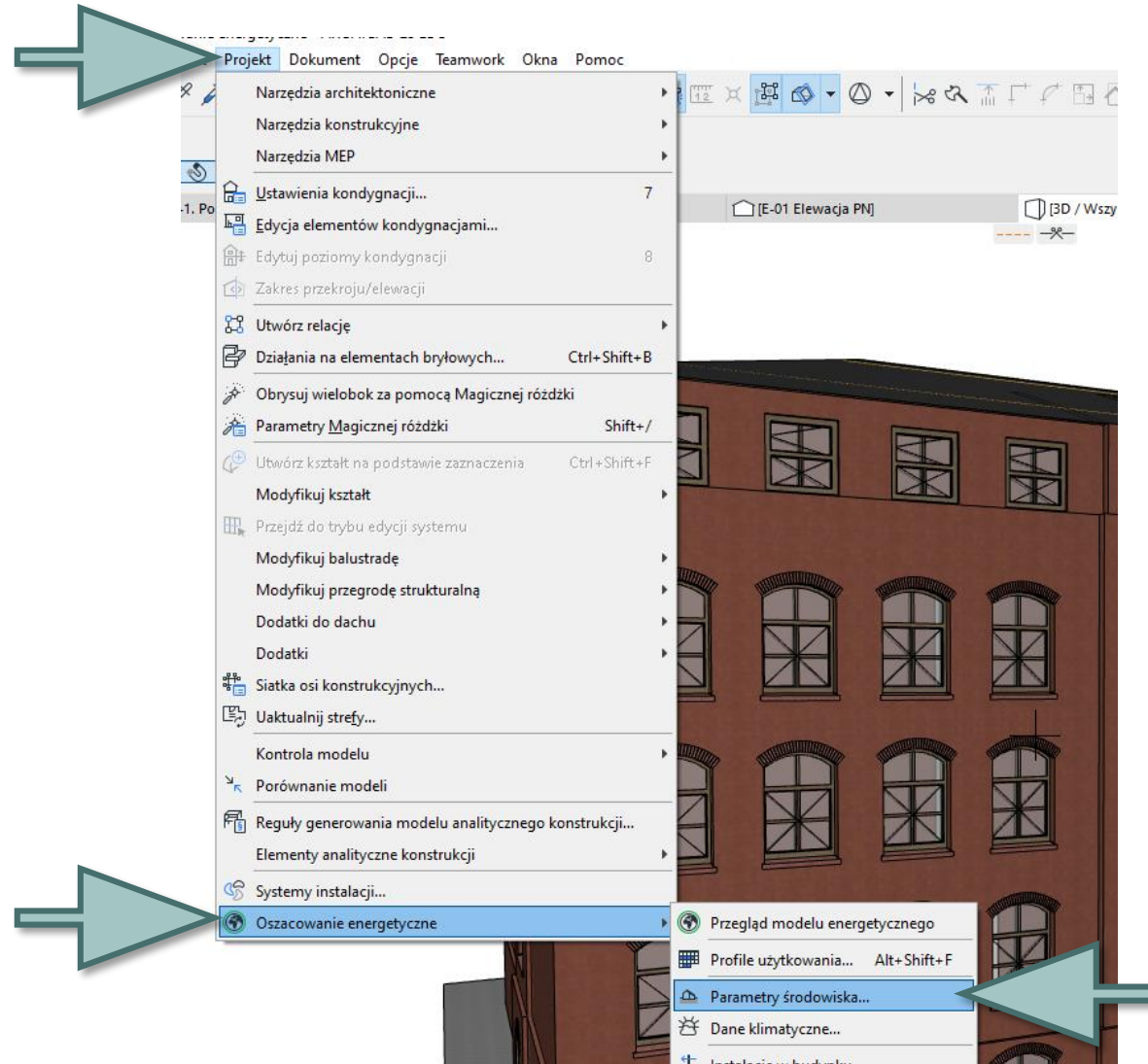


In the **Installation** dialog box all installations are shown on the left and options corresponding to each of them on the right. The content of the options for building installation on the right will change depending on the selected system configuration. Use the Building installations dialog box to edit the properties of the existing Building installations, create new ones and assign them to thermal blocks.



