Detailing in Autodesk® Revit® Architecture

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AB3744   Part of creating a successful building information model is knowing what to build into the model and what to leave out of the model. When learning Revit, many users have a tendency to "over model." What is often not clear, is that Revit offers a powerful suite of detailing tools. This class will explore the process of extracting views from your model and then detailing them within Revit. You will learn about model views and drafting views. You will gain understanding on when to model, when to draft, and when to import graphics from other CAD programs. We will cover detail components, drafting elements, symbolic lines, text, annotation and keynotes. If you have been told the myth that you can't do construction documents in Revit Architecture, then join us in this session of "myth busting" as we explore the complete detailing process in Revit Architecture.

Learning Objectives

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

- Learn the Revit detailing process from top to bottom
- Understand "Hybrid" details and how to create them
- Learn when to stop modeling and when to start detailing
- Let's not forget "typical" details and details imported from CAD

About the Speakers

Paul F. Aubin is the author of many CAD and BIM book titles including the widely acclaimed: The Aubin Academy Mastering Series: Revit Architecture, AutoCAD Architecture, AutoCAD MEP and Revit MEP titles. Paul has also authored video training both on his Web site and for lynda.com www.lynda.com/paulaubin. Paul is an independent architectural consultant who travels internationally providing Revit® Architecture and AutoCAD® Architecture implementation, training, and support services. Paul's involvement in the architectural profession spans over 20 years, with experience that includes design, production, CAD management, mentoring, coaching, and training. He currently serves as Moderator for Cadalyst magazine's online CAD Questions forum, is an active member of the Autodesk user community, and has been a top-rated speaker at Autodesk University (Autodesk's annual user convention) for many years. This year Paul is speaking at the Revit Technology Conference in both the US and Australia. His diverse experience in architectural firms, as a CAD manager, and as an educator gives his writing and his classroom instruction a fresh and credible focus. Paul is an associate member of the American Institute of Architects. He lives in Chicago with his wife and three children. You can reach Paul at: www.paulaubin.com (click the contact link).

Introduction

Creating detail drawings in Revit Architecture involves a combination of live views generated from the building model and overlaid two-dimensional embellishments and notes. The process is simple—create a callout or section view of the model at a large scale and then add additional drafted components, text, dimensions and other embellishments necessary to craft the detail and convey design intent. In most cases, such embellishments are drawn relative to an underlying building model view and can be automatically constrained or linked to model geometry in the view. Unlike the other Revit Architecture views, all Drafting Components appear *only* in the view to which they are added.
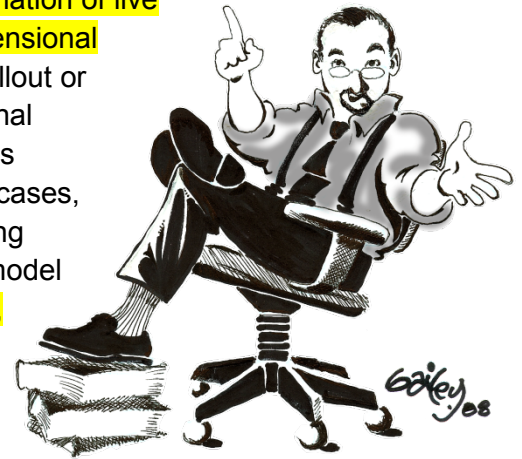
A large collection of Detail Component Families is included with the software and using the provided Family Templates, you can create additional detail components as required. In addition to detail component Families, drafting lines, batt insulation, filled regions and repeating details will help to flesh out the details you create.

Building Information Modeling and Detailing

If you have been using Revit Architecture for a while but are new to its detailing capabilities, you are likely to have the expectation that to create a detail, one simply cuts a section of the appropriate area of the model and open the resulting view to see an automatically generated detail direct from the Building Information Model! Alas, this is only partially true. The reality is that it is a rare instance when all of the specific components required by a successful construction detail can be effectively modeled in all aspects and thus "built into" the overall building model. In most cases, the effort required to model the small scale components shown in the typical construction detail would prove impractical and would generate a very large and unwieldy model. Therefore, while theoretically a fully embellished and

"Break Line" is a Detail Component that Hides the Model Geometry behind it.

"Cut" lines of 3D Wall

Reglet is "3D" Reveal in 2D Detail Component

3D Sill Plate "Sweep" added to top of foundation wall type with automatically added "X" in each 2x.

View Specific Detail Line

Concrete, Earth, CMU, Rigid Insulation, & Hardwood flooring Fill Patterns all automatically generated by Revit. Plywood Fill Pattern and the Batt Insulation are 2 Point Pick Detail Components.

