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ES10730

Ways To More Effectively Utilize REVIT For Electrical Design

Stephanie P. Elliott, PE, LEED AP BD+C, GGP – Electrical Engineer/ BIM Coordinator - Jacobs Engineering

Learning Objectives

- Utilize schedules to perform energy code calculations
- Utilize schedules to better coordinate electrical circuitry with mechanical and plumbing loads
- Utilize schedules to check electrical design at the panel and breaker level
- Utilize view filters to catch uncircuited electrical items as well as other disciplines that require power

Description

This class will discuss and present ways to more effectively utilize REVIT for electrical design by better utilizing the data already in the model to perform calculations and checks. Rather than spending days working on the energy code calculation counting the fixtures and space square footages, imagine if you could print out a REVIT schedule with all the information needed to fill out COMCheck in a matter of minutes. REVIT can also be used to help the senior engineers and the QA/QC teams quickly to check the electrical backbone of a building for things like over and under-loading of electrical panels/transformers as well as branch circuit loading to check breaker size, wire size, and load classification with all the information exactly as it is currently modeled. A series of schedules can also compare the current Mechanical/plumbing schedules with the current electrical design load to ensure they match. Filters can be used to check for uncircuited items as a quick backcheck.

Your AU Expert

Stephanie P. Elliott, PE, LEED AP BD+C, GGP *is a licensed electrical engineer for Jacobs Engineering Group Inc. She is a LEED AP BD+C and a Green Globes Professional. She is a Revit MEP 2015 Certified Professional and serves a dual role as the Houston office Building Information Modeling (BIM) coordinator as well as being an electrical engineer. She has been working in Revit software since 2007 and has experience with Revit software-based projects in many areas, including aviation, convention centers, data centers, education, federal, high-rise office towers, hospitality, and specialty facilities. Stephanie has served as an MEP BIM consultant for Revit projects that span 1 million square feet, as well as for campus projects with a central plant.*

Email: stephaniepelliott@gmail.com

Introduction

According to Autodesk, Revit is building design software is specifically built for Building Information Modeling (BIM), including features for architectural design, MEP and structural engineering, and construction.
Autodesk purchased the Revit idea in 2006 and starting around 2010 architectural firms started to prefer to perform design work in REVIT even if the final deliverable was ACAD. Why? Architects had figured out how to utilize the information in the model to their advantage, to improve their efficiency, coordination and design. The same this is possible for the MEP team as well. We are able to use the Revit model to improve our designs and coordination as well.
As Engineers and Designers, we have to have a mindset shift from ACAD to Revit. Our thinking has to shift from ACAD which is a drafting tool only to REVIT which is a database that does some drafting on the side.

Utilize schedules to perform energy code calculations

Determining when to perform the take-offs and fixture counts needed for the energy code is a tight rope walk. Too early and the lighting design will change substantially and the effort will be wasted. Too late and it is difficult to react to energy code concerns and still make the deadline.

How We Use to Perform Energy Code Calculations?

Energy code calculations were never a quick and simple task. We used to have to open ACAD and draw Polylines (P-Lines) around each space and do hand area take-offs. We then had to transfer that data to Excel. Next we would grab out highlighters and print out the light drawings full size and hand-count all of the fixtures per space and then input those counts into our spreadsheet. If we were lucky then we could fill out the energy code form as the whole building method and save ourselves some time.

How We Can Use REVIT to Perform Energy Code Calculations

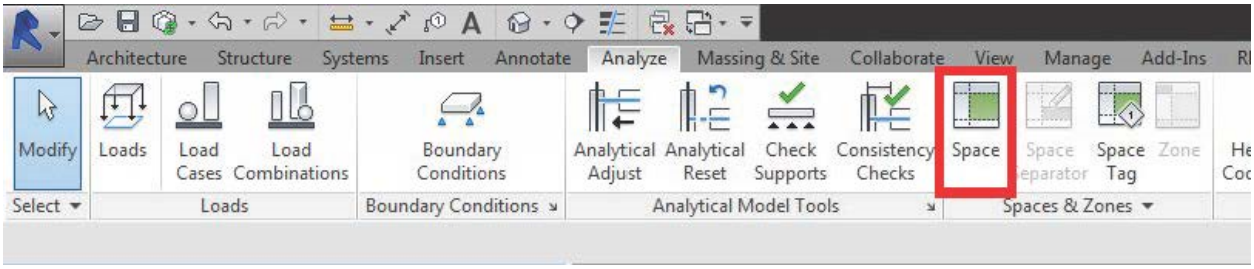
Using Schedules in Revit, we can go from spending hours/days counting fixtures in order to report on whether a project meets the energy code to real time reporting at any phase of the design. Imagine the time and rework savings being able to continuously monitor energy code status on a project! So how do we set up our projects to achieve this?

Step1: Create Spaces based off the Architectural Rooms

In order for our energy code calculation to work, all of the light fixtures in the model need to inherently know what space they reside in. We achieve this by placing spaces in the electrical model. An important thing to understand is the difference between Rooms and Spaces in Revit. Rooms are used predominately on the Architecture side of things to address things like Room Name, Number, Square Footage, and Occupancy. Spaces are used for MEP calculations requiring volume information. A space understands in which room of a linked model it resides, and it can report the identity of that room.

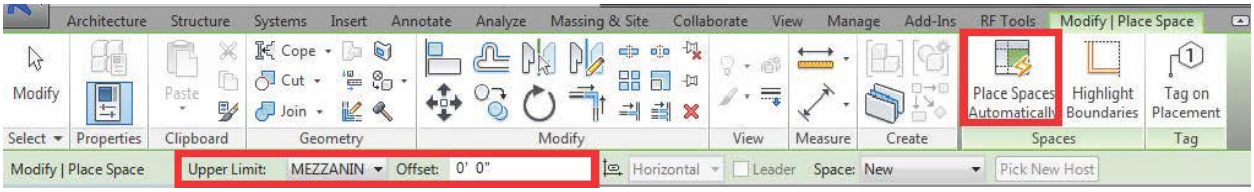
To add spaces to the Electrical Model,

Go the Analyze tab and select the Space Button on the Spaces & Zones panel



This will trigger the Modify/Place Space Panel. Check the Upper Limit Setting and Offset Values. The Upper Limit value is Z axis value for the space volume. The Offset Value is an additional adder to the Upper Limit Value if needed. For MEP work the recommendation is to use the Level Datums i.e. Upper Limiting Settings to define the height of the space to ensure the entire volume between structural slabs is accounted for.

Once the Upper Limit and Offset have been set, select the Place Spaces Automatically Button



Revit will then create spaces for all enclosed areas greater than 0.25 sq. ft. Revit will arbitrarily name and number all of the spaces. This is where the space naming utility comes into play. The Space Naming Utility Revit automatically renames spaces to match their associated rooms. This plug-in is typically part of the Autodesk Subscription package.