## 2.3. Thermal blocks - Environmental parameters

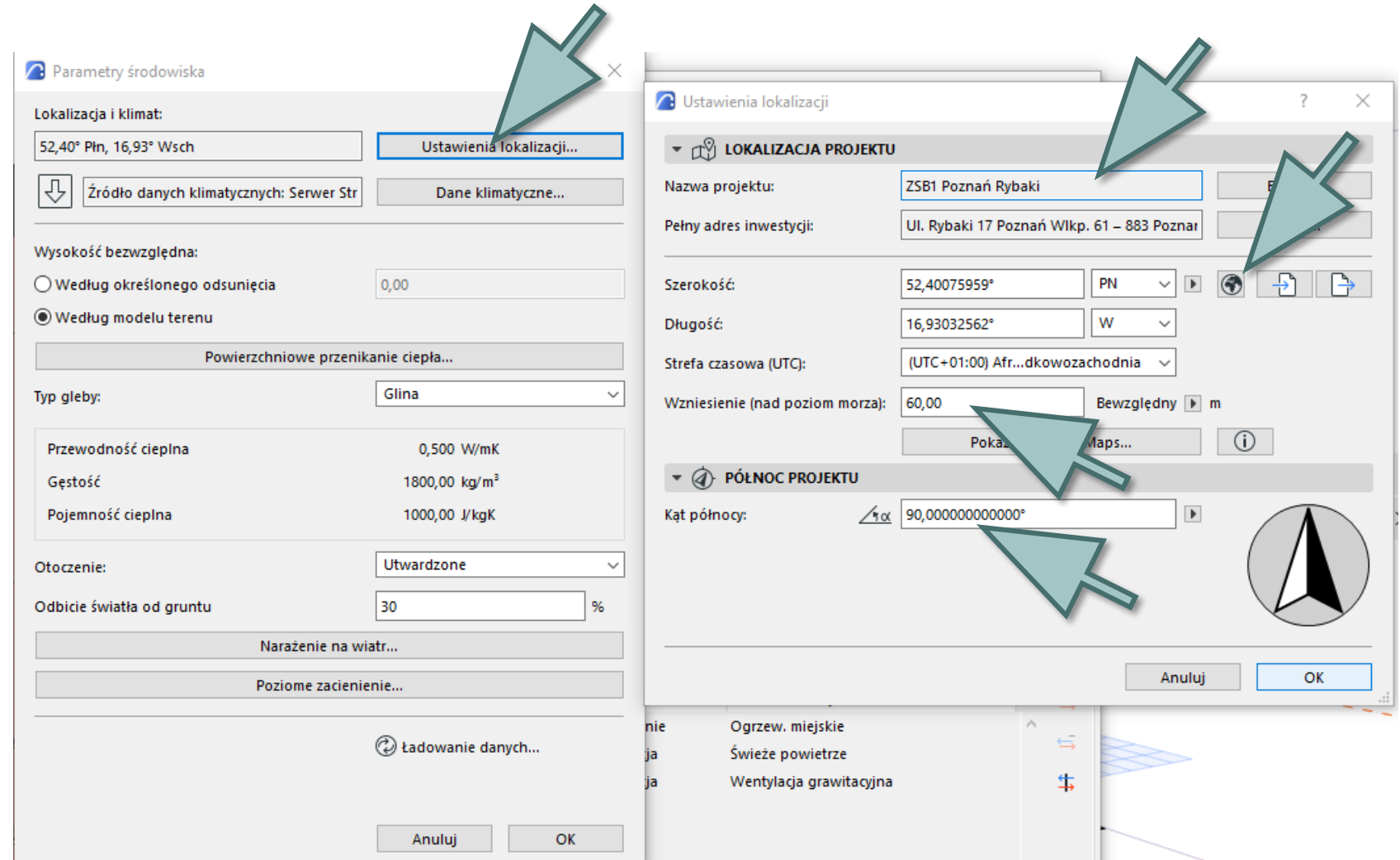
open the **Project > Energy Estimation > Environment Parameters** dialog.