The outlines of the walls, floor, and site are all live views of the model cut in section.
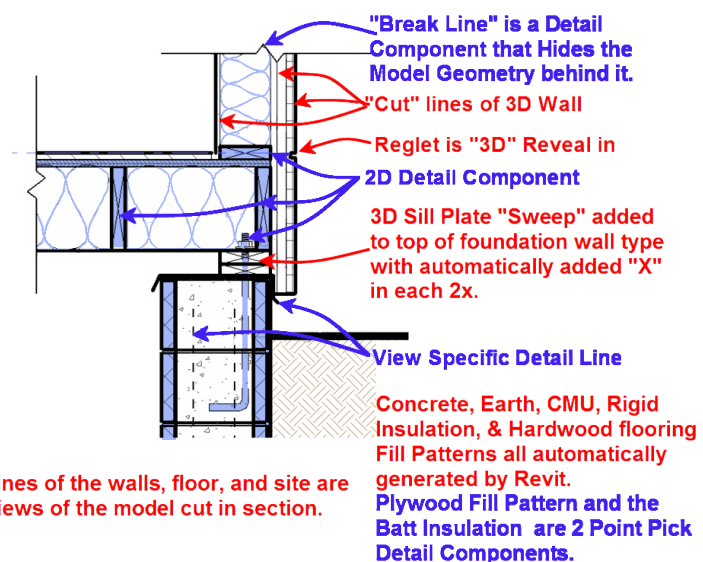
Figure 1 – Revit Architecture's Hybrid approach to detailing – Image courtesy of Robert Guarcello Mencarini, Architect, AIA (2D Detail Components are shaded blue in the figure)

detailed building model capable of generating all large scale views and details is seen by some as the ultimate goal, currently (and perhaps indefinitely) the means to do so do not justify the end.

To keep the size of our models reasonable and to avoid spending additional and often unnecessary effort modeling every bolt screw and piece of flashing, the strategy to detailing in Revit Architecture is instead a hybrid approach. In nearly all details you may endeavor to create in Revit Architecture, you will be able to start the process with a cut from the model. This live view of the model portrayed at the scale of the detail, will give you a starting point upon which to add detail components and other view specific elements and annotations. By separating a detail into both live model elements and view-specific embellishments, we achieve the best of both worlds: we have an underlay that remains live and changes automatically with the overall building model and we have all of the additional data required to convey design intent occurring only on the specific detail view, thus saving on overhead and unnecessary modeling effort.

As you can see in the illustration in Figure 1, there are many tools at our disposal that when used together give us a complete detailing solution. The next several topics will introduce many of these tools.

Detail Callouts

You can create the detail view from a portion of your model using the Callout tools. Callouts can be made from plan, section or elevation views. Creating an enlarged scale callout is typically the first step in the detailing process.
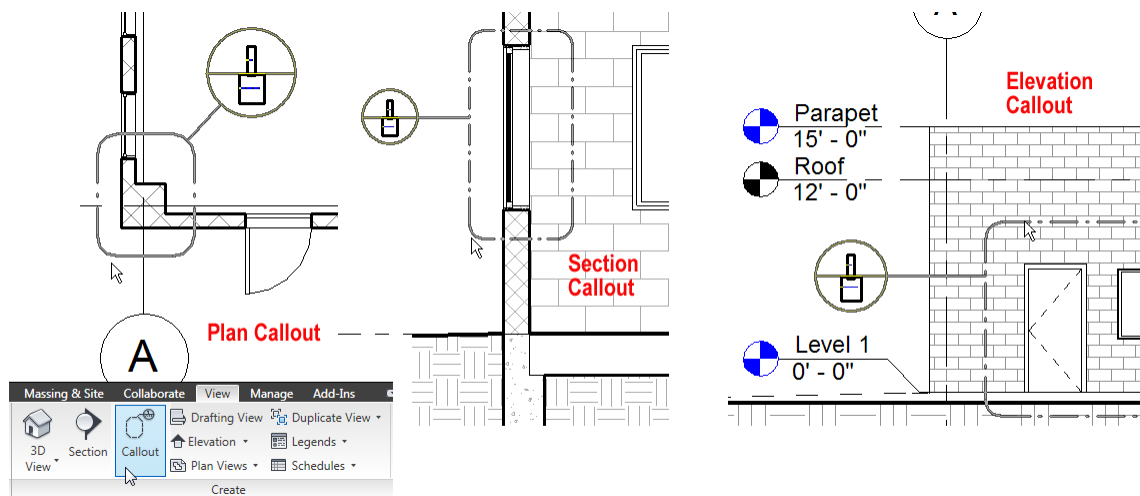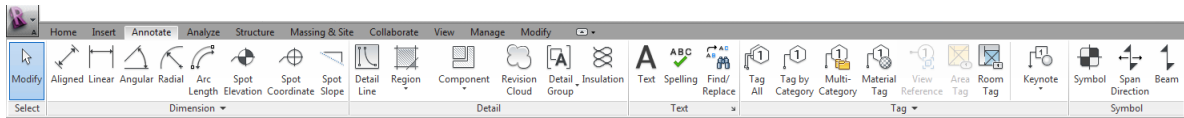

Figure 2 – You can make callouts of any other view

Detailing Tools

Once you have created your callout or section, you will find the tools you need to embellish it on the Annotate tab of the ribbon. Refer to this illustration and the following descriptions. We will start with the tools on the Detail panel.

