



Revit Lighting Fixture Schedules

Tutorial: Creating and using schedules in Revit MEP 2009 for Construction Documents and Calculations.

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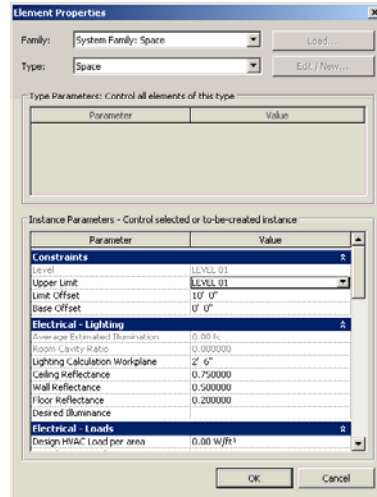
Goals

1. Introduce Spaces (MEP only)
 - What are Spaces?
 - Place them in a model
 2. Introduce Key Schedules (Arch and MEP)
 - What are Key Schedules, and when do I use them?
 - Create a Key Schedule for our Model
 3. Create a Space Schedule (MEP only)
 4. Create a Lighting Calculation Schedule (MEP only)
 5. Create a Lighting Fixture Schedule (Arch and MEP)
- You may not use all of these, however, try to pick up and understand the basic concepts!



Spaces

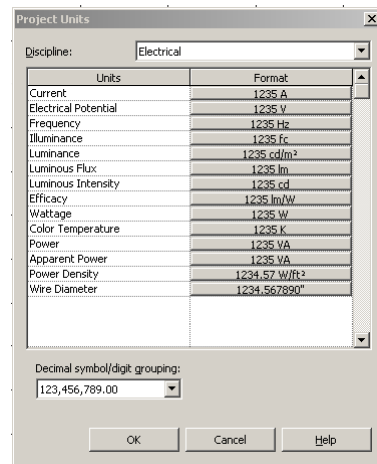
- Spaces are to Revit MEP as Rooms are to Revit Architecture.
- They are an intelligent that contains information about a Space/Room
 - Mechanical Information
 - Electrical Load information
 - Lighting information (RCR, Average Illuminance, reflectances, etc)
- They will be used in combination with schedules for lighting calculations.
- Spaces are shared by MEP disciplines.



Spaces - Units

• If any of your units are incorrect, do the following

1. Go to Settings → Project units, OR type "UN"
2. Change the Discipline to Electrical.
3. Click on the Box to the right of "Illuminance"
4. Change the unit from Lux to Footcandles.



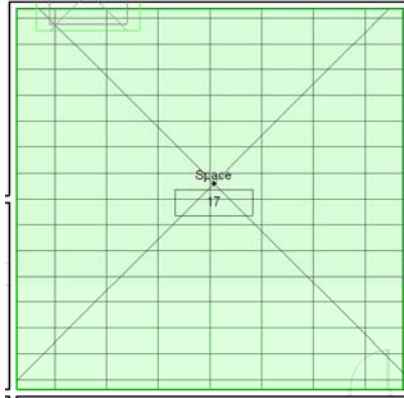
Spaces (cont.) – Placing Spaces

1. To place spaces in the model, under the Electrical or Mechanical tab on the design bar, click Space.



2. Hover over a room in the model. If the walls make it a properly enclosed region, it will be outlined in green with diagonal lines. Click to place. The entire room will turn green. When using the space tool, all existing spaces will show green.

3. If you have a space tag loaded, the tag will be placed where you clicked. If not, you can load a tag in and place it later by clicking Space Tag.



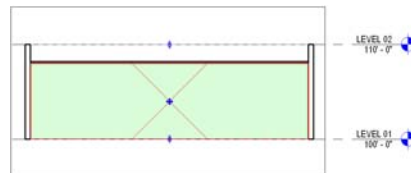
Spaces (cont.) – Placing Spaces

4. Check the Space height. Select the space and go into Element Properties. Check that The constraints “Upper Limit” and “Limit offset” will allow the top of the space to fill the room. If not, adjust them.


5. You can also do this by drawing a section and selecting the space. You can see how tall the space is. It should look like the picture on the right.

6. If the Space extends higher than the ceiling, either the ceiling was not drawn properly or Revit is not computing volumes.