## Location setting

The energy estimate takes the geographic location of the building into account when retrieving climate data from the StruSoft climate server.

- click on location settings
- provide the address of the investment
- enter the width and longitude
- enter your time zone
- enter elevation above sea level



## Soil type

Select: options from the window, which best suits soil type at the site buildings.

## Surroundings

choose an environment that best describes the conditions for a given building location: Water, Garden, Paved or your own.

Parametry środowiska

Lokalizacja i klimat:  
52,42° Płn, 16,92° Wsch Ustawienia lokalizacji...  
Źródło danych klimatycznych: Serwer Str Dane klimatyczne...

Wysokość bezwzględna:  
 Według określonego odsunięcia 0,00  
 Według modelu terenu

Powierzchniowe przenikanie ciepła...

Typ gleby: Glina

|                     |                           |
|---------------------|---------------------------|
| Przewodność cieplna | 0,500 W/mK                |
| Gęstość             | 1800,00 kg/m <sup>3</sup> |
| Pojemność cieplna   | 1000,00 J/kgK             |

Otoczenie: Utwardzone

Odbicie światła od gruntu 30 %

Narażenie na wiatr...

Poziome zacienienie...

Ładowanie danych...

Anuluj OK

**Wind exposure**  
select the appropriate Wind Exposure Level for each orientation of the building. Shrouded, Partially Shrouded, or Unprotected. For each orientation, a point will be inserted on the graph that represents Wind exposure (the further the point is, the higher the exposure factor) and the points are connected by a red line.

The screenshot displays a software interface for energy simulation. A 3D model of a building is visible in the background. Overlaid on the model are several windows:

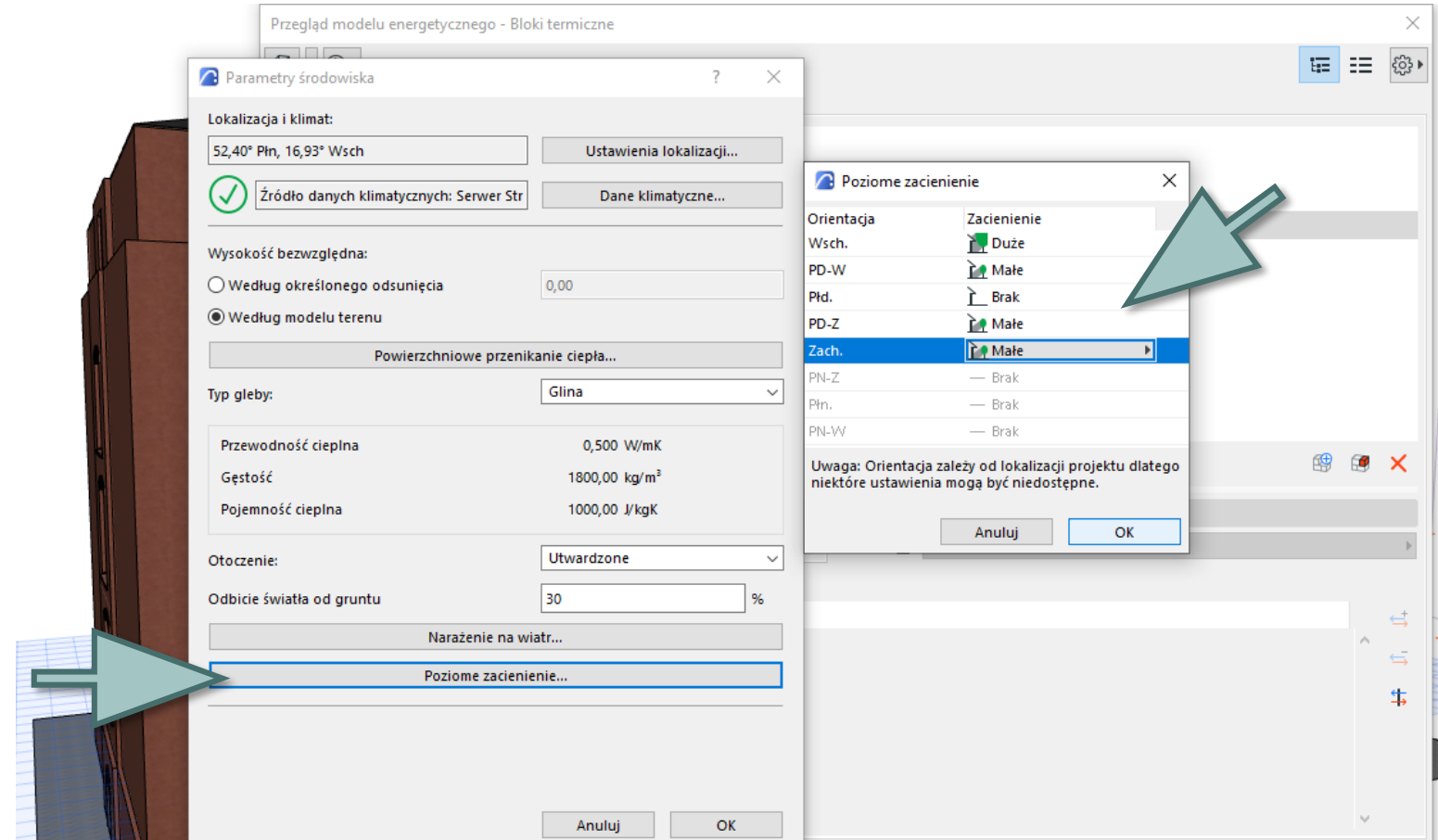
- Parametry środowiska (Environment Parameters):** A dialog box with the following settings:
  - Lokalizacja i klimat: 52,40° Płn, 16,93° Wsch
  - Źródło danych klimatycznych: Serwer Str
  - Wysokość bezwzględna: Według modelu terenu
  - Typ gleby: Głina
  - Otoczenie: Utwardzone
  - Odbicie światła od gruntu: 30%
- Narażenie na wiatr (Wind Exposure):** A wind rose chart showing wind frequency by direction. A red line connects points for each orientation. Below the chart is a table for selecting exposure levels:

