Revit MEP

by: Jerad Meidinger

The SLD BANQUET

Electrical single-line diagrams (SLDs) have been a hole in Autodesk® Revit® software. Fortunately, there are ways to implement SLDs into Revit, but it requires a little legwork and some workarounds. The goal of this article is to show these workarounds and guide you in a direction to implement Revit-generated SLDs into future projects. The article utilizes a family that can be downloaded from the internet at http://www.jeradical.com/SLD Panel Tag jm.rfa

BENEFITS OF REVIT SINGLE LINE DIAGRAMS

Unfortunately, even on Revit projects, SLDs typically must still be done in AutoCAD®. The information is in the model, sitting on the "BIM platter," but there are no utensils (Revit families) to access it. Because of this required AutoCAD crutch, extra time is required to tidy up a project (i.e., AutoCAD titleblocks must match Revit titleblocks, panel naming and sizing must be consistent, feeder sizes must be coordinated between the two separate design files, etc.). During crunch times, some of these double-checks may be overlooked, and it can lead to a disgruntled boss, engineer, architect, contractor, or owner.

If an SLD is implemented in Revit, using the information nested within the families, fixes can be implemented once and automatically updated elsewhere. Overall, this reduces the time required to make design changes, allowing for more efficient work.

GETTING STARTED

There are several steps to implementing SLDs into Revit, and they can be summarized as:

1. Evaluate a sample SLD

2. Create an elevation view

3. Build required families

4. Tag all equipment

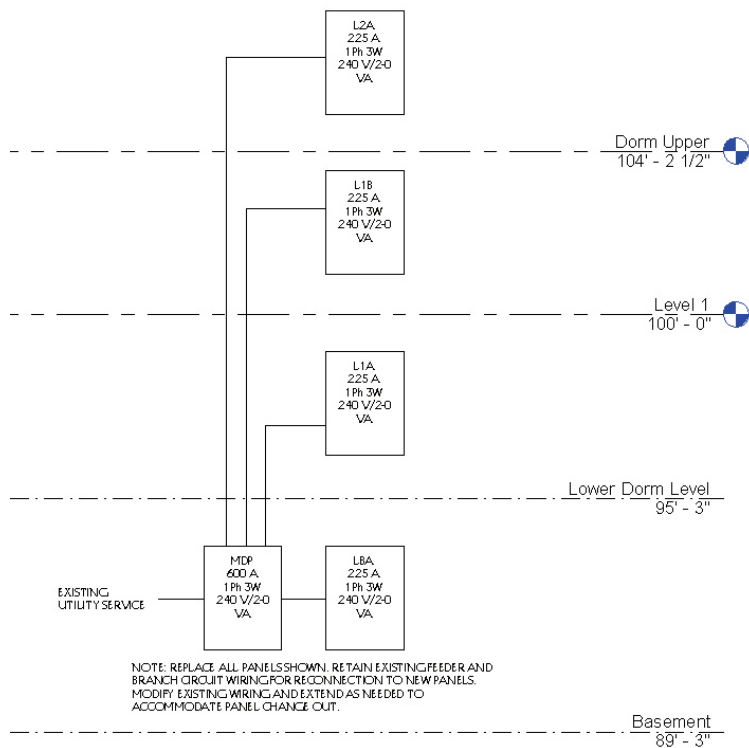5. Block out background

6. Annotate where necessary

Figure 1: Example of Revit SLD

STEP 1: GATHER A SAMPLE SLD

The first thing to figure out is the current company standard is for SLDs, which is done most easily by looking at an existing SLD (typically produced in AutoCAD). Some firms may be very particular on how the appearance comes across while others may allow for more liberties. Make sure that the SLD is printed full-size for exact dimensioning purposes. This sample should be similar to the example provided in Figure 1.

