SOFTWARE
DESIGN SOLUTIONS

CTC BIM Data Suite (Snapshot)
Reporting Guide

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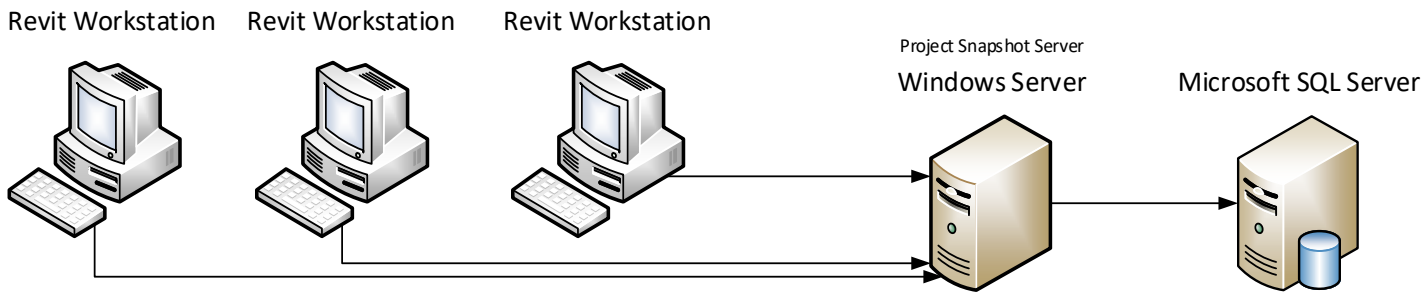
Snapshot Exporter Overview

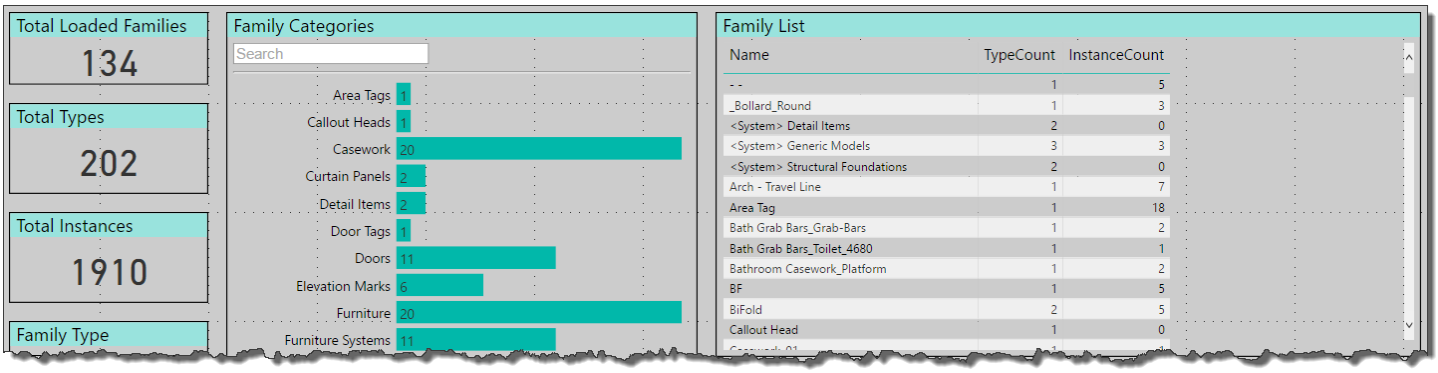
The Snapshot Exporter is a Revit Add-in that runs on demand or on a schedule from the CTC BIM Data Suite ribbon. Model data can be filtered, and ultimately stored in SQL, XML, JSON or CTC's Model Compare Format.

The data is written by the 'Data Suite' (Revit add-in) to memory. A conversion service then sends the data to the 'Snapshot Server' Windows service installed on a server. This service is responsible for writing the data to a Microsoft SQL Server database.



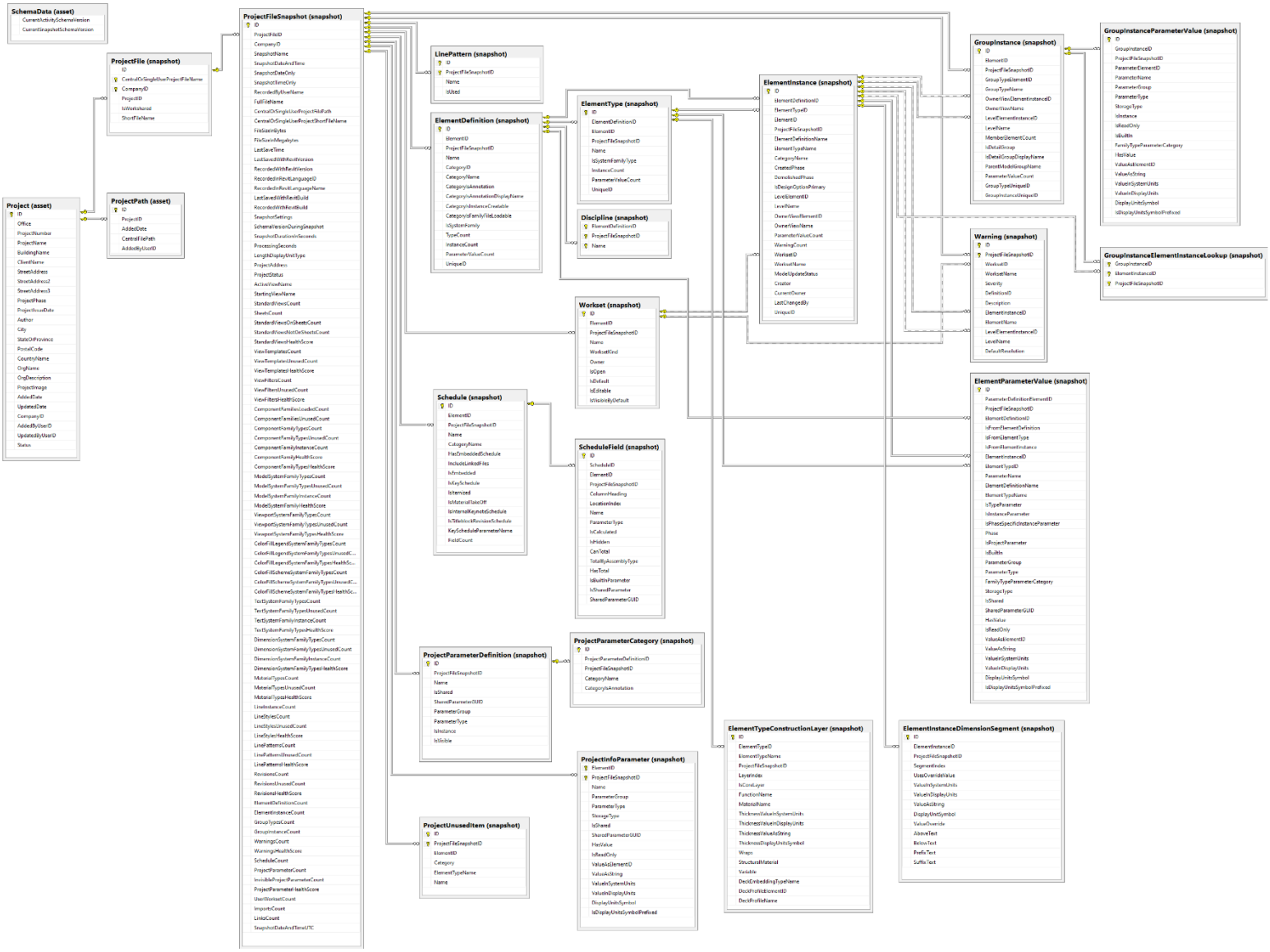
For more detailed information regarding the Snapshot process, Snapshot Server functionality and SQL Database structure, see the appropriate installation and user guides related to each tool.

By leveraging the data stored in SQL as a result of the snapshot process, the report chart below illustrates some of the visualization options available in tools such as Power BI or Tableau. Examples of the example reports provided by CTC can be found in [Appendix B – Report Tab Explanations](#).



Data Structure

The following image shows the portions of the structure of the data in the database which are related to project snapshots. Child tables are shown to the right of parent tables. Some of the tables shown in this structure are referenced elsewhere in this document.



Data Collection Explained

Data is collected by the client "Project Snapshot Exporter" add-in application on demand, or via a scheduled task in the Revit editing session. Below a few tables will be discussed as they relate to the report outlined later in this document

ProjectFileSnapshot Table

The ProjectFileSnapshot table contains approximately 90 fields providing an excellent overview of the captured data. In the example report, every piece of data is sourced from this table. Important project file information, and quantity summaries are stored here to allow you easy access to the health information about your project model(s)

ElementDefinition Table

Most of the components in Revit that can be managed by a family/category have the high-level information stored here. This table allows access to families, views, links and many other aspects of the Revit project model. Ultimately, if it is not a Workset, Schedule, Group or Warning, it is likely that the top-level information is in this table.

This table is often the basis for many of the Detail tabs in the example report, often backed up by the Element Types and Element Parameter Values tables.

ElementType Table

The ElementType table is dependent on the ElementDefinition table. If there is more detailed type information from one of the element definitions, it is likely that information will be found here. This table is often used in the example report to allow a deeper dive into the project data and provide quantities related to types and their dependent instances

ElementInstance Table

The ElementInstance table is dependent on the ElementType table. When individual instances and their properties are desired, this is likely the table that will be used. This table is also referenced by the GroupInstance table to help understand which instances are contained in groups, and what their properties are.

ElementParameterValue Table

This table stores the value of almost every parameter in the project. It is referenced and highly dependent on both the ElementType and ElementInstance tables. As almost every captured parameter value is stored here, it by far the largest table in the entire database. While the sample report rarely uses this table to display data, it is often used to filter results from the other tables.

To optimize the SQL server, and speed up your Power BI reporting, it is recommended that you carefully consider filtering out parameters that you are unlikely to need in your reports when taking the snapshot. Limiting what is captured will speed up data conversions, and speed up reporting refresh times. That said, if you do not capture something, you cannot report on it. Carefully consider what should be included and excluded in the snapshot data stored in SQL server.

ProjectParameterDefinition Table

Project parameters are some of the few parameters that are not stored in the ElementParameterValue table. These may refer to elements, but they have special properties that require they be stored differently for easily accessibility. These are used on a single report in the sample database, and can often provide interesting insight into project health. Projects may often have project parameters defined that are invisible. It is difficult for users to access this information limiting its value. This table can help you discover this type of information in your project models.

ProjectParameterCategory Table

The ProjectParameterCategory table is dependent on the ProjectParameterDefinition table. This table allows you to gain insight on how project parameters are used. This table is also highly used on the Project Parameters detailed report tab in the provided sample report.

ElementTypeConstructionLayer Table

The ElementTypeConstructionLayer table is dependent on the ElementType table. This table contains the information about the “layers” defined in walls, ceilings, floors, roofs and pads. The table is structured the same as seen in Revit.

ElementInstanceDimensionSegment Table

The ElementInstanceDimensionSegment table is dependent on the ElementInstance table. This table contains the information about dimension segments, most notably whether or not an override value is being displayed instead of the actual value of the dimension.

