

# Modeling Complex Railings and Balusters in Revit

AS500129

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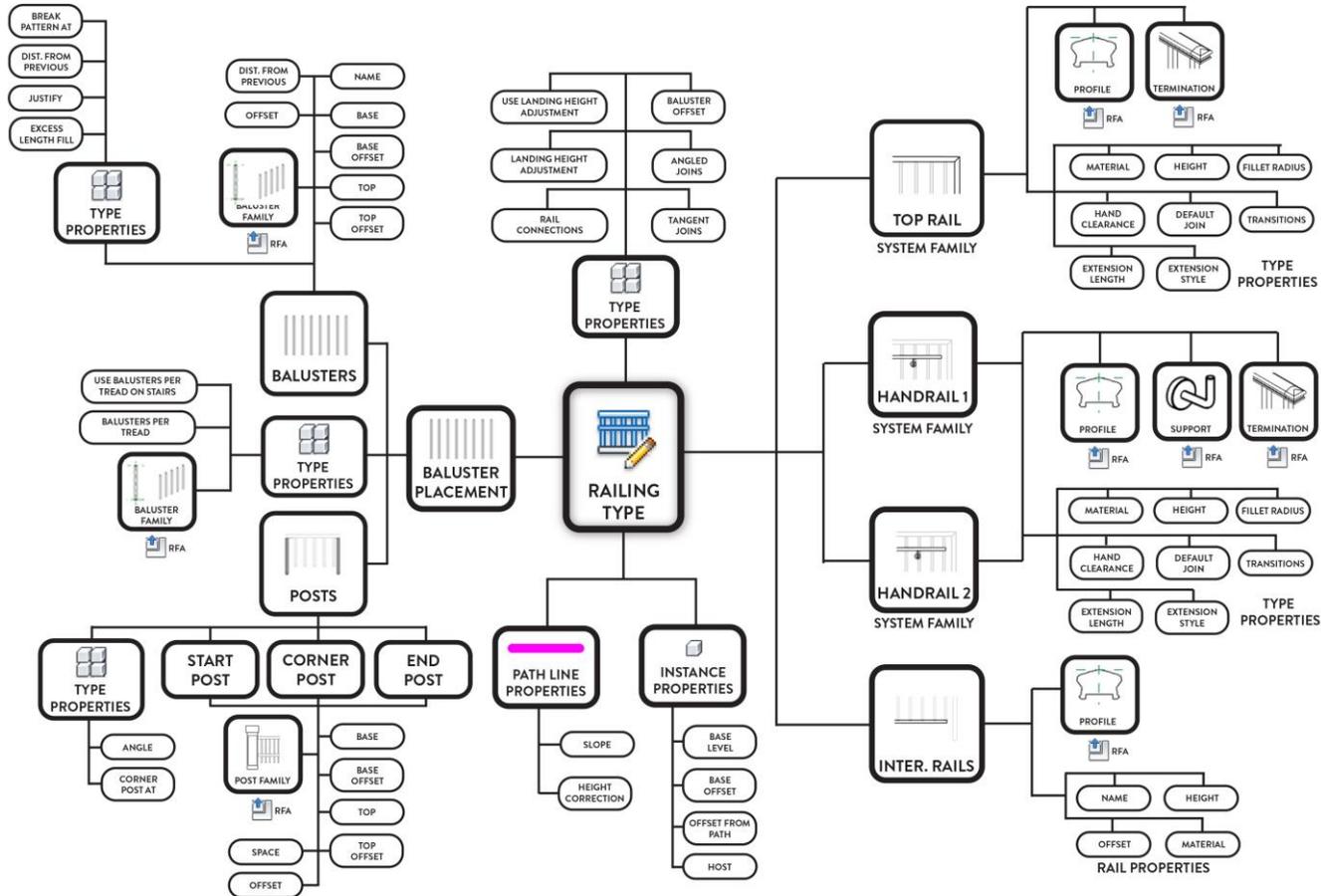
# The Ancestral Railing

## 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

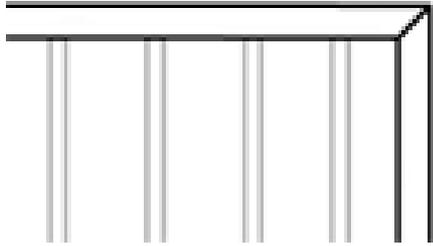


# Railings Topics Covered:

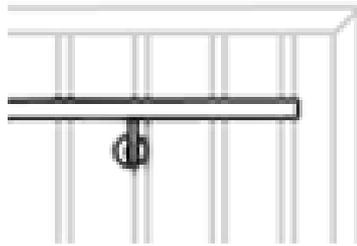
- Understanding all types of rails
- Setting up rail properties
- Additional railing settings that impact rails
- Understanding balusters & posts
- Creating an advanced baluster family

# **Mastering the Rail Properties**

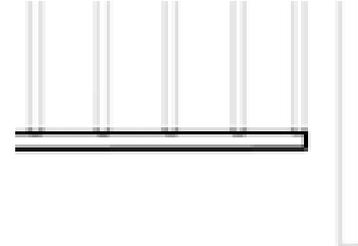
# 3 Types of Rails



- Top Rails

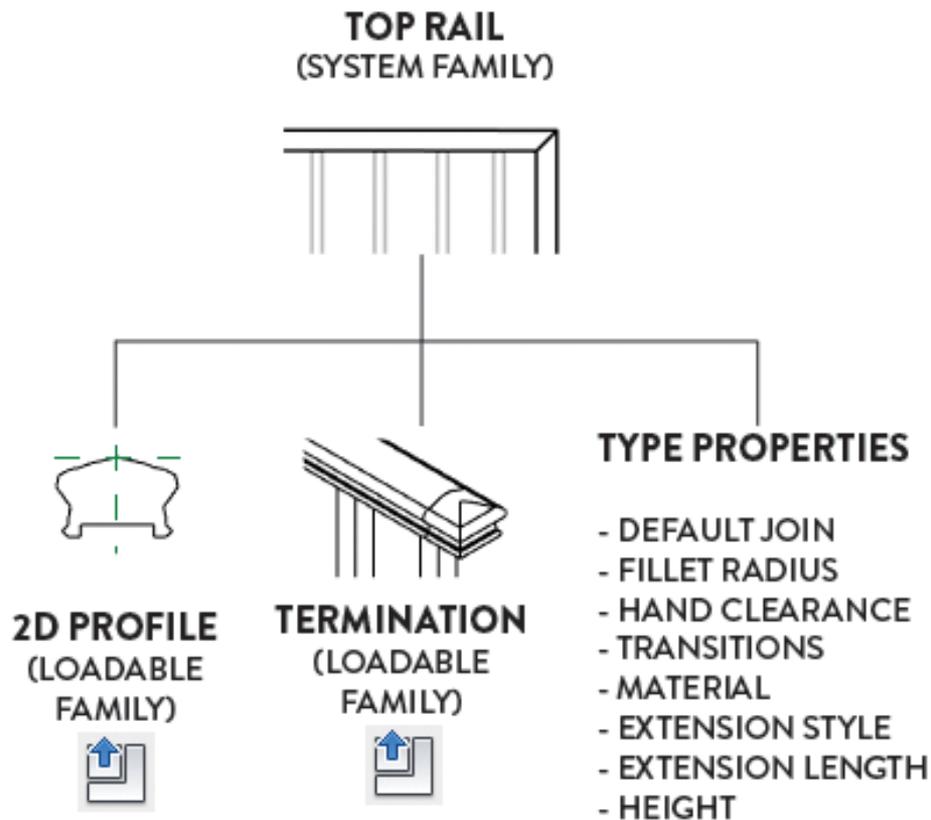


- Handrails

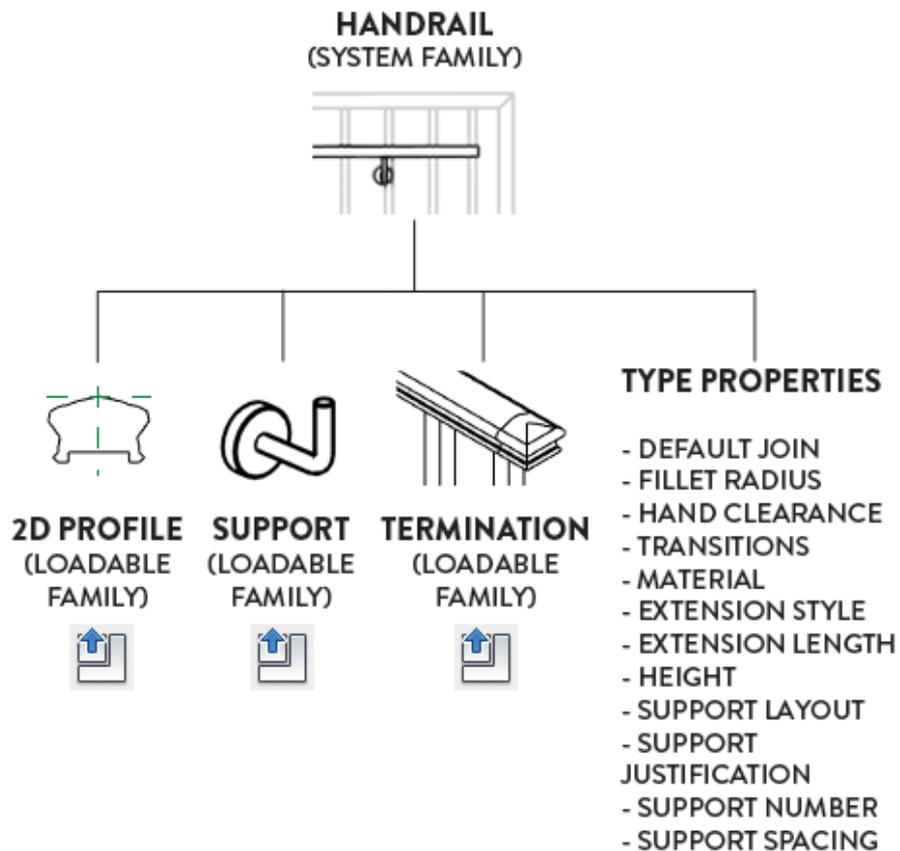


- Intermediate Rails (or non-continuous rails)

