REVIT PURE PRESENTS

PAMPHLETS

ISSUE #18 / FALL 2020

RAILINGS
PART 1

revitpure.com

PAMPHLETS COLLECTION

ISSUE #1
WORKSETS

ISSUE #2
SCHEDULES

ISSUE #3
PHASES

ISSUE #4
LINK CAD

ISSUE #5
FILTERS

ISSUE #6
VIRTUAL REALITY

ISSUE #7
3D VIEWS

ISSUE #8
PLAN NOTES

ISSUE #9
COORDINATES

ISSUE #10
SCOPE BOXES

ISSUE #11
FINISHES

ISSUE #12
LINE WEIGHTS

PAMPHLETS COLLECTION

ISSUE #13
DOORS

ISSUE #14
SHARED SITES

ISSUE #15
pyREVIT

ISSUE #16
FREE ADD-INS

ISSUE #17
SLANTED WALLS

ISSUE #18
**RAILINGS
PART 1**

WHAT IS THIS "PAMPHLET" ?

Revit Pure Pamphlets are published 4 times a year by email. Each edition covers a very specific Revit theme. We like to pick themes that are complex and confusing. Our job is to make these topics simple for you.

WHY RAILINGS?

Railings is one of these topics you could write a 1000 pages book about. There are so many mysterious little features hidden from most users.

In fact, both the fall 2020 and winter 2021 pamphlets will be dedicated to railings. In the first part, everything will be about rails. How to create specific shapes, transitions, height, terminations and much more.

The upcoming pamphlet will explore balusters and posts.

This pamphlet assumes that you have some basic proficiency using railings. If not, check out our Railings BASICS guide by clicking this link:

https://revitpure.com/s/Revit-Pure-BASICS-Railings.pdf

Thanks and good luck! Now, let's get going.

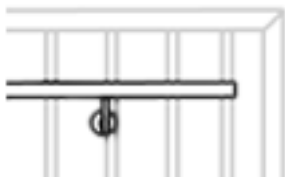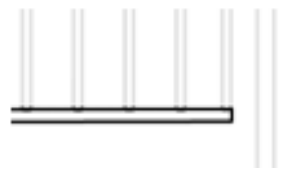## 3 TYPES OF RAILS

TOP RAIL

Top rail is the highest horizontal element of a railing. It is created by selecting a 2D profile and a height.

HANDRAIL

Handrail is an intermediate rail used for hands. They are linked to a wall or to a railing with **Supports.**

INTERMEDIATE RAIL

Any horizontal rail other than the **Top Rail** and the **Handrail**. Can be used to constraints balusters. Also known as **Non-Continuous Rails.**

Top Rails and **Handrails** have their own system families. They can be found in the project browser. Different types can be used on different railings.
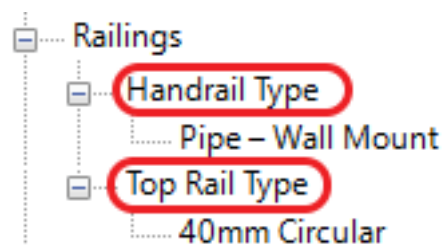
In the railings properties, you can select a **Top Rail** type and set the height. Click the 3 small dots to access the top rail properties.

Top Rail	
Use Top Rail	☑
Height	1100.0
Type	RP_Top Rectangular - 50x50mm

You can have 2 different **Handrail** types for each railing type. Set the right/left position and the type used. Unlike Top Rails, the height is set in the Handrail type properties.

Handrail 1	
Lateral Offset	55.0
Height	900.0
Position	Left and Right
Type	RP_Pipe – Wall Mount
Handrail 2	
Lateral Offset	55.0
Height	900.0
Position	Right
Type	RP_Rectangular – Wall Mount

SET HANDRAILS PROPERTIES

As for **Intermediate Rails**, they are created directly in the main Railing type properties. Access the menu by clicking on Rail Structure (Non-Continuous). Then, set setting properties like Height, Offset, Profile and Material.

Construction	
Railing Height	1100.0
Rail Structure (Non-Continuous)	Edit...

	Name	Height	Offset	Profile	Material
1	Inter. Rail	300.0	15.0	M_Circular Handrail : 40m	<By Category>
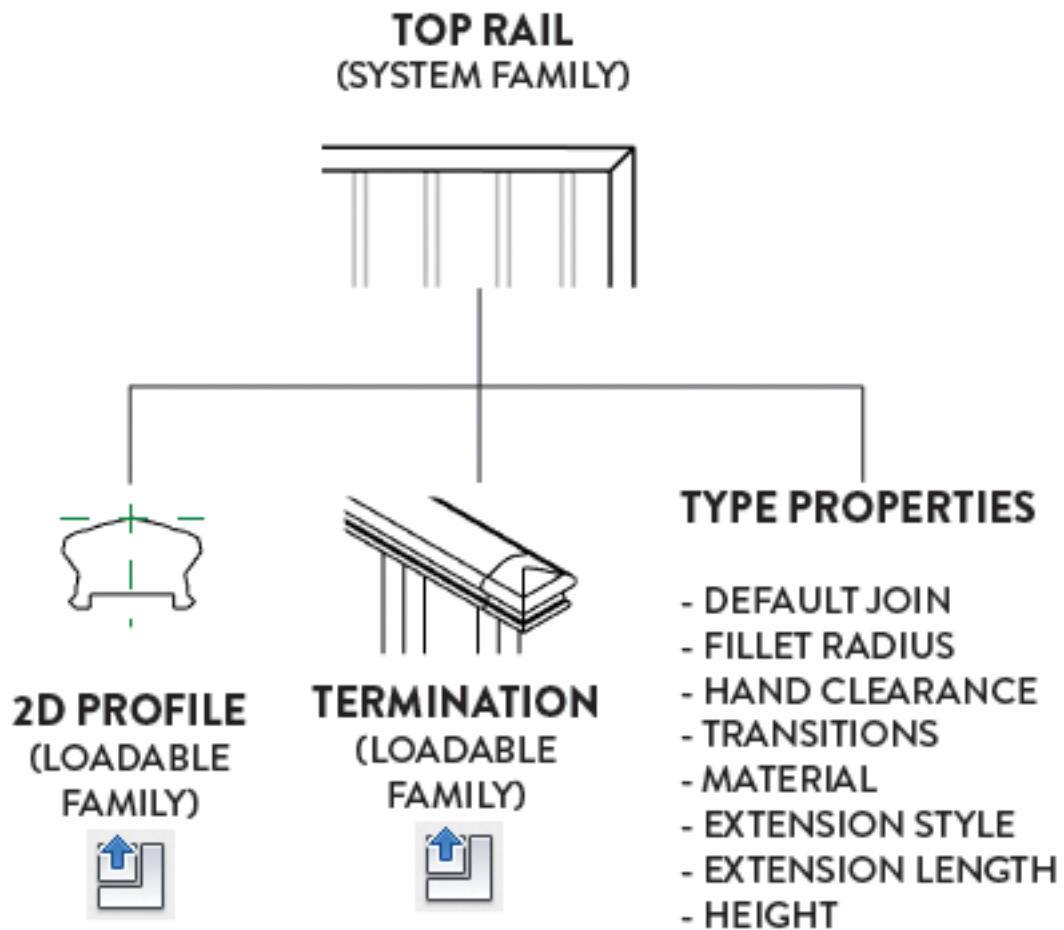
TOP RAIL PROPERTIES

TOP RAIL
(SYSTEM FAMILY)

2D PROFILE
(LOADABLE FAMILY)

TERMINATION
(LOADABLE FAMILY)

TYPE PROPERTIES

- DEFAULT JOIN
- FILLET RADIUS
- HAND CLEARANCE
- TRANSITIONS
- MATERIAL
- EXTENSION STYLE
- EXTENSION LENGTH
- HEIGHT

HANDRAIL PROPERTIES

HANDRAIL
(SYSTEM FAMILY)

2D PROFILE
(LOADABLE FAMILY)

SUPPORT
(LOADABLE FAMILY)

TERMINATION
(LOADABLE FAMILY)

TYPE PROPERTIES

- DEFAULT JOIN
- FILLET RADIUS
- HAND CLEARANCE
- TRANSITIONS
- MATERIAL
- EXTENSION STYLE
- EXTENSION LENGTH
- HEIGHT
- SUPPORT LAYOUT
- SUPPORT JUSTIFICATION
- SUPPORT NUMBER
- SUPPORT SPACING
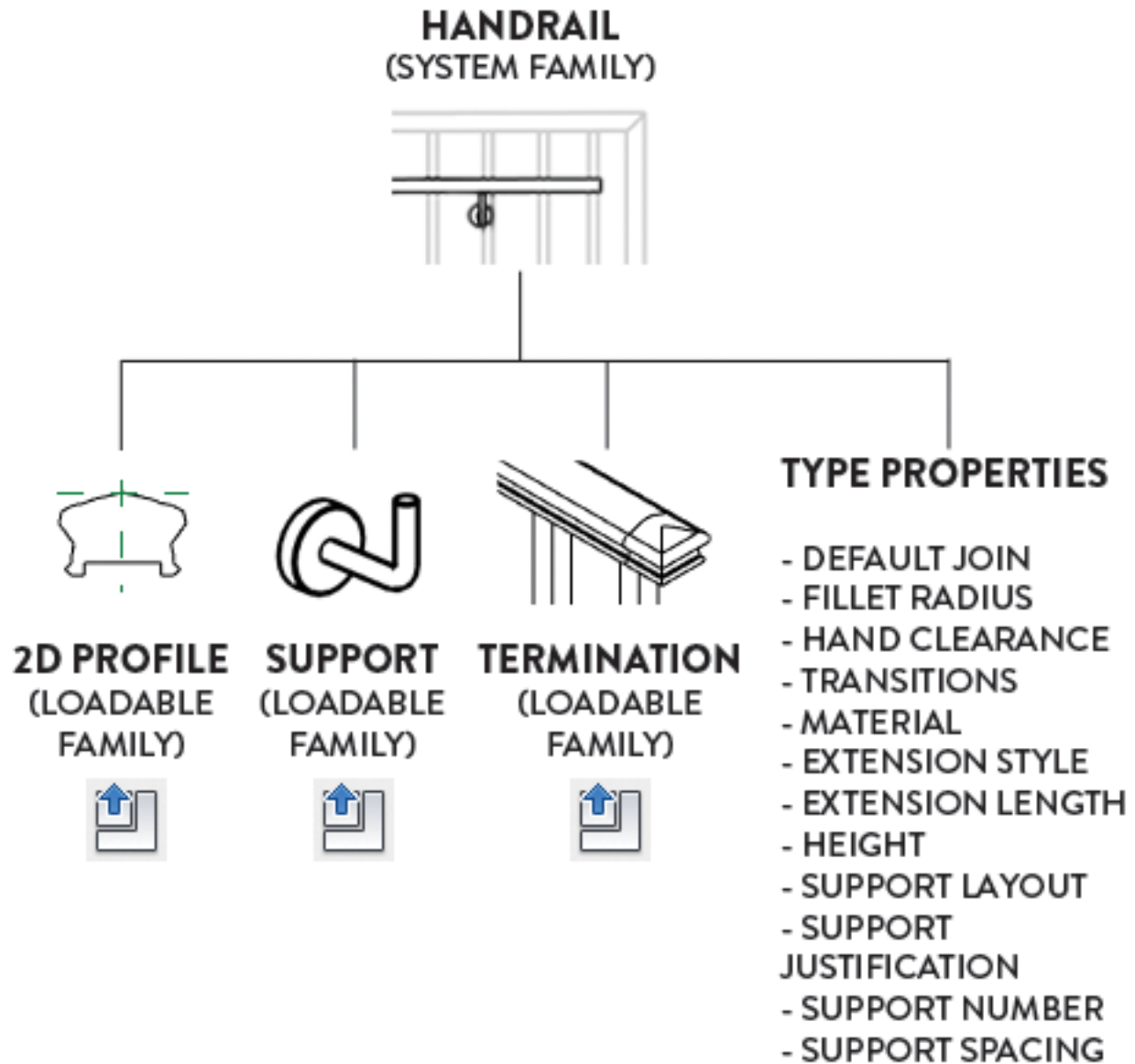
INTERMEDIATE RAIL PROPERTIES