STEP 2: CREATE AN ELEVATION VIEW

Begin creating the SLD by creating an elevation view of the building. It is not required to be facing any particular direction, but the best user experience will be the view that maximizes the number of panel faces perpendicular to the elevation.
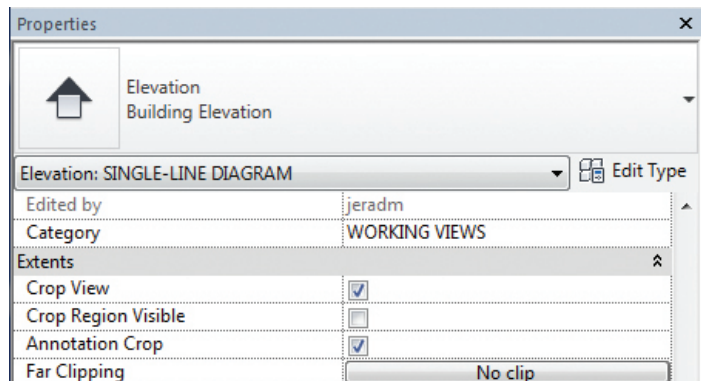

Figure 2: Cropping helps reduce the SLD size

Name this new elevation view SINGLE-LINE DIA-GRAM, and choose a scale that will make text heights consistent throughout the project. For this example, 3/8" = 1'0" was chosen.

In the Visibility/Graphic dialog box for the new elevation, modify it to hide all linked files (assuming that levels have already been copy/monitored into the project). Also within the dialog box, modify Annotation Categories to show only Electrical Equipment Tags, Levels, and Text Notes. Ensure that under Model Categories, Lines and Electrical Equipment are shown.

In the elevation view's Properties pane, turn on Crop View and Annotation Crop.

Crop the view to a size that includes all equipment that will be included in the SLD. If the equipment is excluded from the cropped view, its annotation will be excluded as well, so be sure to include it.

For a cleaner looking SLD, level names should be all on one side of the diagram. This can be toggled similar to how grid bubbles are toggled, via the checkbox on each end of the level.

STEP 3: BUILD FAMILIES

Once an SLD is available as an example and an elevation view has been created, it is time to start building an annotation family. The first useful family is one used to represent electrical panels. Create a new family using Revit's Electrical Equipment Tag.rft template file.
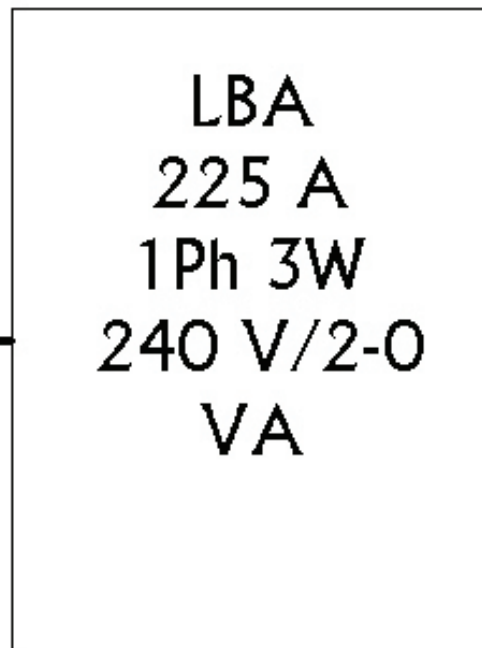

Figure 3: Finished panel tag family should look like this

Label Parameters

	Parameter Name	Spaces	Prefix	Sample Value	Suffix	Break
1	Panel Name	1		LBX		☑
2	Type Name	1		225A		☑
3	Voltage	1		XXX	V	☑
4	Number of Phases	1		3	Ph	☐
5	Number of Wires	1		4	W	☑
6	Electrical Data	1		Electrical Data		☐

Figure 4: Potential label parameters

Measure the physical dimensions of the example SLD and have the numbers handy. Create a box made from lines (Create Tab-> Detail Panel -> Line). Match the dimensions of the example SLD. For a better user experience when tagging individual panels, make sure that the intersection of the reference planes is nearly centered within the box. If they are not shown, they can be turned on via the Visibility/Graphic dialog box.

