



BIM CON
CFIA 2024



Colegio Federado de Ingenieros y de Arquitectos de Costa Rica

AI In Action

Elevating Everyday Tasks for Architects, Engineers, and Contractors



SECTOR AECO: **A**RQUITECTURA
INGENIERÍA
CONSTRUCCIÓN
OPERACIONES

Learning Objectives

1. Understand why A.I. skills are necessary to stay ahead in the AEC landscape.
2. Discover techniques for using A.I. to enhance the rendering process, saving time and resources.
3. Learn how to effectively leverage AI for project ideation and innovation.
4. Explore the practical application of A.I. in automating construction documents and streamlining workflows for increased efficiency.



Why Are AI Skills Necessary To Stay Ahead In the AEC Landscape?

OPCIÓN DE FONDO

Where are we at?

1972

1982

2012

2020

2023

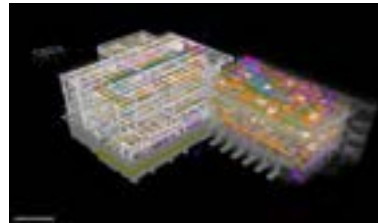
2024



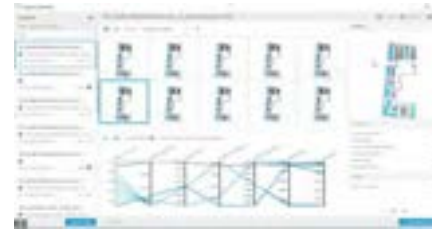
Hand Drafting



Computer Aided Design



Building Information
Modeling



Building Information
Optimization



Artificial Intelligence
Machine Learning

"It's not AI that is going to take your job, but someone who know how to use AI might"
-**Richard Baldwin**, Economist and Professor





Techniques For Using AI To Enhance The Rendering Process

OPCIÓN DE FONDO

The Problem With Traditional Rendering



Text to Image



Text Prompt: Architecture
Perspective of modern skyscraper
with 47 stories in New York City Bronx
with undulating parametric wood
facade backlit with blue lights.

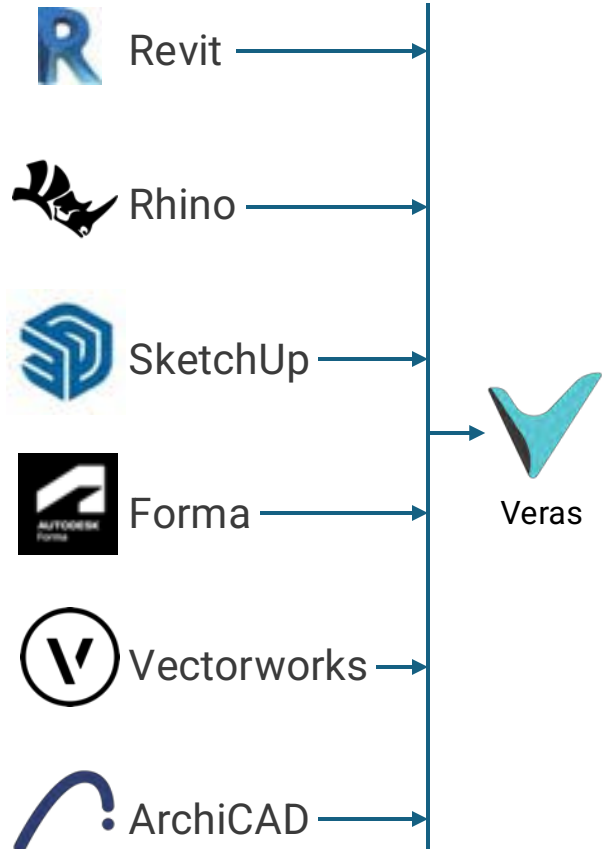


The Problem With Text To Image...

- No Context
- No Site Plan
- No Feasibility
- No Setbacks
- No Space Program
- No Code Study

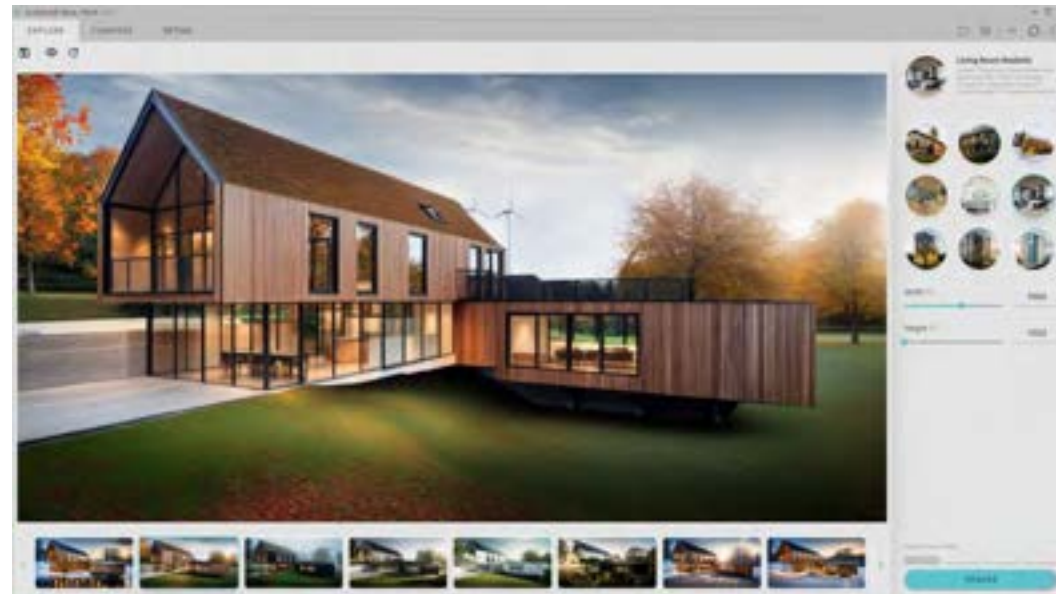
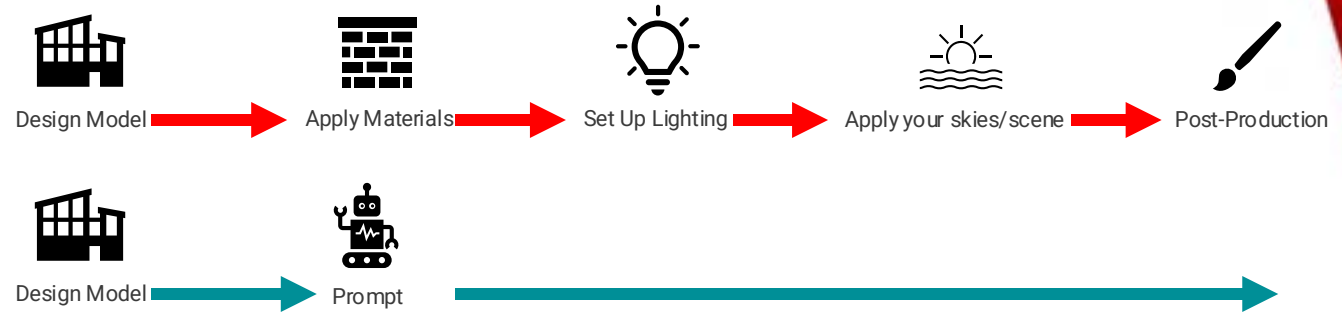
Not Your Project

Use Your Model As a Substrate For AI



AI Expedites The Process

- Uses your actual project
- Tell the AI what materials you want
- Tell the AI what season you want
- Prompt what Lighting/Shading you want
- Typically, no post-production needed



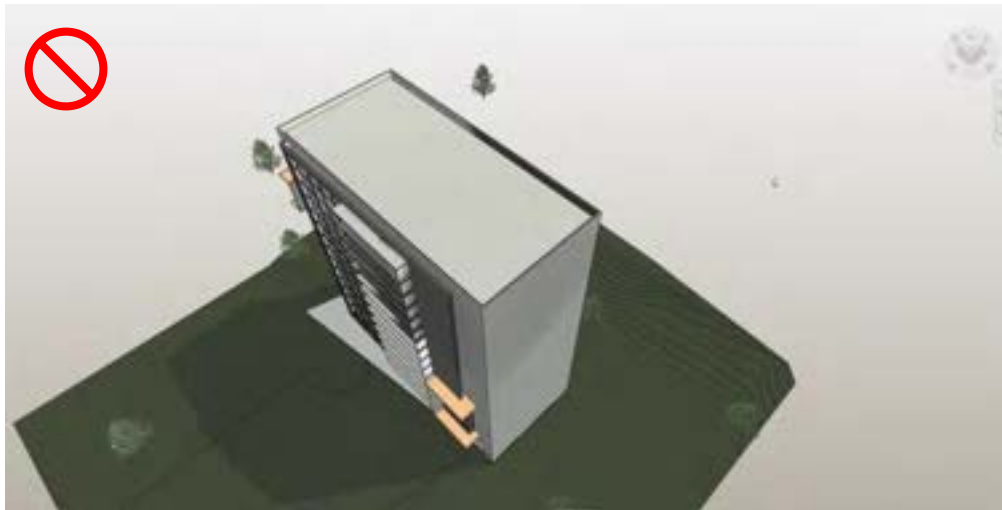


AI Do's and Don'ts

Camera Position

The camera view that frames the shot is correlated to the prompt & quality of the output. For example, if the camera is set to a really obscure angle, this constraints what the prompt can interpret, as less ML data would be trained on images for such angles. A good though is to frame the shot a way a photographer would, as there is more data on this framing:

- Straight on shots
- Horizon to be shown
- Closer to 2-point perspective, instead of 3-point perspectives
- Do not use a super wide field of view or highly distorted views



Sky

Foreground

Text Prompt Engineering



- The **Subject** is the core **idea** behind the image.
- The **Aesthetic** of artwork - **oil painting, 3d rendering, photography, cinematic shot, etc.**
- The **Style and details** **Ornate details, minimal, monolithic, rustic, modern, etc.**
- The **Names of Artists** whose unique aesthetic styles you might want to mimic. For example, you can add phrases like "in the style of Van Gogh", "in the style of Akira Kurosawa", "Studio Ghibli"
- **Lighting and Color Palette** such as **dark lighting, muted color palette, vibrant, saturated, etc.**
- **Additional Details** such as **names of cameras, names of rendering techniques, rendering engines, and resolution** can also be included depending on the vision of the artist.
- The **Weather** such as **Sunny, overcast, blizzard, rain**
- The **Season** – **Summer, Winter, Spring, Autumn**



Example: cinematic shot, parametric building in style of Zaha Hadid, golden hour, unreal engine, 4k, Sunny, Summer

Statement Composition

Statements should be separated by commas to denote separate ideas.

Don't	Do
a living room with a black sofa and a brown carpet	living room, black sofa, brown carpet
	

Prompt What You Want, not what you don't

There is no “session persistence”, so avoid prompting what you don't want and any comments on past images

Don't	Do
“Make more glass”	“building with a lot of glass”
“Remove bricks”	“Building with curvy wood façade”
“Erase sky and replace with night shot”	“day time rendering of beautiful building”



Clarity

It's good to keep the prompt clear & concise, instead of vague and open to interpretation

Don't

“timber construction”



Do

“timber building”



Weights and Biases

Put a paratheses around a word or prompt to give further weight to that statement in the rendering

Don't	Do
“award winning rendering of modern building during winter, blizzard, snow storm”	“award winning rendering of modern building during winter, ((((((blizzard)))))), ((((((snow
	

Prompt Order Matters

The text that is in the beginning of the prompt automatically receives more attention from the AI.

Don't	Do
<p>Include elements like cherry blossoms, neon signs, and hovering vehicles to add dynamic energy to the scene. The buildings should have exaggerated, stylized features, with bold colors and dramatic lighting to emphasize the contrast between old and new. The overall composition should feel lively and bustling, with characters in the foreground interacting with their environment perhaps crossing a busy intersection or enjoying a rooftop view. Vibrant anime-style illustration of a futuristic cityscape with a mix of traditional Japanese architecture and ultra-modern skyscrapers. The city should feature towering, glass-clad buildings with sleek, angular designs, alongside traditional pagodas and shrines that have been integrated into the urban landscape.</p>	<p><i>Vibrant anime-style illustration of a futuristic cityscape with a mix of traditional Japanese architecture and ultra-modern skyscrapers. The city should feature towering, glass-clad buildings with sleek, angular designs, alongside traditional pagodas and shrines that have been integrated into the urban landscape. Include elements like cherry blossoms, neon signs, and hovering vehicles to add dynamic energy to the scene. The buildings should have exaggerated, stylized features, with bold colors and dramatic lighting to emphasize the contrast between old and new. The overall composition should feel lively and bustling, with characters in the foreground interacting with their environment perhaps crossing a busy intersection or enjoying a rooftop view.</i></p>




You can Prompt different Render Styles



Craft Image With Prompt Building

- 1. Start with a simpler prompt of the subject
- 2. Test the prompt with at least 4 renders
- 3. Gradually add other parts of the prompt anatomy: mood, weather, style
- 4. Test again with 4 renders between each new comma-separated statement



Modern Building	Modern Building with red brick and large glass windows	award winning cinematic image of a modern building, red brick facade and large glass windows	award winning cinematic image of a modern red brick building, large glass windows designed in the style of Zaha Hadid, golden hour
			

Using Chat GPT To Assist With Prompting

Ask Chat GPT for a prompt with the attributes that describe your idea

Can you give me an architecture text prompt for an AI generator in the style of anime?

< 2/2 >

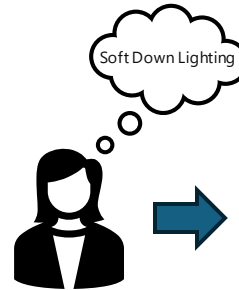
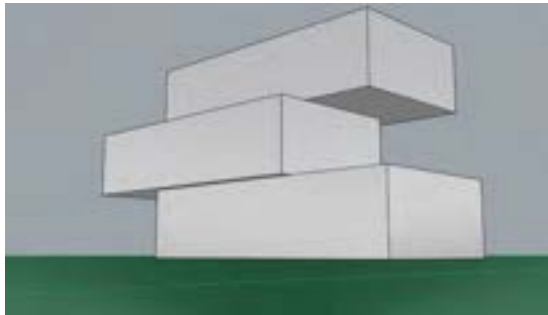
Certainly! Here's a text prompt for generating an architectural image in the style of anime:

"Design a vibrant, futuristic cityscape in anime style, featuring towering skyscrapers with sleek, flowing lines and bold, dynamic shapes. The buildings should have large, glowing windows and neon signs in various bright colors, reflecting the energy and vibrancy of the city. Incorporate a mix of advanced technology and traditional Japanese elements, such as pagoda-inspired rooftops or torii gates integrated into the modern architecture. The streets should be bustling with activity, including detailed shopfronts, flying vehicles, and animated billboards displaying colorful characters and advertisements. The scene should have a dynamic perspective, with a focus on the scale and grandeur of the city, using vibrant, saturated colors and dramatic lighting to enhance the futuristic, anime-inspired atmosphere."