7. To make it compute volumes, go to Settings → Area and Volume Computations and make sure Area and Volumes is checked.



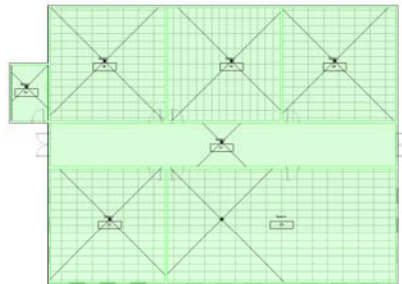
Spaces (cont.) – Larger Spaces

1. Lets say you have a larger space that you want to break up into a smaller space, like a classroom with a partition. Click on the Space Separation button  to create separation lines.
2. Make sure your lines make bounded spaces
3. Drop spaces in as previously described.



Spaces (cont.) – Placing Spaces

1. Finish placing spaces for all rooms in the model.
2. If you delete a Space tag, the space still exists in the room. Click Space Tag to re-tag it.
3. If you delete a space within a room, the space still exists in the model, it is just "unplaced." This can be deleted in the space schedule which we will create soon.
4. If parts of the project change (walls get deleted, etc) multiple spaces can overlap. You will get a warning on this upon opening the file. To look for these later, go to Tools → Review Warnings.



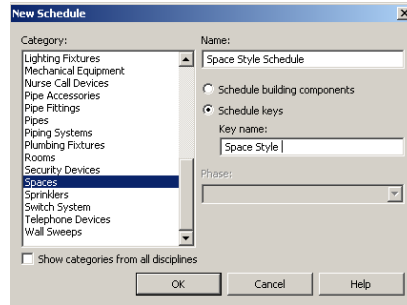
Key Schedules

There are two types of schedules in REVIT, Component Schedules and Key Schedules. A key schedule will save us time by determining typical parameters for typical spaces.

1. Under any of the MEP tabs on the design bar, click Schedule/Quantities.



2. Select "Spaces" for the category, and click the radio button for "Schedule keys." The Key Name will show up as a parameter later. Adjust the names as you like and hit OK.



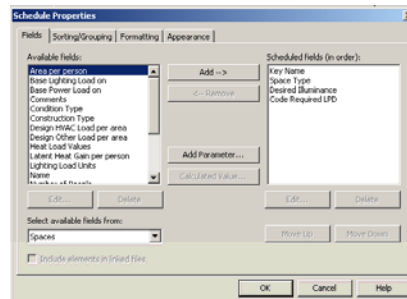
Key Schedules (cont.)

3. In the Schedule Properties Dialog under the Fields tab, we will select the elements for our Key Schedule. I use the following:

- Key Name
- Space Type
- Desired Illuminance
- Code Req'd LPD

4. The first two elements can be chosen from the available fields and can be added by clicking the "Add →" button.

5. The second two elements are something we need to create. Click the Add Parameter Button.

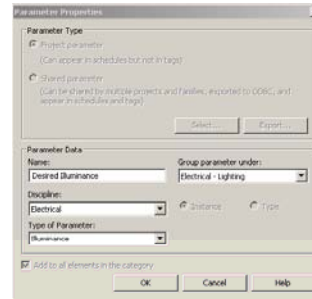


Key Schedules (cont.)

6. This Dialog should look familiar from the family tutorial. Create the next two Space Parameters for our key schedule.

- Name: Desired Illuminance, Discipline: Electrical, Type of Parameter: Illuminance, Group: Electrical-Lighting.
- Name: Code Req'd LPD, Discipline: Electrical, Type of Parameter: Power Density, Group: Electrical-Lighting.

Notice that these are all instance parameters! Why is that? They differ from room to room.



Key Schedules (cont.)

7. When you have all of your schedule parameters (fields) selected, hit OK to finish. You will have a blank schedule.

8. To add Key types, right click and click "Add row" or click "Rows: New" on the options bar.

9. Type in the necessary data in the row. For Space Type, select from the pull down menu.

10. By default the menu is in alphabetical order by key, so pay attention when you enter in data, as the rows will jump around.