INTERMEDIATE RAIL
(RAILING PROPERTIES)
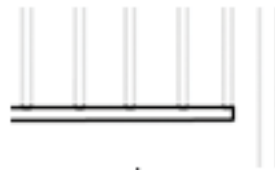
2D PROFILE
(LOADABLE
FAMILY)

PROPERTIES
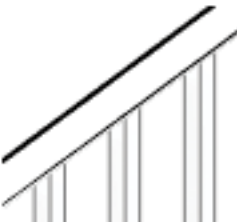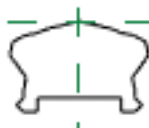
- NAME
- HEIGHT
- OFFSET
- MATERIAL

COMPARING 3 TYPES OF RAILS

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

COMPARING 3 TYPES OF RAILS

FEATURES	TOP RAIL	HANDRAIL	INTERMEDIATE RAILS
HAND CLEARANCE	✔	✔	✘
TRANSITIONS	✔	✔	✘
TERMINATION	✔	✔	✘
EXTENSION	✔	✔	✘
CUSTOM PATH	✔	✔	✘

UNDERSTANDING 9 RAILS PARAMETERS

1- ASSIGN TO BALUSTERS

Balusters **base** and **top** can be constrained to rails, except for **handrails**.

In the image below, you can see we constrain a baluster base to an intermediate rail (also known as non-continuous rail). The top of the baluster is constrained to the **Top Rail**. Offsets can be assigned to the base and top.
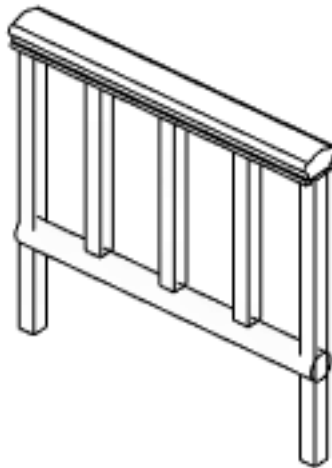
	Name	Base	Base offset	Top	Top offset
1	Pattern start	N/A	N/A	N/A	N/A
2	Regular baluster	Inter. Rail	0.0	Top Rail Element	0.0
3	Pattern end	N/A	N/A	N/A	N/A

CONSTRAIN BALUSTERS TO RAILS

2- CREATING RAIL PROFILE

Create a new profile family using the **Profile - Rail** default template. Use the text guidelines to properly draw the profile.
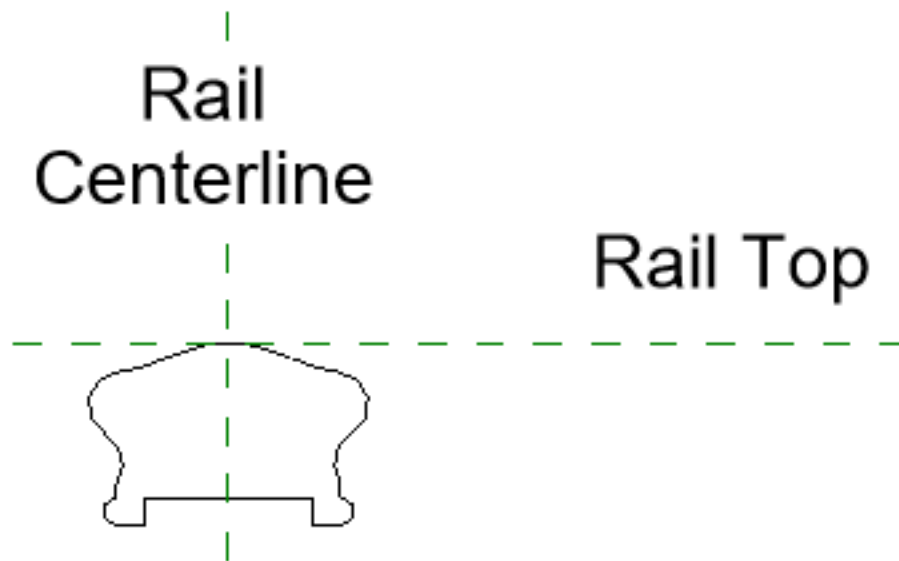
In the top rail properties, make sure to select the profile you have just created. The **Hand Clearance** value will be set so the profile is automatically centered with the railing boundary line. (see property #5)

Construction	
Default Join	Miter
Fillet Radius	0.0
Hand Clearance	-31.8
Profile	Ancestral-Top-Rail-Profile : Ancestral-Top-Rail-Profile
Projection	31.8
Transitions	Simple

We got our top rail profile. Yeah!
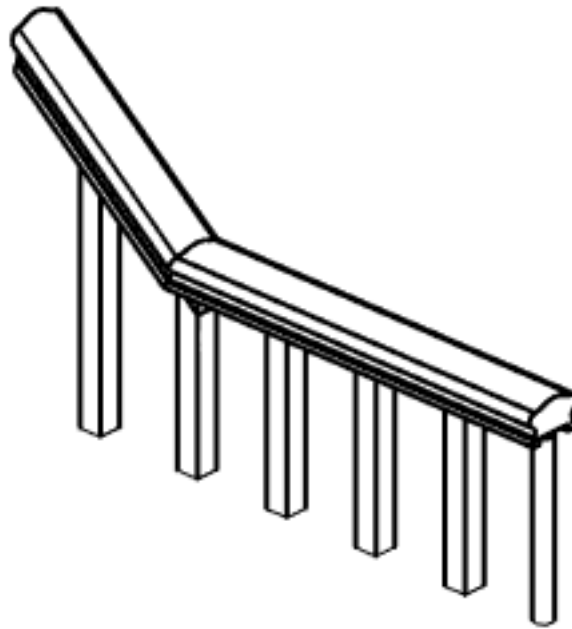
3- DEFAULT JOIN: MITER OR FILLET

Most top rail **Default Join** parameters are set to miter, producing a standard, straight transition. You can go to the Top Rail or Handrail type properties and change the **Default Join** to **Fillet** instead of **Miter**. Then, you will get access to the **Fillet Radius** value. This affects all transitions, both in the horizontal and vertical planes.
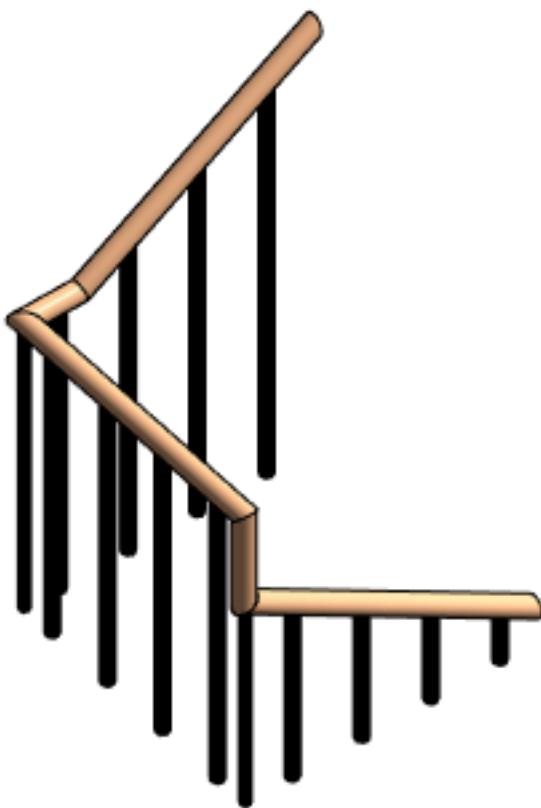
Construction	
Default Join	Miter
Fillet Radius	0.0
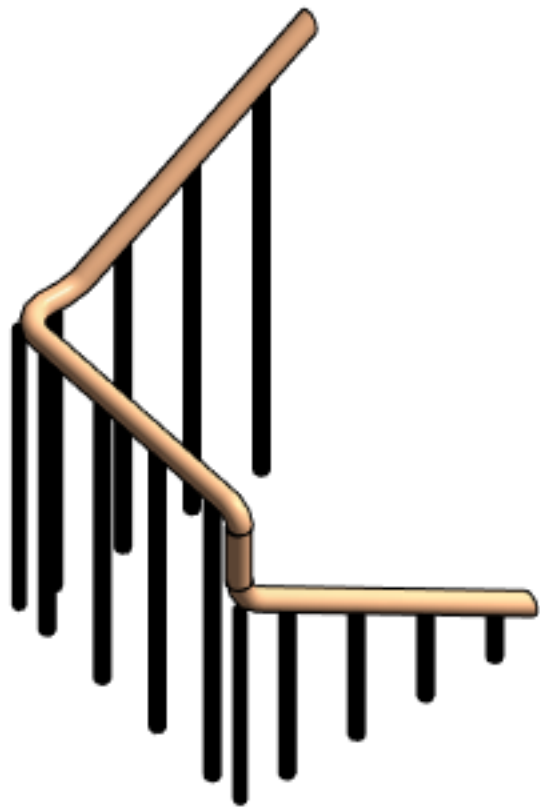
Construction	
Default Join	Fillet
Fillet Radius	50.0

