Pesky Electrical Setting in Revit 2018

Mike Massey

Senior AEC Specialist

Presenting Today…

Mike Massey

Senior Technical Specialist

Applied Software®

Autodesk Certified Instructor

Revit Architecture Certified Professional

Revit MEP: Electrical Certified Professional

Revit MEP: Mechanical Certified Professional

- Graduated from **Texas A&M University** with a degree in Architecture and has **27+ Years of AEC Experience**
- Experience includes various types of projects including residential, commercial, retail, educational, and healthcare
- Is an **Autodesk Certified Instructor** with Professional Certifications in Revit Architecture, Revit MEP (Electrical) and Revit MEP (Mechanical).
- Speaker for AIA functions on the benefits of BIM and repeated speaker at Autodesk University
- **Won top speaker award at Autodesk University 2016**
- **Contributing author for Autodesk Official Training Courseware** and has also been published in a number of industry magazines and newsletters
- Has been an AutoCAD user since Release 9 and AutoCAD Architecture since its debut
- Expertly assists firms in assessing, planning, and implementing new technology
- Provides valuable consulting on executive strategies which assist owners and principals in the deployment of BIM solutions

Class summary / Learning Objectives

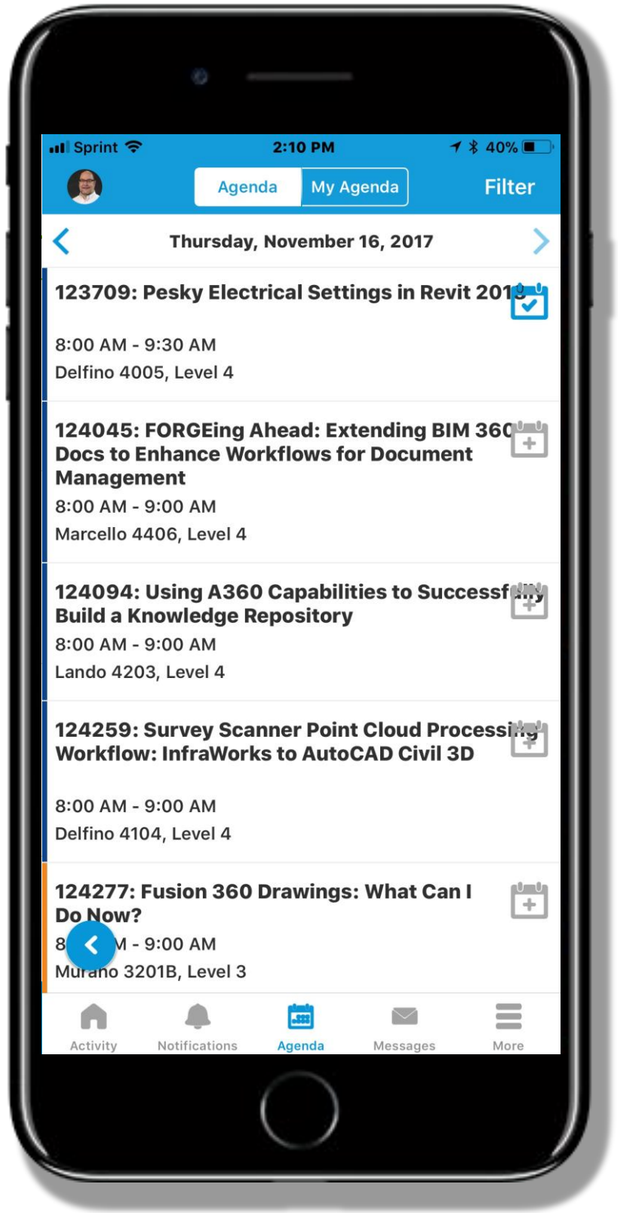
Revit MEP software for electrical engineering is all about coordination. Yes, it does modeling in 3D; but the biggest benefit for electrical is not that it can model 3D lights. Rather, ***it's that it produces a coordinated model with the assurance that everything is circuited and documented correctly****. Setting up Revit MEP for electrical can be painful. There are many pesky settings and things that just do not work the way you want them to work. Come to this class to discuss the major items that keep electrical engineers up at night trying to configure Revit MEP to work the way they want it to. We'll tackle problems such as editing panel schedules, changing graphics of nested families, creating circuit paths, developing powerful electrical schedules, working with hosted fixtures, and working with load classifications. Don't let Revit MEP get the best of you. Learn how to fix these pesky settings before they drive you crazy.*

At the end of this class, you will be able to:

- Know how to create powerful electrical schedules
- Know how to define the circuit path in Revit 2018
- Know how to work and configure electrical panel schedules
- Know how load classifications and demand factors are applied

Agenda

- Introductions
- Working with Lights
- Working with Equipment Families
- Creating Electrical Circuits
- Working with Panel Schedules
- Questions From YOU!
- Additional Topics (Time Permitting)
- Wrap Up



Class Handout

ES123709
Pesky Electrical Settings in Revit 2018

- Further Explanation
- Step-by-steps

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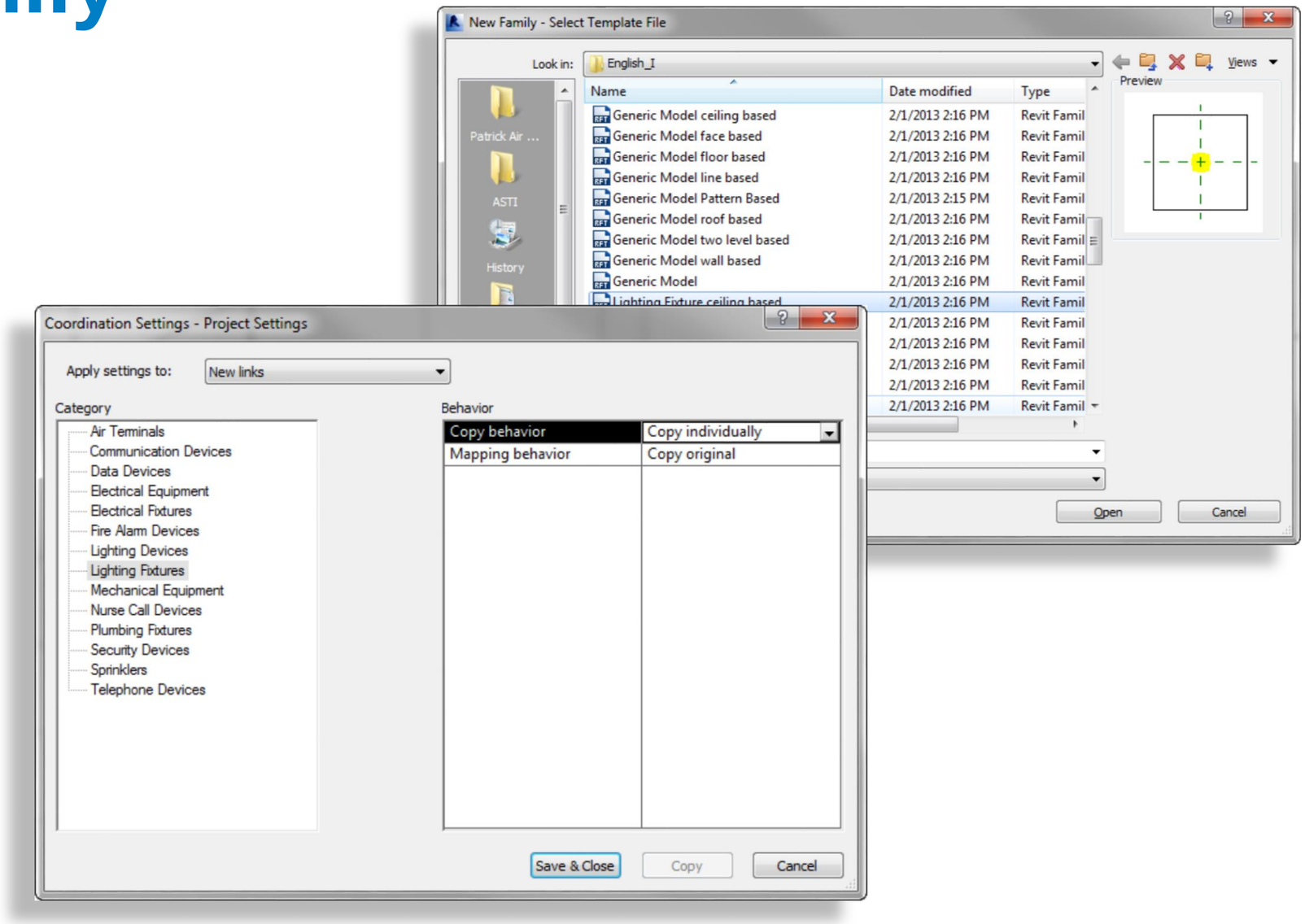
  - Spaces not Calculating Foot Candles
  - **Key Schedules for Lighting Loads**
- **Working with Equipment Families**
  - **Adding panel names to 3d Views**
  - **Creating Clearance zones**
  - **Use Copy/Monitor to copy Mech Equipment with Connector Families**
- Creating Electrical Circuits
  - **Use Filters to show un-circuited and not connected to panels**
  - **Viewing and modifying circuit Paths**
- Working with Panel Schedules
  - Load Classification and Demand Factors
  - Load Names in Panel Schedules
  - Getting Panels to Number Down instead of across
  - Panel Schedule Templates
  - ~~**Load Schedules (No circuits)**~~
  - **Using schedules to determine if main is sized correctly on panels**
- Questions From You
  - One-Line Diagrams
  - Creating a Family with multiple connectors
  - Load Summaries in KVA
  - Load Names in Upper Case
  - Simplified Wire Size Callout
  - Changing Watts/SF Settings
  - Multiple Circuits through J-Box
  - Calculating Watts/SF on 2-story spaces
- Additional Topics
  - Correcting Upside Down Switch Labels
  - Creating Stacked Devices
  - Changing the Origin of a Light Fixture
  - Double Homeruns
  - Changing the Graphics of a Light Fixture
  - 3 Most important parameters when inserting panels
- Wrap Up

Working with Lights

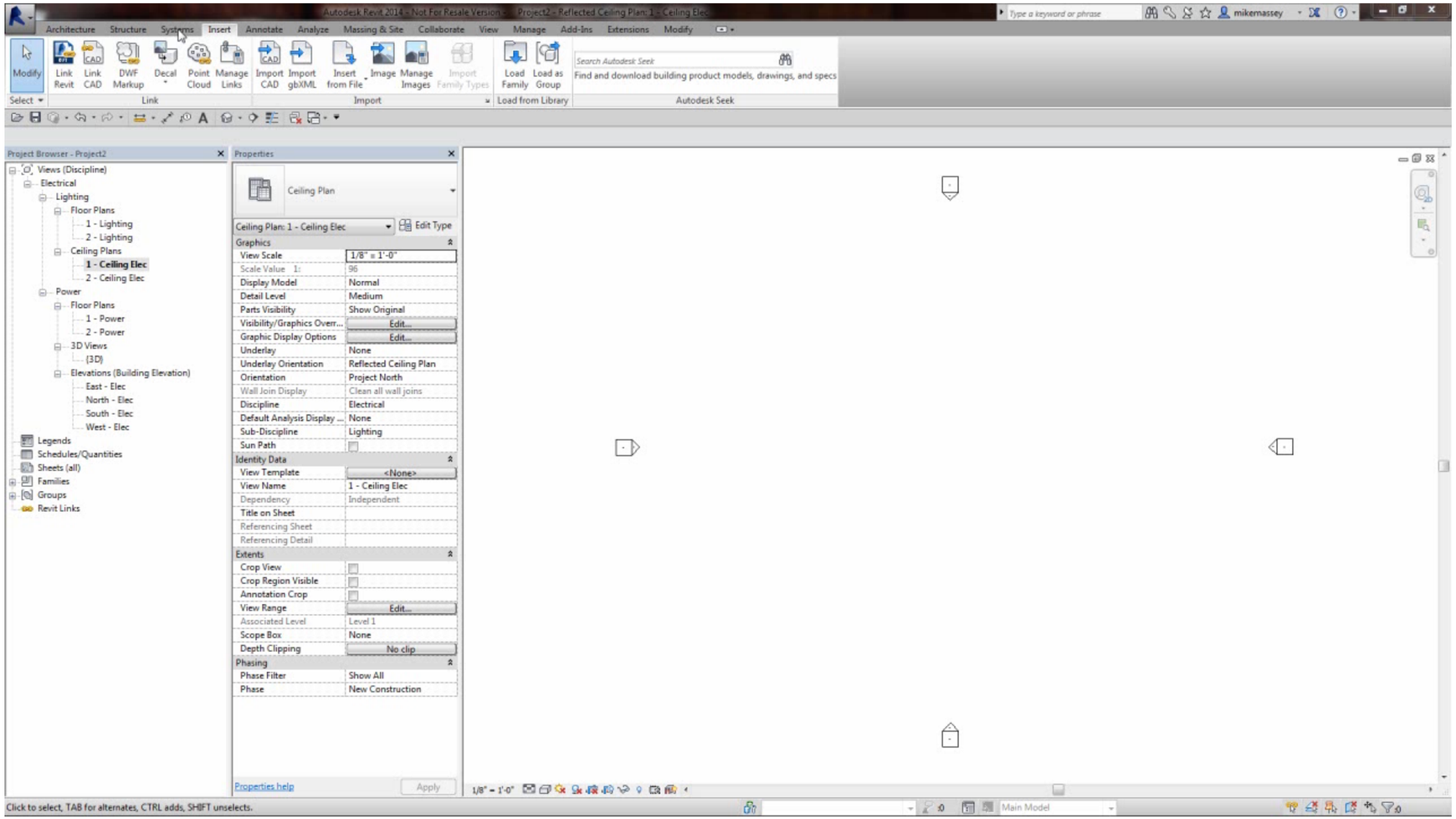
Converting a Ceiling Hosted Family to a Non-hosted Family

- Link in Family
- Use Copy/Monitor
- Save as New Family



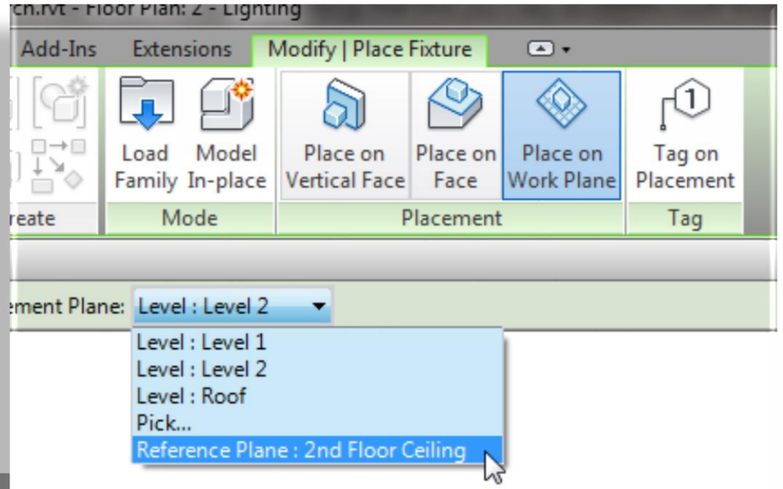
Converting a Ceiling Hosted Family to a Non-hosted Family
Let’s see how this works…

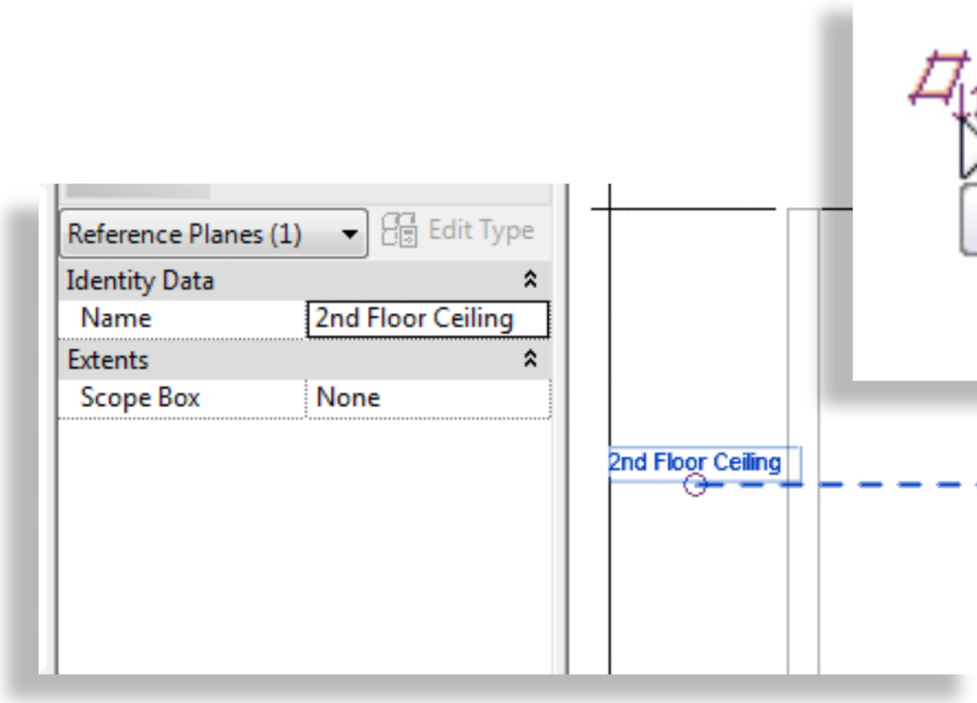
Converting a Ceiling Hosted Family to a Non-hosted Family

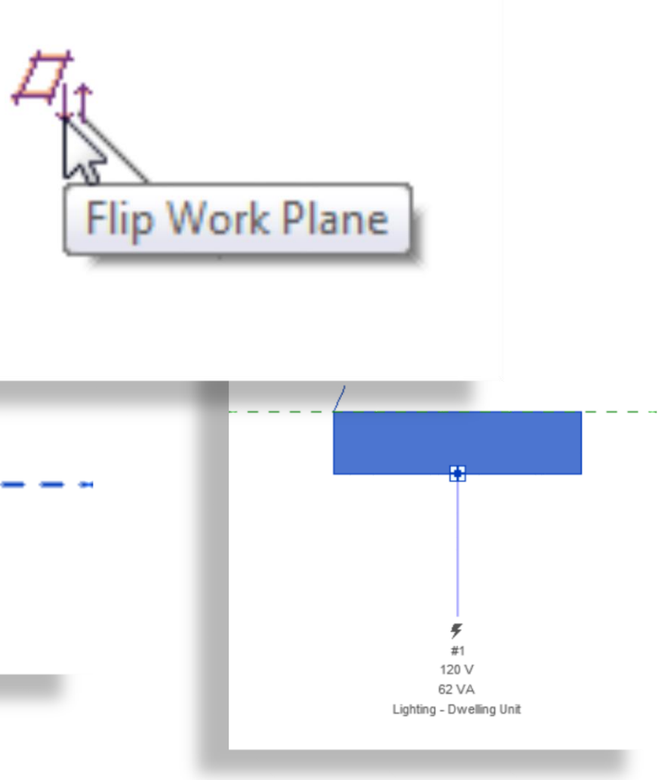


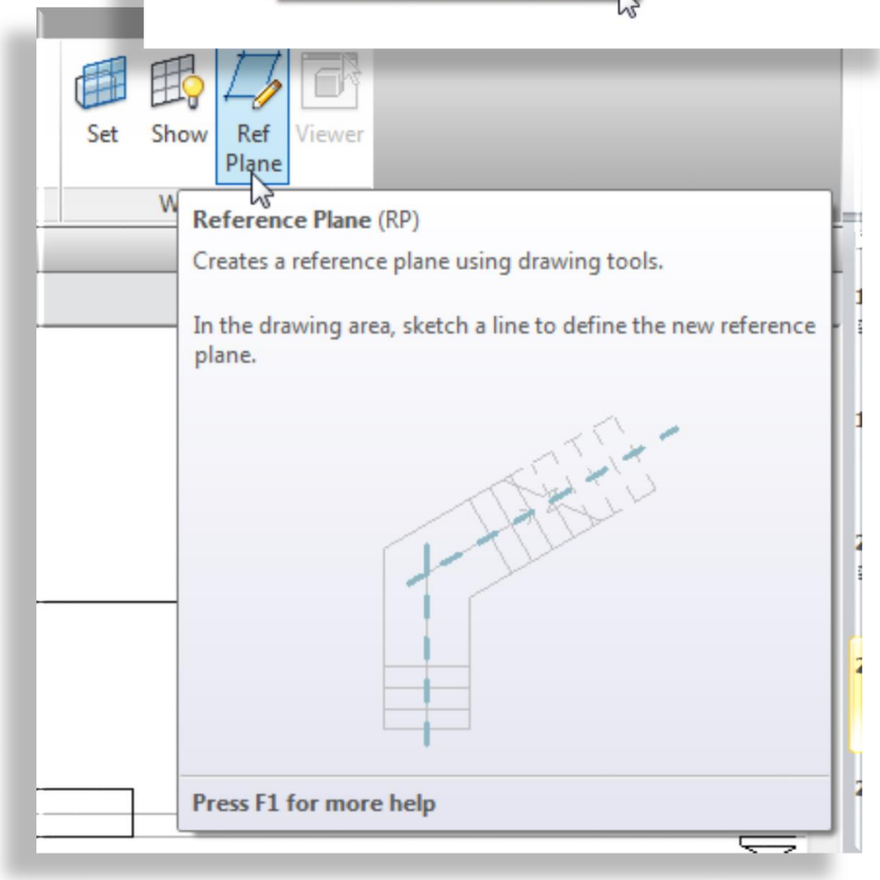
Placing Hosted Lights Without a Face (Ceiling)

- Lights are upside down?
- Draw Reference Plane Right to Left









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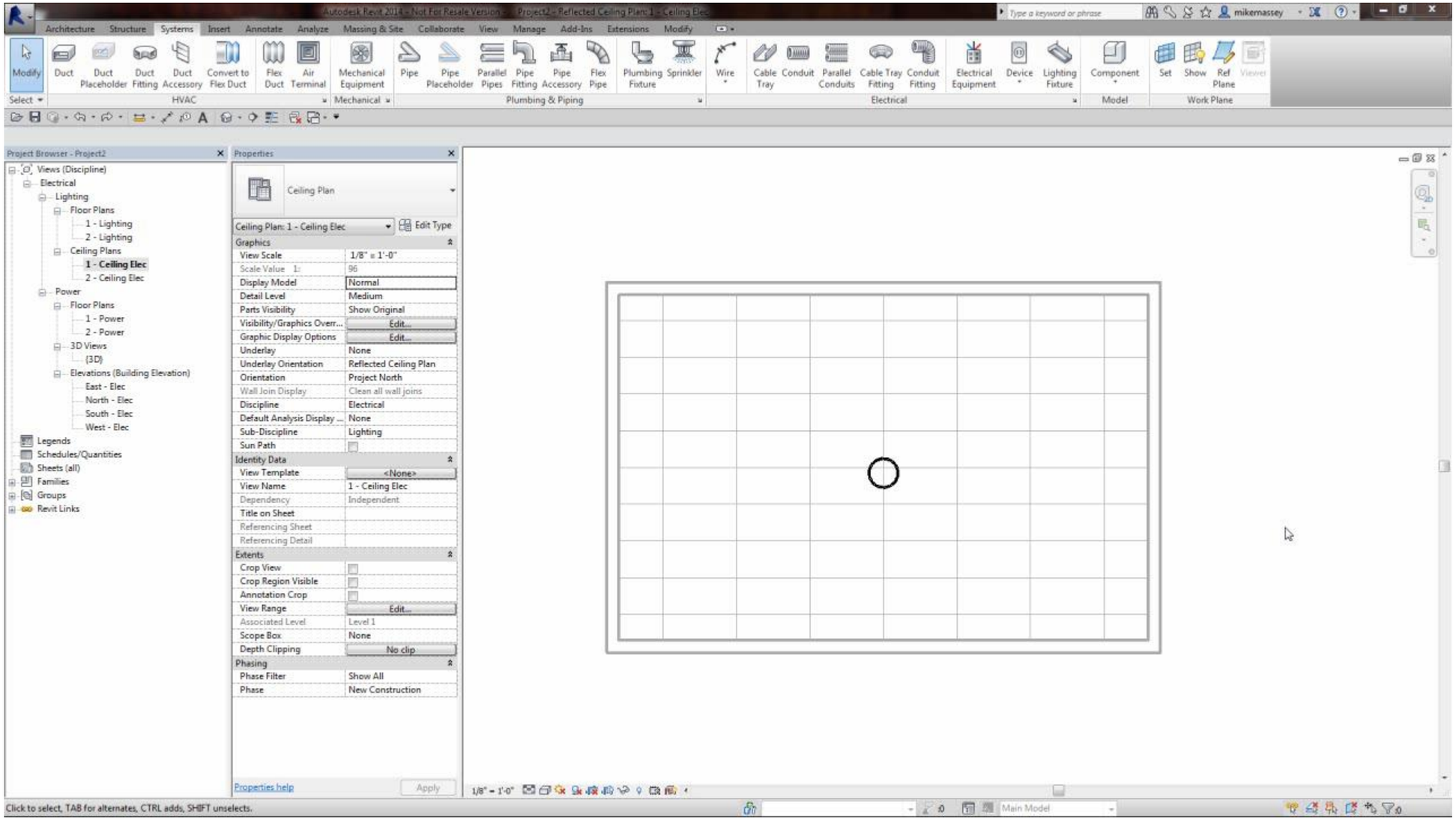
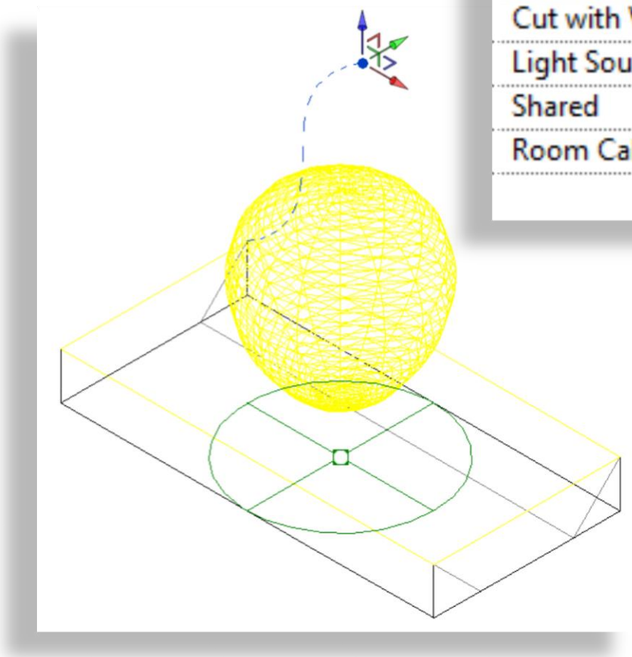
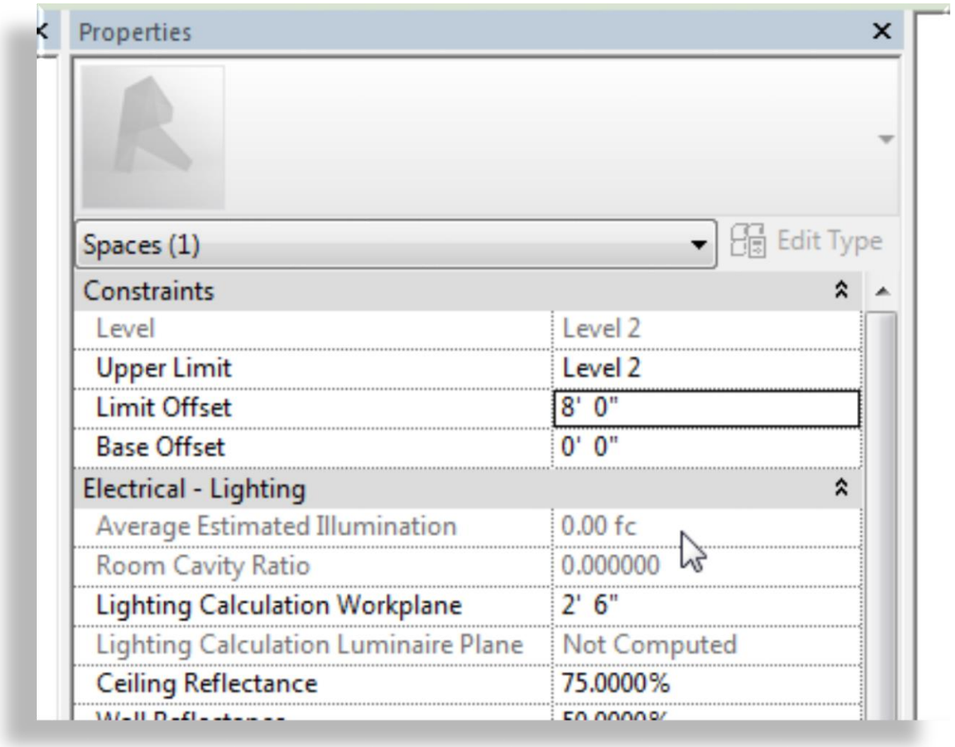