Appendix A – Example Power BI File

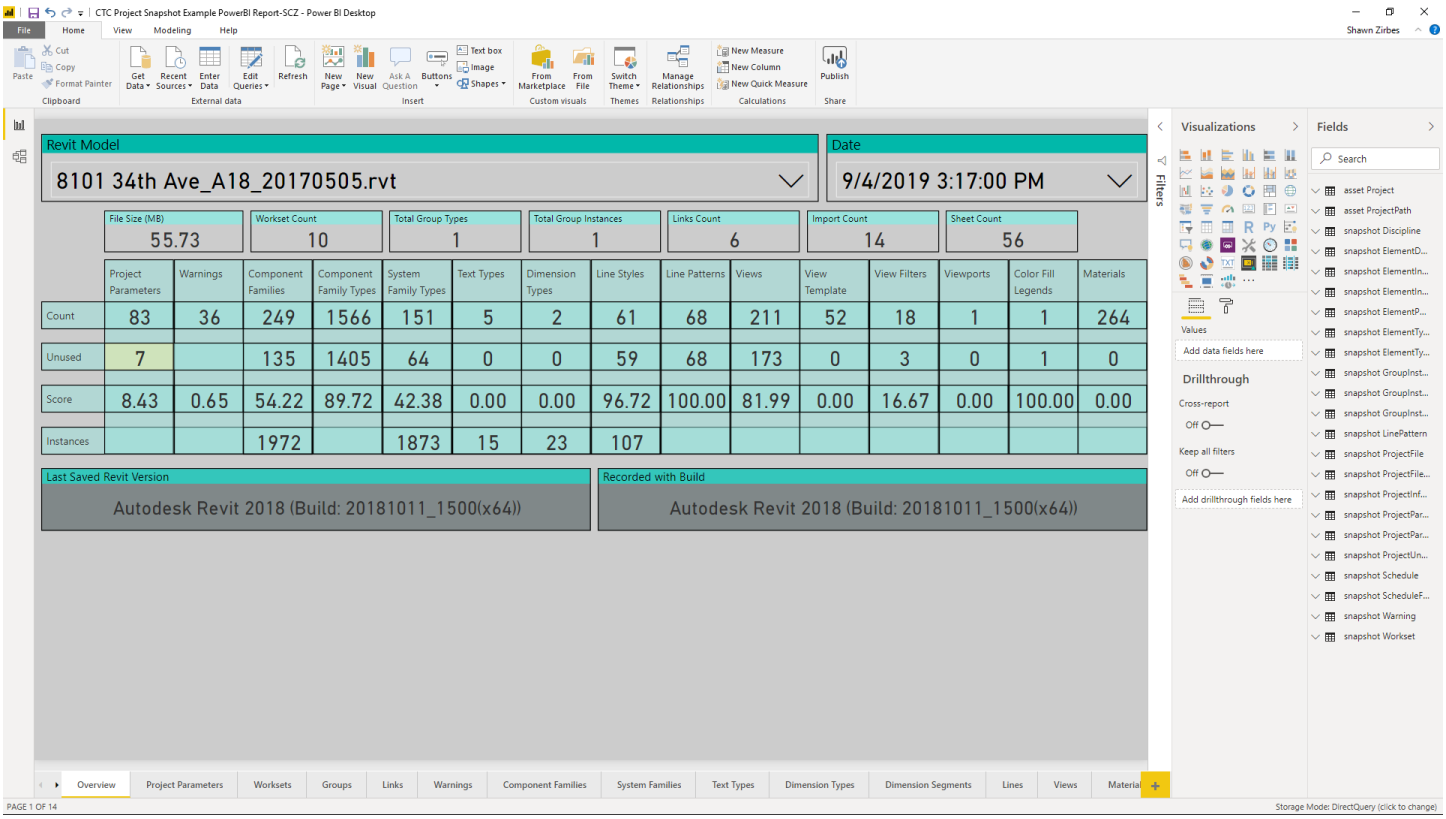
A sample Power BI file (*CTC Project Snapshot Example PowerBI Report.pbix*) is provided as a starting point for your data visualizations. The file can be found in folder:

C:\ProgramData\CTC\Project Snapshot Exporter

IMPORTANT: Also located in this folder is a file called *!Optimal Health Check Snapshot Filters.psf* which can be used when taking a snapshot (e.g. in the Project Snapshot Exporter add-in for Revit) to minimally gather all the data needed by the sample PowerBI file. This can GREATLY reduce the amount of time it takes to take a snapshot and get it into the database.

Initially the file only contains some sample data. To access your data a few configuration changes must be made. Once the configuration is complete, Power BI will pull data from a number of tables in the CTCBIMData database found on one of your SQL Server instances.

Before proceeding, confirm the exact SQL Server instance name with your database administrator.



Example dashboard

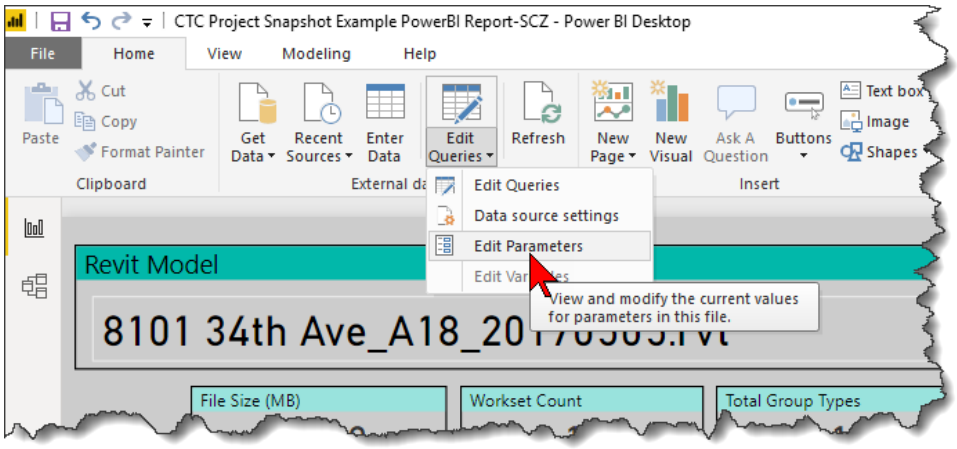
Configure Power BI Files to Access Your Database

The following steps must be applied to the provided Power BI sample file.

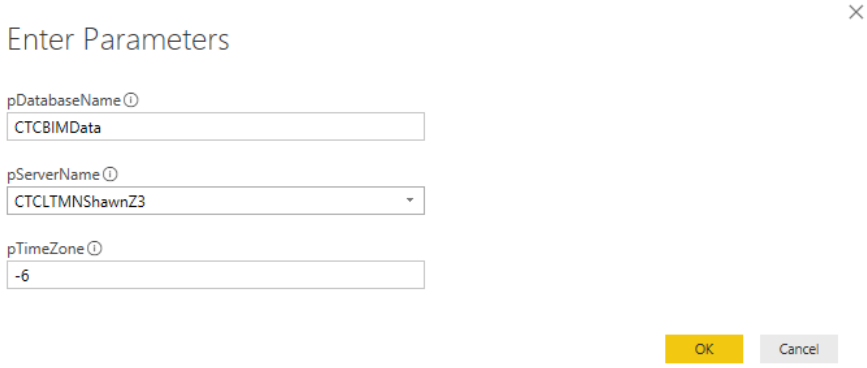
Edit Data Sources

The ServerName parameter (pServerName) must be an exact match to your SQL Server instance name.

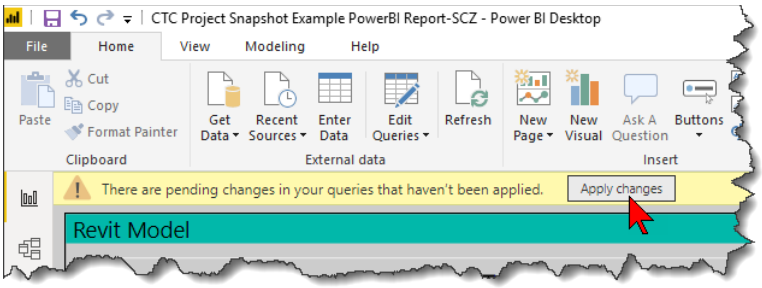
1. Select the 'Home' ribbon panel, then 'Edit Queries → Edit Parameters':



2. Enter your SQL Server instance name and database name:



3. Select "Apply Changes" from the update noticifation to pull the latest data from your SQL server's database:

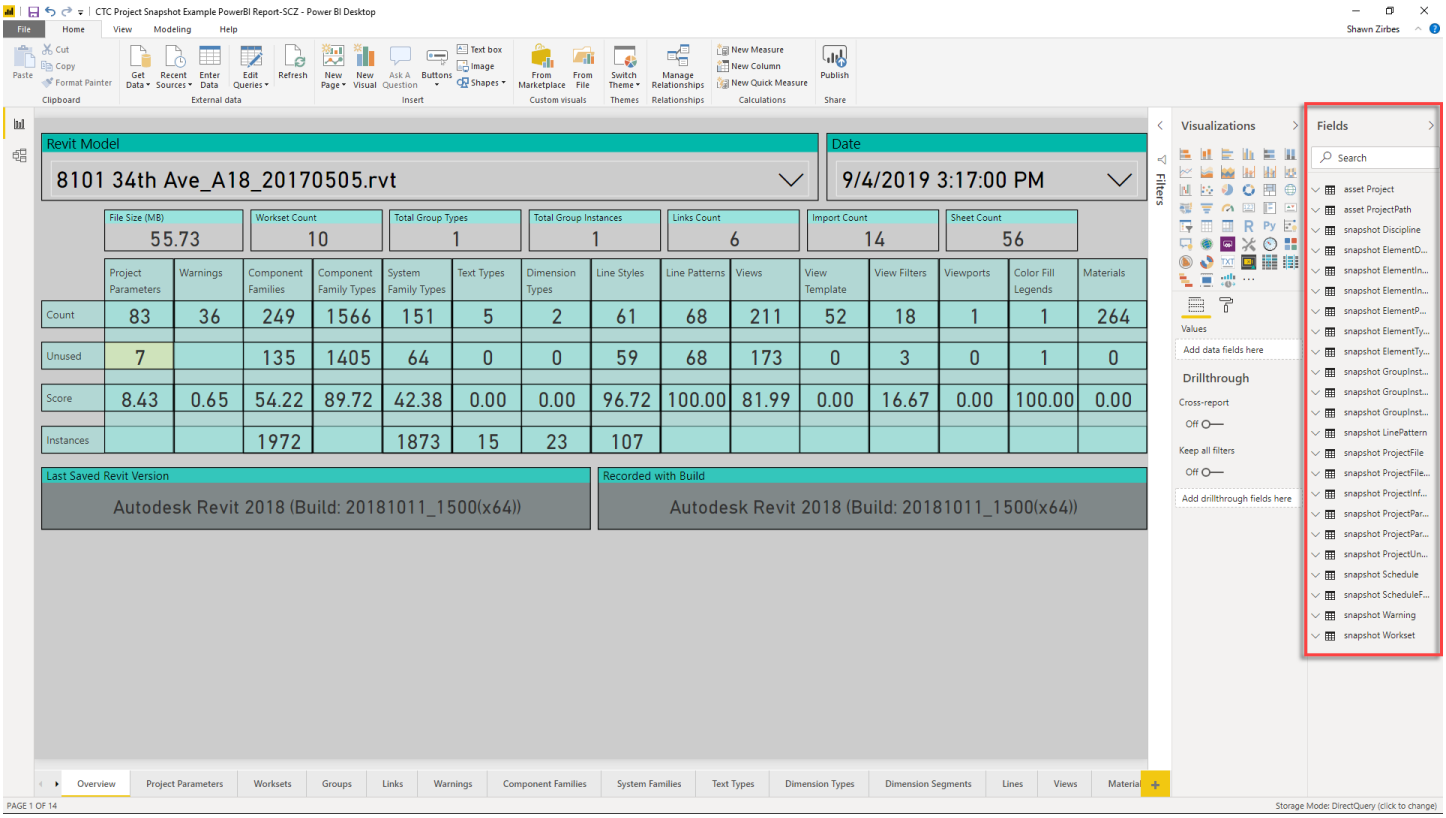


NOTE: Whenever updated data is required, the Refresh button should be pressed in Power BI to ensure latest data is available to the reporting interface.

