PCPA reach

Rhino Tools Manual

Version 2.1

PCPA reach

Rhino Tools Manual

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Version	Date
2.0	08-06-2018
2.1	12-03-2018

Developed by: PCPA NY REACH Core
Jimmy Chang, Spencer Steenblik
Prepared By: Tim Williams

General Requirements

- Always model in inches.
- Always update to the latest version of Rhino.
- Always keep the project near the Rhino origin point.
- Never overwrite the toolbar or template.

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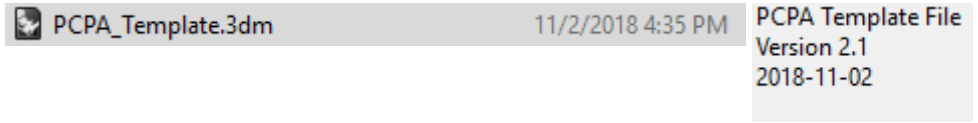
Installation

1. From the PCPA Rhino Toolbar, click **PCPA** > **Standards** > **Set Template**

Further instructions can be found here.

When you open a new Rhino file, the template will be the default.



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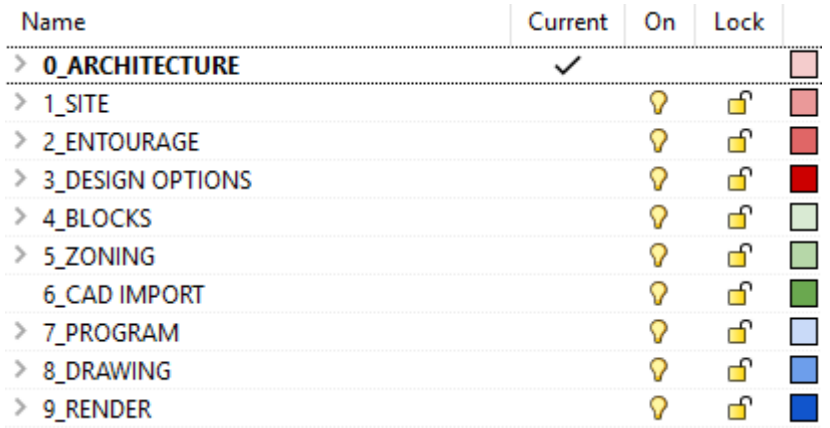
Layers

Layers have been simplified for readability and speed of navigating.

All objects should fit within this hierarchy.



Changes since 1.0

- Each root layer has a number in front for proper sorting.
- Root layers have been assigned unique colors.
- Architecture layers combined with Interior and brought to root.
- Annotation and Hatch combined into Drawing layer
- Animation and Lights combined into Render layer

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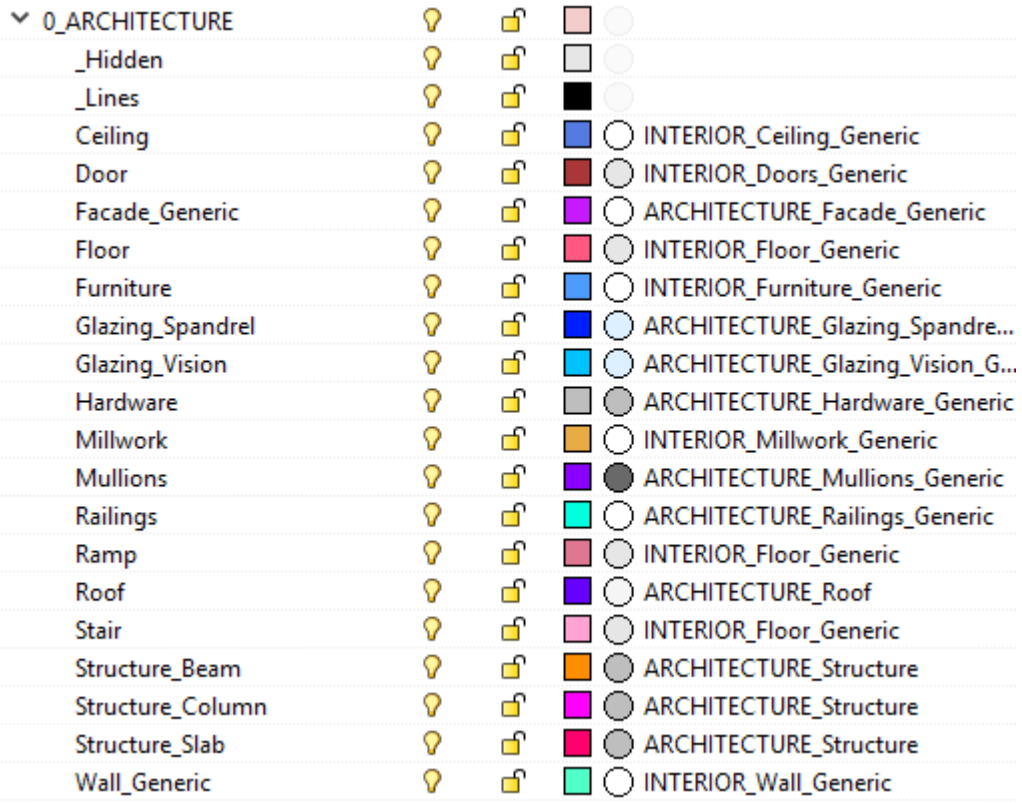
Layers

Architecture

- For all objects describing the geometry of the building



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Layers

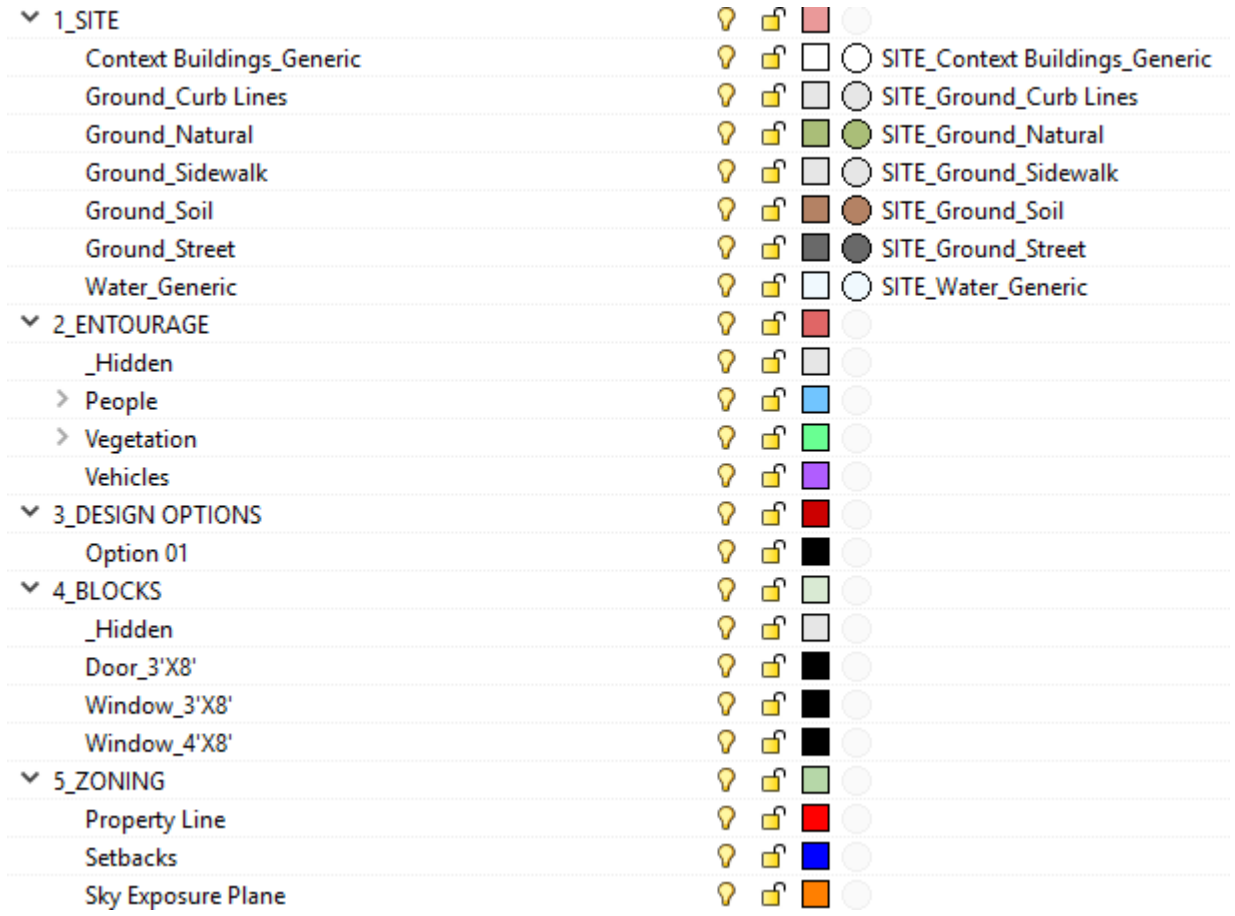
Site
- For landscape and surrounding context

Entourage
- For people, plants, and vehicles (often blocks)

Design Options
- For the master blocks that contain all objects describing a design option

Blocks
- For the geometry of frequently used blocks, and their block instance.

Zoning
- Geometry describing the zoning requirements



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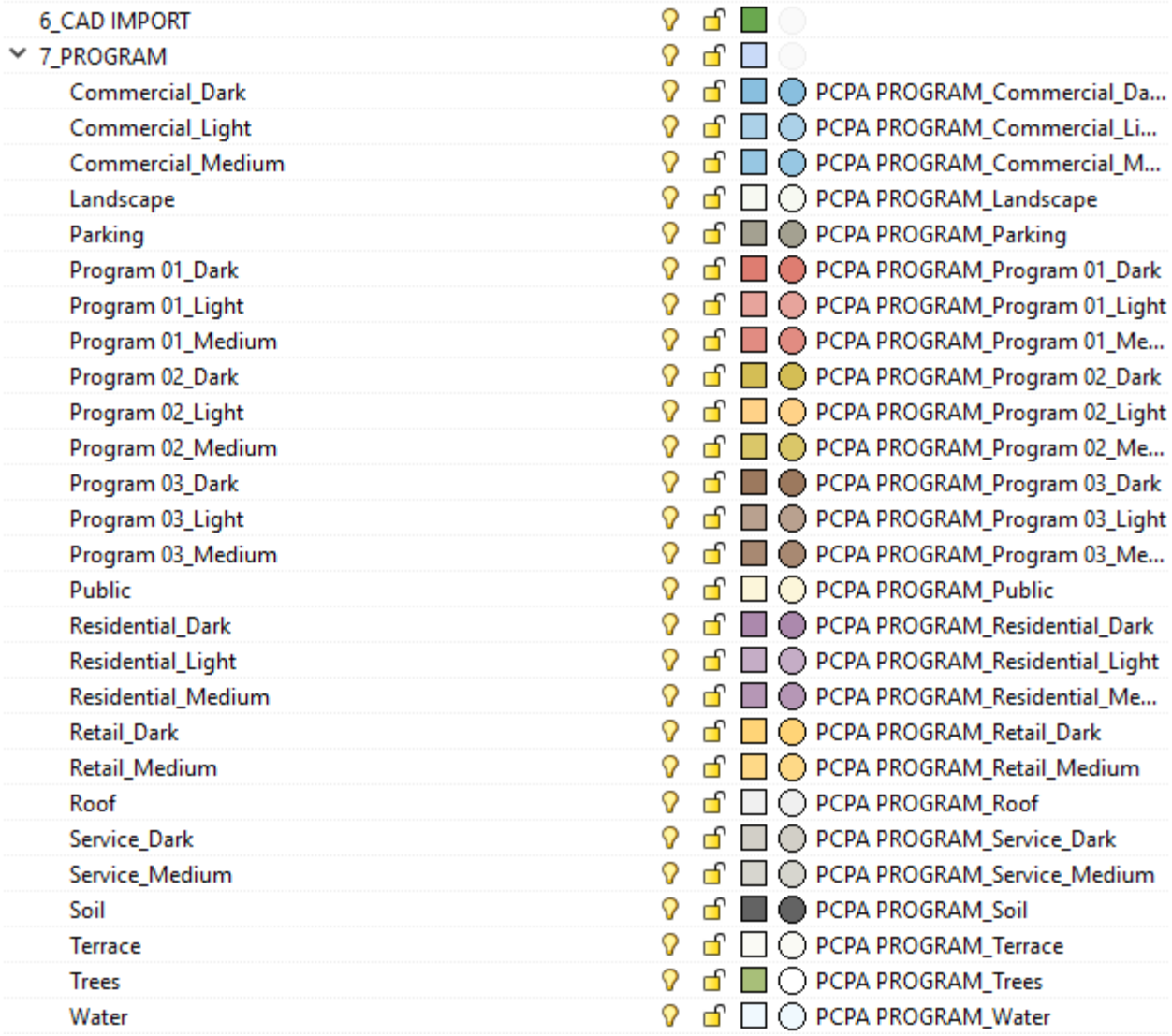
Layers

CAD Import
- For the layers of imported CAD drawings

Program
- Used for massing models



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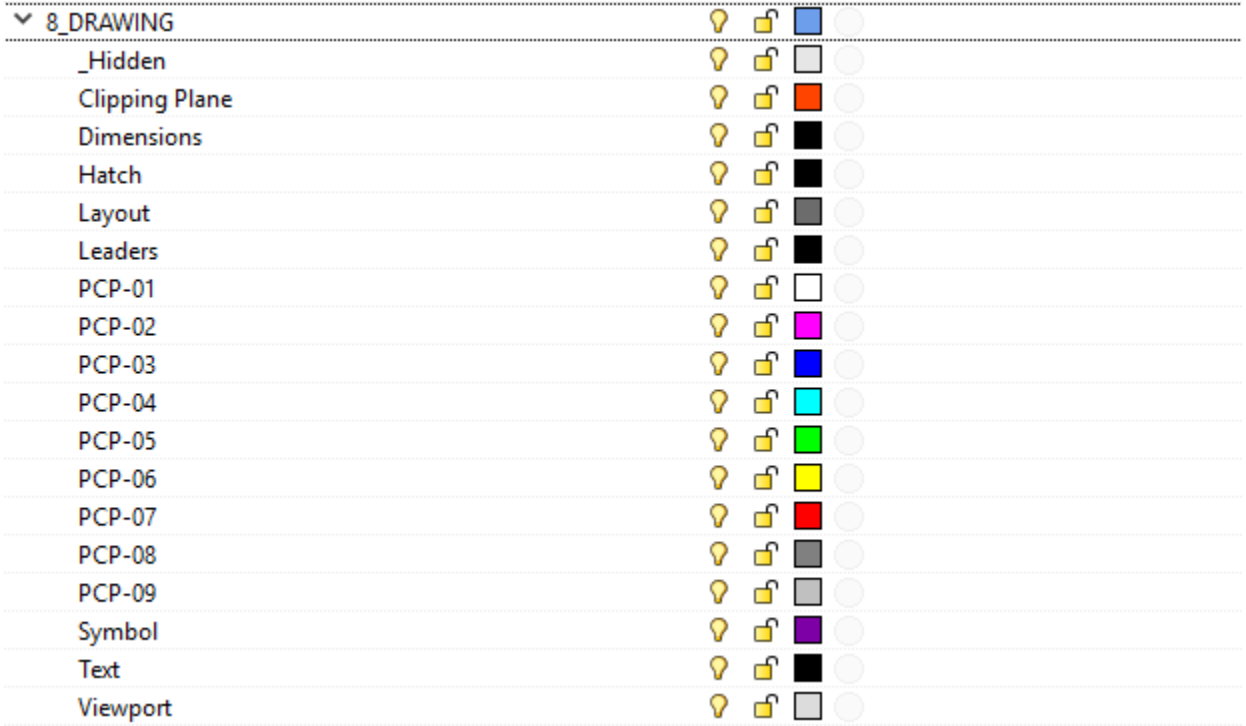
Layers

Drawing

- For geometry placed on the layouts, or printing from layouts



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Layers

Render
- For objects necessary to render

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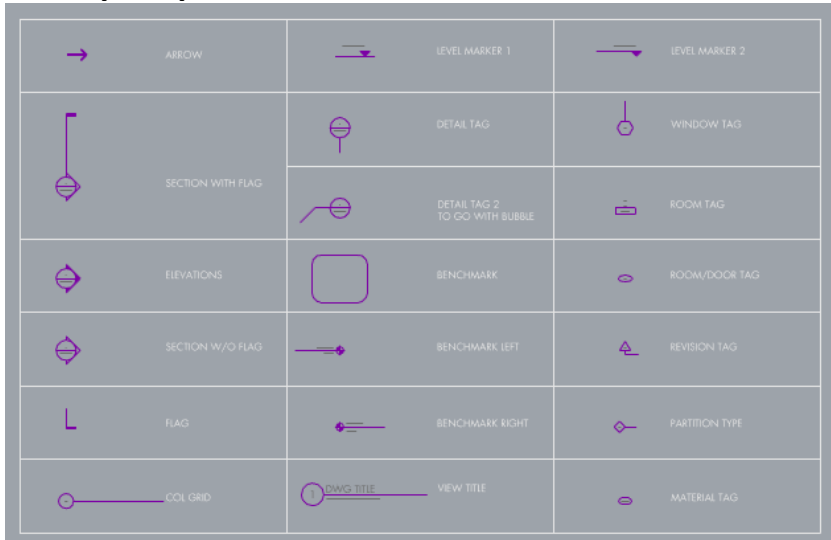
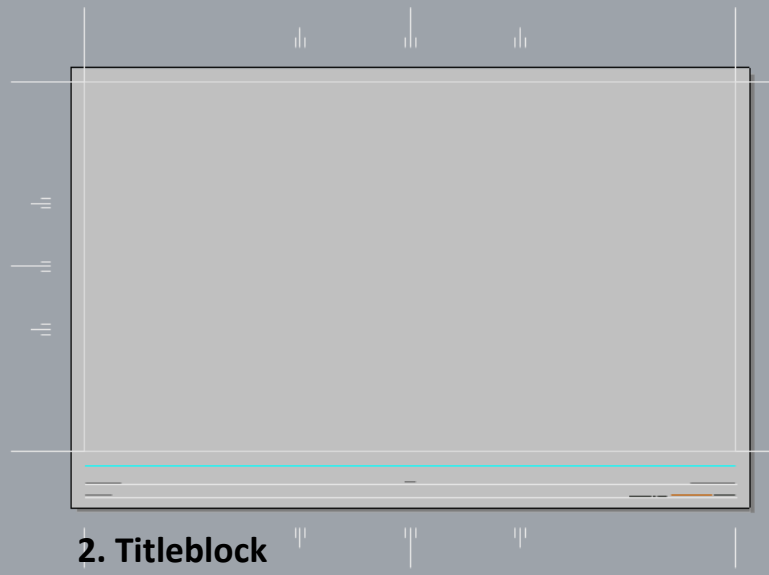
Layout

In the layout called PCPA_Layout, there are many paper space annotation objects to help in preparing your drawing.

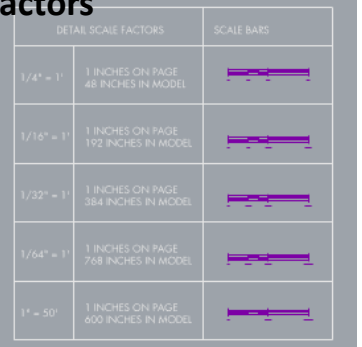
1. Paper Space Annotation





2. Titleblock

5. Scale Bars and Scale Factors



3. North Arrows

4. Annotation Styles

Template

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Annotation Styles

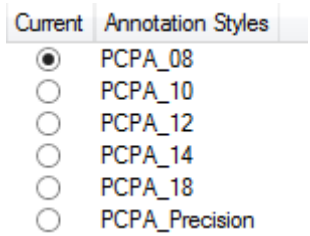
6 PCPA Annotation styles have been placed in the template file.

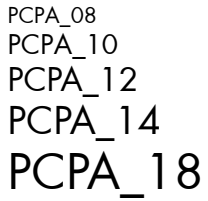
- PCPA_08
- PCPA_10
- PCPA_12
- PCPA_14
- PCPA_18
- PCPA_Precision

Model space scale has been set to 192 by default.

PCPA_Precision is for checking model geometry.

*Beware that model space scale does not affect printed text size.





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Linetypes

3 PCPA Linetypes have been placed in the template file.

- PCPA_DashDot
- PCPA_DashedMedium
- PCPA_DashedSmall

PCPA_DashDot	
PCPA_DashedMedium	
PCPA_DashedSmall	

Toolbar

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Toolbar

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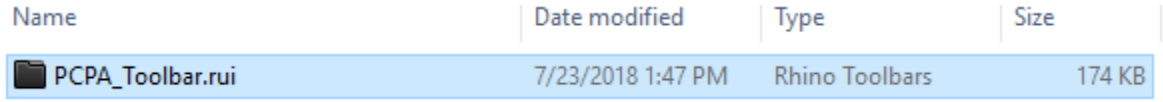
1. Ensure only one instance of Rhino currently open.
2. Drag and drop PCPA_WIP from the following folder into Rhino: Toolbar path
3. Close Rhino (this saves the toolbar to your Rhino settings).

PCPA Should appear at the top menu bar of Rhino



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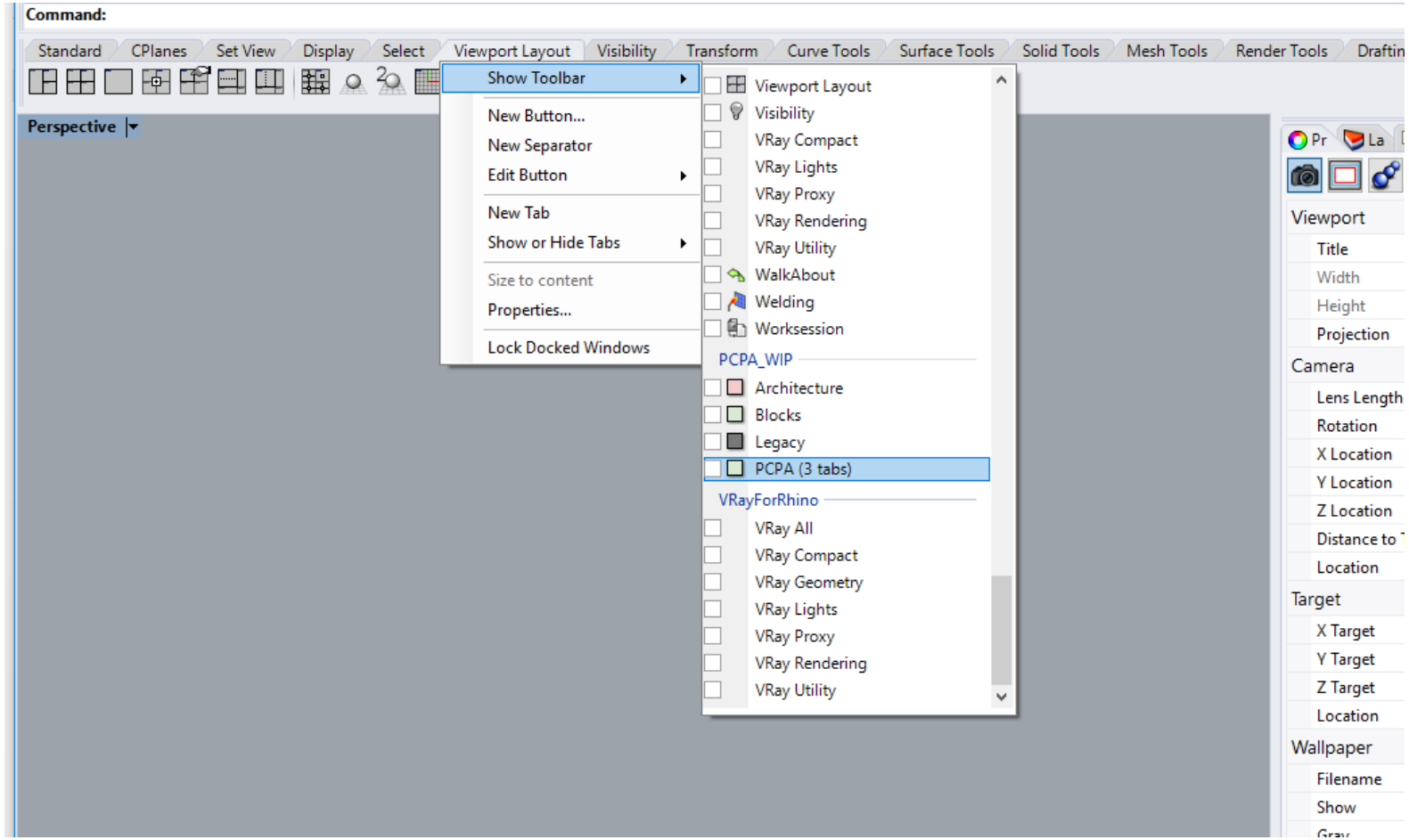
After installing the toolbar, if it does not display immediately, you can show it by right clicking anywhere on the toolbar, then choosing Show Toolbar, then scrolling down to the PCPA and checking that box.