Step 2: Create a Room Schedule and define Space Type

1. Go to the view tab and select “Schedules” under the create pane or right click on Schedules on the project browser.
2. Select “New Schedule/ Quantities”
3. Under category select “Rooms”
4. Select the following Available Field and click Add→:
    a. Number
    b. Name
    c. Limit Offset
    d. Space Type
    e. Actual Lighting Load
    f. Actual Lighting Load per Area

   g. Specified Lighting Load
   h. Specified Lighting Load Per Area
5. If energy code will be achieved via space by space method, then go room by room and define the space category to be applied.
6. Go back to Visibility/Graphics Override window, on the Fields tab, create some calculated values to help with the calculations. Select Calculated Value button.
   a. Above LPD Allowance
      i. Name: Above LPD Allowance
      ii. Discipline: Common
      iii. Type: Number
      iv. Formula: Actual Lighting Load / Specified Lighting Load
   b. Square Footage
      i. Name: Square Footage
      ii. Discipline: Common
      iii. Type: Area
      iv. Formula: Specified Lighting Load / Specified Lighting Load per area
7. On the Sorting/Grouping tab, sort by Name or Number, whichever you prefer
8. At the bottom of the Sorting/Grouping tab, check the box for Grand Totals and select Title and Totals.
9. Click on the Formatting tab, select the following parameters and check the Hidden check box
   a. Square Footage
   b. Above LPD Allowance
10. Select Actual Lighting Load and then click on the Conditional Formatting Field to create the test to determine if the lighting layout in the room exceeds the energy code allowance.
11. Select the following:
   a. Field: Above LPD Allowance
   b. Test: Greater Than
   c. Value: 1
   d. Background Color: Yellow
12. Select Actual Lighting Load per Area and repeat Step 10.

<ASHRAE ENERGY CODE CHECK>							
A	B	C	D	E	F	G	H
Number	Name	Square Footage	Space Type	Specified Lighti	Specified Lighting	Actual Lighting	Actual Lighting
I1130	JAN. CLOSET	40 SF	Active Storage	0.80 W/ft²	32 VA	1.60 W/ft²	64 VA
I1108	INSULATION STORAGE	1978 SF	Active Storage	0.80 W/ft²	1582 VA	0.59 W/ft²	1176 VA
I1114	HAND TOOL SECURE STORAGE	270 SF	Active Storage	0.80 W/ft²	216 VA	1.18 W/ft²	320 VA
I1128	CONFERENCE / BREAK ROOM	384 SF	Conference Meeting/Multipurpos	1.30 W/ft²	500 VA	0.56 W/ft²	216 VA
I1107	CORRIDOR	923 SF	Corridor/Transition	0.50 W/ft²	461 VA	0.24 W/ft²	220 VA
I1901	MECHANICAL / COMPRESSOR	252 SF	Electrical/Mechanical	1.50 W/ft²	378 VA	1.53 W/ft²	384 VA
I1903	ELECTRICAL / COMM.	151 SF	Electrical/Mechanical	1.50 W/ft²	227 VA	1.27 W/ft²	192 VA
I1902	IT	64 SF	Electrical/Mechanical	1.50 W/ft²	97 VA	1.99 W/ft²	128 VA
I1126	OFFICE	96 SF	Office - Enclosed	1.10 W/ft²	106 VA	0.75 W/ft²	72 VA
I1124	OFFICE	94 SF	Office - Enclosed	1.10 W/ft²	103 VA	0.77 W/ft²	72 VA
I1122	OFFICE	98 SF	Office - Enclosed	1.10 W/ft²	107 VA	0.74 W/ft²	72 VA
I1110	BUILDING MAINTENANCE	1213 SF	Office - Enclosed	1.10 W/ft²	1334 VA	0.97 W/ft²	1176 VA
I1120	OFFICE	96 SF	Office - Enclosed	1.10 W/ft²	106 VA	0.75 W/ft²	72 VA
I1118	COPY / SUPPLY RM	122 SF	Office - Enclosed	1.10 W/ft²	134 VA	0.59 W/ft²	72 VA
I1102	MEN'S	195 SF	Restrooms	0.90 W/ft²	175 VA	0.88 W/ft²	172 VA
I1101	WOMEN'S	82 SF	Restrooms	0.90 W/ft²	74 VA	1.04 W/ft²	86 VA
I1104	INSULATION SHOP	812 SF	Workshop - Workshop	1.90 W/ft²	1543 VA	1.45 W/ft²	1176 VA
I1106	INSULATION SHOP	1299 SF	Workshop - Workshop	1.90 W/ft²	2467 VA	0.91 W/ft²	1176 VA
I1112	CARPENTER SHOP	2041 SF	Workshop - Workshop	1.90 W/ft²	3879 VA	0.86 W/ft²	1764 VA
I1116	DUST COLLECTOR	68 SF	Workshop - Workshop	1.90 W/ft²	129 VA	0.80 W/ft²	54 VA
Grand total					13650 VA		8664 VA

This gives a snap shot of spaces that exceed their energy code allowance as well as the grand totals at the bottom to verify if we are able to trade Wattage allowances between spaces to meet the energy code overall.

Step 3: Create a COMCheck Schedule

1. Go to the view tab and select “Schedules” under the create pane or right click on Schedules on the project browser.
2. Select “New Schedule/ Quantities”
3. Under category select “ Light Fixtures”
4. Select the following Available Field and click Add→:
    a. Type Mark
    b. Manufacturer
    c. Lamp
    d. Lamp Quantity
    e. Wattage
    f. Count
    g. Change the Select available Fields to Spaces and select Space Type
    h. Cove Fixture Count (user added parameter to family that takes the length value and divides it by a fixed off the shelf fixture length value)
5. Still on the Fields tab, create some calculated values to help with the calculations. Select Calculated Value button.
    a. Wattage Per Type
        i. Name: Wattage Per Type

   ii. Discipline: Common
   iii. Type: Number
   iv. Formula: Lamp Quantity * (Wattage / 1 W)

b. Count Manual
   i. Name: Count Manual
   ii. Discipline: Common
   iii. Type: Number
   iv. Formula: 1

c. Cove WholeNumber
   i. Name: Cove WholeNumberl
   ii. Discipline: Common
   iii. Type: Number
   iv. Formula: roundup(Cove Fixture Count)

d. Combined Count
   i. Name: Combined Count
   ii. Discipline: Common
   iii. Type: Number
   iv. Formula: if(Cove Fixture Count > 1, CoveWholeNumber, CountManual)

6. On the Sorting/Grouping tab, sort by Space Type and then Type Mark.
7. At the bottom of the Sorting/Grouping tab, check the box for Grand Totals and select Title and Totals.
8. Uncheck the itemize every instance checkbox.
9. Under the Formatting tab, check the calculate totals check box for the following fields:
   a. CountManual
   b. Cove Fixture Count
   c. Cove WholeNumber
   d. Combined Count

