

# What's New in Autodesk Revit Building 9.1

## Filled Regions Report Area – all Revit Products

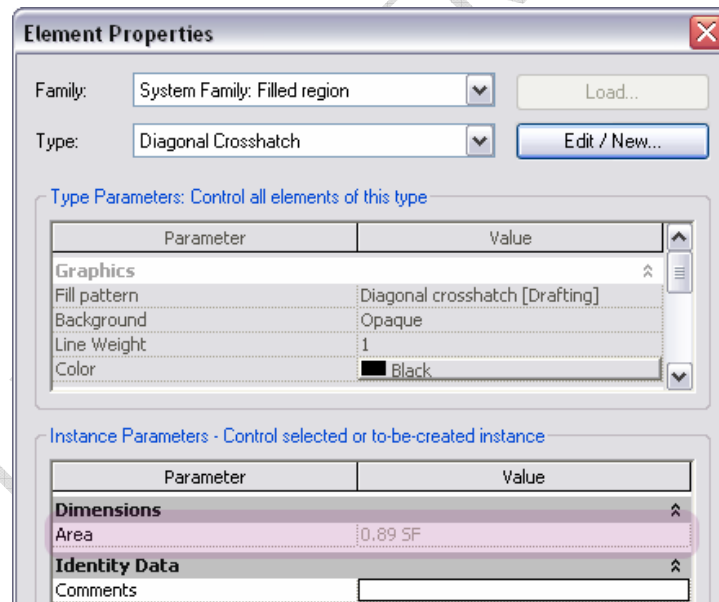
Filled Regions have a new read-only property called Area that reports the area of the filled region.

### The Project:

This is a customer wish list item. Users have been asking for a quick and easy way to calculate the area of some region without having to change the model or, in other cases, having to create rooms or areas.

### Accessing the new functionality:

Select a Filled Region and click to open its properties. The new Area Parameter is listed under Dimensions.

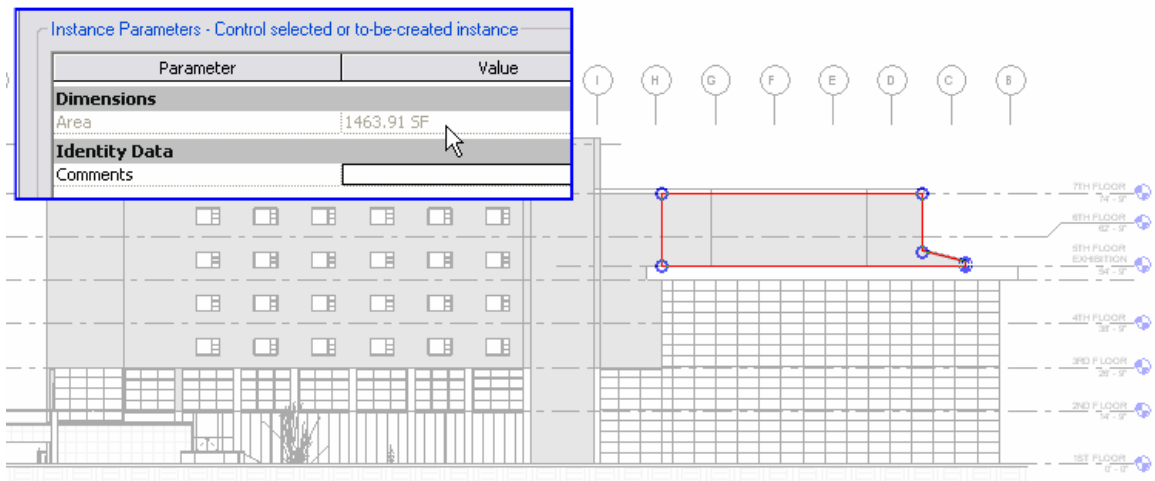


### Benefit to the User:

Users now have a quick and easy way to get feedback from the model before changing it.

**Example:** I need the surface area of only the enclosed portion of the wall below because, based on a quick cost analysis, I may (or may not) decide to change the wall covering. I'd like to do a quick cost analysis without having to change the model.

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By calculating square footage (or meters) of the filled region, I can quickly obtain the desired area measurement to use in my cost calculation. Without having to change the model! Once I have made my decision, I can easily delete the filled region – leaving the model exactly as it was before – or I could leave it to help guide the creation of a new wall.

### Additional things to know:

The Area Parameter **does not**:

- report to a tag
- report to a schedule

## gbXML Export Settings – Revit Building

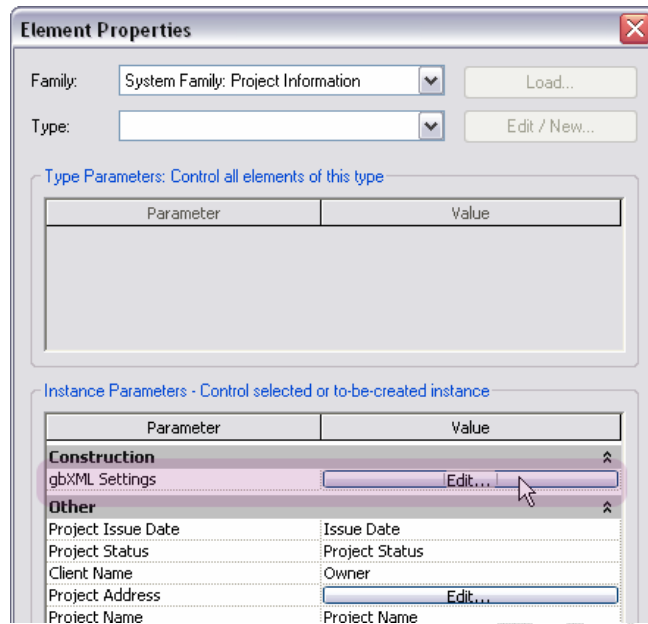
There are new settings to control the export of gbXML information. The settings are Building Type and Zip Code. The Building Type parameter specifies the type of building according to the gbXML schema 0.34 (similar to ASHRAE). The Zip Code determines the location of the building.

### The Project:

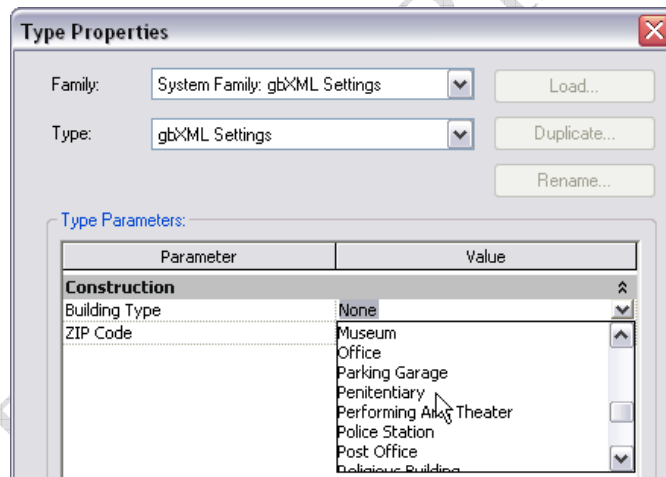
Two variables that a gbXML file stores for analysis are Building Type and Zip Code. Prior to Revit Building 9.1, Building Type was automatically set to 'Office' and Zip Code was ignored. As a result some analysis around energy use or cost could become inaccurate.