CTC Snapshot Power BI Reports - Reporting Tables

The reporting tables found in this file are populated directly from tables in the CTCBIMData database. Stored procedures or views (not included) can also be used because they provide the ability to provide database level filtering when retrieving records from your database, resulting in faster data retrieval. The CTC-provided example, using the Power BI tool, created visualizations directly using the tables rather than stored procedures or custom views.

To view the reporting tables in Power BI, expand the 'Fields' pane:



Appendix B – Report Tab Explanations

Reporting or visualization requirements vary greatly by organization. Today's issue requiring analysis and/or presentation will quickly change. Flexible tools such as Power BI and Tableau allow you to quickly create reports and visualizations from many different viewpoints (e.g. by model, project, user, or workstation). CTC overview and detailed examples are documented below.

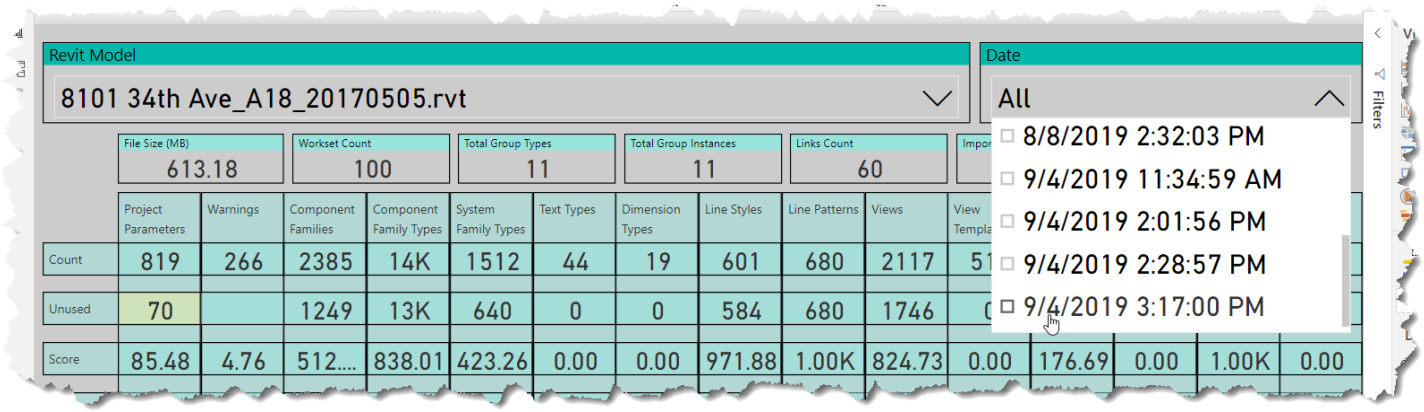
The example report authored by CTC is designed to represent a single model at a single point in time. The report can be used to understand the general health of a model in an isolated environment. CTC hopes this report will inspire you to develop additional reports as your database begins to be populated to compare a single model to itself over time, and to similar models from other projects.

Report Settings (Primary)

This Power BI Report utilizes linked slicer filters to isolate an individual project at a specific date and time.

Specifying an explicit short file name in the 'Revit Model' slicer will automatically filter the date/time section to valid options for that file stored in the database. Further filtering the 'Date' slicer will provide the metrics for a single model at single point in time

When your report is properly connected to your SQL server, and your server has model information stored from at least one snapshot, the information presented will be relevant to your data. When more than one snapshot is in the database, you must use the slicer filters to retrieve valid information on any of the tabs. This report-level filtering does affect the entirety of the report, filtering every tab automatically to these selections.



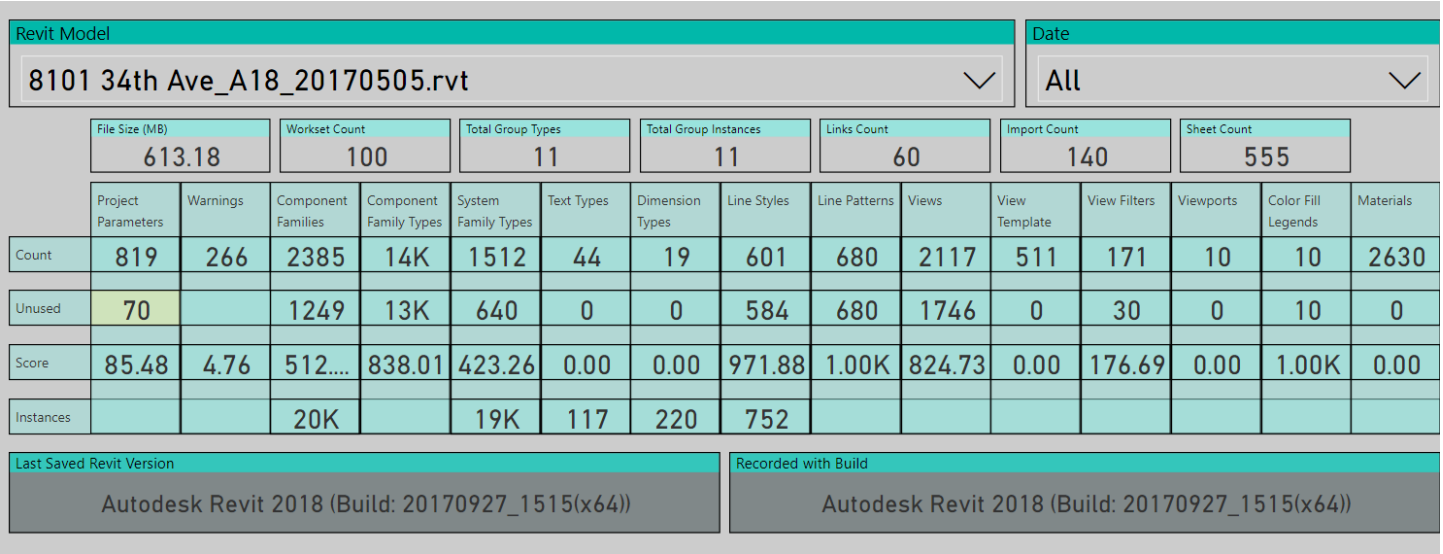
Report Settings (Secondary)

In order to refine some of the results, there is a report-level filter to eliminate the model's association to Assembly Code and Keynote Settings. This is, of course optional, so if your reports needed to represent that information, the report wide filter could be removed.

Report Tabs

Each tab in this report is designed to serve a specific purpose. The overview tab shows general information, while the remaining tabs provide detailed data about select sections on the overview tab.

Overview Tab



Revit Model: 8101 34th Ave_A18_20170505.rvt

Date: All

File Size (MB)	Workset Count	Total Group Types	Total Group Instances	Links Count	Import Count	Sheet Count
613.18	100	11	11	60	140	555

	Project Parameters	Warnings	Component Families	Component Family Types	System Family Types	Text Types	Dimension Types	Line Styles	Line Patterns	Views	View Template	View Filters	Viewports	Color Fill Legends	Materials
Count	819	266	2385	14K	1512	44	19	601	680	2117	511	171	10	10	2630
Unused	70		1249	13K	640	0	0	584	680	1746	0	30	0	10	0
Score	85.48	4.76	512....	838.01	423.26	0.00	0.00	971.88	1.00K	824.73	0.00	176.69	0.00	1.00K	0.00
Instances			20K		19K	117	220	752							

Last Saved Revit Version: Autodesk Revit 2018 (Build: 20170927_1515(x64))

Recorded with Build: Autodesk Revit 2018 (Build: 20170927_1515(x64))

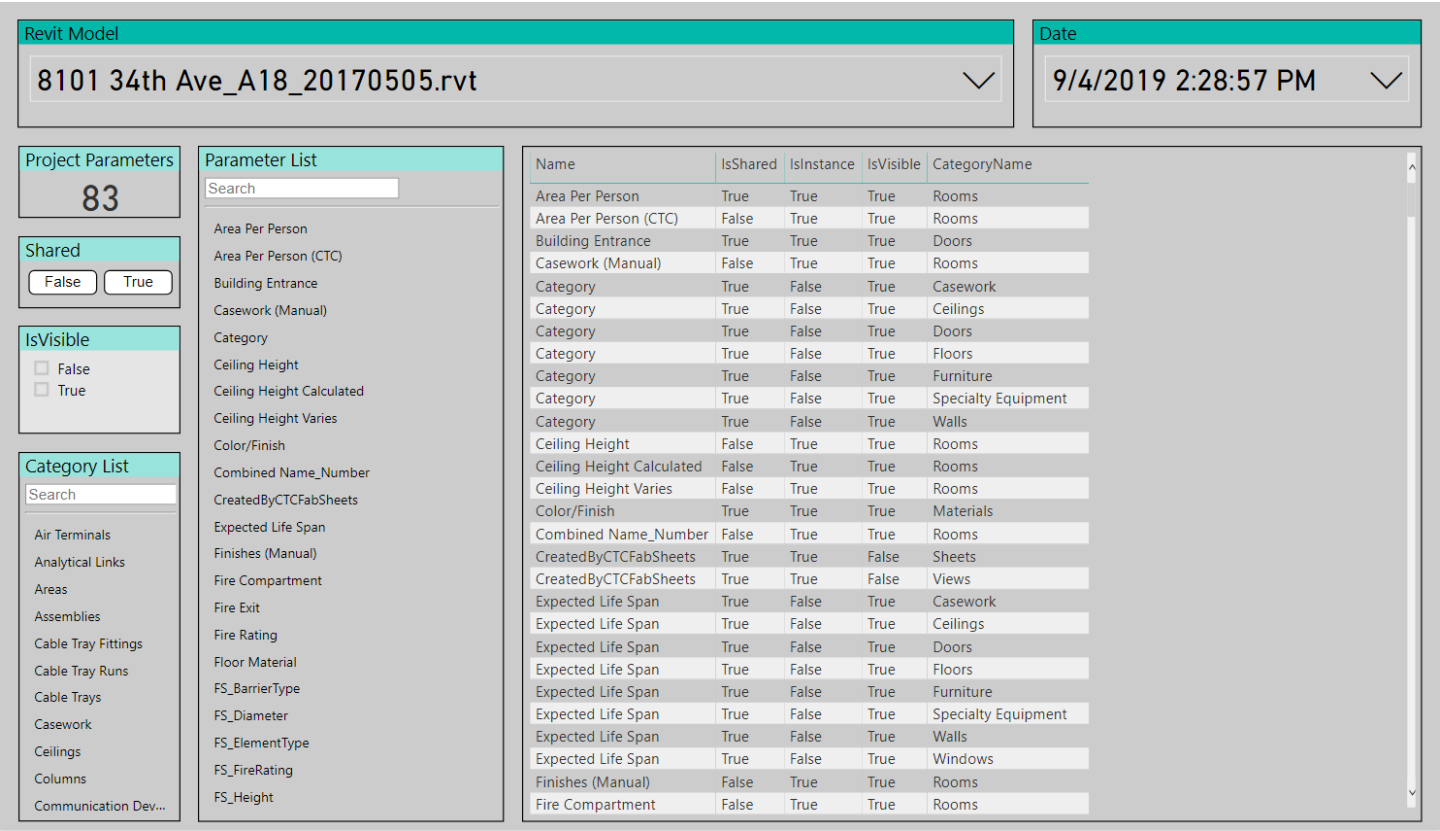
This tab reports exclusively from the ProjectFileSnapshot table in the database. The intent here is to represent the overall quantities from the captured Revit model. The values displayed here are captured, calculated and stored at the time the snapshot is written to SQL. As such, these values are not used on any other tabs in the example Power BI report as they are not dynamically read from the individual tables in the database.

On this tab, the desire is always to have the score for any scored section be as close to 0 as possible. Zeros in a specific category indicates that the model is healthy and free of unnecessary bulk in that segment.

Most categories are based on a percentage 0-100%. Warnings are the single variation where it compares the ratio of warning count to file size in MB. The ideal target range is two or less, where lower numbers are always better.