Detail Lines—The most straightforward form of embellishment is drafted Linework (lines, arcs, circles, etc) that can be used for any generic illustration purposes. Detail Lines have all of the same options as Model Lines. However, Model Lines appear in *all* views like other model geometry and Detail Lines appear *only* in the view in which they are sketched. Use Model Lines for items like Control Joints on elevations and Detail Lines for items like flashing in construction details.
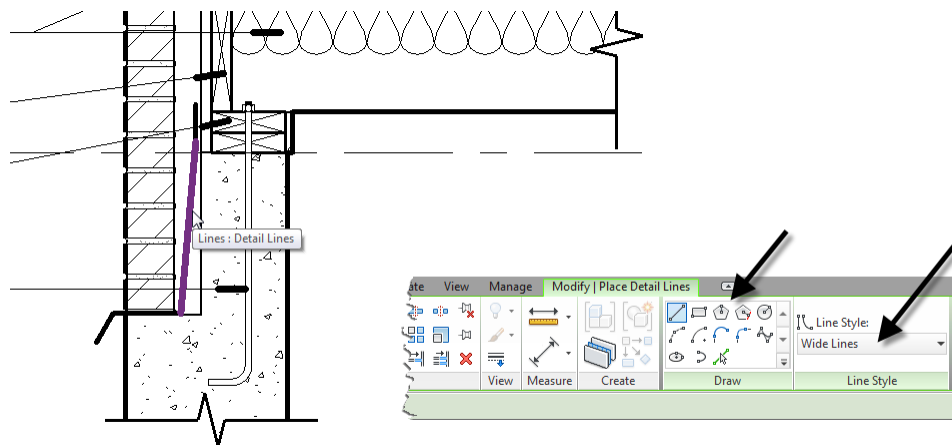
Figure 3 – Detail Lines used to draw flashing in the masonry cavity

Filled Regions—These are polygon objects that are drawn like other Revit sketch-based objects. Filled Regions include an edge style and a fill pattern. Use them to add graphical embellishment representing materials that would be impractical to model three-dimensionally.
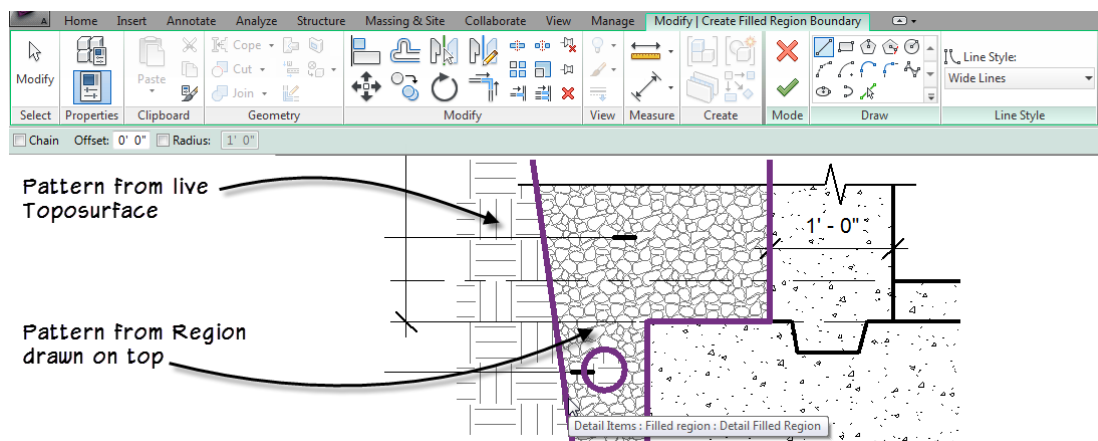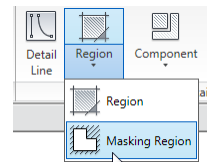
Figure 4 – Using a Filled Region to show materials that would be impractical to model

Masking Regions—These are polygon objects that are drawn like other Revit sketch-based objects. Masking Regions include an edge style and a solid white fill. They are nearly identical

to Filled Regions except that instead of a pattern they have a simple white fill. When exported to AutoCAD, Masking Regions will not appear solid black as Filled Regions with white fills do. <mark>Use them to "white out" areas of the model that you do not want displayed in the detail.</mark>

Detail Component—Similar to the Component tool on the Home tab of the ribbon, this tool inserts a Detail Component Family. <mark>A Detail Component is a 2D Family that represents some common element in a construction detail</mark> such as a piece of wood blocking, or an anchor bolt or a steel shape. Like other Families, most Detail Components have several Types from which to choose each representing a particular size or configuration of an element. For example, the Nominal Cut Lumber-Section Detail Component Family includes sizes like 2 x 4, 2 x 6 and 2 x 10. Unlike Model Component Families, they are inserted only into the current view and sit graphically on top of any model geometry.
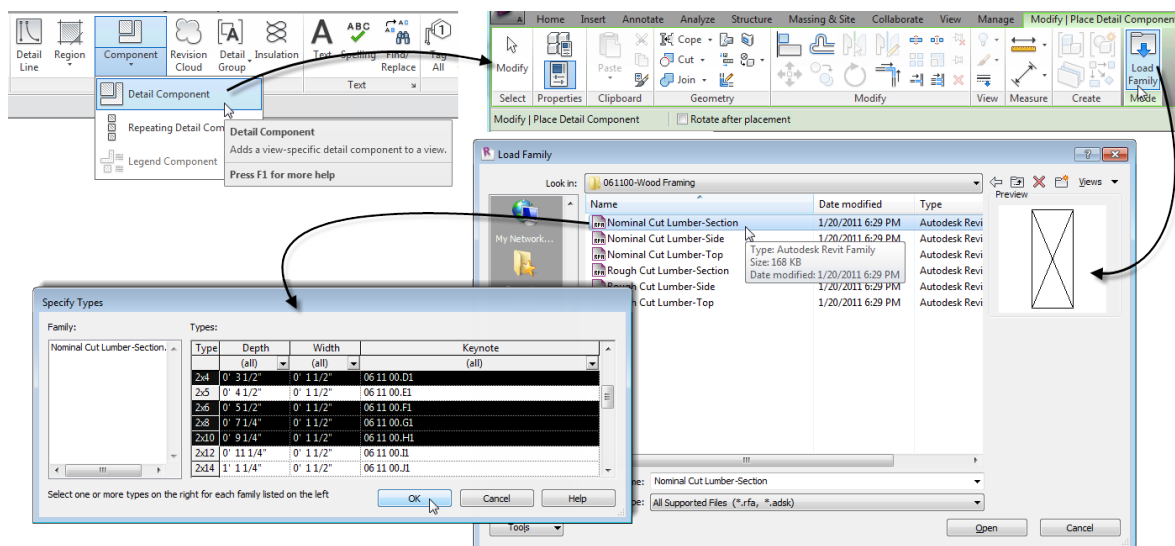