| Orientacja | Narażenie na wiatr  |
|------------|---------------------|
| Płn.       | Nieosłonięty        |
| PN-W       | Częściowo osłonięty |
| Wsch.      | Osłonięty           |
| PD-W       | Nieosłonięty        |
| Płd.       | Nieosłonięty        |
| PD-Z       | Nieosłonięty        |
| Zach.      | Nieosłonięty        |
| PN-Z       | Nieosłonięty        |

A green arrow points to the 'Narażenie na wiatr...' button in the 'Parametry środowiska' dialog. Another green arrow points to the 'Nieosłonięty' option in the dropdown menu for the 'PD-W' orientation.

## Horizontal shading

Model-Driven Solar Analysis in ARCHICAD's Energy Estimation only works on the translucent parts of the building envelope. However, it does not automatically determine the extent to which shadows are cast by external objects onto the opaque parts of a building. Using the Horizontal shading button, activate a separate dialog with a list of sunny sides of the building (the Orientation list may differ depending on the project location).



## Climatic data

- click Download from **StruSoft Server**. All meteorological data on the StruSoft website is generated from data collected by NCEP facilities obtained from the NOAA-CIRES meteorological research center in Boulder, Colorado (USA) at <http://www.cdc.noaa.gov/>.
- click on a data type to view the table: Air Temperature, Relative Humidity, Sunshine or Wind Speed.

The screenshot displays the 'Parametry środowiska' (Environmental Parameters) dialog box in the background, with the 'Dane pogodowe' (Weather Data) dialog box in the foreground. The 'Dane pogodowe' dialog is set to 'Dane klimatyczne do symulacji gotowe' (Ready weather data for simulation) and 'Pobierz z serwera StruSoft' (Download from StruSoft server). The 'Rodzaj danych' (Data type) is set to 'Temperatura powietrza' (Air temperature). A line graph shows the monthly air temperature profile, with a maximum of 37.7°C and a minimum of -7.41°C. The x-axis represents months from January to December, and the y-axis represents temperature in degrees Celsius.

| Month | Temperature (°C) |
|-------|------------------|
| Sty   | ~5               |
| Luty  | ~5               |
| Mar   | ~10              |
| Kwi   | ~15              |
| Maj   | ~20              |
| Cze   | ~25              |
| Lip   | ~30              |
| Ser   | ~35              |
| Wrz   | ~30              |
| Paź   | ~20              |
| List  | ~10              |
| Gru   | ~5               |

# 2.4. Thermal blocks - Structure property settings

## U-factor calculator

The U refers to the heat transfer coefficient of the selected structure.