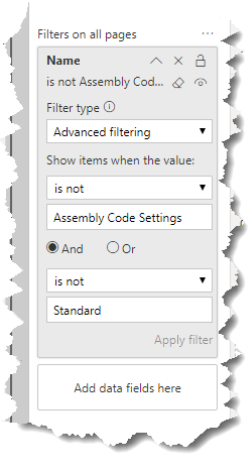
This tab uses no custom filtering, other than the report-level filtering defined earlier.

Project Parameters



Name	IsShared	IsInstance	IsVisible	CategoryName
Area Per Person	True	True	True	Rooms
Area Per Person (CTC)	False	True	True	Rooms
Building Entrance	True	True	True	Doors
Casework (Manual)	False	True	True	Rooms
Category	True	False	True	Casework
Category	True	False	True	Ceilings
Category	True	False	True	Doors
Category	True	False	True	Floors
Category	True	False	True	Furniture
Category	True	False	True	Specialty Equipment
Category	True	False	True	Walls
Ceiling Height	False	True	True	Rooms
Ceiling Height Calculated	False	True	True	Rooms
Ceiling Height Varies	False	True	True	Rooms
Color/Finish	True	True	True	Materials
Combined Name_Number	False	True	True	Rooms
CreatedByCTCFabSheets	True	True	False	Sheets
CreatedByCTCFabSheets	True	True	False	Views
Expected Life Span	True	False	True	Casework
Expected Life Span	True	False	True	Ceilings
Expected Life Span	True	False	True	Doors
Expected Life Span	True	False	True	Floors
Expected Life Span	True	False	True	Furniture
Expected Life Span	True	False	True	Specialty Equipment
Expected Life Span	True	False	True	Walls
Expected Life Span	True	False	True	Windows
Finishes (Manual)	False	True	True	Rooms
Fire Compartment	False	True	True	Rooms

The Project Parameters tab required the addition of a page level filter, but since many other tabs would benefit from the same filter, it was generated as a report-level filter.

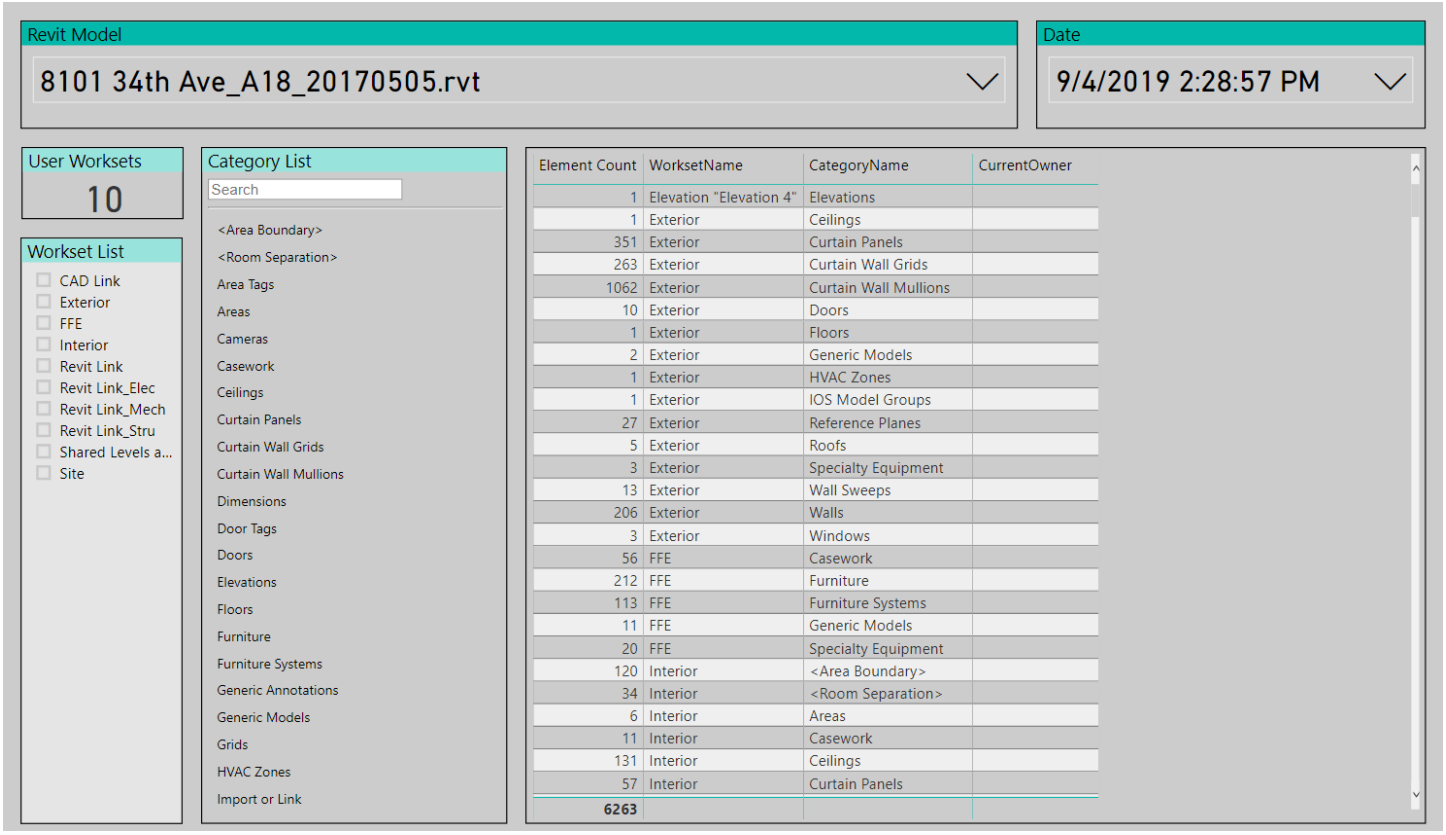


The above filter allows the project parameters and links tabs to exclude the Assembly Code and Keynote settings from the entire report as they aren't factored in the project health check, and their inclusion in certain areas may be misleading.

In typical Power BI fashion, each of the visualizations are dynamic. Selecting on any of the list, chicklet or checkbox options will filter the list across other visualizations on this tab to represent related information.

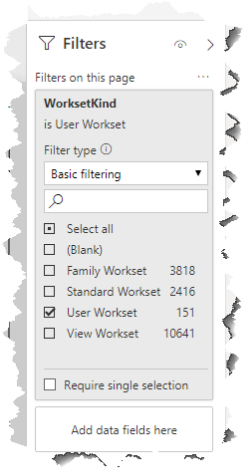
While they can add value, often invisible parameters can oddly affect the project. As such, it is recommended to minimize their use in project parameters.

Worksets



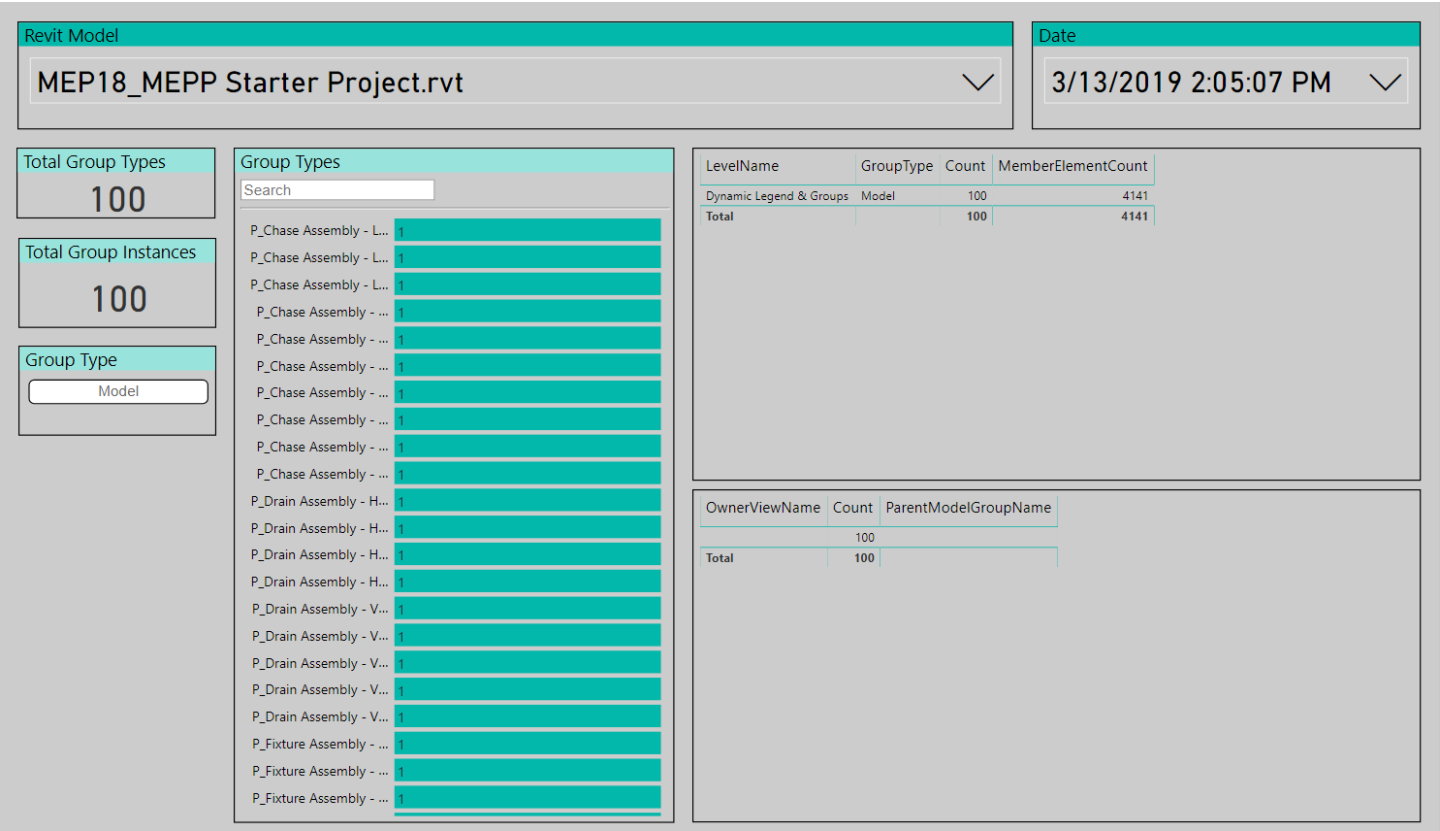
Element Count	WorksetName	CategoryName	CurrentOwner
1	Elevation "Elevation 4"	Elevations	
1	Exterior	Ceilings	
351	Exterior	Curtain Panels	
263	Exterior	Curtain Wall Grids	
1062	Exterior	Curtain Wall Mullions	
10	Exterior	Doors	
1	Exterior	Floors	
2	Exterior	Generic Models	
1	Exterior	HVAC Zones	
1	Exterior	IOS Model Groups	
27	Exterior	Reference Planes	
5	Exterior	Roofs	
3	Exterior	Specialty Equipment	
13	Exterior	Wall Sweeps	
206	Exterior	Walls	
3	Exterior	Windows	
56	FFE	Casework	
212	FFE	Furniture	
113	FFE	Furniture Systems	
11	FFE	Generic Models	
20	FFE	Specialty Equipment	
120	Interior	<Area Boundary>	
34	Interior	<Room Separation>	
6	Interior	Areas	
11	Interior	Casework	
131	Interior	Ceilings	
57	Interior	Curtain Panels	
6263			

The worksets tab is designed to represent user created worksets exclusively. Since the Revit API provides access to worksets in a somewhat odd manner, this tab has a series of tab-level filters to remove some of the rogue worksets that are not easily filtered out in a different way.



The filters on this tab can be utilized to validate some of the categories that have been placed on user created worksets.