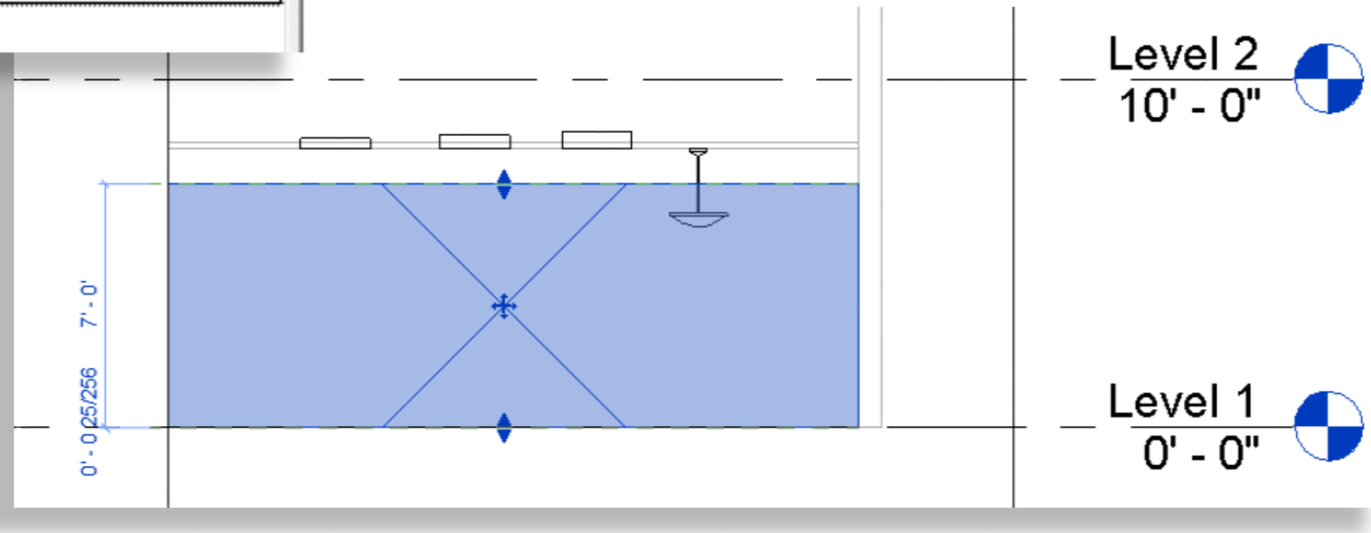
Space Not Calculating Foot Candles

- Light is outside of Space
- Use Room Calculation Point



OmniClass Title	Direct/Indirect
Other	
Cut with Voids When Loaded	☐
Light Source	☑
Shared	☐
Room Calculation Point	☑





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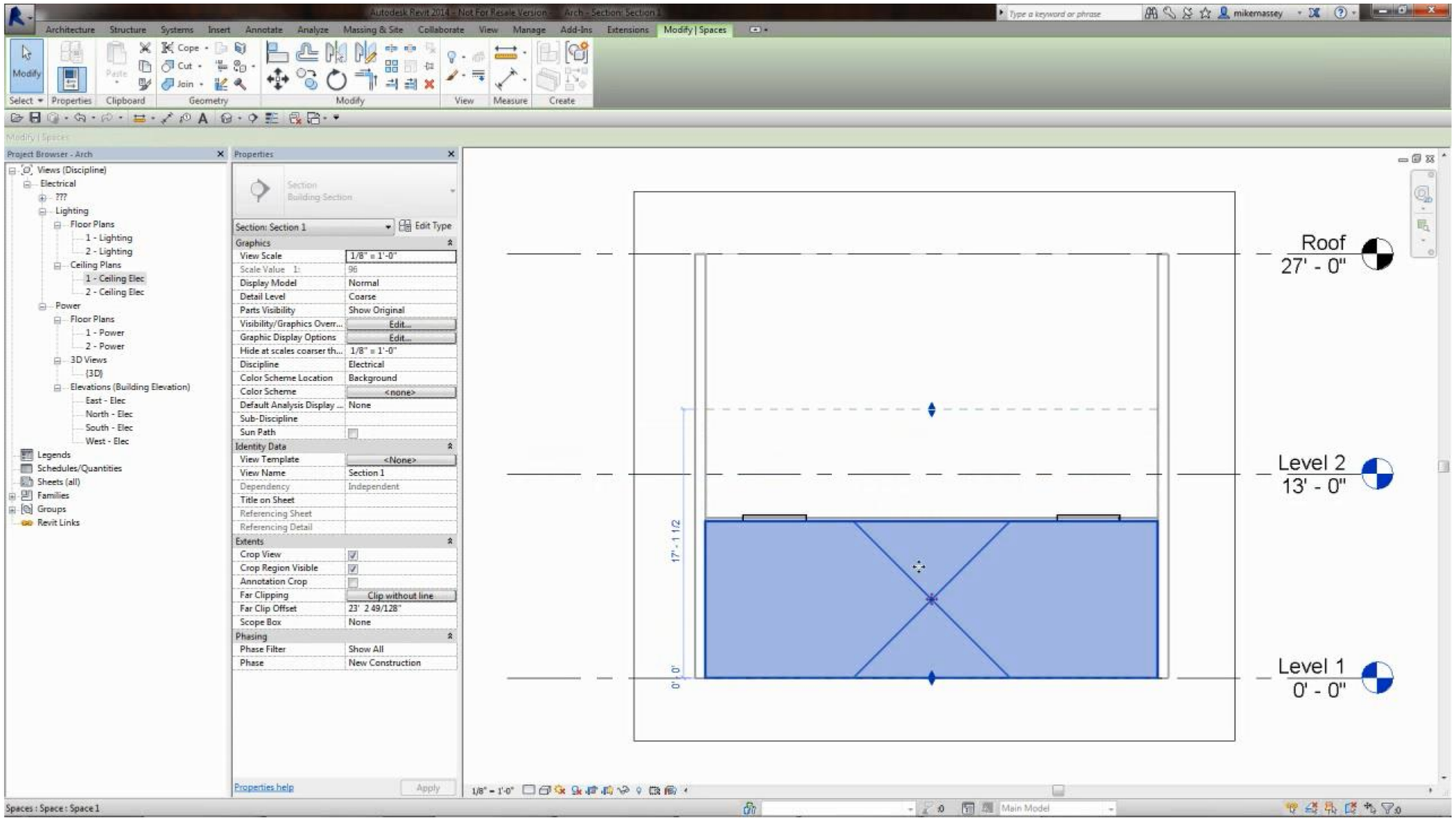
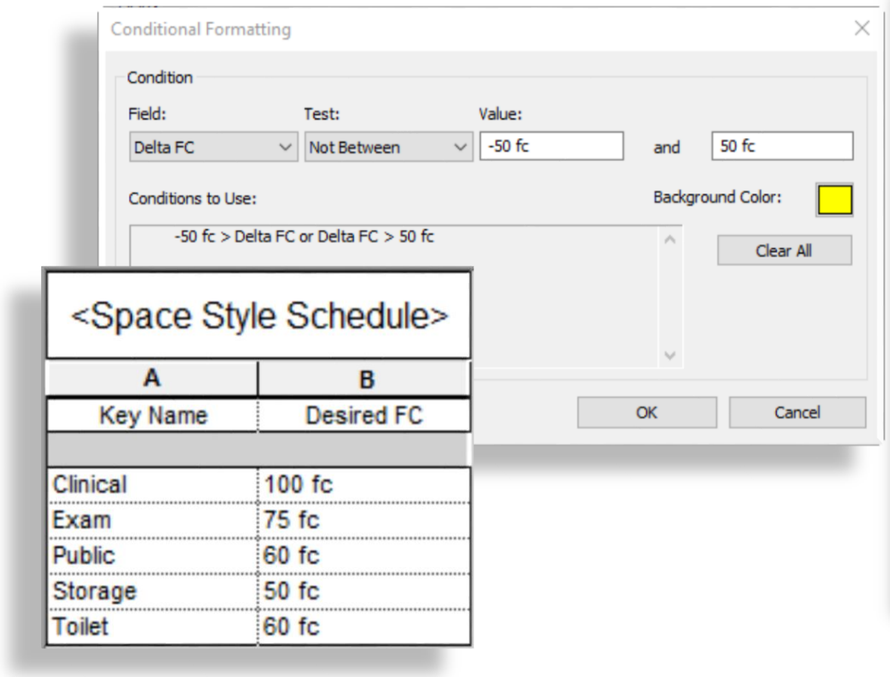


Creating Schedule Keys for Lighting Loads

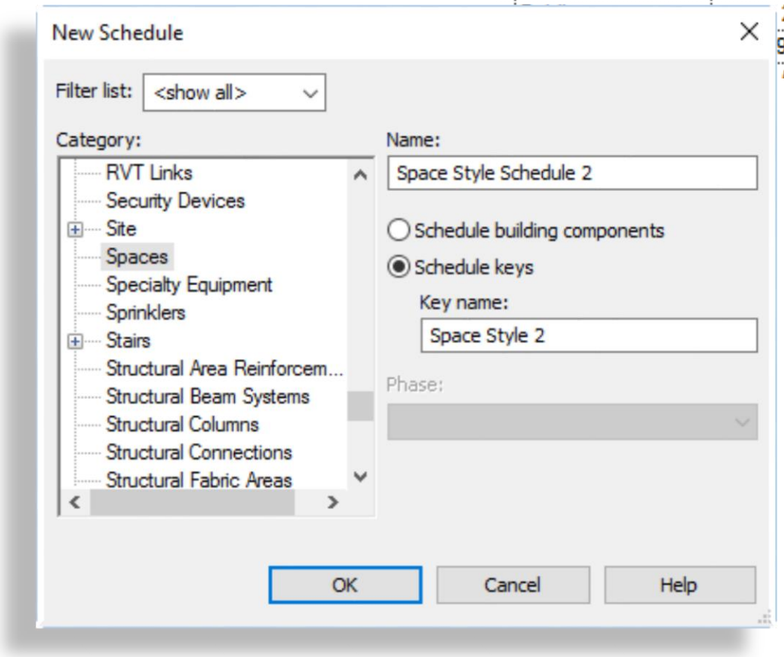
- Keys for main Space Types
- Create a Calculated Value Parameter
- Use Conditional Formatting

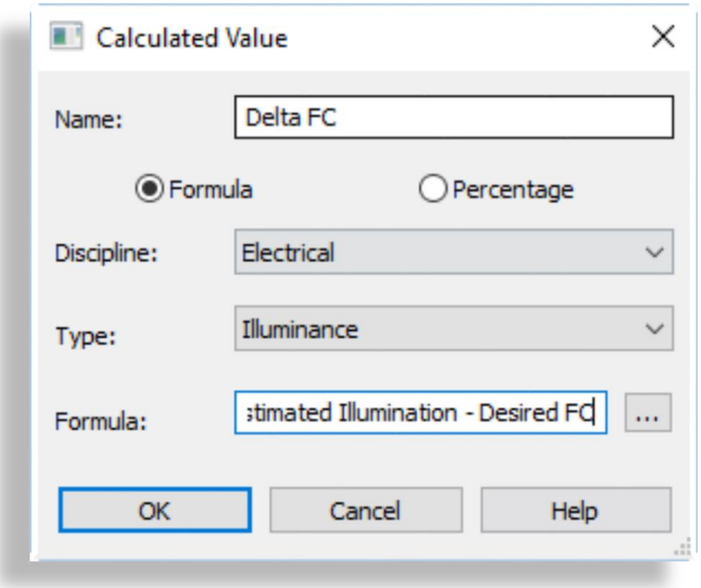
D	E	F	G	H
Space Style	Area	Average Estimated	Desired FC	Delta FC
Public	153 SF	65 fc	60 fc	5 fc
Public	642 SF	53 fc	60 fc	-7 fc
Public	59 SF	0 fc	60 fc	-60 fc
Public	483 SF	75 fc	60 fc	15 fc
Toilet	59 SF	44 fc	60 fc	-16 fc
Toilet	32 SF	62 fc	60 fc	2 fc
Toilet	59 SF	44 fc	60 fc	-16 fc
Public	135 SF	68 fc	60 fc	8 fc
Clinical	37 SF	55 fc	100 fc	-45 fc
	20 SF	0 fc	60 fc	-60 fc
	981 SF	72 fc	60 fc	12 fc



<Space Style Schedule>

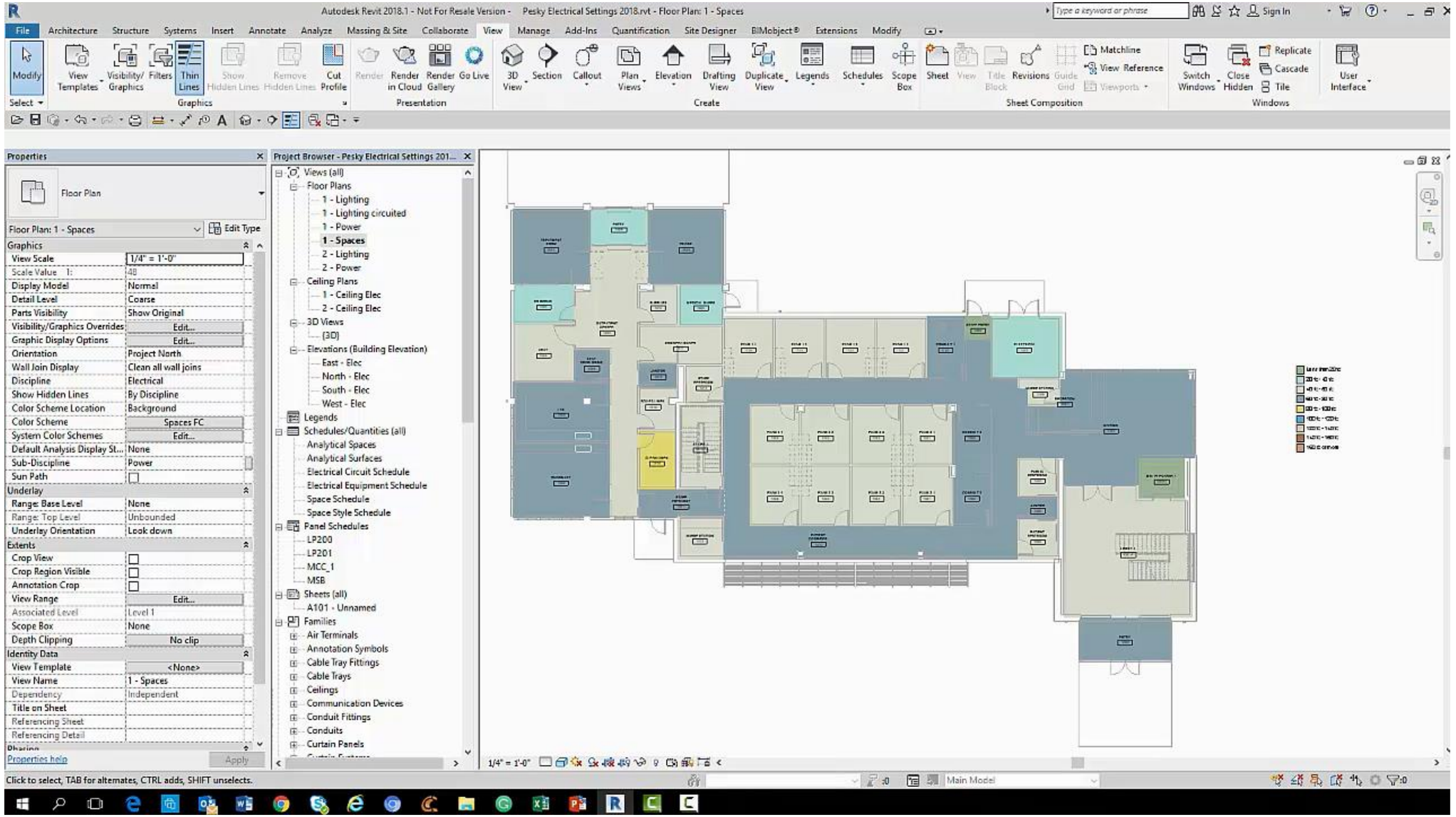
A	B
Key Name	Desired FC
Clinical	100 fc
Exam	75 fc
Public	60 fc
Storage	50 fc
Toilet	60 fc





Creating Schedule Keys for Lighting Loads
Let’s see how this works…

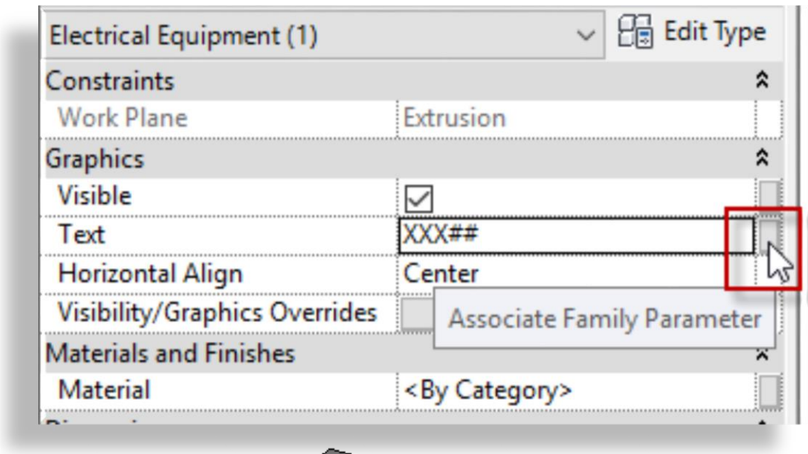
Creating Schedule Keys for Lighting Loads

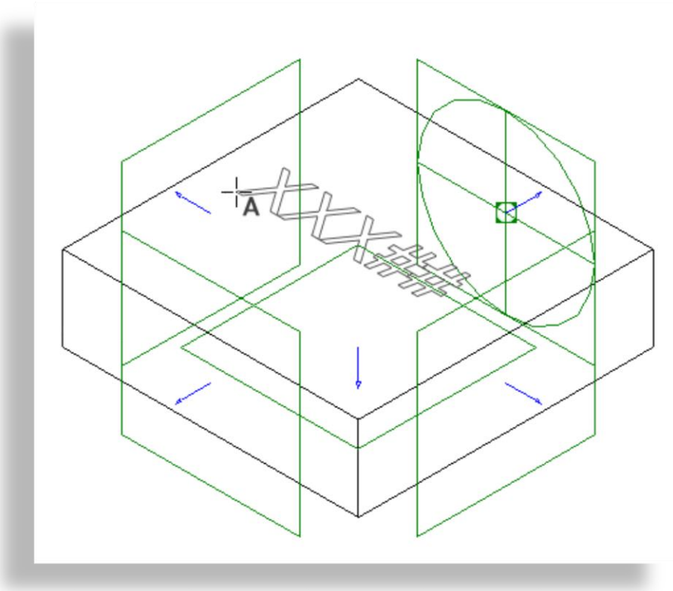


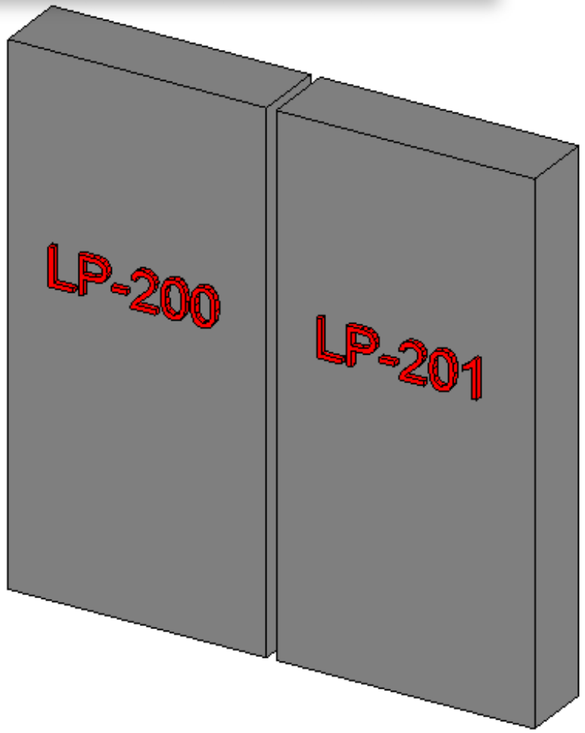
Working with Equipment Families

Adding Panel Names to 3D Views

- Great for visualization
- Needed for Navisworks
- Automatically Populates the Panel Name
- Visibility by Sub-Category







