

Visibility Graphics: Winning the Game of Hide and Seek with Revit

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HKS Inc.



DBEI PRESENTS

DIGITAL BUILT WEEK NORTH AMERICA

JULY 17-20, 2019 | SEATTLE, WA

AIA Provider: RTC Events Management LLC

Course Number: AIADBW

Course Date: July 20, 2019

Session Description

Learn how to uncover common visibility issues in your Revit model with filters, worksets, line styles, view templates and other methods of controlling your views

Learning Objectives

At the end of this session, participants will be able to:

1. Become knowledgeable of Revit Graphic overrides and Learn how to uncover common visibility settings affecting your views
2. Develop a unique project graphic guide document to help your team fix graphics problems
3. Create View templates to recover your settings and train other users to do the same
4. Understand how hardware like graphics card effects the model performance and how you can optimize computer performance by optimizing your hardware configuration

AIA Provider: RTC Events Management LLC



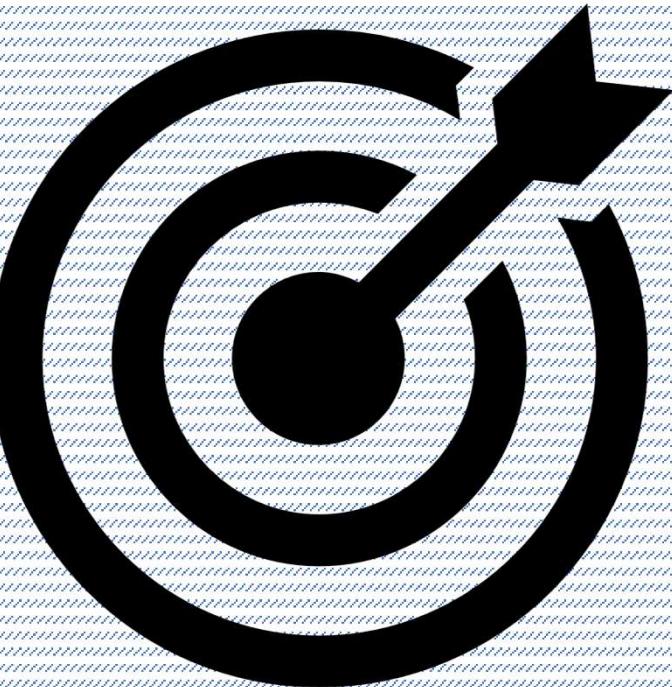
Presenter Bio

Tadeh (Todd-A) is a BIM Coordinator and design technology specialist at HKS inc, an Architecture firm working out of their Los Angeles office. He graduated with a degree in Architecture and experience throughout the AEC field working for Engineers, Contractors and Architects for the last 8 years. Along the way he experienced first hand the spectrum of BIM expanding to provide solutions to common project problems. To that end he has researched new methods and technologies, authored in house workshops, provided model efficiency insights and been active in promoting best practices amongst design teams. Course authoring includes Navisworks basics and advanced topics, Revit fundamentals and add in training. His associations include the Autodesk user feedback group, LA Revit users group and VR meetups. His current fields of interest include Dynamo scripts with Python and leveraging the Metadata in BIM models for life cycle analysis.

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DEFINE THE PROBLEM



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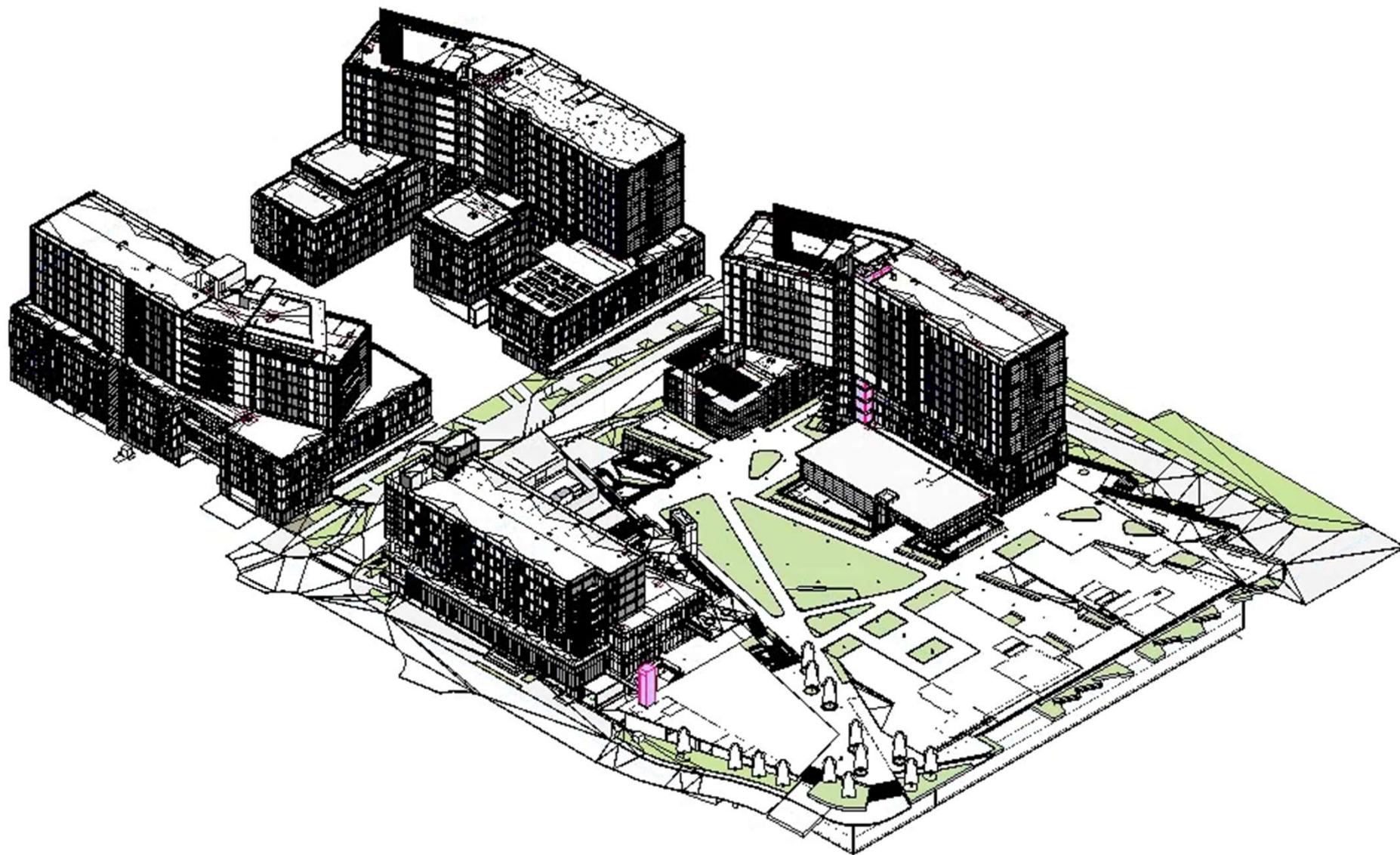


The screenshot shows a search interface with the query "why is revit" entered. Below the search bar, there is a list of suggested search terms, each with a "Remove" link to its right. The suggestions are:

- why is revit visibility so complicated
- why is revit so expensive
- why is revit so bad
- why is revit important to interior design
- why is revit so slow
- why is revit in viewer mode
- why is revit not backward compatible
- why is revit better than cad
- why is revit so hard to use

- Why is it a problem? – Can't see things in the model which takes times to resolve
- What is the issue in particular? – Don't know how to control visibility in Revit since there is no central way to access these settings or review them
- How can you resolve it? – Learn about the system behind visibility and Revit as a system

PERSONAL EXPERIENCE



- Large College project with multiple buildings and models linked together
- 25 Architects and Designers worked in 12 models with over a million square feet
- Concept design models went to Schematic to Design Development to Construction Documents with minimal clean up
- What could go wrong?

PERSONAL EXPERIENCE



EVERYTHING WENT WRONG

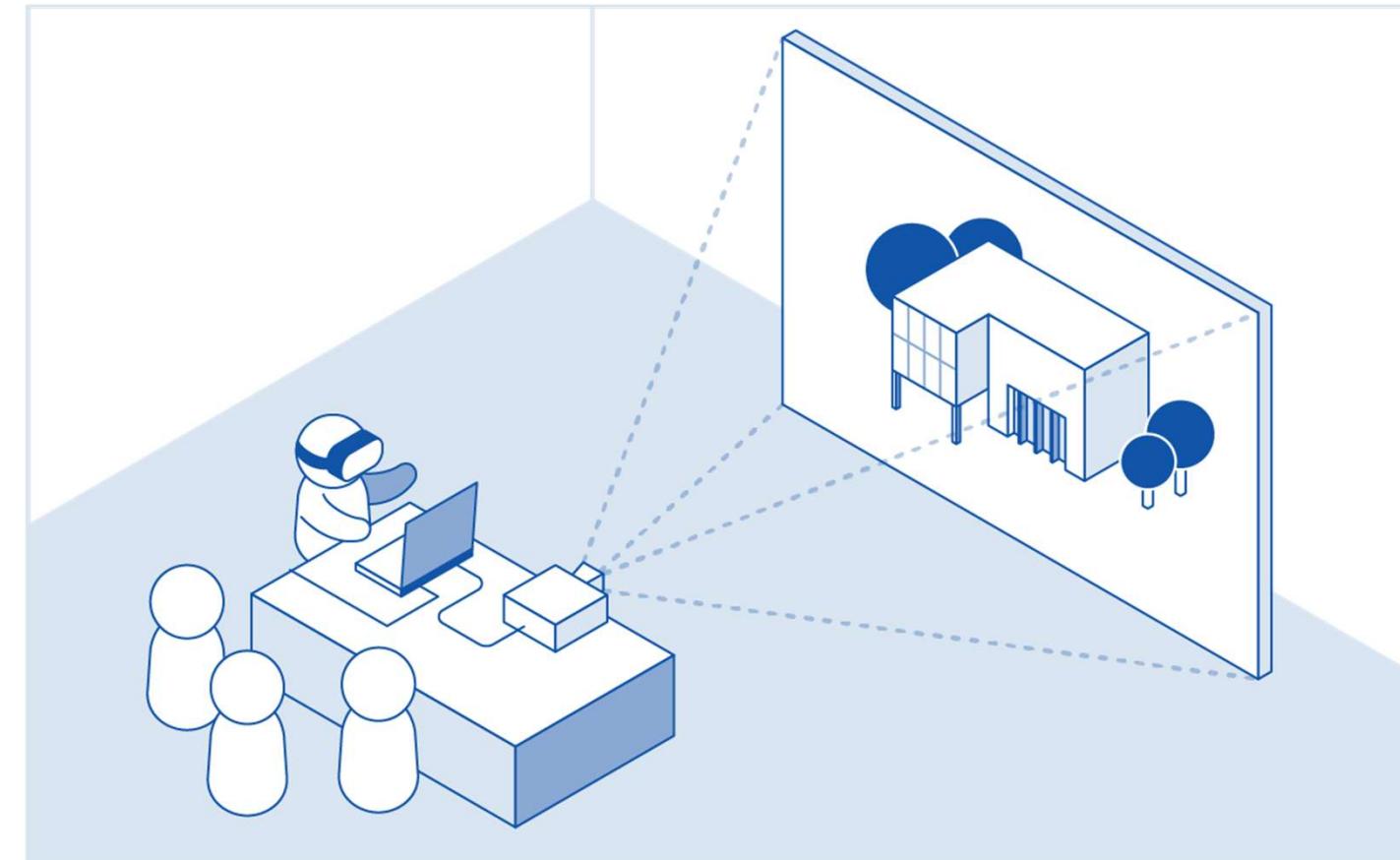
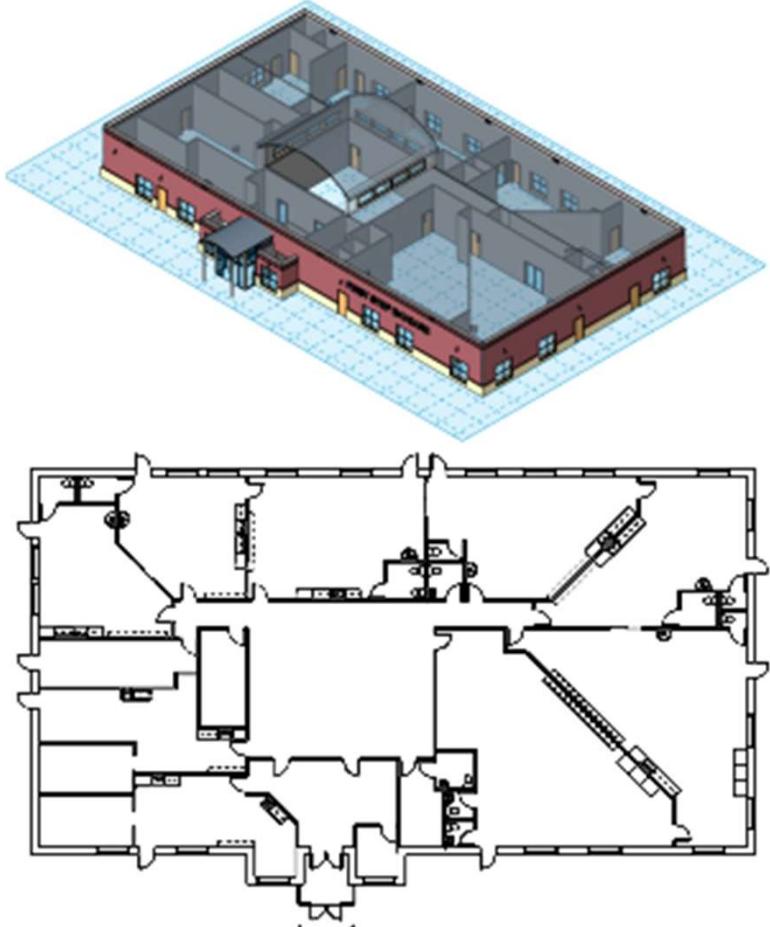
- I personally spent hours sorting through many visibility problems but that applied to the whole team
 - Likely half my time was addressing visibility issues of one kind or another and thought a good training resource would make a difference to the project team
 - Disclaimer I mainly focus on Architecture projects because that is my profession but these methods can apply to any project

DEFINE THE PROBLEM



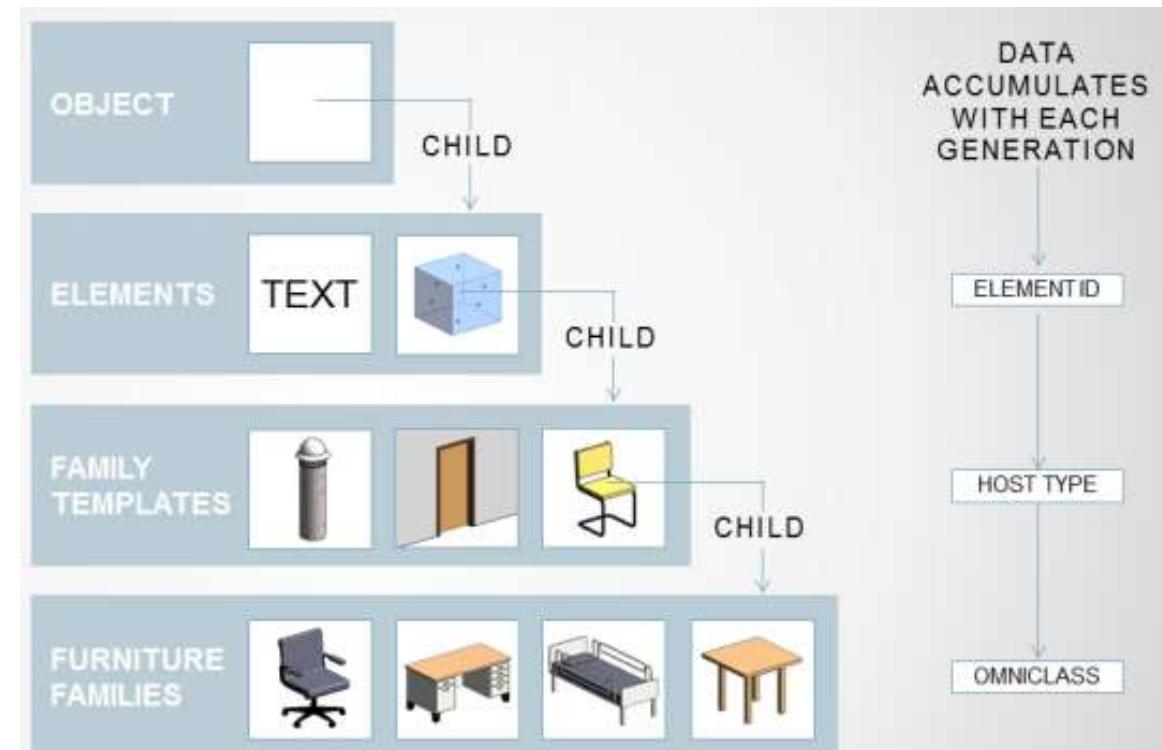
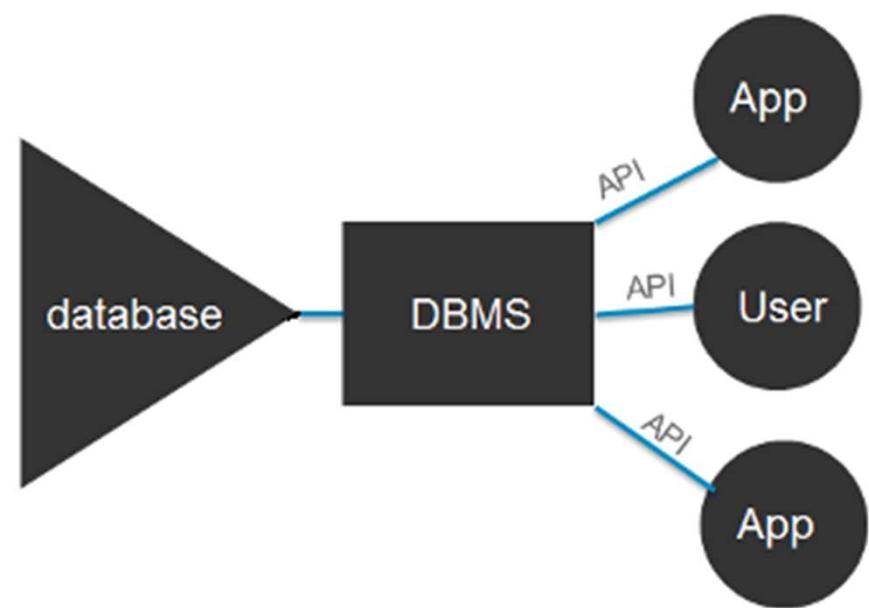
- Find a clear path to the solution
- Usually it's a trial and error process that may not lead us any closer to solving the problem
- When the way isn't clear it is best to zoom out, look at things from a high level and map a path

FIRST PRINCIPLES – REVIT IS 3D



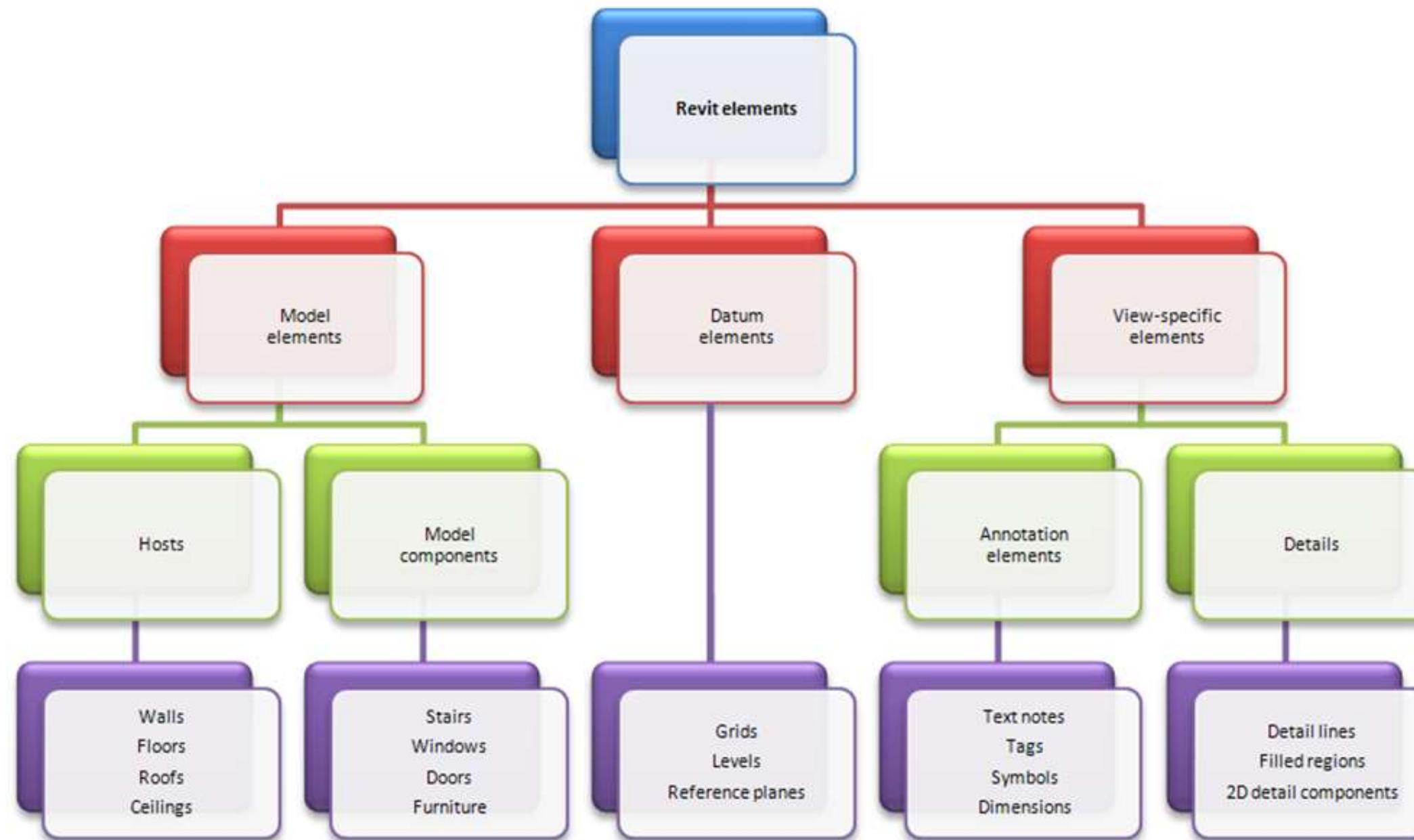
- Everything you see with plans is a 3D model made into 2D views
- If your 3D model isn't correct your 2D model isn't correct
- Avoid 'drawing lines' and making things up as you go because you are digging yourself into a deeper hole

FIRST PRINCIPLES – REVIT IS DATABASE MAGEMENT SYSTEM (DBMS)



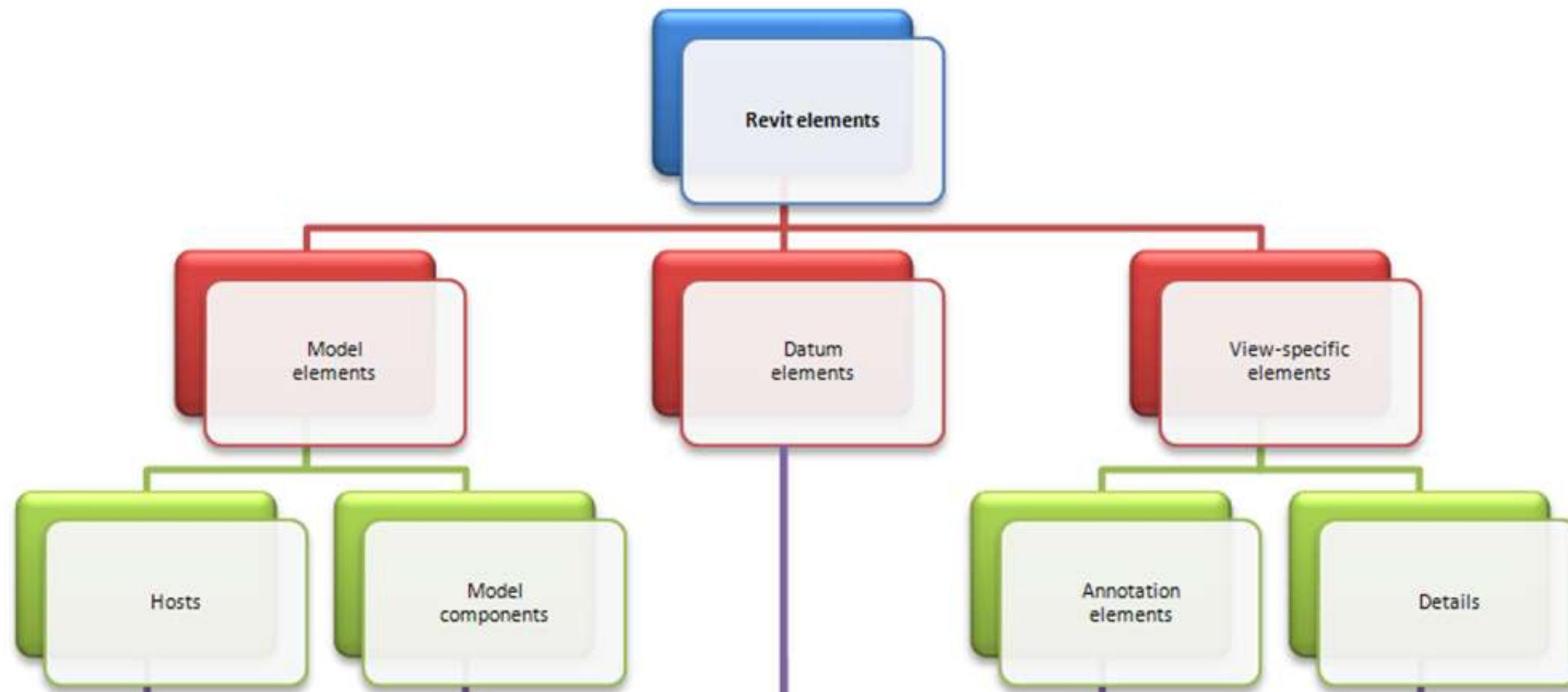
- Revit is a Database Management System meaning everything relates to each other in single source, the .rvt file
- DBMS allows users a way to make, retrieve, change and manage data in a single database
- Effectively serves as a middle man between users and a database
- With Revit that means any change one user makes propagates to all users
- Revit is built with VB.Net and C# meaning it is OOP
- OOP allows for inheritances of classes like types within a family
- What is started on the highest category of a class is inherited in all childs of that class

FIRST PRINCIPLES – ELEMENT BRANCHES



- Revit treats different classes of elements in different ways so know what you're starting off with
- Datum Elements effectively host or orient most of the other model elements
- Pay attention to where your Datum Elements are so your model elements are in good order

FIRST PRINCIPLES – DEFINITIONS



Project Settings – Several Categories – Modifications to the entire model

View Settings – One Category – Affects how the view is presenting the 3D content

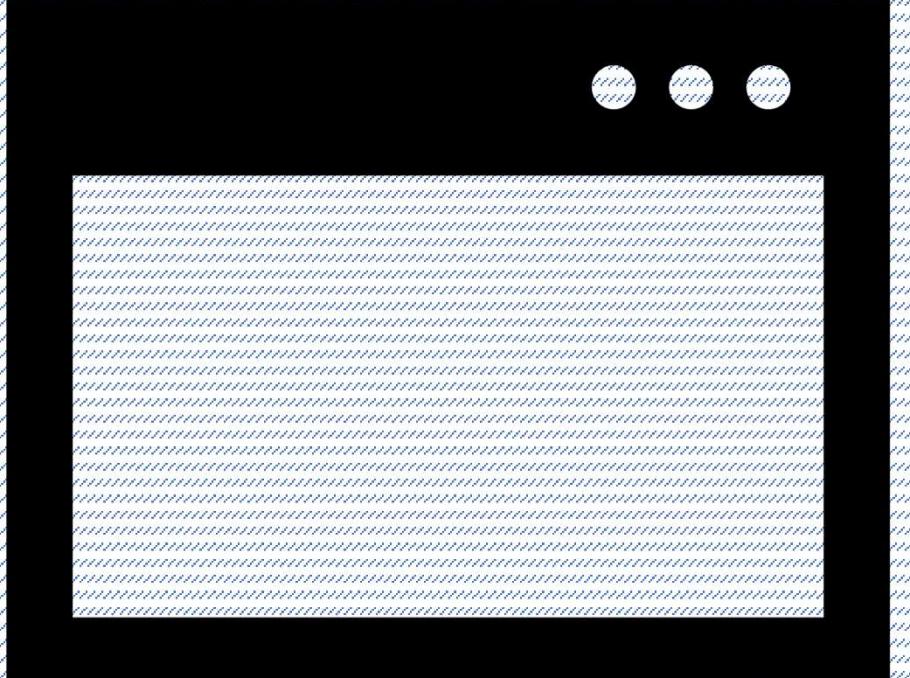
Visibility Graphics – One Category – Affects superficial graphics settings not the modeling itself

SUMMARY

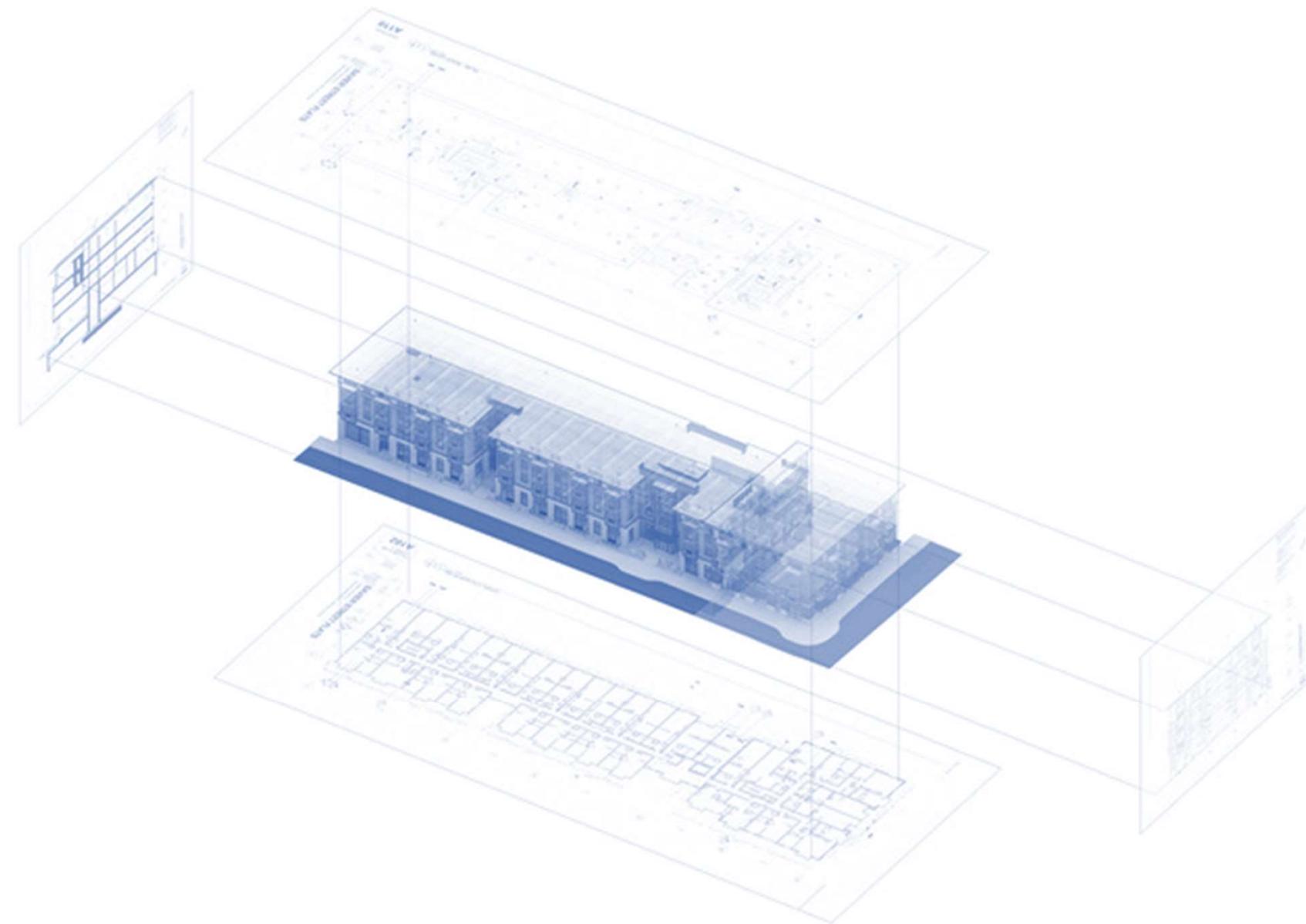


- Revit is not a powerpoint file with content loaded into it like a scrap book
- Content and modifications in Revit inherit properties set in the model template
- Certain changes can affect the entire project or many parts of the project
- Understanding how Revit prioritizes certain settings and options over others in your team is essential for good model management
- Understanding high level functions of Revit will make reviewing graphic problems much easier
- FYI Visibility Graphics only applies to elements already modeled the other settings that can affect your ability to see content are in the view, model and project settings

VIEW SETTINGS

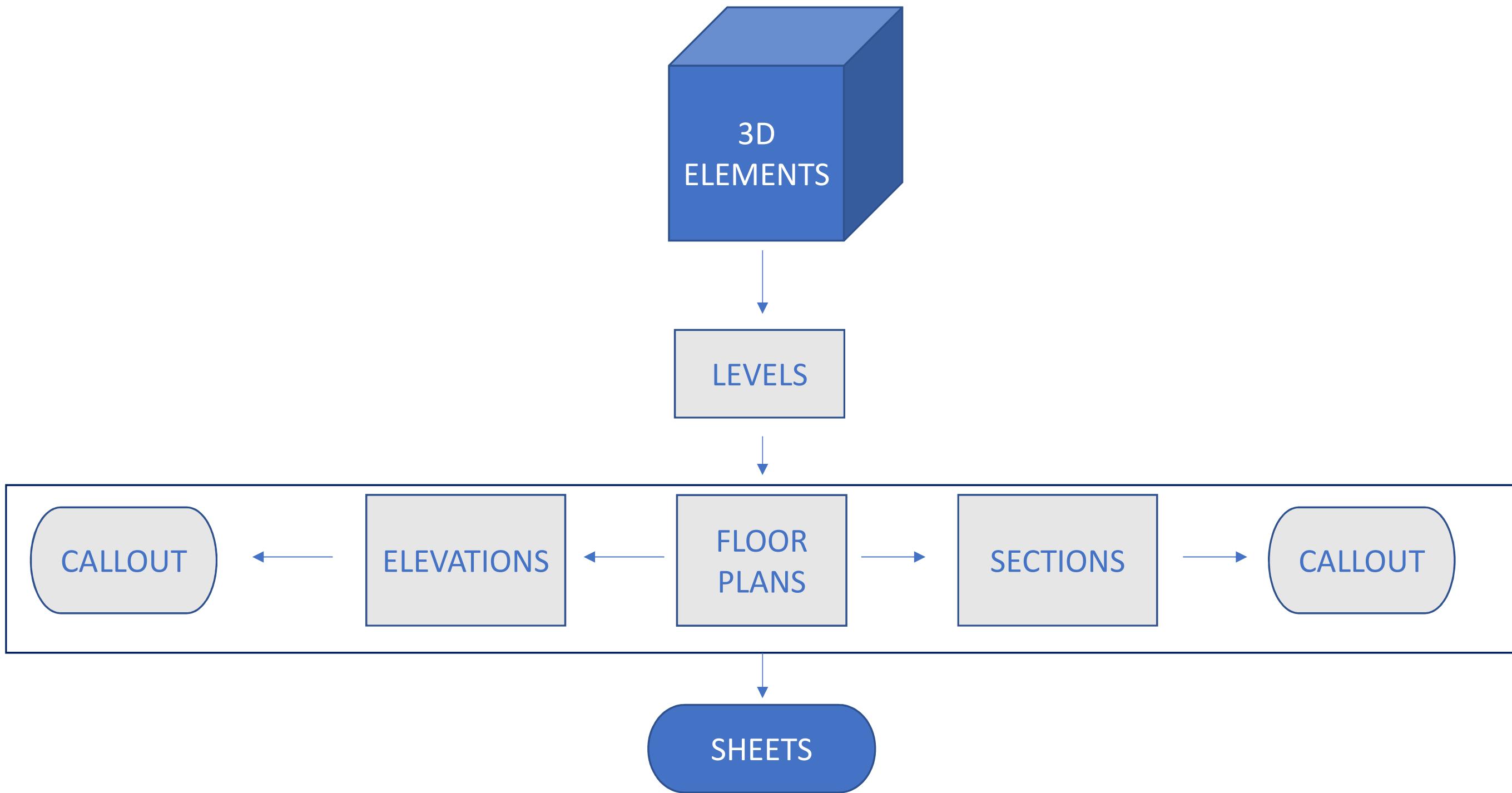


VIEWS



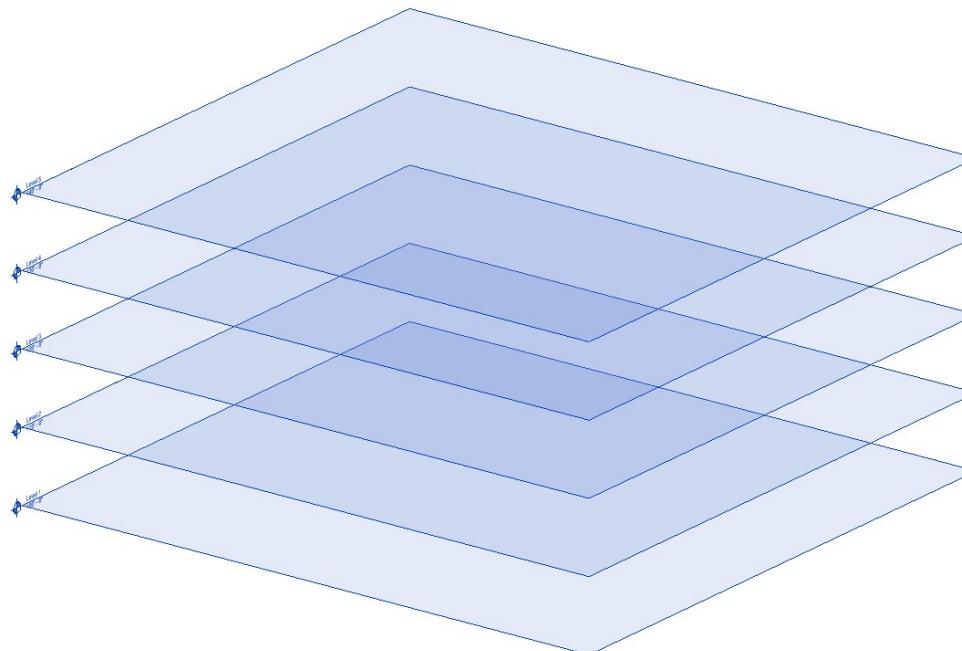
- Views in Revit are any element that can provide graphic visibility to your project
- Includes Plan views, Elevations, Sections, 3D views, Schedules, Legends, Drafting Views
- Views can be applied to sheets
- Any view can be controlled by view templates
- Understanding views lets you understand the visibility settings so start here

VIEWS – ORIGIN

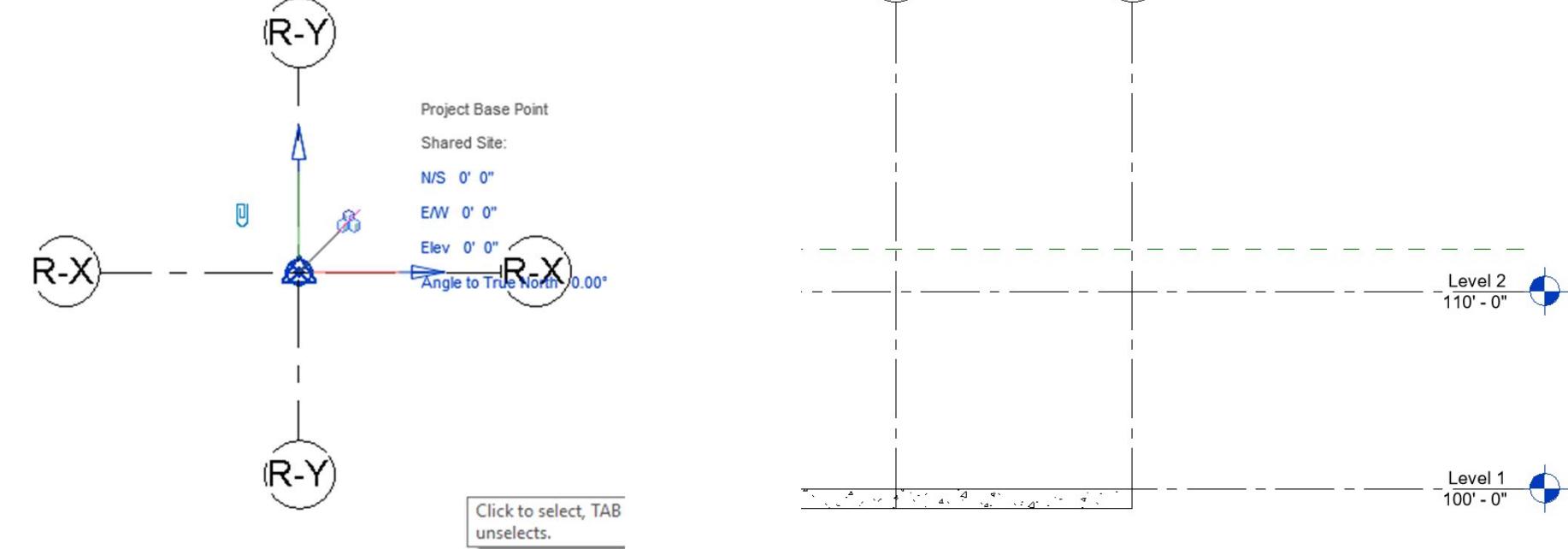


- Projects start in empty space where a 3D model is created
- Levels and Reference Planes are added to help organize and host content
- Additional views are created based on these levels then placed on sheets

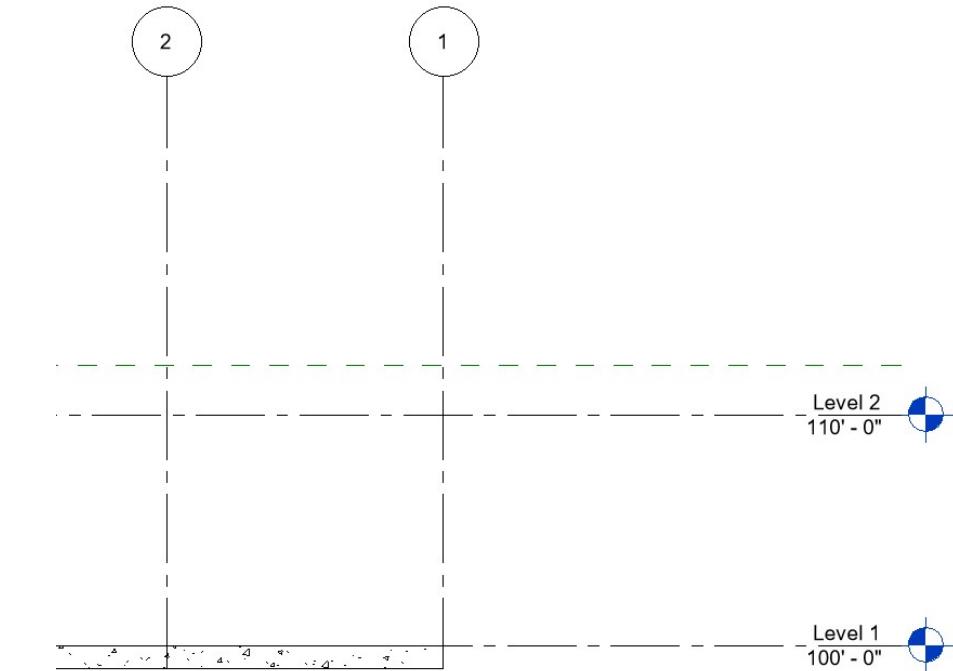
VIEWS – DATUM ELEMENTS



LEVELS



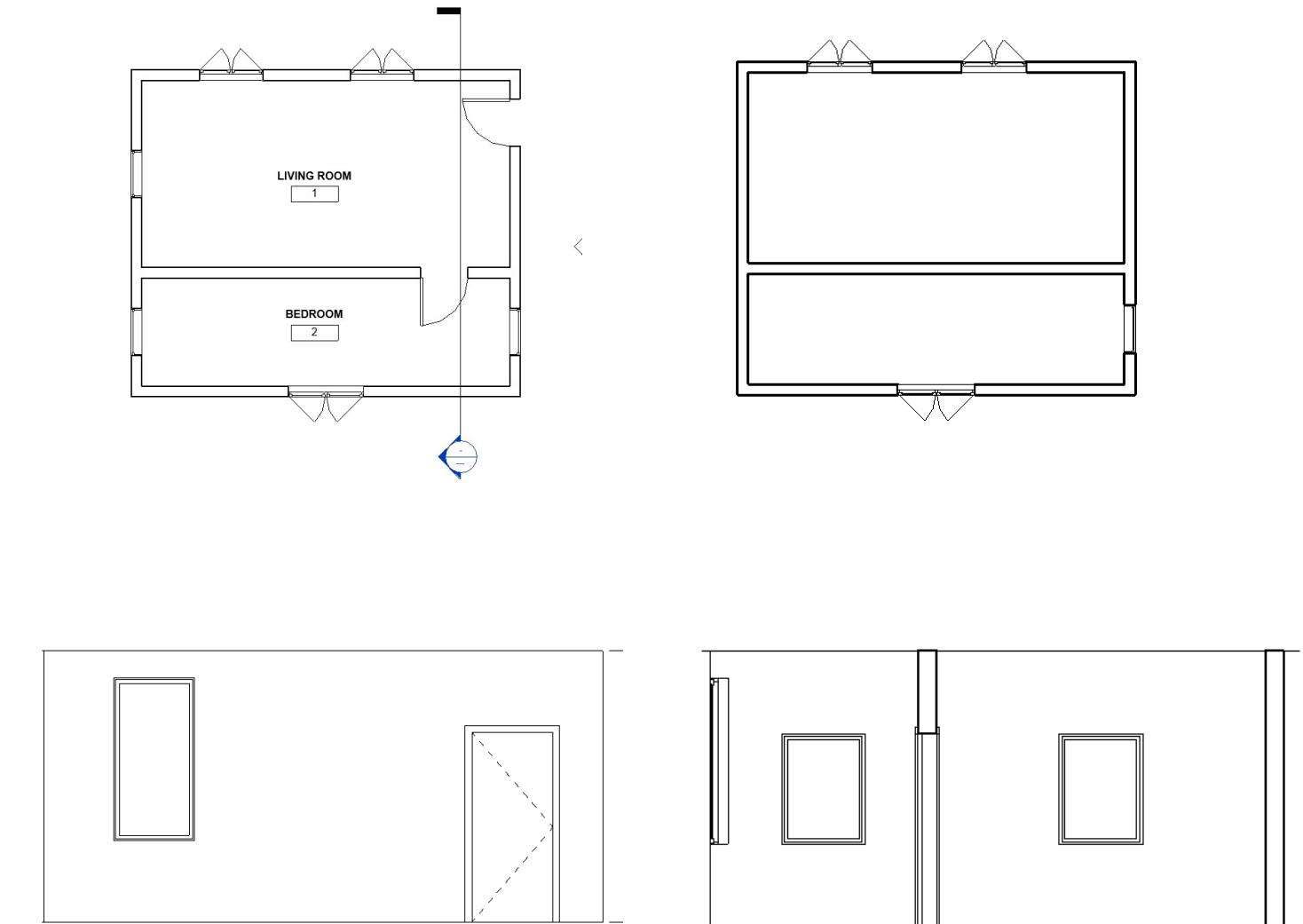
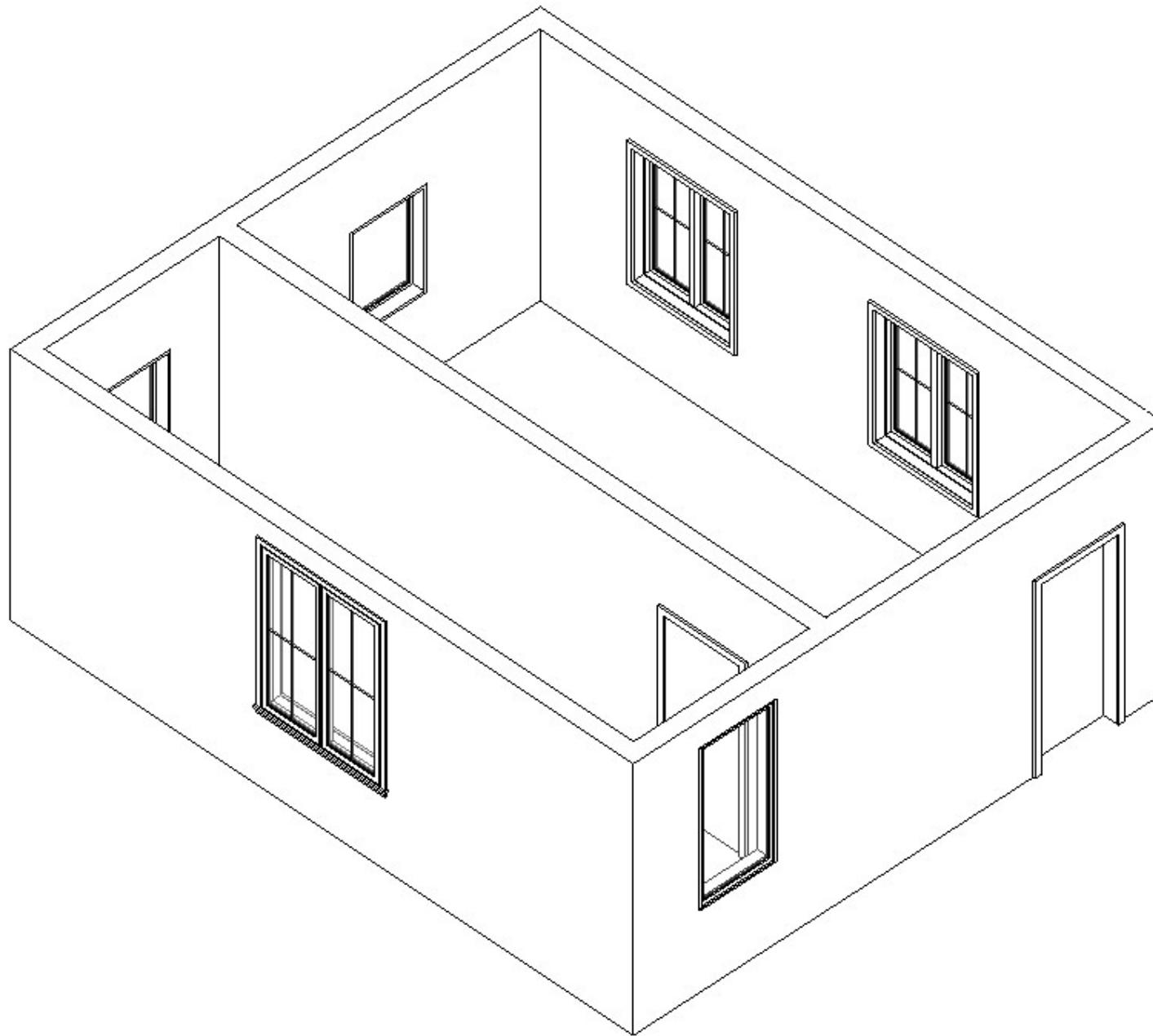
GRIDS



REFERENCE PLANES

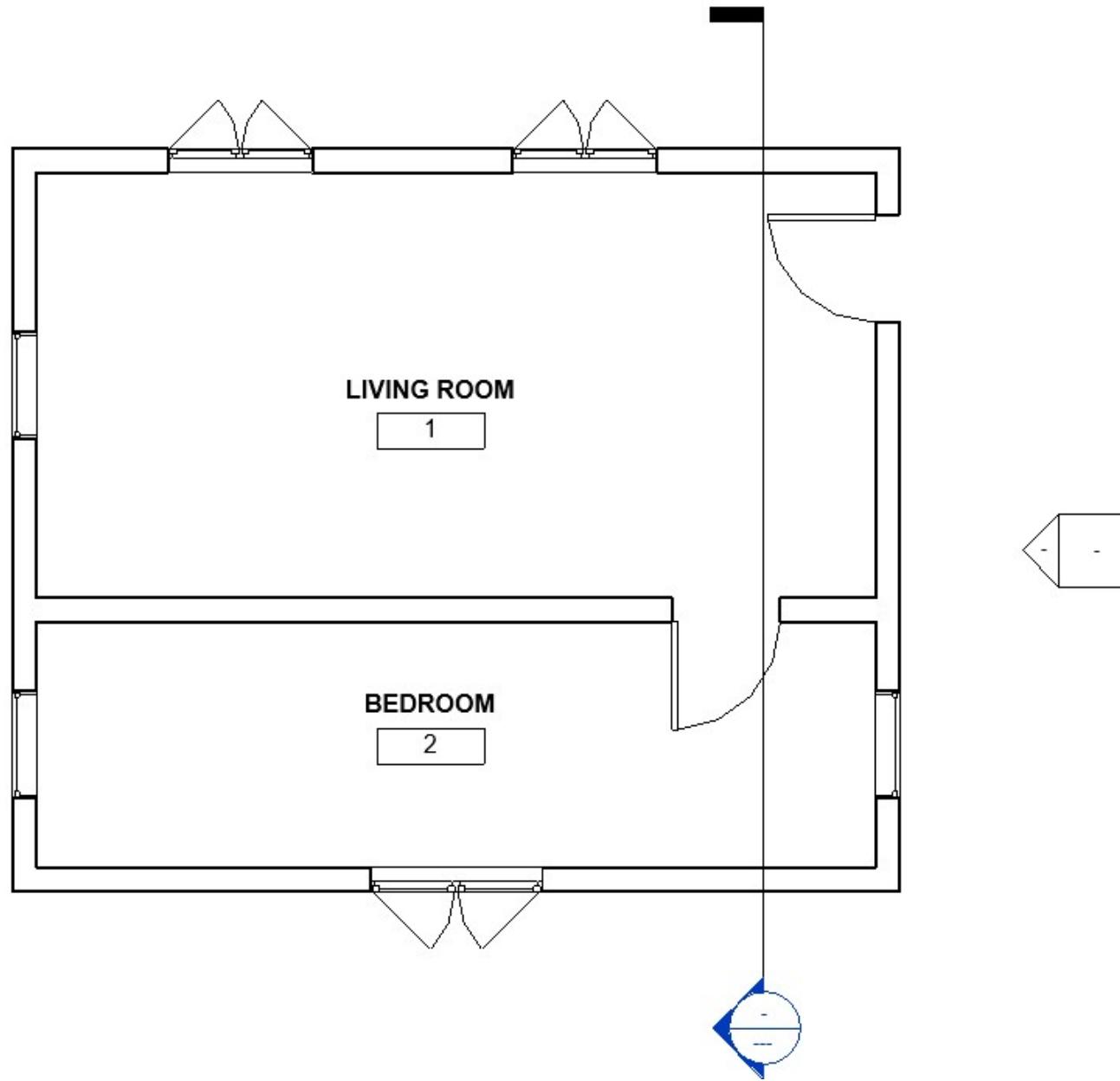
- The 3D model becomes a building model with hosts in the form of levels and reference planes
- Without these hosts for your elements you can't create views

VIEWS – 3D VIEW



- You model in 3D and the project is a 3D object as part of the database
- All 3D views are rendered into 2D views
- The 2D to 3D transition is where the awkwardness begins because we have a 'slice' of the model not the whole thing

VIEWS – FOOR PLAN



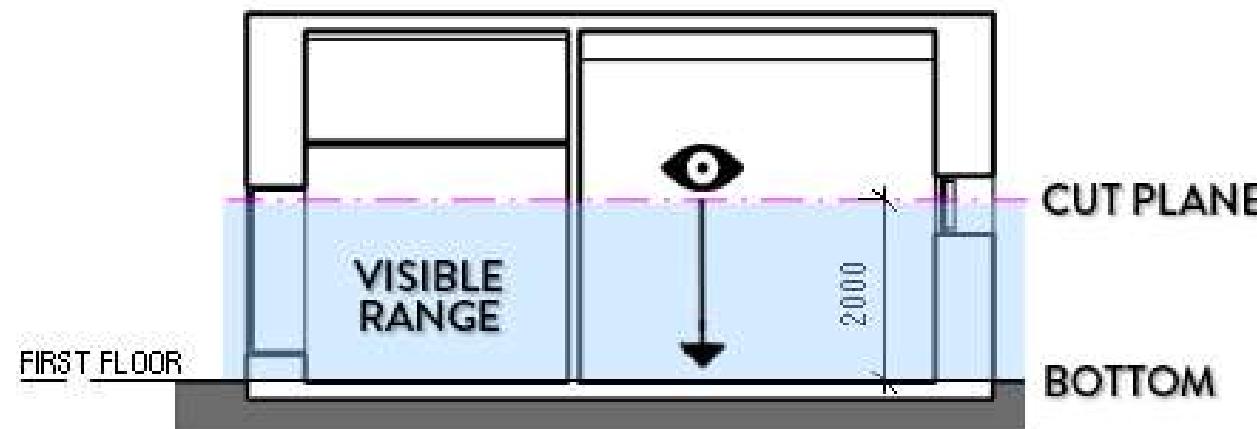
- Floor plans are a representation of the 3D model at a given plane
- All controls for floors start from the 3D environment
- Very simple but there are many modifiers – view range, depth clip, crop, scope box, etc