Figure 5 – Browsing for Detail Components in the out-of-the-box library

In some cases, a Family will have an associated Type Catalog. You will see this when loading a new Family into your project. Simply load the Family as normal. After you select it and click Open, a separate dialog will appear with a table of available sizes for the Family or Families selected. When a type catalog is available, you can select one or more sizes using the SHIFT and CTRL keys and then import them into your project when you click OK.

Repeating Detail—<mark>This tool is used to place linear arrays of other Detail Components.</mark> Find it on the Component

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Browsing in Windows Explorer
Tip: By default the Detail Component Library is saved in the *All Users* folder (Windows XP) or the *Program Data* folder (Vista and Windows 7). You can browse to the components via Windows Explorer and then drag the desired Family file and drop it into the Revit Architecture project window. This will import the Family and all of its Types.

drop-down button. For example, to place an array of bricks in a detail, you define a Repeating Detail that contains a brick Detail Component and repeats it every 2 2/3". Repeating Details can be used to add floor joist, brick joints, masonry ties, control joints, Ceiling tiles, etc.
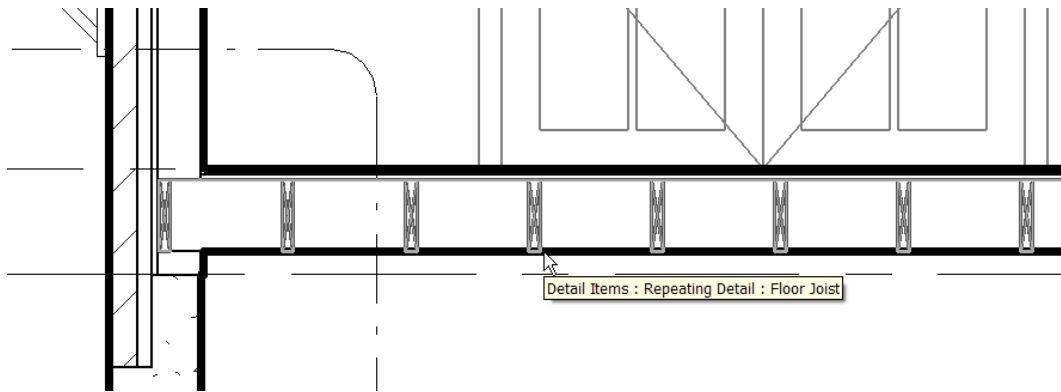

Figure 6 – Repeating Detail to show floor joists in the floor cavity

Revision Cloud—Sketch based object used to enclose areas of the drawings that have been modified since the last document issue. There is also a Revision Tag that ties the revision clouds to entries on a revision schedule built into the titleblock.

Symbol—This tool places a Generic Annotation Family in the current view. You must have the desired Generic Annotation Family loaded in your project, or you can use the Load Family button to locate one and import it. You can schedule Generic Annotation Families using a Note Block Schedule.

Detail Group—This tool will let you insert a Detail Group into the current view. A Detail Group contains a named collection of detail (view-specific) elements. Similar to a Model Group, if the Detail Group is edited, all instances of it throughout the project will update.

Insulation—This tool creates a special kind of Detail Line in the form of batt insulation. Use this to add insulation in your details.

Additional Detailing Tools

In addition to the ribbon tools noted above, there are other tools and techniques useful to detailing.

Lock Components—As you add components in a Revit Architecture project, you have no doubt discovered that you can often click the small padlock symbol to constrain the position of one element relative to another. This can be very handy in many instances to help maintain desired design relationships as the project progresses. When you are adding detail components, it is possible to lock these to the underlying model geometry. In this way, if the elements in the model move, the detail components associated with them will stay attached even though they appear in only their own callout or section view. Use caution when employing this technique however. In some cases the extra effort required to align and lock detail components can outweigh the benefit of having them locked. If the design changes you

anticipate are limited to the movement of a Wall or Floor, it may be easier to simply open the detail view later and move the detail components manually to the new position. This can also help you avoid those frustrating "Constraints not satisfied" error messages.
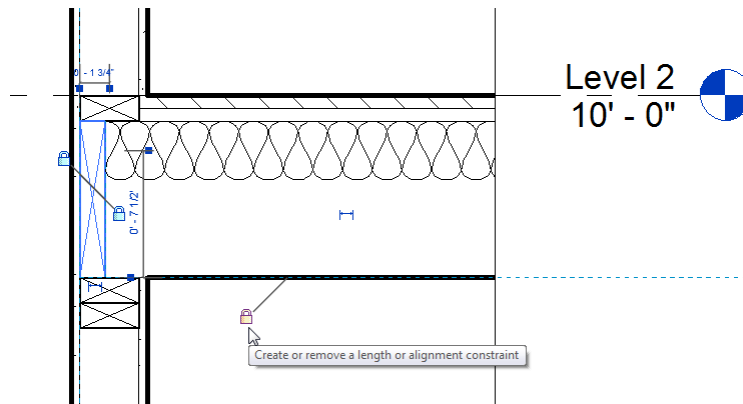