Adding Panel Names to 3D Views
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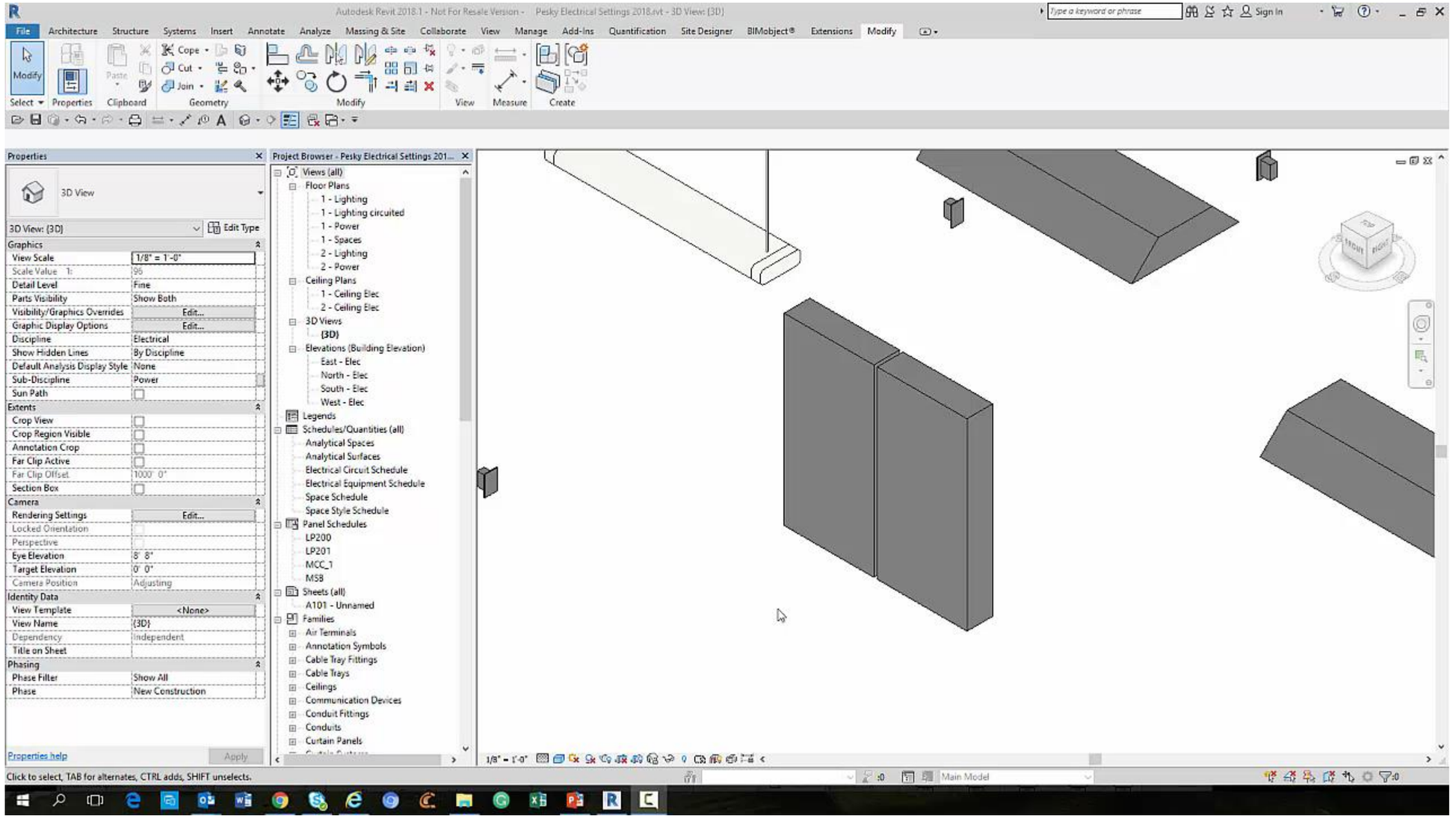
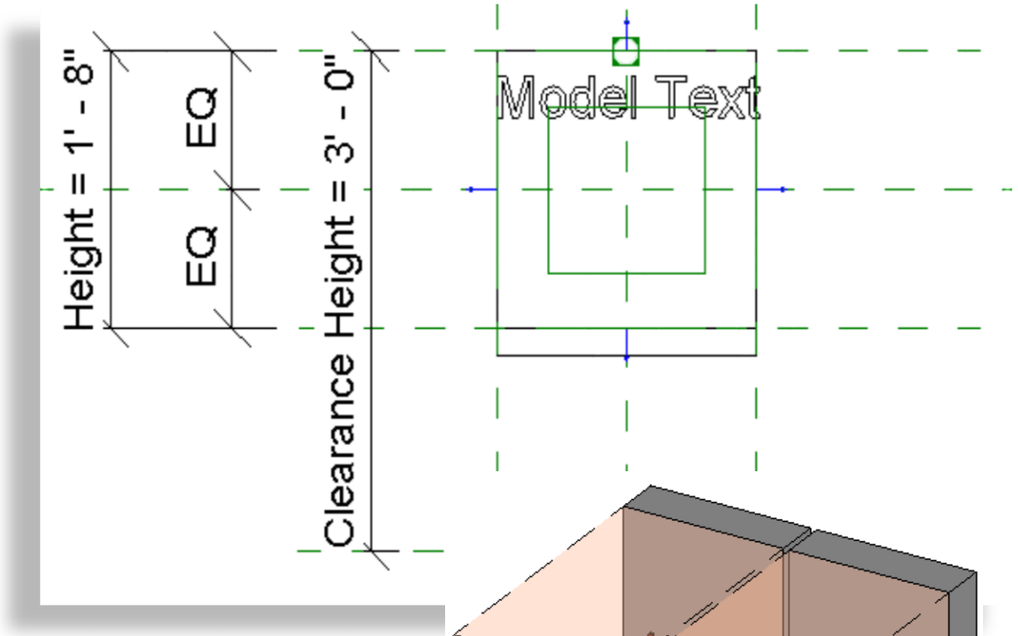
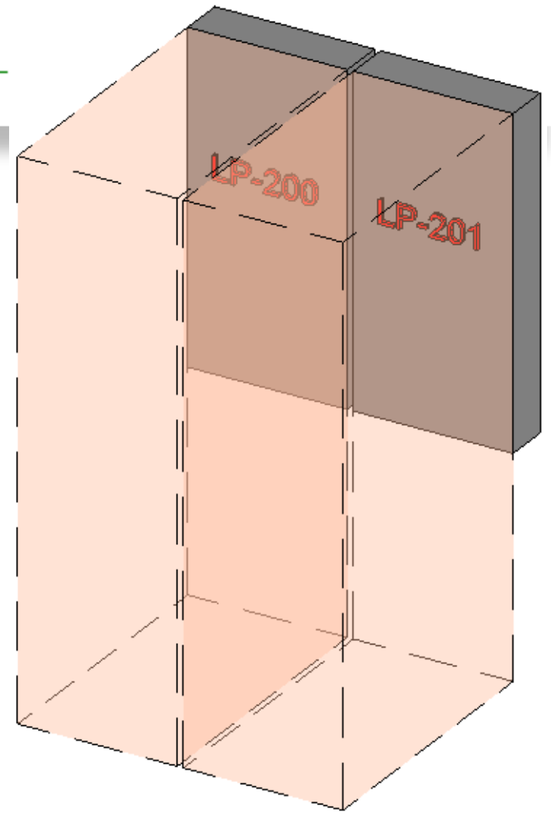
Adding Panel Names to 3D Views



Creating Clearance Zones

- Required for Clash Detection
- Geometry Built in Family
- Make Transparent
- Build with Parametrics
- Visibility by Sub-Category

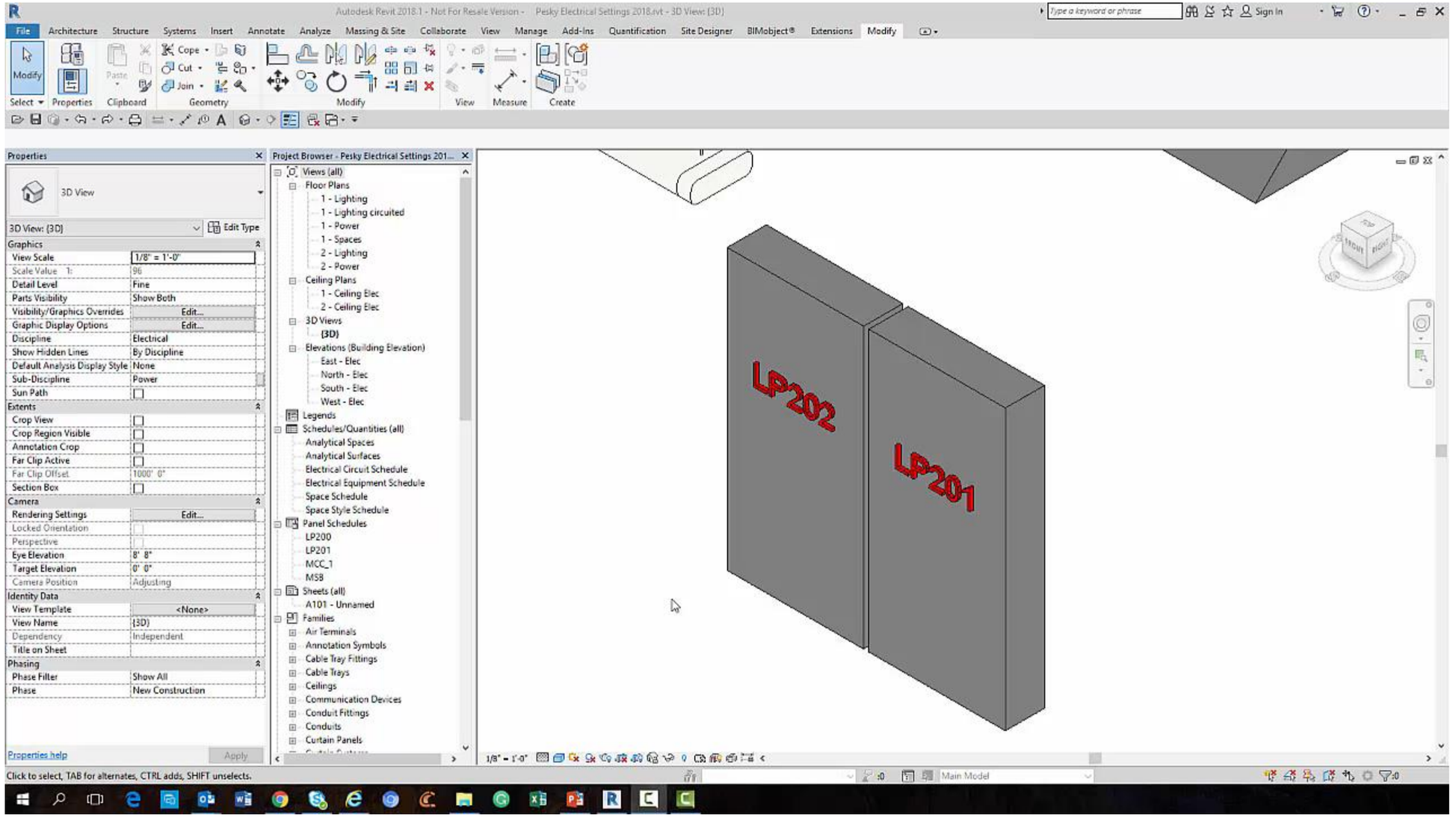




Dimensions		
Clearance Depth (default)	3' 0"	=
Clearance Height (default)	4' 10"	= Default Elevation + (Height / 2)
Width	1' 8"	=
Height (default)	1' 8"	= if(Max #1 Pole Breakers > 12, if(

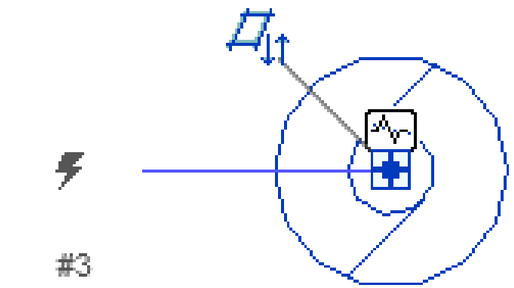
Creating Clearance Zones
Let’s see how this works…

Creating Clearance Zones



Using Copy/Monitor for Mechanical Equipment

- Copy/Monitor from Mechanical Model
- Create a Connector Family
- Nest an Annotation Symbol
- Change to Mechanical Equipment Category
- Batch Copy with Type Mapping



Behavior

Copy behavior	Allow batch copy
Mapping behavior	Specify type mapping

Behavior

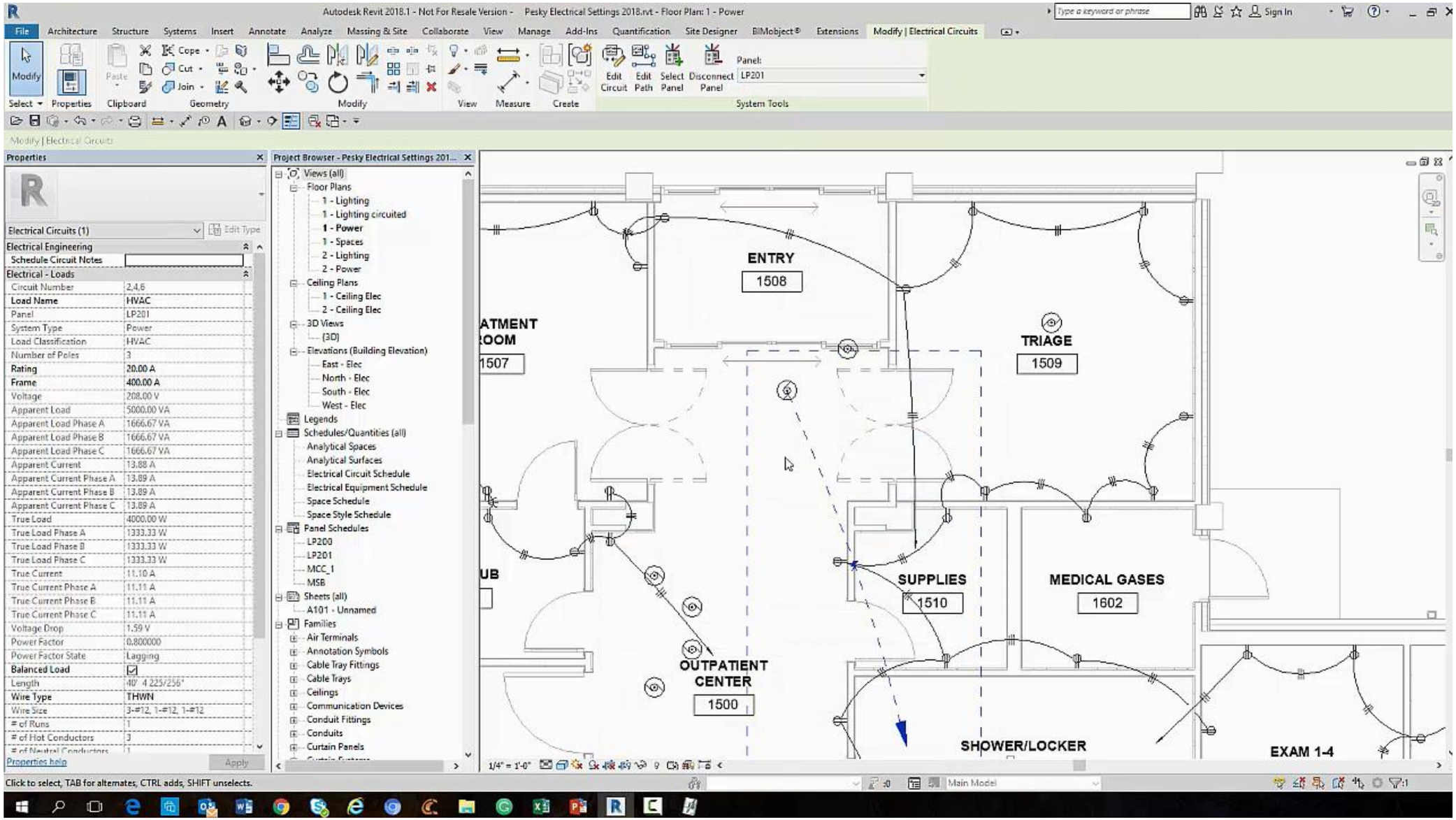
In the Linked Model	In the Host Model
PEFY-P-NMAU-E_Mediu	
PEFY-P18NMAU-E	Motor Connector : 208 V
PEFY-P30NMAU-E	
PEFY-P36NMAU-E	
PEFY-P48NMAU-E	
PEFY-P54NMAU-E	
PEFY-P-NMSU-E_Low_Pr	
PEFY-P12NMSU-E	
PEFY-P15NMSU-E	Motor Connector : 208 V

Motor Connector
Motor Connector : 120 V
Motor Connector : 208 V
Motor Connector : 240 V
Motor Connector : 277 V
Motor Connector : 480 V

Technique by Amber Young – Affiliated Engineers, Inc.

Using Copy/Monitor for Mechanical Equipment Let’s see how this works…

Using Copy/Monitor for Mechanical Equipment



Creating Electrical Circuits

Using Filters to show Un-Circuited Devices

- Create Filter for Items not Circuited
- Create Filter for Items Circuited but not Assigned to a Panel
- Assign Solid Color Patterns in Views

Visibility/Graphic Overrides for Floor Plan: 1 - Power

Model Categories | Annotation Categories | Analytical Model Categories | Imported Categories | Filters

Name	Visibility	Projection/Surface		
		Lines	Patterns	Trans
Electrical Check - Not Circuited	☑			
Electrical Check - Circuited But ...	☑			Ove

Filters

Filters

Domestic
Domestic Cold Water
Domestic Hot Water
Electrical Check - Circuited But Not Assigned to a Pa
Electrical Check - Not Circuited
Gas Refrigerant Tubing
Hydronic
Interior
Liquid Refrigerant Tubing
Mechanical - Exhaust
Mechanical - Return
Mechanical - Supply
Sanitary
Vent

Categories

Select one or more categories to be included in the filter. Parameters common to these categories will be available for defining filter rules.

Filter list: <multiple>

☑ Hide un-checked categories

☑ Electrical Fixtures
☑ Lighting Devices
☑ Lighting Fixtures
☑ Mechanical Equipment

Check All | Check None

Filter Rules

Filter by: Circuit Number
is less than
1

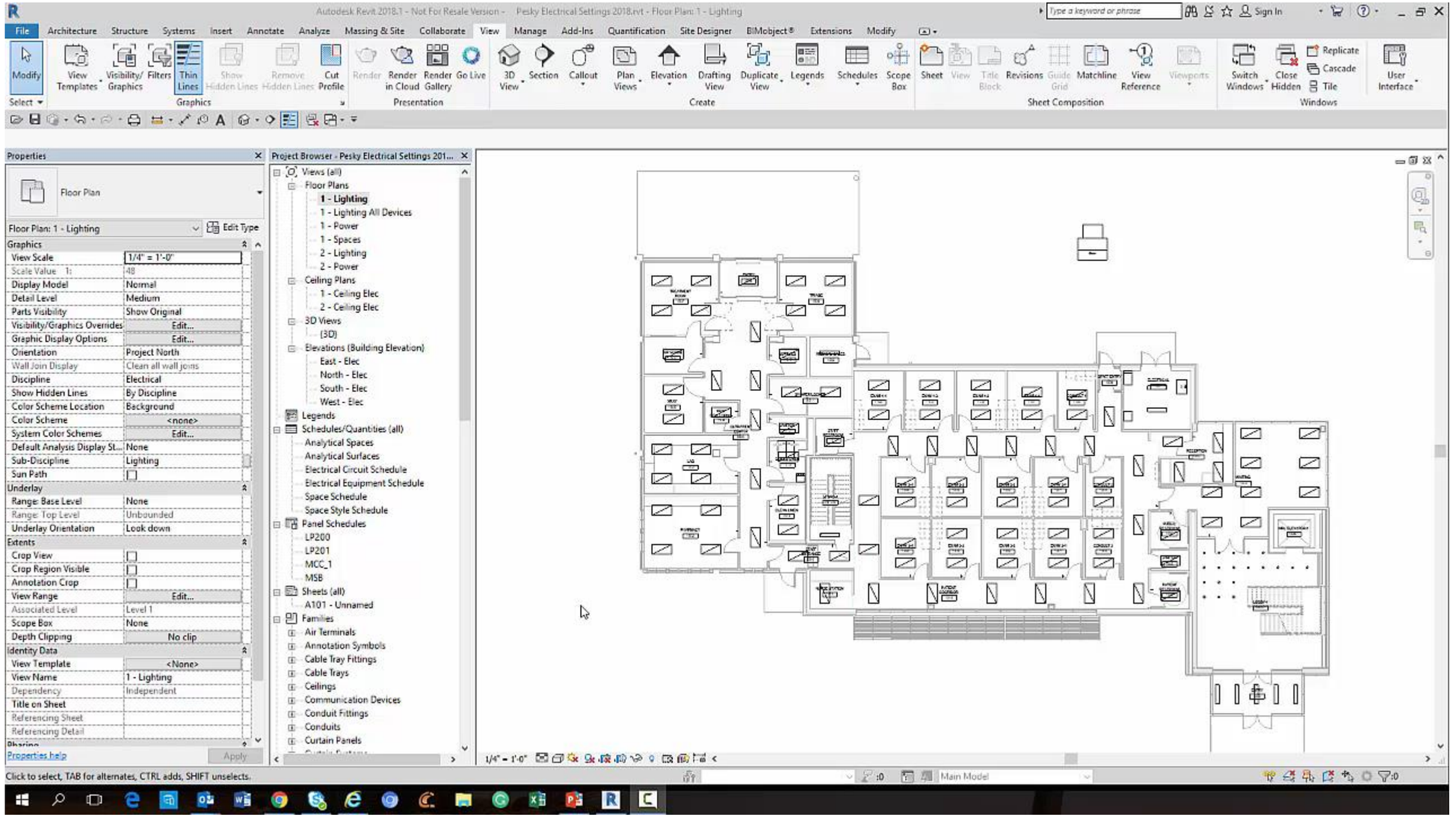
And: (none)

And: (none)

OK | Cancel | Apply | Help

Using Filters to show Un-Circuited Devices
Let’s see how this works…

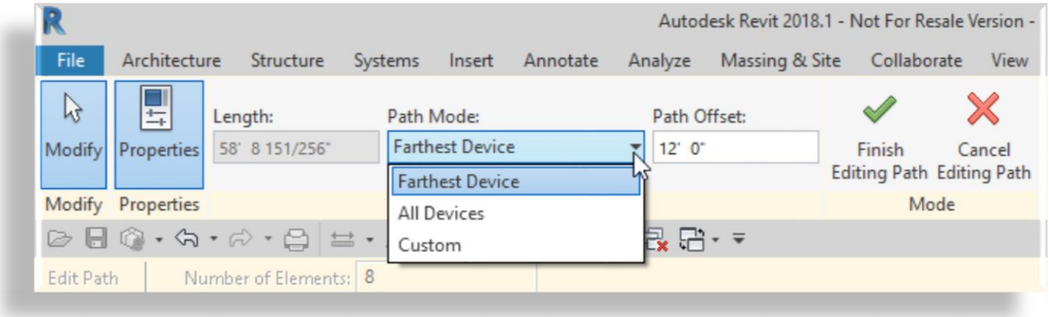
Using Filters to show Un-Circuited Devices

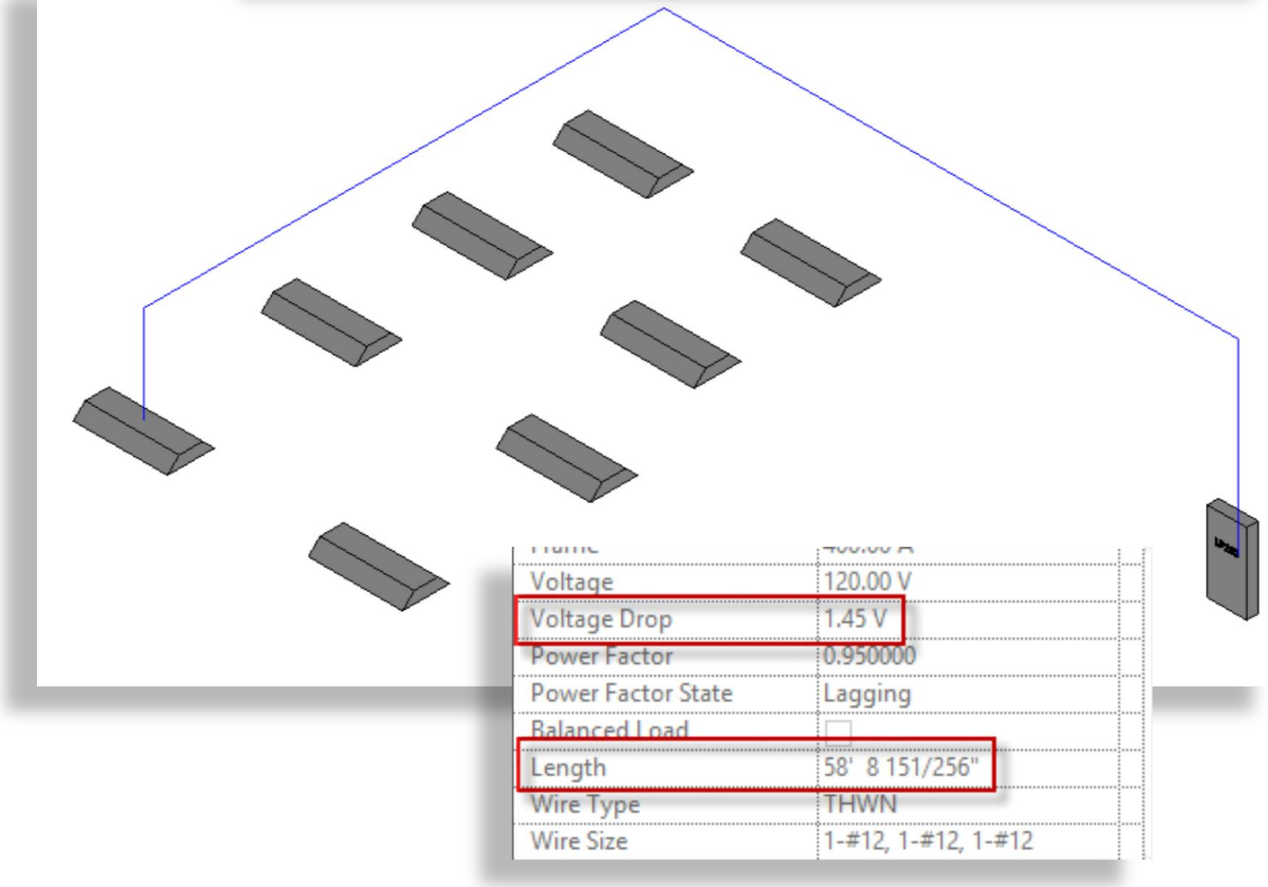


View/Modify Circuit Paths

New in Revit 2018!