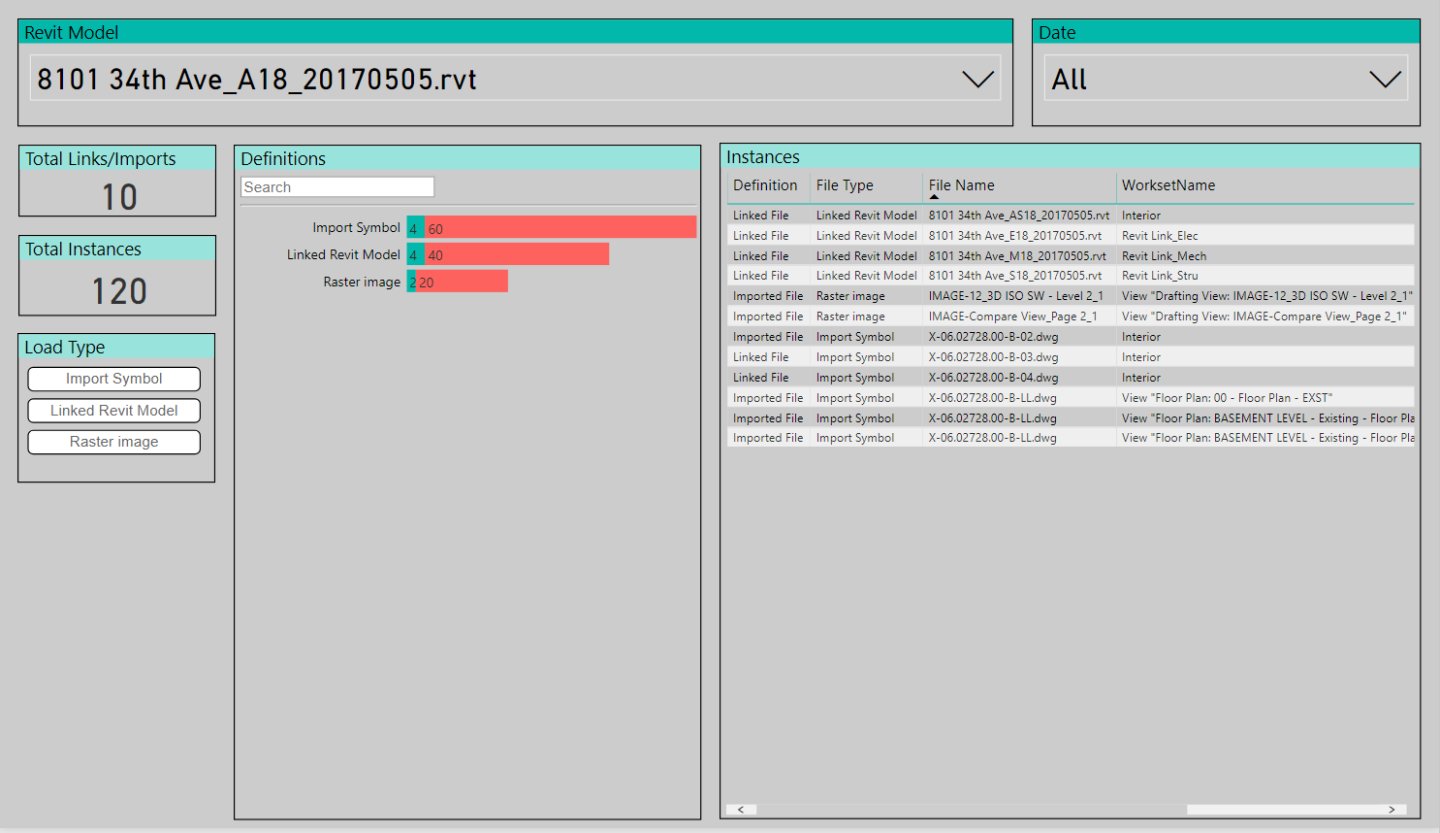
Groups



Groups in Revit can both be a great benefit and a source of pain. This tab is designed to represent both model and details groups, the worksets/views they are placed on, how many instances of the groups exist, and how many elements are contained in each group.

This information can be used to run a preliminary check to see if groups may be adversely affecting the project performance.

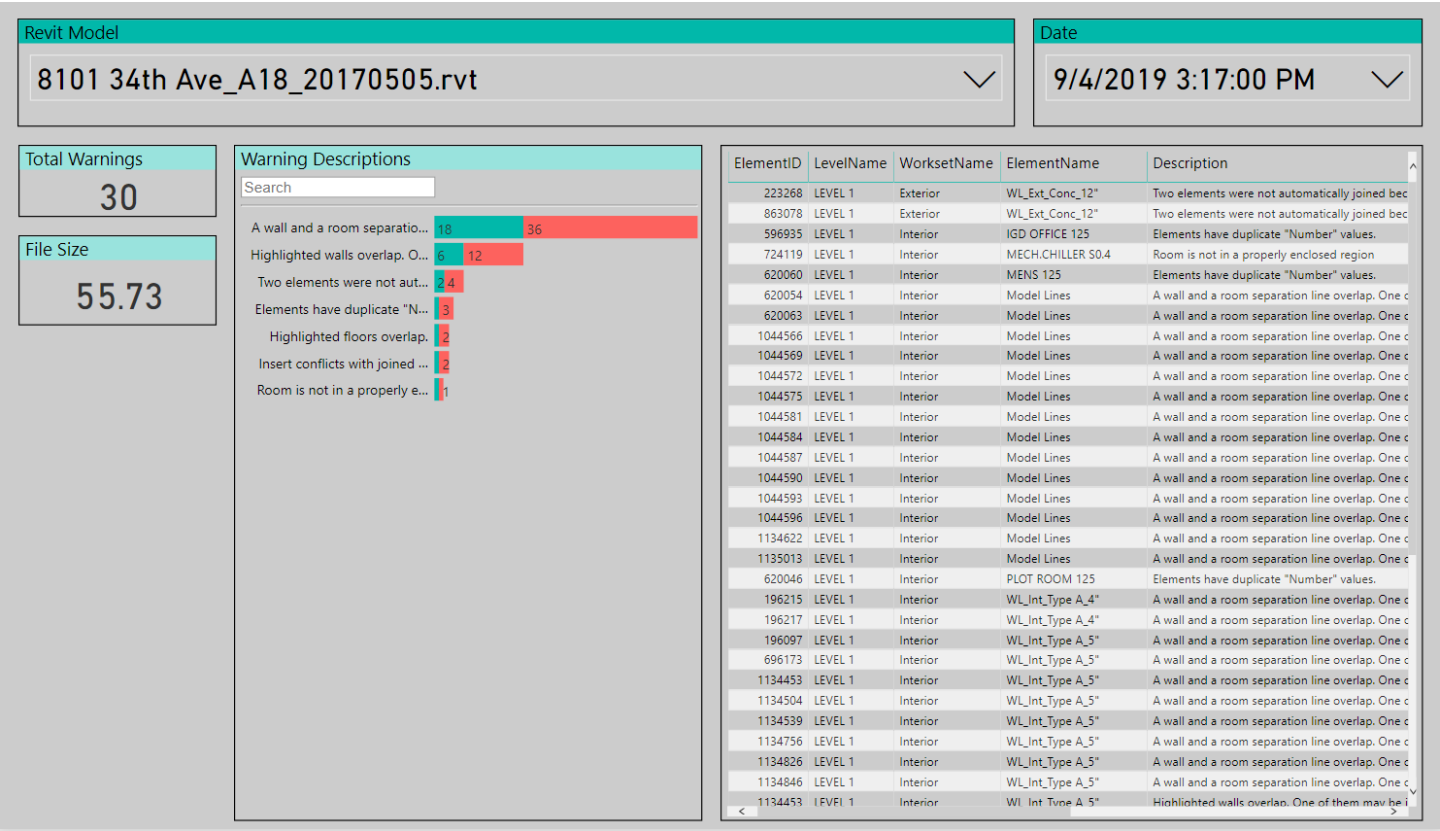
Links



Links and imports can be used to advance the performance of a model, or by leveraging too many imports; significantly degrade model performance. This tab is designed to provide insight into the links and imports that exist.

Ultimately, few to no imports of CAD files and images should exist in any model. Instead, links are preferred to maximize model performance. Understanding what imports exist, and where they are in the model, can lead to an action plan for model repair.

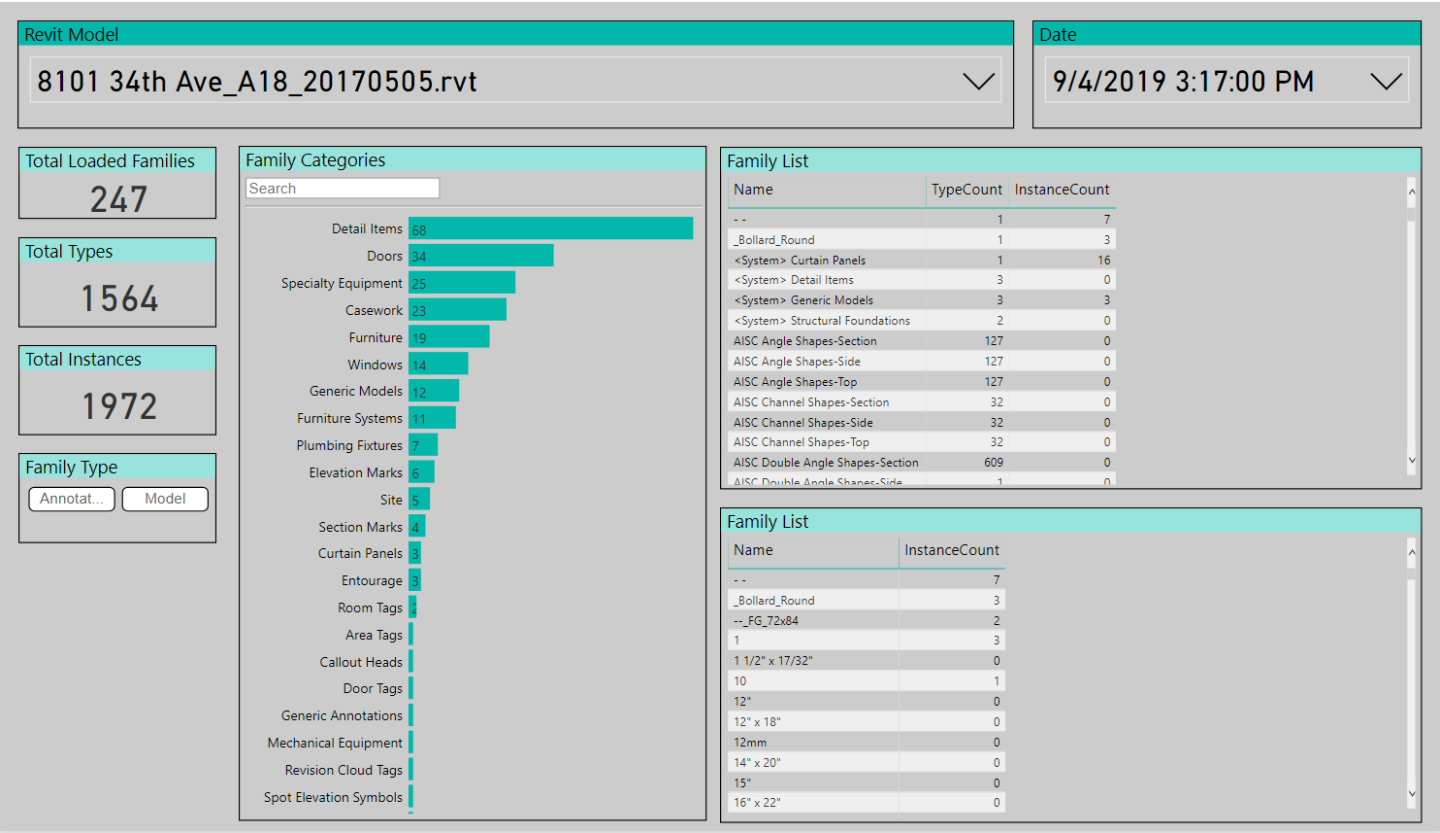
Warnings



While warnings do not add to the model file size, they do adversely affect the model performance in different ways. This tab is designed to provide a rapid summary of all model warnings, and indicate the elements affected by the warnings.

