

Don't Get Floored in Your Facility

Christopher Fernandez – CADD Microsystems, Inc.

FM427-1 See how Autodesk Revit Architecture can be an effective facilities management tool. Understand how parameters, schedules, and area plans can create a cohesive facility plan from design to management..

About the Speaker:

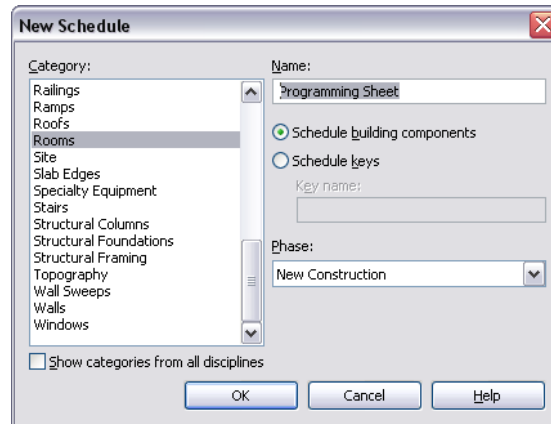
Christopher spent many years working in the AEC community as a designer, project manager, and CAD Manager. Now he is a Senior Applications Engineer with one of the most successful resellers in the nation, CADD Microsystems, Inc. He is a certified instructor and Revit Implementation Expert. He applies his diverse industry experience to assist design firms with adapting their work processes to take advantage of design automation tools and collaborative technologies.

Space Programming for Design

Space Programming is one of the first steps in designing a building. The Facilities Manager uses a variation of this tool when adding or subtracting properties, buildings, floors, and rooms. Room Schedules in Autodesk Revit allow us to create space without having to already have a building to work with. This technique will allow us to design based on needs.

Step 1 - Create a New Room Schedule

Name the schedule Programming Sheet.



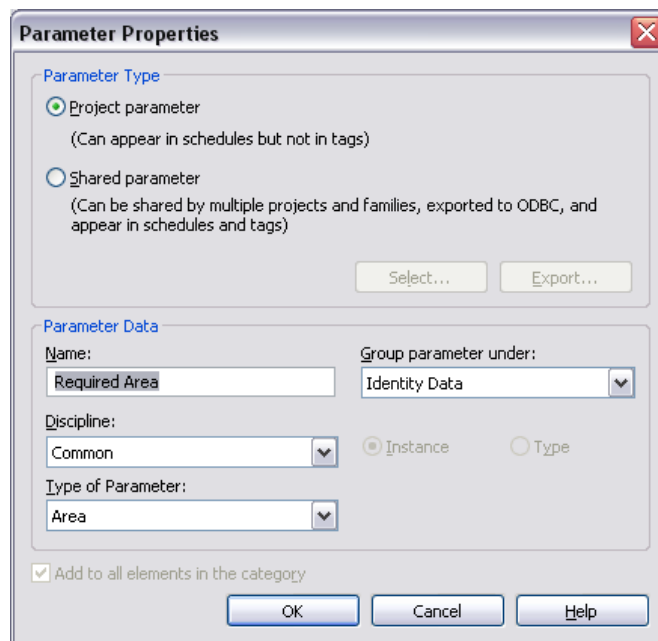
Step 2 - Select and Create Parameters

Select

- Name
- Area

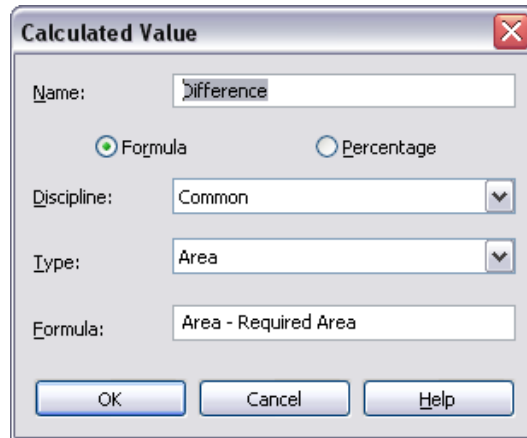
Create

- Required Area



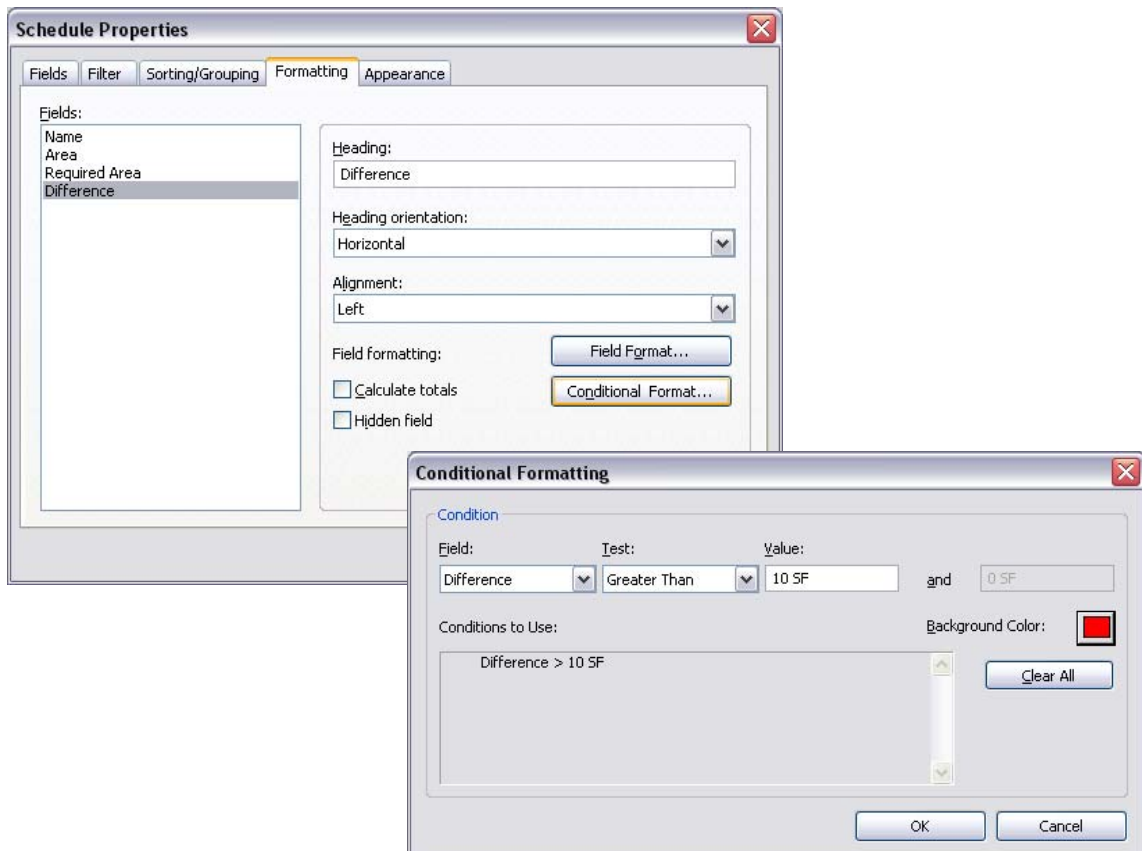
Step 3 - Create Calculated Values

Creating a Difference Calculated Value will allow you to see the amount of change needed after the Room object is placed.



Step 4 - Add Conditional Formatting

In this scenario, if the difference in the Required Area is greater than 10 Sq. Ft., I want the fill color of the field to be Red.



