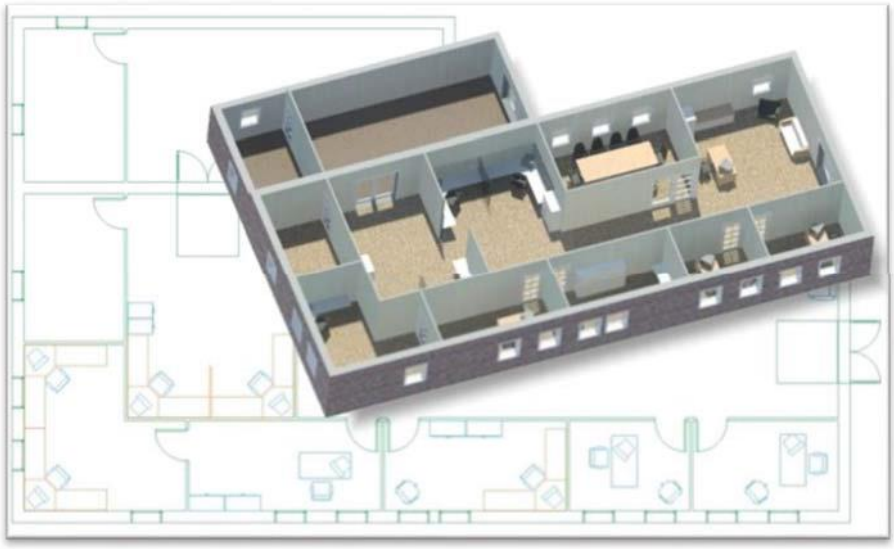


PMWeb and Building Information Management (BIM)

Contents

Introduction

Building Information Modeling (BIM) is the practice of using digital data to represent real world structures. This data can be presented as 3 dimensional models, spreadsheets, relational databases, and more. PMWeb offers a wide variety of tools that let you view, interact with, and create BIM data. This paper introduces several of those tools and provides an overview of their uses. Please consult PMWeb documentation and your PMWeb trainer for more detailed information about any of these topics.

In the sections that follow we discuss:

- The PMWeb 3D Viewer – Use this fast and powerful online tool to view and interact with models in most 3d formats. Take unlimited snapshots and use them to attach to and create new PMWeb records in real time.
- PMWeb Model Manager records – Model Manager records let you view, monitor, and approve any model, whether it is held by you or any of your partners.
- The PMWeb Autodesk Revit Add-in – This lightweight add-in lets you connect unlimited Revit models directly to your PMWeb database. Use the add-in to automatically generate and link to actual PMWeb records.
- PMWeb COBie Manager records – The PMWeb Revit Add-in sends COBie-formatted data to PMWeb, automatically creating COBie Manager records which can be analyzed, edited, and used to create PMWeb asset records.
- BIM Takeoff in PMWeb Estimates – Generate takeoff data from Revit models and use it to populate PMWeb Estimates with quantities and costs.

PMWeb 3D Viewer

The PMWeb 3D Viewer can be used to view and interact with many types of 3D file formats. Use the 3D Viewer to inspect models, rotate them, explode them, and take measurements. The 3D Viewer can be opened from any Attachments tab, the Document Manager, and from a Model Manager record.

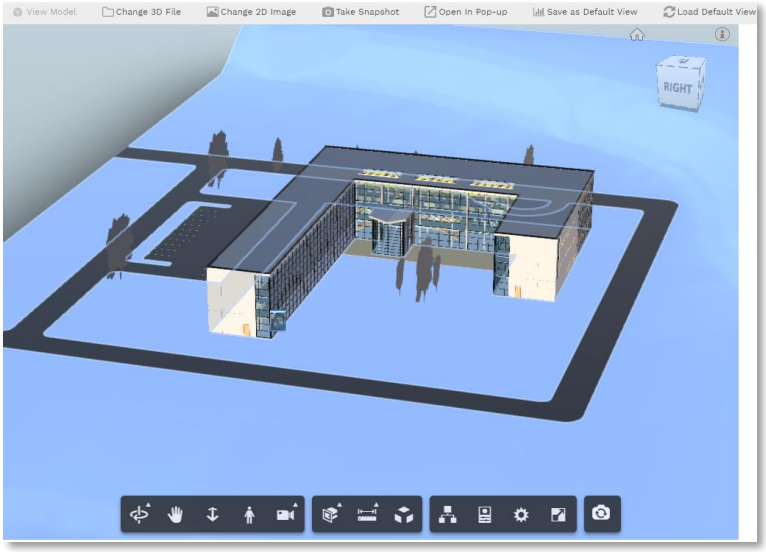


Figure 1 - The PMWeb 3D Viewer

Use the image Snapshot feature to quickly and easily:

- Save the image as an attachment to the current PMWeb record
- Link to a PMWeb record – an RFI, for example, with the image attached
- Create an email with the image attached
- Print the image

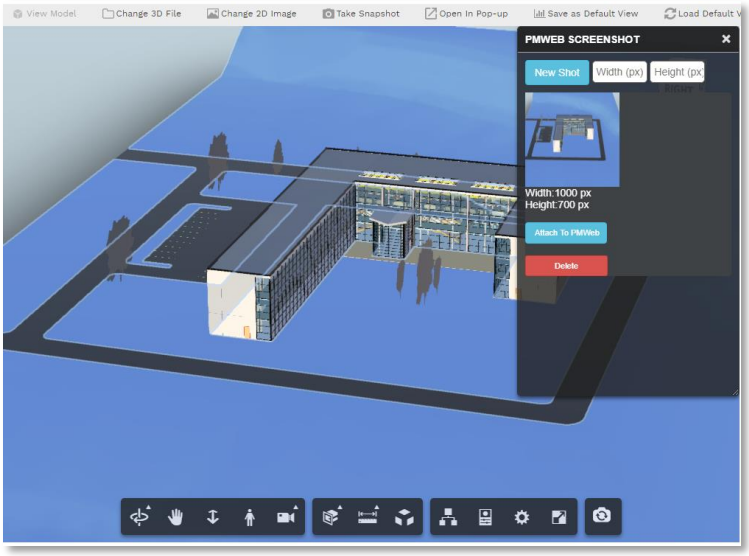


Figure 2 - Use the Snapshot Feature to Attach to and Create New Records

Model Manager

Model Manager is a powerful tool that lets you interact with 3D models using the PMWeb 3D Viewer, store unlimited metadata about the model, and facilitate model discussion using PMWeb Visual Workflow, Collaboration and Notifications.

Figure 3 - Quickly and Easily Link 3D Files to PMWeb Model Manager

Model Manager can be used to track models that you own or models that are created and maintained by others on your behalf. For example, one project might contain conceptual models that you create in-house, models created by your architect, as well as models from your specialty subcontractors. Model Manager gives you a central location from which you can organize and monitor all of them.