VIEWS – VIEW RANGE



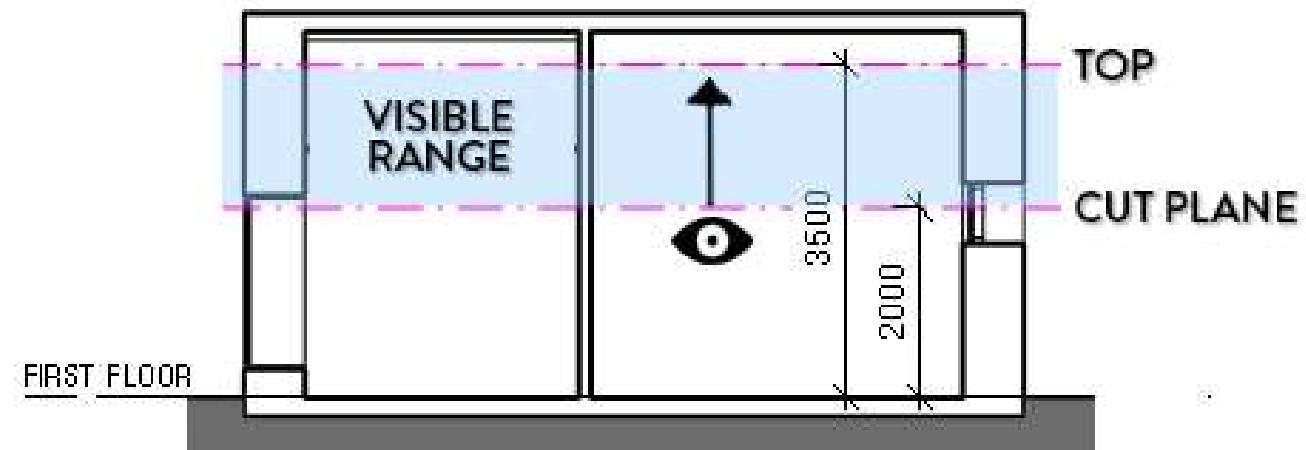
FLOOR PLAN

Floor Plan
 Cut plane: Associated Level (FIRST FL) ▾ Offset: 2000.0
 Bottom: Associated Level (FIRST FL) ▾ Offset: 0.0



CEILING PLAN

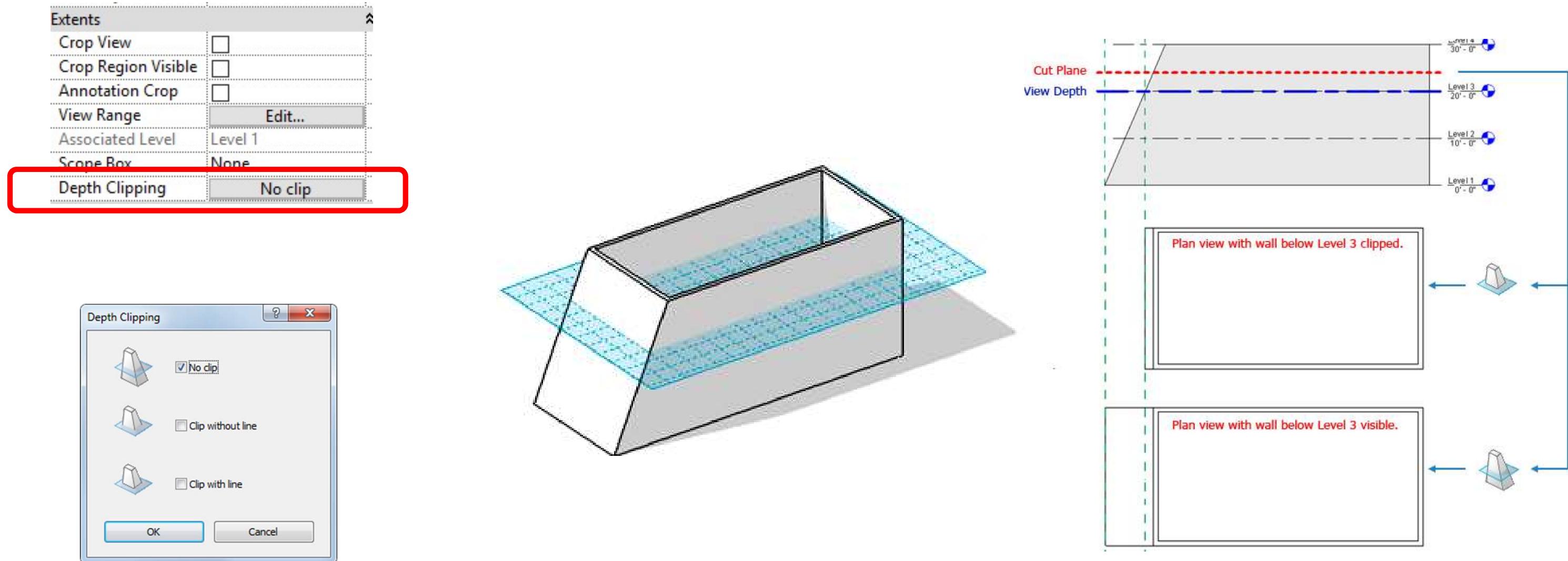
Ceiling Plan
 Top: Associated Level (FIRST FL) ▾ Offset: 3500.0
 Cut plane: Associated Level (FIRST FL) ▾ Offset: 2000.0



- Starts from the cut plane which can be manually changed per range
- Cut plane is default hosted to the level of the view
- If you are in a floor plan then you are looking down from the cut plane
- In a ceiling plan you are looking up
- Depending on the cut plane and offset you can adjust what is visible in the view

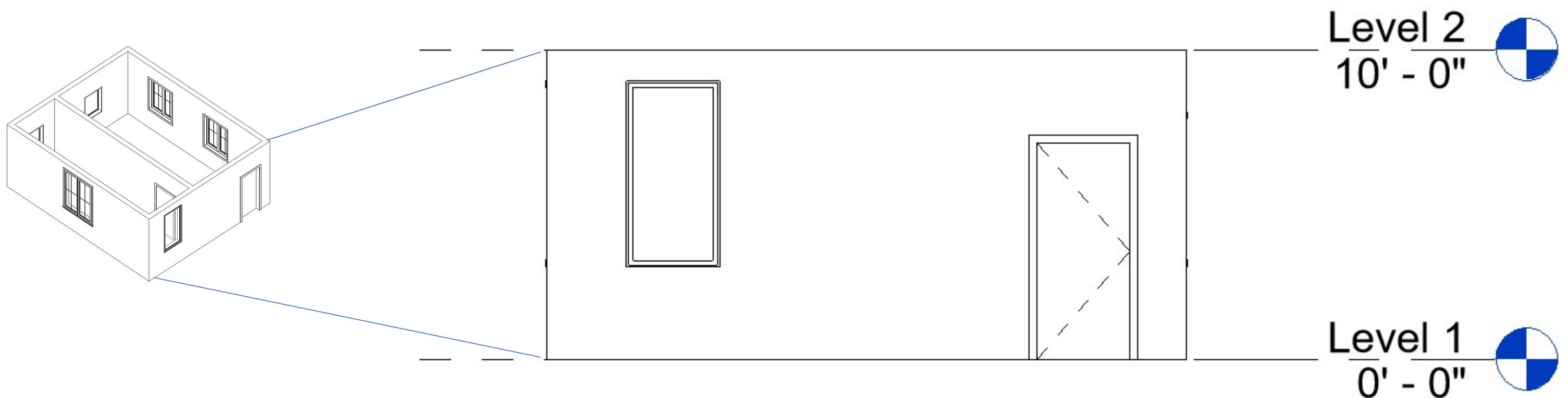
Extents	
Crop View	<input type="checkbox"/>
Crop Region Visible	<input type="checkbox"/>
Annotation Crop	<input type="checkbox"/>
View Range	<input type="button" value="Edit..."/>
Associated Level	Level 1
Scope Box	None
Depth Clipping	No clip

VIEWS – DEPTH CLIP



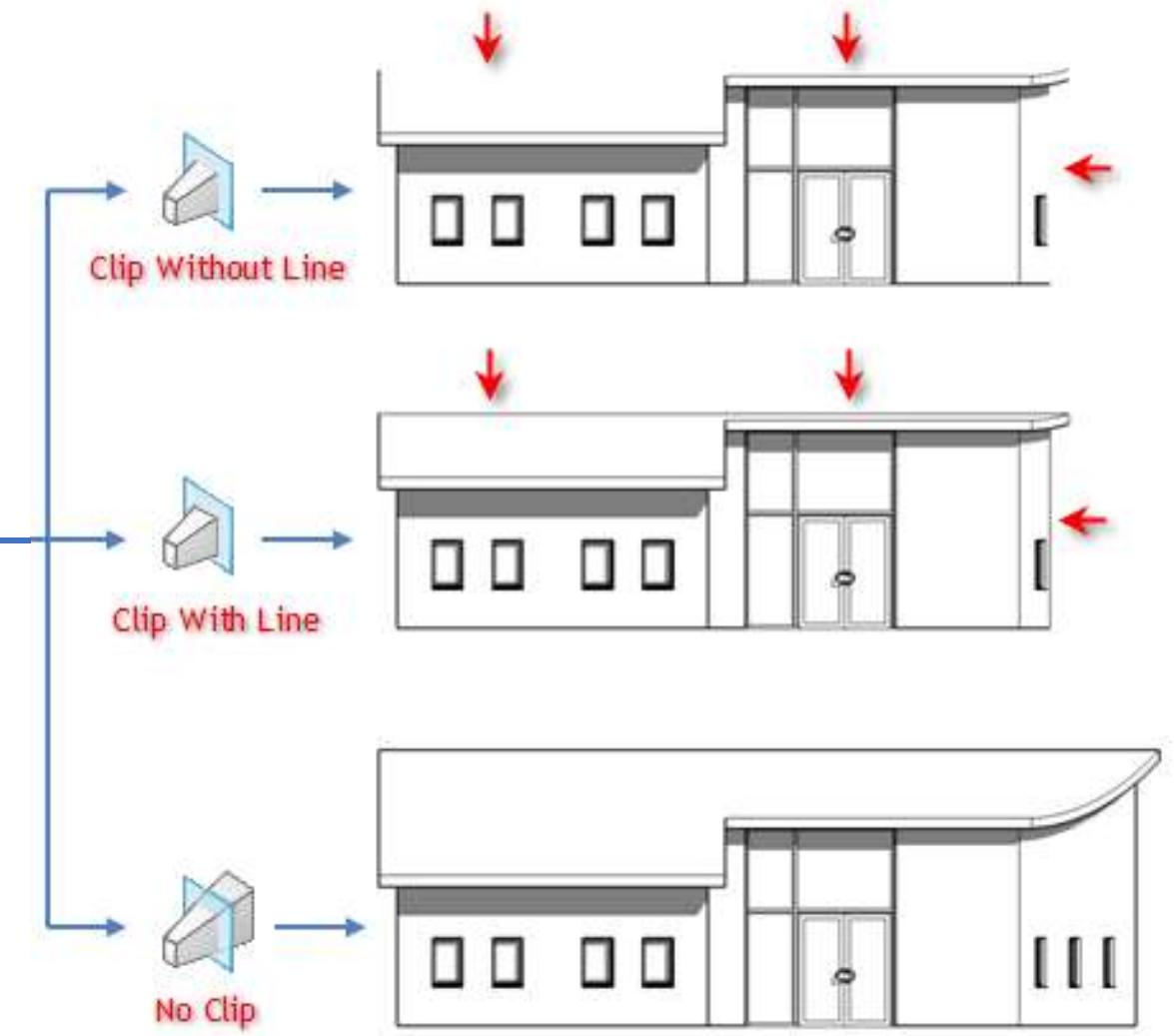
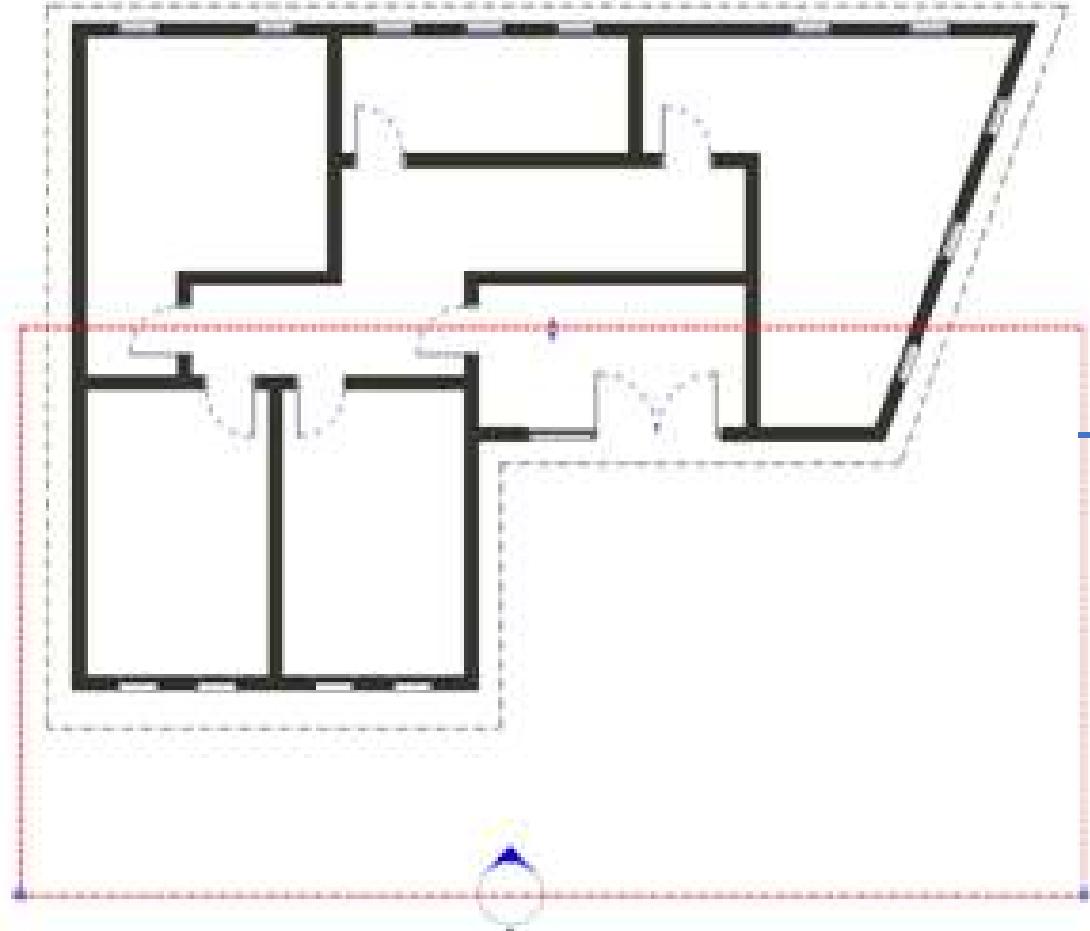
- Like View range but hosted from a given workplane usually the Level
- Each setting determines how much beyond that plane you can see
- If you have no clip then everything beyond that plane can be seen
- Clip without line stops the depth at the plane but has no outline just surfaces
- Clip with line stops at the depth at the plane and keeps the outline

VIEWS – ELEVATION



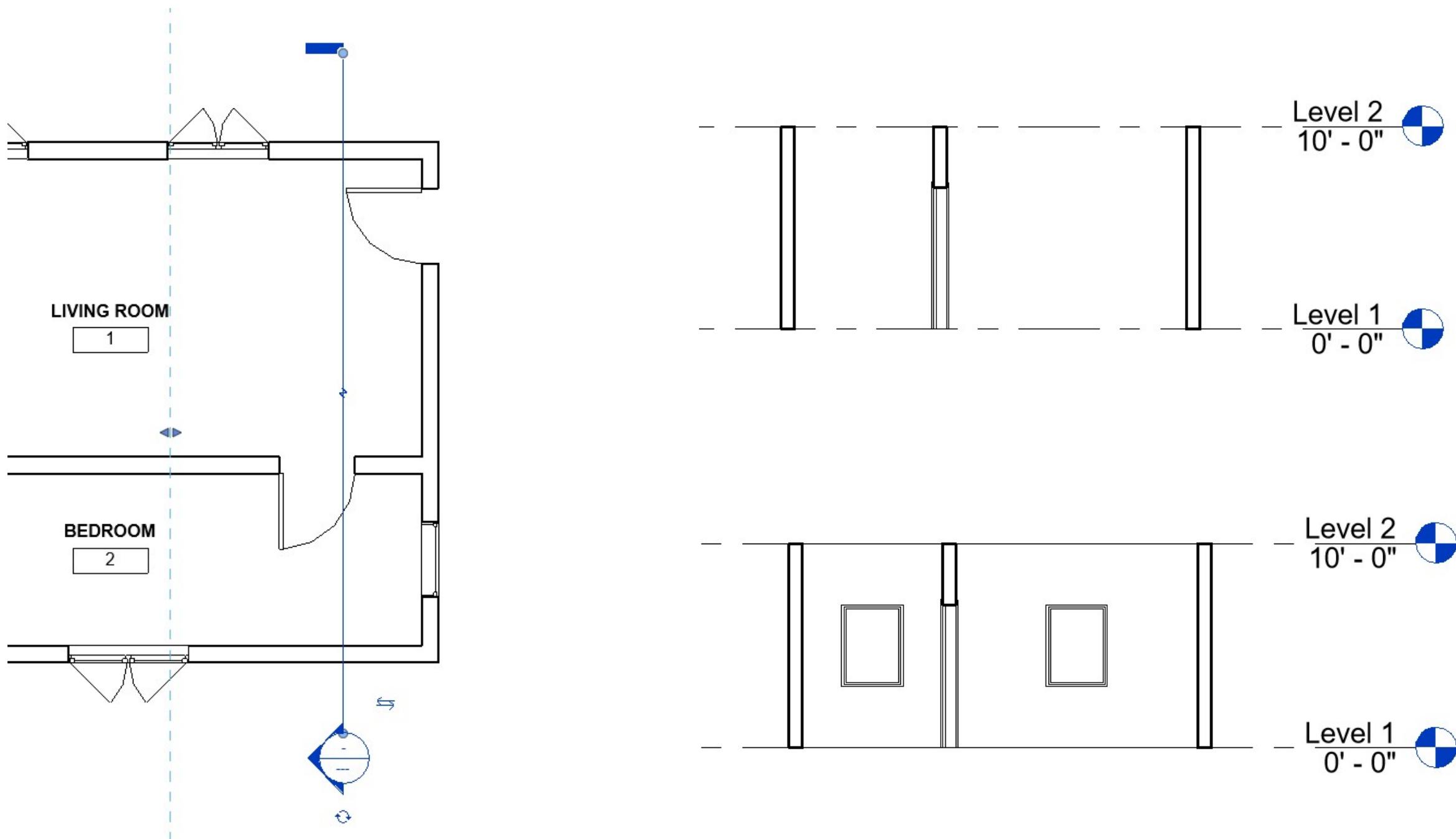
- Elevations are a view from the outside of the model orthogonal to the surface
- View depth and clipping are important parameters to control

CONCEPT – ELEVATION DEPTH CLIP



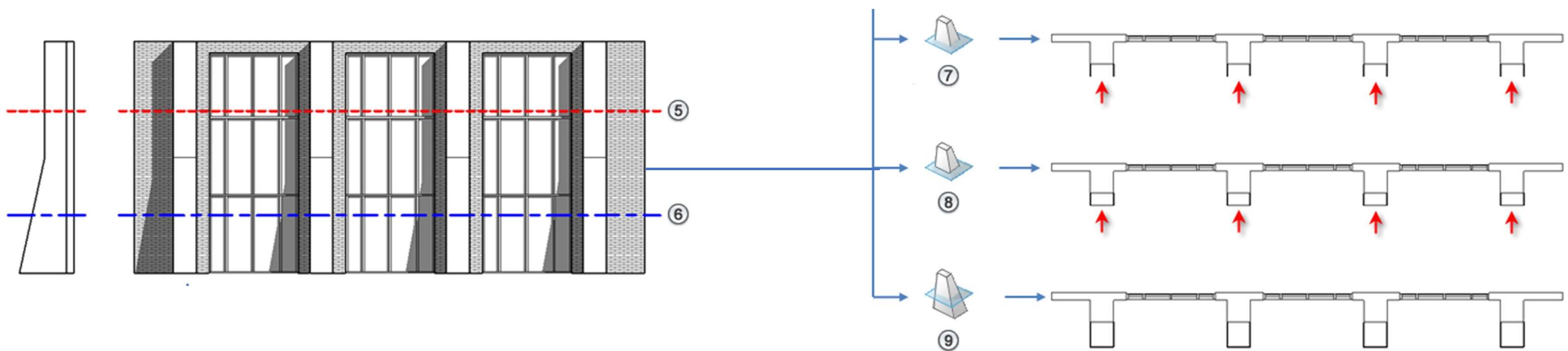
- Depth clip in elevation functions the same as in plan
- No line, Line with nothing showing beyond and everything in the view

VIEWS – SECTION



- Sections are orthogonal views through a given plane within the model
- Clipping options are prominent in effect with sections

VIEWS – ELEVATION

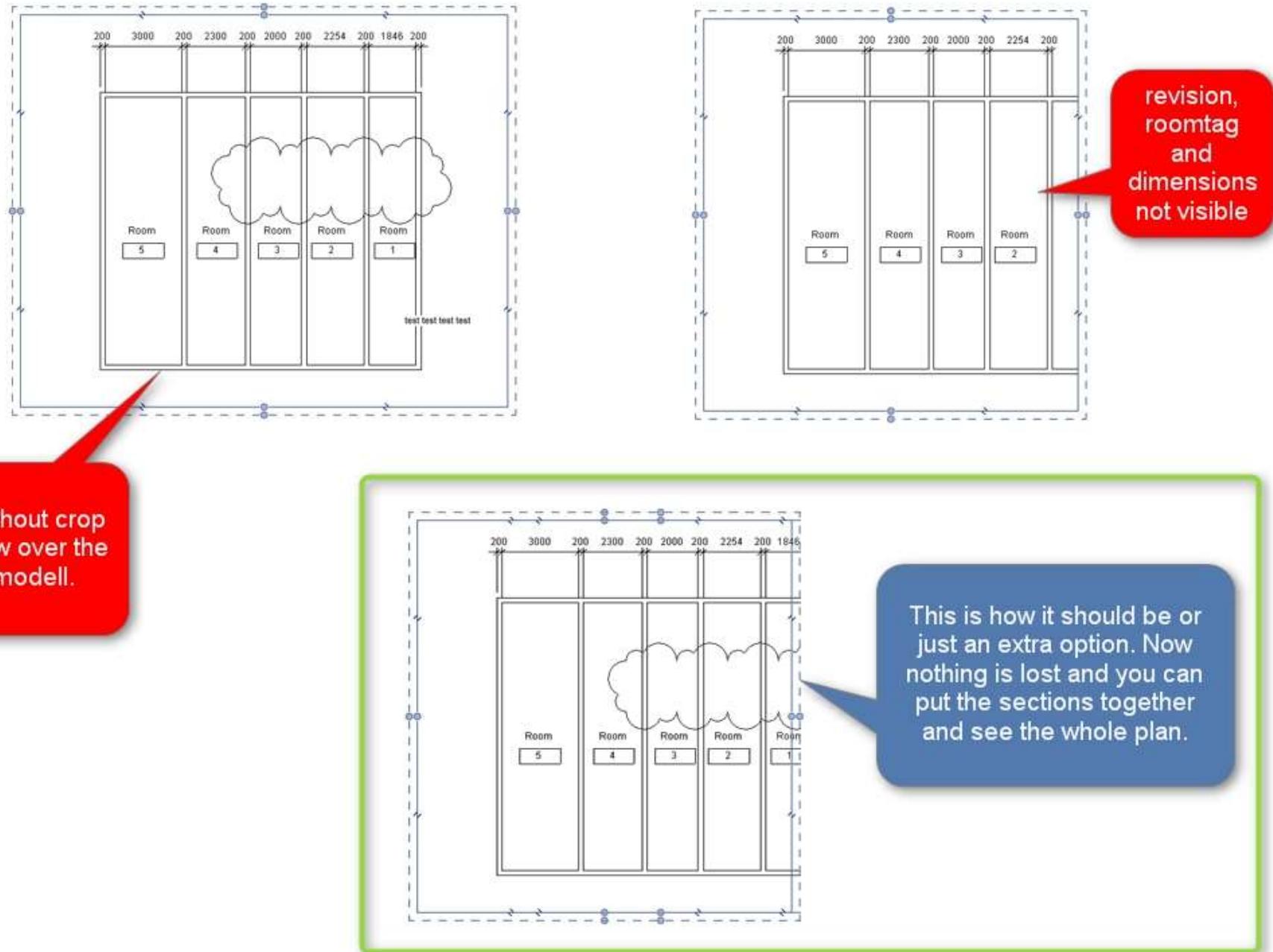


- Depth Clip in section functions the same as in plan or elevation
- View depth is more important with sections because you may want to see something in the background

VIEWS – CROP

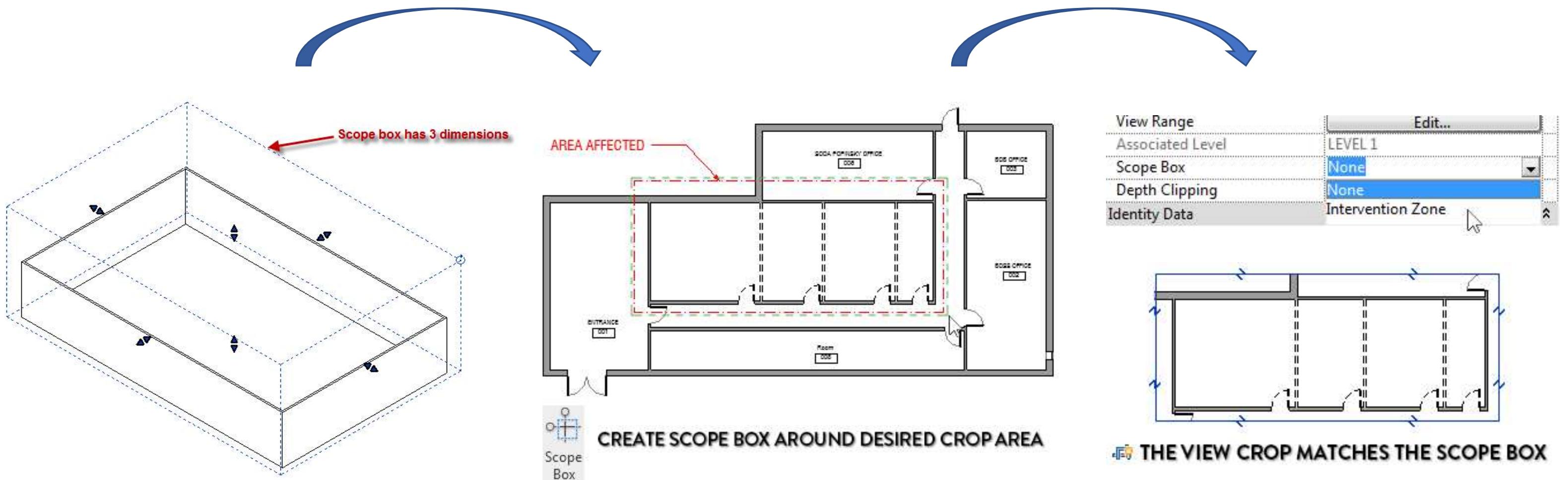


Extents	
Crop View	<input type="checkbox"/>
Crop Region Visible	<input type="checkbox"/>
Annotation Crop	<input type="checkbox"/>
View Range	Edit...
Associated Level	Level 1
Scope Box	None
Depth Clipping	No clip



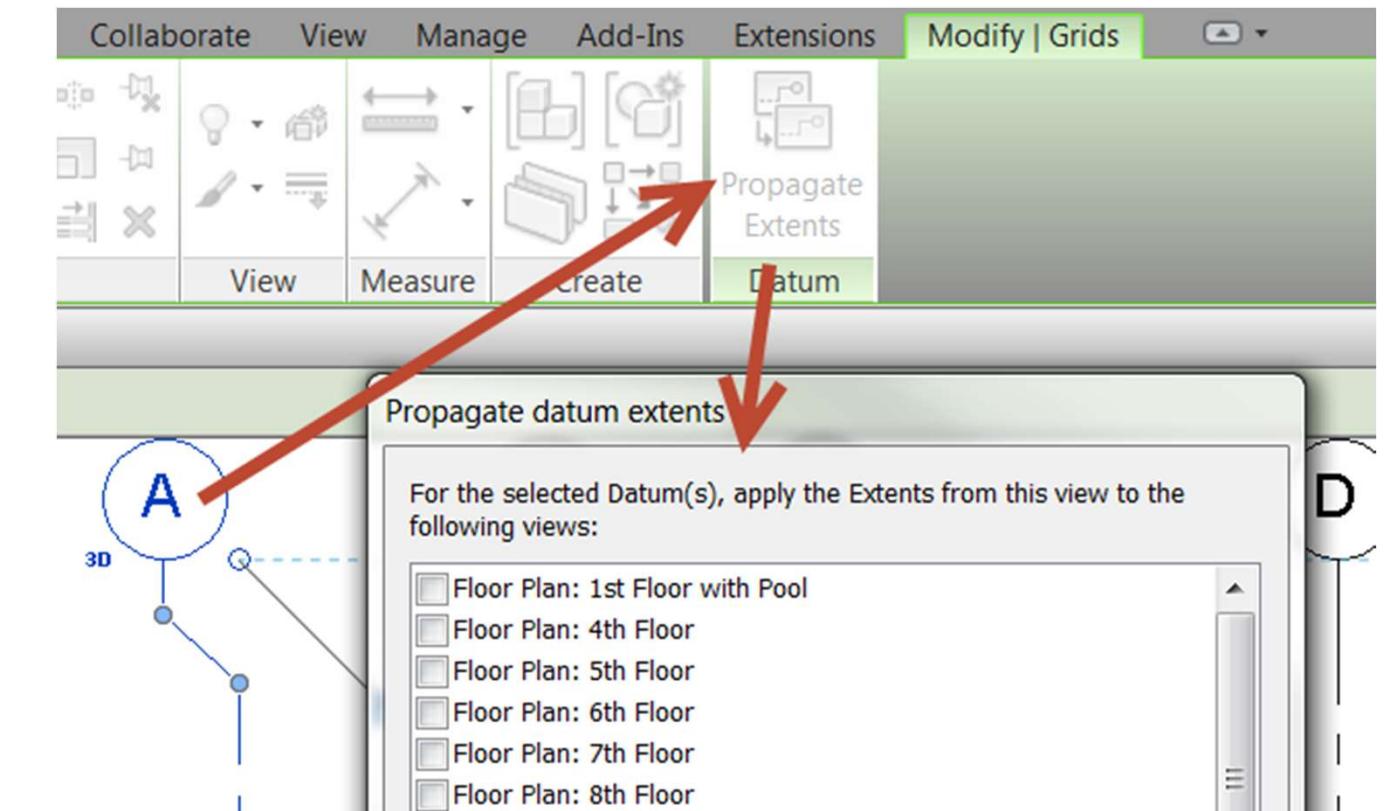
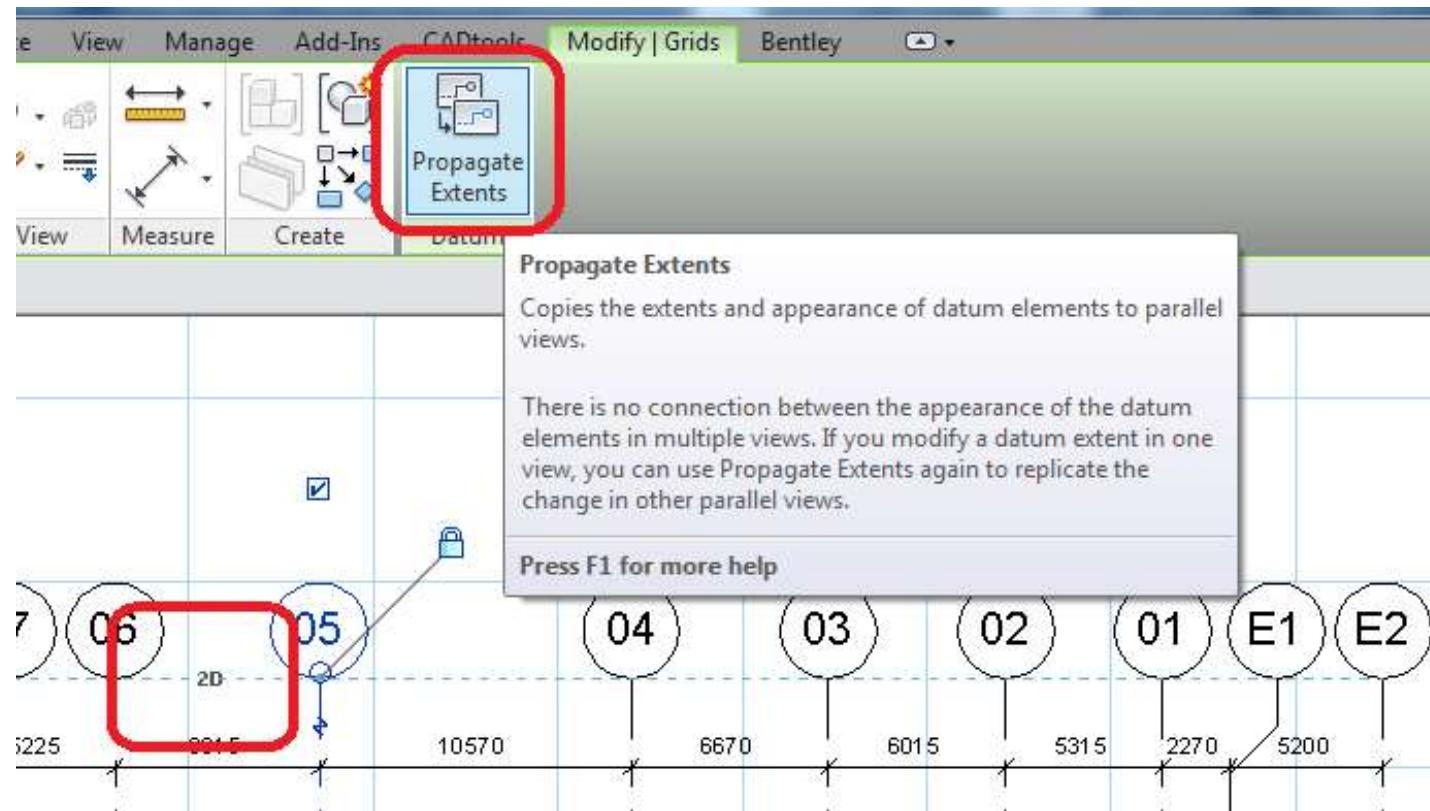
- Crop / Annotation Crop
- Always make sure if your crop options are active which hides a lot
- If any annotation content is touch the crop boundary then you cannot see them either

OTHER ISSUES



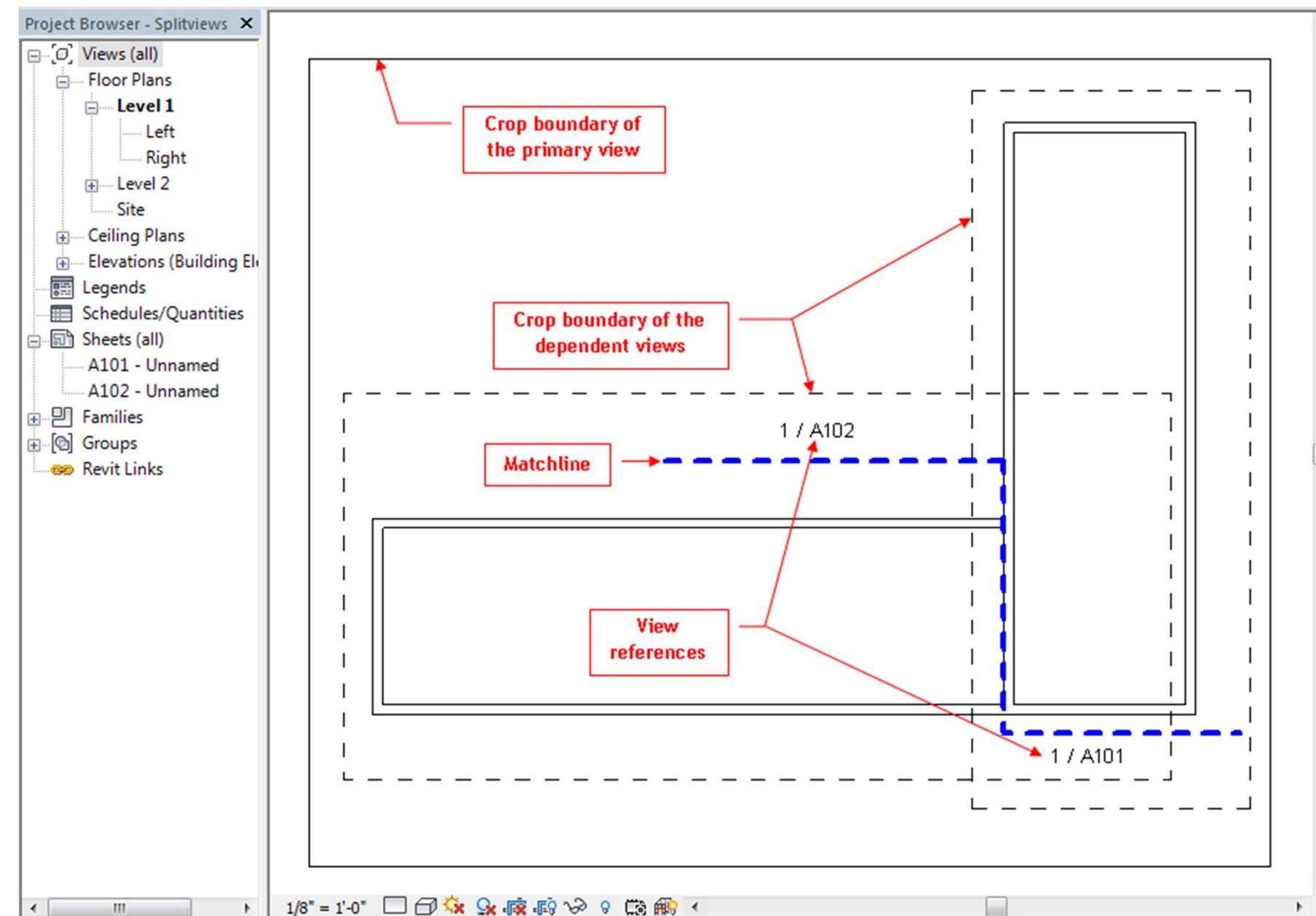
- Scope boxes are 3D elements in the annotation categories to help set crops for a given portion of the model
- If applied they can crop the view and limit what you can see like a regular view
- Not always obvious if a scope box or a view crop is being used which can lead to a lot of troubleshooting

OTHER ISSUES



- Propagate Extents can help display the grids in all your views
- Aligns your grids after you positioned them
- More of a fix to grids overlapping or being offset from each other

OTHER ISSUES



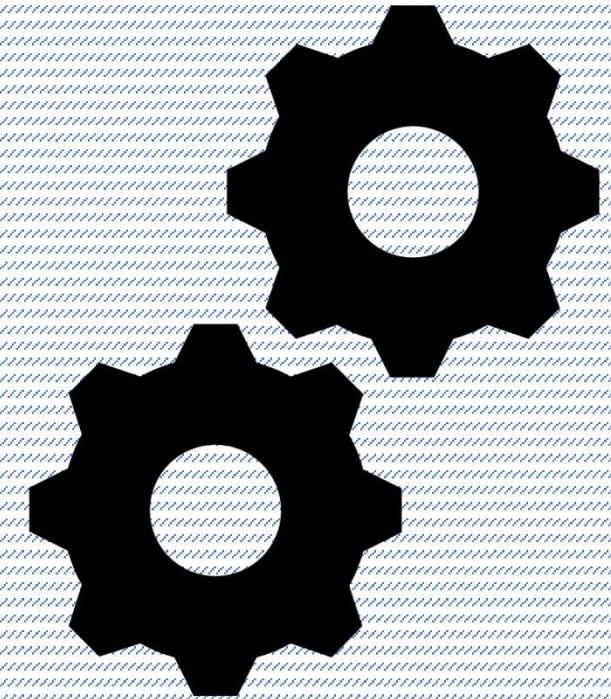
- Sheet Settings are where your project views are displayed for printing
- Without sheet views you can't print to paper or PDF with Revit
- Be mindful of how sheet settings and organization can affect view layout

SUMMARY

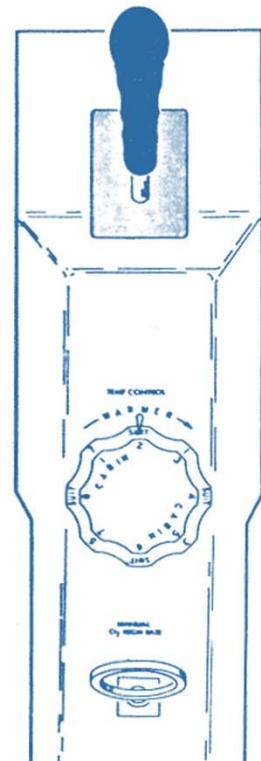
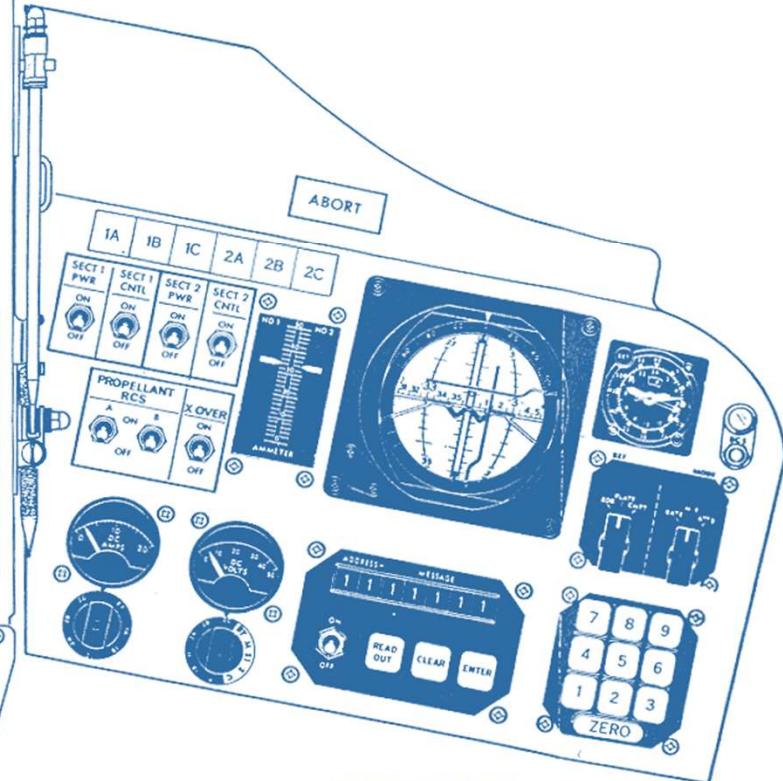
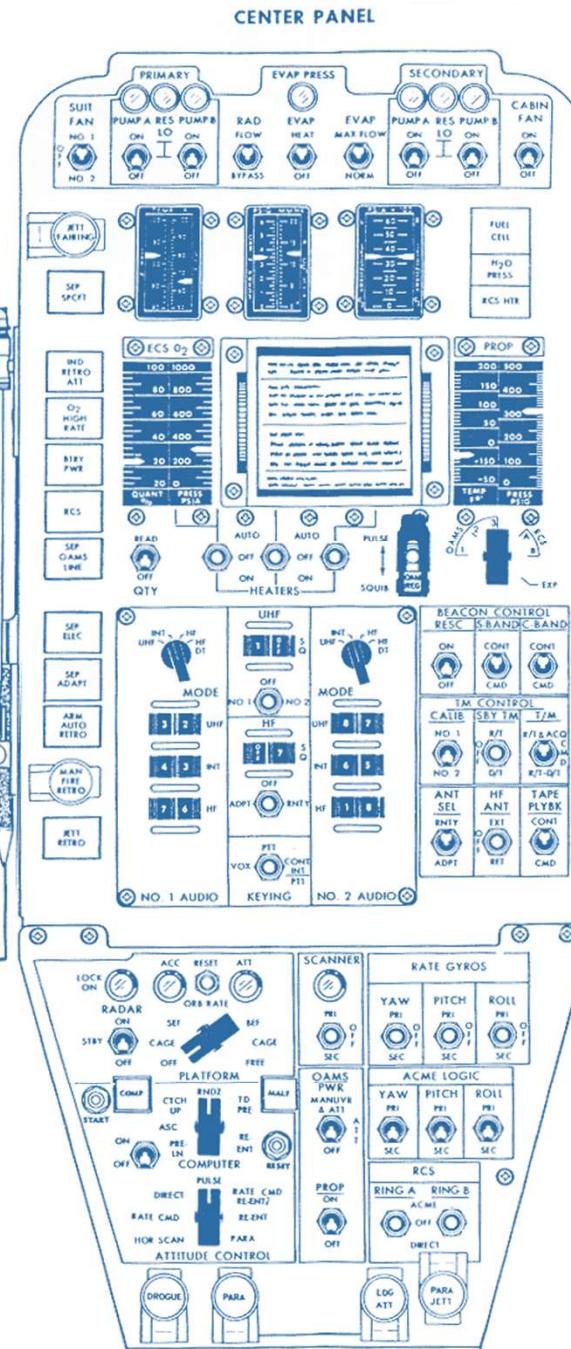
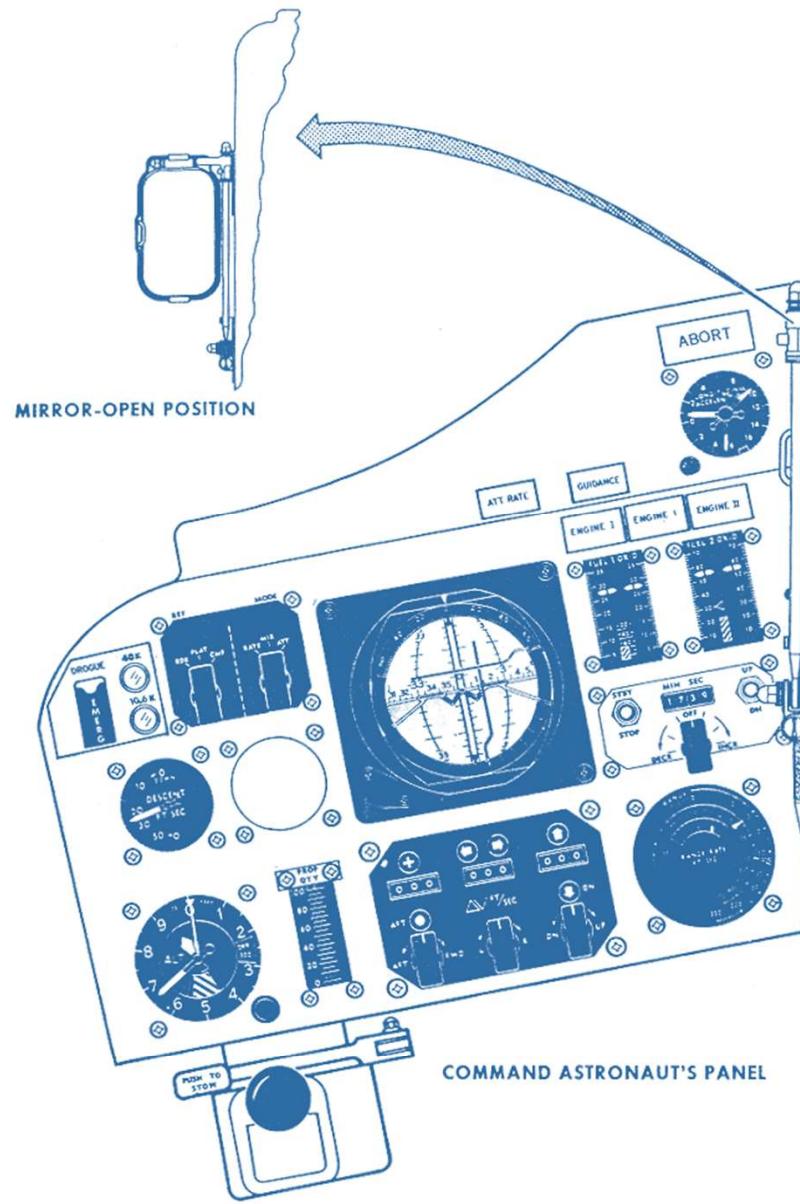


- The Revit model is 3D with controls for different view settings
- Revit configures views from the level workplanes
- Level workplanes host the elevations, sections and callout views
- Each view has its own settings like view depth and clipping
- Keep it simple with view settings and modify when necessary
- Common problems in views include view range issues and annotation crops
- Best solution is to duplicate your target view, adjust the view settings and see if that resolves your problem

PROJECT SETTINGS



PROJECT SETTINGS



GEMINI INSTRUMENT PANELS AND CONTROLS
from Project Gemini Familiarization Manual
revised 31 December 1964

- Think of these tools as your system control like cockpit
- Some settings have impact on the entire project and others just on a view



PROJECT SETTINGS

GLOBAL

Worksets

Design Options

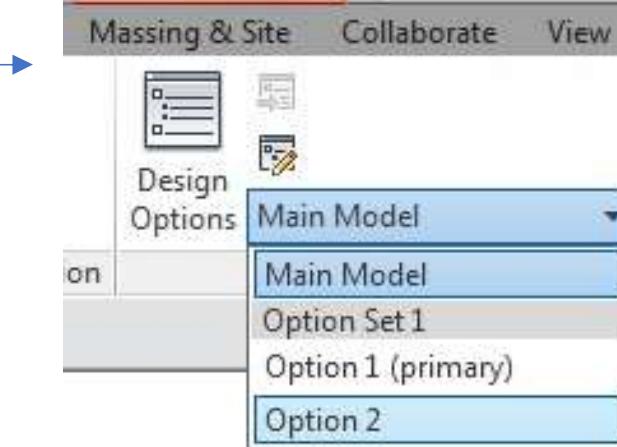
Coordinates

Project units

Object Styles



WORKSETS

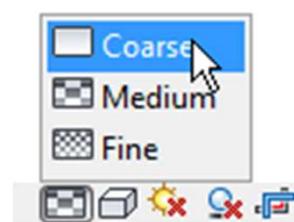
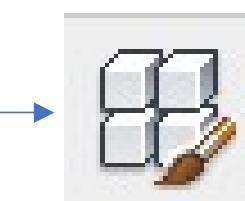
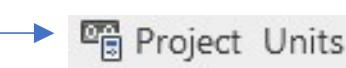
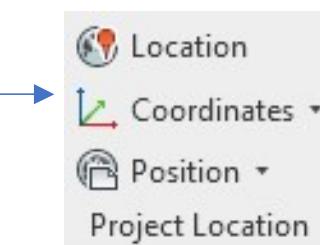
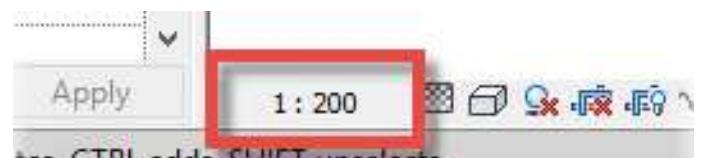


GLOBAL

Scale

Hide in View

Level of Detail



PROJECT SETTINGS – PROJECT UNITS



The image shows two dialog boxes side-by-side. On the left is the 'Project Units' dialog box, which contains a table of units and their formats. On the right is the 'Format' dialog box, which contains various options for customizing unit formats.