### Accessing the new functionality:

There is a new gbXML Settings button in the Project Information Properties. Choose **Project Information** from the **Settings** Pull Down Menu.



In the sub dialog box, users can specify predefined values for Building Type and the Zip Code for the project.



## Benefit to the User:

As a result of this project, the gbXML file created by Revit Building is significantly more accurate. Analysis programs yield more accurate design information for energy use and costs, thermal loads, and constructions.

## Additional things to know:

- The predefined values fro Building Type are:
  - Automotive Facility
  - Convention Center
  - Courthouse
  - Dining Bar Lounge or Leisure
  - Dining Cafeteria Fast Food
  - Dining Family
  - Dormitory
  - Exercise Center
  - Fire Station
  - Gymnasium
  - Hospital or Healthcare
  - Hotel
  - Library
  - Manufacturing
  - Motel
  - Motion Picture Theatre
  - Multi Family
  - Museum
  - Office

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- Parking Garage
- Penitentiary
- Performing Arts Theater
- Police Station
- Post Office
- Religious Building
- Retail
- School or University
- Sports Arena
- Town Hall
- Transportation
- Warehouse
- Workshop

- Postal Code is not automatically pulled/pushed from/to the Project Address
- The Zip Code parameter accepts all US and non-US postal codes
- In Revit Systems, users also have the option to specify default construction data, information about assumed exterior wall construction, floor slab, roof and ceiling constructions. This construction data is not exposed in Revit Building (or Revit Structure) at this point.
- When an export to gbXML is attempted and these parameters have not been set, the user will be notified.
- This project is specific to commercial architecture. Thus, residential building types are not available.

## Set DWG Units on Export – all Revit Products

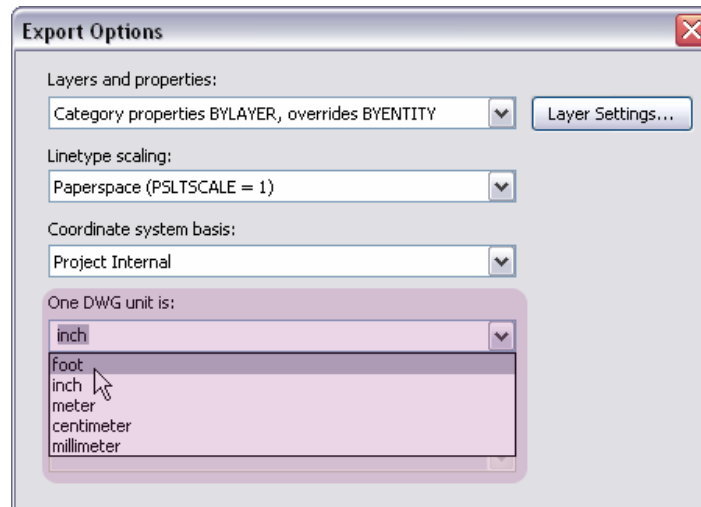
When exporting to DWG, the user can control the unit type for export.

### The Project:

Prior to Revit Building 9.1, DWG information was always exported in inches (Imperial) and millimeters (Metric). While the information was correct, the resulting DWG was laden with cumbersome measurements. For example, when a Revit Building user shared their data with an AutoCAD user prior to Revit Building 9.1, a 10M line will be exported to a DWG line 10000mm long. As a result, the AutoCAD user needed to scaled all of their measurements 1000x.

### Accessing the new functionality:

From the **File** Pull Down Menu, choose **Export > CAD Formats**. Click the **Options** button. In the sub dialogue, set the DWG Unit.



## Benefit to the User:

By controlling the value of 'One DWG unit is', users will be able to control the unit type for a DWG Export. The result is that the line that is 10' long in Revit Building will be exported to a DWG line that is also 10' long – thereby avoiding confusion, additional calculations, and post process work.

## Additional things to know:

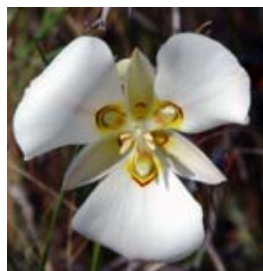
- The default values are inches (Imperial) and millimeters (Metric).
- The export setting is totally regardless of the units used in the project.

## PNG Import/Export Capability– all Revit Products

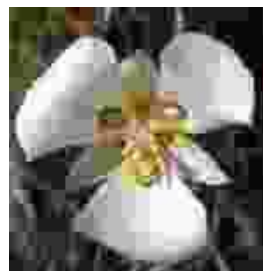
Revit Building 9.1 allows users to import and export PNG Images.

### The Project:

PNG (Portable Network Graphic) is a bitmap image compression format that is similar to GIF and is gaining popularity in the web community. PNG and GIF are both lossless image formats. This means that the image quality is greater than (even lossless) JPEGs which produce compression artifacts as a result of the compression algorithm.



PNG



JPEG

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PNG is largely thought of as the successor to GIF. When compared to one another, PNG yields better quality images because:

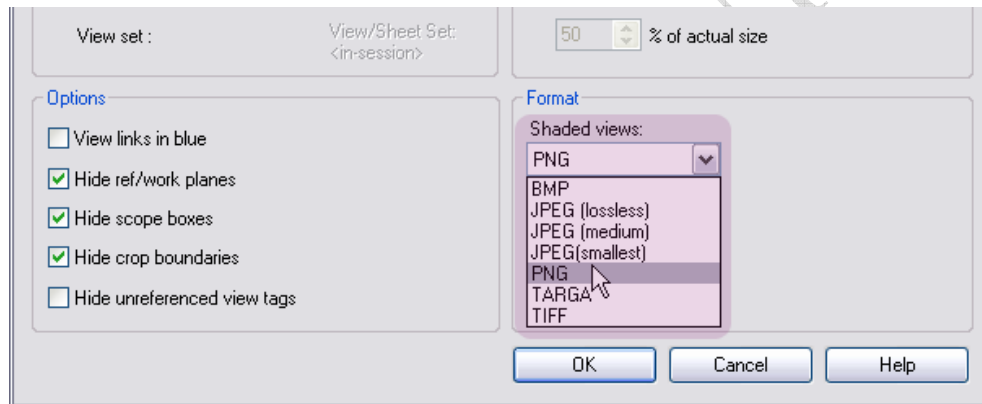
- PNG offers much wider range of transparency options than GIF, including alpha-channel transparency
- Much wider range of color depths than GIF (true color up to 48-bit vs 256-color for GIF). Translates into greater color precision, smoother fades, etc.

