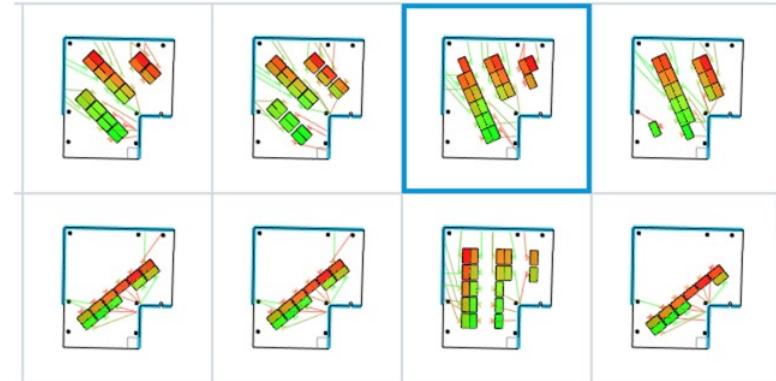


# Generative Design

New in Revit 2021

“As an architect who uses Revit but is not a skilled computational designer, I want to perform generative studies so that I can evaluate better performing design alternatives.”



“It will be a huge time saver to generate and evaluate options so quickly”  
AU Idea Exchange Participant

“This will automate repetitive work and create better designs”  
AU Idea Exchange Participant

# Benefits of Generative Design

[Video: Introduction to Generative Design](#)



Designers can generate options using the power of computation

Explore the full range of options while focusing on the higher performing solutions

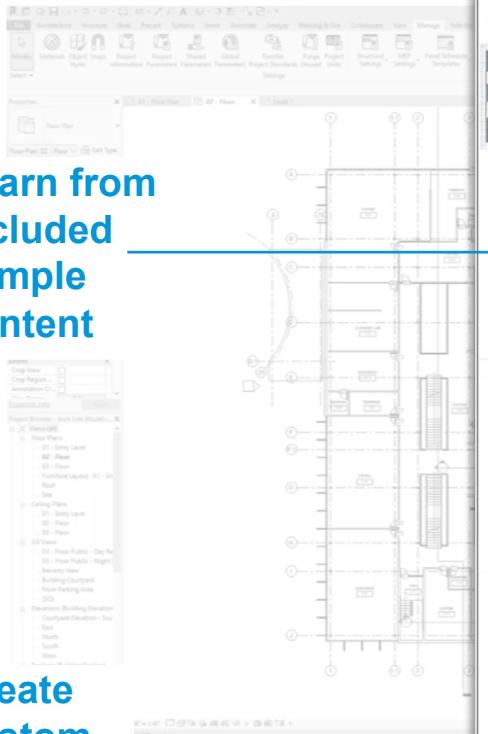
Gain more insight into your designs by studying the relationships between inputs and results at scale

Make more informed decisions in less time by leveraging what is learned in each study

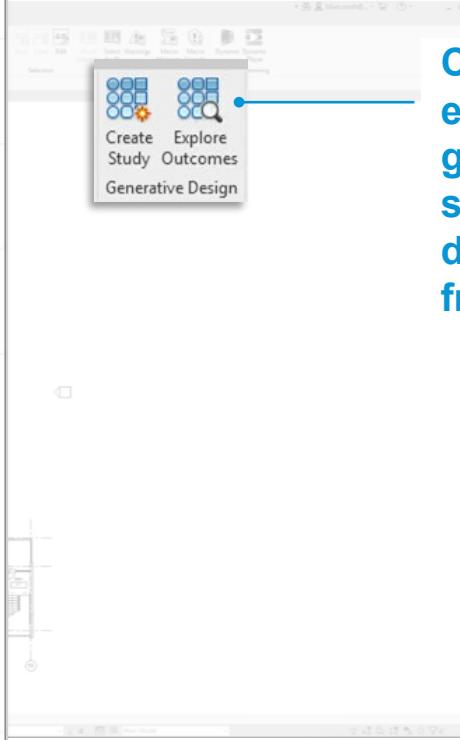
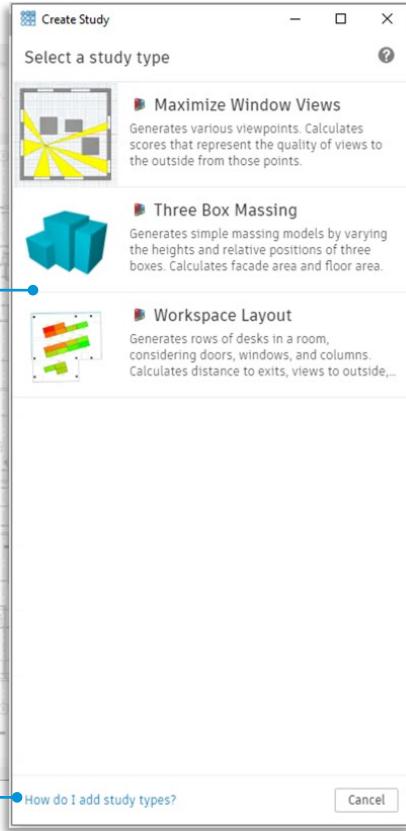
# Create a Study