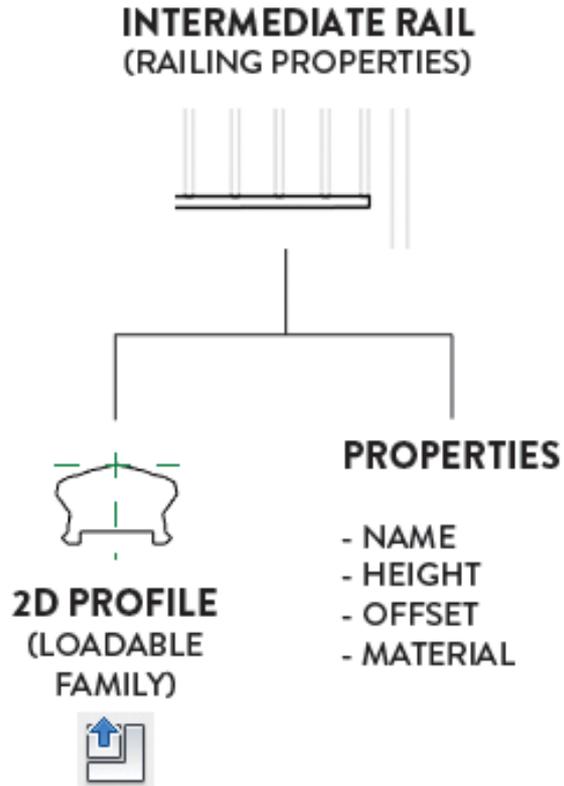
# Top Rail Properties



# Handrail Properties



# Intermediate Rails Properties



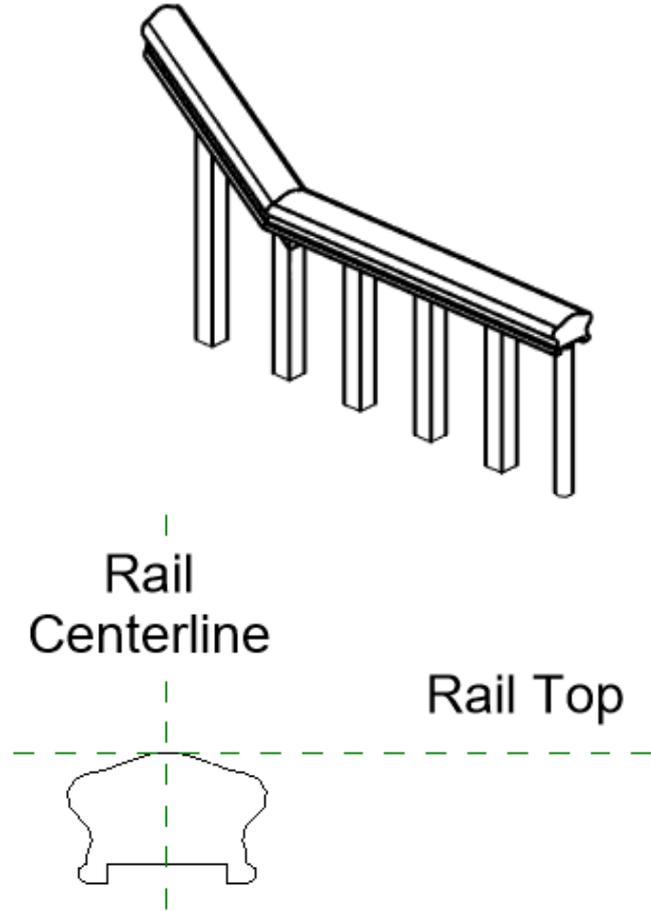
# Comparing 9 Rails Properties

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 	✓	✓	✗

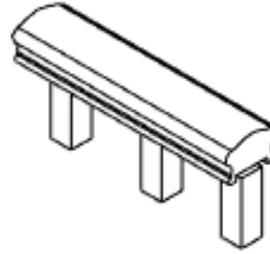
# Creating a Rail Profile

- Draw the profile below the center reference plane.

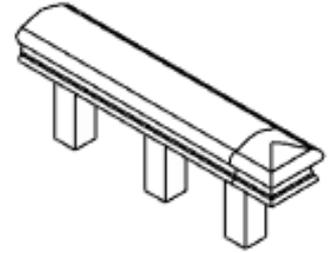


# Creating a Termination

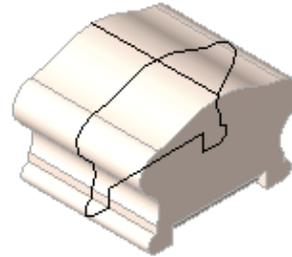
- Termination are placed at the end or beginning of a top rail / handrail.
- Can be used to avoid having a “straight” cut of the rail profile.
- To create the Termination family, create a sweep using the rail profile.
- Cut the sweep with a void extrusion.



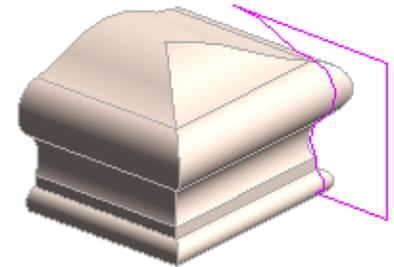
**NO TERMINATION**



**TERMINATION**



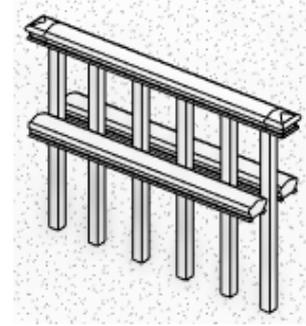
**1- MODEL SWEEP USING  
TOP RAIL PROFILE**



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

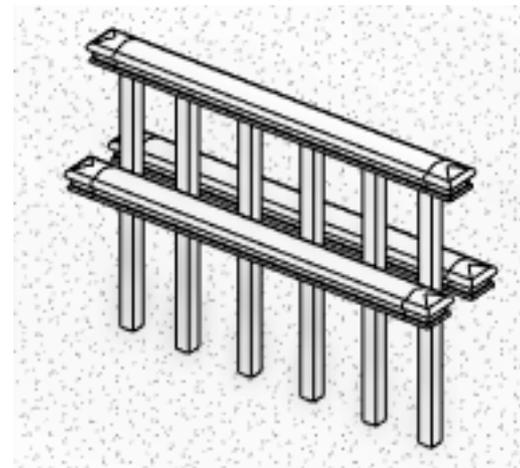
# Setting the Termination

- 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.



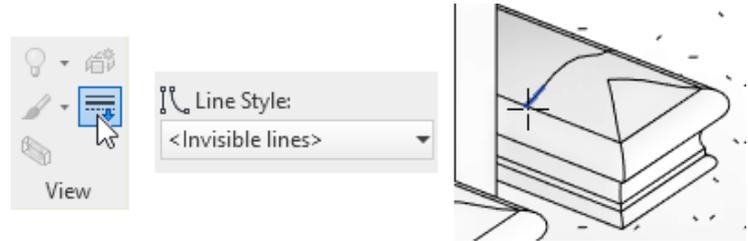
## Terminations

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

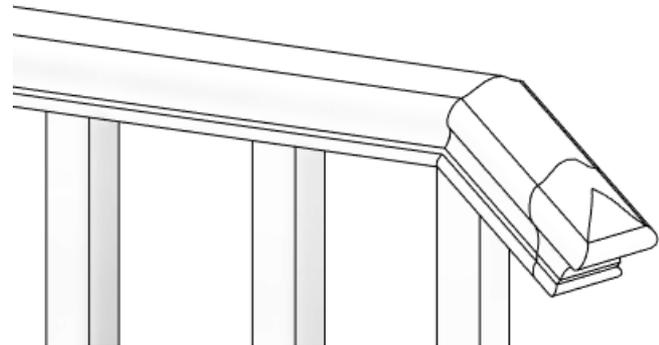


# Other Facts About Terminations

- 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

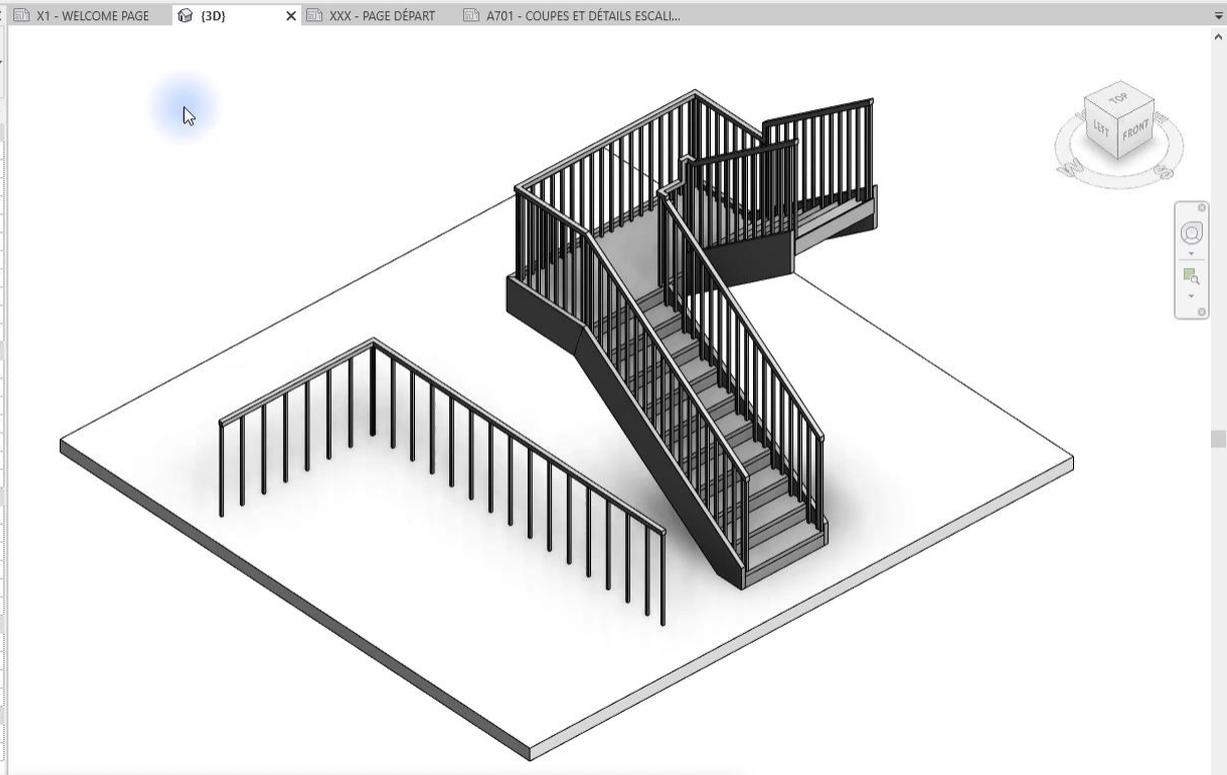
Properties

3D View

3D View: (3D) Edit Type

Graphics	
View Scale	1 : 25
Scale Value 1:	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	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

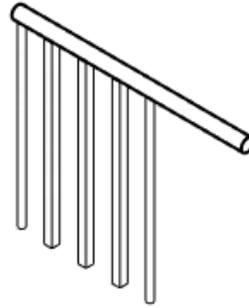
[Properties help](#)