Next, insert a label (Create Tab-> Text Panel -> Label). Specify its placement within the box and include parameters consistent with the company current standard (or at least very close to it). This may require a bit of trial-and-error to work properly, but it will eventually work out. Be sure to include breaks, prefixes, and suffixes where required. It can also be helpful to use meaningful Sample Values for a good check while building the family. Example parameters can be seen in Figure 4, but each firm will be slightly different.
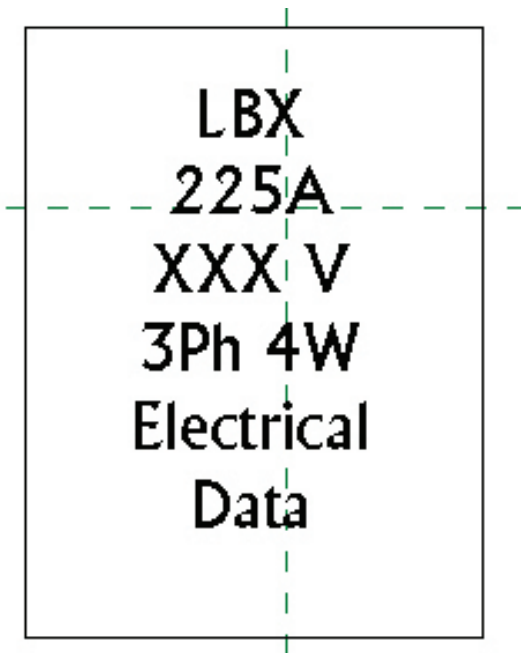

Figure 5: Example of family with sample values being used

Once this family is created, save it and then load it into the project. Congratulations on creating your first utensil and being one step closer to enjoying the information steaming on that BIM platter. Get ready to enjoy!

STEP 4: TAG ALL EQUIPMENT

Now that the family has been created, it is time to dig the utensil into the BIM platter by placing the family into the SLD. Open the SLD elevation view and Tag by Category for the panels shown in the view. The tag initially placed may be different from the one created, but just switch it after it has been placed. It is also possible to use the Tag All feature for this step. This may cause some overlapping of the annotations, but just nudge/move them around to have spacing consistent with the company standard.

Note: Unfortunately the physical representation of the panels will still show up in the view, which is a major *faux pas* in SLDs. Furthermore, if the physical representations become hidden in the view, the annotation will also become hidden in the view. Fortunately, there is a workaround for this issue, as detailed in Step 5: Block Out Background.
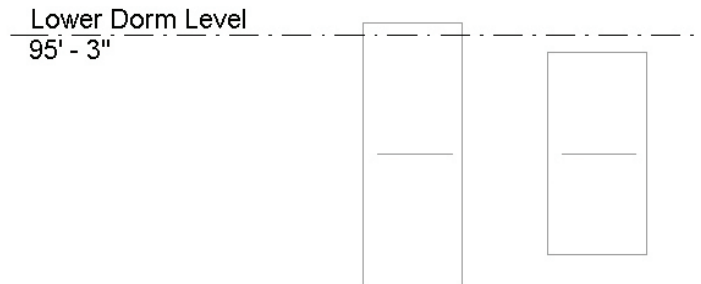

Figure 6: Example of panels showing up when undesired

STEP 5: BLOCK OUT BACKGROUND

Now that the BIM platter has been tasted, a little cleanup is required. After all, what feast is complete without a napkin placed on the table?

This next step requires the use of the white, non-inverted background. If the inverted background (black) is in use, this workaround will not work properly.
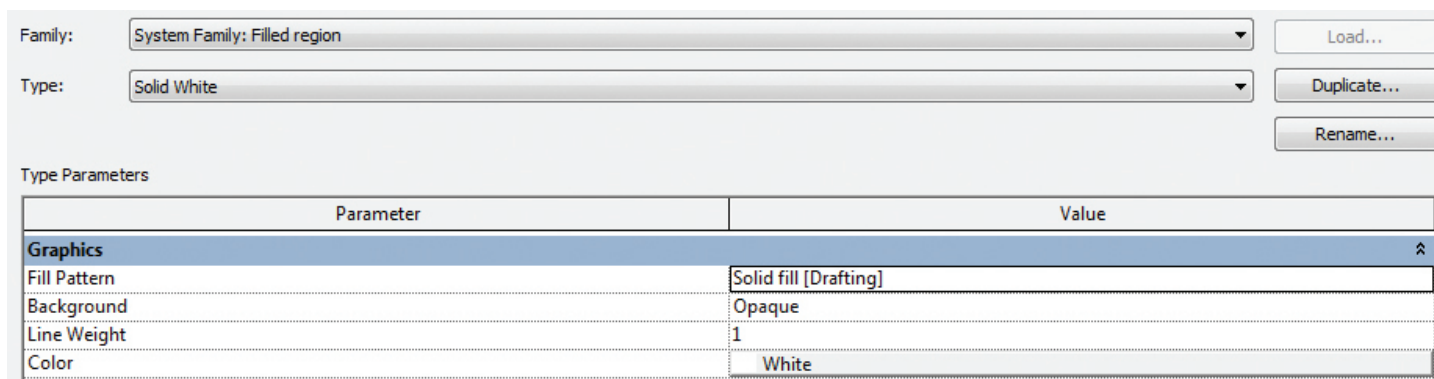
Family:	System Family: Filled region	Load...
Type:	Solid White	Duplicate...
		Rename...

