

Modeling Complex Railings and Balusters in Revit

AS500129

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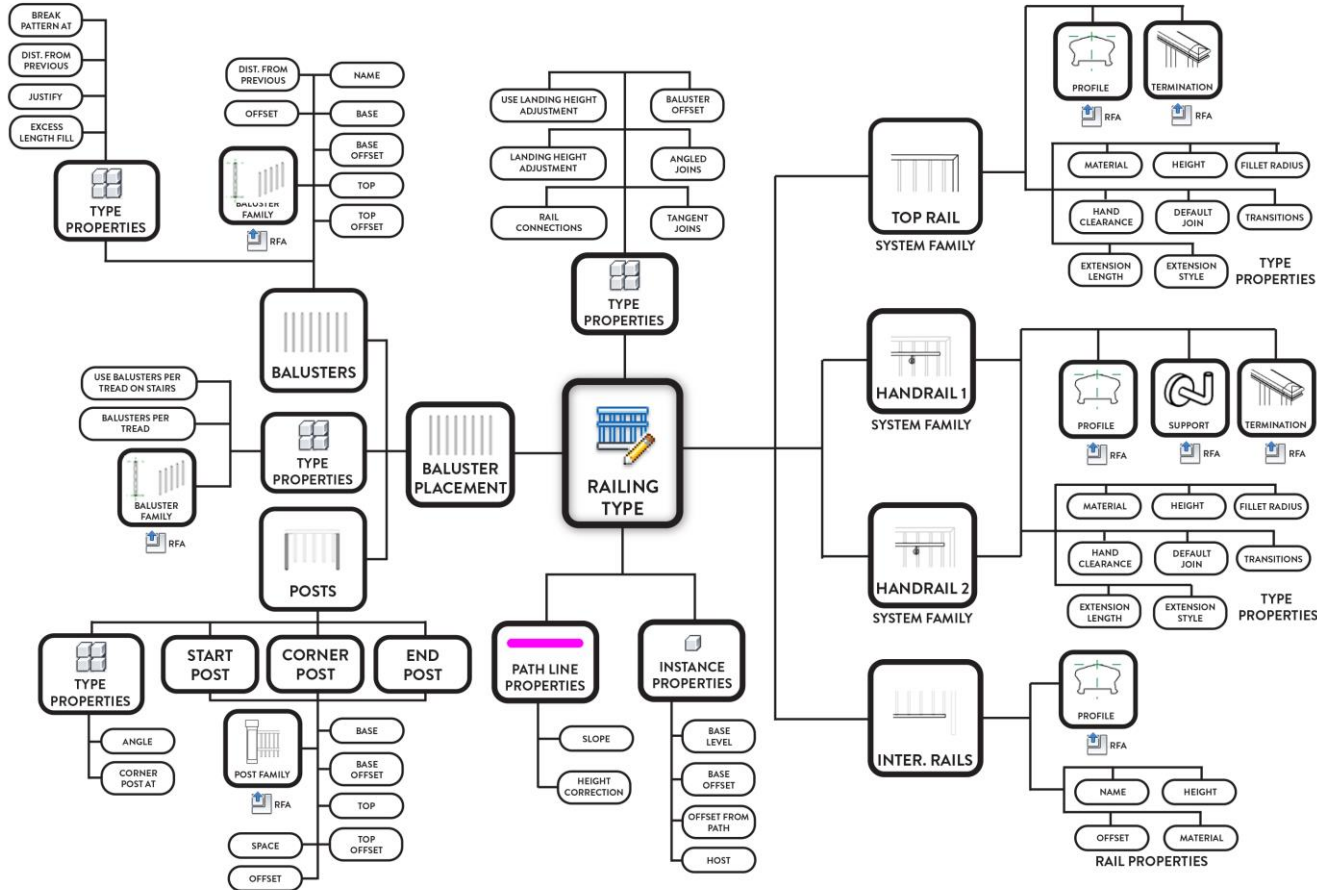
The Ancestral Railing

Specifics:

- Curved vertical + horizontal transitions.
- Different height on landings.
- Posts with complex geometry.
- Project: Maison Dauphine by Atelier 21 Architects.



All Parameters Inside a Railing Type

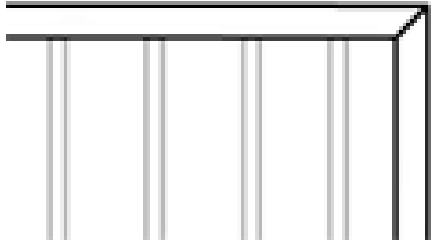


Railings Topics Covered:

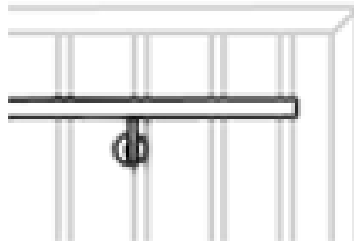
- Understanding all types of rails
- Setting up rail properties
- Additional railing settings that impact rails
- Understanding balusters & posts
- Creating an advanced baluster family

Mastering the Rail Properties

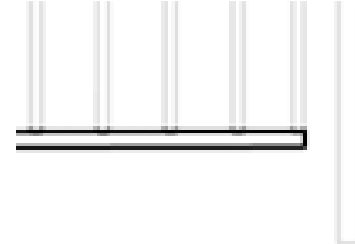
3 Types of Rails



▪ Top Rails

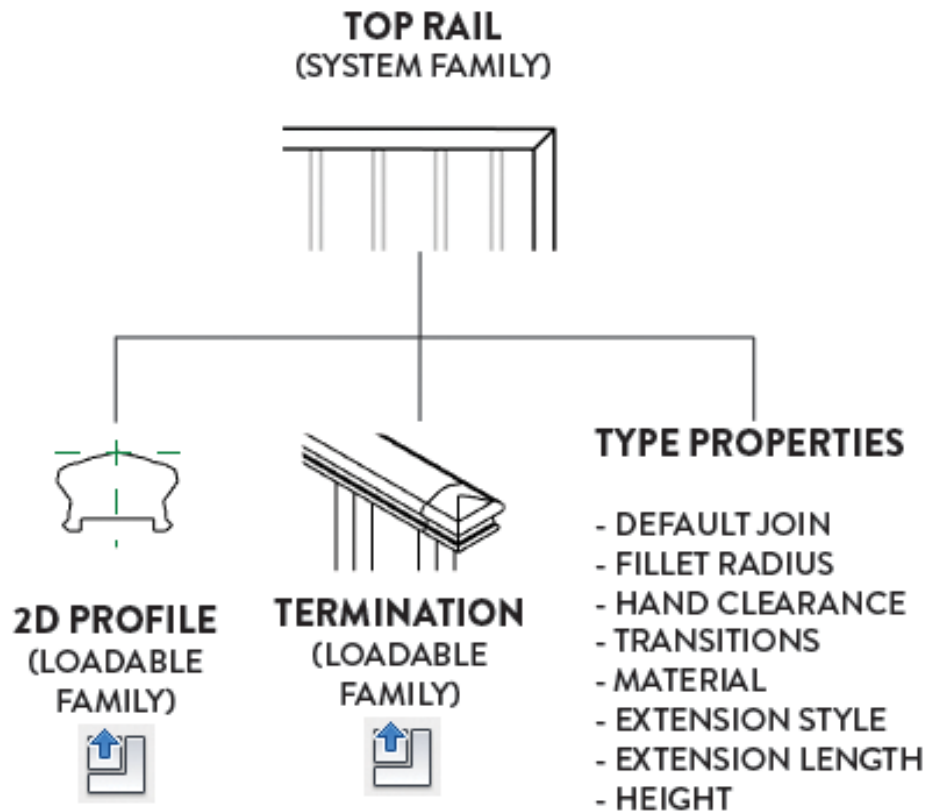


▪ Handrails

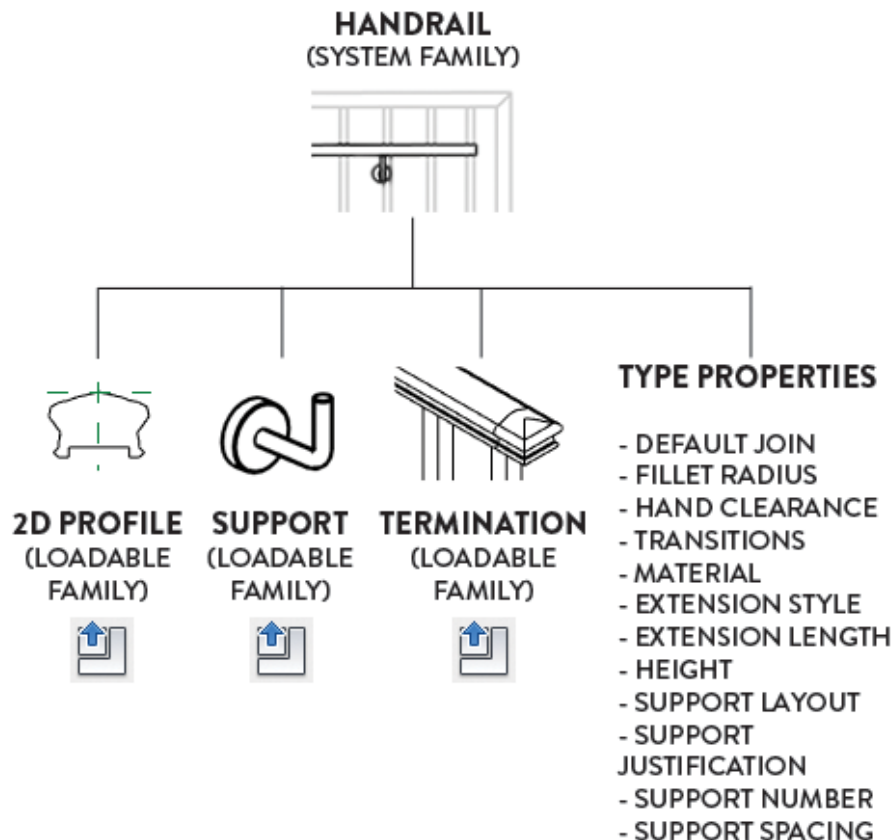


▪ Intermediate Rails (or non-continuous rails)

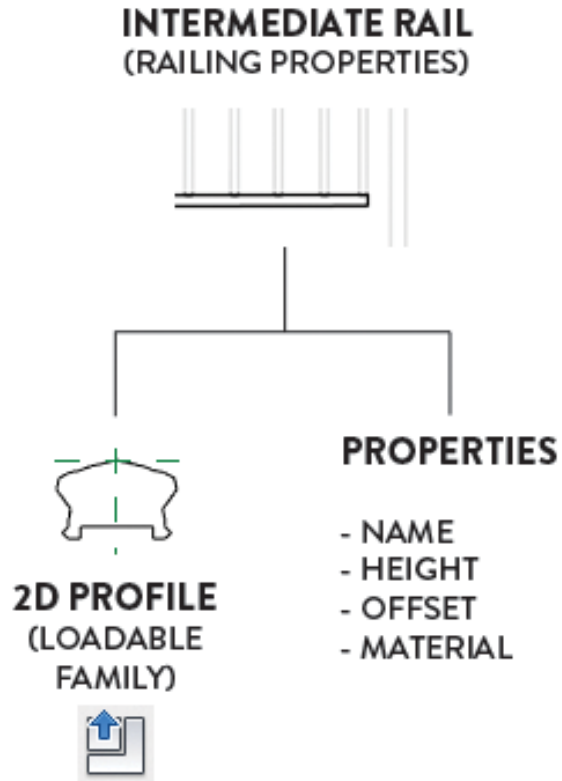
Top Rail Properties







Handrail Properties

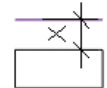

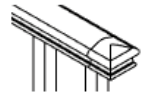




Intermediate Rails Properties



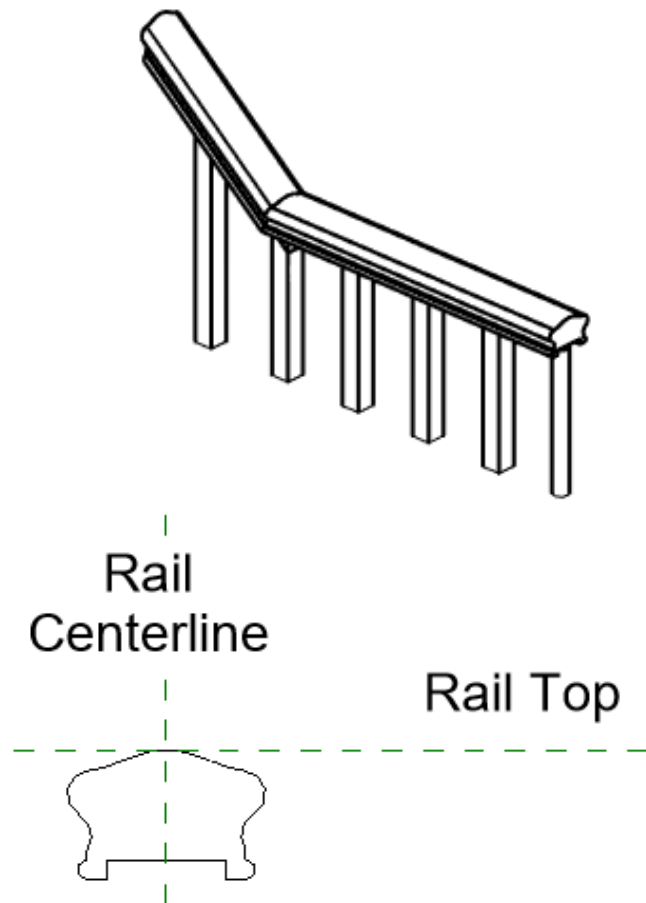
Comparing 9 Rails Properties

FEATURES	TOP RAIL	HANDRAIL	INTERMEDIATE RAILS
ASSIGNED TO BALUSTERS 	✓	✗	✓
CUSTOM PROFILE 	✓	✓	✓
DEFAULT JOIN (MITER / FILLET) 	✓	✓	✗
SUPPORTS 	✗	✓	✗

FEATURES	TOP RAIL	HANDRAIL	INTERMEDIATE RAILS
HAND CLEARANCE 	✓	✓	✗
TRANSITIONS 	✓	✓	✗
TERMINATION 	✓	✓	✗
EXTENSION 	✓	✓	✗
CUSTOM PATH 	✓	✓	✗

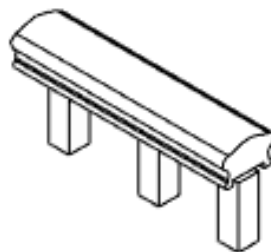
Creating a Rail Profile

- Draw the profile below the center reference plane.