Figure 7 – You can optionally lock detail components to the underlying model geometry

Show/Remove Hidden Line—When a Filled Region or other Detail Component conceals another component or model element, it is sometimes desirable to have the edges of the concealed element show through as a dashed line. This tool will create this condition for you. Click the View tab of the ribbon and find the *Show Hidden Lines* tool on the Graphics panel.
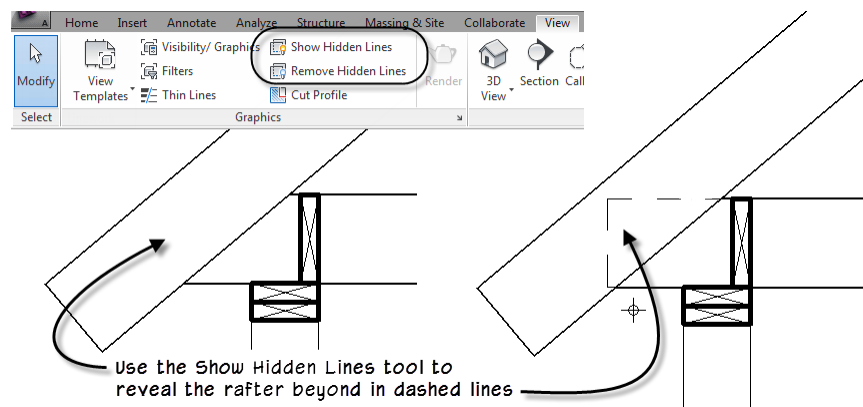

Figure 8 – Show Hidden Lines displays concealed objects as dashed lines

Use *Remove Hidden Lines* tool to reverse the effect.

Cut Profile—Also on the Graphics panel, this tool gives us the ability to edit the shape of the heavy cut line that Revit automatically generates when an object is cut in section or plan. This type of edit is view-specific and two-dimensional. While it does not change the 3D shape of the model, it gives us a quick way to make the detail look the way we need without forcing us to model something that would have little or no benefit in other views. For example, something like a key between the bottom of a foundation wall and the top of a footing, that would never be seen in any view other than a section or detail view, it would be difficult to justify the additional time or effort required to model it in 3D. Using the Edit Cut Profile tool we can make the section or detail appear as required without the extra modeling overhead.
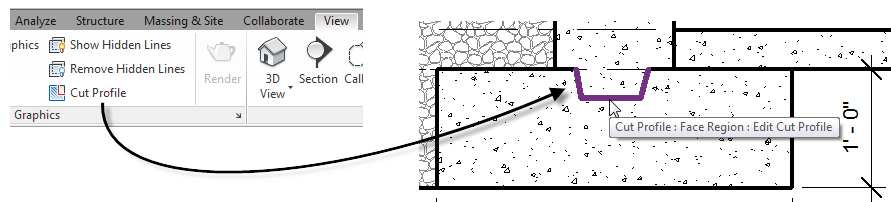
Figure 9 – Use Edit Cut Profile to modify the automatically generated profile outline

Keynotes

While much of creating a detail involves the drawing itself, equally critical is the notes and annotations used to describe its contents. Keynoting allows you to annotate your details (and other views) using a pre-defined list of notes. The notes are organized in a keyed list, which is why they are referred to as keynotes. However, it is not required that you actually utilize the keys in order to use the keynote functionality. Revit Architecture includes a sample keynote file organized in CSI format. You can use this list as is, edit it or create your own. Creating or editing your own file is easy. The Keynote list is stored in a simple tab-delimited text file. If you wish to create your own file, search for the "Sample User Keynote Text File" topic in the online help for instructions and an example of the proper format.

Keynote Settings—Before you can keynote elements in your project, you must load a Keynote file. On the Annotate tab, click on the Tag panel title (this is an expandable panel and will pop open), click the *Keynote Settings* tool.
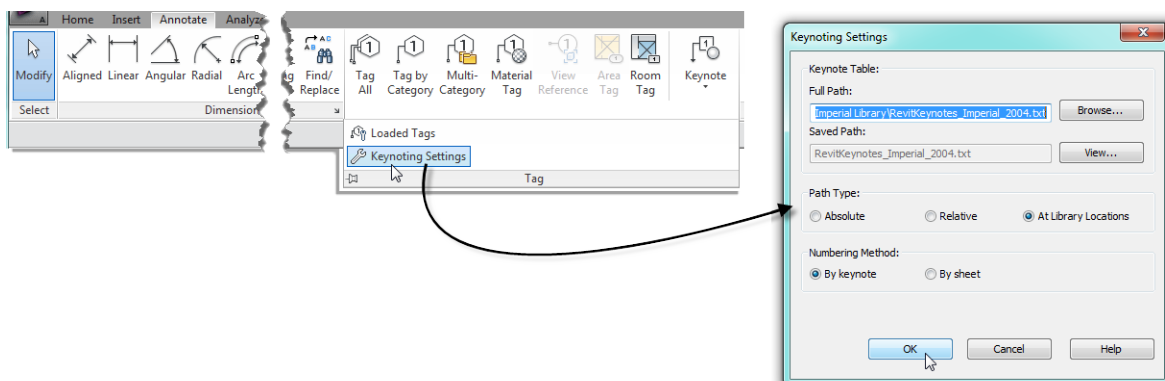

Figure 10 – Load a Keynote file and Configure settings in the Keynote Settings dialog

Use the Browse button to load an existing file. You can use the provided file or create your own as noted above. Three types of path are possible. An Absolute path writes the complete path back to the drive letter. A Relative path assumes that the keynote file is located in the same location as the project file and therefore only writes the path relative to the location in which the project is saved. Using the "At Library Locations" option writes the path relative the locations defined on the "File Locations" tab of the Options dialog (Application menu). Click the File Locations tab and then click the Places button to see and edit the library locations.