The layers that make up the selected structure in the U-value calculator are listed along with their specific properties (thickness, thermal conductivity, density and heat capacity). To be able to modify them:

The screenshot shows a software window titled "Przegląd modelu energetycznego - Struktura". On the left, there is a tree view of thermal blocks. The main area displays a table of properties for various blocks. A dialog box titled "Współczynnik U wartość" is open, allowing the user to set the U-factor for a selected block. The dialog shows "Współczynnik U:" set to 0,46 W/m²K. A red padlock icon in the table indicates that the U-factor for that block is locked. A green arrow points to the ellipsis button next to the U-factor value in the table, and another green arrow points to the "OK" button in the dialog.

| Powierzchnia [m²] | Grubość [...] | Współczynnik ... | Infiltracja [l/sm²] | Absorpcja [%] |
|-------------------|---------------|------------------|---------------------|---------------|
| 2,24              | 56,00         | 0,46             | 1,10                | 85,00         |
| 2,24              | 56,00         | 0,46             | 1,10                | 85,00         |
| 14,67             | 42,00         | 0,59             | -----               | -----         |
| 24,69             | 16,00         | 0,84             | 1,10                | -----         |
| 26,29             | 40,00         | 0,63             | 1,10                | -----         |
| 27,16             | 40,00         | 0,63             | 1,10                | 85,00         |
| 27,16             | 40,00         | 0,63             | 1,10                | 85,00         |
| 29,40             | 42,00         | 0,62             | 1,10                | 85,00         |
| 29,40             | 16,00         | 0,78             | -----               | -----         |
| 29,90             | 42,00         | 0,62             | 1,10                | 85,00         |
| 32,28             | 40,00         | 0,63             | 1,10                | 85,00         |
| 63,06             | 55,00         | 0,48             | 1,10                | 85,00         |
| 69,03             | 30,00         | 0,59             | 1,10                | 85,00         |
| 70,51             | 55,00         | 0,48             | 1,10                | 85,00         |
| 394,37            | 30,00         | 0,55             | 1,10                | 85,00         |