However:

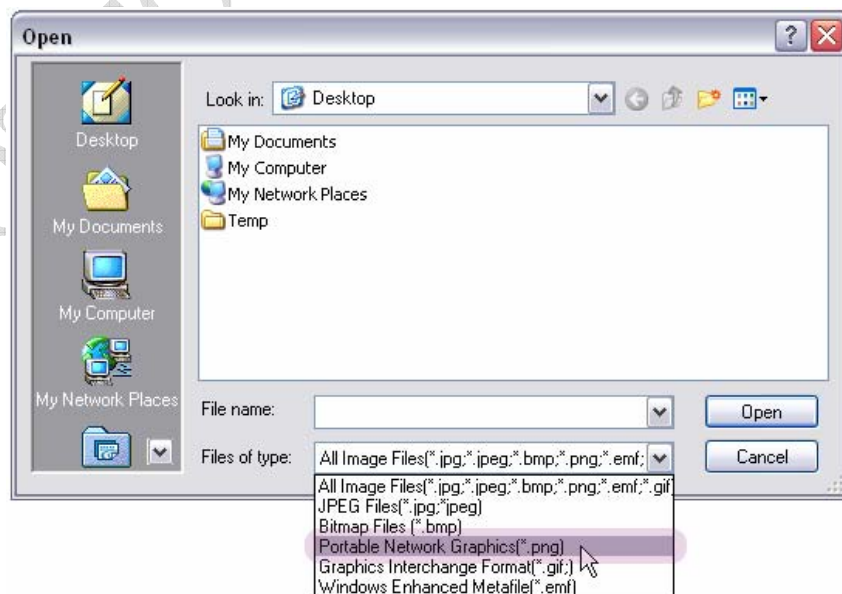
- GIFs are typically smaller files.
- GIF supports animation. PNG does not.

## Accessing the new functionality:

To export a PNG, click **Export > Image** from the **File** pull-down menu and then select PNG from the list of available file formats.



To import a PNG, click **Import > Image** from the **File** pull-down menu and then pick PNG from the **Files of Type** pull-down.



## Benefit to the User:

Users have the freedom to use an additional file format in Revit Building Projects.

## Additional things to know:

- PNGs function exactly like other image formats in Revit Building. (ie: Drag & Drop, Rotate, etc)

## Columns: Set Room Bounding Parameter prior to Placement – all Revit Products

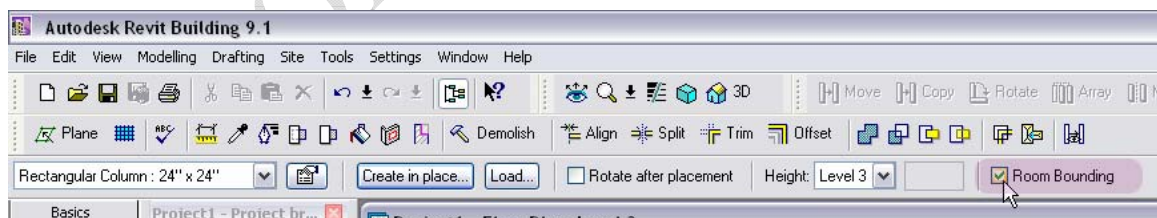
During the placement of columns, the Room Bounding Parameter can be toggled on or off.

## The Project:

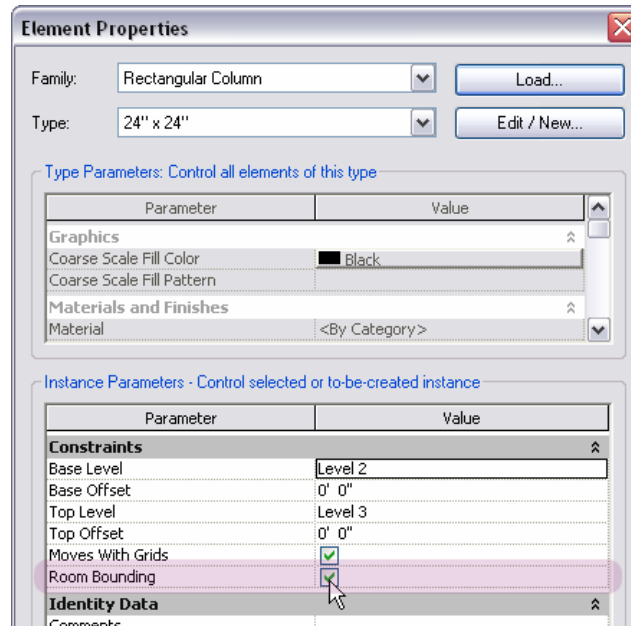
In Revit Building 9, Columns were introduced as room bounding elements. While columns room boundedness could be controlled at the instance level, it could only be toggled on or off after the column was placed.

## Accessing the new functionality:

Select the column tool and choose a type of column that can be room bounding. Simply, check/uncheck the room bounding checkbox. Alternately, the user could open the properties box before placement to change this parameter. By default, a column is set to be room bounding.



After a column is placed, the room bounding parameter can still be edited through the columns properties box. Select a column and click to open its properties. Check or uncheck the room bounding checkbox.



### Benefit to the User:

This added flexibility increases the usability of the Column tool by setting the desired behavior during placement as opposed to post process.

### Additional things to know:

- Columns that can be room bounding are Architectural Columns or Concrete Structural Columns

## Elevation Tag Visibility Control – all Revit Products

Elevation tag visibility can be set to be a function of scale.

### The Project:

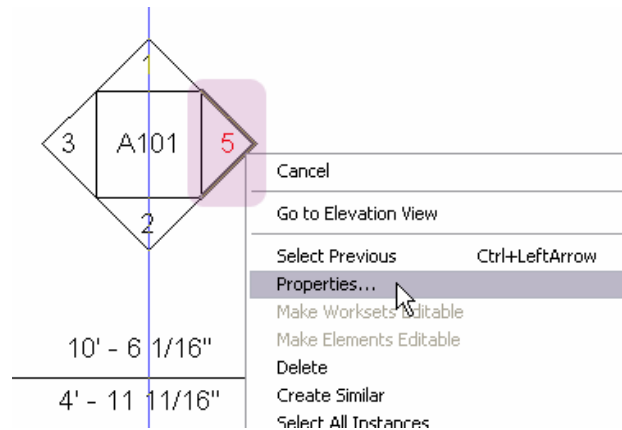
There is a new parameter in the properties of elevation 'arrows' called 'Hide at Scales Coarser than'. Once the value is set, the elevation arrow will hide at all scales that are coarser than the specified scale.

At very high scales (1' = 200', 300', or 400'), elevation tags become very large and greatly distort the readability of a view. In order to correct this, elevation annotations needed to be turned off in the view.