[Video: Create a Study](#)

Learn from included sample content



Create custom studies



Create and explore generative studies directly from Revit\*

\* For AEC Collection and enterprise subscribers

# Define the Study

The screenshot shows the Revit software environment with the 'Define Study' dialog box open. The dialog box is titled 'Workspace Layout' and contains several sections:

- Study Name:** Workspace Layout 001
- Method:** Optimize
- Select in model:** Two checkboxes are checked: "Select a room (Element : 281513)" and "Select desk family instance (Element : 281519)".
- Choose variables:** Two checkboxes are checked: "Desk row rotation" (range -90 to 90) and "Spacing between rows (ft.)" (range 10 to 16).
- Set goals:** Three checkboxes are checked: "Average distance to exits" (Minimize), "Views to outside" (Minimize), and "Number of desks" (Minimize).
- Set constraints:** Three checkboxes are shown but not checked: "Average distance to exits", "Views to outside", and "Number of desks". Each checkbox has 'Min' and 'Max' input fields.
- Generation Settings:** A section with a 'How do I define a study?' link, a 'Cancel' button, and a prominent blue 'Generate' button.

Annotations with blue arrows point to specific areas:

- An arrow points from the text "Set design goals" to the 'Set goals' section of the dialog box.
- An arrow points from the text "Select Revit elements to use in the study\*" to the "Select in model" section of the dialog box.
- An arrow points from the text "Generate design alternatives" to the 'Generate' button in the dialog box.

# Explore Outcomes

The screenshot shows the 'Explore Outcomes' feature within a software application. On the left, a sidebar lists various workspace configurations. The main area displays a grid of workspace layouts, with one layout highlighted in blue. Below the grid, there are filter options and a chart showing correlations between desk row rotation, spacing between rows, average distance to exits, views to outside, and the number of desks. To the right, a detailed view of a selected layout shows its specific parameters and outcomes.