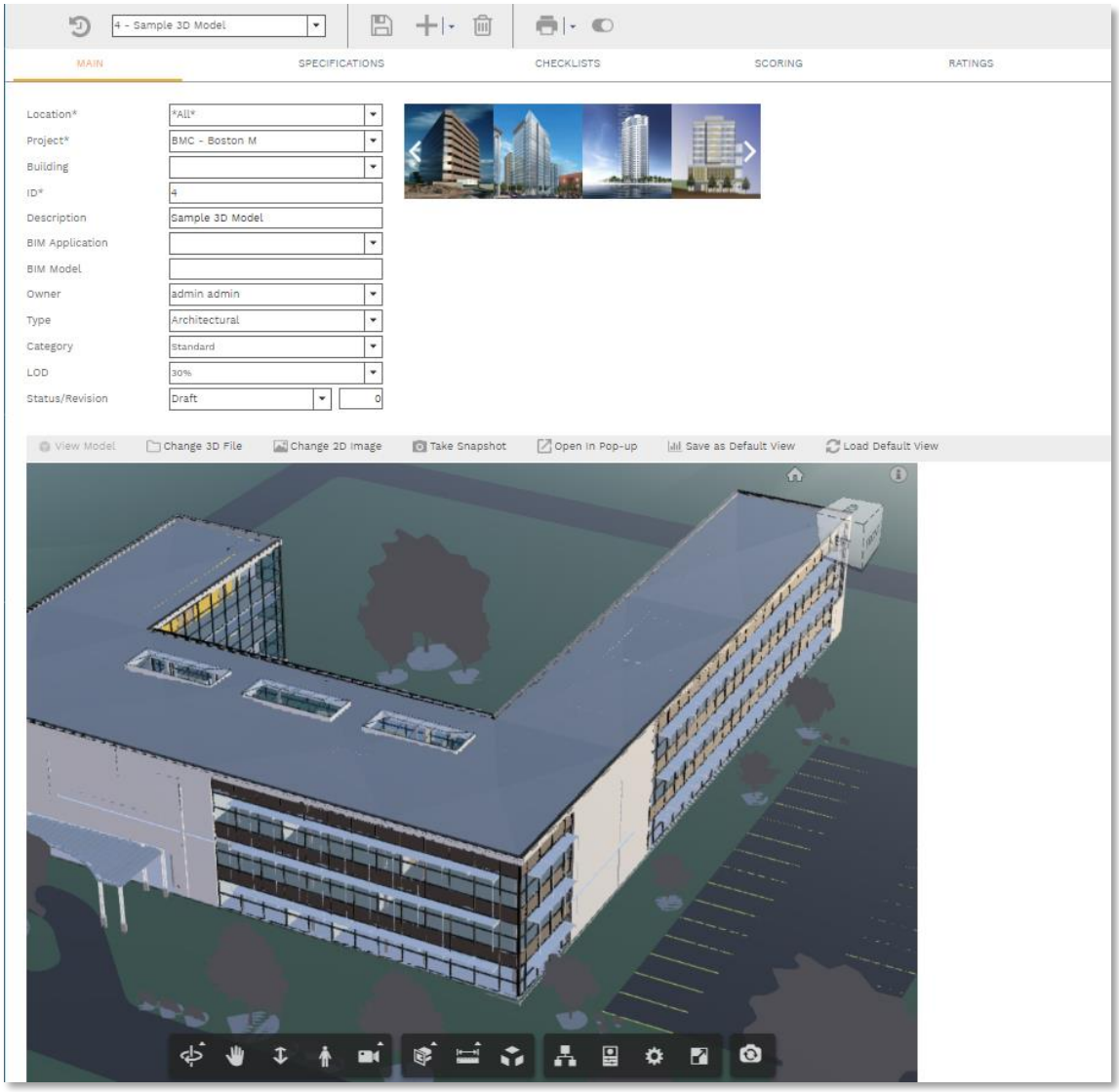


Figure 4 - Interact With 3D Models Using PMWeb 3D Viewer

Model Manager records can be created inside PMWeb or automatically generated from and linked to a Revit Model using the Autodesk Revit® Add-in.

Use the standard PMWeb tabs to add:

- Unlimited custom fields
- Customized scoring questions that let you monitor the accuracy and completeness of the model
- Notes, including rich Web content such as site maps
- Digital attachments – support documents, links to anything with a URL, other PMWeb records, and more
- Email notifications, both outgoing and incoming
- Visual Workflow or Collaboration – discussions and approvals

Autodesk Revit® Add-in

PMWeb integrates with Autodesk Revit BIM models. Using the integration, you can:

- ✓ Electronically connect Revit models to your PMWeb database
- ✓ Create a linked Model Manager record in PMWeb by clicking a button in Revit
- ✓ Extract lists of floors, spaces and equipment from the Revit model and send the lists to PMWeb
- ✓ Extract COBie data from the Revit model and send it to PMWeb
- ✓ Create records – such as RFIs, Work Requests and Work Orders – linked to selections in the Revit model and automatically send them to PMWeb

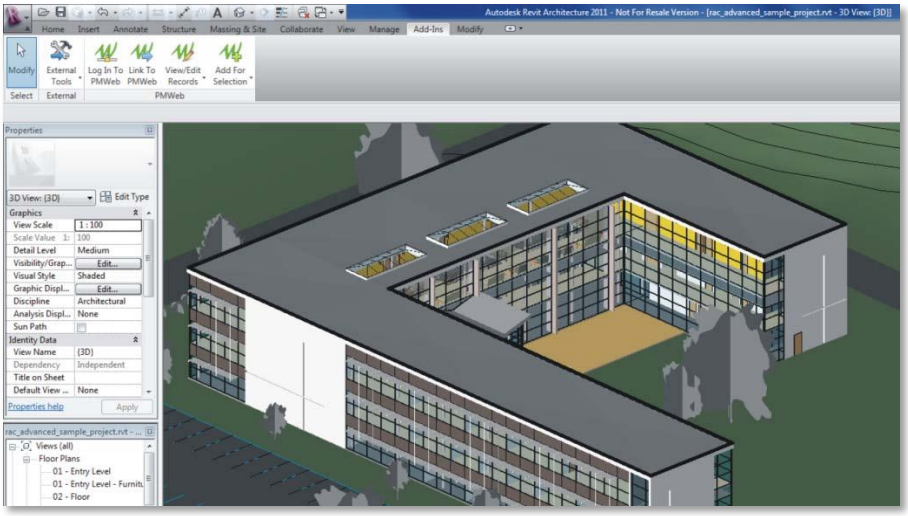


Figure 5 – Link Your Revit Model to PMWeb

Installation of the PMWeb Add-in for Revit is easy and only takes a couple of minutes. Once the add-in is installed PMWeb buttons appear on a tab inside each of your Revit models. Use the buttons to extract data from the model and quickly send it to PMWeb.

Important notes:

1. At this time, the add-in is designed to be used with Autodesk Revit Architecture 2011 and 2015. The add-in may function with other versions, but they are not supported at this time.
2. The PMWeb BIM module, which resides in the PMWeb Toolbox, must be licensed for the add-in to work.
3. The add-in must be installed on the Windows computer from which Revit Architecture will be run.
4. The add-in has versions just as PMWeb does. If upgrades to the add-in become available, they will be listed as part of the PMWeb release notes and will be made available for download from the PMWeb support portal.