11. When finished you should have something similar to the schedule on the right.

12. This schedule will link with our Space Schedule that we will create next.

Space Style Schedule			
Key Name	Space Type	Desired Illumina	Code Required LPD
Classrooms	Classroom	40 fc	1.20 W/ft ²
Corridor	Corridor/Tr	15 fc	0.80 W/ft ²
Elec/mech	Electrical/	50 fc	1.50 W/ft ²
Open Office	Office - op	35 fc	0.80 W/ft ²

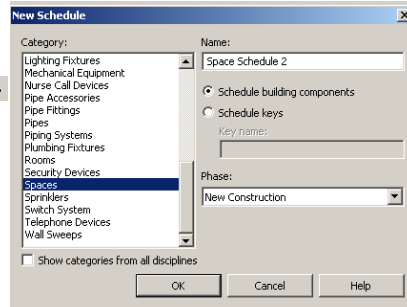


Space Schedule

A space Schedule is a good way to keep track of our spaces. Much of the data will appear on future schedules, but it is good to have a simple space schedule to share between disciplines for managing spaces.

1. Click Schedule/Quantities.

2. Select "Spaces" for the category and make sure "Schedule Building Components" is selected. Name it as you wish. Hit OK.



Space Schedule

3. The Schedule Properties dialog will pop up again.

4. In the lower left, Change "Select Available Fields from:" to rooms. Add the following fields:

- Number
- Name

5. Change the available fields back to spaces and add the following.

- Number
- Name
- Area
- Space Type

6. Hit Ok to Finish. You should now have a schedule with all your spaces listed.

Space Schedule			
Room: Number	Room: Name	Area	Space Style
		Not Placed	(none)
2	Classroom	881.90 SF	(none)
3	Classroom	867.18 SF	(none)
4	Classroom	867.18 SF	(none)
5	Corridor	1029.72 SF	(none)
7	Classroom	881.90 SF	(none)
6	Open Office	1750.62 SF	(none)
8	Electrical Roo	136.50 SF	(none)



Space Schedule

3. You will notice first that the schedule to the right has a blank row at the top. This is a space that was deleted in the model, but still exists in the project. Its area shows up as "Not Placed". To delete the space, select the row and click delete on the options bar.

Space Schedule					
Room Number	Room Name	Number	Name	Area	Space Style
		17	Space	Not Placed	(none)
2	Classroom	18	Space	881.90 SF	(none)
3	Classroom	19	Space	867.18 SF	(none)
4	Classroom	20	Space	867.18 SF	(none)
5	Corridor	21	Space	1029.72 SF	(none)
7	Classroom	22	Space	881.90 SF	(none)
6	Open Office	23	Space	1750.62 SF	(none)
8	Electrical Roo	24	Space	136.50 SF	(none)

4. The Space Style column is how we will link the space schedule with the key schedule. Click on one of the Space Style fields and select the key that is appropriate for the room type. Do this for all spaces.

Space Schedule					
Room Number	Room Name	Number	Name	Area	Space Style
2	Classroom	18	Space	881.90 SF	Classrooms
3	Classroom	19	Space	867.18 SF	Classrooms
4	Classroom	20	Space	867.18 SF	Classrooms
5	Corridor	21	Space	1029.72 SF	Corridor
7	Classroom	22	Space	881.90 SF	Classrooms
6	Open Office	23	Space	1750.62 SF	Open Office
8	Electrical Roo	24	Space	136.50 SF	Electmech

5. If you go back into the model, select a space, and go into element properties, you'll notice that the space now contains our specified lighting info.

Electrical - Lighting	
Average Estimated Illumination	0.00 Fc
Room Cavity Ratio	0.000000
Lighting Calculation Workplane	2' 6"
Ceiling Reflectance	0.750000
Wall Reflectance	0.500000
Floor Reflectance	0.200000
Desired Illuminance	40.00 Fc
Code Required LPD	1.20 W/ft²



Lighting Calculation Schedule

1. This Schedule is same as the Space schedule, but it will have more parameters (fields). Make a new space schedule just as you did before, and call it "Lighting Calculation Schedule"

2. In the Schedule Properties dialog, select "Room: Number" and "Room: Name" under available Room fields.

3. Under Available Space Fields, select "Desired Illuminance" and "Average Estimated Illuminance." The latter is calculated by Revit using the RCR method.

4. Say we want to calculate how far off we are from our design parameter. We can do this! Click on Calculated Value

Calculated Value...

5. Call this value "Illuminance Mismatch." Set the discipline to Electrical and the type to Illuminance.

6. In the formula box, type in "Average Estimated Illuminance - Desired Illuminance." If you don't want to type them out, click the ellipse button to the right to select the values.