MODIFY INDIVIDUAL JOIN

In the previous tip, changing the default join affected all joins. What if you want to modify an individual join instead? You will have to select the top rail using tab. Then, click on **Edit Rail**. Click on **Edit Path**.
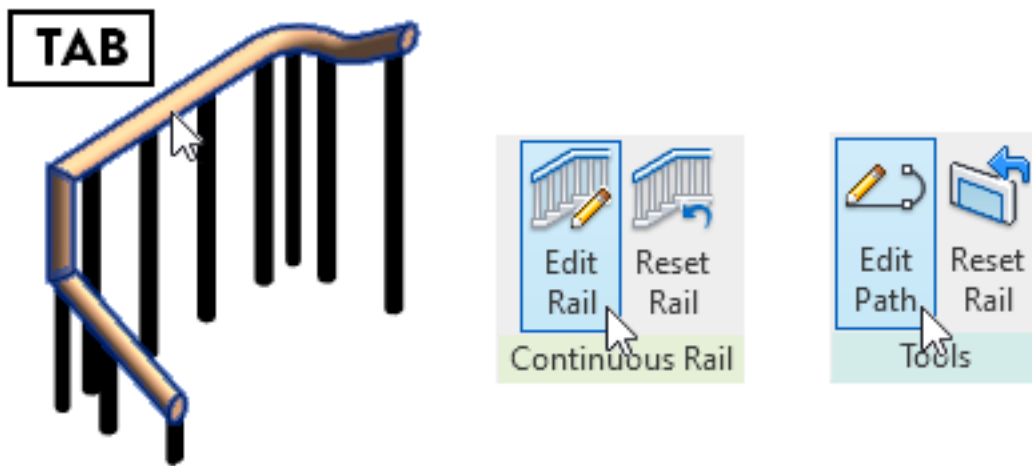
SELECT TOP RAIL, CLICK EDIT RAIL, CLICK EDIT PATH

Then, you'll have to click on **Edit Rail Joins**.
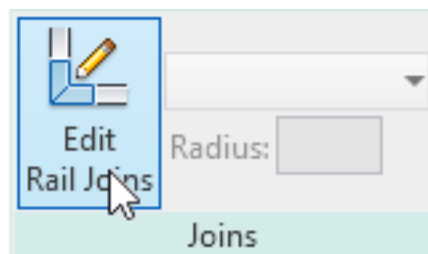
CLICK ON EDIT RAIL JOINS

Click on one of the join, represented by the square snap symbol. Then, change the join type to Fillet and enter the radius value you wish to use.
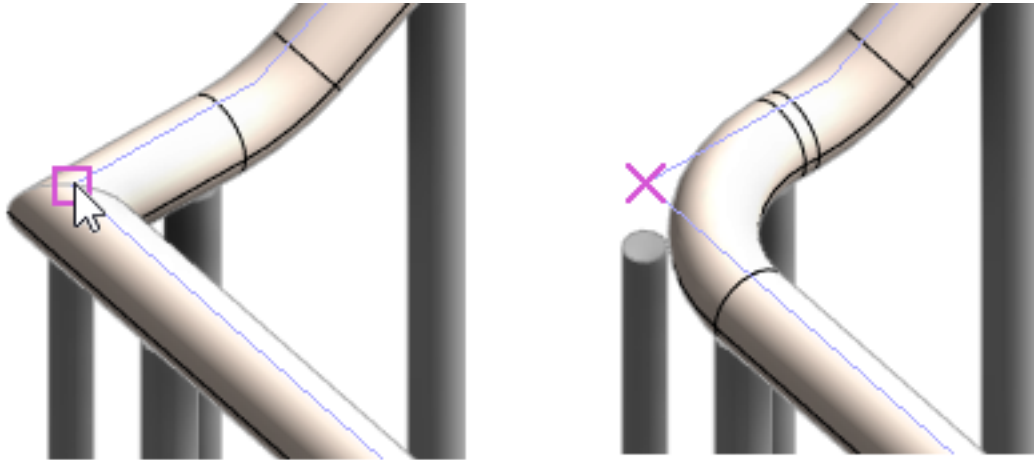
CLICK JOIN, CHANGE JOIN TYPE AND SET RADIUS
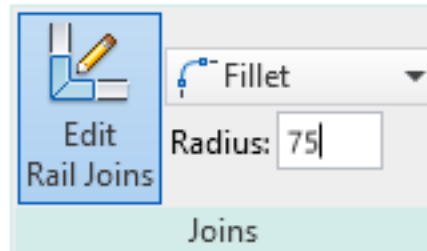
If you enter a value that is too big and would interfere with another intersection, you will get the following warning:

Error - cannot be ignored

Cannot create specified fillet for rail join(s). Please try a different value.

Show   More Info   Expand >>
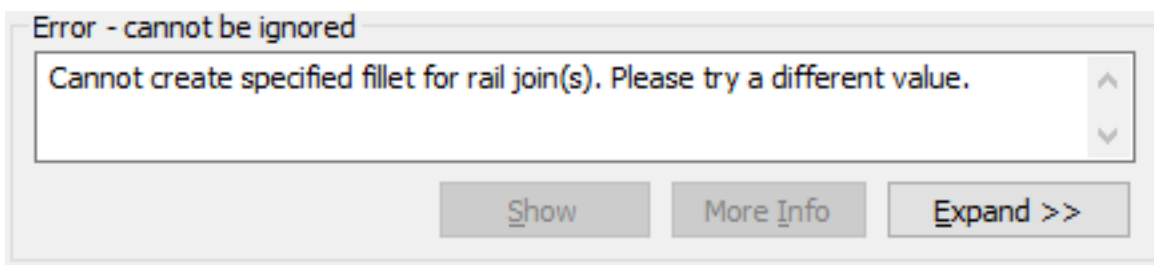
4- SUPPORTS

Supports are used to connect **Handrails** to railings or to walls. Adjust **Family** type, **Layout**, **Spacing** and **Justification** in Handrail type.
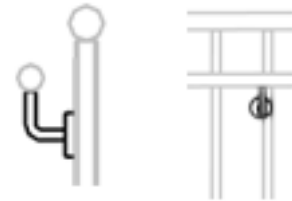
The default Revit family is Circular. In the Support Type properties, you can adjust **Radius** and **Height**. If you want a different shape, you will need to create another Support family.

Supports	
Family	M_Support - Metal - Circular
Layout	Fixed Distance
Spacing	400.0
Justification	Center
Number	0

HANDRAIL TYPE

Construction	
Height	50.0
Dimensions	
Radius 2	6.0
Radius 1	25.0

SUPPORT TYPE

LAYOUT OPTIONS

There are 5 different layout options for supports:

None
Fixed Distance
Align With Posts
Fixed Number
Maximum Spacing
Minimum Spacing

LAYOUT OPTIONS EXAMPLES
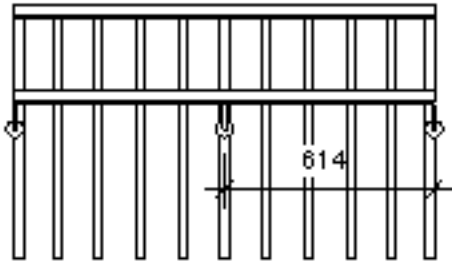
Supports	
Family	M_Support - Metal - Circular
Layout	Maximum Spacing
Spacing	700.0

MAXIMUM SPACING
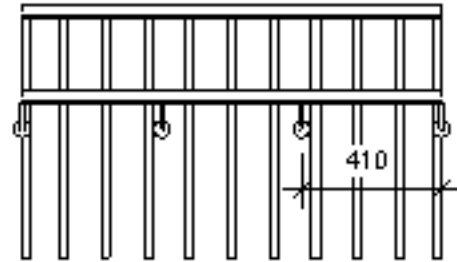
Supports	
Family	M_Support - Metal - Circular
Layout	Minimum Spacing
Spacing	400.0

MINIMUM SPACING
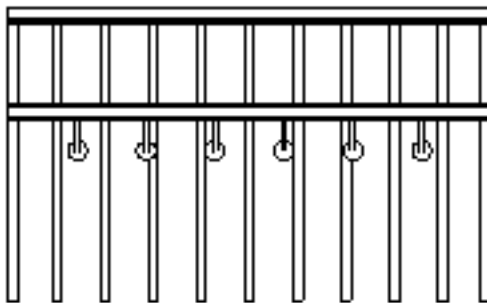
Supports	
Family	M_Support - Metal - Circular
Layout	Fixed Number
Spacing	700.0
Justification	Center
Number	6

FIXED NUMBER
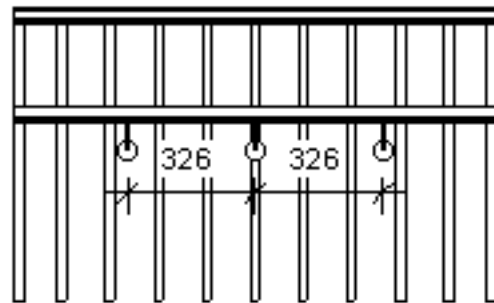
Supports	
Family	M_Support - Metal - Circular
Layout	Fixed Distance
Spacing	326.0
Justification	Center

FIXED DISTANCE

SUPPORTS TIPS

You can unpin and move a support to get a specific position.
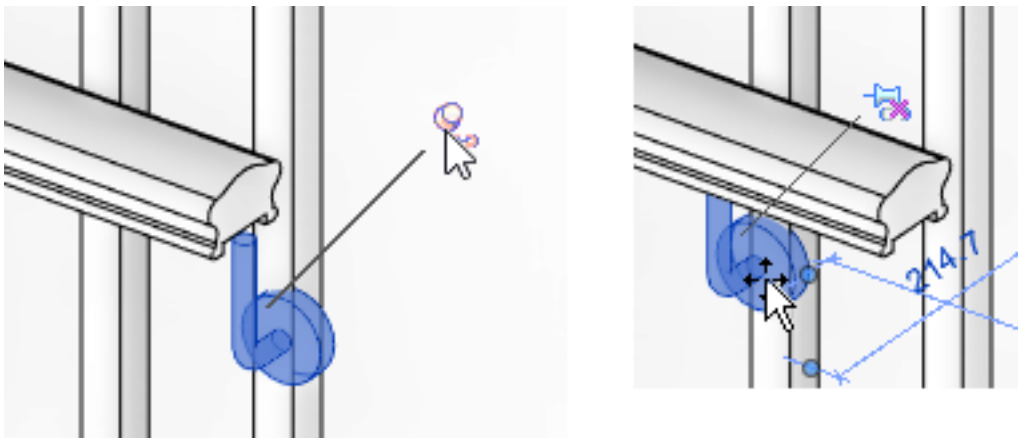
UNPIN AND MOVE SUPPORT