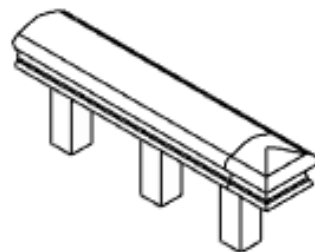


Creating a Termination

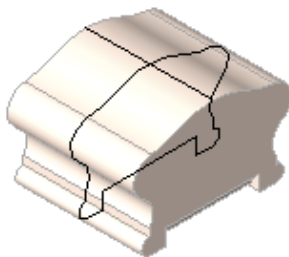
- Termination are placed at the end or beginning of a top rail / handrail.
- Can be used to avoid having a “straight” cut of the rail profile.
- To create the Termination family, create a sweep using the rail profile.
- Cut the sweep with a void extrusion.



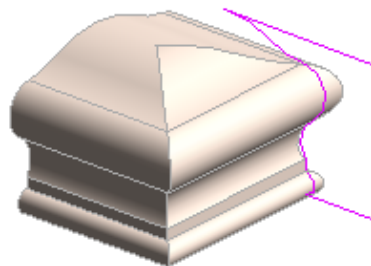
NO TERMINATION



TERMINATION



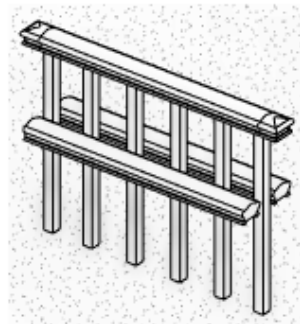
**1- MODEL SWEEP USING
TOP RAIL PROFILE**



**2- MODEL VOID
EXTRUSION AND CUT
GEOMETRY**

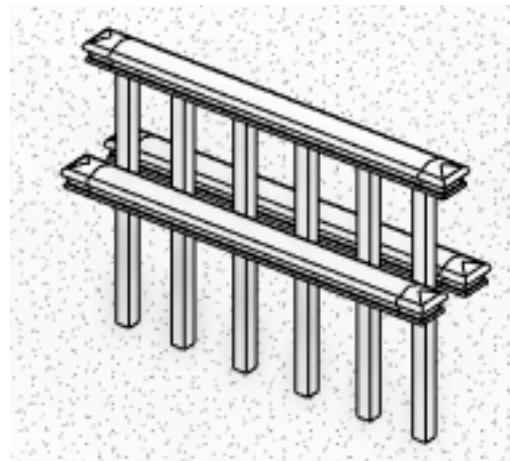
Setting the Termination

- Termination can be placed at both the beginning and end of a rail.
- In addition to top rails, they can also be placed on handrails.



Terminations

Beginning/Bottom Termination	Ancestral Termination
End/Top Termination	Ancestral Termination

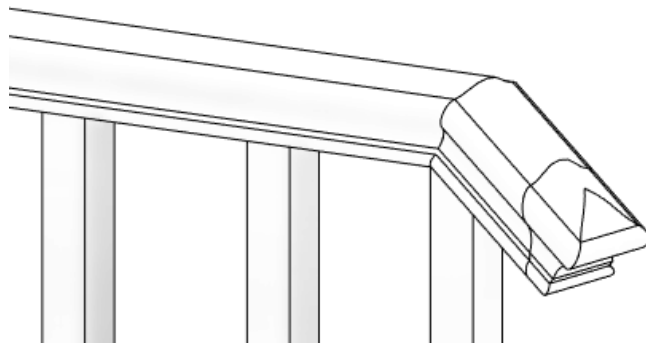


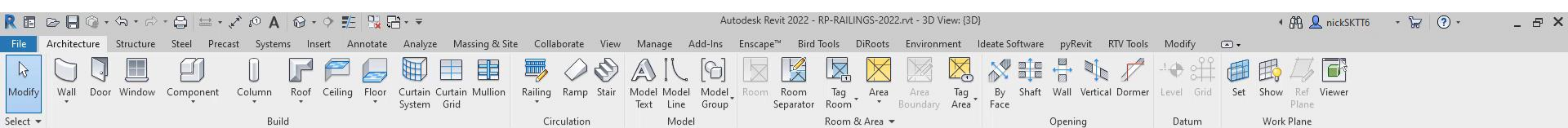
Other Facts About Terminations

- To remove the visible line between the termination and the top rail, use the Lineworks tool.
- If you have a custom path for your rail, the termination will match the angle.



**USE LINEWORKS <INVISIBLE LINES> ON
TERMINATION EDGES**





Project Browser - RP-RAILINGS-2022.rvt

- A500 - WALL SECTIONS AND DETAILS
- A600 - PLAN DETAILS
- A700 - INTERIOR ELEVATIONS
- A800 - DOOR SCHEDULE
- A900 - LEGENDS AND ROOMS FINISHES
- X1 - WELCOME PAGE
- X2 - ALL TITLE BLOCKS

Families

- Analytical Links
- Annotation Symbols
- Cable Trays
- Ceilings
- Conduits
- Curtain Panels
- Curtain Systems
- Curtain Wall Mullions
- Detail Items
- Duct Systems
- Ducts
- Flex Ducts
- Flex Pipes
- Floors
- Pattern
- Pipes
- Piping Systems
- Profiles
 - RP_PRL_Ancstral-Top-Rail-Profile
 - RP_PRL_Circular-Handrail
 - RP_PRL_Fascia-Flat
 - RP_PRL_Gutter-Bevel
 - RP_PRL_Rectangular-Handrail
 - RP_PRL_Stair-Nosing-Radius
- Railings
 - Handrail Type
 - Railing
 - RP_RAI_Baluster-Square
 - RP_RAI_Support-Metal-Circular
 - Top Rail Type
 - Ramps
 - Roofs
 - Stairs
 - Structural Beam Systems
 - Structural Foundations
 - Walls
 - Groups
- Revit Links

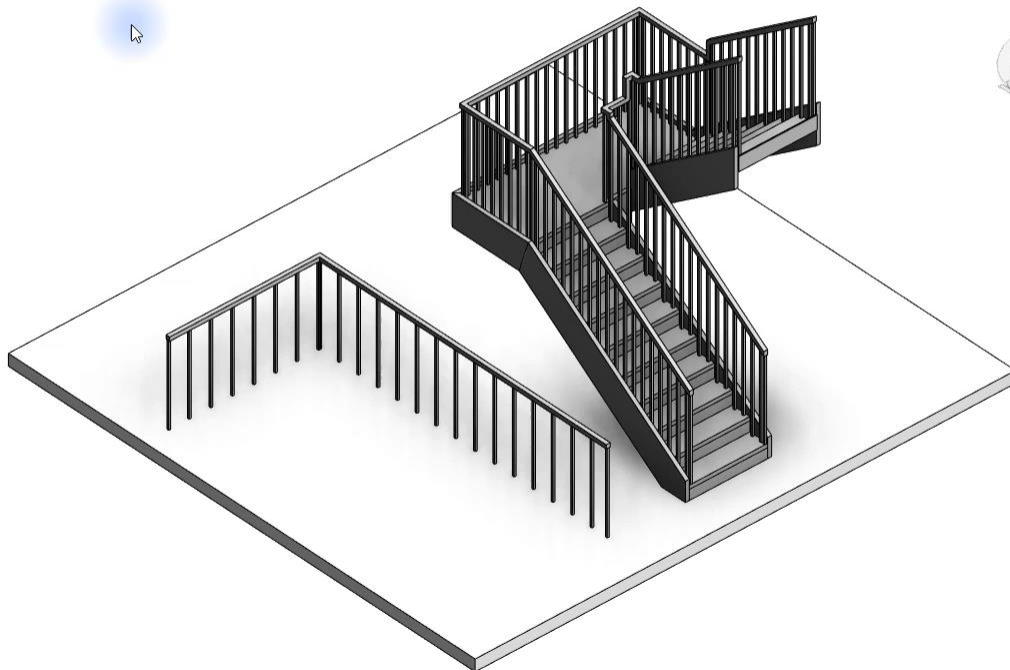
Properties

3D View

3D View: {3D}

Edit Type

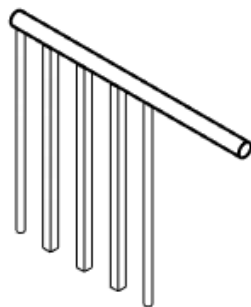
Graphics	
View Scale	1:25
Scale Value	1:
Detail Level	Fine
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Coordination
Show Hidden Lines	By Discipline
Default Analysis Display Style	None
Show Grids	Edit...
Sun Path	<input type="checkbox"/>
Extents	
Crop View	<input type="checkbox"/>
Crop Region Visible	<input type="checkbox"/>
Annotation Crop	<input type="checkbox"/>
Far Clip Active	<input type="checkbox"/>
Far Clip Offset	304800.0
Scope Box	None
Section Box	<input type="checkbox"/>
Camera	
Rendering Settings	Edit...
Locked Orientation	<input type="checkbox"/>
Projection Mode	Orthographic
Eye Elevation	70718.3
Target Elevation	552.9
Camera Position	Adjusting
Identity Data	
View Template	<None>
View Name	{3D}
Dependency	Independent
Title on Sheet	
Phasing	
Phase Filter	Show Complete
Phase	New



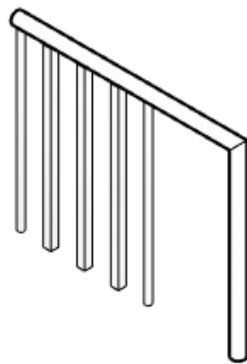
SETTING A RAIL PROFILE

Extensions

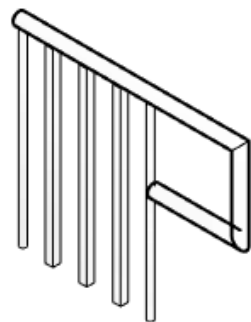
- There are 4 types of extensions
- Even when set to “None”, you can set an extension length, which will be straight.



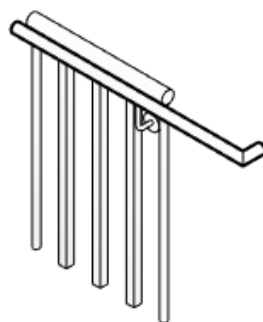
Extension (Beginning/Bottom)	
Extension Style	None
Length	300.0



Extension (Beginning/Bottom)	
Extension Style	Floor
Length	300.0



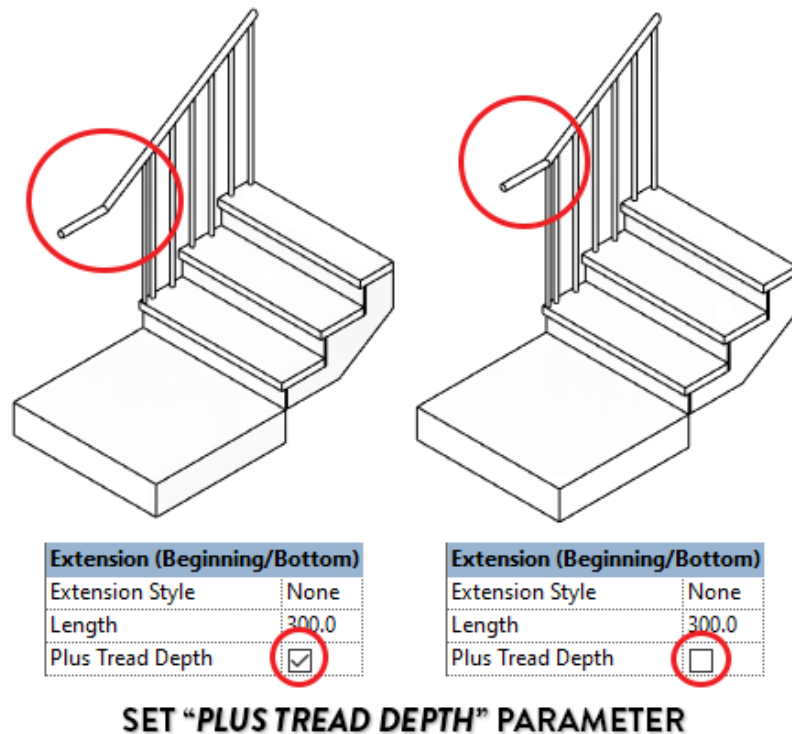
Extension (Beginning/Bottom)	
Extension Style	Post
Length	300.0



Extension (Beginning/Bottom)	
Extension Style	Wall
Length	300.0

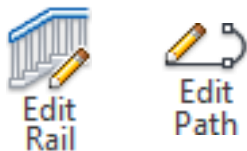
Using the “Plus Tread Depth” on Extensions

- If you check the “Plus Tread Depth” parameter for the bottom extension, the railing will extend an extra distance the same value as a tread depth.