# SETTING A RAIL PROFILE

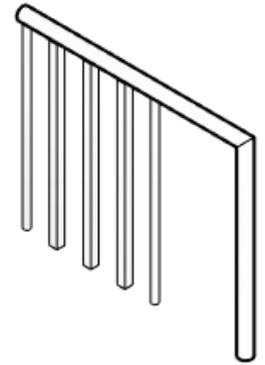
# Extensions

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



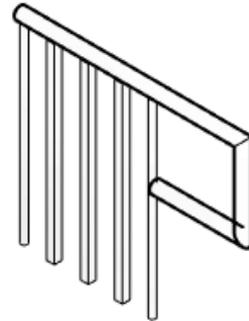
**Extension (Beginning/Bottom)**

Extension Style	None
Length	300.0



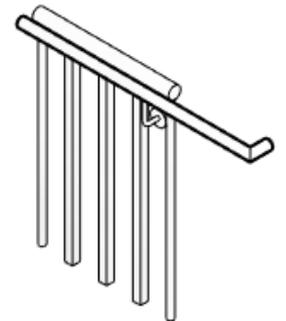
**Extension (Beginning/Bottom)**

Extension Style	Floor
Length	300.0



**Extension (Beginning/Bottom)**

Extension Style	Post
Length	300.0

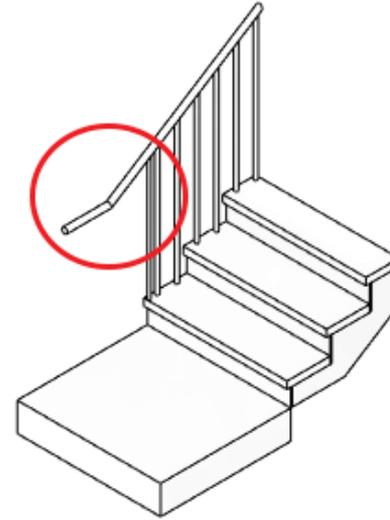


**Extension (Beginning/Bottom)**

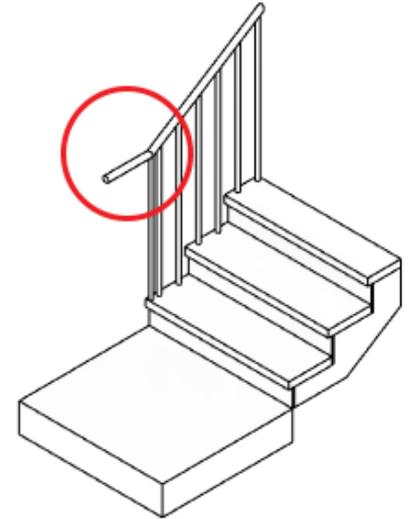
Extension Style	Wall
Length	300.0

# 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.



Extension (Beginning/Bottom)	
Extension Style	None
Length	300.0
Plus Tread Depth	<input checked="" type="checkbox"/>



Extension (Beginning/Bottom)	
Extension Style	None
Length	300.0
Plus Tread Depth	<input type="checkbox"/>

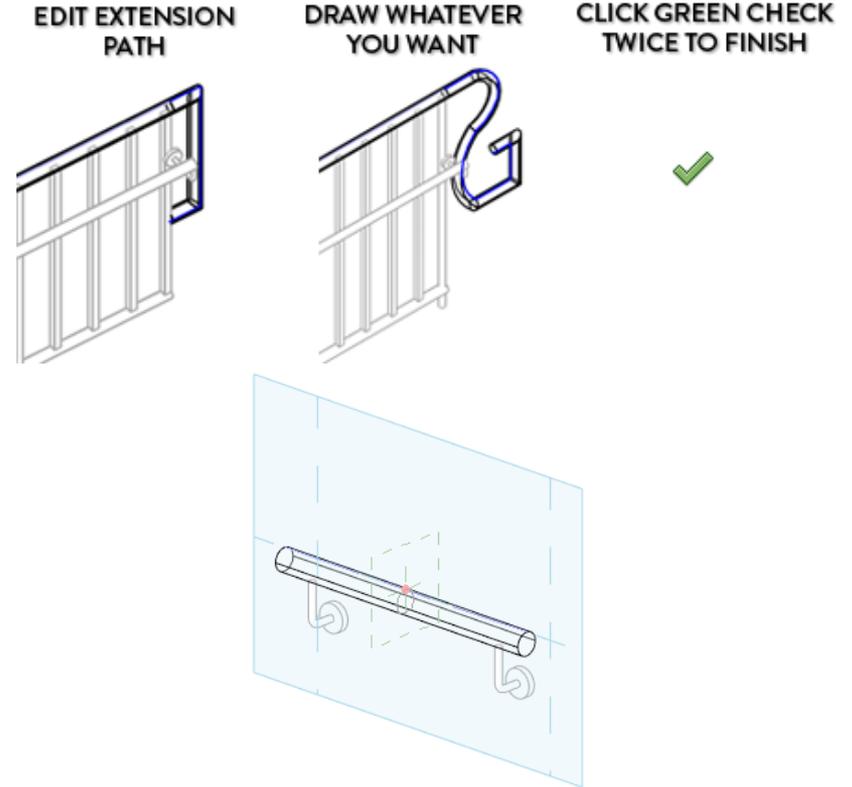
SET “PLUS TREAD DEPTH” PARAMETER

# 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.





Type Properties

Family: System Family: Top Rail Type Load...  
Type: RP\_TopRail\_6\_Goosneck Duplicate... Rename...

Type Parameters

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

What do these properties do?

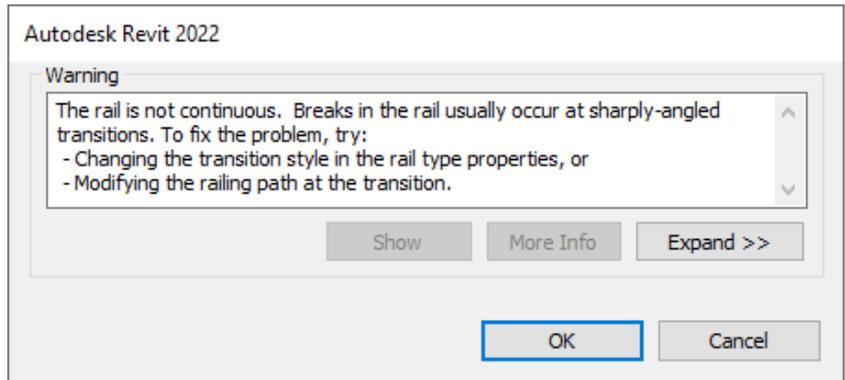
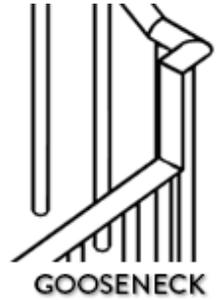
<< Preview OK Cancel Apply



# SETTING EXTENSIONS

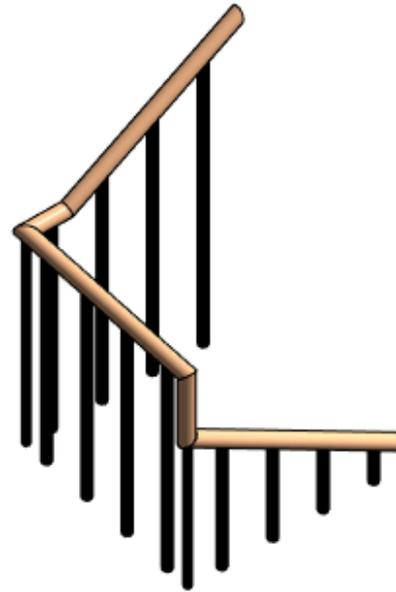
# Setting up Transitions

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

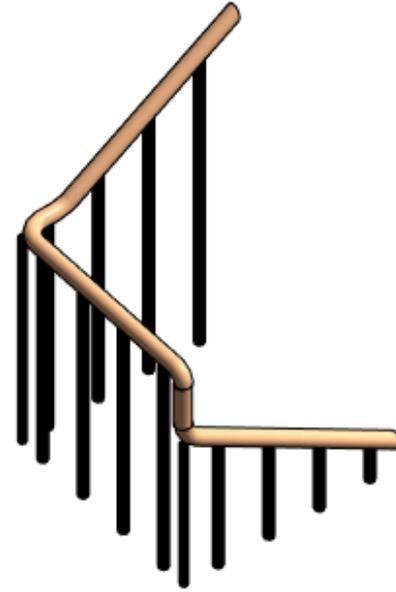


# Rail Join: Miter or Fillet

- 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.



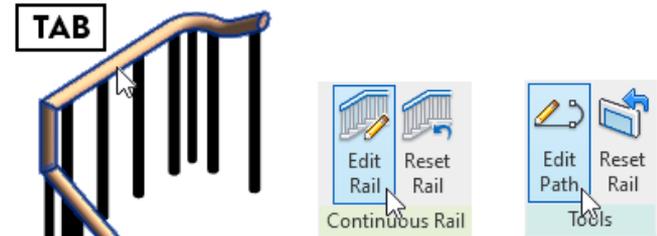
Construction	
Default Join	Miter
Fillet Radius	0.0



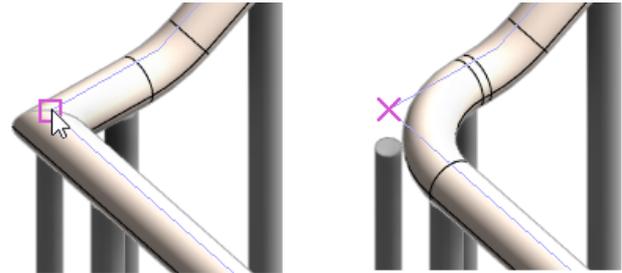
Construction	
Default Join	Fillet
Fillet Radius	50.0

# 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.

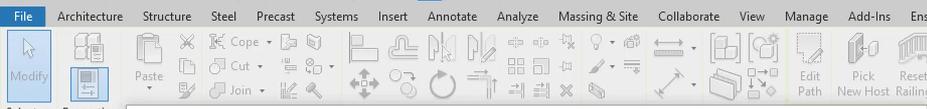


**SELECT TOP RAIL, CLICK EDIT RAIL, CLICK EDIT PATH**



**CLICK JOIN, CHANGE JOIN TYPE AND SET RADIUS**





Modify | Railings

Project Browser - RP-RAILINGS.rvt

- A500 - WALL S
- A600 - PLAN C
- A700 - INTERI
- A800 - DOOR S
- A900 - LEGEN
- X1 - WELCOM
- X2 - ALL TITLE

Families

- Analytical Link
- Annotation Sys
- Cable Trays
- Ceilings
- Conduits
- Curtain Panels
- Curtain System
- Curtain Wall M
- Detail Items
- Duct Systems
- Ducts
- Flex Ducts
- Flex Pipes
- Floors
- Pattern
- Pipes
- Piping Systems
- Profiles
- RP\_PRL\_An
- RP\_PRL\_Cir
- RP\_PRL\_Fat
- RP\_PRL\_Gu
- RP\_PRL\_Rei
- RP\_PRL\_Sta