Step 5 - Add and Edit Rooms in Schedule

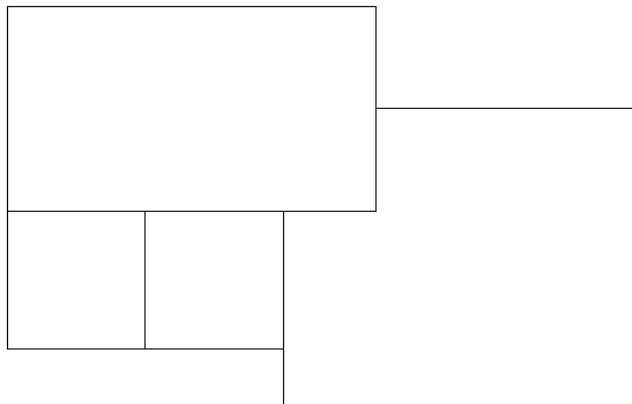
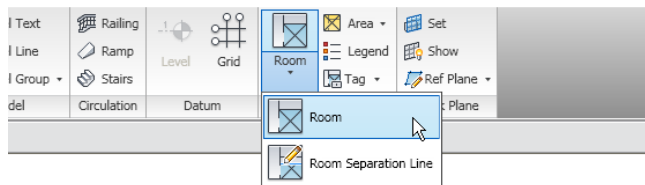
Use the New button to add Rooms to the schedule.

Fill in the information for Name and Required Area.

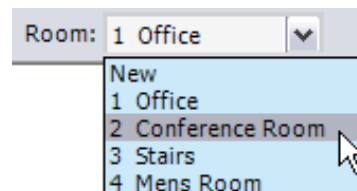
Programming Sheet			
Name	Area	Required Area	Difference
Office	Not Placed	150 SF	
Conference Room	Not Placed	450 SF	
Stairs	Not Placed	0 SF	
Mens Room	Not Placed	250 SF	

Step 6 - Create Space and Place Rooms

Use the Room Separation Lines tool to create a layout of Rooms. Assign Rooms with the Room tool by choosing the Room Name from the Room dropdown.



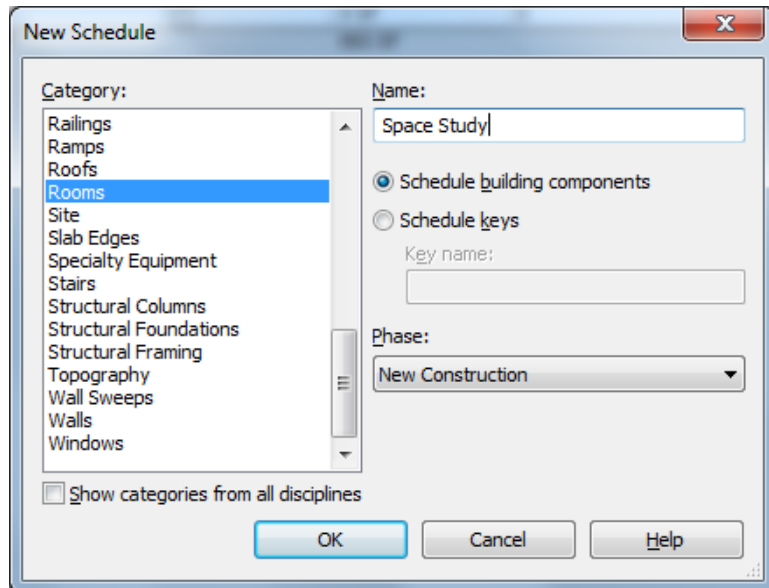
Select the Room from the list



Space Programming for Management

In this example lets use calculations to analyze Gross and Net square footage and then use those values to define areas of assignable/non assignable space.

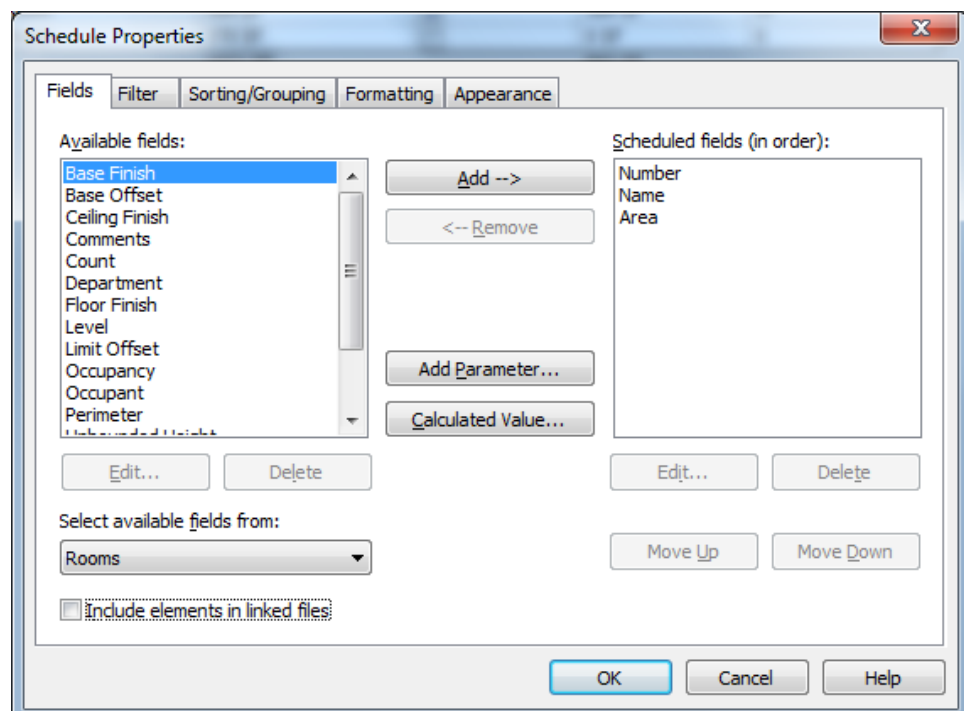
Step 1 - Create a New Room Schedule



Step 2 - Select Parameters

Select

- Name
- Area
- Level

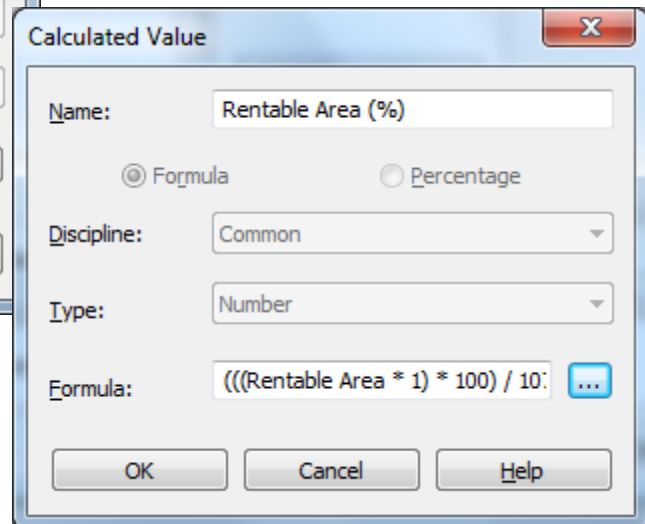
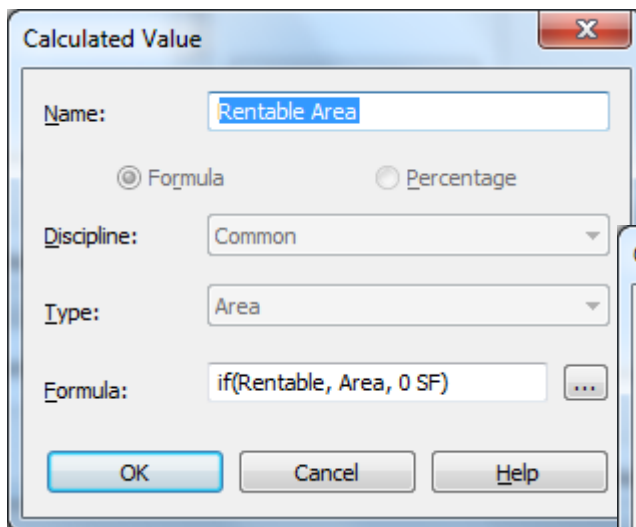


Step 3 - Create Calculated Values

Creating a Difference Calculated Value will allow you to see the amount of change needed after the Room object is placed.