Installing the PMWeb - Revit Add-In

The PMWeb - Revit Add-in is available in both 32- and 64-bit versions. When you license the PMWeb BIM tool you will be provided with two small zipped files you can use to install the Revit add-in. The file names will be in a format similar to this:

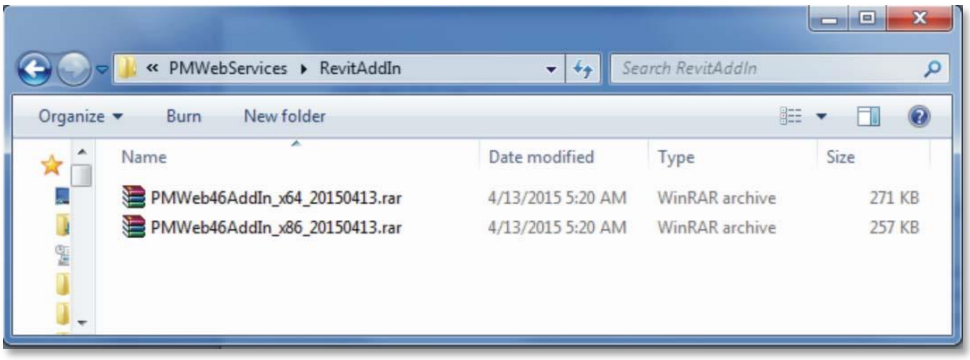


Figure 6 - Sample PMWeb - Revit Add-In Install Files

where the "46" section represents a PMWeb version number (version 4.6 in this case), the "v64" or "v86" section represents either 64- or 32-bit, respectively, and the last section represents the date the add-in was released (April 13, 2015 in this case).

The “46” in the paragraph above indicates that the add-in is compatible with PMWeb version 4.6 and higher. Occasionally, changes are made to the add-in and new install files are made available. If upgrades to the add-in become available, they will be listed as part of the PMWeb release notes and will be made available for download from the PMWeb support portal.

The add-in is installed on the machine where Revit is installed. Installing the add-in is easy and takes only a couple of minutes. To install the add-in:

1. Unzip the Add-in you have selected to install. Be sure to select the add-in that matches your PC's architecture and your PMWeb version.
2. Open the folder that is created
3. Confirm that Revit is closed
4. Right click on the *PMWebRevitAddInDeploy.exe* file and select "Run as administrator" from the fly-out menu

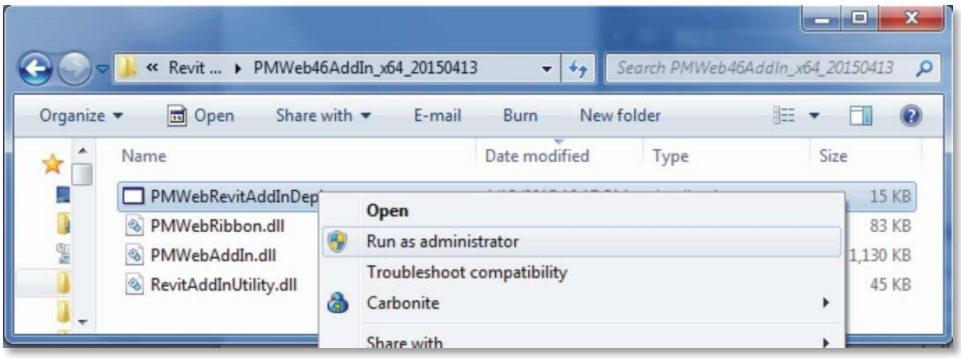


Figure 7 - Right Click and Select "Run as administrator"

5. If Windows asks if you want to let the application make changes to your system, say "Yes"
6. A confirmation message will appear. Press any key to dismiss the message.

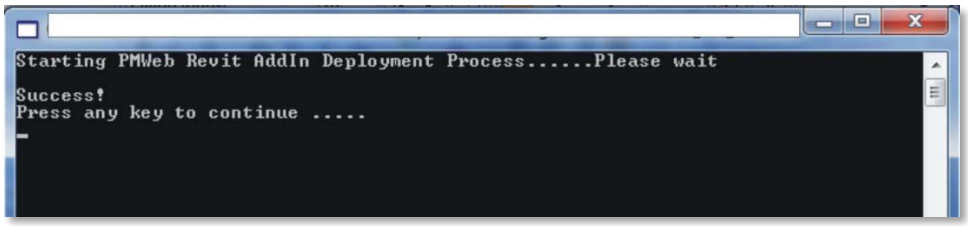


Figure 8 - The Confirmation Message

Important note: The version of the add-in you are using much exactly match the PMWeb version you are connected to. If your PMWeb installation is upgraded, you must install the matching PMWeb - Revit Add-In before using Revit to connect to PMWeb.

Logging into PMWeb from Revit

With the add-in installed you can now connect your Revit models to PMWeb. To do so:

