AUTODESK UNIVERSITY

AS500100

Analyzing Revit Data using Microsoft Power BI

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Learning Objectives

- Know what Ideate BIMLink and Microsoft Power BI are used for
- Learn where to find learning resources for Ideate BIMLink and Microsoft Power BI
- Learn how to extract data from a Revit model using Ideate BIMLink and bring into Microsoft Power BI
- Create and walk through example of using Microsoft Power BI to examine the data from the Revit model

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Description

Data analytics have been a hot topic for a while now but how can anyone extract data from Revit to review, interpret and use the information to either improve their Revit model content or performance? The information could also be used in Microsoft Power BI for many other reasons as well. In this presentation we will use Ideate BIMLink to extract data from a Revit model, show how the data can be visualized in Microsoft Power BI in different ways to help understand more about the Revit model and if anything needs to be changed to improve it.

Speaker

Dan Tartaglia has been in the AEC industry since 1986. He has been working for the Architectural Design firm NBBJ for 15 years and counting, before that he worked at Bentley Systems and a couple of Architectural firms in the Philadelphia area. Over the years my responsibilities at NBBJ have evolved as needed. Currently in the NBBJ Digital Team I manage the Development Team, create in-house tools to help automate and improve Revit efficiency in an effort to get the most we can out of our use of Revit. Besides that he supports our Revit projects, provide guidance and training on Revit. He also uses Microsoft Power BI to create a number of Power BI dashboards not only for Revit and other AEC reasons but also for all levels of the company using different sources of data.

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Ideate BIMLink and Microsoft Power BI

What is Ideate BIMLink and where can I find learning resources?

Ideate BIMLink is a tool that can let Autodesk Revit users pull information from a model into Microsoft Excel, modify the data as needed for your project and push the data back into the model. There are many useful reasons to do this. A couple of examples are: changing room parameter information, changing family and family type names to match a needed standard and creating health check reports. This is a time saving tool our company uses a lot. For more information go to this link: https://ideatesoftware.com/ideatebimlink

What is Microsoft Power BI and where can I find learning resources?

Microsoft Power BI is a platform that allows you to use one or more data sources, link them together (if the data allows) and create dashboards and reports that give you or others in your company the ability to visualize and interpret the data. This is very useful in many ways for example: to determine the health of a Revit model and many other business related reasons using company data. For more information go to this link: https://powerbi.microsoft.com/

How to extract data from a Revit model using Ideate BIMLink and bring into Microsoft Power BI

The class is focused on doing a health check for Revit models. For this reason we are going to use the pre-defined *BIMLink Health Check* link files:
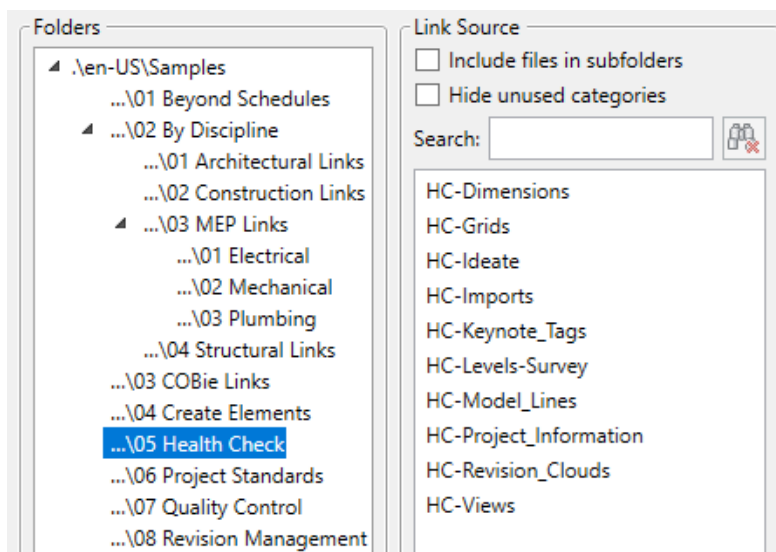
Step #1: Extract the Revit data using Ideate BIMLink

The prerequisites for this effort is to have [Ideate BIMLink](#) installed and Autodesk Revit (preferably one of the last 3 versions). For this to be a better health check example, you also need to have [Ideate Explorer](#) installed to get all the warning data for the resulting *Microsoft Power BI* report.

Note: This is the manual method to extract the data from the model. To automate this process, see: [Automation for Ideate BIMLink](#). To schedule the automation using the *Windows Task Scheduler* see: [Configure a recurring Ideate Automation Script](#).

1. Copy the template Excel file: *Ideate_HealthCheck.xlsx* (the name of the file may change slightly) from the below location into your project folder and rename it as per your project, for example: *ACME Pet Store Interior_HealthCheck.xlsx*. The template exists here:

C:\Program Files\Ideate\Ideate Software <version number>\Ideate BIMLink\en-US\Samples\05 Health Check

Note: This needs to be done once per Revit model. Each time you update the health check the same Excel file will be overwritten.

Note: Not all the *HC- links* are being currently used by the resulting *Power BI* report but they are needed to be exported. This way if you find a use for the data these contain, you can modify the *Power BI* report at a later date. The links we are using in the example are:

HC-Dimensions, HC-Ideate, HC-Imports, HC-Levels-Survey, HC-Model_Lines, HC_Project_Information and HC_Views.

2. Open the Revit model then launch **Ideate BIMLink**.
3. For the first time used in the model, click **New**. The *New Link* dialog will open.