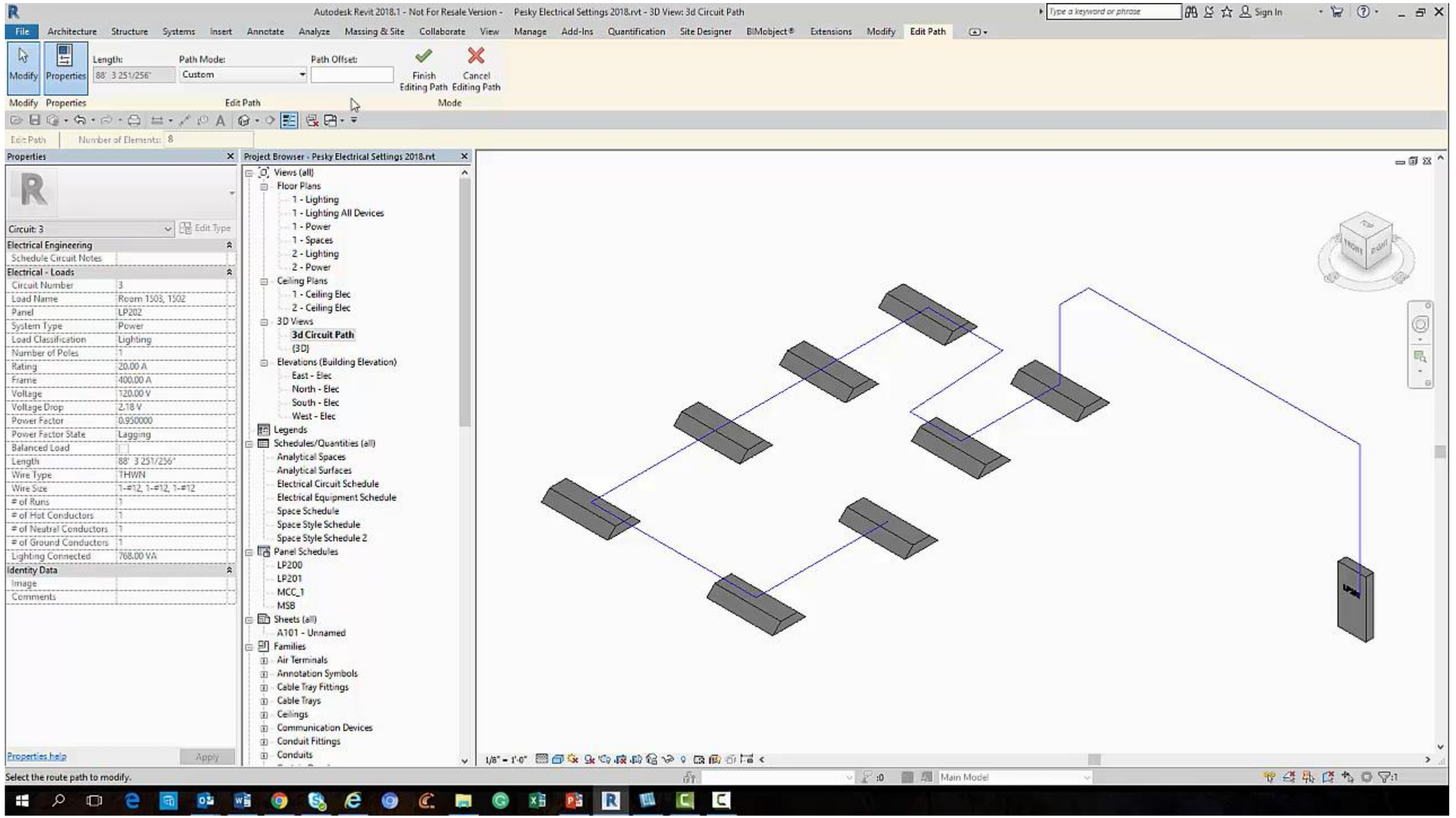
- Allows you to see the path that is used to determine the circuit length
- Modifiable
- All Devices or Farthest Device
- Updates Circuit Length and Voltage Drop





View/Modify Circuit Paths
Let’s see how this works…

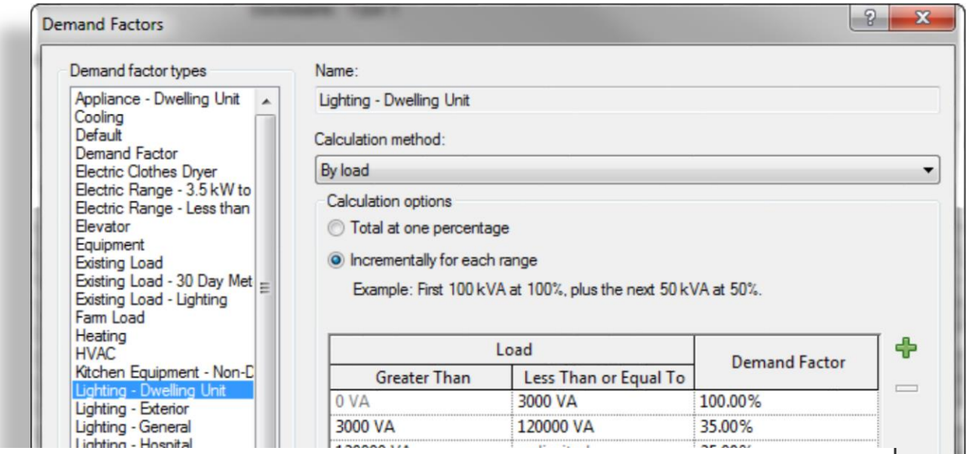
View/Modify Circuit Paths



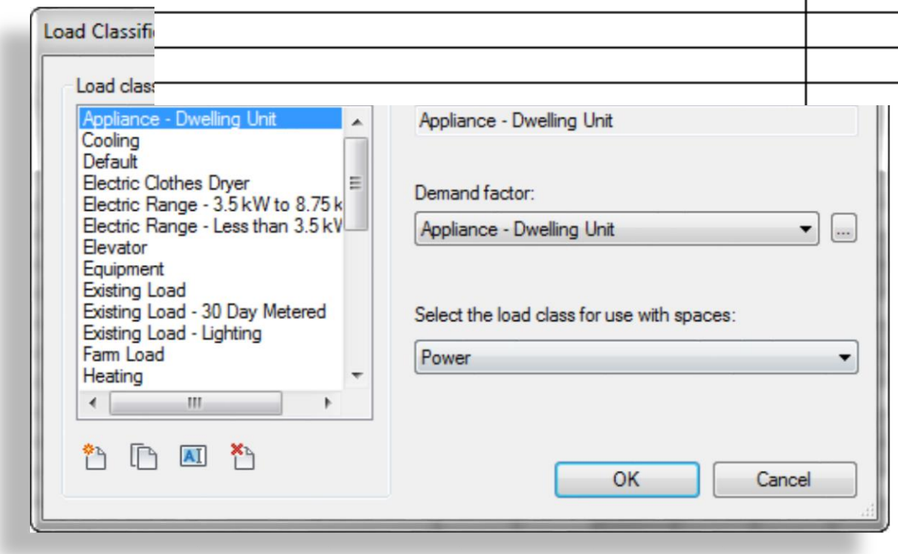
Working with Panel Schedules

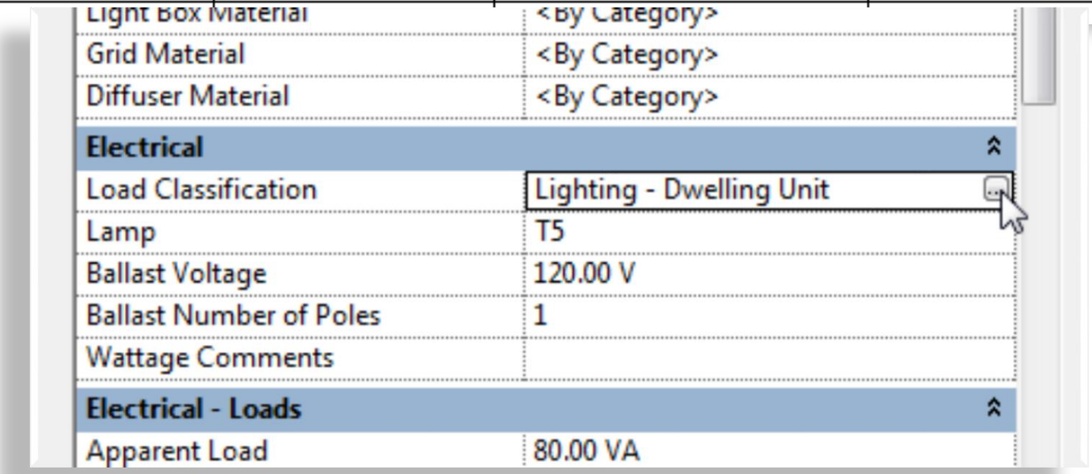
Load Classifications and Demand Factors

- Demand Factors
- Load Classifications



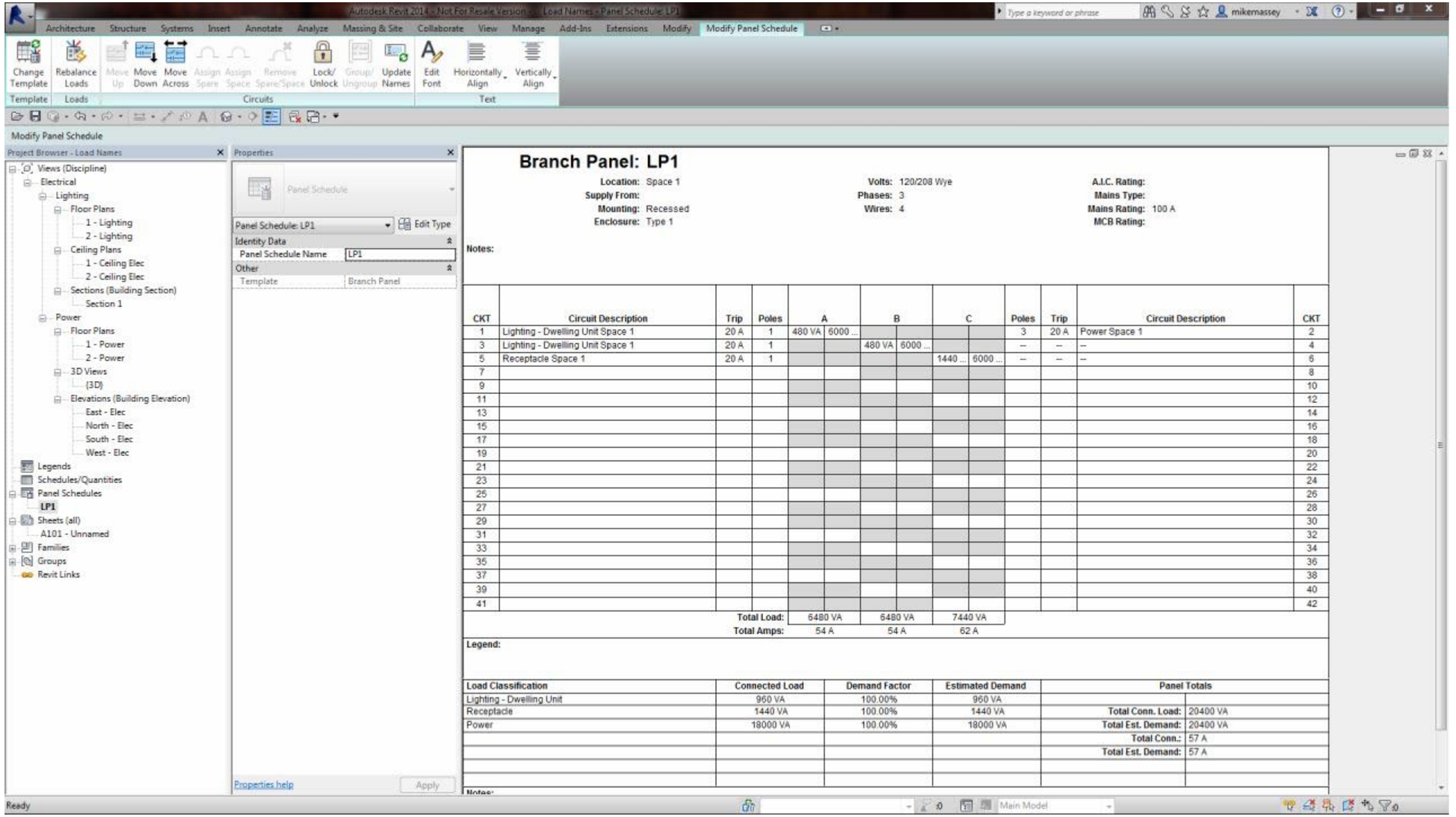
Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting - Dwelling Unit	960 VA	100.00%	960 VA		
Receptacle	1440 VA	100.00%	1440 VA	**Total Conn. Load:**	20400 VA
Power	18000 VA	100.00%	18000 VA	**Total Est. Demand:**	20400 VA
				Total Conn.:	57 A
				Total Est. Demand:	57 A





Load Classifications and Demand Factors
Let’s see how this works…

Load Classifications and Demand Factors



Branch Panel: LP1

Location: Space 1
Supply From:
Mounting: Recessed
Enclosure: Type 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type:
Mains Rating: 100 A
MCB Rating:

Notes:

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	Lighting - Dwelling Unit Space 1	20 A	1	480 VA	6000 ...		3	20 A	Power Space 1	2
3	Lighting - Dwelling Unit Space 1	20 A	1		480 VA	6000 ...	--	--	--	4
5	Receptacle Space 1	20 A	1			1440 ...	--	--	--	6
7										8
9										10
11										12
13										14
15										16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42
		Total Load:		6480 VA	6480 VA	7440 VA				
		Total Amps:		54 A	54 A	62 A				

Legend:

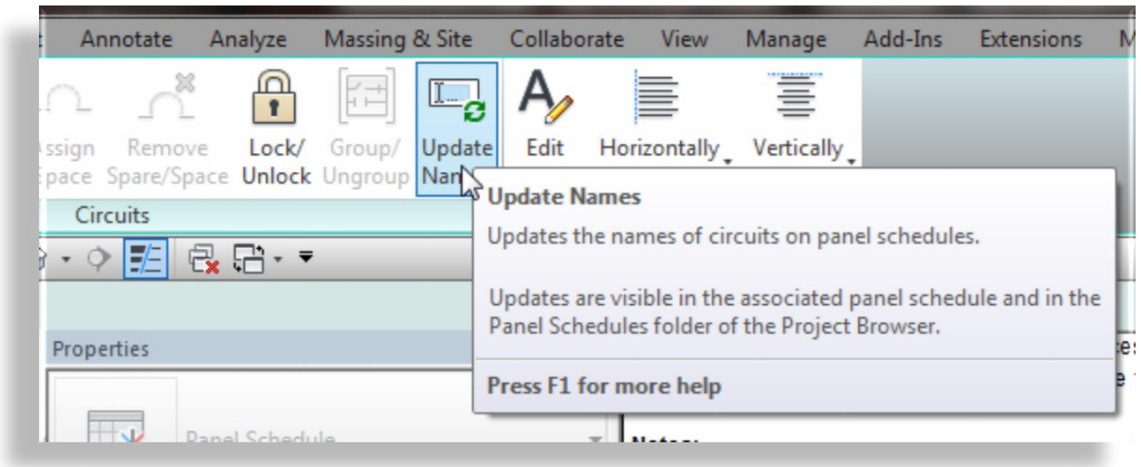
Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting - Dwelling Unit	960 VA	100.00%	960 VA		
Receptacle	1440 VA	100.00%	1440 VA	Total Conn. Load:	20400 VA
Power	18000 VA	100.00%	18000 VA	Total Est. Demand:	20400 VA
				Total Conn.:	57 A
				Total Est. Demand:	57 A

Notes:

Load Names in Panel Schedules

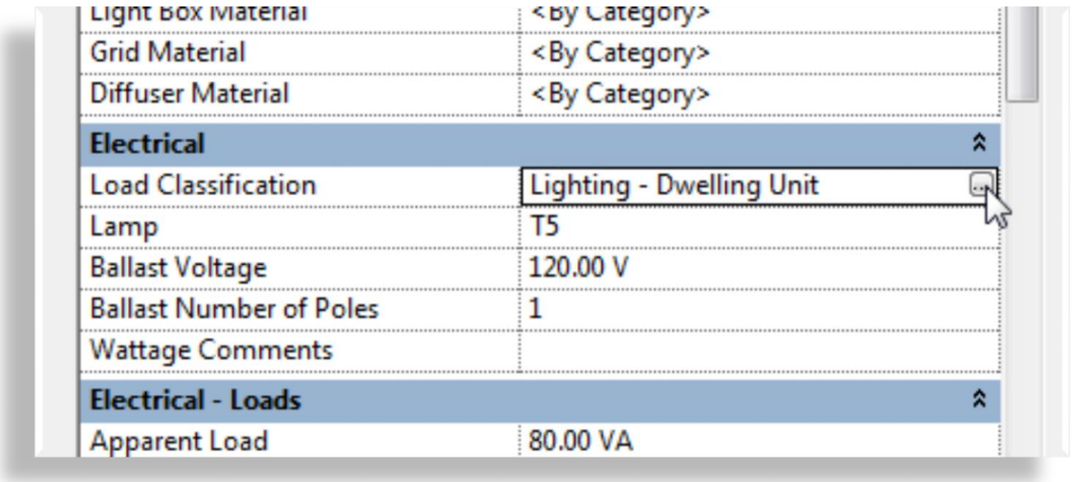
- (Load Classification) (Space Name) (Space Number)
- Or (Load Classification) Room (Space Numbers)

CKT	Circuit Description
1	Lighting Space 1
3	Lighting Space 1
5	Receptacle Space 1
7	
9	



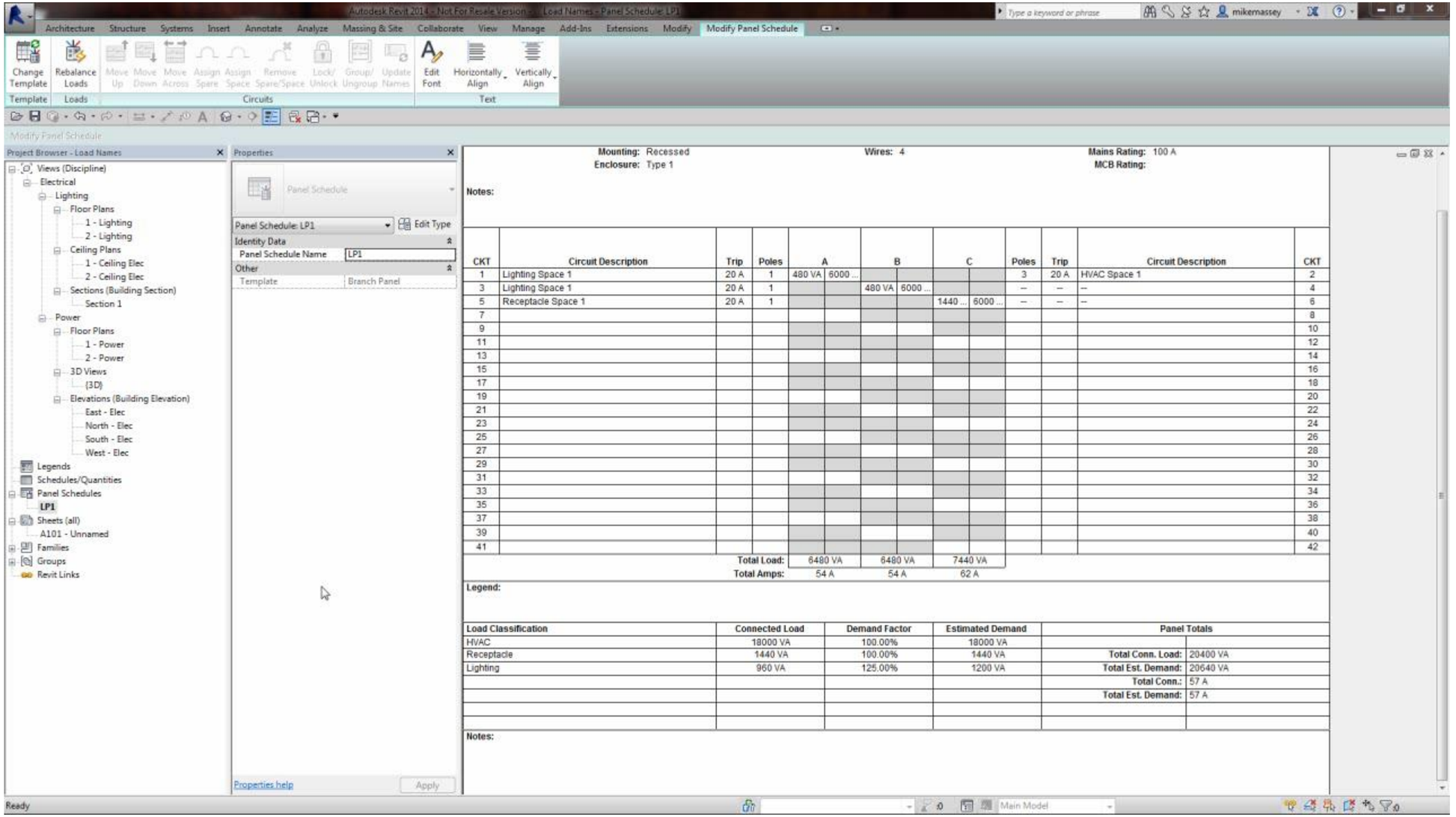
Space

1



Load Names in Panel Schedule
Let’s see how this works…

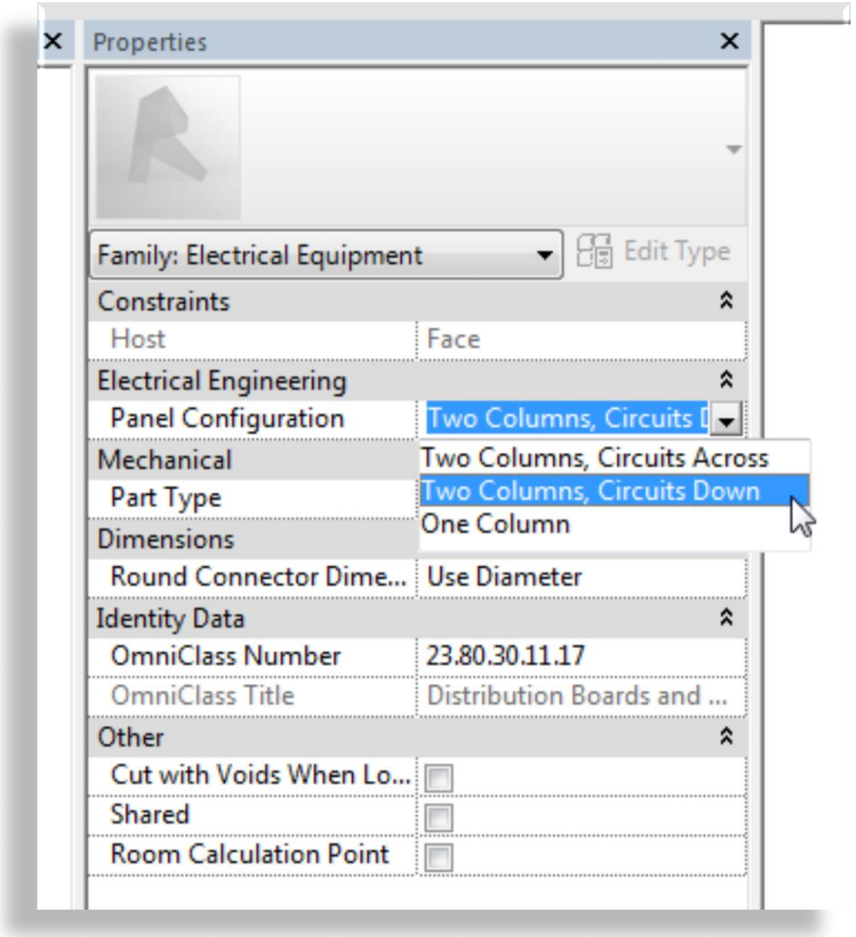
Load Names in Panel Schedule



Getting Panels to Number Down Instead of Across

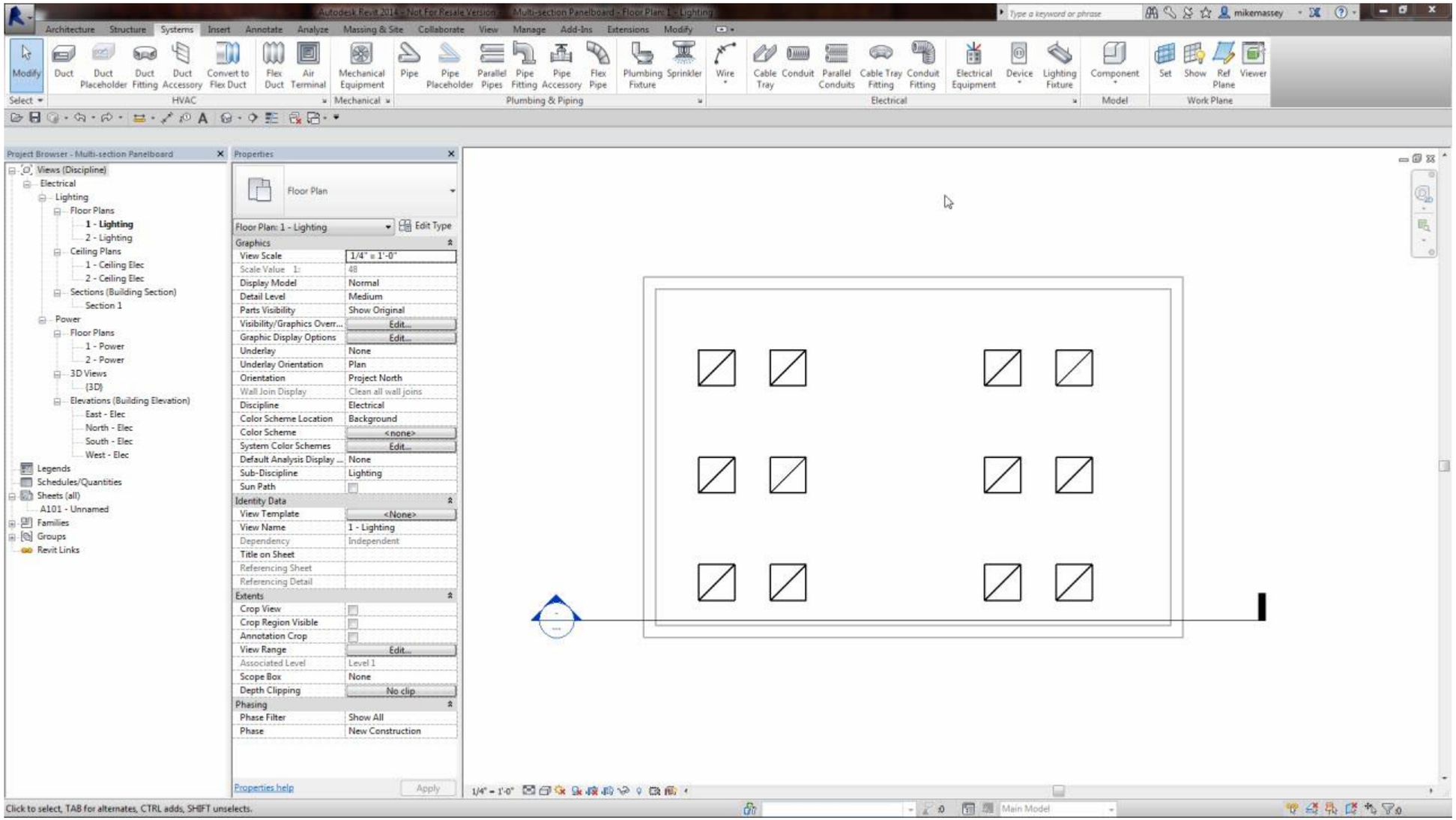
- Change Properties In Panel Schedule Family