(You do not need to check the other PCPA tabs)



Toolbar

Architecture

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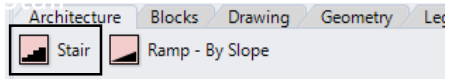
Stair



Creates a stair to specified height, along a guide curve. Risers kept below 7", tread is result of the guide curve length.

*Curved geometry not currently supported.

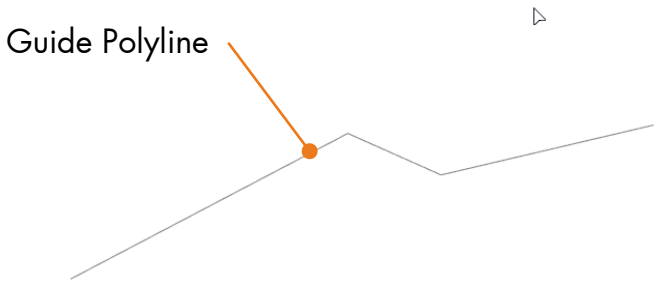
INPUT

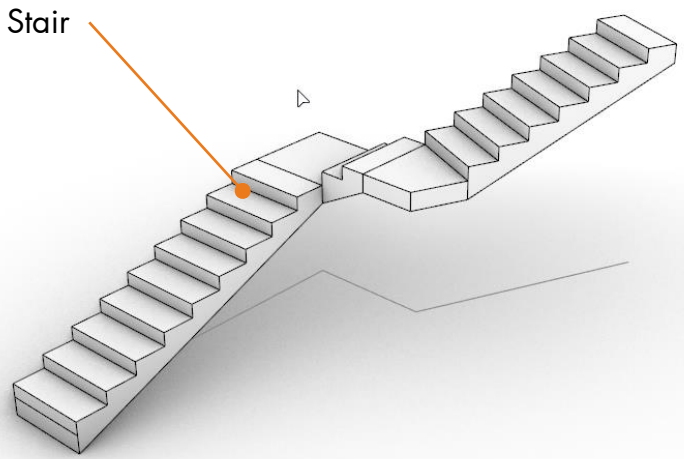
1. Select Guide Polyline
2. Width (inches)
3. Height (inches)

OUTPUT

- Stair

INPUT > OUTPUT





Toolbar

Architecture

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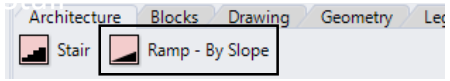
Ramp



Creates a ramp at specified slope, along a guide curve.

Handrail inserted if slope > 5%

*Curved geometry not currently supported.
*Will currently only insert 1 landing per run.

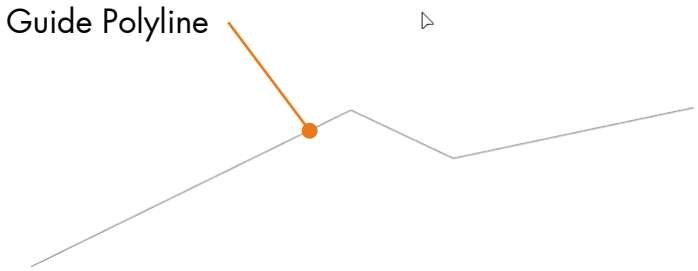
INPUT

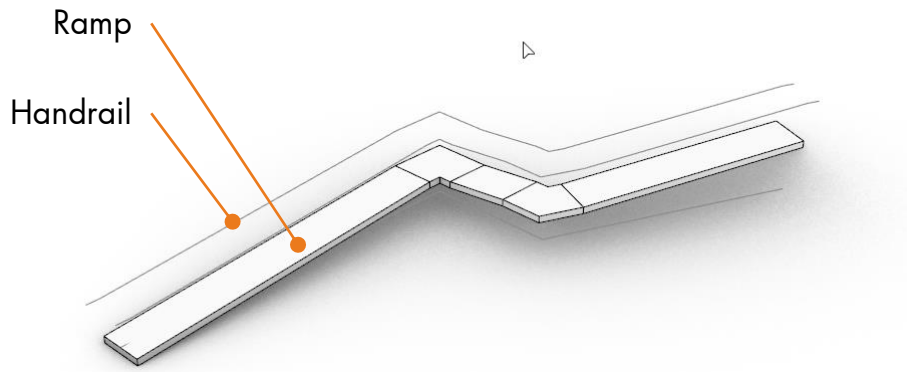
1. Select Guide Polyline
2. Width (inches)
3. Slope (%)

OUTPUT

- Ramp
- Handrail

INPUT > OUTPUT





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Blocks

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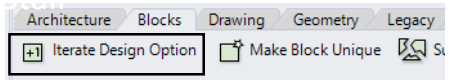
Create Design Option



Selected objects will be converted into a block and placed in a new matching layer, under “3_DESIGN OPTIONS”.

INPUT

1. Select Geometry
2. Input design option name

OUTPUT

- Block on layer under “3_DESIGN OPTIONS”

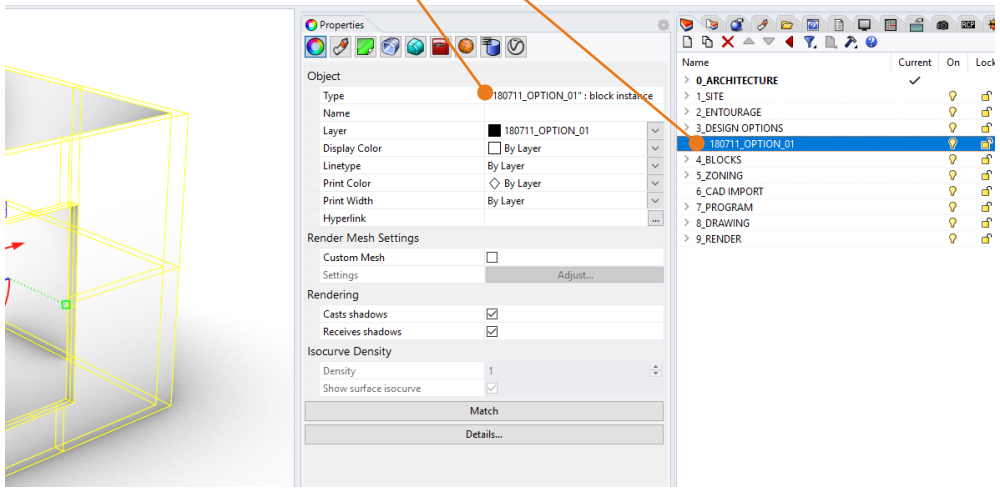
INPUT > OUTPUT

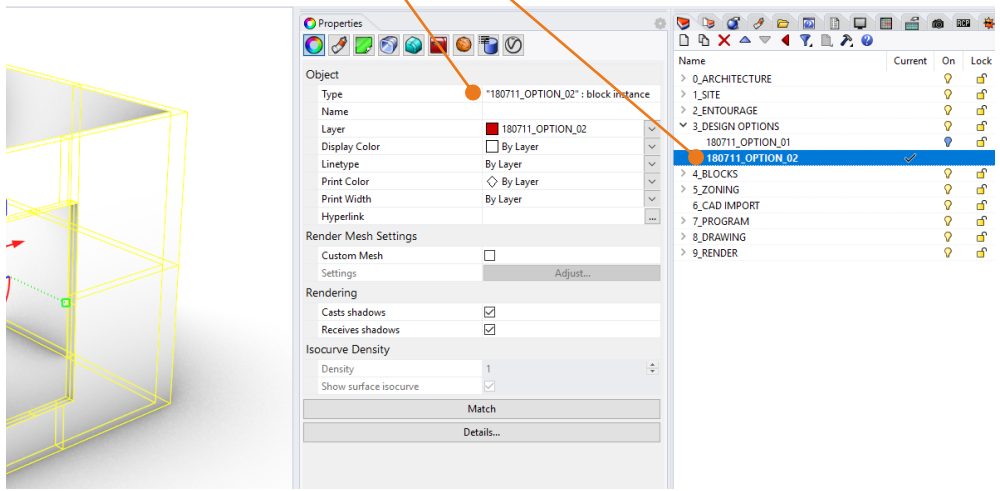
Design Option Layer

Design Option Block

New Design Option Layer

New Design Option Block





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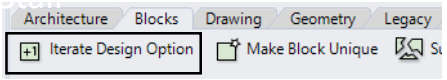
Iterate Design Option



The selected block will be duplicated and renumbered with a new block name.

A new matching layer name with be created and the previous will be turned off.

Supports numbers and letter suffix, separated by "-" , "_", or " ".

INPUT

1. Select block
2. Input new blocks name

OUTPUT

- Duplicated block, renamed with suffix +1 or update date.
- Duplicated layer with same name

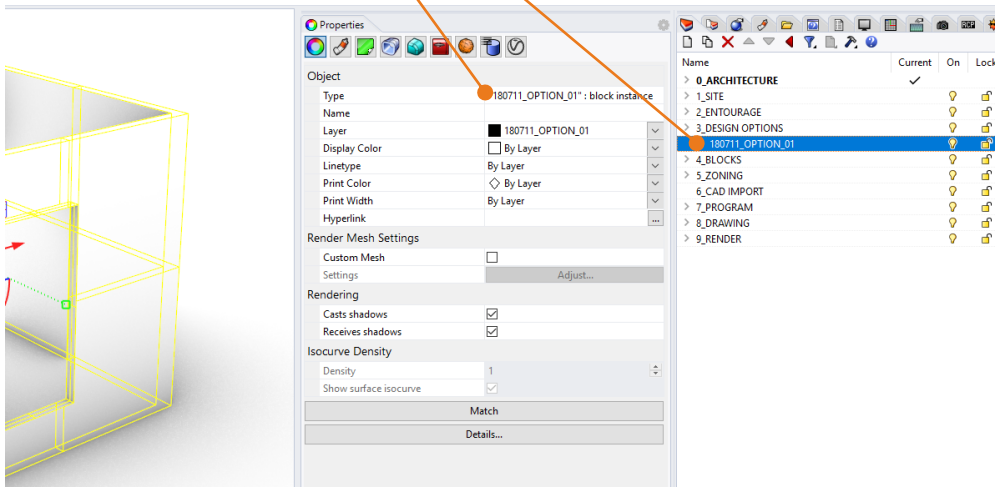
INPUT > OUTPUT

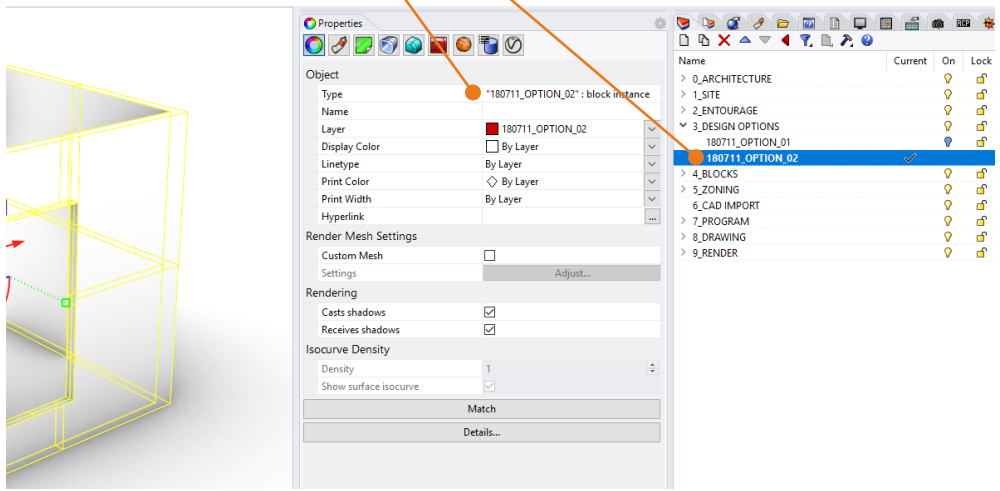
Design Option Layer

Design Option Block

New Design Option Layer

New Design Option Block





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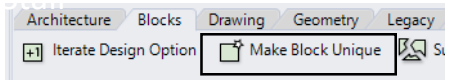
Make Block Unique



Creates a new block definition from an old block. (Keeps the old block in the file, but deletes the instance)

Default name will be either an update date, or the name +1 (if suffixed with a number)

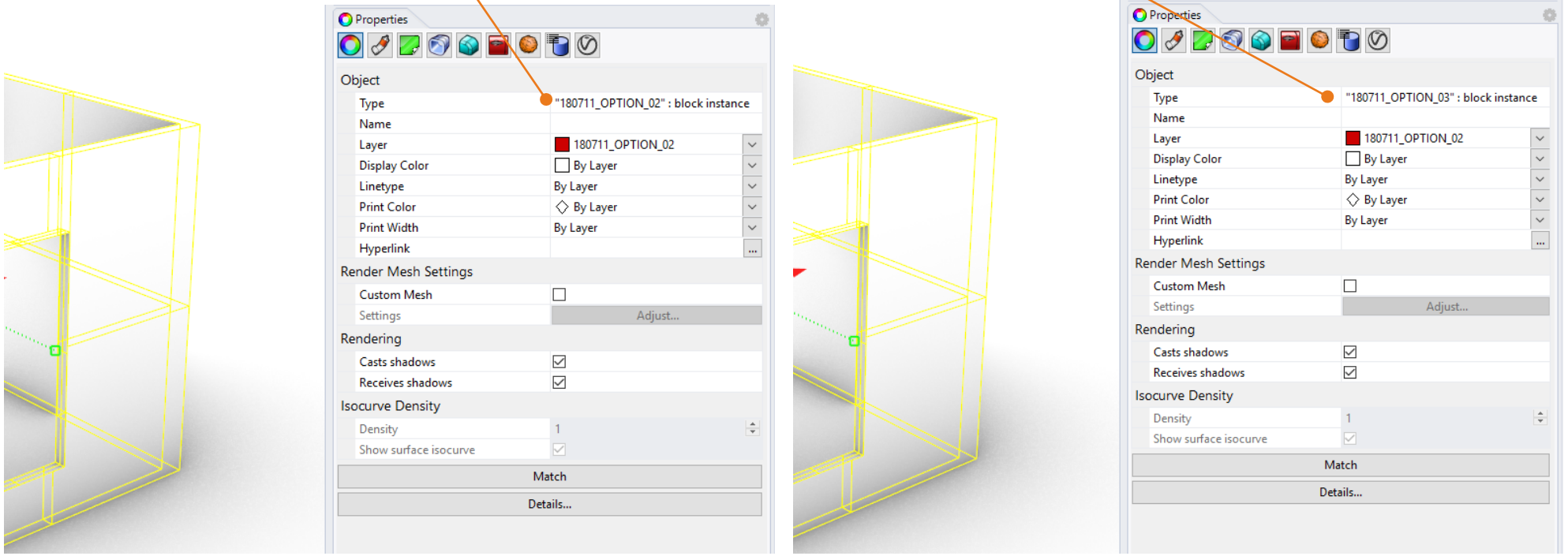
INPUT

1. Select block
2. Input new blocks name

OUTPUT

- New Block with same geometry and origin pt.

INPUT > OUTPUT



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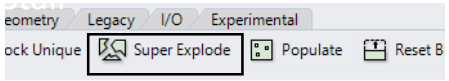
Super Explode



Explodes a block and all blocks within it.

INPUT

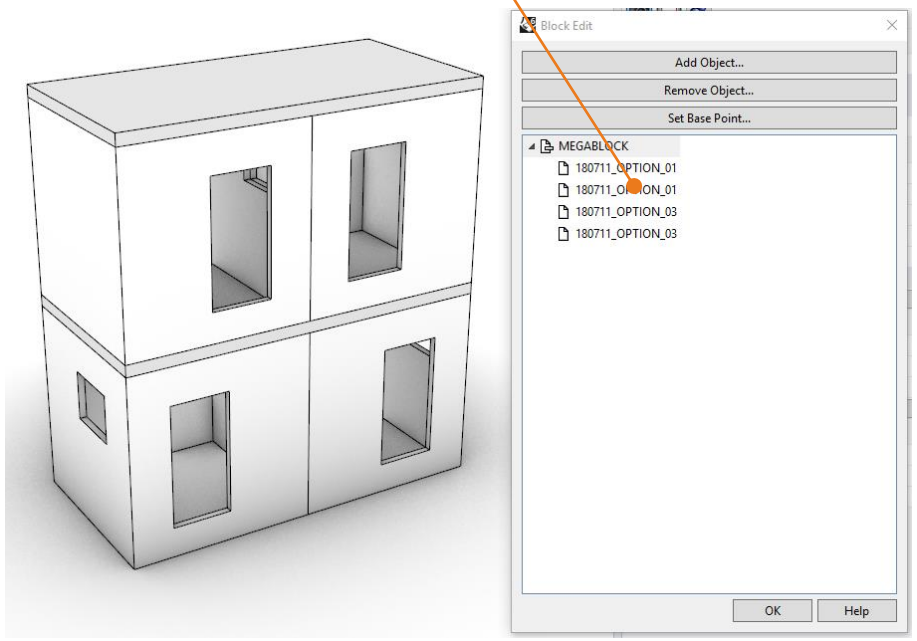
1. Select block with blocks nested inside.

OUTPUT

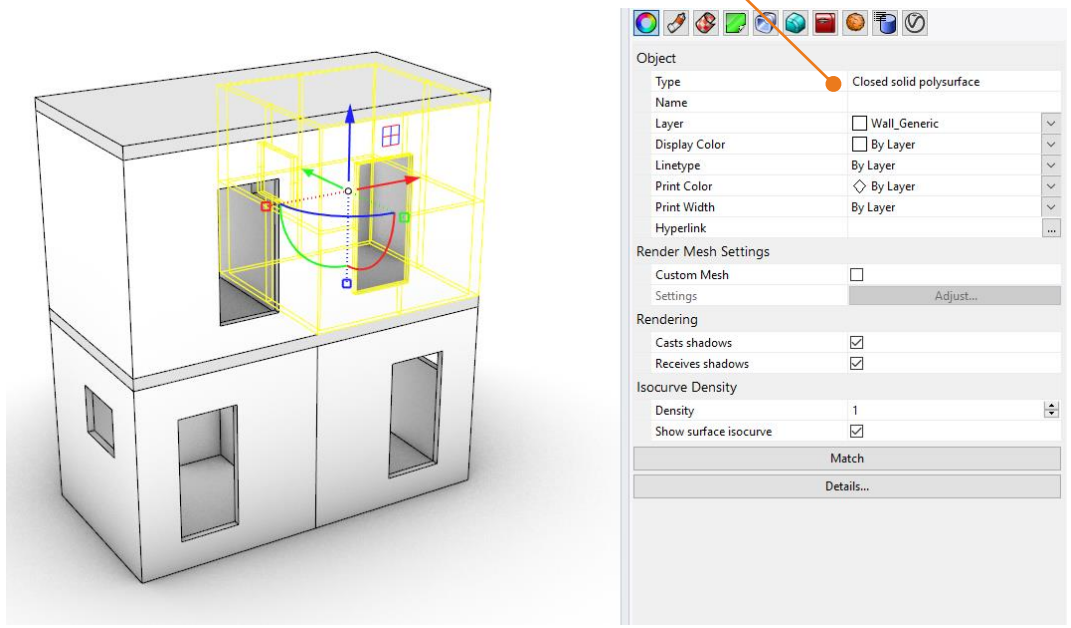
- Geometry inside those blocks.

INPUT > OUTPUT

Blocks inside a block



All blocks exploded



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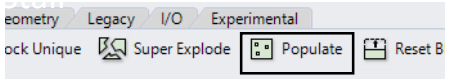
Populate



Populates a surface with selected population type.

Blocks are imported from the network and randomly placed across the surface.