4. Select: **\05 Health Check**, Shift-select each **HC-** link as shown below and click: **Next**:
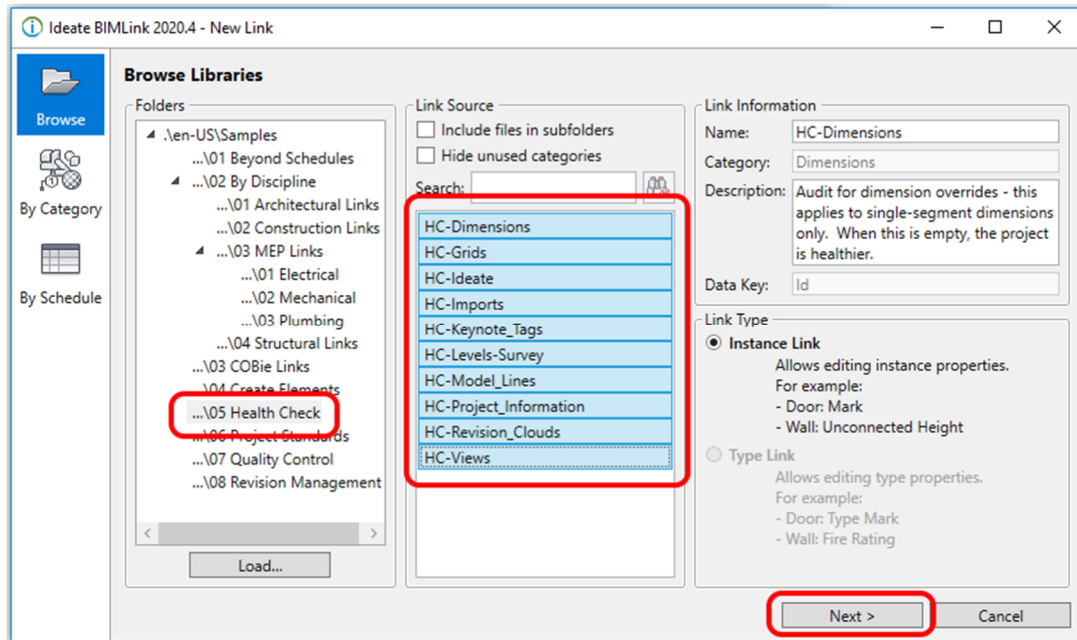
5. Do the following steps for each *HC-* link.
    a. In the *BIMLink* dialog, select the **HC-** link then click: **Export**:
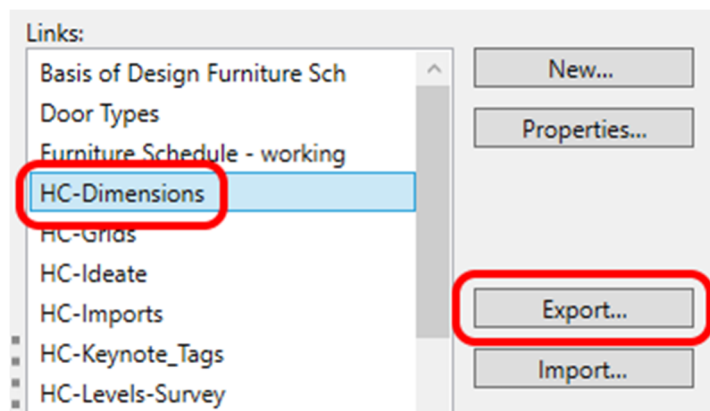
b. Browse to where you copied/renamed the template Excel file, select it and click: **Save**. Overwrite the Excel file if asked.
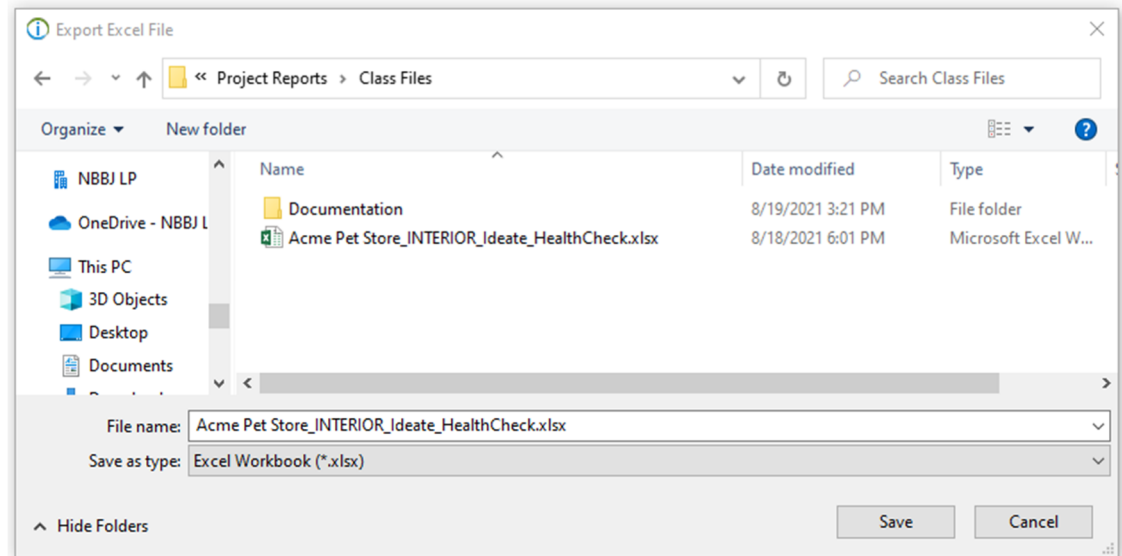

c. After the processing finishes click: **Done**.

6. **Close** Ideate *BIMLink* and **Synch** the Revit model.
7. Open the Excel file. Notice there are a number of worksheets. Ideate uses pivot tables for the first number of worksheets to analyze the data then you will see all the *HC-* worksheets you added or modified.
8. Review the Ideate worksheets:
    - Summary
    - View Summary
    - Workset and Phasing
    - Import and Links
    - In-Place
    - Generic Model Usage
    - Model Line Usage
    - Dimension and Keynotes
    - Revisions
    - Grids

9. *Save* and close the Excel file.