CKT	Circuit Description	Trip	Poles
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			



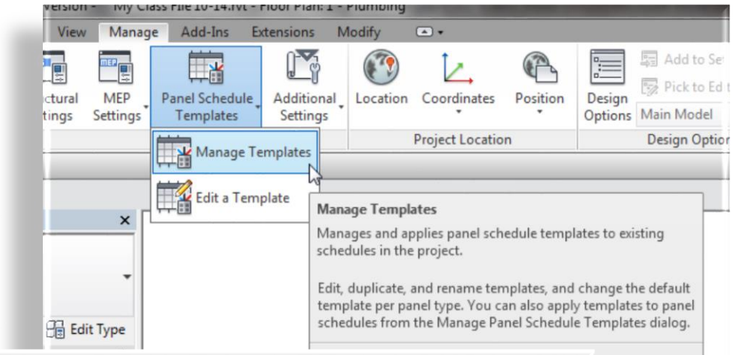
Getting Panels to Number down instead of Across Let’s see how this works…

Getting Panels to Number down instead of Across



Panel Schedule Templates

- Multi-Section Panelboard



CKT	Circuit Description	Trip	Poles	A	
1	<Load Name>	<Ratin	<Numb	<Val>	<Val>
3	<Load Name>	<Ratin	<Numb		
5	<Load Name>	<Ratin	<Numb		
7	<Load Name>	<Ratin	<Numb	<Val>	<Val>
9	<Load Name>	<Ratin	<Numb		
11	<Load Name>	<Ratin	<Numb		
13	<Load Name>	<Ratin	<Numb	<Val>	<Val>
15	<Load Name>	<Ratin	<Numb		
17	<Load Name>	<Ratin	<Numb		

Branch Panel:

Location: Space 1
Supply From:
Mounting: Recessed
Enclosure: Type 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Main Type:
Main Rating: 100 A
MCB Rating:

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	Lighting - Dwelling Unit Space 1	20 A	1	480 VA									2
3													4
5													6
7													8
9													10
11													12
13													14
15													16
17													18
19													20
21													22
23													24
25													26
27													28
29													30
31													32
33													34
35													36
37													38
39													40
41													42

Section 2

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
43	Lighting - Dwelling Unit Space 1	20 A	1	480 VA									44
45													46
47													48
49													50
51													52
53													54
55													56
57													58
59													60
61													62
63													64
65													66
67													68
69													70
71													72
73													74
75													76
77													78
79													80
81													82
83													84
		Total Load:		960 VA		0 VA		0 VA					
		Total Amps:		8 A		0 A		0 A					

Legend:

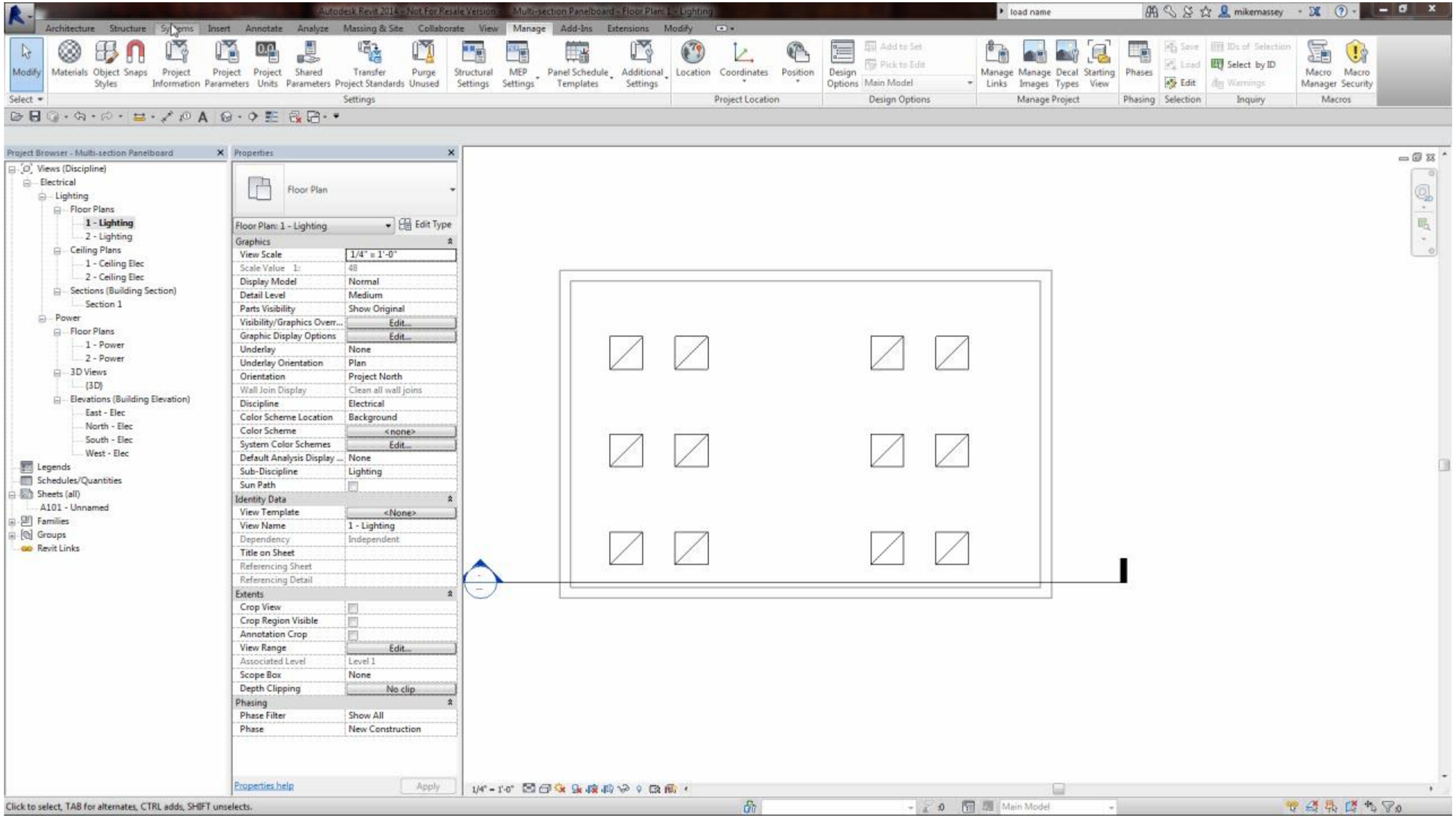
Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting - Dwelling Unit	960 VA	100.00%	960 VA		
				Total Conn. Load:	960 VA
				Total Est. Demand:	960 VA
				Total Conn.:	8 A
				Total Est. Demand:	8 A

Notes:

Technique by Cory Dunn – Autodesk Discussion Groups

Panel Schedule Templates
Let’s see how this works…

Multi-Section Panel Board

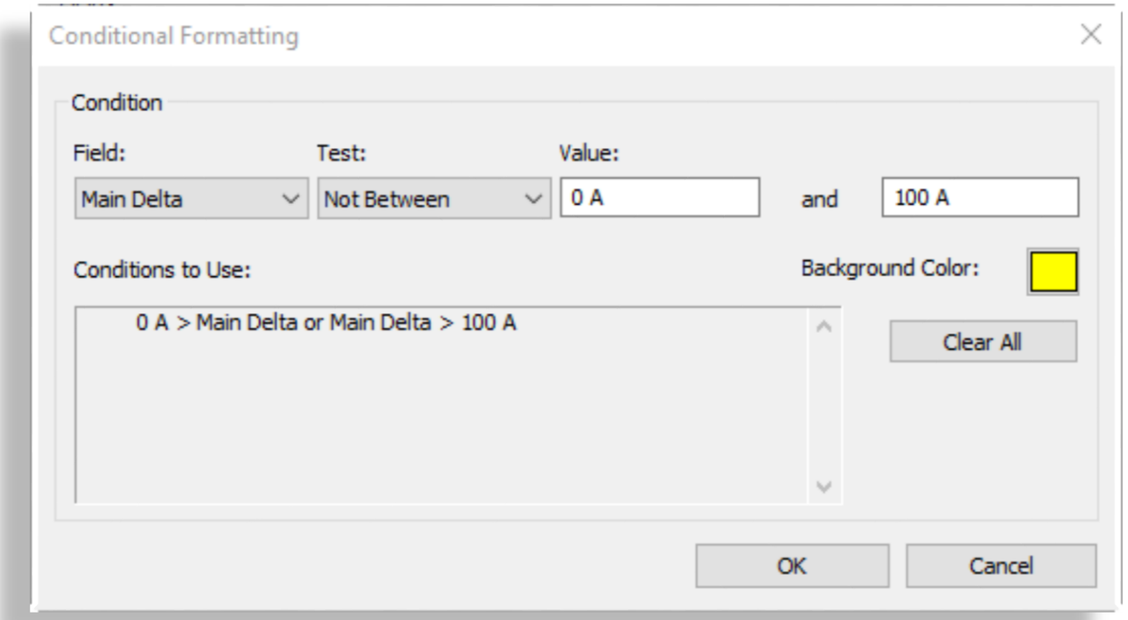


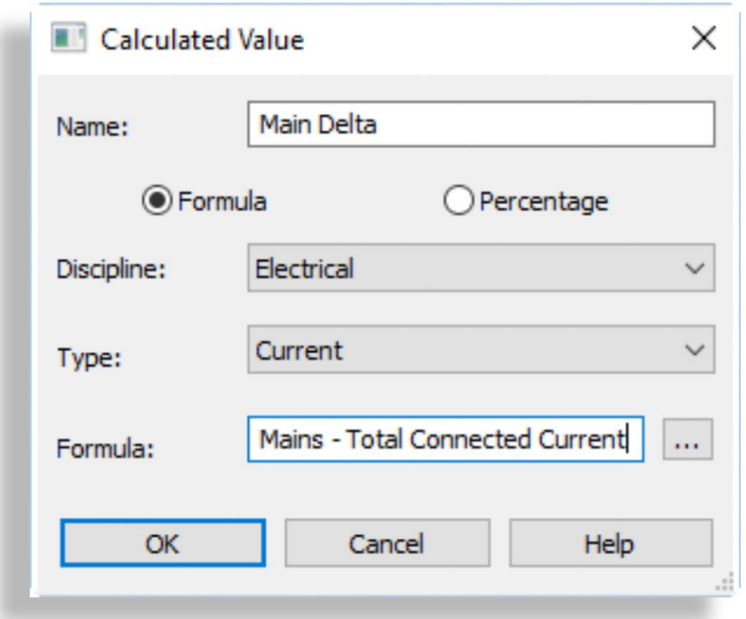
* Panel and Ghost Font are in Class Files

Using Schedules to Check if Main is Sized Correctly

- Create Equipment Schedule
- Use Calculated Value
- Use Conditional Formatting

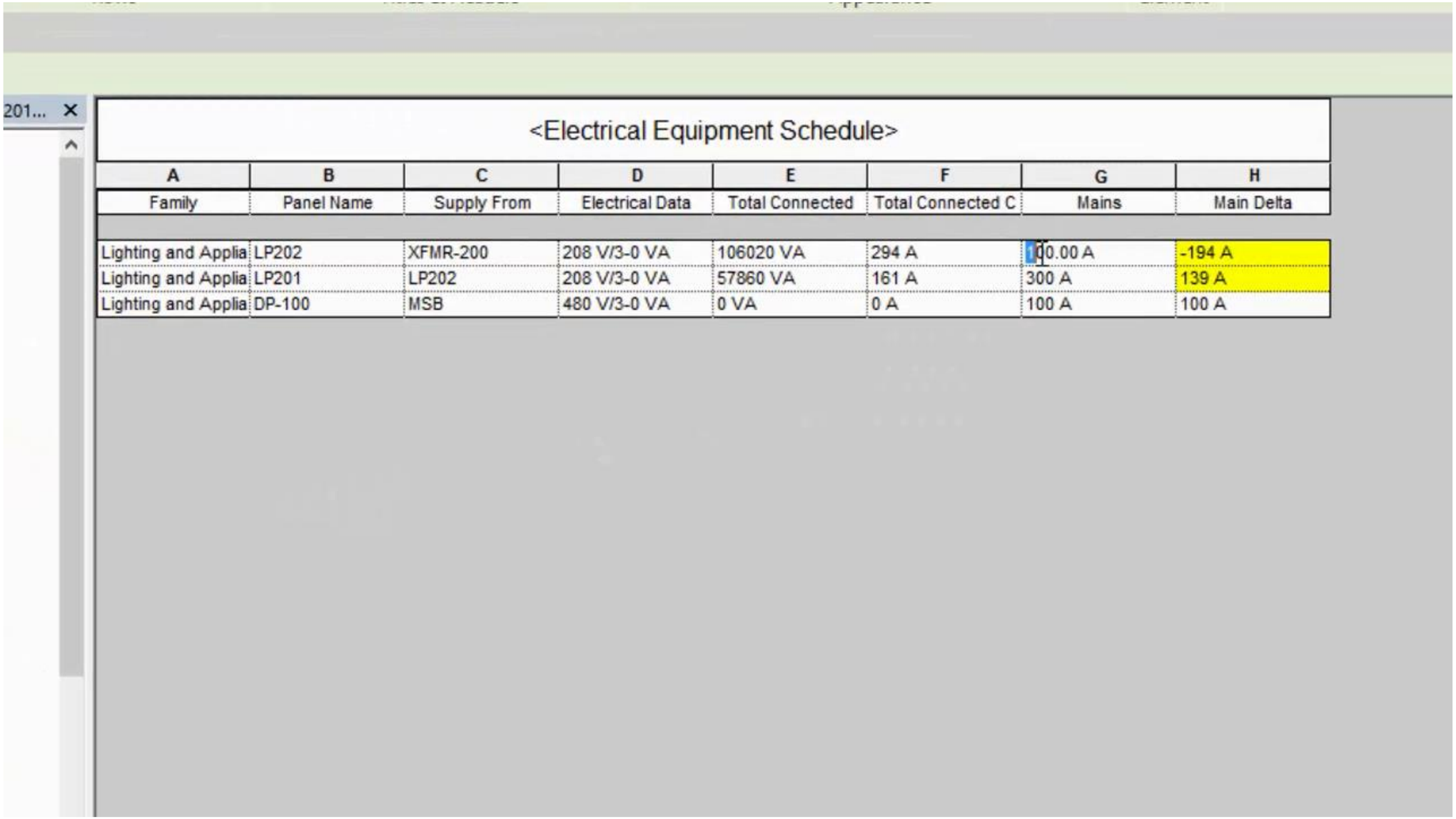
F	G	H
Mains	Total Connected C	Main Delta
100 A	280 A	-180 A
300 A	133 A	167 A
100 A	0 A	100 A





Using Schedules to Check if Main is Sized Correctly Let’s see how this works…

Using Schedules to Check if Main is Sized Correctly



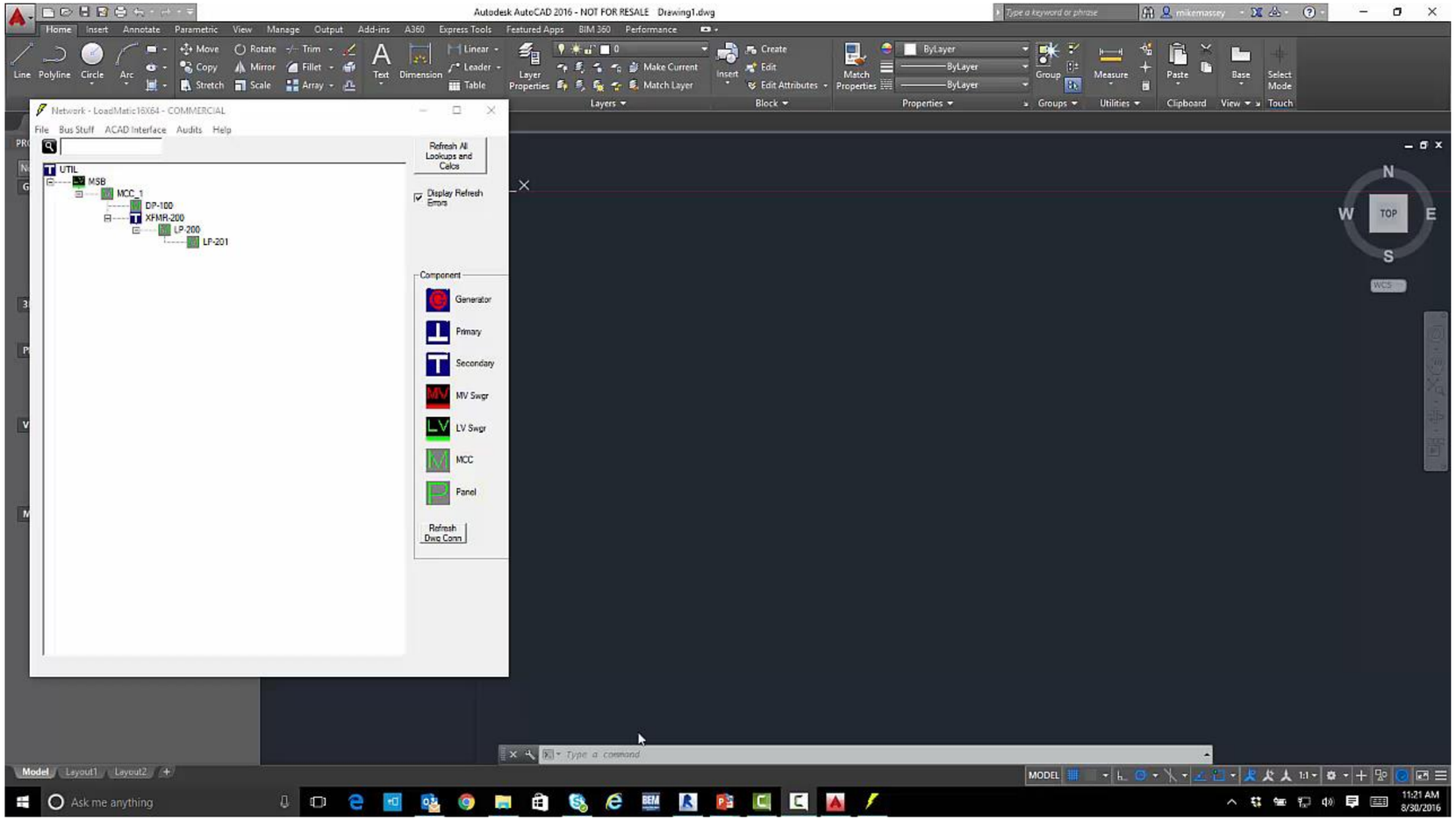
<Electrical Equipment Schedule>

A	B	C	D	E	F	G	H
Family	Panel Name	Supply From	Electrical Data	Total Connected	Total Connected C	Mains	Main Delta
Lighting and Applia	LP202	XFMR-200	208 V/3-0 VA	106020 VA	294 A	100.00 A	-194 A
Lighting and Applia	LP201	LP202	208 V/3-0 VA	57860 VA	161 A	300 A	139 A
Lighting and Applia	DP-100	MSB	480 V/3-0 VA	0 VA	0 A	100 A	100 A

Questions From You!

Questions From You

- One-Line Diagrams
  - Still no great solution ☹
  - Dynamo?
  - RushForth Tools?
  - Aeries?
  - Other?