1. Open a Revit project
2. Click the Add-Ins tab

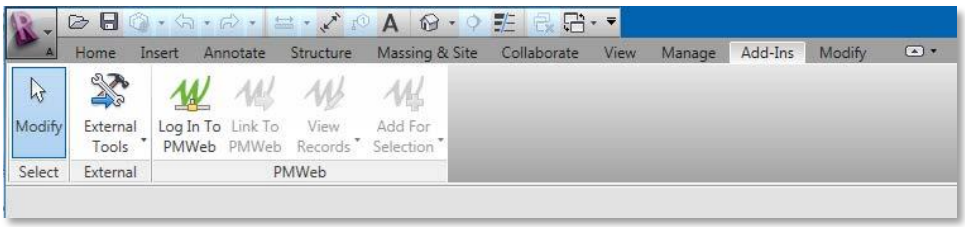


Figure 9 - The Log In To PMWeb Button

3. Click on the *Log In To PMWeb* button. The Log In To PMWeb dialog opens.

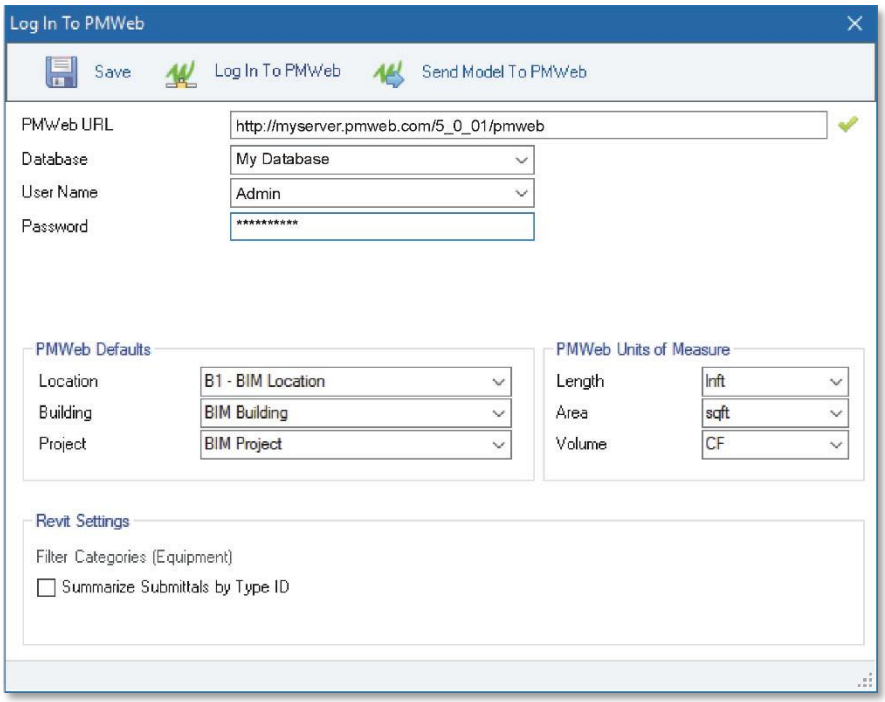


Figure 10 - The Log In To PMWeb Dialog

4. Type or paste your PMWeb URL. Press the TAB key. The add-in automatically connects to the URL and activates the Database and Username drop-down lists. The exclamation mark icon to the right of the field will change to a checkmark when the URL has been reached. It may take a few seconds to connect.
5. Select a Database from the drop-down list. The username field will fill automatically for the selected Database.
6. Select a username from the drop-down list
7. Enter the Password for the user
8. *Click the Log In To PMWeb* button in the toolbar or press ENTER. The add-in verifies that BIM is licensed for the database and that the password is correct. A "Logged In" message and checkmark icon appear when the log in is complete.
9. Optional: Click the *Save* button in the toolbar to save your log in credentials. With your credentials saved, next time that you open the model you need only select the username you wish to use and enter your password to reconnect.

Notes:

- If you upgrade the version of the add-in you are required to re-enter all the log in credentials, even if they were previously saved.
- When you have completed the log in process and close the Log In To PMWeb dialog the other three PMWeb buttons on the Add-Ins tab become available.

Important: Revit disables the PMWeb add-in buttons if the current view is a custom 3D one. You must be in a 2D or the default 3D view in order to use the PMWeb add-in buttons.

Saving Defaults

Notice that as soon as you log in to PMWeb the drop-down lists in the PMWeb Defaults and PMWeb Units of Measure sections will automatically fill with the data from your PMWeb database. If you make selections in these lists and then click the *Save* button, the next time you connect to PMWeb these selections will automatically pre-fill for you. The defaults are used when creating PMWeb records from the Revit model.

- **PMWeb Defaults** - Select a default Location, Building, and Project. These defaults are used in the Link to PMWeb and Add For Selection tabs.
- **PMWeb Units of Measure** - Select a default unit of measure for Length, Area, and Volume. These defaults are used when sending spaces (from the Link to PMWeb tab) to Spaces in PMWeb Asset Management.

Revit Settings

At the bottom of the Log In To PMWeb dialog are settings that you can use to personalize the add-in.

Filter Categories (Equipment)

Use this drop-down list to pre-filter the list of categories that appear on the Equipment tab of the Link To PMWeb Dialog. It is recommended that you pre-filter the list of choices - there are many of them and using the whole list may cause the Link to PMWeb Dialog to load very slowly. Using the whole list also makes it cumbersome to navigate the equipment list in the dialog and identify the records you wish to send to PMWeb.

Summarize Submittals by Type ID

If this option is checked, when you create Submittals from Revit the add-in will automatically combine all selections by their Revit Type ID. See the tables below for an example of how this option works.

If you select these items in the model:

Type ID	Family Description
1830 x 2134	Double-Glass 1 Door
1830 x 2134	Double-Glass 1 Door
1830 x 1564	Single-Glass 1 Door
1830 x 1564	Single-Glass 1 Door
1830 x 2134	Double-Glass 1 Door

...and then elect to create one of the Submittal records, if "Summarize Submittals by Type ID" ***is not*** checked the add-in will create these Submittals:

Type ID	Family Description
1830 x 2134	Double-Glass 1 Door
1830 x 2134	Double-Glass 1 Door
1830 x 1564	Single-Glass 1 Door
1830 x 1564	Single-Glass 1 Door
1830 x 2134	Double-Glass 1 Door

Table 1 - With the Option Unchecked

...but if "Summarize Submittals by Type ID" ***is*** checked the add-in will create these Submittals:

Type ID	Family Description
1830 x 2134	Double-Glass 1 Door
1830 x 1564	Single-Glass 1 Door

Table 2 - With the Option Checked

Send Model to PMWeb Button

Click the *Send Model To PMWeb* button to create a linked record in the PMWeb Model Manager. The PMWeb record will include a hyperlink to the Revit model on the Attachments tab. Note that hyperlinks to the Revit model will only work if the model is hosted on a Web server.

Upgrading the Add-in

Upgrading the add-in is easy. Simply download the new version of the add-in and repeat the steps in Installing the PMWeb - Revit Add-In, above.

Link to PMWeb Dialog

Use the Link to PMWeb Dialog to send lists of Revit data to various places in PMWeb and link them bi-directionally.

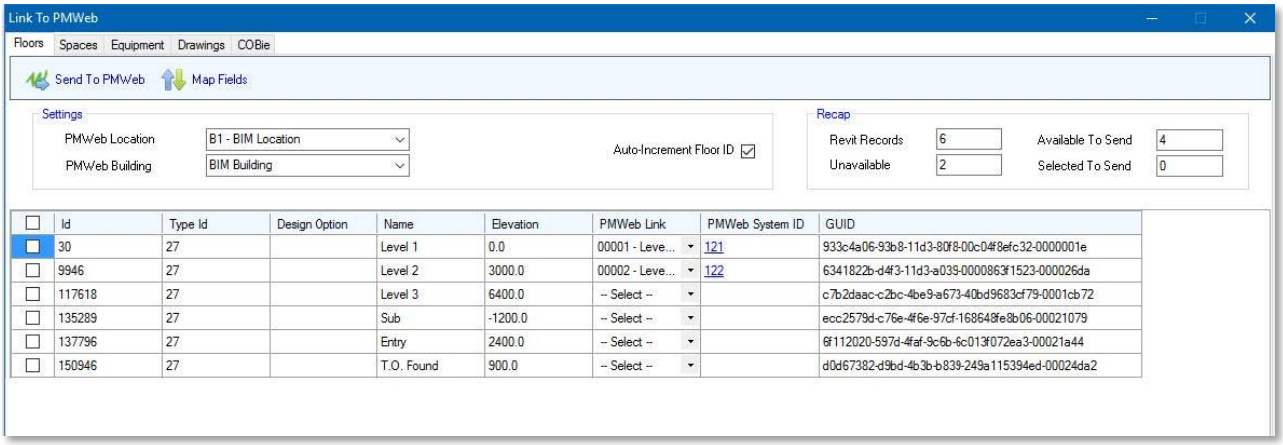


Figure 11 – The Link Floors to PMWeb Tab

The Floors, Spaces, and Equipment Tabs

The Floors, Spaces, and Equipment tabs basically work the same way:

- The add-in extracts a list of records from the Revit model
- You can select one or more records in the list and edit some of their information
- You can then send the selected records to PMWeb, creating new records in PMWeb Asset Management and linking them bi-directionally to Revit
- You can also use these tabs to manually link Revit records to PMWeb ones

Note that what PMWeb refers to as "Floors" Revit calls by default "Levels". The lines that appear on the Floors tab are Revit levels.