Railings

- Handrail Ty
- Railing
- RP\_RAI\_Bal
- RP\_RAI\_Sup
- RP\_TERMIN
- Top Rail Ty

Ramps

- Roofs
- Stairs
- Structural Bea
- Structural Founda
- Walls

Groups

Properties help

Type Properties

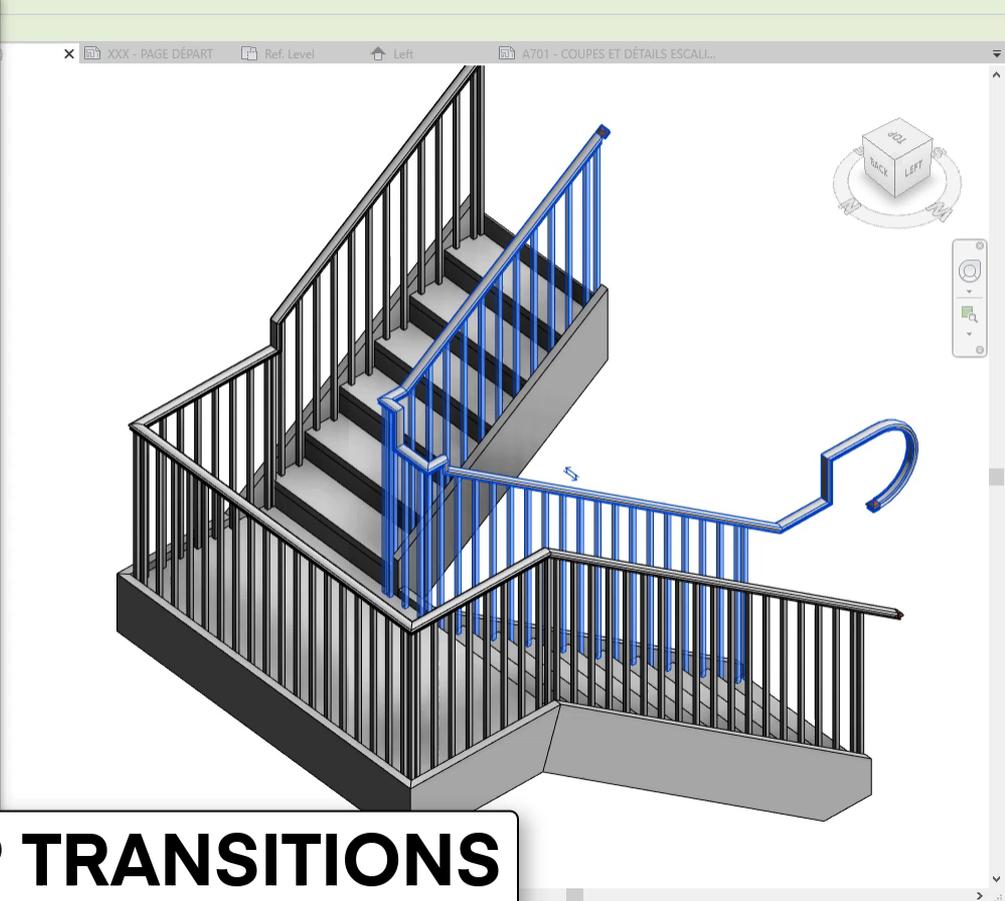
Family: System Family: Railing

Type: RP\_6\_Gooseneck

Type Parameters

Parameter	Value
<b>Construction</b>	
Railing Height	1100.0
Rail Structure (Non-Continuous)	Edit...
Baluster Placement	Edit...
Baluster Offset	0.0
Use Landing Height Adjustment	<input type="checkbox"/>
Landing Height Adjustment	0.0
Angled Joins	Add Vertical/Horizontal Segments
Tangent Joins	Extend Rails to Meet
Rail Connections	Trim
<b>Top Rail</b>	
Use Top Rail	<input checked="" type="checkbox"/>
Height	1100.0
Type	RP_TopRail_6_Gooseneck
<b>Handrail 1</b>	
Lateral Offset	
Height	
Position	None
Type	<None>
<b>Handrail 2</b>	
Lateral Offset	
Height	
Position	None
Type	<None>
<b>Identity Data</b>	
Type Image	
Keynote	
Model	
Manufacturer	
Type Comments	
URL	
Description	

<< Preview

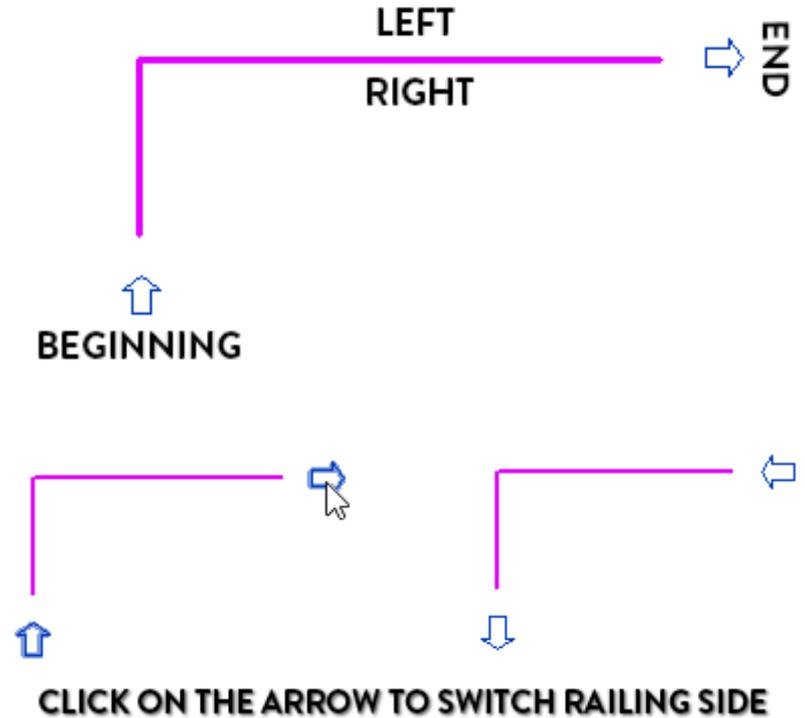


# SETTING UP TRANSITIONS

# 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

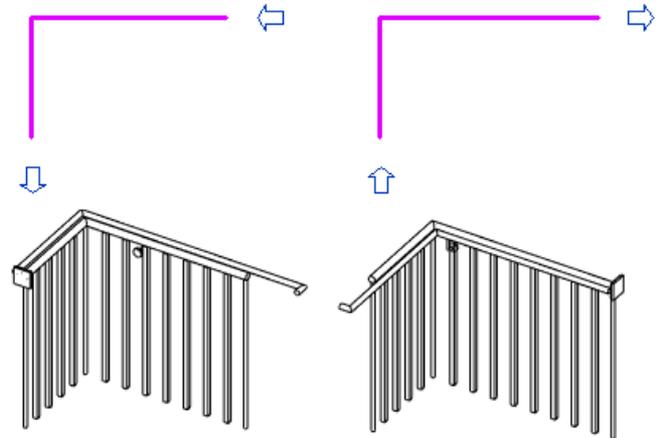
- You can see how the right-side handrail is placed depending on the arrows direction.

## TOP RAIL WITH END/TOP TERMINATION

Terminations	
Beginning/Bottom Termination	None
End/Top Termination	M_Termination

## RIGHT SIDE HANDRAIL

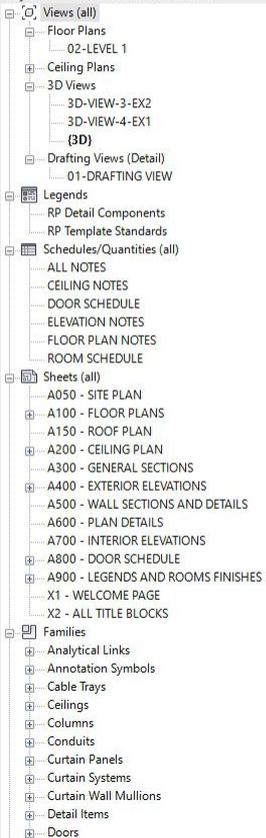
Handrail 1	
Position	Right
Type	Pipe - Wall Mount



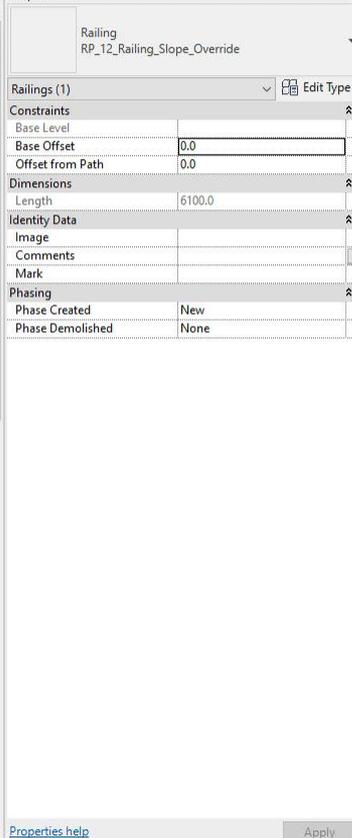


Modify | Railings

Project Browser - RP-RAILINGS-2021.rvt

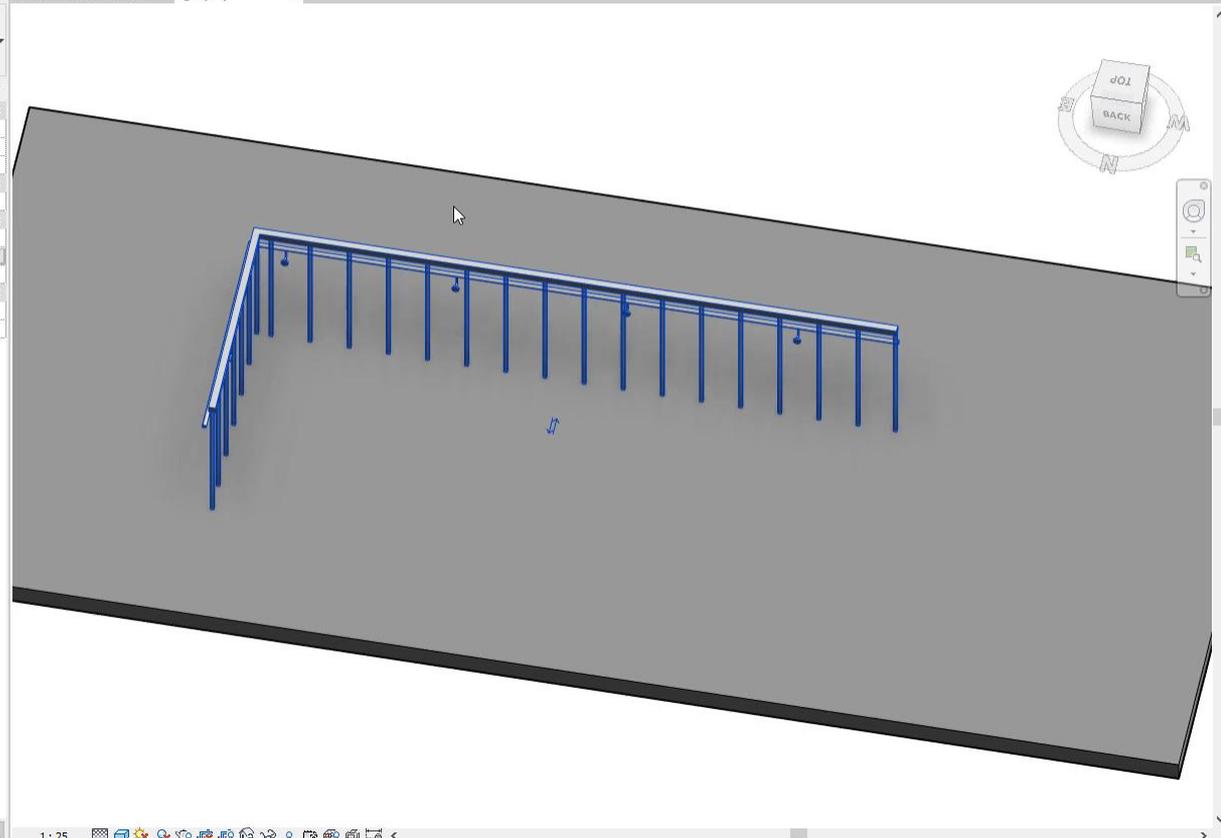


Properties



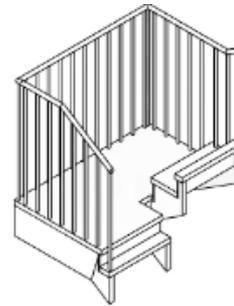
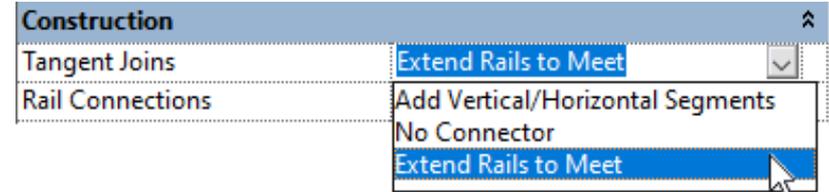
X1 - WELCOME PAGE