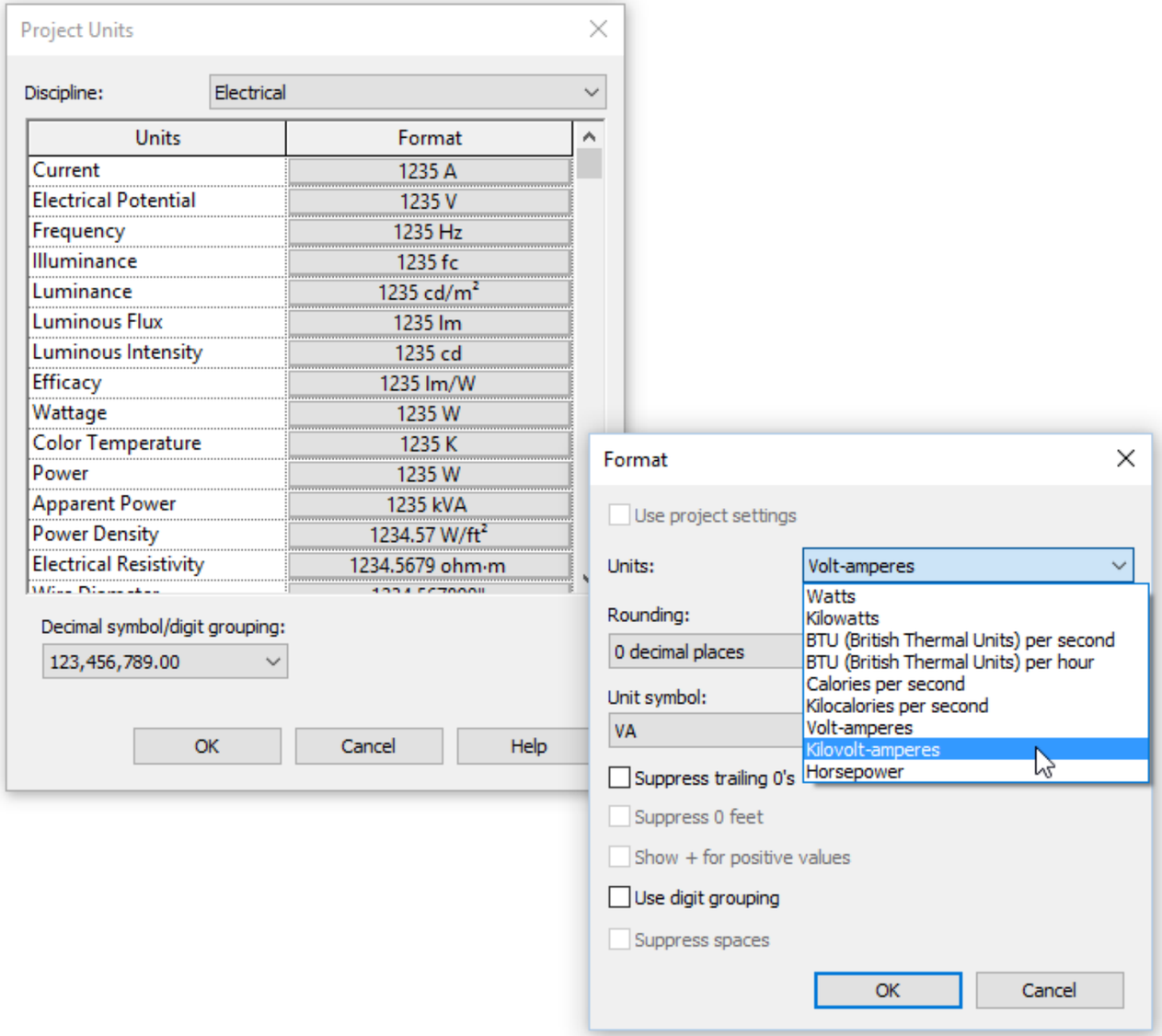
Questions From You

- Creating a Family with Multiple connectors
  - Create multiple connector Parameters
    - Connector 1 Voltage
    - Connector 2 Voltage
    - Etc…

Electrical Engineering	
Connector 1 Number of Poles	3
Connector 1 Voltage	208.00 V
Connector 2 Number of Poles	3
Connector 2 Voltage	208.00 V
Electrical - Loads	
Connector 1 Apparent Load	500.00 VA
Connector 1 Load Classification	HVAC
Connector 2 Apparent Load	800.00 VA
Connector 2 Load Classification	Heating
Panel	PP1
Circuit Number	1,3,5
Mechanical	

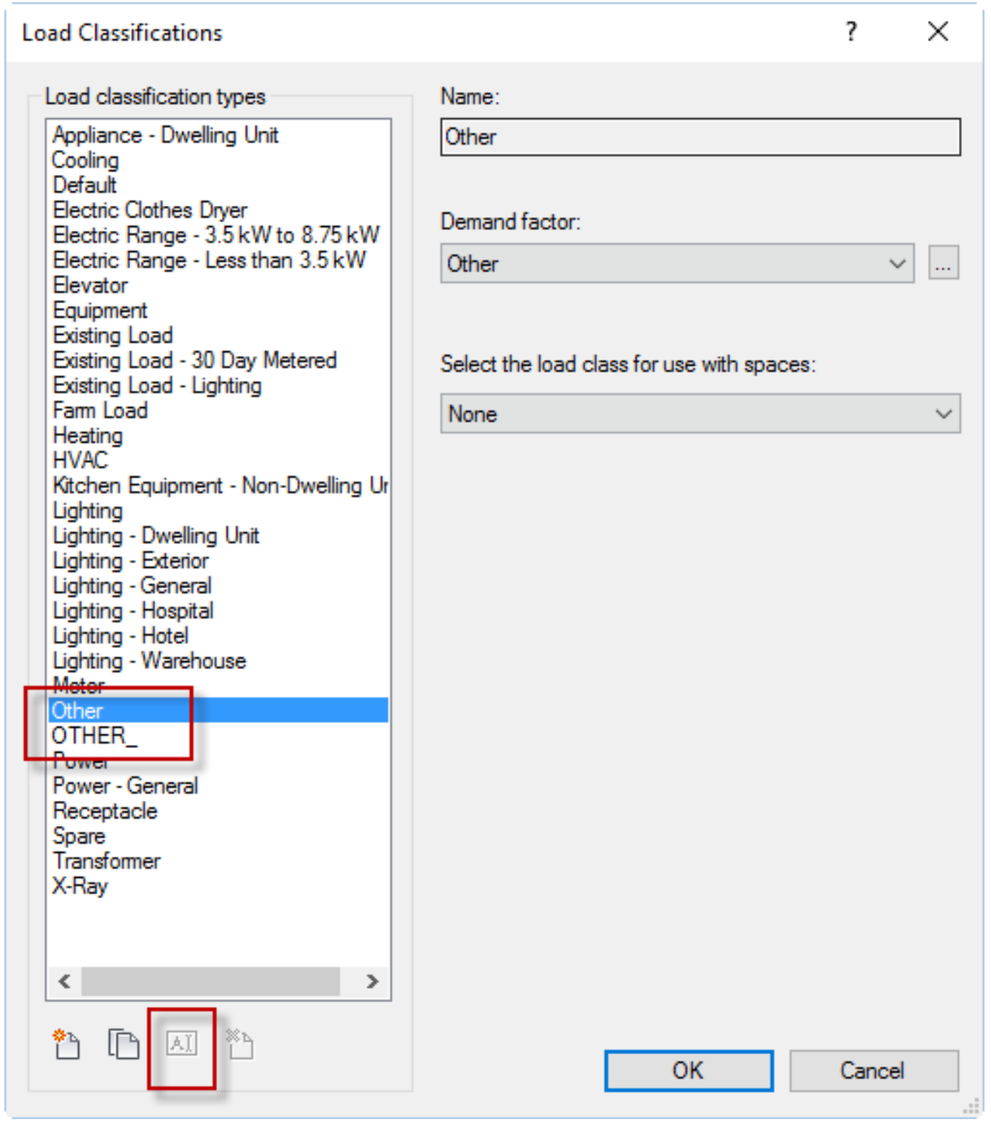
Questions From You

- Load Summaries to display loads in KVA, not VA
  - Change Project Units of Apparent Power to KVA
  - Use Format Unit to override the circuit loads to be VA in the Panel Schedule Template
  - Wishlist Item ☹



Questions From You

- Load Names Upper Case
  - Other, Motor, & Spare are hardcoded
  - Unable to change to Upper Case
  - Wishlist Item ☹



Questions From You

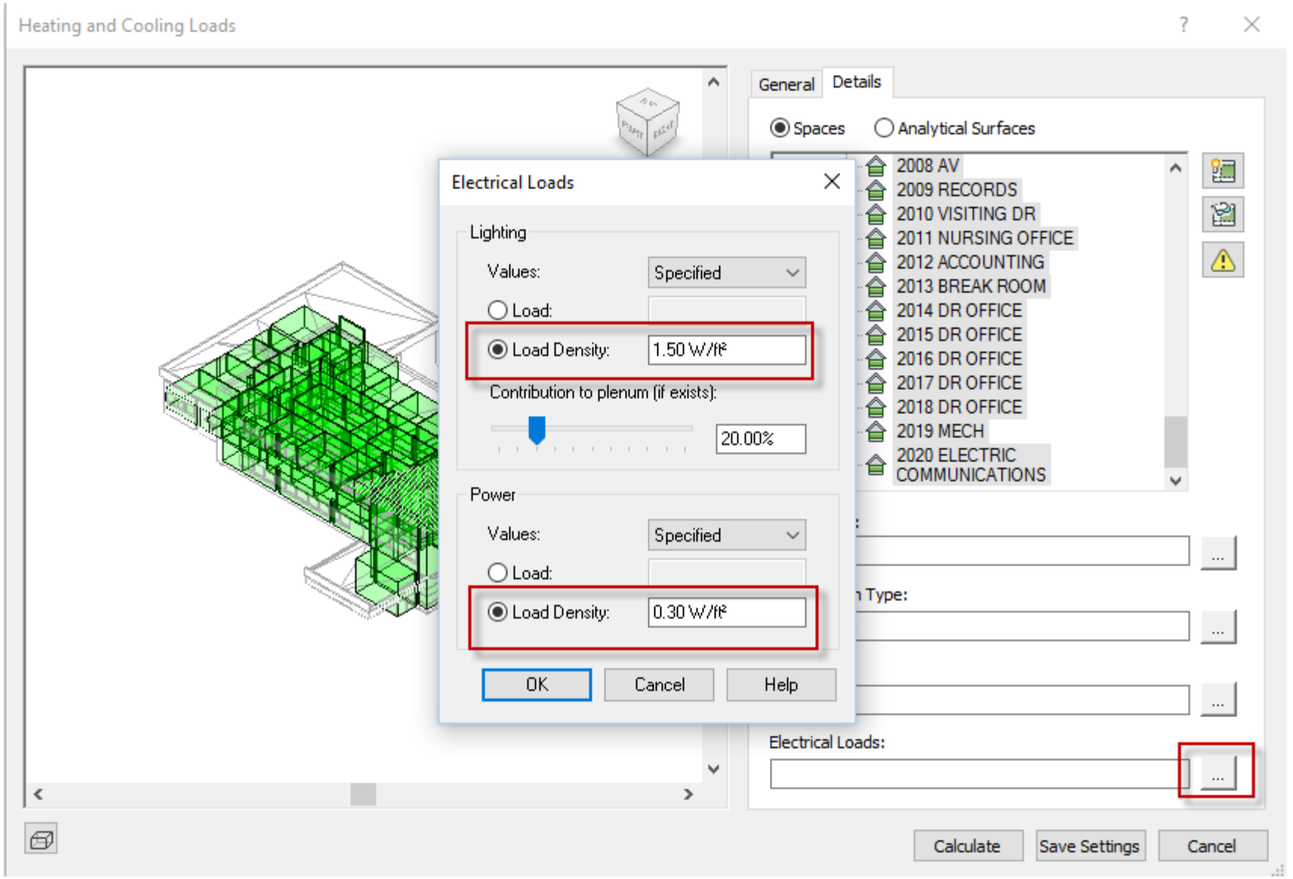
- Simplified Wire Size Callout
  - Simply list #12 Instead of “1-#12, 1-#12, 1-#12”
  - Wishlist Item ☹

<Electrical Circuit Schedule>

A	B	C	D
Panel	Circuit Number	Wire Type	Wire Size
LP1	3	THWN	1-#12, 1-#12, 1-#12
LP1	1	THWN	1-#12, 1-#12, 1-#12
LP1	5	THWN	1-#8, 1-#8, 1-#8
LP1	2,4,6	THWN	3-#12, 1-#12, 1-#12
PP1	1,3,5	THWN	3-#12, 1-#12, 1-#12
PP1	2,4,6	THWN	3-#12, 1-#12, 1-#12

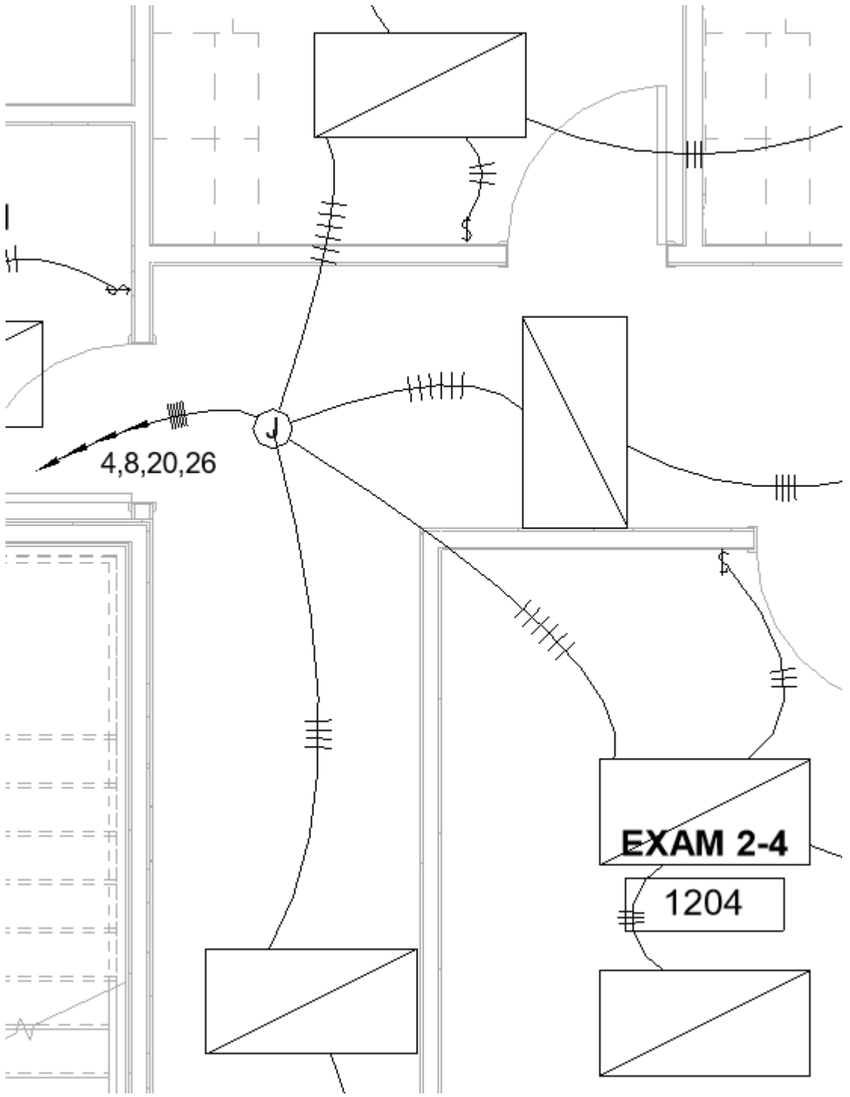
Questions From You

- Easy way of changing the building or space settings Watts/Square Feet from one Energy Code (say AHSRAE 90.1) to another Energy Code (say IECC or Title 24) values.



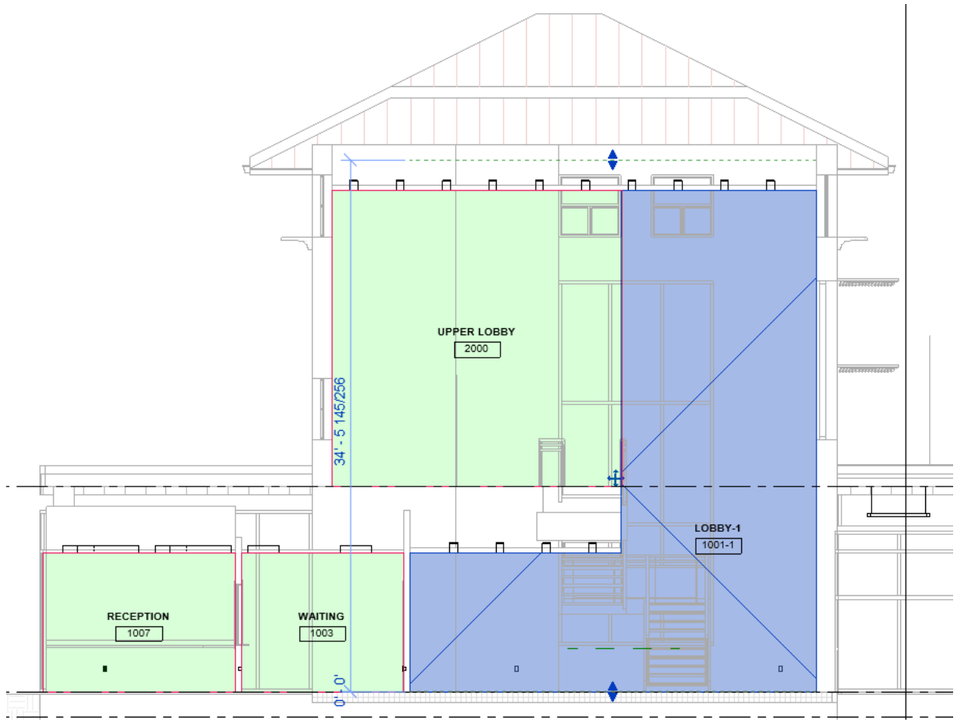
Questions From You

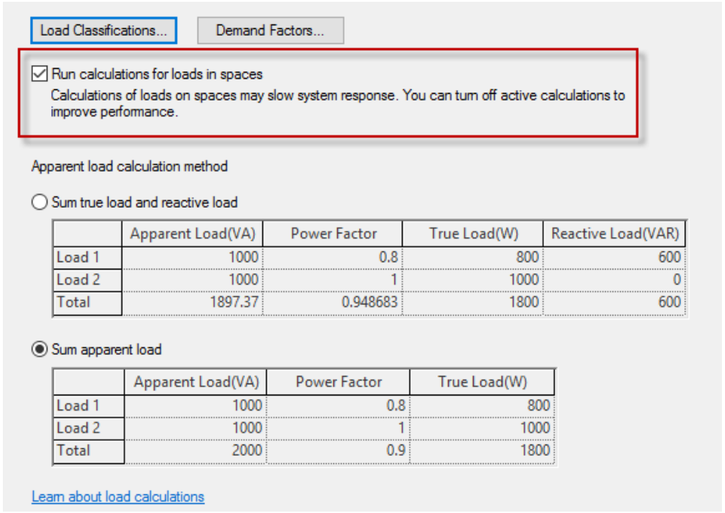
- How to get multiple circuits to group into a common homerun junction box so that they all show up in a single tag when the wiring command can't seem to find the electrical connector in a family.
  - Is there a way to have the wire command snap to that and not any other snap point (i.e. mid, end, quadrant).

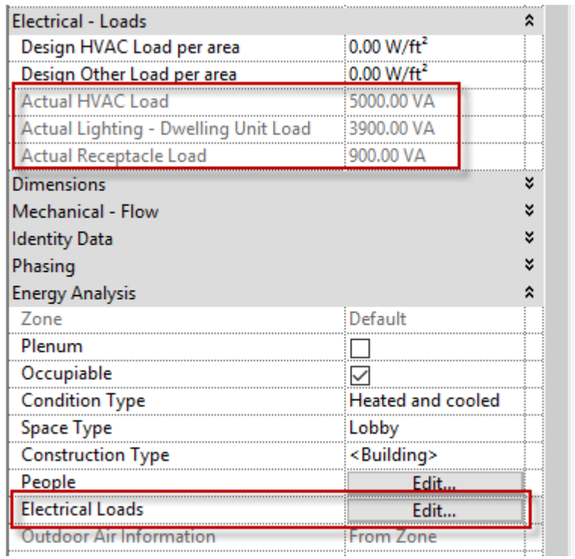


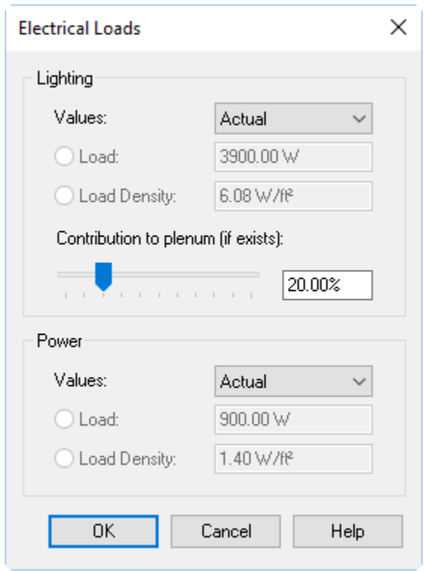
Questions From You

- How to create a space to handle an area open to multiple floors (i.e. Atriums) so that everything calculated within that space for purposes of lighting calculation software like ElumTools or determining the total W/SF within that lobby/atrium for both power and lighting loads.





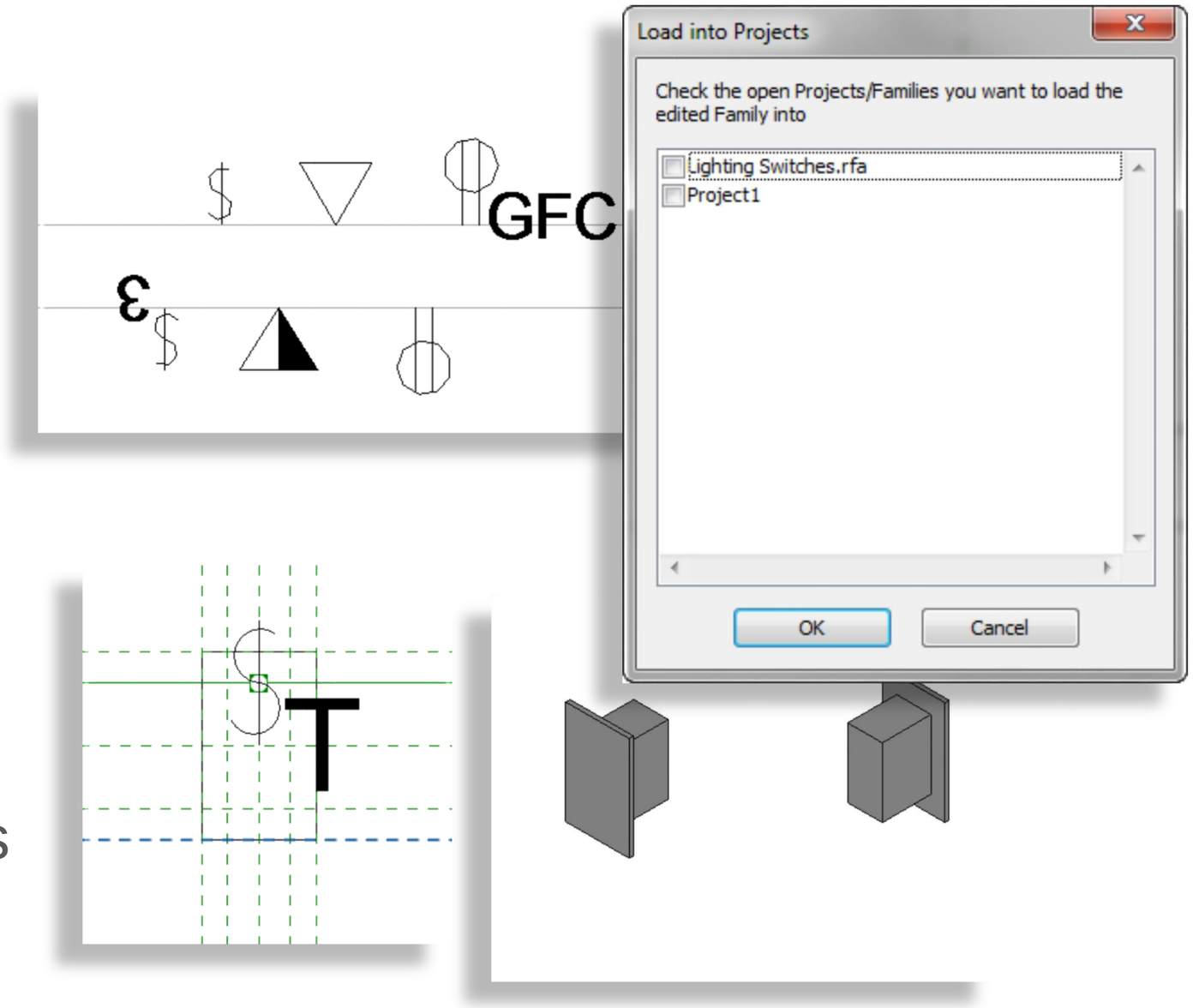




Additional Topics

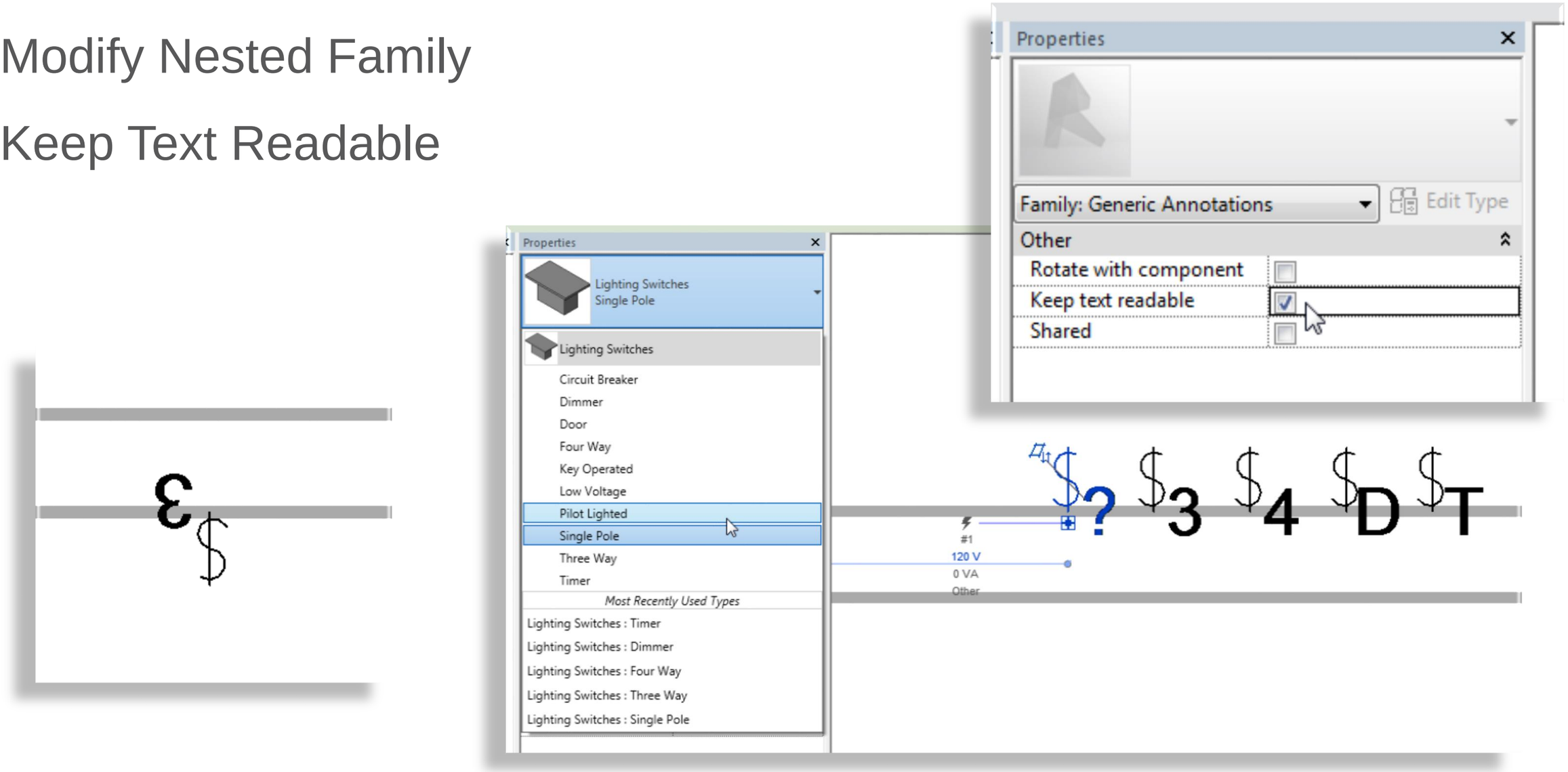
Control the Graphics of Nested Symbol Families