Map Fields

Before you send records to PMWeb you must map the data fields. If you click the *Map Fields* button, the Map Fields dialog opens.

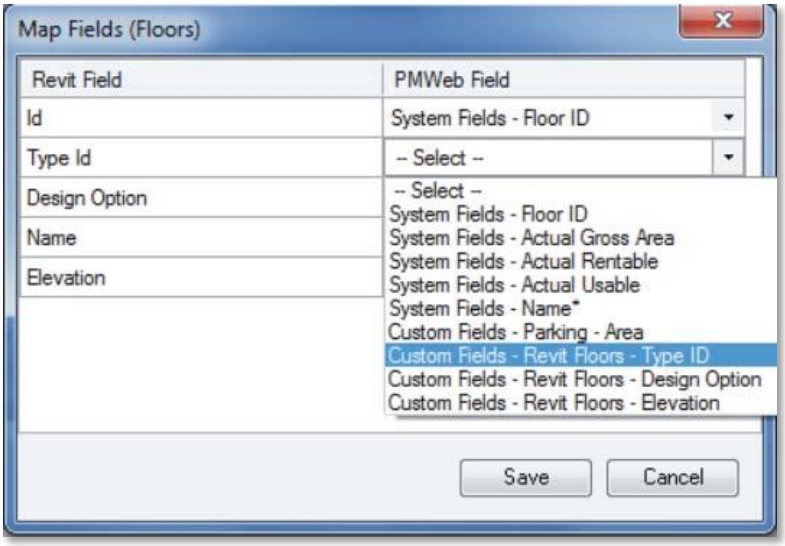


Table 3 - The Map Fields Dialog from the Floors Tab

The left column of the dialog displays the fields of data that Revit makes available to export. The right column is a drop-down list that displays fields in PMWeb for the related record type: Floors, Spaces, and Equipment. The PMWeb list includes not only system fields but custom fields as well. Here are a few important points about mapping fields:

- Not all PMWeb system fields are available for mapping. Those that are appear in the list.
- Data types must match. For example, a Revit text field must be mapped to a PMWeb text field. Mismatched fields will be ignored when sending the record to PMWeb.
- Some PMWeb fields are required in order to send the record. Those fields are marked with an asterisk (*) after the name

Click the *Save* button to save your mapping and close the dialog.

Sending to PMWeb

One technique is used to send Floors, Spaces, and Equipment to PMWeb:

- Place a check in the checkbox on every line you wish to send to PMWeb
- Click the *Send to PMWeb* button in the toolbar
- Your records appear in the PMWeb Asset Management module (you might need to refresh the Manager Page screens to see them).

The Recap Section

Notice that as you check or uncheck lines in the table the Recaps section is updated for you. The fields in the Recap are:

- Revit Records - the number of lines in the table on the tab
- Unavailable - the number of lines that cannot be sent because they are already linked to PMWeb records
- Available to Send - equal to Revit Records minus Unavailable
- Selected to Send - the number of lines in the table with a check mark

The Settings Section

Drop-down lists let you select PMWeb records to link to when sending new records. These fields vary by tab. For example, a floor must be linked to a PMWeb location and a building while a space must be linked to a location, a building, and a floor. An equipment record must be linked to at least a location, building, floor and space are optional.

There is a special setting on the Floors tab, "Auto-Increment Floor ID". If this setting is checked, when you send floors to PMWeb the add-in automatically assigns them the numbers 1,2,3, etc., from top to bottom order in the table, and puts those numbers in the PMWeb Floor ID field. Also, if this setting is checked you are not required to map a Revit field to the PMWeb Floor ID field and previous mapping to this field, if it exists, will be ignored.

The Select Category Drop-down List

The Select Category drop-down list at the top of the Equipment tab filters the records displayed in the table. The drop-down list is, itself, pre-filtered by the choices made in the Log In To PMWeb dialog. See Filter Categories (Equipment), above.

Revit projects usually contain hundreds of equipment categories, complex models may contain thousands, and the majority of those would never become PMWeb Equipment records. "Structural Internal Loads", for example, is a default Revit equipment category which does not logically translate as a PMWeb Equipment record. Use the Filter Categories (Equipment) setting to remove the irrelevant categories from consideration and use the Select Category drop-down list to further filter the results in the Equipment tab

table. Pre-filtering the equipment records is also beneficial as it may greatly enhance the speed of the query when loading the Equipment tab.

The Drawings Tab

Use the drawings tab to send the current view in the Revit model to PMWeb and automatically create a new PMWeb Viewer record.