Project Units Dialog (Discipline: Common):

Units	Format
Length	1' - 5 11/32"
Area	1235 SF
Volume	1234.57 CF
Angle	12.35°
Slope	17 1/2" / 12"
Currency	1234.57
Mass Density	1234.57 lb/ft ³

Decimal symbol/digit grouping: 123,456,789.00

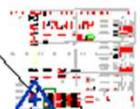
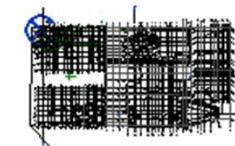
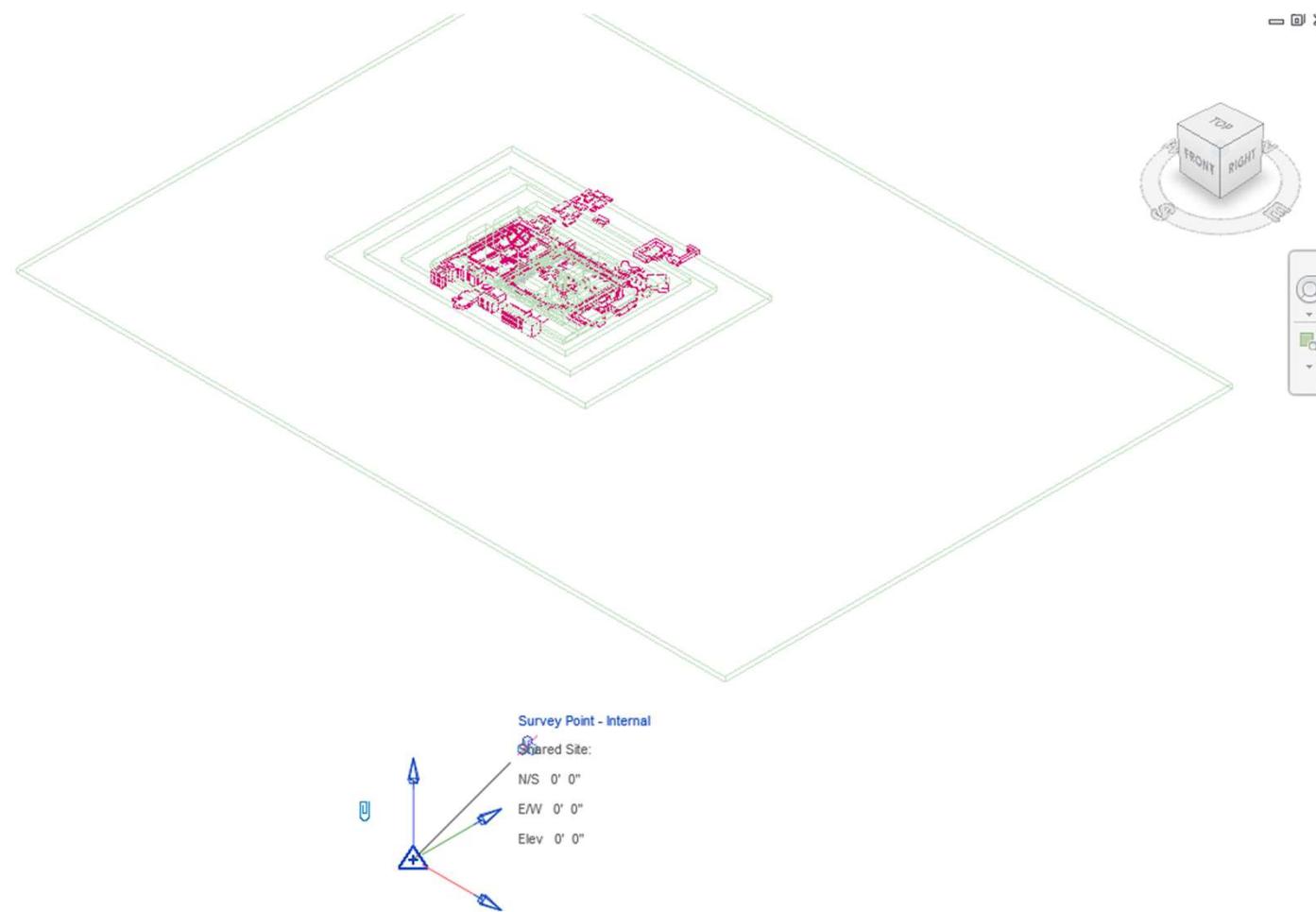
Format Dialog:

- Use project settings
- Units: Feet and fractional inches
- Rounding:
Rounding increment: To the nearest 1/32"
- Unit symbol:
- Suppress trailing 0's
- Suppress 0 feet
- Show + for positive values
- Use digit grouping
- Suppress spaces

OK Cancel

- Unit types and Tolerances
- Affects appearance of dimension information

PROJECT SETTINGS – COORDINATES

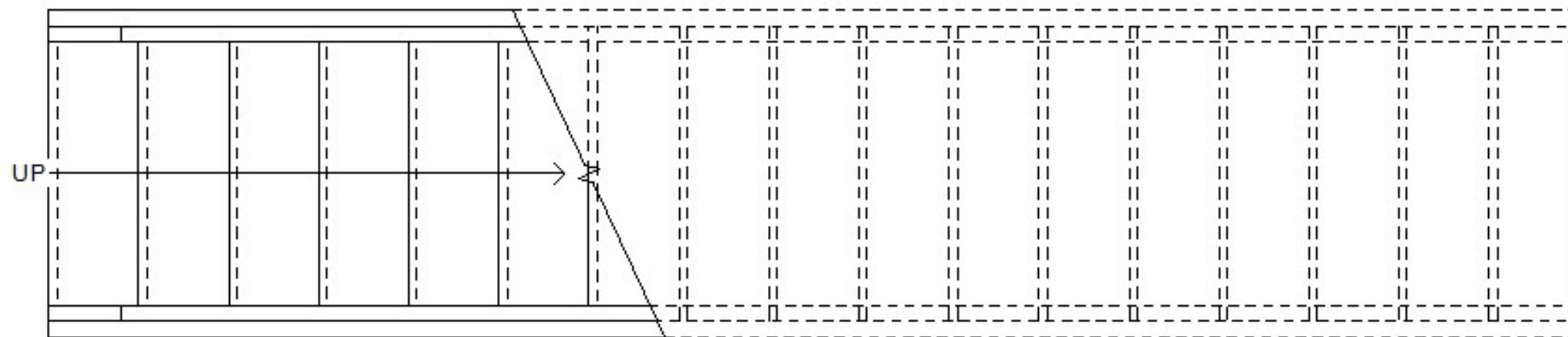


- Where your model is relative to Revit Origin
- Comes in handy for navigating 3D and linking models
- Don't take it for granted or you'll get lost

PROJECT SETTINGS – OBJECT STYLES



Stairs	1	3	Black	Solid
<Above> Cut Marks	1	1	Black	Overhead 1/16"
<Above> Nosing Lines	1	1	Black	Overhead 1/16"
<Above> Outlines	1	1	Black	Overhead 1/16"
<Above> Riser Lines	1	1	Black	Overhead 1/16"
<Above> Supports	1	1	Black	Overhead 1/16"
Cut Marks	1	1	Black	Solid
Hidden Lines	1	1	Black	Dash
Nosing Lines	1	1	Black	Solid
Outlines	1	1	Black	Solid
Riser Lines	1	1	Black	Overhead 1/16"
Supports	1	3	Black	Solid
Treads/Risers	1	3	Black	Solid

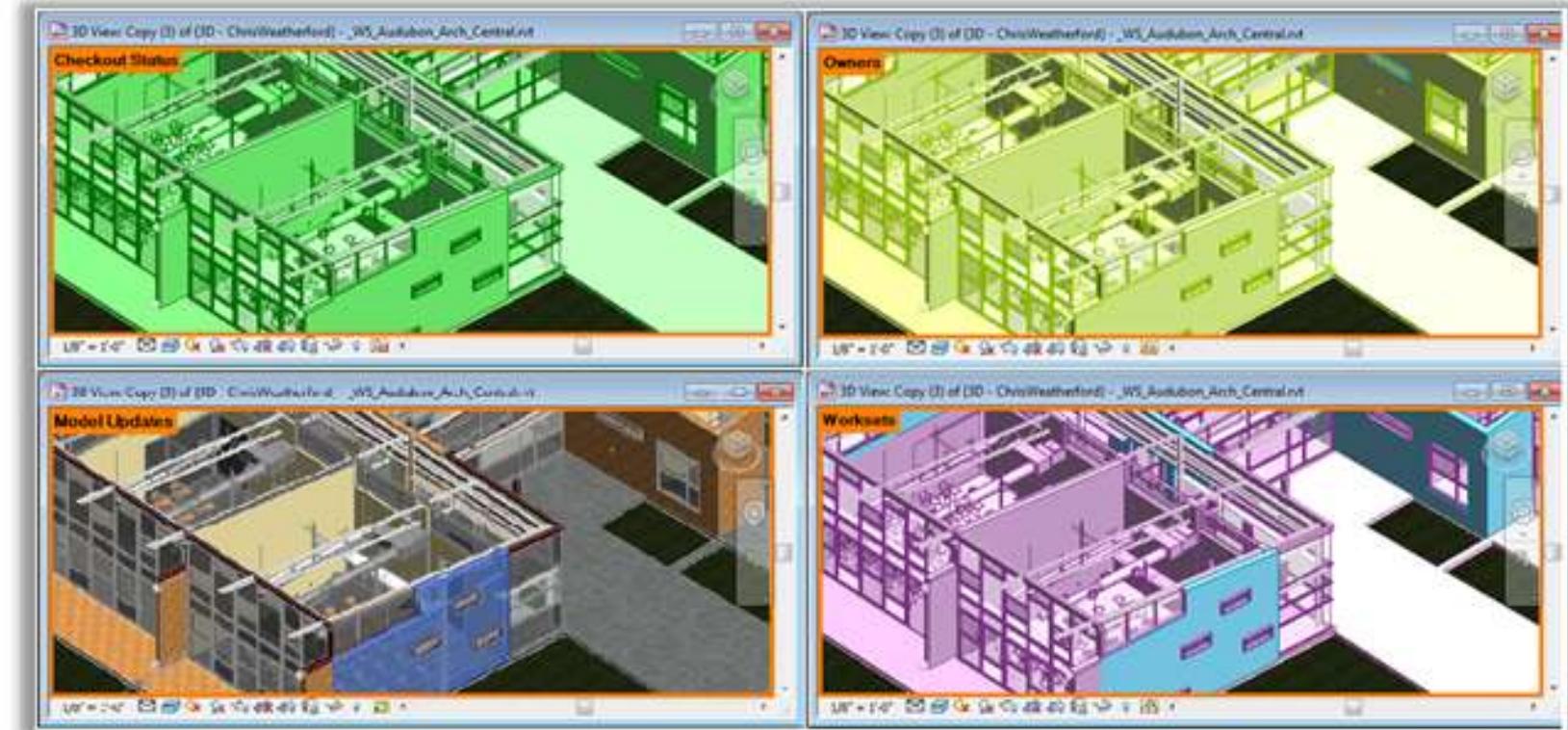
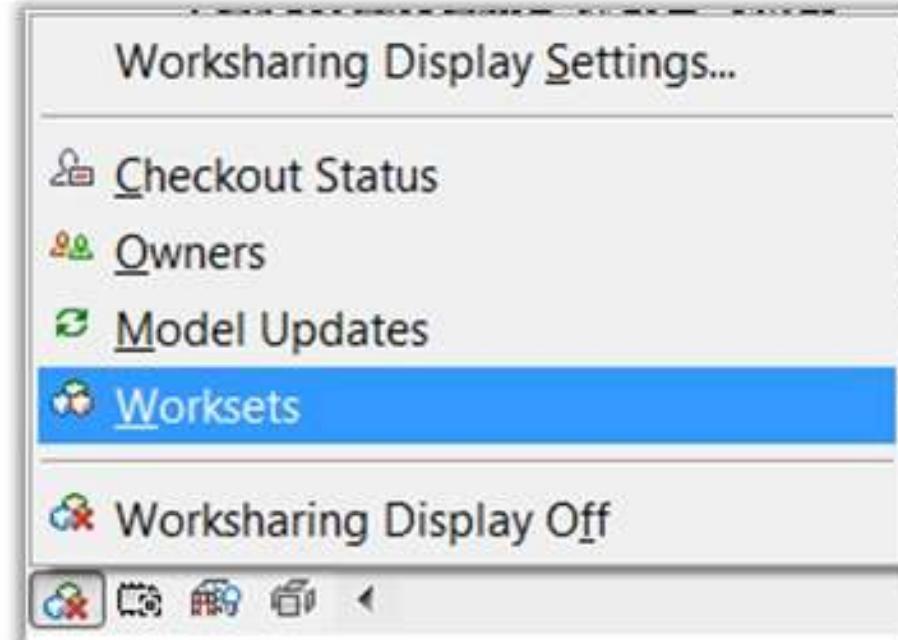


- All default graphics in all categories for your Revit project
- More on this in the next section

PROJECT SETTINGS – WORKSETS

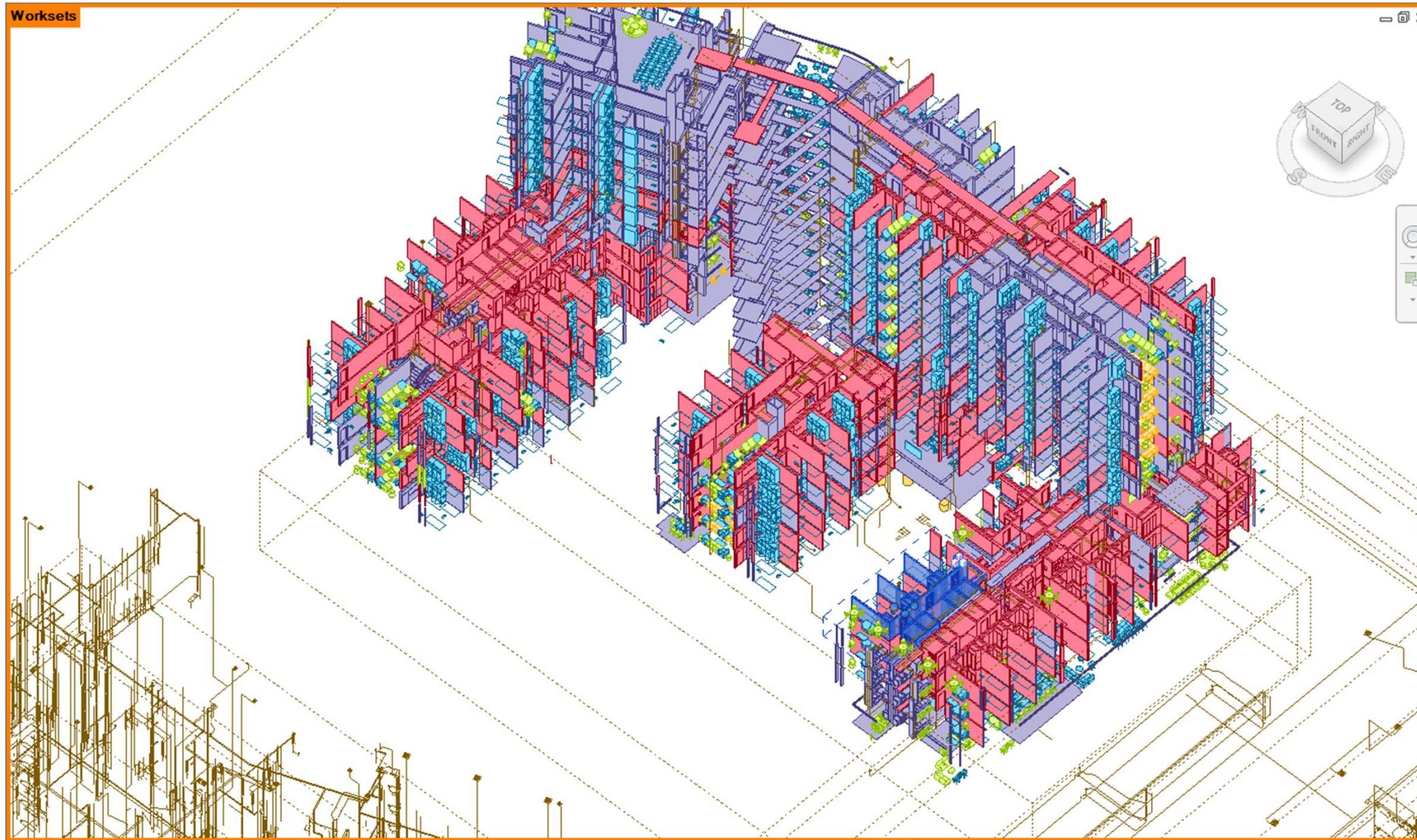


WORKSETS



- Worksets are not Visibility controls – they are meant to control **memory load** in your model
- Revit is a database which uses a lot of memory and worksets give you some control over the memory usage by choosing to load them on startup or when the model is open
- There are user worksets and system worksets
- The user worksets are ones you make and are often mixed up with visibility controls

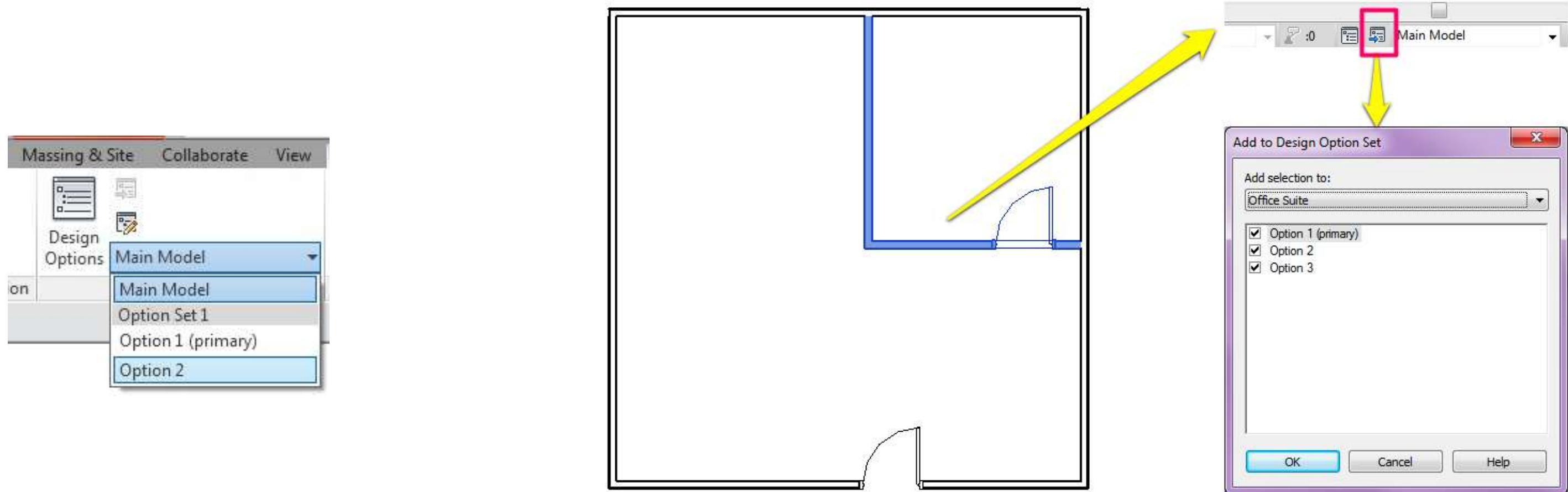
PROJECT SETTINGS – WORKSETS



Workset	Color
_BASEBOARD-HEATERS	Blue
_BIM Manager	Yellow
_Furniture	Cyan
_Furniture N.I.C.	Light Green
_Grids interior only	Magenta
_Interior	Dark Blue
_Interior Floor Finish	Orange
_Life Safety	Light Blue
_Shared Levels and Grids	Light Green
_Temp Interior Finishes	Yellow
_Unit Groups	Red
LR-A_NTPLL_BLDG_2_CS	Dark Blue
LR-A_NTPLL_BLDG_2_INT_2017	Green
LR-A_NTPLL_BLDG_3_CS	Red
LR-A_NTPLL_BLDG_3_INT_2017	Pink
LR-A_NTPLL_BLDG_4_CS	Orange
LR-A_NTPLL_BLDG_4_INT_2017	Cyan
LR-A_NTPLL_DATUMS_2017	Light Green
LR-A_NTPLL_GARAGE_2017	Yellow
LR-M_NTPLL_BLDG_3_2017	Red
LR-P_NTPLL_ALL_2017	Yellow
LR-S_NTPLL_BLDG_3_4_2017	Purple
X-DO-NOT-USE	Purple

- Keep your worksets in good order by reviewing the display settings
- If one type of element – like interior walls – should be in a single workset then make sure they aren't in 10 different worksets

PROJECT SETTINGS – DESIGN OPTIONS

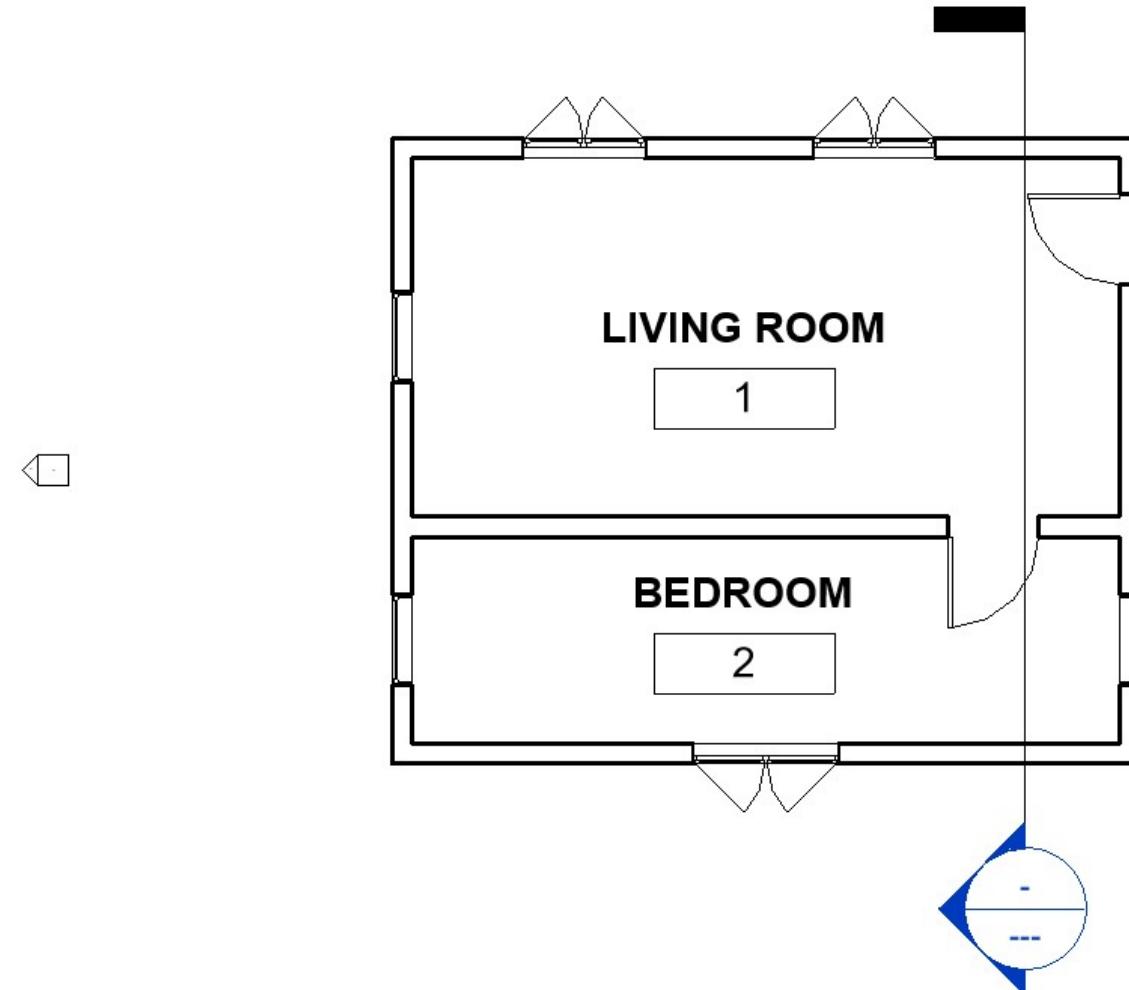
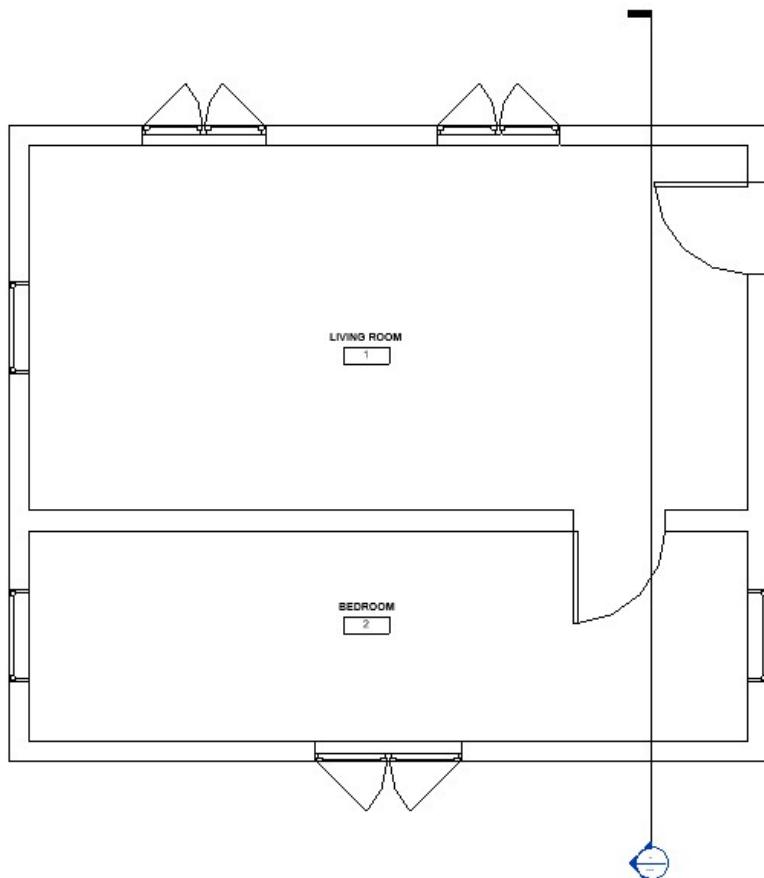


- Design Options are not Visibility Controls – meant to **contain versions** of design in your model
- Multiple designs and configurations can be modeled in the same place then switched on or off in different sets and sub sets
- It is a modeling feature not visibility controls

CONCEPT – SCALE



12" = 1'-0"
6" = 1'-0"
3" = 1'-0"
1 1/2" = 1'-0"
1" = 1'-0"
3/4" = 1'-0"
1/2" = 1'-0"
3/8" = 1'-0"
1/4" = 1'-0"
3/16" = 1'-0"
1/8" = 1'-0"
1" = 10'-0"
3/32" = 1'-0"
1/16" = 1'-0"
1" = 20'-0"
1/8" = 1'-0"



SCALE: 1:100
PROJECTION LINES: 1 (0.1mm)
CUT LINES: 3 (0.35mm)

1 : 100	
1	0.1000 mm
2	0.2200 mm
3	0.3500 mm
4	0.5000 mm



SCALE: 1:200
PROJECTION LINES: 1 (0.1mm)
CUT LINES: 3 (0.30mm)

1 : 200	
1	0.1000 mm
2	0.2000 mm
3	0.3000 mm
4	0.4500 mm

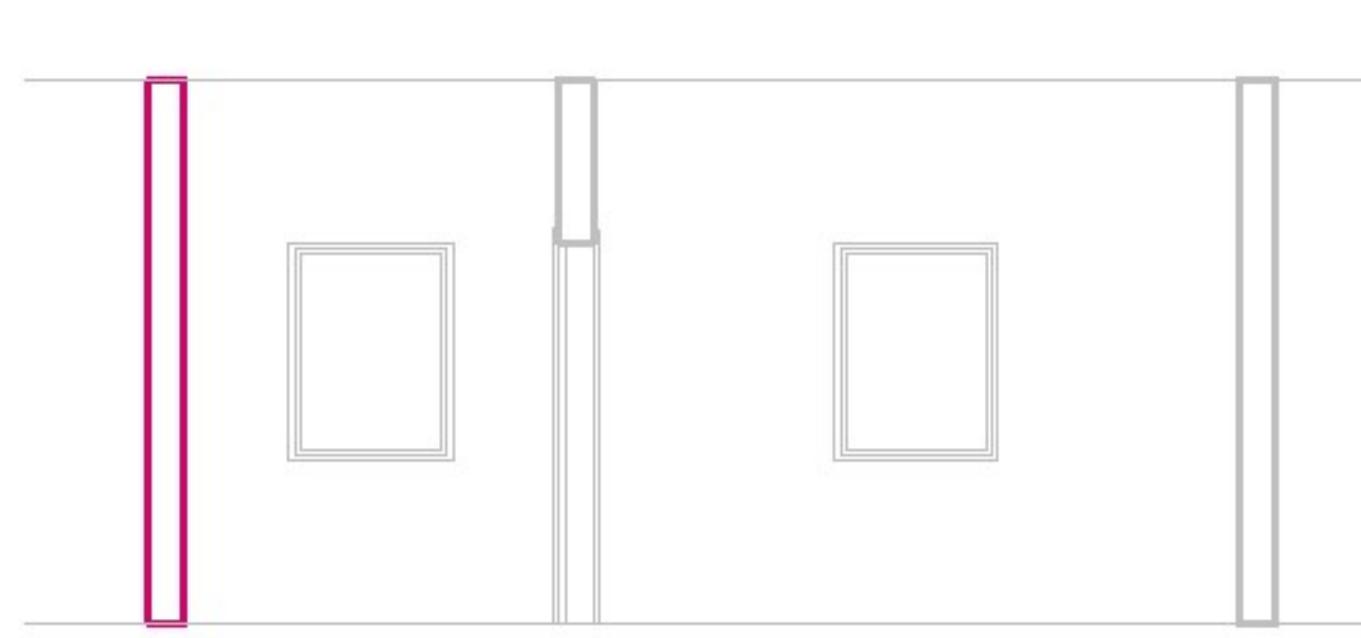
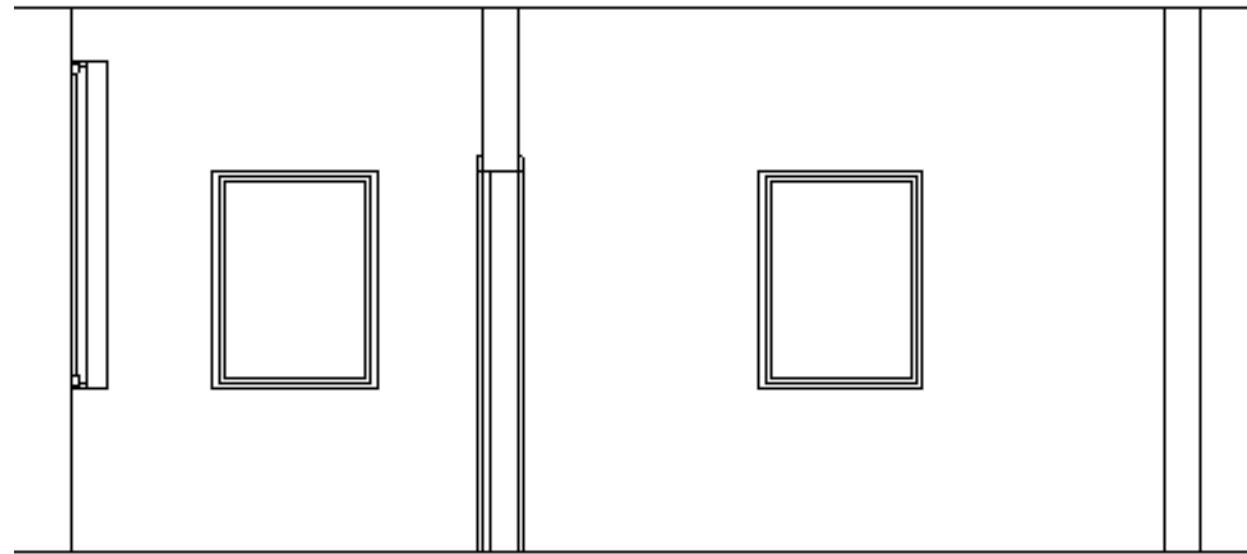
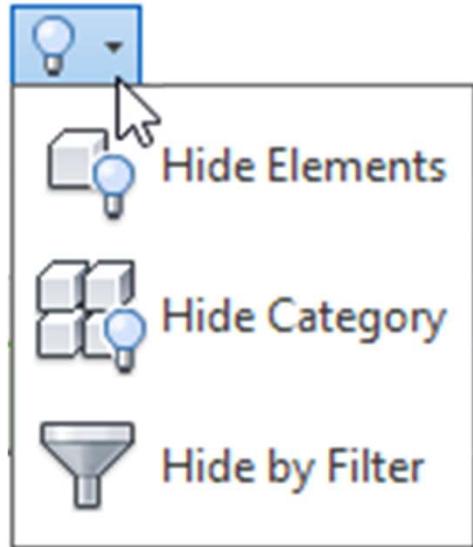


SCALE: 1:200
PROJECTION LINES: 1 (0.1mm)
CUT LINES: 3 (0.35mm)

1 : 200	
1	0.1000 mm
2	0.2200 mm
3	0.3500 mm
4	0.5000 mm

- Scale changes - Manipulate the relative size of annotations, line thickness, patterns and text
- A result of how you set object styles and other visibility controls
- Inherent property of each object in your template

CONCEPT – HIDDEN ELEMENTS



Level 2
10' - 0"

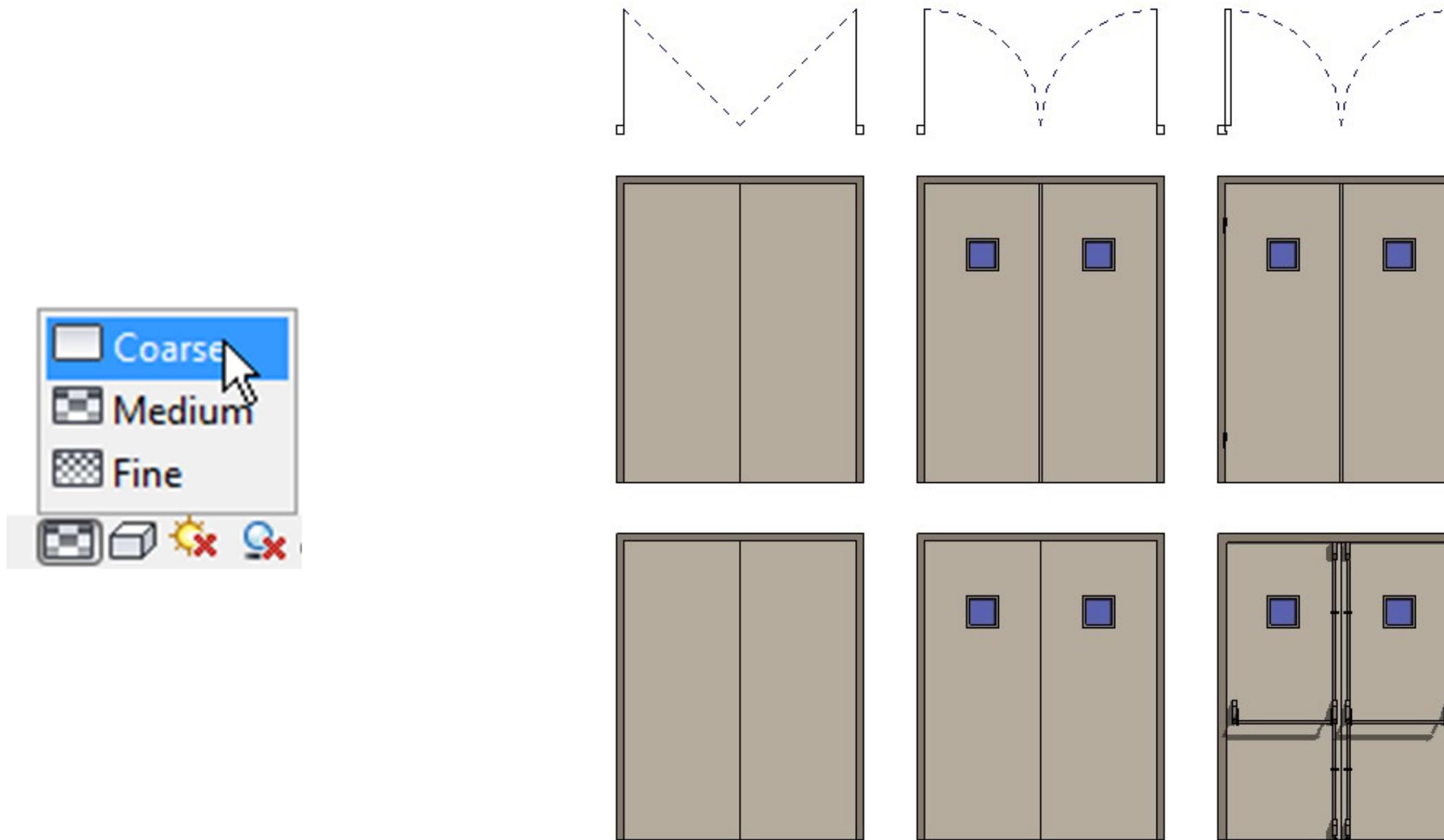


Level 1
0' - 0"



- Hide Elements conceals a given object in a specific view
- Reveal Hidden Elements show everything hidden in a view except closed worksets and hidden filters
- Can specifically hide elements with this method but must remember to use this tool to unhide them

CONCEPT – DETAIL LEVEL



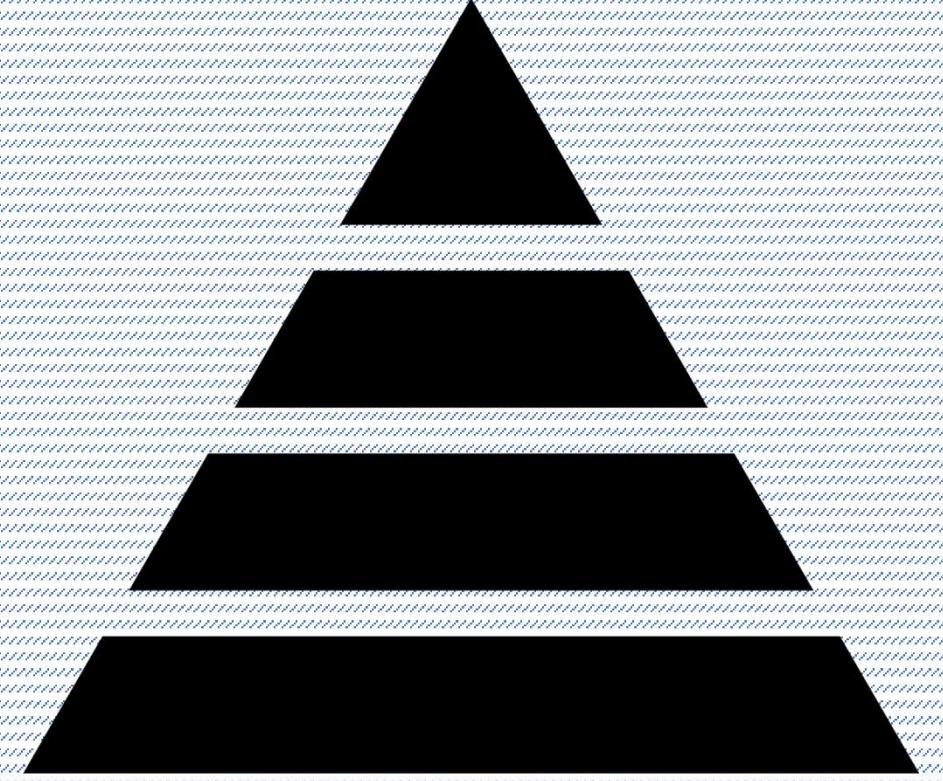
- Detail Level
- Changing the detail setting in your view can change your model elements appearance
- The model family will have the Coarse, Medium and Fine settings labeled

SUMMARY



- There are many settings in Revit that can affect visibility but aren't necessarily visibility tools
- Worksets are meant to control memory so prioritize that function
- Hidden elements should be used sparingly as an exception to regular visibility controls
- Design options configure model content for review but is not meant for visibility control either
- Level of Detail and Scale changes are meant to affect content in views

VISIBILITY HIERARCHY



VISIBILITY HIERARCHY

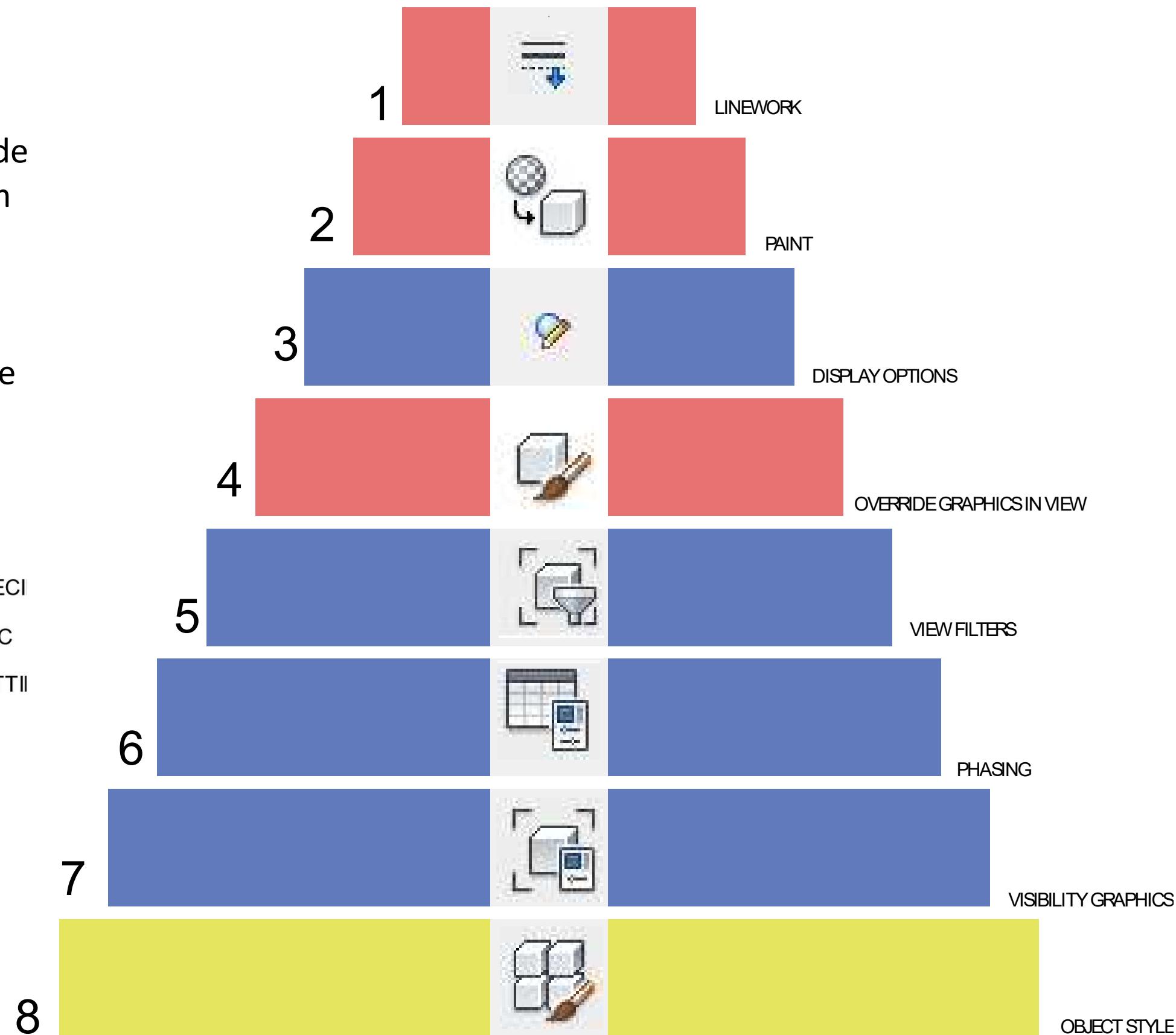


- Revit has a set of designated visibility graphic tools
- All these tools are meant to control the visibility properties of a given object
- Unlike other tools they do not create content just modify appearances which sets them apart

VISIBILITY HIERARCHY



- Some VG settings override others as you apply them
- Visibility elements are 'stacked' such that you'll see the top of the stack overrides before you see the bottom stack



VISIBILITY HIERARCHY – OBJECT STYLES



8

Category	Line Weight	Line Color	Line Pattern	Material
	Projection	Cut		
Air Terminals	1	Black	Solid	
Cable Tray Fittings	1	Black	Solid	
Cable Trays	1	Black	Solid	
Casework	1	3	Black	Solid
Ceilings	2	5	Black	Solid
Columns	1	4	Black	Solid
Communication Devi...	1	Black		
Conduit Fittings	1	Black	Solid	
Conduits	1	Black	Solid	
Curtain Panels	1	2	Black	Solid
Curtain Systems	2	2	RGB 000-127-0	Solid
Curtain Wall Mullions	1	3	Black	Solid
Data Devices	1	Black		
Detail Items	1	Black	Solid	

Category	Line Projection	Line Color	Line Pattern	
Adaptive Points	1	Black	Solid	
Air Terminal Tags	1	Black	Solid	
Analytical Beam Tags	5	RGB 247-150-0	Solid	
Analytical Brace Tags	5	RGB 210-210-0	Solid	
Analytical Column Ta...	5	RGB 083-141-2	Solid	
Analytical Floor Tags	5	RGB 128-064-0	Solid	
Analytical Isolated F...	7	RGB 165-165-1	Solid	
Analytical Link Tags	1	Black	Solid	
Analytical Node Tags	1	Black	Solid	
Analytical Slab Foun...	5	RGB 155-187-0	Solid	
Analytical Wall Foun...	5	RGB 079-098-0	Solid	
Analytical Wall Tags	5	RGB 000-200-2	Solid	
Anchor Tags	1	Black		
Area Load Tags	1	Black		

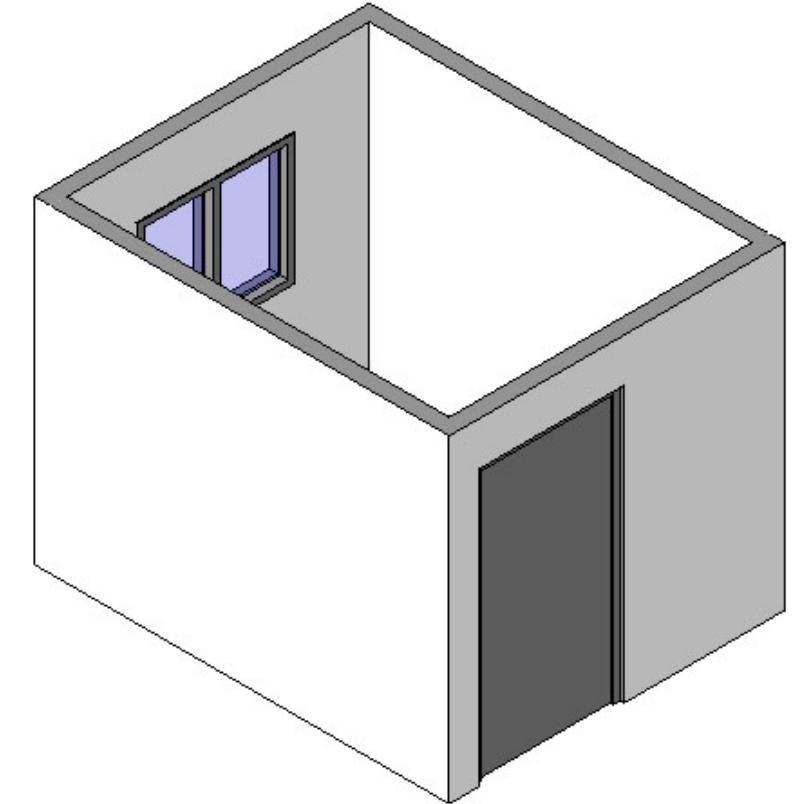
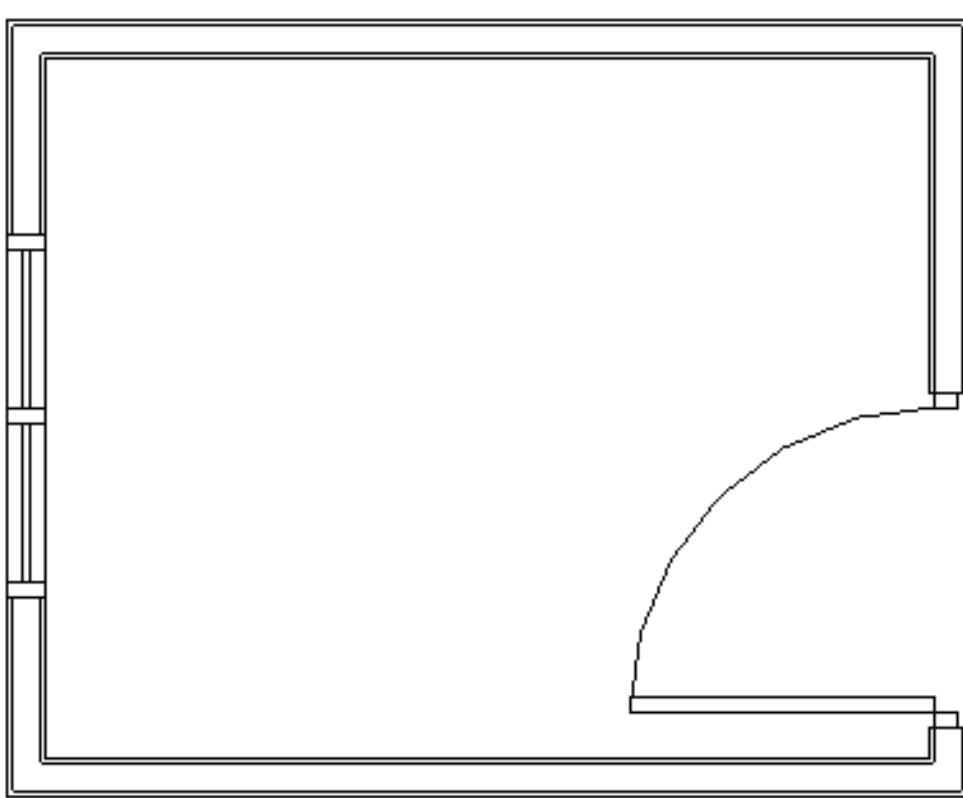
- Where graphics all starts in your Revit template
- Default graphics for your family elements based on your template
- Lowest priority meaning just about every tool can modify your object styles
- Main categories and sub-categories exist
- Specifies most element default graphic appearance
- Object Styles are a part of every template which controls default view appearances

VISIBILITY HIERARCHY – OBJECT STYLES



8

- Edit – No changes to the elements at this point just Object Styles from template coloring and creating lines for all families in view
- Plan and 3D show essential information in cut lines, project lines and surface patterns or colors.



Object Styles

Model Objects					
Annotation Objects					
Analytical Model Objects					
Imported Objects					
Filter list: <show all>					
Category	Line Weight		Line Color	Line Pattern	Material
	Projection	Cut			
Data Devices	1		■ Black		
+ Detail Items	1		■ Black	Solid	
Doors	2	2	■ Black	Solid	
ADA Clearance	1	1	■ RGB 128-000-000	Dash	
Egress	4	4	■ Black	Solid	
Electronics	1	1	■ Black	Solid	
Elevation Swing	1	1	■ Black	Dash 1/16"	

VISIBILITY HIERARCHY – VIEW GRAPHICS OVERIDES



Visibility/Graphic Overrides for Floor Plan: Level 1

Model Categories Annotation Categories Analytical Model Categories Imported Categories Filters

Show model categories in this view If a category is unchecked, it will not be visible.

Filter list: <show all>

Visibility	Projection/Surface			Cut		Halftone	Detail Level
	Lines	Patterns	Transpar...	Lines	Patterns		
<input checked="" type="checkbox"/> Air Terminals					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Areas					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Cable Tray Fittin...					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Cable Trays					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Casework					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Ceilings					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Columns					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Communication...					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Conduit Fittings					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Conduits					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Curtain Panels					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Curtain Systems					<input type="checkbox"/>	By View	
<input checked="" type="checkbox"/> Curtain Wall Tags					<input type="checkbox"/>	By View	

All None Invert Expand All

Override Host Layers
 Cut Line Styles Edit...

Categories that are not overridden are drawn according to Object Style settings. Object Styles...

Visibility/Graphic Overrides for Floor Plan: Level 1

Model Categories Annotation Categories Analytical Model Categories Imported Categories Filters

Show annotation categories in this view If a category is unchecked, it will not be visible.

Filter list: <show all>

Visibility	Projection/Su...		Halftone	
	Lines	Halftone		
<input checked="" type="checkbox"/> Adaptive Points		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Air Terminal Tags		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Beam Tags		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Brace Tags		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Column Tags		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Floor Tags		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Isolated Foun...		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Link Tags		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Node Tags		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Slab Foundati...		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Wall Foundati...		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Analytical Wall Tags		<input type="checkbox"/>		
<input checked="" type="checkbox"/> Anchor Tags		<input type="checkbox"/>		

All None Invert Expand All

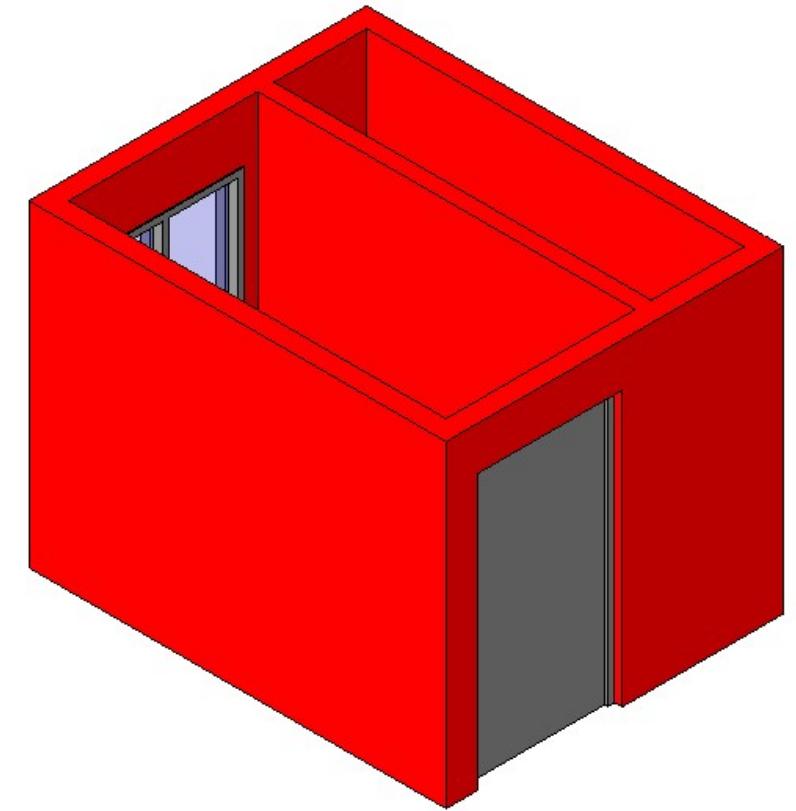
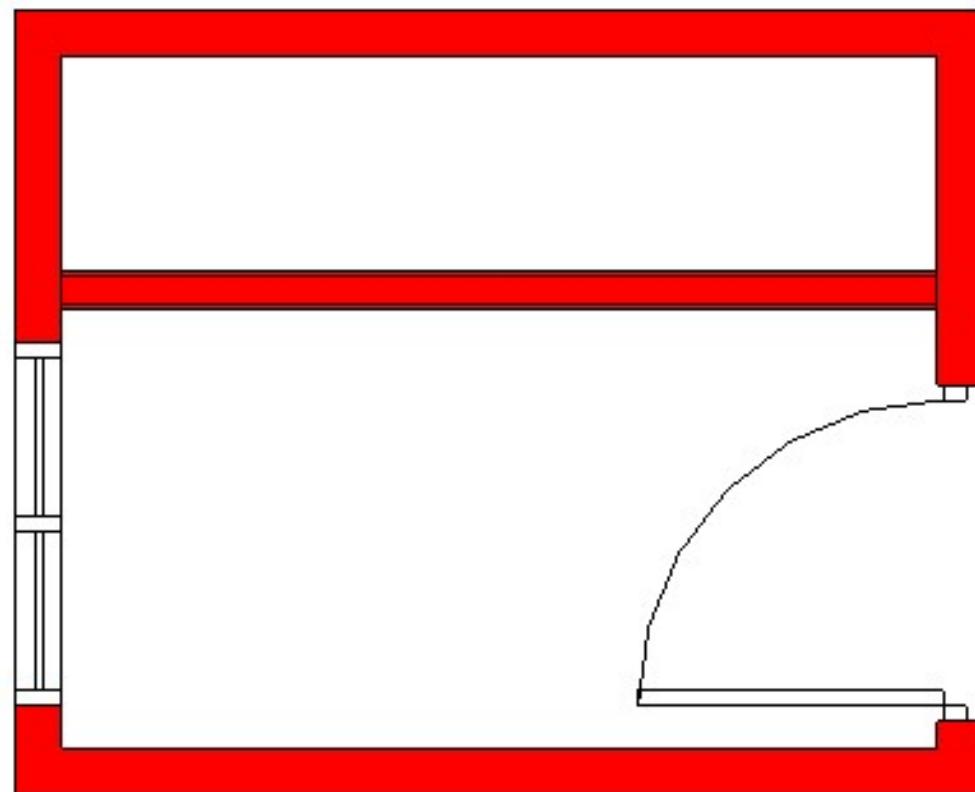
Categories that are not overridden are drawn according to Object Style settings. Object Styles...