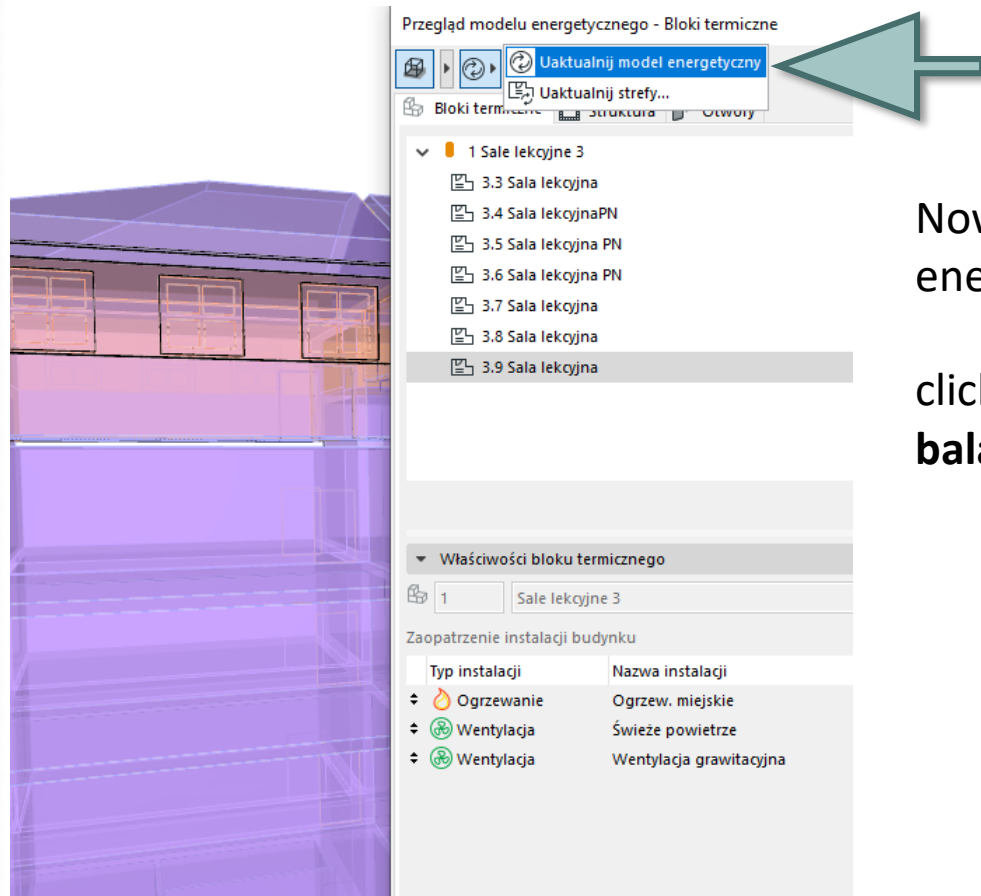
click the ellipsis button in the U-factor column - when the padlock icon is closed (red) - to bring up the U-factor calculator dialog.



# 3 Estimating energy efficiency

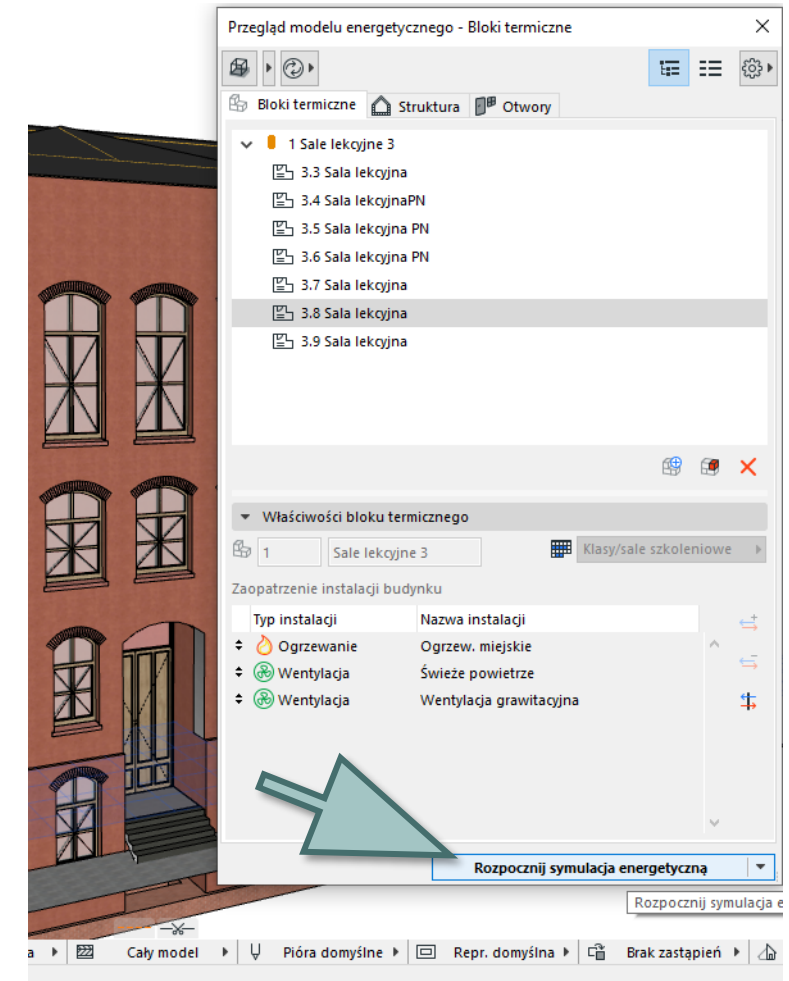
Before starting the energy simulation of the energy balance

click the **Update energy model button**



Now we can start the simulation energy balance

click the button **Start energy balance simulation**



The built-in, certified VIP-Core module performs a dynamic energy simulation that calculates the hourly energy balance in the building and generates the report on the energy balance in the building. The report contains information on, inter alia, energy efficiency of structures in the project, the annual energy consumption, energy balance and the level of carbon dioxide emissions.