When a support is placed on walls of different distances, you can individually select a support and set an individual **Hand Clearance** value.
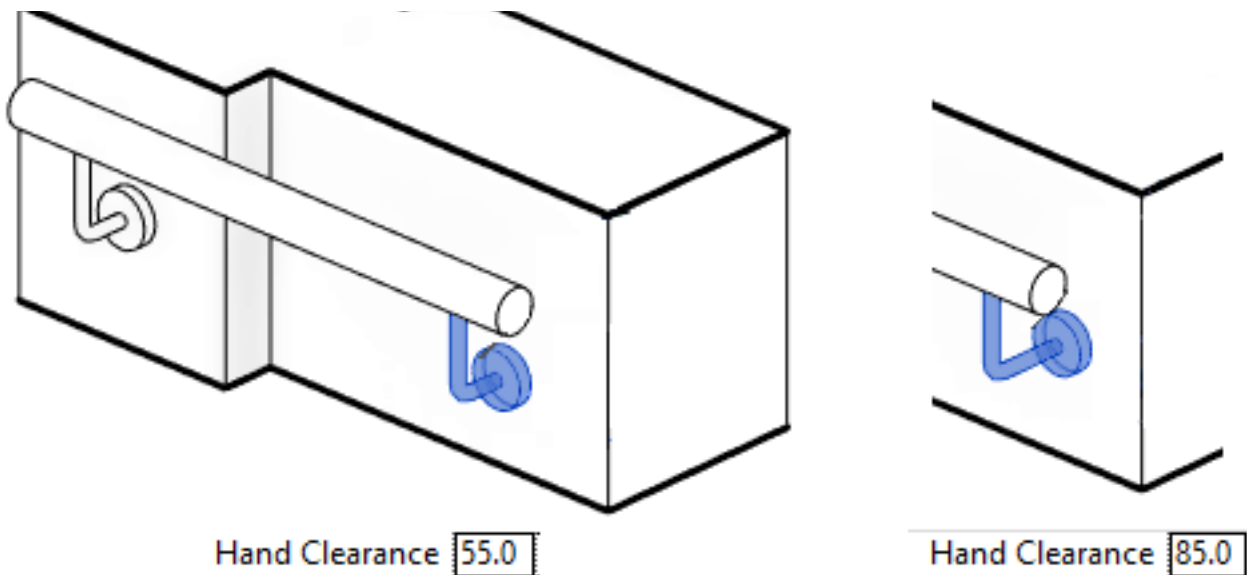
Hand Clearance 55.0

Hand Clearance 85.0

5- HAND CLEARANCE

The **Hand Clearance** value represents the distance between the railing path (represented by a purple line) and the beginning of a rail. In the example below you can see a few different values use on a Top Rail, showcased in a plan view.
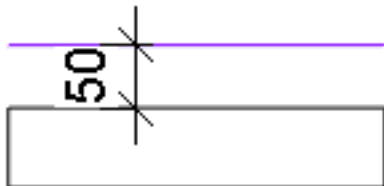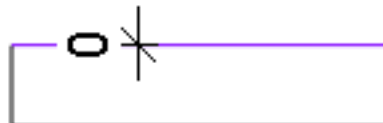
| Hand Clearance | 50 |

| Hand Clearance | 0 |

| Hand Clearance | 100 |

| Hand Clearance | -32 |
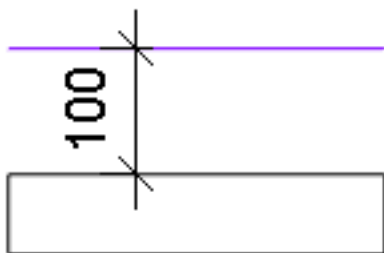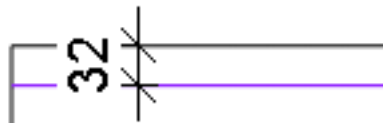
PROJECTION VALUE IS AUTOMATICALLY CREATED

Just next to the **Hand Clearance** value in the properties, you will find the **Projection** value. This represents the distance between the railing path line and the **end** of the rail. This value is only for information purpose: it can't be modified. It is automatically generated by adding the Hand Clearance to the rail's width. In the example below, you can see the projection is equal to the Hand Clearance (50mm) added to the width of the rail (40mm).

Hand Clearance	50.0
Profile	M_Circular Handrail : 40mm
Projection	90.0
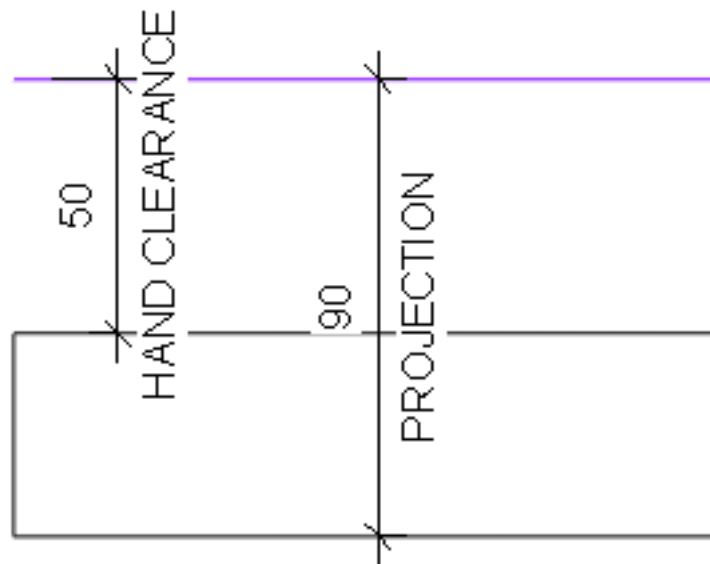
FLIP THE DIRECTION OF THE RAILING

By default, the hand clearance value is relative to the interior side of the railing. That's quite obvious when you are hosting the railings on a stair, but less so when you are drawing a railing on the ground. If the hand clearance puts your rail on the wrong side, click the ⇆ **flip** arrows to switch sides.
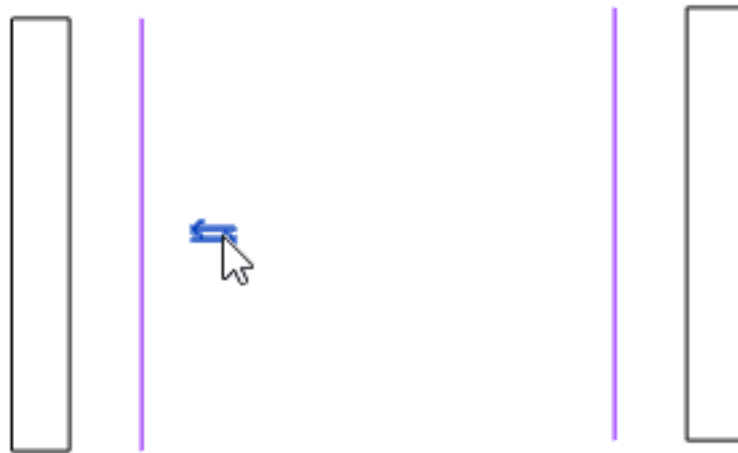
CLICK ON ARROWS SYMBOL TO FLIP THE RAILING DIRECTION

HAND CLEARANCE GUIDELINES

The top rail is usually centered on the railing path line. Actually, Revit will automatically set the Hand Clearance value to -(width/2) so the profile is perfectly in the middle.

Hand clearance is usually more useful for Handrails, where code standards often requires you to have a minimum value.

6- TRANSITIONS

There are 3 transition types for Handrails and Top Rails in Revit. **Simple**, **Gooseneck** and **None**. Look at the image below to understand what all these transitions actually do:
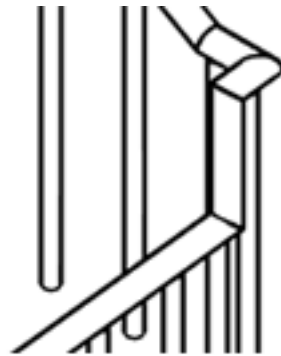
NONE   SIMPLE   GOOSENECK

In the strange railing below, the **Top Rail** has **Gooseneck** transitions and the **Handrail** has **Simple** transitions.
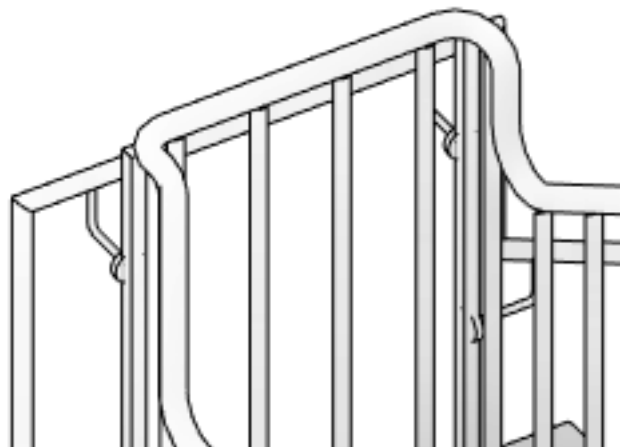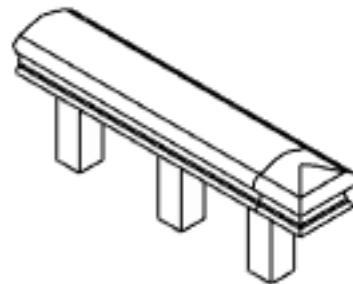
7- TERMINATIONS

Terminations are located at the end of a Top Rail or Handrail. In the example below you can see the difference between a top rail using a termination and one using no termination. People are less likely to stab themselves in the stomach when a termination is used :)
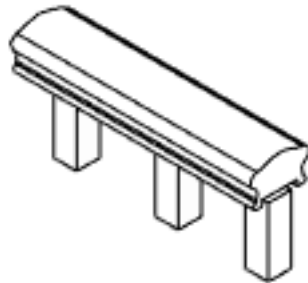
NO TERMINATION   **TERMINATION**

The default Revit termination family is a simple plate of wood usually set against a wall and used for handrails.
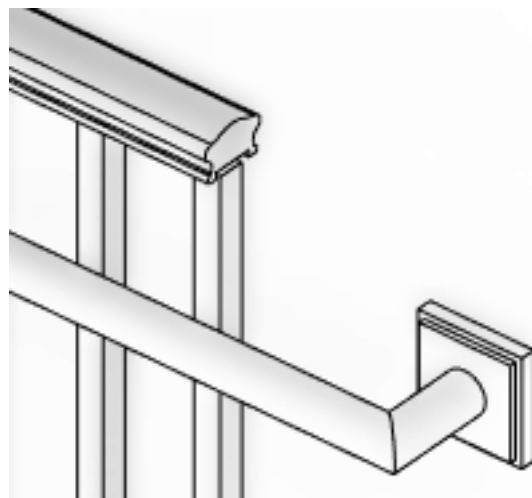
CREATING A TERMINATION FAMILY

Create a new family and use the **Railings - Termination** family template. Model the geometry of the termination on the right side of the reference planes, where the red lines are drawn in the image below.