Reverse Prompting

Embrace inspiration from an image to influence future prompts



Text Prompt Examples



Electronic robot building ,unreal engine, cozy outdoor lighting, artstation, detailed, digital painting,cinematic,character design by mark ryden and pixar and hayao miyazaki, unreal 5, daz, hyperrealistic, octane render



Award winning watercolor painting of modern parametric building, rounded overhang balconies, rounded edges, golden hour, autumn, colorful leaves, city background



Cinematic 4k rendering of beautiful container house, large glass windows, graffiti art, urban city background, grunge, wet pavement, raining

Different Perspectives

- Lower Your Geometry/Material Override
- Render From Same Seed



Geometry Override 0

Material Override 0

Width 1472

Height 1024

☒ Is Interior ☐ Is Aerial View

Prompt

award winning images of a modern kitchen with warm finishes, black appliances, dinersware on wood table

Prompt Strength 60

☒ Seed 3820427965

RENDER

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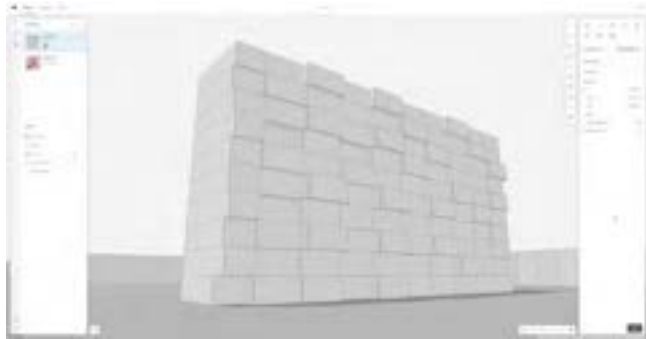
Render views together on a sheet

Drop your views on a sheet with no title block and render them together



Rendering The Same Building In Different Seasons

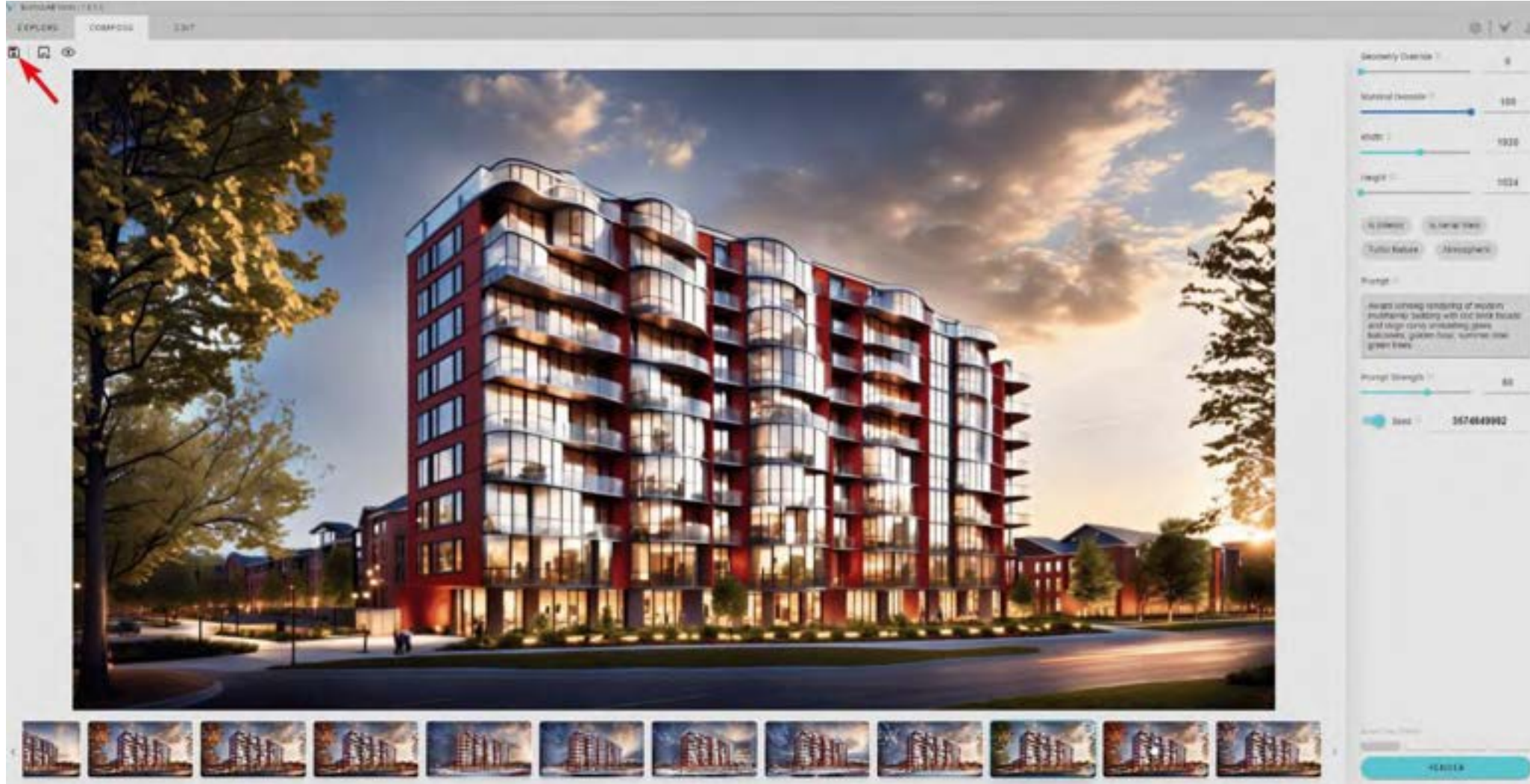
Don't use original model as substrate



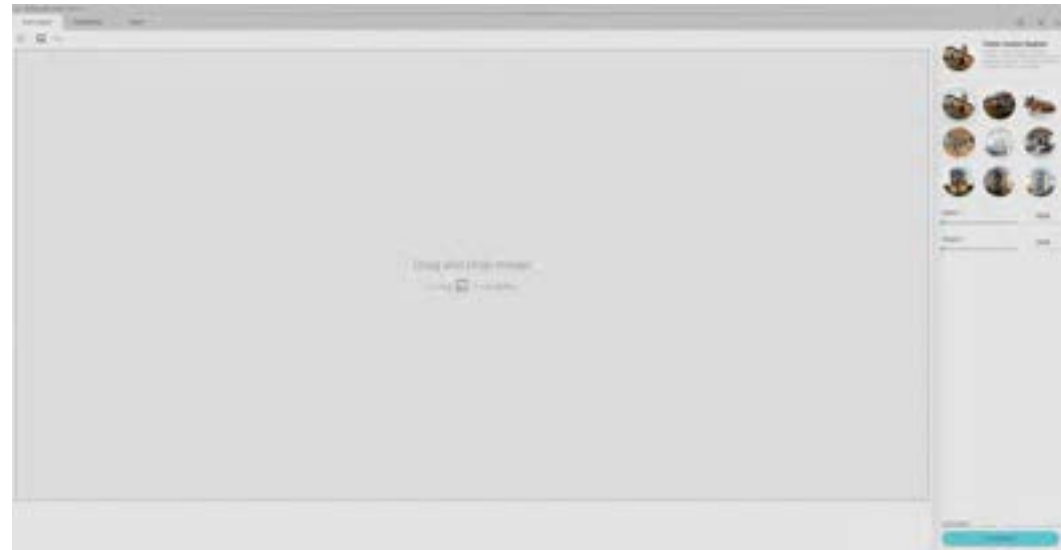
Winter, Fall, Summer, Spring

Step #1 – Save rendered Image to be used in Web

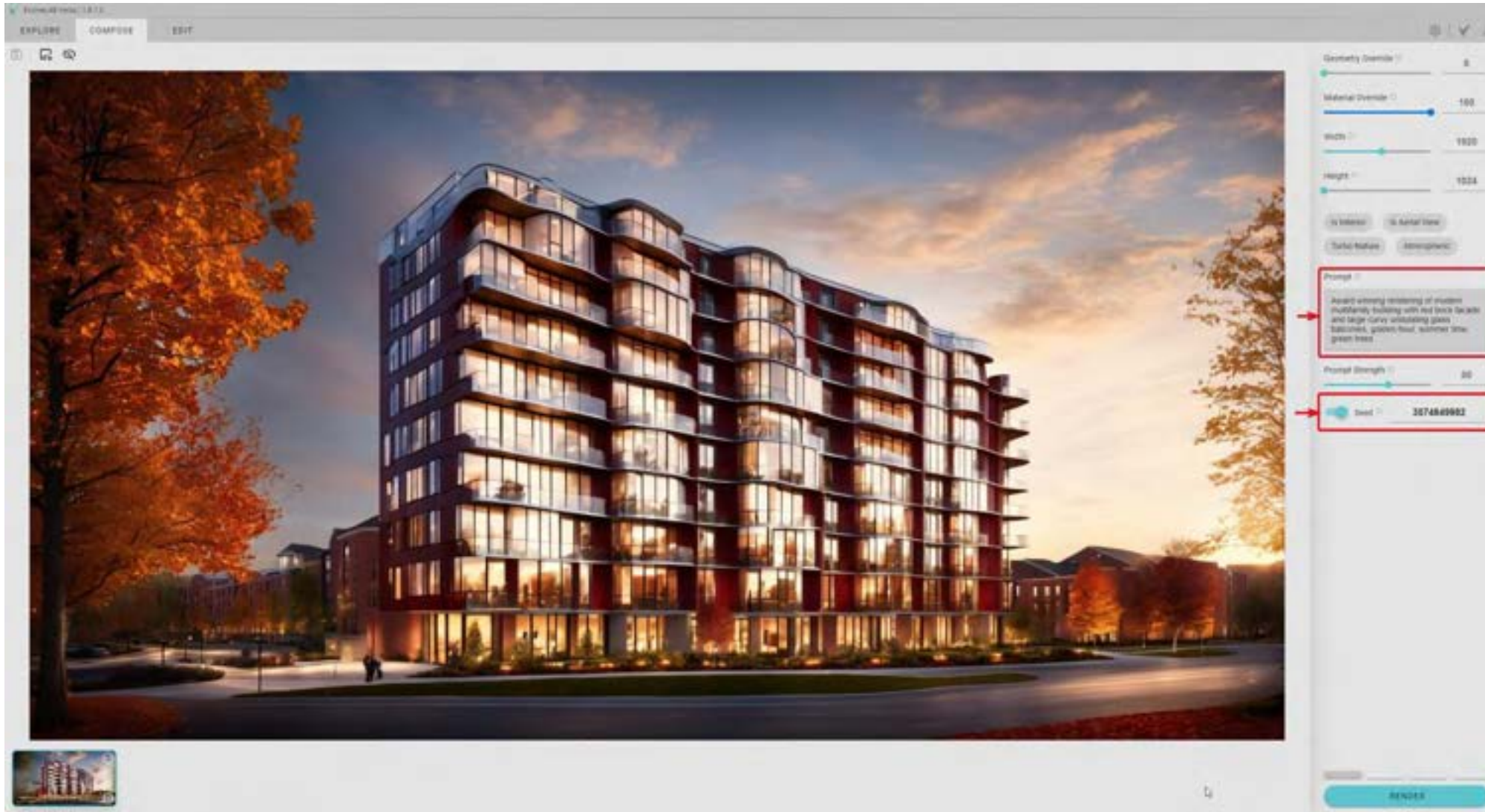
This assures we are using the AI-generated image as the substrate instead of the original model