- Control category settings in each view
- Accessible through the Visibility graphics menu or through VG / VV shortcut key
- The starting point of most Graphic changes in Revit
- Essentially turn on or off certain categories like model and annotation content
- Modifying appearance through section cut and patterns also possible here
- Located low on the hierarchy meaning many settings above it can modify these settings further
- Consider keeping your options straight forward and simple as a consistent base across views

VISIBILITY HIERARCHY – VG OVERRIDE



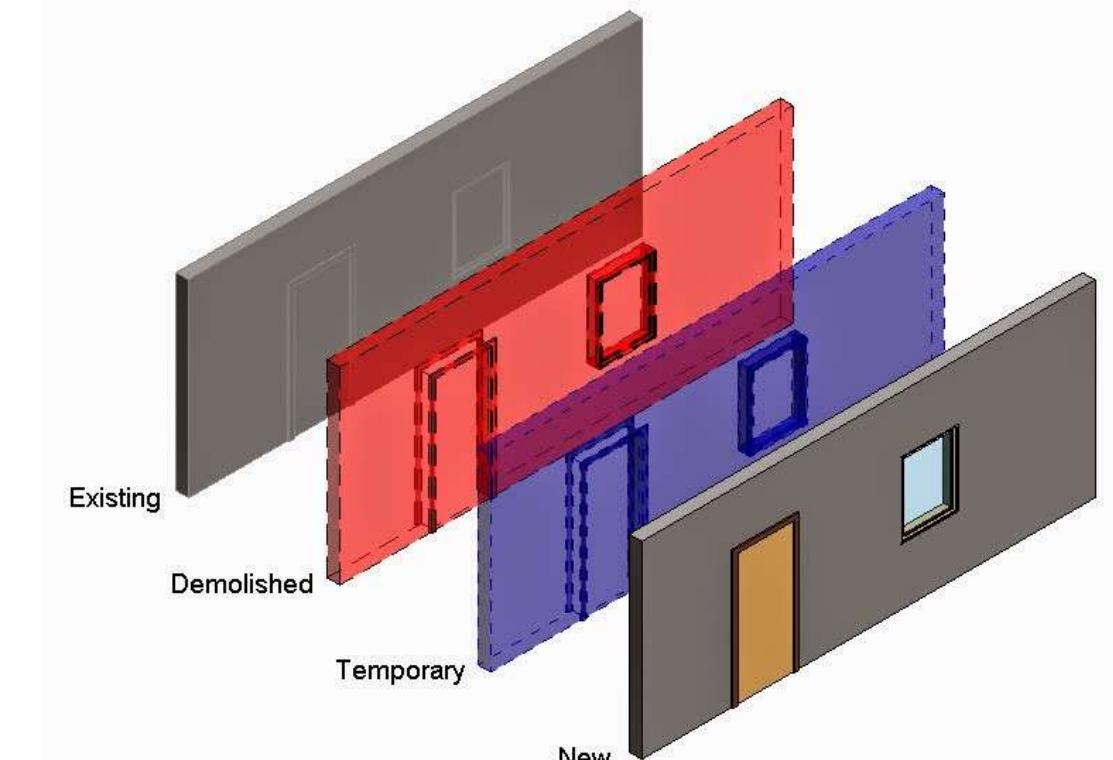
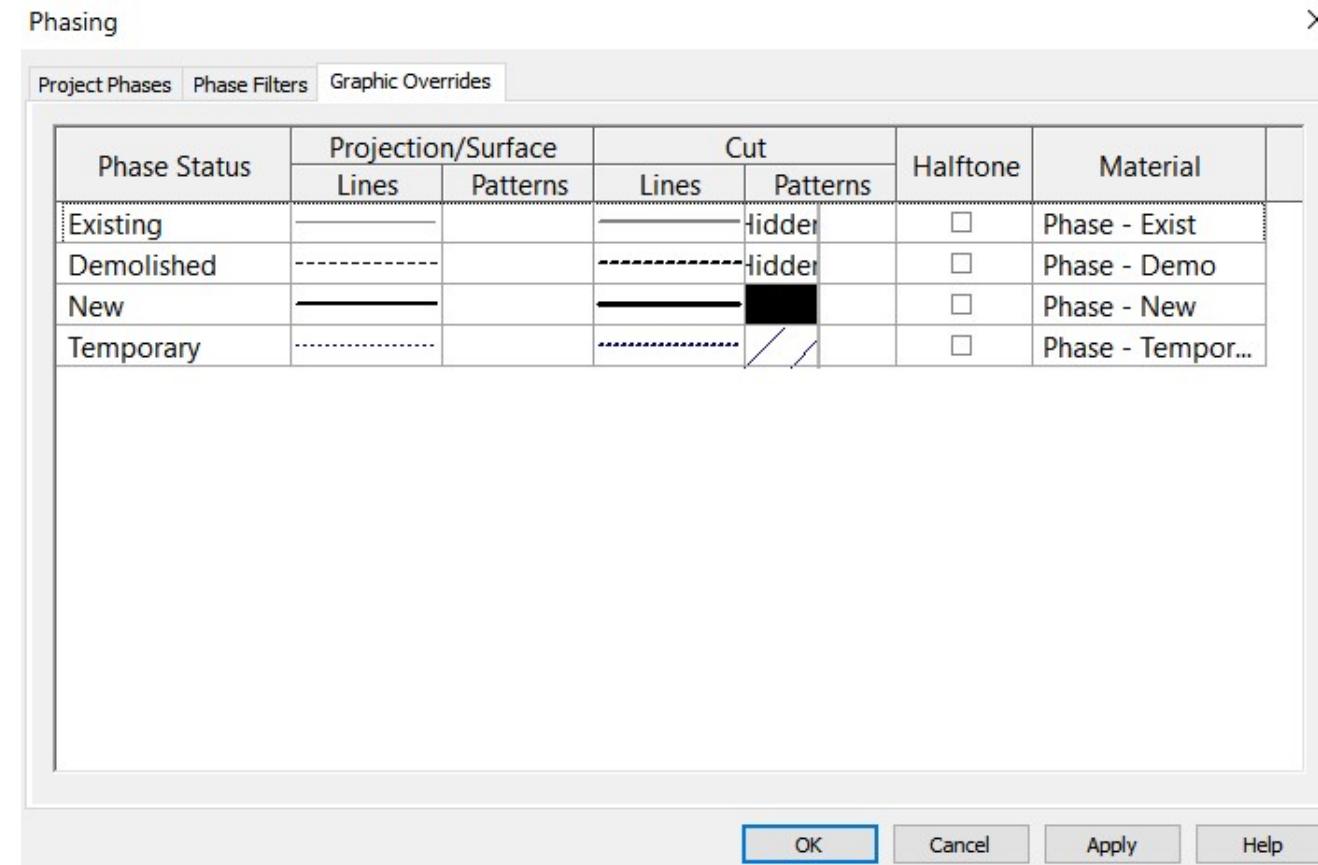
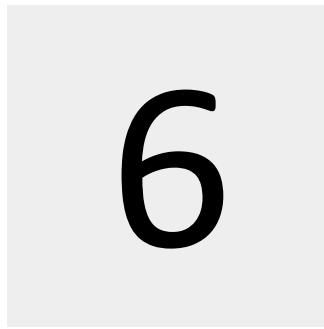
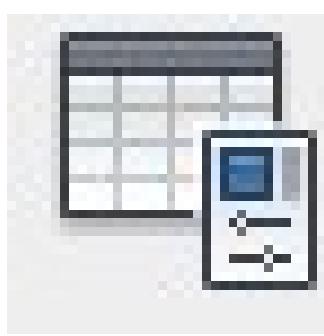
7



- Edit – Change Surface and Cut pattern to Solid Red

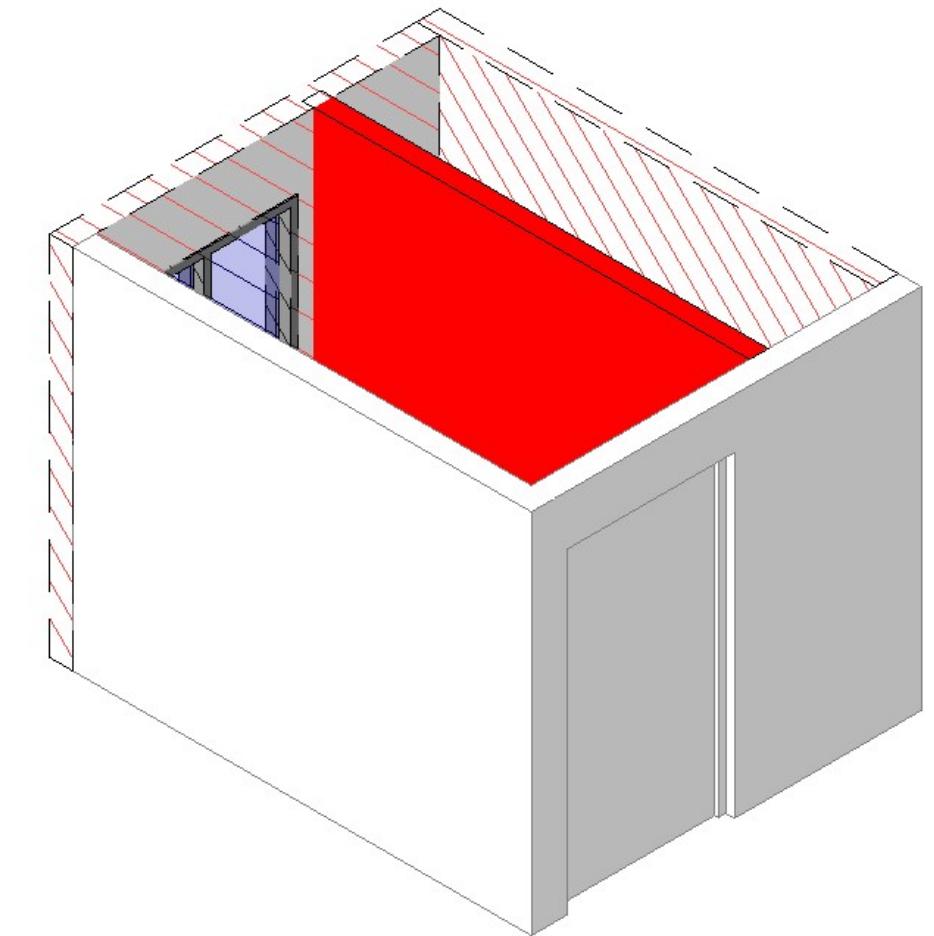
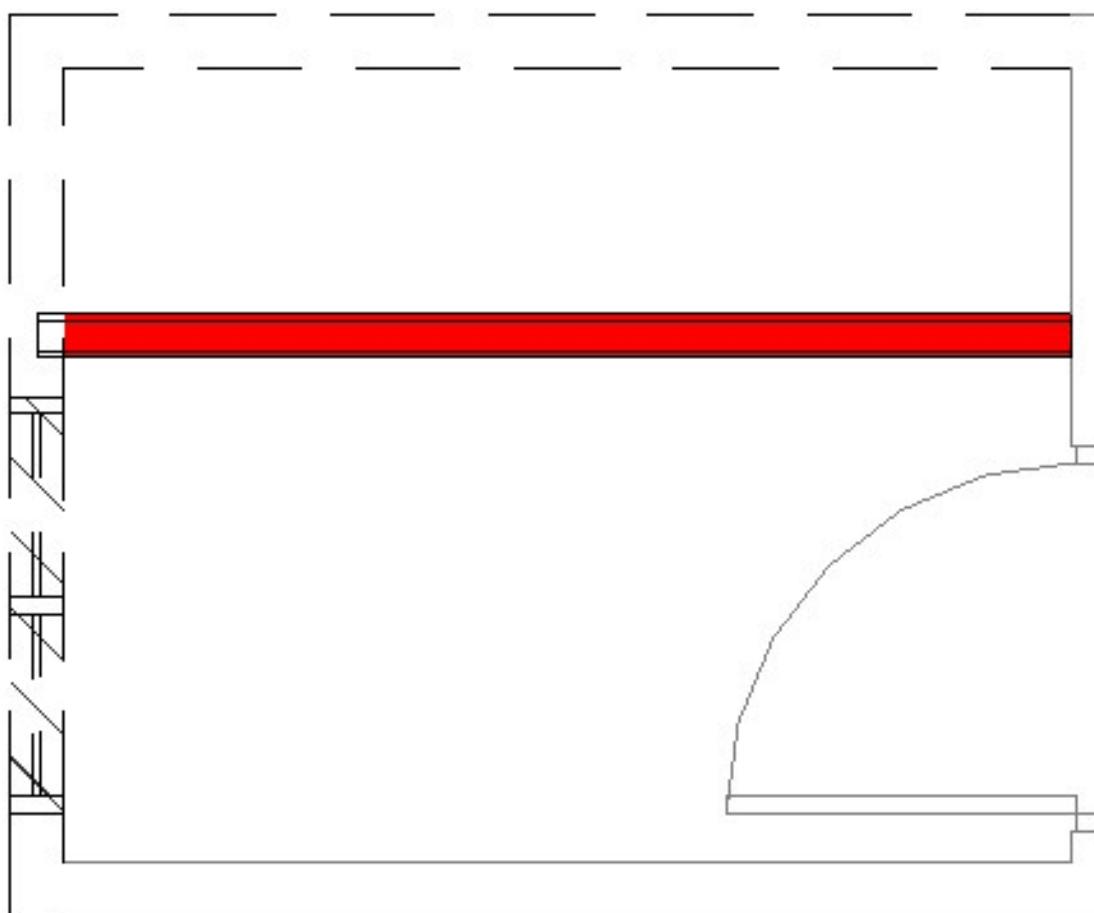
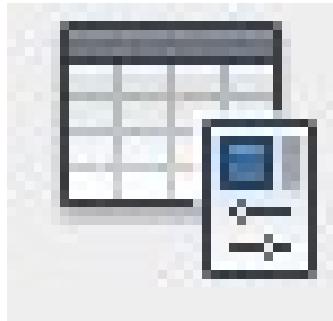
Topography	Override...	Override...	Override...	Override...	By View
Walls	<input checked="" type="checkbox"/>				<input type="checkbox"/> By View
Common Edges	<input checked="" type="checkbox"/>				
Hidden Lines	<input checked="" type="checkbox"/>				
Wall Sweeps - Cornice	<input checked="" type="checkbox"/>				

VISIBILITY HIERARCHY – VG OVERRIDE



- PHASING OVERRIDE
- Phase Filter can be used to control model layout and the graphics
- Set in your view properties
- Surface, Cut and halftone can be controlled through the phase filter
- The phase must be applied to views and elements so it won't be done automatically
- Usually very easy to get mixed up if you don't pay attention to your phases in the first place

VISIBILITY HIERARCHY – PHASE FILTER

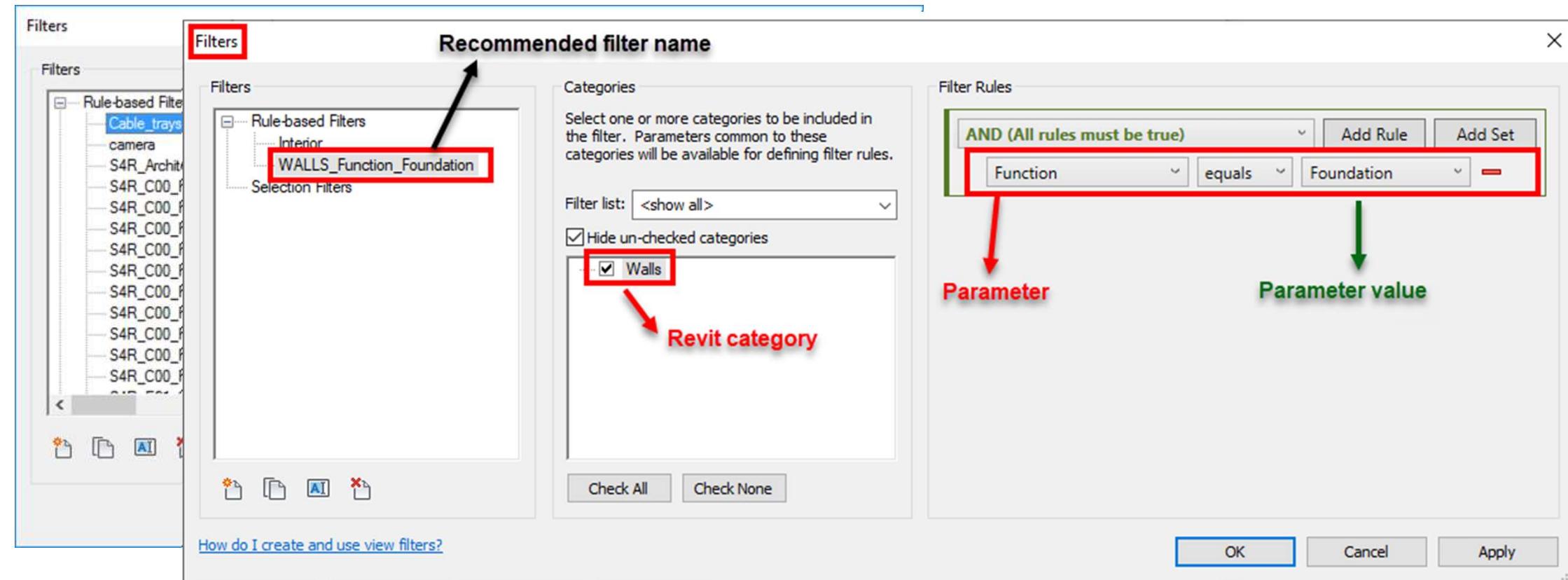
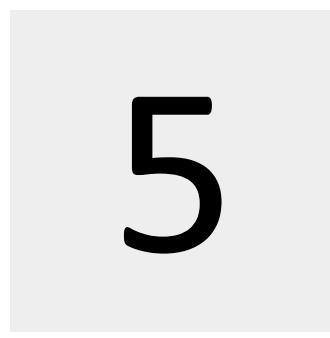
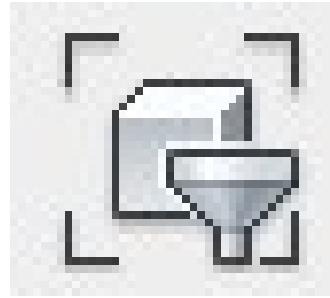


- Edit – Place west wall and east wall into different phases then set the view to the designated phase to activate the phasing override graphics

Phasing	
Phase Created	Demo
Phase Demolished	New Construction

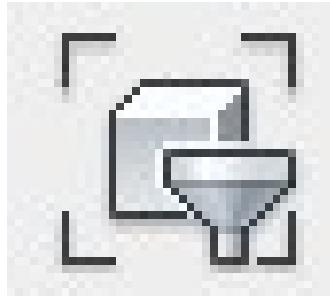
Phasing		Projection/Surface				Cut	
Phase Status		Lines		Patterns		Lines	Patterns
Existing							Hidden
Demolished		- - - - -	/ \ / \ / \			- - - - -	Hidden
New		— — — —				— — — —	
Temporary		

VISIBILITY HIERARCHY – VIEW FILTER

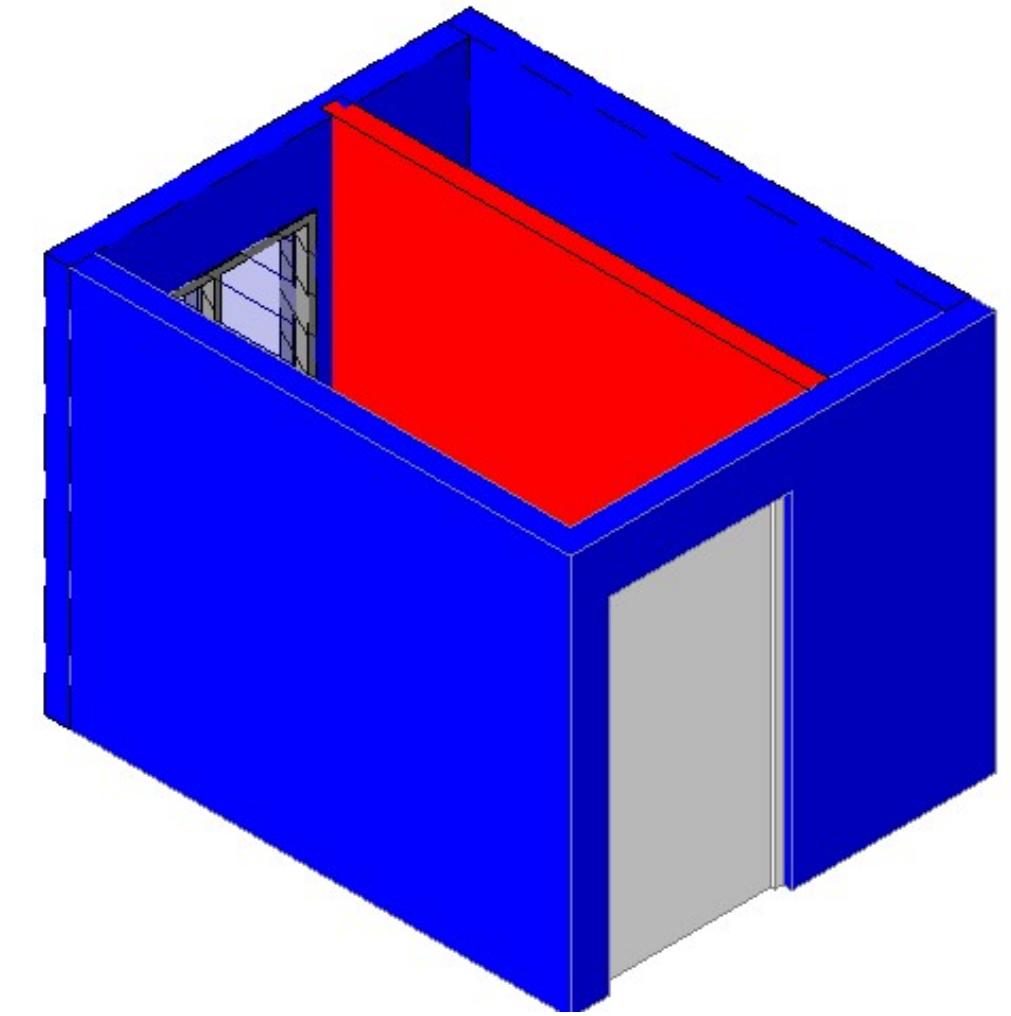
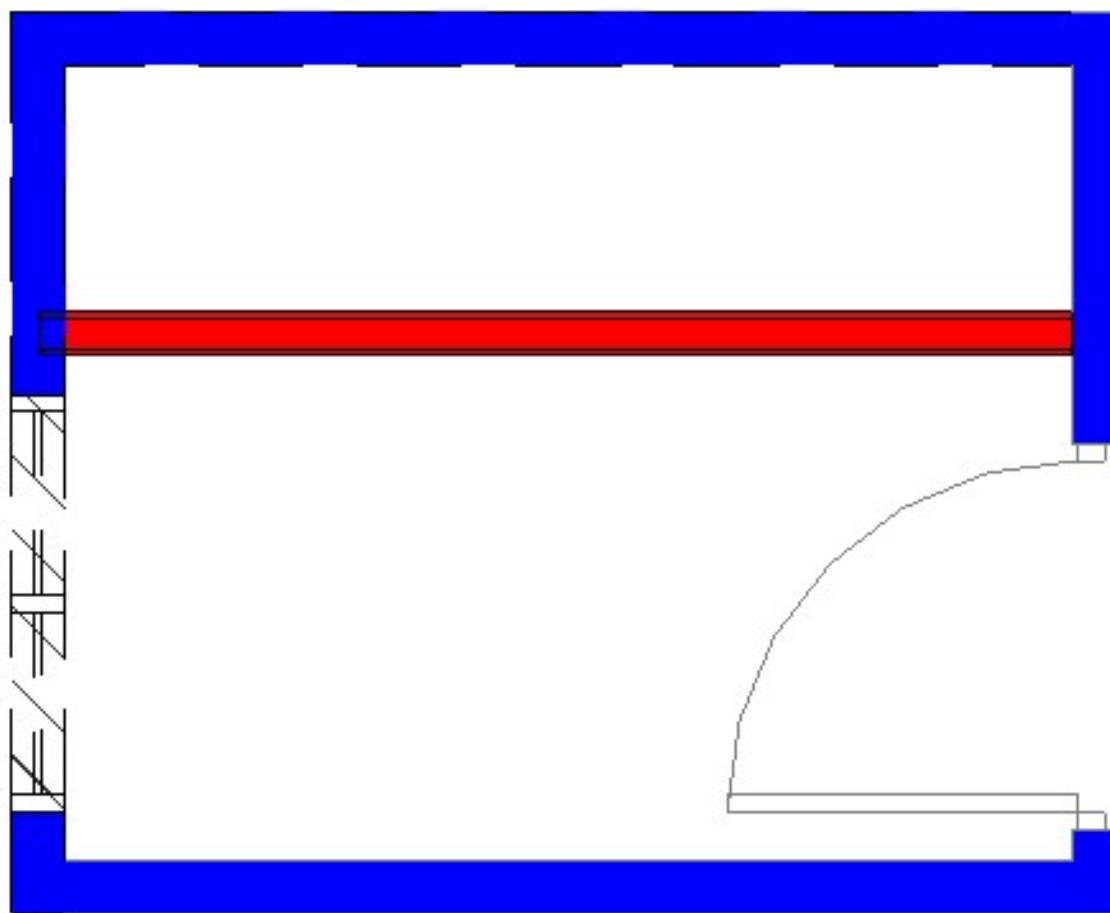


- **VIEW FILTER**
- Located in the View Override menu and has its own tool
- Like the Phase filter it can override graphics though it is based upon indexed categories not selected elements
- Visibility, Surface, Cut and halftone can be changed here
- Useful way to control specific content on a view without editing the elements directly
- No good way of knowing a filter is on except looking at view settings
- Be mindful of how you create filters and name them systematically
- Too many filters active can confuse users

VISIBILITY HIERARCHY – VIEW FILTER



5



- Edit – Add filter category for generic walls in view. The filter will change cut pattern and projection to blue

Name	Visibility	Projection/Surface			Cut		Halftone
		Lines	Patterns	Transparen...	Lines	Patterns	
_FILTER_WALL	<input checked="" type="checkbox"/>					<input type="color" value="blue"/>	<input type="checkbox"/>

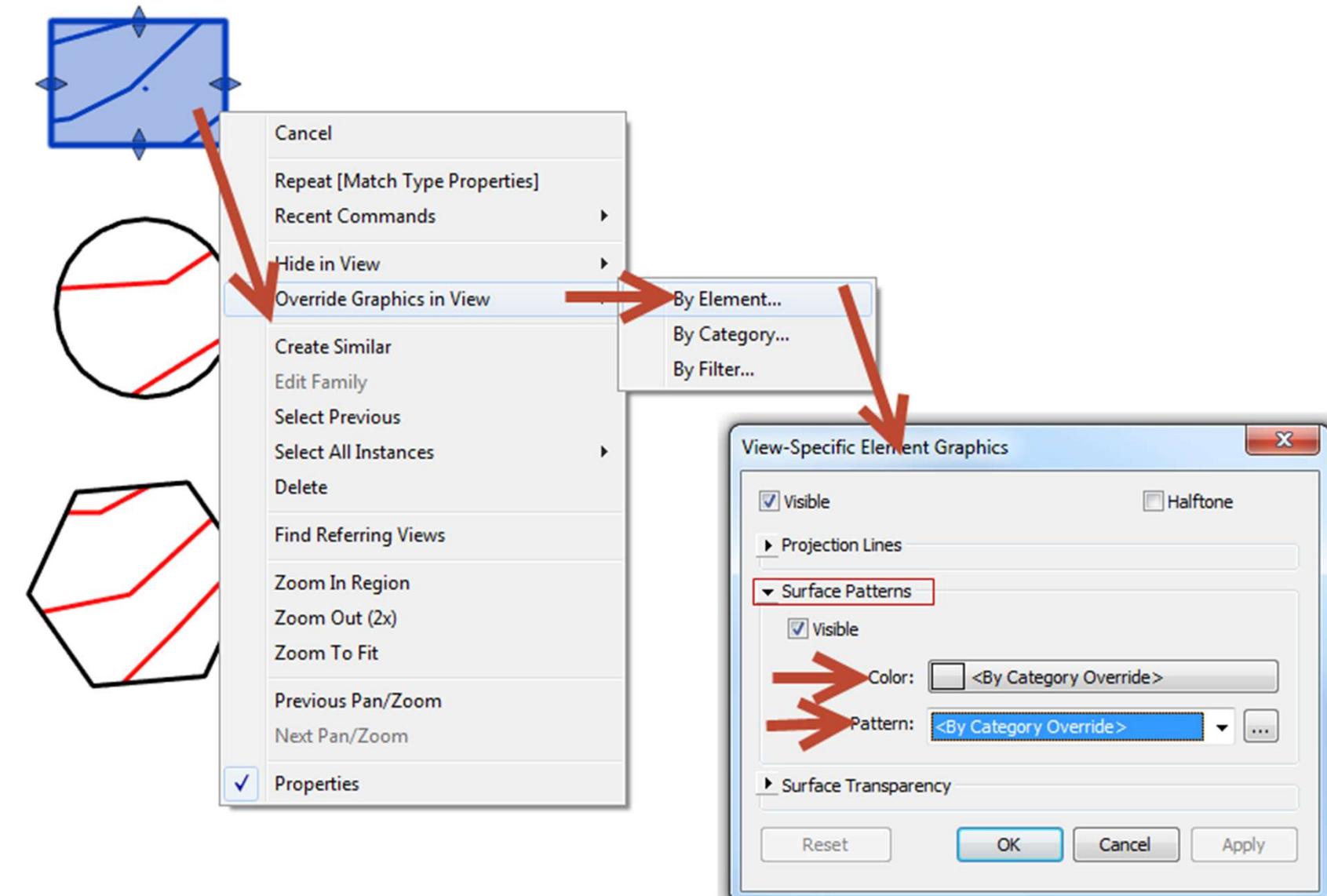


VISIBILITY HIERARCHY – OVERRIDE GRAPHICS IN VIEW

 **Override by Element**

 **Override by Category**

4

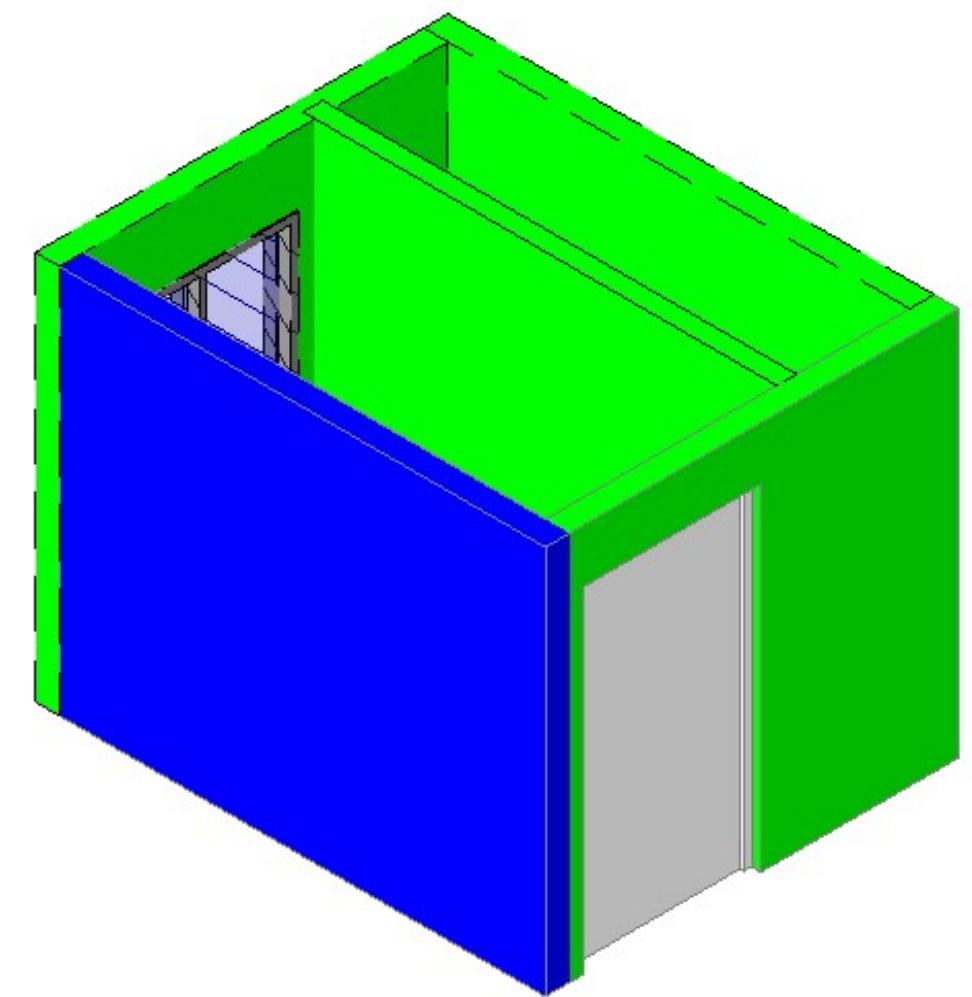
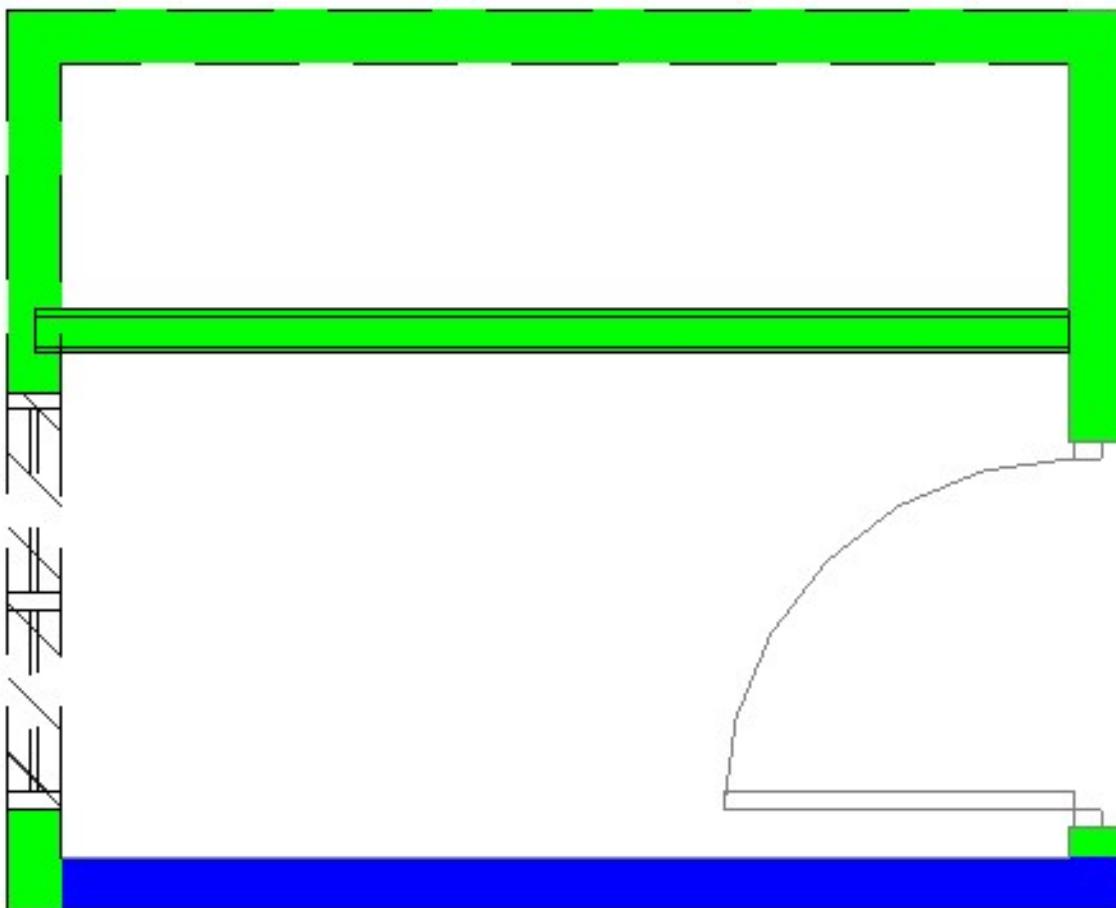


- Can be set to elements or categories
- Click on Any element then right click to change the override directly in that view
- Patterns and Transparency can be modified here
- Best choice is to use it for non-sheet views so you don't confuse other users with these edits
- Modify views with overrides sparingly and for specific reasons or these changes will be very difficult to track

VISIBILITY HIERARCHY – OVERRIDE GRAPHICS IN VIEW



4



- Edit – Right click on West, East, North and Center walls and change the element property colors to green

View Specific Element Graphics

Visible Halftone

► Projection Lines

▼ Surface Patterns

Foreground Visible
Pattern: <Solid fill>
Color: Green

Background Visible
Pattern: <Solid fill>
Color: Green

▼ Cut Patterns

Foreground Visible
Pattern: <Solid fill>
Color: Green

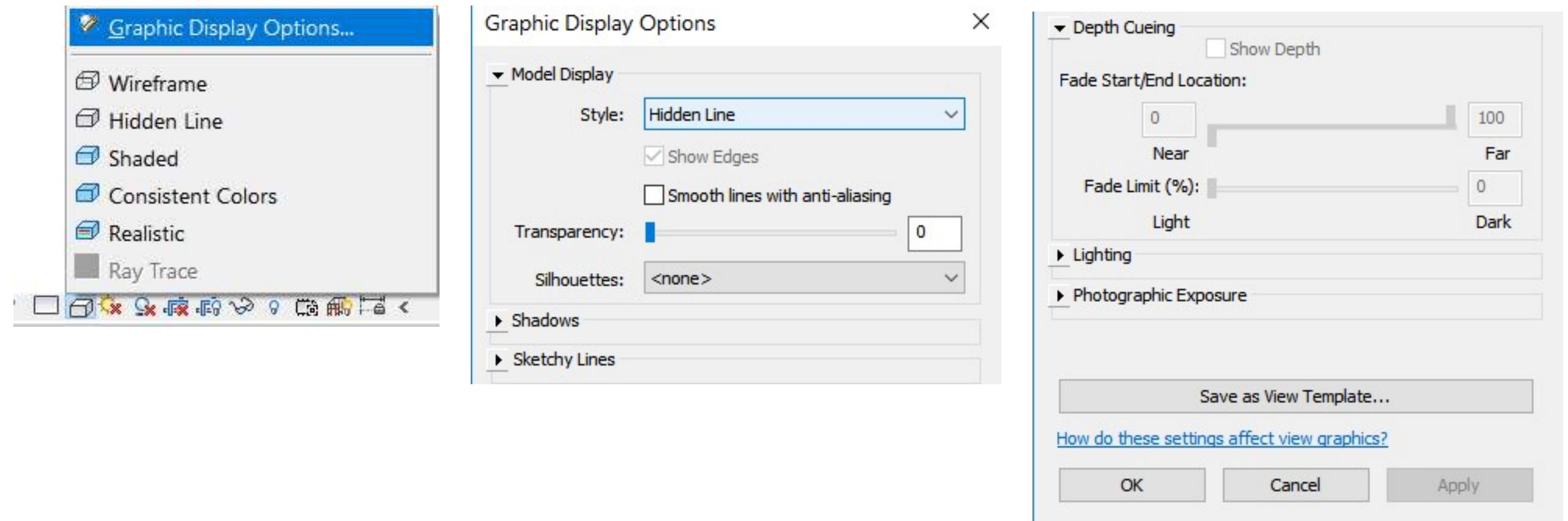
Background Visible
Pattern: <Solid fill>
Color: Green



VISIBILITY HIERARCHY – GRAPHIC DISPLAY OPTIONS



3

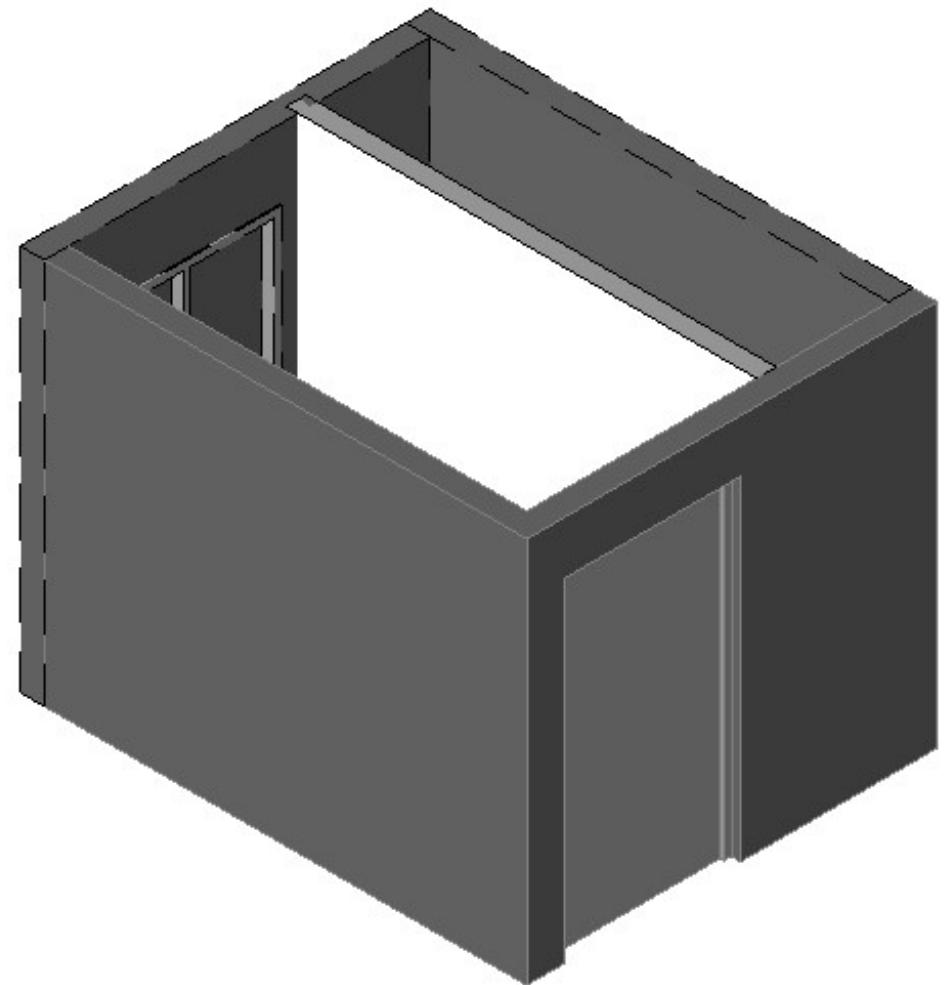
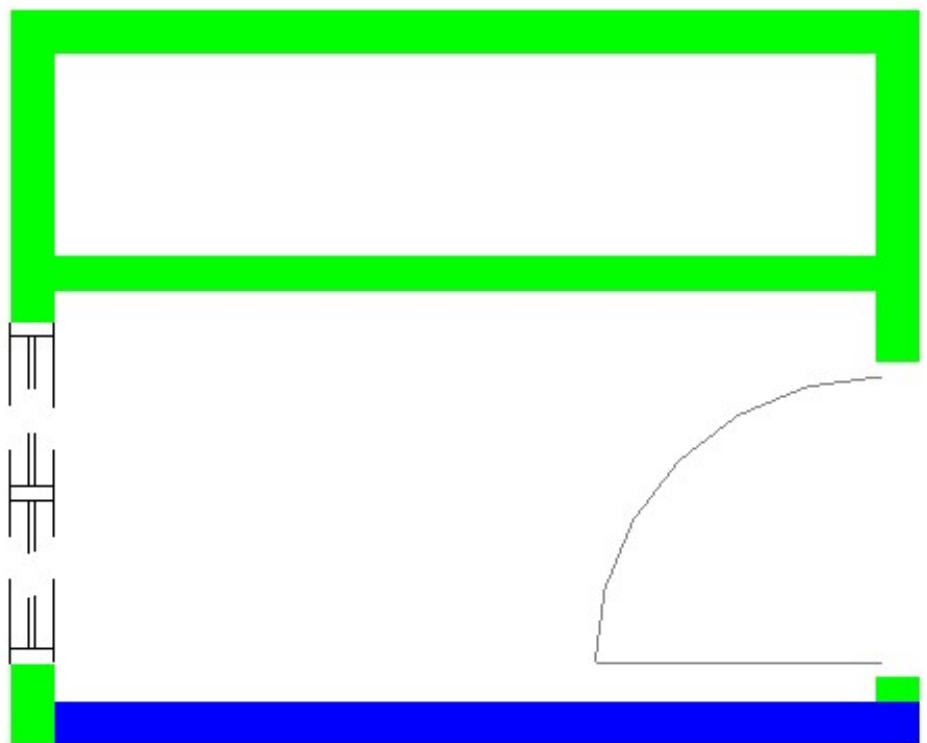


- GRAPHIC DISPLAY OPTIONS
- Tool at the bottom of a view
- Preset for different surface and line renderings available or you can create your own
- Stacked high on hierarchy and can ignore a lot of the other visibility controls
- More obvious effect in 3D view than 2D plan

VISIBILITY HIERARCHY – GRAPHIC DISPLAY OPTIONS



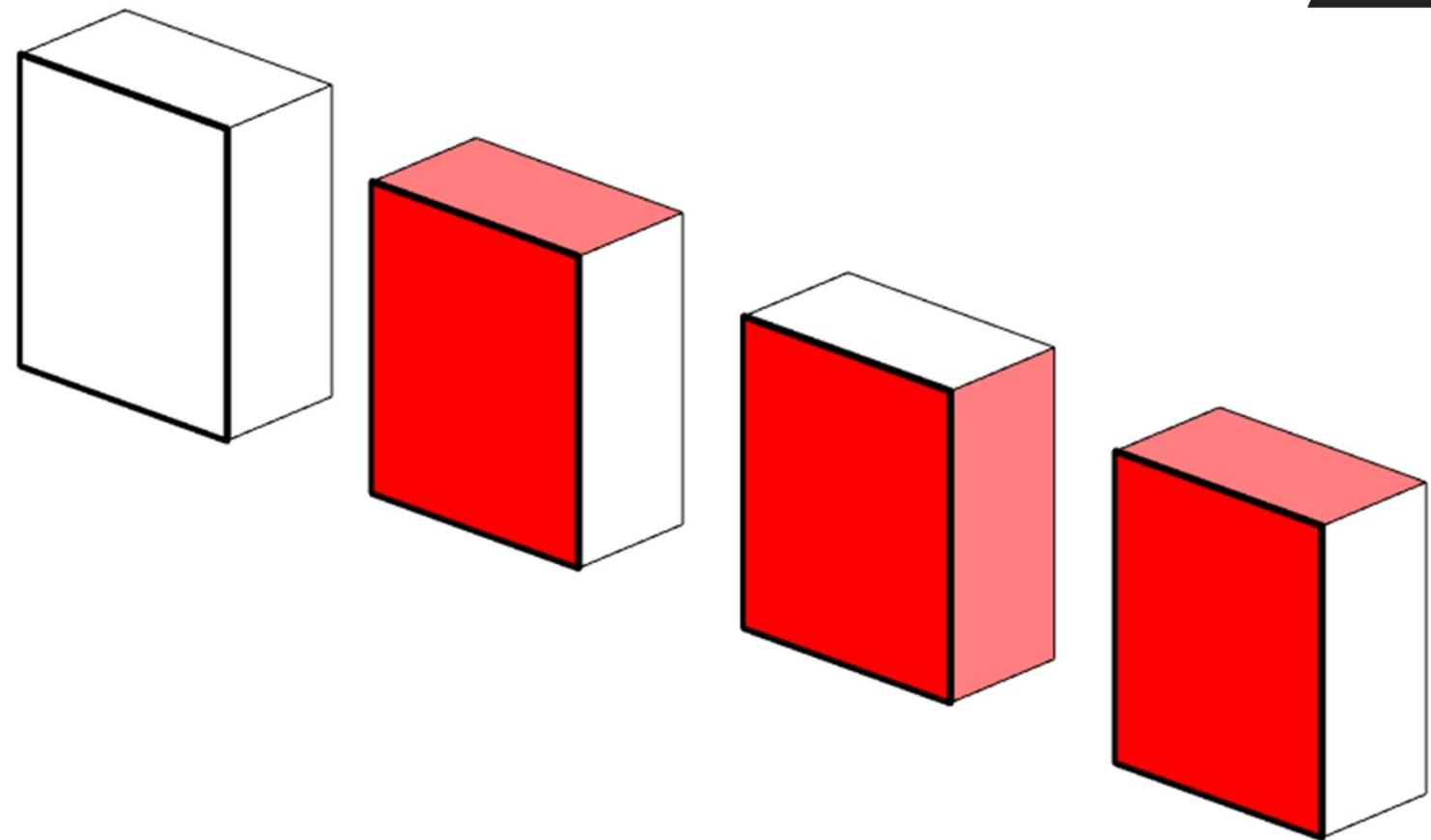
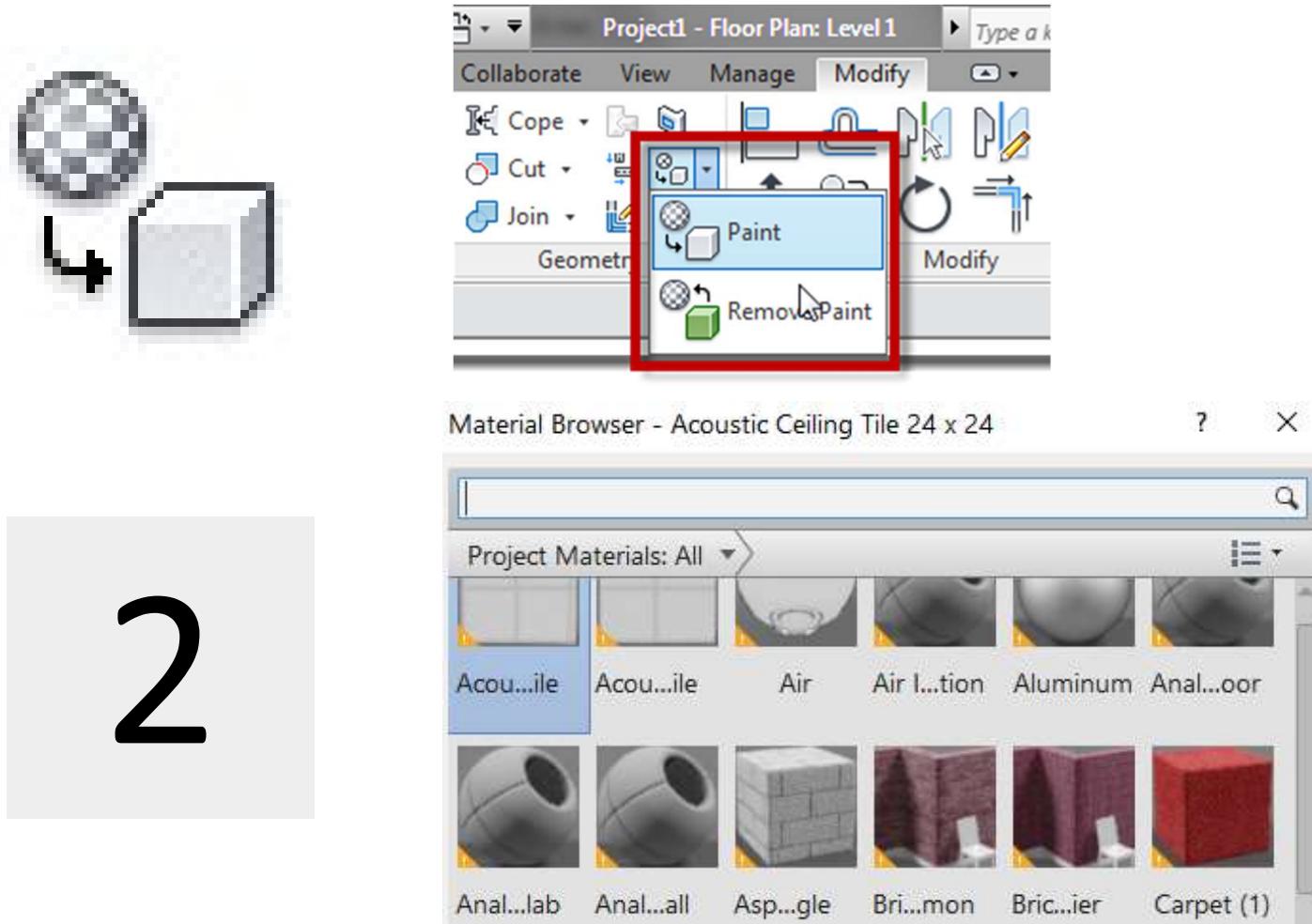
3



- Edit – Set display option to realistic which affects the surface projection patterns but not the cut patterns except for the edges which are surfaces

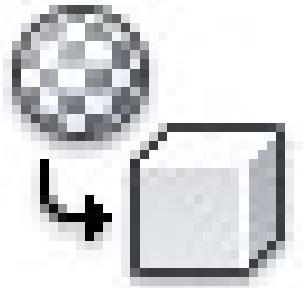


VISIBILITY HIERARCHY – PAINT



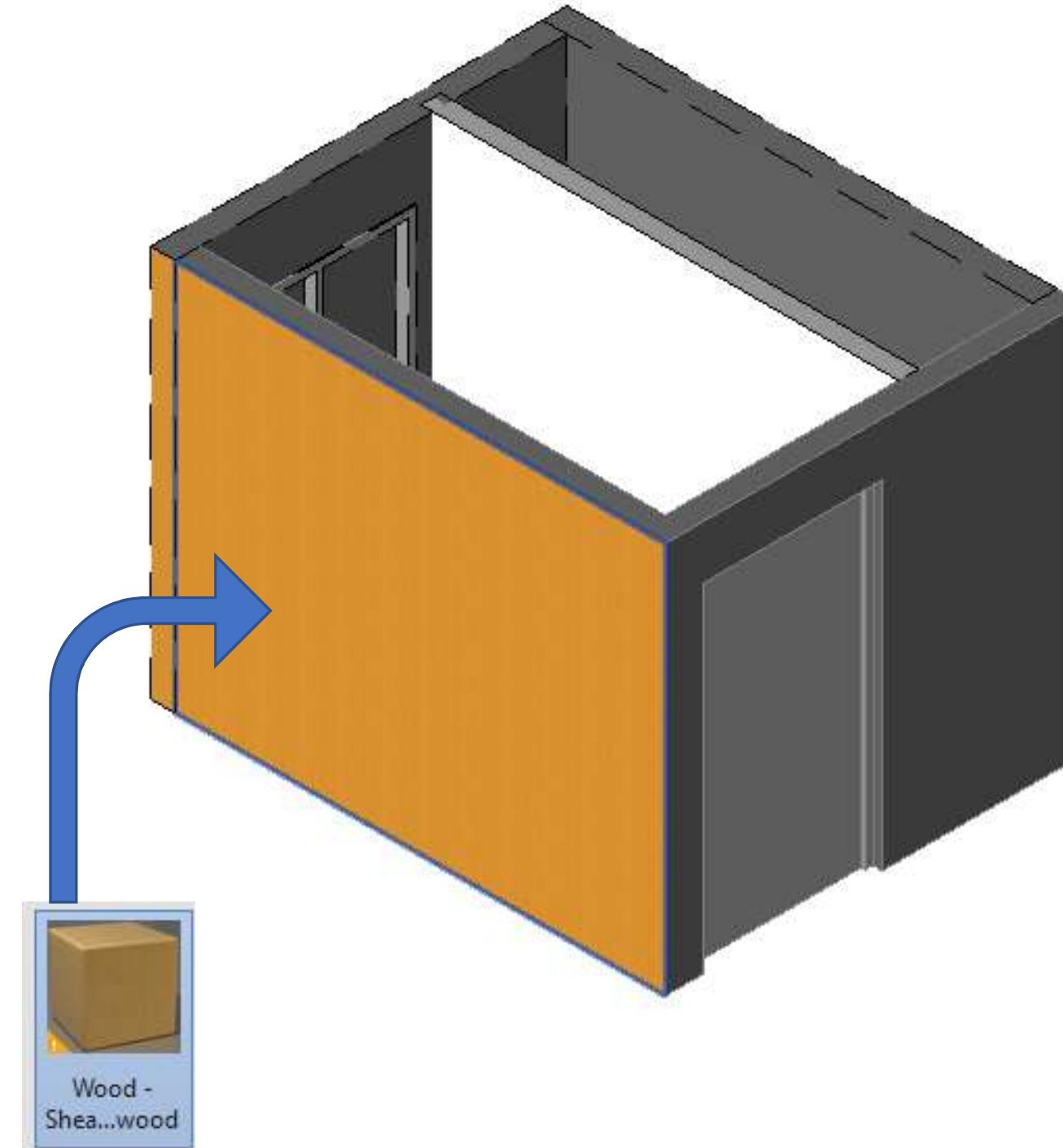
- PAINT
- Available on the Modify tab
- Change surface color and material in 3D display
- Can override any surface modification
- Easy to change and easy to forget how you made that change
- If you know it's painted then another tool can remove the paint
- Useful for render views with special textures
- Avoid using it for typical work since there's no control besides manual editing

VISIBILITY HIERARCHY – PAINT

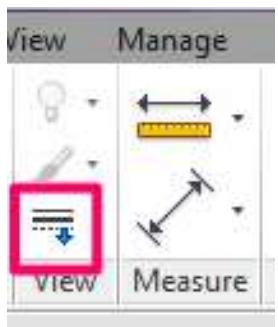


2

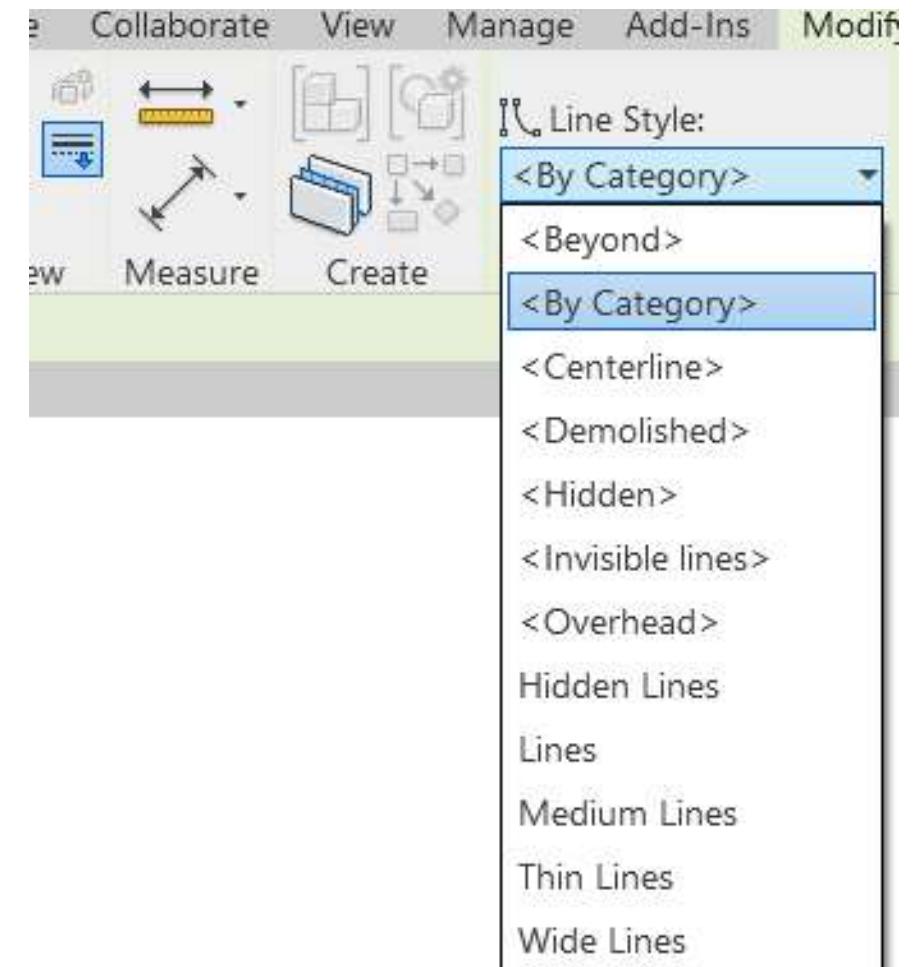
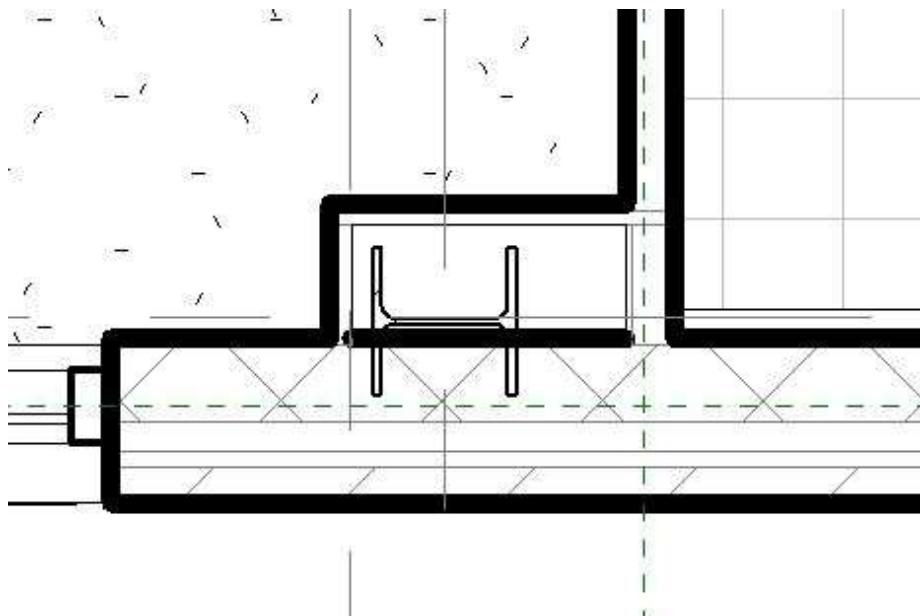
- Edit – Apply wood color to south wall