MODEL TERMINATION HERE

Extension Length = 75
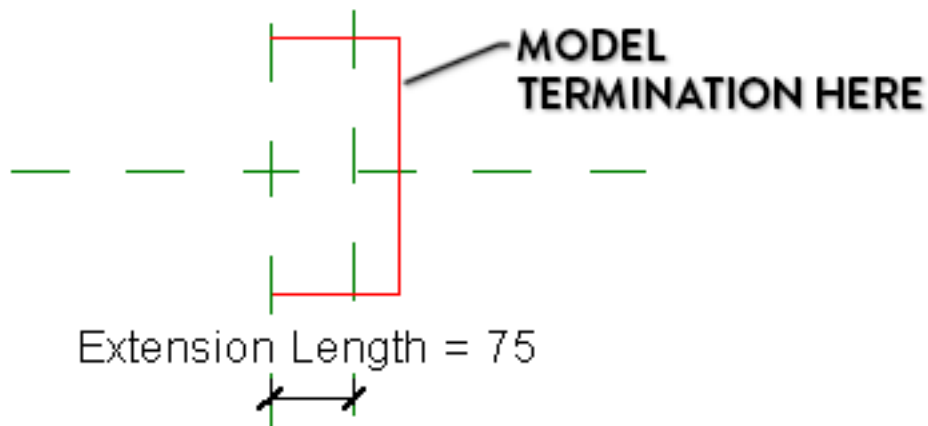
To recreate the ancestral termination used in the previous page, load the profile in the family and model a sweep. Then, create a void extrusion to cut the extremity of the sweep. Load the family in your project.
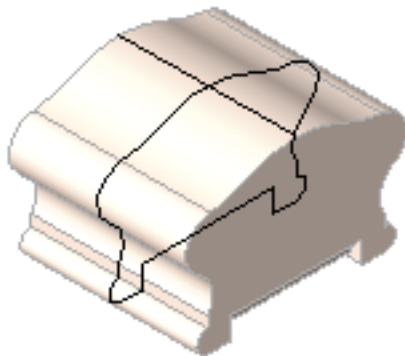
1- MODEL SWEEP USING TOP RAIL PROFILE
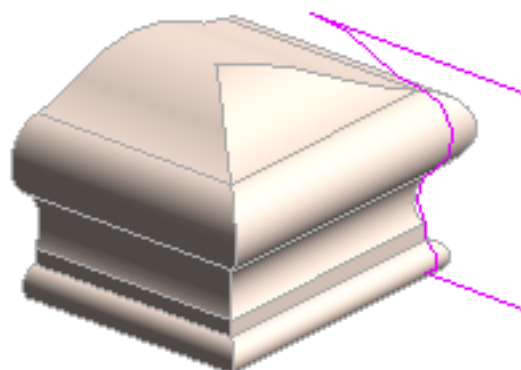
2- MODEL VOID EXTRUSION AND CUT GEOMETRY

ASSIGN TERMINATION TO RAIL

Terminations can be assigned to **Top Rails** and **Handrails**. In the example below, we start by assigning terminations to the Top Rail. We assign a termination to both the **Beginning** and the **End** of the rail. Then, we assign terminations to the handrails. Why not?
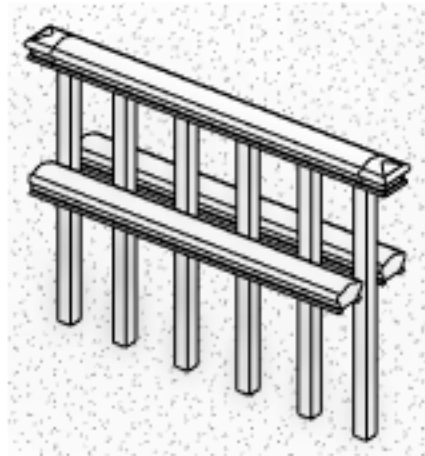
Terminations	
Beginning/Bottom Termination	Ancestral Termination
End/Top Termination	Ancestral Termination
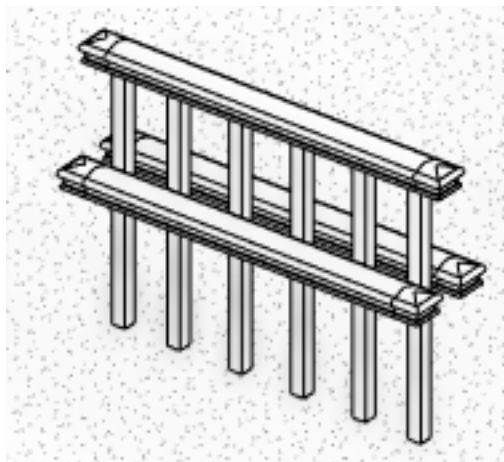
REMOVE TERMINATION LINE IN 3D VIEWS

As you can see, there is an annoying line that joins the rail with the termination. You can get rid of it in a 3D view by using the **Lineworks** tool (shortcut: **LW**). Select the **<Invisible Lines>** type and click a few times on each visible line you want to remove. This only affects the visibility of the lines on a single view.
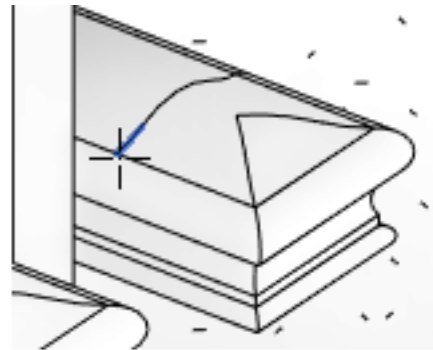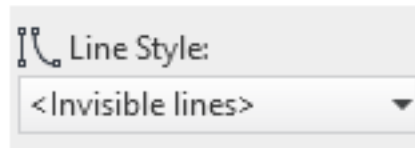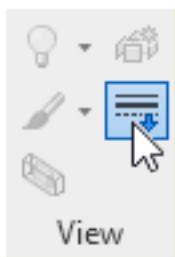
USE LINEWORKS <INVISIBLE LINES> ON TERMINATION EDGES

TERMINATION IS PLACED AT END OF PATH

Are you using a custom end path for the railing? The termination will be placed at the end of the custom path.
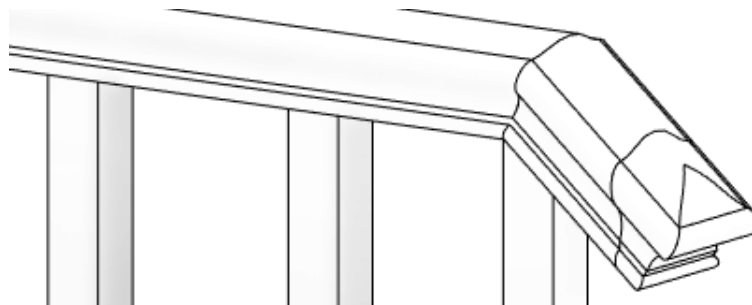
8- EXTENSIONS

Now, let's talk about extensions. You will find these options in the Top Rails and Handrails properties. You can set an extension type and a value. You set whether the the extension is at the beginning and/or end of the railing. The **Wall** extension type only works with handrails.

Extension (Beginning/Bottom)	
Extension Style	None
Length	0.0
Plus Tread Depth	☑

SELECT TOP RAIL, EDIT TYPE, ADJUST EXTENSION SETTING

As you can see below, an extension value goes beyond the purple path lines of a railing. See next page to understand the extension options.
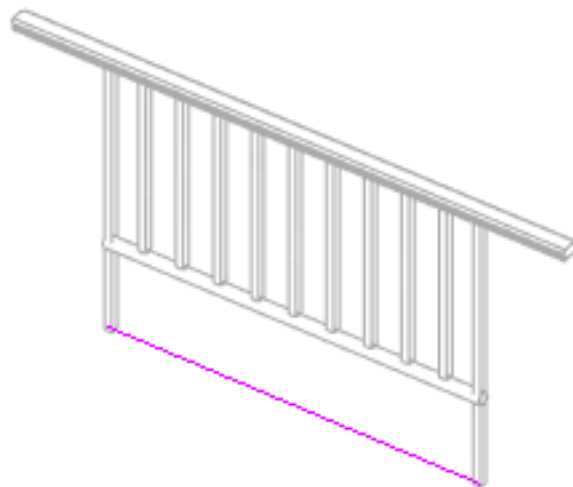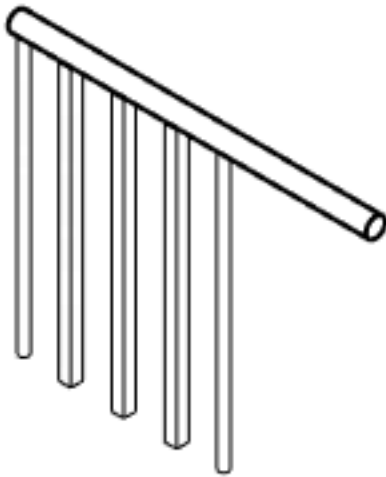
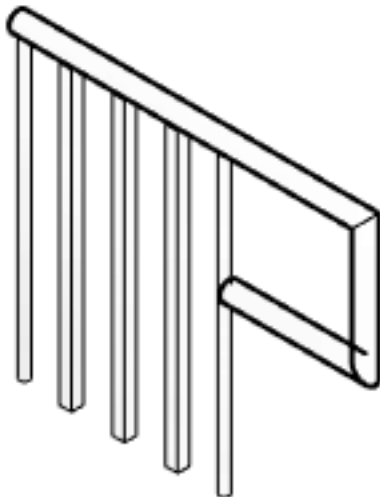# EXTENSION STYLES