Create

- Required Area (Area)
- Rentable (Yes/No)
- Rentable Area (Area)
Formula: $\text{if}(\text{Rentable}, \text{Area}, 0 \text{ SF})$
- Rentable Area (%) (Number)
Formula: $\frac{((\text{Rentable Area} * 1) * 100)}{1071 \text{ SF}}$

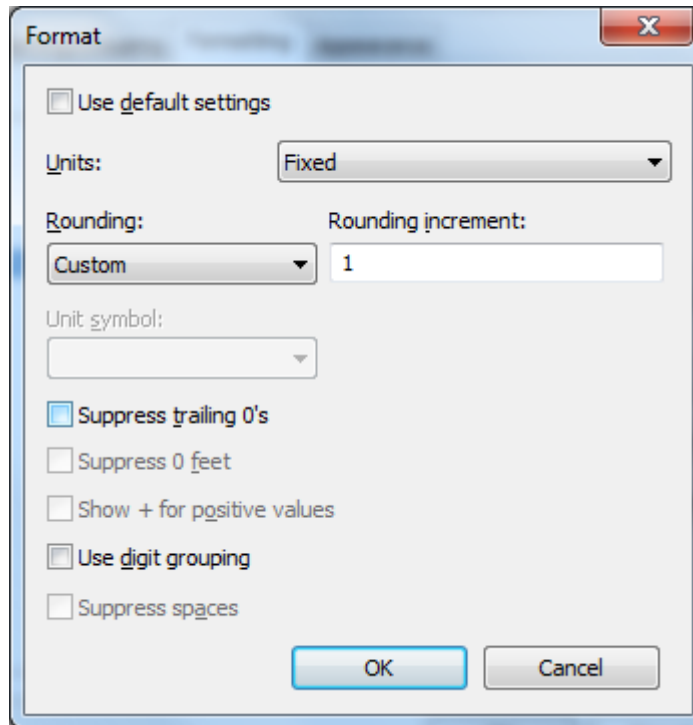


Formula Syntax

Addition	+	Logarithm	log
Subtraction	-	Square root	sqrt: sqrt(16)
Multiplication	*	Sine	sin
Division	/	Cosine	cos
Exponentiation	x^y, x raised to the power of y	Tangent	tan
Arcsine	asin	e raised to an x power	exp
Arccosine	acos	Absolute Value	abs
Arctangent	atan		

Step 4 - Formatting

Round the Rentable Area (%) Field





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Scenario Planning

Sometimes we want to know "What if?" Sometimes we need to reconfigure or add space and want to experiment with the right fit. We can solve this issue with Design Options.

Step 1 - Set Up Design Options

Add Option Sets and Options as necessary.



Step 2 - Design As Needed

Working on the appropriate Design Option, create the scenarios that are needed.

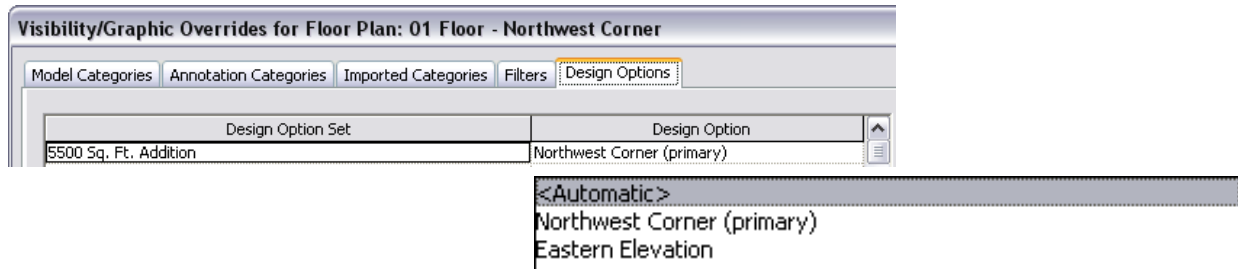
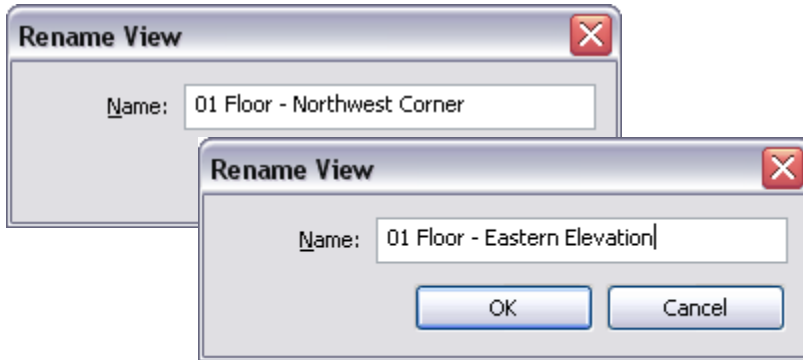
Notes

Design options can vary in complexity. For example, a designer may want to explore alternatives for entry designs or structural systems for a roof. Design options tend to become more focused and simplified as a project progresses. They are typically used as follows:

- Changing the entry design
- Exploring different layouts for rooms or furniture
- Trying different window configurations
- Developing sustainable design alternatives

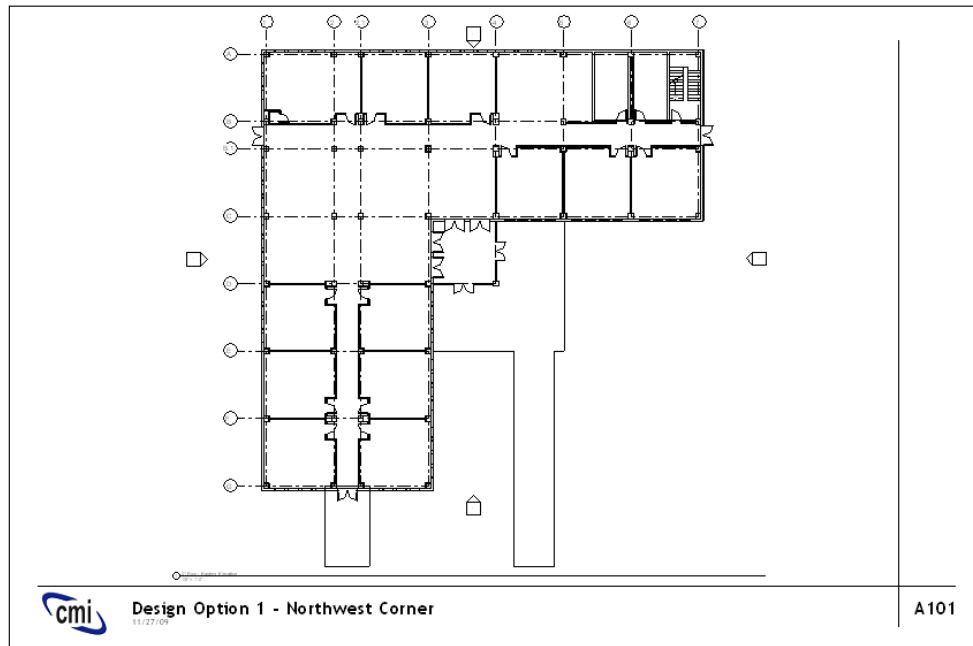
Step 3 - Create Views for Design Options

To make it easier on you, create views for the different options. Then set Visibility Graphics Overrides to show those Design Options.