(3D)

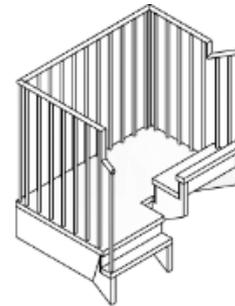


# Understanding Tangent Joins

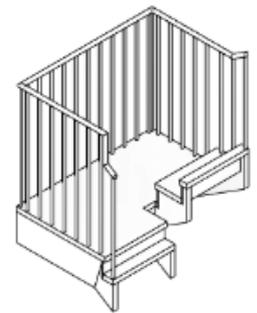
- In this example, you can see the difference between multiple options for the “Tangent Join” parameter.
- Usually, “Add Vertical / Horizontal Segment” is the best option.



**EXTEND RAILS  
TO MEET**



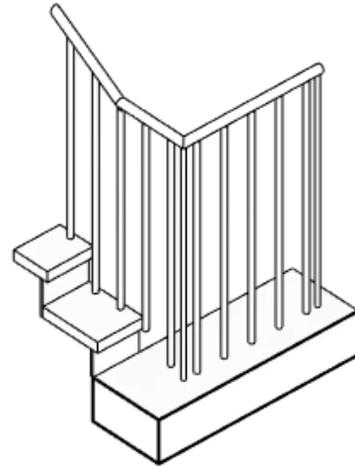
**NO CONNECTOR**



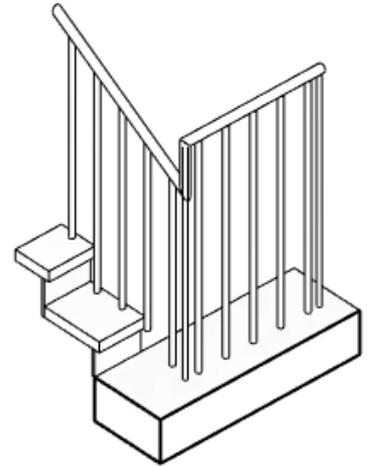
**ADD VERTICAL /  
HORIZONTAL  
SEGMENT**

# 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.



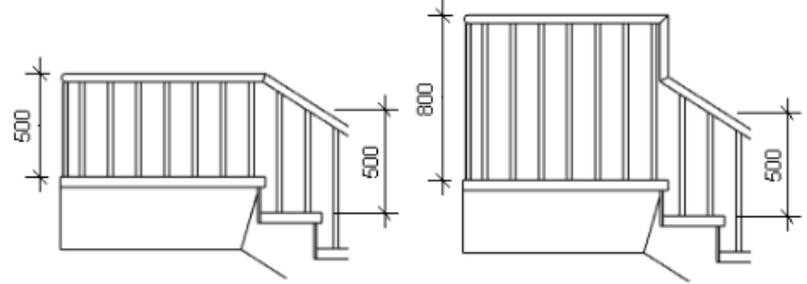
Angled Joins | Add Vertical/Horizontal Segments



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.

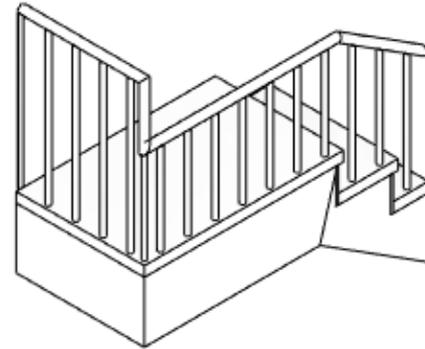
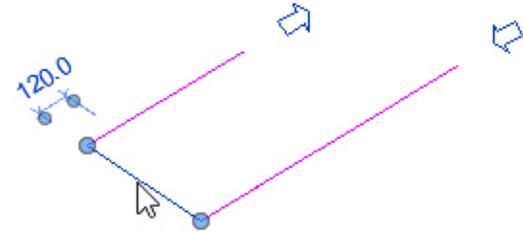
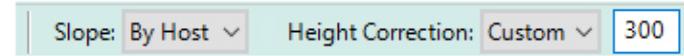


Construction	
Use Landing Height Adjustment	<input type="checkbox"/>
Landing Height Adjustment	0.0

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.

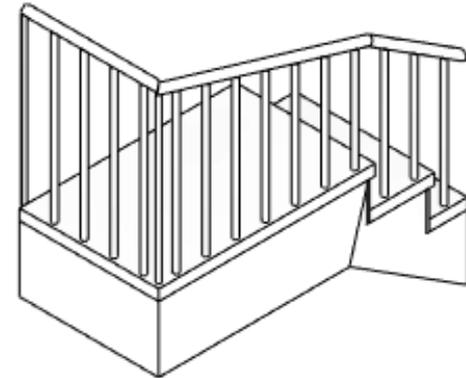
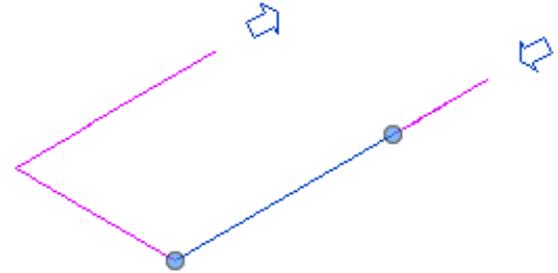


**SET "HEIGHT CORRECTION" VALUE TO AN INDIVIDUAL RAILING PATH LINE**

# 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.

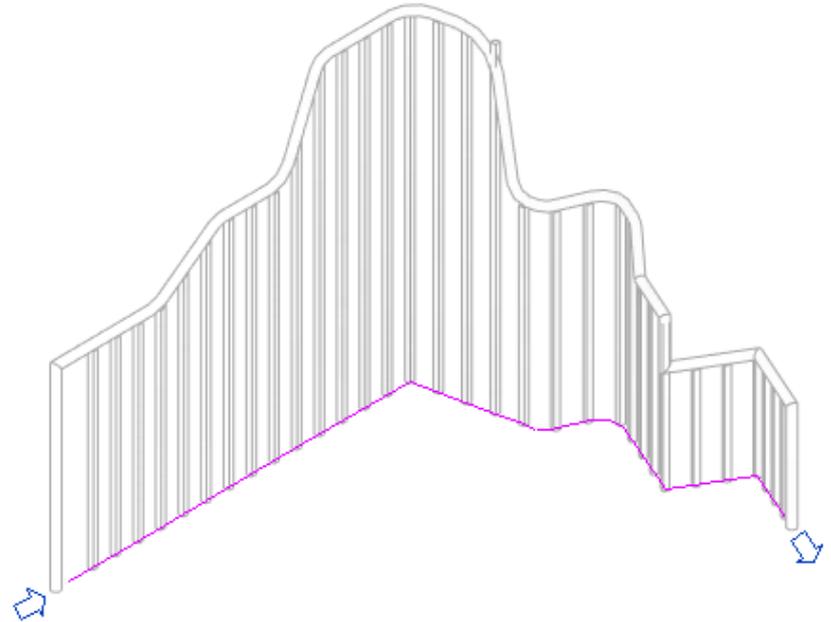
Slope: Sloped ▾ Height Correction: By Type ▾ 0



**SET “SLOPE” PARAMETER TO AN  
INDIVIDUAL RAILING PATH LINE**

# Railing Path Slope Override

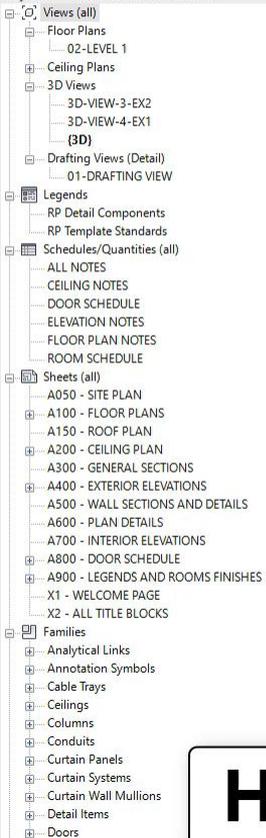
- By combining Landing Height and Path Slope you can create very specific railing shapes.





Modify | Railings

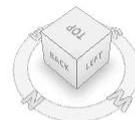
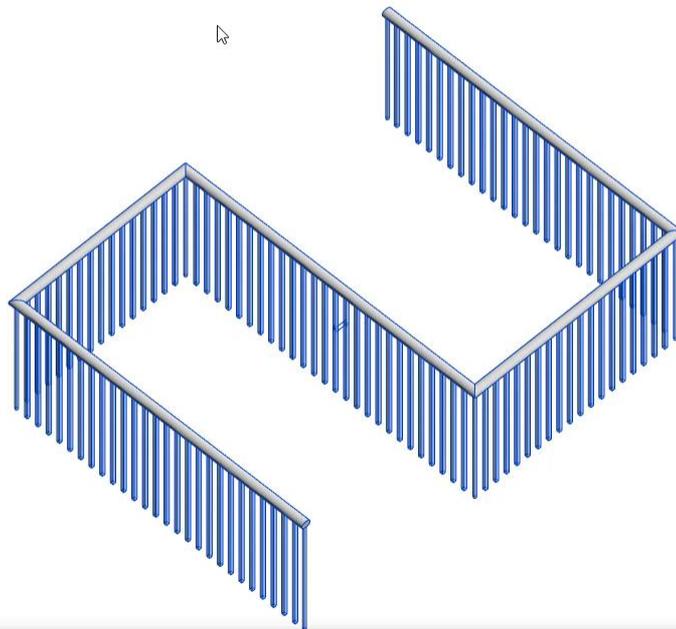
Project Browser - RP-RAILINGS-2021.rvt



Properties

Railing	
RP_5_EX1	
Railings (1) <span>Edit Type</span>	
<b>Constraints</b>	
Base Level	LEVEL 1
Base Offset	0.0
Offset from Path	0.0
<b>Dimensions</b>	
Length	11600.0
<b>Identity Data</b>	
Image	
Comments	
Mark	
<b>Phasing</b>	
Phase Created	New
Phase Demolished	None