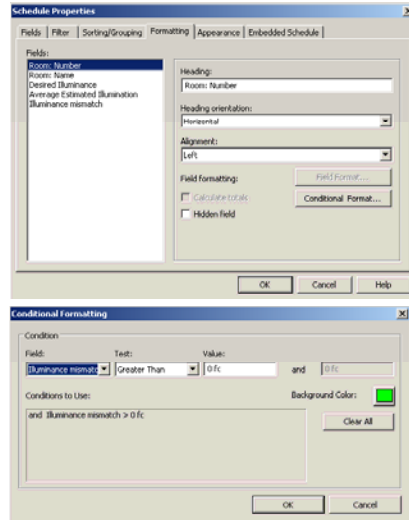
Lighting Calculation Schedule

7.If we want to make our obtained targets obvious, we can turn the box containing the calculation result a different color. In the schedule Properties dialog, click the Formatting Tab.

8.Select "Illuminance Mismatch" from the fields list, and click the Conditional Format button.

9.Set the test to "Greater Than" and leave the value at zero. Set the Background color to Green.

10.If the lighting in the room meets your desired illuminance, it will now show up green on the schedule.



Lighting Calculation Schedule

11.The same can be done for our Power Density calculations. Repeat steps 4-10. The parameters you will use are "Code Req'd LPD" and "Actual Lighting Load." Set up a calculated value called "LPD Mismatch." Make it Red if you actual load is greater than your code limit.

12.We are essentially done with this schedule, but while we are designing, it could be helpful to see what lights are in the room. This is done as an embedded schedule, and will add the sub-tabs shown on the schedule below.

Lighting Calculations							
Room: Number	Room: Name	Desired Illuminance	Average Estimated Illumination	Illuminance mismatch	Actual Lighting Load	Code Required LPD	LPD Mismatch
Type Mark	Type Comme	Count					
2	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft²	1.20 W/ft²	-1.20 W/ft²
3	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft²	1.20 W/ft²	-1.20 W/ft²
4	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft²	1.20 W/ft²	-1.20 W/ft²
5	Corridor	15 fc	0 fc	-15 fc	0.00 W/ft²	0.80 W/ft²	-0.80 W/ft²
7	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft²	1.20 W/ft²	-1.20 W/ft²
6	Open Office	35 fc	0 fc	-35 fc	0.00 W/ft²	0.80 W/ft²	-0.80 W/ft²
8	Electrical Roo	50 fc	0 fc	-50 fc	0.00 W/ft²	1.50 W/ft²	-1.50 W/ft²



Lighting Calculation Schedule – Embedded Schedule

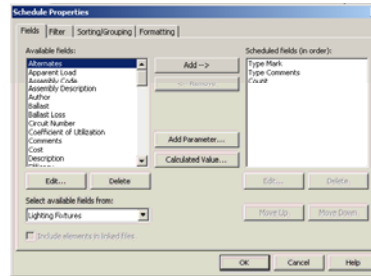
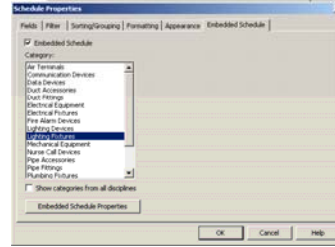
13. Right click somewhere within the schedule and select View Properties. Near the bottom of the dialog is a field called "Embedded Schedule". Click Edit.

14. Select Lighting Fixtures for the category and click the "Embedded Schedule Properties" button.

15. From the available fields for Lighting Fixtures, choose "Type Mark", "Type Comments", and "Count."

16. Click the Sorting/Grouping tab and uncheck the box near the bottom for "Itemize every instance." We don't need to see every light fixture listed individually.

17. Hit Ok a few times until you get back to the schedule.



Lighting Calculation Schedule


18. You should now see the sub-tabs at the top of the schedule as pointed out below. As we add fixtures, they will start to populate below the rooms they are installed in. We will revisit this later.

