Plumbing Code Calculations

With Spreadsheet Link and Schedule XL

CTC SOFTWARE™
DESIGN SOLUTIONS

BIM PROJECT SUITE
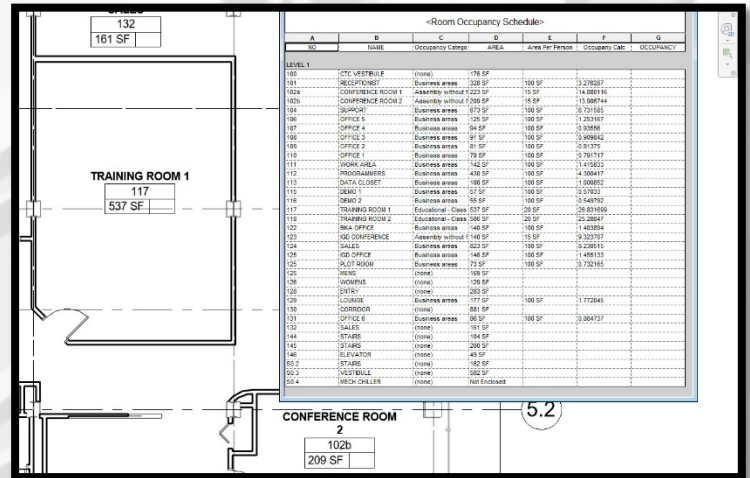
Speed up manual IBC code calculations with the ease of repeatability.
Spreadsheet Link and Schedule XL can save you hours!

The Issue

Revit® has trouble with complex calculations and the ability to run cross-category math. This can be frustrating when design calculations need to be run. In the case of plumbing code calculations, we need to take the occupancy of a defined area (floor, smoke compartment, etc.) and use these totals to derive the number of different plumbing fixtures that are required by code to be designed into these areas. Many firms run these calculations manually, but this can be done far more efficiently. This white paper will describe how a re-usable workflow can generate occupancy, calculate plumbing fixture counts and generate graphics for use in Revit to present this information in a live model.

Typical Workflow

In manual workflows, some Architectural firms will use either fake calculated values in a Revit schedule, then sometimes copy those values across to a real parameter for display in a tag, a schedule, and on the actual room object. Some firms may also use a calculated value in a tag to reduce some of the manual data transfer. Other firms will export schedules to Excel®, and run calculations there, but then must manually copy the values back into Revit. In all cases, the process is very manual and extremely error prone.

This is also rather time consuming, reducing potential production time. Regardless of how we get the room occupancy, we always must manually transfer the occupancy to a spreadsheet for our code checks, present the information in a meaningful way and return this information back to Revit. This is also entirely manual and error prone. Nothing keeps this information up to date with the Revit project model. There needs to be a better, more efficient way to do these types of calculations, and return the result of our efforts to the Revit project model and include the information on the construction document set.

Solution

This entire workflow can be heavily automated using the Spreadsheet Link and Schedule XL tools from the CTC BIM Project Suite. Your current spreadsheet can be incorporated, and the values entered far more automatically. Even the room occupancy calculations can be tuned to your liking, entered directly into the room/area/space elements you are using in the Revit model. Further, the spreadsheet graphics can be directly linked into the model, avoiding any manual image or CAD file workflows.

- **Establish predictable, repeatable workflows for all Revit users**

- **Leverage existing spreadsheet layouts so formatting in Revit aligns with company graphic standards**

- **Implement the power of spreadsheet formulas to drive calculations and graphics**

- **Import spreadsheet graphics directly into the Revit model for use on sheets**

Result

When the workflow is developed and implemented, the entire building occupancy can be calculated in a minute, and the code validation table can be filled out. With one more step, that same table can be linked back into the Revit model for use on sheets.