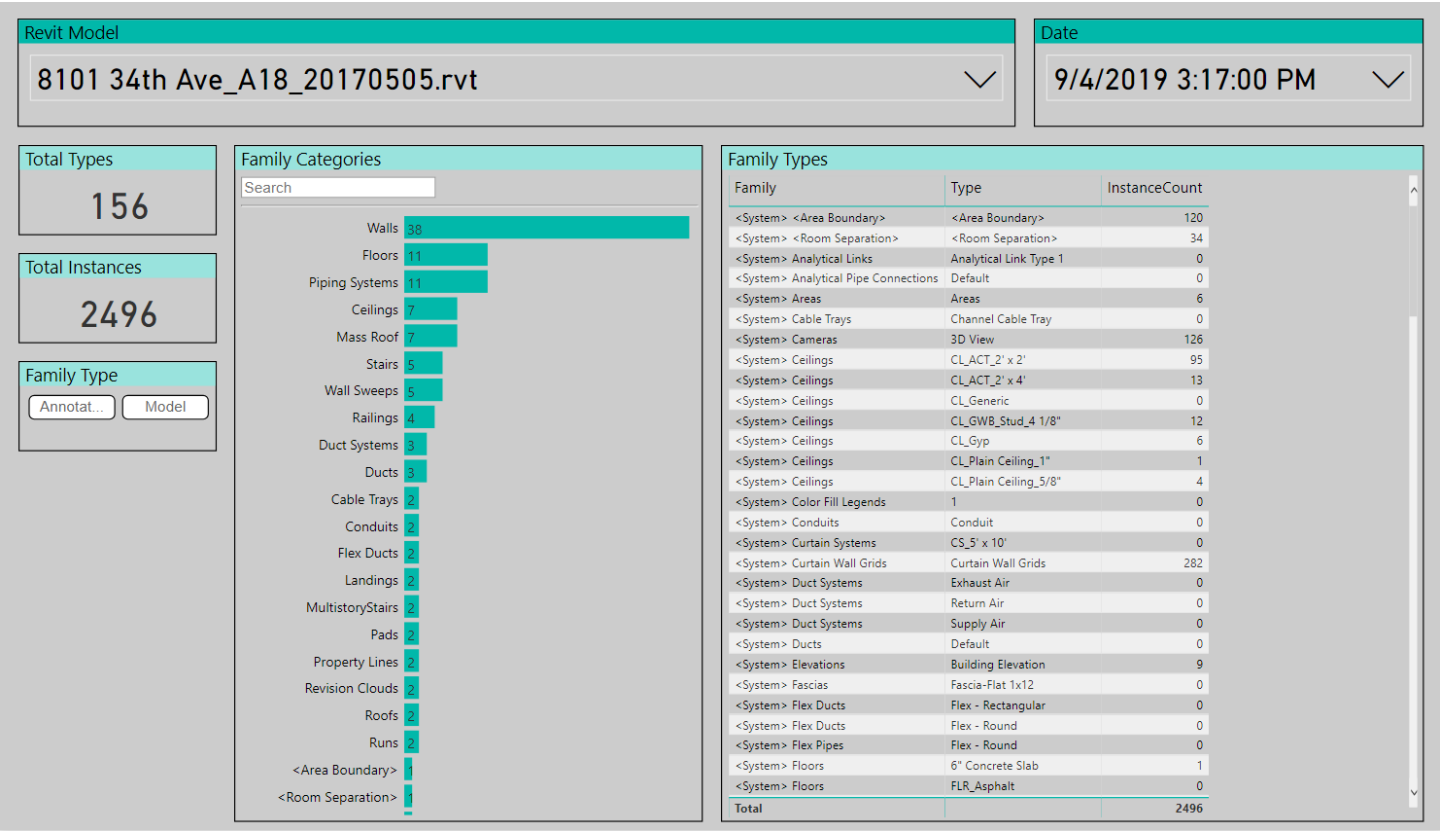
Having this understanding can make it easy to generate a repair plan for the project team.

Component Families



Component families are often ignored and left in the model when they are not needed. This tab will help reviewers understand loaded families and types that are unused, facilitating planning for model maintenance.

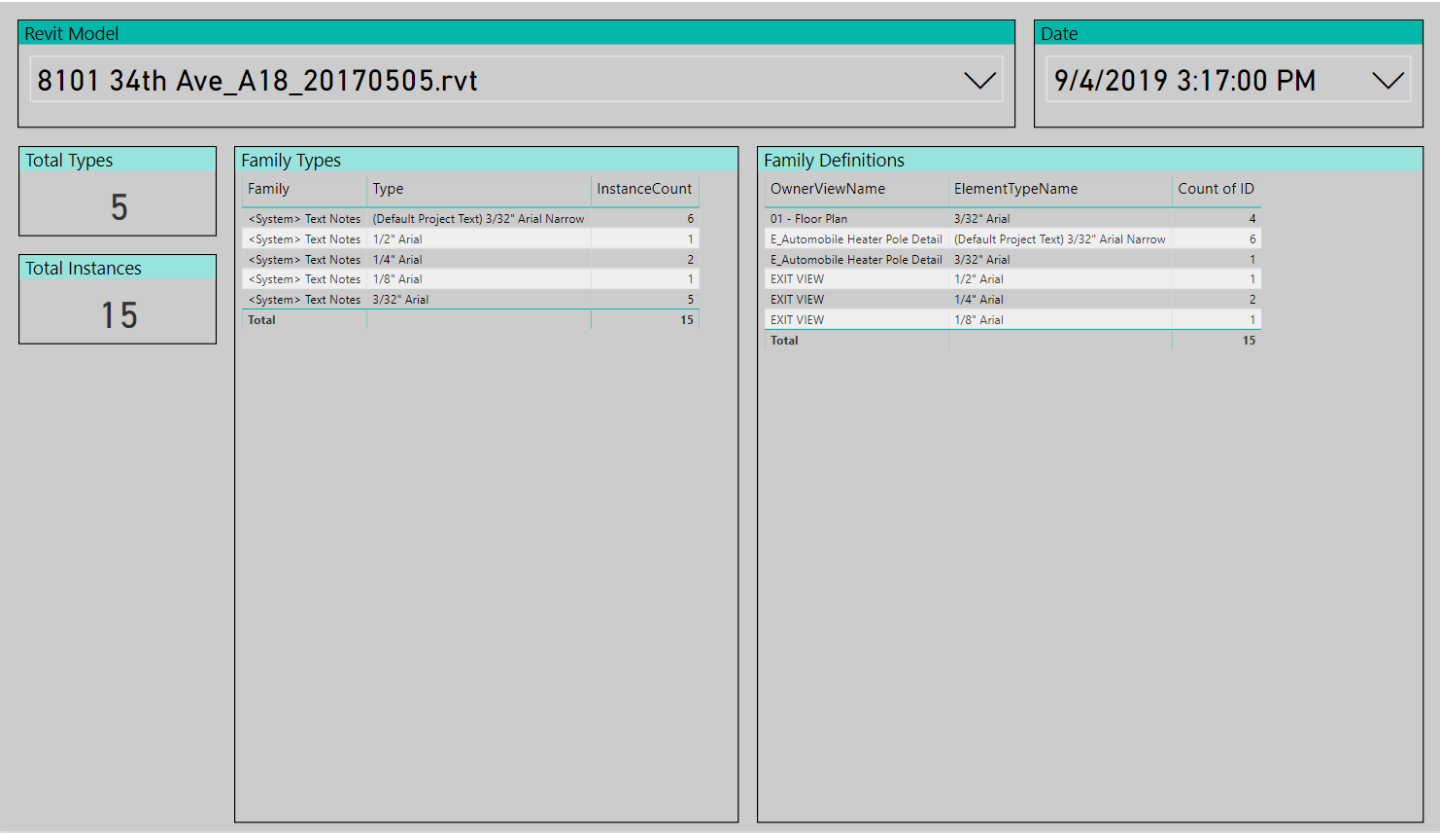
System Families



Like component families, system families can flood models. Often, they are imported using Revit's 'Transfer Project Standards,' bringing entire categories of system families into a model when only a single type is needed. Understanding the impact of this can aid in the maintenance of a model.

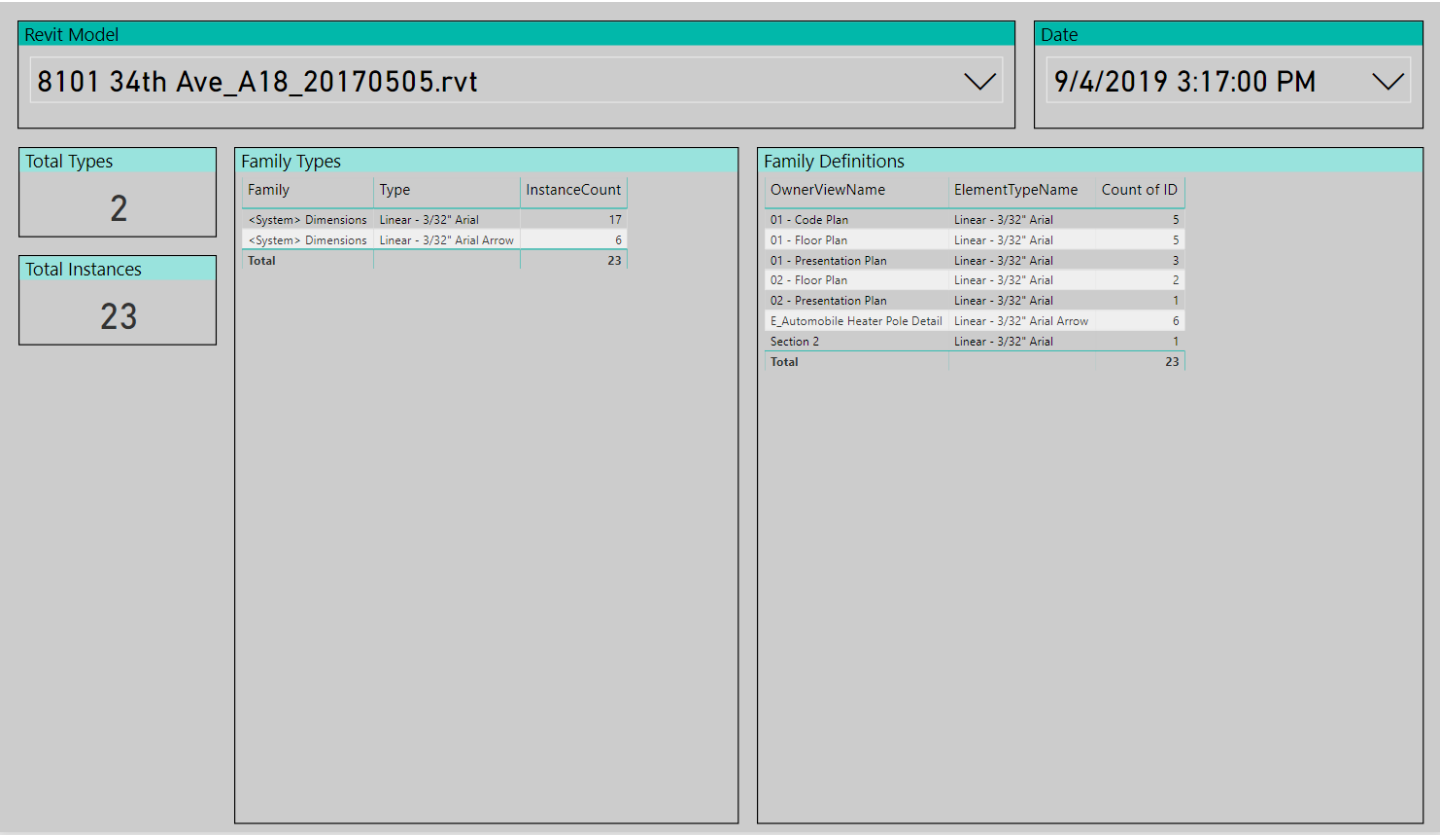
This tab is designed around major system families and allows filtering to better understand use and standards compliance.