- Family within a Family
- Symbol Families
  - Generic Annotation Families
  - Contain 2D lines and text and/or labels
  - Scale with View Scale
  - Only show up in Plan Views



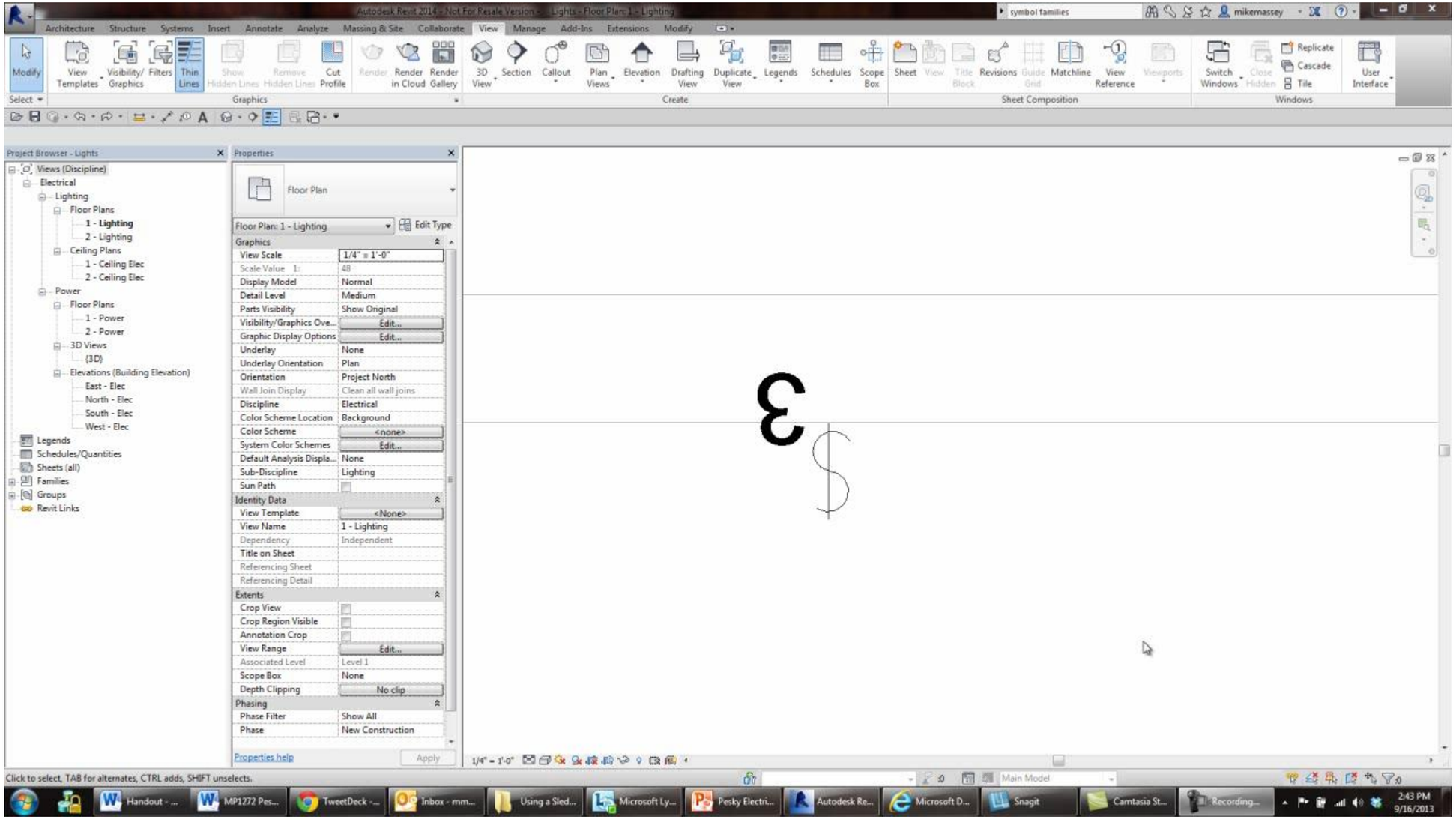
Correcting Upside Down Switch Labels

- Modify Nested Family
- Keep Text Readable



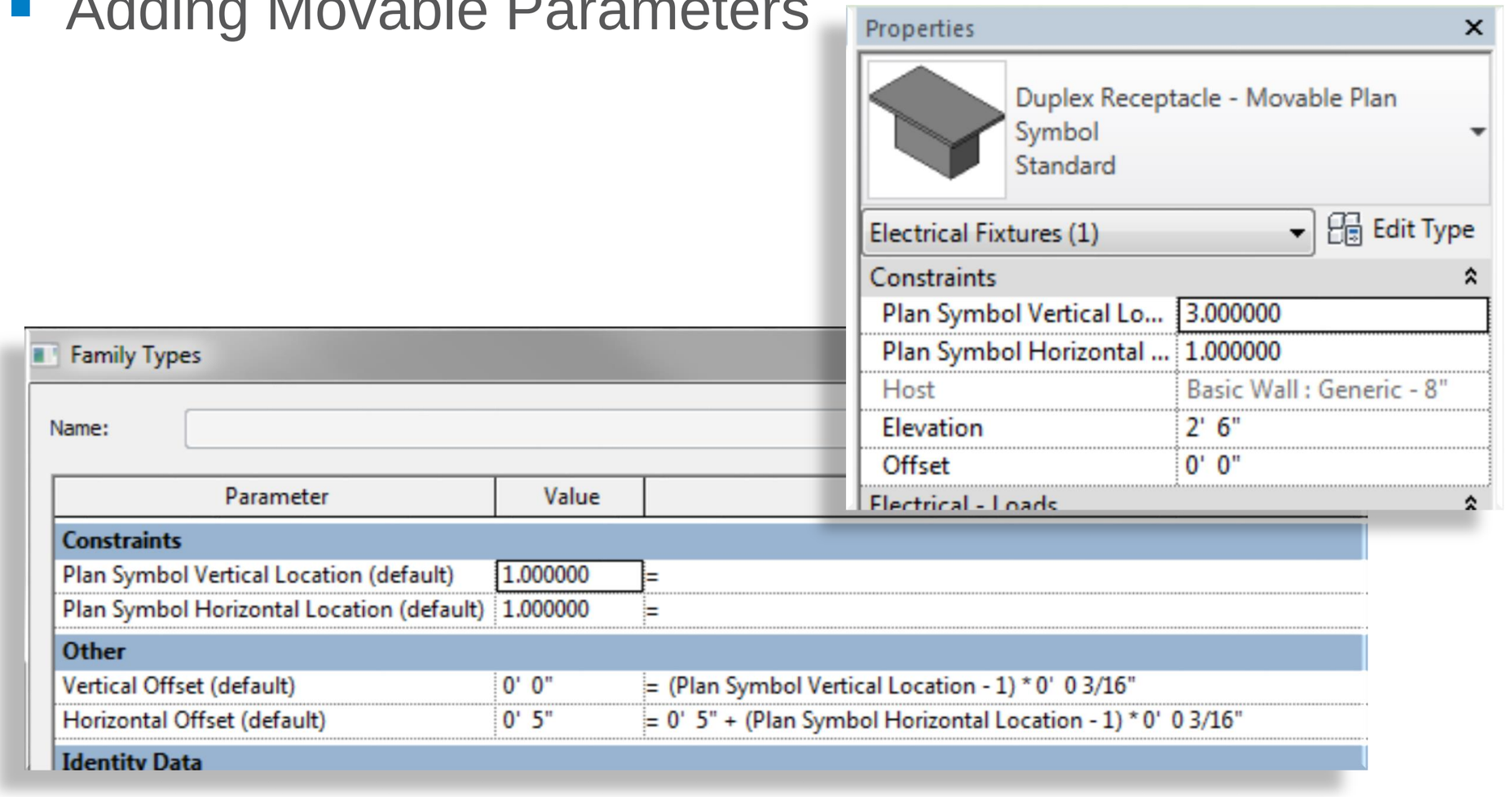
Correcting Upside Down Switch Labels
Let’s see how this works…

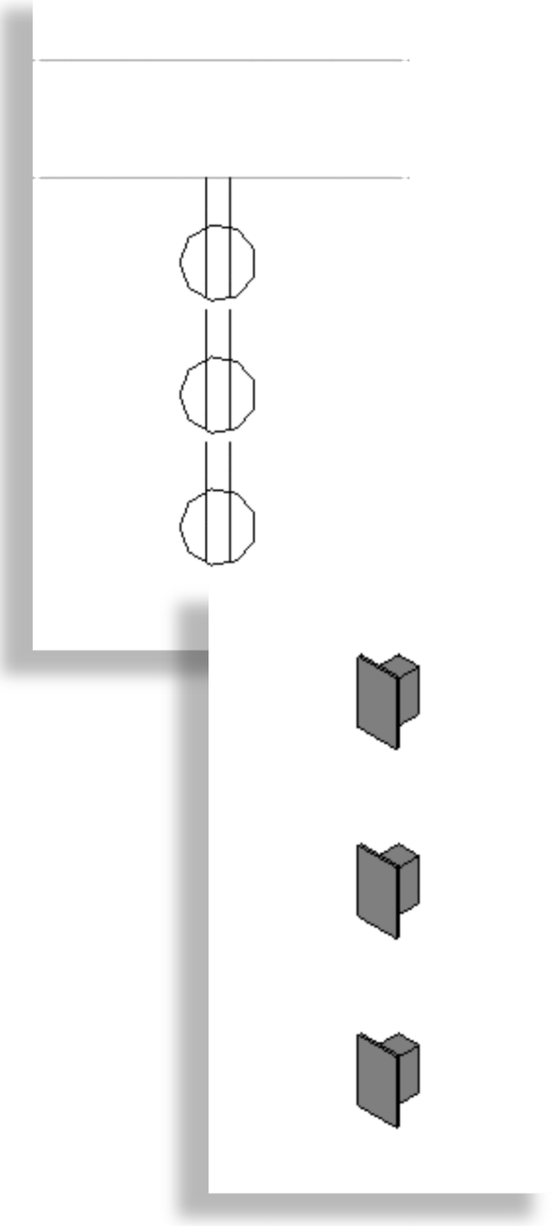
Correcting Upside Down Switch Labels



Creating Stacked Devices

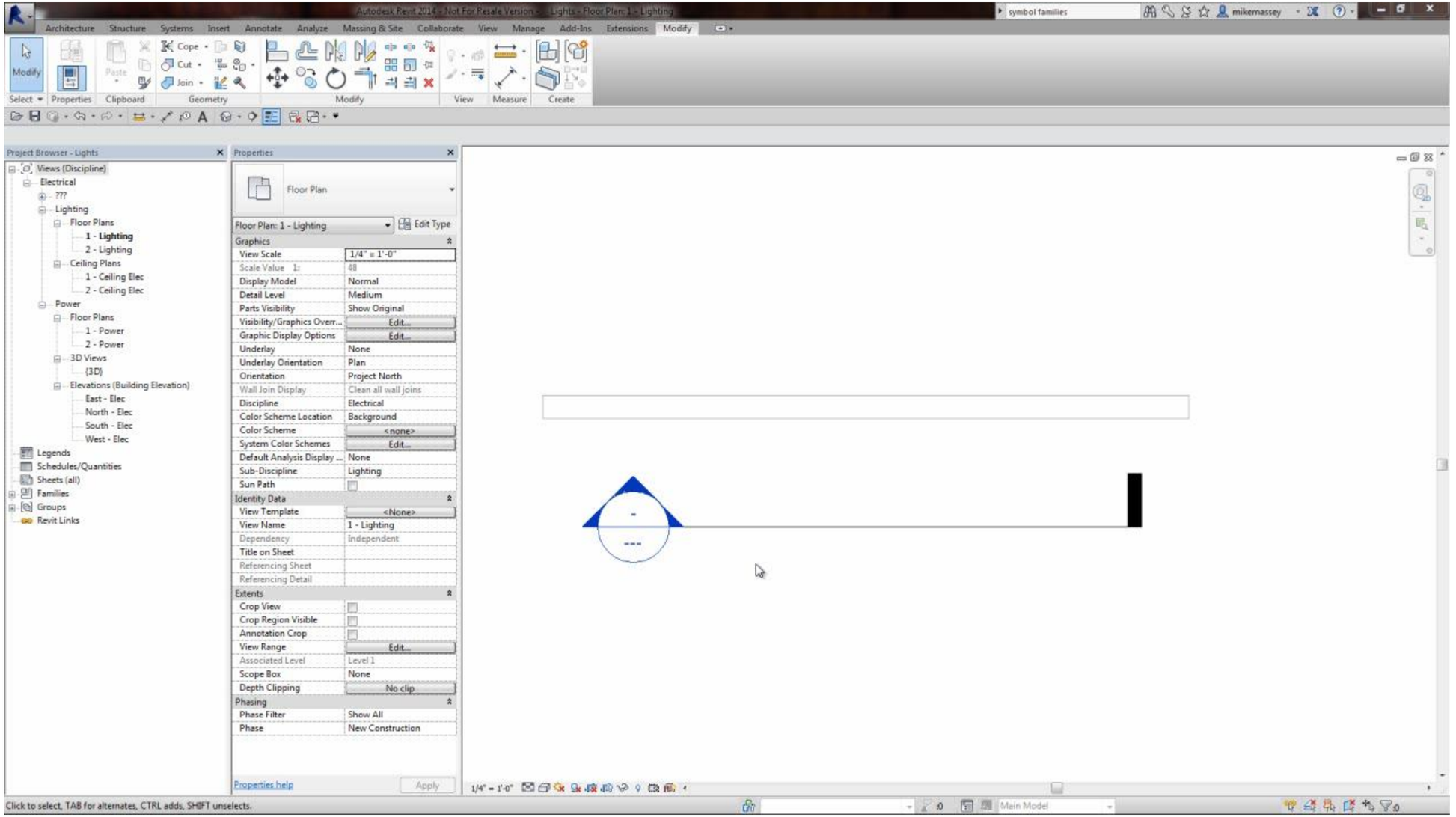
- Adding Movable Parameters





Creating Stacked Devices
Let’s see how this works…

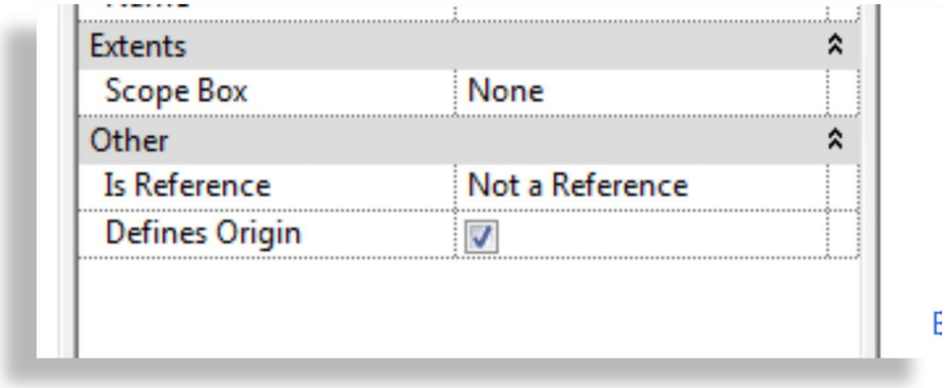
Creating Stacked Devices

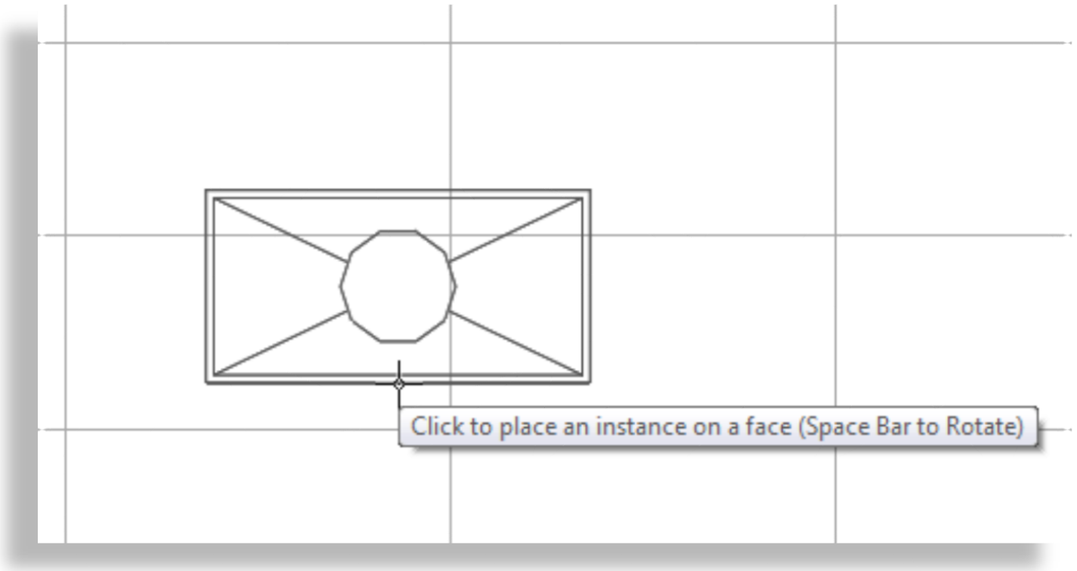


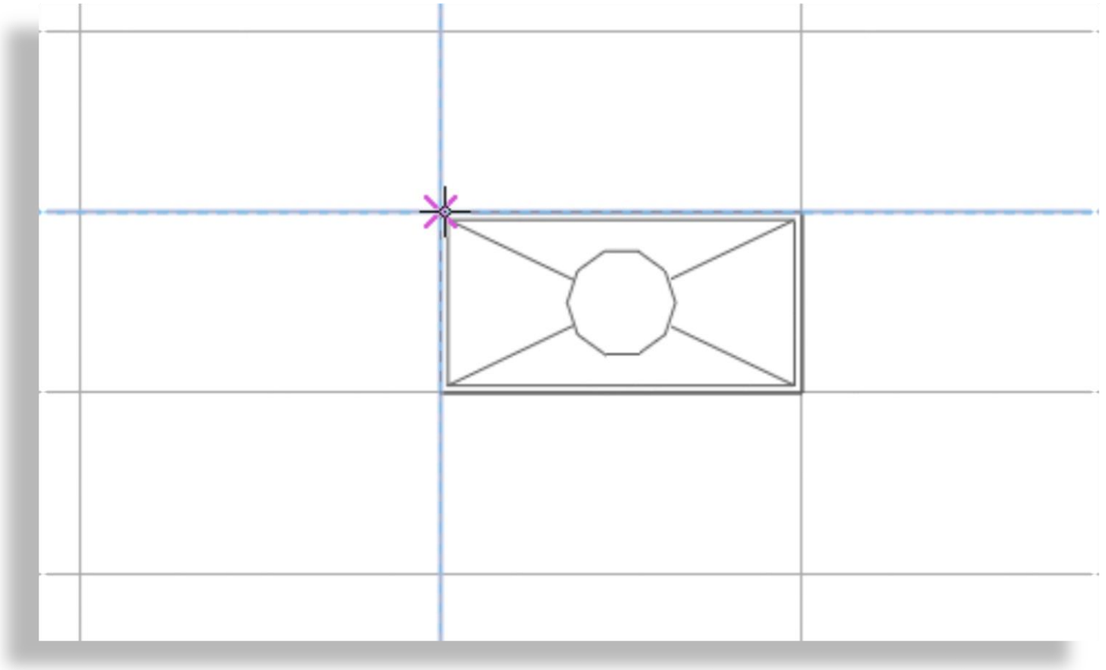
* Family is in Class Files

Changing the Origin of a Light Fixture

- Reference Plane
- Use Define Origin Parameter

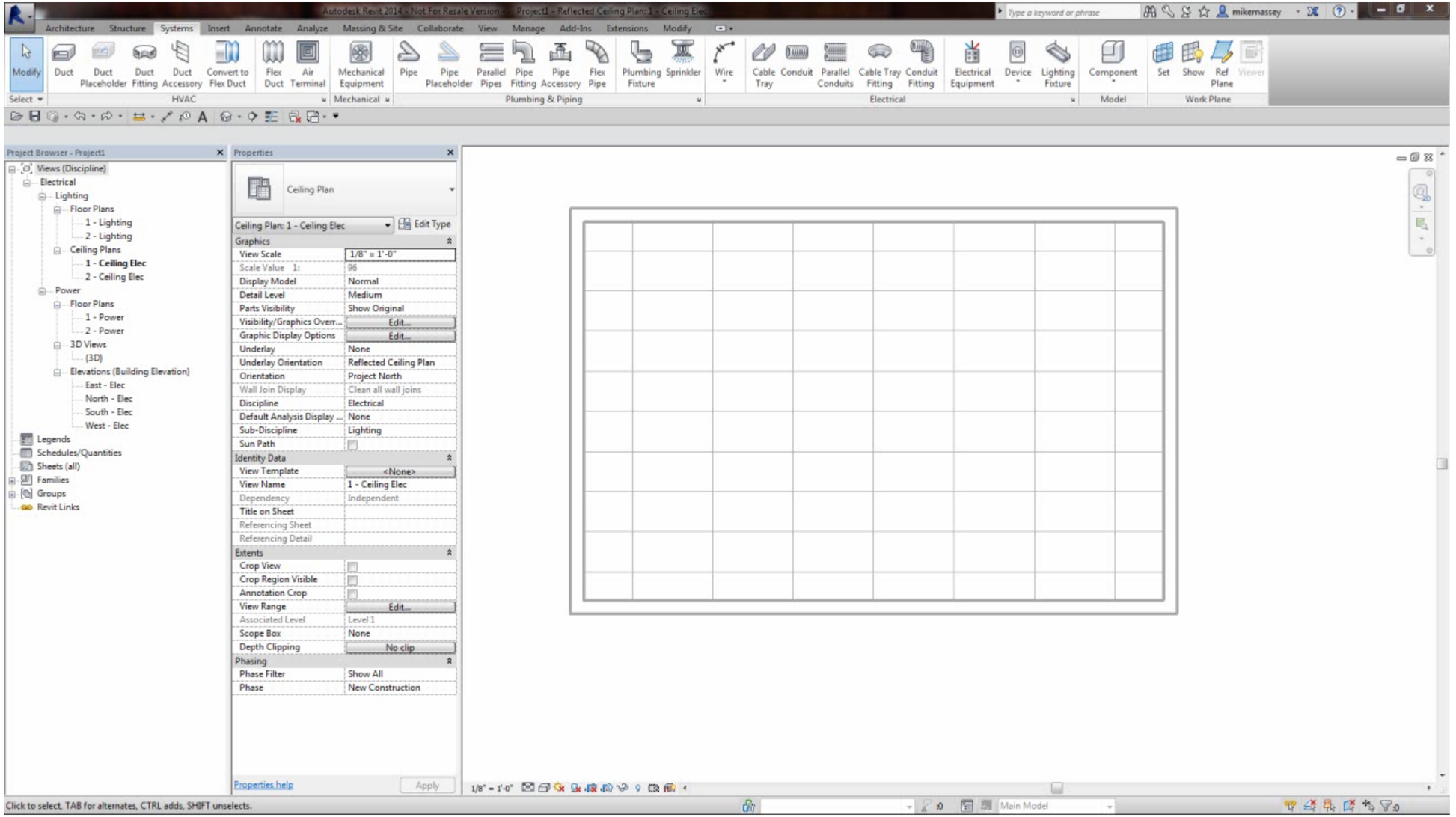






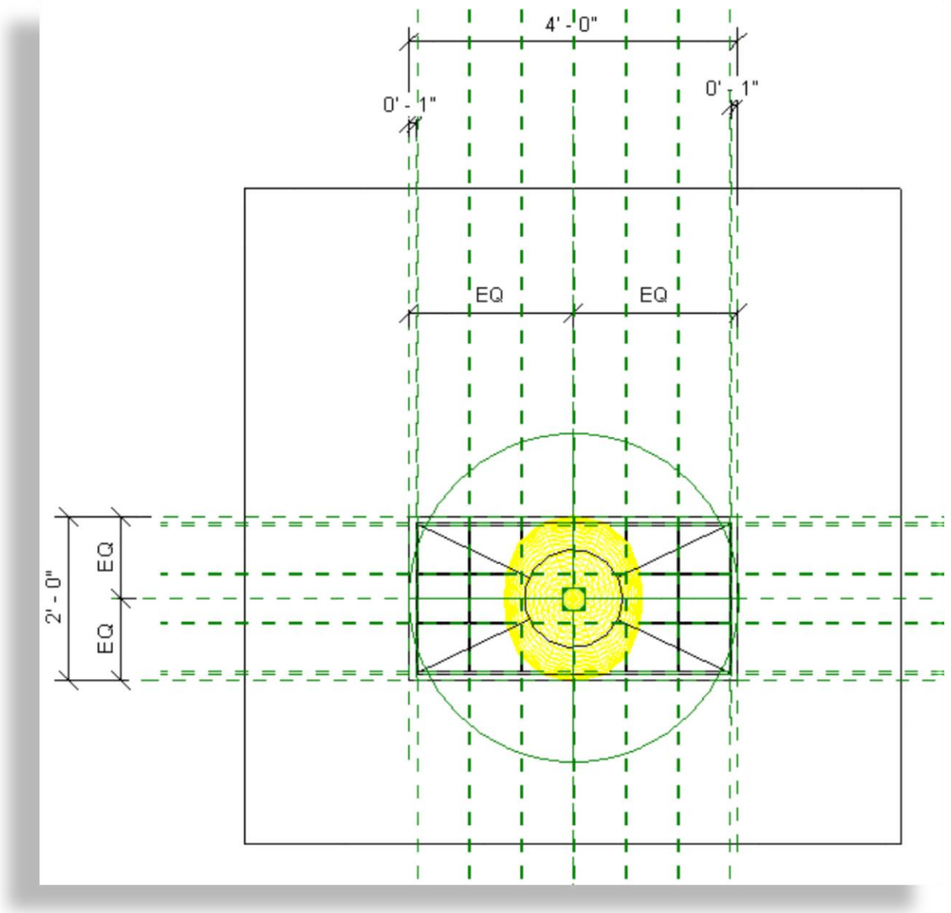
Changing the Origin of a Light Fixture
Let’s see how this works…