Step 4 - Place Views on Sheets

To illustrate your designs, place them on sheets.



Space Accountability

One of the main areas of responsibility for a Facility Manager is tracking Space. Whether it's who's in it, who pays for it, what spaces utilities affect another spaces. We can track all kinds of information with parameters, creative legends, floor plans and Area Plans.

Color Scheme Legends

Which one is visible is a property of the View

The 'Edit Color Scheme' dialog box shows the following configuration:

- Schemes:** Category: Rooms
- Scheme Definition:**
 - Title: Name Legend
 - Color: By value
 - Options: Include elements from linked files

Value	Visible	Color	Fill Pattern	Preview	In Use
1	Conference Room	PANTONE 62	Solid fill	[Color swatch]	Yes
2	Corridor	PANTONE 36	Solid fill	[Color swatch]	Yes
3	Executive Office	PANTONE 32	Solid fill	[Color swatch]	Yes
4	Filing	RGB 096-224	Solid fill	[Color swatch]	Yes
5	Foyer	RGB 064-192	Solid fill	[Color swatch]	Yes
6	Kitchen	RGB 160-096	Solid fill	[Color swatch]	Yes
7	Mechanical / Elect	RGB 192-064	Solid fill	[Color swatch]	Yes
8	Men's	PANTONE 61	Solid fill	[Color swatch]	Yes
9	Office	RGB 194-161	Solid fill	[Color swatch]	Yes
10	Printing	RGB 064-064	Solid fill	[Color swatch]	Yes
11	Reception	RGB 064-064	Solid fill	[Color swatch]	Yes
12	Stair	RGB 209-203	Solid fill	[Color swatch]	Yes
13	Women's	RGB 096-175	Solid fill	[Color swatch]	Yes
14	Work Area	RGB 173-118	Solid fill	[Color swatch]	Yes
15	Workstations	RGB 139-166	Solid fill	[Color swatch]	Yes

The floor plan below is color-coded according to this legend:

- Conference Room: Light Green
- Corridor: Yellow-Green
- Executive Office: Light Blue
- Filing: Cyan
- Foyer: Green
- Kitchen: Purple
- Mechanical / Electrical: Magenta
- Men's: Yellow
- Office: Brown
- Printing: Dark Blue
- Reception: Grey
- Stair: Tan
- Women's: Blue
- Work Area: Dark Brown
- Workstations: Grey-Blue

Quick Notes

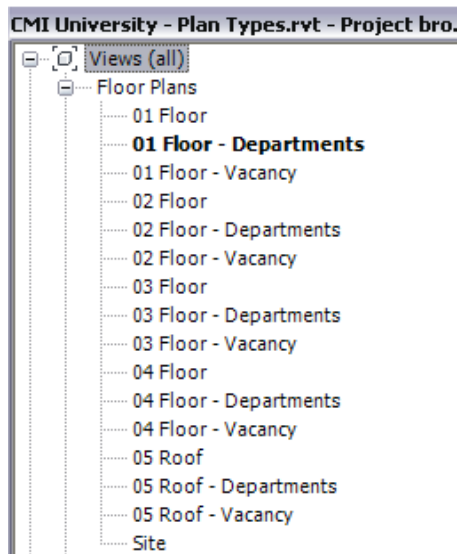
- Rooms represent the space between your modeled elements (walls, doors, columns, etc.)
- Rooms must be added in plan Views
- Room properties can be scheduled and most elements know which room they are located within (Doors even know the “to” and “from” Rooms)
- Room Separation Lines allow you to break up Rooms within an area when there are no walls

Tips

- Create a separate floor plan View just for your Rooms and turn off their visibility in other Views
- Deleting a Room does not remove it completely from your project, you must also delete it from the Room Schedule
- You can tag all your Rooms in a View with the “Tag All” tool found on the “Annotate” tab of the Ribbon



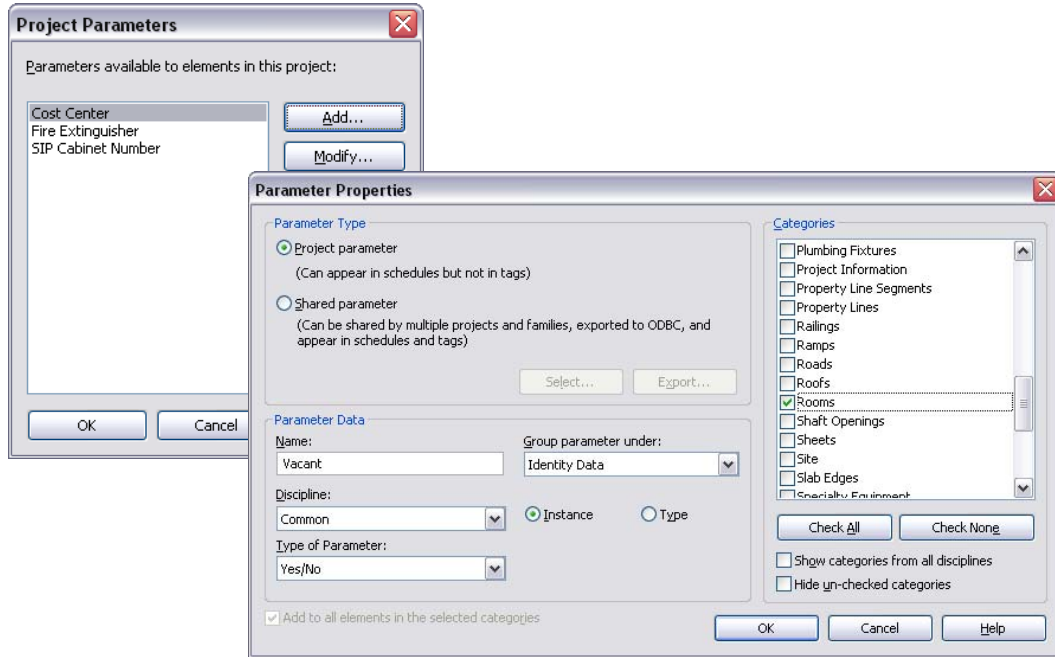
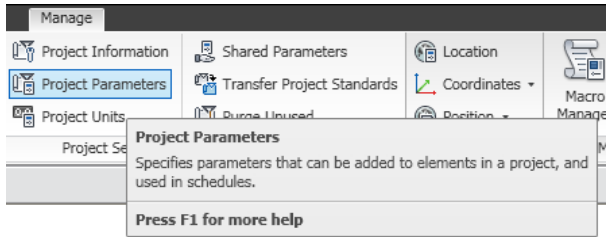
Step 1 - Create Views for Legend Types