VISIBILITY HIERARCHY – LINEWORK

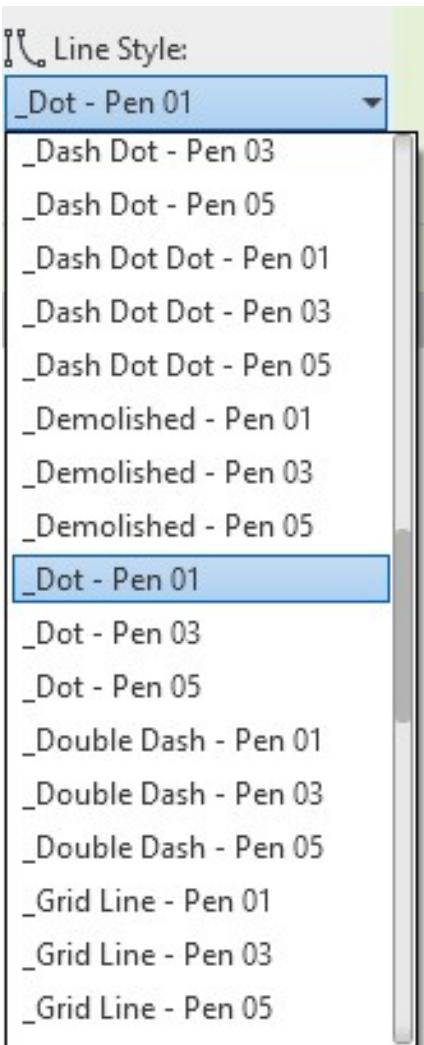


1



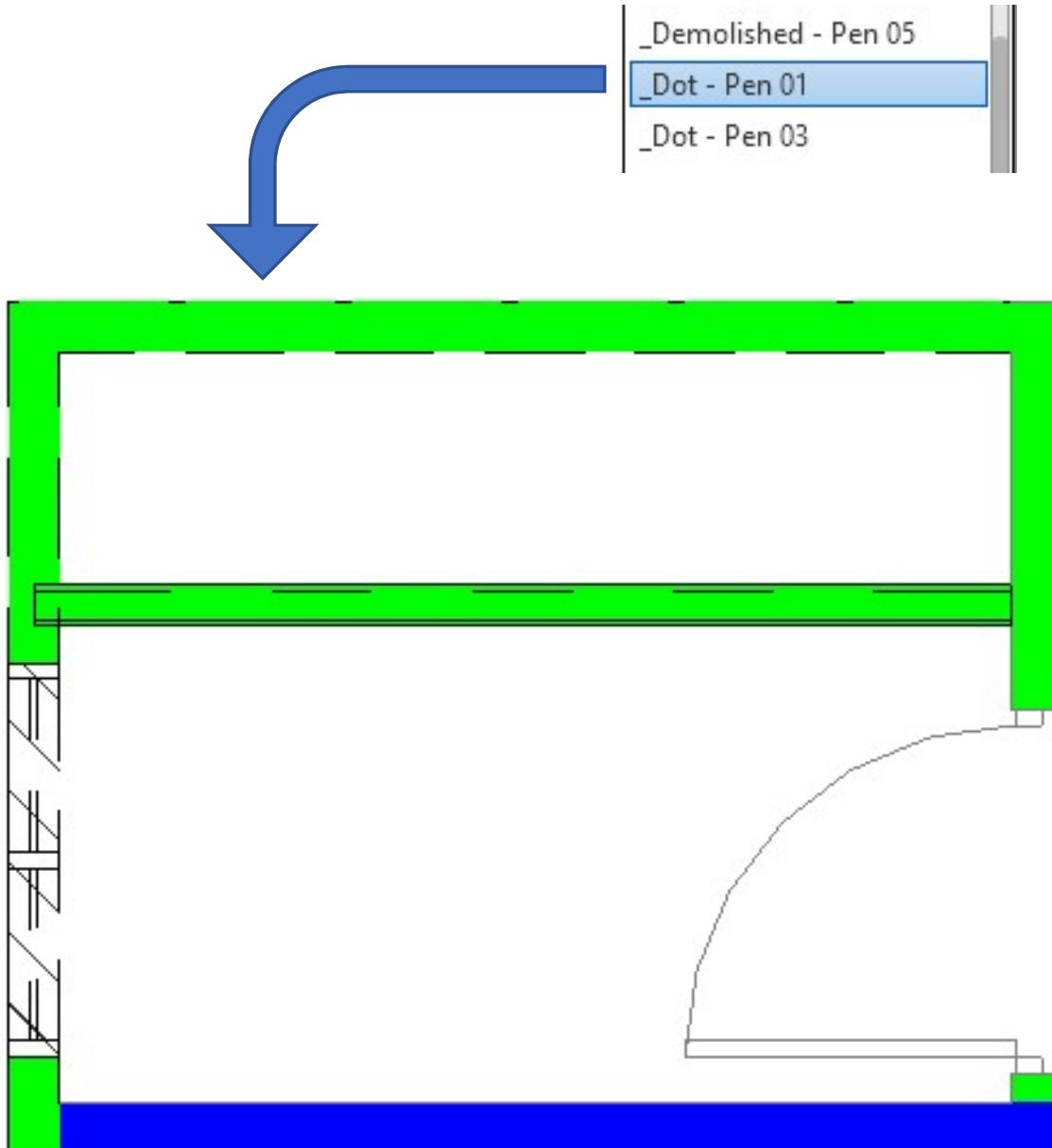
- LINEWORK
- Part of the Modify tab
- Will let you override line styles
- Highest on the visibility hierarchy meaning it will show up on the top of the stack
- Usually not too difficult to discern if they are active but shouldn't be used in anything other than detail or drafting views

CONCEPT – VISIBILITY HIERARCHY

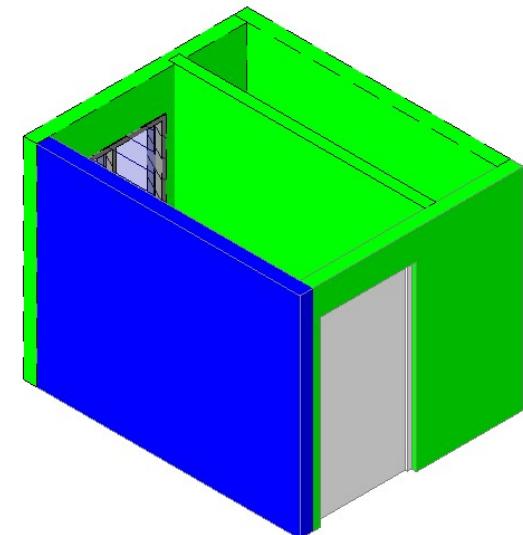
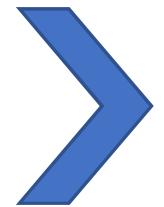
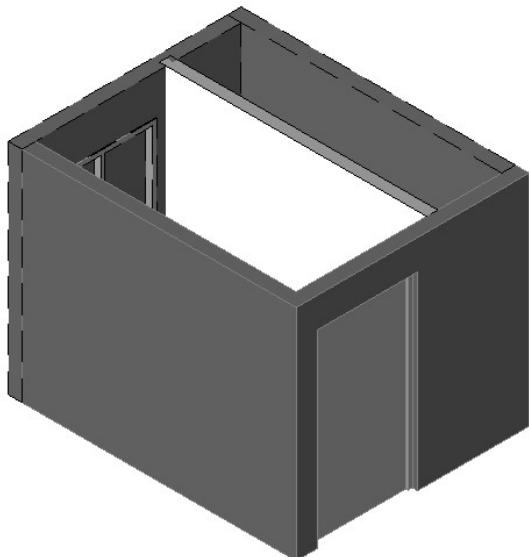
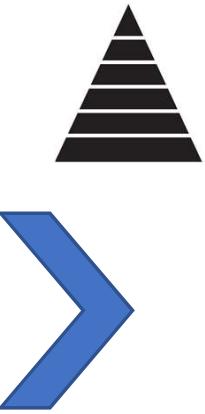
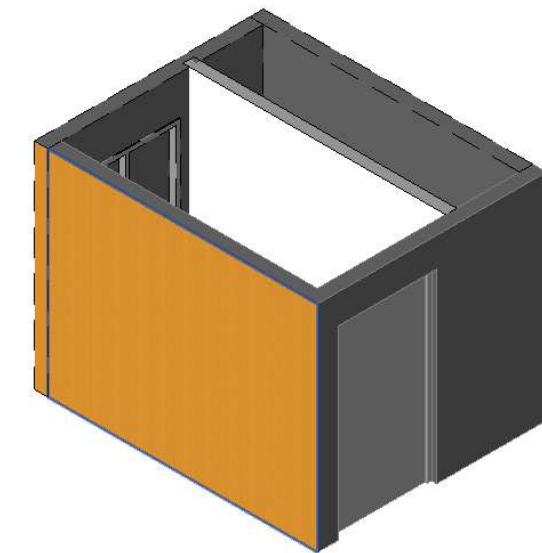


1

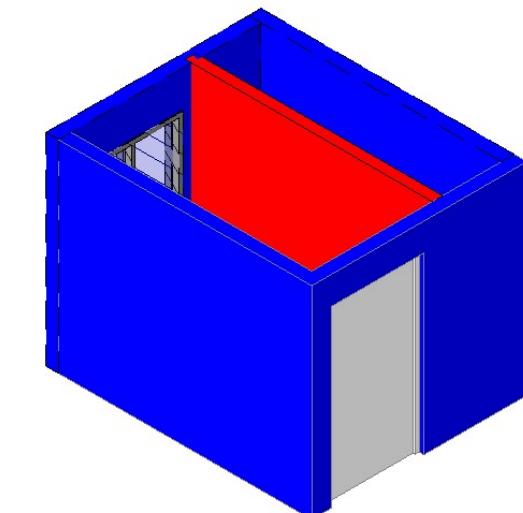
- Edit – Linework applied to edge line on North wall



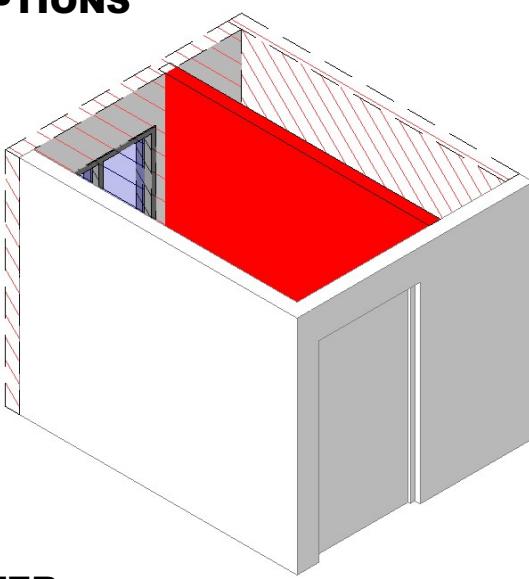
REVIEW – 3D



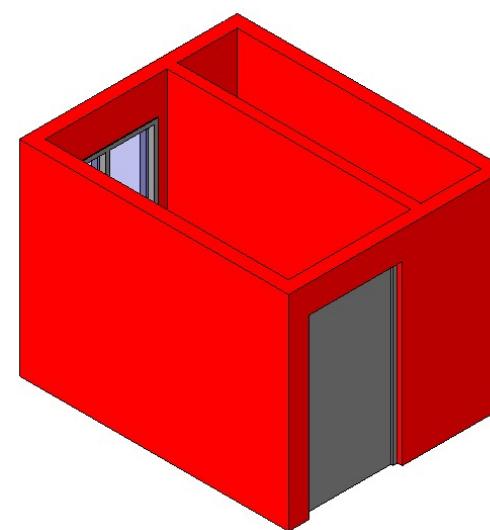
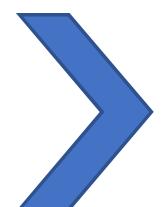
OVERRIDE IN VIEW



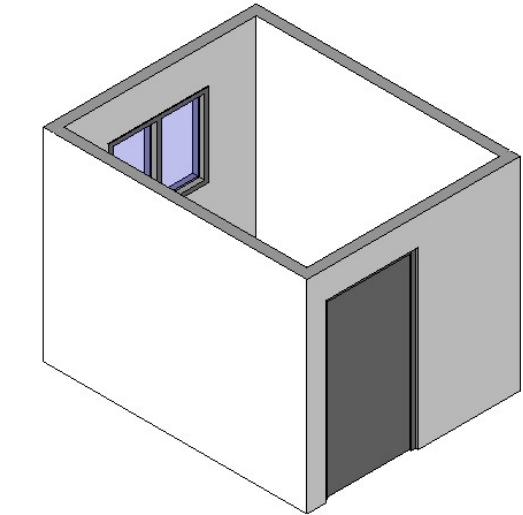
VIEW FILTER



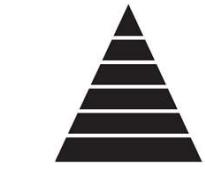
DISPLAY OPTIONS



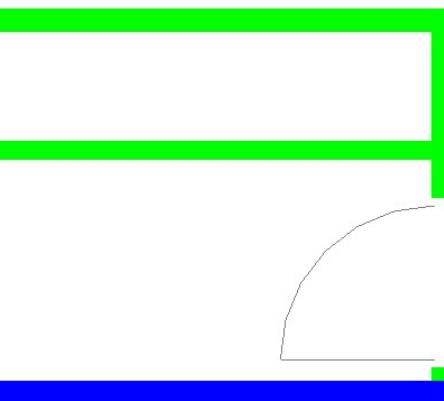
VG OVERRIDE



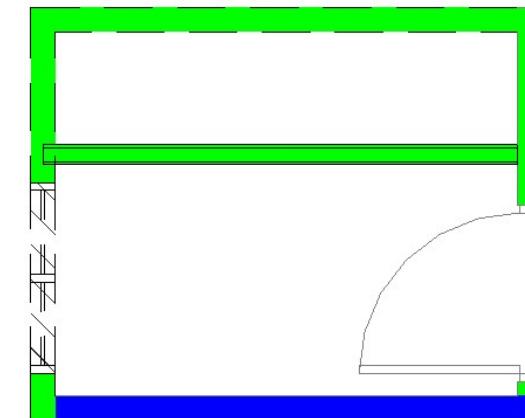
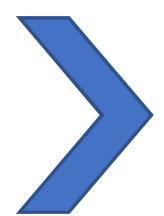
OBJECT STYLE



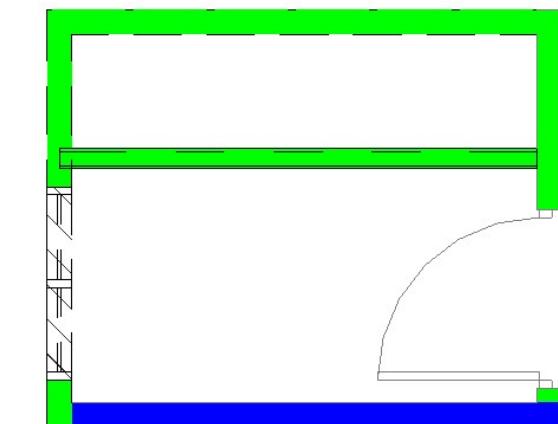
REVIEW – 2D



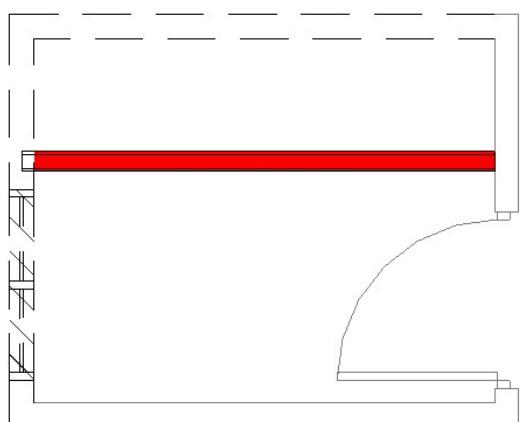
DISPLAY OPTIONS



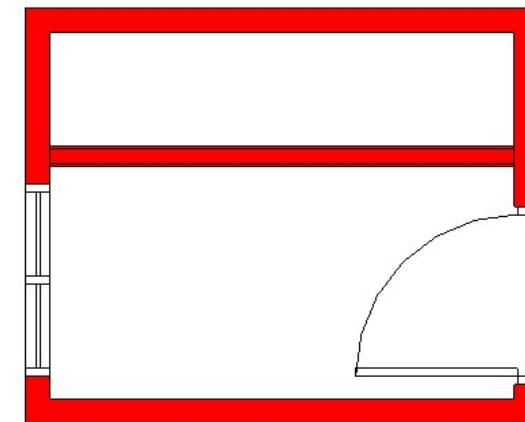
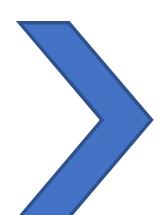
OVERRIDE IN VIEW



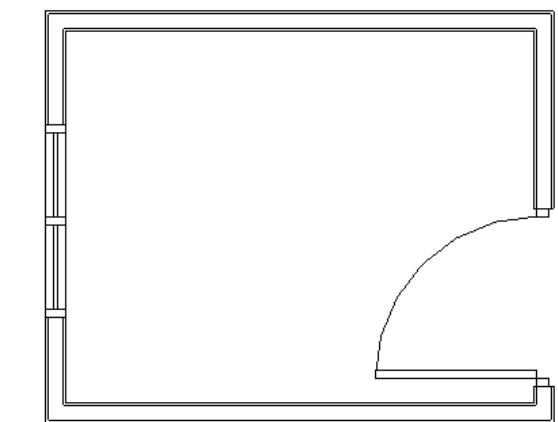
LINE WORK



PHASE FILTER



VG OVERRIDE

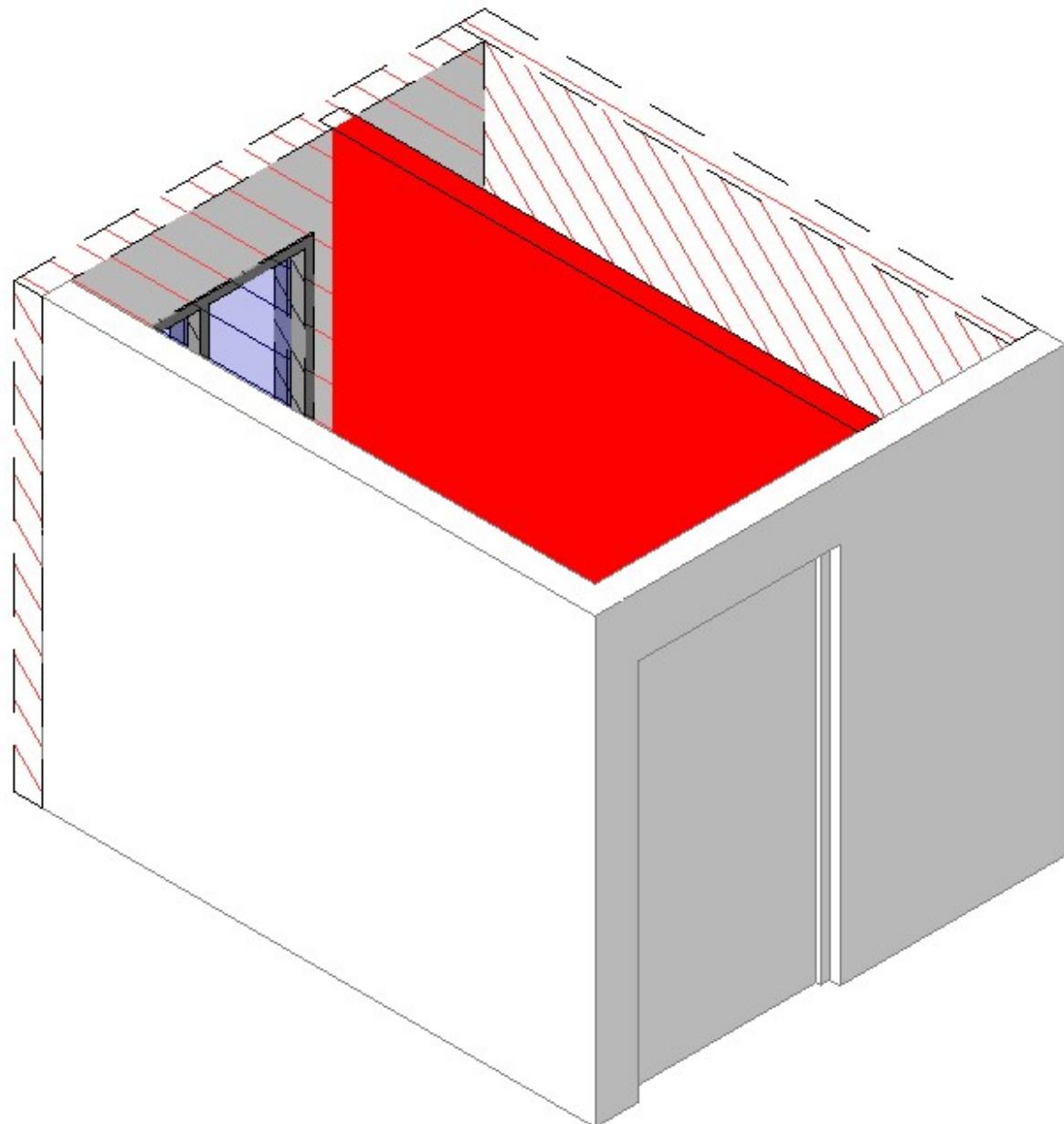


OBJECT STYLE

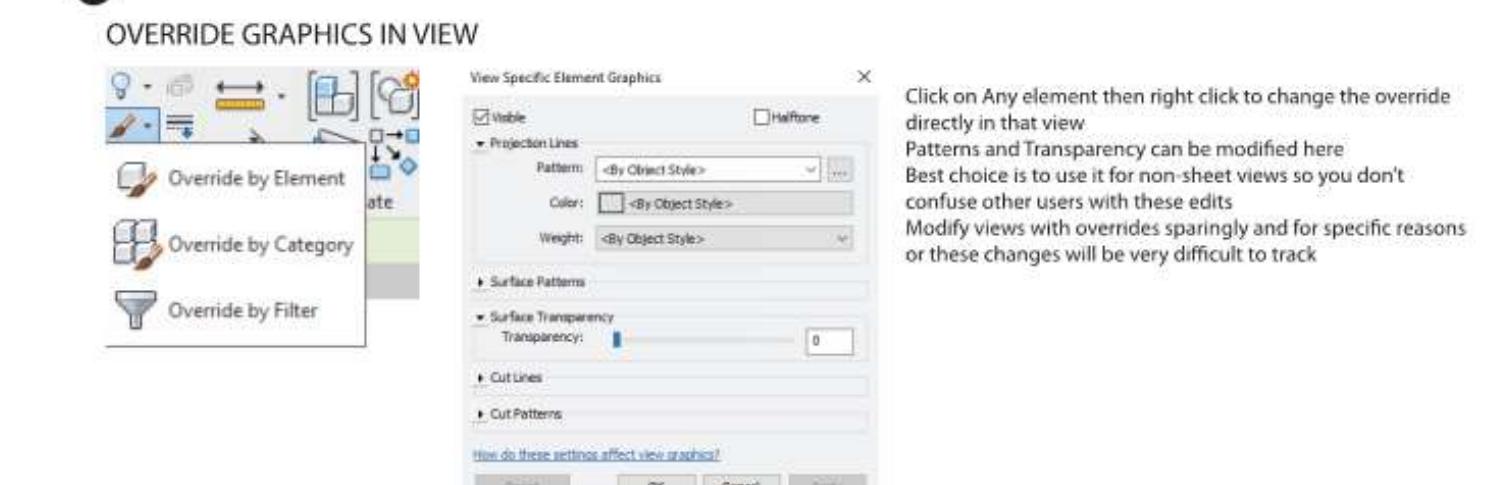
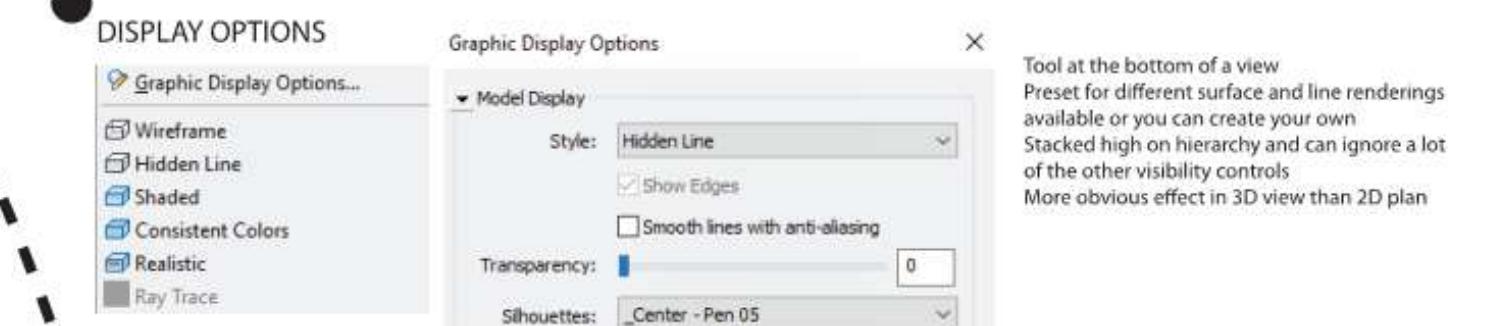
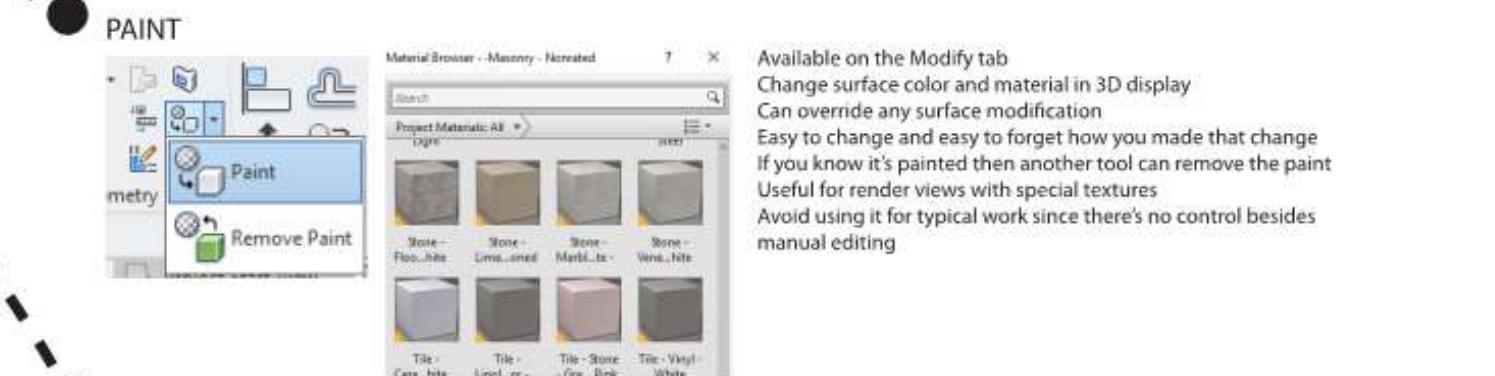
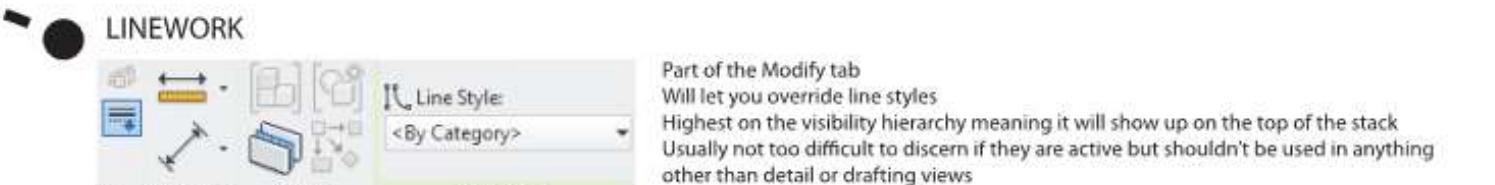
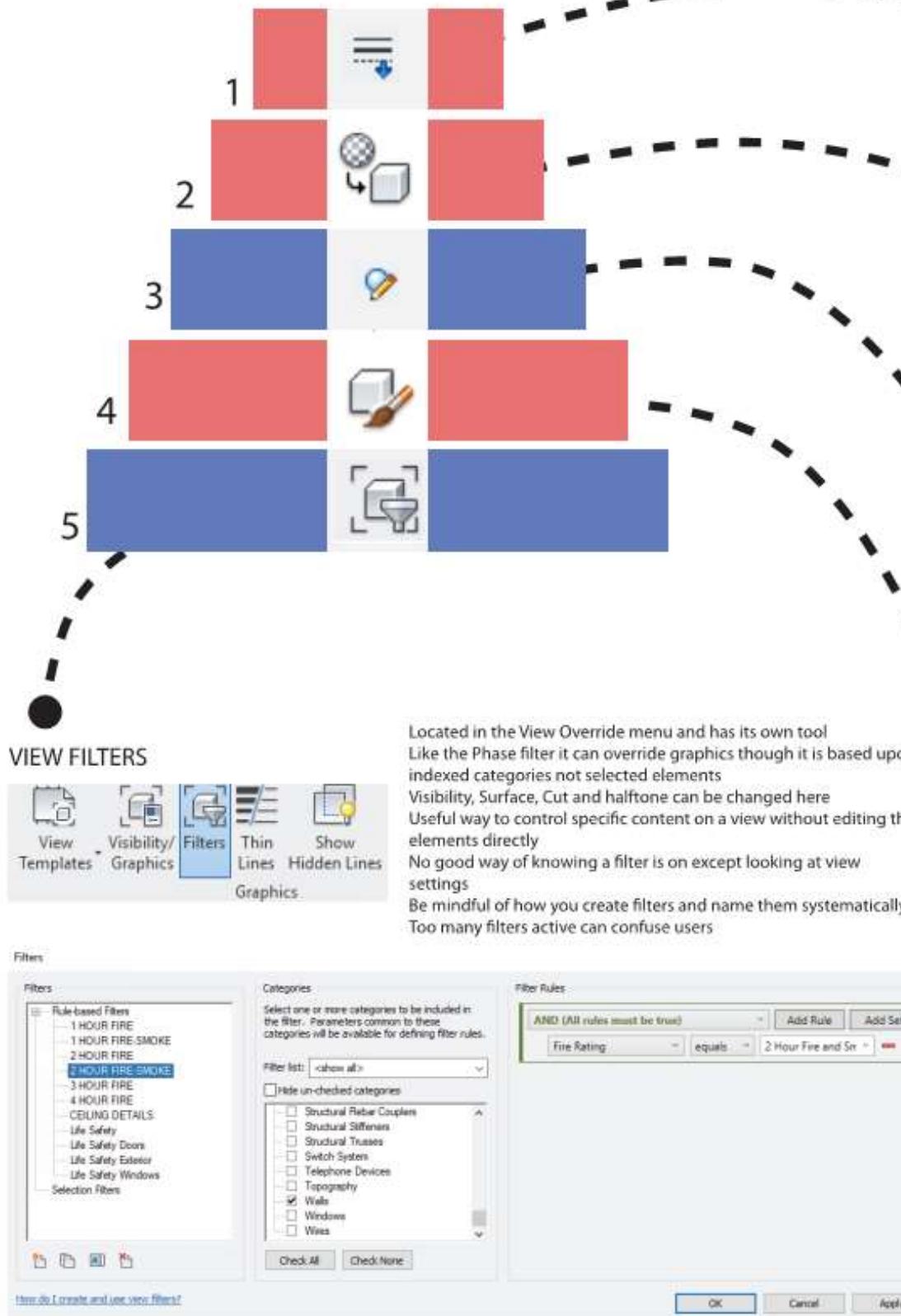
CONCEPT – VISIBILITY HIERARCHY



- Different Overrides can be used together for different graphic effects
- The more overrides you use the more likely you will experience a visibility issue
- Keep track of how your overrides are organized and which ones you should be using
- If you need to reset then create a new view of the level then turn off the phase setting to go back to 'base' settings of object styles
- Same concept works for elevations, sections, 3D views and other views

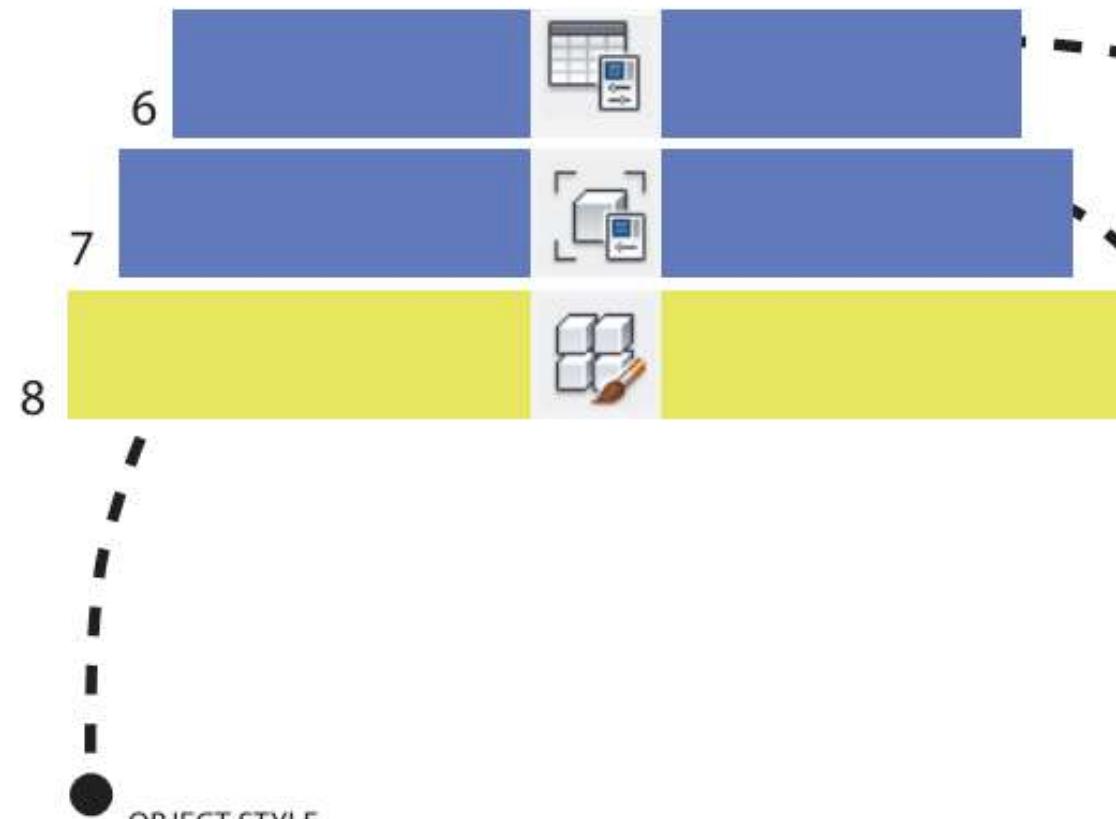


SUMMARY





SUMMARY



OBJECT STYLE



Object Styles

Category	Line Weight		Line Color	Line Pattern	Material
	Projection	Cut			
Entourage	1		■ Black	Solid	
Fire Alarm Devices	1		■ Black	Solid	
Flex Ducts	1		■ Black	Solid	
Flex Pipes	1		■ Black	Solid	
Floors	2	5	■ Black	Solid	
Common Edges	2	2	■ Black	Solid	
Hidden Lines	2	2	■ RGB 000-127-000	Dash	
Interior Edges	2	2	■ Black	Solid	
Slab Edges	2	5	■ Black	Solid	
Furniture	1		■ Black	Solid	

Where graphics all starts in your Revit template

Default graphics for your family elements based on your template

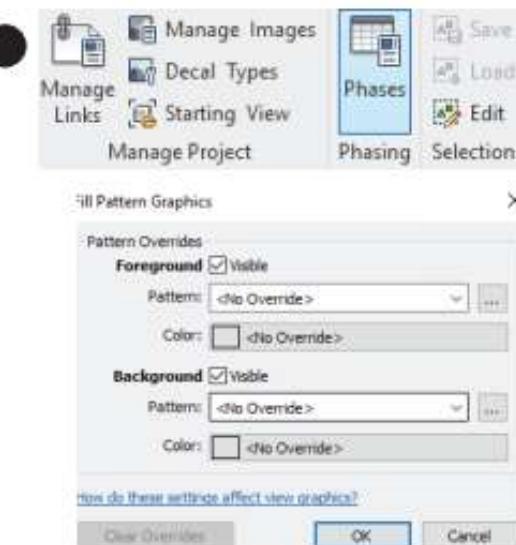
Lowest priority meaning just about every tool can modify your object styles

Main categories and sub-categories exist

Specifies most element default graphic appearance

Object Styles are a part of every template which controls default view appearances

PHASING



Phasing

Phase Status	Projection/Surface		Cut		Halftone
	Lines	Patterns	Lines	Patterns	
Existing					<input type="checkbox"/>
Demolished					<input type="checkbox"/>
New				<input checked="" type="checkbox"/>	<input type="checkbox"/>
Temporary					<input type="checkbox"/>

Phase Filter can be used to control model layout and the graphics

Set in your view properties

Surface, Cut and halftone can be controlled through the phase filter

The phase must be applied to views and elements so it won't be done automatically

Usually very easy to get mixed up if you don't pay attention to your phases in the first place

VISIBILITY GRAPHICS



Control category settings in each view

Accessible through the Visibility graphics menu or through VG / VV shortcut key

The starting point of most Graphic changes in Revit

Essentially turn on or off certain categories like model and annotation content

Modifying appearance through section cut and patterns also possible here

Located low on the hierarchy meaning many settings above it can modify these settings further

Consider keeping your options straight forward and simple as a consistent base across views

Visibility/Graphic Overrides for Floor Plan: Level 1

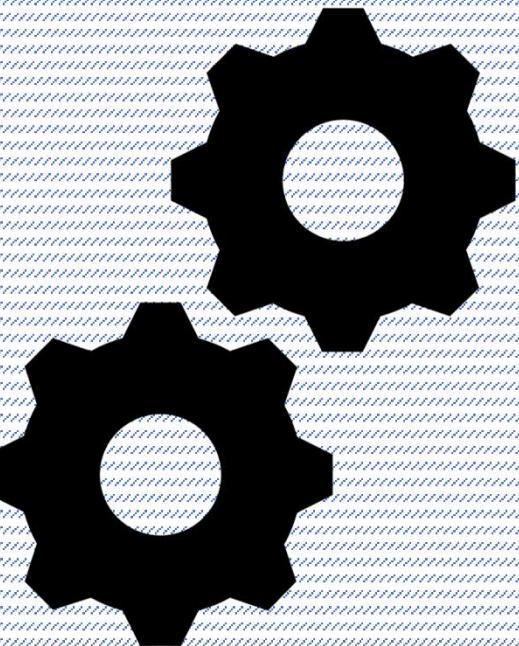
Visibility	Projection/Surface			Cut		Halftone	Detail Level
	Lines	Patterns	Transparency	Lines	Patterns		
Electrical Fixtures	<input checked="" type="checkbox"/>					<input type="checkbox"/>	By View
Entourage	<input checked="" type="checkbox"/>					<input type="checkbox"/>	By View
Fire Alarm Devices	<input checked="" type="checkbox"/>					<input type="checkbox"/>	By View
Flex Ducts	<input checked="" type="checkbox"/>					<input type="checkbox"/>	By View
Flex Pipes	<input checked="" type="checkbox"/>					<input type="checkbox"/>	By View
Floors	<input checked="" type="checkbox"/>	Override...	Override...	Override...	Override...	<input type="checkbox"/>	By View
Furniture						<input type="checkbox"/>	By View

SUMMARY



- Visibility Graphics specifically applies to a set of tools that modify the elements in your project
- VG graphics have override hierarchy to control view content
- Understanding the hierarchy and how it can affect a given view is crucial in achieving the graphics you want

MORE ISSUES

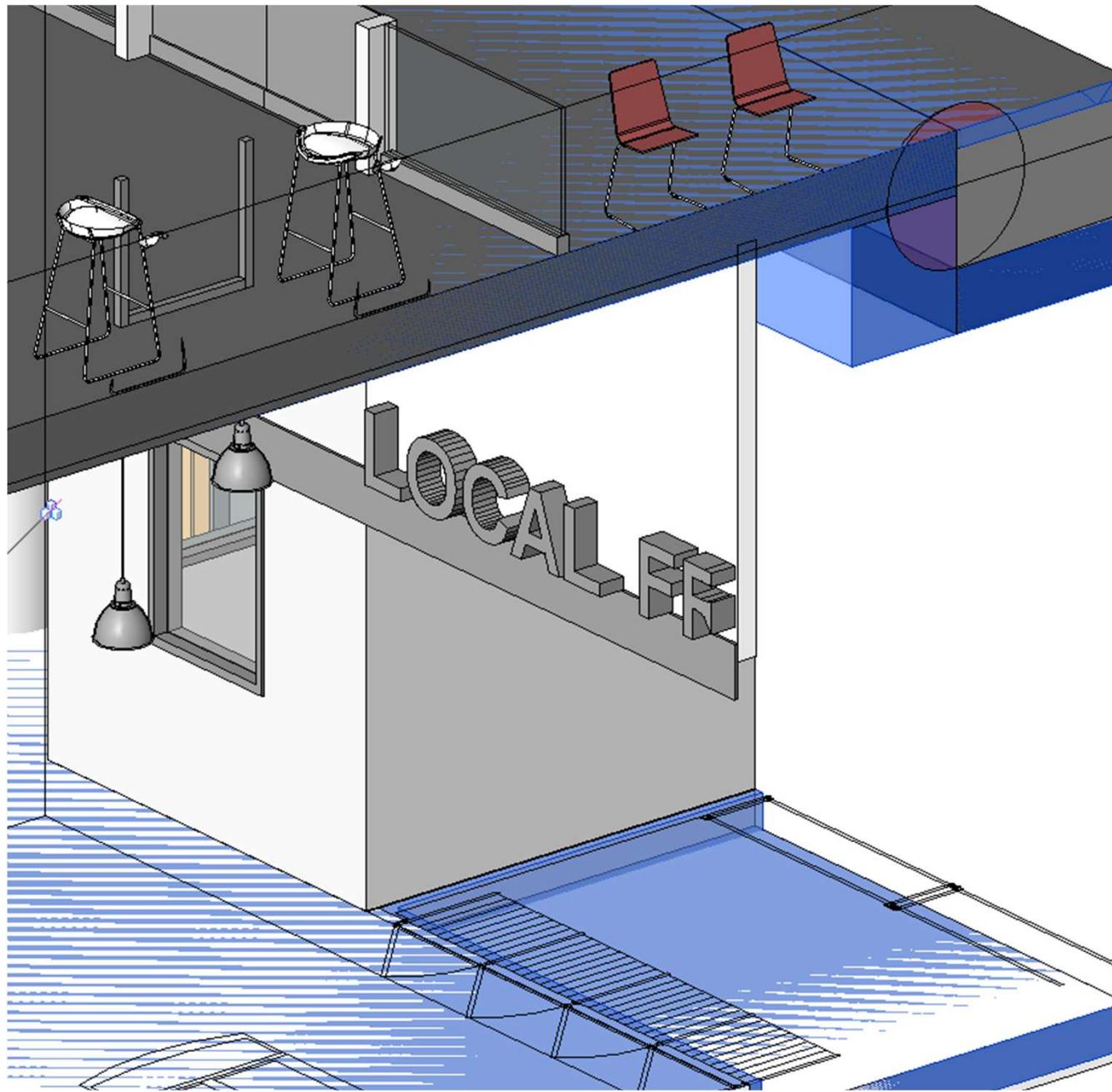


OTHER ISSUES



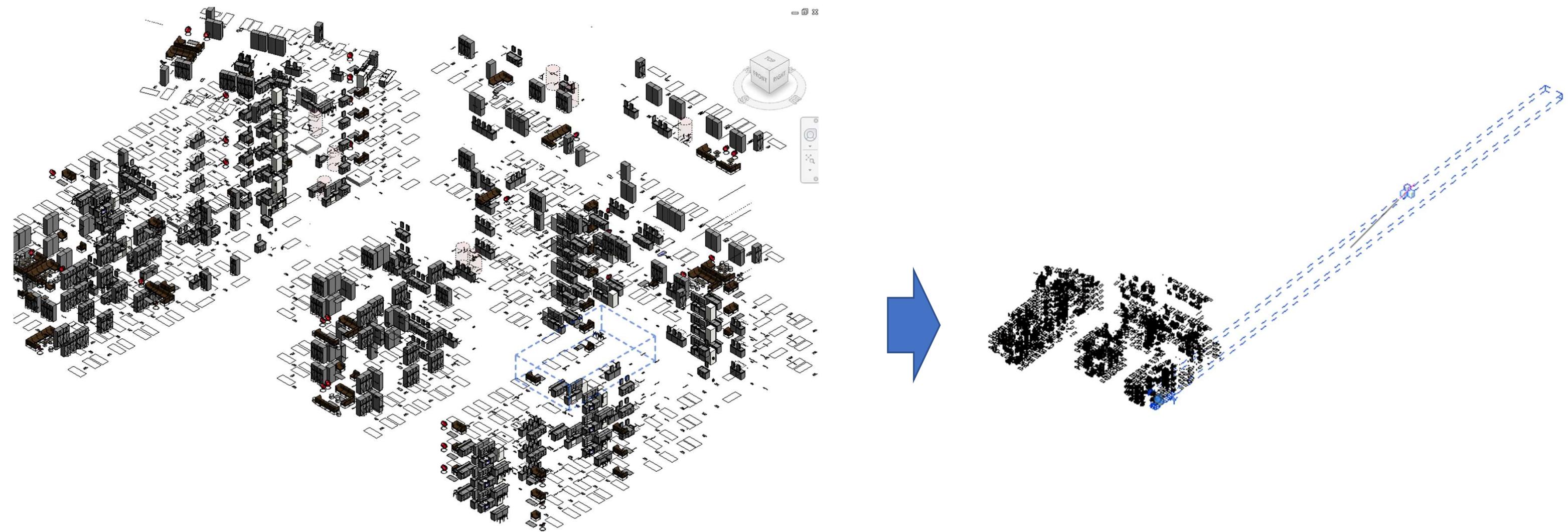
- Puzzles within Puzzles
- Sometimes you don't know where to start unraveling the issue

OTHER ISSUES



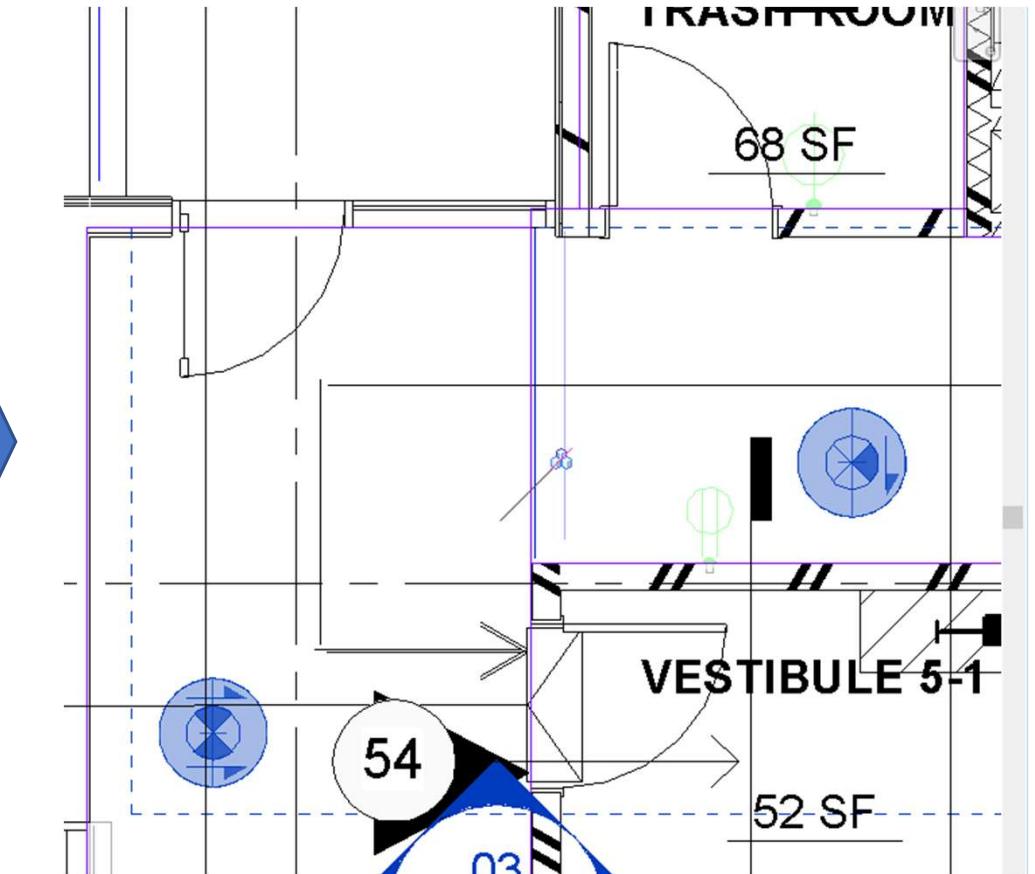
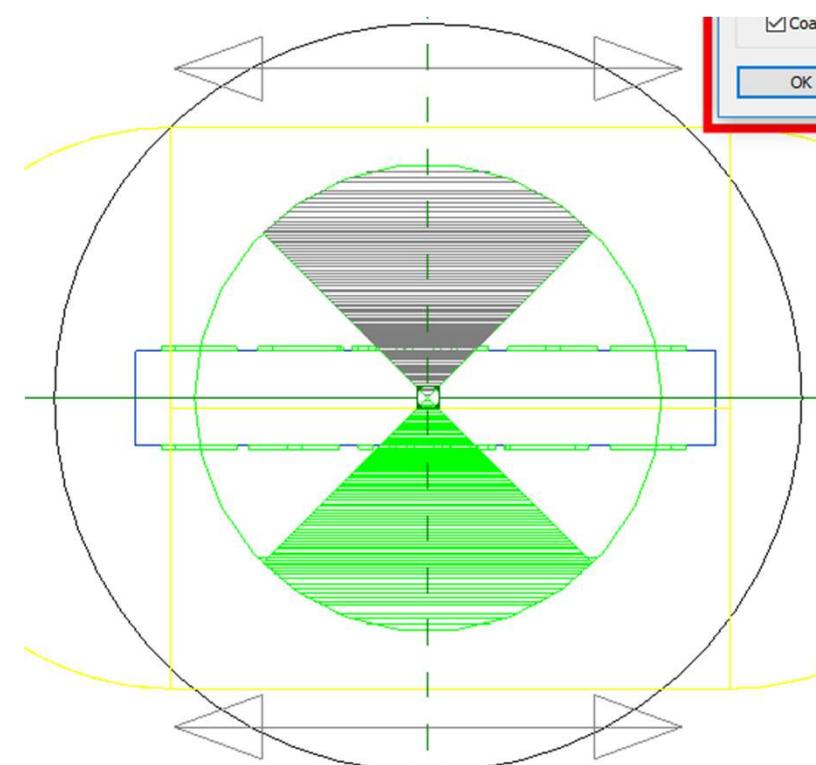
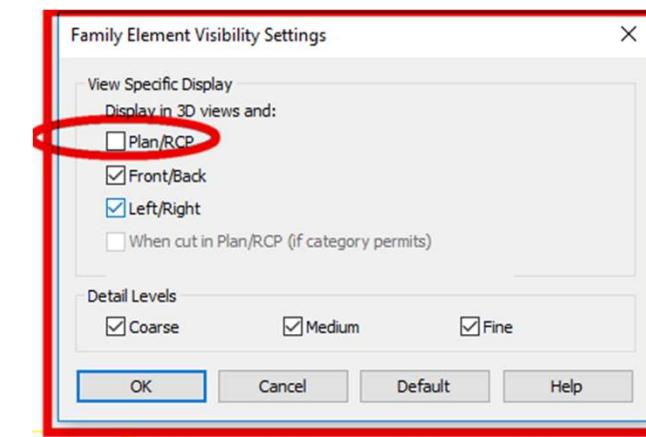
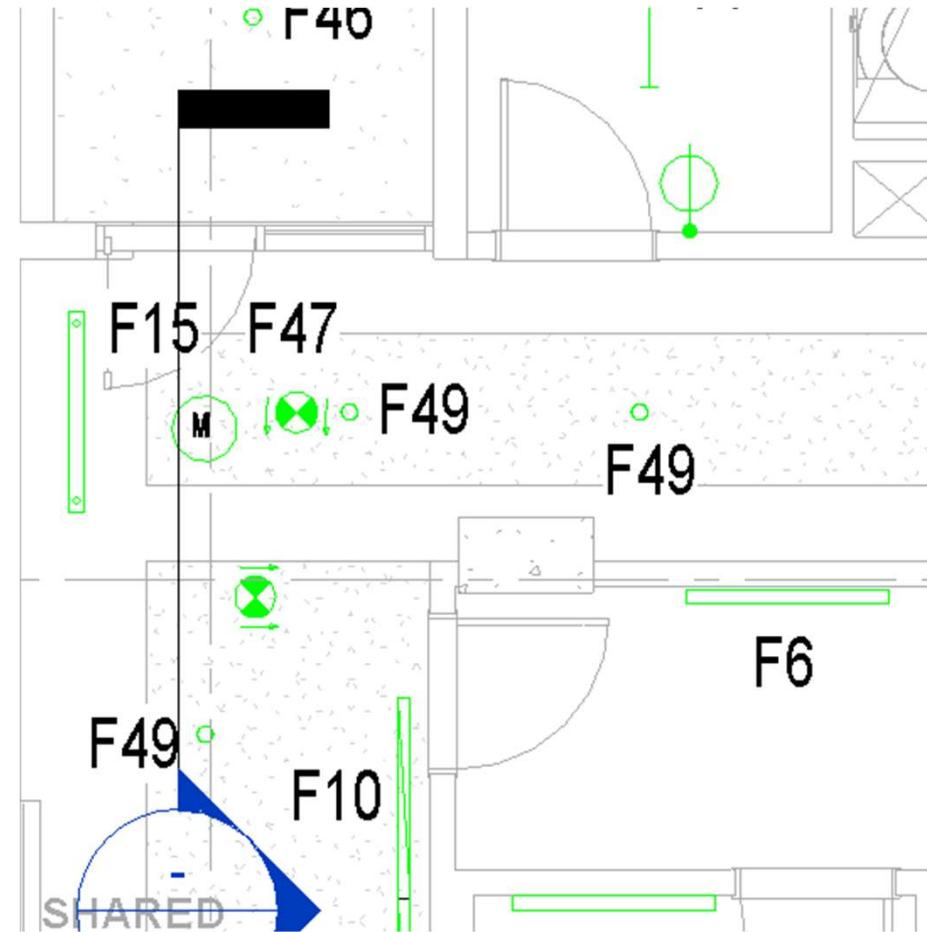
- Elements beneath elements
- 3D lines could be beneath content like floor finishes and effectively invisible
- Use 3D section models to see the lines and moving them above the objects
- Using wire frame mode can also help to uncover objects beneath each other

OTHER ISSUES



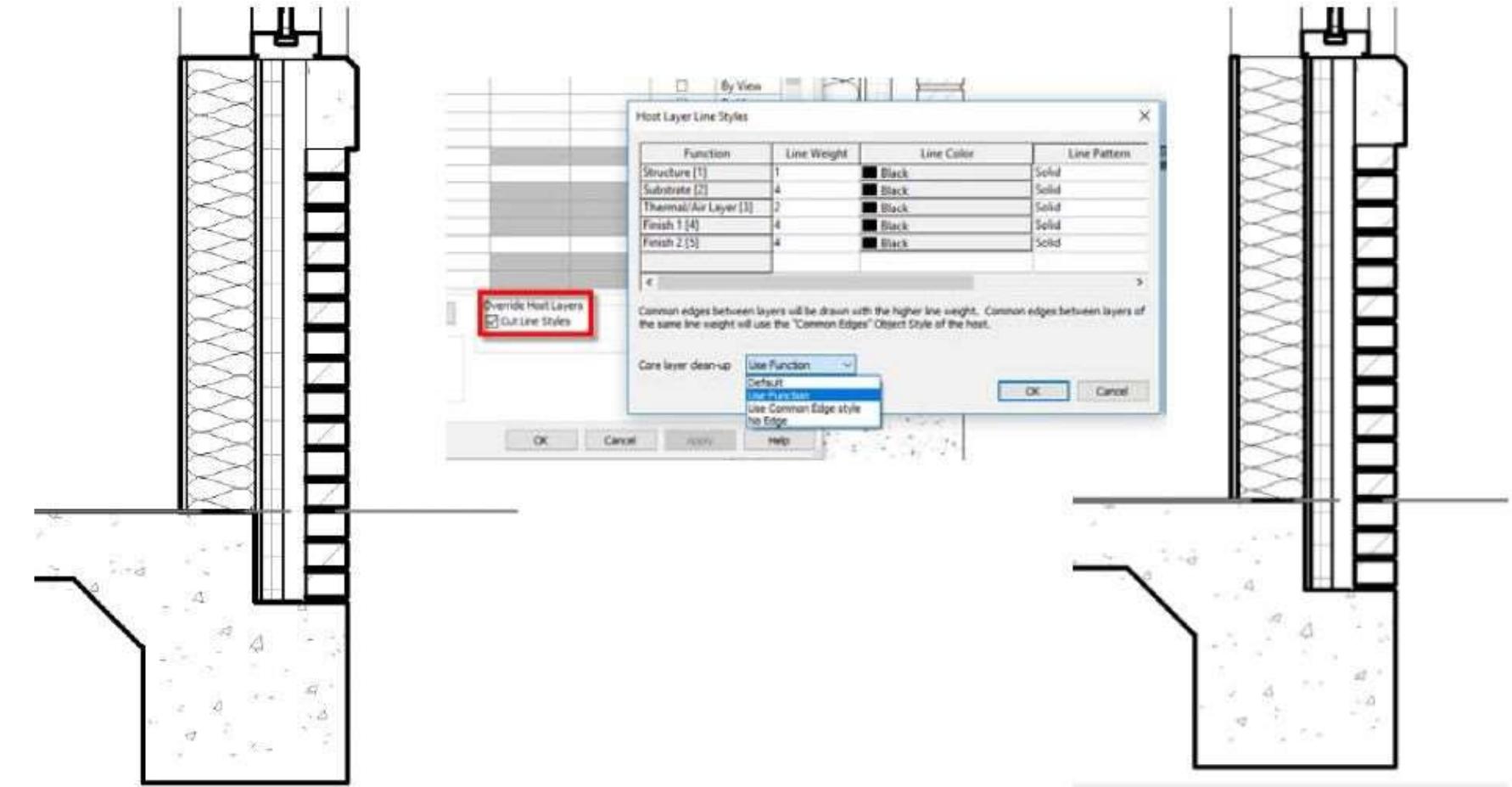
- If your element is in a group then your groups may be a liability
- Groups are not meant to last because they are not easy to keep track of and there's no parameters to control the group except naming it
- Avoid groups