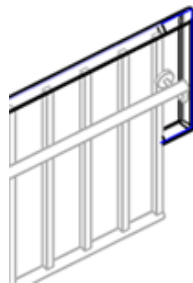
Using a Custom Extension Path

- If you don't like the default extension styles, you can customize the extension to anything you want.
- Tab-Select the top rail or handrail, then click on “Edit Rail” and “Edit Path”.

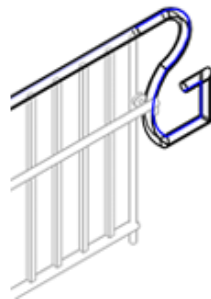


- The custom path is limited to a plane. That means you can't draw a fancy 3D path.

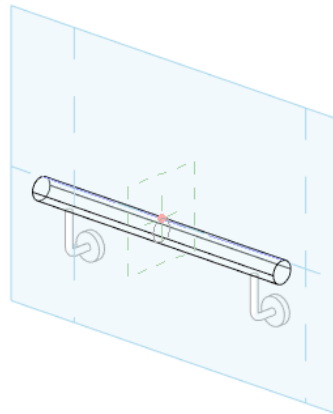
EDIT EXTENSION
PATH

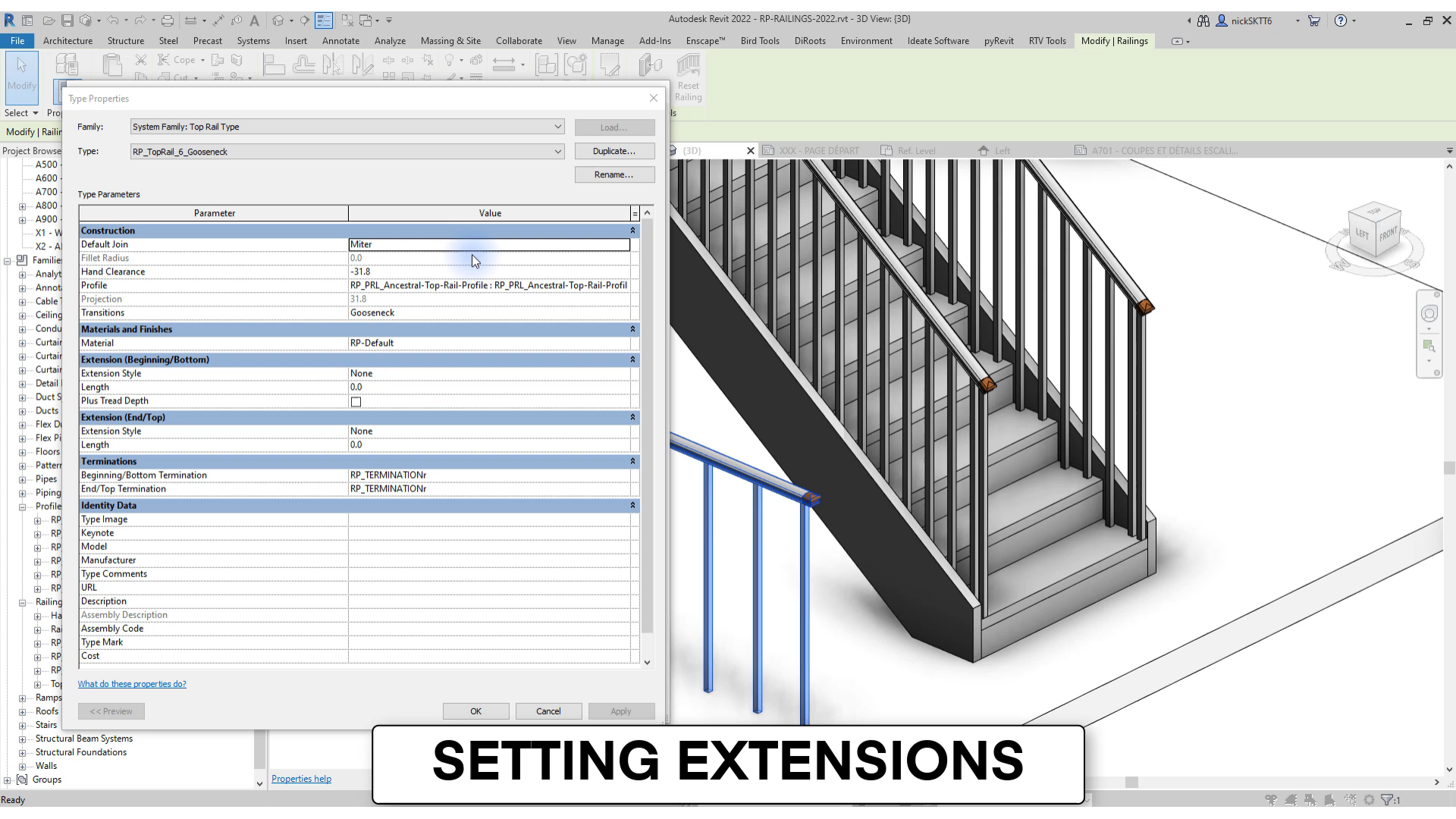


DRAW WHATEVER
YOU WANT



CLICK GREEN CHECK
TWICE TO FINISH





Type Properties

Family: System Family: Top Rail Type Load...

Type: RP_TopRail_6_Goosneck Duplicate... Rename...

Type Parameters

Parameter	Value
Construction	
Default Join	Miter
Fillet Radius	0.0
Hand Clearance	-31.8
Profile	RP_PRL_Ancstral-Top-Rail-Profile : RP_PRL_Ancstral-Top-Rail-Profi
Projection	31.8
Transitions	Goosneck
Materials and Finishes	
Material	RP-Default
Extension (Beginning/Bottom)	
Extension Style	None
Length	0.0
Plus Tread Depth	<input type="checkbox"/>
Extension (End/Top)	
Extension Style	None
Length	0.0
Terminations	
Beginning/Bottom Termination	RP_TERMINATIONr
End/Top Termination	RP_TERMINATIONr
Identity Data	
Type Image	
Keynote	
Model	
Manufacturer	
Type Comments	
URL	
Description	
Assembly Description	
Assembly Code	
Type Mark	
Cost	

[What do these properties do?](#)

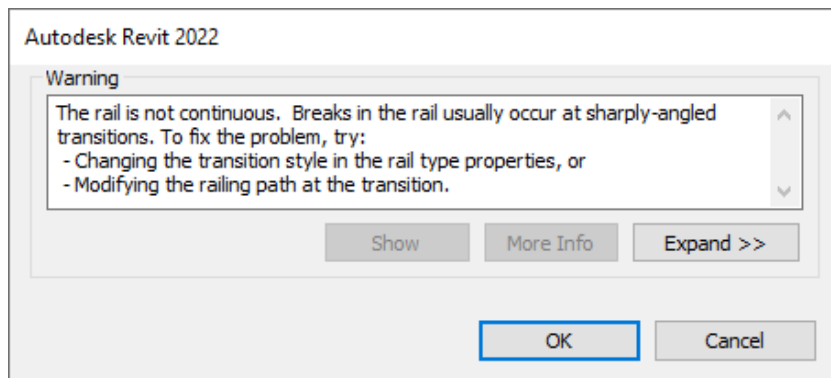
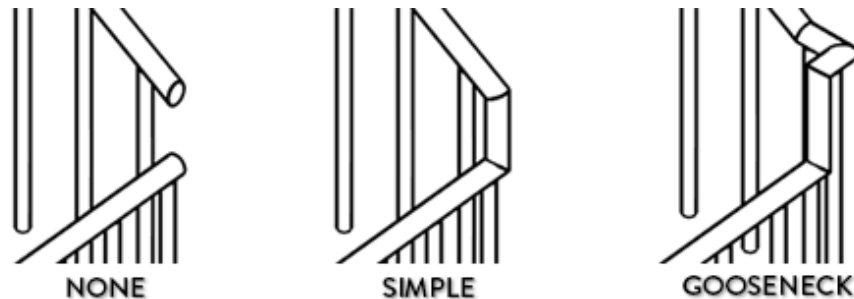
<< Preview OK Cancel Apply

Properties help

SETTING EXTENSIONS

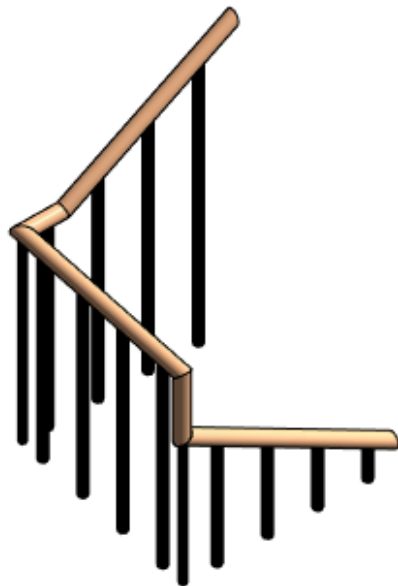
Setting up Transitions

- There are 3 types of transitions.
- By default, your rails might be set to the “None” transition, which will give you a warning.

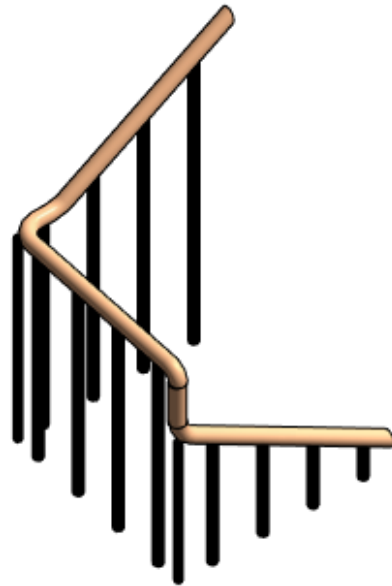


Rail Join: Miter or Fillet

- By default, rails are set to “Miter”, creating a standard, straight transition.
- You can change the setting to Fillet instead, creating a curved transition.
- You can also set a specific fillet radius value.
- This affect all transitions, both horizontal and verticals.



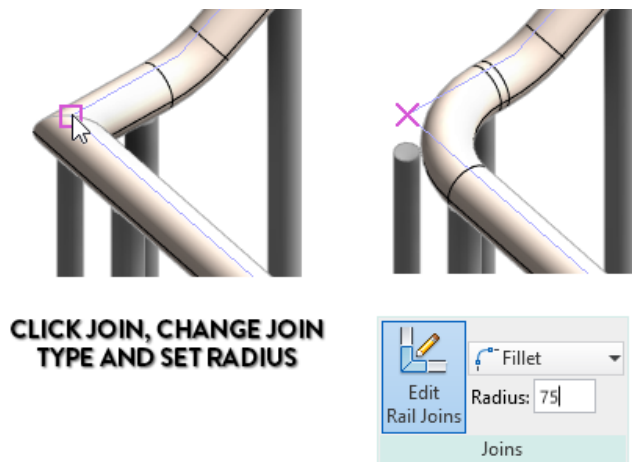
Construction	
Default Join	Miter
Fillet Radius	0.0