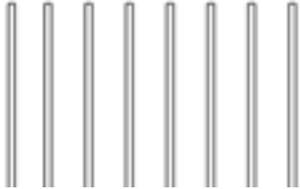
X1 - WELCOME PAGE (3D)



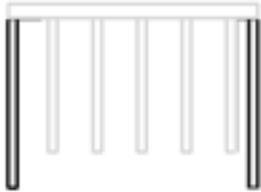
# HEIGHT CORRECTION + SLOPE OVERRIDE

# Balusters & Posts

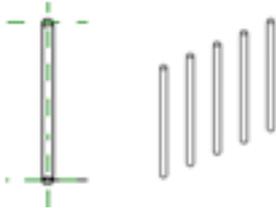
# Balusters vs Posts



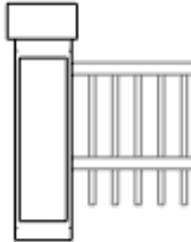
▪ Balusters



▪ Posts



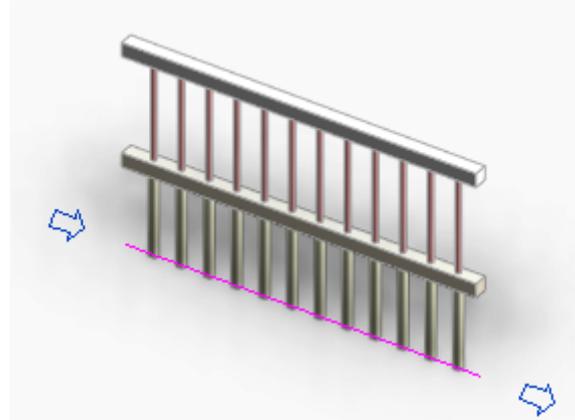
▪ Baluster Family



▪ Post Family

# Vertically Aligned Balusters

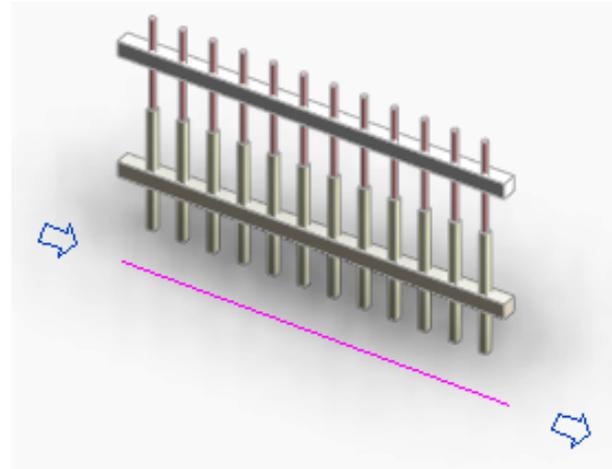
- In the balusters menu, set two balusters type. Set the second one to a Distance from Previous value = 0.



	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

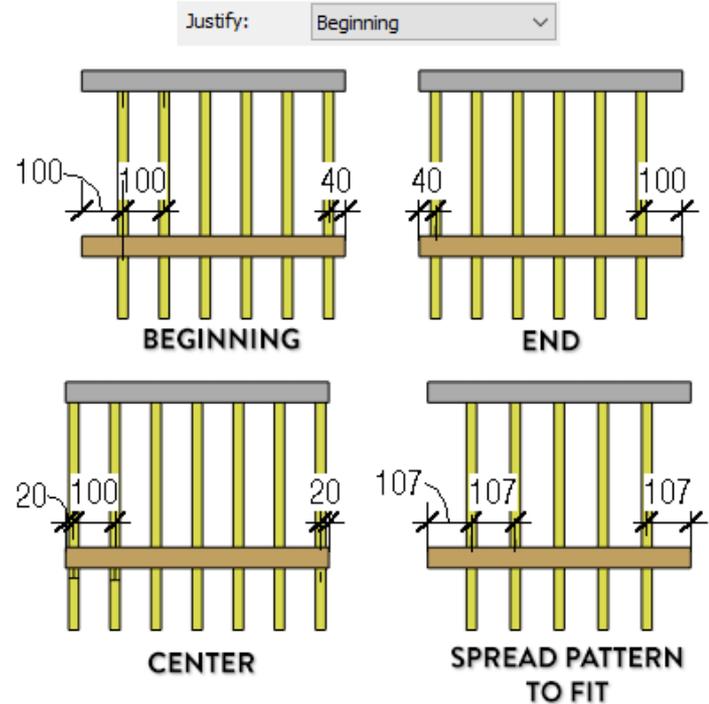
- Play around with the Base and Top offset values.



	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

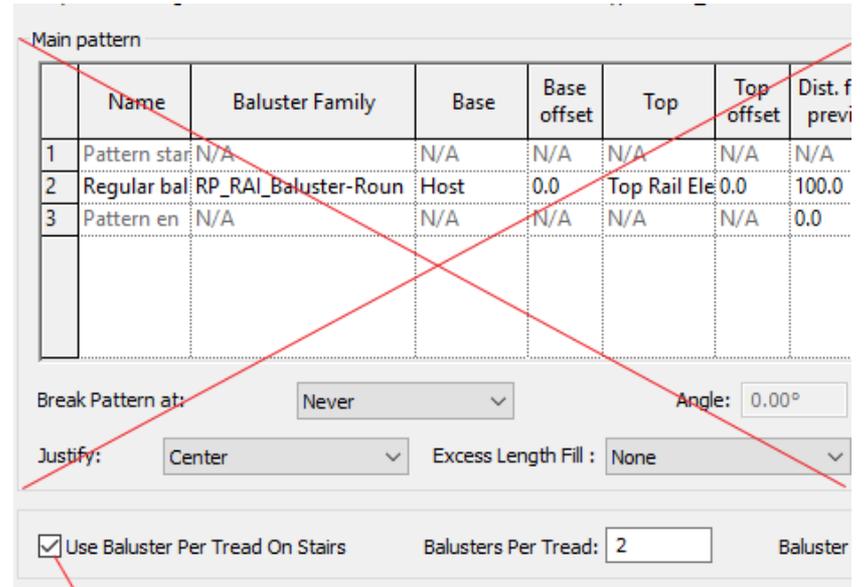
# Setting the Justification

- 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”

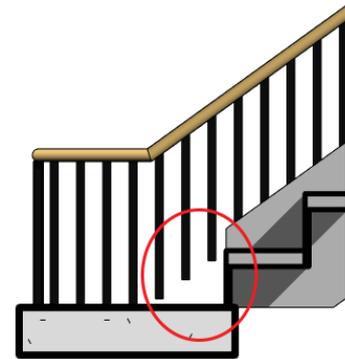
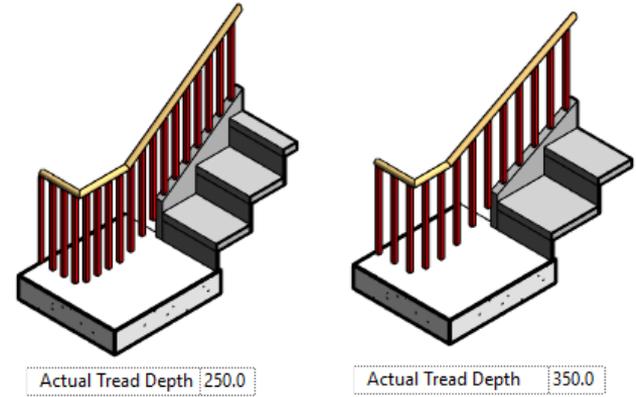
- When this option is activated, the main pattern is completely ignored when the railing is placed on stairs.



WHEN THIS IS CHECKED, “MAIN PATTERN” IS IGNORED

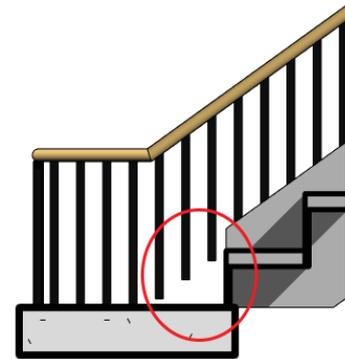
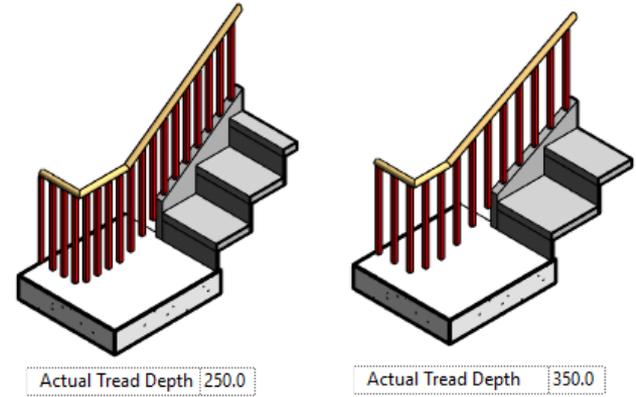
# “Use Balusters Per Tread on Stairs”

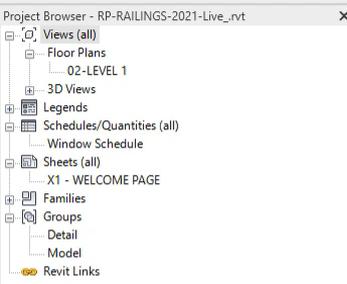
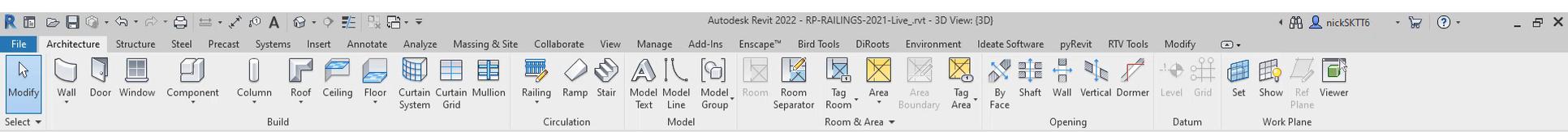
- If the railing with the “Use Balusters per Tread on Stairs” extends beyond the stairs, it will keep the same baluster spacing.
- The spacing is based on the number of balusters per tread and on the tread depth.
- There is a known glitch where the balusters don't touch the ground.