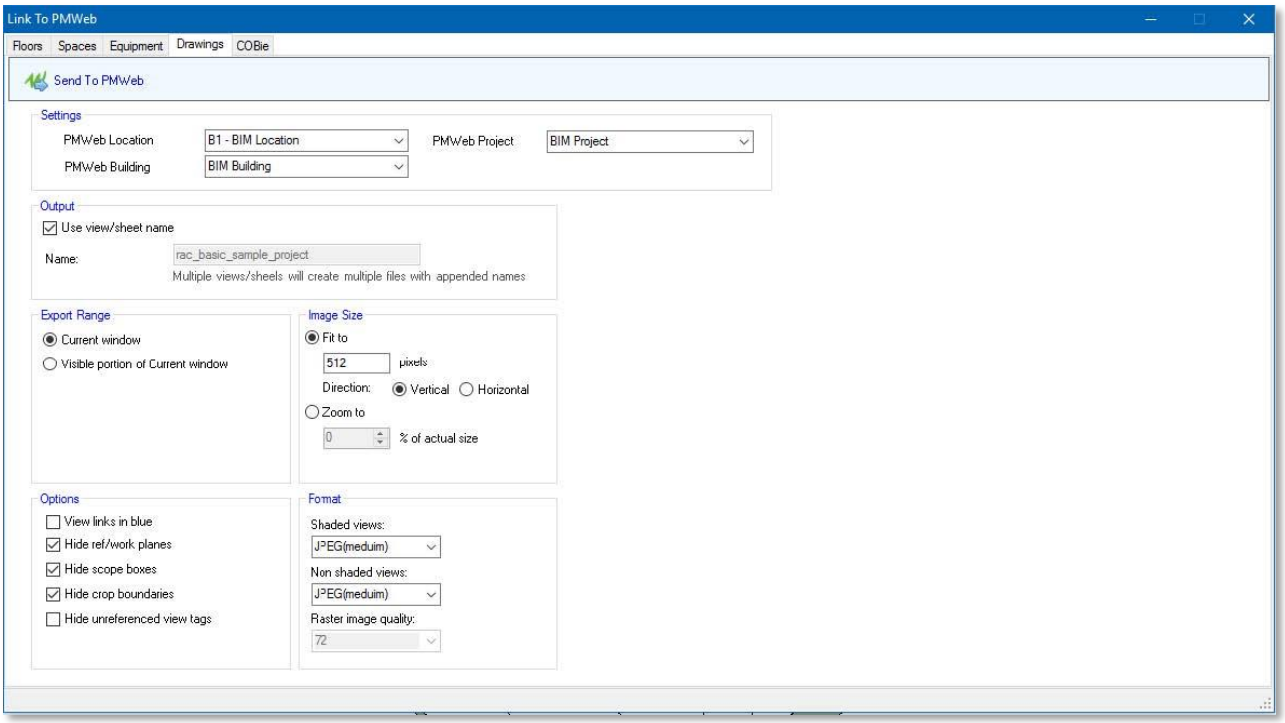


Figure 12 - The Link Drawings to PMWeb Tab

- Use the controls on the tab to configure the drawing
- Click the *Send to PMWeb* button. A confirmation dialog displays.
- Click the *OK* button in the confirmation dialog. A PMWeb Viewer record is created in PMWeb with the Revit drawing attached. The PMWeb Viewer record also has a hyperlink to the Revit model on the Attachments tab. Data in the Selections section of the Drawings tab populates fields in the header of the PMWeb Viewer record.

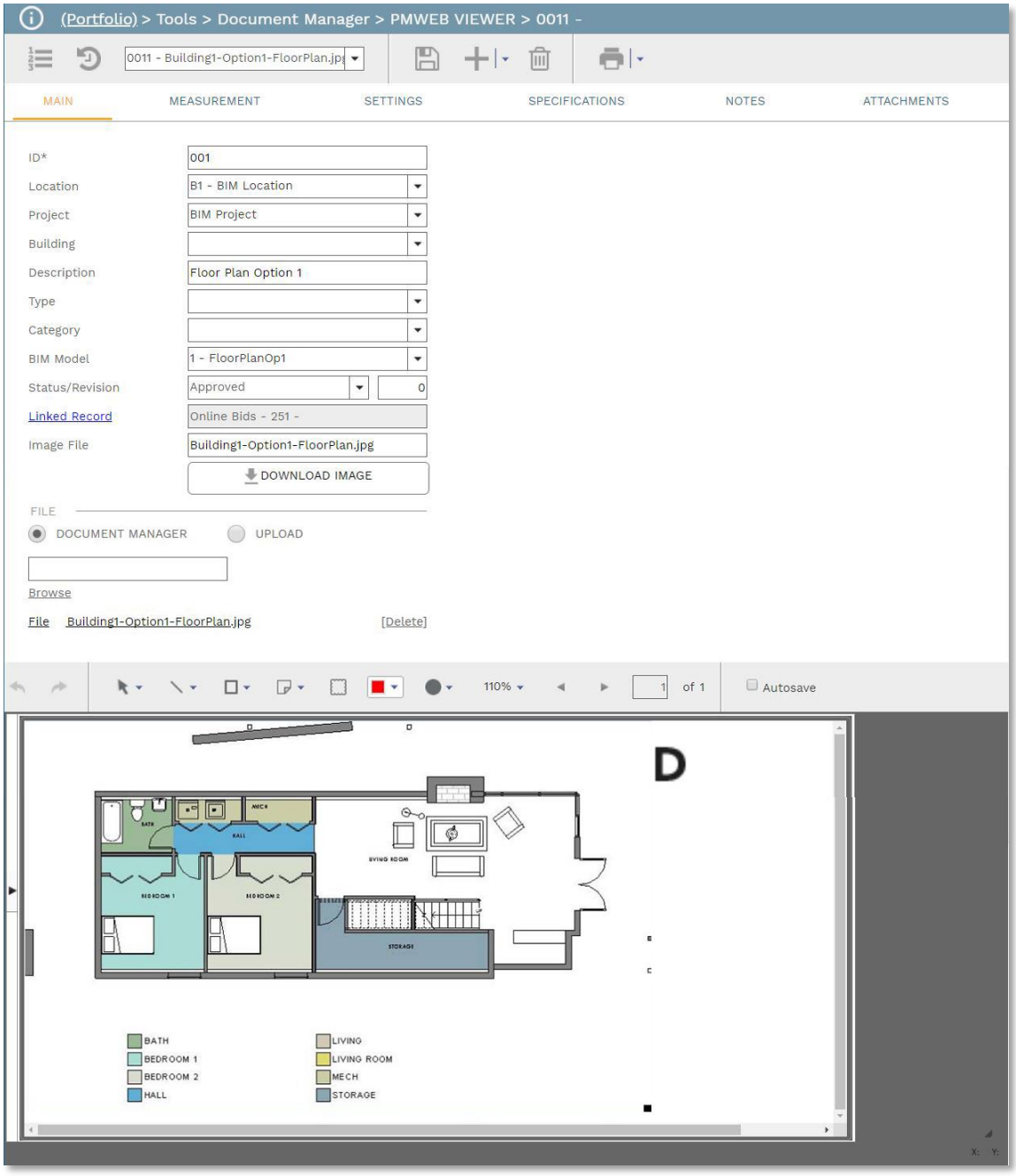


Figure 13 - A Revit Drawing in PMWeb Viewer

All of the PMWeb Viewer redlining, polylining, and collaboration tools are available to use on the Revit drawing.

The COBie Tab

The COBie tab extracts data from the Revit model and then sends it to a linked PMWeb COBie Manager record. See COBie Manager, below, for more information about COBie standards and how they are used in PMWeb.

To use the tab:

- In the COBie Tab table place a checkmark next to each COBie tab type for which you wish to send data to PMWeb
- Click the *Send to PMWeb* button. A confirmation dialog opens.
- Click the *OK* button in the confirmation dialog. A new PMWeb COBie Manager record is created. The COBie Manager record includes a hyperlink to the Revit Model.
- The linked PMWeb record is displayed on the COBie tab in Revit. The Record # field is a hyperlink to the PMWeb record.

To update data on one or more COBie tabs in PMWeb place a checkmark in the Replace Existing Records box and then repeat the Send to PMWeb process.

Important Note: To use the COBie tab you must first install the COBie add-in that Autodesk supplies for Revit. See Autodesk for information on installing and using the COBie add-in for Revit.

The Add for Selection Dialog

Not only can the Revit Add-in create and link the PMWeb record types discussed above but it can also generate other PMWeb records as well. The Add for Selection function can create these record types in PMWeb:

- RFIs
- Online Submittals
- Submittal Items
- Submittal Packages
- Work Requests
- Work Orders

The technique for using the Add for Selection tab is the same for each record type:

- Select one or more elements in the Revit model and then click the *Add for Selection* button. (You can also click the *Add for Selection* button without selecting Revit elements first. In that case, the selection is empty but a PMWeb record will still be created.)
- Select a record type from the drop-down list. An appropriate dialog for the selected record type will open.