Keynotes can be numbered using the keynote defined in the file or by sequential number relative to each Sheet in your document set. In other words, the "By keynote" method will use a

fixed and predefined key (in the keynote file). The "By sheet" method will compile the numbering uniquely for each Sheet of the set.

Keynote Tags—Keynote tags are added by selecting elements in the model. If a Keynote is already assigned to the selected element, the tag will simply appear on screen. If the keynote has not yet been assigned to the selected element, a dialog showing the list of keynotes in the file will appear. Choose an appropriate note and then click OK. The out-of-the-box Keynote tag has three Types that give you the flexibility to show the key or the note itself. If you wish to see both the key and the note text, you can edit the Family and add a Type for this.
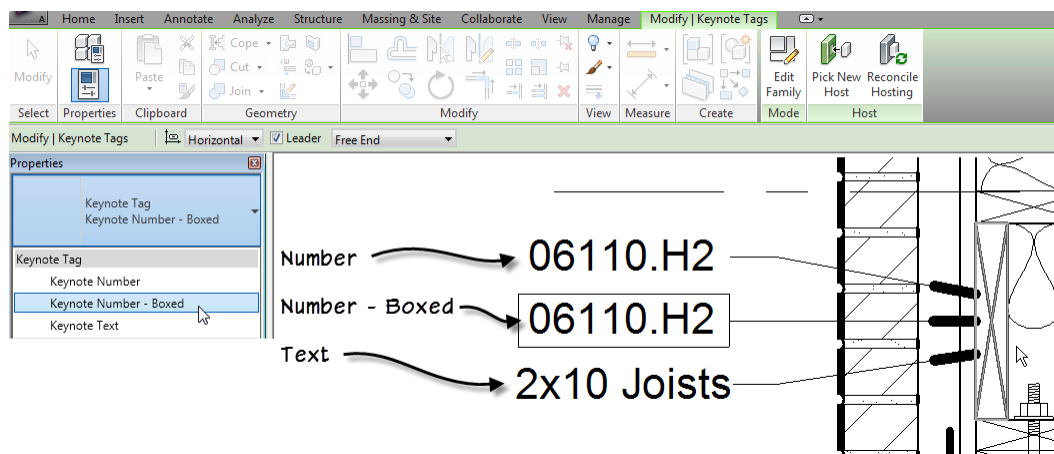

Figure 11 – Swap the Keynote tag to show the desired type

Types of Keynotes—Keynotes have three modes: Element, Material and User. The Element option reads the keynote assigned to the element in the model such as the keynote assigned to a Wall or Door, not the individual layers or sub-components of the Wall or Door. To keynote the layers of a Wall or components of a Door, you would use the Material keynote option. This will read the keynote assigned to the Material of the selected component. When you wish to override the pre-defined keynote setting, choose the User option. This option will display the "Keynotes" dialog and prompt you to choose a note of your choice. Since this option is an override, it will not update if you edit the Type or Material of the selected element.
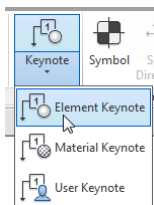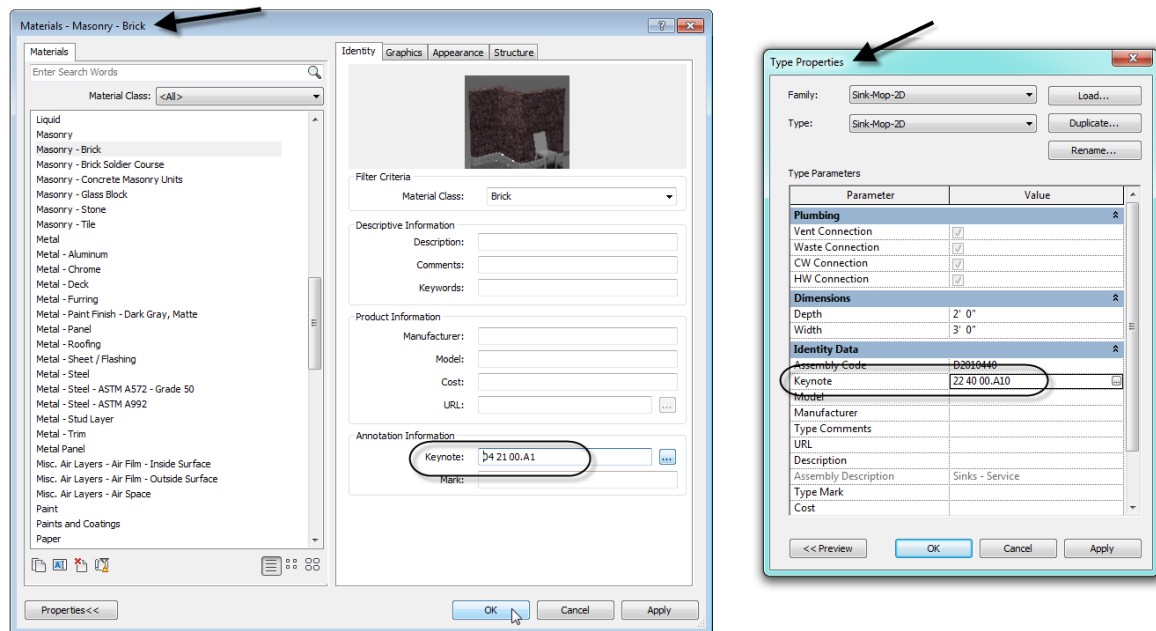
Figure 12 – Assign Keynotes to the Element Type or the Material or both