EXTENSION STYLE:
NONE
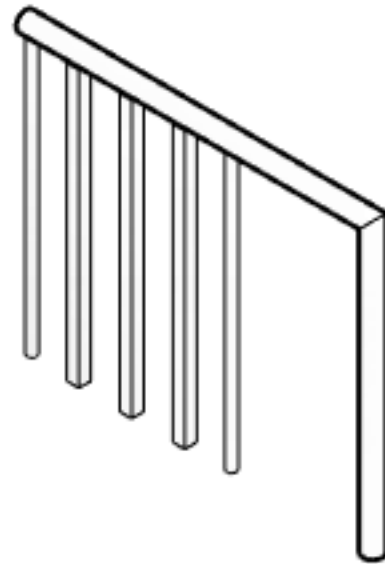
EXTENSION STYLE:
FLOOR

EXTENSION STYLE:
POST
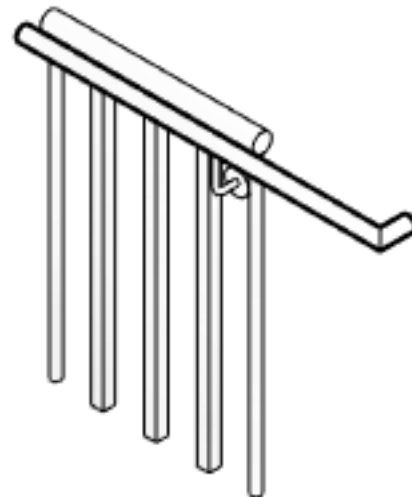
EXTENSION STYLE:
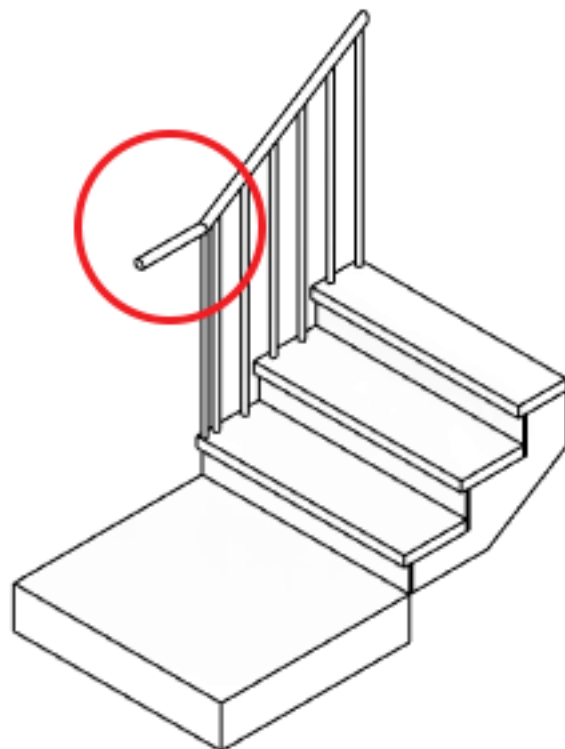WALL

USING "TREAD DEPTH"

When using railing on a stair, you can activate the **Plus Tread Depth** parameter. This is only available at the bottom of the stairs. In addition to the extension length, the width of a tread will also be added to the rail.
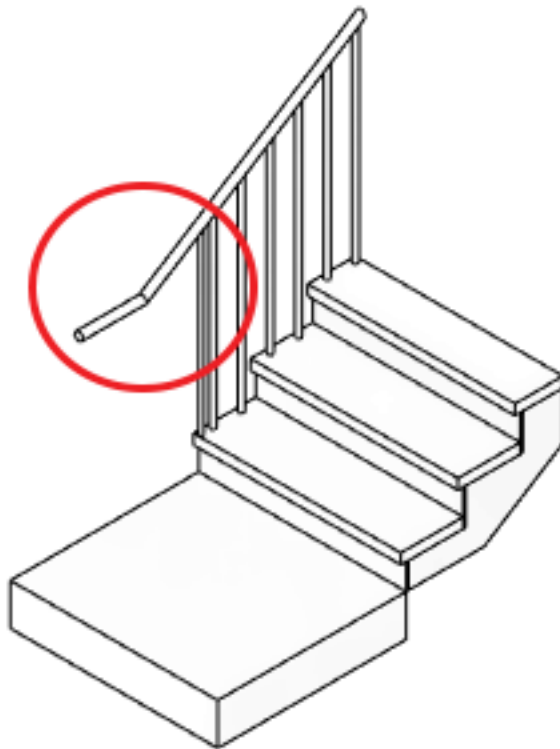
Extension (Beginning/Bottom)	
Extension Style	None
Length	300.0
Plus Tread Depth	☑

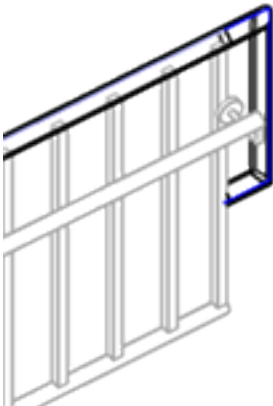| Extension (Beginning/Bottom)	
Extension Style	None
Length	300.0
Plus Tread Depth	☐

SET "*PLUS TREAD DEPTH*" PARAMETER

9- CREATE CUSTOM EXTENSION PATH

In the last page, you were limited to 4 extension shapes. Turns out you can customize the shape to whatever you want.
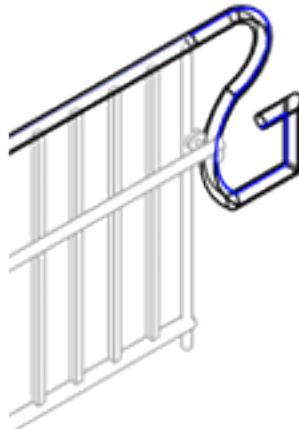
Tab-select the Top Rail, then click the **Edit Rail** button. Then click **Edit Path**.

EDIT EXTENSION PATH

DRAW WHATEVER YOU WANT

CLICK GREEN CHECK TWICE TO FINISH

Changed your mind and want to go back to the original shape? Click the Reset Rail button when the Top Rail is selected.

Editing railing path is limited to the extensions, you cannot modify the main part of the rail. Use this feature for **Top Rails** or for **Handrails**.
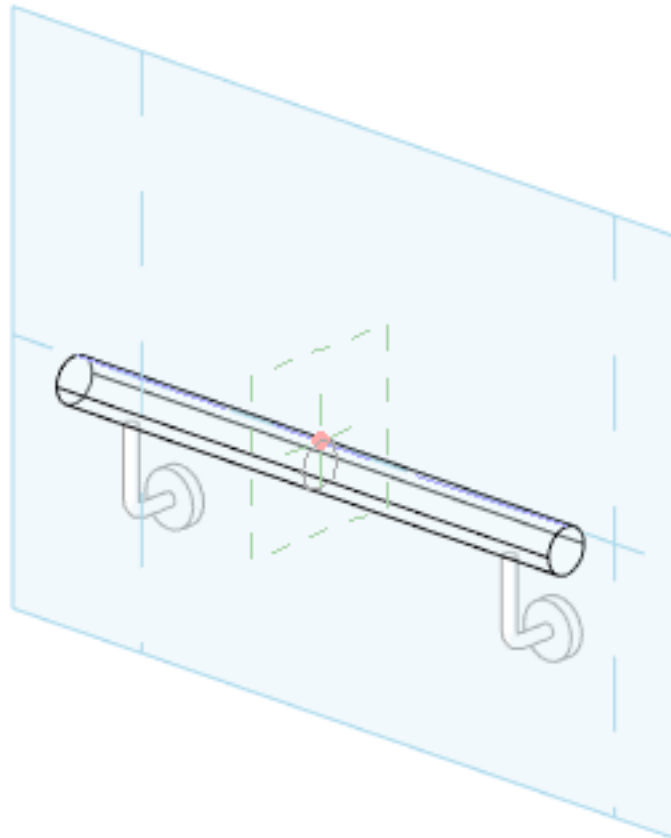
CUSTOM PATH LIMITATIONS

A custom path is limited to the current plane of the railing. You can't draw a sophisticated 3D path. In the image below, the path has to be drawn on the blue plane.

OTHER RAILING FEATURES AFFECTING RAILS

We just went through 9 features affecting rails. Now, we'll go through general railings features that also have effects on rails. These are:

1- Railing Direction
2- Tangent and Angled Joins
3- Landing Height Adjustment
4- Railing Slope Override

Let's go.

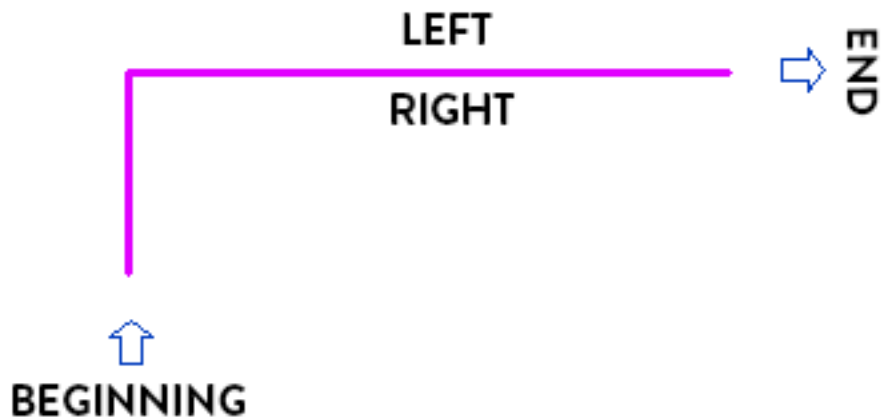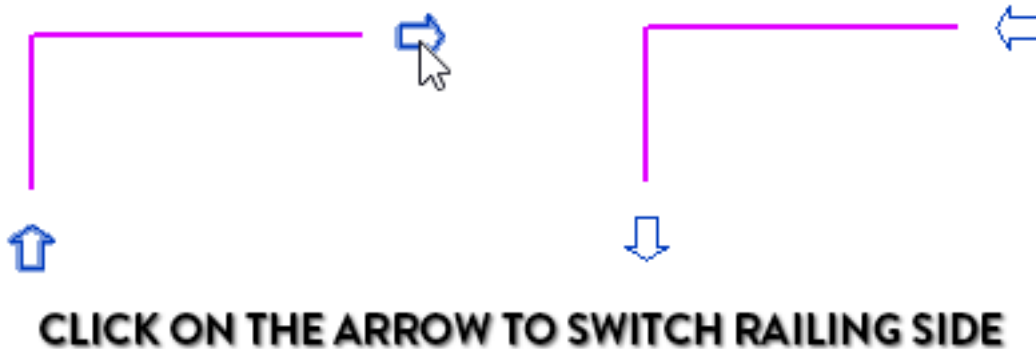## RAILING DIRECTION

Have you ever wondered what the arrows in the railing path mean? They indicate where the beginning and end of railings are located. They also indicate the location of the left side and right side of the railing.