Step #2 – Launch Web Version and import image



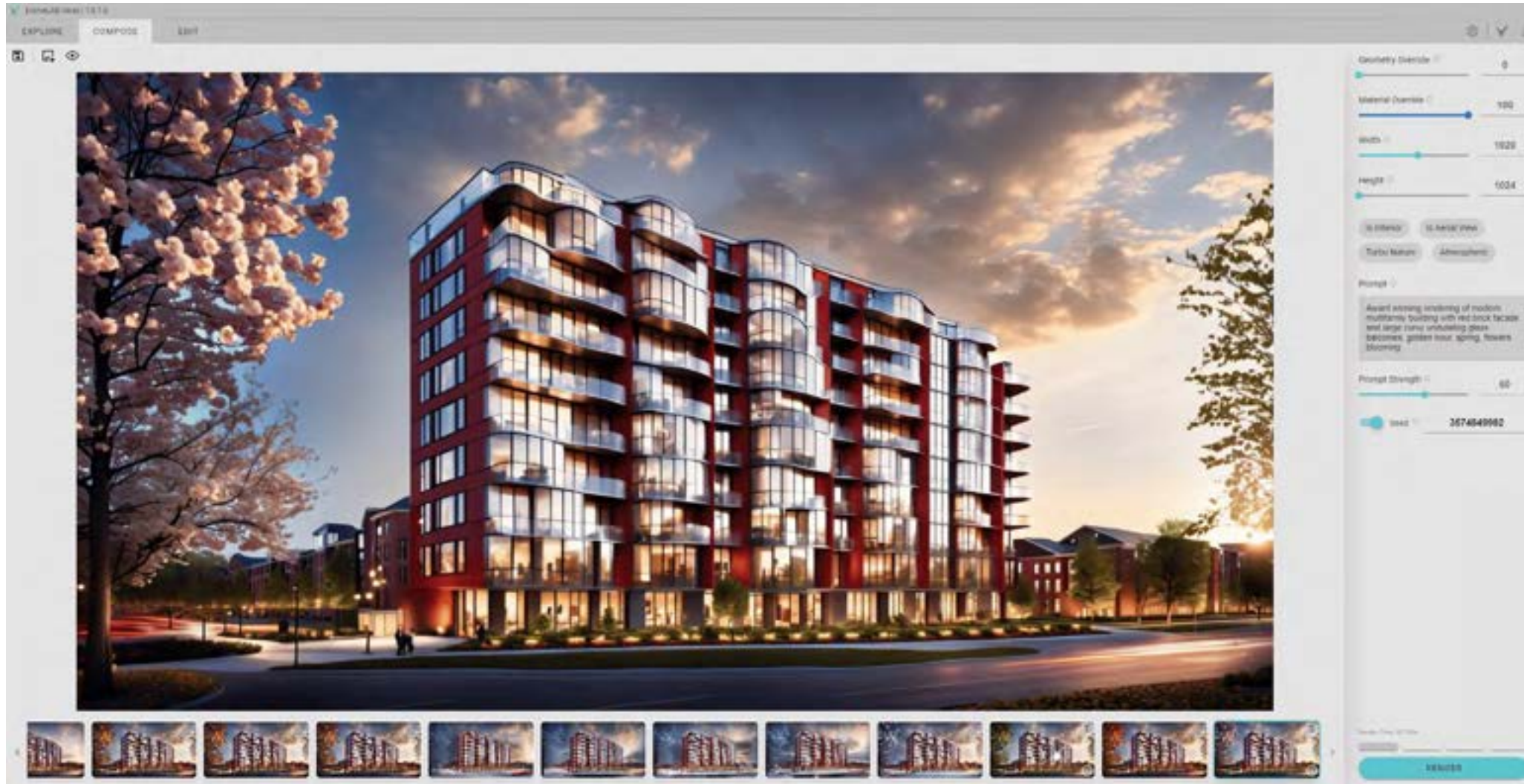
Step #3 – Copy Paste Prompt and Seed



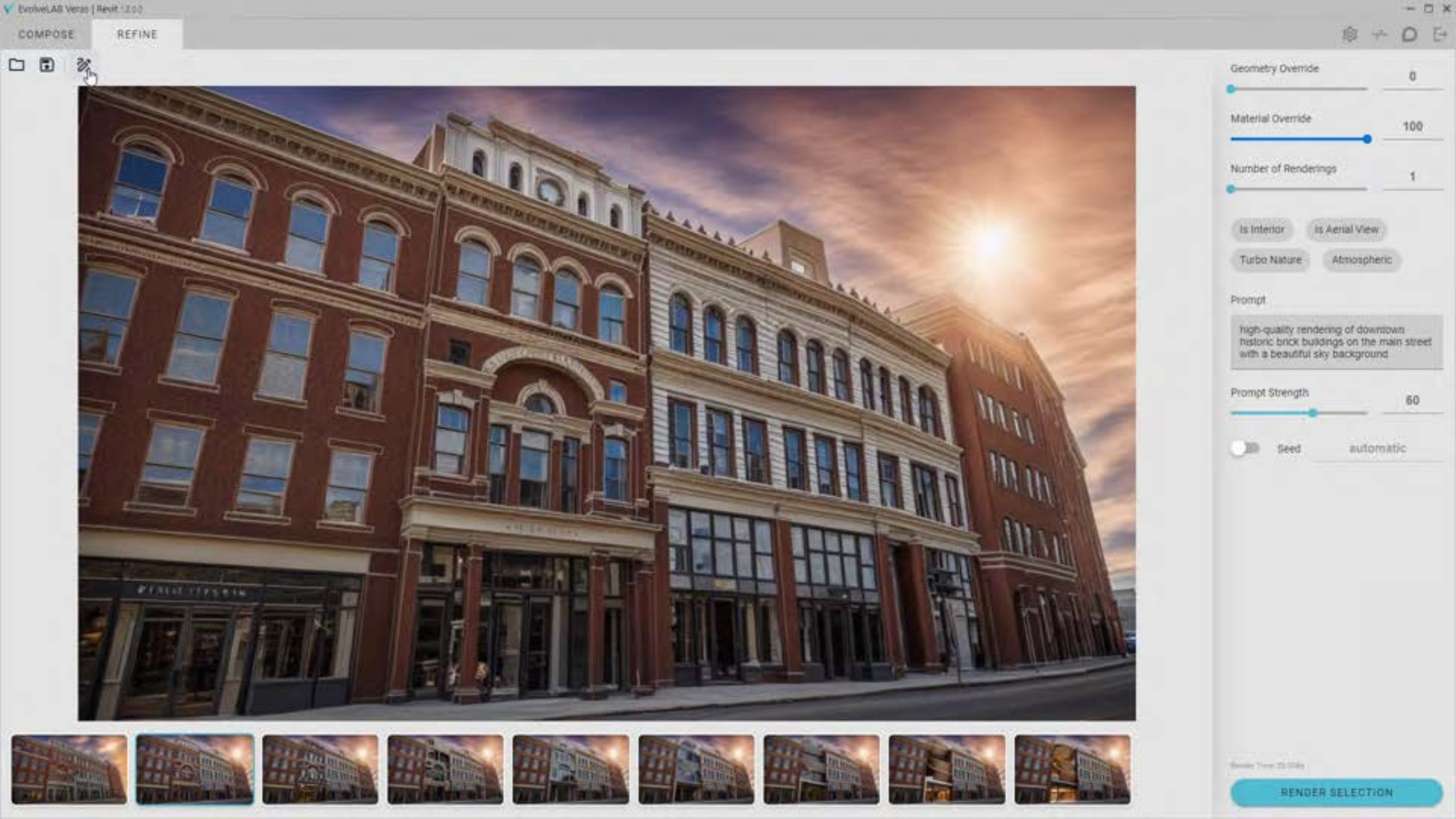
Step #4 – Make sure geometry override is low



Step #5 - Change end of prompt for desired season



Use The Render Selection to re-render
only part of your image



AI Render Selection

Changing the Foreground



AI Render Selection

Changing the Facade



AI Render Selection

Changing the Finishes

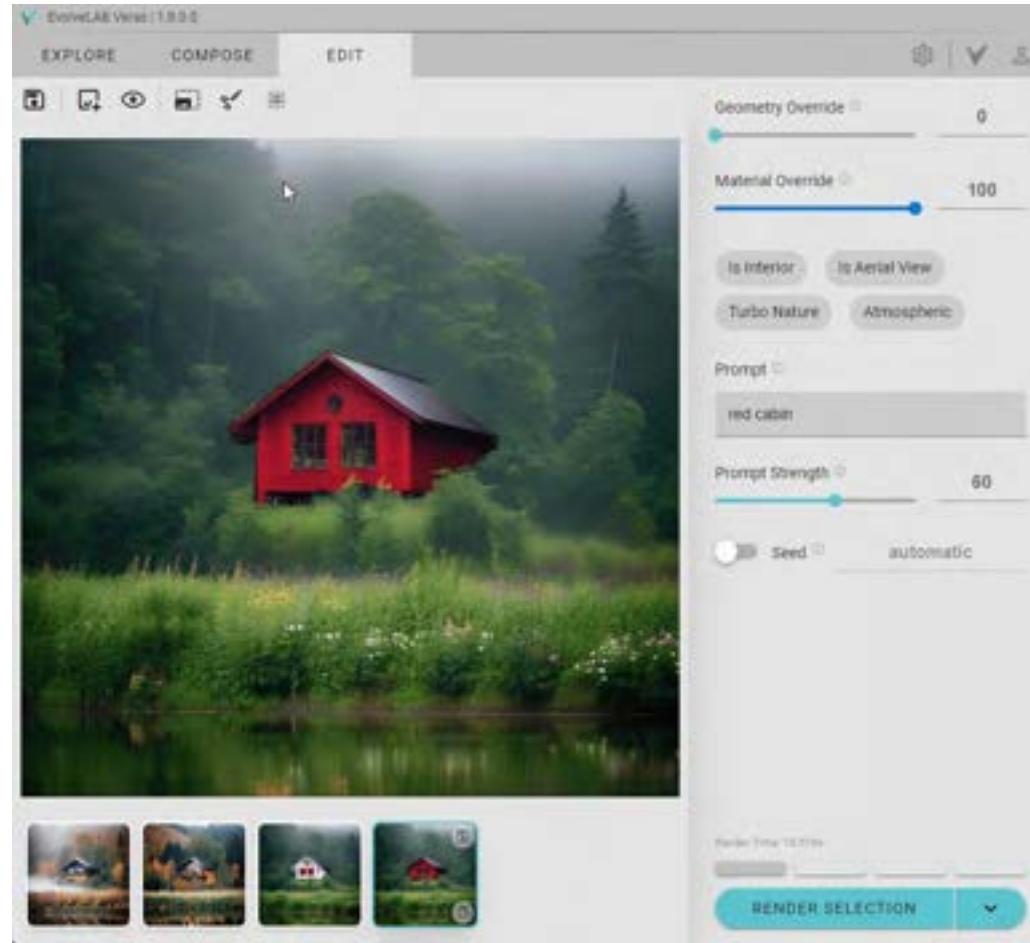
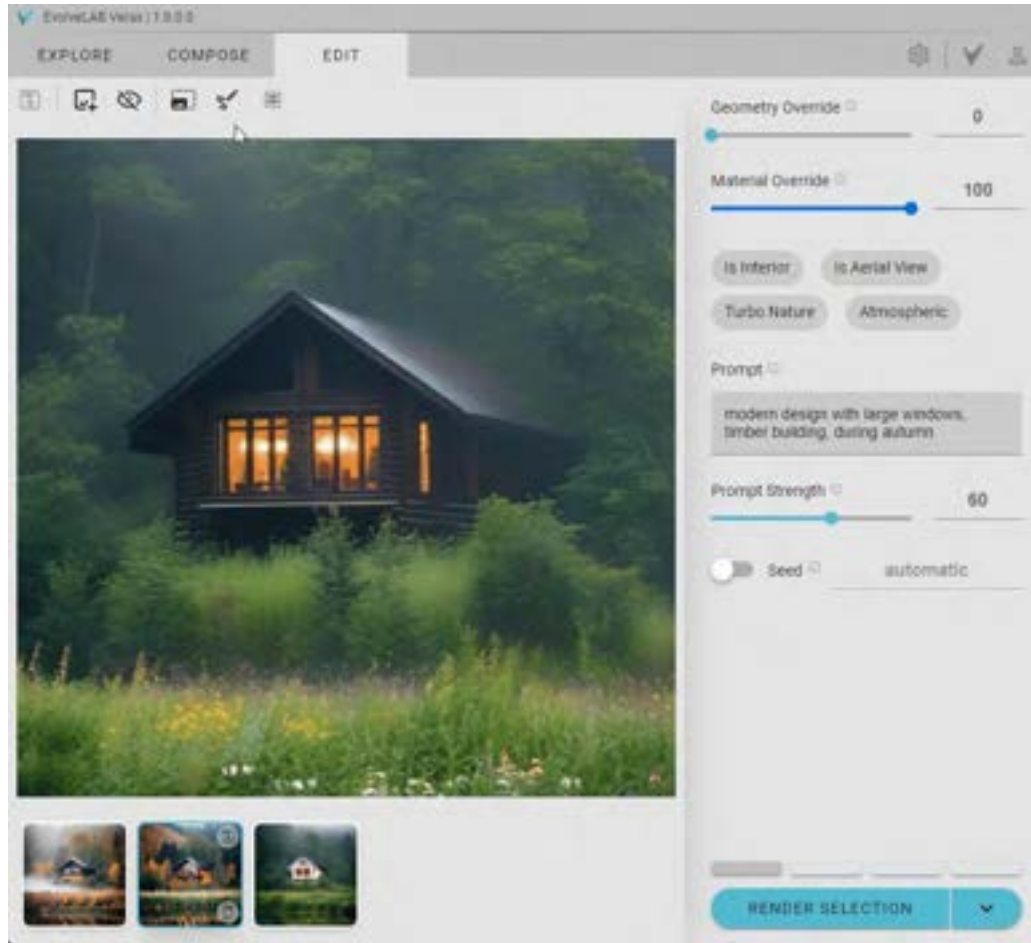