OTHER ISSUES



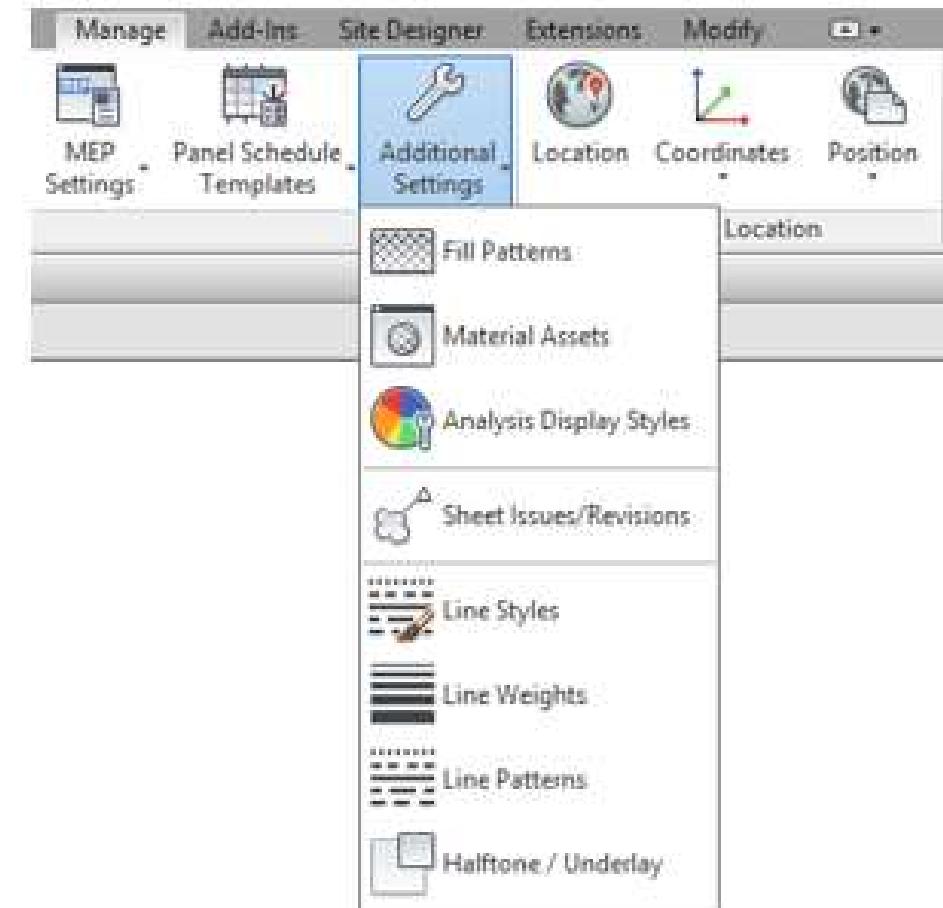
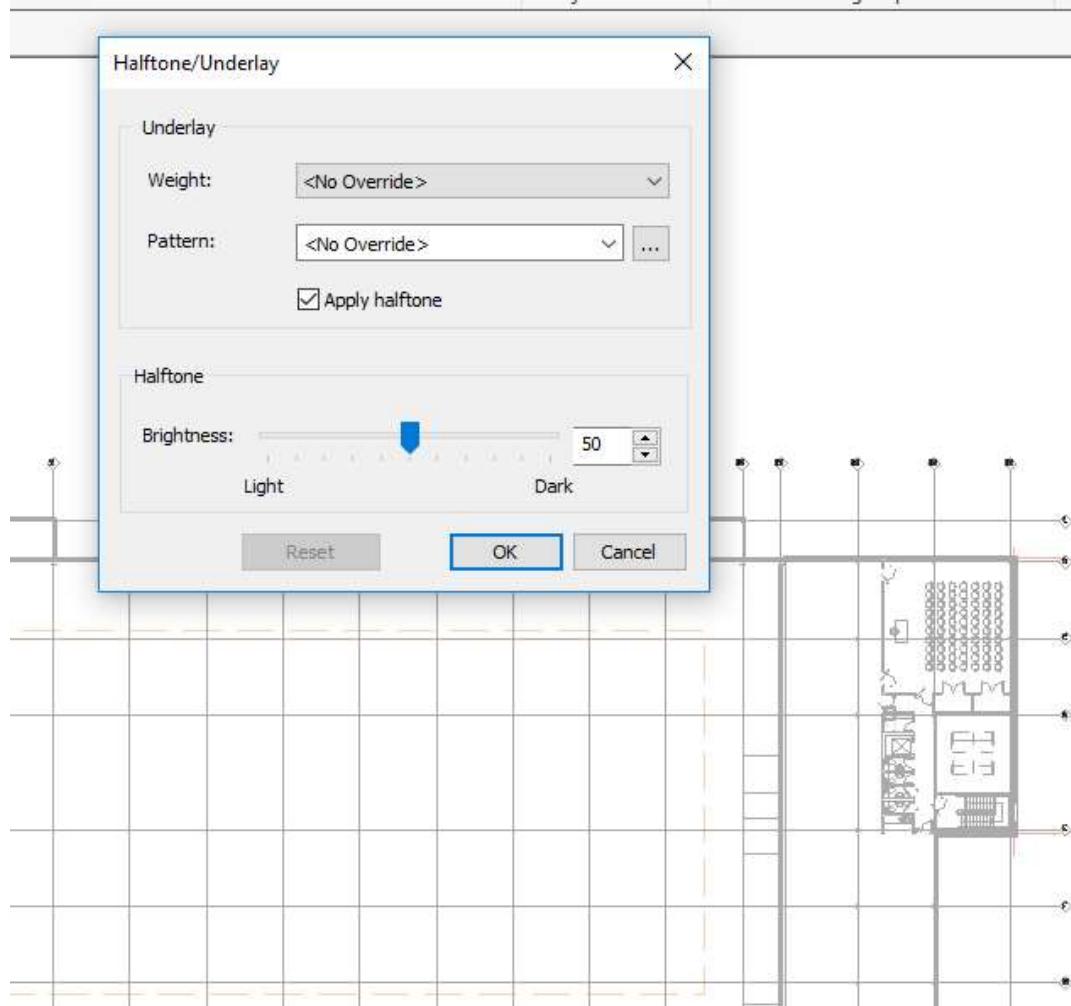
- Family settings may be the problem
- Review the family Visibility Settings which include plan display options

OTHER ISSUES



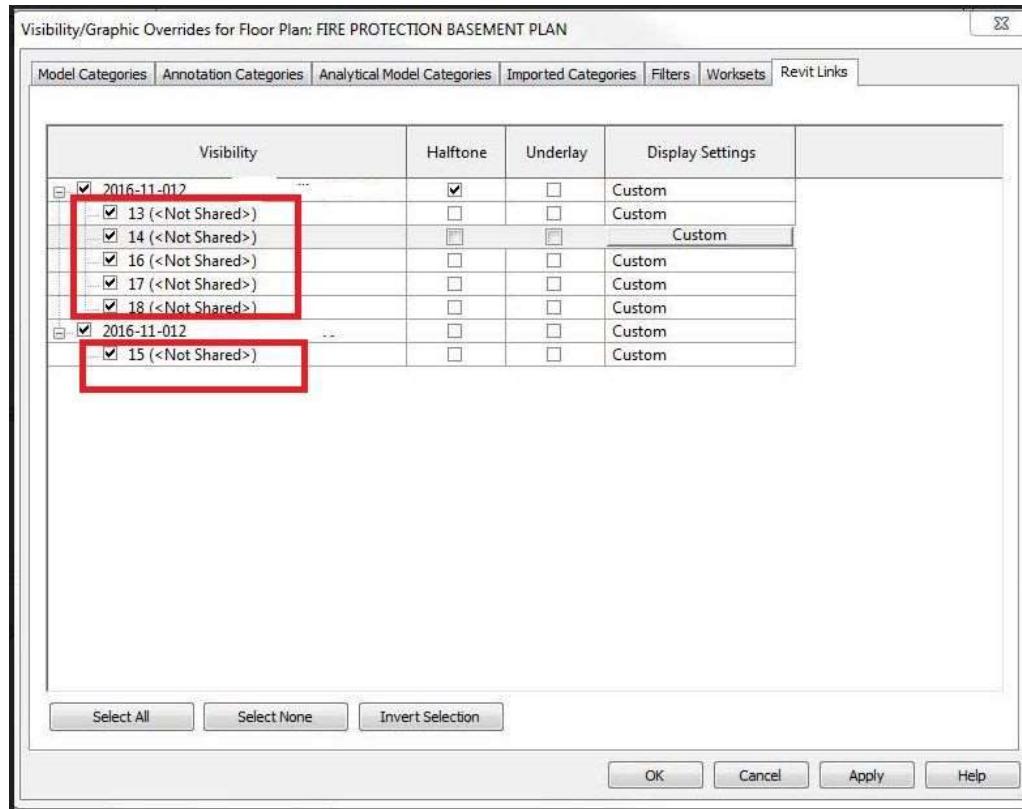
- Drafting Views
- Hybrid detail views can combine detail elements and 3D elements
- Be mindful of how your detail views are organized

OTHER ISSUES



- Halftone / Underlay
- Options to change tone exist in additional settings

LINK REVIT MODELS



Manage Links						
Linked File	Status	Reference Type	Positions Not Saved	Saved Path	Path Type	
Zone - Podium.rvt	Loaded	Overlay	<input type="checkbox"/>	Zone - Podium.rvt	Relative	
Zone - Spine.rvt	Loaded	Overlay	<input type="checkbox"/>	Zone - Spine.rvt	Relative	
Zone - Wing A.rvt	Loaded	Overlay	<input type="checkbox"/>	Zone - Wing A.rvt	Relative	
Zone - Wing B.rvt	Loaded	Overlay	<input type="checkbox"/>	Zone - Wing B.rvt	Relative	
Zone - Wing C.rvt	Loaded	Overlay	<input type="checkbox"/>	Zone - Wing C.rvt	Relative	
Zone - Wing D.rvt	Loaded	Overlay	<input type="checkbox"/>	Zone - Wing D.rvt	Relative	
Zone - Wing E.rvt	Loaded	Overlay	<input type="checkbox"/>	Zone - Wing E.rvt	Relative	
Autodesk_Hospital_Imperial_Architect	Not Loaded	Overlay	<input type="checkbox"/>	Autodesk_Hospital_Imperial_Architect	Relative	
Autodesk_Hospital_Imperial_Electrica	Not Loaded	Overlay	<input type="checkbox"/>	W:\Autodesk Hospital Project_Imperi	Relative	
Autodesk_Hospital_Imperial_Plumbin	Not Loaded	Overlay	<input type="checkbox"/>	W:\Autodesk Hospital Project_Imperi	Relative	
Autodesk_Hospital_Imperial_Structura	Not Loaded	Overlay	<input type="checkbox"/>	..\16001-Hospital Dataset\Imperial	Relative	

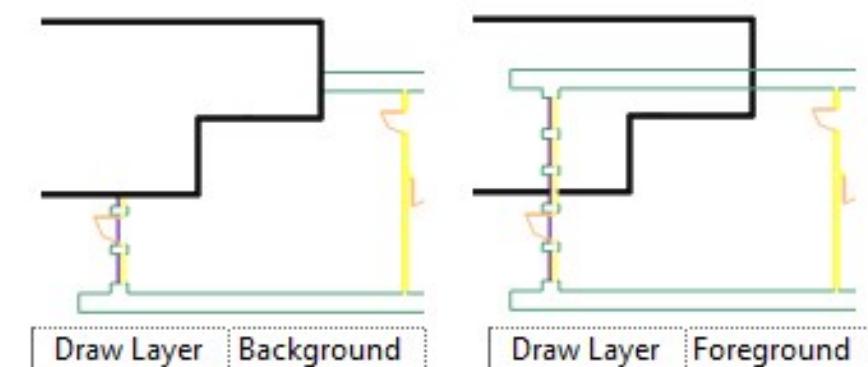
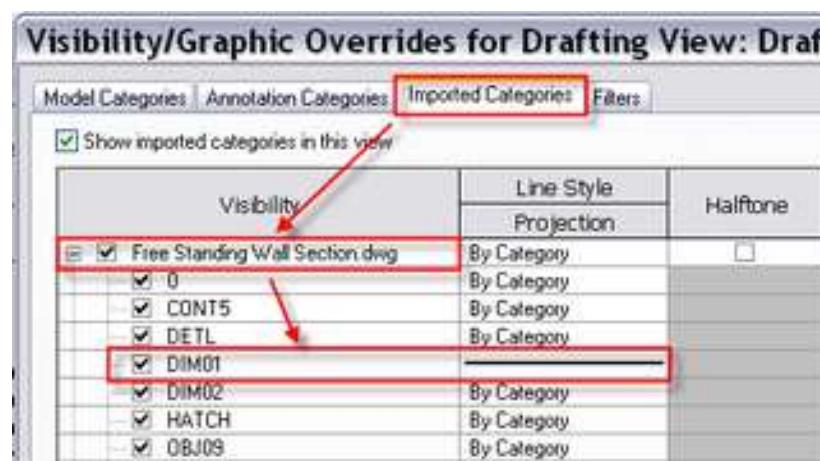
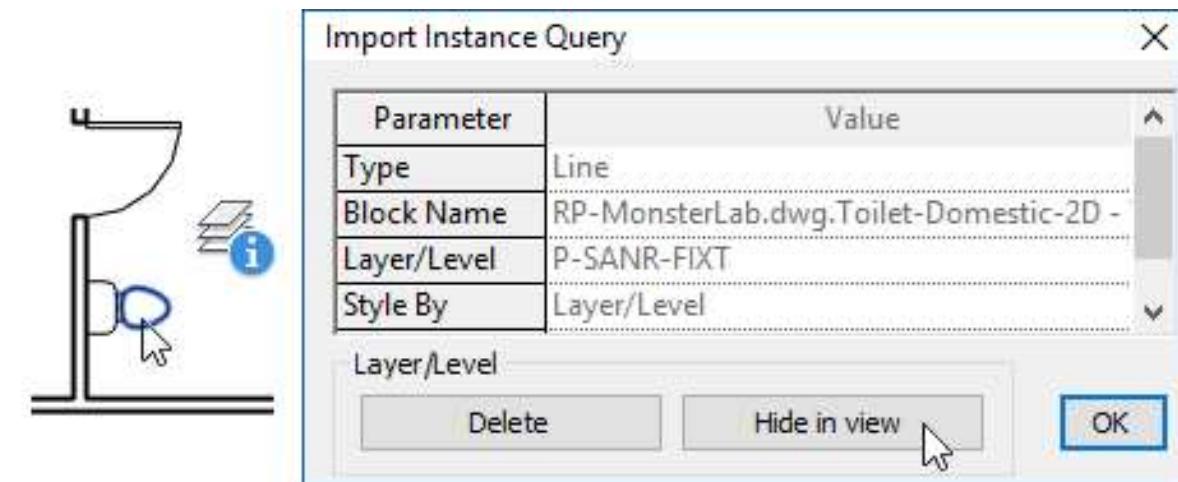
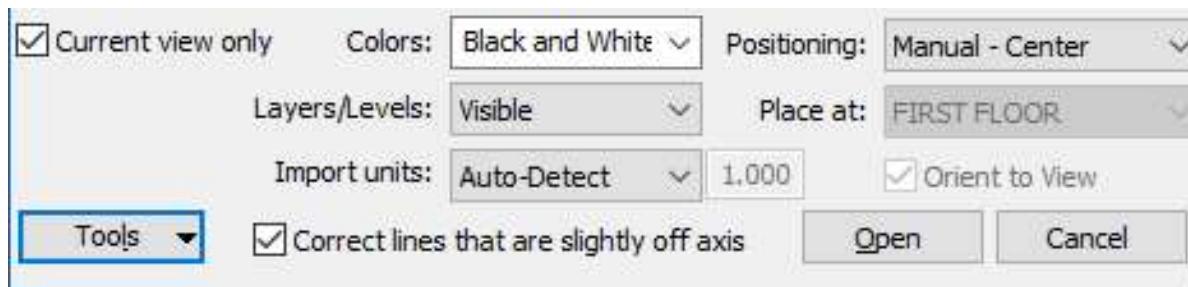
Worksets						
Active workset: Parking Garage Model <input checked="" type="checkbox"/> Gray Inactive Workset Graphics						
Name	Editable	Owner	Borrowers	Opened	Visible in all	
Architectural	Yes	ChrisWea		No	<input type="checkbox"/>	New
Link - Zone - Podium	Yes	ChrisWea		No	<input type="checkbox"/>	Delete
Link - Zone - Spine	Yes	ChrisWea		No	<input type="checkbox"/>	Rename
Link - Zone - Wing A	Yes	ChrisWea		No	<input type="checkbox"/>	Open
Link - Zone - Wing B	Yes	ChrisWea		No	<input type="checkbox"/>	Close
Link - Zone - Wing C	Yes	ChrisWea		No	<input type="checkbox"/>	Editable
Link - Zone - Wing D	Yes	ChrisWea		No	<input type="checkbox"/>	Non Editable
Link - Zone - Wing E	Yes	ChrisWea		No	<input type="checkbox"/>	
MEP Models	Yes	ChrisWea		No	<input type="checkbox"/>	
Parking Garage Model	Yes	ChrisWea	Yes	No	<input type="checkbox"/>	
Shared Levels and Grids	Yes	ChrisWea	No	No	<input type="checkbox"/>	
Site Model	Yes	ChrisWea	Yes	No	<input type="checkbox"/>	
Structural Model	Yes	ChrisWea	No	No	<input type="checkbox"/>	

Show:

User-Created Project Standards
 Families Views

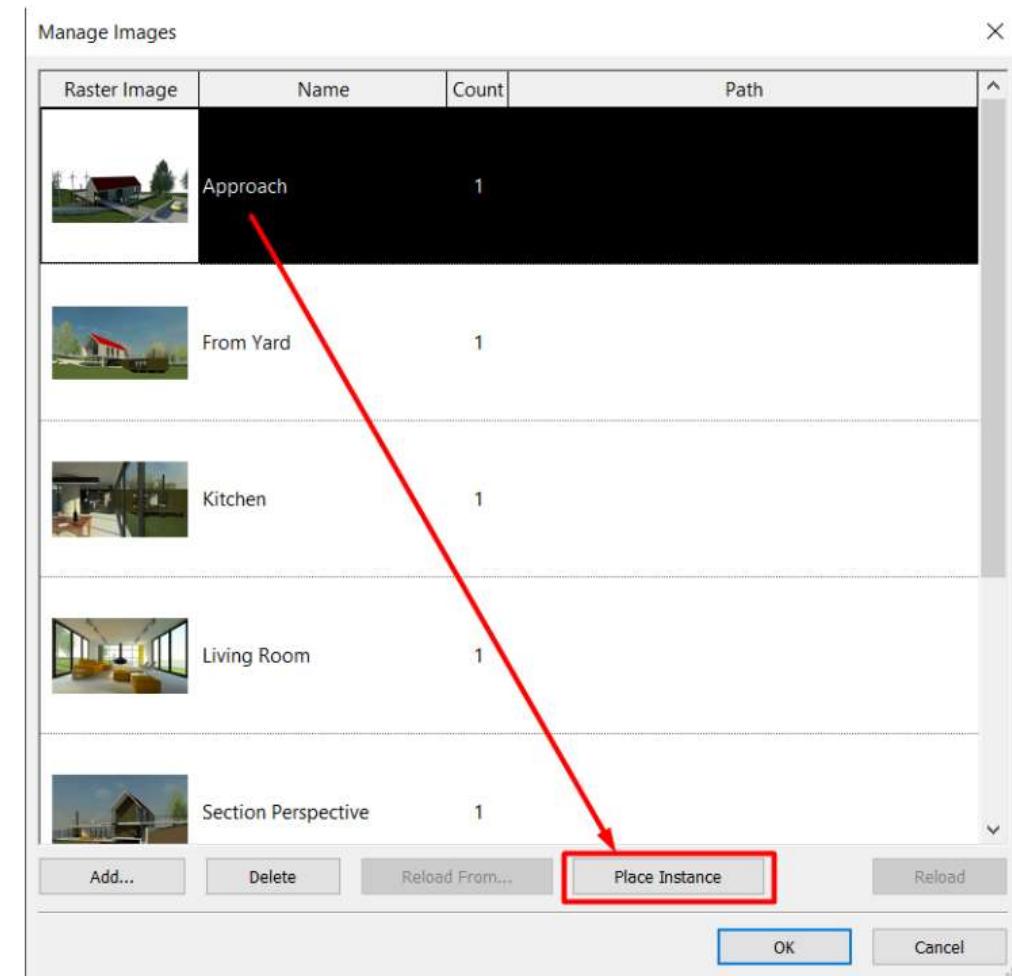
- Links follow the host, have their own properties or are somewhere in the middle
- If you can't see a model at all then it could be turned off or unloaded in the model

LINK CAD MODELS



- Can't see the Link because it's only a single view not every view
- Multi Colors may be jarring, can be overwritten with link or VG override settings
- Too Big / Small due to scale changes
- Layers not showing because they are hidden or deleted

OTHER ISSUES



- Manage Images
- Sometimes your image links can be lost if the folder is changed

MORE TOPICS



- Linked views 'hybrid' setting
- Phase mapping to families
- Floor plans and Area plans graphics
- Plan Regions
- View Underlay
- Modifying angled elevations
- Masking Regions
- Family masking regions
- Wall sweeps and reveals
- Wall stacking
- Linked CAD settings
- Origin and how that affects your model views
- Elements far away in the plan
- PDF print settings
- Digital Cartoon Sets
- Schedules for searching views and elements
- 2D wheel
- View Cube
- Family Visibility settings
- Mass elements
- Textures
- Materials

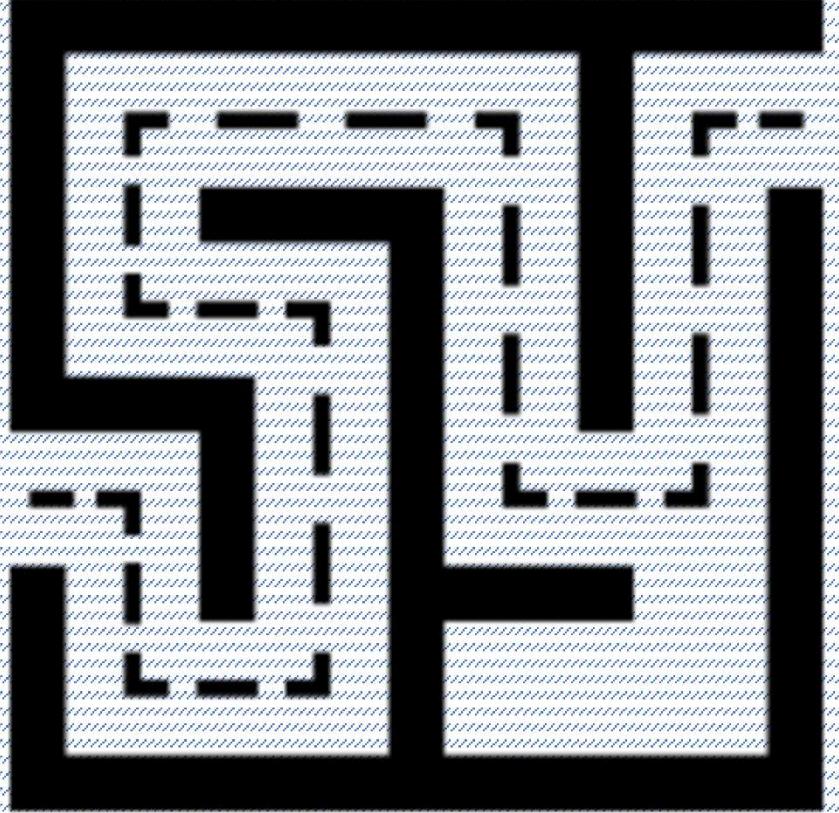
To Be Continued 

SUMMARY

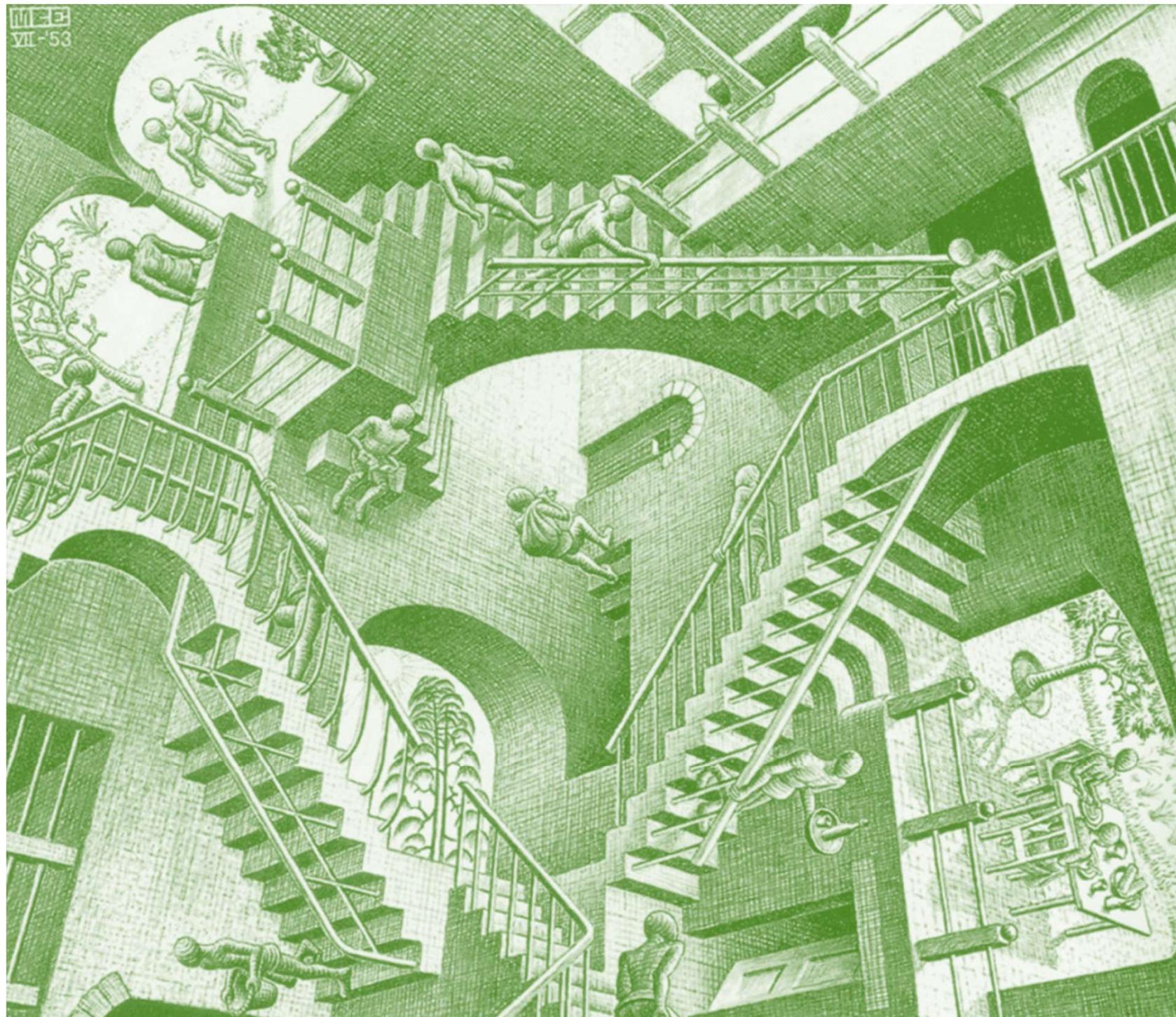


- Before going into the nuanced options and settings make sure your regular setting discussed earlier are already reviewed
- Many settings can affect your model so keep in mind what kind of model you have and how it is organized
- Start from the options that have the biggest impact like scope boxes and narrow down the list of possibilities from there
- Every project is different and keeping a directory of common problems and fixes can go a long way to help users navigate through their own issues

TROUBLESHOOT



TROUBLE SHOOT

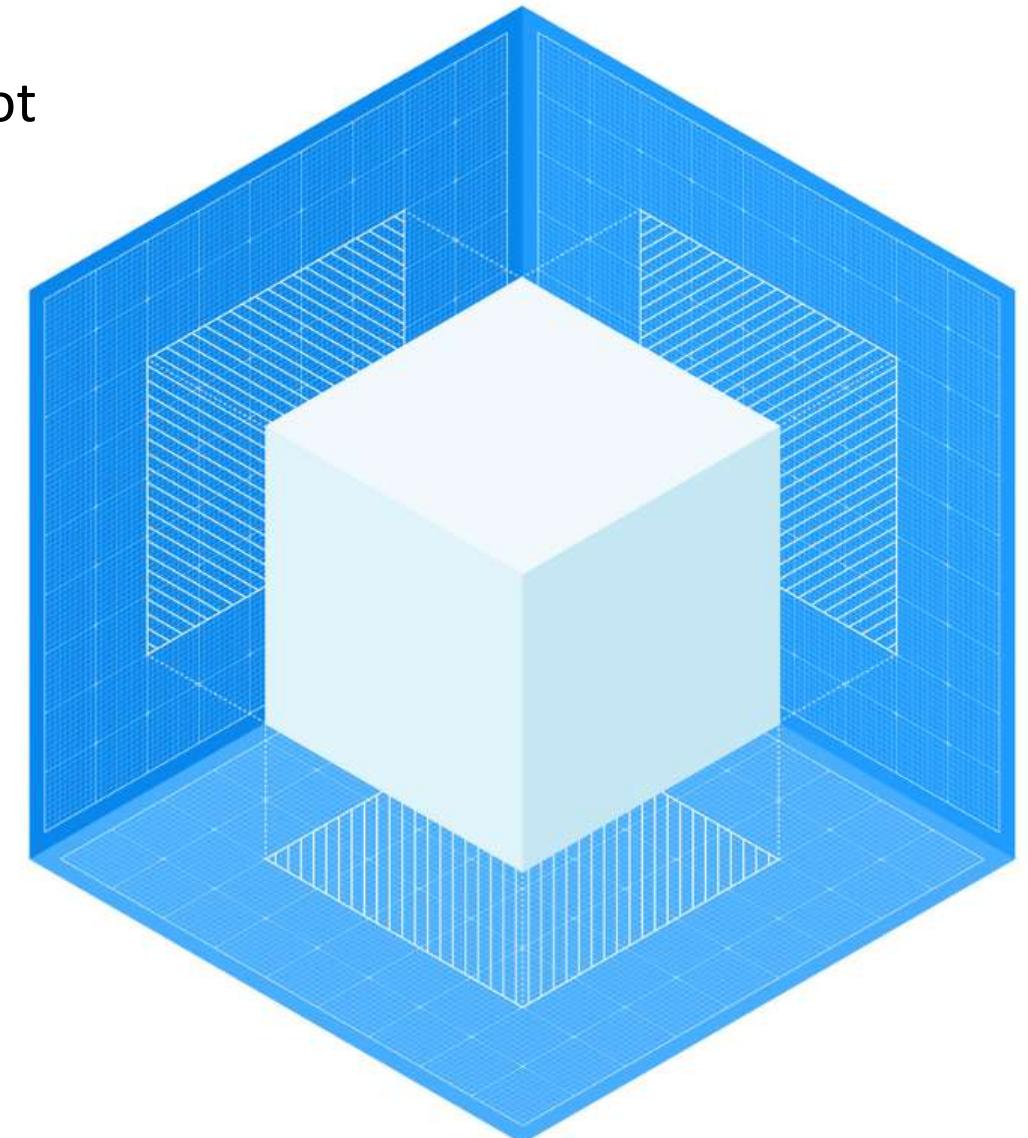


- Navigate the maze
- Methods to review your model and creating fixes

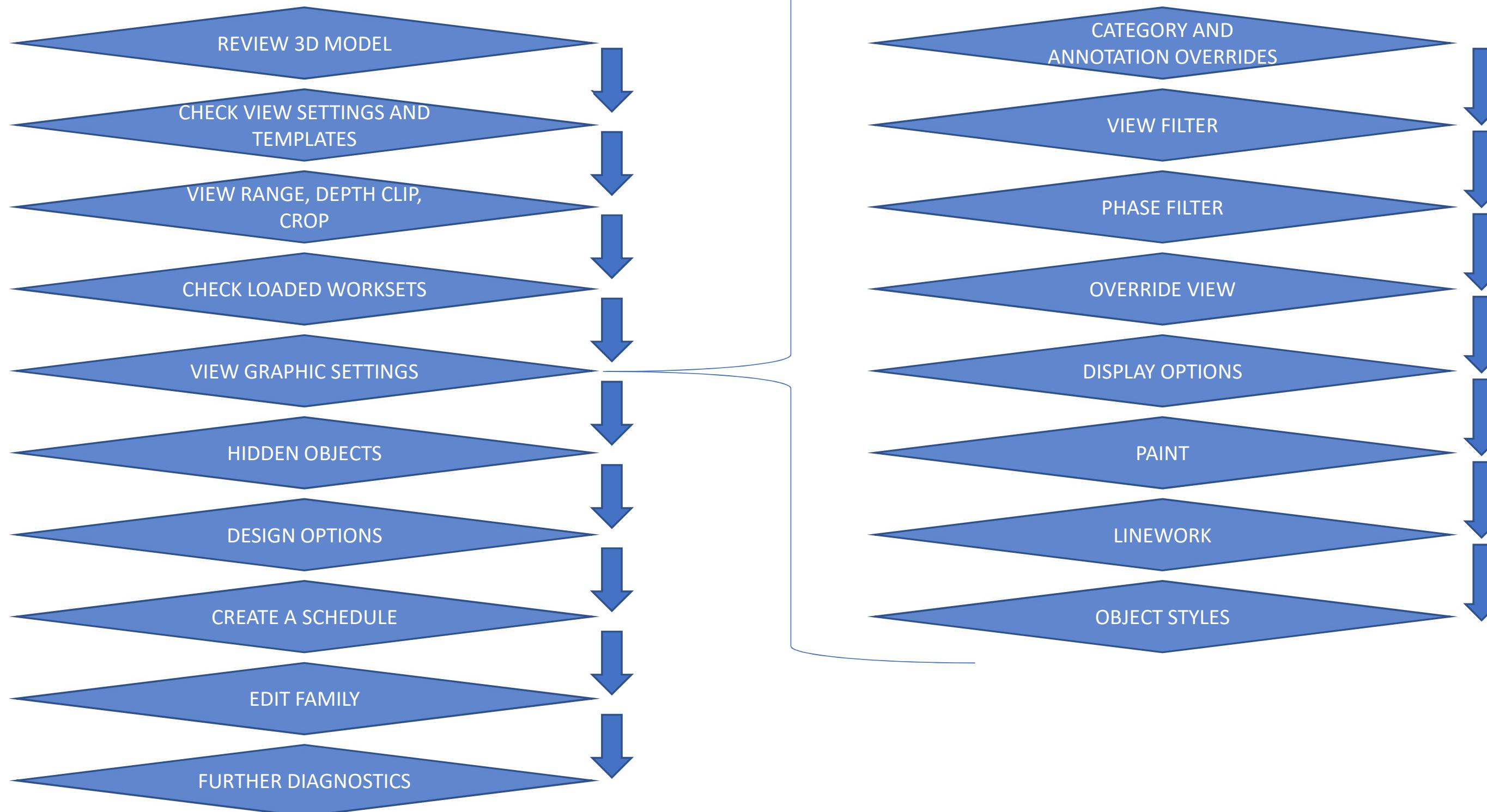
TROUBLE SHOOT



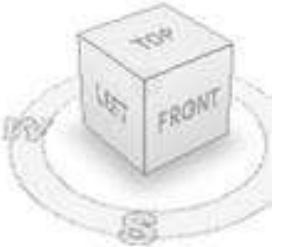
- Problem with troubleshooting is that it is not obvious where you start
- Are you aware how the model visibility and template works?
- If you are not familiar with the project then you have a trial and error troubleshoot
- Might save you some time to study the model and its settings
- Consider what you need to know to fix a given visibility setting
- Project Parameters
- Shared Parameters
- Full 3D view of the model
- Levels and Grids
- Worksets
- Design Options
- Filters
- Linked content
- List of view templates
- Browser organization
- Loaded families



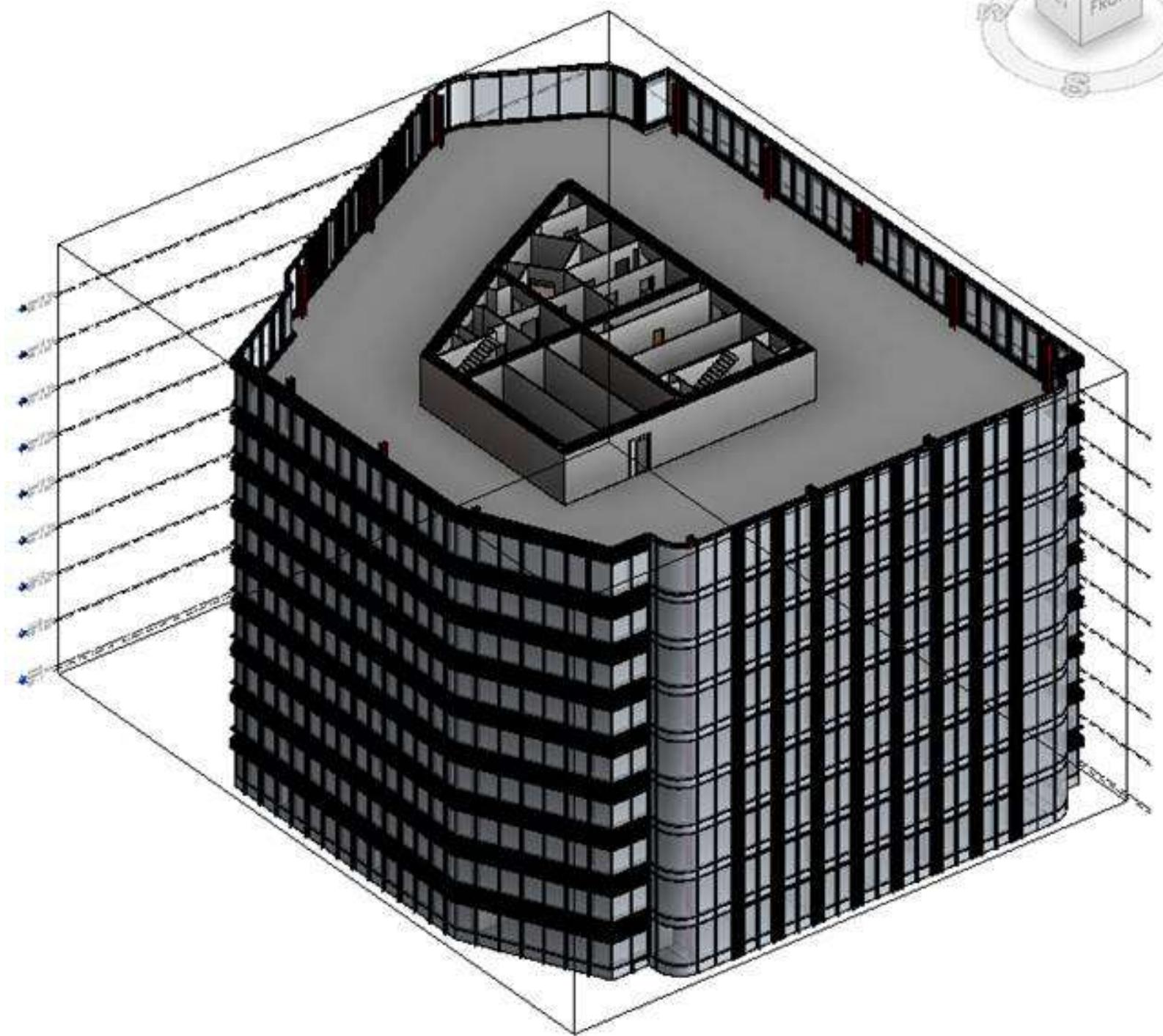
QUICK VIEW – PATH OF LEAST RESISTANCE



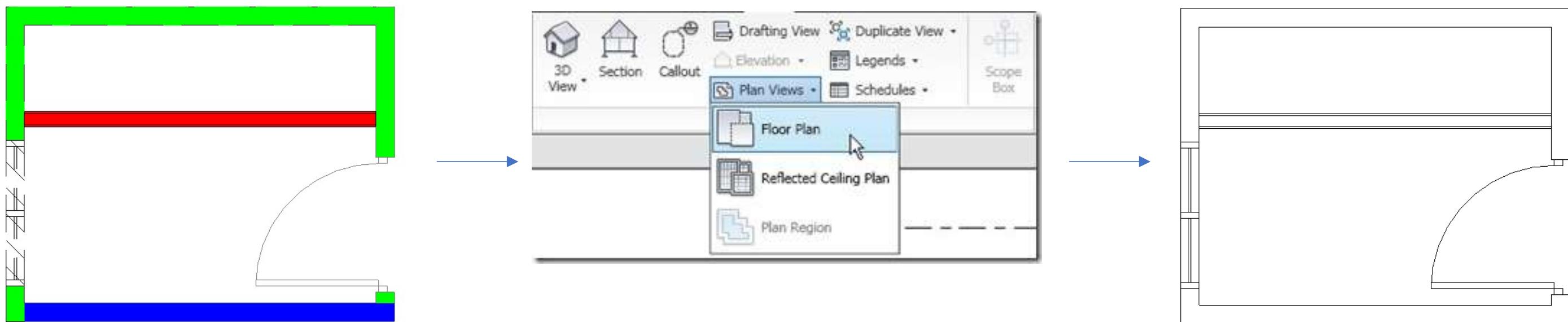
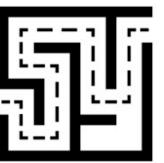
TROUBLE SHOOT



- First step is to evaluate your model
- Open a 3D view and check the settings in your model before going into views
- Check if your worksets are loaded
- Check View Range if it is a plan
- Check Crop and Annotation Crop options
- Review your View template for what settings are preset
- Objects can be on the wrong host object like ceiling instead of floor
- Check the Visibility Graphics Hierarchy and if one setting is overriding another

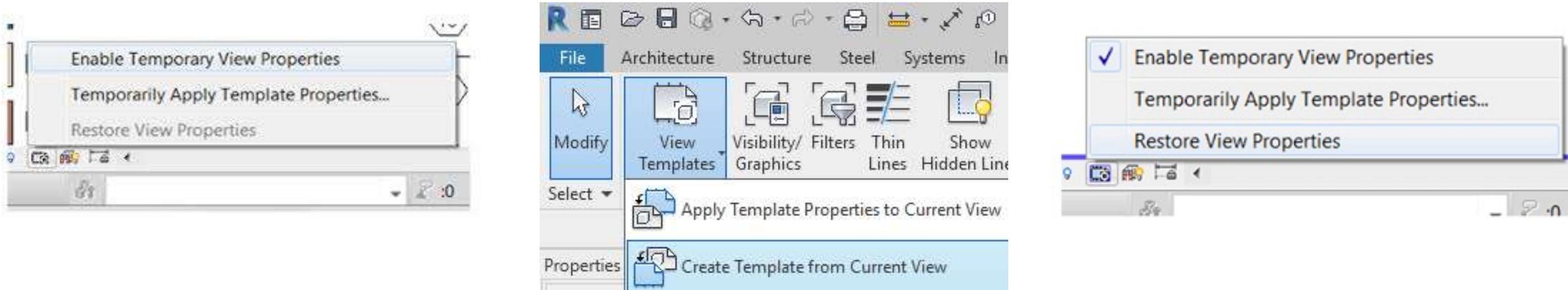


TROUBLE SHOOT



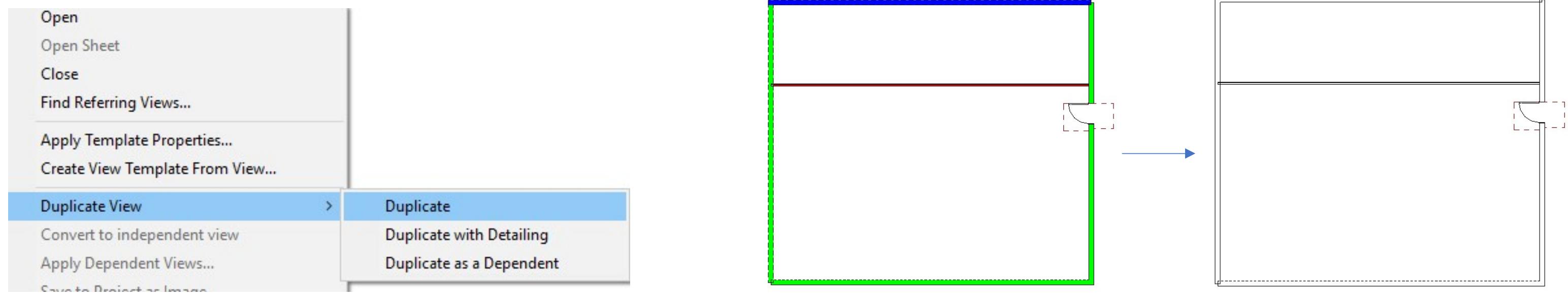
- Existing plans may have too many settings which obfuscates the graphics
- Easiest way to check a view is to create another one without all the modifications
- Start from a fresh copy and compare to the existing view
- Make notes of differences to make sense of the view content
- If the new view suits you better, then you can create a template from it and apply to your existing views

TROUBLE SHOOT



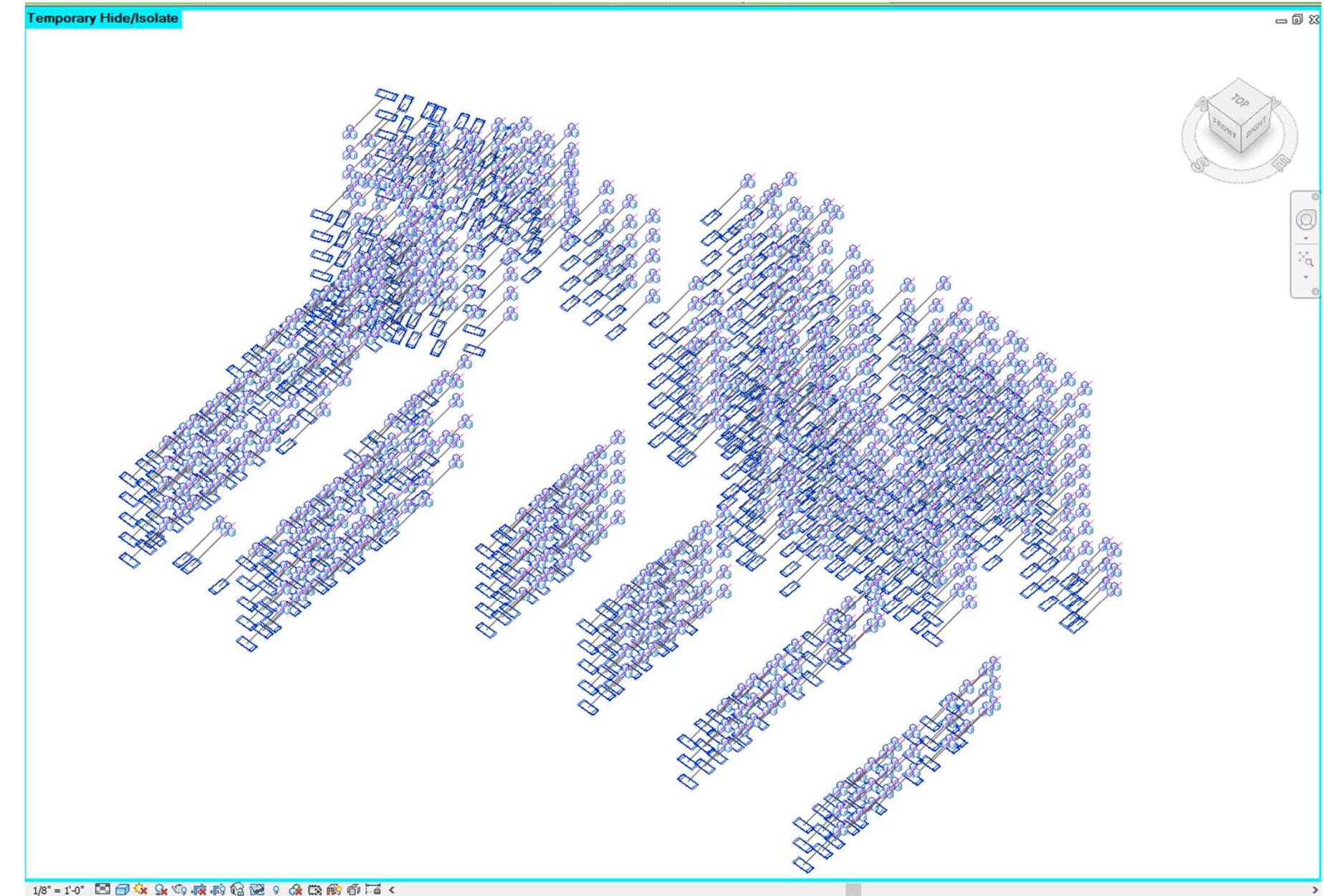
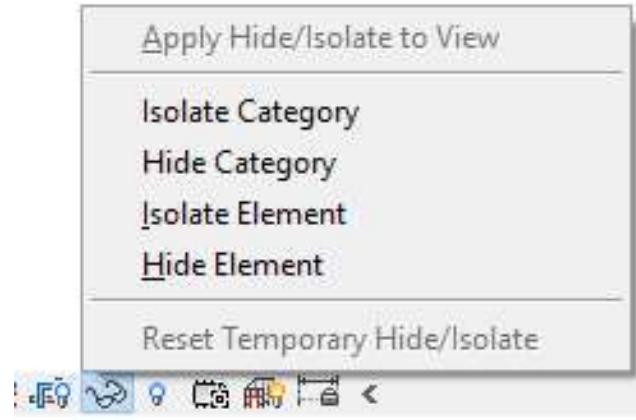
- Temporary views can bypass view templates without altering a given view
- Good way to modify your settings without making permanent changes
- Can either apply the temporary settings to the current view, save a template or restore original settings

TROUBLE SHOOT



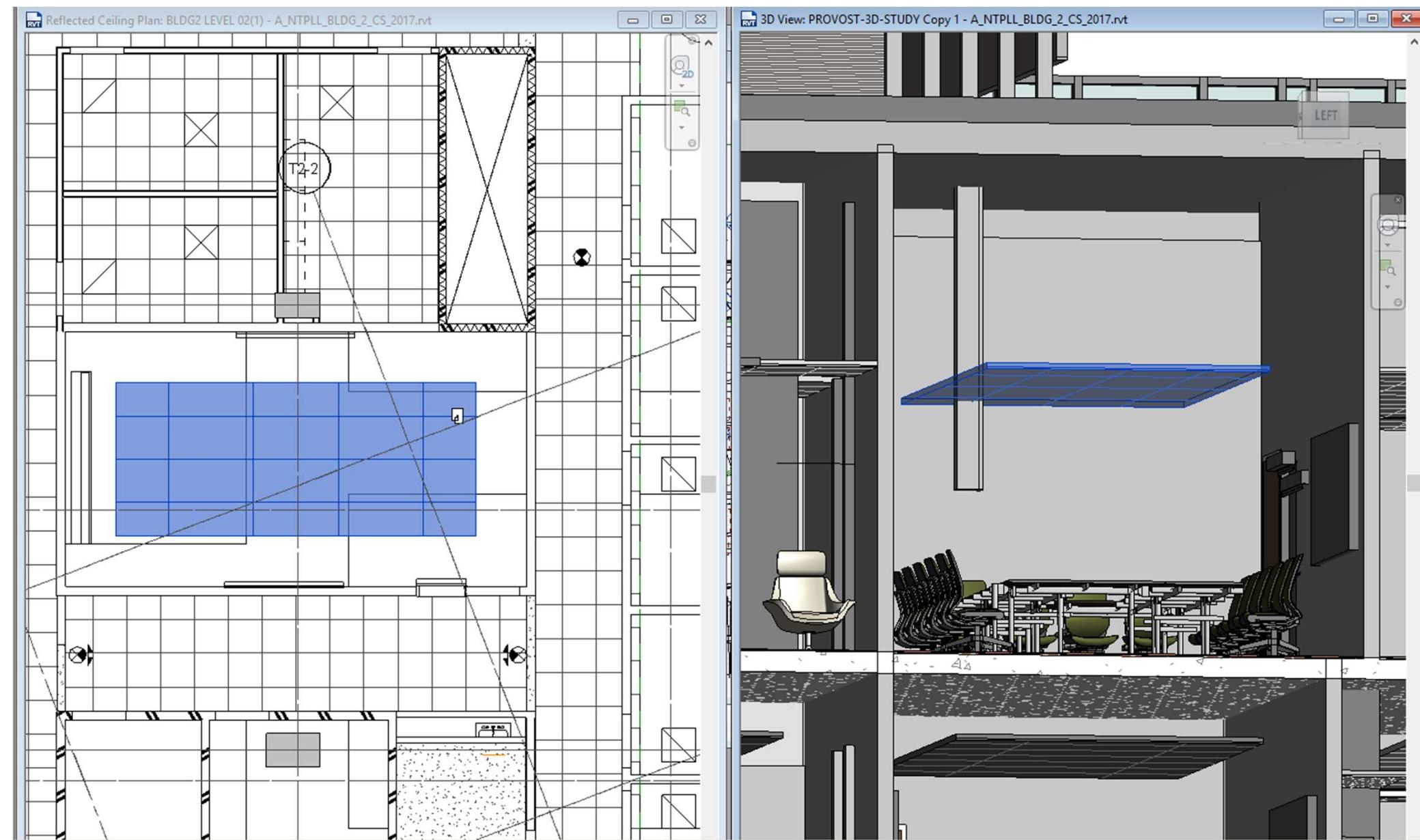
- Reproduce the view, assign to a working view group and compare to the trouble view
- Reverse engineer the steps and see what changes affect the settings
- Usually a default view will make clear what went wrong with the target view
- Start from scratch and try to rebuild the view and account for your visibility settings

TROUBLE SHOOT



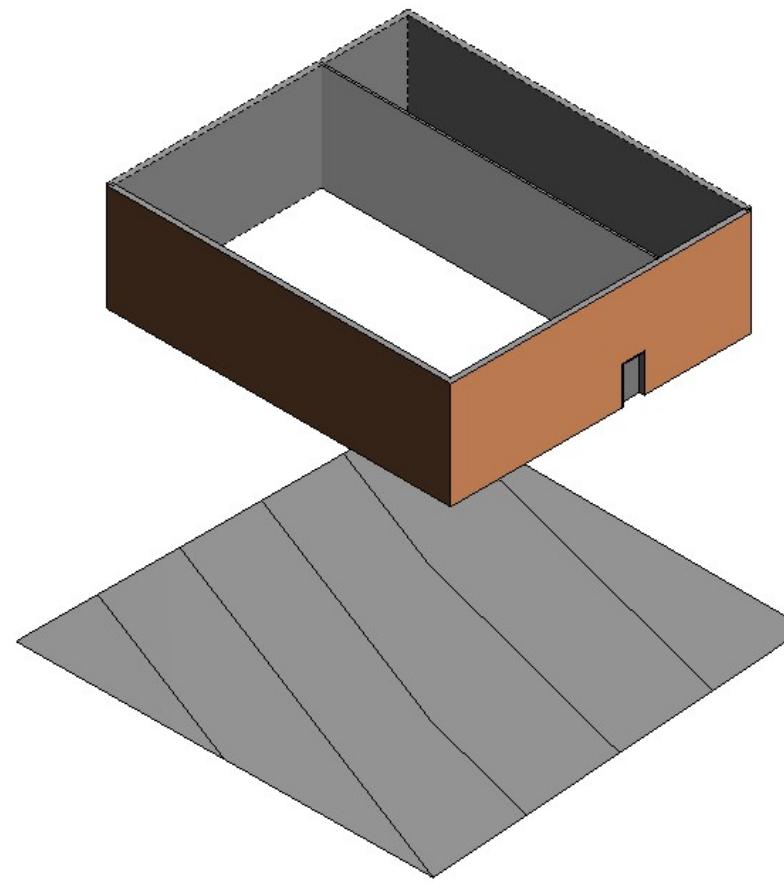
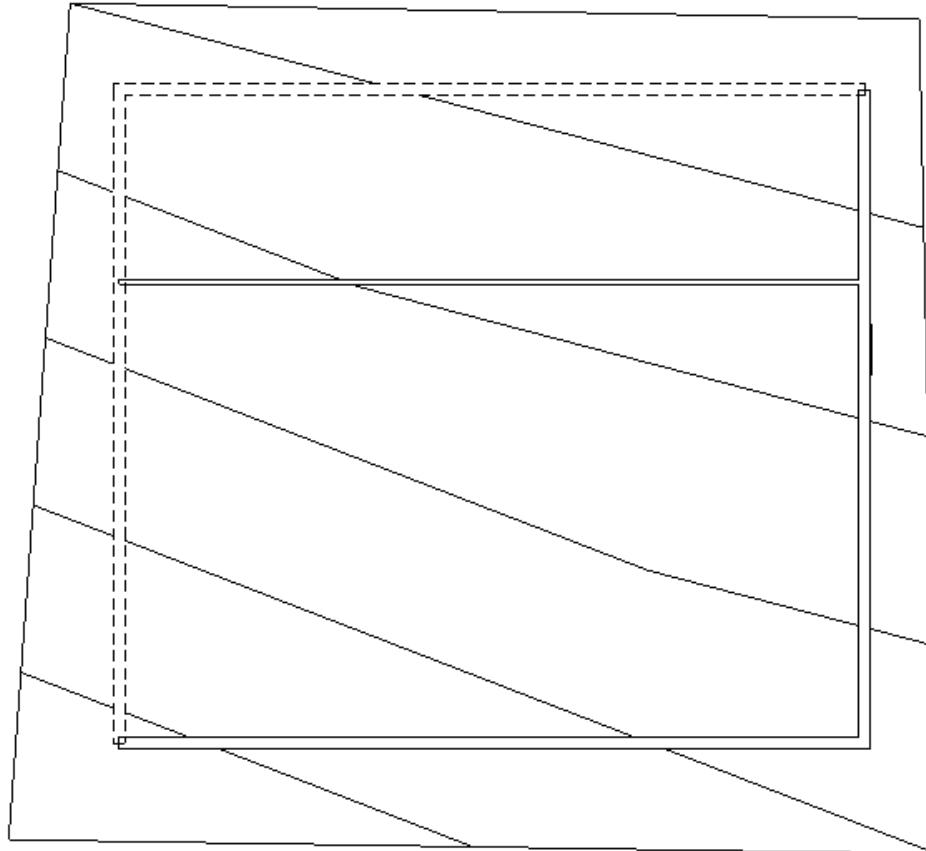
- Isolate Elements or Category in View is useful when you have a lot of something selected
- Can filter content then use isolate option to review content
- Can compare count in a view to a schedule count as a cross reference