<LIGHTING ENERGY CODE>

A	B	C	D	E	F	G
TYPE MARK	TYPE, MANUFACTURER AND MODEL NUMBER	JEHou_Lamp C	LAMP TYPE	LAMP WATTA	Watts per Type	Count
J	EXTERIOR WALL PACK, LITHONIA DSXW1 LED-20C-700-40K-T4M-MVOLT-DWHXD	1	LED	47 W	47	1
K	EXTERIOR WALL PACK, LITHONIA DSXW2 LED-30C-700-40K-T4M-MVOLT-DWHXD	1	LED	71 W	852	12
L-10E	6" DIA. RECESSED LED DOWN LIGHT, LITHONIA LDN6 35/10 LO6AR 277 EL	1	LED	18 W	18	1
ME	EXTERIOR WALL PACK, LITHONIA DSXW1 LED-10C-530-40K-T3M-MVOLT-ELCW-DWHXD	1	LED	20 W	60	3
X	LITHONIA LIGHTING EXG LED EL M6	1	LED	3 W	3	1
Active Storage						
B	LITHONIA LIGHTING C 2 32 MVOLT GEB10PS	2	F32T8	32 W	256	4
BE	LITHONIA LIGHTING C 2 32 MVOLT GEB10PS EL. EMERGENCY LIGHT WITH BATTERY PACK.	2	F32T8	32 W	128	2
G4	2'X4' FLUORESCENT HIGH BAY LIGHT LITHONIA LIGHTING IBZ 454L WD WGX	4	F54T5HO/841/EA/ALT	54 W	864	4
G4E	2'X4' FLUORESCENT HIGH BAY LIGHT LITHONIA LIGHTING IBZ 454L WD EL14 WGX	4	F54T5HO/841/EA/ALT	54 W	432	2
X	LITHONIA LIGHTING EXG LED EL M6	1	LED	3 W	3	1
Conference Meeting/Multipurpose						
D	VOLUMETRIC TROFFER 2X2 LED LAY-IN, LITHONIA 2VTL2 - 33L-ADP-MVOLT-EZ1-LP835-N100	1	LED	33 W	165	5
DE	VOLUMETRIC TROFFER 2X2 LED LAY-IN, LITHONIA 2VTL2 - 33L-ADP-MVOLT-EZ1-LP835-N100-EL14L	1	LED	33 W	33	1
Corridor/Transition						
C	VOLUMETRIC TROFFER 2X2 LED LAY-IN, LITHONIA 2VTL2 - 20L-ADP-MVOLT-EZ1-LP835-N100	1	LED	20 W	100	5
CE	VOLUMETRIC TROFFER 2X2 LED LAY-IN, LITHONIA 2VTL2 - 20L-ADP-MVOLT-EZ1-LP835-N100-EL14L	1	LED	20 W	120	6
X	LITHONIA LIGHTING EXG LED EL M6	1	LED	3 W	6	2
Electrical/Mechanical						
B	LITHONIA LIGHTING C 2 32 MVOLT GEB10PS	2	F32T8	32 W	320	5
BE	LITHONIA LIGHTING C 2 32 MVOLT GEB10PS EL. EMERGENCY LIGHT WITH BATTERY PACK.	2	F32T8	32 W	384	6
Office - Enclosed						
D	VOLUMETRIC TROFFER 2X2 LED LAY-IN, LITHONIA 2VTL2 - 33L-ADP-MVOLT-EZ1-LP835-N100	1	LED	33 W	297	9
DE	VOLUMETRIC TROFFER 2X2 LED LAY-IN, LITHONIA 2VTL2 - 33L-ADP-MVOLT-EZ1-LP835-N100-EL14L	1	LED	33 W	33	1
G4	2'X4' FLUORESCENT HIGH BAY LIGHT LITHONIA LIGHTING IBZ 454L WD WGX	4	F54T5HO/841/EA/ALT	54 W	864	4
G4E	2'X4' FLUORESCENT HIGH BAY LIGHT LITHONIA LIGHTING IBZ 454L WD EL14 WGX	4	F54T5HO/841/EA/ALT	54 W	432	2
Restrooms						
A	LITHONIA LIGHTING WL4 41L D43 LP835 NX	1	LED	43 W	172	4
AE	LITHONIA LIGHTING WL4 41L D43 LP835 NX EL14L. EMERGENCY LIGHT WITH BATTERY PACK.	1	LED	43 W	86	2
Workshop - Workshop						
G4	2'X4' FLUORESCENT HIGH BAY LIGHT LITHONIA LIGHTING IBZ 454L WD WGX	4	F54T5HO/841/EA/ALT	54 W	3240	15
G4E	2'X4' FLUORESCENT HIGH BAY LIGHT LITHONIA LIGHTING IBZ 454L WD EL14 WGX	4	F54T5HO/841/EA/ALT	54 W	1296	6
W	4' STRIP FLUORESCENT LITHONIA LIGHTING FEN4 1 54T5HO BMPCL MVOLT GEB10PS90	1	F54T5HO/841/EA/ALT	54 W	54	1
X	LITHONIA LIGHTING EXG LED EL M6	1	LED	3 W	9	3
Grand total: 108					10274	

Utilize schedules to better coordinate electrical circuitry with mechanical and plumbing loads

Creating schedules to help with the coordination between electrical and Mechanical and Plumbing is a little more difficult because to be able to use the data in their schedules the parameters have to be set up in such a way that we are able to pull the data across the link and incorporate it into our schedules.

First thing is to import Mechanical and Plumbing schedules in to the Electrical Model.

1. Go to a floor plan view. Click on the insert tab and select Insert from File on the Import Pane.
2. Navigate to and select the Mechanical Model.
3. Select all of the mechanical equipment schedules requiring electrical power and click import.
4. Open each of the imported schedules and check the box Include Elements in Links.

Next, create an electrical circuit schedule that isolates the mechanical and/or plumbing loads.