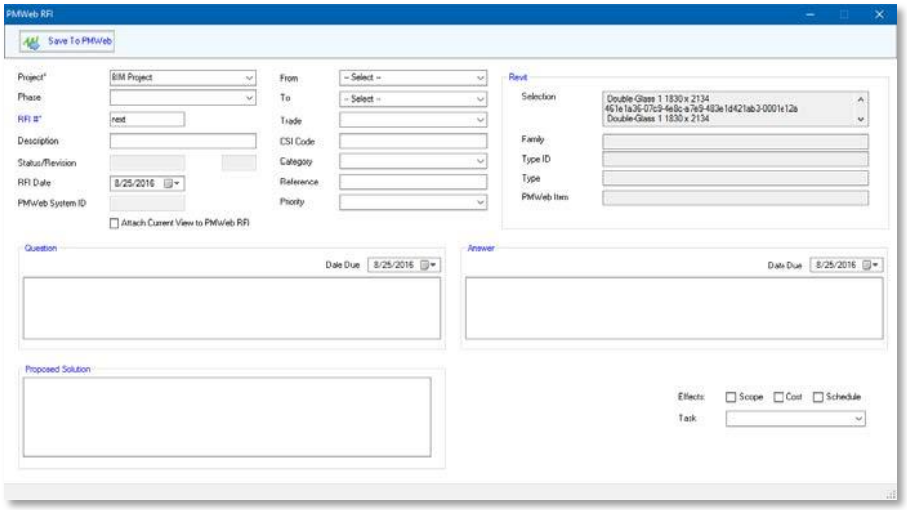


Figure 14 - An RFI Form in the Revit Add-in

- Complete the fields in the form
- Click the *Save To PMWeb* button. A confirmation dialog opens.
- Click the *OK* button in the confirmation dialog. The record is created for you in PMWeb. The record contains a link to the Revit model on the Attachments tab. If you selected Attach Current View to PMWeb a drawing of the current Revit view is also on the PMWeb Attachments tab.

The View Records Dialog

Use the View Records dialog to see records that were created using the Add for Selection dialog.

- Click the *View Records* button
- Select a record type from the drop-down list. The View Records dialog opens. The dialog shows a list of the records of that record type created from the Revit model.

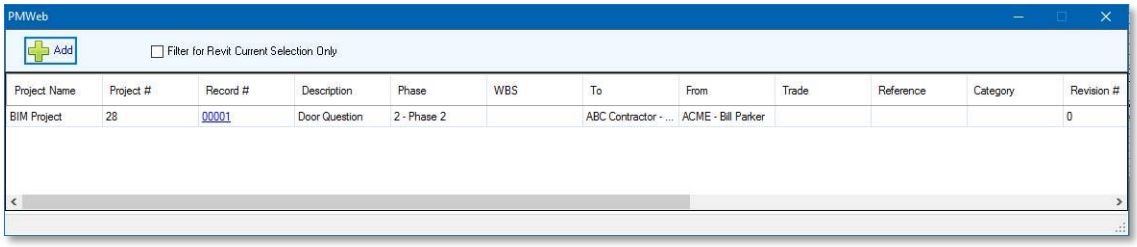


Figure 15 - The View Records Dialog for RFIs

- Click the hyperlink in the Record # field to open the PMWeb record

If you select one or more elements in the Revit file before you open the View Records dialog you can use the Filter for Revit Current Selection Only checkbox to filter the records shown. Be aware, though, that the selection in Revit must exactly match the selection you made when you first created the PMWeb record. If not, and Filter for Revit Current Selection is checked, no records will show in the dialog.

COBie Manager

Construction Operations Building Information Exchange (COBie) is a standard by which data is extracted from BIM models, organized, and stored. In PMWeb that data can be stored using COBie Manager records which contain tabs of BIM data by class:

- Space
- Zone
- Type
- Component
- System

Data in each tab can analyzed, edited, and used to create PMWeb assets.

COBie Manager records can be created like most other PMWeb records – by clicking the Add Record button at the top of the COBie Manager record page – or by generating them using the PMWeb Revit Add- in. See The COBie Tab for information about creating COBie Manager records from Revit.

BIM in Estimating Takeoff

Using Revit Data in Estimates

Preparing the Revit File

- Create an empty Microsoft Excel workbook and save it in this format: Excel 97-2003 (*.xls).
- Open an Autodesk Revit project.
- Click the *Home* button above the ribbon. The menu opens.

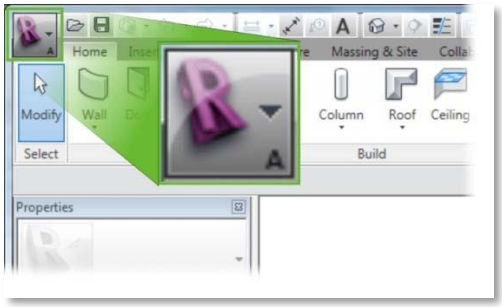


Figure 16 - Click the Revit Home Button

- Select Export/ODBC Database from the menu. The Select Data source dialog opens.
- Click the Machine Data Source tab, select Excel Files in the list and click the OK button. The Select Workbook dialog opens.
- Navigate to the workbook you created in step 1, select it and click the OK button. The dialog closes and the data from your Revit project is written to the workbook.

Linking to a PMWeb Estimate

- In PMWeb, open an estimate.
- Click the *BIM* drop-down button in the toolbar and select Revit from the menu. The BIM Revit dialog opens.

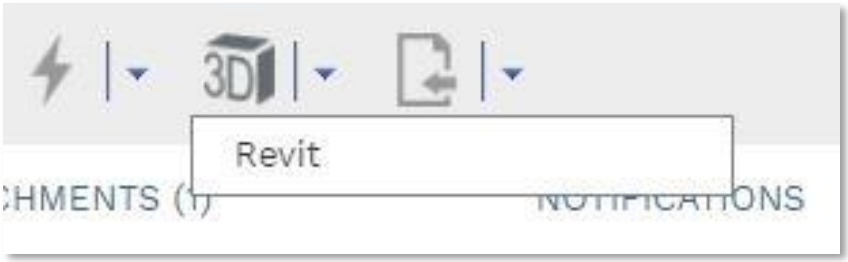
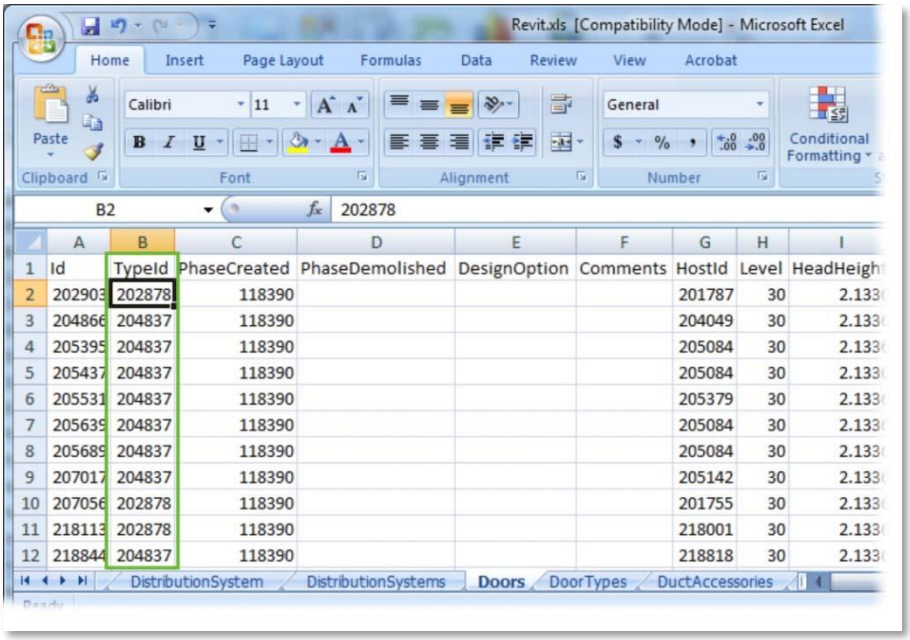