Keynotes unfortunately have a few limitations. For example, certain items cannot be keynoted like Repeating Details and Batt Insulation. The reasons for this are not exactly clear. Furthermore, keynotes have not been pre-assigned to the out-of-the-box content. This means that a great deal of effort will need to be expended to go through the library and assign keynotes to both Families and Materials. While you might be tempted to abandon the keynote functionality altogether based on these limitations, it is recommended that you try using them in production despite this. Once set up, having keynotes assigned to elements will save a great deal of time in production and will help to standardize the verbiage used on notes throughout the office.

Importing Details

Most architectural firms have amassed a library of "standard" details over the years. Such standard details may be drafted manually or generated in other computer drafted programs like AutoCAD. As you transition your day-to-day operations over to Revit Architecture you do not have to start completely over with such resources. Over time you may choose to redraw your standard library natively in Revit Architecture, but in the meantime, you can import both scanned image files (from hand-drafted details) and popular CAD formats such as DWG, DGN and even SketchUp files.

Before importing a file, on the View tab, on the Create panel, click the Drafting View button to create blank view in which to import it. A Drafting view is a blank sheet of paper with no link to the live Revit model. Use them to sketch or import details that are not cut from the model. Type a name and choose a scale when prompted.
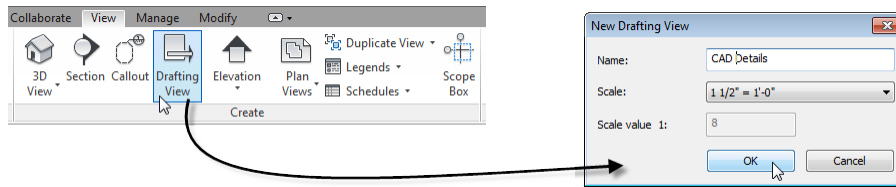
Figure 13 – Create a new Drafting View and assign it a scale

The commands to import or link CAD files are located on the Insert tab of the ribbon. If you want to simply insert the CAD file, on the Insert tab, click the **Import CAD** button. This will import the CAD file into Revit without maintaining a connection back to the original file. If you wish to maintain a link to the file, so that you can later update it if the original changes, then click the **Link CAD** button instead. You can update the link periodically using the **Manage Links** button on the Link panel.
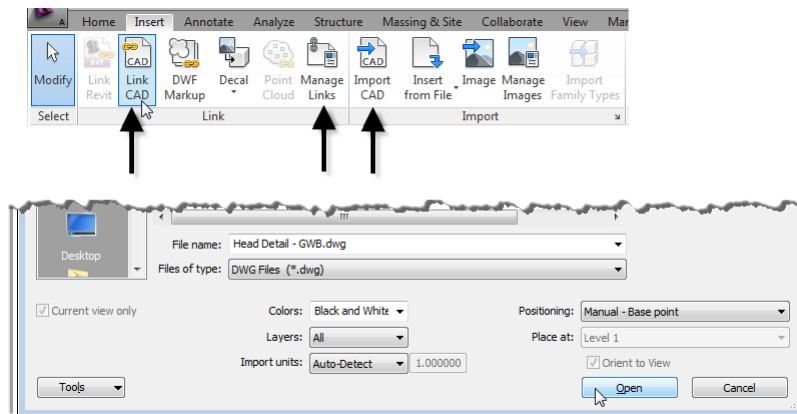

Figure 14 – Import CAD Formats dialog from the Insert ribbon tab

Browse to the file you wish to link (or import) and select it. Before clicking the Open button, configure the options at the bottom of the dialog. From the "Colors" list, you can keep the original CAD file colors, invert them or make everything black and white. In the "Positioning" area are several choices. For detail drawings, the "Manually place" option with either the "Manual – Base Point" or "Manual - Center" option typically will give the best results. In most cases, Revit will interpret the units of the imported file correctly; however, you can choose the import units manually from the "Import units" list. The "Layers" list defaults to importing all the CAD file layers, but you can also import a sub-set of layers with the "visible" and "specify" options.