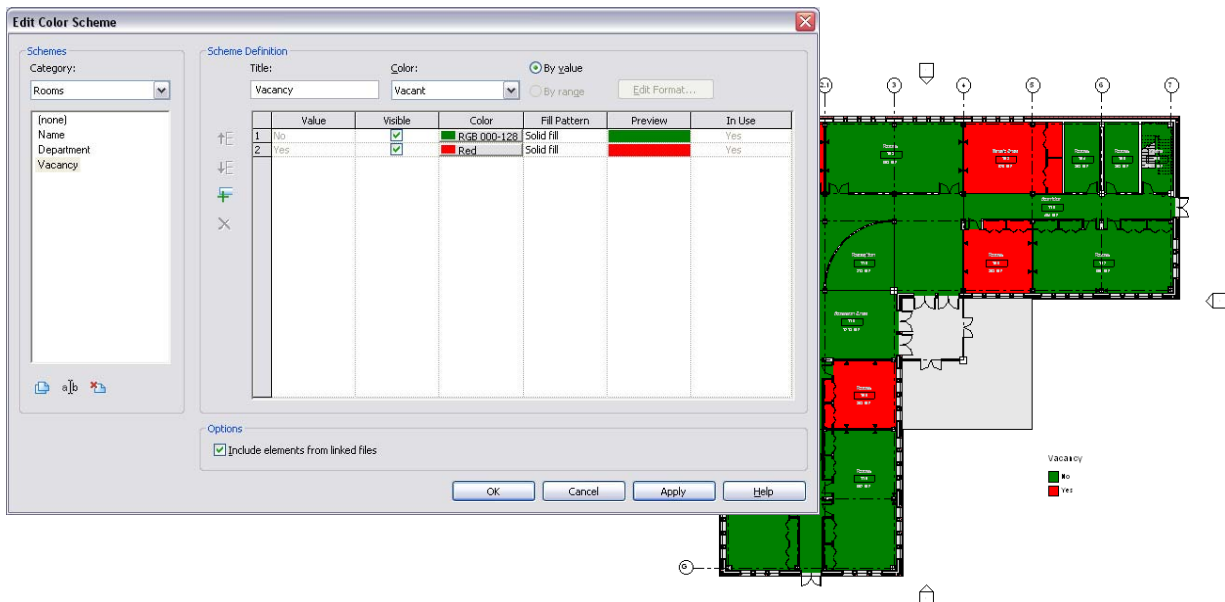
Step 2 - Add Legends and Edit as Necessary



Step 3 - Add Parameters as Necessary

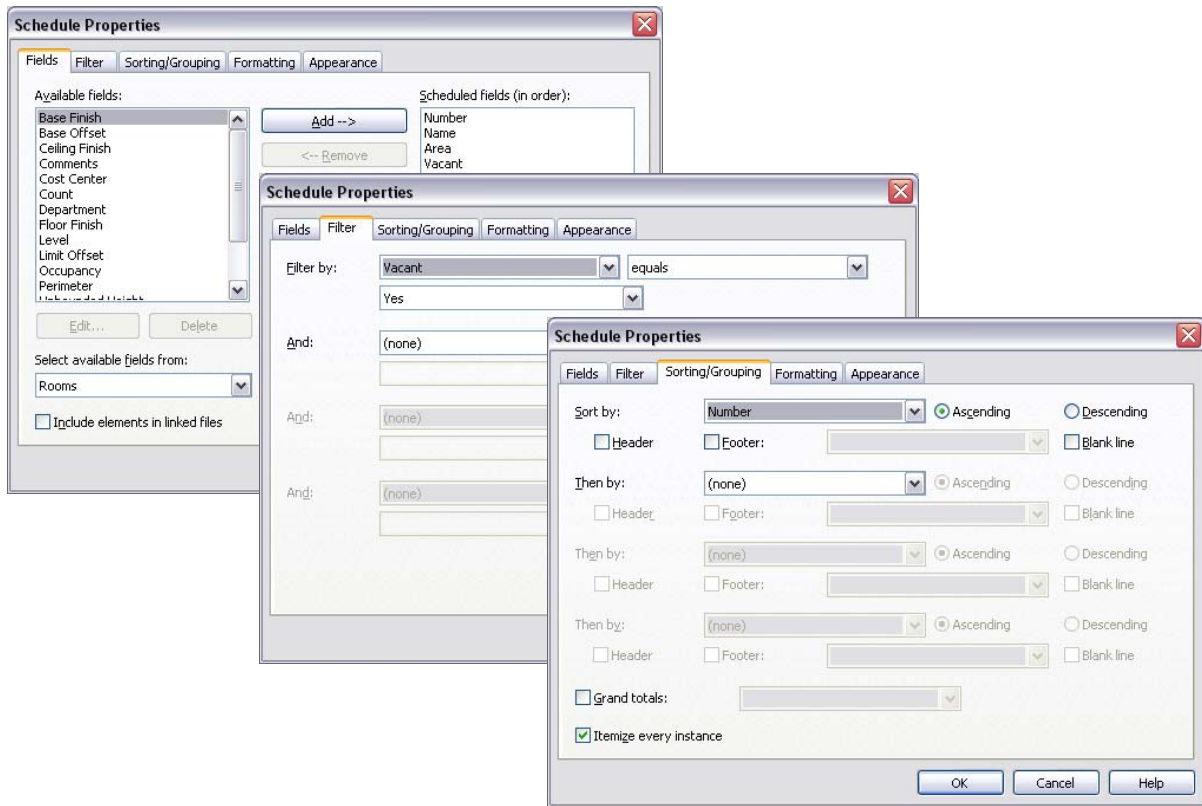


Step 4 - Create a New Legend and Edit as Necessary

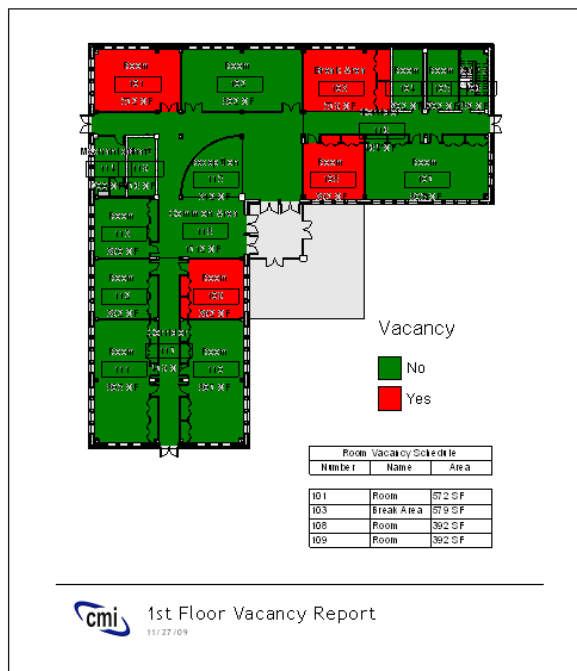


Step 4 - Create Schedules

Create a Room Schedule for reporting purposes.