TROUBLE SHOOT



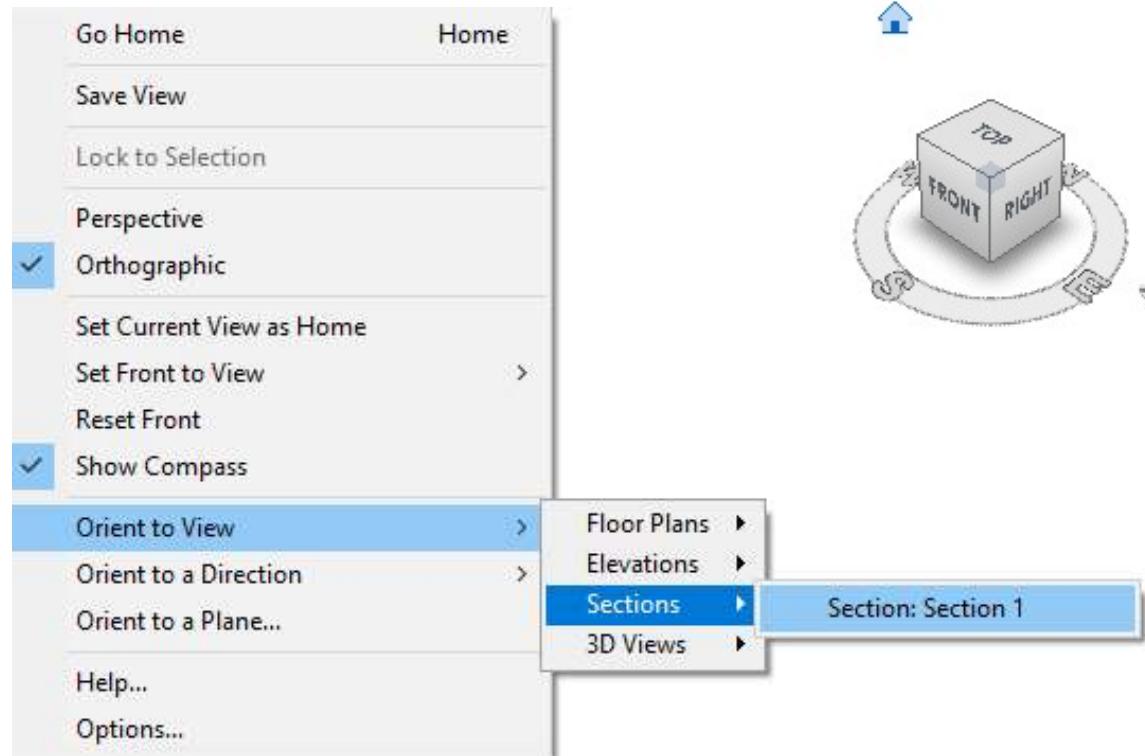
- Use multiple views of the same model to help review object orientation
- Plan, Section, 3D and other views should all be used together to help check the design
- What may not be obvious in one view can be in another view

TROUBLE SHOOT

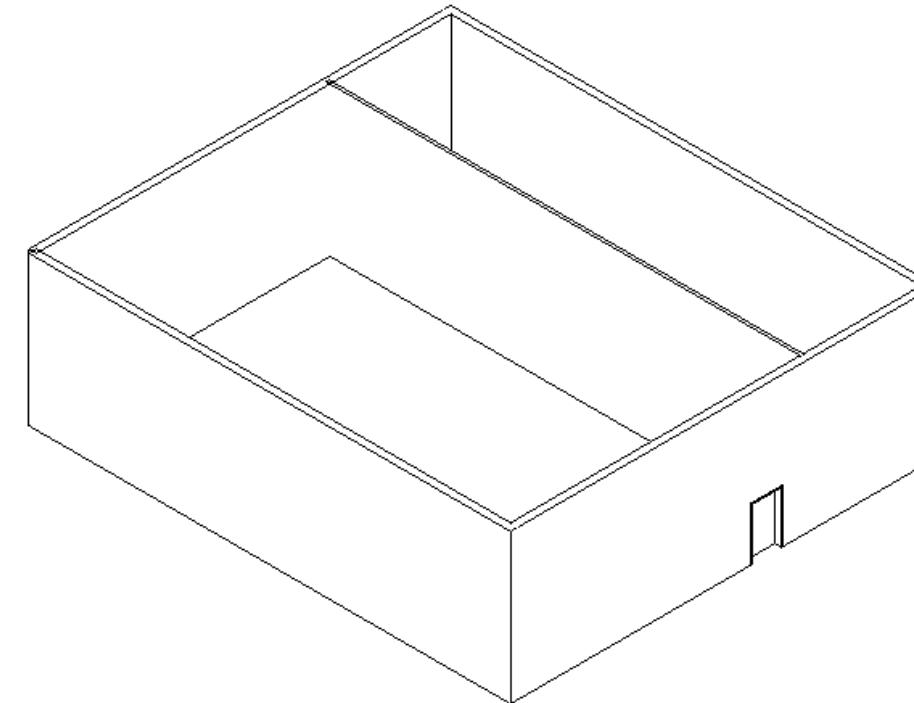


- Elements beneath elements
- 3D lines could be beneath content like floor finishes and effectively invisible
- Use 3D section models to see the lines and moving them above the objects
- Using wire frame mode can also help to uncover objects beneath each other

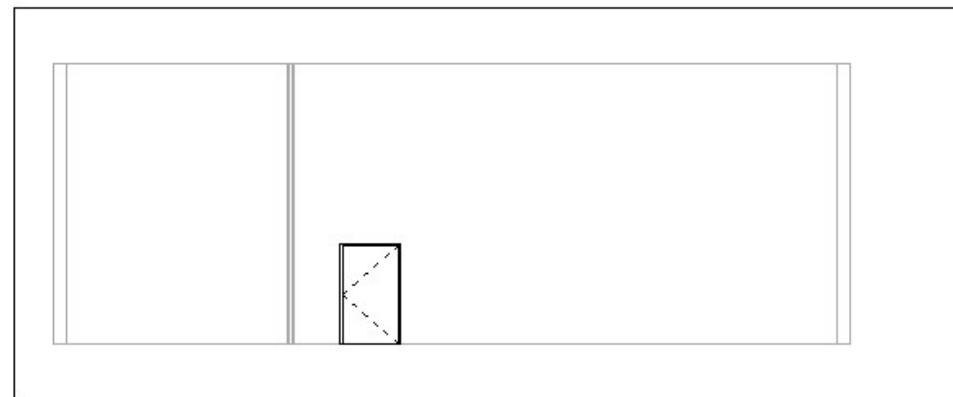
TROUBLE SHOOT



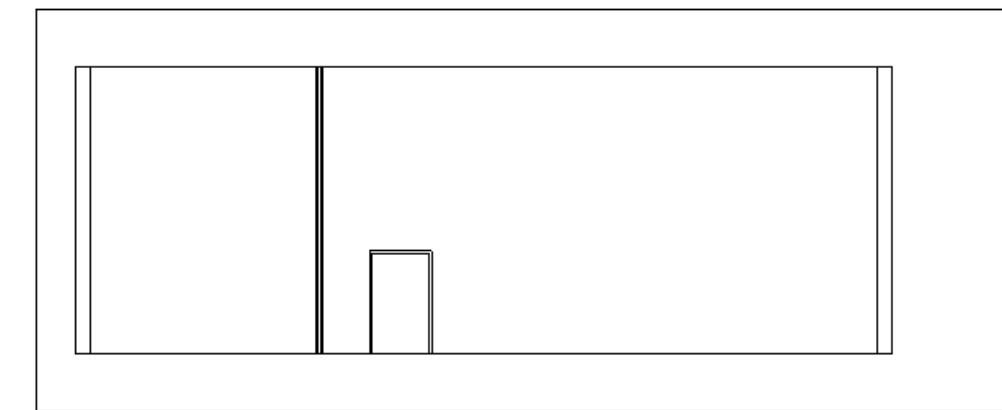
3D



2D

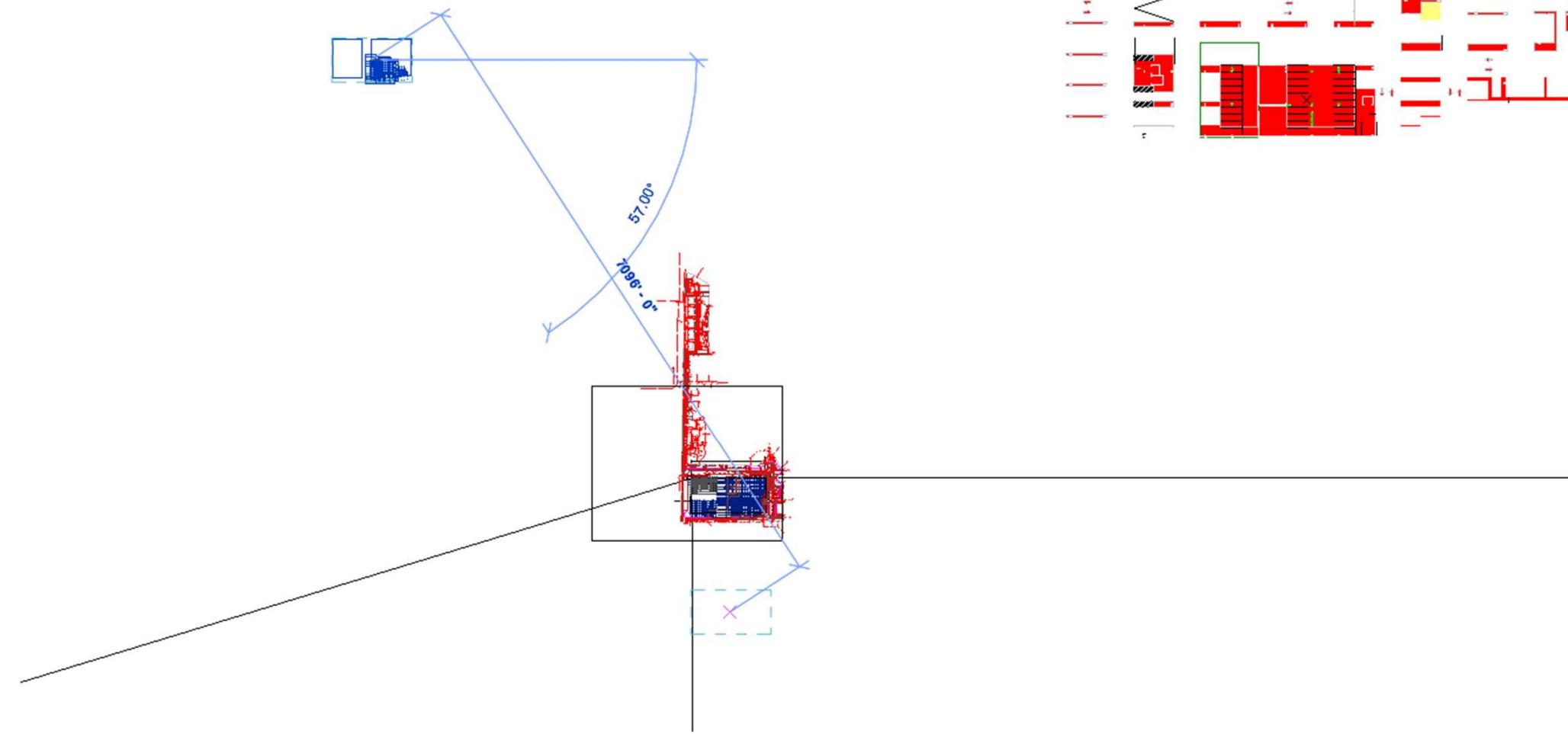


3D



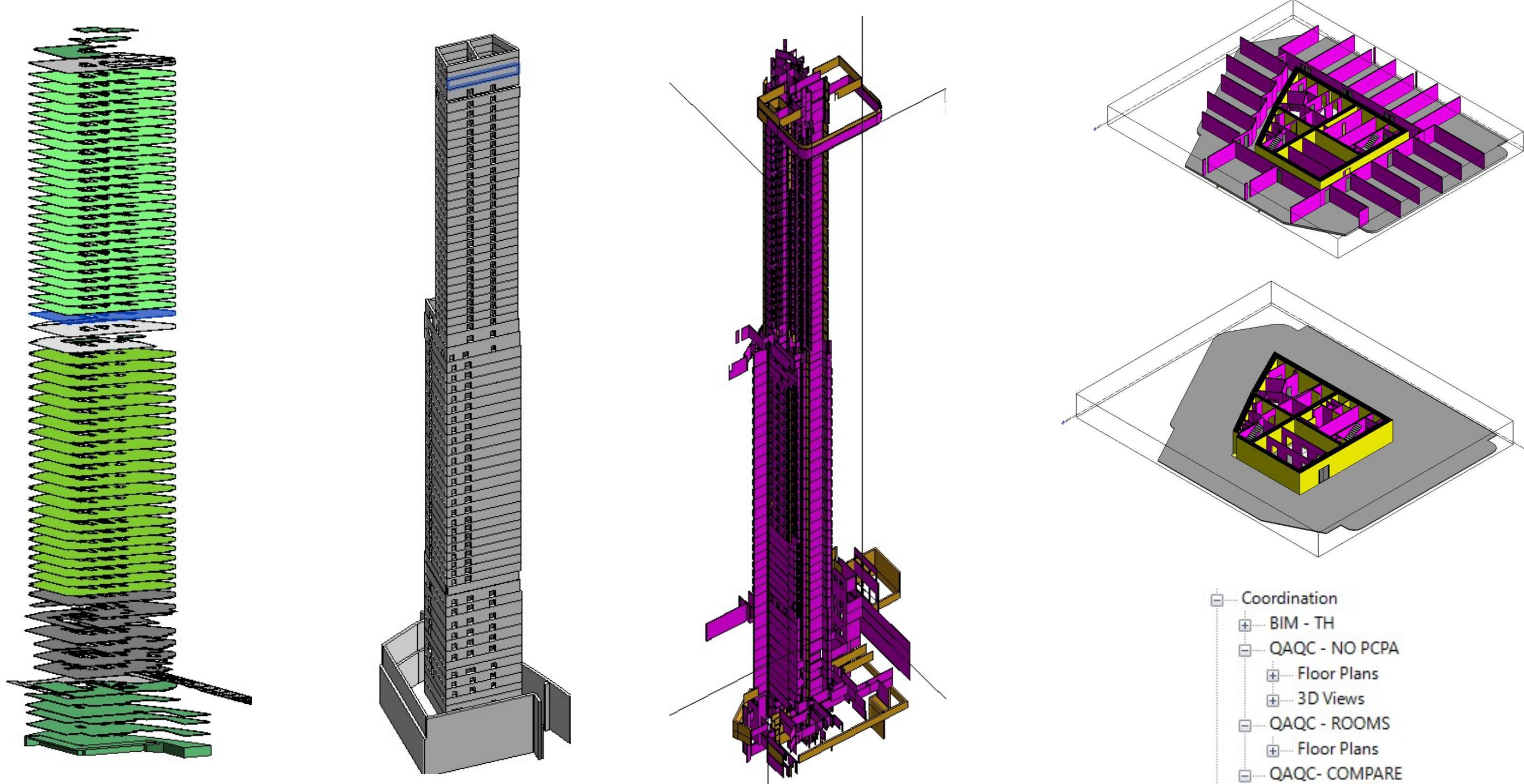
- The view cube has a lot of tools include orient to view to help align 3D to a given plan
- Since all plans reference the 3D model this tool can align your 3D model to a selected view
- Useful to compare what is showing in 3D to a 2D plan or section as a way to confirm graphics are accurately represented

OTHER ISSUES

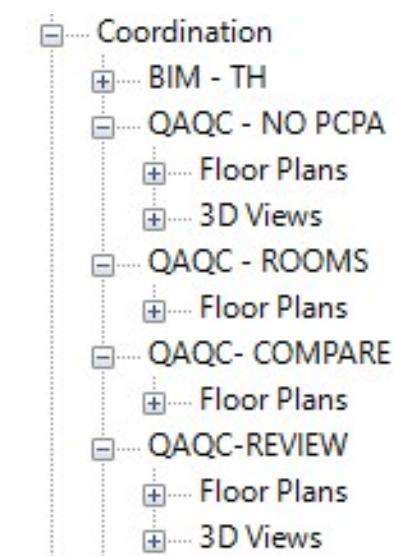


- Your objects may be way out of bounds
- Turn off all crop regions and scope boxes to see what's in the distance
- Relates back to the relevance of origin points

TROUBLE SHOOT



- Sometimes you need to review content in a different way
- Show it with filters for different categories to help visualize your project assets



TROUBLE SHOOT



<_MANAGE BIM - VIEW LIST FOR BILT>

A	B	C	D	E	F	G	H	I	J	K	L	M
View Name	View Subgroup	View Template	View Group	View Type	Associated Level	Type	Family	Family and Type	Drawing Subgroup	Phase Filter	Discipline	Phase
BMU ROOF-NO PCPA CO	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	BMU ROOF	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 1 Mezz.-NO PCPA	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 1 Mezz.	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 17-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 17	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 18-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 18	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 1-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 1	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level -1-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level -1	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 2-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 2	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level -2-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level -2	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 30-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 30	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 31-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 31	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 32 Mezz.-NO PCPA	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 32 Mezz.	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 32-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 32	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 33-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 33	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 34-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 34	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 3-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 3	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level -3-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level -3	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 4-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 4	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level -5 Stacker Pit-NO P	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level -4 Stacker Pi	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 5-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 5	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level -5-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level -4	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 60-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 60	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 61 Mech Cooling To	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 61 Mech Co	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 61 Mezz. Elev mach	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 61 FSAE Ele	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 61 ROOF-NO PCPA	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 61 ROOF	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 61-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 61	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 6-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 6	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 7-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 7	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
Level 8-NO PCPA CORE	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	Level 8	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction
TOP OF PARAPET-NO PC	QAQC - NO PCPA	<u>QAQC_NO_PCBA</u>	Coordination	Floor Plan	TOP OF PARAPET	Floor Plan	Floor Plan	Floor Plan: Floor Pl		Show New	Architectural	New Construction

- Schedule the views and show the categories to help you sort out the content
- View name, group, discipline, level, view type, phase filter, etc
- Some categories like view filter and element ID are hidden but exports to spreadsheets can report those fields

TROUBLE SHOOT



Autodesk Revit 2017

The screenshot shows the Autodesk Revit 2017 interface with the 'Messages' dialog box open. The 'Messages' tree view lists 17 warnings. A specific warning is expanded, showing detailed notes about highlighted elements, wall overlaps, and curtain wall mullions. Below the tree view are buttons for 'Show', 'More Info', and 'Delete Checked...'. A note at the bottom of the dialog box says, "To highlight an element in the graphics window, select it in this tree." Another note below that says, "Most standard view commands work without exiting this dialog." At the bottom of the dialog are buttons for 'Unjoin Elements', 'Export...', and 'Close'. To the left of the main window, a smaller 'Warning Dialog' is visible, containing a message about elements being invisible in a specific view and instructions to check parameters and visibility settings.

Autodesk Revit 2017

Messages

- 17 Warnings (may be ignored)
 - Highlighted elements are joined but do not intersect.
 - Warning 1**
 - Highlighted walls overlap. One of them may be ignored when Revit finds room boundaries. Use Cut Geometry to embed one wall within the other.
 - Warning 2
 - A Comer Mullion has been placed at the end of a Curtain Wall that is not joined to another Curtain Wall. The angle of the Comer Mullion will default to 90 degrees.
 - Warning 3
 - Warning 4
 - Warning 5
 - Warning 6
 - Some columns in the project are excluded from the graphical column

Show More Info Delete Checked...

To highlight an element in the graphics window, select it in this tree.

Most standard view commands work without exiting this dialog.

Unjoin Elements Export... Close

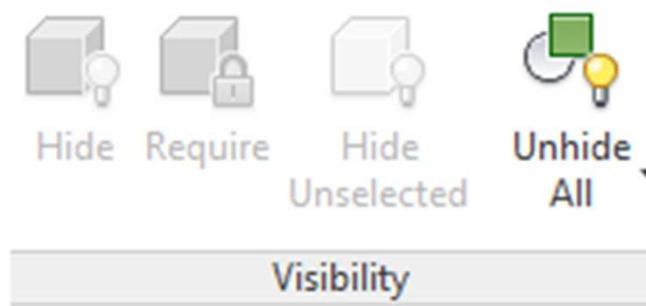
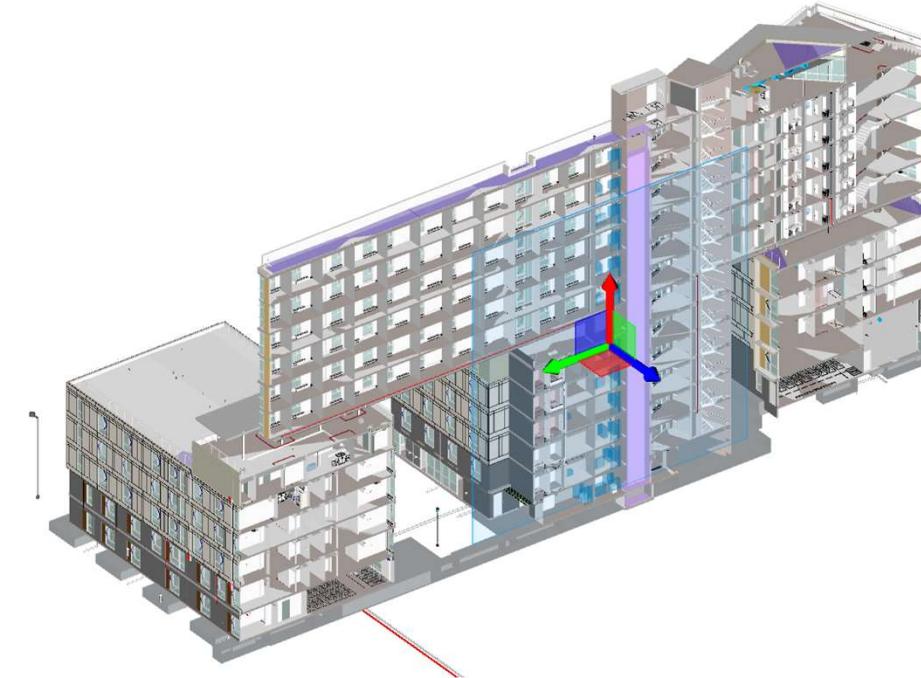
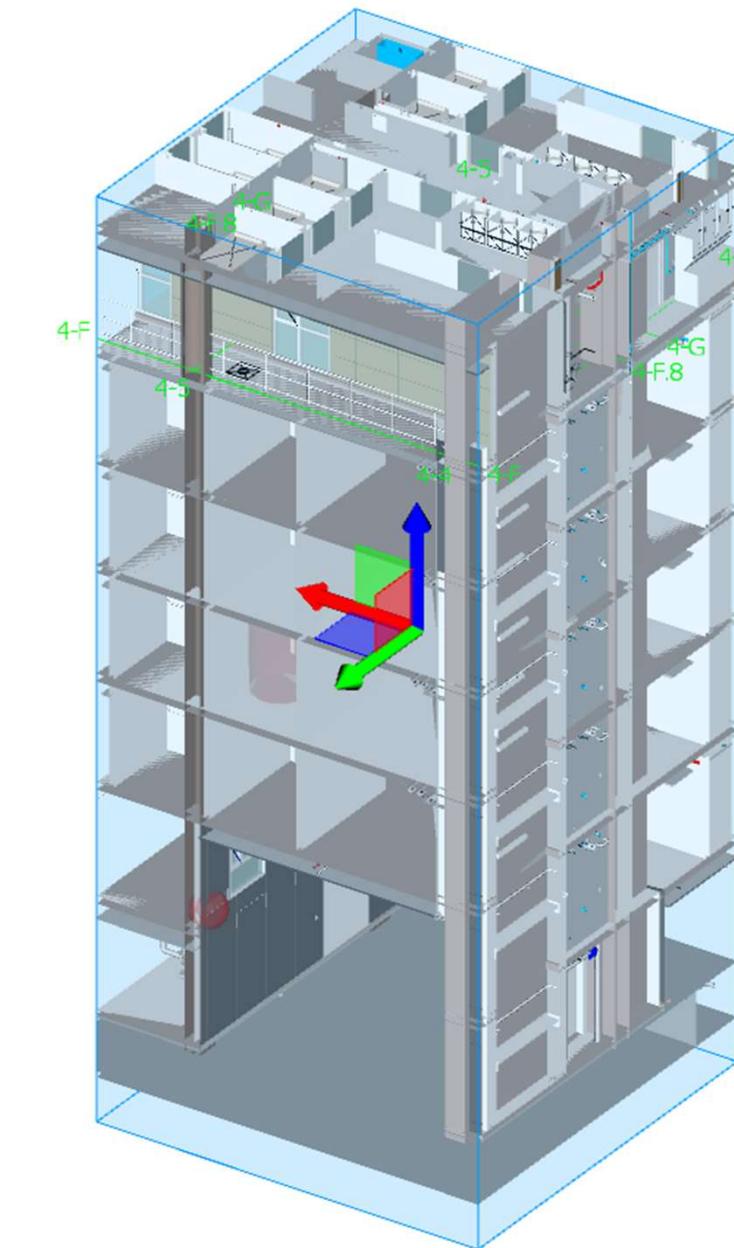
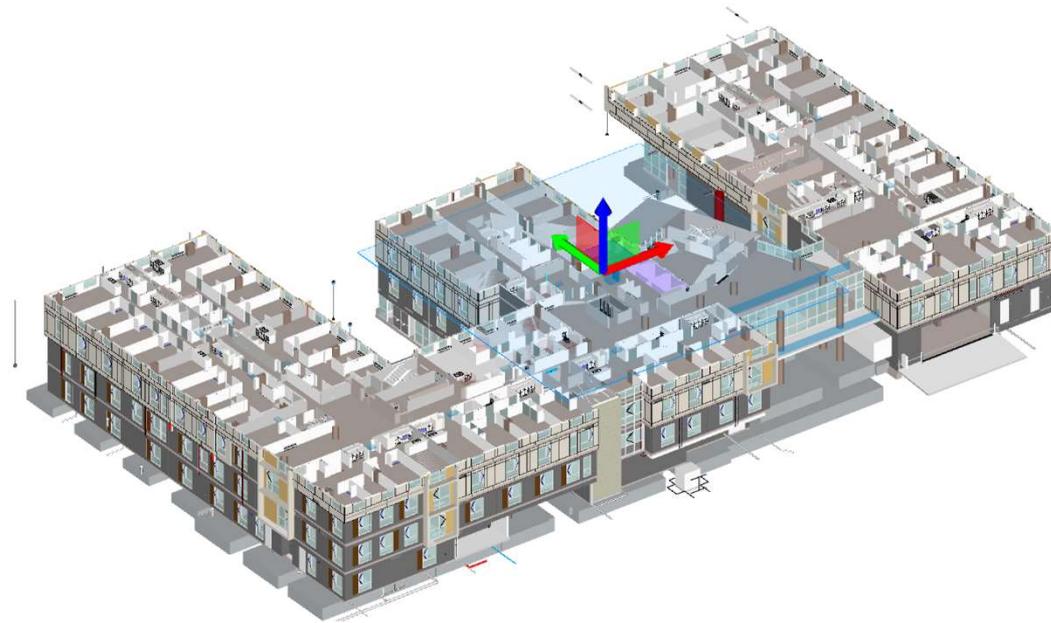
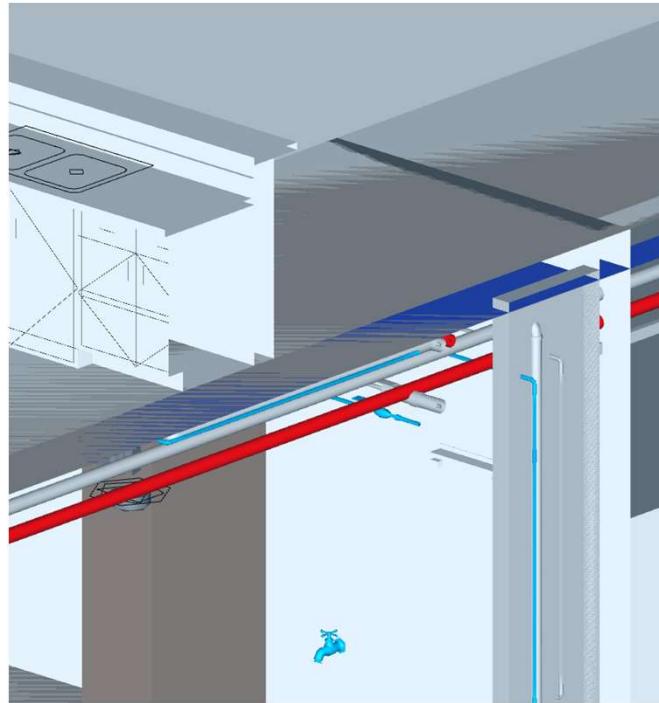
Warning Dialog

Warning

None of the created elements are visible in Floor Plan: Floor 01 View. You may want to check the active view, its Parameters, and Visibility settings, as well as any Plan Regions and their settings.

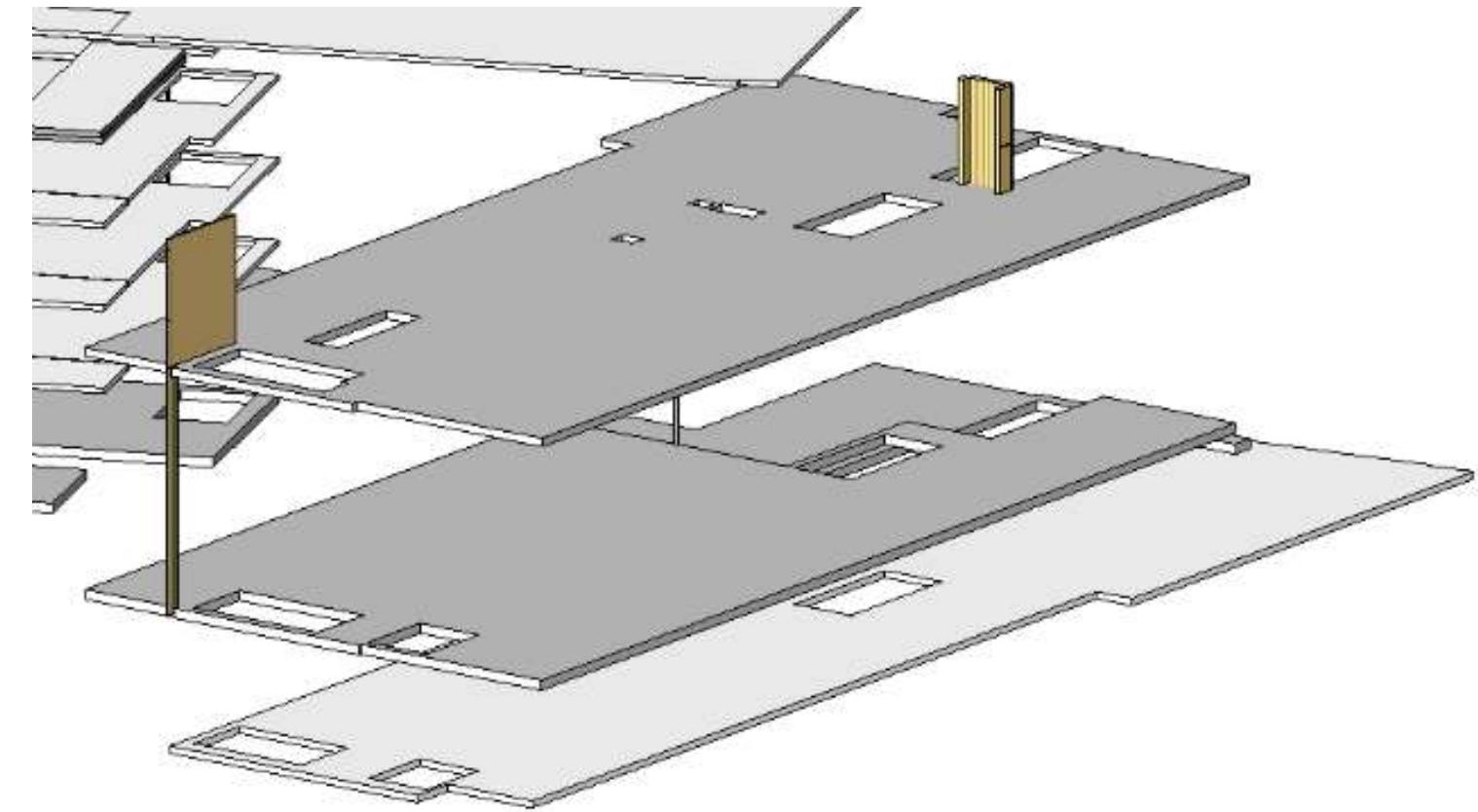
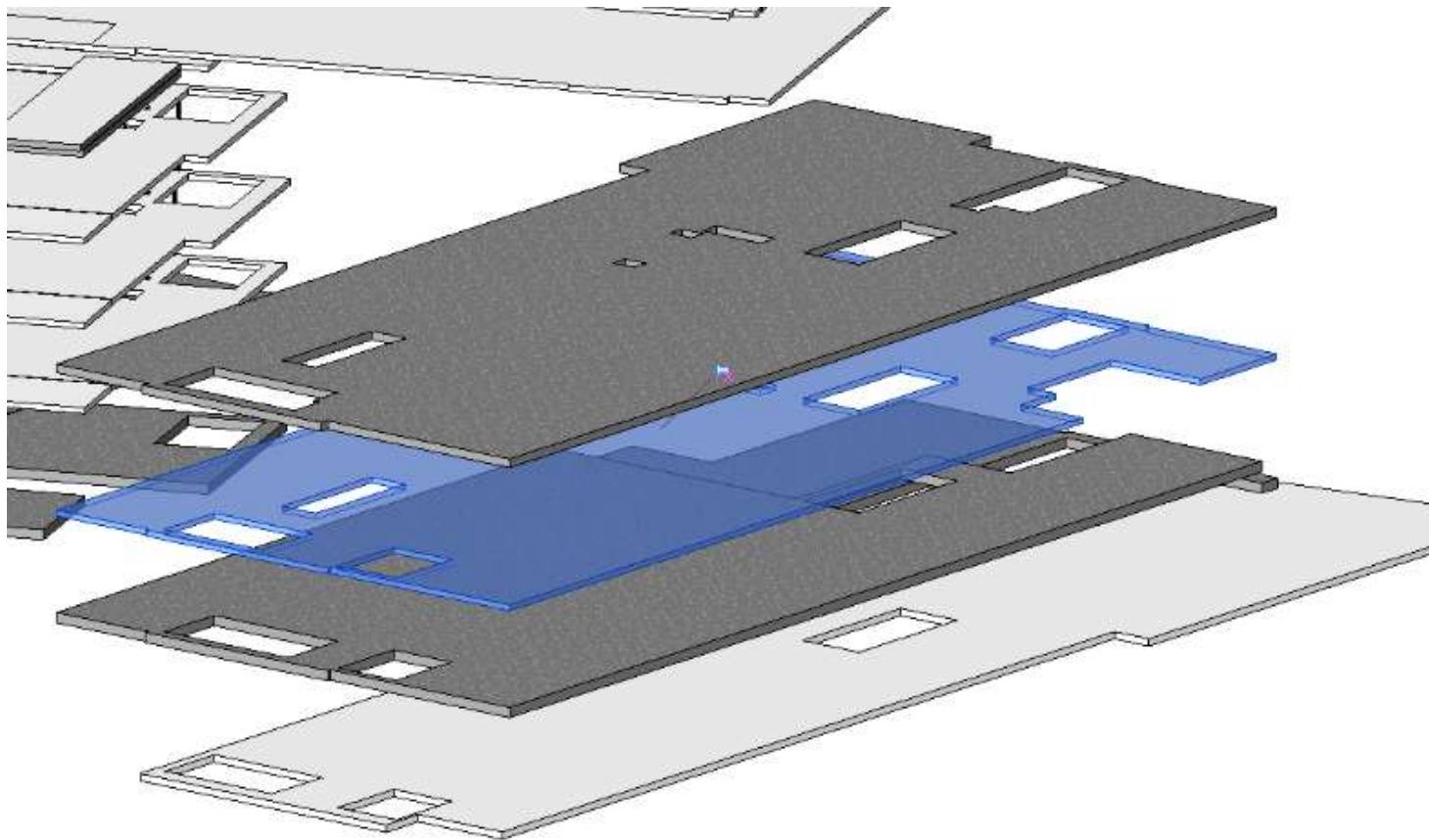
- Warning messages are a list of what could be problems in your model
- Check your warnings by category to see the specific notes as part of routine cleanup
- Keep your warnings down to the low hundreds as a rule of thumb
- Warnings pertaining to reference planes are ones that can affect view settings

TROUBLE SHOOT



- Navisworks can be a great tool for reviewing model graphics because it is much faster to load and indexes all the content for searching better than Revit (note that Navis only reads content you export from a Revit view)
- Sections and equipment review is much easier to do with large models
- Hide / Unhide tool along with Naviswork's own search system is a good way to find content

TROUBLE SHOOT

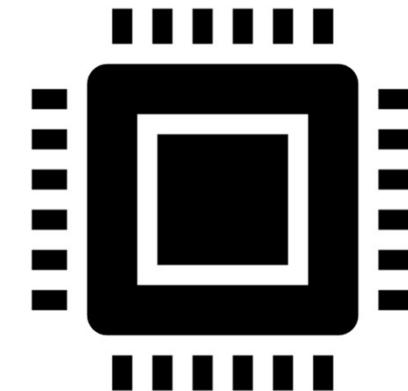
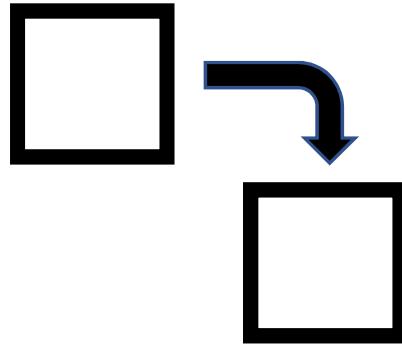


- Maybe what you're looking for has been deleted
- If you have tools to compare element IDs in Revit then you can compare archive copy to current copy to confirm if content has been deleted

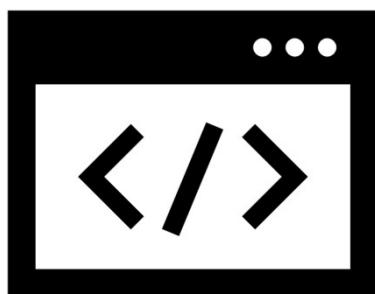
DIAGNOSTICS



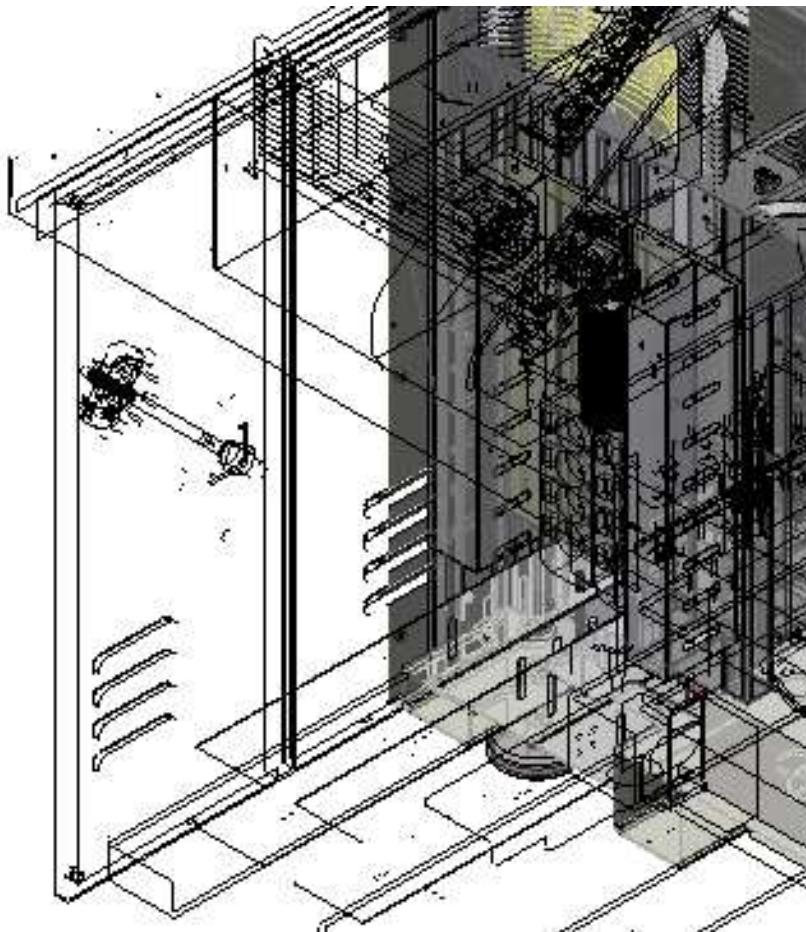
- Detach a model copy - Take it apart
- Hardware - Graphics Card, RAM, CPU, Battery



- Software - OS, Revit upgrade, Drivers
- Backend - Synchronize issues, server, cloud, internet



HARDWARE



- GPU in Revit – Renders images as you zoom and pan in views
 - Faster GPU clock speed helps with rendering shadows
 - Multi-monitor displays make use of the graphics cards features
 - Revit is not a PC game and won't use a lot of texture mapping so GRAM can be lower
- CPU in Revit – Managing all elements of the Revit database, look for faster clock speeds
 - Rendering in Revit done with CPU
- RAM – Loads all your content in memory, more memory is preferred
- Storage media – faster the better, SSD > HDD

- Note that sometimes your hardware and software can make a difference
- Usually the last place to troubleshoot but can affect your model
- Work with your SysAdmin and Equipment experts to get ahead of issues with computers

HARDWARE - GRAPHICS CARDS



2. * For which product(s) or suite
 * Product(s) (3 maximum)
 Autodesk MayaLT
 Autodesk Motionbuilder
 Autodesk Mudbox
 Autodesk Navisworks
Autodesk Revit

Or a Design Suite
 Select one

Suite Edition

* Product or Suite Release
 2017

3. * For which operating system and manufacturer?
 Operating System
Windows 10 64-bit
 Graphics Card Manufacturer
NVIDIA

Which results would you like to see? Recommended Certified All

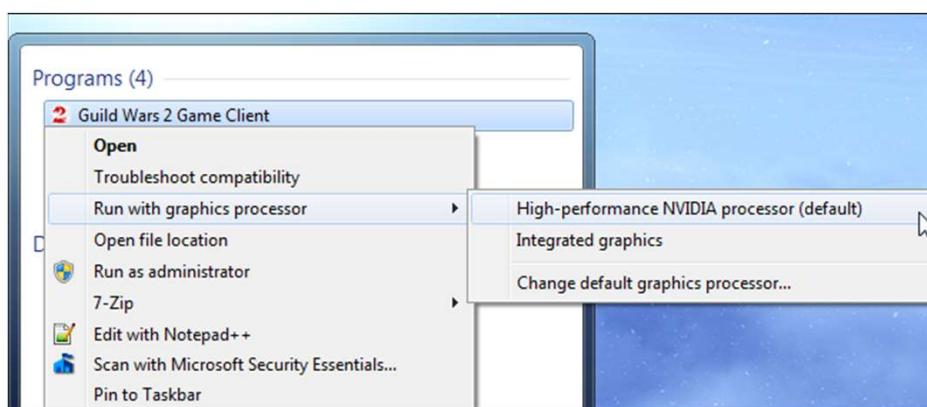
Find

The hardware below meets the criteria you provided. Select a Card for detailed information.

Selected Product(s): Autodesk Revit 2017
 Operating System: Windows 10 64-bit
 Graphics Card Manufacturer: NVIDIA

Refine Search

Rating	Card	Generation	Memory (MB)	Type	Manufacturer
★ 🌟	NVIDIA Quadro M2200	Maxwell	4096	Mobile	NVIDIA
★ 🌟	NVIDIA Quadro M620	Maxwell	2048	Workstation	NVIDIA
★ 🌟	NVIDIA Quadro P2000	Pascal	5120	Workstation	NVIDIA
★ 🌟	NVIDIA Quadro P4000	Pascal	8192	Workstation	NVIDIA
★ 🌟	NVIDIA Quadro P5000	Pascal	16384	Workstation	NVIDIA
★ 🌟	NVIDIA Quadro P6000	Pascal	24576	Workstation	NVIDIA



General
 User Interface
Graphics
 File Locations
 Rendering
 Check Spelling
 SteeringWheels
 ViewCube
 Macros

Warnings
Older video card driver
 The installed video card driver is older than those certified by Revit.
 Card: NVIDIA Quadro K4100M; current driver: 9.18.13.3221
 Certified drivers: 9.18.13.3356
 You may continue to use Hardware Acceleration.
 If you experience graphics display issues, you should:
 - Turn off Hardware Acceleration; or
 - Install driver that is recommended for use with Revit

[Get information on supported hardware](#)

Graphics Mode

Use Hardware Acceleration (Direct3D®)
 Draw visible elements only
 Allow navigation during redraw (reopening models is required)
 Smooth lines with anti-aliasing
 Allow control for each view in the Graphic Display Options dialog
 Use for all views (control for each view is disabled)

- Make sure your Graphics card is certified with Autodesk products -
<https://knowledge.autodesk.com/certified-graphics-hardware>
- Try running with graphics processor set to high performance from shell menu
- Some items may not render correctly without Hardware acceleration on

HARDWARE - REVIEW



Resource Management

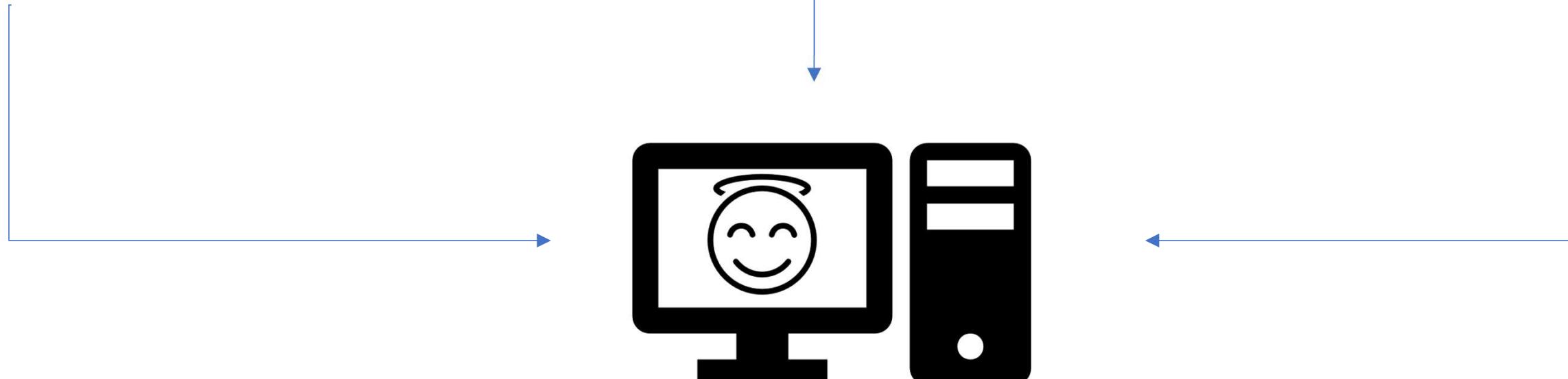
Check your task manager
Too many programs hold up CPU and
RAM resources

Have software up to date

Drivers
Revit Patches
OS updates

Hardware control

Keep your Storage media with enough
free space to avoid problems
Power settings - Laptops may be on
reduced power mode which slows CPU
performance



RESOURCE – HEAT MAP



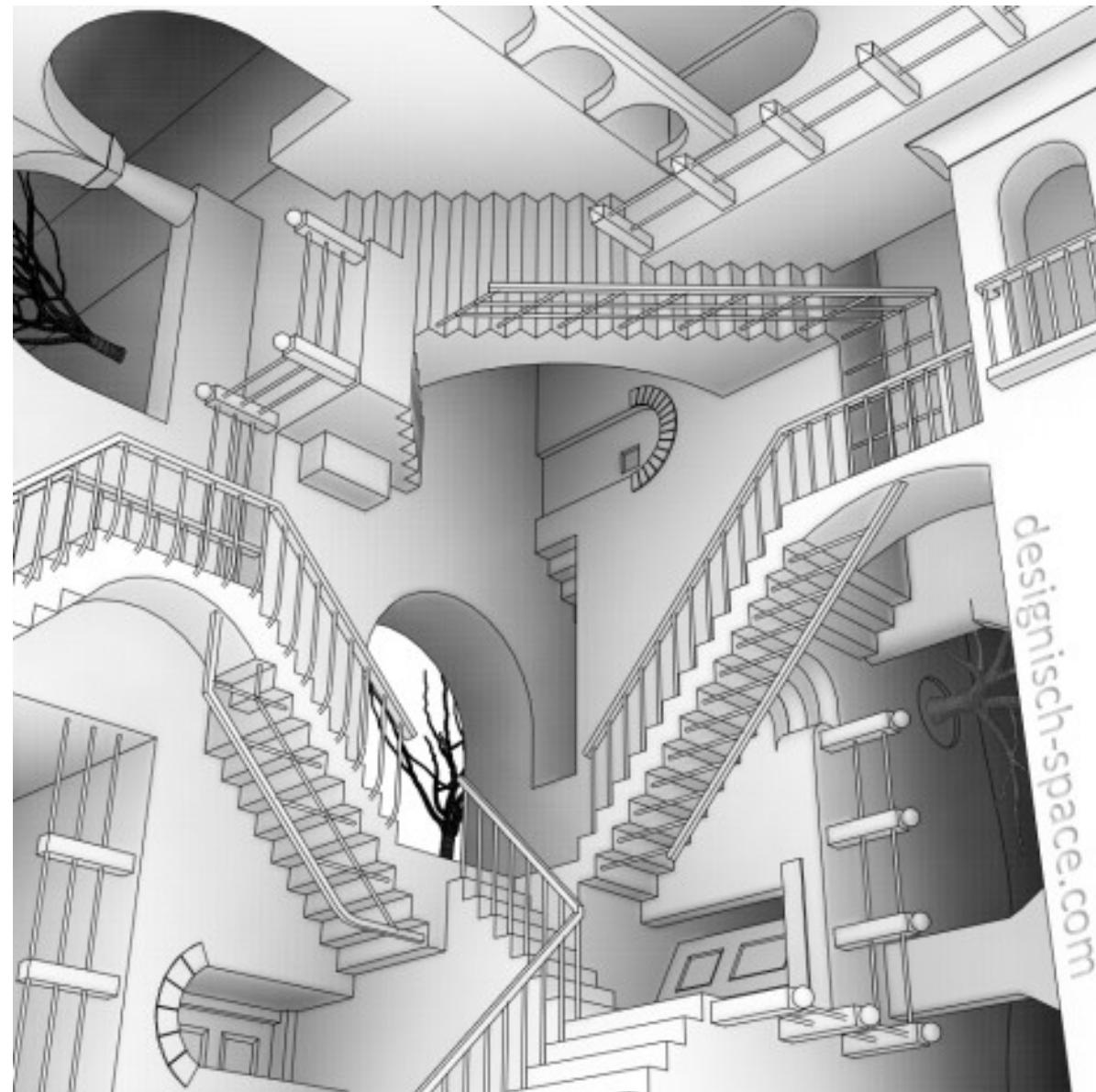
REVIT VISIBILITY MATRIX

The higher the number the greater the correlation between the element you are trying to find and the setting to use

	0	1	2	3	4	5
--	---	---	---	---	---	---

	PLAN VIEWS	3D VIEWS	SINGLE ELEMENT	MULTIPLE ELEMENTS	ANNOTATIONS	LINKS
MODEL SETTINGS	1	1	2	3	4	5
Worksets	1	2	1	4	1	5
Design Options	1	2	2	3	2	1
VIEW PROPERTY						
View Range	4	1	1	3	1	2
Crop Region	4	1	2	3	1	2
Annotation Crop	4	1	1	1	5	1
Depth Clip	4	1	2	3	1	2
Scope Box	3	3	1	1	2	2
VISIBILITY GRAPHICS						
Linework	1	1	2	1	2	1
Display Options	2	2	1	2	1	2
View Filters	3	2	2	4	5	3
Phase Filters	3	1	3	4	2	1
VG overrides	4	4	2	5	4	4
Object Styles	1	1	1	1	2	1
FAMILY MODEL						
Level of Detail	2	1	2	3	2	1
Visible in (X) View	1	1	3	3	1	1
Yes / No parameter	1	2	3	4	2	1
OTHER						
Image Links	2	2	4	2	3	2
Hidden object	2	2	4	2	3	2
SOFTWARE						
Revit Update	2	2	1	1	1	1
OS Update	2	2	1	1	1	1
Driver Update	2	2	2	2	1	3
3rd Party tool update	1	1	1	2	1	2
HARDWARE						
Slow CPU	1	3	1	2	1	3
Not enough RAM	1	3	1	2	1	3
Graphics Card not compatible	2	3	1	2	1	2
Monitor problem	2	2	1	1	1	1

TROUBLE SHOOT



- Is that even possible?
- Some things you just can't do within Revit
- Consider your choices as a cost benefit analysis of achieving desirable results with reasonable input
- Use photoshop or Render plugins to create your visualizations as a last resort

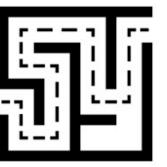


OTHER ISSUES

- No standard templates
- Users Aren't communicating what is edited
- New content is added to the model
- Changes and methods aren't known
- Start with the settings that will most likely affect visibility controls
- Worksets loaded or hidden in the collaborate menu
- Linked models loaded or correctly linked
- VG overrides
- Filters hiding content
- View Range and depth clipping
- Crop and Annotation Crop
- Create a copy of the problem view and edit it
- Create a new version of a preset view like a floor plan and compare to the problem view
- Start Every project with the same template
- Have regular call ins to talk about changes
- One point of contact to add new content to each project model
- Create a project resource like onenote or slack to document information for anyone to see
- Remember that worksets can manage what Revit loads
- If the model is becoming too large then consider splitting into several models
- Don't use large complex families if you don't need them
 - If you are using BIM 360 cloud then make sure your internet connection is fast enough

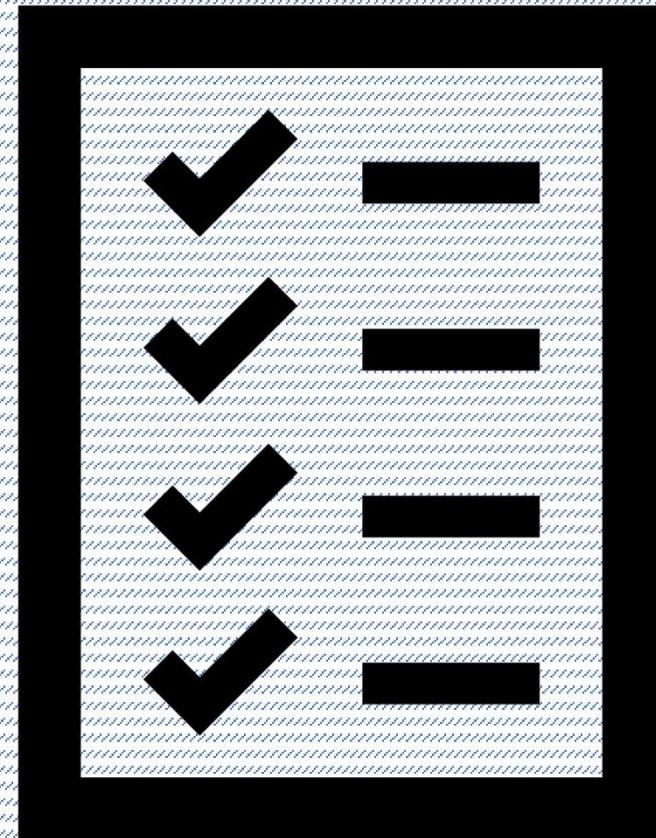
A graphic featuring a large white arrow pointing left, with the text "To Be Continued" written in a hand-drawn style across the arrow, and a small icon of two vertical bars at the end of the arrow.