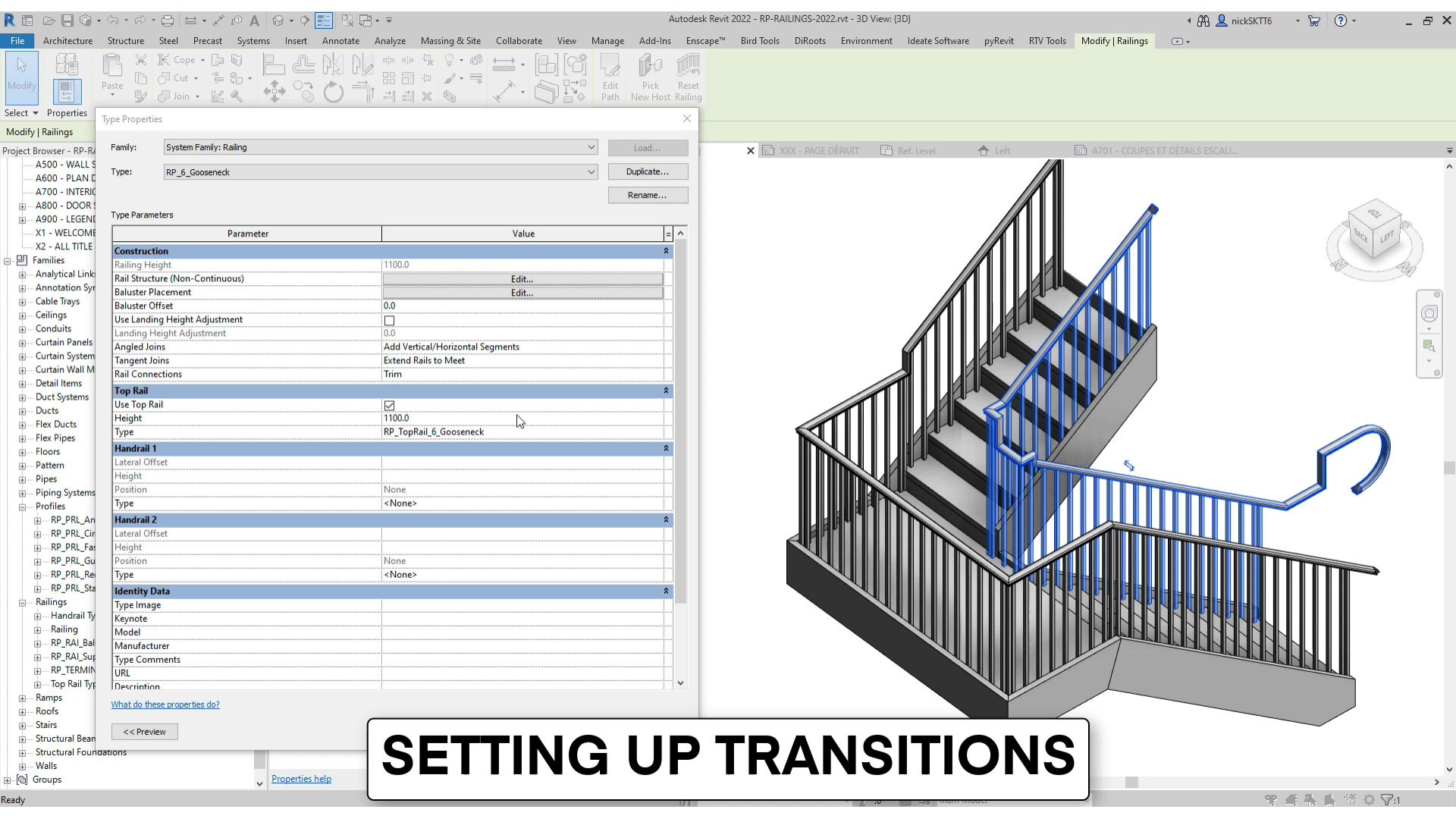


Construction	
Default Join	Fillet
Fillet Radius	50.0

Rail Join: Modify Individual Join

- Instead of setting the Rail Join setting in the type properties, you can modify a single join instead.
- Tab-select the rail, click on Edit Rail, then Edit Path, then Edit Rail Joins.
- Select the specific join, change the join type and set a radius value.
- As you can see, that might cause issues with balusters.

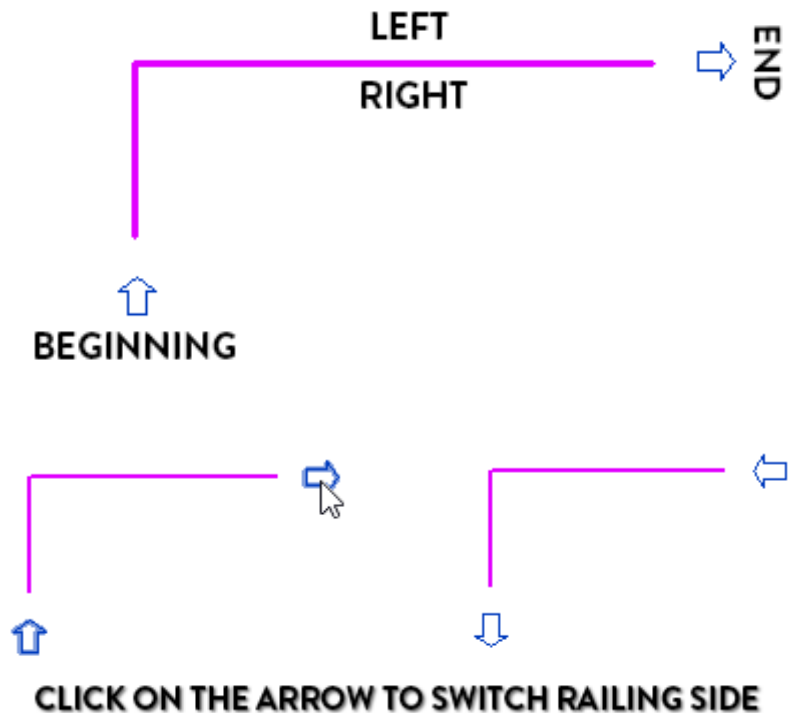




General Railing Settings

Understanding the Railing Direction

- Arrows symbol indicate the beginning and end of a railing. That also helps to indicate which side is left or right.
- Click on the arrow to switch the railing side.
- For railings on stairs, the bottom is always the beginning.



Understanding the Railing Direction

- You can see how the right-side handrail is placed depending on the arrows direction.

TOP RAIL WITH END/TOP TERMINATION

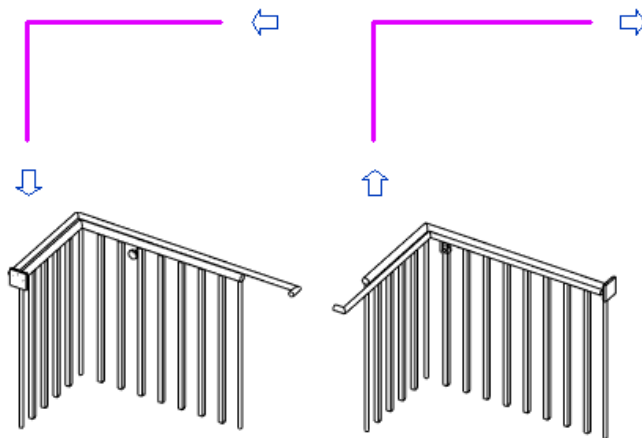
Terminations

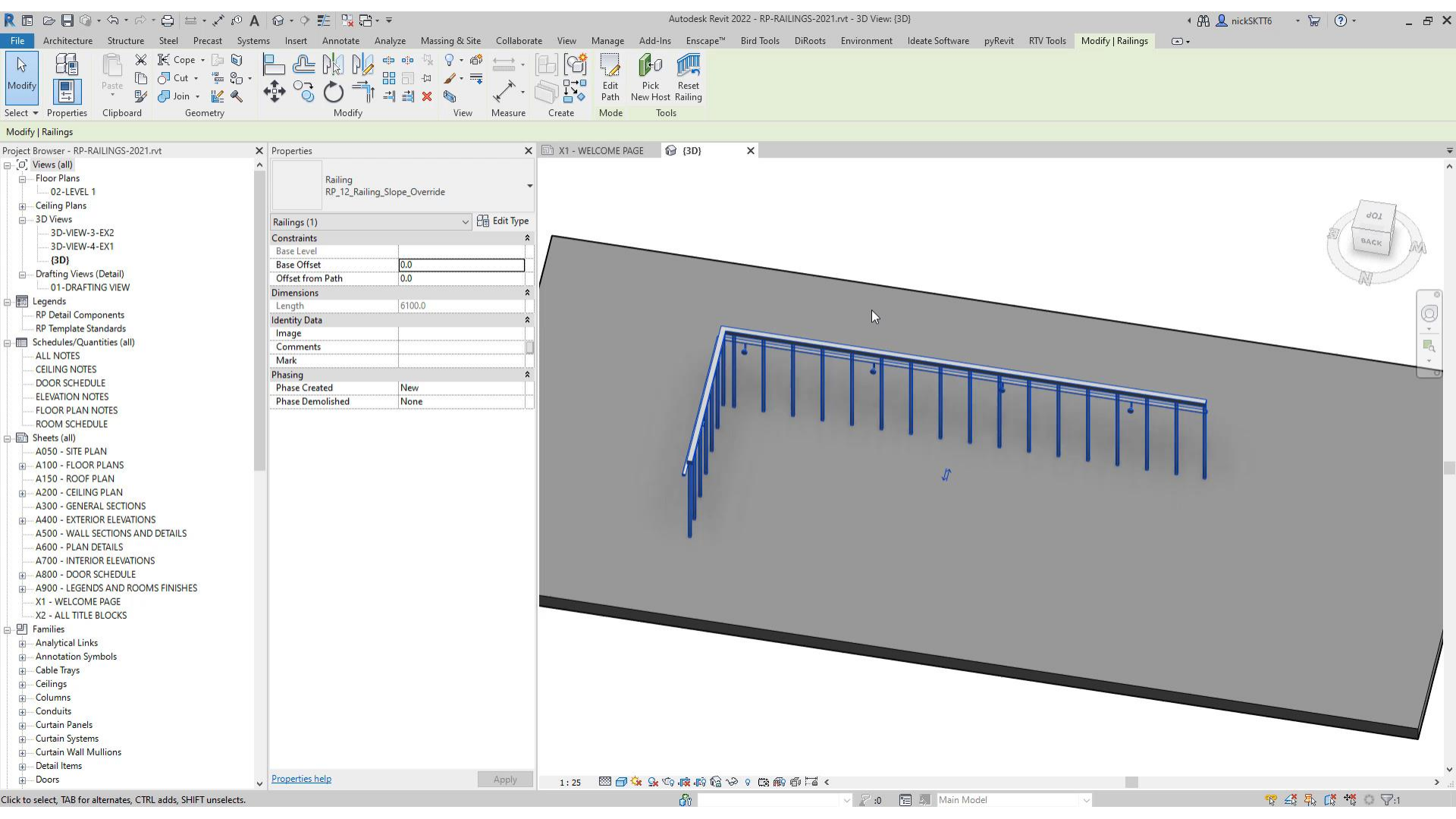
Beginning/Bottom Termination	None
End/Top Termination	M_Termination

RIGHT SIDE HANDRAIL

Handrail 1

Position	Right
Type	Pipe – Wall Mount





Modify | Railings

- Project Browser - RP-RAILINGS-2021.rvt
- Views (all)
 - Floor Plans
 - 02-LEVEL 1
 - Ceiling Plans
 - 3D Views
 - 3D-VIEW-3-EX2
 - 3D-VIEW-4-EX1
 - (3D)
 - Drafting Views (Detail)
 - 01-DRAFTING VIEW
 - Legends
 - RP Detail Components
 - RP Template Standards
 - Schedules/Quantities (all)
 - ALL NOTES
 - CEILING NOTES
 - DOOR SCHEDULE
 - ELEVATION NOTES
 - FLOOR PLAN NOTES
 - ROOM SCHEDULE
 - Sheets (all)
 - A050 - SITE PLAN
 - A100 - FLOOR PLANS
 - A150 - ROOF PLAN
 - A200 - CEILING PLAN
 - A300 - GENERAL SECTIONS
 - A400 - EXTERIOR ELEVATIONS
 - A500 - WALL SECTIONS AND DETAILS
 - A600 - PLAN DETAILS
 - A700 - INTERIOR ELEVATIONS
 - A800 - DOOR SCHEDULE
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 - Analytical Links
 - Annotation Symbols
 - Cable Trays
 - Ceilings
 - Columns
 - Conduits
 - Curtain Panels
 - Curtain Systems
 - Curtain Wall Mullions
 - Detail Items
 - Doors

Properties

Railing
RP_12_Railing_Slope_Override

Railings (1) Edit Type

Constraints

Base Level

Base Offset 0.0

Offset from Path 0.0

Dimensions

Length 6100.0

Identity Data

Image

Comments

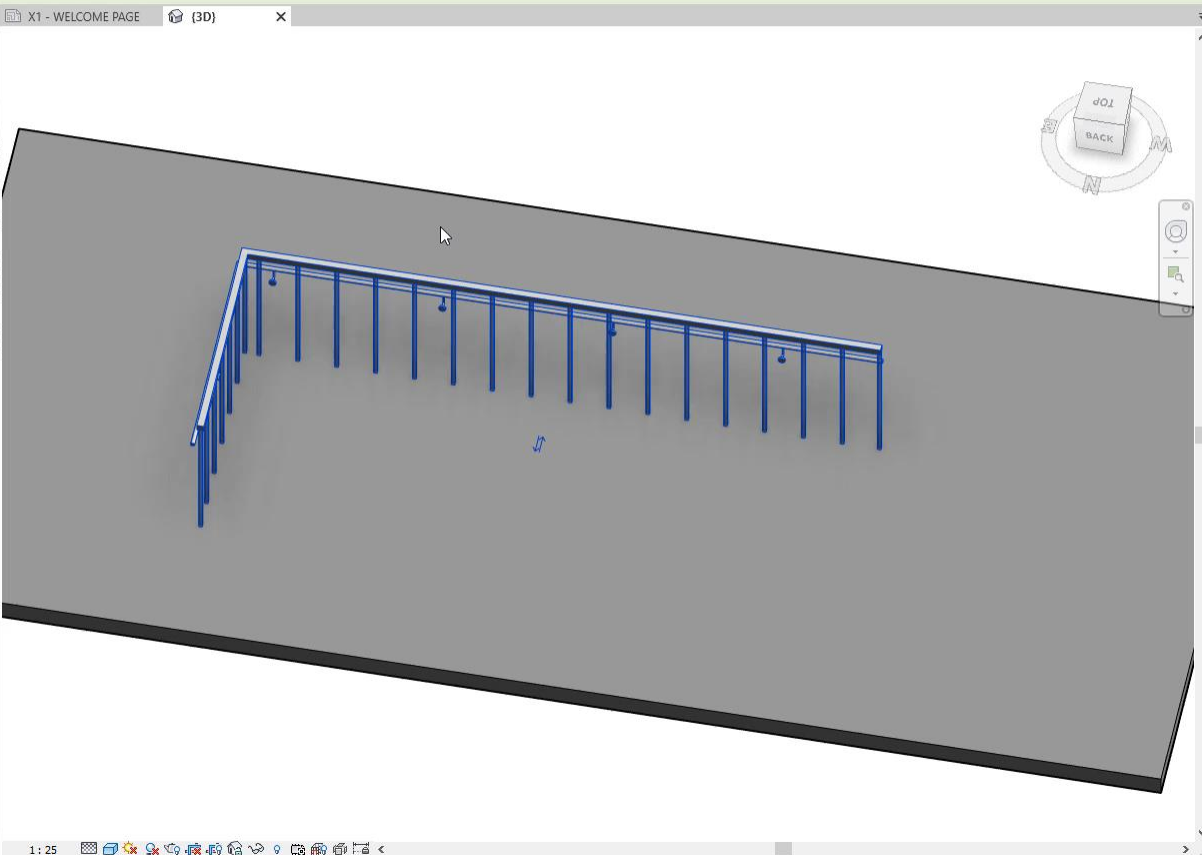
Mark

Phasing

Phase Created New

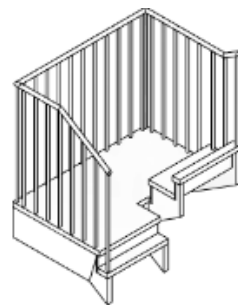
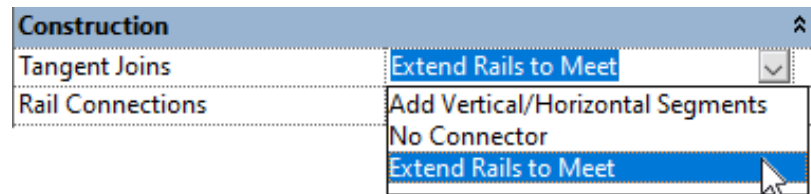
Phase Demolished None