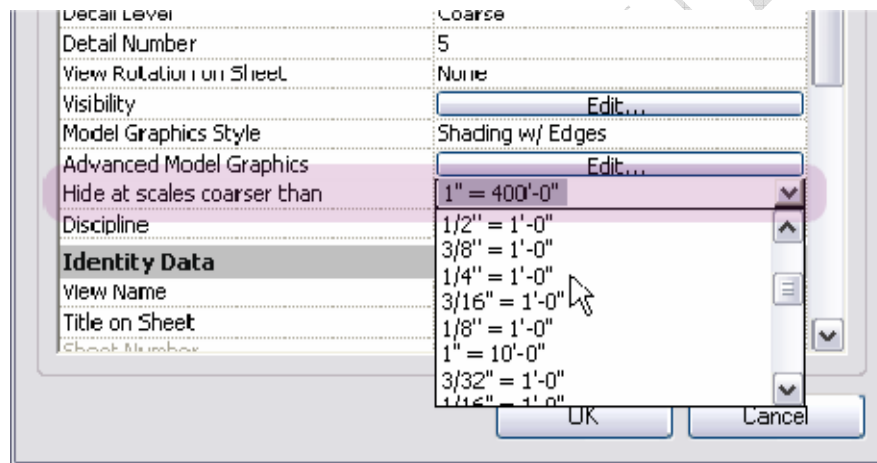
### Accessing the new functionality:

Select the elevation arrow and click to open its properties





In the properties dialogue box, select the coarsest scale at which the elevation tag should appear.



## Benefit to the User:

Elevation tags can be controlled as a product of view scale which eliminates the need to turn off elevation tags when a view is set to a very high scale. Elevation tags are now more consistent with their section tag counterparts.

## Additional things to know:

- The parameter is a parameter of the elevation 'arrow.' Therefore, it is not view specific
- If you want the tags always on, set the 'Hide at Scales Courser than' to be 1" = 400'
- If several arrows are visible for a given elevation, each would have its own parameter, the central square (or circle) will disappear with the last arrow.

- Default (and upgrade) values are set to most coarse view 1" = 400' in order to keep existing drawings accurate and workflow uninterrupted. The user needs to change the value to hide elevation tags in coarser views.
- This functionality is similar to 'Hide at Scales Coarser than' for section lines – however, not identical. Section lines assume the value from the current view while the value for Elevation Tags must be set by the user.

## Triangulation with Exclusions in Area Reports – all Revit Products

Area reports that are calculated by the triangulation method, can be set to calculate total area with or without exclusions.

### The Project:

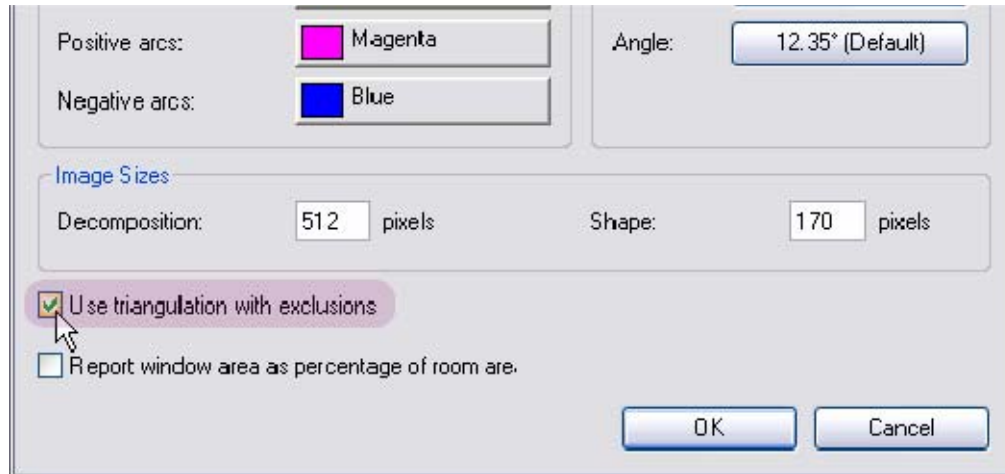
In all regions of the world, the size of a space directly impacts the price that it can be rented or sold. For example, a 1300SF apartment is more expensive than a comparable 1000SF apartment. In regions such as Germany, Japan, Italy, and France governing authorities have put regulations in place to protect the consumer from inaccurate room area calculation. More specifically, any building project must be accompanied by a proof of room area calculations. Recently, local building authorities have begun to also require geometrical proofs of the area value calculations reported in a project, in order to further substantiate the price at which it is rented or sold.

Revit Building has been able to create Room Area Reports for several releases. However, since the introduction of room bounding columns, the visual information was cluttered and often times discernable due to the method of triangulation. Also, there was not enough information to achieve the new more in depth level of data that local authorities now require.

In this new calculation method, area for the entire room is calculated first. Next, the area of each exclusion is calculated. Finally, the area of each exclusion is subtracted from the total area of the room.

### Accessing the new functionality:

From the File pull-down menu, choose Export > Room/Area Report. Click the Settings button to open the Area Report Settings.



Turn on/off the option to Use triangulation with exclusions

## Benefit to the User:

The new method of calculating area in Room Area Reports greatly improves the readability of Room Area Reports. Additionally, all of the geometrical and algebraic proof data required for permit is automatically generated by Revit Building.

## Additional things to know:

- Default is set to use triangulation with exclusions
- The Triangulation with Exclusions checkbox is only relevant for reports generated using the triangulation method. It is ignored when generating numerical reports.
- When Triangulation with Exclusions is not set for rooms, the report generates as it did in versions previous to Revit Building 9.1.

## Section Line Snapping – all Revit Products

While creating a section line, section ends will snap to datums (ie: grid lines and reference planes) as well as parallel and orthogonal to those datums. Section lines can also snap to walls in plan.

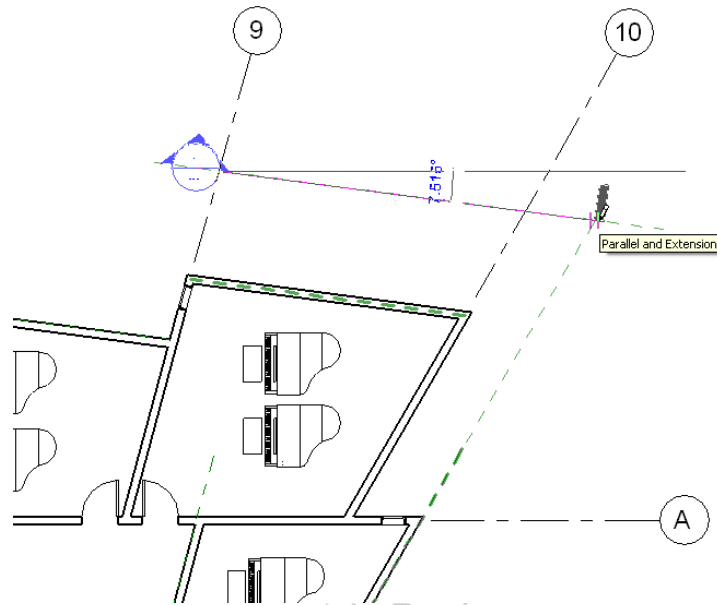
## The Project:

In Revit Building 9 and earlier, section line snapping was limited. As a result creating a section line that ran parallel to an angled datum was difficult.