Text Types



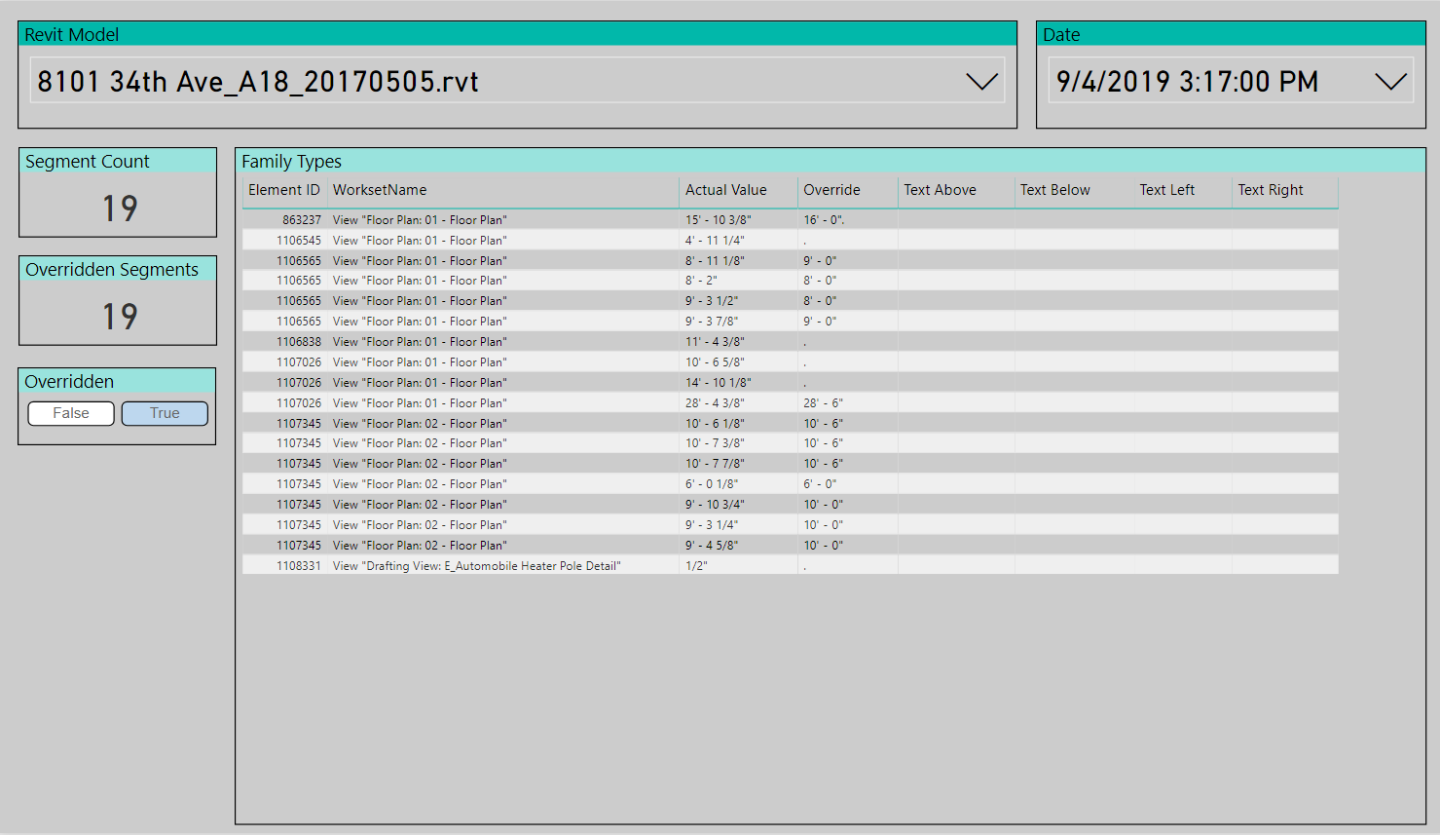
Text Types are technically a system family, but these types have been isolated to help understand the impact of possible CAD import explosions and general standards compliance.

Dimension Types



Like Text types, Dimension Types often manifest in projects, and non-standard types are often used. This tab makes it easy to report on the dimension types available, and their frequency of use in the model.

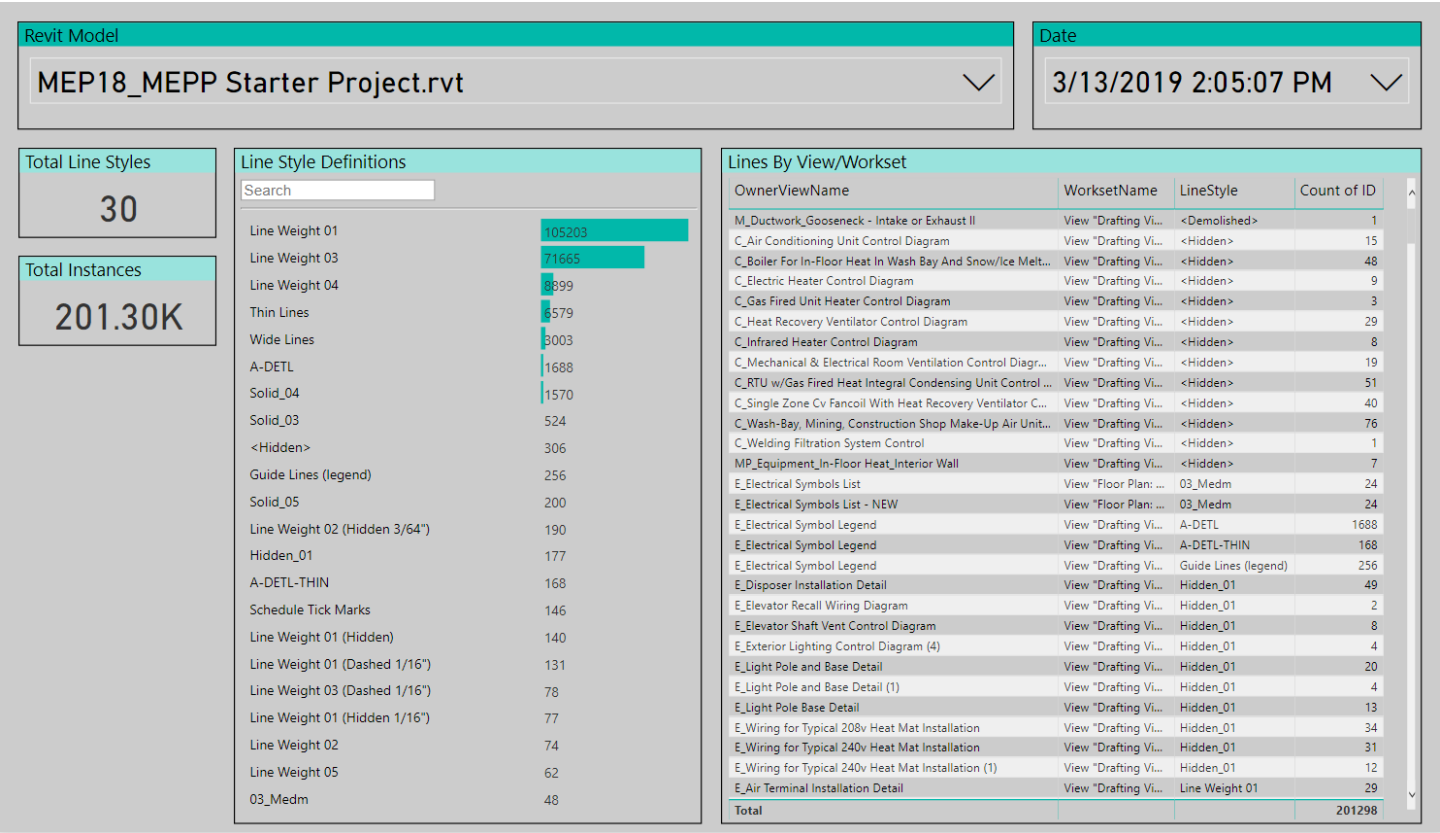
Dimension Segments



Element ID	WorksetName	Actual Value	Override	Text Above	Text Below	Text Left	Text Right
863237	View "Floor Plan: 01 - Floor Plan"	15' - 10 3/8"	16' - 0".				
1106545	View "Floor Plan: 01 - Floor Plan"	4' - 11 1/4"	.				
1106565	View "Floor Plan: 01 - Floor Plan"	8' - 11 1/8"	9' - 0"				
1106565	View "Floor Plan: 01 - Floor Plan"	8' - 2"	8' - 0"				
1106565	View "Floor Plan: 01 - Floor Plan"	9' - 3 1/2"	8' - 0"				
1106565	View "Floor Plan: 01 - Floor Plan"	9' - 3 7/8"	9' - 0"				
1106838	View "Floor Plan: 01 - Floor Plan"	11' - 4 3/8"	.				
1107026	View "Floor Plan: 01 - Floor Plan"	10' - 6 5/8"	.				
1107026	View "Floor Plan: 01 - Floor Plan"	14' - 10 1/8"	.				
1107026	View "Floor Plan: 01 - Floor Plan"	28' - 4 3/8"	28' - 6"				
1107345	View "Floor Plan: 02 - Floor Plan"	10' - 6 1/8"	10' - 6"				
1107345	View "Floor Plan: 02 - Floor Plan"	10' - 7 3/8"	10' - 6"				
1107345	View "Floor Plan: 02 - Floor Plan"	10' - 7 7/8"	10' - 6"				
1107345	View "Floor Plan: 02 - Floor Plan"	6' - 0 1/8"	6' - 0"				
1107345	View "Floor Plan: 02 - Floor Plan"	9' - 10 3/4"	10' - 0"				
1107345	View "Floor Plan: 02 - Floor Plan"	9' - 3 1/4"	10' - 0"				
1107345	View "Floor Plan: 02 - Floor Plan"	9' - 4 5/8"	10' - 0"				
1108331	View "Drafting View: E_Automobile Heater Pole Detail"	1/2"	.				