Step 5 - Place On Sheets for Reports

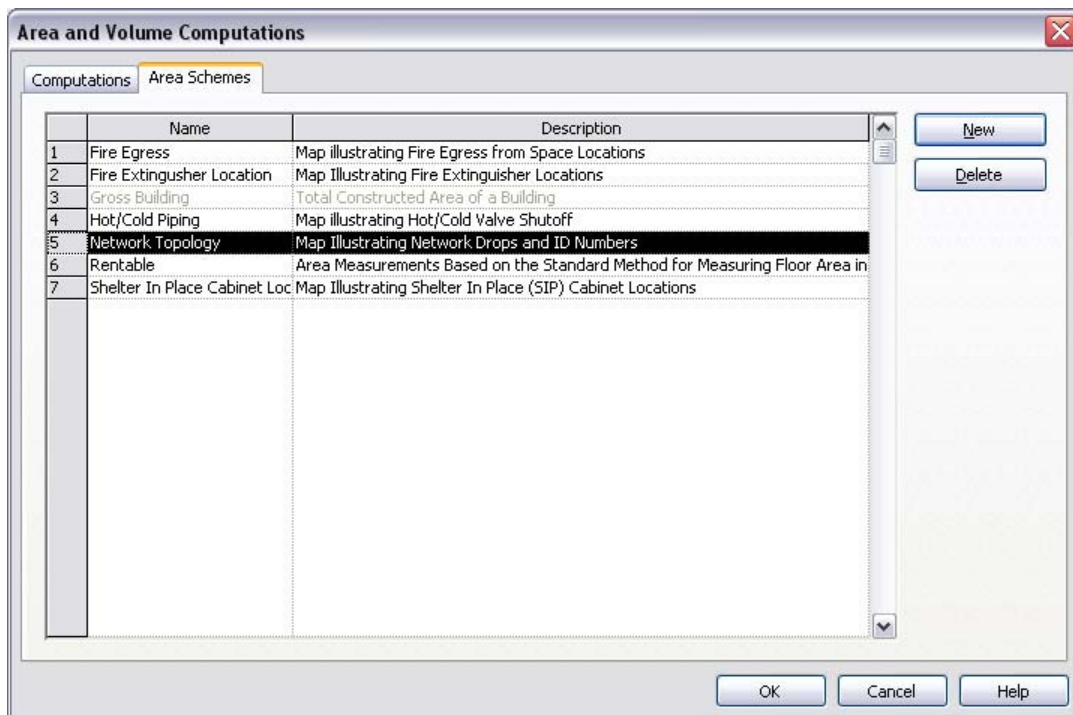


Because of Autodesk Revit's amazing ability to organize and display views differently we can get a little creative at showing what we want how we want it.

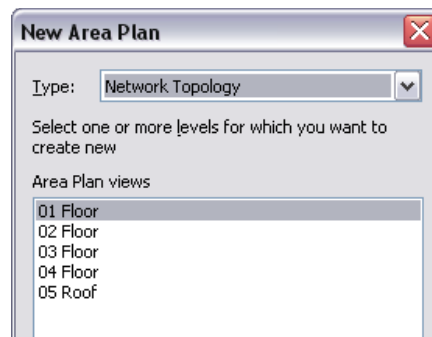
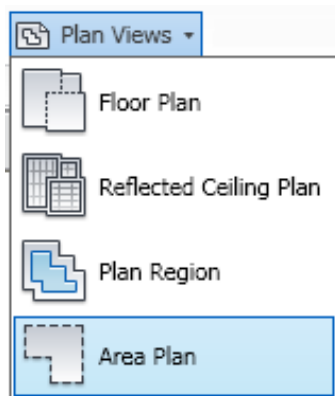
The most effective way is the Area Plan. The reason I use this is simple, I can create my own categories and making views couldn't be easier.

Step 1 - Create an Area Scheme

Name the new area scheme. Also, as with most things in Revit, information is key. Fill in descriptions.

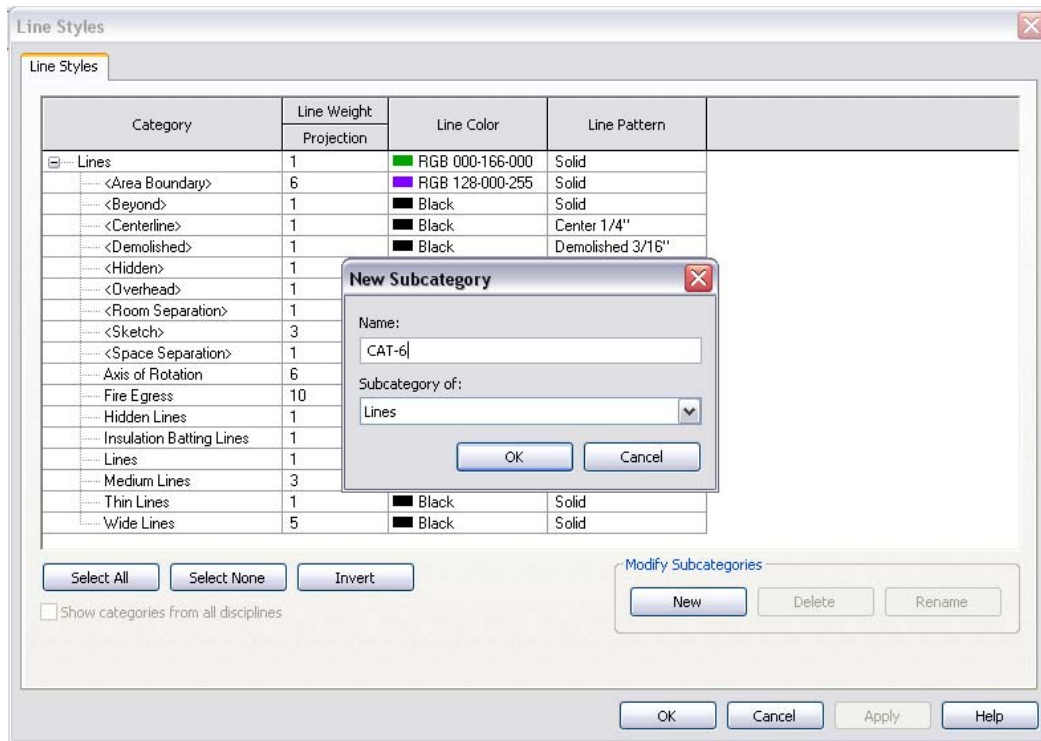


Step 2 - Create Appropriate Area Plan

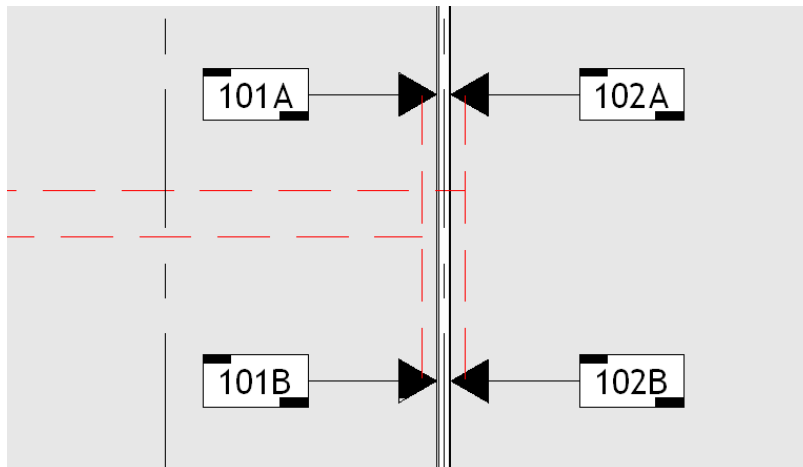


Step 3 - Create Necessary Detailing

In this example, I've created CAT-6 Cable Linework.



Step 4 - Annotate as Needed



Content

Tracking information about content is the lifeblood of a Revit Facility Manager. Since Revit is a big database with an amazing graphical front end we can take advantage of it.