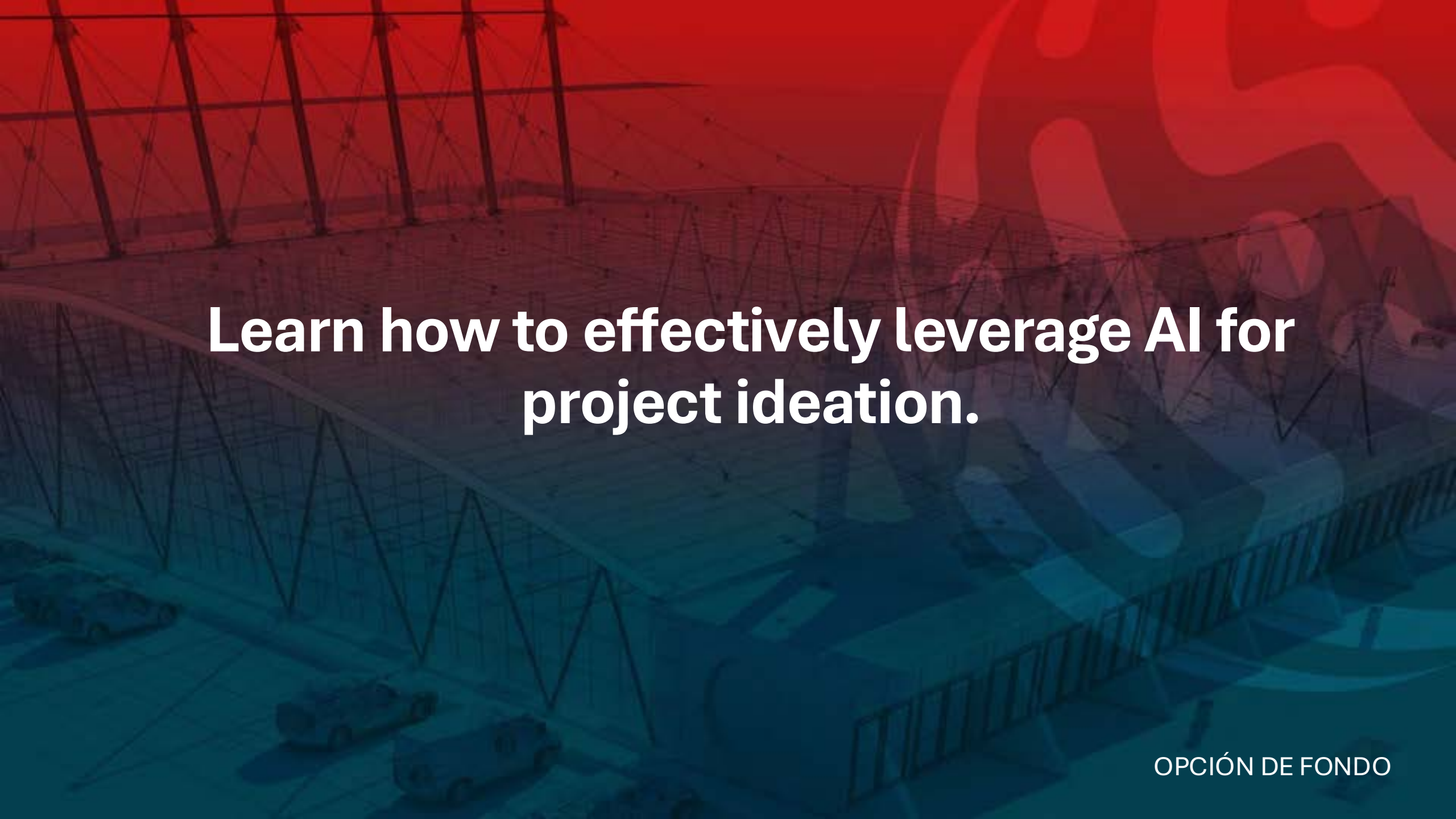
AI Render Selection

Changing the Background



Use the blend tool to blend your render selection



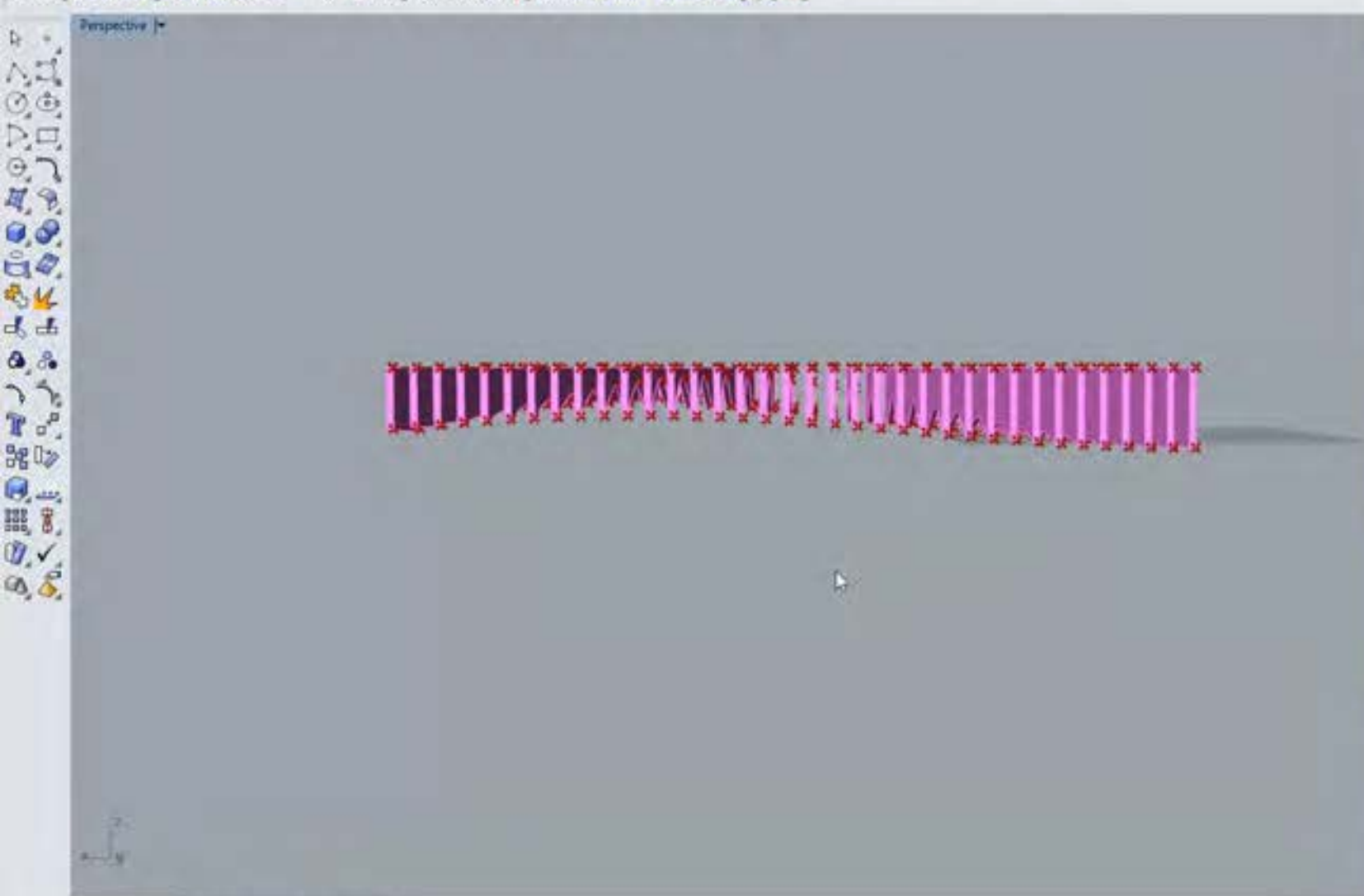


**Learn how to effectively leverage AI for
project ideation.**

OPCIÓN DE FONDO

Command: _Setview
 Choose coordinate system (CPlane: World): _World
 Choose world view (Top Bottom Left Right Front Back Perspective TwoPointPerspective): _Perspective
 Command: _Setview
 Choose coordinate system (CPlane: World): _World
 Choose world view (Top Bottom Left Right Front Back Perspective TwoPointPerspective): _Perspective
 Command:

Standard CPlane Set View Display Select ViewportLayout Visibility Transform Curve Tools Surface Tools Solid Tools Mesh Tools Render Tools Drafting New in V5

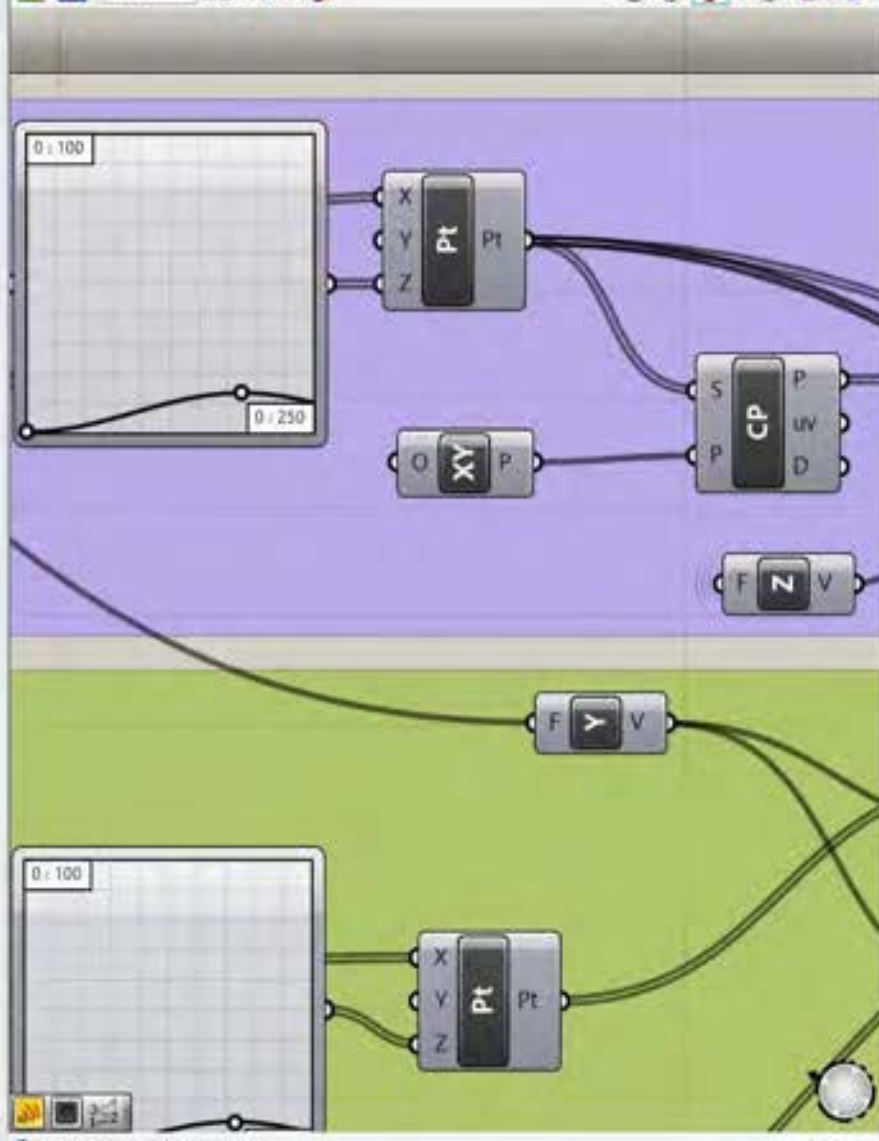


Perspective Top Front Right

CPlane x 115.154 y 437.161 z 0.000 Meters Default Grid Snap Ortho Planar Osnap SmartTrack Gumball Record History Filter Memory use: 289 MB

File Edit View Display Solution Help
 Params Maths Sets Vector Curve Surface Mesh Intersect Transform Display LunchBox Extra
 Hummingbird

156%



Autosave complete (22 seconds ago)

0.0075

Up Geometry Override For Ideation

Decreasing the slider value keeps the geometry closer to the Revit geometry, while increasing the geometry override gives the AI more creative freedom



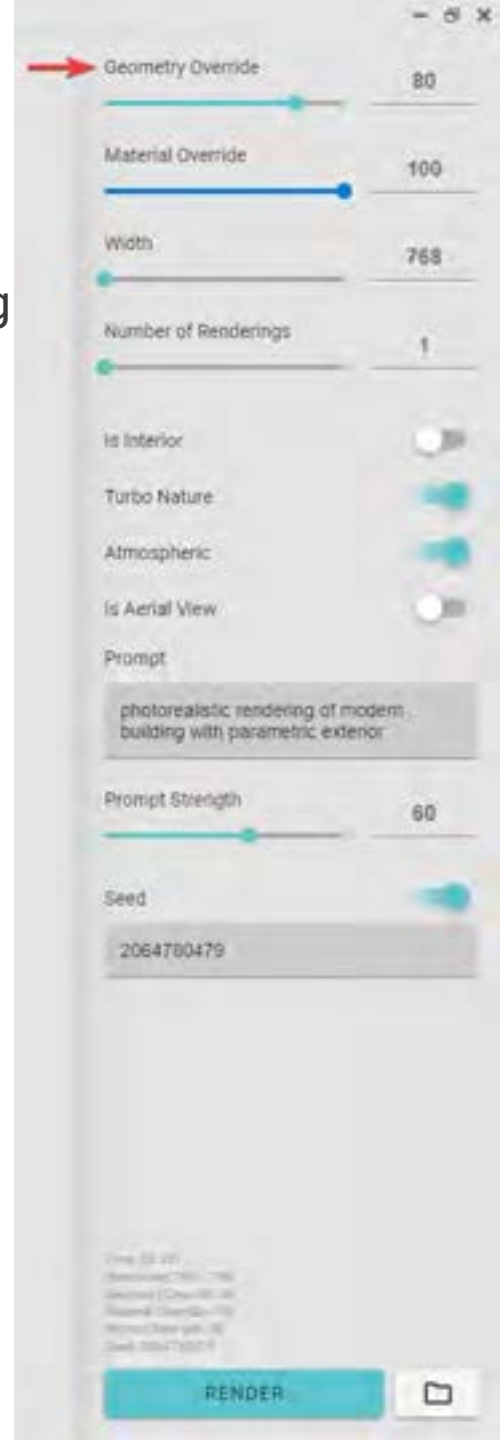
Low Geometry Override

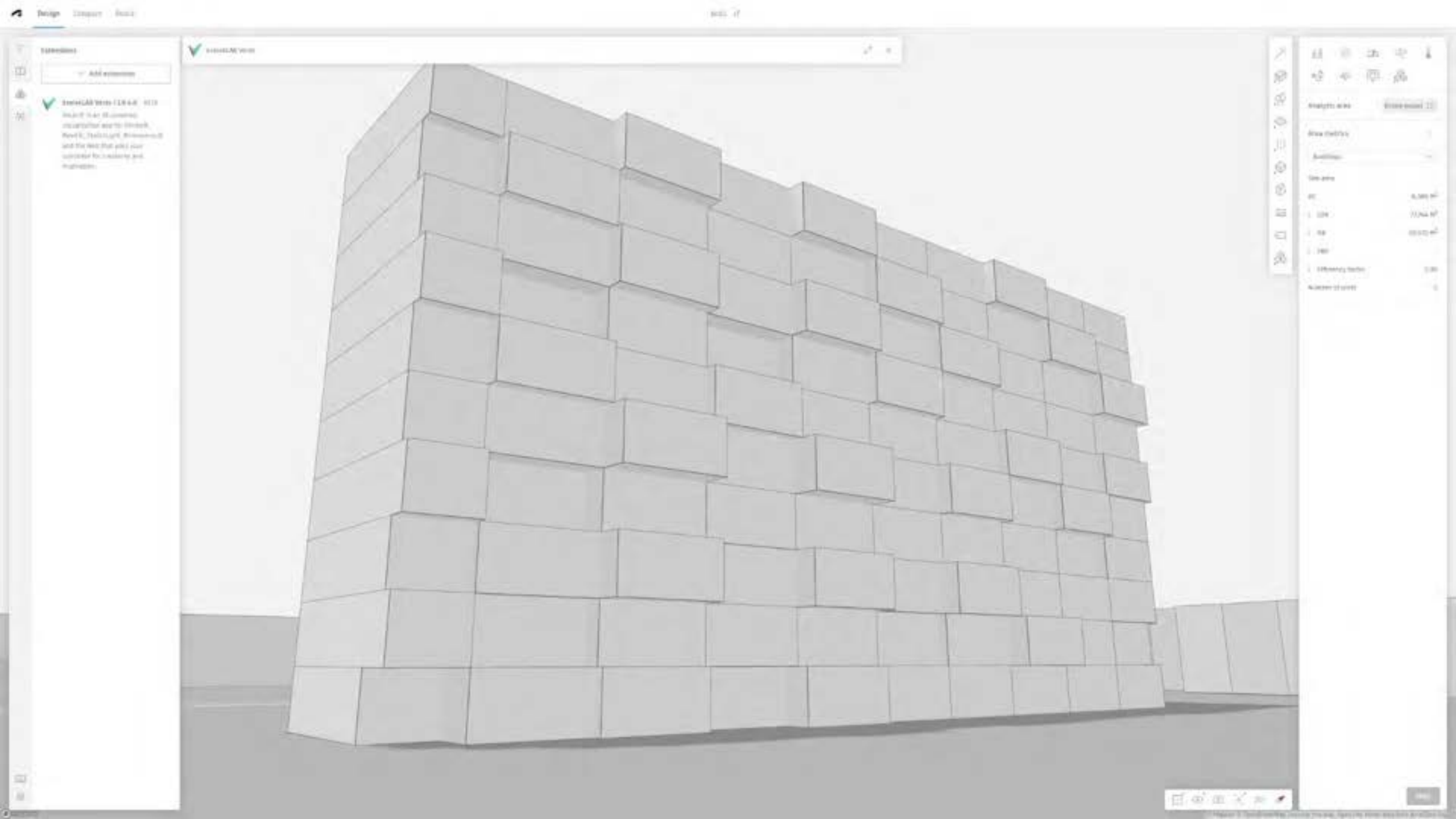


Medium Geometry Override



High Geometry Override





Properties

+

✓ **Brick** (1.0.0) 1013
Material for brick walls, made of red or grey bricks. It is a solid material with a rough texture. It is used for walls, chimneys, and other structures made of brick.