## Accessing the new functionality:

While drawing a section line that should snap to datums (reference lines/planes or grid lines), mouse over the datum for the snap to take effect. Click to start and finish the section line.

To snap to a wall, place the first anchor point for the section line and then move parallel to or orthogonal to the wall for the snap to take effect. Click again to finish the section line.



### Benefit to the User:

Improved snapping and better graphical feedback during section line creation ultimately contributing to more accurate section lines.

### Additional things to know:

- Snapping is only available during section line creation
- Section ends do not snap to model geometry
- When the user snaps parallel or orthogonal to a wall, the wall highlights with a dashed green line
- Section line does not become parametric – ie: if the angle of the wall changes, the section does not automatically update

## DWF Export: Publish Room and Area Properties – all Revit Products

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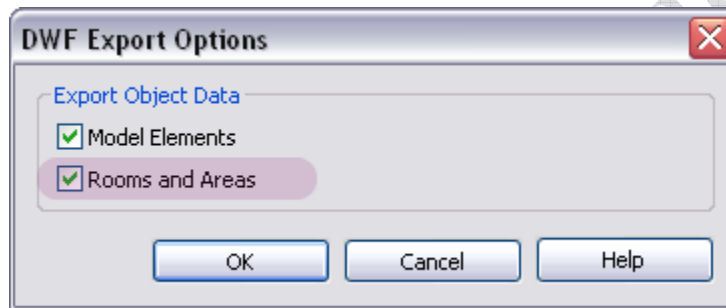
There is a new DWF Export Option that allows Room and Area information to be attached to the 2D DWF Export from Revit Building

## The Project:

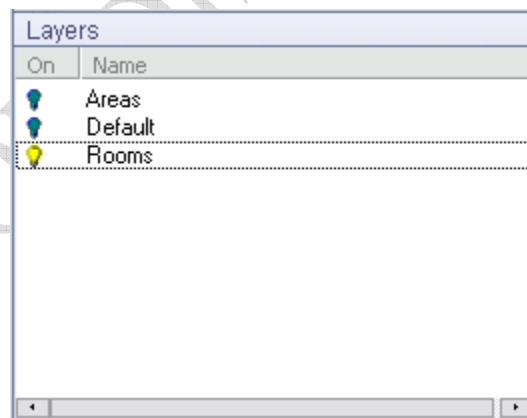
To meet FMDesktop requirements and provide more feedback to users, Room and Area Properties are exportable.

## Accessing the new functionality:

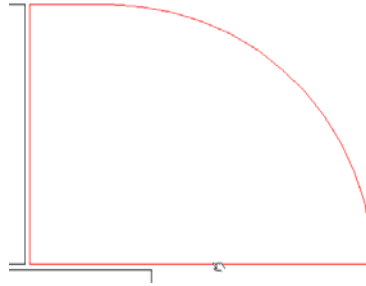
From the file menu, click Export DWF > 2D DWF and click the Options button to open the DWF Export Options. Check/uncheck the option to include room and area data.



This option creates new layers in the DWF for rooms and areas. To view the room and area information in DWF Composer or DWF Viewer, turn off the Default layer



and select a room



The room/area properties are displayed in the properties box.

## Benefit to the User:

Additional user feedback as well as compatibility with FMDesktop.

## Additional things to know:

### ➤ Area properties are:

- Area
- Area Scheme Id
- Area Type
- Comments
- Id
- Level
- Name
- Perimeter

### ➤ Room properties are:

- |                                     |                                 |                                  |
|-------------------------------------|---------------------------------|----------------------------------|
| • Actual Exhaust Airflow            | • Ceiling Reflectance           | • Lighting Calculation Workplane |
| • Actual HVAC Load                  | • Comments                      | • Name                           |
| • Actual Lighting Load              | • Condition Type                | • Number                         |
| • Actual Other Load                 | • Department                    | • Number of People               |
| • Actual Power Load                 | • Design Exhaust Airflow        | • Occupancy                      |
| • Actual Return Airflow             | • Design HVAC Load per area     | • Occupancy                      |
| • Actual Supply Airflow             | • Design Lighting Load per area | • Perimeter                      |
| • Area                              | • Design Other Load per area    | • Phase Id                       |
| • Area per person                   | • Design Power Load per area    | • Room Cavity Ratio              |
| • Average Estimated Illumination    | • Design Return Airflow         | • Sensible Heat Gain per person  |
| • Base Finish                       | • Design Supply Airflow         | • Space Type                     |
| • Calculated Lighting Load per area | • Floor Finish                  | • Temperature                    |
| • Calculated Power Load per area    | • Floor Reflectance             | • Total Heat Gain per person     |
| • Calculated Supply Airflow         | • Id                            | • Volume                         |
| • Ceiling Finish                    | • Latent Heat Gain per person   | • Wall Finish                    |
|                                     | • Level                         | • Wall Reflectance               |

## DWF Export: Meeting FMDesktop Requirements – all Revit Products

User-hidden fields that contain unformatted values of Revit object data have been added to the 2D DWF Export to meet FMDesktop requirements.

## The Project:

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For any object's property with an assigned unit of measurement, Revit will export both visible formatted values (this already occurs) as well as user-invisible information (this is new). The user-invisible information consists of two additional fields, an unformatted "raw" value and a field to describe the unit type or data type.

These new properties will not display in Design Review. However, FMDesktop will read them.

### **Accessing the new functionality:**

New functionality is automatic and invisible to the user.

### **Benefit to the User:**

Compatibility with FMDesktop.

## **DWF Export: Meeting FMDesktop Requirements – all Revit Products**

Object Guaranteed Unique Identifier (GUID) Numbers are added to the 2D and 3D DWF export to meet FMDesktop compatibility requirements.

### **The Project:**

Revit Element IDs are unique inside of a single RVT file and are already being used successfully by FMDesktop. However, element IDs are not *globally* unique and there is a chance, in more complicated cases involving combining different RVT projects into one FMDesktop database, that the same ID could be used for more than one object.

The GUID makes it virtually impossible to have duplicate identification numbers.

### **Accessing the new functionality:**

New functionality is automatic and invisible to the user.

### **Benefit to the User:**

Compatibility with FMDesktop.