Type Parameters

Parameter	Value
Graphics	⊗
Fill Pattern	Solid fill [Drafting]
Background	Opaque
Line Weight	1
Color	White

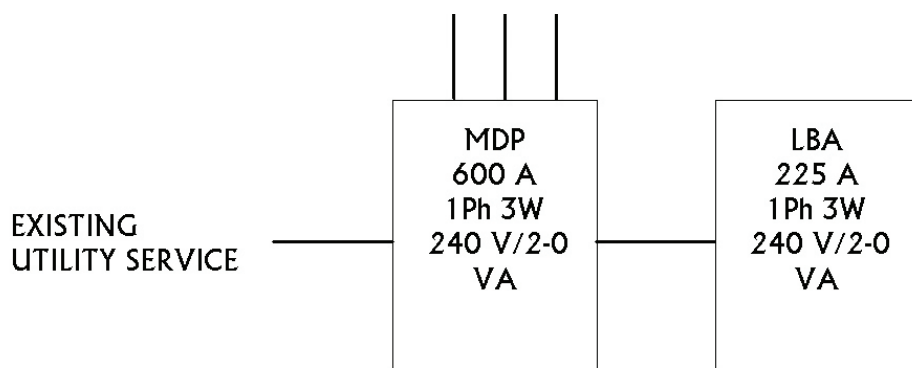*Figure 7: Solid white filled region*

Figure 8: Lineweight projection example

At locations where a panel is showing up, begin creating a filled region (Annotate Tab-> Detail Panel -> Region Dropdown -> Filled Region). Make sure this region fully covers the panel. It can also cover multiple panels, if desired.

Unfortunately, the filled region should default to a type that is not useful for this, so it must be changed. Hit the Edit Type button in the Properties panel. If "Solid White" is an option, choose it. Otherwise, it must be created. Set the following type parameters:

+ Fill Pattern: Solid Fill
+ Background: Opaque
+ Color: White

It is not merely a coincidence that napkins are typically white and rectangular and are used to clean up unwanted extra food. These white, rectangular regions also cover up unwanted Revit elements. Once the SLD is covered with these filled regions, it is time to move on and add some finishing touches.

STEP 6: ANNOTATE WHERE NECESSARY

Now that panels are tagged and showing up in the SLD, connect the annotation symbols together via Detail Lines (Annotate Tab -> Detail Panel -> Detail Line). These single lines diagrammatically represent the conduit connection between two panels. Once again, be sure to conform to the existing standard SLD example.

Being consistent with the SLD example may require creating another Line Style. The example in Figure 8 uses a Lineweight of 3 and its color is Black. If necessary, Line Styles can be added to the project (Manage Tab -> Settings Panel -> Additional Settings Dropdown -> Line Styles).

In any given Revit project, the uppermost power distribution equipment is not modeled, so add text annotation to the SLD to represent objects that may not be modeled within the project.

FURTHER EXPLORATION

Electrical single-line diagrams can encompass much more than just panels and conduits based on the complexity of the project. Elevators, motor disconnects, transformers, and other pieces of electrical equipment often need representation as well. Each of these is sitting on the BIM platter, ready to consume via its own unique utensil. The information contained within this article provides a good starting point for firms to begin creating families that can pull the required information together. In turn, this can help with creating a path toward implementing SLDs via Revit, using the information modeled.

Jerad Meidinger is an electrical engineer for Associated Construction Engineering, located near Bozeman, Montana. In his free time, he can be found developing smartphone apps on the Google Play store under the publisher name Jeradooka. Jerad can be reached via email at jeradm@acemt.com.