Analysis and **Brick** (1.0.0)

Area (m²) 1013

Volume (m³) 1013

Mass (kg) 1013

Energy (J) 1013

Efficiency factor 1.00

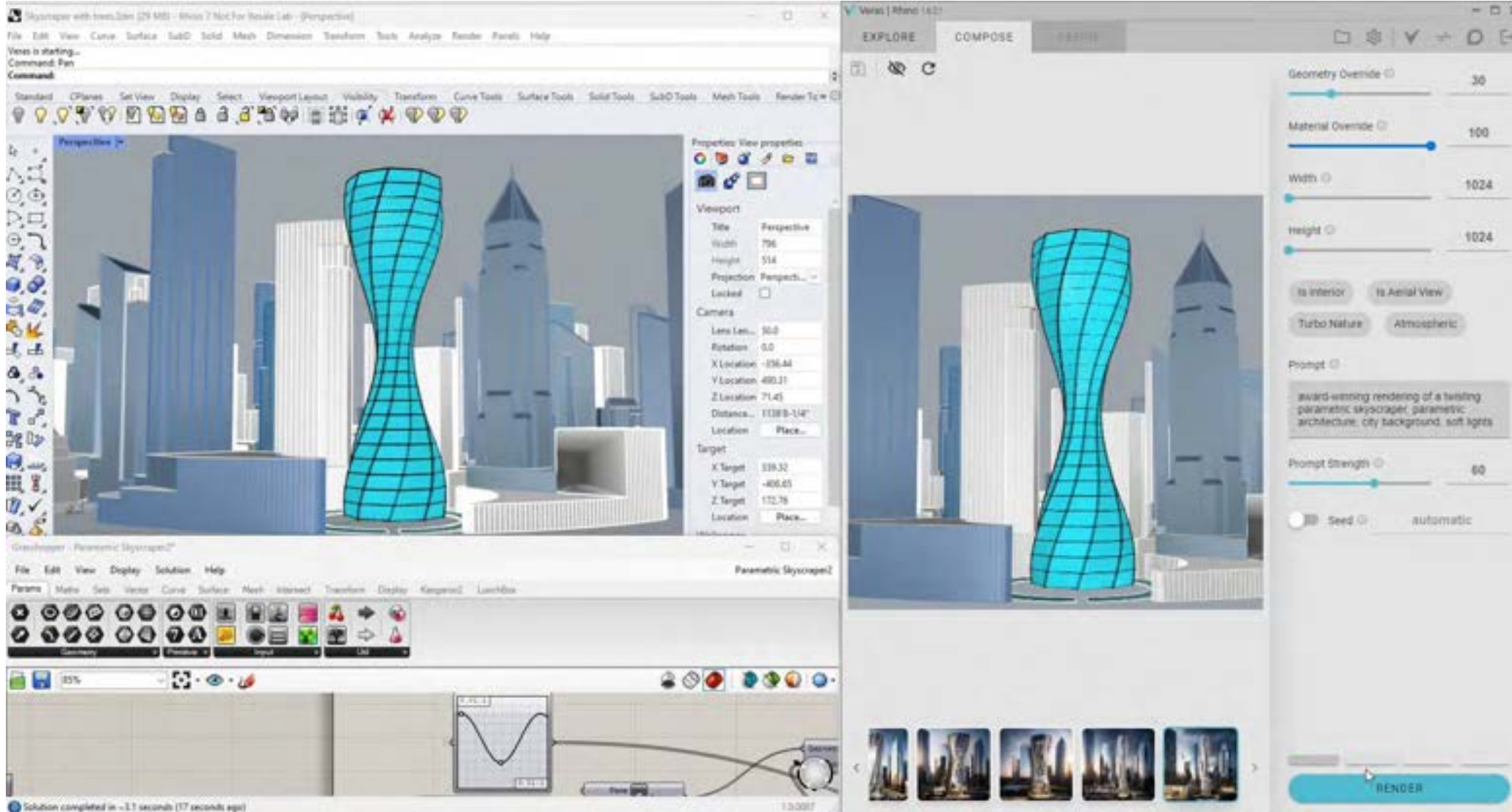
Number of units 1



Parametric Modeling And AI Synergy

Using Computational Design And AI For Ideation

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Animate Your Parametric Model With AI

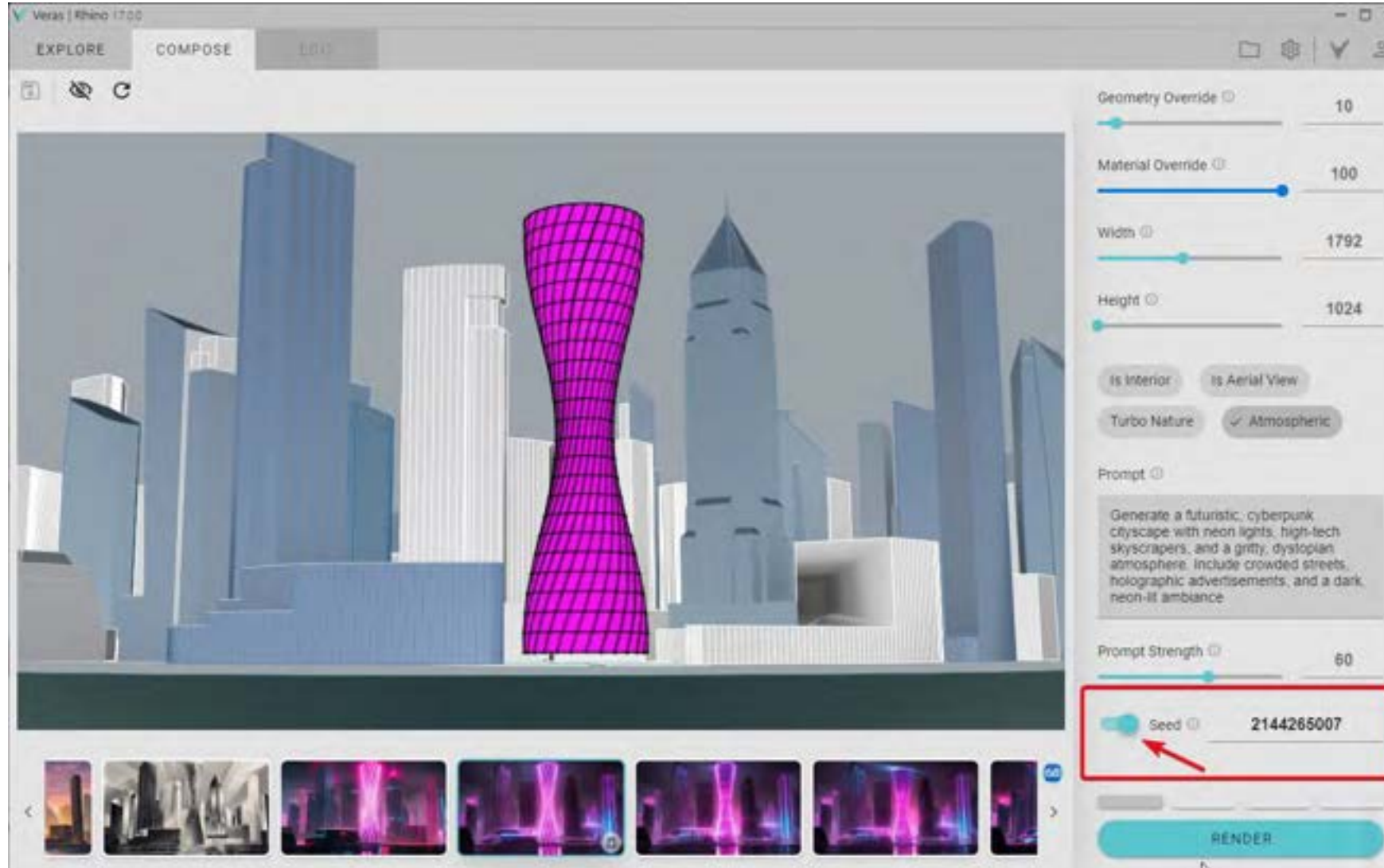
Step your model

Step your model



Step 2

Lock Your Seed



Step 3

Render Your Image



Step 4

Interpolate with Runway



Step 5

Enjoy!



AI Case Studies

Data Center Case Study



Original Image



Veras Image

Data Center Case Study



Original Image



Veras Image



Case Study - My House 😊



Case Study – My Kitchen

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Case Study - My Bathroom



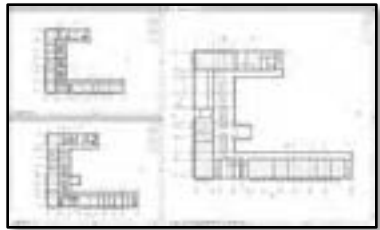


Practical application of AI in automating construction documents

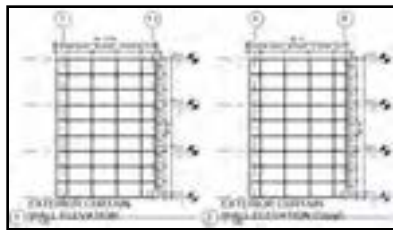
OPCIÓN DE FONDO

The Problem...

Repetitive Mundane Tasks On Every Project



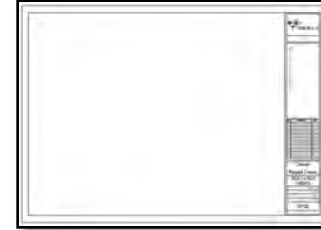
Create Plans



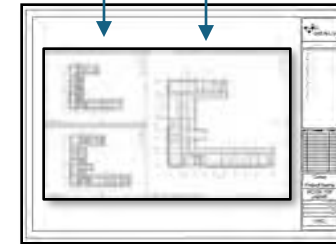
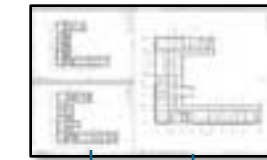
Create Elevations



Tag and Dimension Views



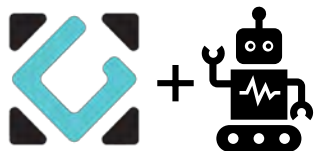
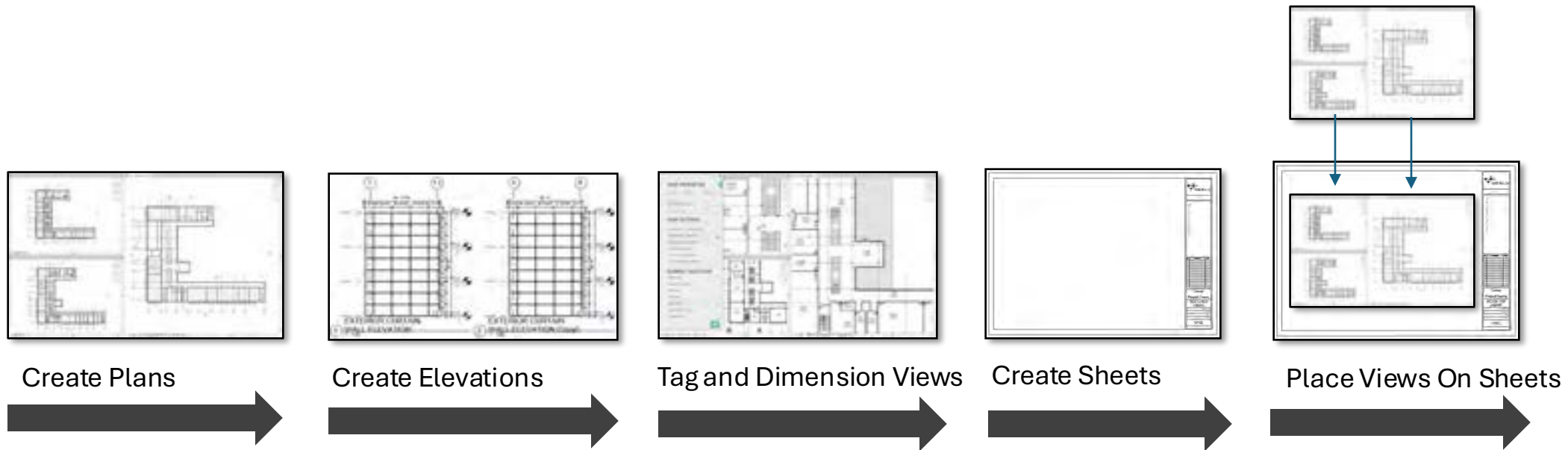
Create Sheets