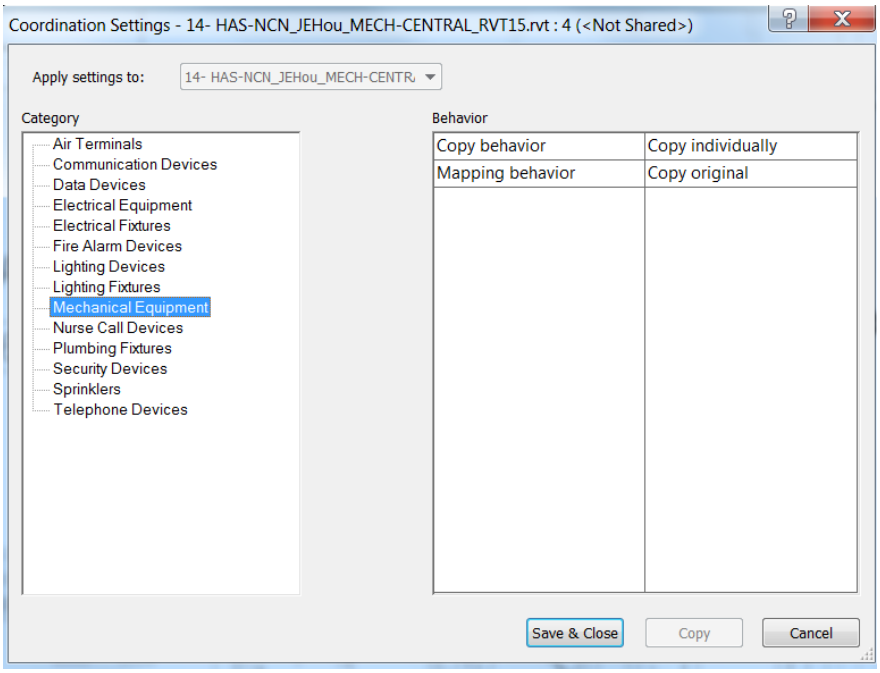
<MECHANICAL EQUIPMENT SCHEDULE>

A	B	C	D	E	F	G	H	I	J	K	L	M
Load Descriptio	Voltage	No. of Poles	Load Classificat	Breaker Rating	Disconnect Rati	Fuse Size	Load Amps	Load	Remarks	HP	Panel	Circuit Number
AHU-NCN-1	480 V	3	Motor	20	30		11	8800 VA		(1) 7.5 HP	1DAC	9
AHU-NCN-1	480 V	3	Motor	30	30		11	9100 VA		(1) 7 1/2 HP	1DAD	18
AHU-NCN-1	480 V	3	Motor	50	60		27	21500 VA		(1) 20 HP	1DAH	6
AHU-NCN-1	480 V	3	Motor	40	60		21	16700 VA		(1) 15 HP	1DAD	10
AHU-NCN-1	480 V	3	Motor	40	60		21	16700 VA		(1) 15 HP	1DAH	12
AHU-NCN-2	480 V	3	Motor	70	100		40	32000 VA		(1) 30 HP	1DAC	5
AHU-NCN-2	480 V	3	Motor	70	100		40	32000 VA		(1) 30 HP	1DAC	6
AHU-NCN-2	480 V	3	Motor	50	60		40	33200 VA		(1) 30 HP	1DAC	7
AHU-NCN-2	480 V	3	Motor	50	60		34	27100 VA		(1) 25 HP	1DAC	12
AHU-NCN-2	480 V	3	Motor	50	60		34	27100 VA		(1) 25 HP	1DBB	9
AHU-NCN-2F	480 V	3	Motor	70	100		40	32000 VA		(1) 30 HP	1DAC	13
AHU-NCN-2	480 V	3	Motor	50	60		34	27100 VA		(1) 25 HP	1DBB	10
AHU-NCN-2	480 V	3	Motor	70	100		40	32000 VA		(1) 30 HP	1DAH	9
AHU-NCN-2J	480 V	3	Motor	100	100	60	34	28200 VA		(1) 25 HP	1DBD	8
AHU-NCN-2	480 V	3	Motor	50	60		34	28200 VA		(1) 25 HP	1DBA	9
AHU-NCN-2L	480 V	3	Motor	50	60		27	21500 VA		(1) 20 HP	1DBA	10
AHU-NCN-2	480 V	3	Motor	40	60		21	16700 VA		(1) 15 HP	1DAD	11

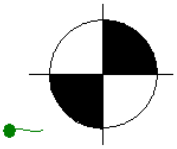
Another way that we can improve our coordination between the Mechanical/Plumbing Team and Electrical team is as follows:

First, copy monitor the mechanical equipment into the electrical model using the type Mapping setting under the Collaborate Tab, Copy/Monitor, Select Link, Coordination Setting.

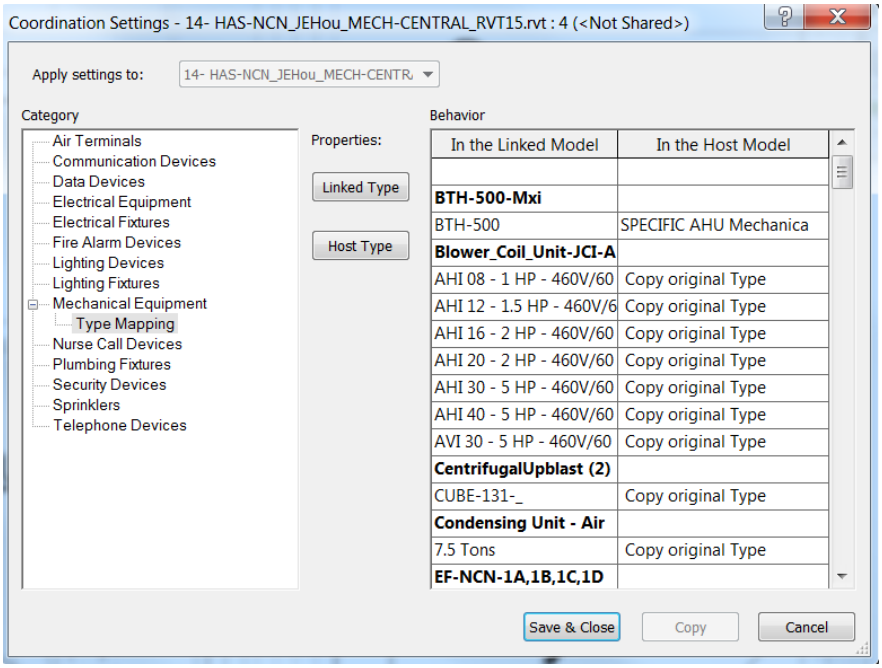
Under Coordination Settings, Select Mechanical Equipment and change the Mapping Behavior from Copy Original to Type Mapping.

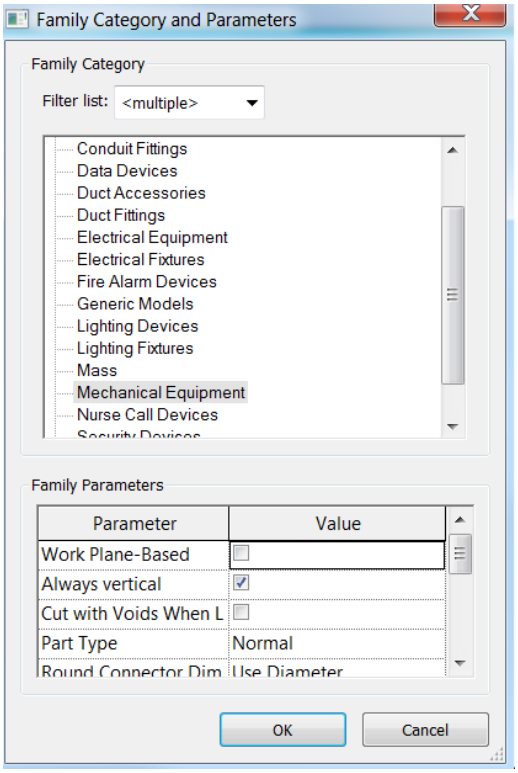


The following screen will pop up. Select the family in the Electrical Model that you would like to be used for the copy/monitoring. This family must be classified as mechanical equipment in order to be able to be selected for the monitoring.



I use an electrical connection symbol.

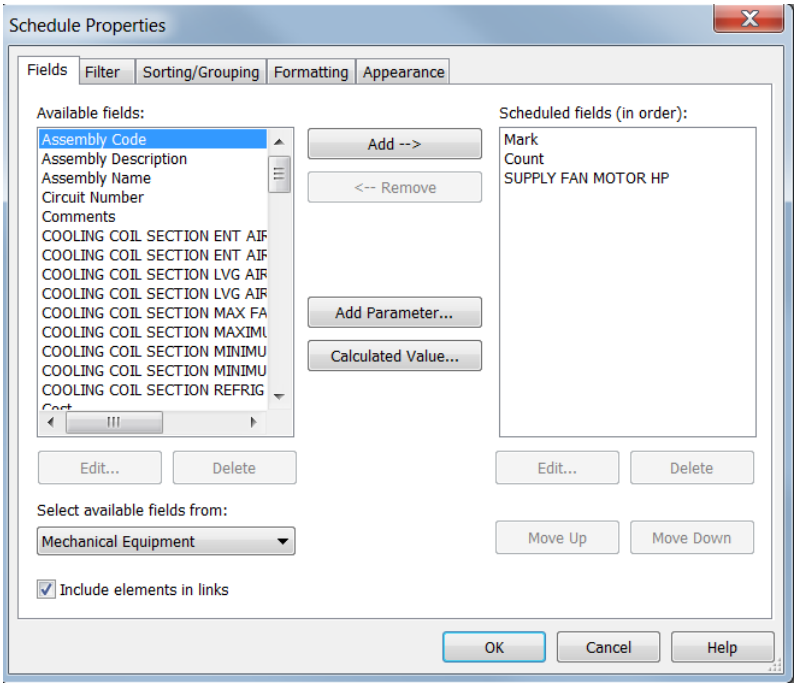

Coordination Settings - 14- HAS-NCN_JEHou_MECH-CENTRAL_RVT15.rvt : 4 (<Not Shared>)
Apply settings to:
14- HAS-NCN_JEHou_MECH-CENTR
Category
Air Terminals
Communication Devices
Data Devices
Electrical Equipment
Electrical Fixtures
Fire Alarm Devices
Lighting Devices
Lighting Fixtures
Mechanical Equipment
Type Mapping
Nurse Call Devices
Plumbing Fixtures
Security Devices
Sprinklers
Telephone Devices
Properties:
Linked Type
Host Type
Behavior
In the Linked Model
In the Host Model
BTH-500-Mxi
BTH-500
SPECIFIC AHU Mechanica
Blower_Coil_Unit-JCI-A
AHI 08 - 1 HP - 460V/60
Copy original Type
AHI 12 - 1.5 HP - 460V/6
Copy original Type
AHI 16 - 2 HP - 460V/60
Copy original Type
AHI 20 - 2 HP - 460V/60
Copy original Type
AHI 30 - 5 HP - 460V/60
Copy original Type
AHI 40 - 5 HP - 460V/60
Copy original Type
AVI 30 - 5 HP - 460V/60
Copy original Type
CentrifugalUpblast (2)
CUBE-131-_
Copy original Type
Condensing Unit - Air
7.5 Tons
Copy original Type
EF-NCN-1A,1B,1C,1D
Save & Close
Copy
Cancel