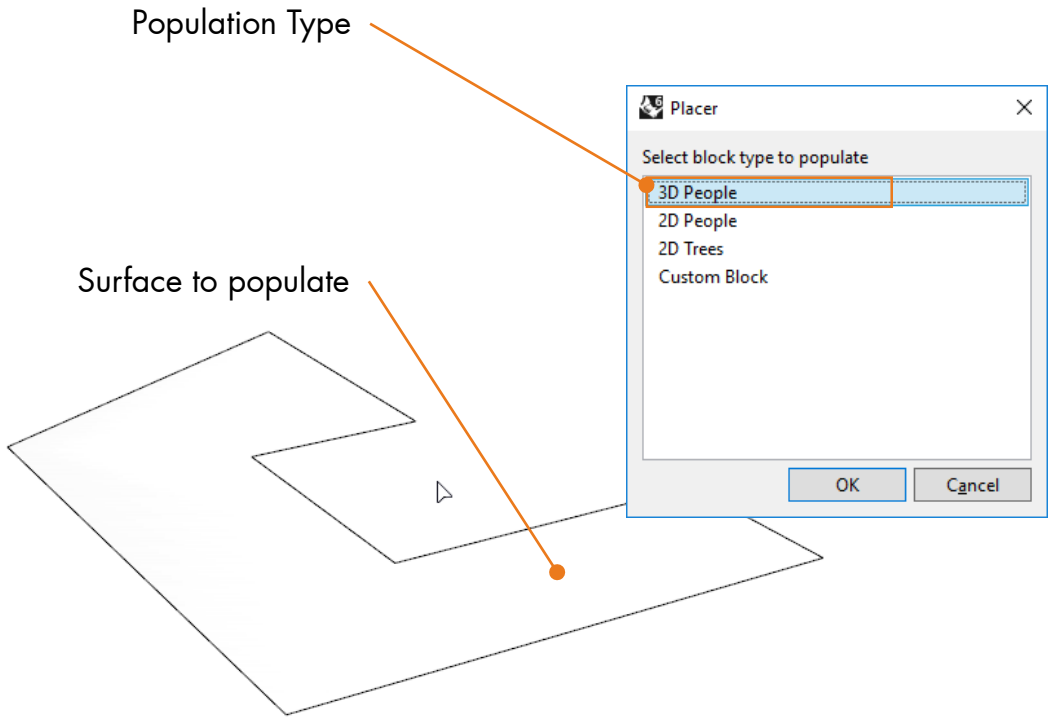
INPUT

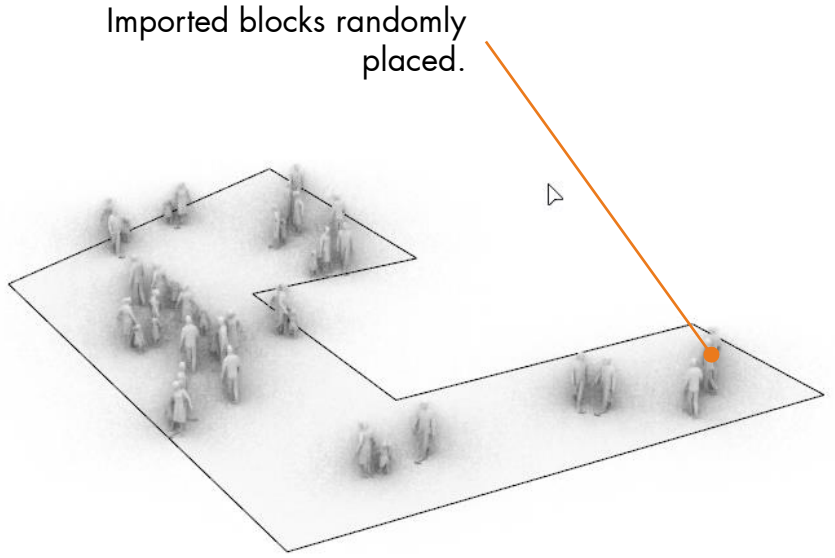
1. Select surface
2. Number of objects to place
3. Select Population Type

OUTPUT

- Blocks randomly placed on the surface.

INPUT > OUTPUT





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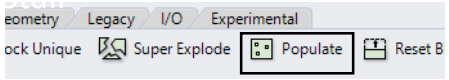
Populate



Populates a surface with selected population type.

Blocks are imported from the network and randomly placed across the surface.

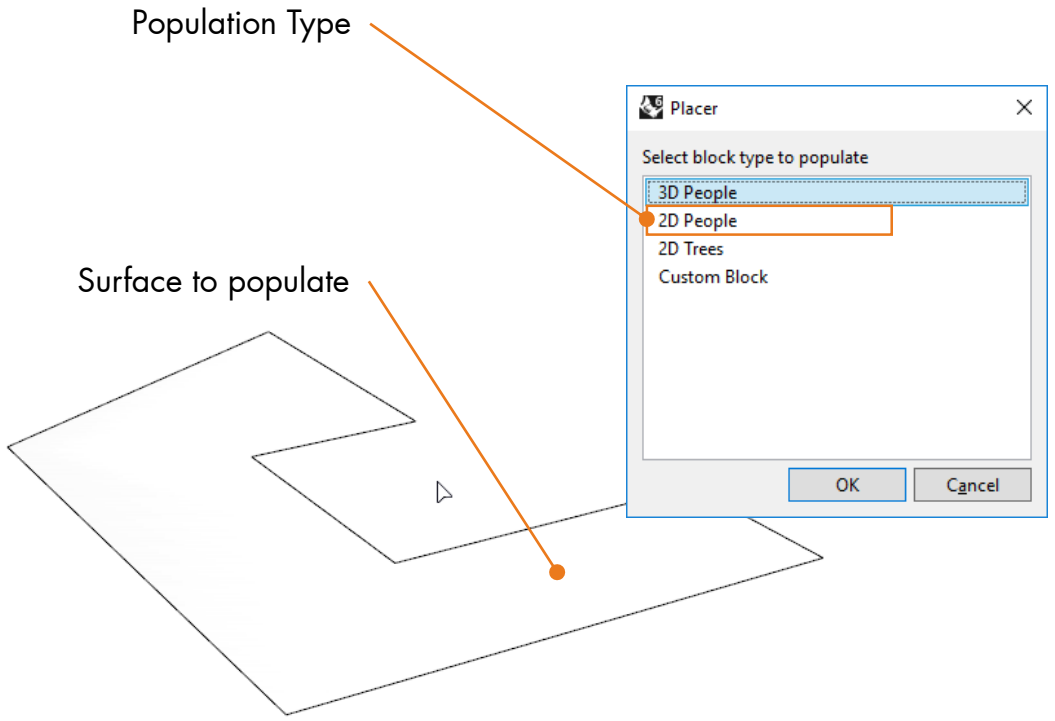
INPUT

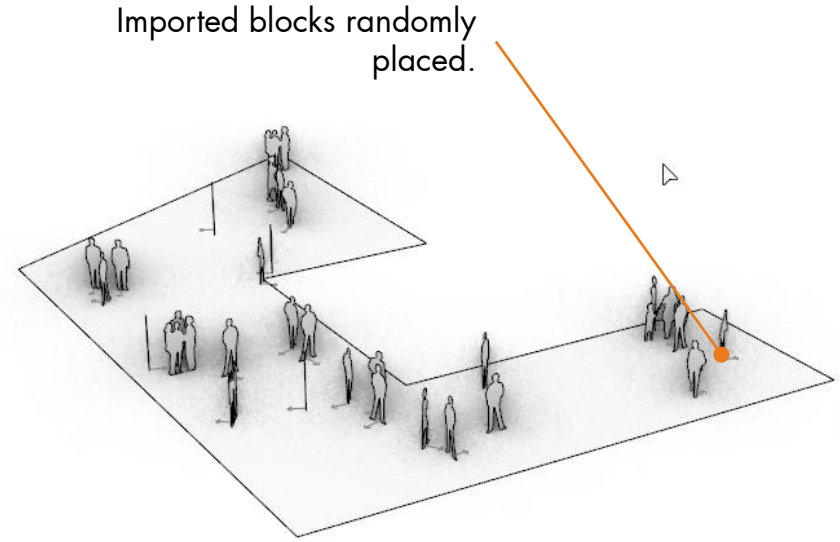
1. Select surface
2. Number of objects to place
3. Select Population Type

OUTPUT

- Blocks randomly placed on the surface.

INPUT > OUTPUT





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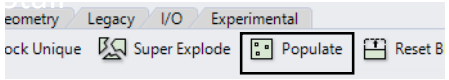
Populate



Populates a surface with selected population type.

Blocks are imported from the network and randomly placed across the surface.

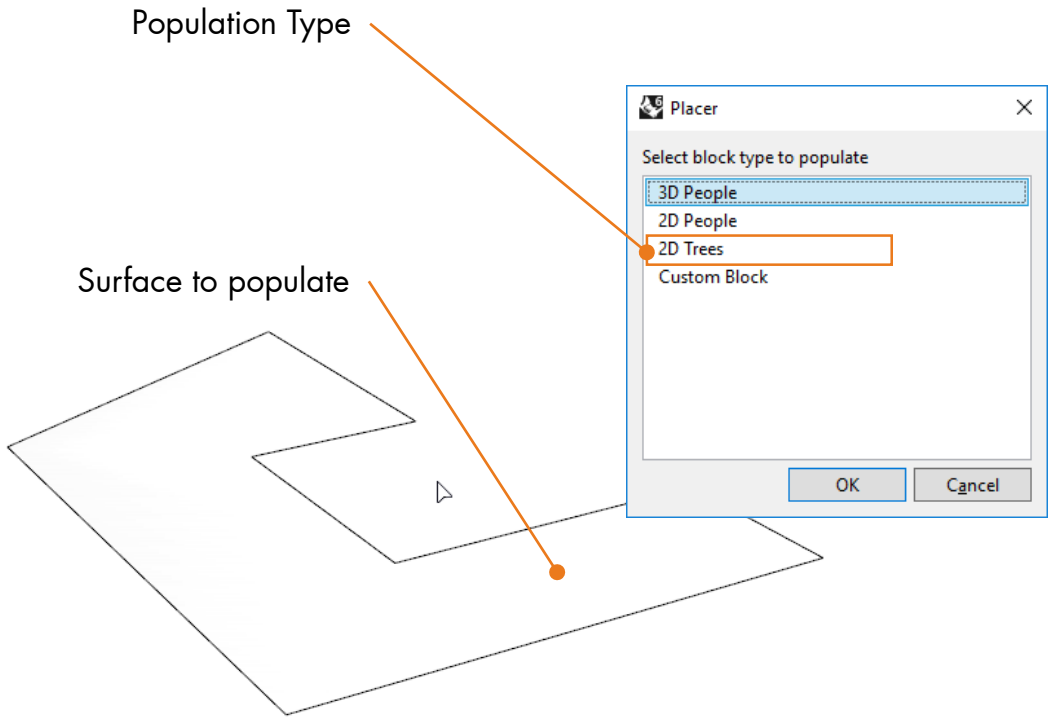
INPUT

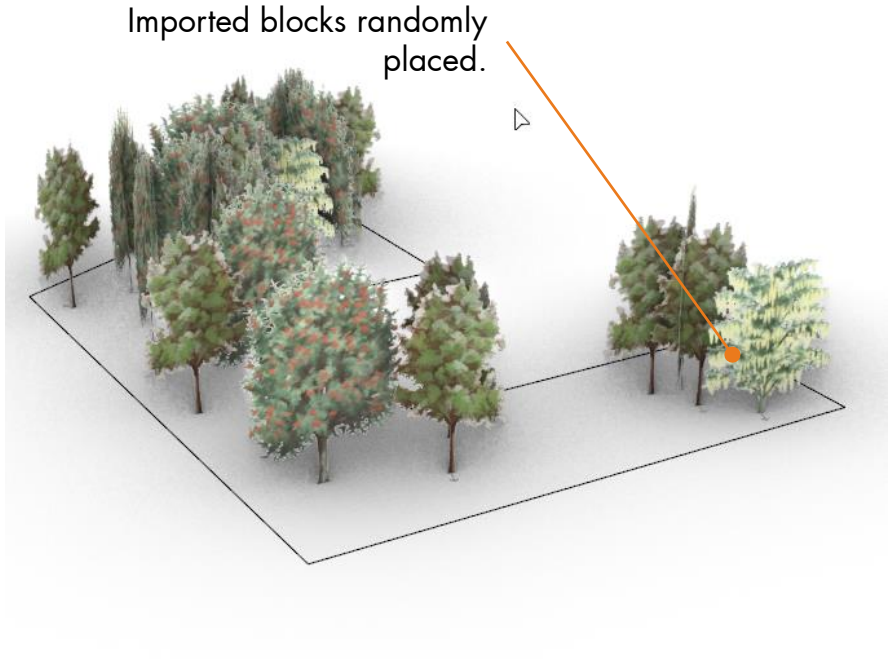
1. Select surface
2. Number of objects to place
3. Select Population Type

OUTPUT

- Blocks randomly placed on the surface.

INPUT > OUTPUT





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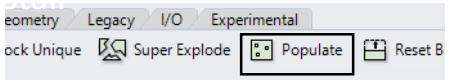
Populate



Populates a surface with selected population type.

Blocks are imported from the network and randomly placed across the surface.

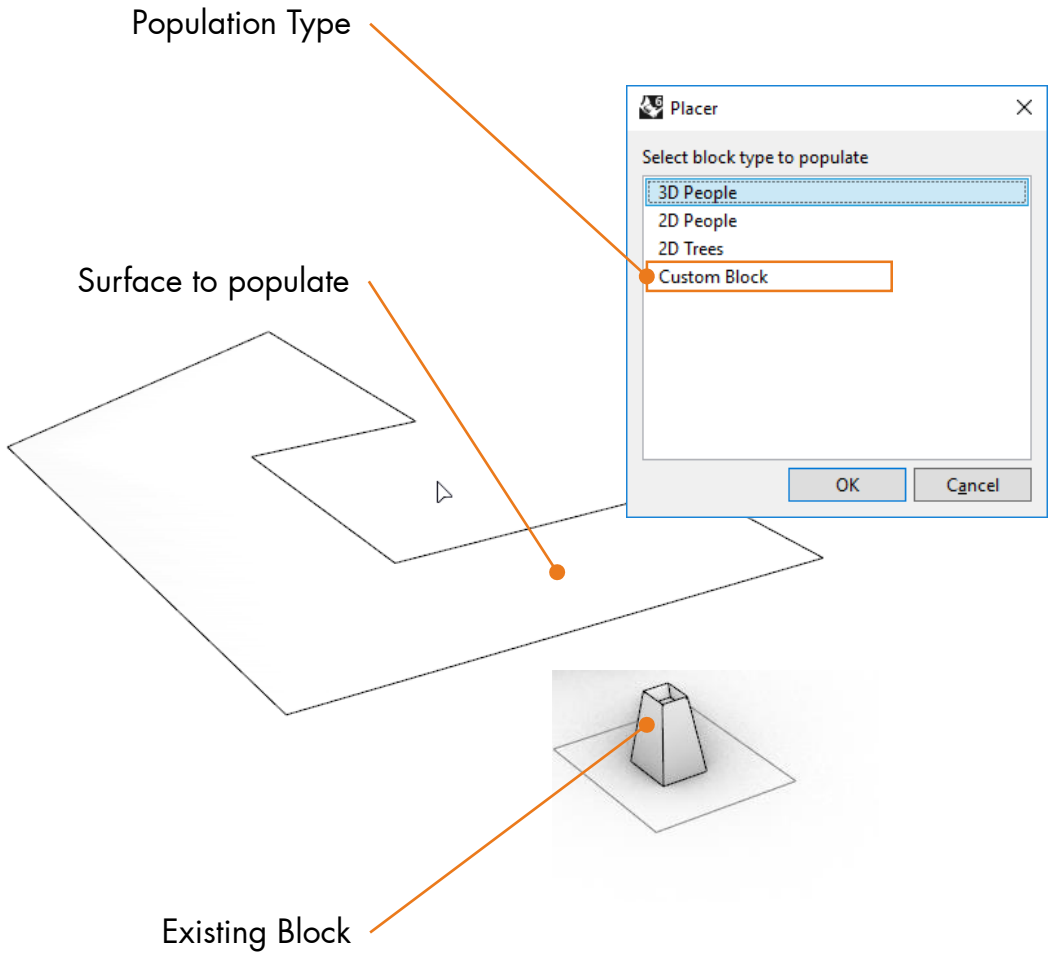
INPUT

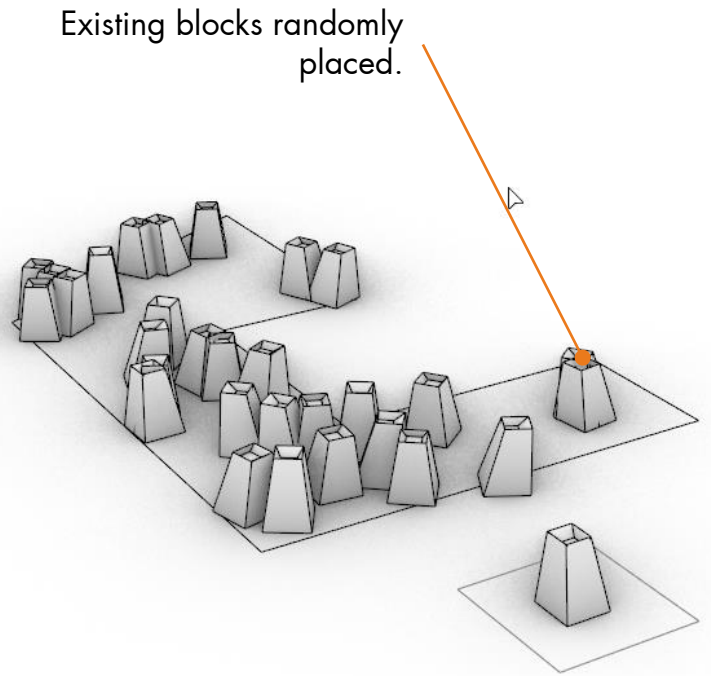
1. Select surface
2. Number of objects to place
3. Select Population Type
4. Select Existing Block

OUTPUT

- Blocks randomly placed on the surface.

INPUT > OUTPUT





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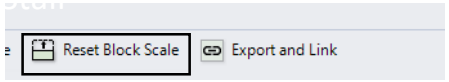
Reset Block Scale



Returns a block to its original scale, while maintaining origin point.

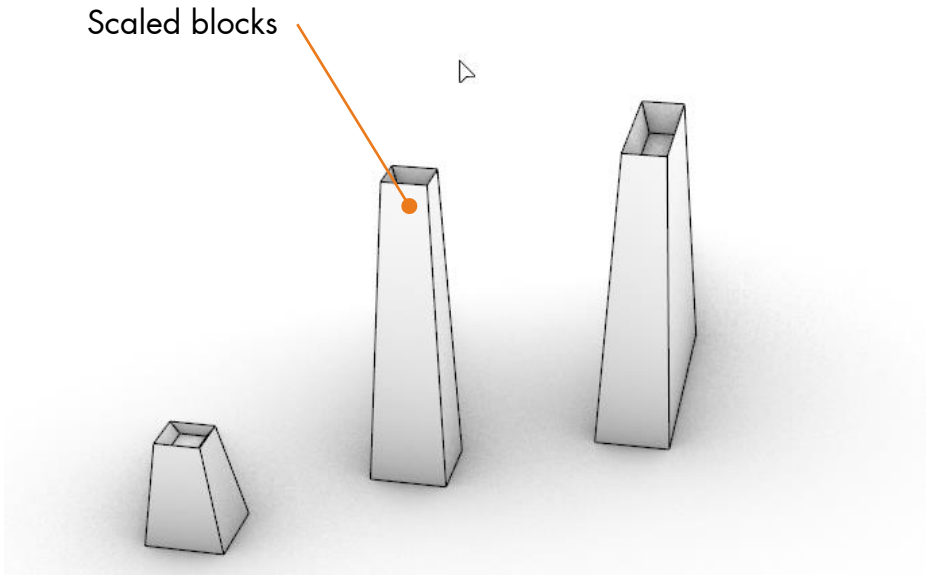
INPUT

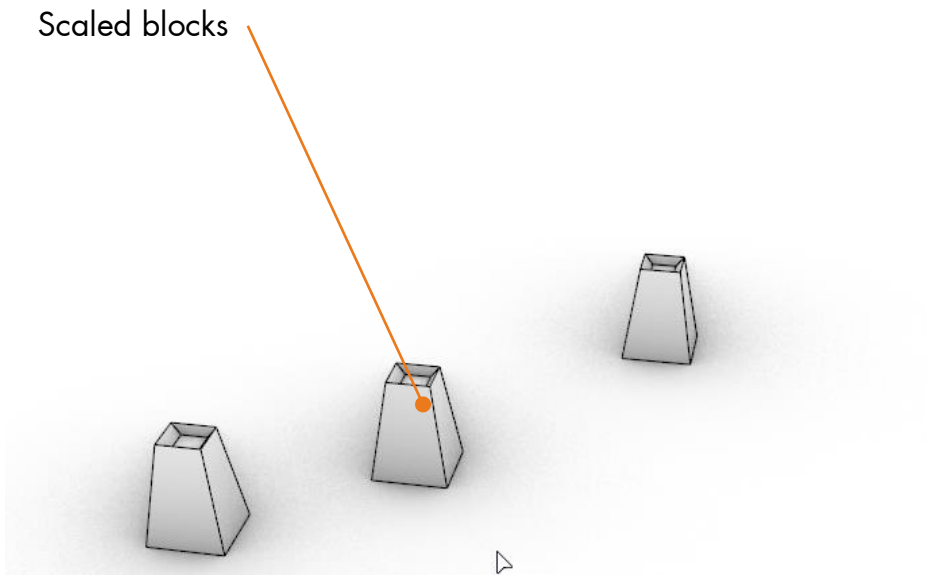
1. Select Scaled blocks

OUTPUT

- Blocks at original scale

INPUT > OUTPUT





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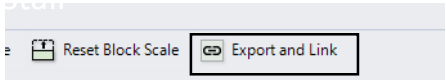
Export and Link



Exports a block to another Rhino file, then links it back to the original block.

Useful when a block occurs multiple times in a file, and you want multiple people on this file.

INPUT

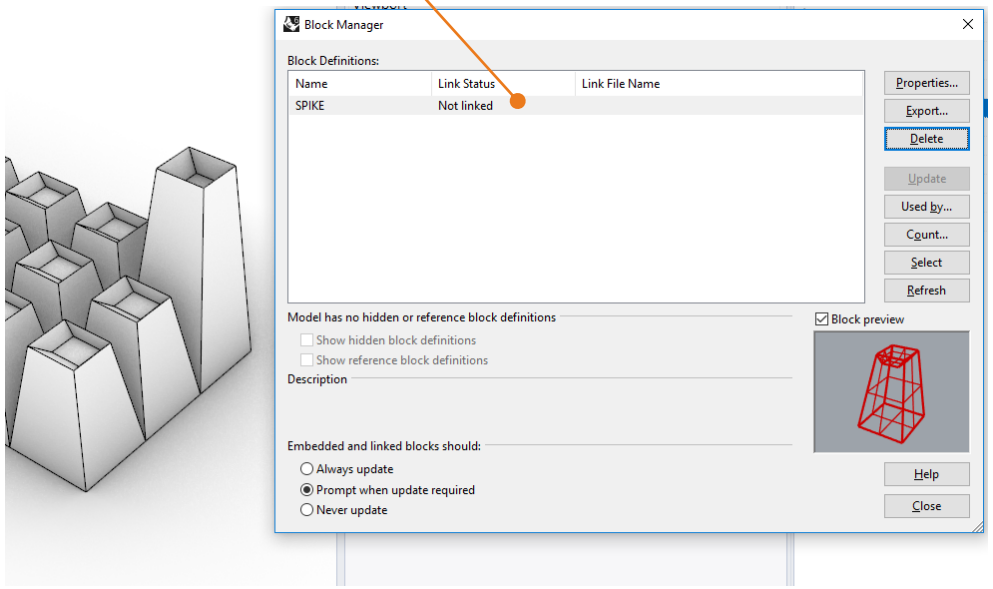
1. Select Block

OUTPUT

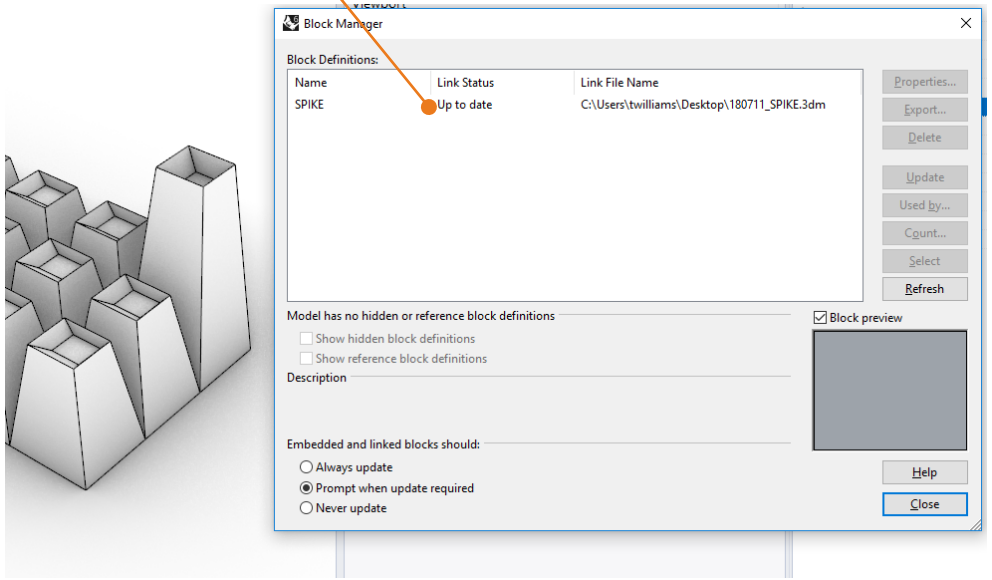
- Linked Block

INPUT > OUTPUT

Block within document



Block linked



Toolbar

Drawing

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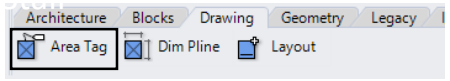
Area Tag



Adds a text object according to the bounding geometries area at the center of that object.