Przegląd modelu energetycznego - Bloki termiczne

Raport szacunkowy

► NAGŁÓWEK I STOPKA  
 ► FORMAT RAPORTU  
 ▼ DZIAŁY RAPORTU

Wybierz rozdział:

- Wartości kluczowe 1
- Konsumpcja energii według źródła 1
- Konsumpcja energii według celu 2
- Bilans energetyczny 3
- Bloki termiczne 3
- Wpływ na środowisko 3

Dodaj/usuń znak końca strony:

Ustawienia działu

Jednostka energii: kWh

Ustawienia formatu dla importu i eksportu

### Oszacowanie wydajności energetycznej

[Numer projektu:] ZSB1 Poznań Rybaki

#### Wartości kluczowe

|  |                        |  |             |                      |
|--|------------------------|--|-------------|----------------------|
| <b>Ogólne dane projektu</b>            | ZSB1 Poznań ...        | <b>Współcz. przewodności ciepłej</b>     | U           | [W/m <sup>2</sup> K] |
| Nazwa projektu:                        | Poznań                 | Srednia dla przęród budynku:             | 0,74        |                      |
| Lokalizacja:                           | 16,93° Wsch            | Piętra:                                  | –           |                      |
| Szerokość geograficzna:                | 52,40° Pn              | Zewn. źródła:                            | 0,40 – 0,84 |                      |
| Długość geograficzna:                  | 80,00 m                | W gruncie:                               | –           |                      |
| Wysokość:                              | Senwer Strusoft        | Otwory:                                  | 2,11 – 3,19 |                      |
| Źródło danych pogodowych:              | 04.03.2022 09:33       |  |             |                      |
| Data sporządzenia raportu:             |                        |  |             |                      |
| <b>Dane geometrii budynku</b>          |                        | <b>Charakterystyczne wartości roczne</b> |             |                      |
| Powierzchnia brutto:                   | 478,5 m <sup>2</sup>   | Energia grzewcza netto:                  | 0,27        | kWh/m <sup>2</sup>   |
| Powierzchnia użytkowa:                 | 397,7 m <sup>2</sup>   | Energia chłodząca netto:                 | 0,30        | kWh/m <sup>2</sup>   |
| Powierzchnia przęród zewnętrznych:     | 885,8 m <sup>2</sup>   | Całkowita energia netto:                 | 0,27        | kWh/m <sup>2</sup>   |
| Kubatura wentylowana:                  | 1030,89 m <sup>3</sup> | Zużycie energii:                         | 147,88      | kWh/m <sup>2</sup>   |
| Współczynnik szklenia:                 | 3 %                    | Zużycie paliwa:                          | 147,88      | kWh/m <sup>2</sup>   |
|  |                        | Główne źródło energii:                   | 137,14      | kWh/m <sup>2</sup>   |
|  |                        | Koszt paliwa:                            | –           | PLN/m <sup>2</sup>   |
|  |                        | Emisja CO <sub>2</sub> :                 | 51,04       | kg/m <sup>2</sup>    |
| <b>Charakterystyka przęród budynku</b> |                        | <b>Stopniodni</b>                        |             |                      |
| Infiltracja przy 50Pa:                 | 3,92 1/h               | Ogrzewanie (HDD):                        | 3735,44     |                      |
|  |                        | Chłodzenie (CDD):                        | 1311,52     |                      |