Use Ideate Explorer to extract the model Warnings

Using *Ideate Explorer* was not part of the class description but to do a proper model health check you really need to get the warnings as well.

1. Launch *Ideate Explorer*.
2. Click the **Warnings** tab then click the button: **View Warning(s) Details**:
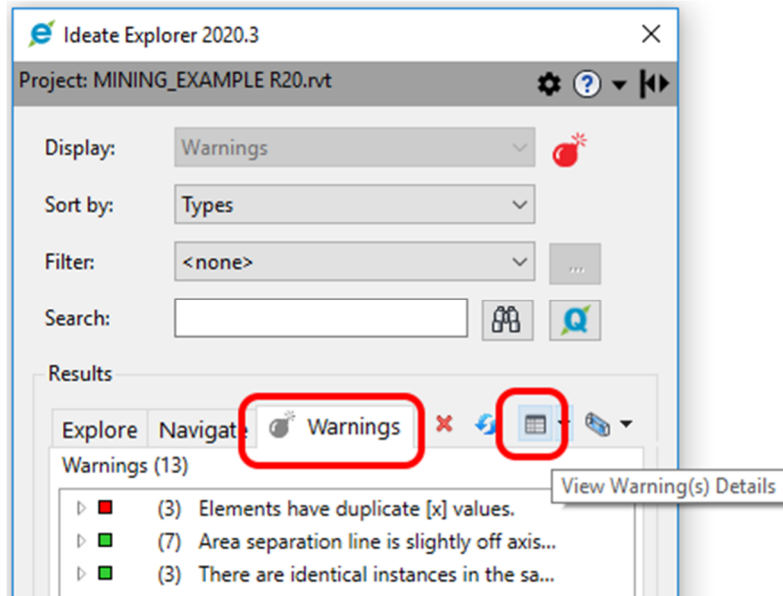
3. In the *Warnings* dialog, click: **Export**.
4. Select the same Excel file you created with Ideate BIMLink and click: **Save**:
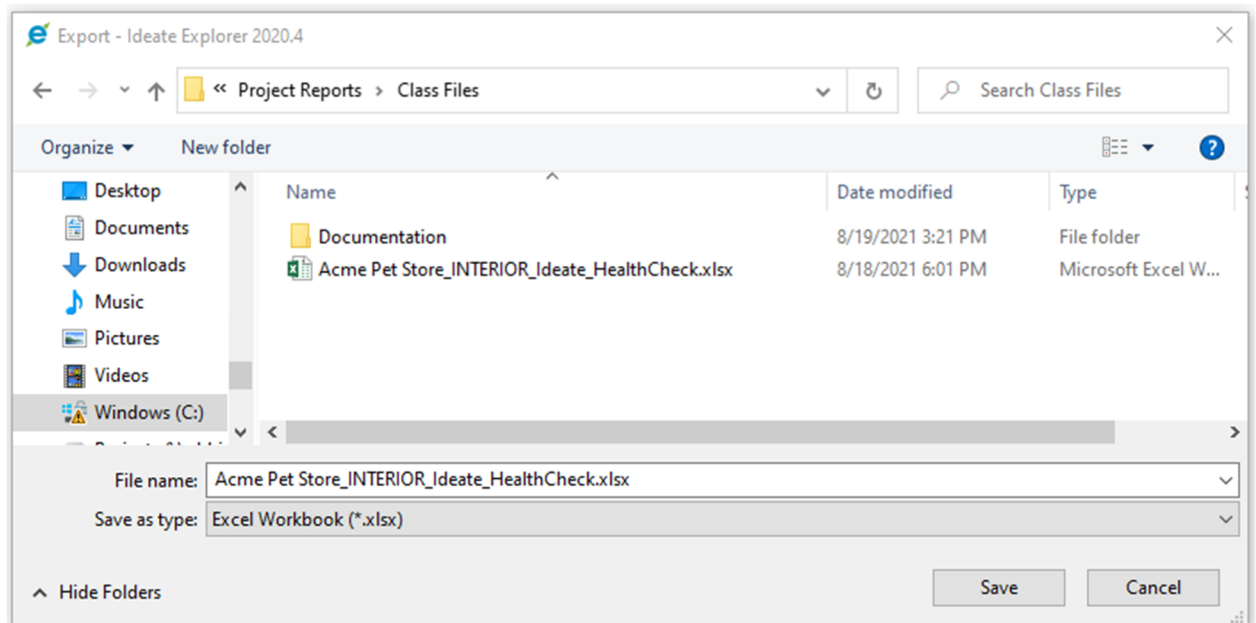
5. Close Revit.

Step #2: Show the Revit data in the Microsoft Power BI Report

During this step we are going to use a *Power B*I template and the *ACME Pet Store Interior Excel file* to make a few changes to view the data correctly.
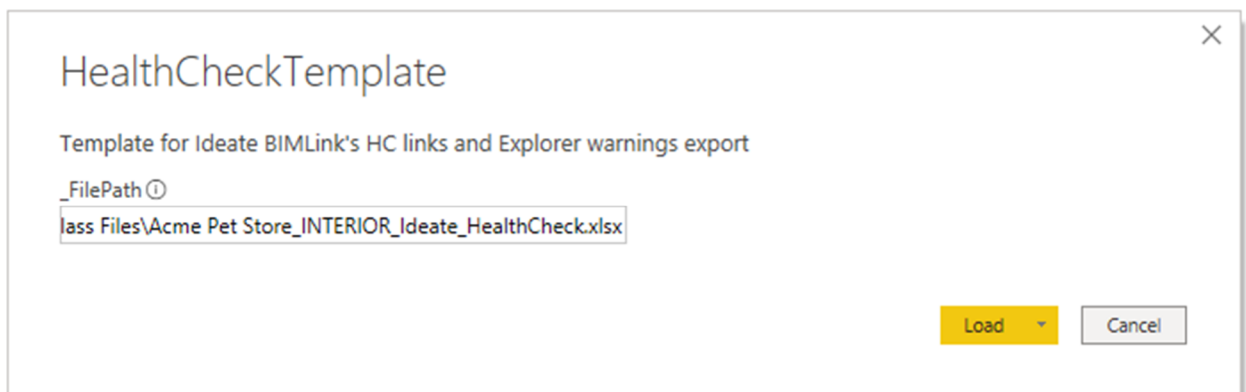
No Revit model is the same this includes the data we are extracting. In the below steps we will go over how to typically modify the *Power BI Report* to reflect and use the Excel data correctly. This may or may not cover every condition you may come across.