Text object with appear on layer: "8_DRAWING::Text"

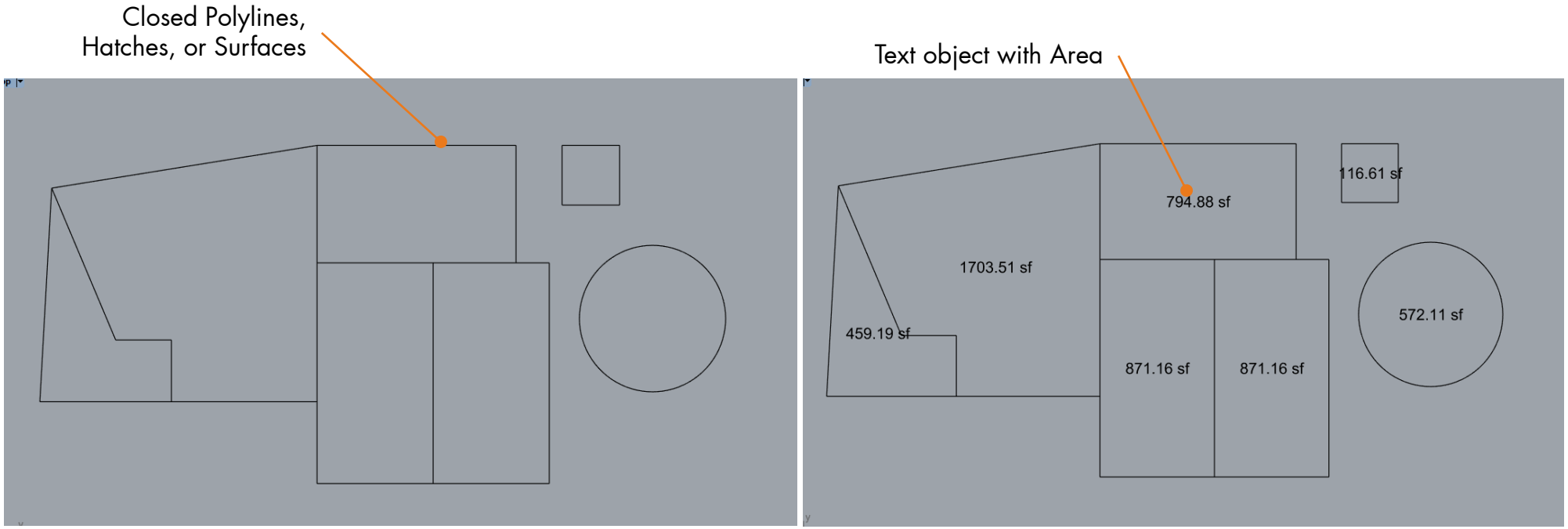
INPUT

1. Select closed planar curves, surfaces, or hatches
2. Number of decimal places
   -1 = X,XX0
   0 = X,XXX
   1 = X,XXX.X
   2 = X,XXX.XX

OUTPUT

- Text object at center of polyline

INPUT > OUTPUT



Toolbar

Drawing

Table of Contents

Dimension Polyline

Automatically dimensions polyline segments.

Will not dimension arcs or NURBs curves.

Dimensions with appear on layer:
"8_DRAWING::Dimensions"

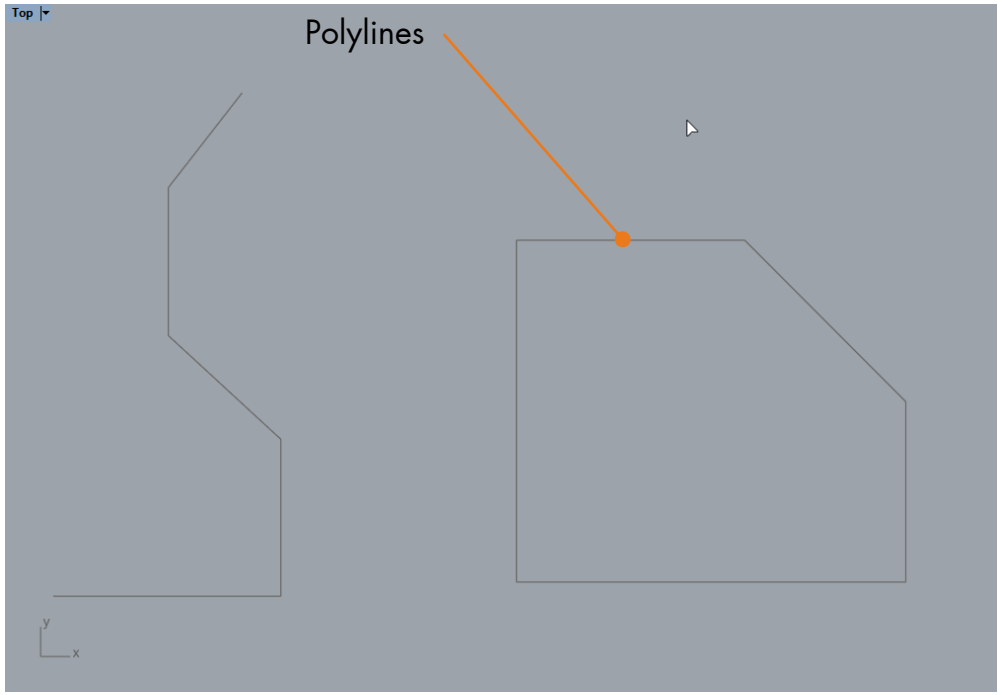
INPUT

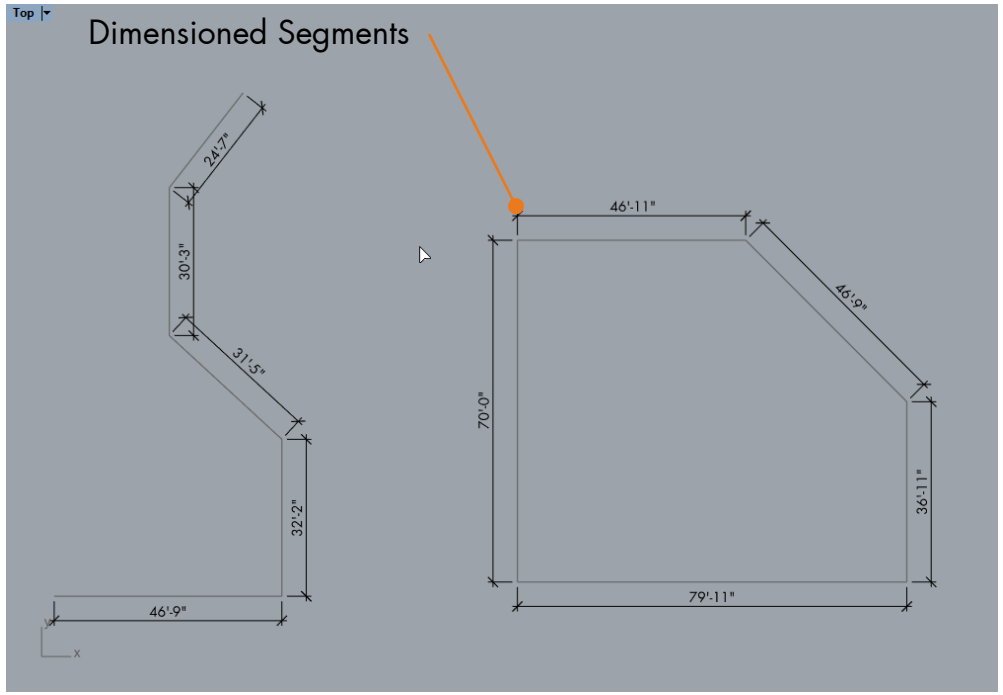
1. Select Polylines
2. Offset Dimension (inches)

OUTPUT

- Dimensioned Segments

INPUT > OUTPUT





Toolbar

Drawing

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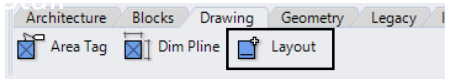
Layout



Adds a new layout to selected standard paper size with a PCPA Presentation Template.

Date is a text field and will update to the current date.

Project Title and Client Name can be parametrically changed through Rhino's 'Document Data' tab.

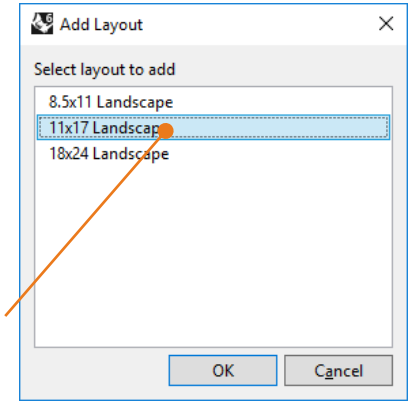
INPUT

1. User Selected Layout Size

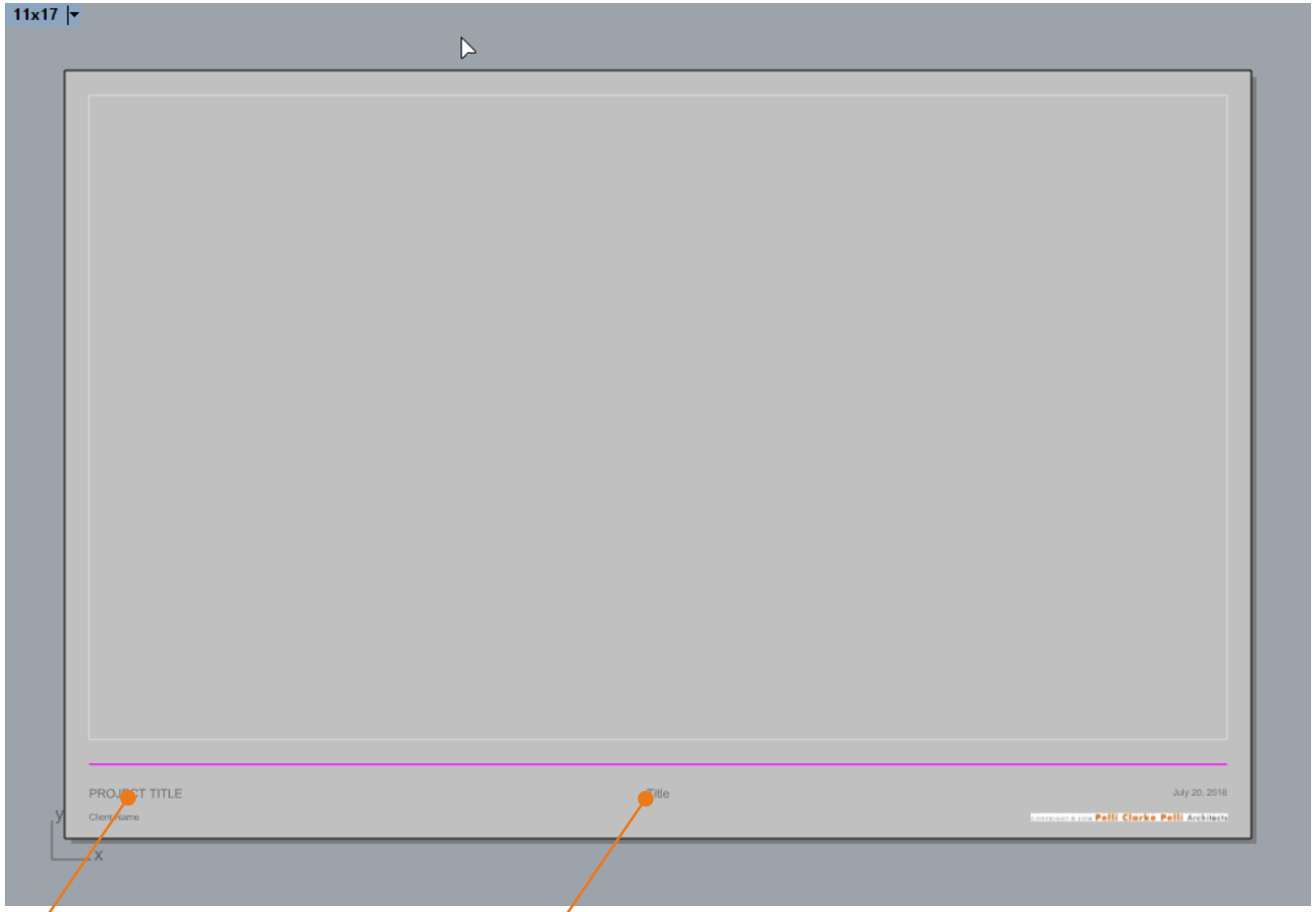
OUTPUT

- New Layout with titleblock

INPUT > OUTPUT



Selected Layout



Presentation Titleblock

New Layout

Toolbar

Geometry

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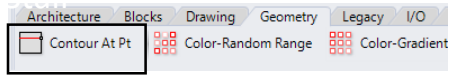
Contour at Point



Cuts input geometry at a designated elevation.

Useful for extracting floor plan cut lines.

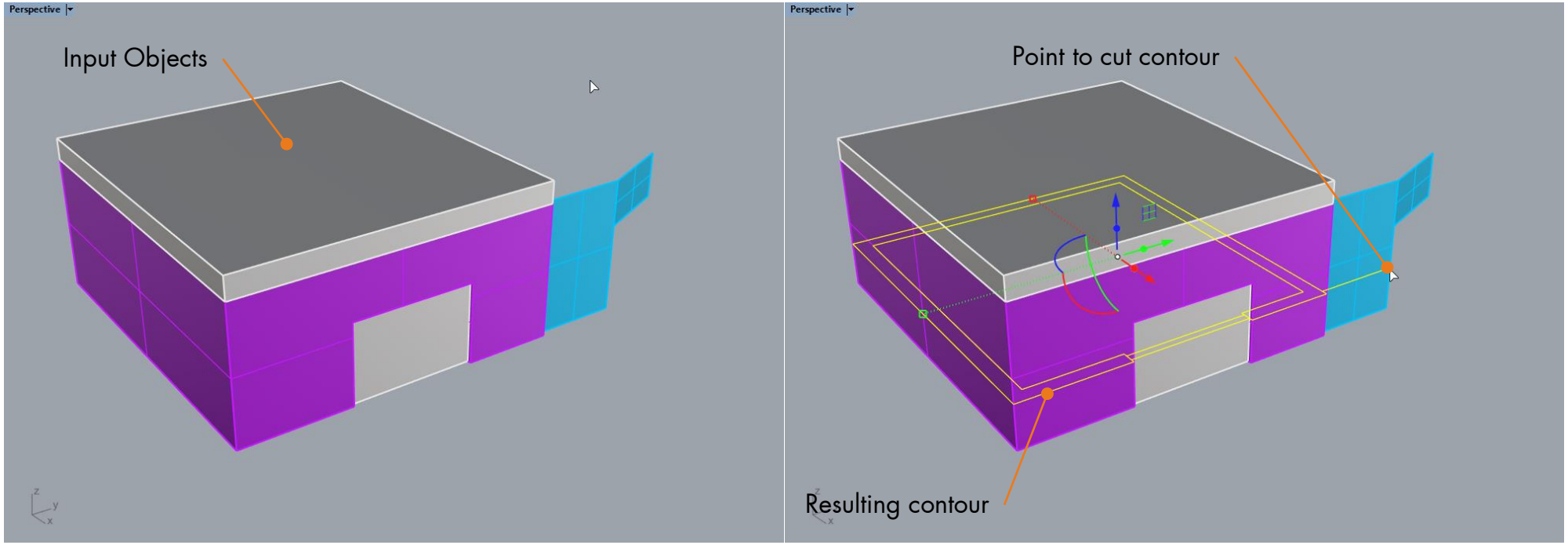
INPUT

1. Select objects
2. Get point to cut contour at

OUTPUT

- Curves joined and on each original objects layer

INPUT > OUTPUT

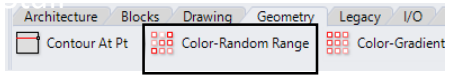


Toolbar

Geometry

Table of Contents

Color – Random Range



Randomly assigns object colors within a specified range.

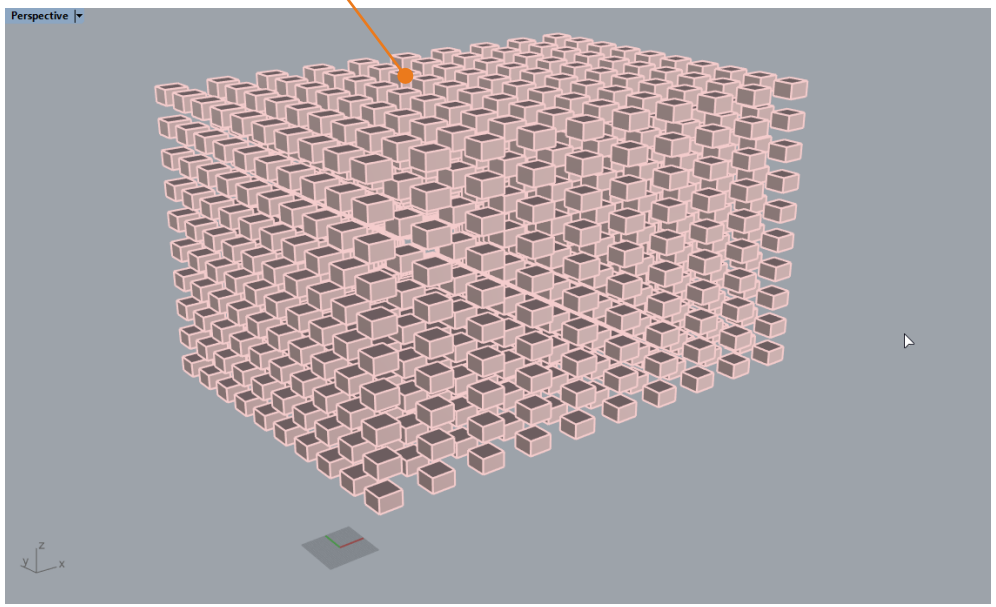
INPUT

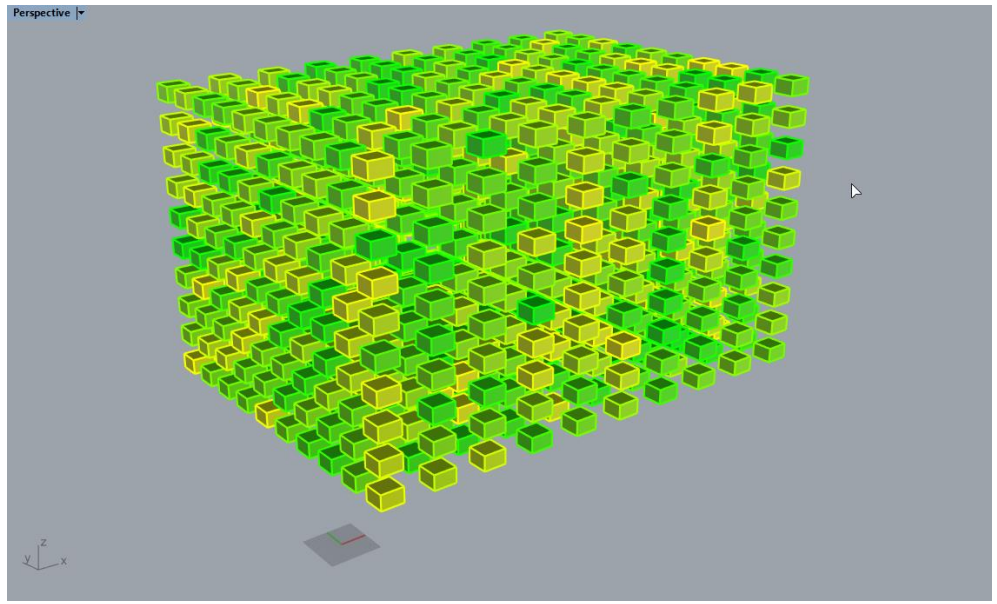
1. Select objects to color
2. Pick color 1
3. Pick color 2

OUTPUT

- Colored objects

INPUT > OUTPUT





Toolbar

Geometry

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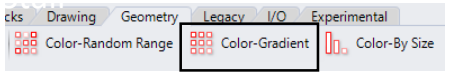
Color – Gradient



Assigns a gradient of colors to objects based on their distance from two input points and two input colors.

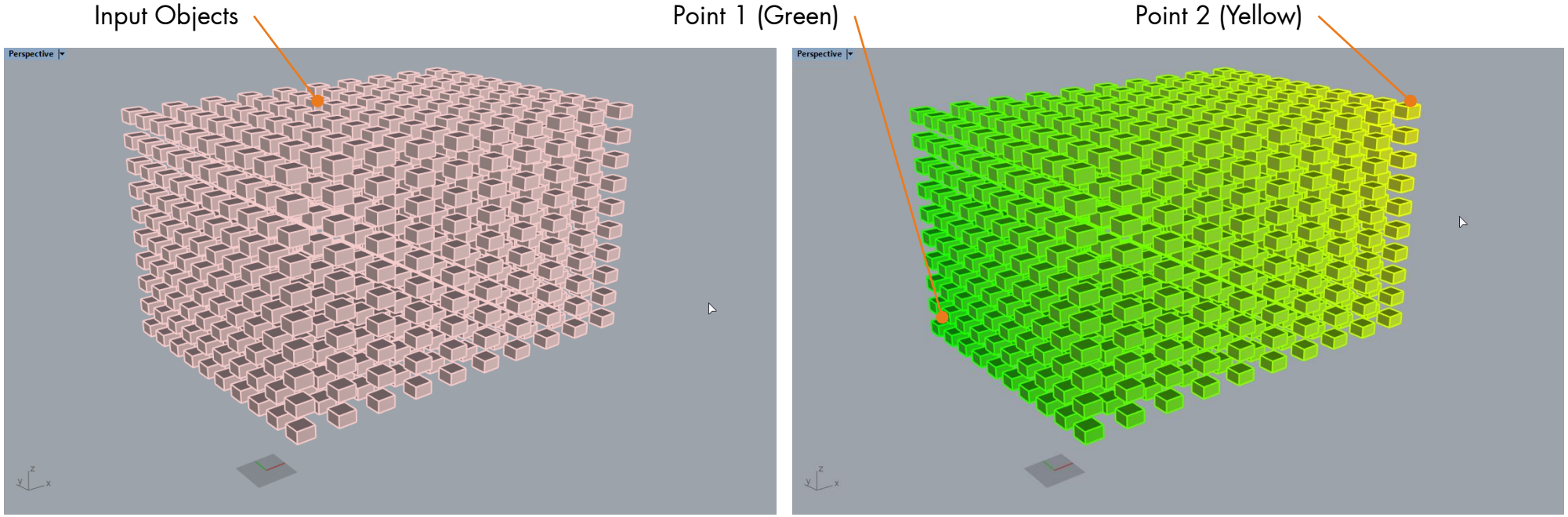
INPUT

1. Select objects to color
2. Pick point 1
3. Pick color 1
4. Pick point 2
5. Pick color 2

OUTPUT

- Colored objects

INPUT > OUTPUT



Toolbar

Geometry

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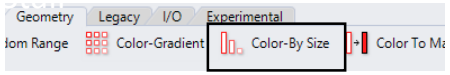
Color – By Size



Assigns a gradient of colors to objects based on their length, area, or volume (depending on what type of objects are input).