Step 1 - Create / Open Content for Editing

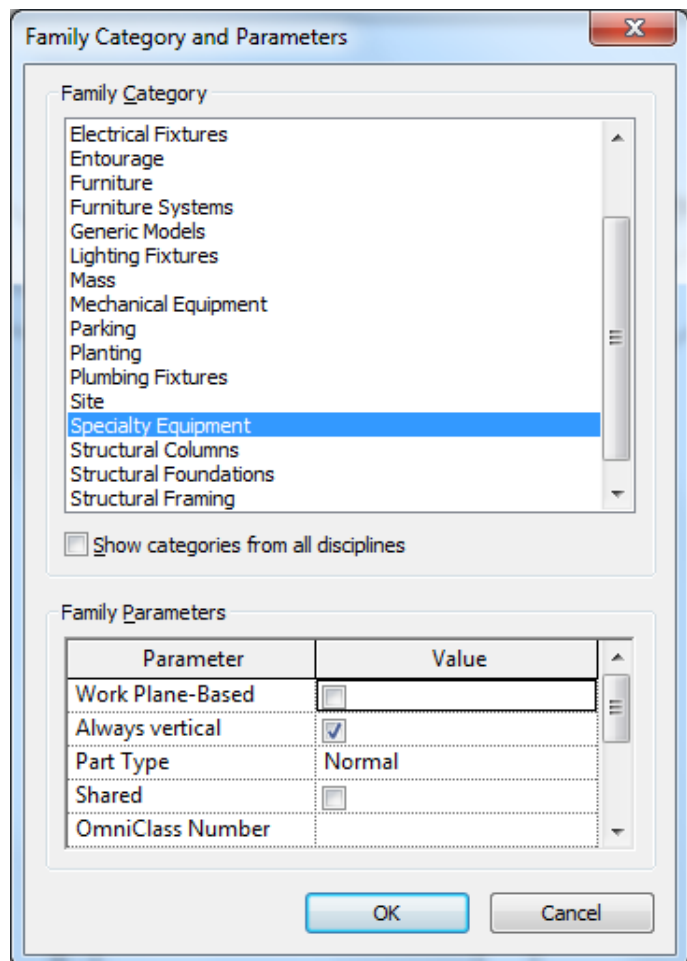
In this scenario, I will open up Copier.rfa

Step 2 - Edit Category if Necessary

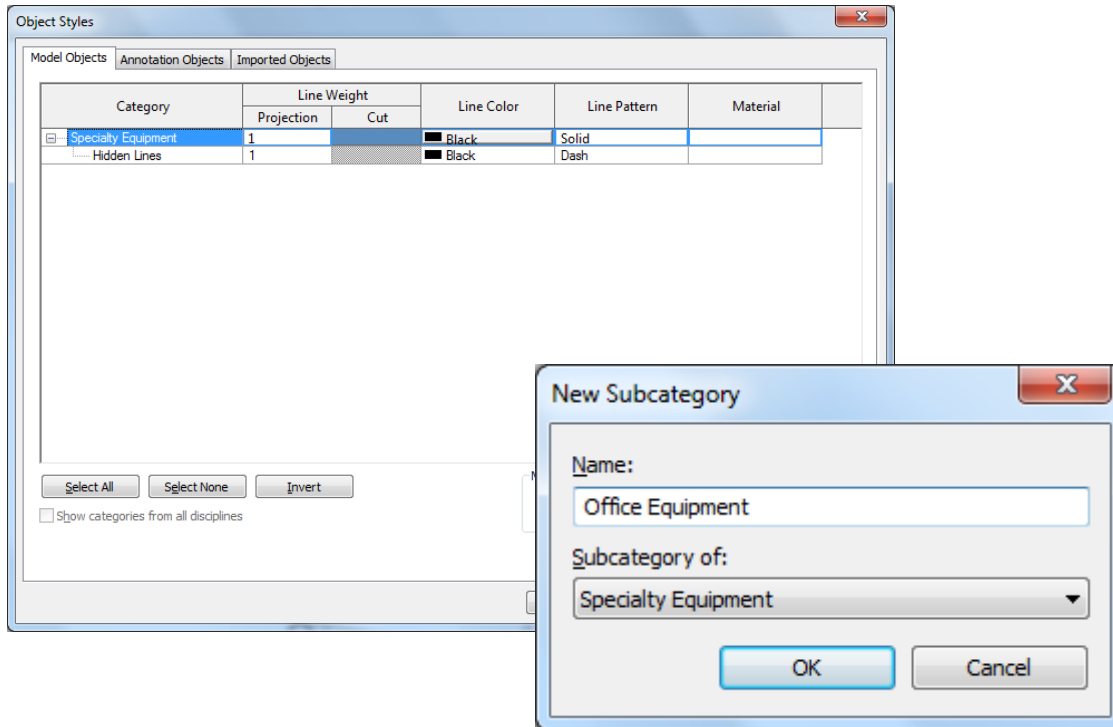
Categories deal with how the object will schedule as well as how it appears in Object Styles, Parameter Lists and Visibility Graphics.

For this example, I'm going to specify this family to be Specialty Equipment.

Note: Family Categories are fixed values that cannot be edited. However, we can create Subcategories.



Step 3 - Create Subcategories if Necessary



Step 4 - Create Parameters

Family Parameters

Cannot appear in tags or schedules. These parameters are reserved more for control of the family.

Shared Parameters

Can appear in tags and schedules. These, by far, are the most flexible types of parameters. They reside in an external txt file. Shared parameters can be added to families or projects and then share with other families and projects. Shared parameters are particularly useful when you want to create a schedule that displays various family categories; without a shared parameter, you cannot do this. If you create a shared parameter and add it to the desired family categories, you can then create a schedule with these categories. This is a multi-category schedule. Only certain categories within Revit Architecture allow shared parameters. For instance, Annotation Symbols and Titleblocks cannot contain Shared Parameters.

Project Parameter

Can appear in schedules but NOT tags. Project parameters are parameters you define and then add to one or multiple categories of elements in a project. They are specific to the project and cannot be shared with other projects. You can then use those project parameters in multi or single-category schedules.

Reporting Parameter

Reporting parameters extract a value from a geometric condition and use it to report the data to a formula or as a schedulable parameter.

Data Types (Common)

Text

All forms of text. This data type cannot be used in mathematical functions.

Integer

A set of numbers consisting of the natural numbers including 0 (0, 1, 2, 3, ...) and their negatives (0, -1, -2, -3, ...). They are numbers that can be written without a fractional or decimal component.

Number

An number that can possibly be used including 0, 1, -3, 3.1415, etc.

Length

Feet and inches, millimeters, miles, etc. Formulas can be used in this field.

Area

Contains an area value such as SF, SM, etc. Formulas can be used in this field.

Volume

Contains a volumetric value such as CF, CM, CI, etc. Formulas can be used in this field.

Angle

Contains the angle value of an entity. Formulas can be used in this field.

Slope

Can be used to create parameters that define slope.

Currency

Can be used to create currency parameters.

URL

Provides web link to user defined URL.

Material

Establishes parameters in which a specific material can be assigned.

Yes/No

A Boolean operation is used, true and false.

Family Type

Use with nested components to swap components after the family is loaded into a project.