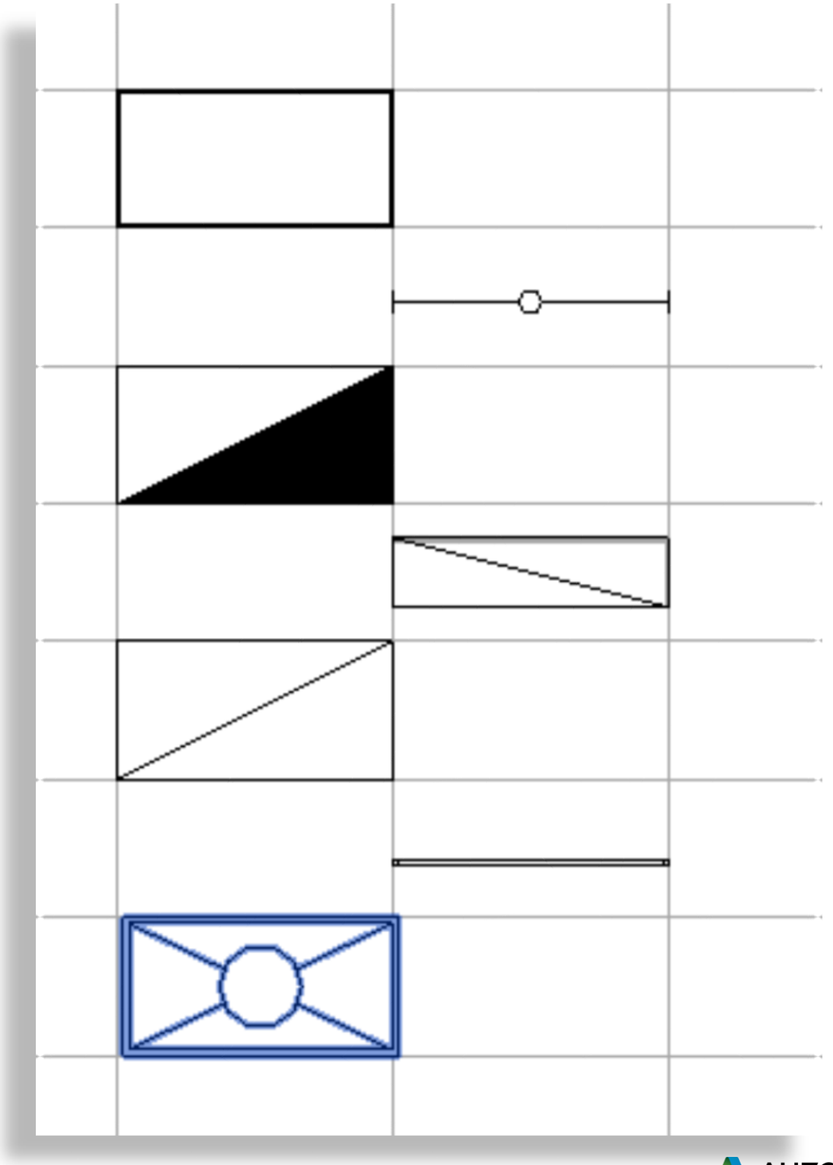
Changing the Origin of a Light Fixture



Changing the Graphics of a Light Fixture

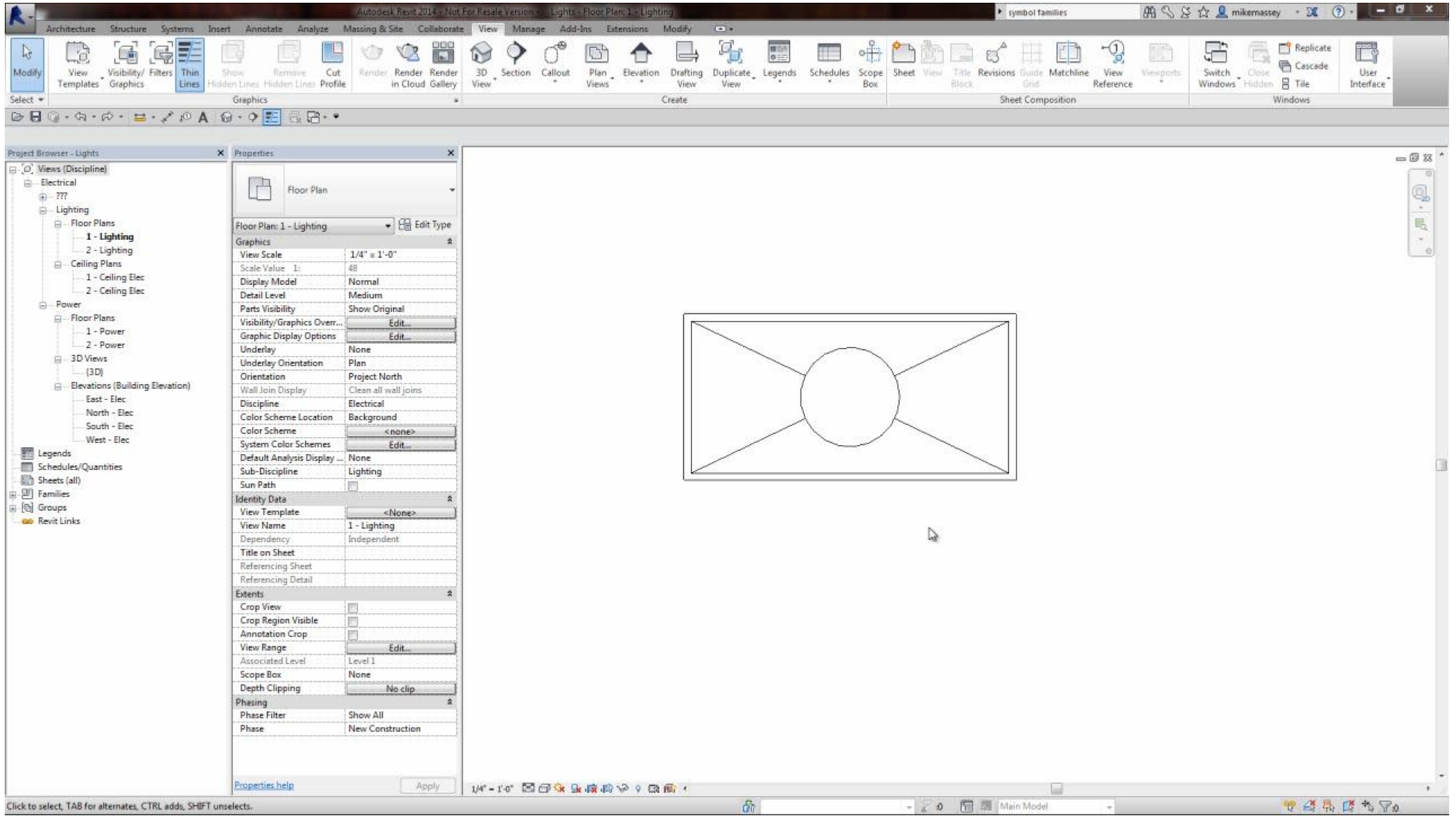
- Model Lines Vs. Symbolic Lines





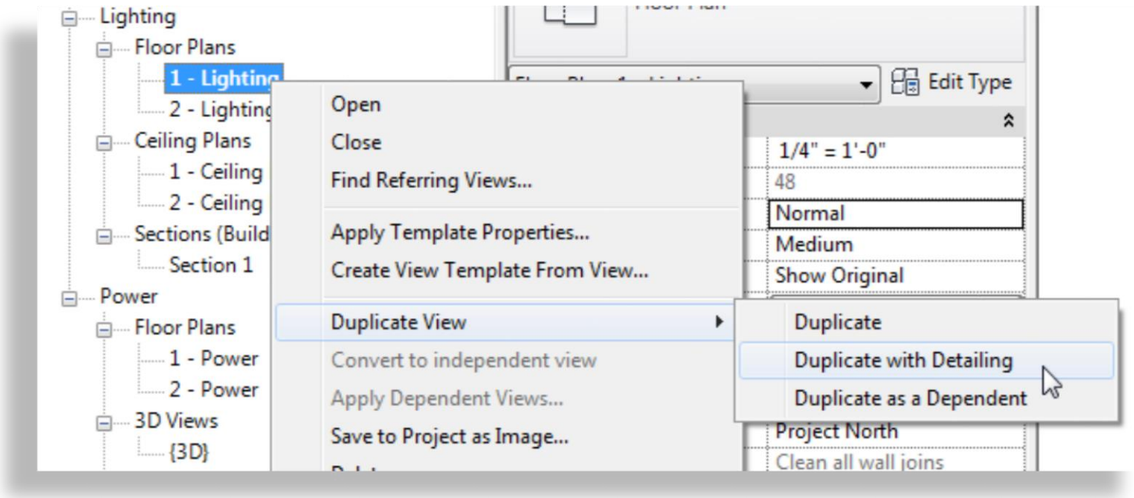
Changing the Graphics of a Light Fixture
Let’s see how this works…

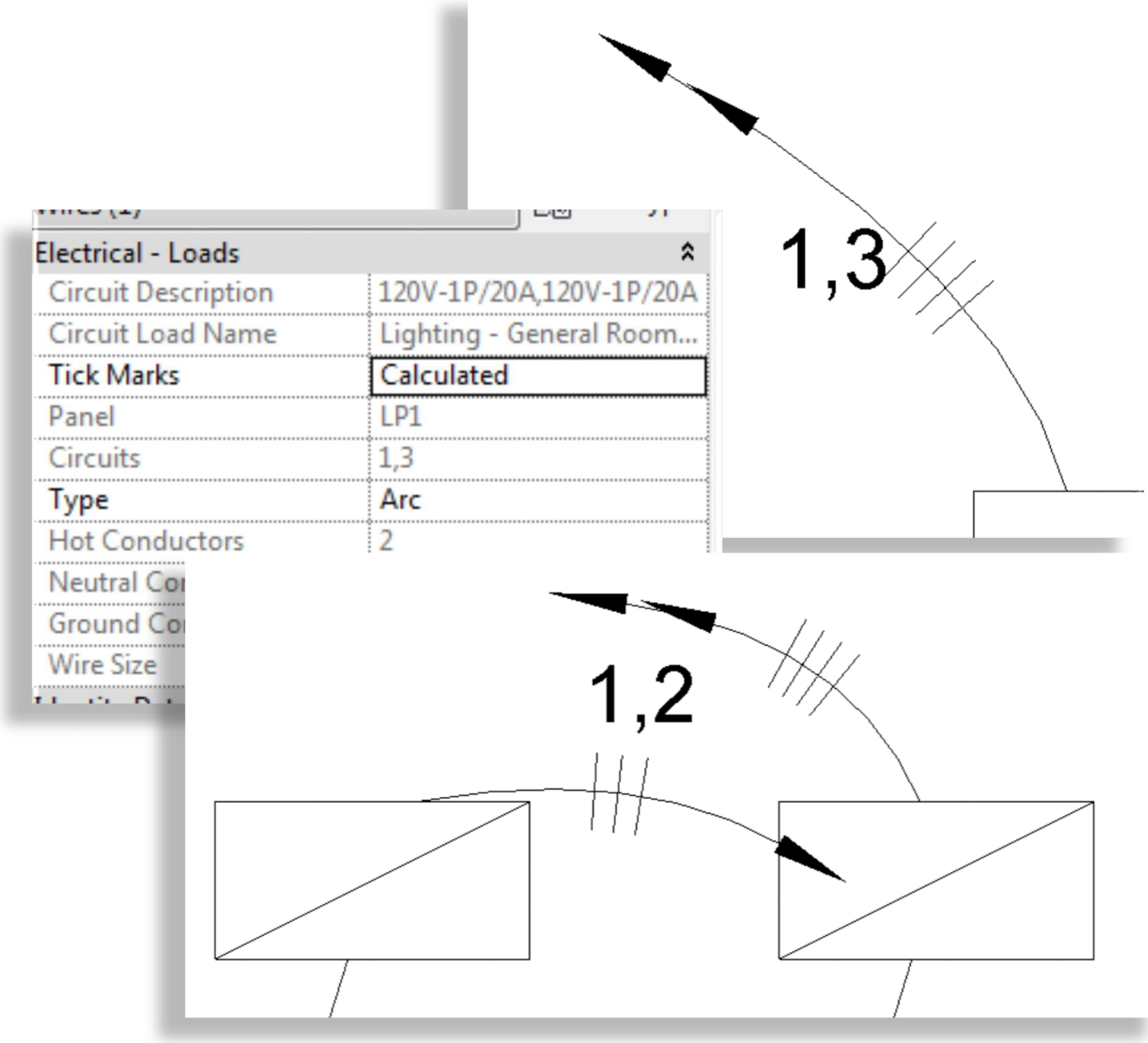
Changing the Graphics of a Light Fixture



Double Homeruns

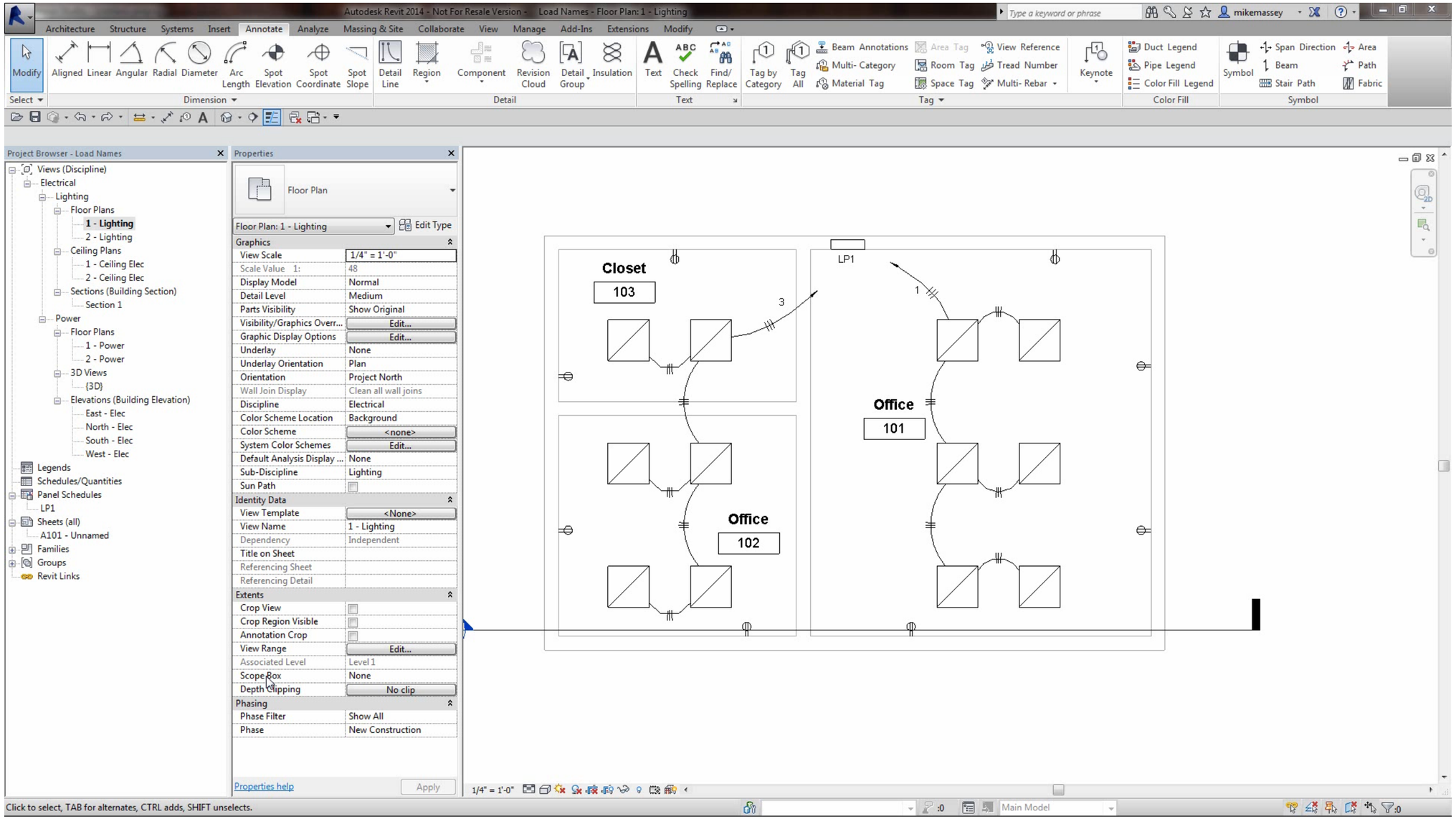
- Connecting them in order
- Eliminating Extra Arrow
  - Duplicate with Detailing
  - FIXED in 2014??





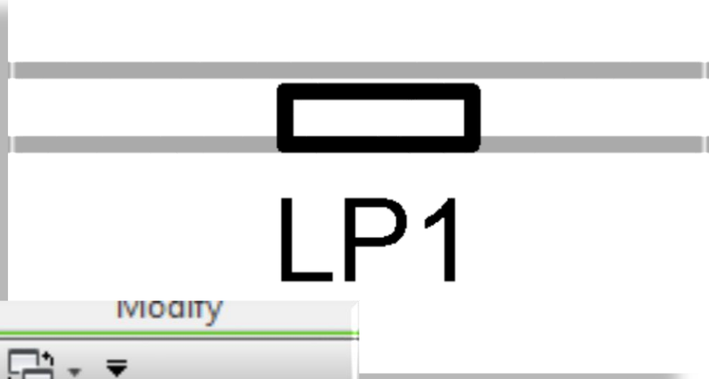
Double Homeruns
Let’s see how this works…

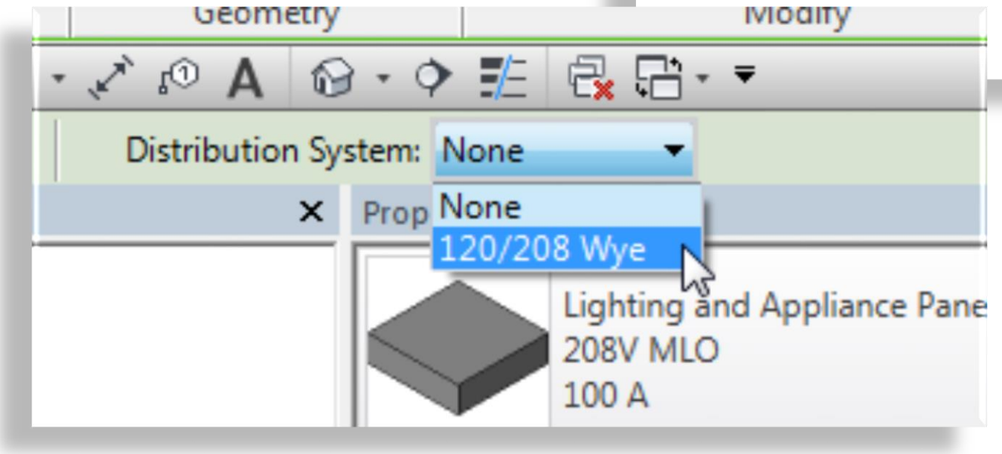
Double Homeruns



Tips and tricks when creating electrical circuits

- 3 Most Important Parameters when Inserting Panels
  - **Distribution System**
  - Panel Name
  - Max. #1 Pole Breakers



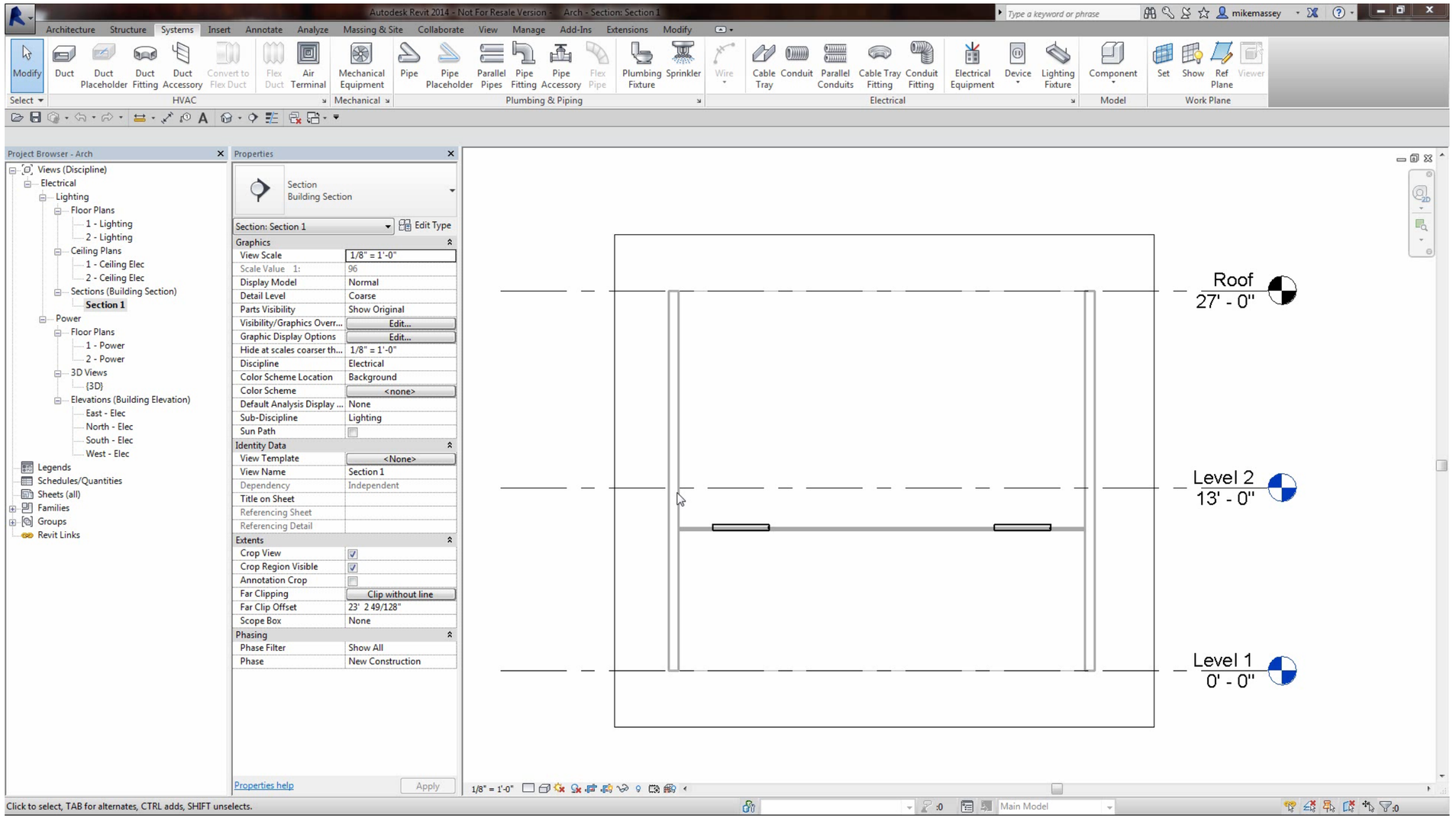


Electrical - Circuiting	
Max #1 Pole Breakers	12
Mains	100.00 A
Circuit Naming	
Circuit Prefix Separator	

Dimensions	
Width	1' 8"
Depth	0' 5 3/4"
42 Circuit Height	3' 5"
30 Circuit Height	2' 2"
24 Circuit Height	1' 11"
12 Circuit Height	1' 8"

3 Most Important Parameters when Inserting Panels Let’s see how this works…

3 Most Important Parameters when Inserting Panels



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- Your class feedback is critical. Fill out a **class survey** now.
- Use the **AU mobile app** or fill out a class survey online.
- Give feedback after each session.
- AU speakers will get feedback in real-time.

Thank you for attending

Mike Massey
Email - mike.massey@asti.com

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