Accepts curves, surface, hatches, polysurfaces and closed breps.

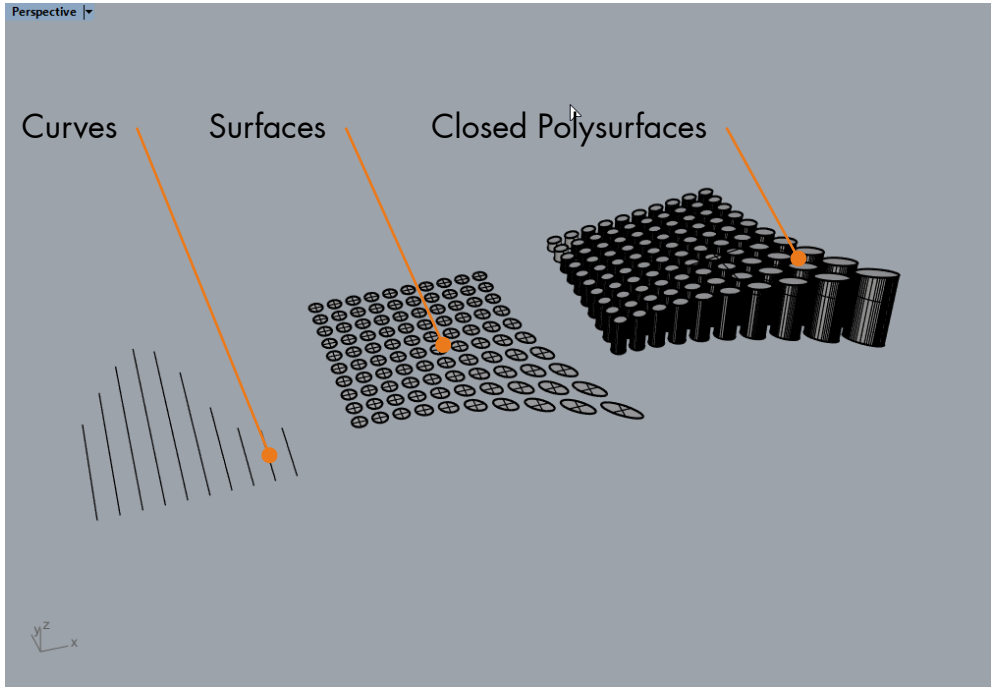
INPUT

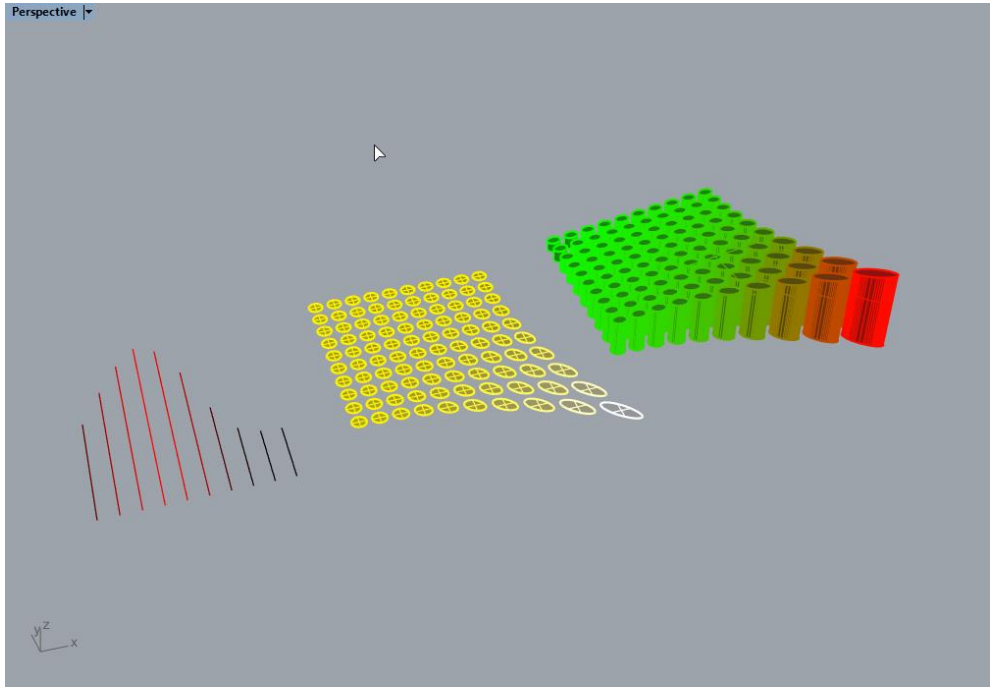
1. Select objects to color
2. Pick color 1 (Smallest)
3. Pick color 2 (Largest)

OUTPUT

- Colored objects

INPUT > OUTPUT





Toolbar

Geometry

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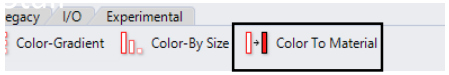
Color to Material



Sets an objects material to its display color. Creates a new material if one does not already exists.

INPUT

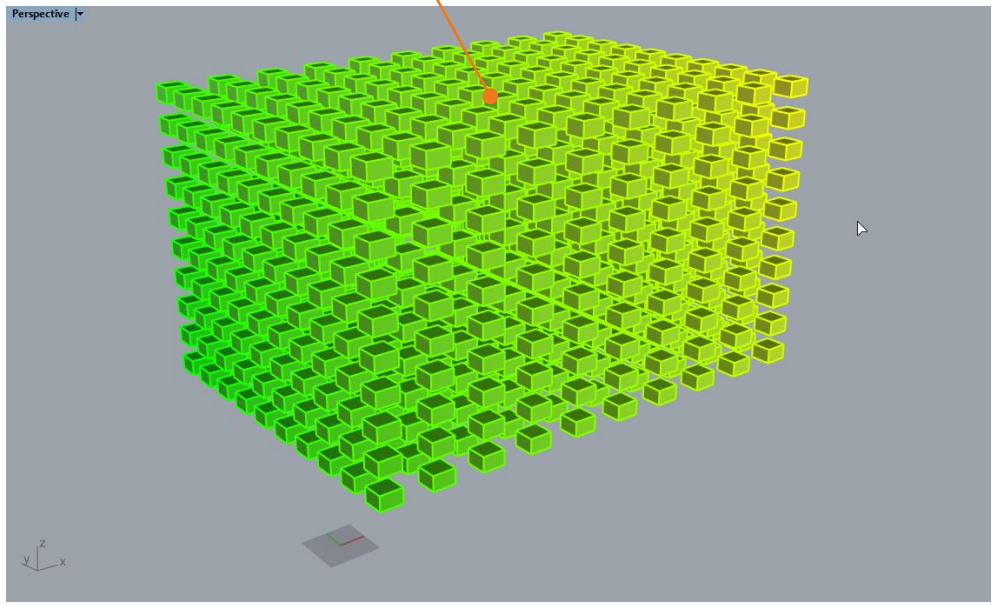
1. Select objects

OUTPUT

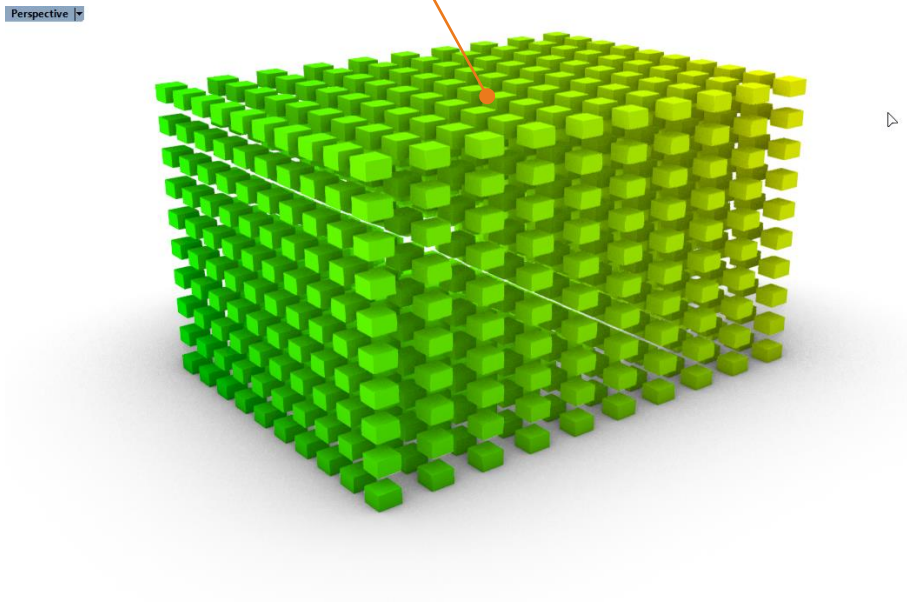
- Objects with colored material

INPUT > OUTPUT

Colored objects



Material matching display color



PCPA reach

Toolbar

Legacy

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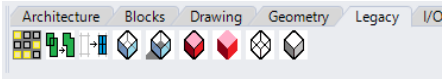
INPUT > OUTPUT



Buttons from the first PCPA Toolbar.

Random Unselect
- Randomly unselects a percentage of selected objects

Clean Boolean
- Macro: Boolean union + Merge all faces

Curve Boolean + Planar
- Macro: Curveboolean + Planar Srf

Various PCPA Display Modes
- Changes display mode to one of the standard PCPA displays

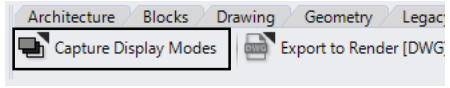
PCPA reach

Toolbar

I/O (Input/Output)

Table of Contents

Capture Display Modes



Exports a PNG from the active view with the user selected display modes.

PNG name with be appended with the display mode name.

Display modes with PCPA at the front are defaults.

INPUT

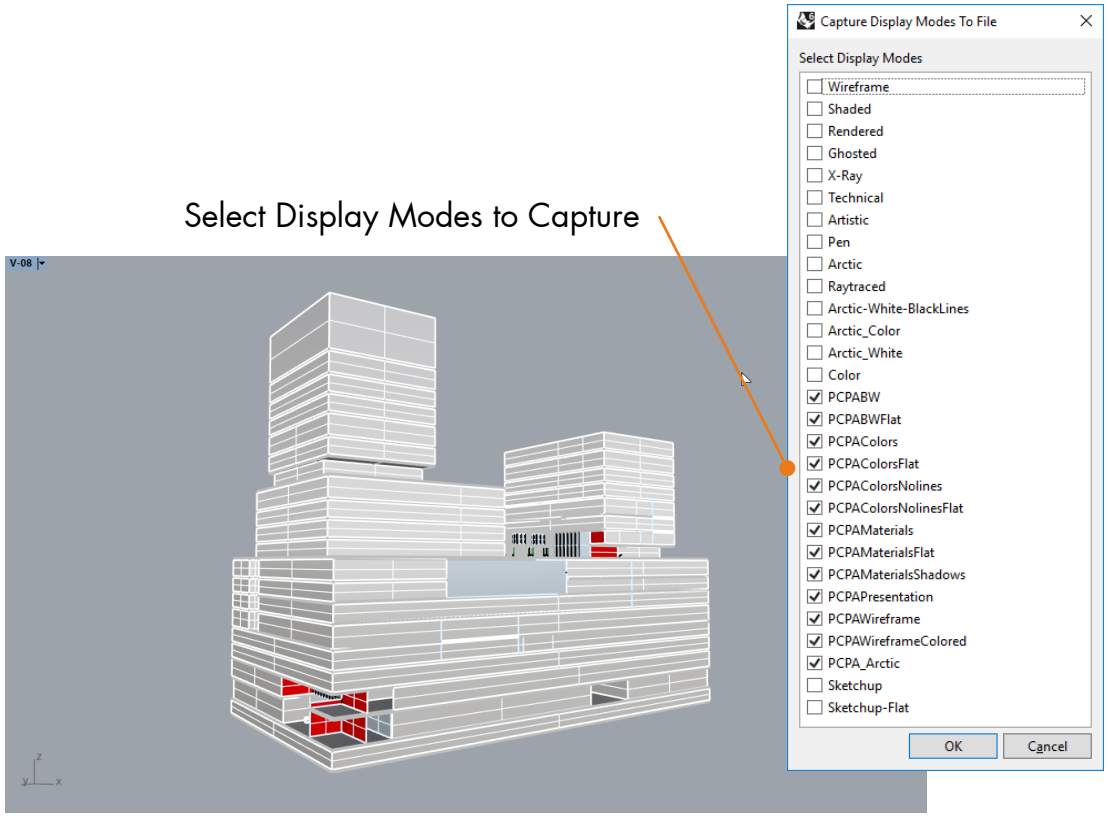
1. Select display modes
2. Output path
3. Image Height (pixels)
4. Image Width (pixels)

OUTPUT

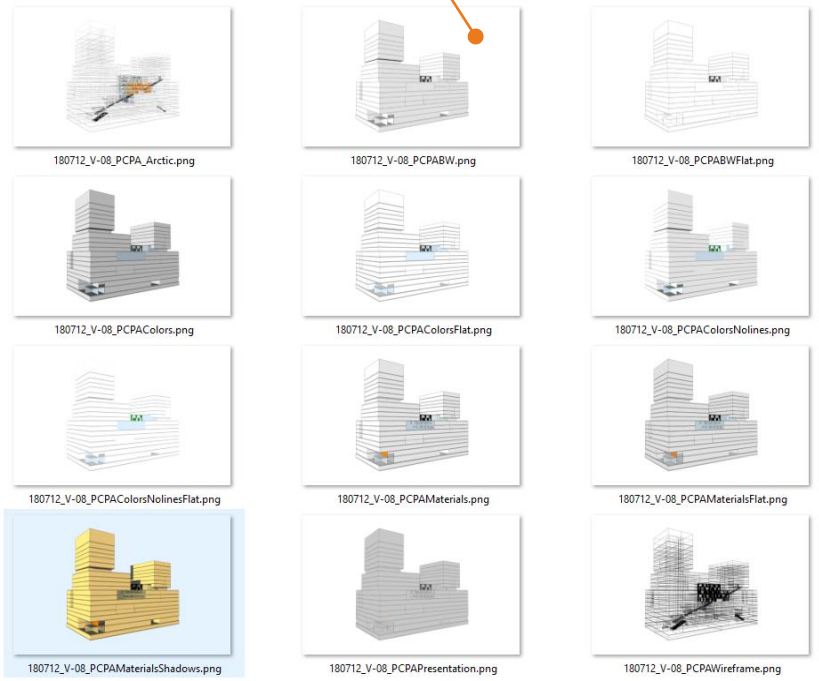
- PNG for each display mode selected.

INPUT > OUTPUT

Select Display Modes to Capture



Each display mode exported to PNG file



Toolbar

I/O (Input/Output)

Table of Contents

Export to Render [DWG]

Exports selected objects to DWG format with the layer names prefixed with the date and option name.

DWG settings automatically applied.

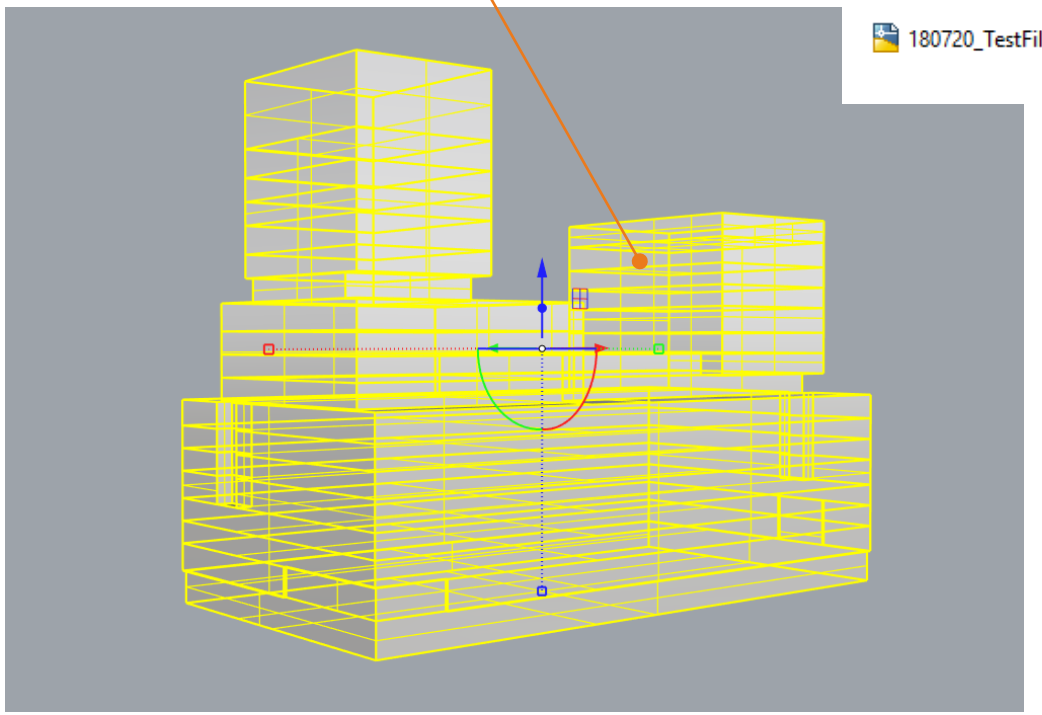
INPUT

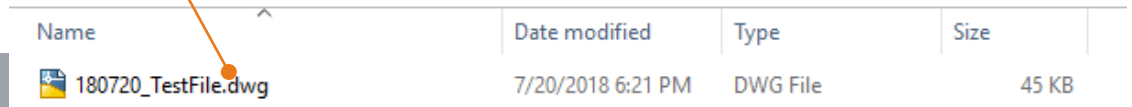
1. Select objects
2. Choose file path

OUTPUT

- DWG file

INPUT > OUTPUT





Toolbar

I/O (Input/Output)

Table of Contents

Export to Render [SKP]

Exports selected objects to SKP format with the layer names prefixed with the date and option name.

SKP Files are preferred because they maintain materials, layer names, and proper geometry.

*If mesh settings not ideal, mesh before export.

INPUT

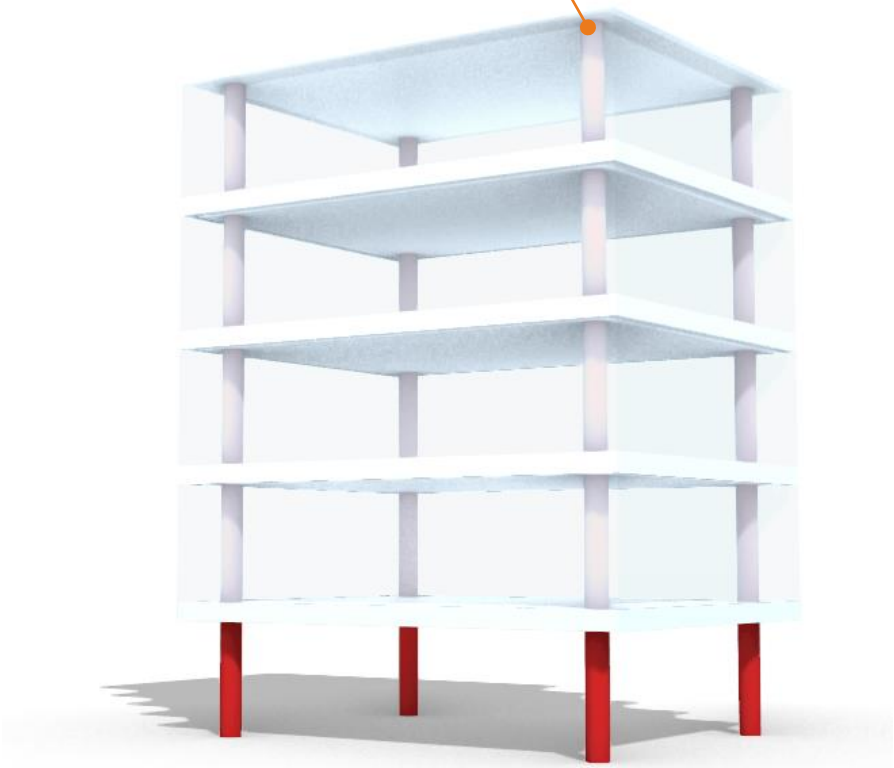
1. Select objects
2. Choose file path

OUTPUT

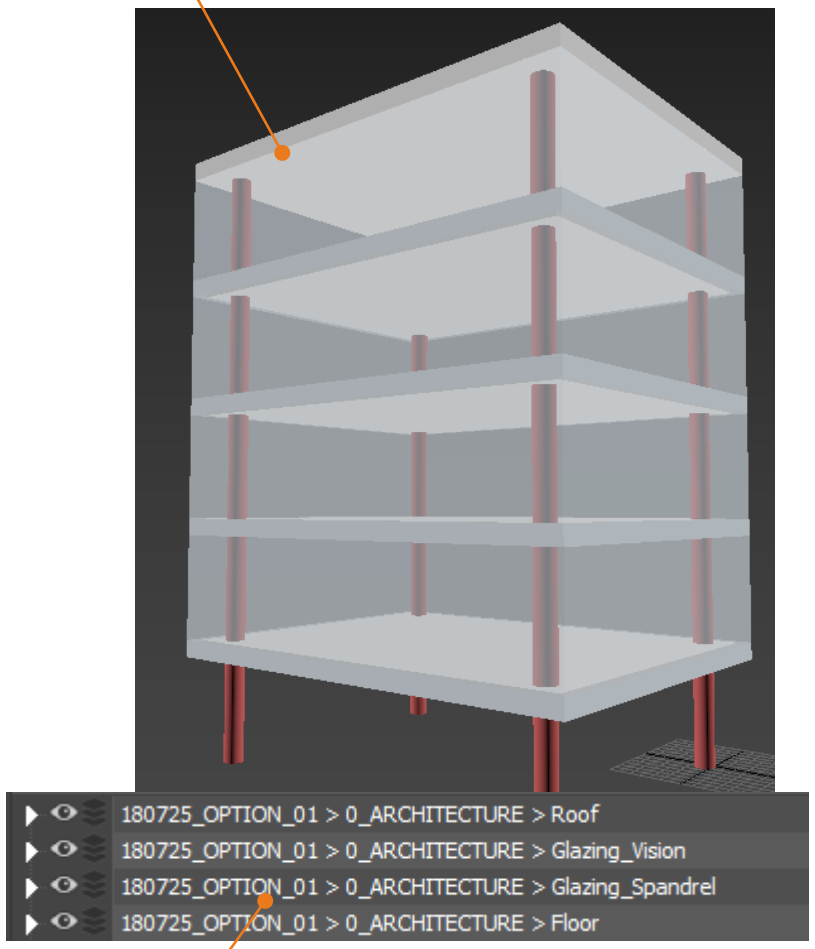
- DWG file

INPUT > OUTPUT

Geometry to export from Rhino



Model in 3ds Max



Properly formatted layer names in 3ds Max
'Filename > Rhino Layer Names'

PCPA reach

Toolbar

I/O (Input/Output)

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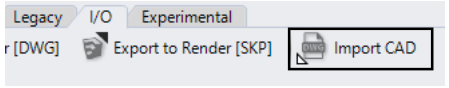
Import CAD



Imports DWG file and nests its layers under a parent layer, named “Date_Filename_##”

Empty layers are removed.