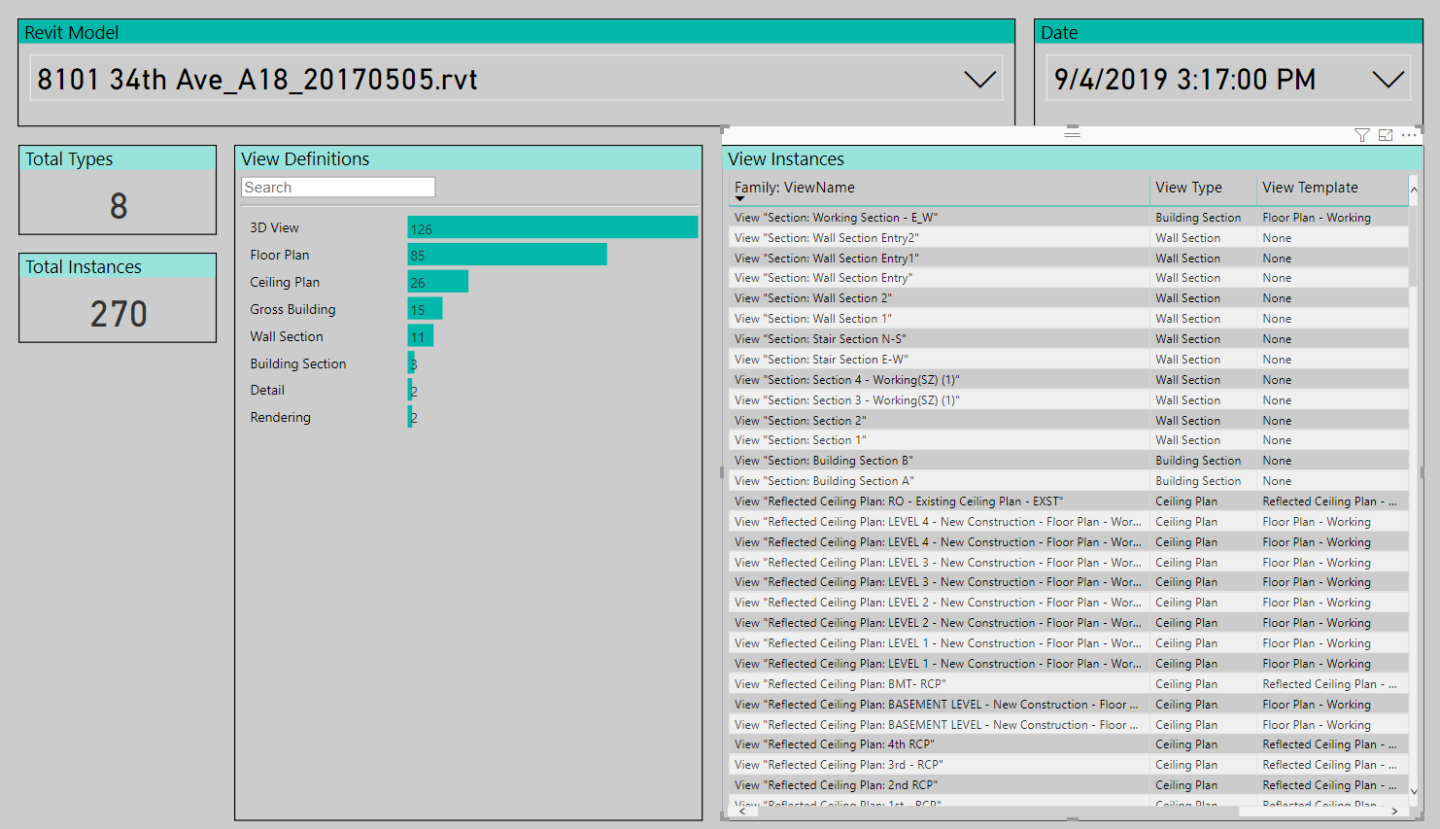
Often in models dimension values are overridden. Repairing improperly overridden dimensions certainly is a great task, but first these issues must be identified. This tab allows isolation of dimensions where value overrides exist, and a report of added text, above/below/left/right can also be achieved here.

Lines



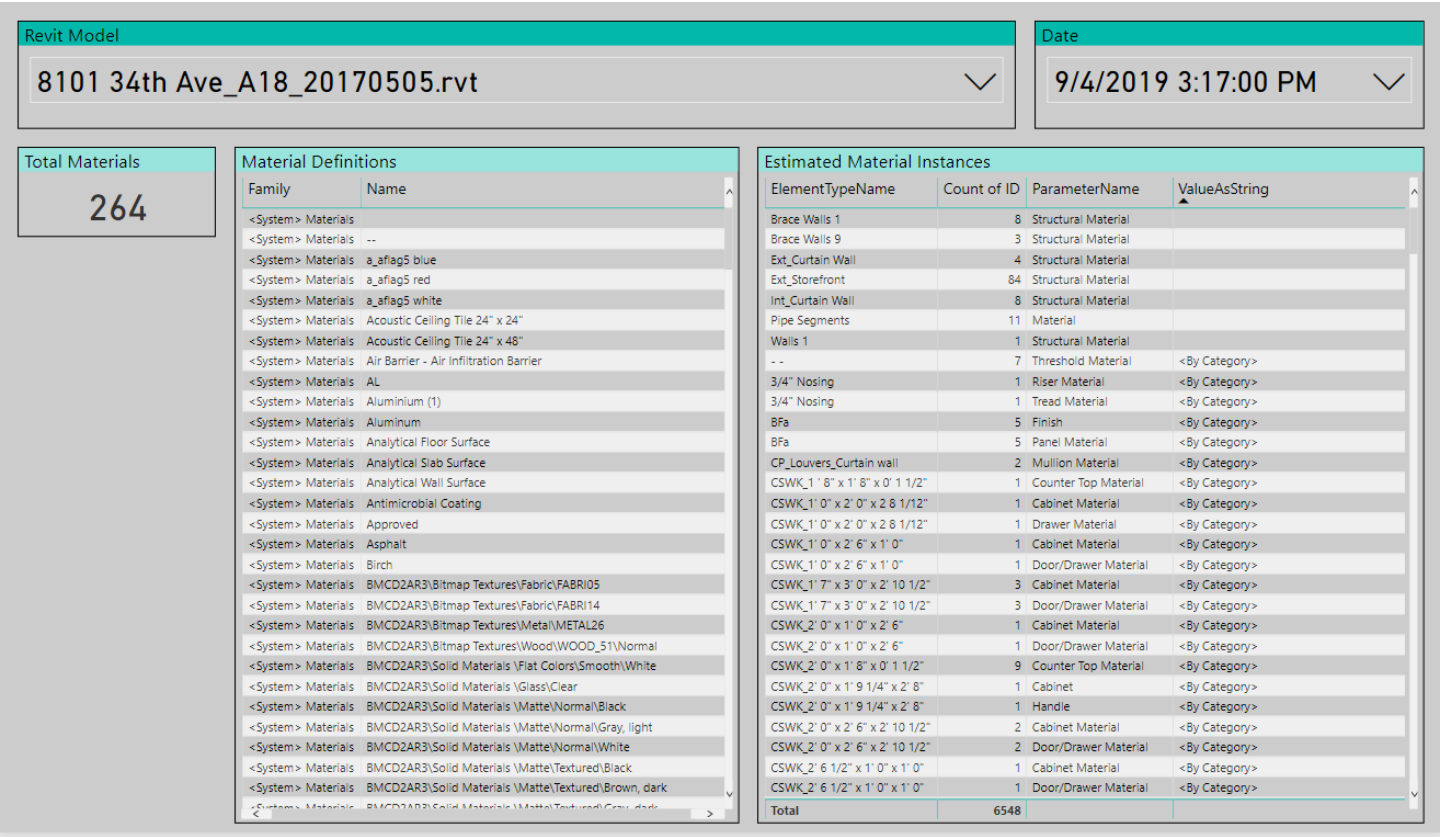
We cannot all be aware of every drafted line in our models… or can we. This tab all uses of drawn lines, identifying line styles used and potential exploded CAD files apparent. It is always best to pair this with one of CTC's other tools, like BIM Manager Suite's *Type Swapper,* to help in repairing a model when issues are discovered. This tab can provide insight prior to needing to access the original model manually.

Views



Unused views in a project can become a major issue. This tab is designed to help the reviewer understand the breakdown of views and their potential usage in the project.

Materials



Revit Model: 8101 34th Ave_A18_20170505.rvt

Date: 9/4/2019 3:17:00 PM

Total Materials: 264

Material Definitions

Family	Name
<System> Materials	
<System> Materials	--
<System> Materials	a_aflag5 blue
<System> Materials	a_aflag5 red
<System> Materials	a_aflag5 white
<System> Materials	Acoustic Ceiling Tile 24" x 24"
<System> Materials	Acoustic Ceiling Tile 24" x 48"
<System> Materials	Air Barrier - Air Infiltration Barrier
<System> Materials	AL
<System> Materials	Aluminium (1)
<System> Materials	Aluminum
<System> Materials	Analytical Floor Surface
<System> Materials	Analytical Slab Surface
<System> Materials	Analytical Wall Surface
<System> Materials	Antimicrobial Coating
<System> Materials	Approved
<System> Materials	Asphalt
<System> Materials	Birch
<System> Materials	BMCD2AR3\Bitmap Textures\Fabric\FABRI05
<System> Materials	BMCD2AR3\Bitmap Textures\Fabric\FABRI14
<System> Materials	BMCD2AR3\Bitmap Textures\Metal\METAL26
<System> Materials	BMCD2AR3\Bitmap Textures\Wood\WOOD_51\Normal
<System> Materials	BMCD2AR3\Solid Materials \Flat Colors\Smooth\White
<System> Materials	BMCD2AR3\Solid Materials \Glass\Clear
<System> Materials	BMCD2AR3\Solid Materials \Matte\Normal\Black
<System> Materials	BMCD2AR3\Solid Materials \Matte\Normal\Gray, light
<System> Materials	BMCD2AR3\Solid Materials \Matte\Normal\White
<System> Materials	BMCD2AR3\Solid Materials \Matte\Textured\Black
<System> Materials	BMCD2AR3\Solid Materials \Matte\Textured\Brown, dark

Estimated Material Instances

ElementTypeName	Count of ID	ParameterName	ValueAsString
Brace Walls 1	8	Structural Material	
Brace Walls 9	3	Structural Material	
Ext_Curtain Wall	4	Structural Material	
Ext_Storefront	84	Structural Material	
Int_Curtain Wall	8	Structural Material	
Pipe Segments	11	Material	
Walls 1	1	Structural Material	
- -	7	Threshold Material	<By Category>
3/4" Nosing	1	Riser Material	<By Category>
3/4" Nosing	1	Tread Material	<By Category>
BFa	5	Finish	<By Category>
BFa	5	Panel Material	<By Category>
CP_Louvers_Curtain wall	2	Mullion Material	<By Category>
CSWK_1 ' 8" x 1' 8" x 0' 1 1/2"	1	Counter Top Material	<By Category>
CSWK_1' 0" x 2' 0" x 2 8 1/12"	1	Cabinet Material	<By Category>
CSWK_1' 0" x 2' 0" x 2 8 1/12"	1	Drawer Material	<By Category>
CSWK_1' 0" x 2' 6" x 1' 0"	1	Cabinet Material	<By Category>
CSWK_1' 0" x 2' 6" x 1' 0"	1	Door/Drawer Material	<By Category>
CSWK_1' 7" x 3' 0" x 2' 10 1/2"	3	Cabinet Material	<By Category>
CSWK_1' 7" x 3' 0" x 2' 10 1/2"	3	Door/Drawer Material	<By Category>
CSWK_2' 0" x 1' 0" x 2' 6"	1	Cabinet Material	<By Category>
CSWK_2' 0" x 1' 0" x 2' 6"	1	Door/Drawer Material	<By Category>
CSWK_2' 0" x 1' 8" x 0' 1 1/2"	9	Counter Top Material	<By Category>
CSWK_2' 0" x 1' 9 1/4" x 2' 8"	1	Cabinet	<By Category>
CSWK_2' 0" x 1' 9 1/4" x 2' 8"	1	Handle	<By Category>
CSWK_2' 0" x 2' 6" x 2' 10 1/2"	2	Cabinet Material	<By Category>
CSWK_2' 0" x 2' 6" x 2' 10 1/2"	2	Door/Drawer Material	<By Category>
CSWK_2' 6 1/2" x 1' 0" x 1' 0"	1	Cabinet Material	<By Category>
CSWK_2' 6 1/2" x 1' 0" x 1' 0"	1	Door/Drawer Material	<By Category>
Total	6548		

Materials in a project aren't always very easy to understand. This tab is designed to provide the information that is available from Revit in order to understand the usage of materials in a project. This can also lead into project model maintenance processes in order to improve overall model performance.