Properties help Apply

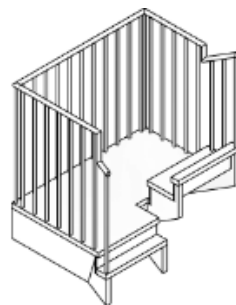


Understanding Tangent Joins

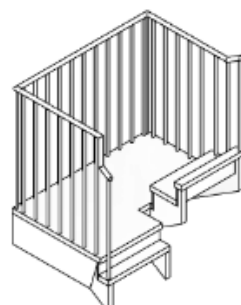
- In this example, you can see the difference between multiple options for the “Tangent Join” parameter.
- Usually, “Add Vertical / Horizontal Segment” is the best option.



**EXTEND RAILS
TO MEET**



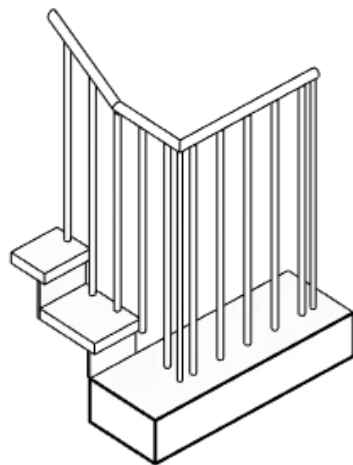
NO CONNECTOR



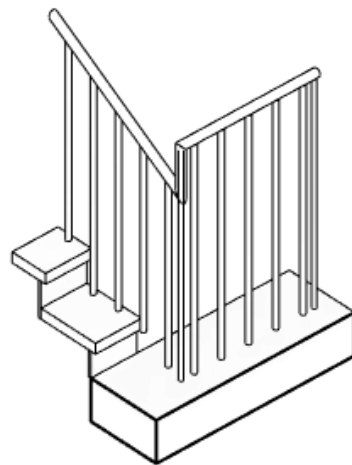
**ADD VERTICAL /
HORIZONTAL
SEGMENT**

Understanding Angled Joins

- The “angled joins” parameter how joins behave at angled intersections. In this example, you can see what happens at the bottom of stairs for different options.
- The “Add Vertical/Horizontal Segments” option is probably the best.



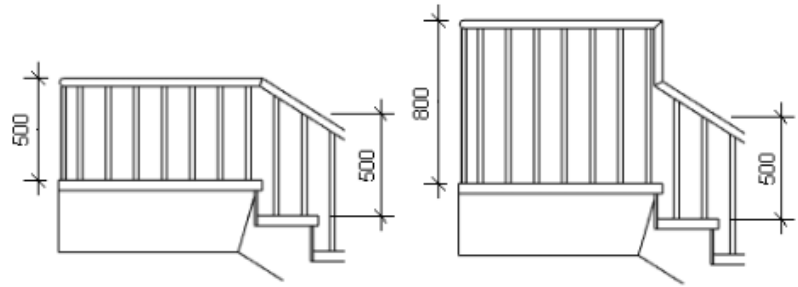
Angled Joins Add Vertical/Horizontal Segments



Angled Joins No Connector

Landing Height Adjustment

- This parameter allows you to set a different height when the railing is located on a landing or on a floor.

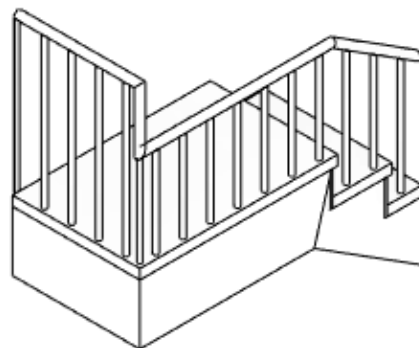
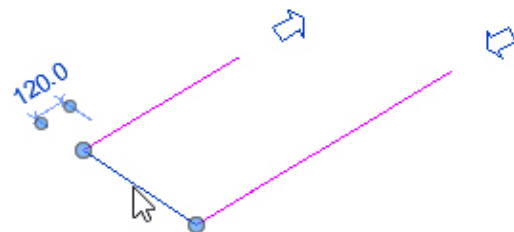
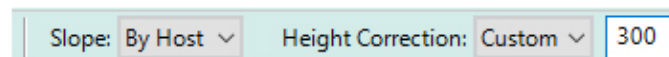


Construction	
Use Landing Height Adjustment	<input type="checkbox"/>
Landing Height Adjustment	0.0

Construction	
Use Landing Height Adjustment	<input checked="" type="checkbox"/>
Landing Height Adjustment	300.0

Height Correction– Individual Segment

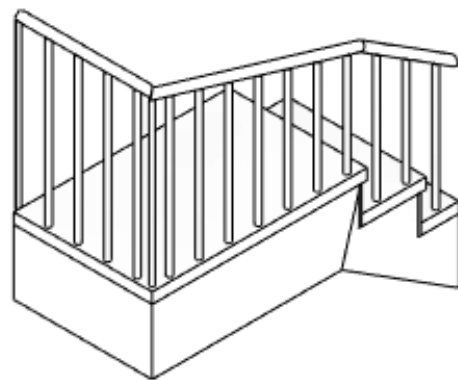
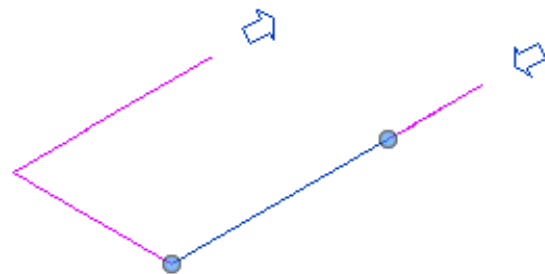
- If you want a specific landing height, you can apply the effect to a single railing path line.
- The value set here will override what is set in the type properties.



**SET "HEIGHT CORRECTION" VALUE TO
AN INDIVIDUAL RAILING PATH LINE**

Railing Path Slope Override

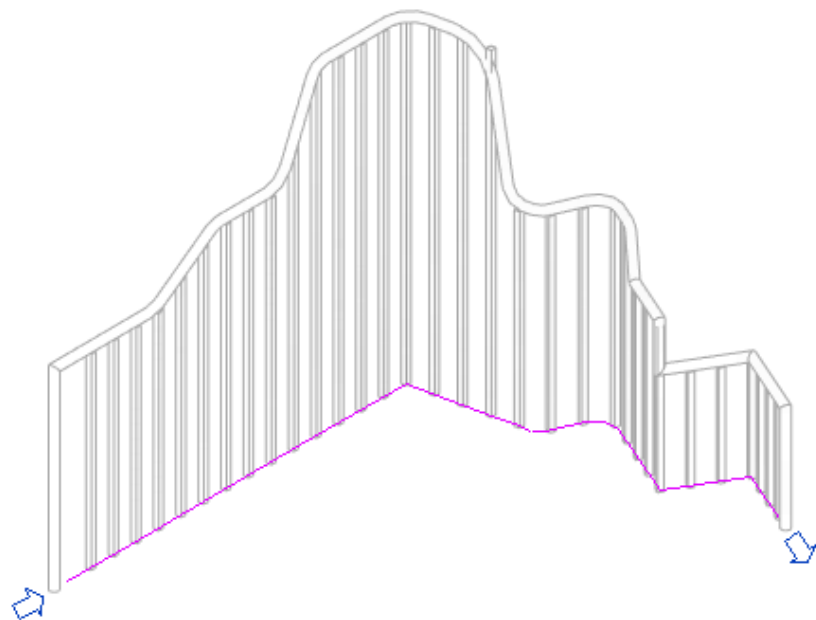
- This hidden feature allows you to select individual railing segment and set them to “Sloped”.
- The segment will become sloped to connect the adjacent segments.

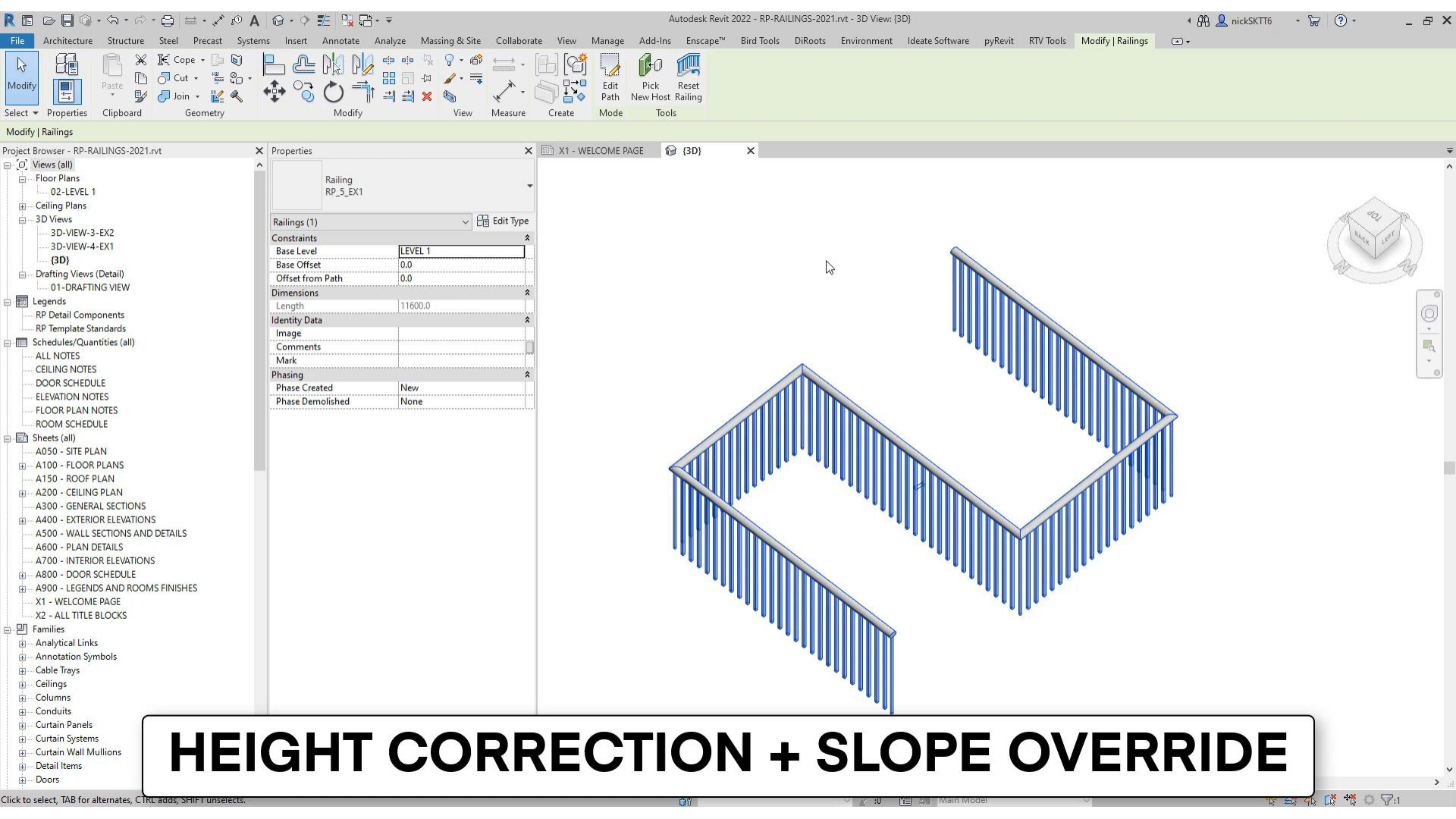


SET “SLOPE” PARAMETER TO AN INDIVIDUAL RAILING PATH LINE

Railing Path Slope Override

- By combining Landing Height and Path Slope you can create very specific railing shapes.