Place Views On Sheets



Automate Repetitive Mundane Tasks With AI



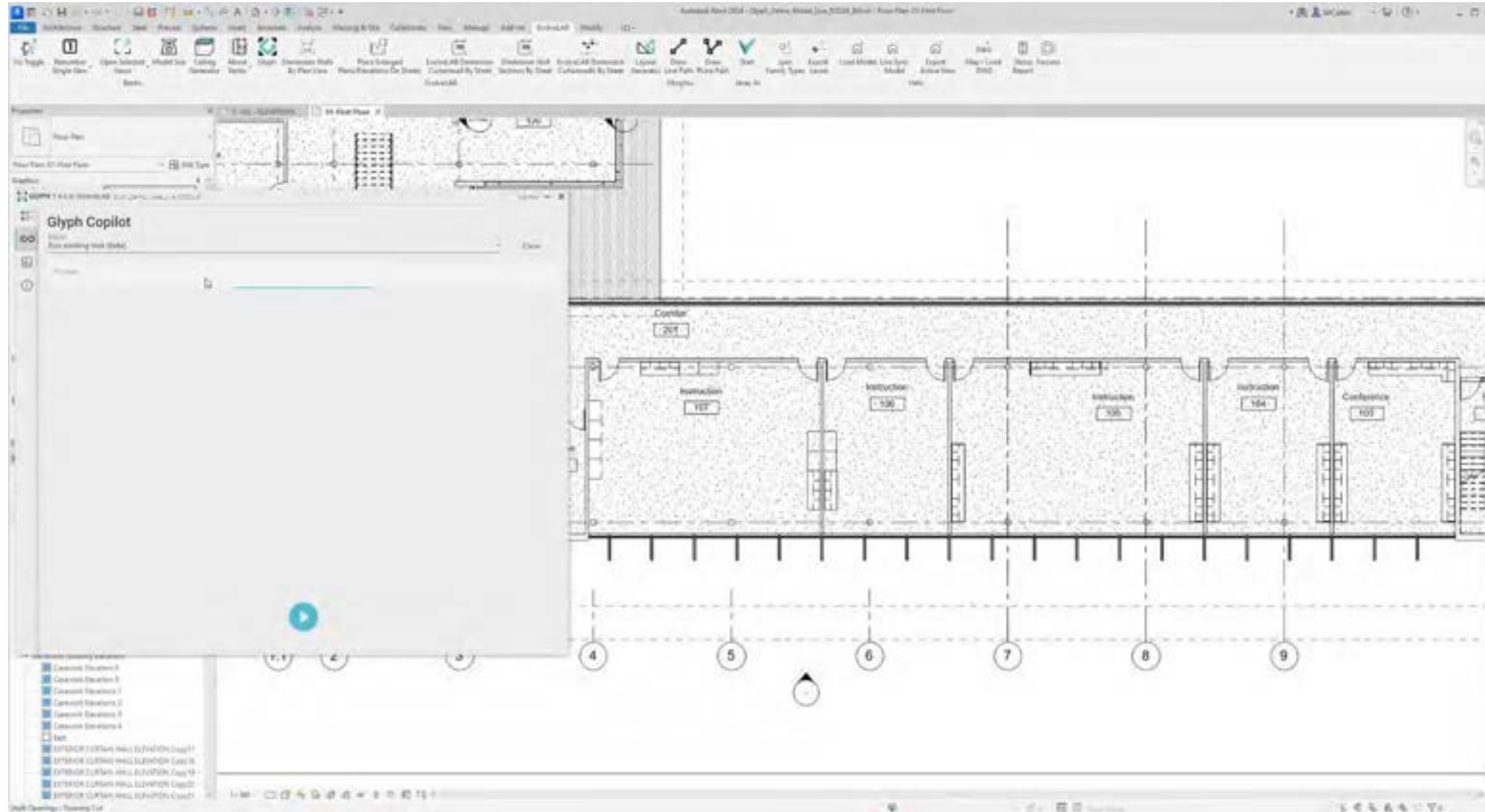
Glyph Copilot

Automate



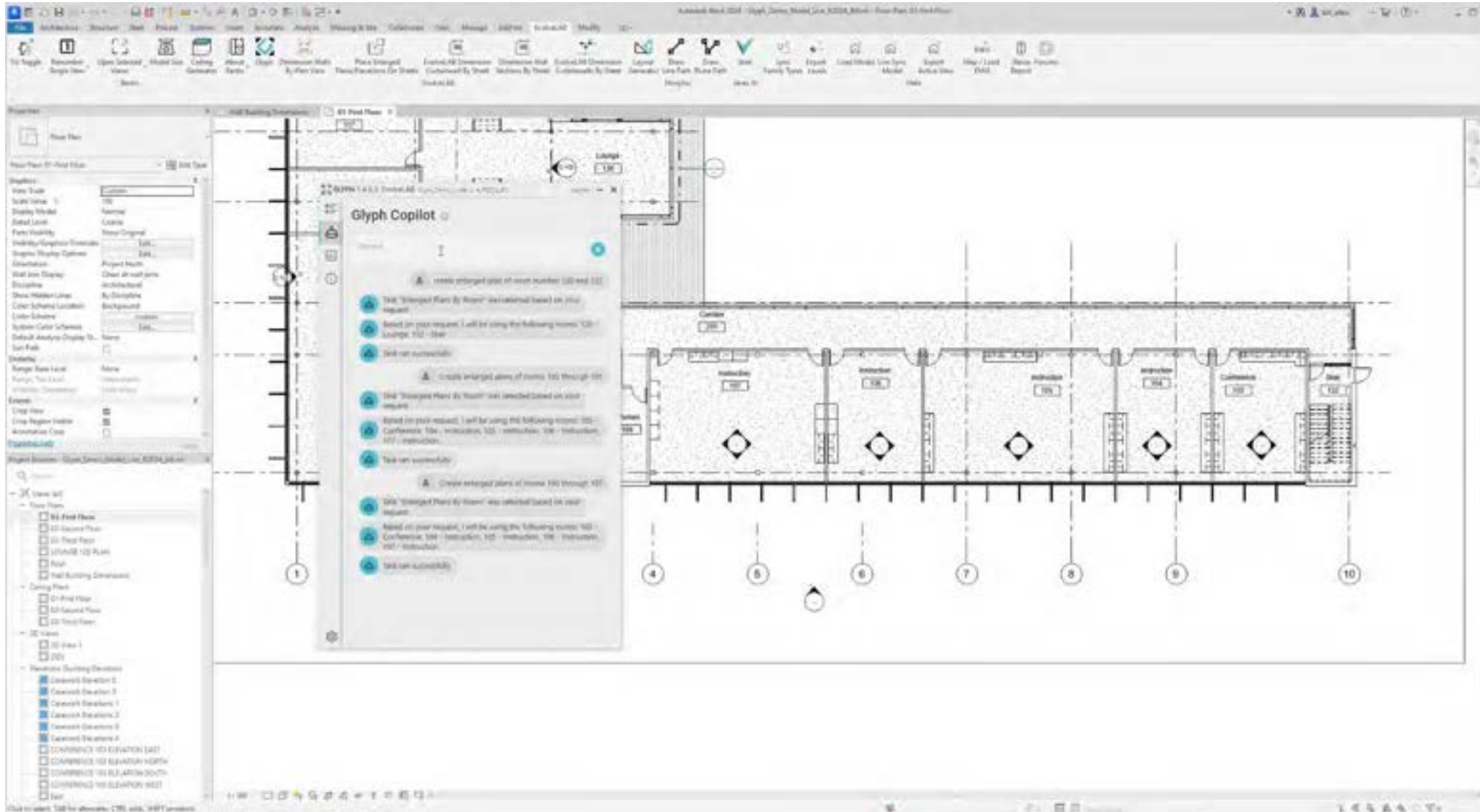
Glyph | Automate Elevations by room

Prompt Example: “Elevate Rooms 103 through 107”



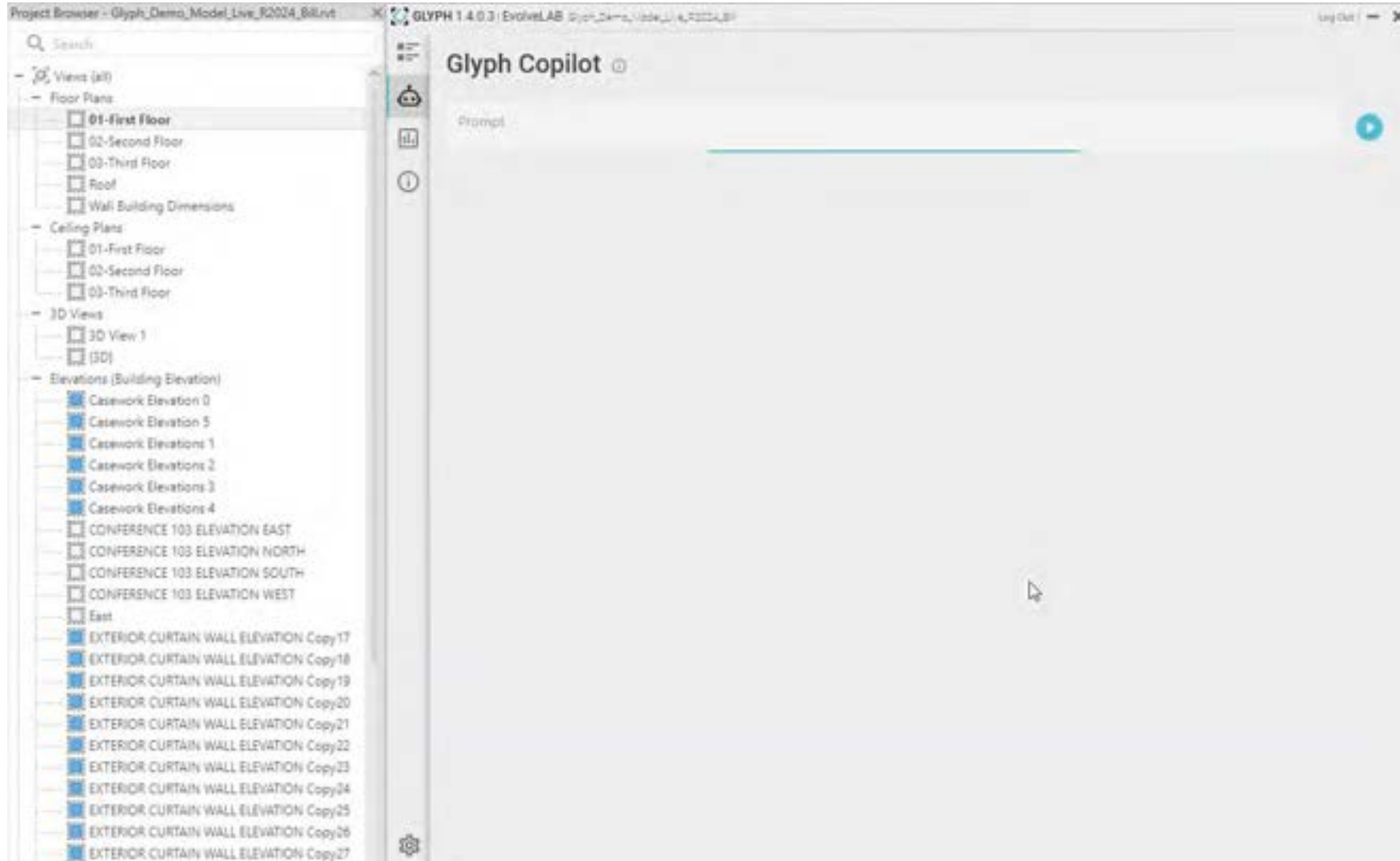
Glyph | Automating Enlarged Plans By Room

Prompt Example: “Create enlarged plans of Rooms 103 through 107”



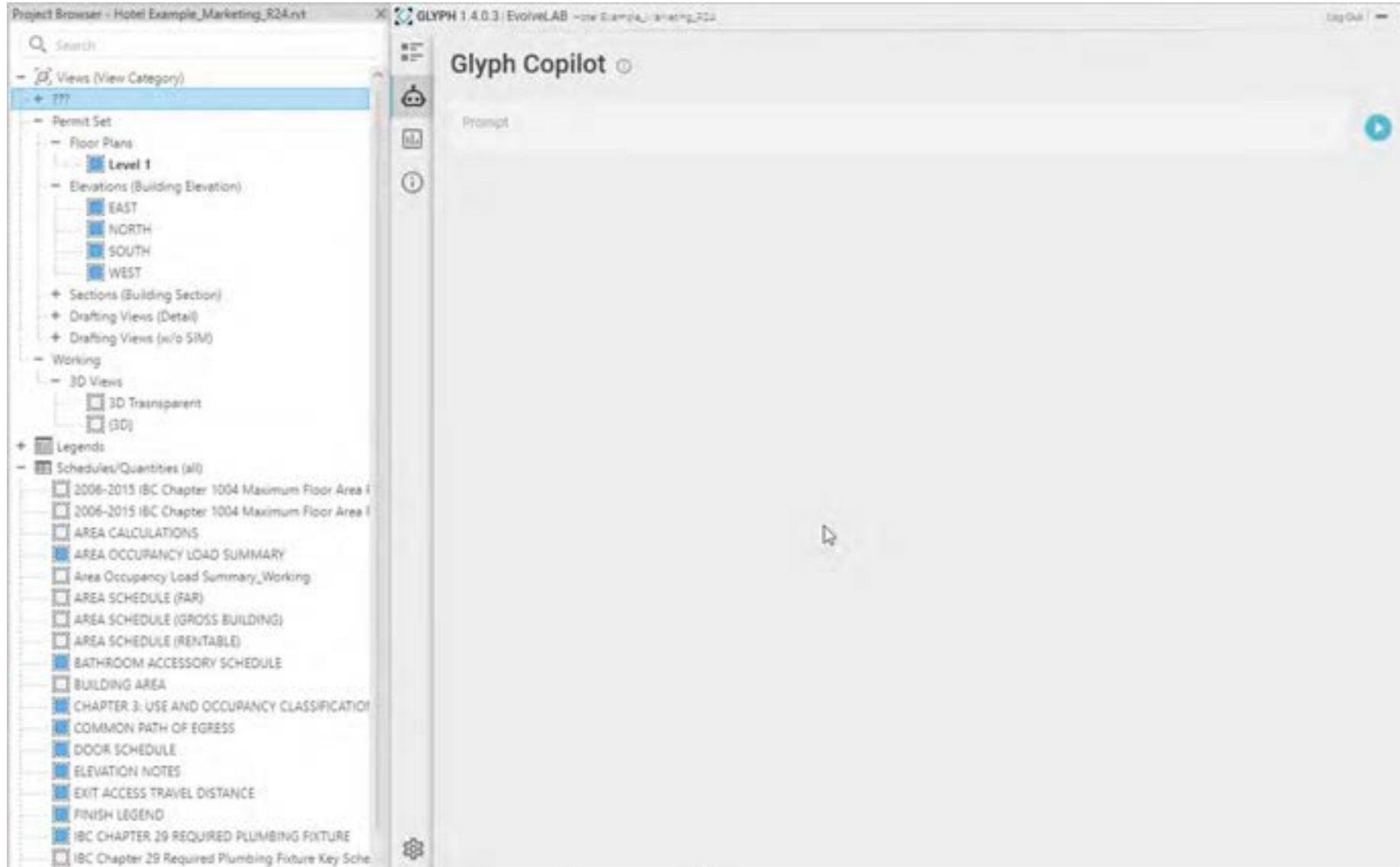
Glyph | Automate Creating Views By Scope Box

Prompt Example: “Create views by scope box for area a, b, and c on Level 01-First Floor”



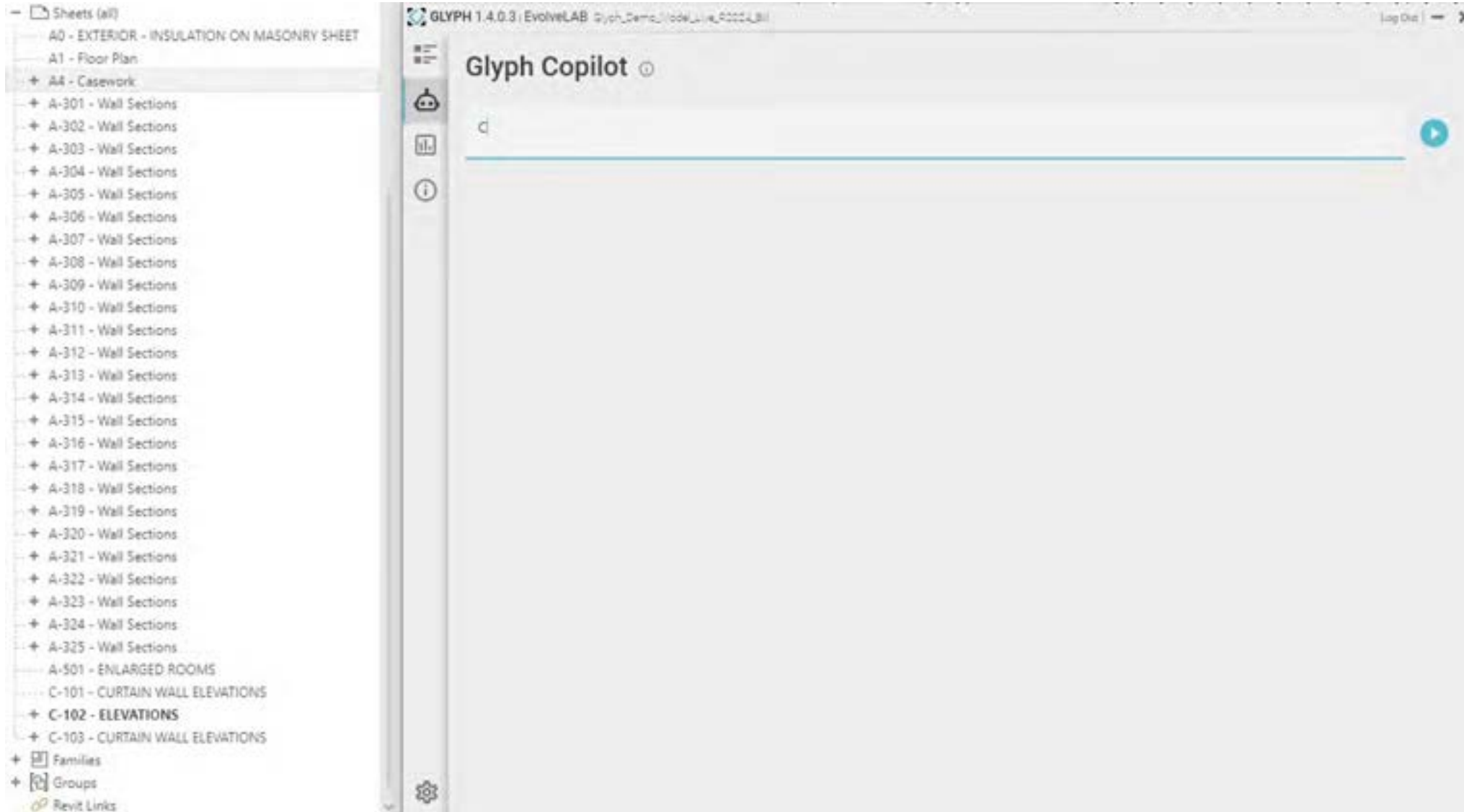
Glyph | Automate Creating Views By Level