Lighting Calculations							
Room: Number	Room: Name	Desired Illuminance	Average Estimated Illumination	Illuminance mismatch	Actual Lighting Load	Code Required LPD	LPD Mismatch
Type Mark	Type Comme	Count					
2	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft ²	1.20 W/ft ²	-1.20 W/ft ²
3	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft ²	1.20 W/ft ²	-1.20 W/ft ²
4	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft ²	1.20 W/ft ²	-1.20 W/ft ²
5	Corridor	15 fc	0 fc	-15 fc	0.00 W/ft ²	0.80 W/ft ²	-0.80 W/ft ²
7	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft ²	1.20 W/ft ²	-1.20 W/ft ²
6	Open Office	35 fc	0 fc	-35 fc	0.00 W/ft ²	0.80 W/ft ²	-0.80 W/ft ²
8	Electrical Roo	50 fc	0 fc	-50 fc	0.00 W/ft ²	1.50 W/ft ²	-1.50 W/ft ²

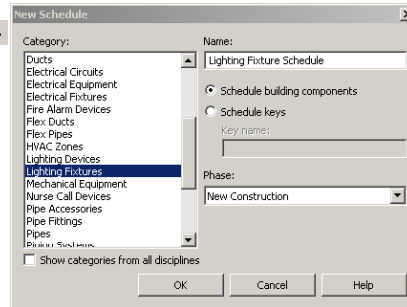


Lighting Fixture Schedule

We have one more schedule to create, the Lighting Fixture Schedule. You should be a pro now at creating schedules, so this one should be a piece of cake.

1. Click Schedule/Quantities. 

2. Select "Lighting Fixtures" for the category and make sure "Schedule Building Components" is selected. Name it as you wish. Hit OK.



Lighting Fixture Schedule

3. From the available fields for Lighting fixtures, add the following:

- Type Mark: It's pulled from the Lighting Fixture Family.
- Manufacturer: It's pulled from the Lighting Fixture Family.
- Model: It's pulled from the Lighting Fixture Family.
- Lamp Qt.: We need to make this one. Click Add Parameter, Discipline: Common, Type: Integer, Group: Electrical.
- Ballast(s): We need to make this one. Click Add Parameter, Discipline: Common, Type: Text, Group: Electrical.
- Electrical Data: It's pulled from the electrical connector within the fixture family. If you gave the connector a description, this will show up instead.
- Mounting: We need to make this one. Click Add Parameter, Discipline: Common, Type: Text, Group: Other.

- Type Comments: It's pulled from the Lighting Fixture Family.
- Description: It's pulled from the Lighting Fixture Family.
- Count: This is an easy way to keep track of how many fixtures you have for each type. No more counting by hand!

Note: The Wattage field is calculated from the initial lumens and luminous efficacy parameters in the fixture family. Unless you want to do the research on luminous efficacy of ballast/lamp combos, I'd recommend not using this.

Note: For all custom parameters that are not part of the lighting fixture family template file; if the parameters are added using the "Add Parameter function" within the schedule, the parameter will populate the Fixture family properties. This will not work the other way around. For example if you add a custom parameter in the fixture family, it won't show up in the available fields for the fixture schedule.



Lighting Fixture Schedule

4. Click the Sorting/Grouping tab and uncheck the box next to "Itemize every instance."

5. You now should have an empty schedule with all the fields at the top. This schedule will populate as we add fixture instances into our model.



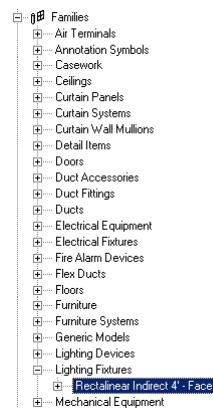
Bringing it All Together!

Now that we have all of our Schedules set up, it's time to use them.

1. First, we need to fill out the necessary data for our fixture. If no lighting fixtures are loaded into the project, do step 2, otherwise skip to 3.

2. Back in RCP view, load in click Light Fixture on the design bar under the Electrical tab. If no fixtures are loaded in the project, it will ask you to load one. If there are fixtures and you want to load more, click Load on the options bar. Hit escape twice.

3. Scroll down in the project browser. Expand Families and expand Lighting Fixtures. You should see all of the Fixture families loaded in the project.

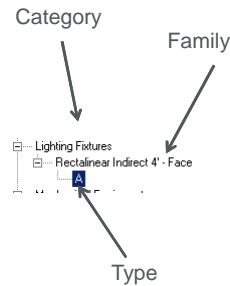


Bringing it All Together!

4. Expand the selected light fixture family. If you brought this in from other projects or made different types within the family editor, it will probably have multiple types in it. Or it will just have a default type which matches the family name.

5. Right Click on the type and click Rename, and rename the type to "A", or whatever type of fixture it is. Remember the family structure! See the diagram to the right if you are confused.

6. Select the type and go into element properties.



Bringing it All Together!

7. Fill in all of the fields that are in the fixture schedule. For Type Mark, put in "A". If some of the fields don't show, don't worry, we will fill them in from the schedule later.