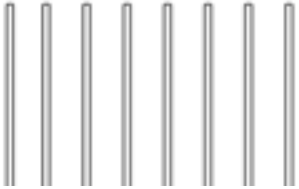




HEIGHT CORRECTION + SLOPE OVERRIDE

Balusters & Posts

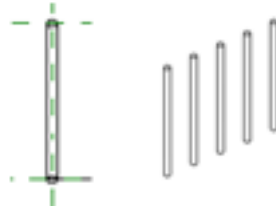
Balusters vs Posts



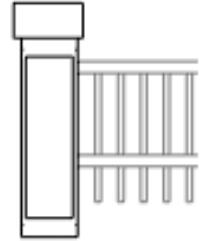
■ Balusters



■ Posts



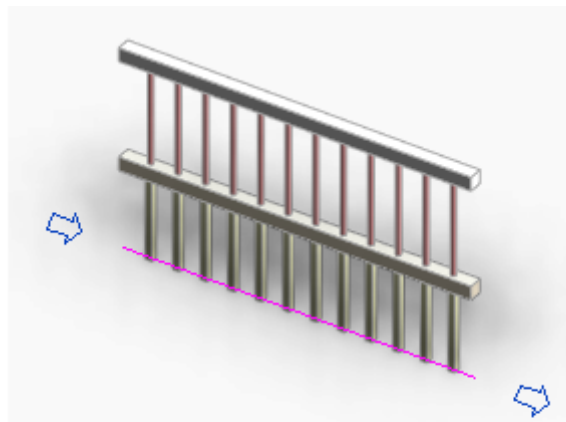
■ Baluster Family



■ Post Family

Vertically Aligned Balusters

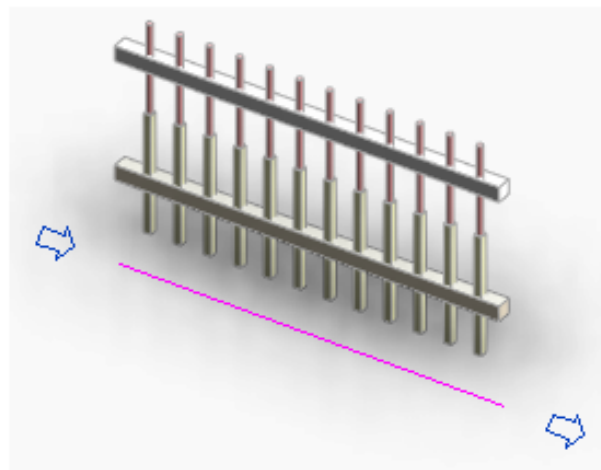
- In the balusters menu, set two balusters type. Set the second one to a Distance from Previous value = 0.



	Name	Baluster Family	Base	Base offset	Top	Top offset	Dist. from previous
1	Patter	N/A	N/A	N/A	N/A	N/A	N/A
2	BAL 1	RP_RAI_	Host	0.0	INT RAIL	0.0	100.0
3	BAL 2	RP_RAI_	INTR	0.0	Top Rail	0.0	0.0
4	Patter	N/A	N/A	N/A	N/A	N/A	0.0

Using Base and Top Offsets

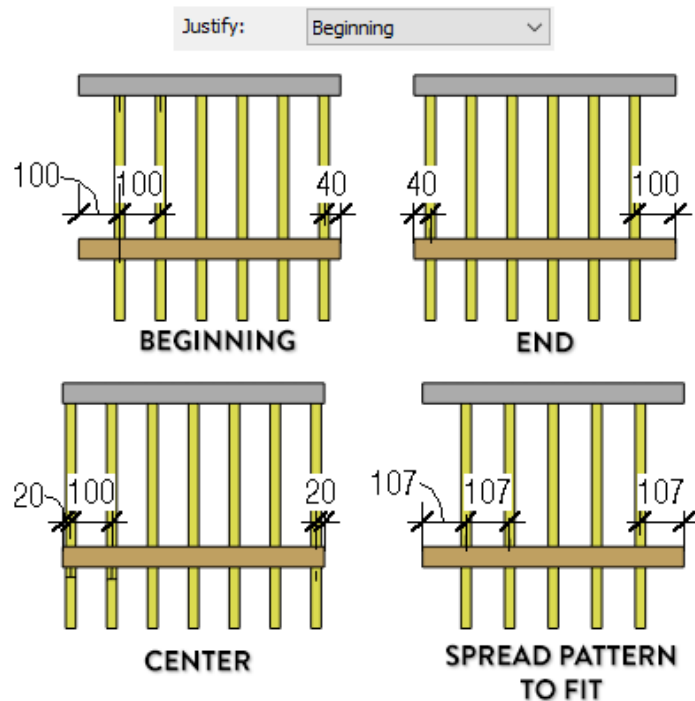
- Play around with the Base and Top offset values.



	Name	Baluster Family	Base	Base offset	Top	Top offset	Dist. from previous
1	Patter	N/A	N/A	N/A	N/A	N/A	N/A
2	BAL 1	RP_RAI_	Host	150.0	INTR	200.0	100.0
3	BAL 2	RP_RAI_	INTR	200.0	Top R	100.0	0.0
4	Patter	N/A	N/A	N/A	N/A	N/A	0.0

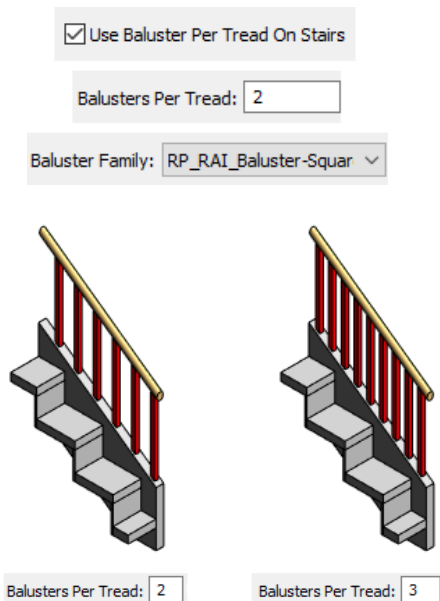
Setting the Justification

- Spread Pattern to Fit is usually the best option.
- If you need to have a specific value between balusters, center might be best.



“Use Balusters per Tread on Stairs”

- When this option is activated, the main pattern is completely ignored when the railing is placed on stairs.



Main pattern

	Name	Baluster Family	Base	Base offset	Top	Top offset	Dist. f previ
1	Pattern star	N/A	N/A	N/A	N/A	N/A	N/A
2	Regular bal	RP_RAI_Baluster-Roun	Host	0.0	Top Rail Ele	0.0	100.0
3	Pattern en	N/A	N/A	N/A	N/A	N/A	0.0

Break Pattern at: Never Angle: 0.00°

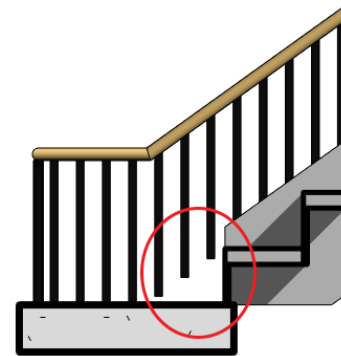
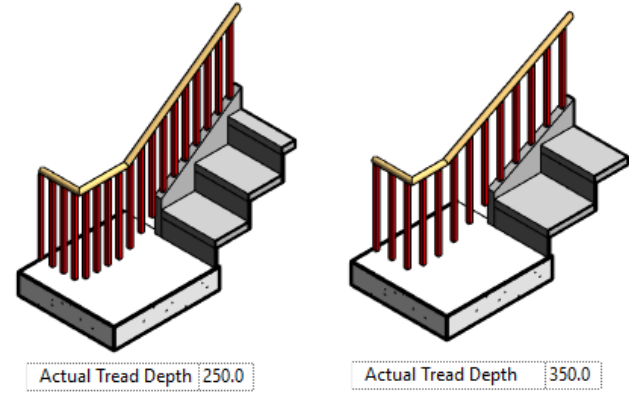
Justify: Center Excess Length Fill: None

Use Baluster Per Tread On Stairs Balusters Per Tread: 2 Baluster

WHEN THIS IS CHECKED, “MAIN PATTERN” IS IGNORED

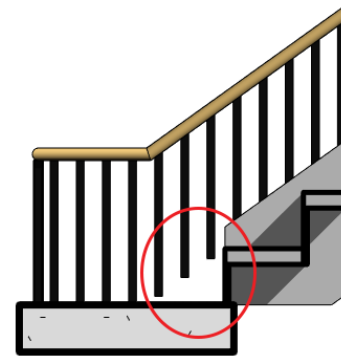
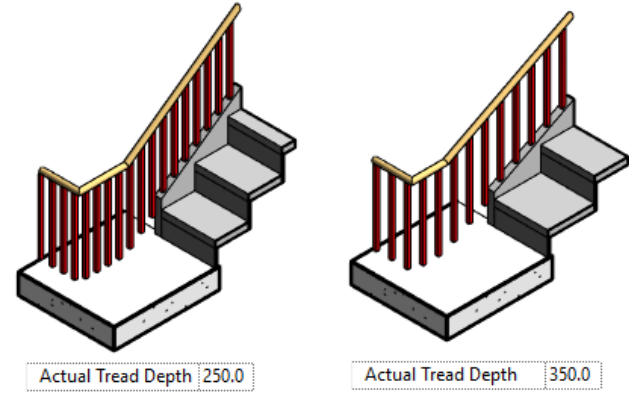
“Use Balusters Per Tread on Stairs”

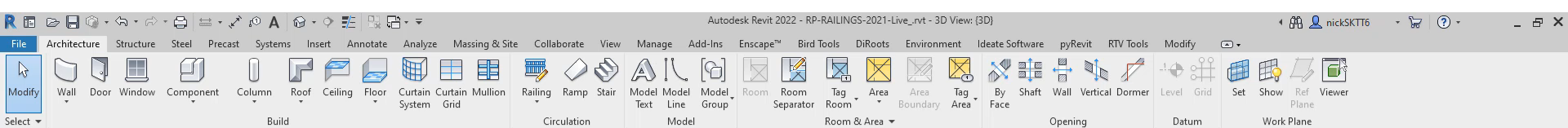
- If the railing with the “Use Balusters per Tread on Stairs” extends beyond the stairs, it will keep the same baluster spacing.
- The spacing is based on the number of balusters per tread and on the tread depth.
- There is a known glitch where the balusters don't touch the ground.



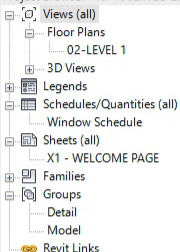
“Use Balusters Per Tread on Stairs”

- If the railing with the “Use Balusters per Tread on Stairs” extends beyond the stairs, it will keep the same baluster spacing.
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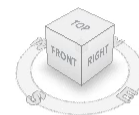
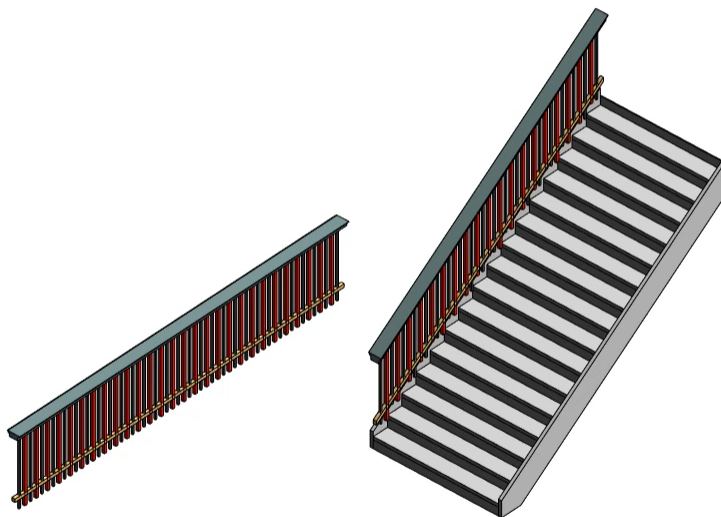


Project Browser - RP-RAILINGS-2021-Live_rvt



Properties

3D View	
3D View: {3D}	Edit Type
Graphics	
View Scale	1:25
Scale Value	25
Detail Level	Fine
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Coordination
Show Hidden Lines	By Discipline
Default Analysis Display Style	None
Show Grids	Edit...
Sun Path	<input type="checkbox"/>
Extents	
Crop View	<input type="checkbox"/>
Crop Region Visible	<input type="checkbox"/>
Annotation Crop	<input type="checkbox"/>
Far Clip Active	<input type="checkbox"/>
Far Clip Offset	304800.0
Scope Box	None
Section Box	<input type="checkbox"/>
Camera	
Rendering Settings	Edit...
Locked Orientation	<input type="checkbox"/>
Projection Mode	Orthographic
Eye Elevation	16953.0
Target Elevation	-96270.8
Camera Position	Adjusting
Identity Data	
View Template	<None>
View Name	{3D}
Dependency	Independent
Title on Sheet	
Phasing	
Phase Filter	Show Complete
Phase	New