Prompt Example: “Create Views by level for Level 1 through 16”



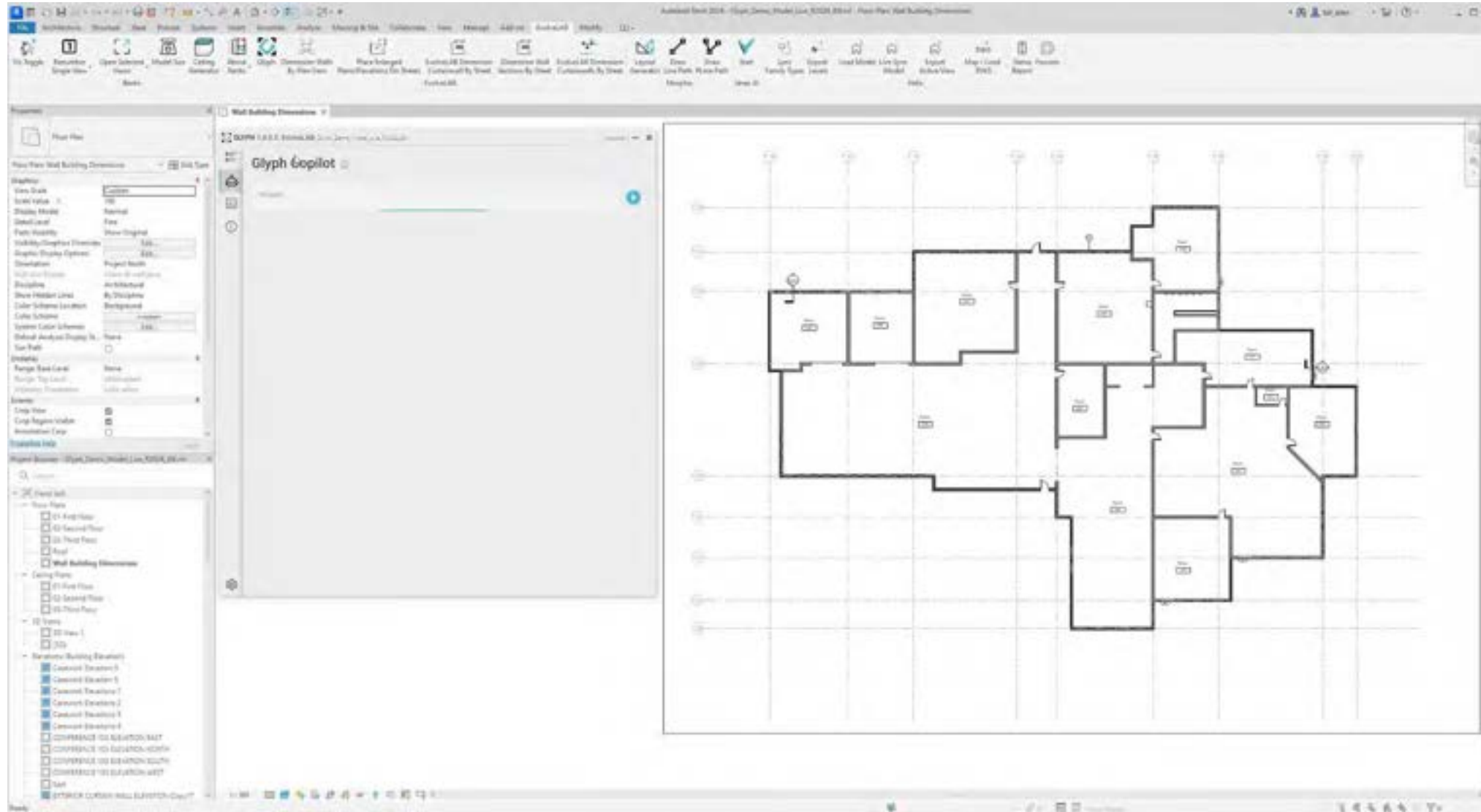
Glyph | Automate creating sheets by room

Prompt Example: “Create sheets by room for rooms 101-125”



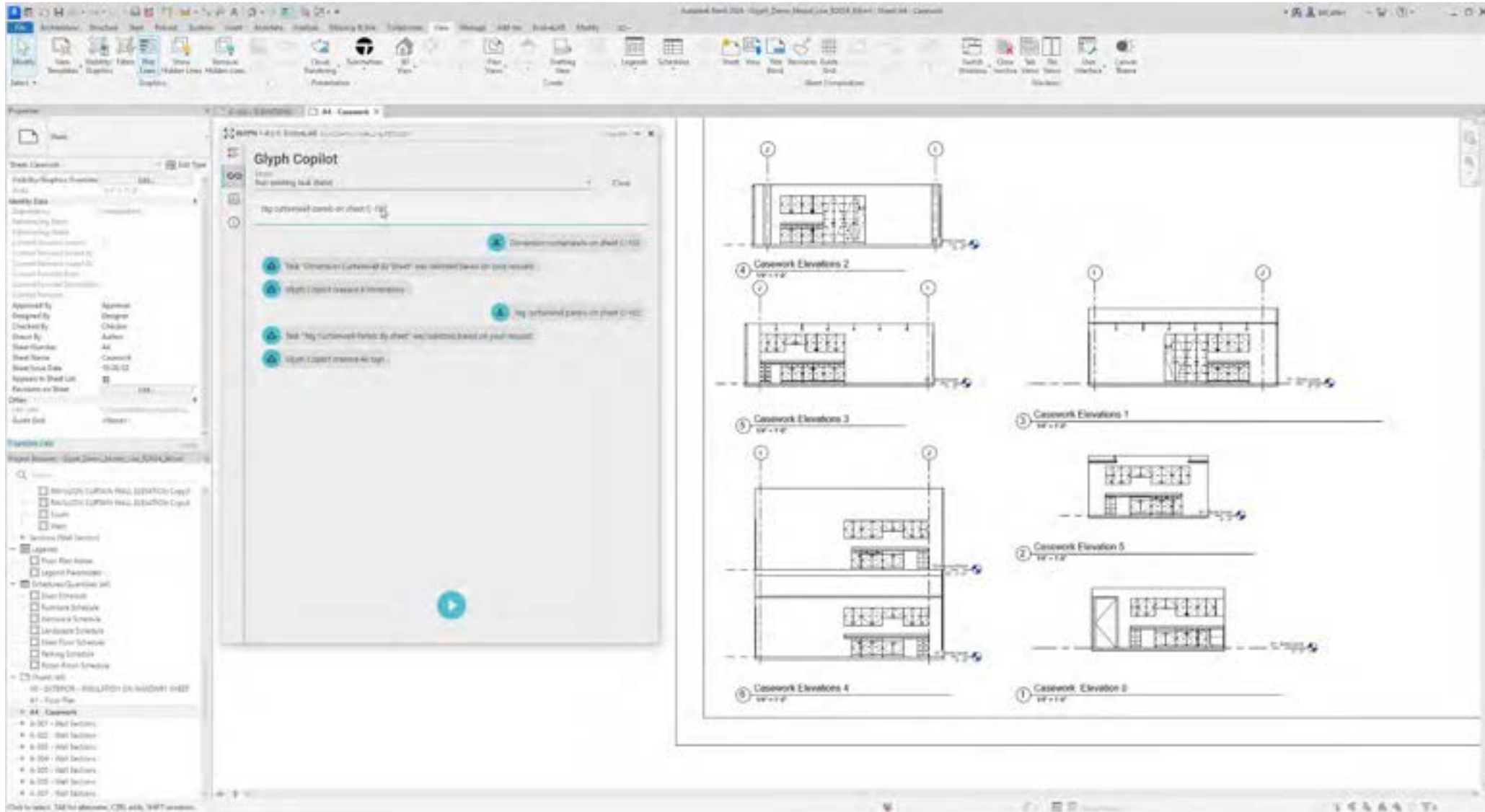
Glyph | Automate dimensions

Prompt Example: “Dimension current floor plan”



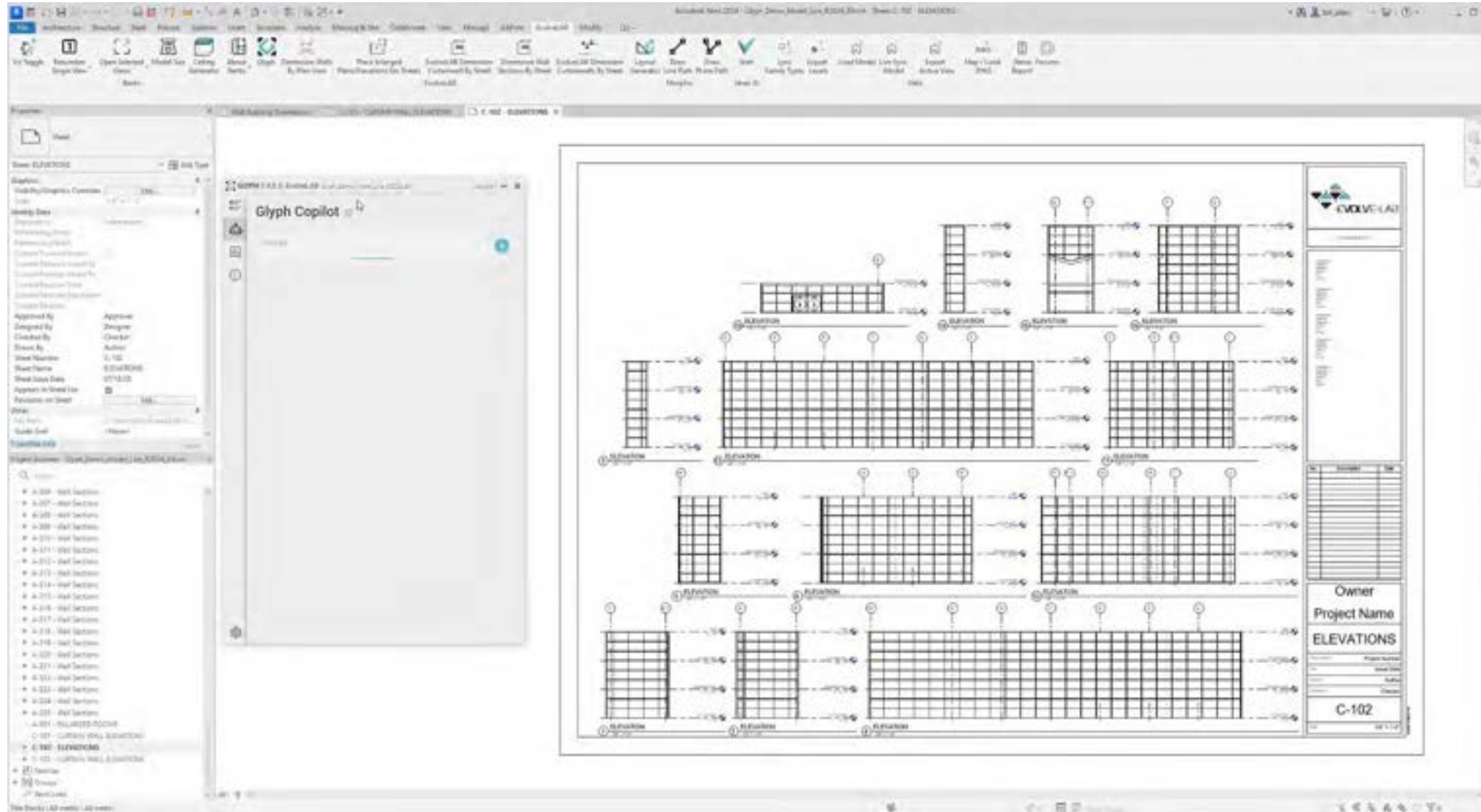
Glyph | Automate dimensions

Prompt Example: “*Dimension casework on sheet A4*”



Glyph | Automate Dimensioning

Prompt Example: “Dimension curtainwalls on sheet C-102”



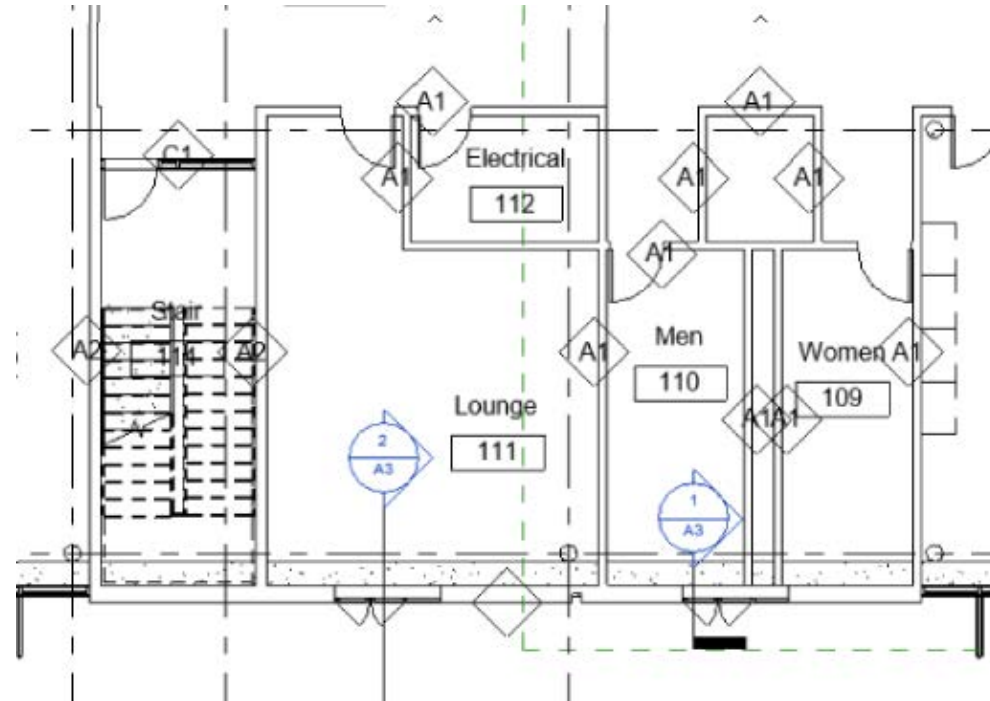
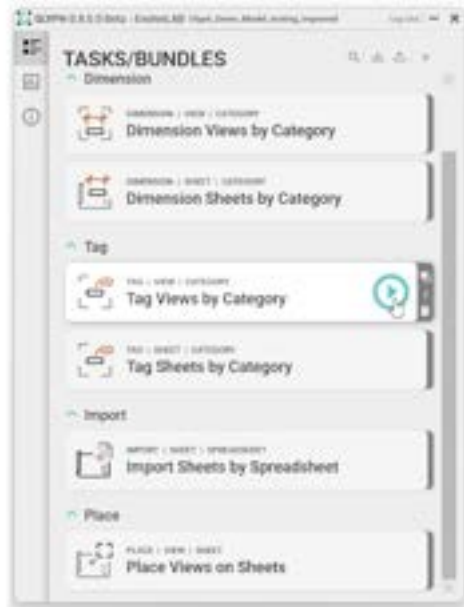
Prompt Example: “Tag Curtainwall panels on sheet C-102”