Figure 17 - Click the BIM Drop-down and Select Revit

- Click the *Browse* button. The Choose File to Upload dialog opens.
- Navigate to the workbook you created in step 1, select it and click the *Open* button. The Choose File to Upload dialog closes and the file path and name appear in the Revit Project field in the BIM Revit dialog.
- Click the *Read Revit* button. PMWeb reads the workbook and then displays takeoff data it extracts in the dialog grid.
- Click the *Save to Estimate* button. The dialog closes and your Revit takeoff data is added to your PMWeb estimate.

Understanding the Revit File

Open the workbook you created above. You can see that a number of tabs – AirTerminals, AirTerminalTypes, AreaLoads, Areas, etc. – have been added by Revit. On each new tab a number of header columns – Id, Typeid, PhaseCreated, PhaseDemolished, etc. – appear. The headers that appear on each tab vary, depending on the type of data Revit stores there. Some tabs (BuildingTypeSettings, for example) contain data that is not relevant to takeoff and will therefore be ignored when you link to PMWeb.



	A	B	C	D	E	F	G	H	I
1	Id	TypeId	PhaseCreated	PhaseDemolished	DesignOption	Comments	HostId	Level	HeadHeigh
2	202903	202878	118390				201787	30	2.133
3	204866	204837	118390				204049	30	2.133
4	205395	204837	118390				205084	30	2.133
5	205437	204837	118390				205084	30	2.133
6	205531	204837	118390				205379	30	2.133
7	205639	204837	118390				205084	30	2.133
8	205689	204837	118390				205084	30	2.133
9	207017	204837	118390				205142	30	2.133
10	207056	202878	118390				201755	30	2.133
11	218113	202878	118390				218001	30	2.133
12	218844	204837	118390				218818	30	2.133

Figure 18 - The Doors Tab of a Sample Revit File

The figure above shows the Doors tab of a sample Revit file. Each data line represents a single instance of a door in the Revit model. The Typeid column shows that there are 7 instances of door 204837 in the model.

Understanding How PMWeb Reads the Revit File

When you click the *Read Revit* button in the BIM Revit dialog, PMWeb inspects each relevant tab in the Revit file, groups lines by the Typeid column, quantifies that type, matches the type to PMWeb items and displays the results in the BIM Revit dialog grid. When you click the *Save to Estimate* button the items and quantities are copied into the estimate and PMWeb inserts the appropriate unit costs which it extracts from matching items in the items catalog.

See the next section for some important points to keep in mind when linking Revit to PMWeb.

Key Points to Successful Linking

PMWeb matches the Typeid field in the Revit file to the BIM ID field in the PMWeb item catalog. If no item in the PMWeb catalog contains a BIM ID matching a Revit Typeid, that Typeid is ignored and will not be displayed in the BIM Revit dialog grid.

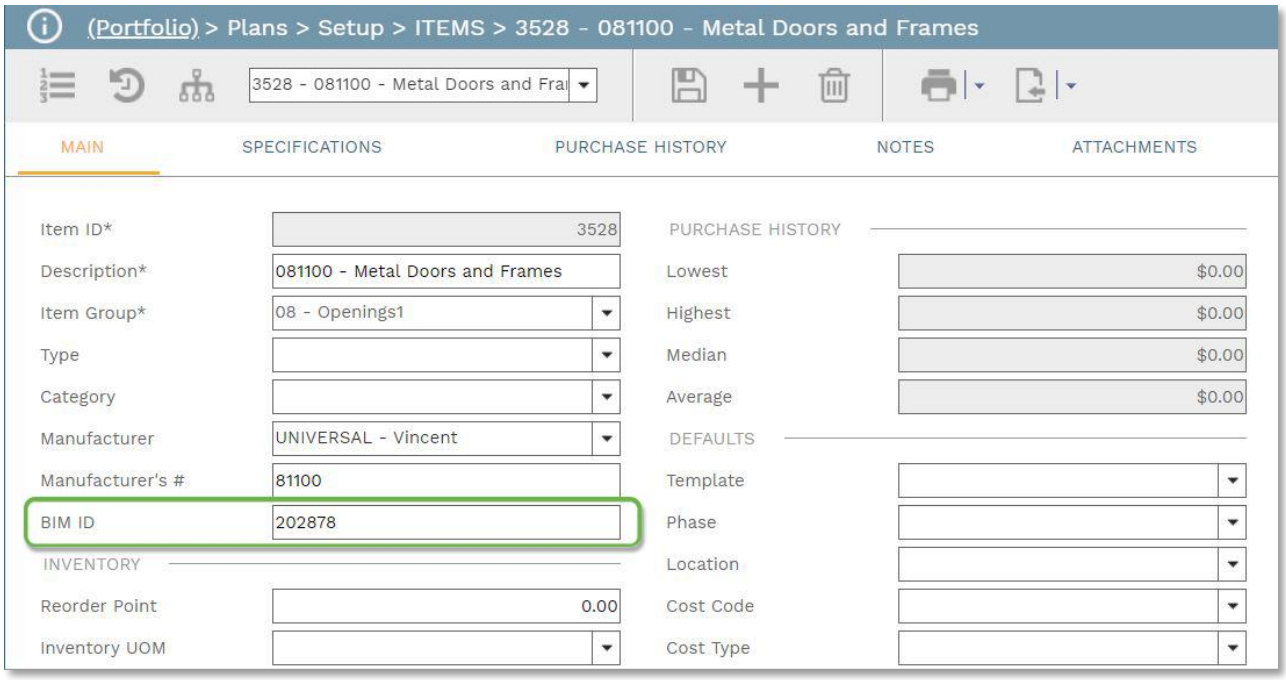


Figure 19 - BIM ID in PMWeb Links to Typeid in Revit

PMWeb quantifies Revit instances differently, depending on their type. For example, doors are counted and summed by each instance, but floors are quantified as the sum of the Area column.

Some tabs in the Revit file are ignored by PMWeb. The BuildingTypeSettings tab, for example, does not contain data that is relevant for takeoff and so is ignored when you click the Read Revit button.