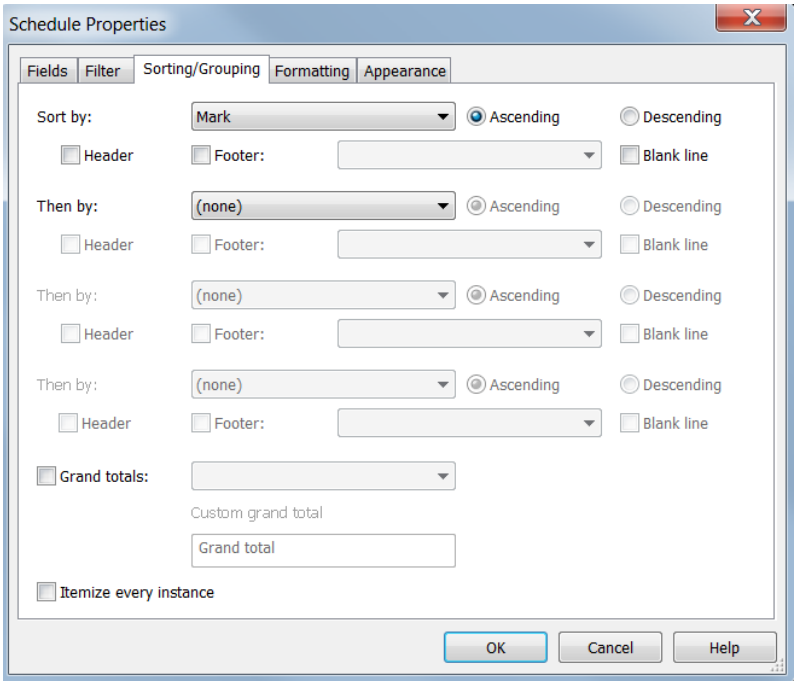

Family Category and Parameters
Family Category
Filter list:
<multiple>
Conduit Fittings
Data Devices
Duct Accessories
Duct Fittings
Electrical Equipment
Electrical Fixtures
Fire Alarm Devices
Generic Models
Lighting Devices
Lighting Fixtures
Mass
Mechanical Equipment
Nurse Call Devices
Family Parameters
Parameter
Value
Work Plane-Based
Always vertical
Cut with Voids When L
Part Type
Normal
Round Connector Dim
Use Diameter
OK
Cancel

Next create a mechanical equipment schedule with the following fields: Mark, Count, and Horsepower field. It is important that the family instance mark field is named exactly the same in the mechanical and electrical model. Under the fields tab, select the include elements in links. Under the sorting/ grouping tab, do not itemize every instance. This will give us a schedule as follows. The count field should be 2 meaning there is an instance in both the electrical model and the mechanical model. If the horsepower field matches in both instances then the horsepower filed will be populated. If not then it will be blank.

<Mechanical Equipment Schedule>

A	B	C
Mark	Count	SUPPLY FAN
AHU-NCN-1A	2	7.5
AHU-NCN-1B	2	
AHU-NCN-1C	1	10
AHU-NCN-1D	1	15
AHU-NCN-1E	2	
AHU-NCN-2A	2	30
AHU-NCN-2B	1	30
AHU-NCN-2C	2	30
AHU-NCN-2D	2	25
AHU-NCN-2E	2	25
AHU-NCN-2F	2	
AHU-NCN-2G	2	25
AHU-NCN-2H	2	30
AHU-NCN-2J	1	25
AHU-NCN-2K	1	25
AHU-NCN-2L	1	20
AHU-NCN-2M	1	15
AHU-NCN-2N	1	25
AHU-NCN-2P	1	25
AHU-NCN-2Q	1	20
AHU-NCN-2R	1	25
AHU-NCN-2S	1	15
AHU-NCN-2T	2	30
AHU-NCN-2U	1	25
OAHU-NCN-1A	2	15
OAHU-NCN-1B	1	7.5
OAHU-NCN-1C	2	25
OAHU-NCN-1D	1	7.5
OAHU-NCN-1D	1	
OAHU-NCN-3A	1	50
OAHU-NCN-3B	1	50





Utilize schedules to check electrical design at the panel and breaker level

Revit is so much more than just a drafting tool. We are able to create circuits that actually connect the electrical load to an electrical equipment panel. We need to have a mindset shift to thinking of Revit as a database and as such what are the ways we can manipulate the data to our advantage. If we are indeed

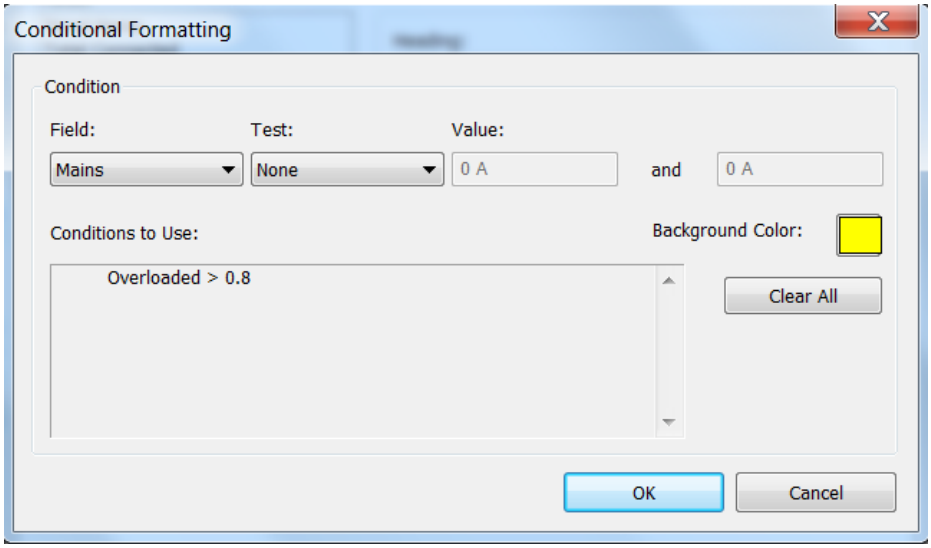
connecting the loads to the panels, then we should be able to also present the same data in a format that will allow us to verify the loadings of the electrical equipment.

We can use schedules to view the loading on our panels.