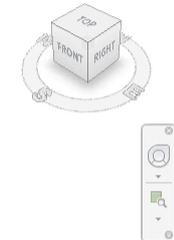
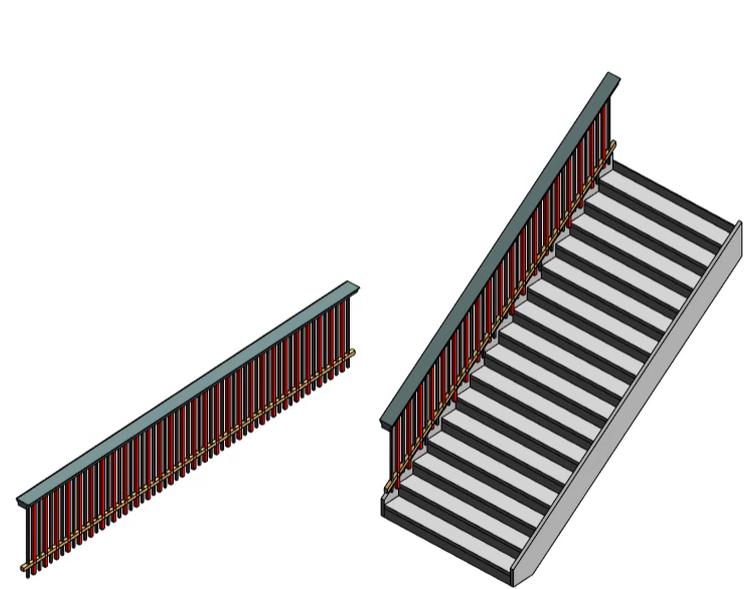
# “Use Balusters Per Tread on Stairs”

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





3D View	
3D View: {3D} Edit Type	
<b>Graphics</b>	
View Scale	1 : 25
Scale Value 1:	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"/>
<b>Extents</b>	
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"/>
<b>Camera</b>	
Rendering Settings	Edit...
Locked Orientation	<input type="checkbox"/>
Projection Mode	Orthographic
Eye Elevation	16953.0
Target Elevation	-96270.8
Camera Position	Adjusting
<b>Identity Data</b>	
View Template	<None>
View Name	{3D}
Dependency	Independent
Title on Sheet	
<b>Phasing</b>	
Phase Filter	Show Complete
Phase	New



**USING "BALUSTERS PER TREAD ON STAIRS"**

# The Offset Value on Balusters

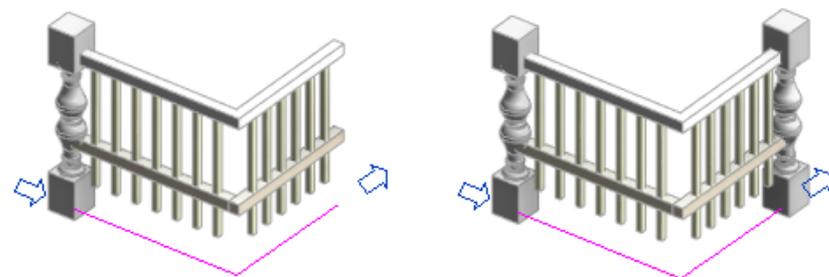
- A positive offset value pushes the balusters to the left side, while a negative value push them to the right side.

	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



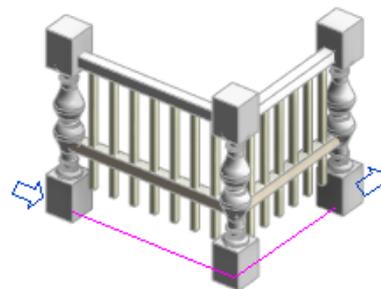
# Using Posts

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



**START POST ONLY**

**START + END POSTS**



**START + END +  
CORNER POSTS**

# Space Balue on Posts

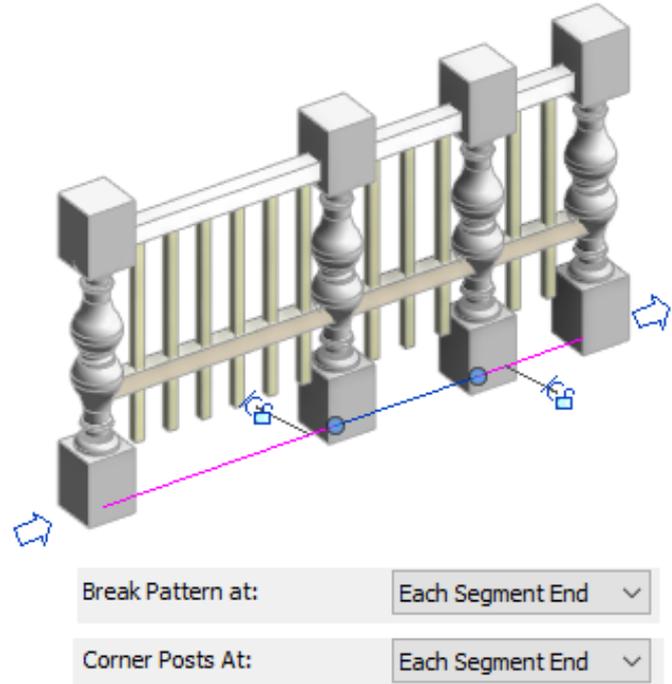
- A positive space value pushes the post towards the beginning, while a negative value pushes the post towards the end of the railing.

	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.



Project Browser - RP-RAILINGS-2021-Live\_rvt

- Views (all)
- Floor Plans
  - 02-LEVEL 1
- 3D Views
- Legends
- Schedules/Quantities (all)
  - Window Schedule
- Sheets (all)
  - X1 - WELCOME PAGE
- Families
- Groups
  - Detail
  - Model
- Revit Links

Properties

Railing  
RP\_Posts

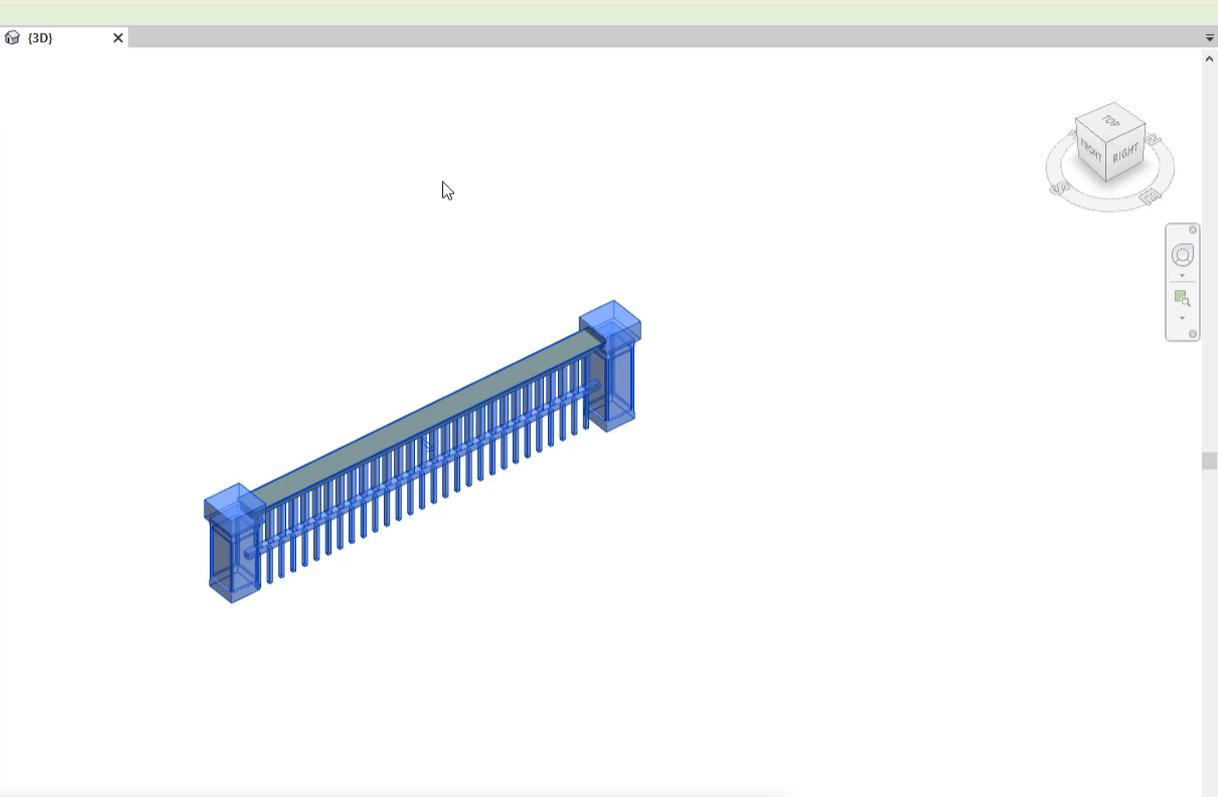
Railings (1) Edit Type

Constraints	
Base Level	LEVEL 1
Base Offset	0.0
Offset from Path	0.0

Dimensions	
Length	3000.0

Identity Data	
Image	
Comments	
Mark	

Phasing	
Phase Created	New
Phase Demolished	None



# SETTING UP CORNER POSTS

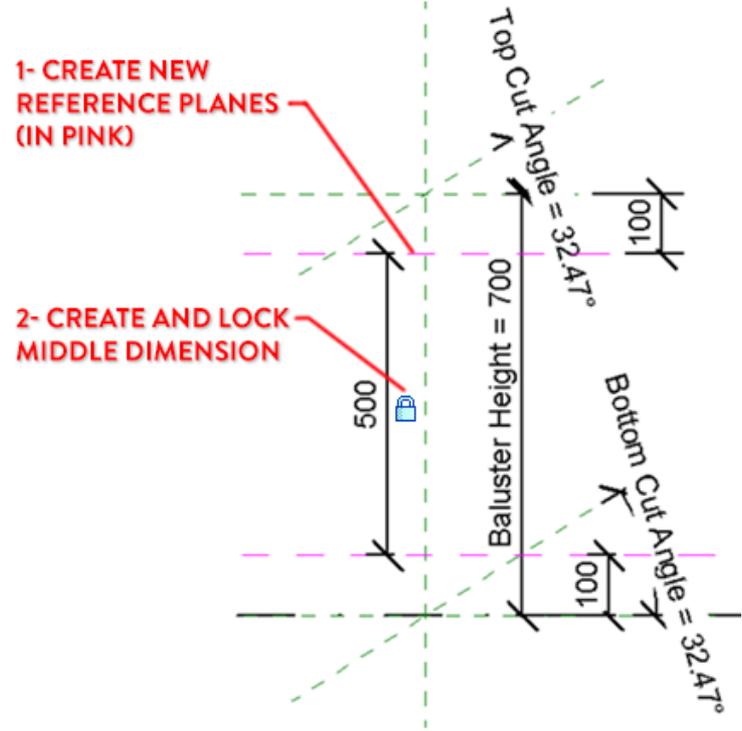


# **Creating a Classical Baluster Family**



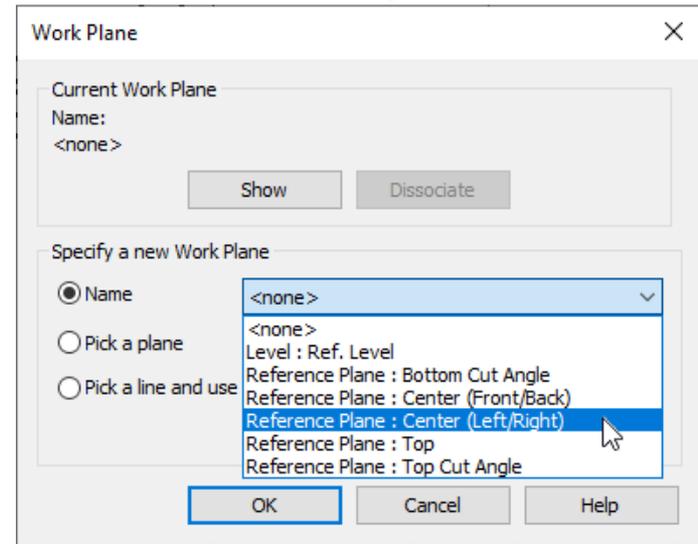
# Create a Classical Baluster Family

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



# Create a Classical Baluster Family

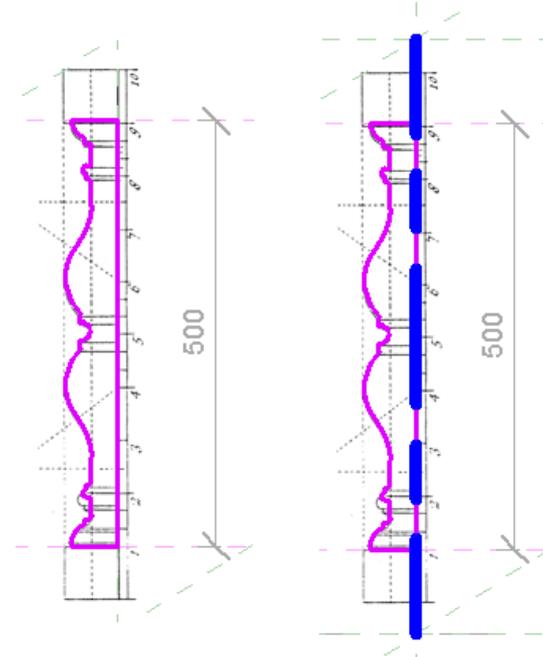
- Create a revolve shape and select the Center (Left/Right) reference plane.