Each model warning may have one or 50 elements that are effected depending on warning type. The Power BI template we are using expects at least 15 'Element' columns in the warnings Excel file.

1. Open the: **ACME Pet Store Interior_Warnings.xlsx** in *Excel*.
2. Notice there are 3 'Element' columns. Create empty columns for up to: **Element 15**. Save the *Excel* file and close it.

R	S	T	U	V
Element 11	Element 12	Element 13	Element 14	Element 15

3. Double-click the *Power BI template*: **HealthCheckTemplate.pbit**. This should open Microsoft Power BI.
4. There is one *parameter* value needed (add no quotes at beginning and end of the value): **_FilePath** = The full path and file name of the Excel file.

HealthCheckTemplate

Template for Ideate BIMLink's HC links and Explorer warnings export

_FilePath ⓘ

lass Files\Acme Pet Store_INTERIOR_Ideate_HealthCheck.xlsx

Load ▾   Cancel

5. Click **Load**. A *Refresh* process will happen. In this case no errors should happen but if they do the *Power BI* file may need to be looked at to resolve them.

You should see the *Power BI* visuals and data but we are not done yet. Notice the **Model Health** table and **Model Score** Gauge:

Model Health:			
Status	**Metric**	**Value**	**Recommended**
🟢	Design Options	6	10
🔴	Imports	27	0
🔴	In-Place Families	30	10
🔴	Model Size	1,615	500
🟢	RVT Links	5	25
🔴	Uncropped Views	557	100
🟢	Worksets	15	30
🔴	Warnings Not Ranked	88	50
🟢	Warnings Low	24	75
🔴	Warnings Medium	96	10
🟢	Warnings High	2	5

Model Score:

45
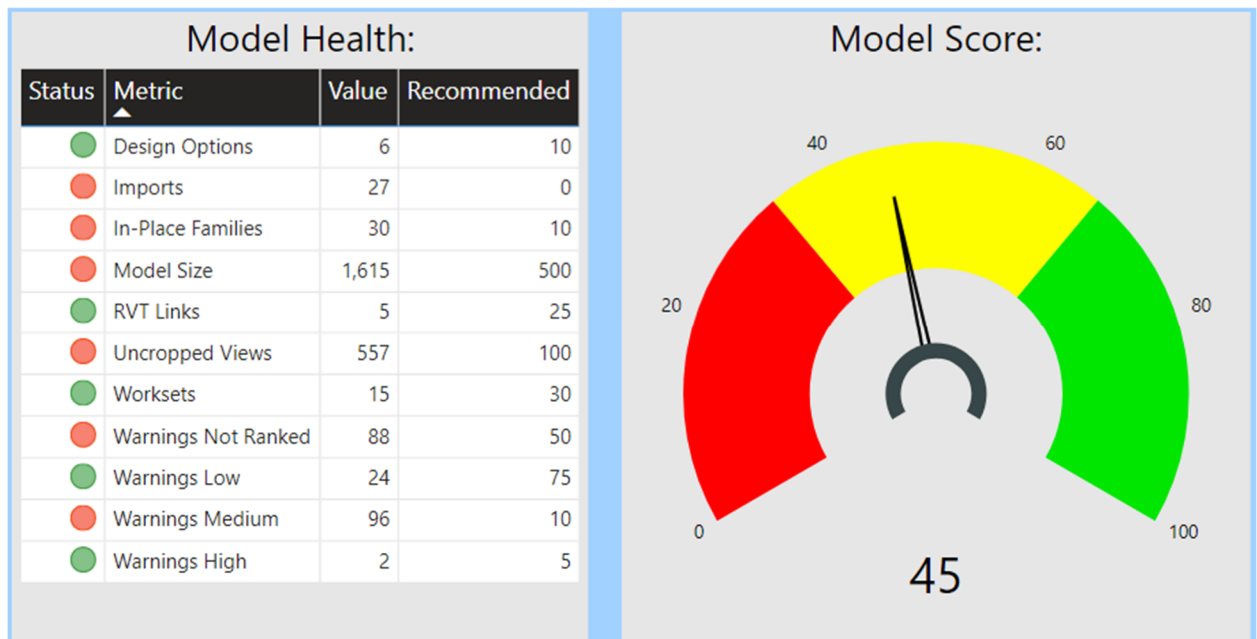
6. We need to make sure the data is correct for these items.
7. In *Power BI* click the button**: Transform Data**. The *Query Editor* will open showing you all the data you have to work with:
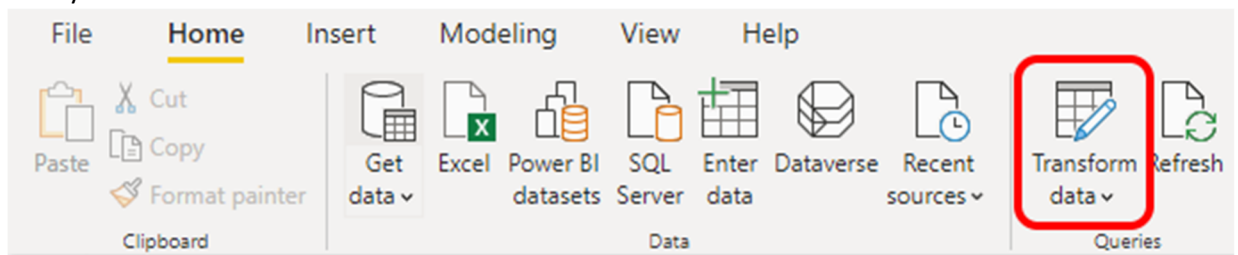
8. On the left side, chose each table starting from the top that begin with **HC_** to see if any errors show (there should not be in this example). Notice all the data!