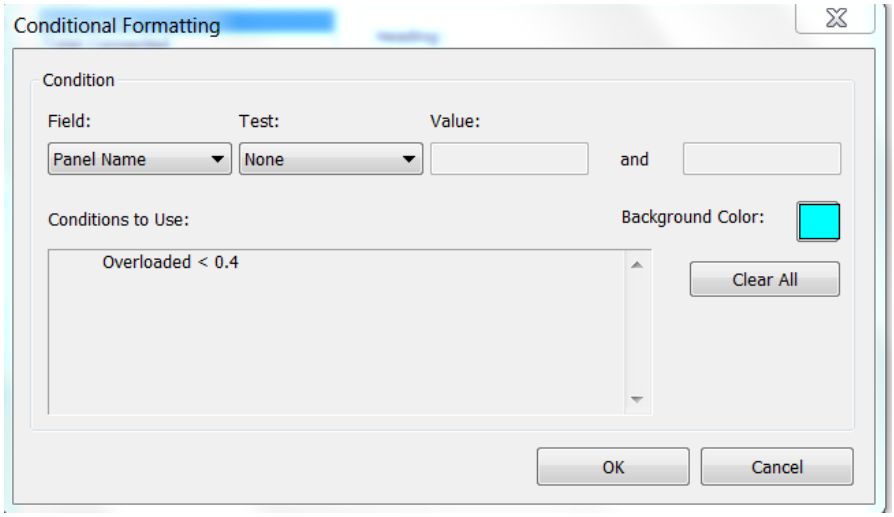
Creating a New Panelboard Loading Schedule

10. Go to the view tab and select "Schedules" under the create pane or right click on Schedules on the project browser.
11. Select "New Schedule/ Quantities"
12. Under category select " Electrical Equipment"
13. Select the following Available Field and click Add→:
    a. Panel Name
    b. Total Connected
    c. Total Connected Current
    d. Total Estimated Demand Current
    e. Mains
    f. Cooling Estimated Demand Current
    g. Heating Estimated Demand Current
14. Still on the Fields tab, create some calculated values to help with the calculations. Select Calculated Value button.
    a. Overloaded
        i. Name: Overloaded
        ii. Discipline: Common
        iii. Type: Number
        iv. Formula: Total Estimated Demand Current / Mains
    b. Total Estimated Demand with NC
        i. Name: Total Estimated Demand with NC
        ii. Discipline: Electrical
        iii. Type: Current
        iv. Formula: Total Estimated Demand Current - if(Heating Estimated Demand Current > Cooling Estimated Demand Current, Cooling Estimated Demand Current, Heating Estimated Demand Current)

15. Move the Total Estimated Demand with NC Field to where it is between Total Estimated Demand Current and Mains.
16. Click on the Filter tab, and create filter to isolate electrical panels from transformers. Create a filter using a distinctive trait such as panel name i.e. Panel name does not contain a "T", Panel name begins with, etc
17. On the Sorting/Grouping tab, sort by Panel Name.
18. Click on the Formatting tab, select the following parameters and check the Hidden check box
    a. Cooling Estimated Demand Current
    b. Heating Estimated Demand Current
    c. Overloaded
19. Select mains and then click on the Conditional Formatting Field to create the test to determine if the mains are loaded to more than 80% of the rating.
20. Select the following:
    a. Field: Overloaded
    b. Test: Greater Than
    c. Value: .8
    d. Background Color: Yellow



21. Select Panel Name and then click on the Conditional Formatting Field to create the test to determine if the mains are under-loaded such that the panel mains could be reduced. Tests for a load of less than 40% of the mains rating.
22. Select the following:
    a. Field: Overloaded
    b. Test: Less Than
    c. Value: .4
    d. Background Color: Cyan



23. Click okay.

<LOADING - PANELBOARDS SCHEDULE>					
A	B	C	D	E	F
Panel Name	Total Connected	Total Connected Current	Total Demand Current	NC Demand Current	Mains
1DAA	880362 VA	1059 A	1074 A	911 A	1600 A
1DAB	422566 VA	508 A	517 A	429 A	1600 A
1DAC	293495 VA	353 A	364 A		800 A
1DAD	425009 VA	511 A	522 A		400 A
1DAE	209357 VA	252 A	267 A		1200 A
1DAF	323000 VA	389 A	389 A		800 A

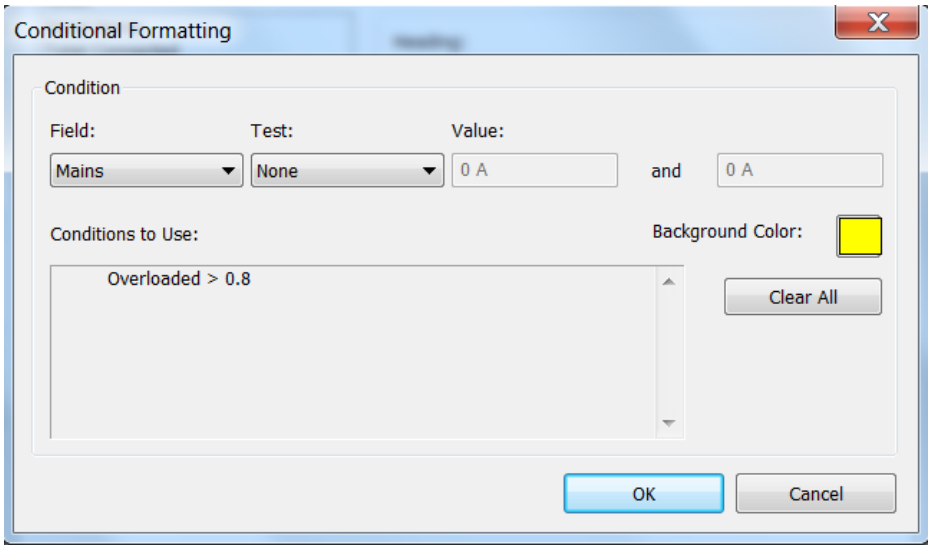
The calculated value to determine Mains overloading is correct but does not take the non-coincidental heating versus cooling diversity. Revit formulas do not play nice with Null or blank values so the comparison between the Non-coincidental current and the mains is a manual/ visual comparison by the end user.

Creating a New Transformer Loading Schedule

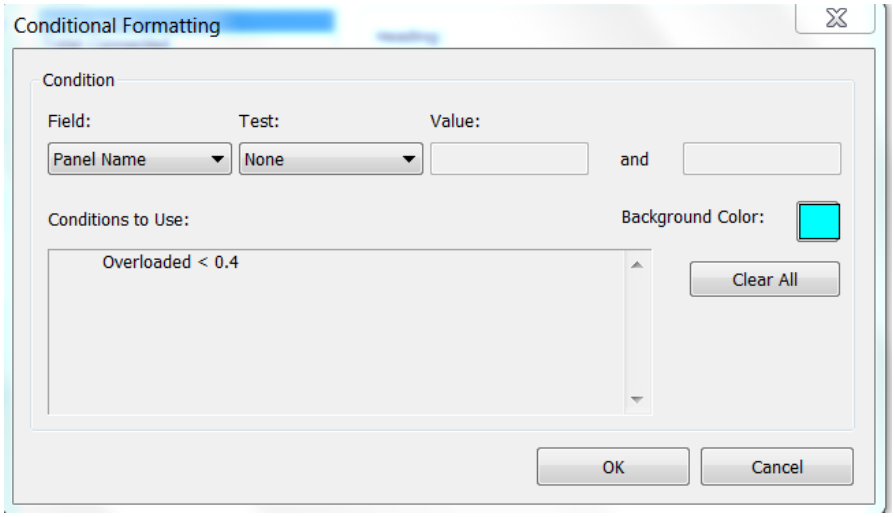
1. Go to the view tab and select “Schedules” under the create pane or right click on Schedules on the project browser.
2. Select “New Schedule/ Quantities”
3. Under category select “ Electrical Equipment”
4. Select the following Available Field and click Add→:
    a. Panel Name
    b. Total Connected
    c. Total Estimated Demand
    d. Mains
5. Still on the Fields tab, create some calculated values to help with the calculations. Select Calculated Value button.
    a. Overloaded
        i. Name: Overloaded
        ii. Discipline: Common
        iii. Type: Number
        iv. Formula: Total Estimated Demand Current / Mains
    b. Total Estimated Demand with NC

i. Name: Total Estimated Demand with NC
ii. Discipline: Electrical
iii. Type: Current
iv. Formula: Total Estimated Demand Current - if(Heating Estimated Demand Current > Cooling Estimated Demand Current, Cooling Estimated Demand Current, Heating Estimated Demand Current)