**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.



 Boundary Line

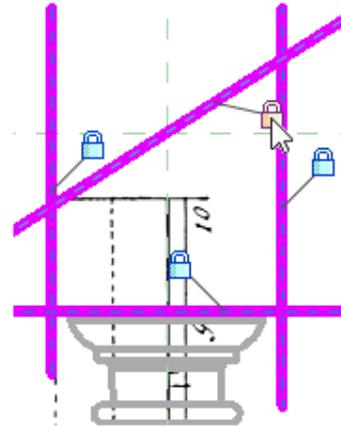
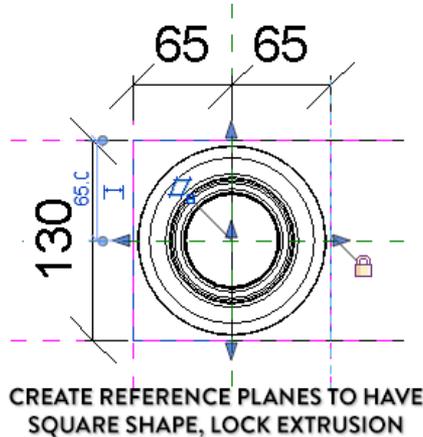
**1- DRAW BOUNDARIES**

 Axis Line

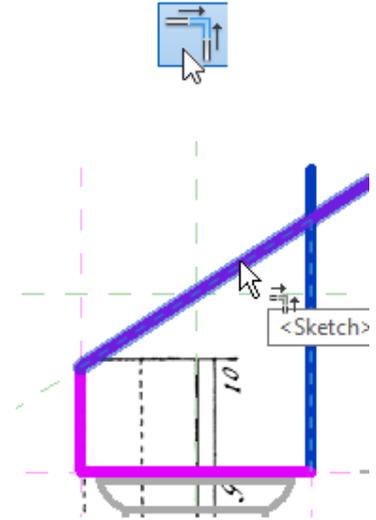
**2- DRAW AXIS**

# 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.



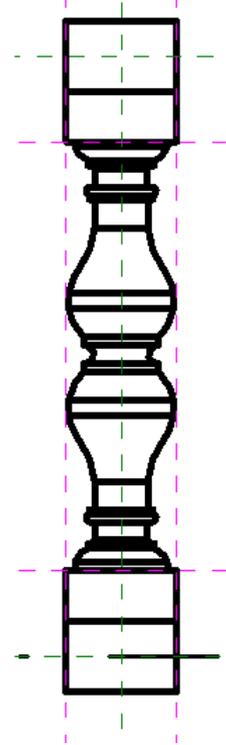
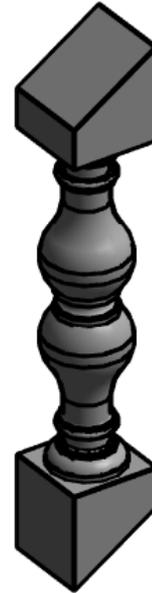
DRAW RECTANGLE PROFILE  
SHAPE BY "PICKING"  
REFERENCE PLANES



TRIM BOUNDARY LINES

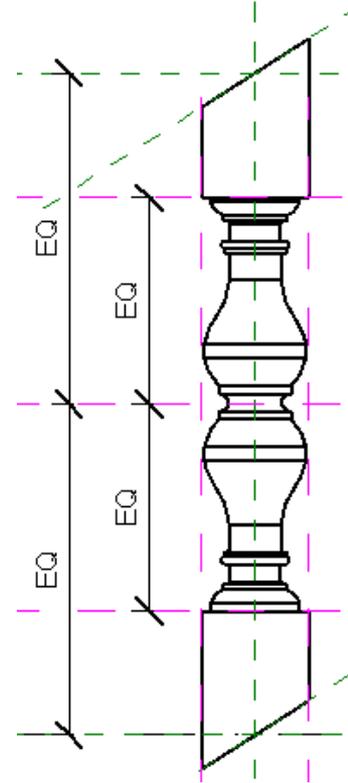
# Create a Classical Baluster Family

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



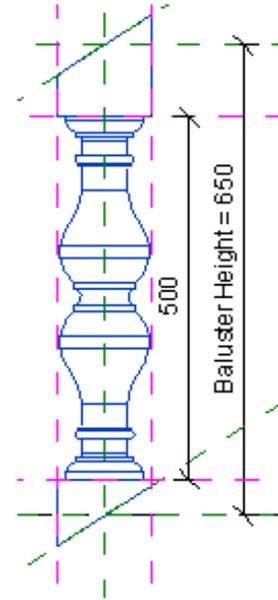
# Create a Classical Baluster Family

- 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.



Material <By Category>

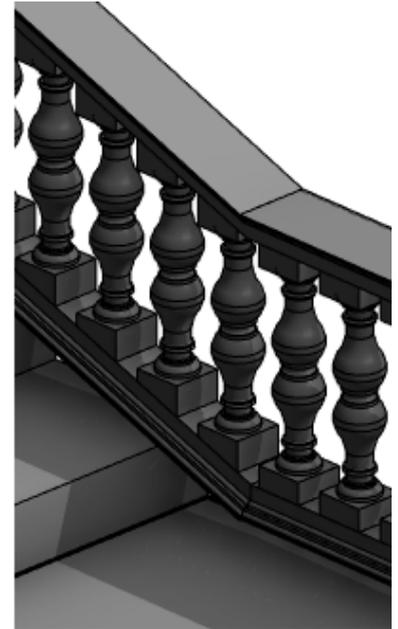
Name:  
Baluster Material

# Create a Classical Baluster Family

- You can see the difference between various railing height.



RAILING HEIGHT: 1200mm



RAILING HEIGHT: 850mm

Project Browser - RP-Classical-Baluster-Complete2.rfa

- Views (all)
- Floor Plans
  - Ref. Level
- Ceiling Plans
  - Ref. Level
- 3D Views
  - View 1 (3D)
- Elevations (Elevation 1)
  - Back
  - Front
  - Left**
  - Right
- Sheets (all)
- Families
- Groups
- Revit Links

Properties

Family: Balusters Edit Type

Constraints

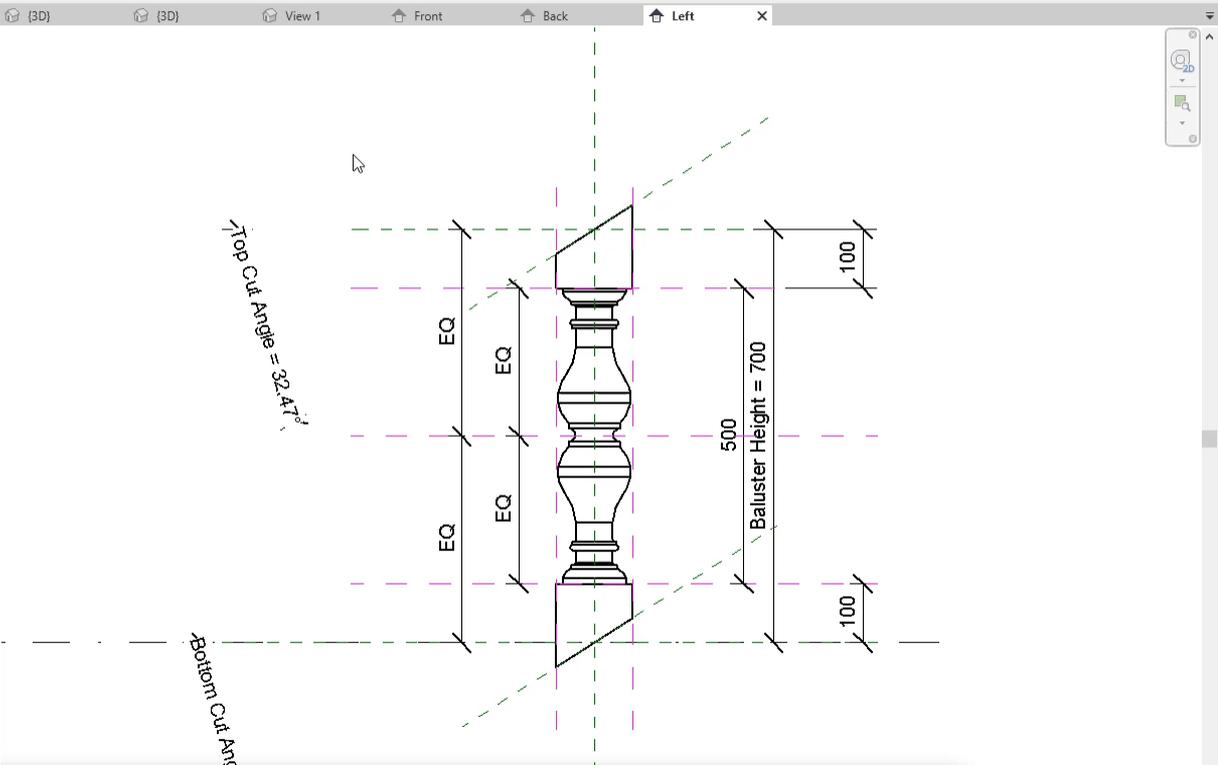
Host

Identity Data

OmniClass Number	23.30.80.11.11.14
OmniClass Title	Posts, Newel Posts, Pickets

Other

Always vertical	<input checked="" type="checkbox"/>
Cut with Voids When Loaded	<input type="checkbox"/>
Shared	<input type="checkbox"/>



# USING A CLASSICAL BALUSTER FAMILY

The background of the slide is black with several large, dark grey, metallic-looking geometric shapes that resemble parts of a computer monitor or a stylized architectural structure. These shapes are positioned in the corners and along the sides, creating a sense of depth and modernity. The text is centered in a bold, white, sans-serif font.

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