9. Keep selecting each table, the tables that effect the items in the image of step #5 are below:

⊞ _Design Options
⊞ _Duplicate Families
⊞ _Imports
⊞ _In-Place Families
⊞ _Model Size
⊞ _RVT Links
⊞ _Uncropped Views
⊞ _Warnings_Low
⊞ _Warnings_NotRanked
⊞ _Warnings_Medium
⊞ _Warnings_High
⊞ _Worksets

Each of these tables <u>need to have one row with the same 3 columns</u> *(<metric name>, Recommended and Score).* For example:

1^2_3 Design Options	1^2_3 Recommended	1^2_3 Score
6	10	4

10. Notice the table**: _Duplicate Families** does not have a row. This is because this model has no duplicate families. Even so, one row must still exist for the report to work.

1^2_3 Duplicate Families	1^2_3 Recommended	1^2_3 Score

There are a few *placeholder* tables to handle this situation if one of the metrics does not have a row (their names all end with **_Blank**):

⊞ _Design Options_Blank
⊞ _Duplicate Families_Blank
⊞ _Imports_Blank
⊞ _In-Place Families_Blank
⊞ _RVT Links_Blank
⊞ _Uncropped Views_Blank
⊞ _Warnings Low_Blank
⊞ _Warnings NotRanked_Blank
⊞ _Warnings Medium_Blank
⊞ _Warnings High_Blank

11. To resolve this issue, click: **Append Queries**:
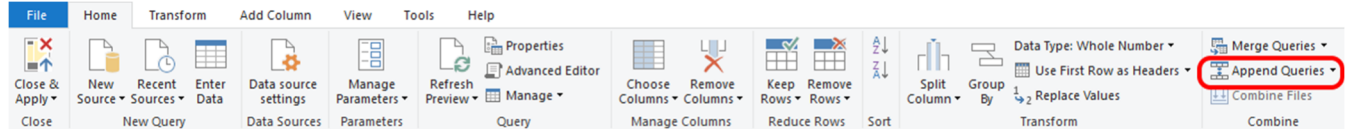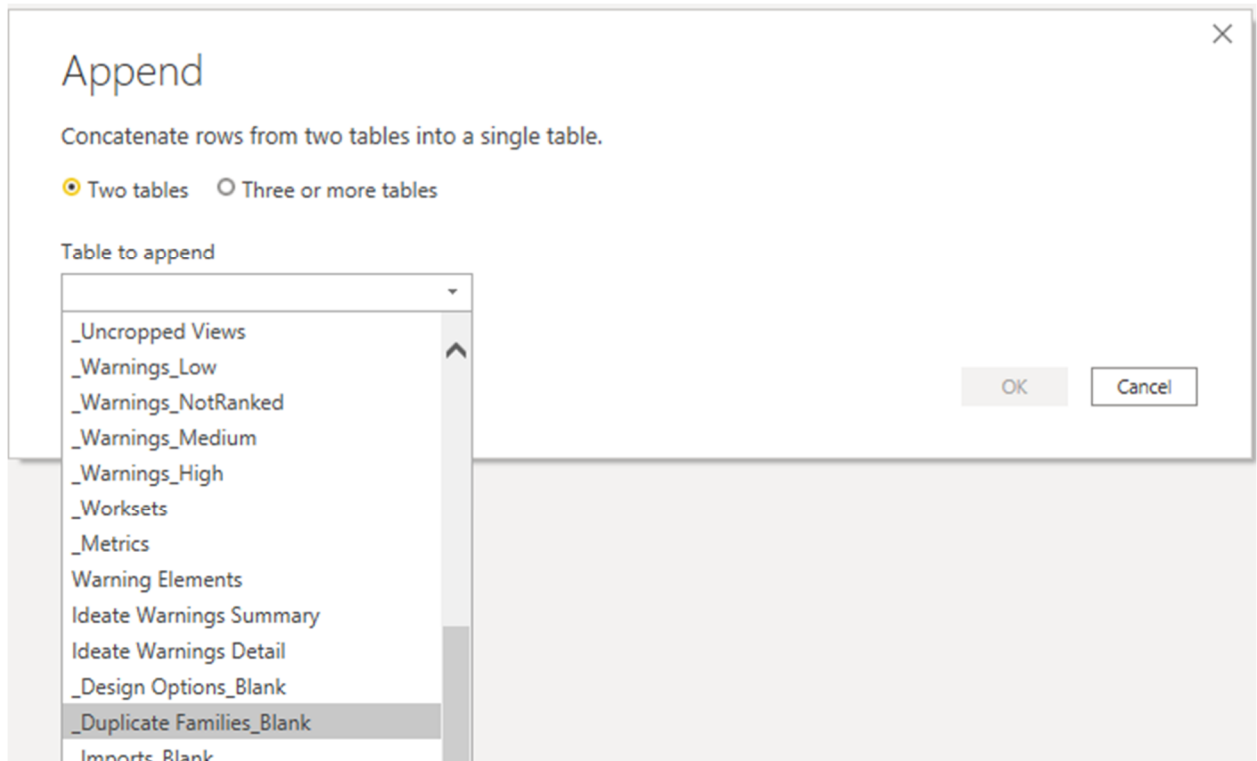

12. Select the table**: _Duplicate Families_Blank** and click: **OK**:

13. You should now see one row:

14. Keep selecting the tables shown in **step #9** to make sure they have one similar row. If any of these do not, follow *steps #11 and #12*. Make sure to use the correct *_Blank* table.