**Track studies**

**Explore outcomes**

**Evaluate goals**

**Filter and rank results**

**Create Revit elements\***

**Explore Outcomes**

Workspace Layout 003

Sort by Number of desks

Details

Average distance to exits 16.545

Views to outside 0.547

Number of desks 22.0

Inputs

Desk row rotation 0

Spacing between rows (ft.) 12

Outputs

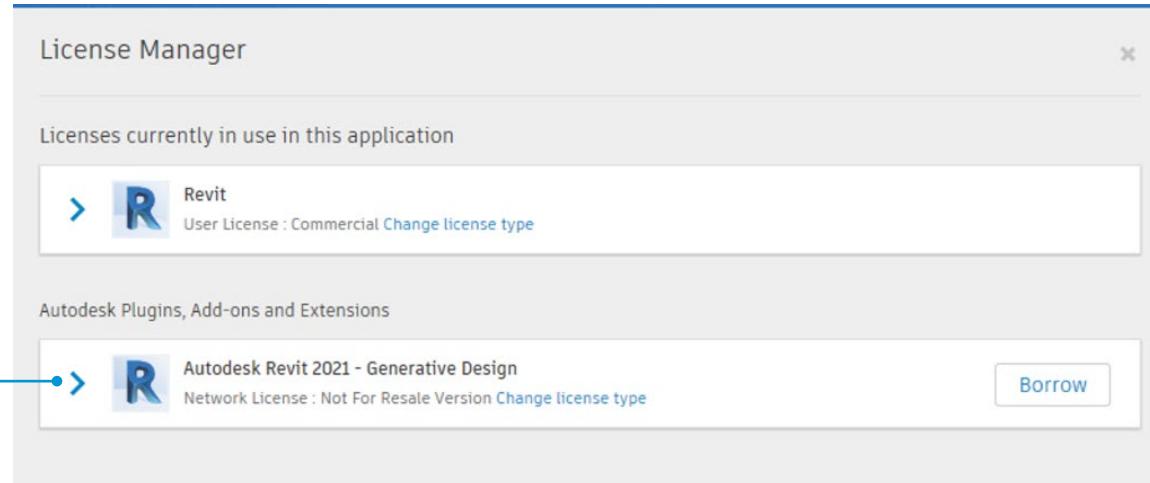
10 of 10

Create Revit Elements

# Installation and Licensing

Generative Design is

- automatically installed with Revit
- updated via Autodesk desktop app and Revit updates
- available in the 14 languages supported by Revit



For AEC Collection and enterprise subscribers, the Generative Design license enables direct access from Revit\*

\* If you are not an AEC Collection or enterprise subscriber, you can access similar functionality using Dynamo for Revit.

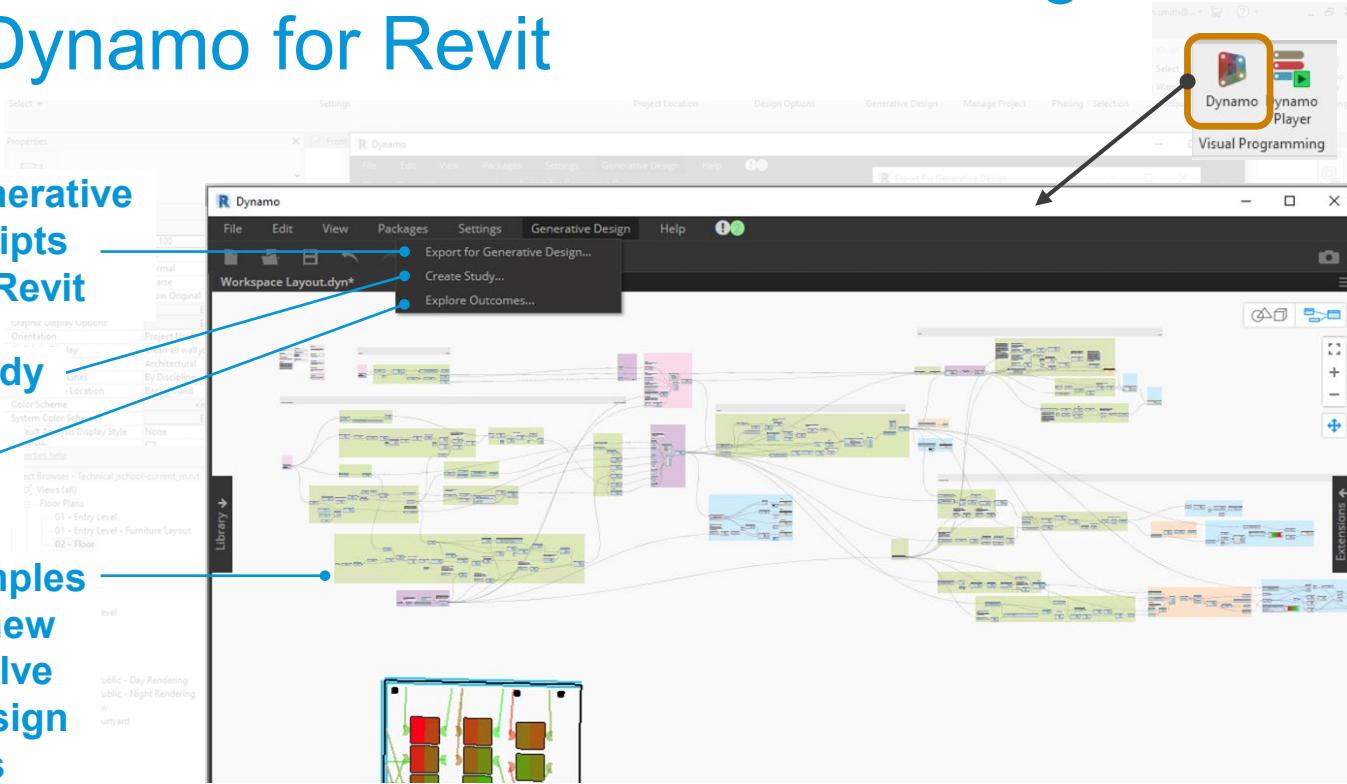
# All users can access Generative Design from Dynamo for Revit