## **Improved: Inserting Windows & Doors in face walls and in-place family walls – all Revit Products**

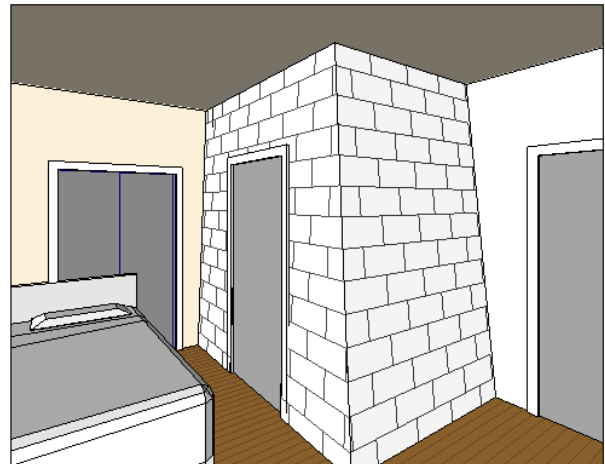
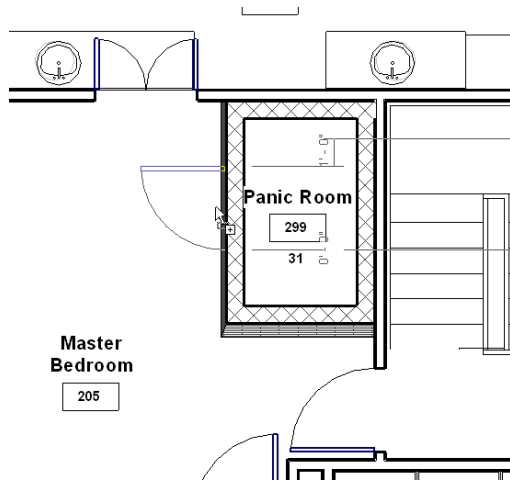
Users can place windows and doors in face walls and in-place family walls while in plan view.

## The Project:

Prior to Revit Building 9.1, users could not place a window or door in a face based wall in plan view.

## Accessing the new functionality:

While in plan view, click the window or door tool and place the object.



## Benefit to the User:

Increased usability and consistency as well as removing an interruption to the users workflow.

## Revision Tag & Cloud Visibility Control – all Revit Products

Revision Tags can remain visible while Revision Clouds are invisible.

## The Project:

To track revisions, a common practice among Architecture and Engineering firms in the USA is to leave evidence of all revisions wherever they were made.

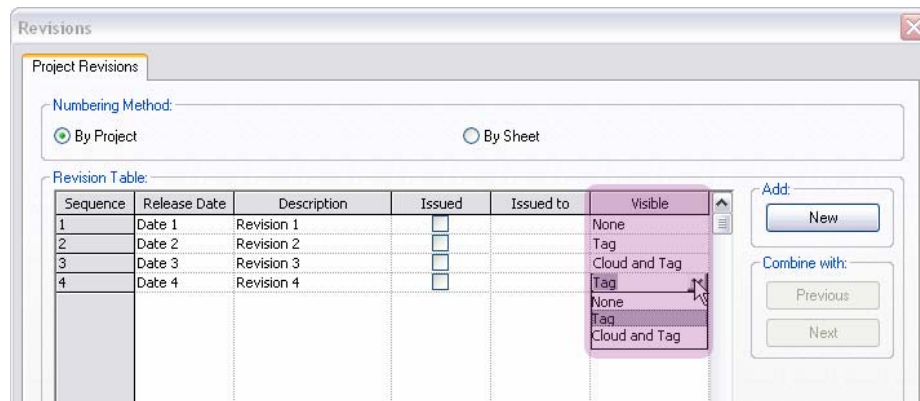
The common practice is to keep a revision tag visible but remove its cloud as the revision is completed. The desired affect is achievable by having a revision tags visibility independent from its associated cloud. By doing so, a tag can remain visible while its cloud is invisible.

## Accessing the new functionality:

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From the **Settings** pull down menu, choose **Revisions**. Set revision tag visibility by choosing one of the three settings in the Visible column.



The three choices are:

- Cloud and Tag – (default) Both the Revision Cloud and any associated Tag will be visible.
- Tag – the Revision Tag will be visible but the Revision Cloud will be drawn invisibly. As long as the revision is not 'Issued,' users can still pre-highlight, select, and edit the cloud.
- None – the cloud and the tag do not draw at all. As a result, neither the cloud nor tag can be selected or edited.

## Benefit to the User:

This new capability gives the option for users to easily control revision tags and clouds to achieve their desired appearance.

## Additional things to know:

- The visibility setting of a revision applies to all clouds and tags that represent it.
- When a revision tag has its leader enabled (figure 1) the leader remains visible when the cloud is turned off (figure 2).

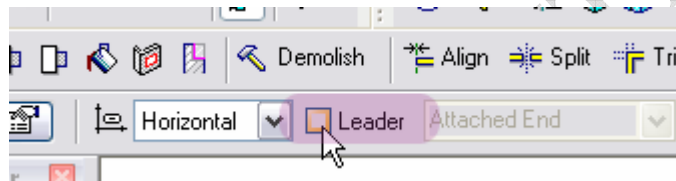


Figure 1



Figure 2

There is an easy work around for this. Once the cloud is turned off, select the tag and disable its leader from the options bar.



This is not a 'bug' – it is operating as designed.

## Concrete Joins – all Revit Products

Joins between certain concrete elements clean up automatically.

### The Project:

There are several concrete element interactions that should consistently produce automatic joins. Specifically between:

- beams and beams
- beams and columns
- beams and foundations
- foundations and foundations

Prior to Revit Building 9.1, these joins were neither consistent nor predictable. Users needed to manually join these connections and sometimes draw 2D line work in order to achieve the desired display.

### Accessing the new functionality:

Similar to walls and lines; when the elements intersect or end within a proximity, they will automatically join.

### Benefit to the User:

Automated control over more concrete joins reduces redundancy as well as predictability.

## Additional things to know:

- This improvement will not be applied to models created prior to Revit Building 9.1. To make use of this new functionality on existing old joins, the user can touch the joining beam ends in order to reconnect them and reestablish the join.
- In order to produce automatic joins between the above concrete elements, they must be at the same elevation.

## Trim/Extend Functionality for Beams and Braces – all Revit Products

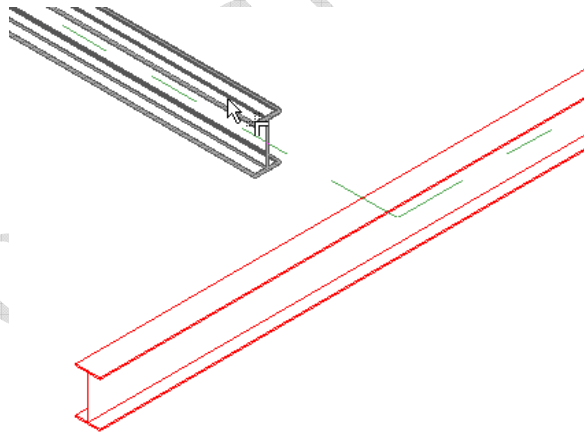
Similarly to model lines, beams and braces can be edited with the Trim/Extend tool.