8. Change the Dimensions of the fixture to match that of the specified fixture.

9. Change the Apparent Load and Ballast Voltage to match the specified fixture.

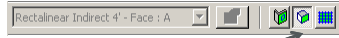
10. If you are going to do RCR calculations, you need to edit the Light Loss Factor and the Initial Intensity to match the fixture. Do this by clicking on the fields to the of the parameter and edit the information in the dialog.

Parameter	Value
Identity Data	
Model	ABC-TSHO-277
Manufacturer	BRAND X
Assembly Code	
Keystone	
Type Comments	4'
Description	LINEAR INDIRECT PENDANT FIXT
Assembly Description	
Type Mark	A
Cost	
Author	
Electrical	
Ballast Voltage	277.00 V
Lamp	TSHO
Worktag Comments	
Ballast(s)	<10% THD PROGRAM START
Photometrics	
Light Source Definition (Family)	Line4Photometric Web
Tilt Angle	-90.000°
Photometric Web File	FTWSPA115.IES
Light Loss Factor	0.8
Initial Intensity	5000.00 lm

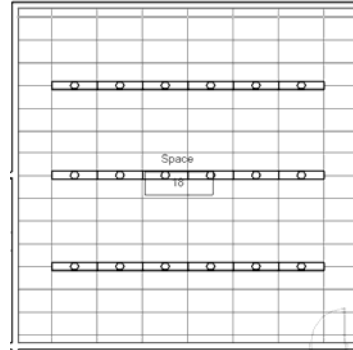


Bringing it All Together!

11. Place Lighting Fixtures in the rooms.
Click Light Fixture again on the design bar. On the options bar, select the appropriate fixture type. If you are using a face hosted family in a linked model, you will need to select the middle button to host to a ceiling.



12. Place a few light fixtures in a room.
13. Lets go check the schedules.



Lighting Calculation Schedule

The calculation schedule is now showing the calculations for room #2. We have met our desired illuminance, but we are slightly over our Lighting Power Density budget.

Under Room 2's row you can see that we have 18 type A fixtures in room 2.

Lighting Calculations							
Room: Number	Room: Name	Desired Illuminance	Average Estimated Illumination	Illuminance mismatch	Actual Lighting Load	Code Required LPD	LPD Mismatch
Type Mark	Type Corne	Count					
2	Classroom	40 fc	43 fc	3 fc	1.24 W/ft ²	1.20 W/ft ²	0.04 W/ft ²
A	4'	18					
3	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft ²	1.20 W/ft ²	-1.20 W/ft ²
4	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft ²	1.20 W/ft ²	-1.20 W/ft ²
5	Currikur	15 fc	0 fc	-15 fc	0.00 W/ft ²	0.80 W/ft ²	-0.80 W/ft ²
7	Classroom	40 fc	0 fc	-40 fc	0.00 W/ft ²	1.20 W/ft ²	-1.20 W/ft ²
6	Open Office	35 fc	0 fc	-35 fc	0.00 W/ft ²	0.80 W/ft ²	-0.80 W/ft ²
8	Electrical Roo	50 fc	0 fc	-50 fc	0.00 W/ft ²	1.50 W/ft ²	-1.50 W/ft ²



Lighting Fixture Schedule

The Lighting Fixture Schedule now has Type A listed. If we delete all the type A fixtures from the model, even if they are still in the Project file, they will not show up on the schedule.

We can fill out the missing data (Lamp Qt. and Mounting) here. Do it!

Lighting Fixture Schedule										
Type Mark	Manufacturer	Model	Lamp Qt.	Lamp	Ballast(s)	Electrical Data	Mounting	Type Comme	Description	Count
A	BRAND X	ABC-2TSHO-2		TSHO	<10% THD	277 V/1-64 V/A		4'	LINEAR INDIRECT PENDANT FIXTURE	18



Printing the Lighting Fixture Schedule

There are two options for printing the schedule. You can:

1. Export the schedule to a tab delimited text file and import it to Excel. This will obviously take some formatting.
2. Create a new Sheet. While in the sheet view, scroll up on the project browser and find the Lighting Fixture Schedule. Drag and drop it onto the sheet. Select the schedule. It will turn red and you can see small blue triangles at the top. If you grab the triangles, you can adjust the width of the columns.



That's it!

That's all for lighting schedules!