SUMMARY



- Have a clear concise template
- Keep your company standards up to date
- Create your own checklist for every project

TEMPLATES



TEMPLATES



Now it can be revealed...
the jealously guarded secrets of how to draw

Let's start with
Homer's Head
and work our way down from there.

As you can see from the rough construction lines on this drawing, Homer's skull is ball-shaped, but his overall head is sort of like a giant thumb. Once you've drawn that basic shape, you can add all the other details one by one, and Homer's head will begin to take shape, as if by magic!



HOMER

But first, a few ground rules for drawing in the patented Matt Groening style.

Notice!

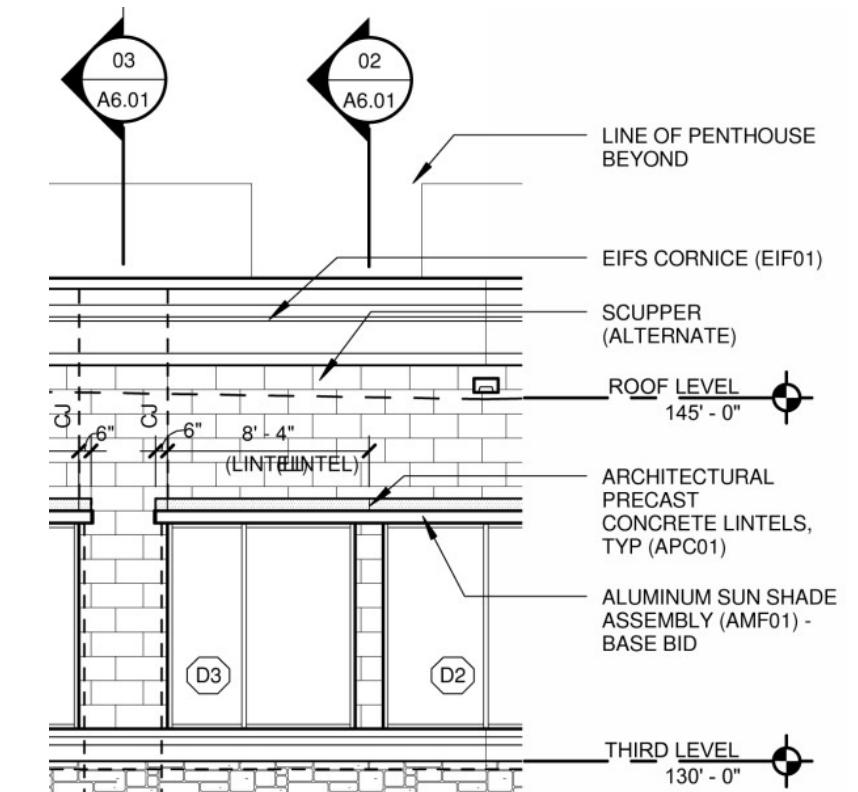
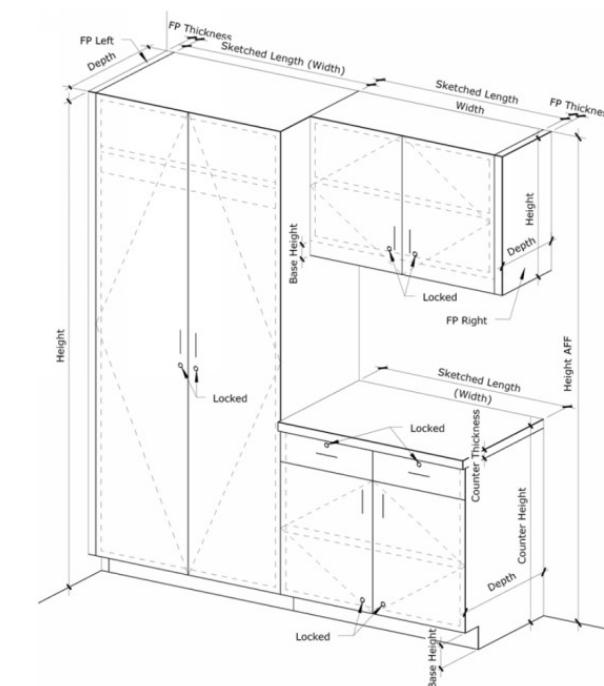
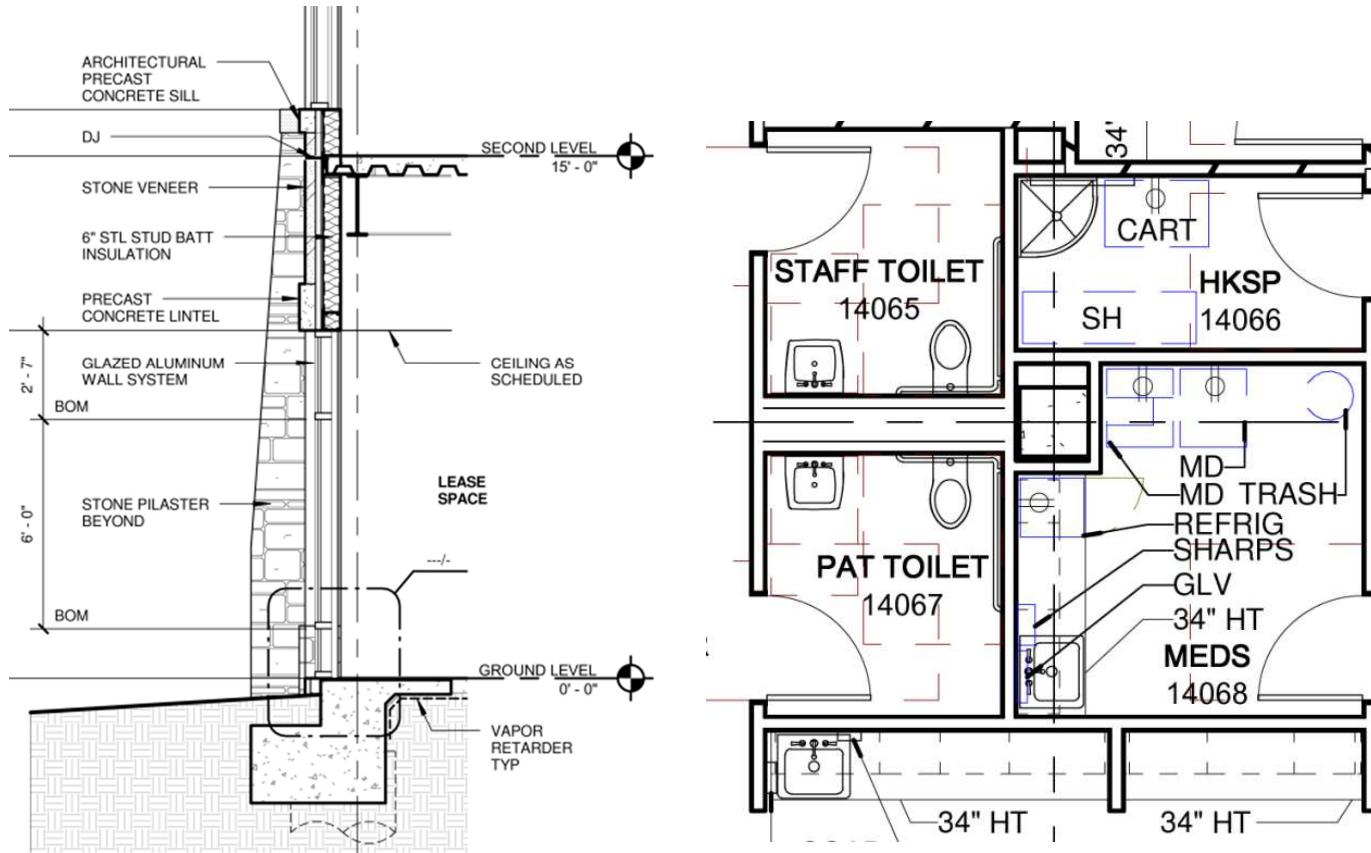
Big, bulgy eyeballs are a must!
Shapes and sizes may vary,
depending on the design
of the individual character,
but always keep 'em bulgy!

Observe!
Matt's characters
ALWAYS have an overbite!

Behold!
Less is indeed more!
Keep it simple with as few
lines as possible!

- Clearly detail what each project should have as standard requirements

TEMPLATES



DETAIL COMPONENTS

08_OPN_PS_HM Door Frame.rfa

1 2 3

Example: LT_FB_Downlight.rfa

Light
Hosting

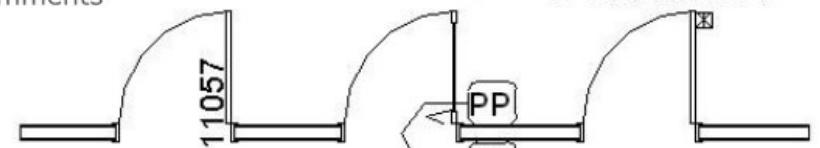
EXISTING ITEMS TO REMAIN

ITEMS TO BE DEMOLISHED

NEW CONSTRUCTION

HKS DOOR TAG-DD

Description	→ FLUSH
Size	→ 3' - 0" X 7' - 0"
Power Operator	→ PO: No
Hold Open	→ HO: Yes
Comments	→ 6" UNDER CUT



- Projects should be based on a Style Guide, line weights and references to graphic guides
- A project Template must have View organization, parameters and families for the company
- Create a 'reset view' template for each project following the guide

TEMPLATES



DRAWING SYMBOLS

Symbol	Identification	HKS Content Name
ROOM NAME XXXXX	Room (Name/Number)	F HKS Room Tag T Room Tag
	Existing Column Centerline	F HKS Grid Head T Existing Construction
	Column Centerline	F HKS Grid Head T New Construction
	Accessory	F HKS Accessory Tag T Type
	Demolition Numbered Notes	F HKS_Demo Note
	Building Wall Section	S Section Tag T Section Head—Filled Section Tail—Filled
	Section Detail	S Section Tag T Section Head—No Fill No Tail
	Interior Section	S Section Tag T Interior Section Tag
	Elevation	S Elevation Tag T HKS Elevation Tag
	Dummy Section Detail	S Elevation Tag T HKS Interior Section
	Plan, Blow-Up Detail	S Callout Tag T HKS Callout

	1 Hour Fire Wall	S Material Type T -Rating - Fire (1 hr) (Wall Type with suffix—Fire (1-hr))
	2 Hour Fire Wall	S Material Type T -Rating - Fire (2 hr) (Wall Type with suffix—Fire (2-hr))
	3 Hour Fire Wall	S Material Type T -Rating - Fire (3 hr) (Wall Type with suffix—Fire (3-hr))
	4 Hour Fire Wall	S Material Type T -Rating - Fire (4 hr) (Wall Type with suffix—Fire (3-hr))
	Non-Rated Smoke Wall	S Material Type T -Rating - Smoke (0 hr) (Wall Type with suffix—Smoke (0-hr))
	1 Hour Smoke Wall	S Material Type T -Rating - Smoke and Fire(1 hr) (Wall Type with suffix—Fire and Smoke (1-hr))
	2 Hour Smoke Wall	S Material Type T -Rating - Smoke and Fire(2 hr) (Wall Type with suffix—Fire and Smoke (2-hr))
	1 Hour Shaft Wall	S Material Type T -Rating - Shaft (1 hr) (Wall Type with suffix—Shaft (1-hr))
	2 Hour Shaft Wall	S Material Type T -Rating - Shaft (2 hr) (Wall Type with suffix—Shaft (2-hr))

PEN MAP—1/8" = 1'-0" THRU 1/16" = 1'-0"

AUTOCAD |

PEN 1 (8 dark gray) = .150mm		PEN 01 = .0025"
PEN 17 (17) = .100mm		PEN 02 = .0055"
PEN 2 (9 light gray) = .254mm		PEN 03 = .0090"
PEN 3 (7 white) = .380mm		PEN 04 = .0135"
PEN 4 (2 yellow) = .510mm		PEN 05 = .0185"
PEN 5 (30 orange) = .620mm		PEN 06 = .0250"
PEN 6 (1 red) = .780mm		PEN 07 = .0325"
PEN 16 (22 salmon) = 1.380mm		PEN 08 = .0450"

LIFE SAFETY PLAN LEGEND	
1 HR FIRE BARRIER	
1 HR FIRE / SMOKE BARRIER	
2 HR FIRE BARRIER	
2 HR FIRE / SMOKE BARRIER	
SMOKE PARTITION (NON RATED)	
NON RATED WALL	
SMOKE COMPARTMENT WALL	
HORIZONTAL EXIT WALL	
OCCUPANCY SEPARATION WALL	
FIRE DEPARTMENT CONNECTION	
FIRE EXTINGUISHER CABINET	
FIRE EXTINGUISHER	
TRAVEL DISTANCE FROM THE MOST REMOTE POINT TO THE CLOSEST EXIT	
TRAVEL DISTANCE WITHIN A SMOKE ZONE TO AN ADJACENT SMOKE ZONE	
EXIT SIGN - HATCH INDICATES EXIT TEXT AND ARROW INDICATES DIRECTION	

LIFE SAFETY PLAN LEGEND	
1 HR FIRE BARRIER	
1 HR FIRE / SMOKE BARRIER	
2 HR FIRE BARRIER	
2 HR FIRE / SMOKE BARRIER	
SMOKE PARTITION (NON RATED)	
NON RATED WALL	
SMOKE COMPARTMENT WALL	
HORIZONTAL EXIT WALL	
OCCUPANCY SEPARATION WALL	
FIRE DEPARTMENT CONNECTION	
FIRE EXTINGUISHER CABINET	
FIRE EXTINGUISHER	
TRAVEL DISTANCE FROM THE MOST REMOTE POINT TO THE CLOSEST EXIT	
TRAVEL DISTANCE WITHIN A SMOKE ZONE TO AN ADJACENT SMOKE ZONE	
EXIT SIGN - HATCH INDICATES EXIT TEXT AND ARROW INDICATES DIRECTION	

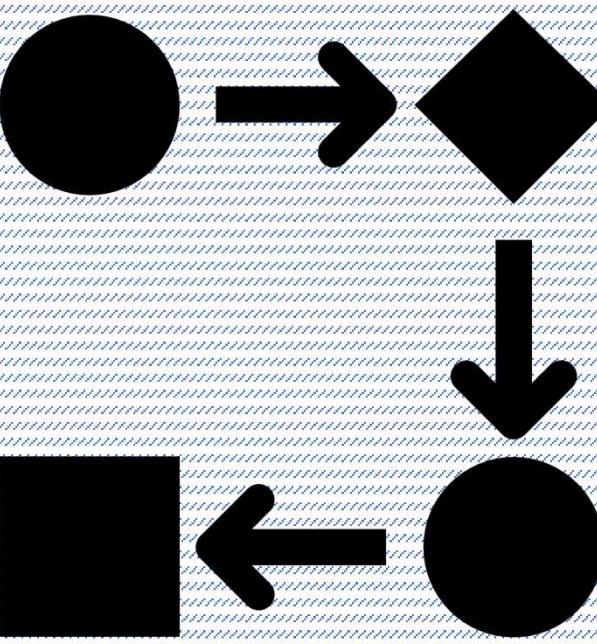
TEMPLATES



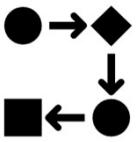
- Every project begins with a template
- Having the right information embedded within can allow a lot of control of your model

- Set your view browser organization
- Have a standard naming scheme
- Set line thickness object styles
- Set Line Styles
- Fonts and text sizes
- Project units and dimensional tolerances
- Starting view with project information and standards
- Reference a graphic standards legend view
- Identify origin
- Use view templates but keep to a minimum
- Don't overstrain view properties in the template
- Schedules for essential categories
- Essential families to be loaded
- Object Styles - Essentials of line type, patterns, etc
- Phase Settings - Patterns for graphic overrides
- Filter Settings
 - Loaded set of filters for your views
 - Standard naming
 - Standard patterns and colors
- View Properties
 - Some are best unchecked to avoid limited adaptability

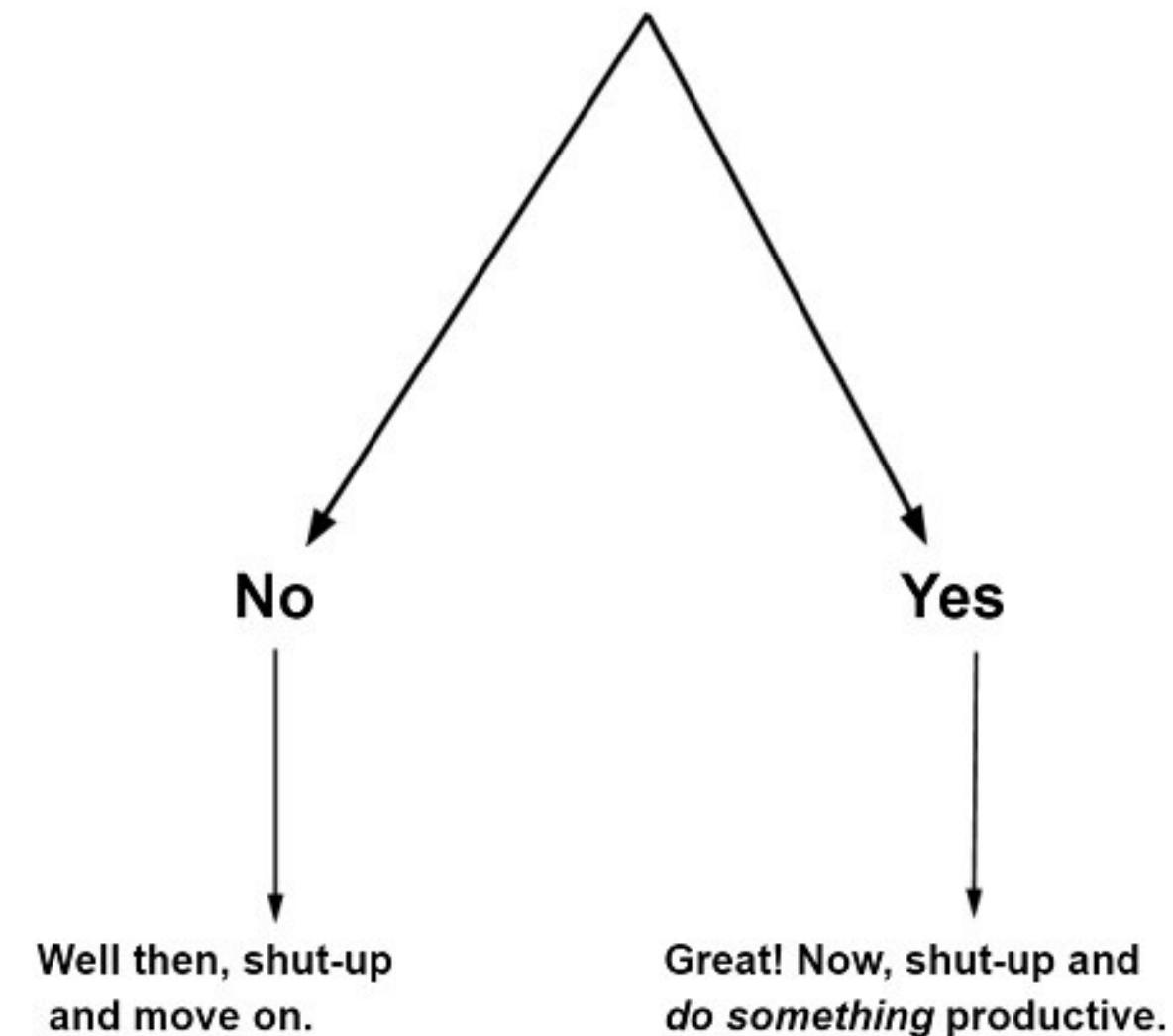
WORKFLOWS



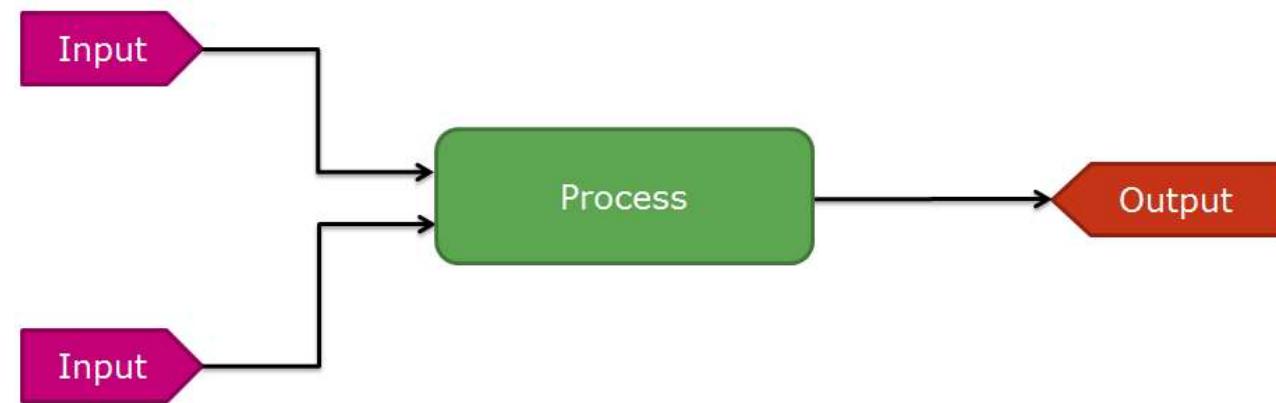
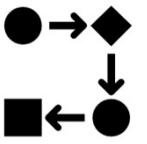
RESOURCES - FLOWCHART



**This problem/situation I'm dealing with:
Can I influence the outcome?**

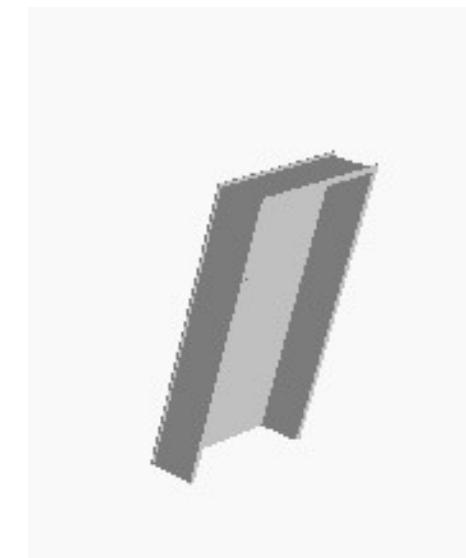
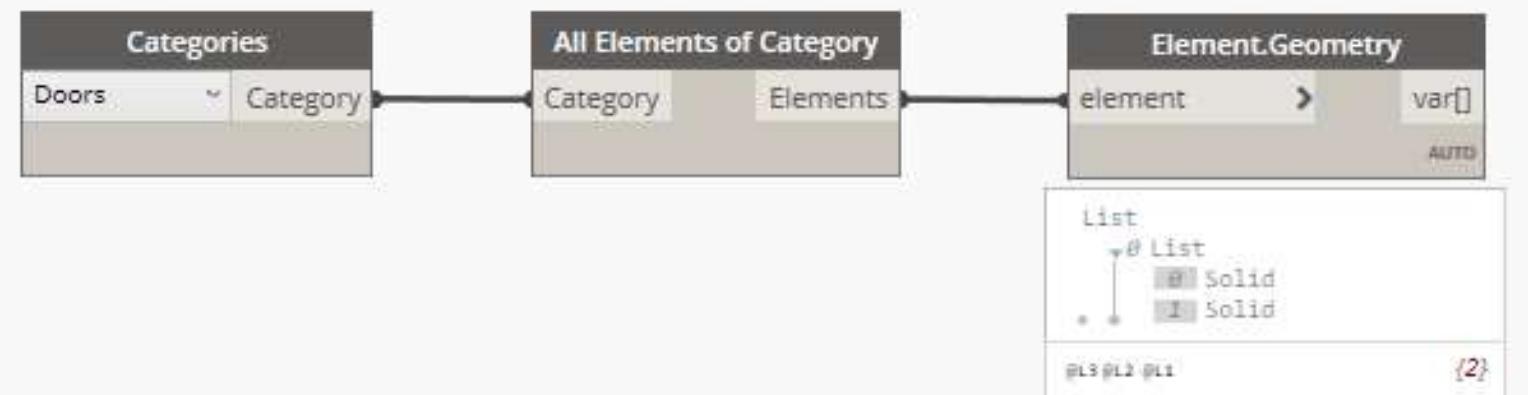
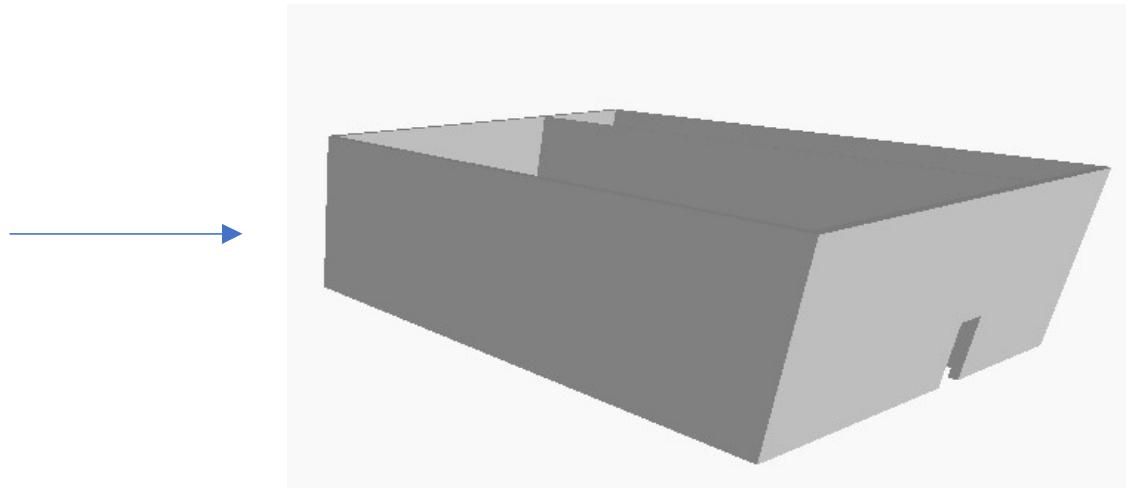
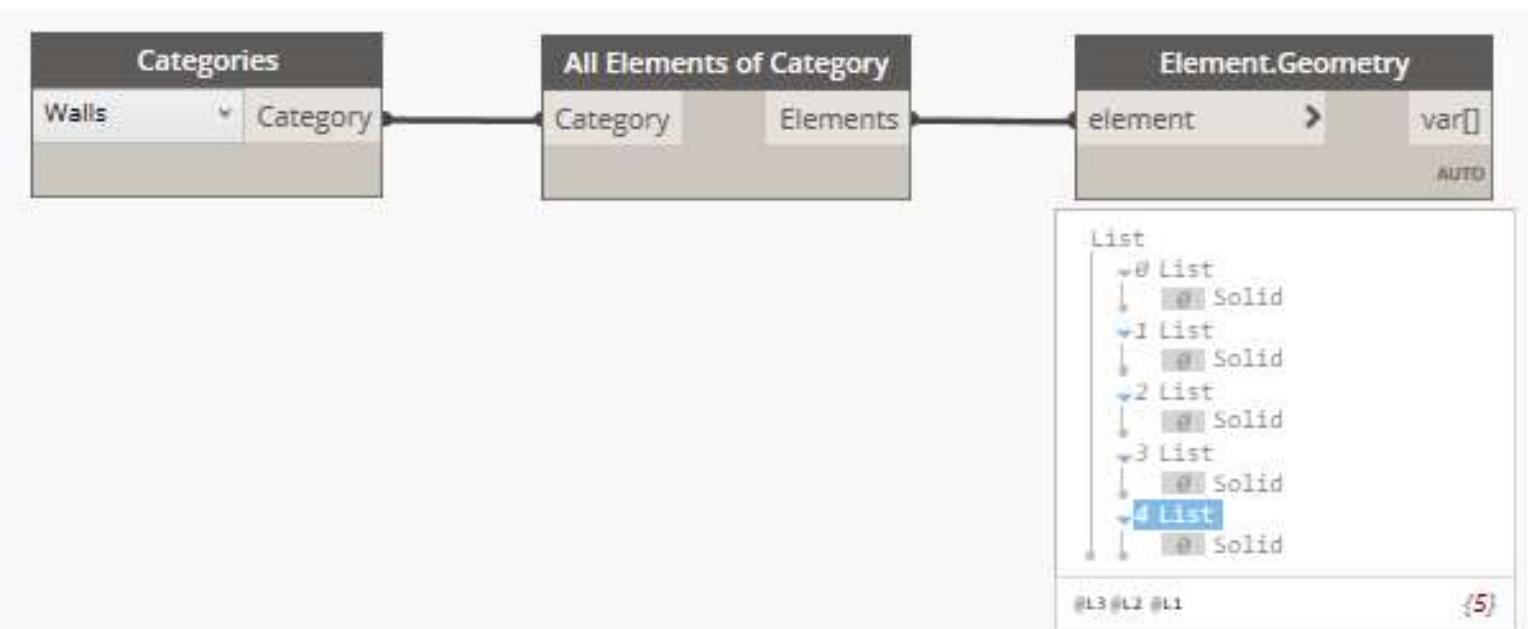
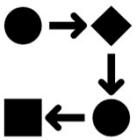


RESOURCES - FLOWCHART



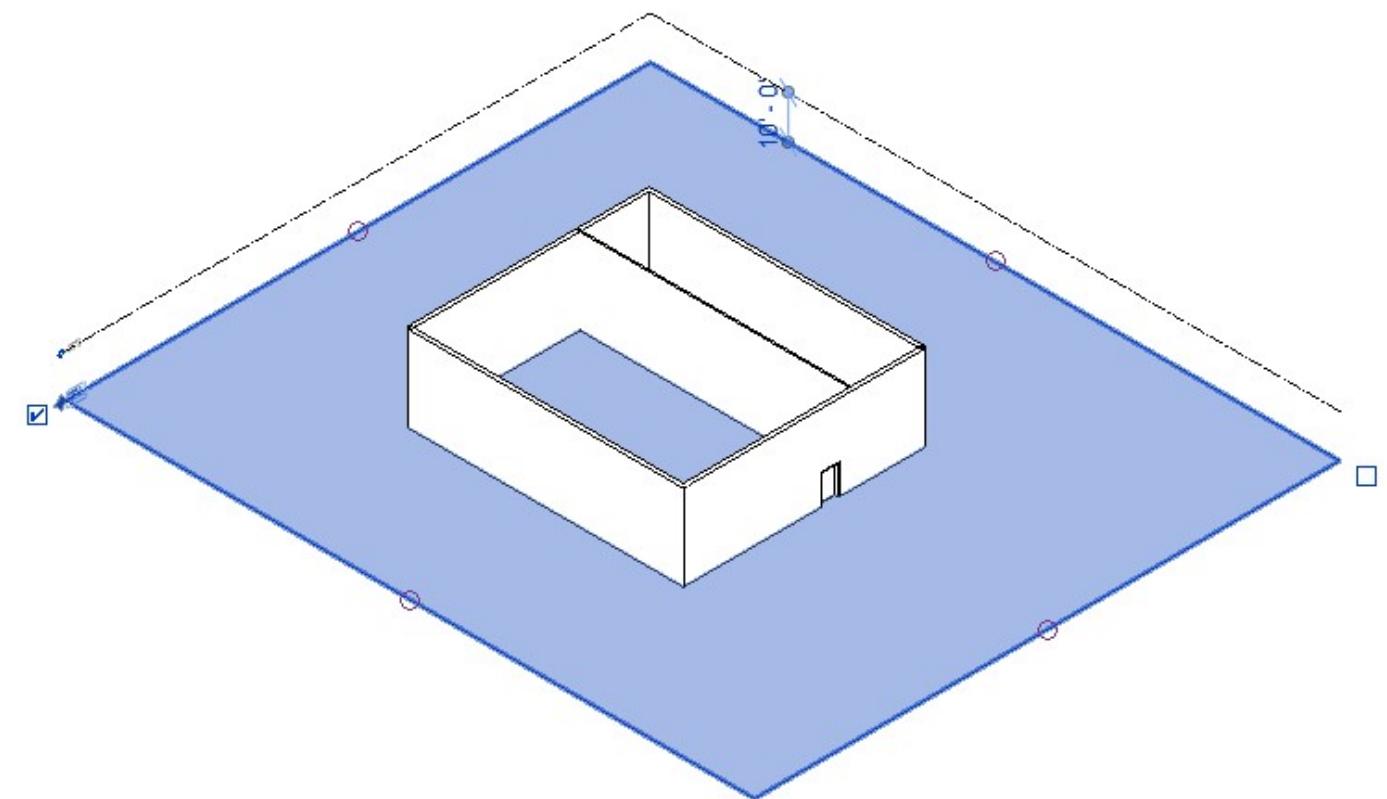
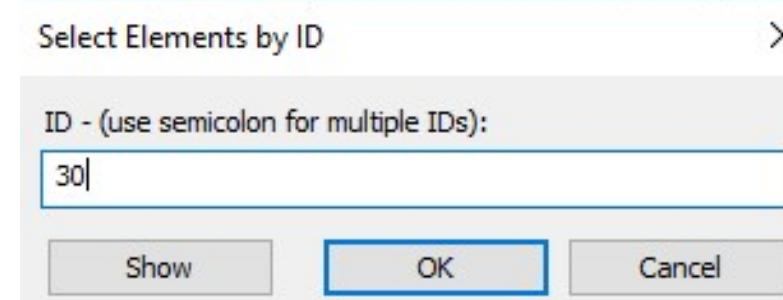
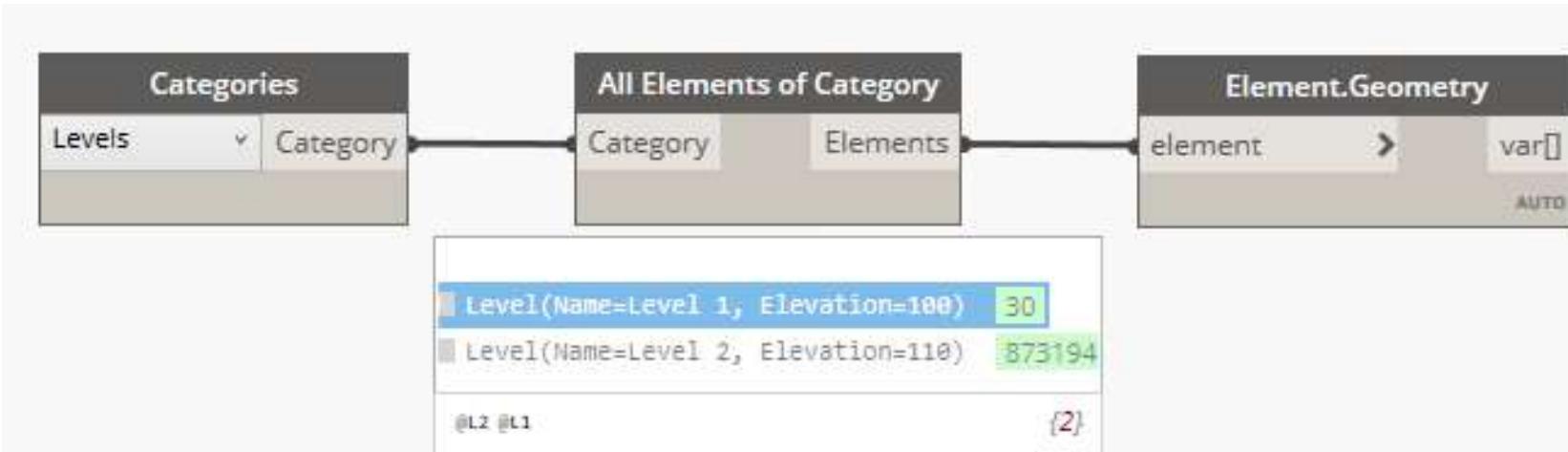
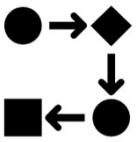
Dynamo

AUTOMATION



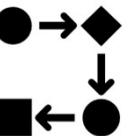
- Preview with the model with Dynamo Scripts to see Revit geometry without configuring views in Revit
- This applies to worksets or any other content in Revit that can be made into a three dimensional solid for preview

AUTOMATION



- The “All elements” node shows the element ID that can be used for finding that specific element in Revit

AUTOMATION



Element.Delete – deletes element from a model.

View.AddFilter – add View Filter to View.

View.Filters – returns all View Filters applied to a View.

View.GetByType – collects all Views by View Type like Floor Plan, Ceiling Plan, Schedule etc.

View.IsViewTemplate – returns a Boolean True/False if View is a View Template.

View.OverrideGraphicsSettings – Graphics Settings for View Filter or Category overrides.

View.RemoveFilter – removes View Filter from a View.

View.RemoveViewTemplate – removes View Template from a View.

View.SetCategoryOverrides – sets Category Override Settings for a View.

View.SetFilterOverrides – sets View Filter Override Settings for a View.

View.SetFilterVisibility – controls if a View Filter is hiding or showing filtered Elements.

View.SetViewTemplate – applies View Template to View.

View.ViewTemplate – returns a View Template applied to View or null.

ViewFilter.CreateFilter – creates a new View Filter.

ViewFilter.CreateRule – creates a new View Filter Rule.

ViewFilter.OwnerViews – returns all Views that View Filter is applied to.

Fill Patterns – lists all Fill Patterns available in a model.

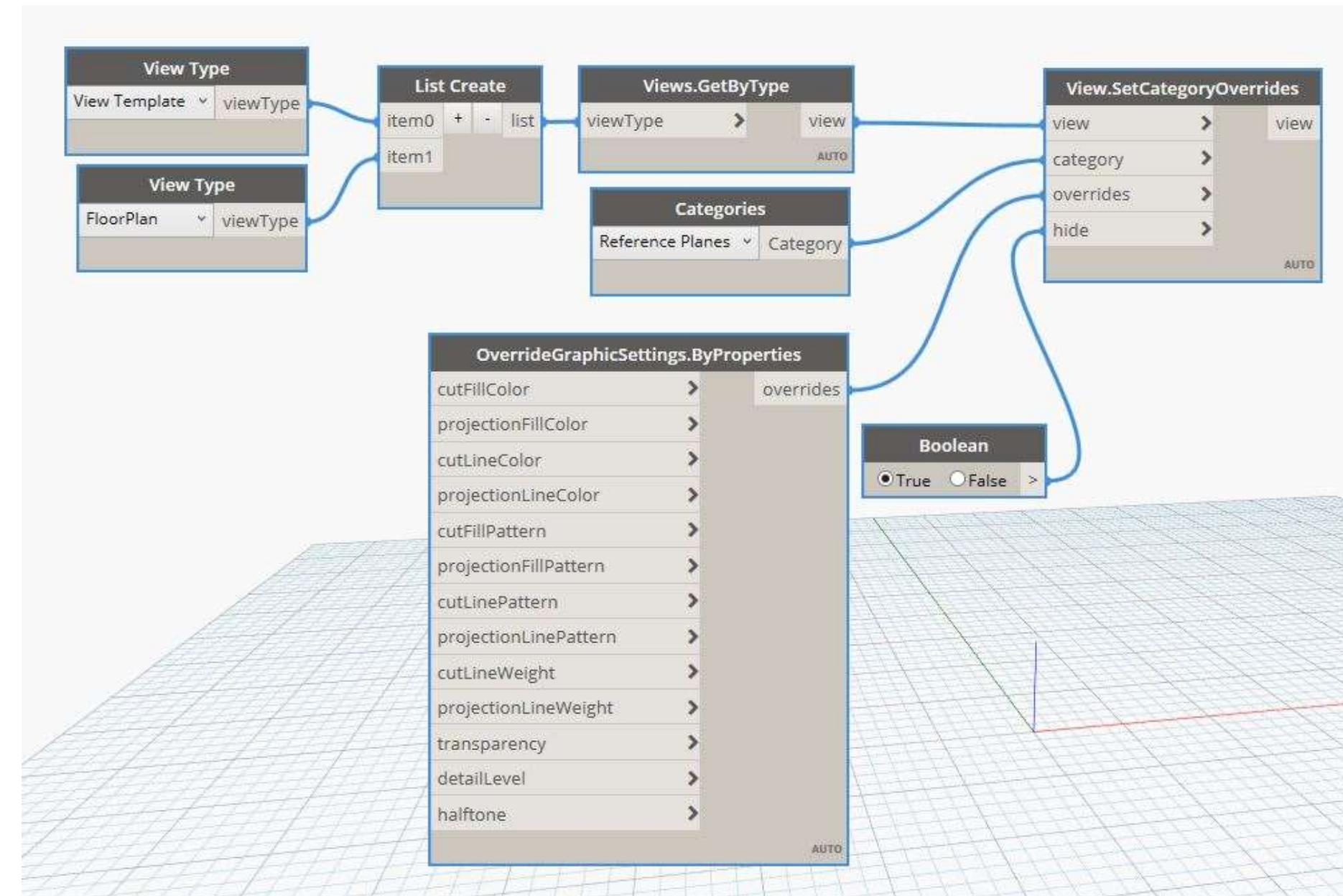
Line Patterns – lists all Line Patterns available in a model.

View Detail Level – lists all View Detail Levels available in a model.

View Type – lists all View Types available in a model.

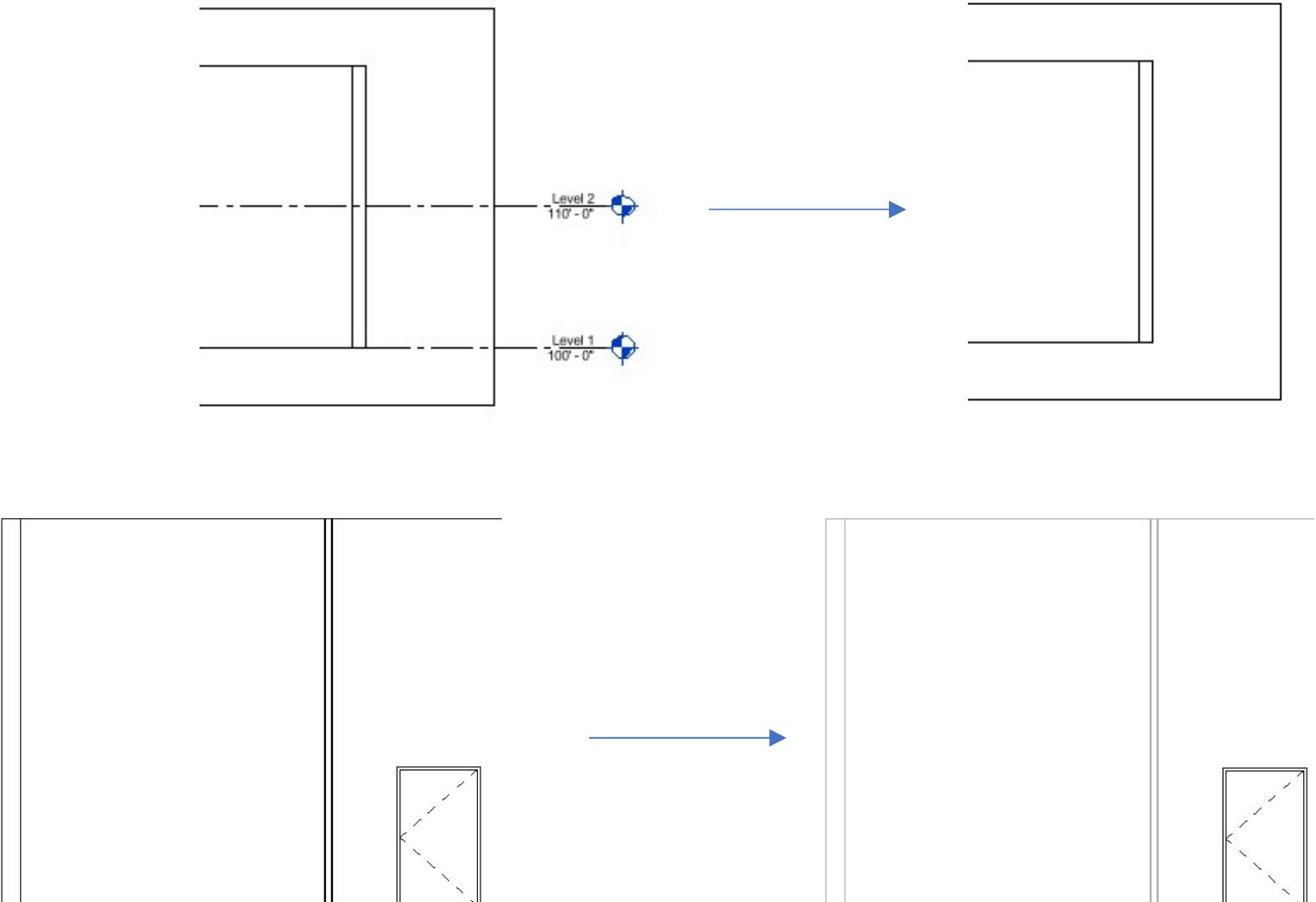
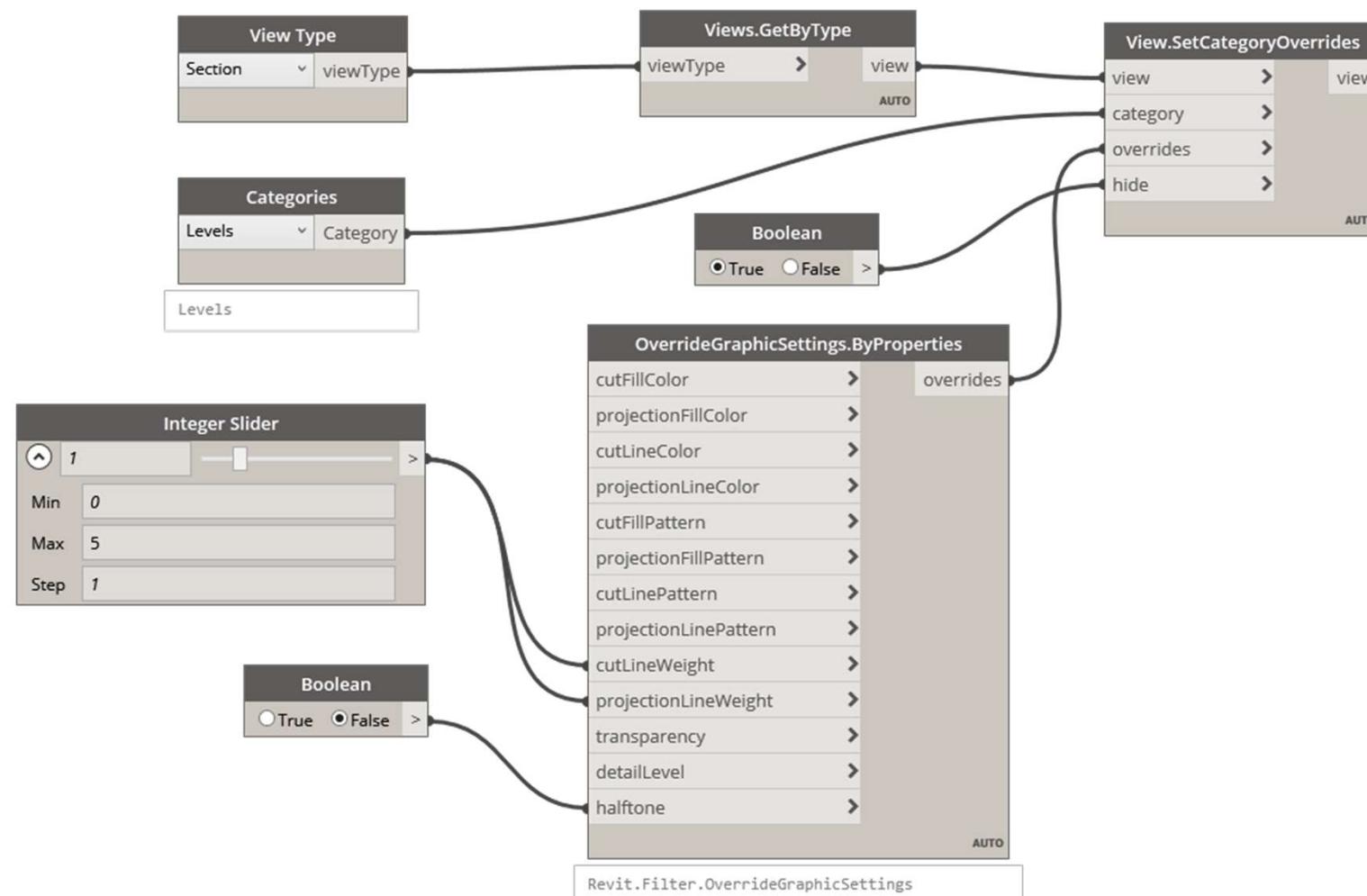
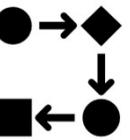
Rule Types – lists all View Filter rules available in a model.

View Templates – lists all View Templates available in a model



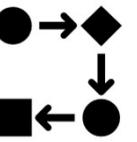
- Scripts can be used to read the model and write parameters to the project settings
- Other node packages can systematically apply view changes to a given view type

AUTOMATION



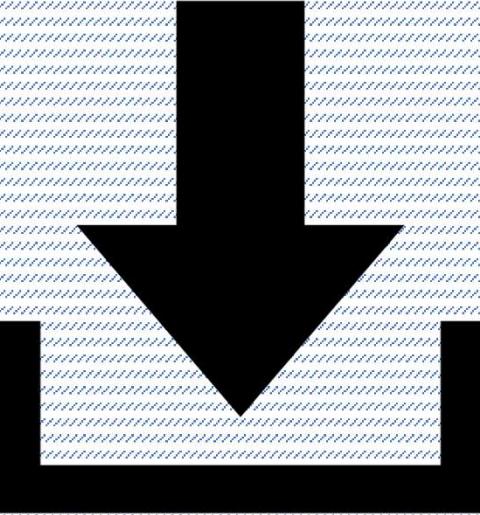
- Category can be level or wall which is then modified by Booleans (true or false values)
- View can be hidden, given halftone, lineweights modified, etc all by a single menu

SUMMARY



- With so many setting and parameters to control the more you can automate the management the better
- Create your own scripts to help you manage the model
- Build towards tools that can take away as many keystrokes as possible
- Coding is a progressive learning code so start from the low hanging fruit and build up from there

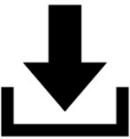
TAKEAWAYS



PUTTING IT ALL TOGETHER

- Understand how Revit Works
- Be Prepared before starting a project
- Think about your project requirements
- Start from simple options
- Automate as much as you can
- Consider alternative methods
- Document solutions and processes

BEST PRACTICES



Use a consistent naming system in your template

Start from a template that works for your projects

Use filters to control visibility and demonstrate use with your team

Don't use project settings to control visibility

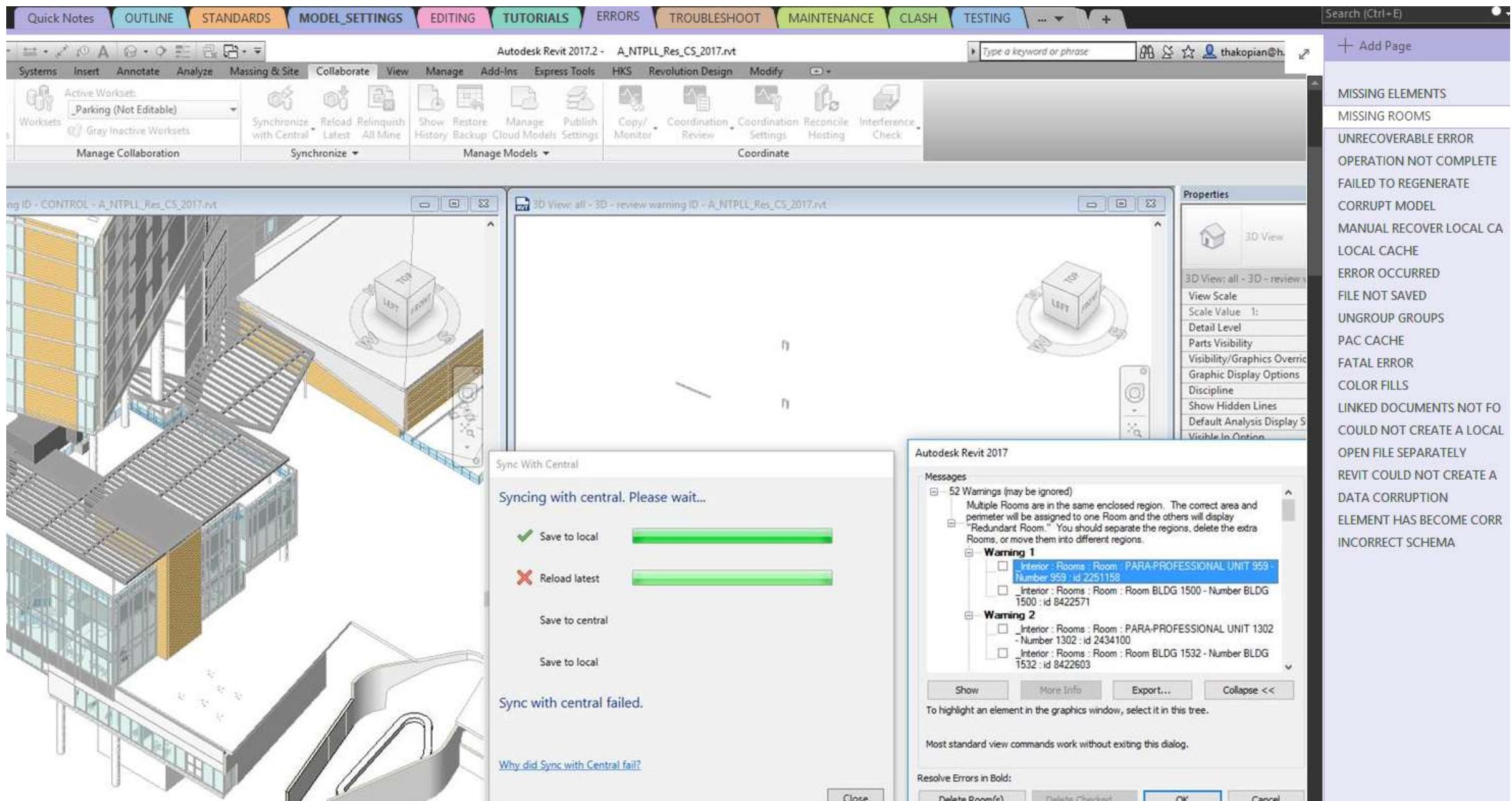
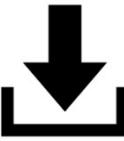
Have periodic model health checks to review warnings and settings that can be a problem

Create a troubleshoot guide for your common issues and place it on a cloud document for easy access

If there are many views to correct or the model is complex then automate with scripts and third party software – it's worth the effort by saving time and frustration

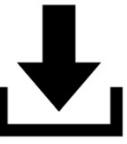
Share your solutions and notes to a cloud based document like OneNote for everyone to access

BEST PRACTICES



- Sharing is caring – create a database that can be searched and edited by all users
- The more useful information about fixing visibility problems in your projects the less time you have to research them

BEST PRACTICES



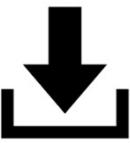
Train the users about the settings in your template and how to control the model views

Train the users

Train the users

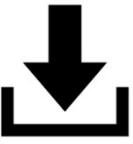
TRAIN THE &%^#\\$^ USERS

PSA



REMEMBER ONLY YOU CAN PREVENT VISIBILITY GRAPHICS PROBLEMS IN REVIT

REFERENCES



- Architect's Next Top Model - <https://prezi.com/jjsd5c-tf-lz/architects-next-topmodel-rtceur-2016/>
- Modelical - Visibility and Graphics Management - <https://www.modelical.com/en/gdocs/graphics-management/>
- Increase the Reliability of Your Revit Model with Better Modeling Habits - <https://medium.com/autodesk-university/increase-the-reliability-of-your-revit-model-with-better-modeling-habits-dc06639d2d3c>
- BIMone - <https://bimone.com/en/blog/elementvisibilityhierarchyrevit>
- Nvidia GPU Guide - <https://images.nvidia.com/content/grid/pdf/revit/vGPU-App-Guide-Revit-2016.pdf>
- Content in Revit - <https://www.synergis.com/uploads/resources/Content%20in%20Revit.pdf>
- Revit Families by Paul Aubin - <https://medium.com/autodesk-university/revit-families-a-step-by-step-introduction-9439f9638062>
- What Controls Revit Visibility by Paul Aubin - <https://learning.linkedin.com/blog/design-tips/what-controls-revit-visibility--five-things-to-look-for->
- Autodesk knowledge network - <https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/CloudHelp/cloudhelp/2016/ENU/Revit-DocumentPresent/files/GUID-A2FC119B-51D7-4C2E-84ED-CD51983EC532.htm.html>
- View Filters Guide - <https://revitpure.com/blog/6-tips-to-master-revit-filters>

REMINDER

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2. Select this Session (3.1)
3. Select Session Rating



REMINDER

**Session materials are available on the
Conference App**

Sessions

Speakers



Visit me at the Speaker Lounge

I will be at the **Speaker Lounge** outside the Exhibition Hall for further conversations. Please join me there at this time:

(July 20, 2019 @10:15 AM)



Questions?

Visibility Graphics:
Winning the Game of Hide and Seek with Revit
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Linkedin: <https://www.linkedin.com/in/thakopian/>
Github: <https://github.com/thakopian>*