You can switch the railing the direction of the railing by clicking on one of the arrow. The arrows are only visible if the railing is hosted on an element.

CLICK ON THE ARROW TO SWITCH RAILING SIDE

In the example below you can see what happens to the railing when the direction is switched. The handrail and termination location are modified to match the beginning/end and right/left side of the arrows.

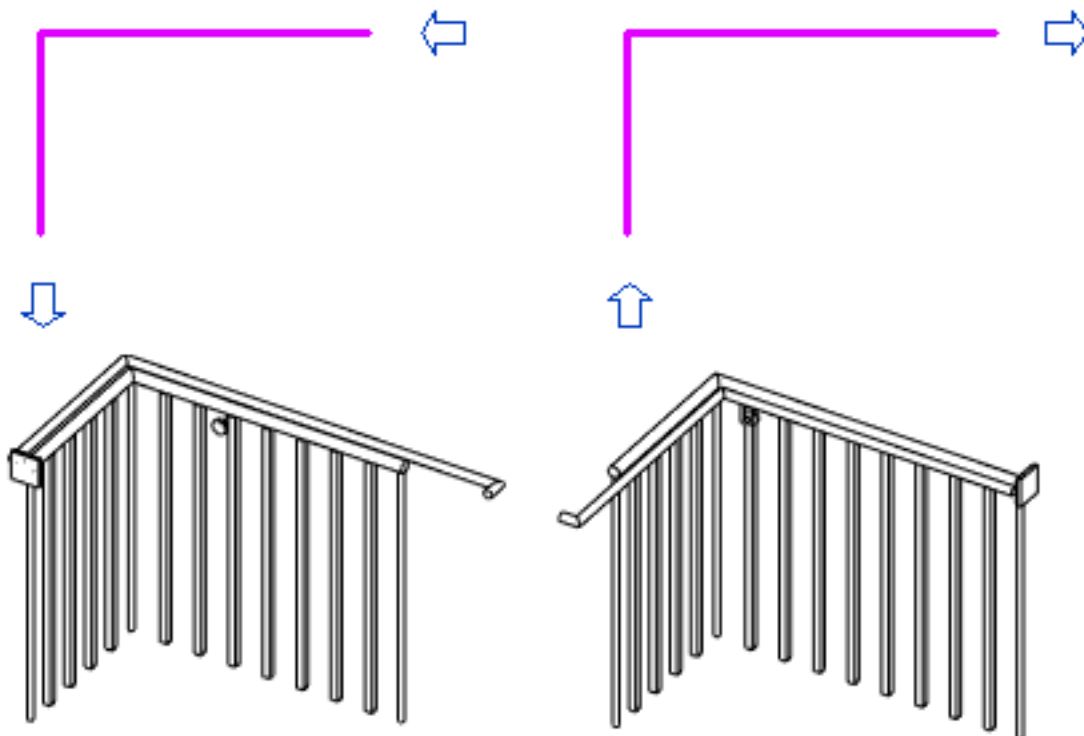## TOP RAIL WITH END/TOP TERMINATION

Terminations	
Beginning/Bottom Termination	None
End/Top Termination	M_Termination

RIGHT SIDE HANDRAIL

| Handrail 1	
Position	Right
Type	Pipe – Wall Mount

TANGENT JOINS

In the railings type properties, you will find the Tangent Joins parameter. The image below illustrates the 3 available types. The behavior of this option can be quite unpredictable. **Add Vertical/Horizontal Segment** is the option that makes the most sense on most cases. See a few examples in the next page. As you can see, different options might end up providing the same result.
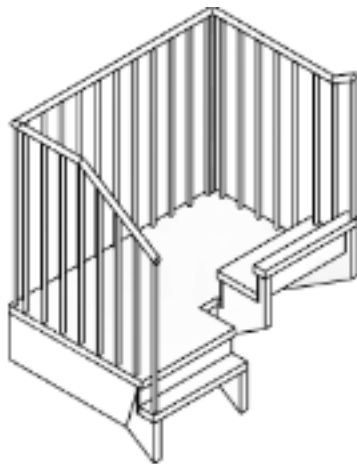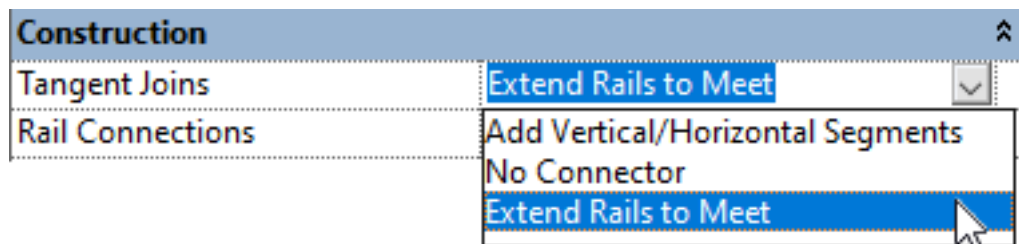
EXTEND RAILS TO MEET   **NO CONNECTOR**   **ADD VERTICAL / HORIZONTAL SEGMENT**
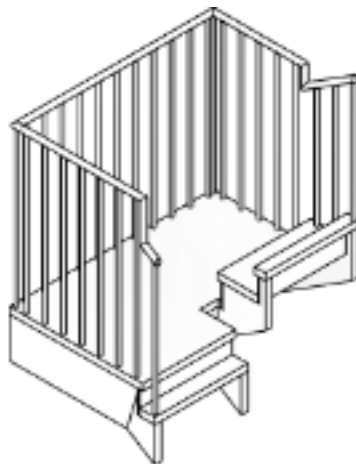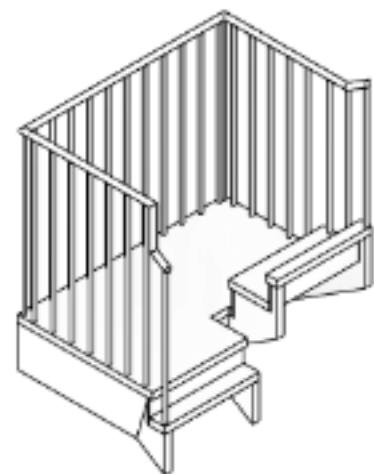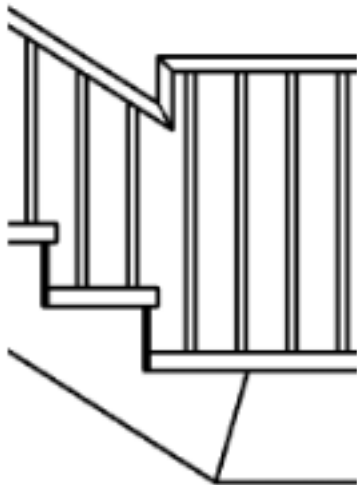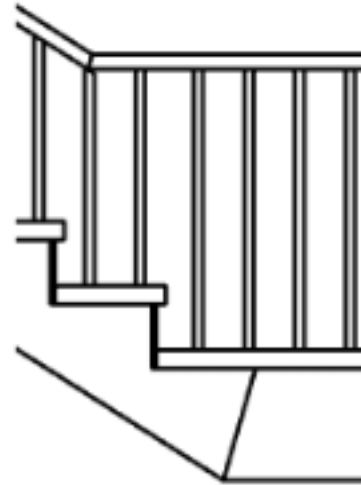
TANGENT JOINS EXAMPLES

• EXTEND RAILS TO MEET

• NO CONNECTOR
• ADD VERTICAL /
HORZIONTAL SEGMENT

• NO CONNECTOR

• EXTEND RAILS TO MEET
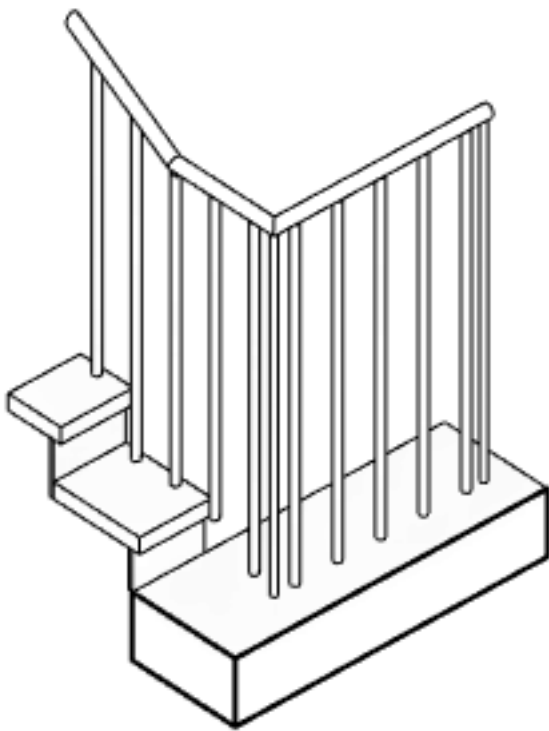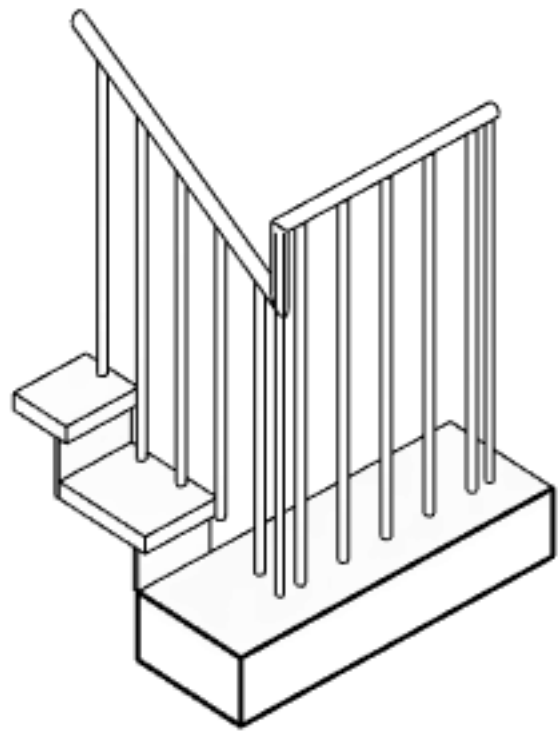
• ADD VERTICAL /
HORZIONTAL SEGMENT

ANGLED JOINS

In the railings type properties, you will find the **Angled Joins** parameter. This option manage how the joins will behave on at the intersection of railings. An example would be at the bottom of the stairs, like in the image below.