All imported blocks come in exploded.

INPUT

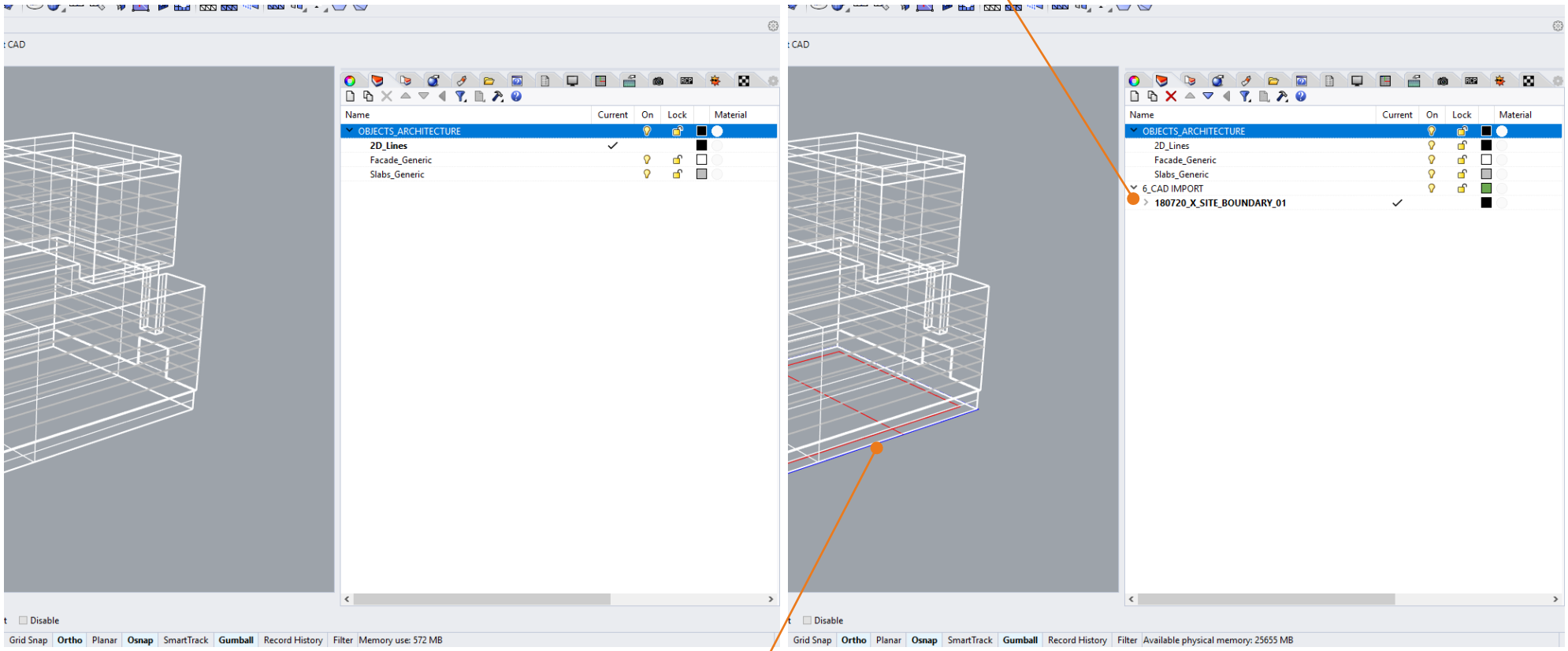
1. Select DWG file

OUTPUT

- Generated parent layers

INPUT > OUTPUT

Automatically generated parent layer names



Imported Lines

Toolbar

Experimental

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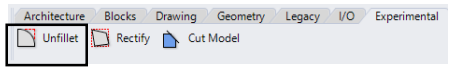
Unfillet



Will remove all arcs from a polyline.

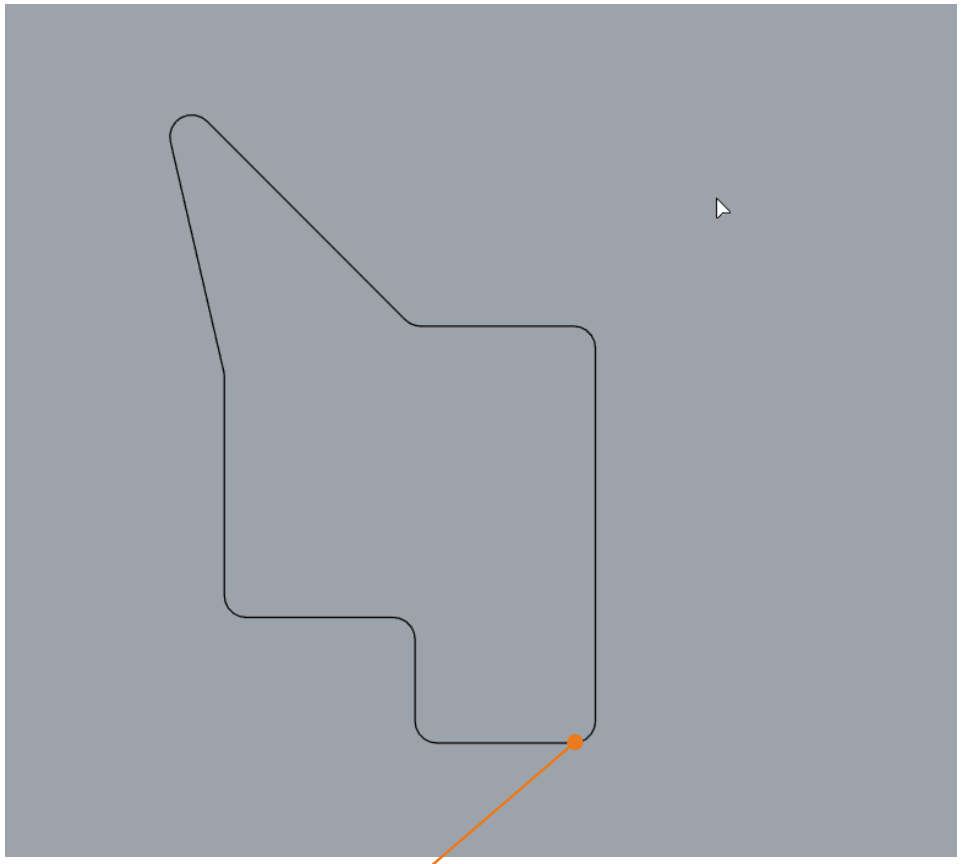
INPUT

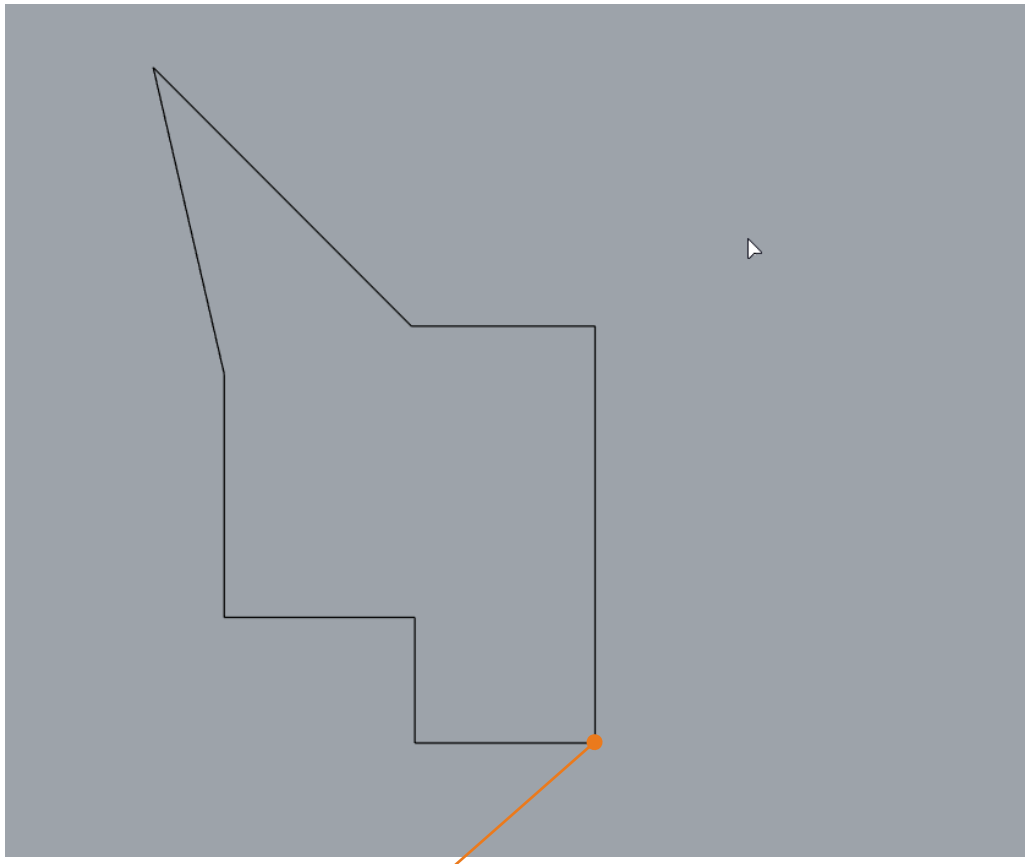
1. Select polyline

OUTPUT

- Polyline

INPUT > OUTPUT





PCPA reach

Toolbar

Experimental

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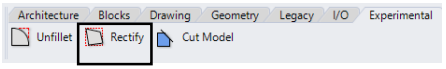
Rectify



Rebuilds a polyline according to specified angle and length multiples.

If 0 is input for the multiples, the original angle or length is used.

*Curves not currently supported.

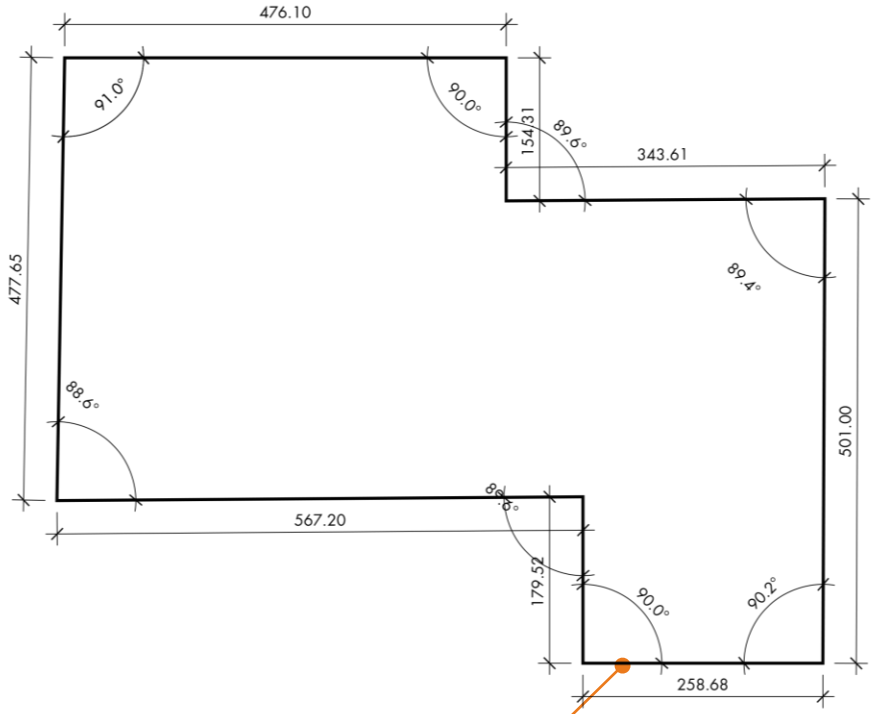
INPUT

1. Select polyline
2. Input angle multiples
3. Input length multiples

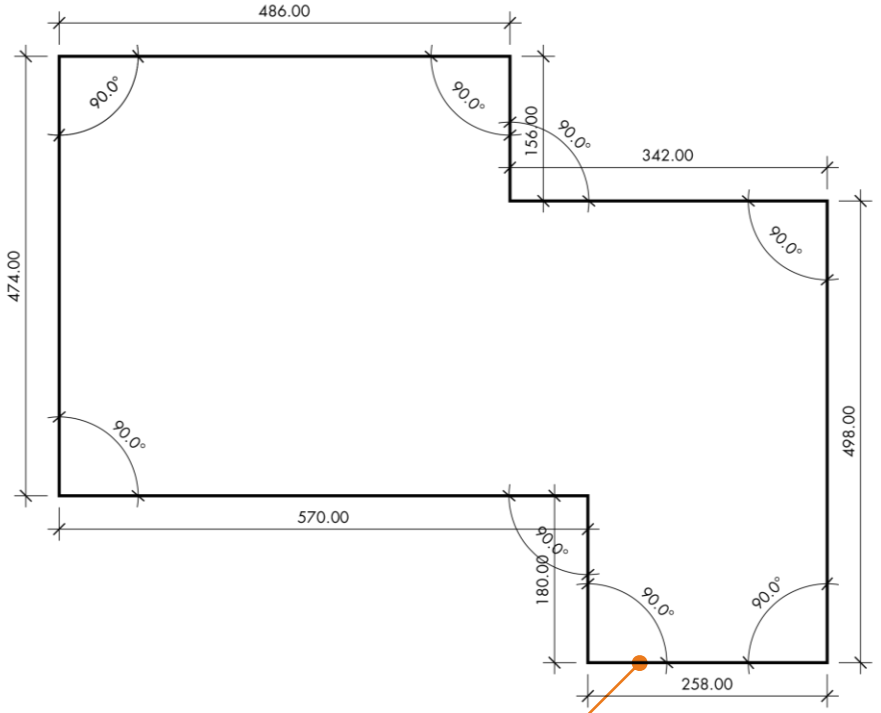
OUTPUT

- Polyline

INPUT > OUTPUT



Polyline with irregular lengths and angles



Lengths and angles rounded.
In this case 90 degrees and 6 inches.

Toolbar

Experimental

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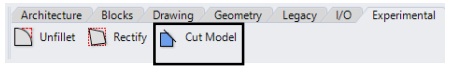
Cut Model



Trims a model with a surface. Duplicates and hides original geometry.

Creates two groups, one with the remaining geometry, the other with section surfaces created when cutting through solid objects.

Useful for rendering or make2d exports.

INPUT

1. Select objects to trim
2. Select surface to trim with

OUTPUT

- Duplicated geometry trimmed by surface plane.

INPUT > OUTPUT

Toolbar

Dropdown

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Toolbar

Dropdown

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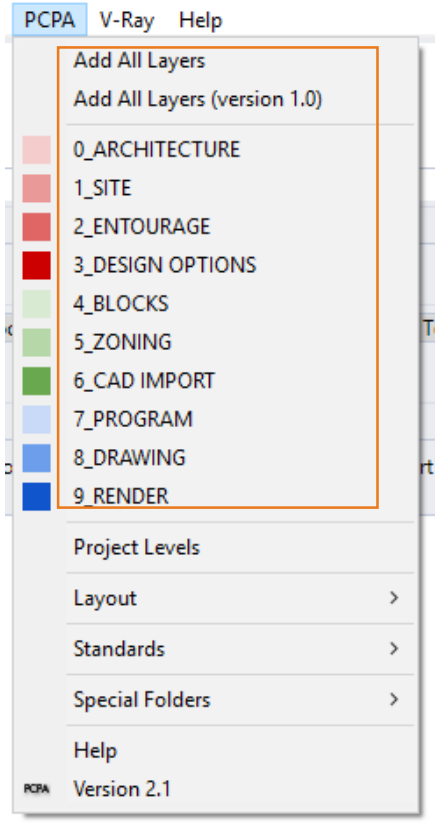
Layers

PCPA Standard layers can be added to a drawing by choosing either **Add All Layers** to load all layers, or choosing one of the Root Layers to add just that Root.

For projects still using 1.0 Layer Standards,
Add All Layers (version 1.0) will load all 1.0 layers.

This will also import and assign PCPA materials if not already in the document.



Toolbar

Dropdown

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Project Levels

Stores level data within the rhino file. Heights and FTF are formulas, responding to changes.

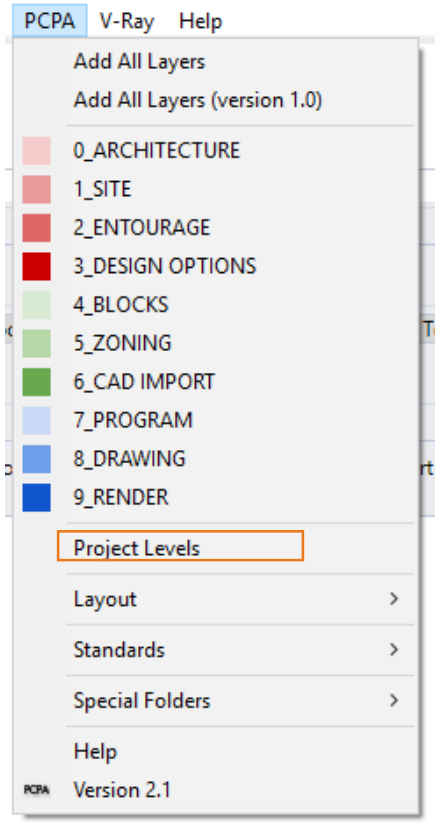
Can enter feet, inches, or decimal.

Can copy paste data to Excel (Edit > Copy)

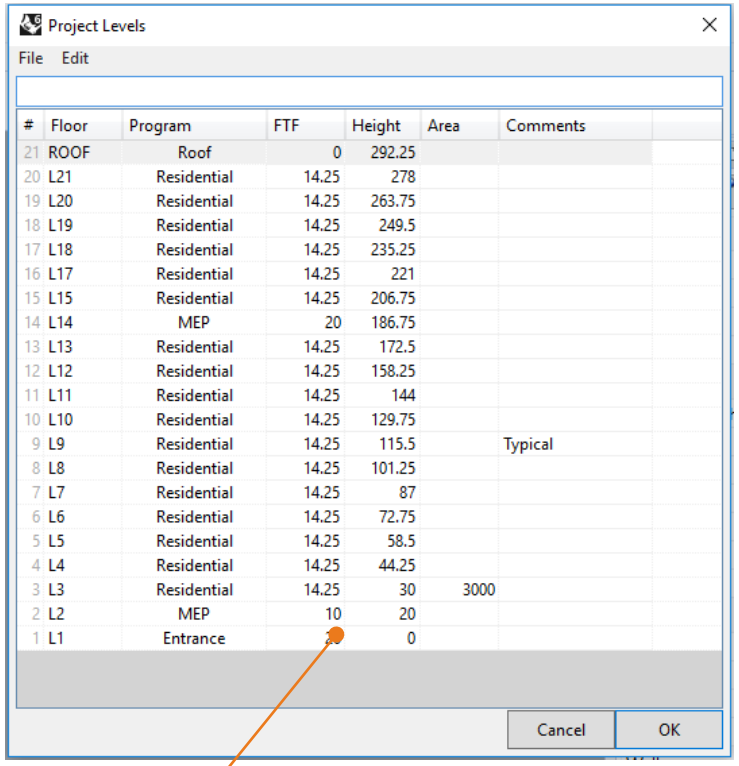
Can import levels from another Rhino file.
(File > Import from 3dm)

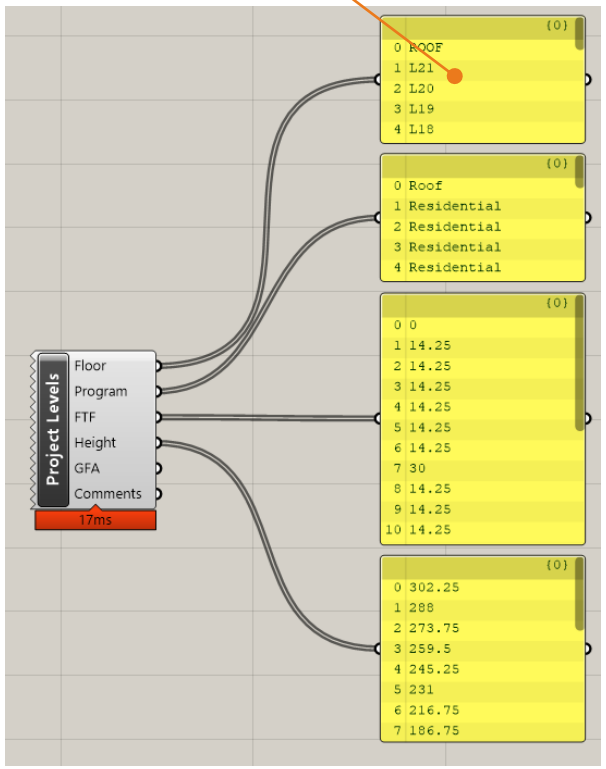
Can read level data into Grasshopper.

*This is still experimental and may have errors.