Export generative design scripts for use in Revit

Create Study

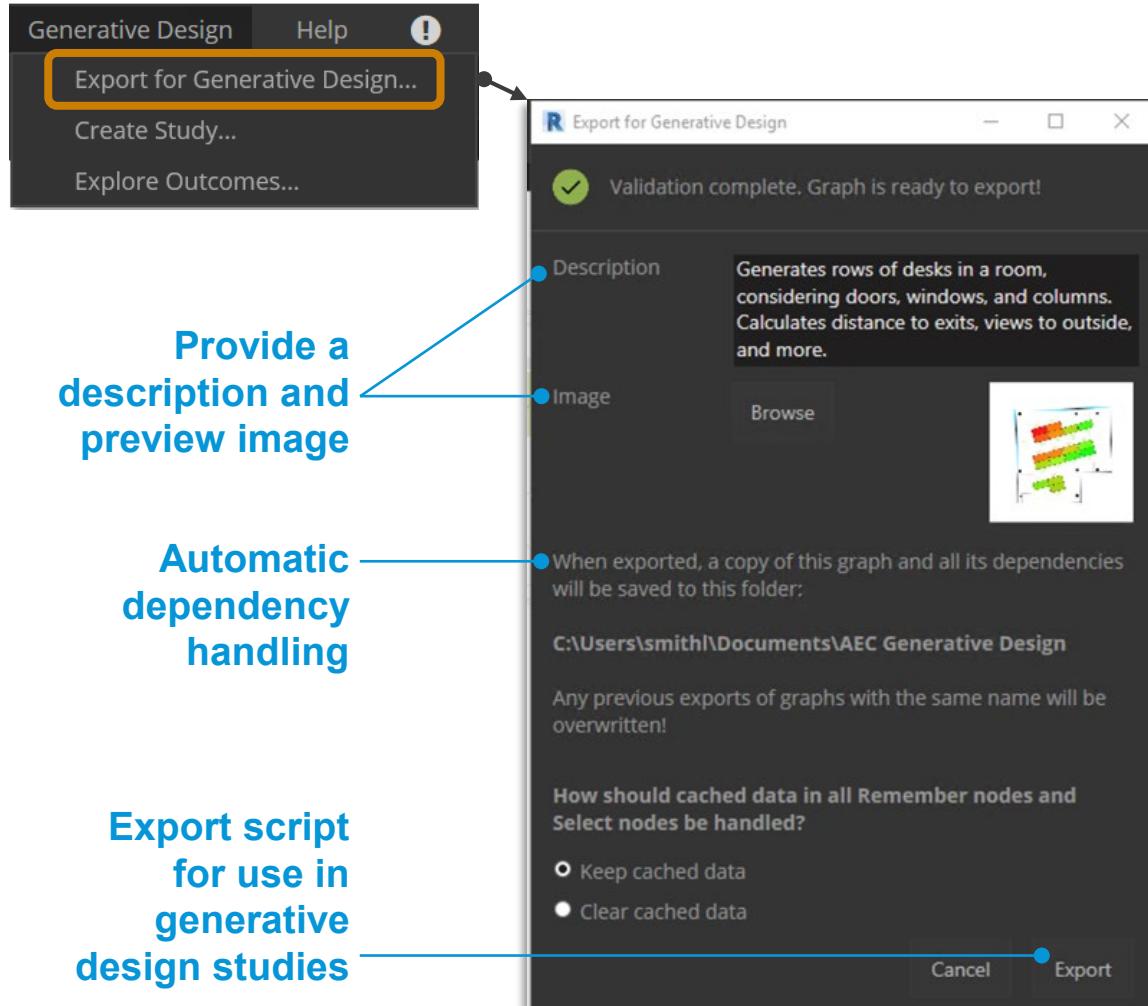
Explore Outcomes

Tweak samples or create new logic to solve unique design challenges

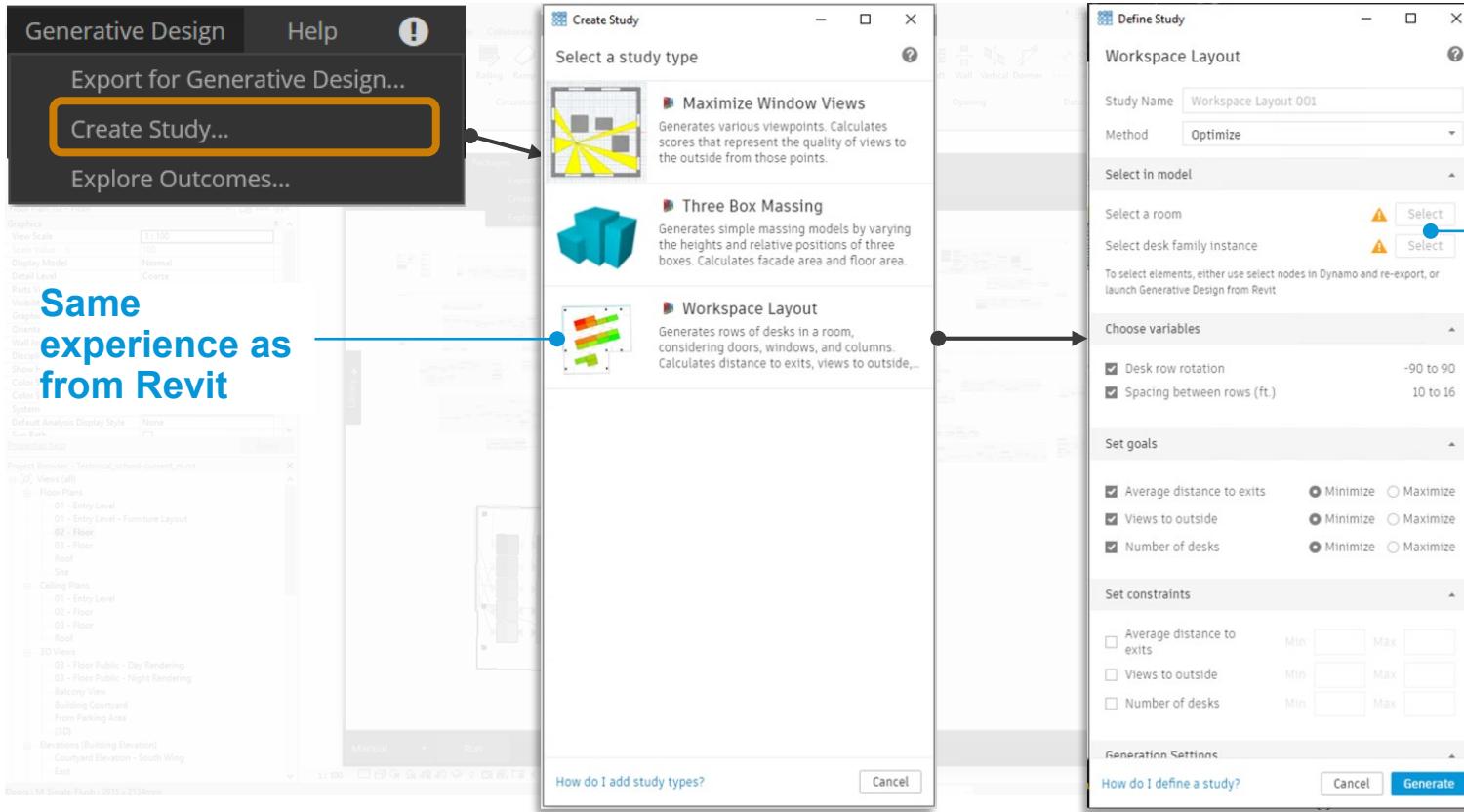


# Export for Generative Design from Dynamo for Revit

From Dynamo, export new or updated scripts for use with Generative Design in Revit



# Dynamo access to Create and Define Study



Revit help:  
[Workflow:](#)  
[Generative Design](#)

# Dynamo access to Explore Outcomes

The screenshot illustrates the integration of the 'Explore Outcomes' feature from Revit into the Dynamo environment. On the left, the Revit interface shows the 'Generative Design' ribbon tab selected. In the center, the 'Explore Outcomes' dialog box is open, displaying a grid of workspace layouts and their corresponding analysis results. On the right, the Dynamo workspace is visible, showing the generated outcomes and their associated data. A blue callout highlights the 'Explore Outcomes...' button in the ribbon, and another blue callout highlights the 'Open in Dynamo' button in the bottom right corner of the dialog box.