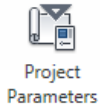
Note: NO DATE FIELD

Step 4 (con't) - Add the Following Shared Parameters

Create

- Purchase Date
- Warranty Date
- PO Number

Step 5 - Load Content and Parameters Into the Project



Manage -> Project Parameters

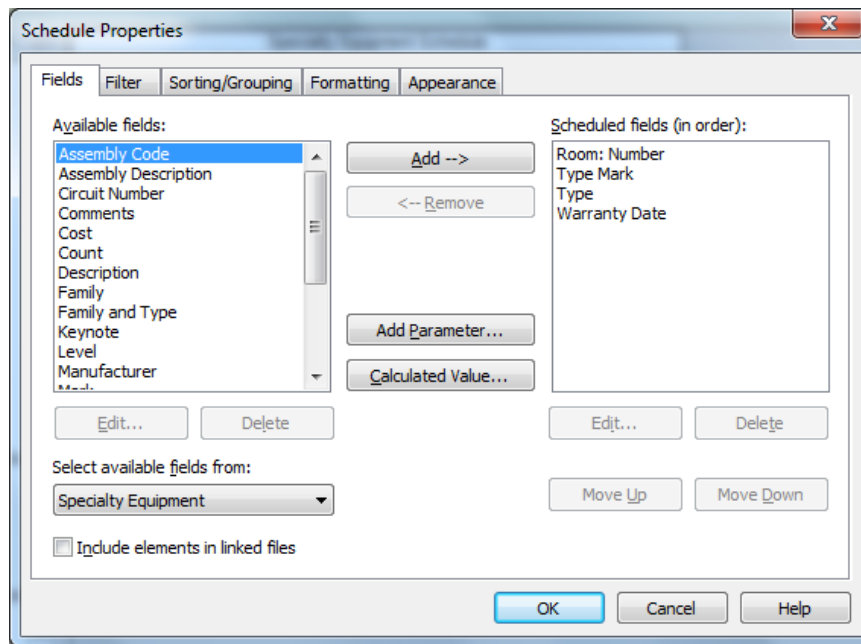
This is the tool that allows you to create parameters inside of a project. This tool also links Shared Parameters to project objects.



Manage -> Shared Parameters

This is the tool that allows you to create and manage Shared Parameters.

Step 6 - Schedule Content

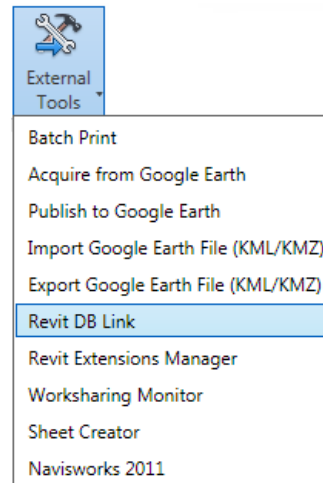


Note: Change the "Select available fields from" value to get more parameters.

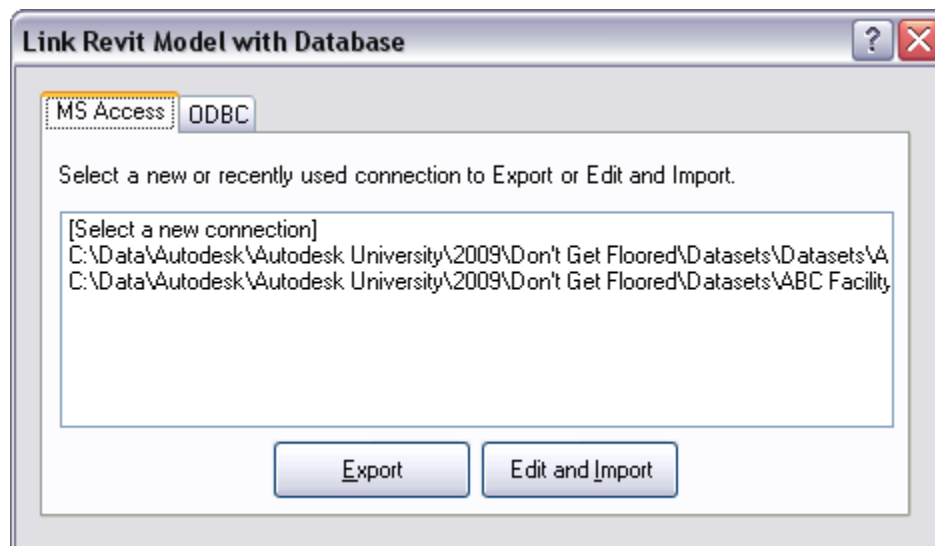
Database Connectivity

Autodesk Revit DB Link provides a way to add model element information to a database, where it can be modified. After modification, the updated data can be linked back to the Revit Architecture project. If you have Autodesk Revit DB Link installed, refer to the Autodesk Revit DB Link online help for more information.

Step 1 - Start the Revit DB Link Tool













Step 2 - Connect to ODBC and Export



Documentation

I find that Autodesk Revit can be a very effective presentation and authoring tool. In this section, I have created a Building Safety Review document that can be given to occupants of the building to make them aware of specific safety issues.

<h3>Building Information</h3>  <p>Emergency Exit stairwell</p> <ul style="list-style-type: none"> In the case of emergency, know your exits and remember to remain calm and help others.  <p>Company Emergency Number: _____</p> <p>Company Meeting Place: _____</p> <p>My Nearest Exit: _____</p> <p>My Alternative Route Is: _____</p>	 <p>6359 Walker Lane Alexandria, VA 22310 703.719.0500</p>	 <p>6359 Walker Lane, Alexandria, VA 22310</p> <h3>Building Safety Review</h3> 
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<h3>Fire Safety</h3>  <p>Fire Safety Systems</p> <ul style="list-style-type: none"> Fire alarm bells, flashing lights, public address system Heat activated sprinkler system One button shut down of outside air intake Fire extinguisher at every stairwell and in every lobby Automatic unlocking and pressurization of stairwells and exit doors  <p>If You Discover a Fire</p> <ul style="list-style-type: none"> Find a Fire Alarm Pull Station at one of the stairwell doors or elevator banks, and set off the alarm. Call 911 if you can safely reach a phone to inform them of the exact location and severity of the fire. Evacuate the Building and meet at your office's designated meeting point.  <p>If You Hear the Fire Alarm</p> <ul style="list-style-type: none"> Follow instructions given by the Building Management and/or the Fire Department. Close doors behind you, but do not lock them. Stay low if smoke is present. Evacuate the building as quickly and calmly as you can. Use the stairwell closest to you. Remember to have an alternate route in case your stairwell is unavailable. DO NOT use the elevators. Move away from the building to your office's meeting point, or at least 500 feet from the building. 	<h3>External Threats</h3>  <p>Shelter in Place</p> <p>Local authorities and emergency preparedness experts tell us that in most downtown crisis scenarios, the protocol will be to secure the building and shelter in place until authorities deem it safe to leave.</p> <ul style="list-style-type: none"> Remain calm. Stay in your office, or if possible, move to an interior building location. Turn to local TV or radio news station for instructions from local government on how to proceed.  <p>In the Case of a Bomb Threat</p> <ul style="list-style-type: none"> Try to get as much information as you can about the location and type of bomb, detonation time, and the reason for its placement if possible. Call 911 to dispatch authorities. Notify Building Management. Do not touch or remove any suspicious objects or materials. Pull a fire alarm if there is an immediate threat to the building. <p>Having a personal emergency plan at home is important. Please visit www.ready.gov to learn how to prepare yourself and your home in the event of an emergency.</p>	<h3>Medical Emergency</h3>  <p>If You or Someone Else Needs Medical Assistance</p> <ul style="list-style-type: none"> Remain calm. Call 911 to dispatch EAS. Notify Building Management. <h3>Severe Weather</h3>  <p>In the Case of a Severe Weather Alert</p> <ul style="list-style-type: none"> Remain in the building. Stay away from windows. Try to move to an interior office. Await instructions.
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