#### Konsumpcja energii według źródła

| Rdzaj źródła   | Energia          |       | Pieniszy | Koszt       | Emisja CO <sub>2</sub> |
|----------------|------------------|-------|----------|-------------|------------------------|
|                | Nazwa źródła     | Ilość |          |             |                        |
| Drugi Kierunek | Elektryczność    | 7     | 23       | –           | 2728                   |
|                | Ogrzew. miejskie | 51    | 51       | –           | 17811                  |
| Suma:          |                  | 58    | 74       | Nie dotyczy | 20538                  |

Ilości energii

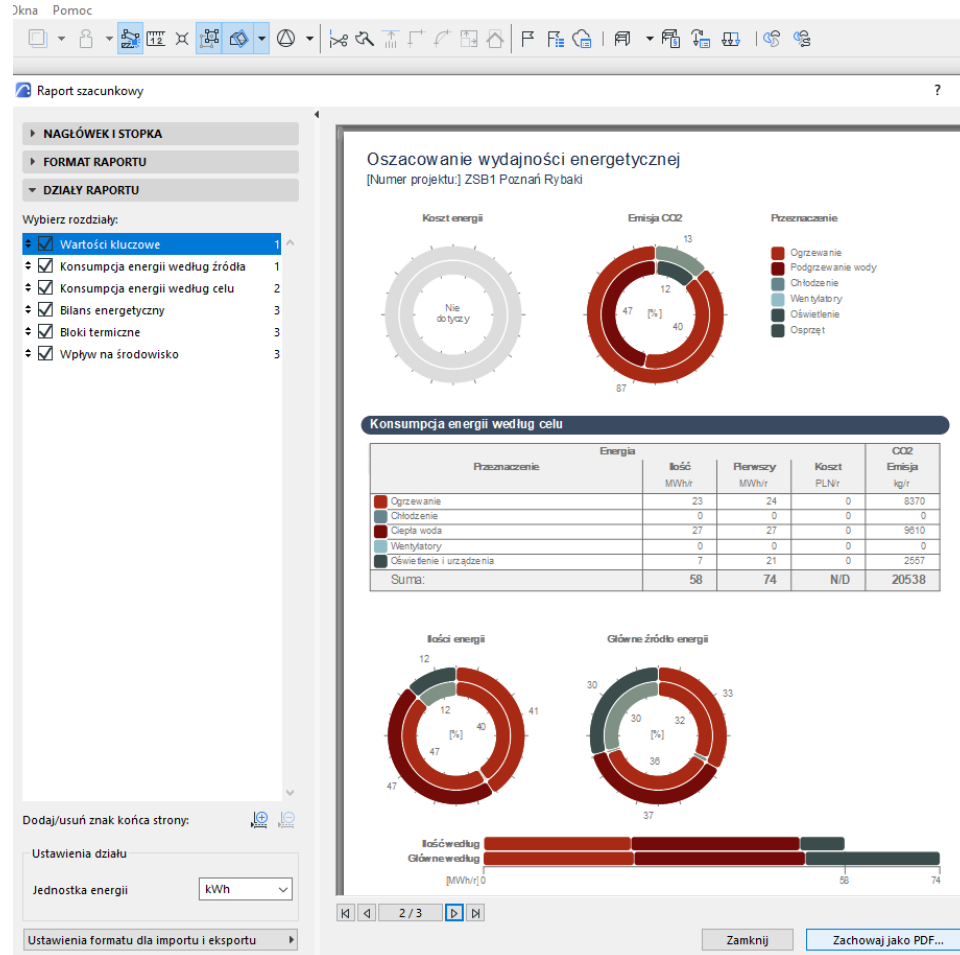
Główne źródło energii

1 / 3

Zamknij | Zachowaj jako PDF...

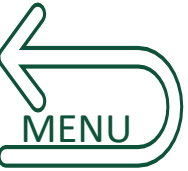
1:50 | Użytkownika | Cały model | Pióra domyślne | Repr. domyślne | Brak zastąpień | Etap domyślne

zb zaznaczania: cały element / część elementu.



We conducted the simulation to the 3rd floor of the building

We can save the simulation results to PDF





This tutorial was prepared by a team from Poznan University of Technology and The Complex of Construction Schools No. 1. in Poznań as part of the RecoverIND project



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