15. Once you click on the **_Metrics** table you should see the below (exactly 12 rows):

	Metric	Value	Recommended	Score	Health Score	Status	Index
1	Design Options	6	10	4	0	0	
2	Duplicate Families	0	0	0	0	0	
3	Imports	27	0	14	14	1	
4	In-Place Families	30	10	10	10	1	
5	Model Size	1615	500	13	13	1	
6	RVT Links	5	25	9	0	0	
7	Uncropped Views	557	100	3	3	1	
8	Warnings Low	24	75	3	0	0	
9	Warnings Not Ranked	88	50	3	3	1	
10	Warnings Medium	96	10	12	12	1	
11	Warnings High	2	5	14	0	0	
12	Worksets	15	30	5	0	0	

16. Make sure the remaining tables do not have any errors.
17. If no errors are found, in the *Query Editor*, click: **Close & Apply**.
18. After the data loads in *Power BI* and hopefully no errors are found, open each tab to verify the *visuals* seem populated correctly.
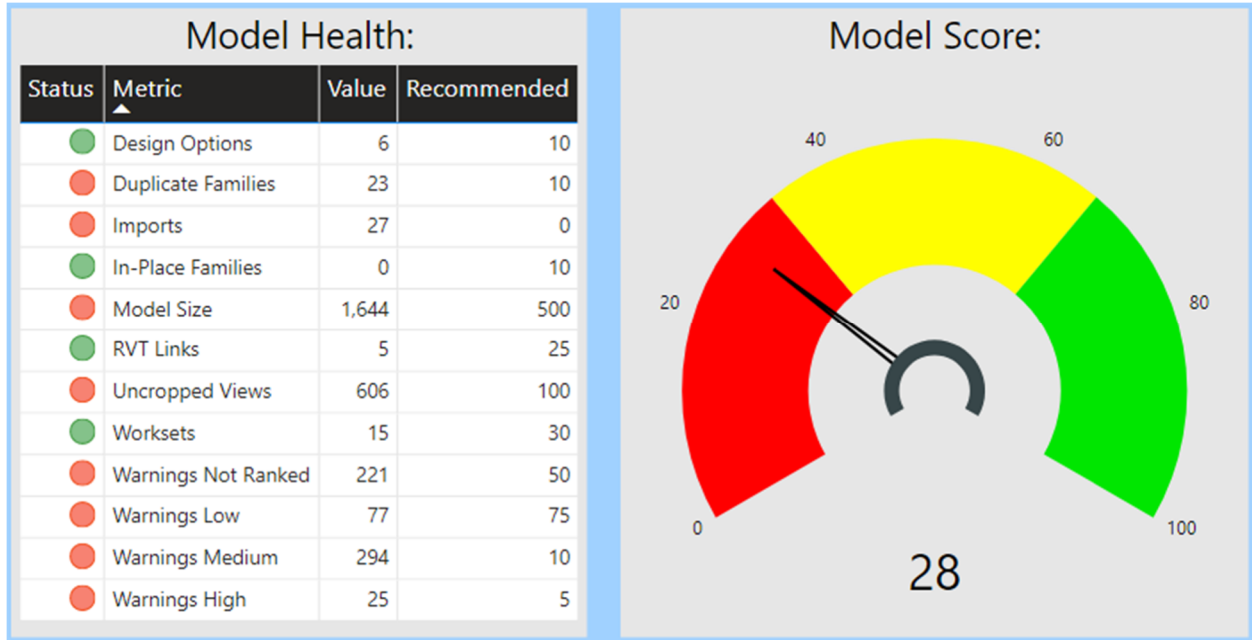19. Click: **Save** and save the *Power BI* file with the model/healthcheck name into the same folder as your other files:
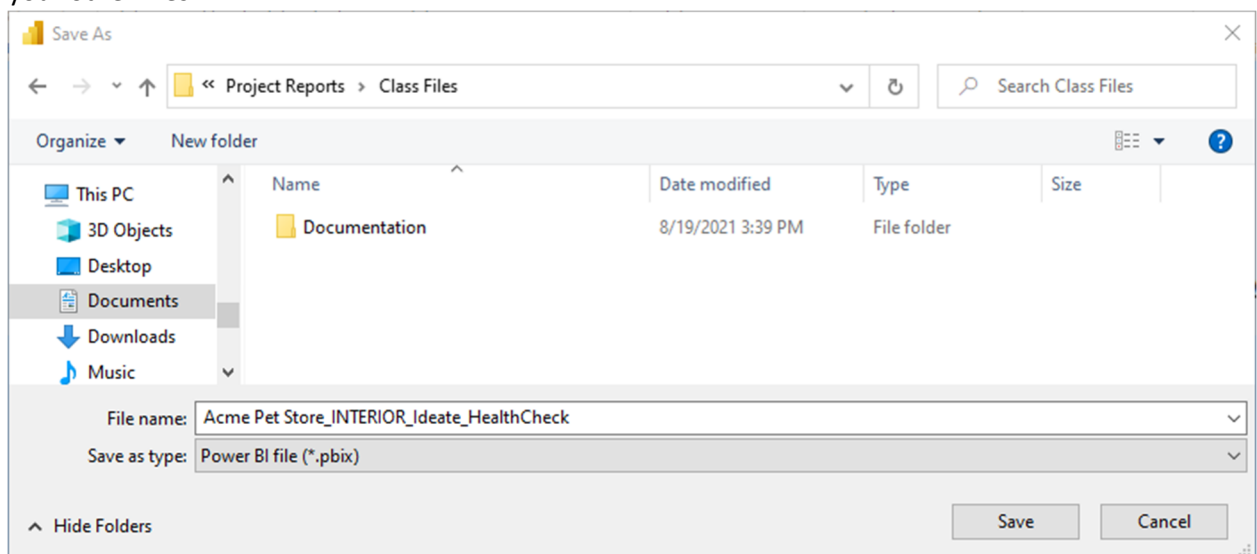
Examine the Microsoft Power BI Report