6. Click on the Filter tab, and create filter to isolate electrical panels from transformers. Create a filter using a distinctive trait such as panel name i.e. Panel name contains a "T", Panel name begins with, etc
7. On the Sorting/Grouping tab, sort by Panel Name.
8. Click on the Formatting tab, select the following parameters and check the Hidden check box
    a. Overloaded
9. Select mains and then click on the Conditional Formatting Field to create the test to determine if the mains are loaded to more than 80% of the rating.
10. Select the following:
    a. Field: Overloaded
    b. Test: Greater Than
    c. Value: .8
    d. Background Color: Yellow



11. Select Panel Name and then click on the Conditional Formatting Field to create the test to determine if the mains are under-loaded such that the panel mains could be reduced. Tests for a load of less than 40% of the mains rating.
12. Select the following:
    e. Field: Overloaded
    f. Test: Less Than
    g. Value: .4
    h. Background Color: Cyan



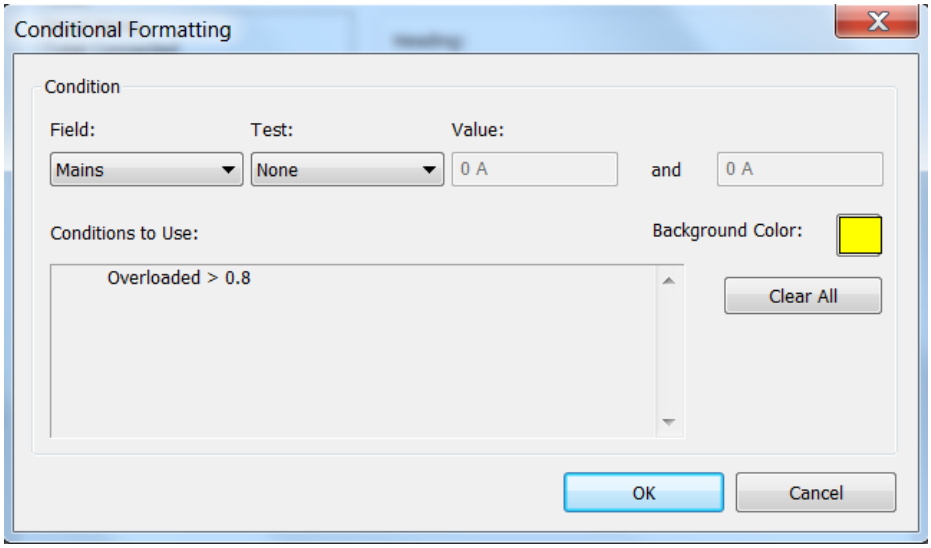
13. Click okay.

Creating a New Circuit Loading Schedule

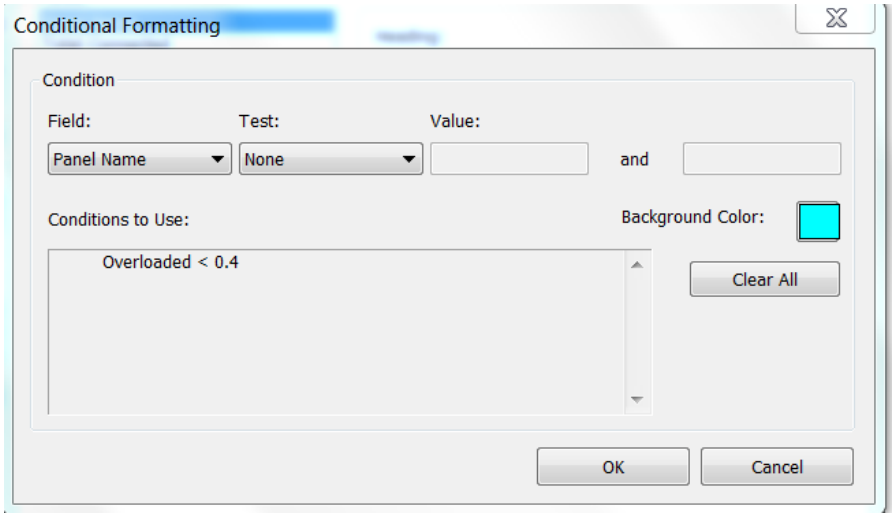
1. Go to the view tab and select “Schedules” under the create pane or right click on Schedules on the project browser.
2. Select “New Schedule/ Quantities”
3. Under category select “ Electrical Circuits”
4. Select the following Available Field and click Add→:
    a. Panel Name
    b. Circuit Number

c. Load Name
d. Rating
e. Apparent Current
f. Apparent Load
g. Wire Size
h. Length
i. Voltage
j. Voltage Drop

5. Still on the Fields tab, create some calculated values to help with the calculations. Select Calculated Value button.
    a. Breaker Loading
        i. Name: Overloaded
        ii. Discipline: Common
        iii. Type: Number
        iv. Formula: Apparent Current / Rating
6. On the Sorting/Grouping tab, sort by Panel Name.
7. Click on the Formatting tab, select the following parameters and check the Hidden check box
    a. Overloaded
8. Select mains and then click on the Conditional Formatting Field to create the test to determine if the mains are loaded to more than 80% of the rating.
9. Select the following:
    a. Field: Overloaded
    b. Test: Greater Than
    c. Value: .8
    d. Background Color: Yellow



10. Select Panel Name and then click on the Conditional Formatting Field to create the test to determine if the mains are under-loaded such that the panel mains could be reduced. Tests for a load of less than 40% of the mains rating.
11. Select the following:
    i. Field: Overloaded
    j. Test: Less Than
    k. Value: .4
    l. Background Color: Cyan



12. Click okay.

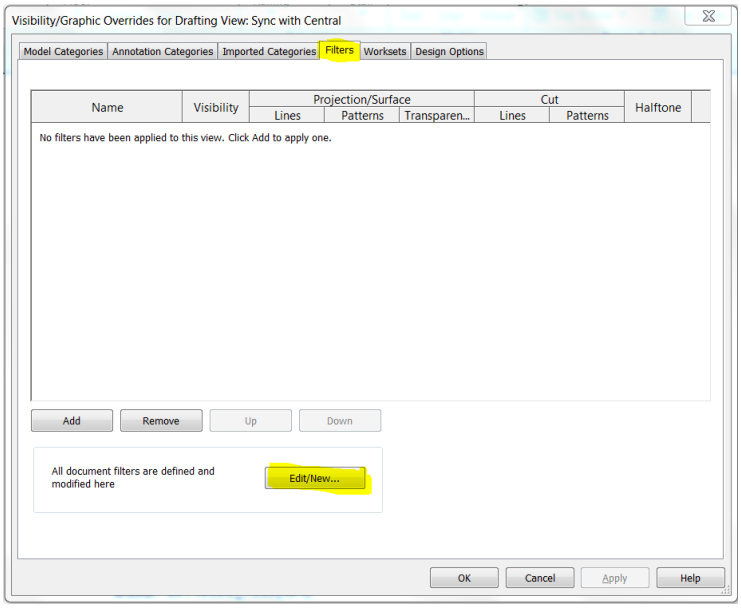
I then place all of the three schedules created above on "Z" series sheets to allow them to be printed and reviewed by the senior engineer as part of the QA/QC process as well as to make the data available to staff who may not work directly in Revit to allow them to benefit from the database mindset as well.