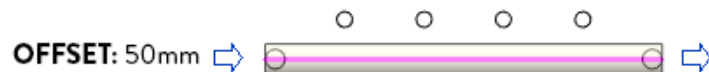
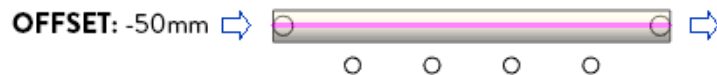


USING "BALUSTERS PER TREAD ON STAIRS"

The Offset Value on Balusters

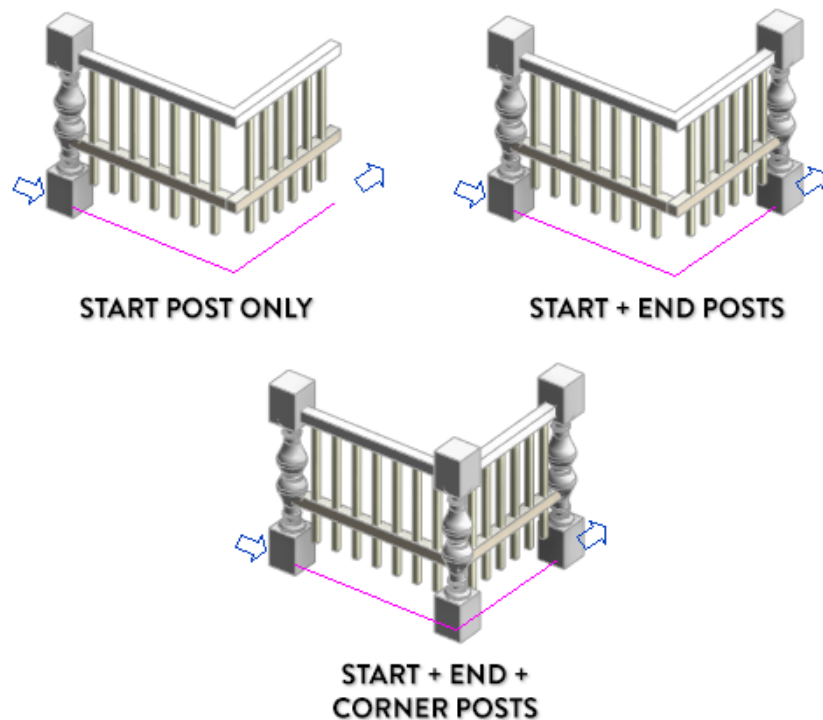
- A positive offset value pushes the balusters to the left side, while a negative value push them to the right side.

	Name	Baluster Family	Dist. from previous	Offset
1	Pattern star	N/A	N/A	N/A
2	Regular bal	RP_RAI_Baluster-Roun	100.0	50.0
3	Pattern en	N/A	0.0	N/A



Using Posts

- You can choose Beginning, Corner and End posts. Use the arrow to understand where is the beginning and end.



Space Balve on Posts

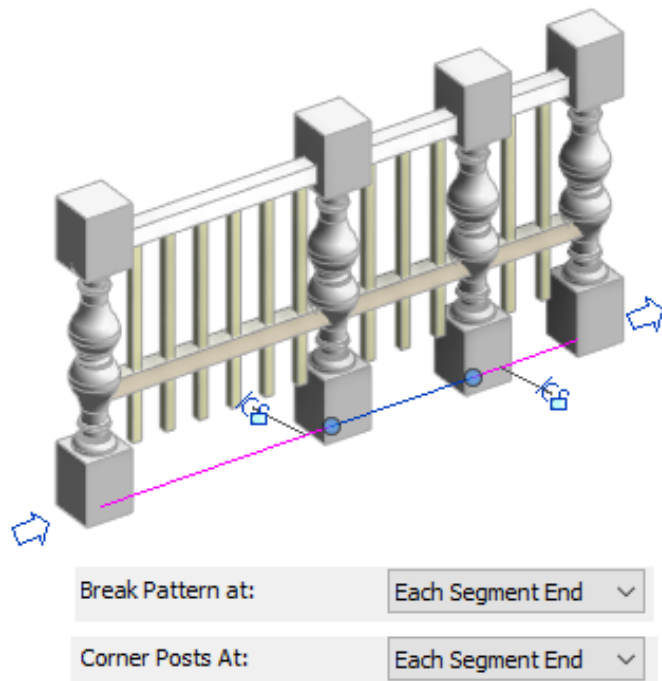
- A positive space value pushes the post towards the beginning, while a negative value pushes the post towards the end of the railing.

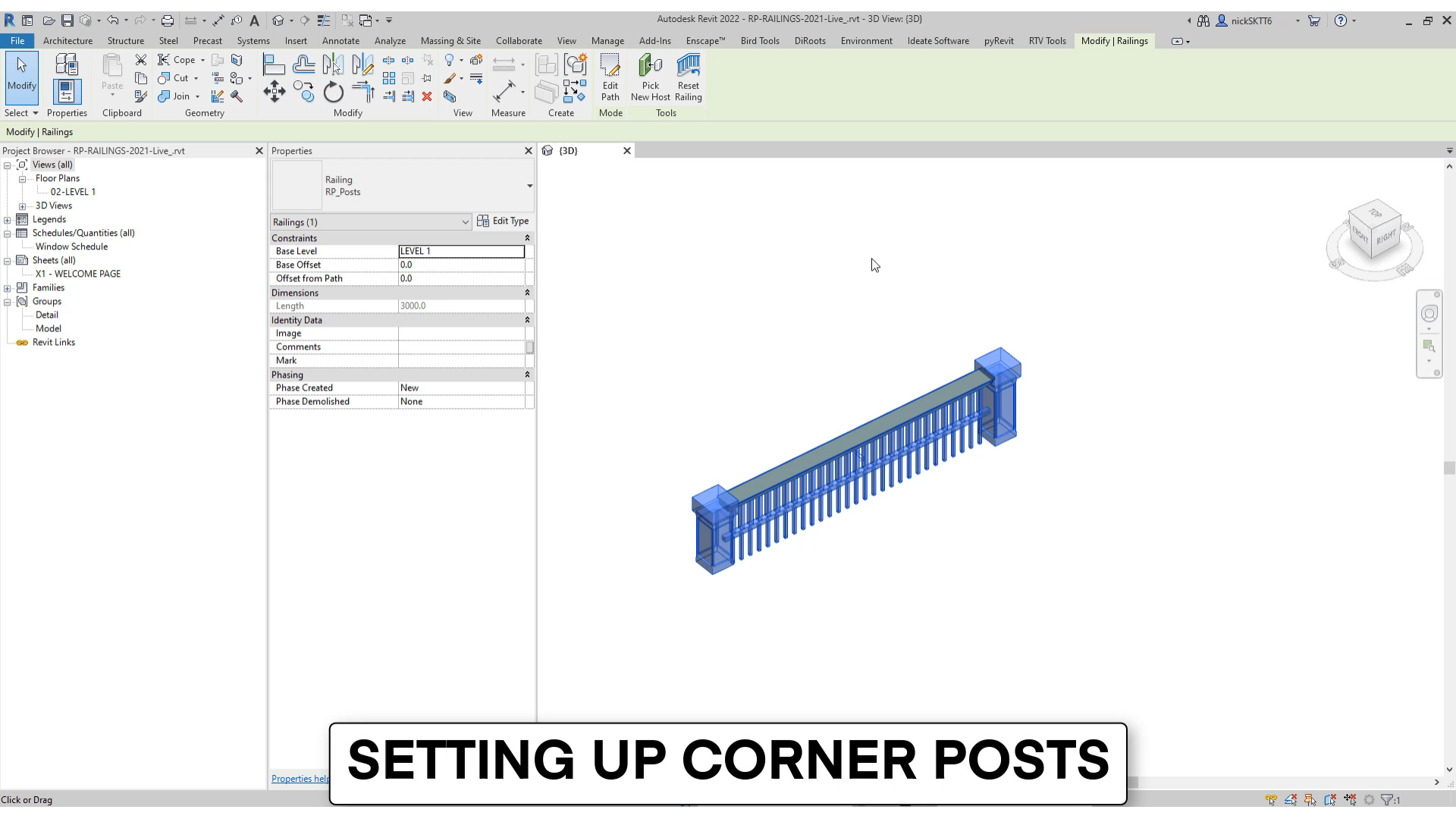
	Name	Baluster Family	Space	Offset
1	Start Post	RP_RAI_Baluster-Round : 25mm	-12.5	0.0
2	Corner Post	RP_RAI_Baluster-Round : 25mm	0.0	0.0
3	End Post	RP_RAI_Baluster-Round : 25mm	12.5	0.0



Breaking the Pattern + Corner Posts

- If you set the “break pattern at” parameter to Each Segment End, the balusters placement will reset for each magenta line
- You can activate the “Corner Posts at” Each Segment End to place posts as well.





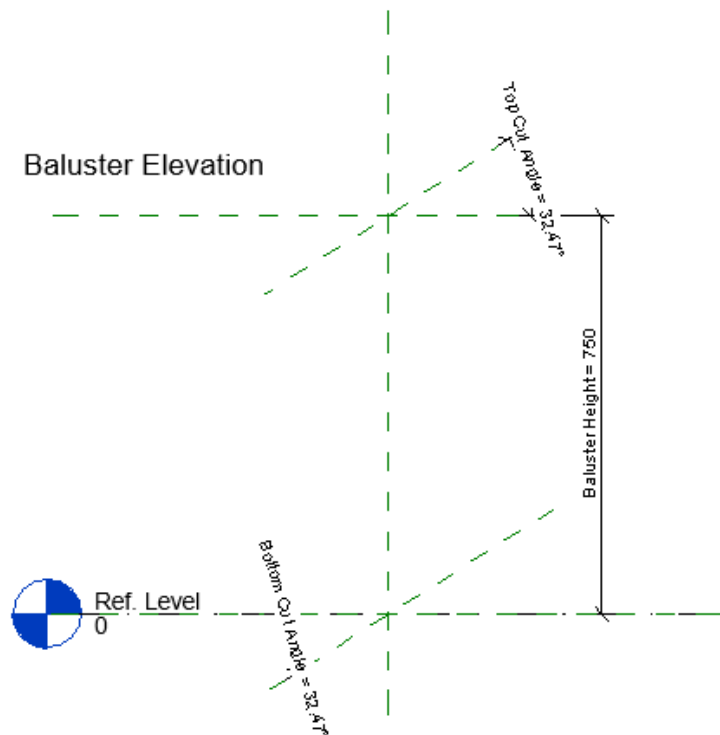
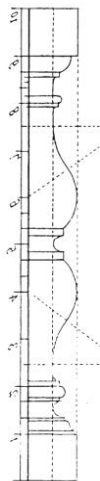
SETTING UP CORNER POSTS



Creating a Classical Baluster Family

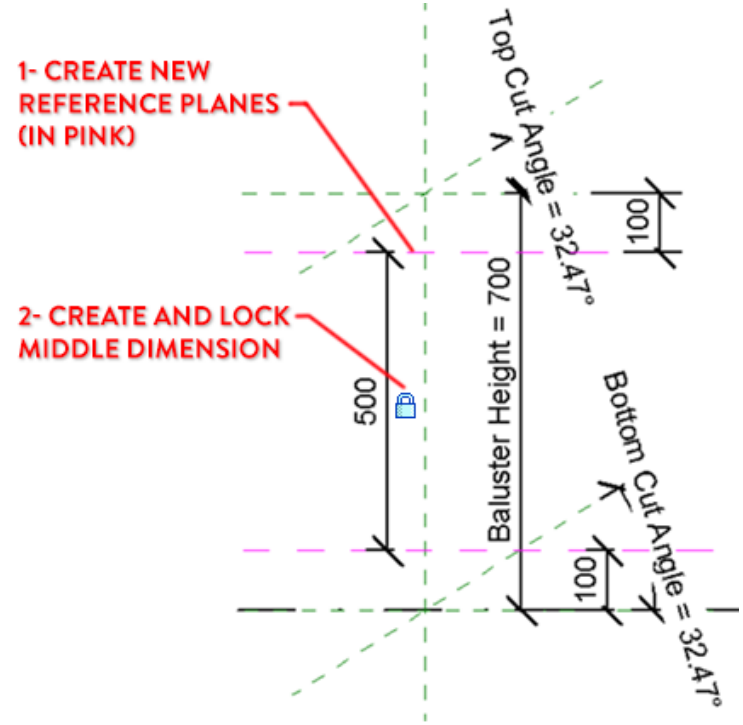
Create a Classical Baluster Family

- Pick an image for reference
- Create a new family using the Baluster Template. You should see diagonal reference planes.



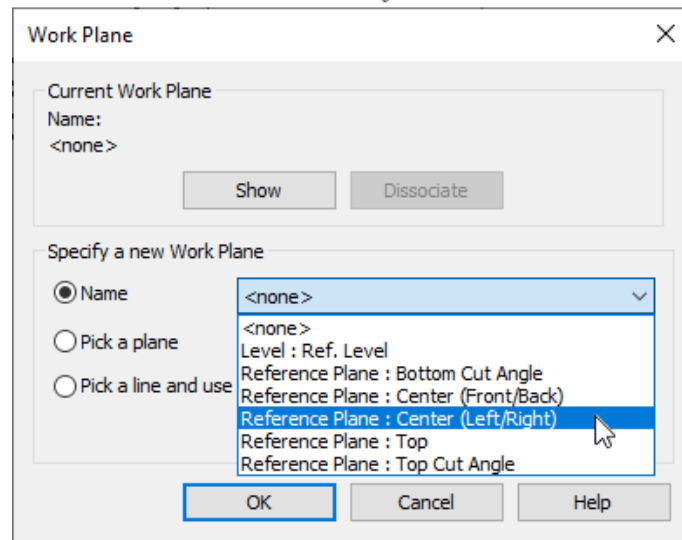
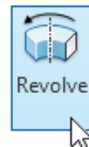
Create a Classical Baluster Family

- Create new reference planes and lock the middle section.
- Import the image reference and scale it.