Any user, on any project, at any time can leverage this workflow to get updated numbers and update the tables on the sheets. Revit data-entry frustrations and quality control issues are gone, since you can leverage the power of computers to do what computers were designed for by automating the repetitive tasks that creative human minds are not great at completing.
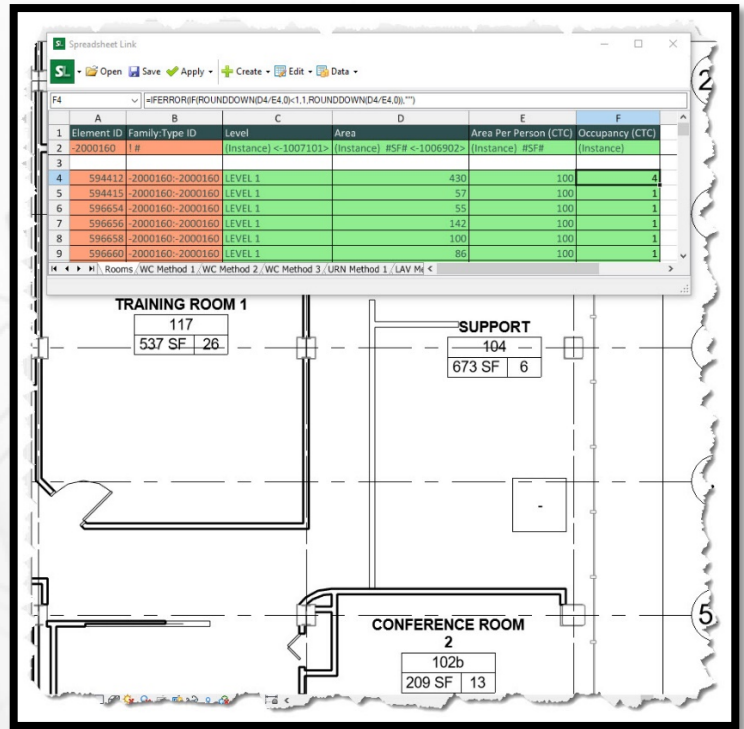
Savings/Benefits

Users do not need to know the formulas that are running automatically. They do not need to depend on Dynamo scripts that can be volatile after updates. They can simply walk through a simple workflow that is stable and repeatable.

The manual, error prone process can be eliminated, allowing users to focus more on design and documentation more than focusing on basic calculations and manual data entry. Time savings can be found every time that print day approaches. Design time can be extended since this time-consuming manual process is now automated.

		Water Closets:		Urinals:	Lavatories:		Drinking Fountians:
		Ratio 1 per 25 for first 50 and 1 per 50 for remaining exceeding 50		Ratio 1 per 65 (Males)	Ratio 1 per 40 for first 80 and 1 per 80 for remaining exceeding 80		Ratio 1 per 100
BASEMENT LEVEL		Male	35	2	1	1	
Occ	70	Female	35	2	--	1	1
LEVEL 1		Male	61	3	1	2	
Occ	122	Female	61	3	--	2	2
LEVEL 2		Male	105	4	2	3	
Occ	209	Female	105	4	--	3	3
LEVEL 3		Male	43	2	1	2	
Occ	85	Female	43	2	--	2	1
LEVEL 4		Male	39	2	1	1	
Occ	78	Female	39	2	--	1	1

Conclusion

Spreadsheet Link and Schedule XL from the CTC BIM Project Suite can help automate calculations. This example of occupancy and plumbing code calculations can be automated nearly 100%. There are many other areas where this type of automation can save hours of time consistently throughout the design and documentation process. Whenever you or your team are pulling data from the Revit model, transferring to a spreadsheet environment, running some calculations then manually transferring data or graphics back into Revit, think about how this can be automated by the BIM Project Suite.

Manual, repetitive tasks are not enjoyable, often error-prone and should be eliminated where possible. Let the tools generated for you by CTC Software augment your workflow to allow you and your team to be more creative for longer periods.

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