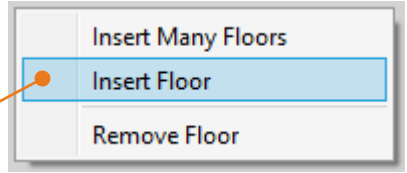


Data can be read in Grasshopper





Excel-like interface inside of Rhino



Right click to open the context menu

Toolbar

Dropdown

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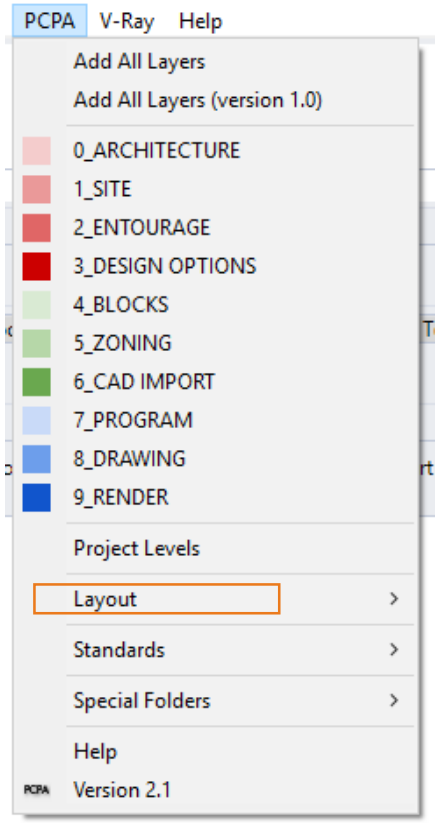
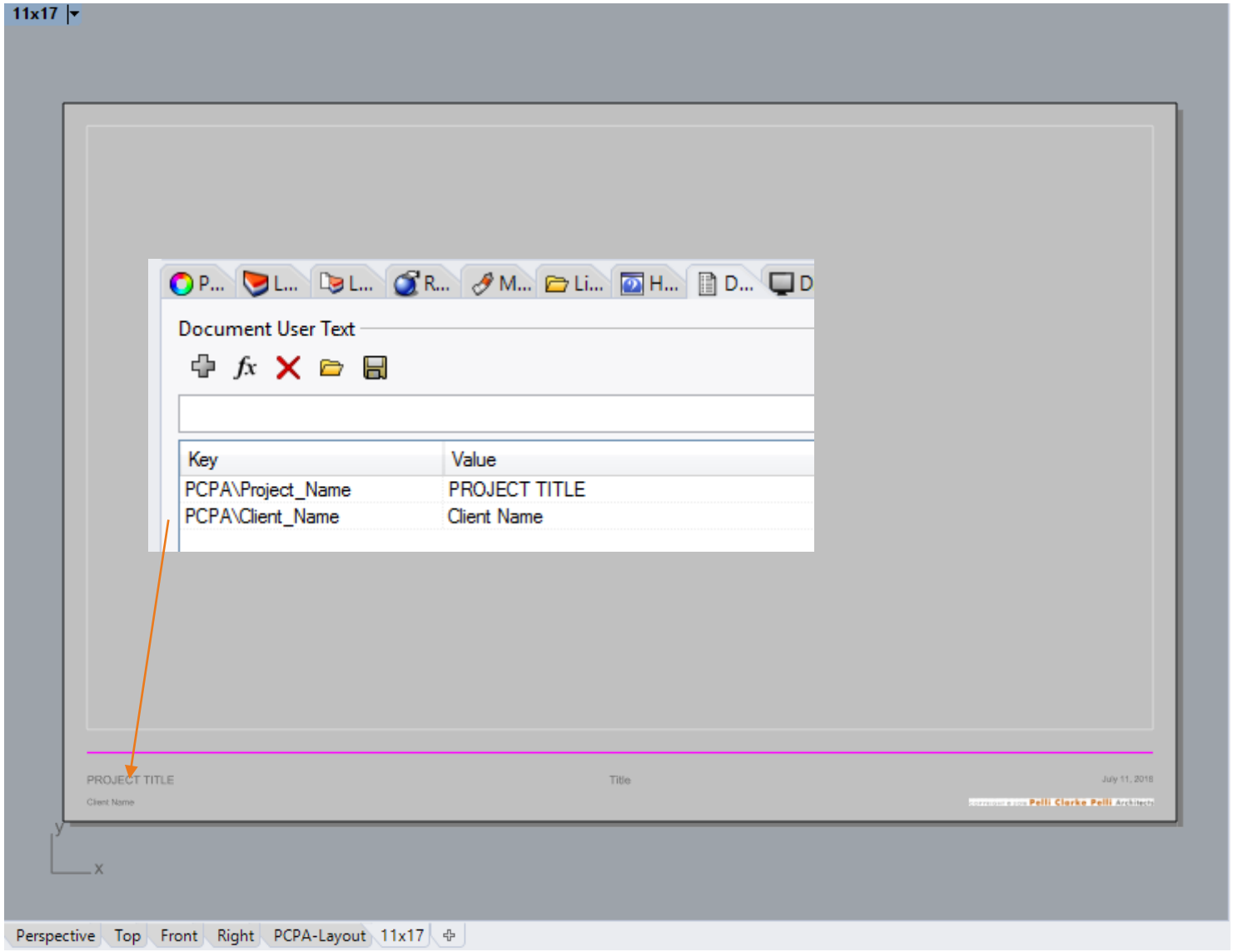
Layout

Adds layout to current file.

Project Name and Client Name reads from Document Data.

Date is text field of the current date and will automatically update.





Toolbar

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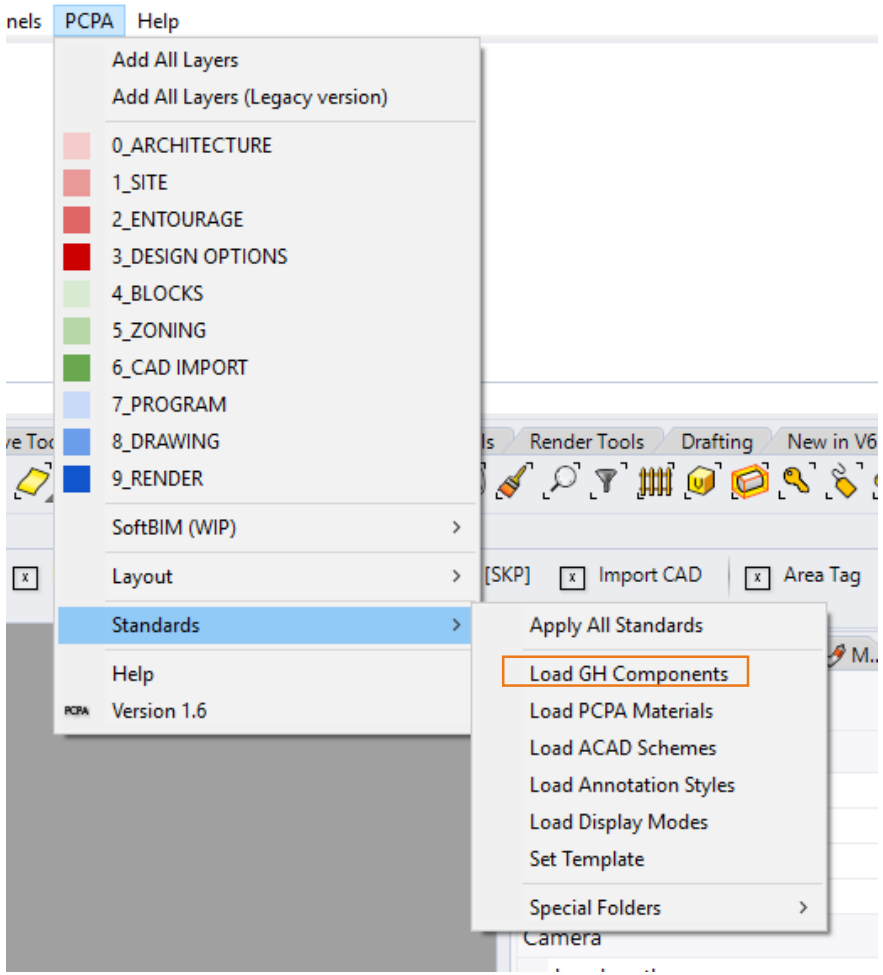
Load GH Components

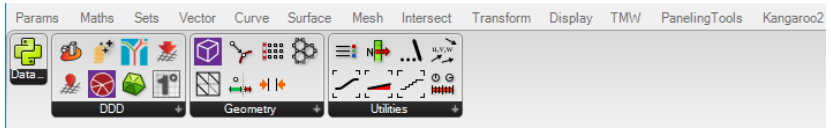
Loads all PCPA GH Components and PCPA Standard Set (curated collection of useful GH Plugins)

1. Close all Rhino Sessions.
2. Reopen Rhino
3. From the PCPA Dropdown menu, choose **Load GH Components**
4. Many things will then be imported. Some things may fail or say "Broken". Stay calm.
5. Open Grasshopper

*Warnings may appear (depends on how many grasshopper plugins you have already installed). This should only happen the first time you run **Load GH Components**

Check out the GH Installation Troubleshooting if problems persist





Toolbar

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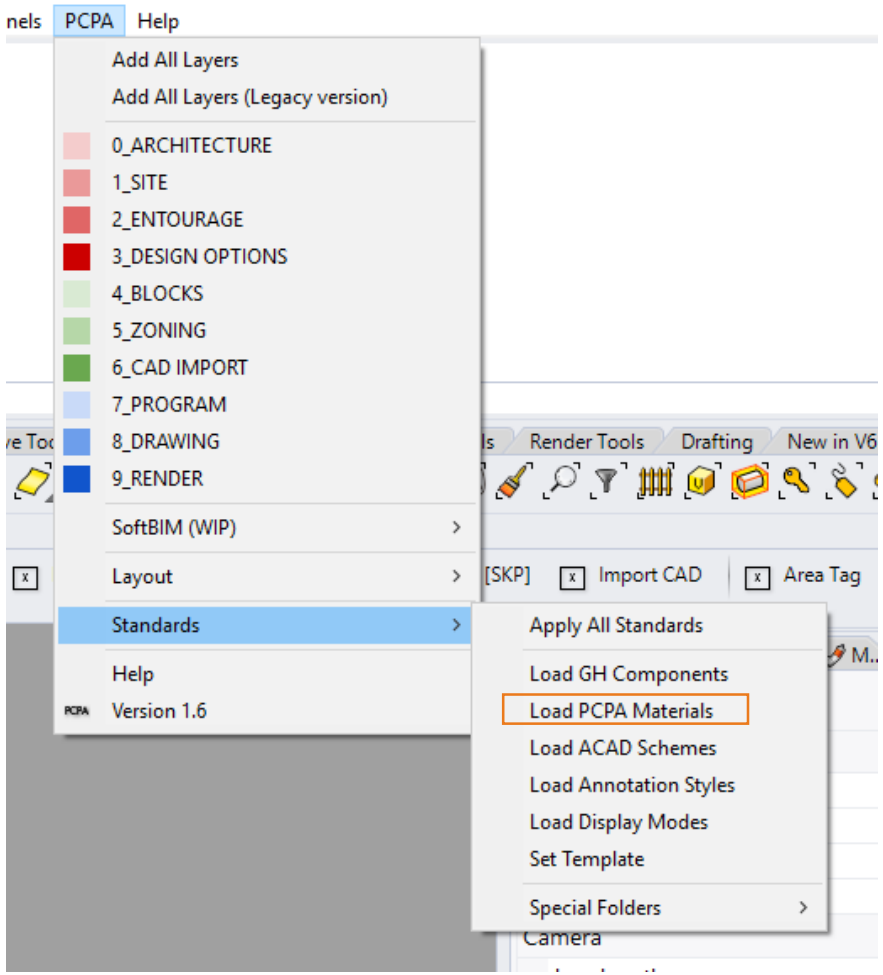
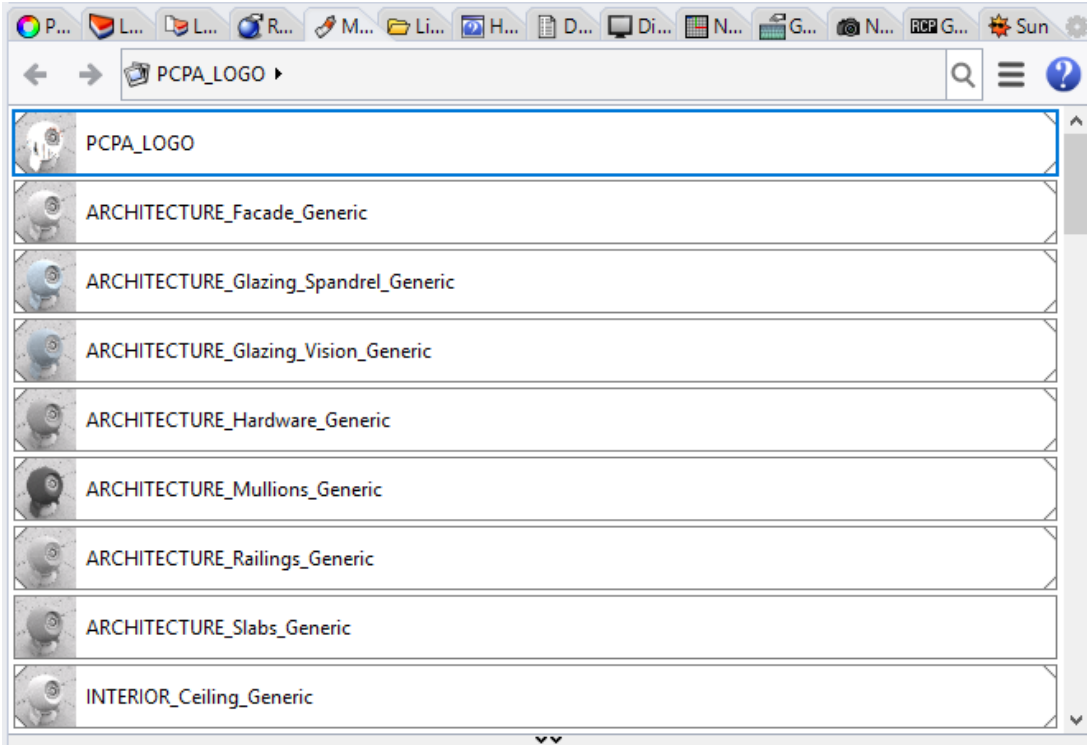
Load PCPA Materials

Loads all standard PCPA Materials into the current file, if they are not already there.





Toolbar

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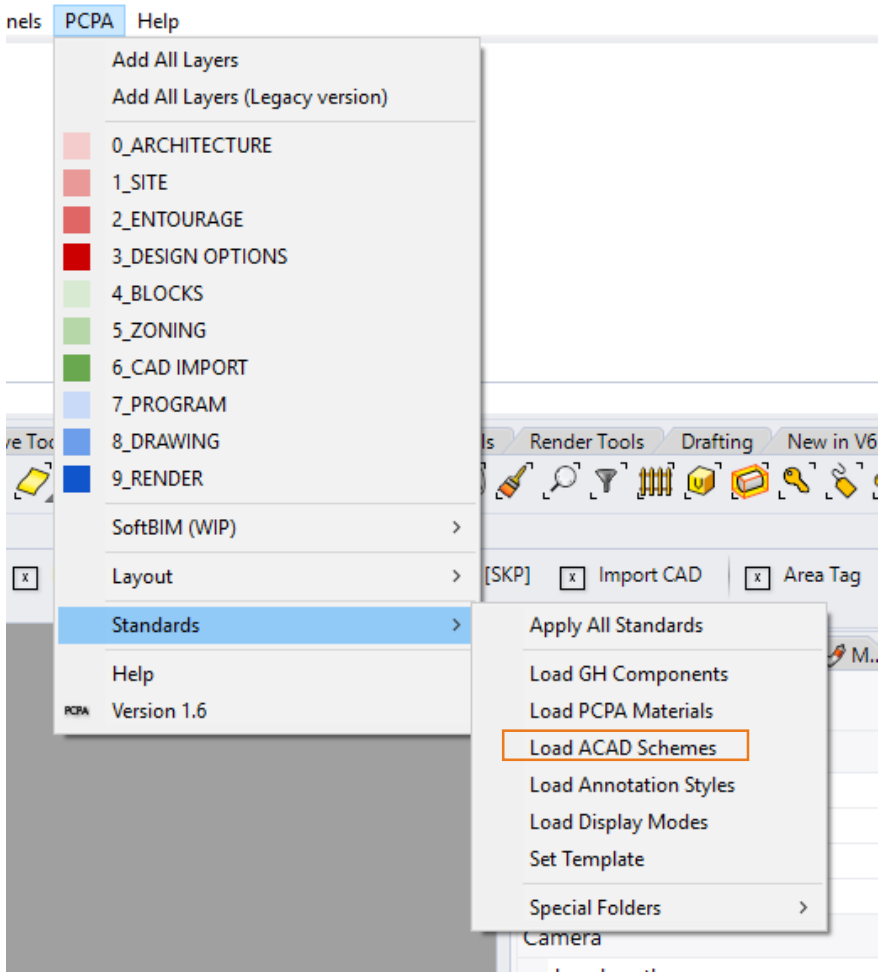
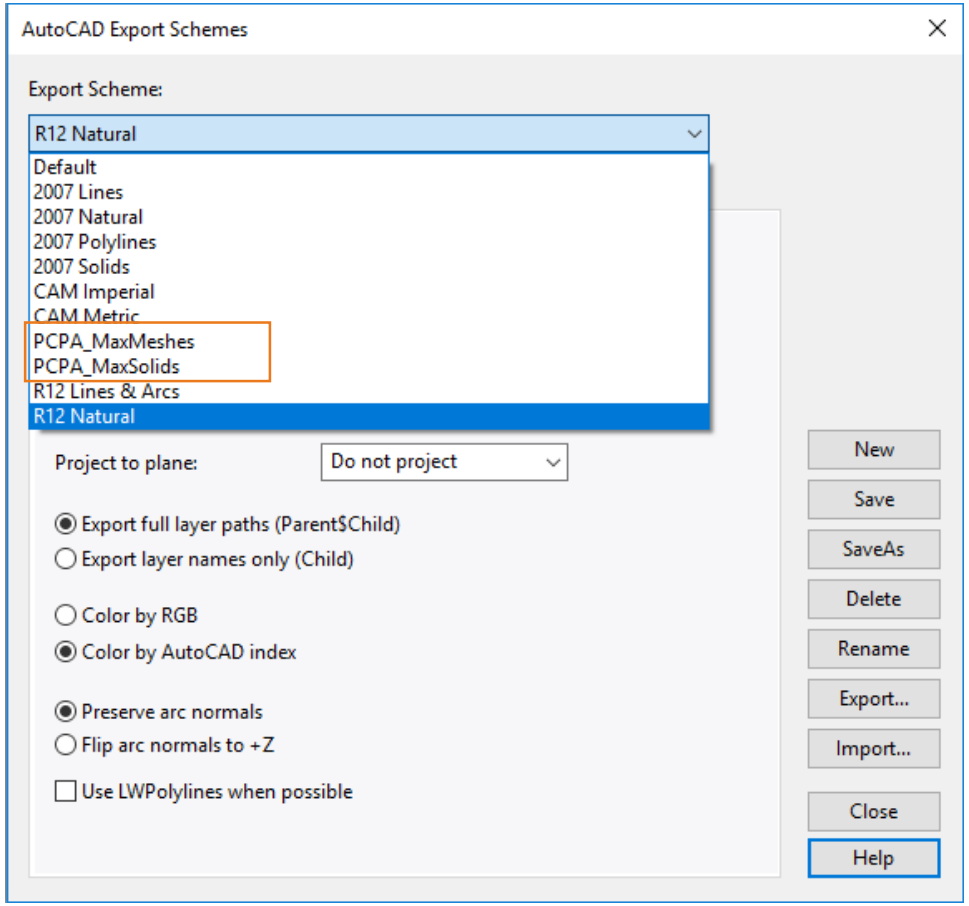
Load ACAD Schemes

Loads all ACAD Schemes (used when exporting to DWG).





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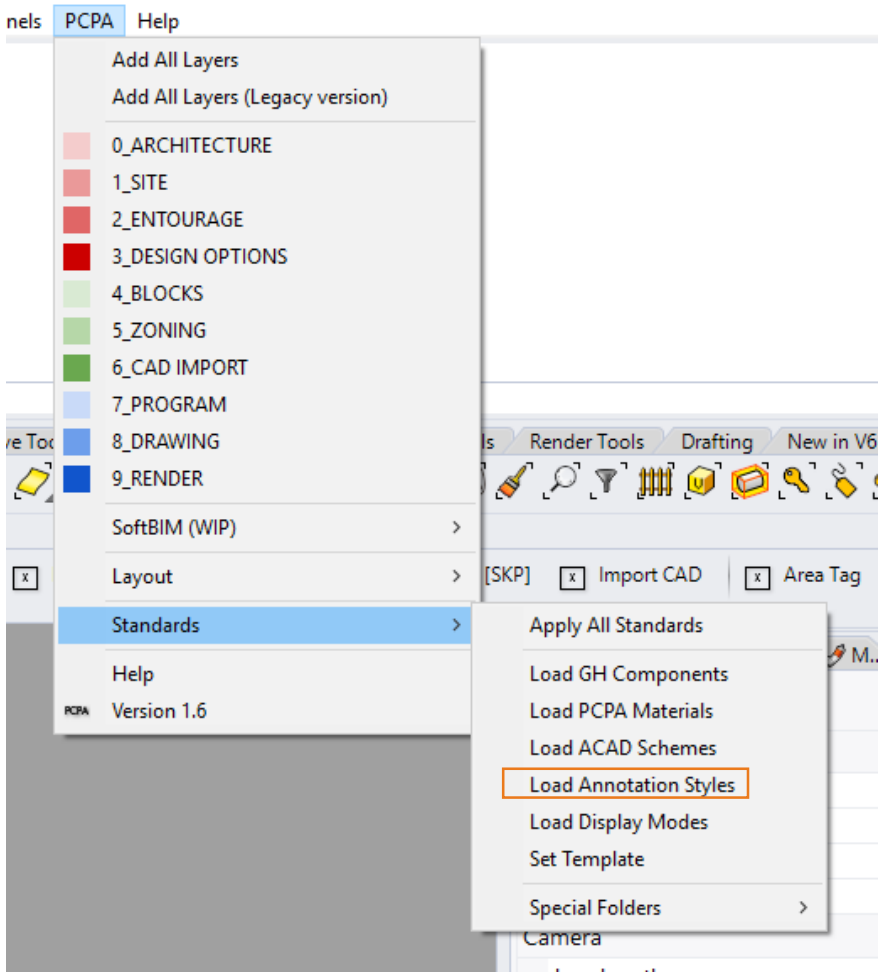
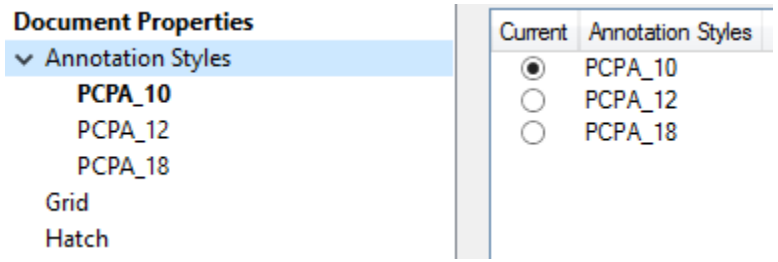
Load Annotation Styles

Loads all standard PCPA Annotation Styles into the current file, if they are not already there.