Utilize view filters to catch un-circuited electrical items as well as other disciplines that require power

There are two ways in Revit that electrical items can be considered un-circuited. One is a little more obvious to the drafter/designer than the other. In Revit, there is both a graphical representation of the circuit as well as a "electrical" representation of a circuit. Filters can be used to check for both types of un-circuited items.

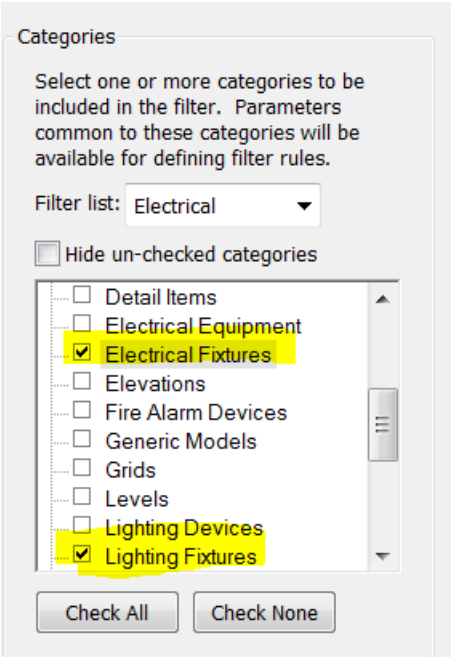
Filters to check for Un-Circuited Items Where no attempt has been made
To check to see if any attempt has been made to circuit electrical items, create a filter to check if the electrical item is associated with a panel.

1. Go to the Visibility/Graphic Overrides window.
2. Click on the filters tab.
3. Select Edit/New… button.

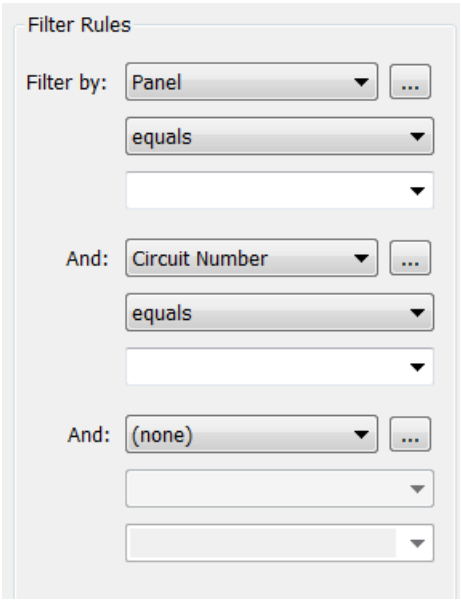


4. Click the new filter button on the button left corner. (Looks like a piece of paper with a sunburst in the corner.)

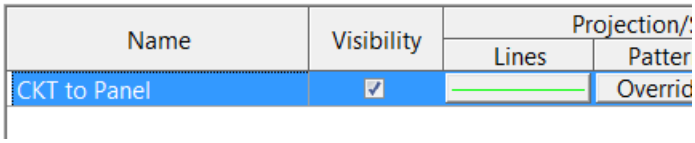
5. Name the filter “CKT to Panel”. Click ok.
6. Select the categories this filter should be applied to. Select “Electrical Fixtures” and “Light Fixture”



7. Under Filter Rules:
    a. Filter by “Panel Name” equals (blank)
    b. Filter by “Circuit Number” equals (blank)



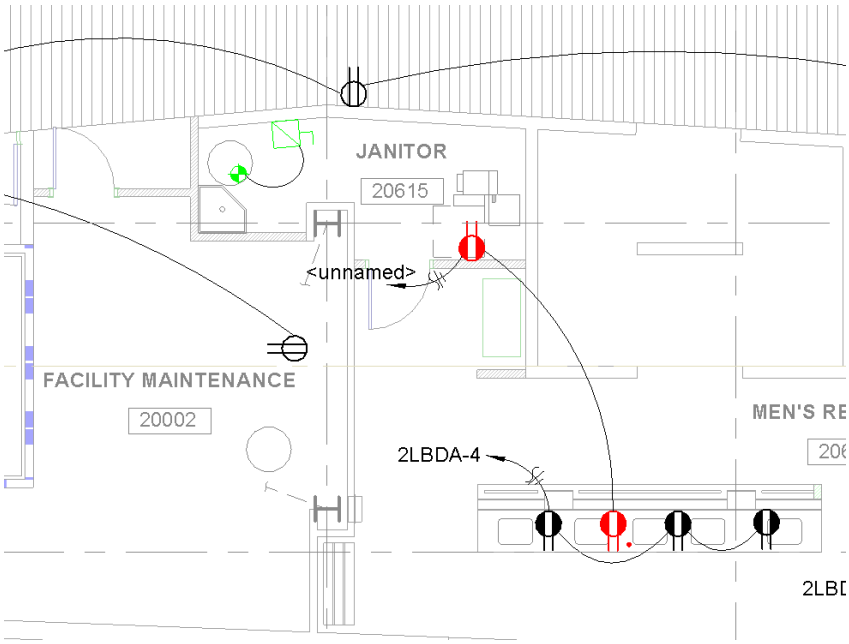
8. Select okay which will return to Visibility/Graphic Overrides window.
9. Click add and select the filter just created: "CKT to Panel"
10. Click the override button under the Lines category and select green as the color. Select Okay.



11. Click okay to exit the Visibility/Graphic Override window. Revit will think for a minute and then all electrical and lighting fixtures that no attempt has been made to circuit will turn green making it much easier to find on the drawings.

Filters to check for Un-Circuited Items Where an attempt has been made but no completed
Sometimes an attempt is made to circuit an item but it is either not successfully completed or something else changed to break the circuit. To check, create a filter to check if the electrical item is associated with a circuit.

1. Go to the Visibility/Graphic Overrides window.
2. Click on the filters tab.
3. Select Edit/New… button.
4. Click the new filter button on the button left corner. (Looks like a piece of paper with a sunburst in the corner.)
5. Name the filter "CKT to Breaker". Click ok.
6. Select the categories this filter should be applied to. Select "Electrical Fixtures" and "Light Fixture"
7. Under Filter Rules:
    a. Filter by "Circuit Number" equals (blank)
8. Select okay which will return to Visibility/Graphic Overrides window.
9. Click add and select the filter just created: "CKT to Breaker"
10. Click the override button under the Lines category and select red as the color. Select Okay.
11. Click okay to exit the Visibility/Graphic Override window. Revit will think for a minute and then all electrical and lighting fixtures that have not been successfully connected to a panel and circuit breaker will turn red making it much easier to find on the drawings.



Conclusion

Revit requires a mindset shift from being a drafting tool to a database to be manipulated to show the data in the formats needed to improve efficiencies and coordination processes. When this mindset shift occurs, we are able to utilize schedules to perform energy code calculations, coordinate electrical circuitry with mechanical and plumbing loads, and check electrical design at the panel and breaker level, and as well as us view filters to catch un-circuited electrical items as well as other disciplines that require power. With a little bit of set up time in the front end of the project, we are able to save both time and money on the backend at the deadline. All of these items allow us to share the information with staff not working in Revit as well as improve our quality and deliverable to the client.