### The Project:

Prior to Revit Building 9.1, the Trim/Extend tools would not function on beams and braces.

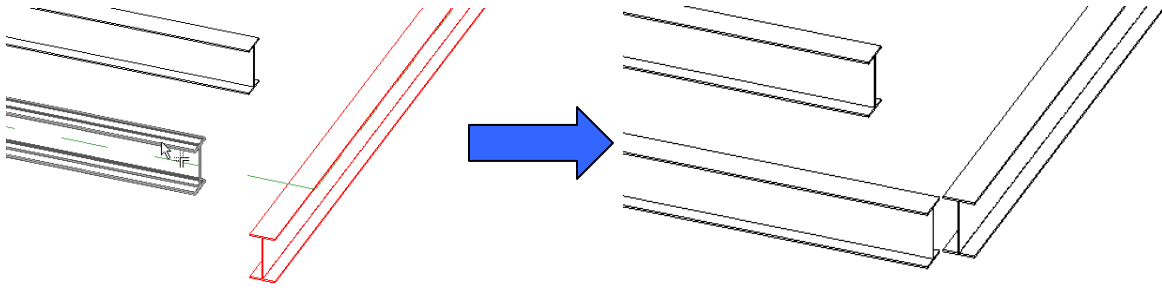
### Accessing the new functionality:

On the toolbar, click the Trim/Extend Tool. Select the first beam/brace, and then select the second beam/brace

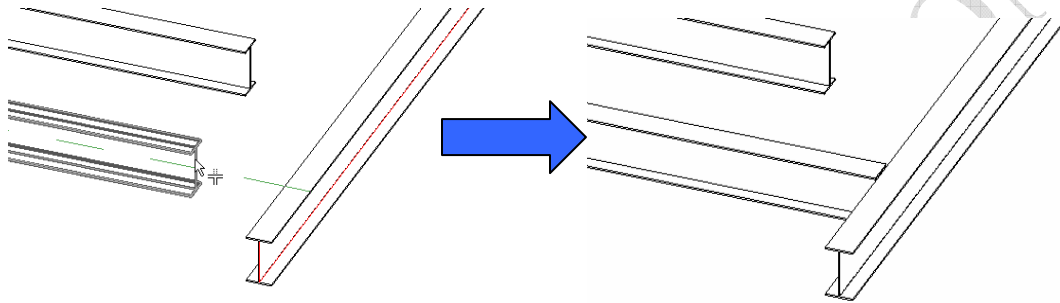


There are 3 modes for the Trim/Extend Tool.

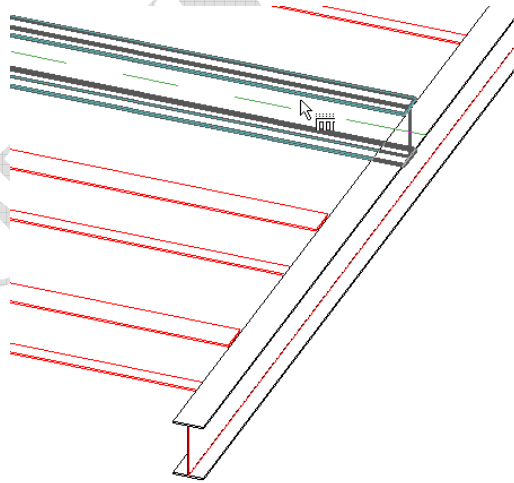
Trim/Extend to Corner – Trims and/or extend both beams/braces



Trim/Extend Single Element – Extends one element to another



Trim Extend Multiple Elements – extends multiple elements to another



### **Benefit to the User:**

Improved modeling control and capabilities for beams and braces.

## **Move Braces out of Originating Plane – all Revit Products**

It is now possible to use standard editing tools on Braces such as Copy, Move, Mirror, Array, and Rotate to move them out of their originating vertical plane.

### **The Project:**

In most projects, brace frames are largely identical or repeatable. However, without the standard editing commands (copy, move, mirror, array, and rotate) users were forced to create – and recreate – each brace.

### **Accessing the new functionality:**

There is nothing new in the User Interface. Instead, Copy, Move, Mirror, Array, and Rotate tools are active for Braces.

### **Benefit to the User:**

The primary benefit to the user is that braces behave as users expect them to. Time is saved because the redundant modeling of identical braces is eliminated.

### **Additional things to know:**

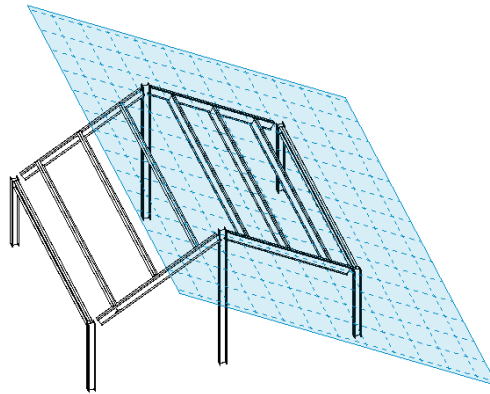
- Prior to Revit Building 9.1, these tools were inactive because braces were constrained to their originating vertical plane.

## **Beam Systems: Sloped & Non-Planar – all Revit Products**

Beam systems now have a new checkbox property called '3D.' By enabling this property the beam system can become sloped and non-planar.

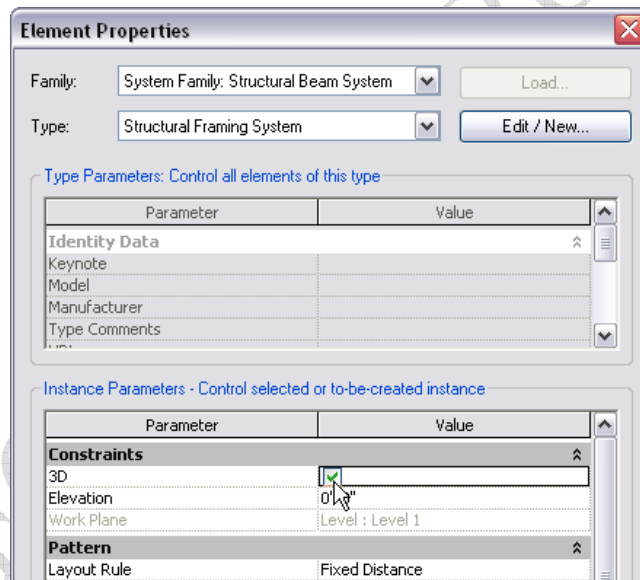
### **The Project:**

Prior to Revit Building 9.1, Beam Systems were restricted to one plane. As a result, beam layouts that changed slope were modeled in pieces. For example, a simple gable roof was modeled with 2 beam systems.