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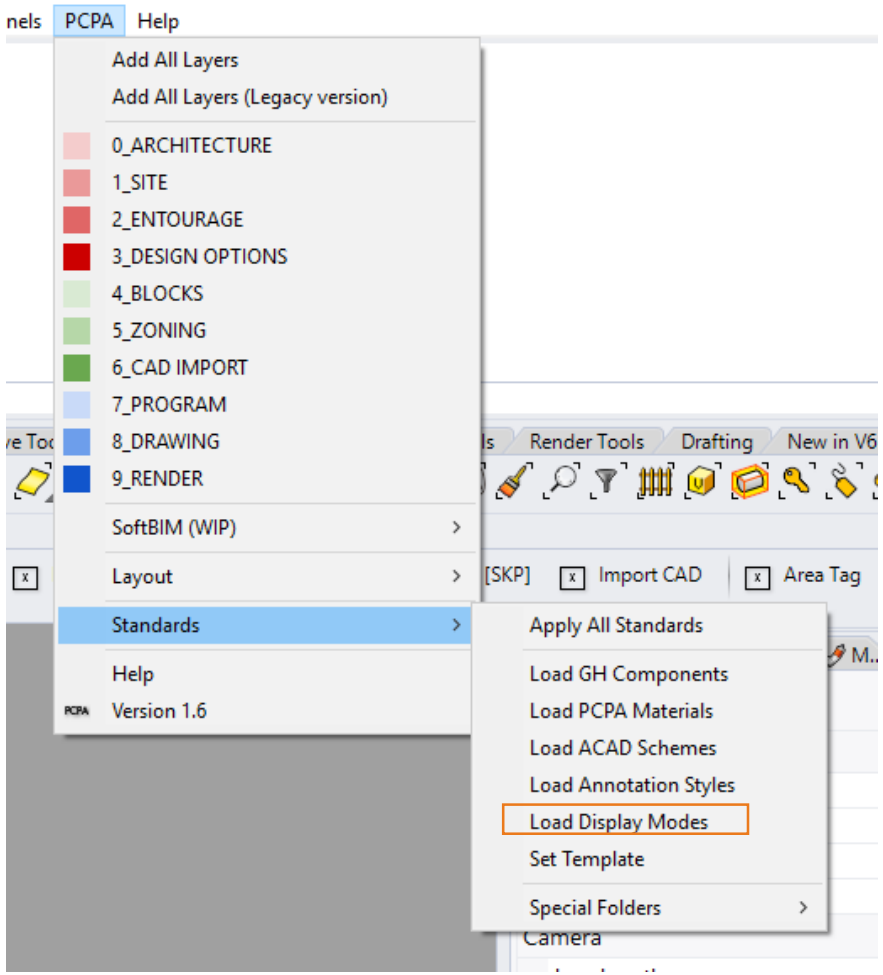
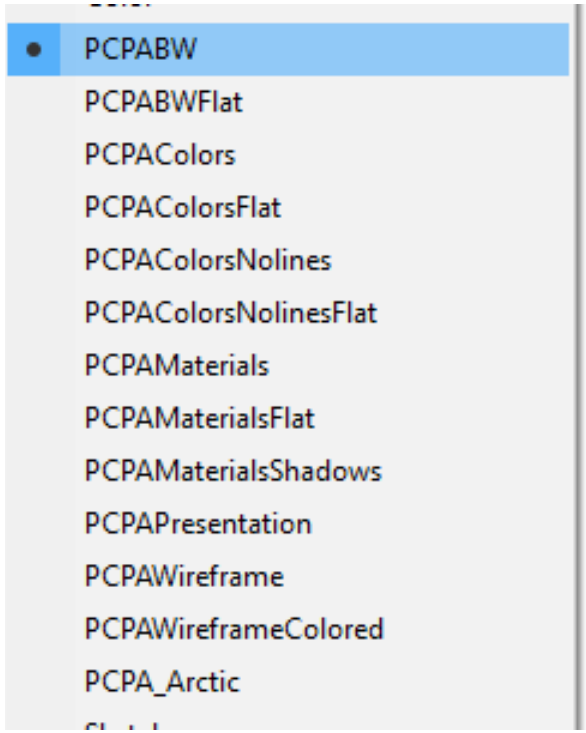
Load Display Modes

Loads all standard PCPA Display Modes into the current file, if they are not already there.





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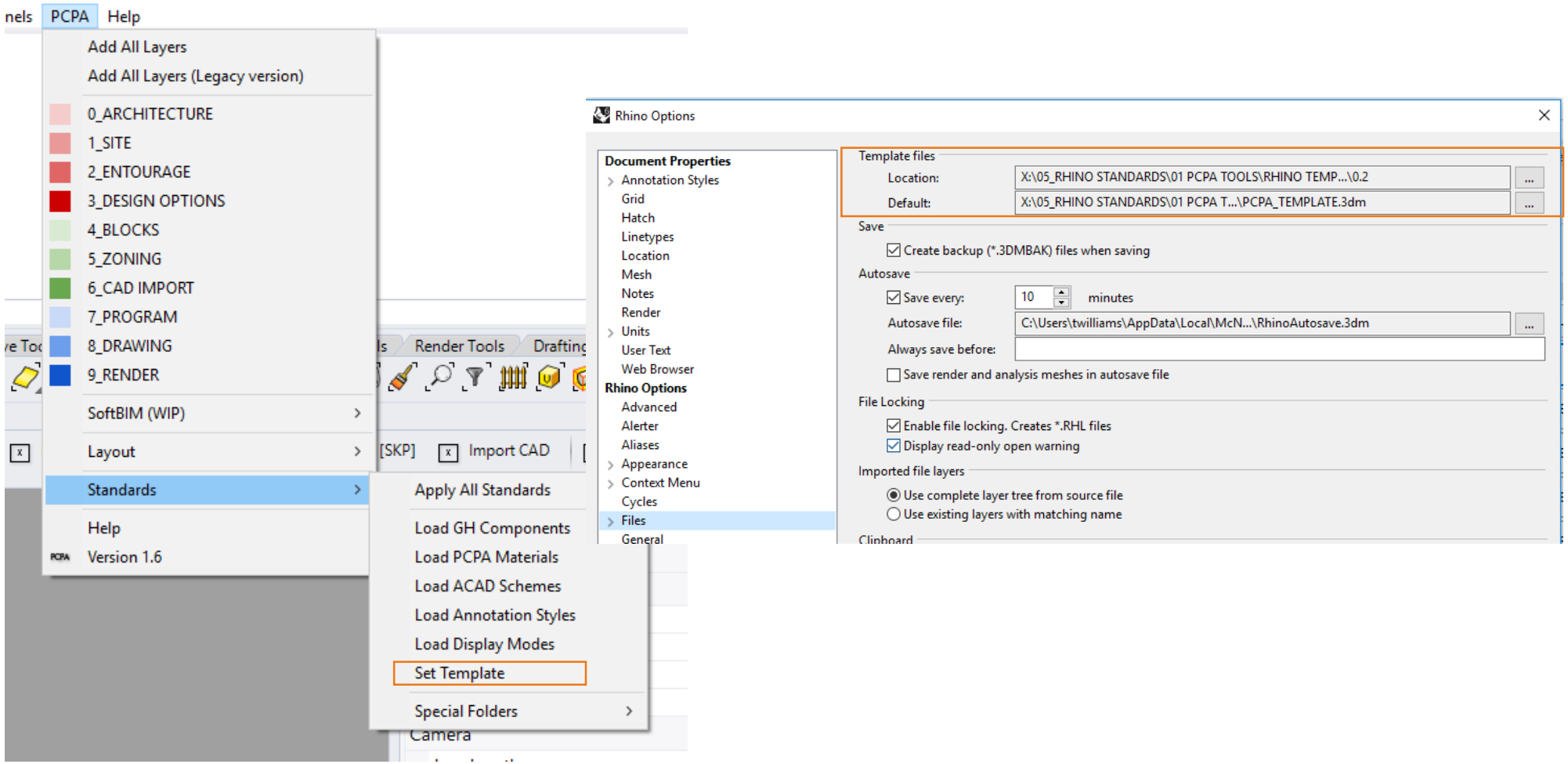
Set Template

Will set the default template file and folder.

Typically only needs to be run once.



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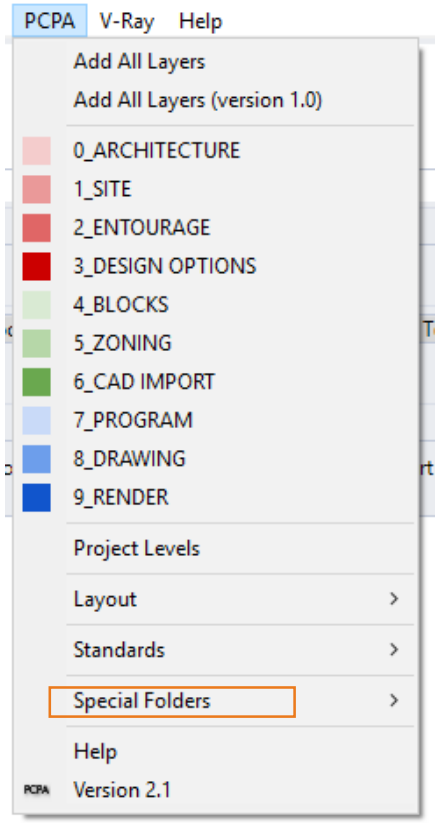
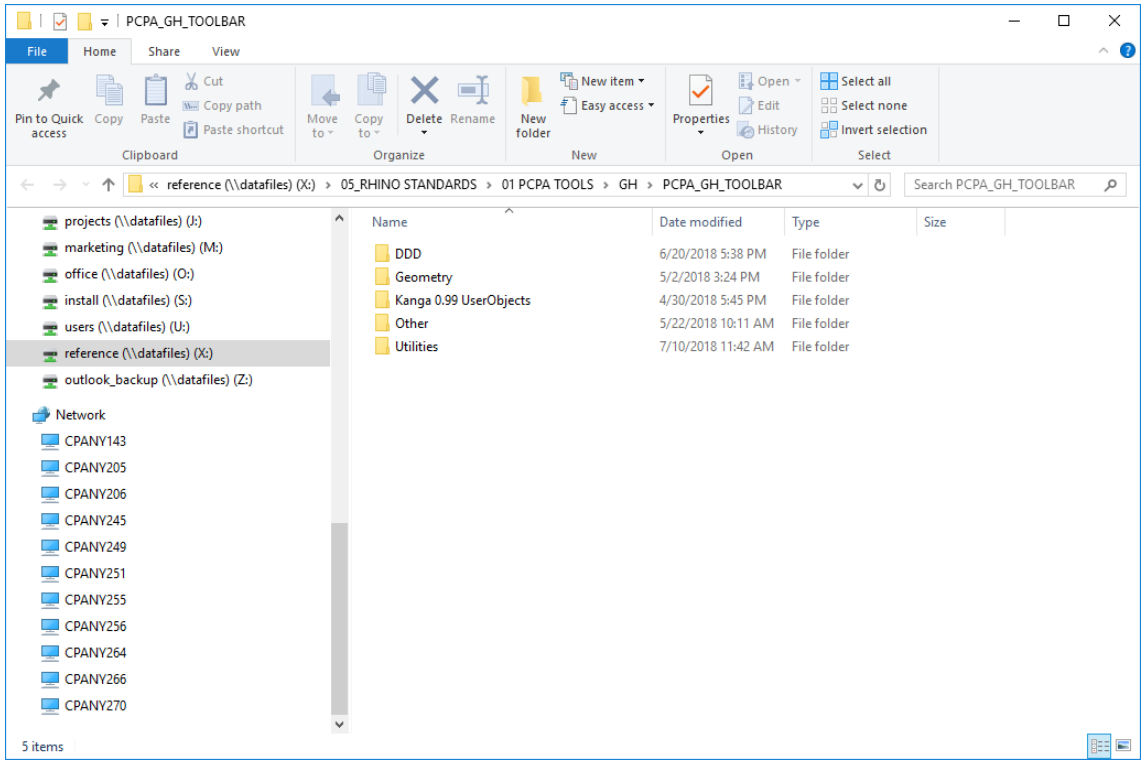
Special Folders

Will launch the folders containing the relative PCPA standard.





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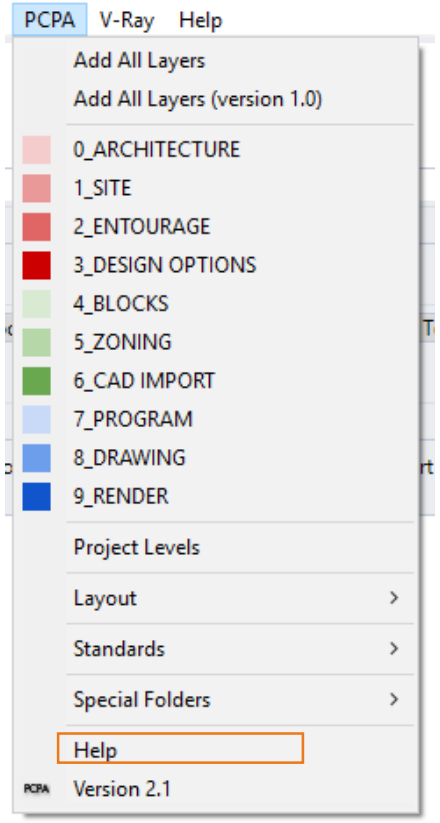
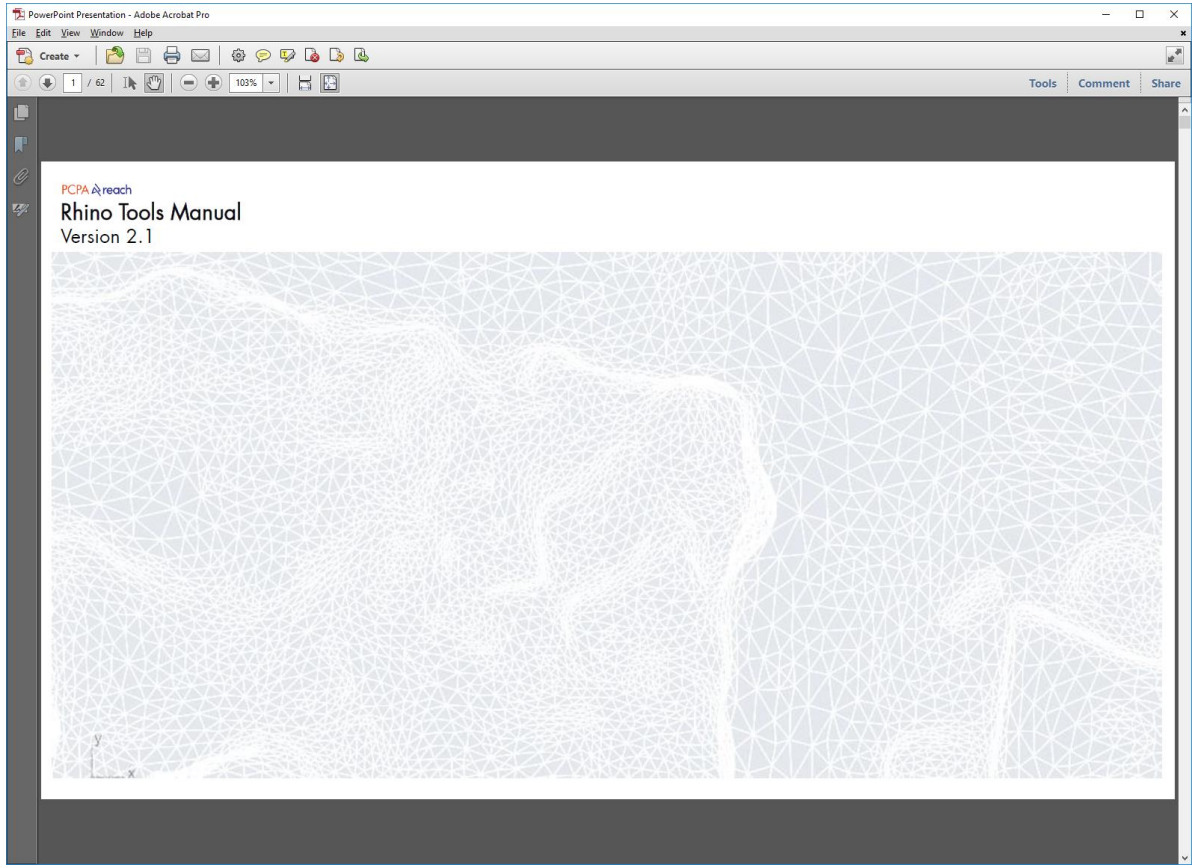
Help

Launches this Rhino Manual in a pdf viewer.





In order to improve the functionality of the toolbar, user input in these functions is dynamically stored in a file on the network.

Analytics should help us learn:
- Which scripts aren't working
- Which are popular
- Which are unpopular
- Which settings should change

Usernames are encrypted for anonymity.

Architecture-Stair					
Date	User	Width	Height	Path	Result
2018-08-03_18:33:46.12	wanrsqjwdptgkljcpwqu	42	120	[(84.098803252888047, 508.17035247603781,	TRUE

Grasshopper

Future Release

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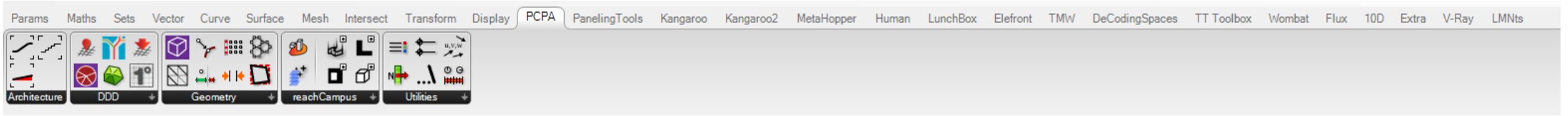
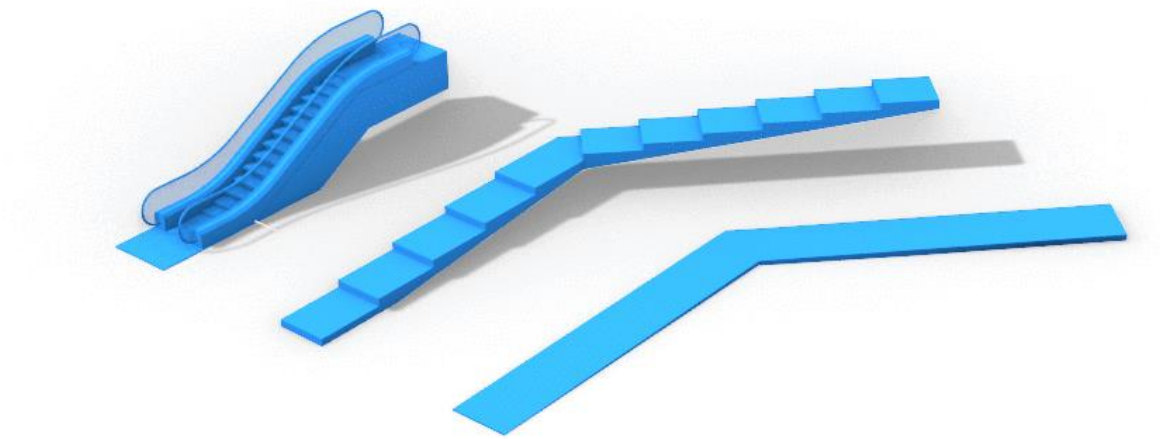


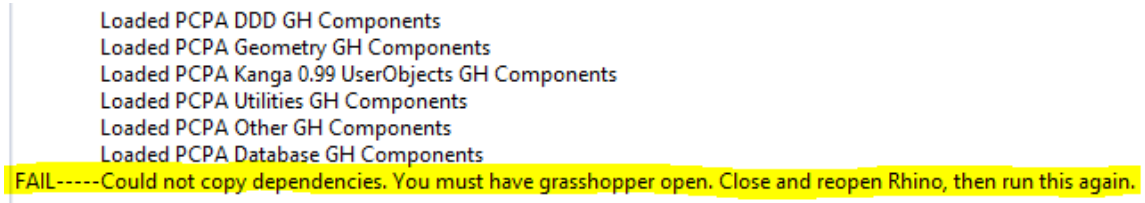
Current release contains

- Stair
- Ramp
- Escalator
- Get PCPA Layers
- Get Project Levels
- Rectify
- Unit Check
- reachCampus
- Topography and Site Generator
- Frit Pattern
- And many others…



ERROR: "FAIL---Could not copy…" Warning

SOLUTION: Close all Rhino sessions and follow the GH installation steps again.



ERROR: "File Conflict Warning " Warning

SOLUTION: Choose the **Delete** button on the left. For each pop-up

---

ERROR: "Component ID conflict" Warning

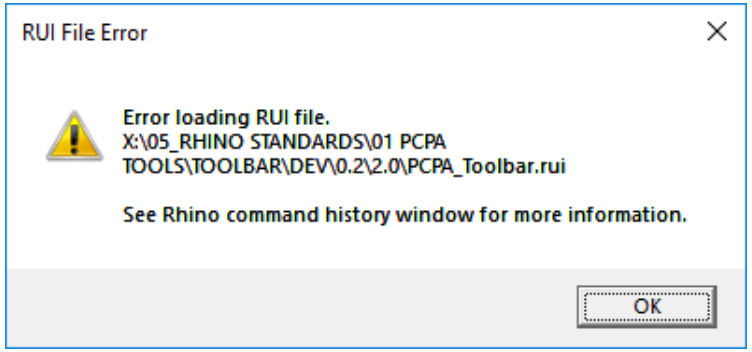
SOLUTION: Choose the **Replace All** button.

If this continues to come up when opening Grasshopper,
paste **%appdata%\Grasshopper\Libraries** into windows explorer. Then delete the conflicting file (**00_PCPA Standard Set** should not be deleted).

ERROR: “RUI File Error” Warning when Rhino Starts

SOLUTION: Drag and drop the toolbar to install again: Toolbar path

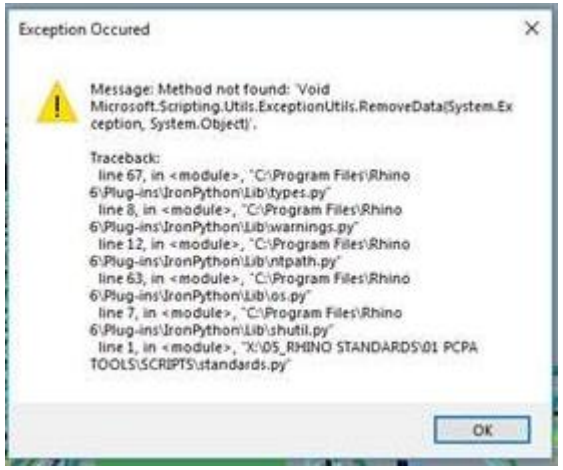
This usually happens when your computer temporarily loses connection to the network when opening Rhino.

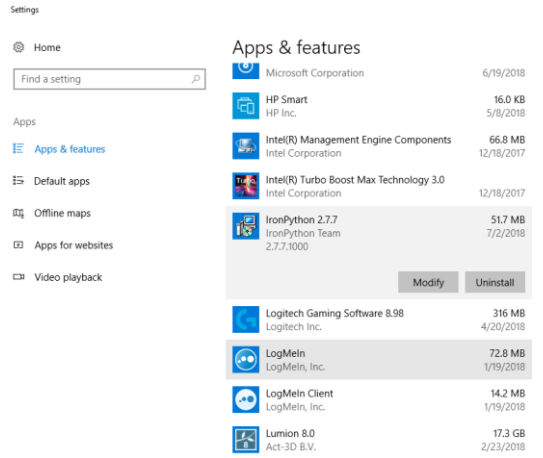


ERROR: “Method Not Found ” Warning

SOLUTION: Go to the “Add & Remove Programs page” in Windows Settings. Scroll down and Uninstall “IronPython 2.7.3” . Close and reopen Rhino.

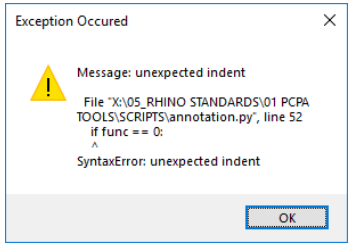
*This is a conflict caused when Dynamo has been installed. (Latest versions of Dynamo do not need this to run).





ERROR: “Exception Occured” Warning

SOLUTION: There is a bug in the script. Please send screenshot and description to Tim.



ERROR: “NVIDIA OpenGL Driver: A TDR has been detected”

SOLUTION: Graphics card cannot process such a large image. Either export as a smaller image or change your NVIDIA settings from default to Dynamic Streaming (as seen here)