Angled Joins | Add Vertical/Horizontal Segments

Angled Joins | No Connector

LANDING HEIGHT ADJUSTMENT

In the type properties of a railing, you will find the Use Landing Height Adjustment parameter. Check the box and enter a value. This way, you can have a different value when the railing is located on a landing (or floor).

Most people aren't aware of this feature and will create multiple railing types with different height. Using this feature avoid the trouble.
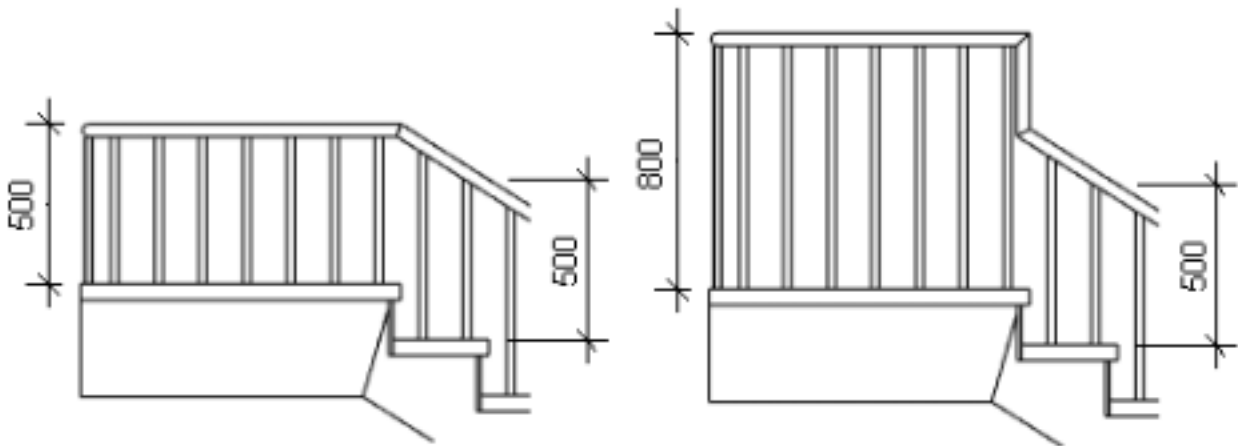
Construction	
Use Landing Height Adjustment	☐
Landing Height Adjustment	0.0

| Construction	
Use Landing Height Adjustment	☑
Landing Height Adjustment	300.0

LANDING HEIGHT - INDIVIDUAL SEGMENTS

If you don't want to apply landing height correction in the railing type, you can apply the effect to a single railing path line. In the example below, we set a height correction value of 300mm to one of the railing path line. This value will override any value set in the type properties of the railing.
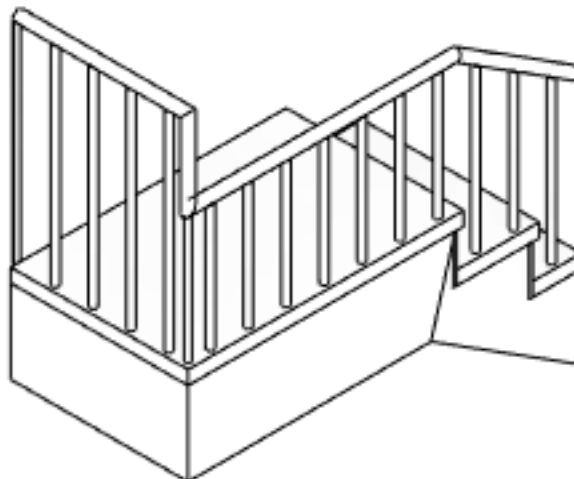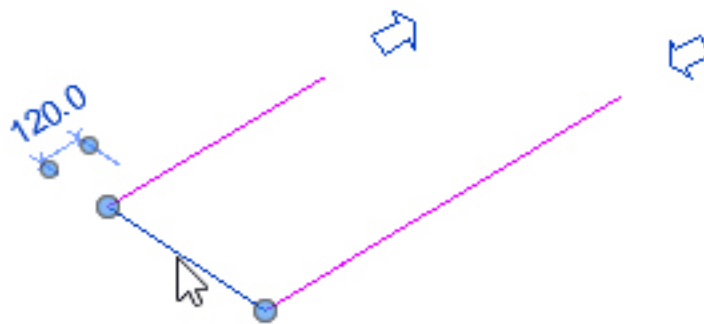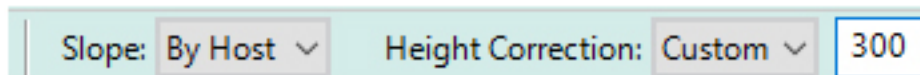
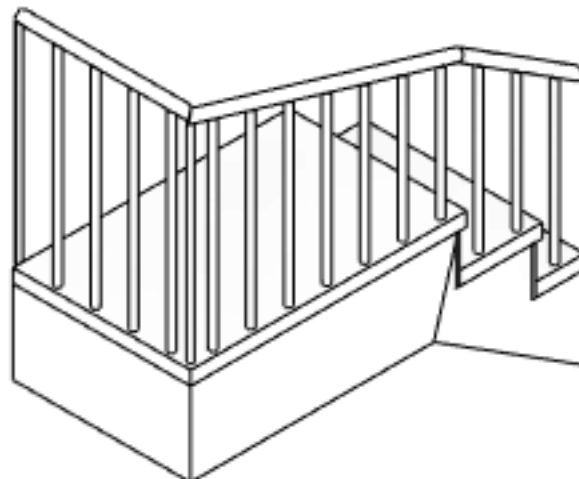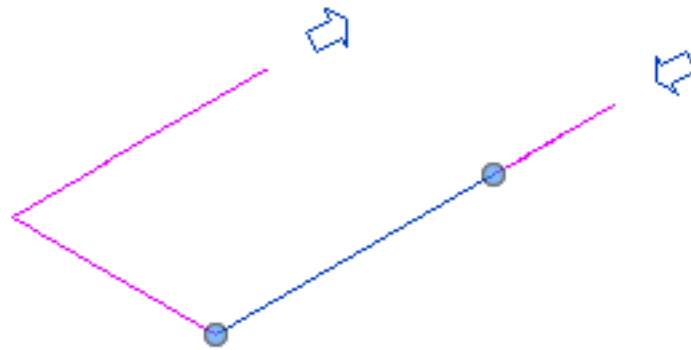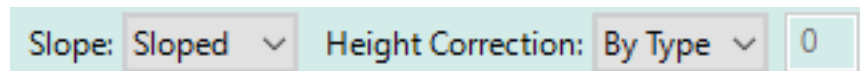**SET "HEIGHT CORRECTION" VALUE TO AN INDIVIDUAL RAILING PATH LINE**

RAILING PATH SLOPE OVERRIDE

Another hidden feature in the railing path options is the **Slope** parameter. Here, we set the **Sloped** parameter override to an individual segment line. Instead of having a vertical connector like in the previous page, the selected segment will be sloped to connect the adjacent segments.

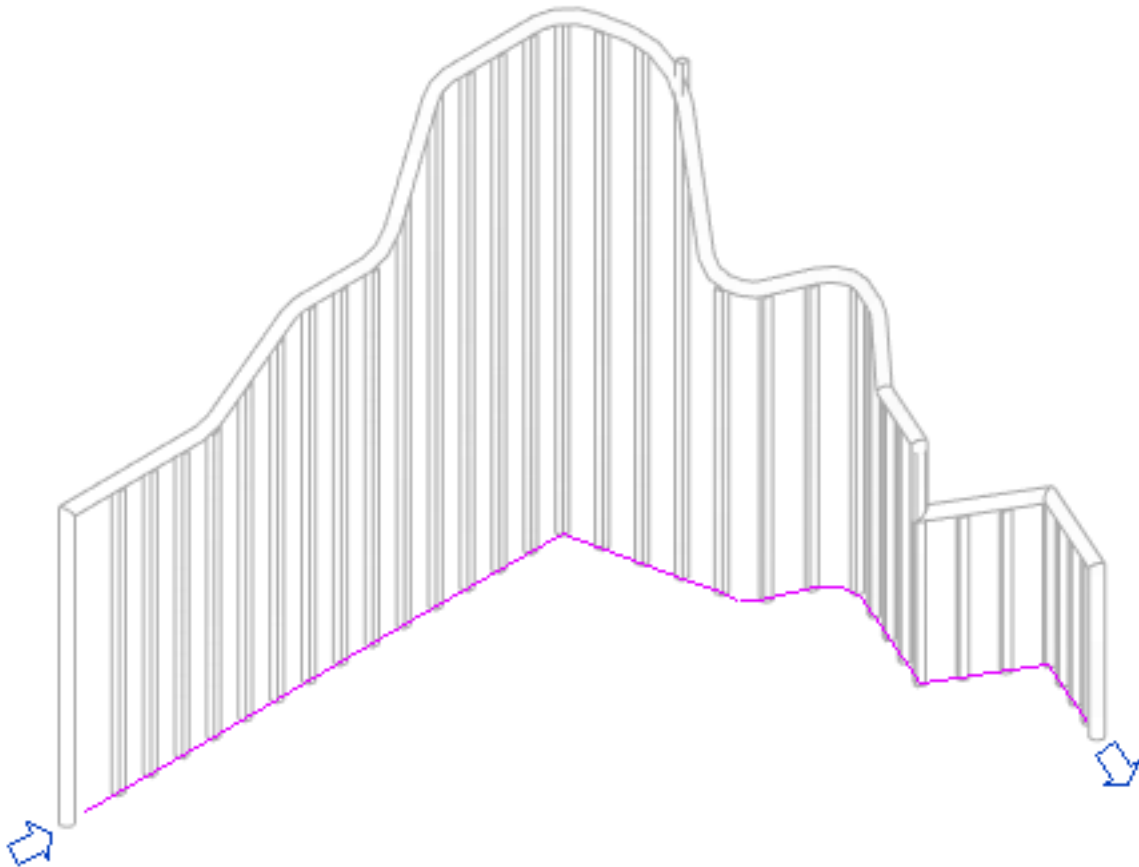**SET "SLOPE" PARAMETER TO AN INDIVIDUAL RAILING PATH LINE**

HAVING FUN WITH SLOPE / HEIGHT CORR.

By using the Sloped parameter and the height correction parameter on individual railing path lines, you can create really odd railings. The example below is made from a single railing, just by creating multiple little segments with overrides.

THANKS FOR READING!

As always, send your thoughts to nick@revitpure.com. I read and answer all emails. Let me know what theme you want explored for the next edition.

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DESIGN

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