**Same Explore experience as from Revit**

**EXCEPT**  
**no creation of**  
**Revit elements**  
**from UI - Open**  
**in Dynamo**  
**instead**

# Summary of Generative Design features by license

Feature	Revit Standalone	AEC Collection or Enterprise
Create Study, Explore Outcomes from Revit ribbon	✗	✓
Select Revit elements via Generative Design interface	✗	✓
Create Revit elements via Generative Design interface	✗	✓
Sample study types	✓	✓
Export to Generative Design from Dynamo	✓	✓
Create Study, Explore Outcomes from Dynamo	✓	✓
Online help	✓	✓

# Generative Design Learning Content

## Revit Help

The screenshot shows the Autodesk Revit 2021 Help interface. The left sidebar contains navigation links for Generative Design, including 'Add a Study Type'. The main content area is titled 'Add a Study Type' and provides instructions for creating study types in Revit using Dynamo. It includes a list of requirements for the graph and steps for exporting the study type.

**Add a Study Type**

From Dynamo, you can make more study types for use with Revit Generative Design.

For information about the sample study types provided with the Revit installation, see [Sample Study Types](#).

Adding a study type is typically performed by someone who is familiar with Dynamo for Revit. See [Revit Generative Design for the Dynamo Author](#).

**To add study types to the Create Study dialog in Revit**

1. Use Dynamo for Revit to create and test the graph.  
The graph must follow specific rules for use with Revit Generative Design.
  - Inputs and outputs have unique names.
  - Inputs are set to "ISInput".
  - Outputs are set to "ISOutput".
  - Additional requirements are satisfied. For complete details, see [Generative Design Primer: Setting up a Graph](#).
2. In Dynamo for Revit, click Generative Design > Export for Generative Design.
3. In the dialog, complete the fields to provide a description and an image.  
This information appears in the Create Study dialog in Revit to describe the study type.
4. Click Export.  
The graph is exported to the folder indicated in the dialog, along with any dependencies needed to run it. As long as the graph resides in that folder, it appears as a study type in the Create Study dialog.

The Dependencies folder contains the following files, which you can update directly if needed.

- info.json: the study type description that appears on the Create Study dialog
- study\_type.png: the thumbnail image that appears on the Create Study dialog

5. Share the study type with team members.

If other team members want to use the new study type, send them the exported DVN file and its Dependencies folder.

## Generative Design Primer

The screenshot shows the 'Generative Design Primer' website. The left sidebar has a navigation menu with sections like 'Introduction to Generative Design', 'Generative Design', 'What is Generative Design?', 'Why Should I Use Generative Design?', 'What Goes Into a Generative Design Process?', 'Examples of Generative Design', 'Anatomy of a Good Generative Design Process', 'Visual Programming', 'Dynamo', 'Refinery', and 'Deeper Dive into Generative Design'. The main content area is titled 'Generative Design' and discusses what generative design means in relation to AEC. It lists topics such as 'What is Generative Design?' and 'What Goes Into a Generative Design Process?'. Below this is a detailed diagram of a building complex with various colored areas representing different performance metrics. A legend at the bottom right defines these metrics: Views (blue), Variety (orange), Solar Gain (green), Yard Size (yellow), Program (red), Cost (purple), and Profit (pink). The diagram is labeled 'design ID: 66-122'.

**Generative Design**

In this section, we'll look at what the term `generative design` means in relation to AEC.

We will look at the following:

- What is Generative Design?
- Why Should I Use Generative Design?
- What Goes Into a Generative Design Process?
- Examples of Generative Design

**design ID: 66-122**

Views	Variety	Solar Gain	Yard Size	Program	Total Cost	UVH Index	Profit
0.4	6	0.3	4.2	1.1	\$5,760,696.54	891.483.81	
input1: 0	0.5000000000000001	0.44077682	3.44577682	0.428672159	0.442617629		

Massing analysis - Alkmaar Housing Commission - The Living



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