Create a Classical Baluster Family

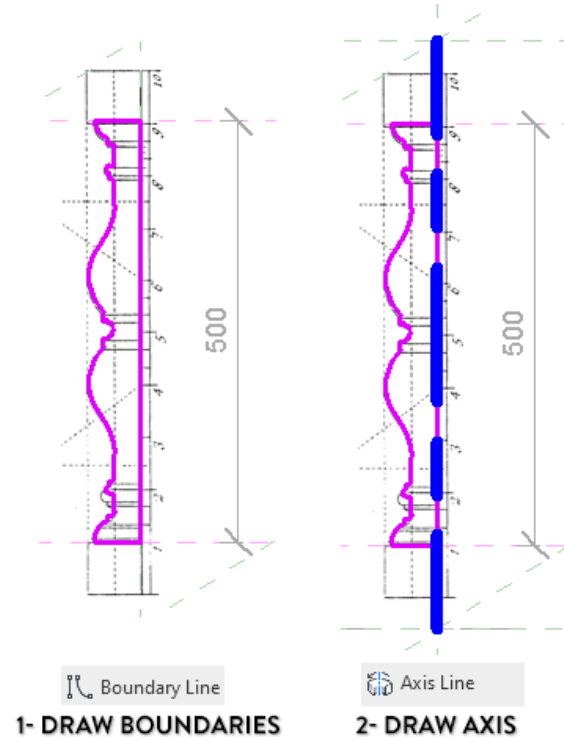
- Create a revolve shape and select the Center (Left/Right) reference plane.



**USE REVOLVE TOOL, USE REFERENCE PLANE:
CENTER (LEFT/RIGHT) AS A WORK PLANE**

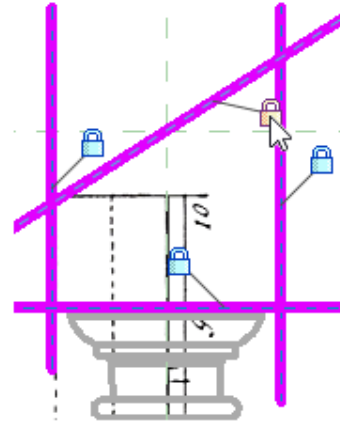
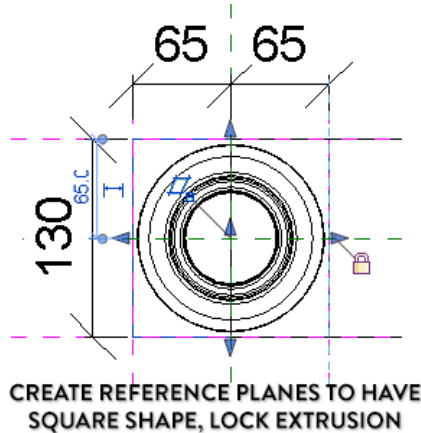
Create a Classical Baluster Family

- Draw half the profile with magenta lines.
- Pick the Axis Line tool, match the center reference plane.

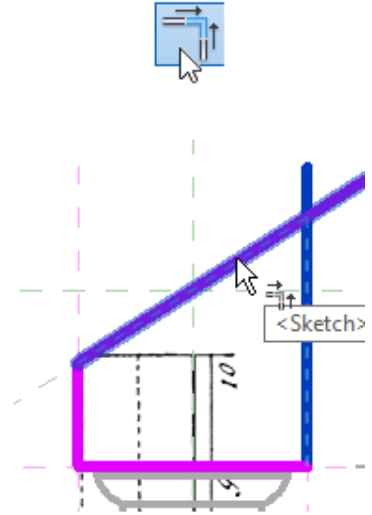


Create a Classical Baluster Family

- Create rectangle shaped parts above and below the main baluster part. Lock the extrusion to the reference planes.
- Adjust the position of the rectangles in a plan view.



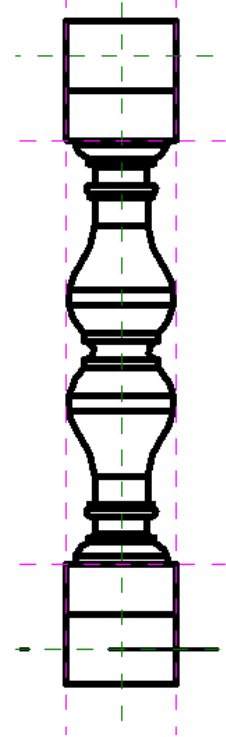
DRAW RECTANGLE PROFILE
SHAPE BY "PICKING"
REFERENCE PLANES



TRIM BOUNDARY LINES

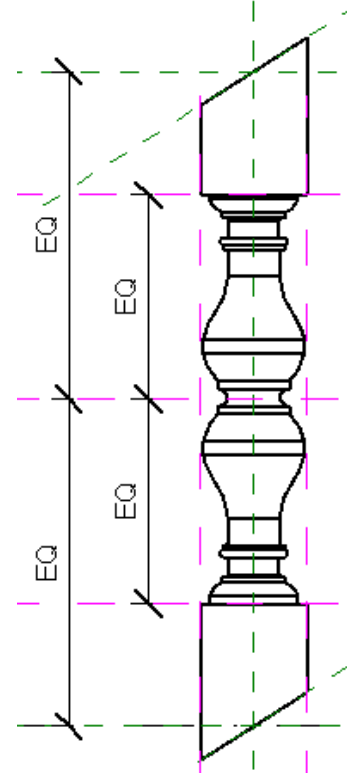
Create a Classical Baluster Family

- The main part of the baluster should be ready.
- Verify it in a 3D view to make sure it is ok.



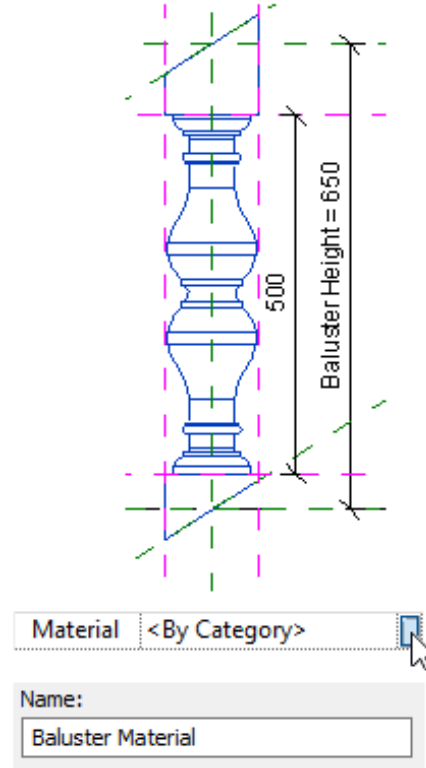
Create a Classical Baluster Family

- Create EQ dimensions to make sure the excess height is distributed equally between top and bottom.



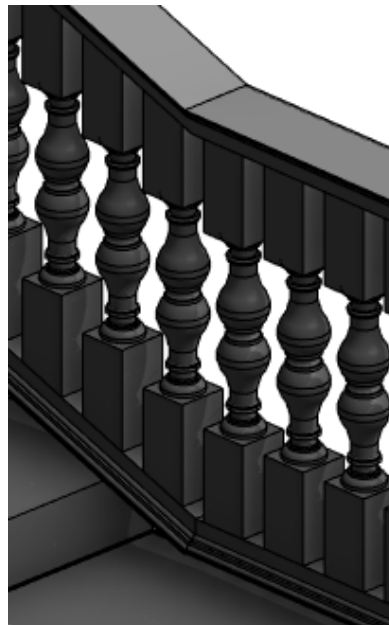
Create a Classical Baluster Family

- Add Material Parameter.
- Load the family back into the project.

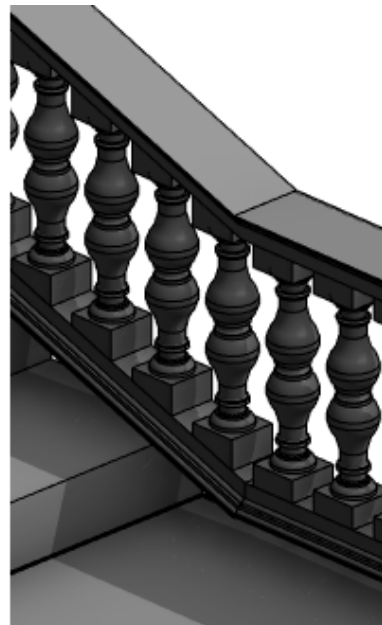


Create a Classical Baluster Family

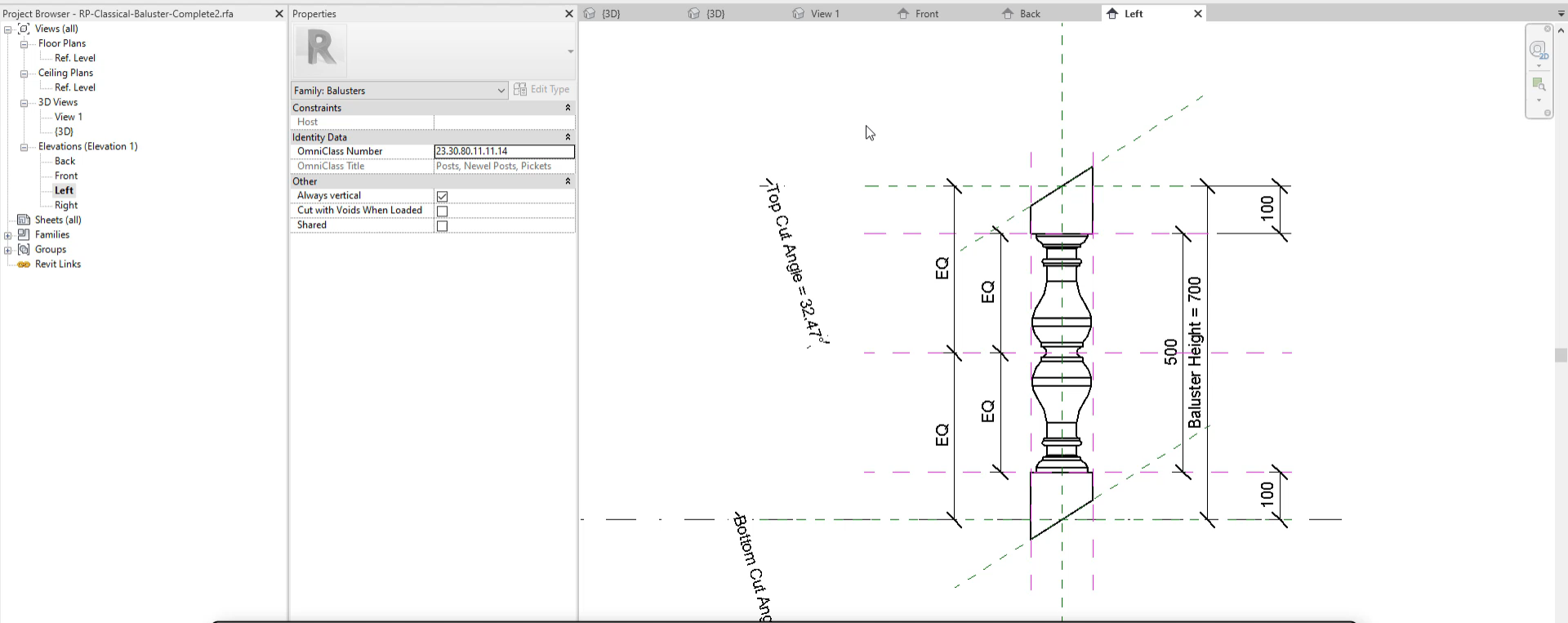
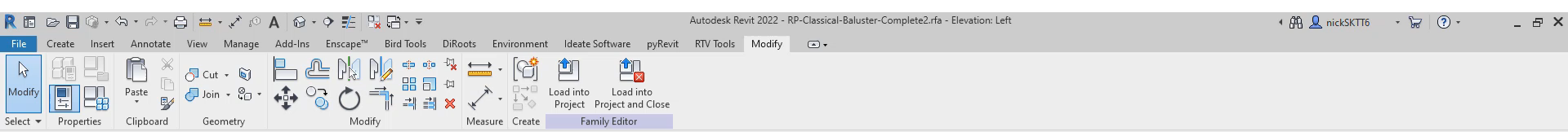
- You can see the difference between various railing height.



RAILING HEIGHT: 1200mm



RAILING HEIGHT: 850mm



USING A CLASSICAL BALUSTER FAMILY

The background of the slide features four abstract, dark, metallic-looking geometric shapes in the corners. These shapes resemble stylized, truncated pyramids or prisms, each with sharp edges and reflective surfaces that catch the light, creating bright highlights and deep shadows. They are positioned in the top-left, top-right, bottom-left, and bottom-right corners, framing the central text.

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