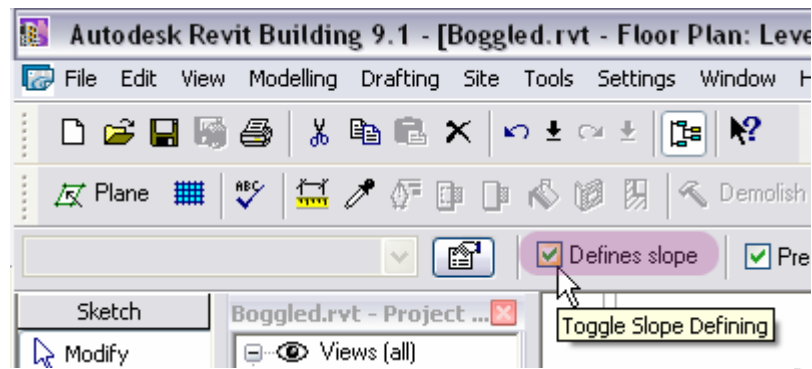
## Accessing the new functionality:

Check or (uncheck) the 3D checkbox in a Beam Systems Properties box.



**Modifying the slope of a beam system:** Once the '3D' capability of a beam system has been enabled, users can change which boundaries determine a beam systems slope.

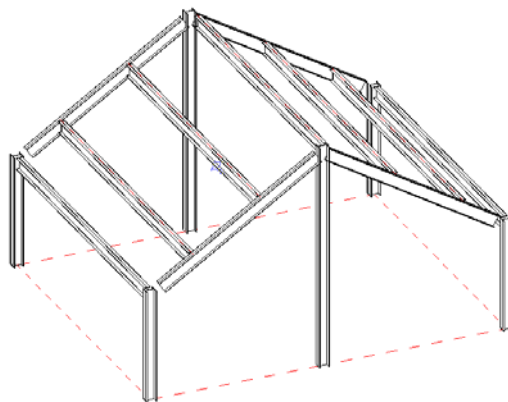
Select the beam system and click Edit on the Options Bar. Once in the sketch mode, select a boundary and check (or uncheck) the Defines slope box in the options bar. Boundaries that define slope have an angle marker next to them.



## Benefit to the User:

The new flexibility in the Beam System Tool makes it possible for users to create Beam Systems that change slope.

**Example:** Prior to Revit Building 9.1, this beam system layout (below) was created by modeling 2 Beam Systems. However, in Revit Building 9.1, this effect is achieved with only one Beam System.



## Additional things to know:

The elevation of beams in the new beam system are defined by its sketch lines. These sketch lines must follow these rules:

- Sketch lines can only define slope if they were created using the pick support tool
- Sketch lines that have a beam as their support always define slope
- Sketch lines that have a wall as their support have a "Defines slope" property. The default value of this property is true.

# Beam Systems: Clear Spacing Layout Rule – all Revit Products

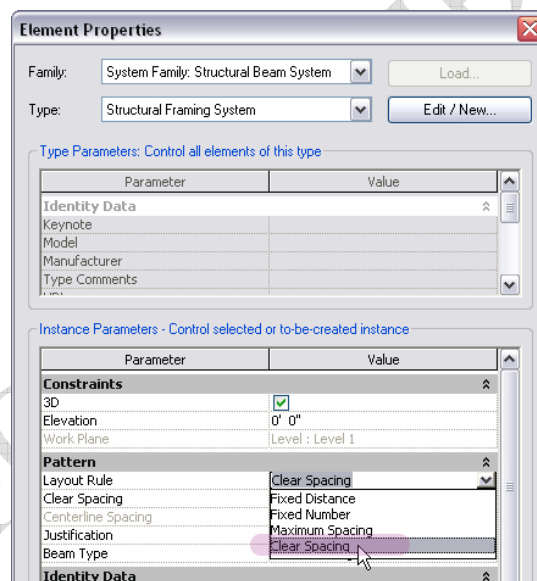
A fourth Layout Rule has been added to Beam Systems. The new rule is by Clear Spacing.

## The Project:

Clear Spacing Layouts is a typical method of laying out precast beams. The Clear Spacing Layout Rule works similar to the Fixed Distance Rule, however, it measures beam spacing between the exterior edges of beams instead of between their centerlines.

## Accessing the new functionality:

Select a beam system and open its properties box. Set the Layout Rule to Clear Spacing and enter the desired Clear Spacing Distance.



## Benefit to the User:

This increases user flexibility in the layout methodology for precast beam systems.

## Additional things to know:

- If a user adjusts the size of an individual beam in a beam system with the clear spacing layout option, the adjacent beams will move to maintain the distance between the beams.

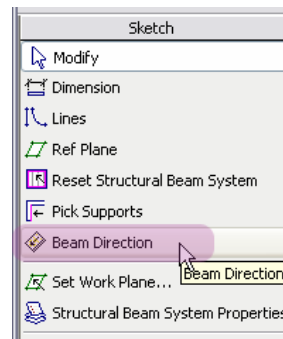


# Beam Systems: Beam Direction Tool – all Revit Products

Several small adjustments have been made to the Beam Direction Edge Tool.

## The Project:

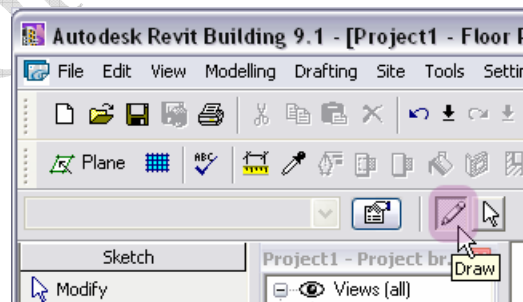
The Beam Direction **Edge** Tool has been renamed in the UI to Beam Direction Tool.



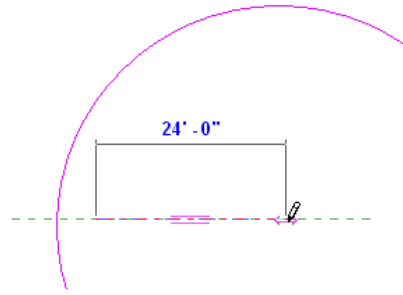
An additional option has been added to the Beam Direction Tool. Prior to Revit Building 9.1, beam direction was defined by a) selecting one of the boundary lines that define the beam system or b) drawing a new sketch line and selecting it to determine beam direction. In Revit Building 9.1, users can use the new line method to draw and set beam direction.

## Accessing the new functionality:

Select the Beam Direction Tool from the sketch tab. In the Options Bar, click the line tool.



Draw the desired beam direction.



### **Benefit to the User:**

Fewer clicks to accomplish a task.

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