Model Health Summery tab:

This tab shows the overall health and score along with other information. The data in the Model Health table drives the Gauge visual score:

Model Health:				Model Score:
Status	Metric ▲	Value	Recommended	
🟢	Design Options	6	10	
🔴	Duplicate Families	23	10	
🔴	Imports	27	0	
🟢	In-Place Families	0	10	
🔴	Model Size	1,644	500	
🟢	RVT Links	5	25	
🔴	Uncropped Views	606	100	
🟢	Worksets	15	30	
🔴	Warnings Not Ranked	221	50	
🔴	Warnings Low	77	75	
🔴	Warnings Medium	294	10	
🔴	Warnings High	25	5	

Model Score: 28

The **Value** column data is from the model data.

The **Recommended** column data is hard coded as 'recommended' values the metric should not go above. This can be changed for your company.

You can easily change the *Recommended* values to suite your company's needs.
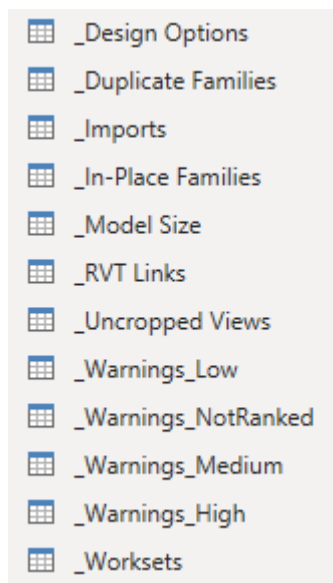
HOW TO CHANGE THE RECOMMENDED VALUES:

1. In *Power BI* click the button**: Transform Data**. The *Query Editor* will open showing you all the data you have to work with:
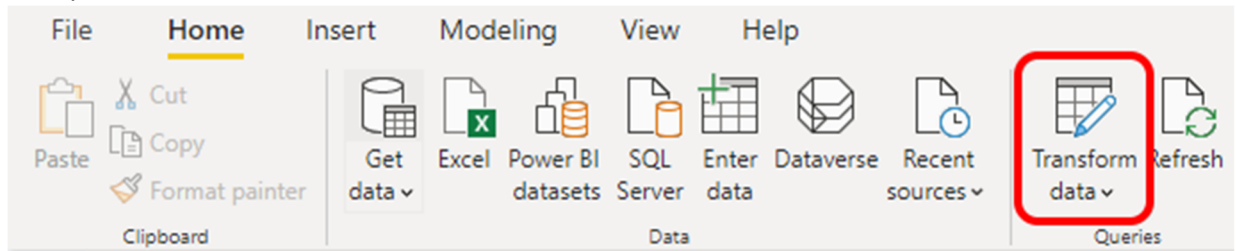
2. Select one of the tables that you want to modify the *Recommended* value for. These are the tables:

⊞ _Design Options
⊞ _Duplicate Families
⊞ _Imports
⊞ _In-Place Families
⊞ _Model Size
⊞ _RVT Links
⊞ _Uncropped Views
⊞ _Warnings_Low
⊞ _Warnings_NotRanked
⊞ _Warnings_Medium
⊞ _Warnings_High
⊞ _Worksets

3. As an example, select: **_Model Size.**

$1^2{}_3$ Model Size	$1^2{}_3$ Recommended	$1^2{}_3$ Score
1615	500	13

4. The first column is data for the model which you should not change but the *Recommended* and *Score* can be.

   Note: The *Score* value needs to total at **100** if you choose to modify this column.