[illegible]

Glyph | Annotation Collision avoidance

No overlapping annotation

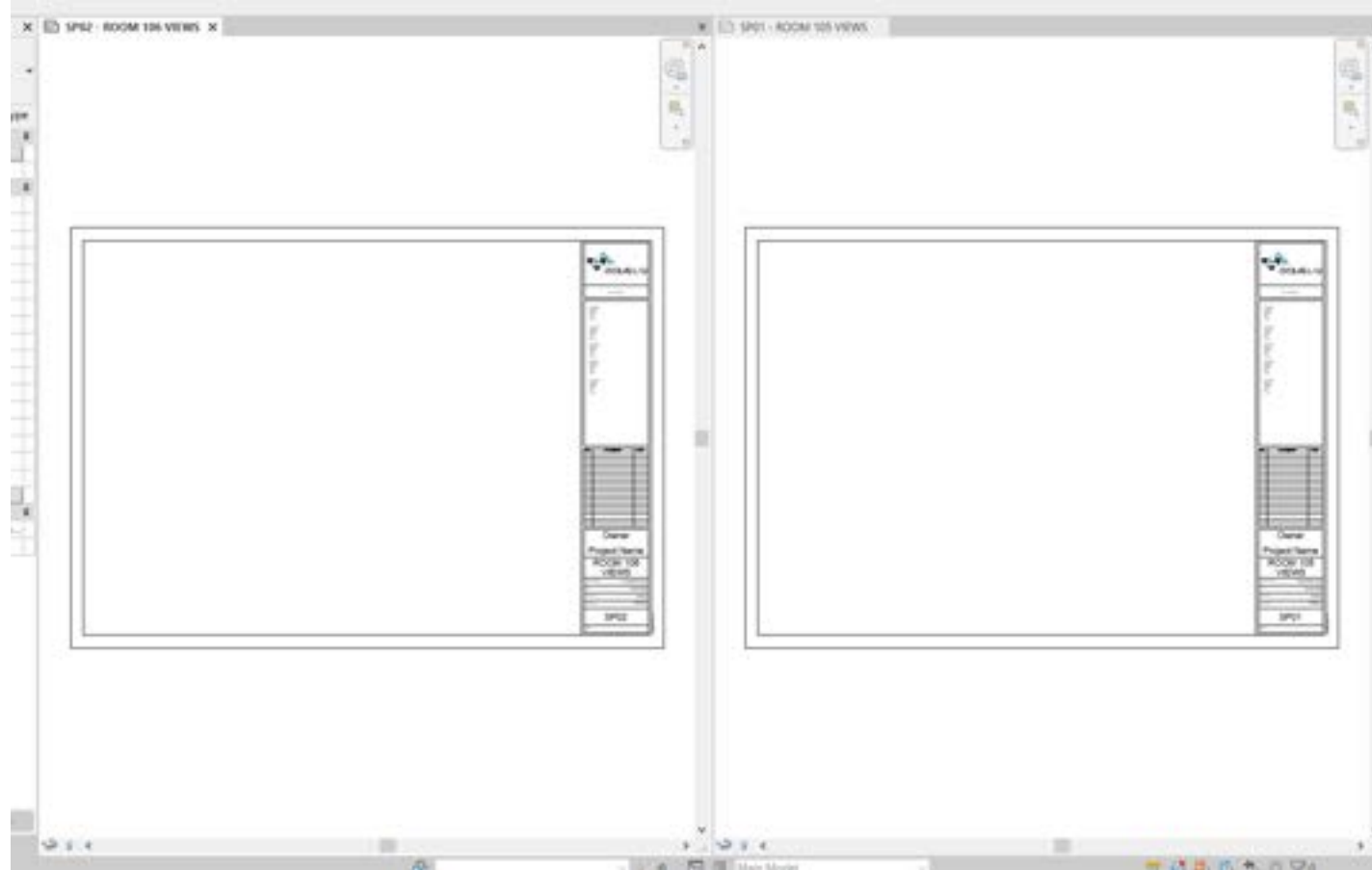
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Glyph | Automate Placing Views On Sheet

Automate sheet packing

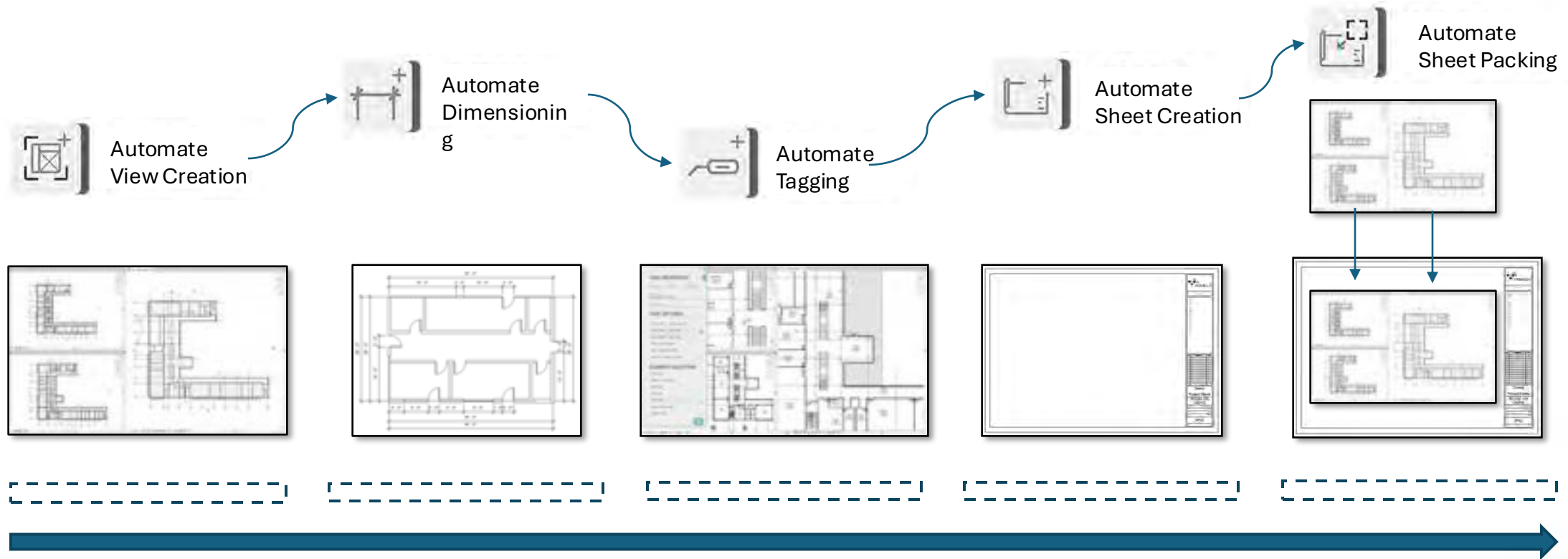
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Bundle Your Tasks Together

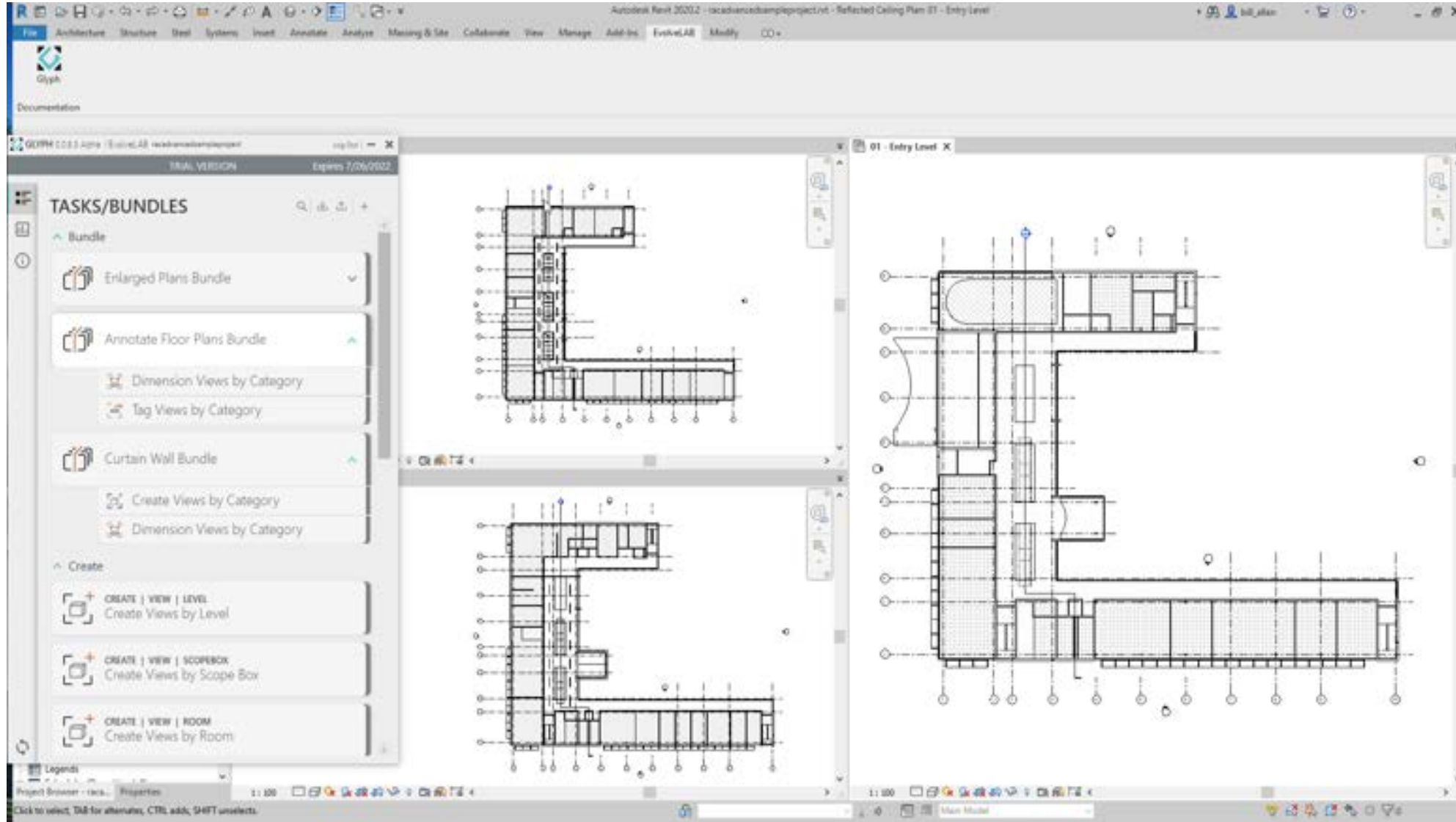
Daisy Chain Tasks

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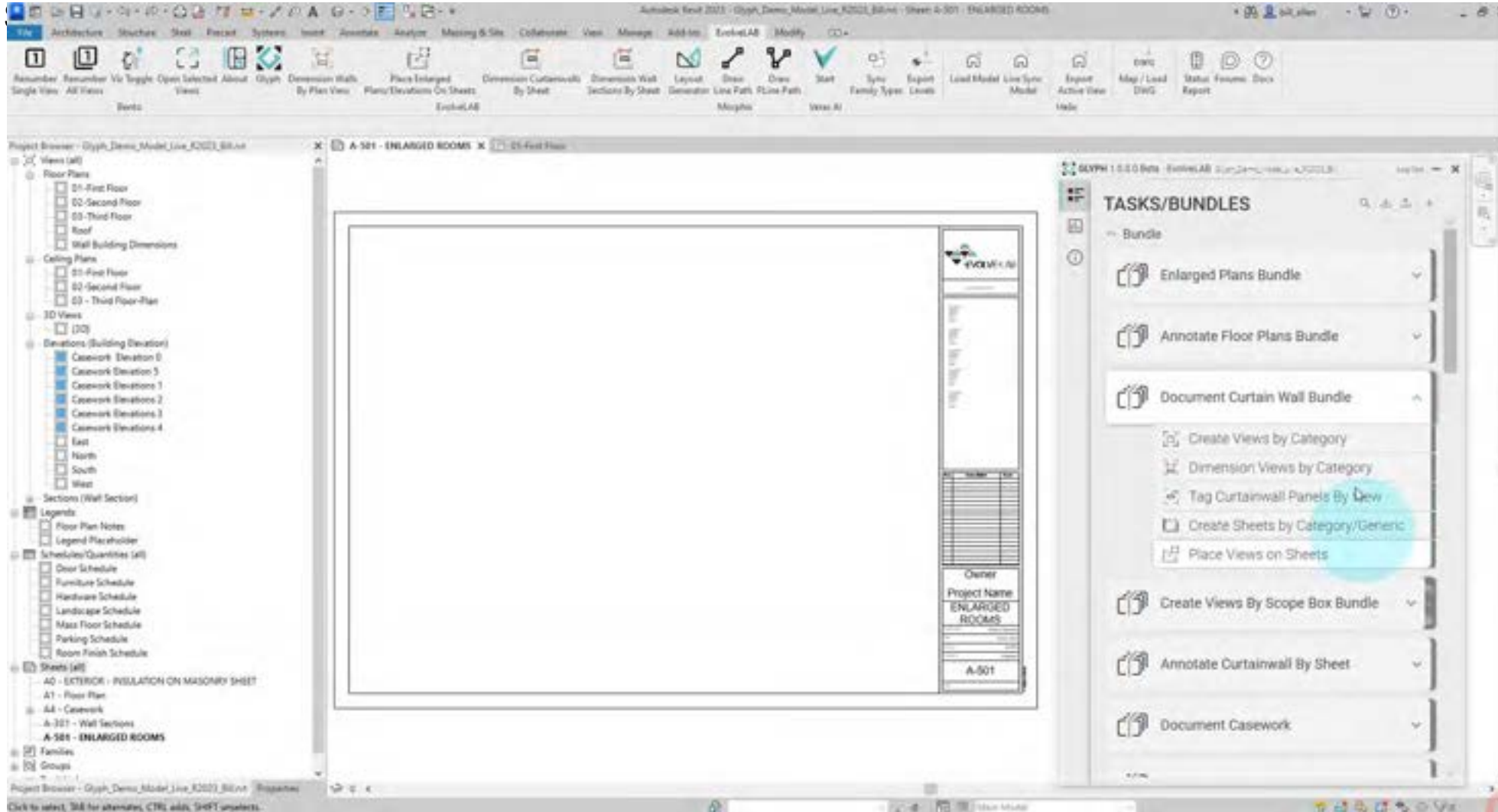
Glyph | Bundle

One Click = Tag Ceilings and Dimension Grids in 3 Reflected Ceiling Plans



Glyph | Bundle

One Click = Elevate Curtainwalls + Dimension Curtainwall Mullions
+ Tag Curtainwall Panels + Create Sheets + Place Elevations On





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"It's not AI that is going to take your job, but someone who know how to use AI might"
-**Richard Baldwin**, Economist and Professor



Questions?