5. To modify the Recommended and/or the Score values, in APPLIED STEPS select the gear symbol for these steps to change:

- **Added Custom** = *Recommended* column
- **Added Custom1** = *Score* column
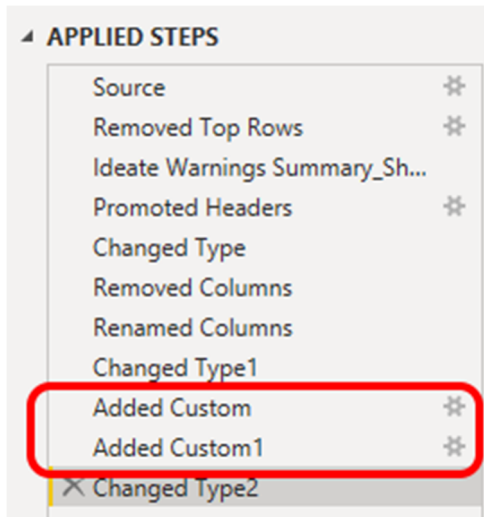
6. For this example let's change the *Recommended* model size from **500** MBs to **300** MBs.
7. Click the gear symbol next to the step: **Added Custom.**
8. Change **500** to **300** and click **OK**:
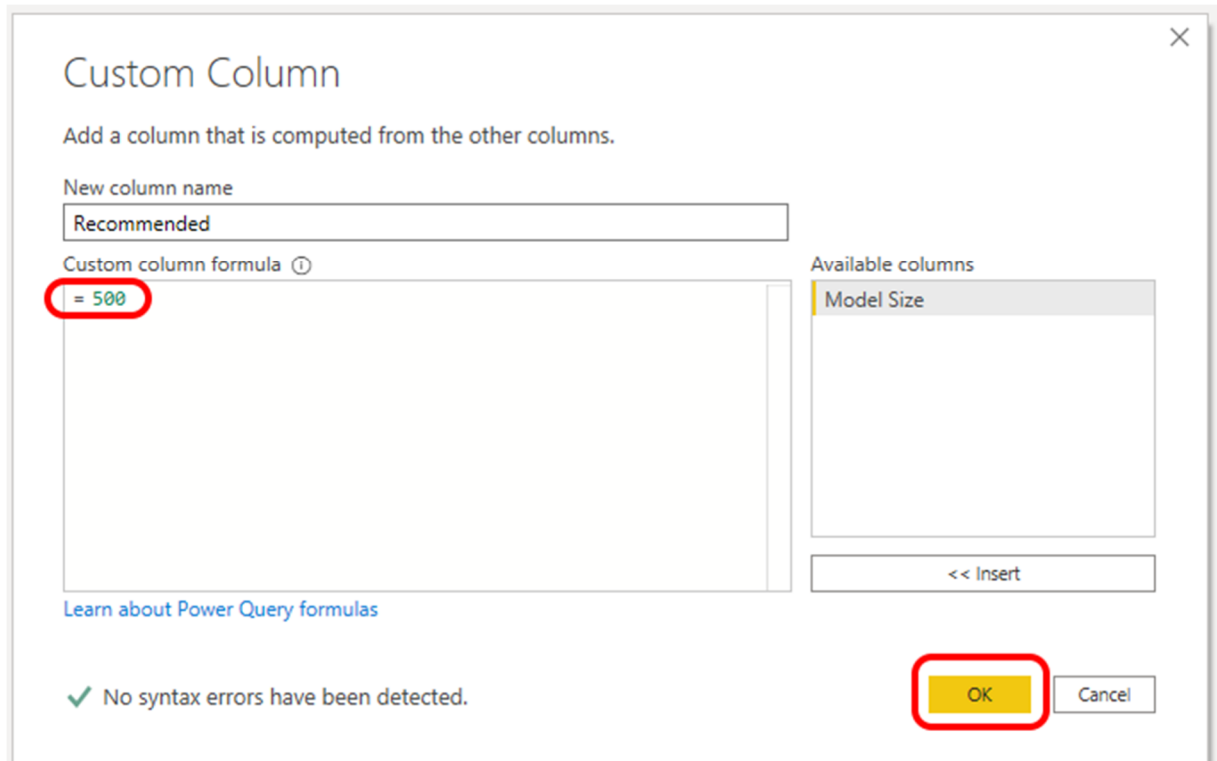
9. In the *Query Editor*, click: **Close & Apply**.
10. The value will change in the table. Depending on what values you change the gauge score may also change.

Warnings tab:

This tab shows all the warning information for the model. One of the most important thing to me in a lot of these tabs is the Element ID so you can easily go into Revit and locate it.

If you click the **orange** Medium warnings bar notice how it filters the below tables:
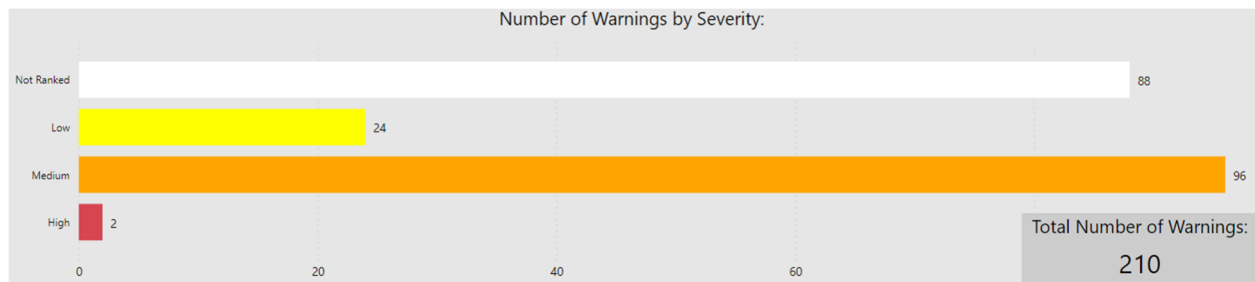
Now click the row with: **OverlapFailures**, you will see only those warnings and elements that you can then go back into Revit to correct:

Families by Workset:

This tab shows all family instances in relation to the *Workset* they are placed on also identify all *In-Place families*. This can help you:

- Determine if one or more *Worksets* are being over-used
- Determine if one or more *Worksets* are being miss-used
- Examine the family name and types to make sure they are consistent with standards
- Locate and determine if any *In-Place families* should be addressed

Families by Phase & Category:

This tab shows all family instances in relation to the *Phase* they are in and organizes the families by their *Category*. It also identify all *In-Place families.* This can help you:

- Verify Phases are being used correctly
- Understand the makeup of the model concerning what and how many family instances exist and their Category
- Examine the family name and types to make sure they are consistent with standards
- Locate and determine if any *In-Place families* should be addressed

Model Lines by Room:

This tab shows all *Model* lines in the model by *Level* and *Room* if applicable. This can help you:

- Determine if Model lines are being used correctly or should be *Detail* lines
- Who created the Model lines
- Verify they exist on the correct Workset
- Make sure their types are consistent with standards

View Information:

This tab shows a lot of *View* information including which are on *Sheets* and which may be causing performance issues. This can help you:

- Modify view settings to improve model/view performance
- Know which views are on sheets and are templates
- The % of views on/off sheets, help you determine if any views should be removed
- How many views exist per level. Someone may have created a lot of unneeded views

Import Information:

This tab shows all the *imported* objects by *View*. This can help you:

- Clean up the model to help overall or view performance
- Know what views they exist in
- Know who created and last modified them

Dimension Override Information:

This tab shows all the *dimensions* in the model that where manually modified by a user and by *View*. This can help you:

- Make sure dimensions are accurate
- Make sure the changed values follow your company's standards