CAD files will come in correctly scaled based upon how they were created and the settings you chose for scaling in the "Import/Link" dialog. When you import a file, the layers will be maintained and accessible from the view's Visibility/Graphic Overrides (keyboard shortcut VG) dialog on the Imported Categories tab.
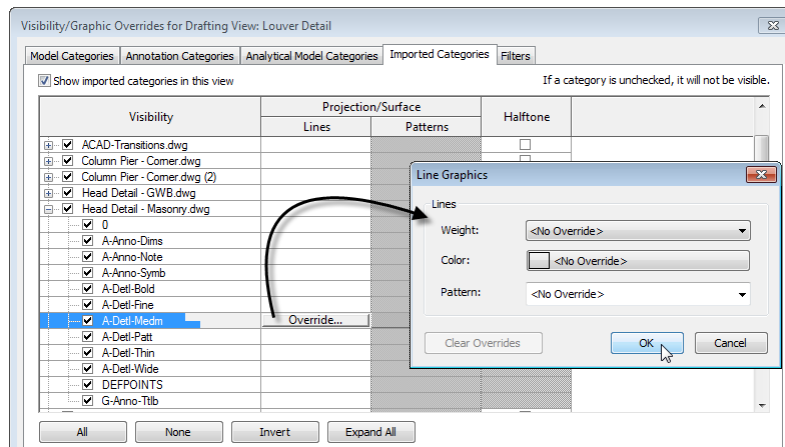
Figure 15 – CAD Layers remain accessible via the view's Visibility/Graphic Overrides

Using this dialog, you can turn layers on or off and override their imported color or lineweight settings. Furthermore, if you select the import object on screen, on the ribbon you have the ability to delete layers, explode and query the objects within the import. Deleting layers will delete the layer and all objects on the layer within the imported file.
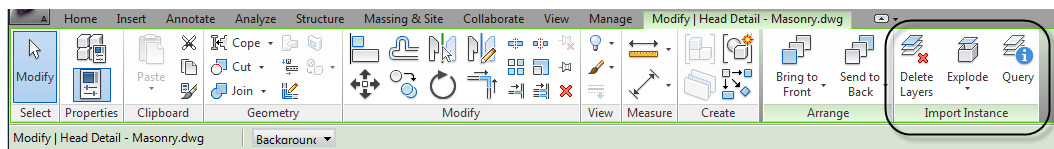

Figure 16 – Options for a selected Imported CAD file

When you explode an imported file, Line Styles will be added to your list of Line Styles (Settings menu). You will get a new Line Style for each layer in the imported file. The Detail lines generated from the exploded file will use these new line styles. <mark>In general, it is a better not to explode imported CAD files.</mark> Doing so litters your Revit model with many artifacts and often creates inaccuracies and other errors in the Revit file. <mark>For best results, clean up the file as much as possible in the original CAD program before importing into Revit and do not explode it.</mark>

In addition to the Import and Link CAD buttons, you will also find an Image button. Click this button to import an image file in BMP, JPG, JPEG, PNG or TIF format into the current view. Imported Images will have shape handles on the corners that you can use to resize the image. You cannot automatically scale such images. Images appear only in the current view. You can drag such views to Sheets for plotting with the rest of your document set.

Controlling Lineweights of Imported CAD Files

When you import details or other files from AutoCAD or other CAD files, you can control the way that the lineweights of the imported Linework will be interpreted when it comes into Revit Architecture. On the Insert tab of the ribbon, on the right corner of the Import panel titlebar, click the dialog launcher icon.
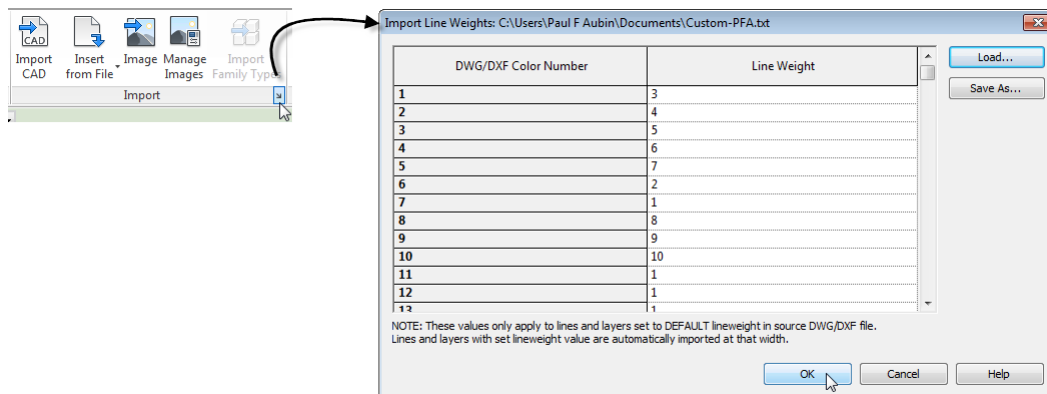
Figure 17 – Configure how Revit should apply lineweights to the imported elements

In the dialog that appears, you can Load a mapping file (several are included with the software), or input the desired values for each of the 255 possible imported color numbers. Since many existing CAD drawings use colors to determine what their lineweight is when plotting, Revit can assign its lineweights to the imported elements based on the values input in this table. ==If your imported entities use the lineweight property rather than color, the settings in this dialog will be ignored and the assigned lineweight used instead.==

==If you have access to AutoCAD (or other CAD program), it is best to open the files and clean them up in their original environment first.== Be sure that each detail uses consistent colors and lineweight settings so that you get predictable import results. Delete any unwanted geometry and purge unneeded layers and settings. If you need to use the same mapping settings for many files, click the Save As button to save the settings to a file for later retrieval.

Manually Assigning Callouts to Drafting Views

If you have chosen to import CAD details or if you have drawn them from scratch in Revit Architecture using only detail components (without an underlain live building model view), you can create callout symbols and manually assign them to the appropriate drafting views.
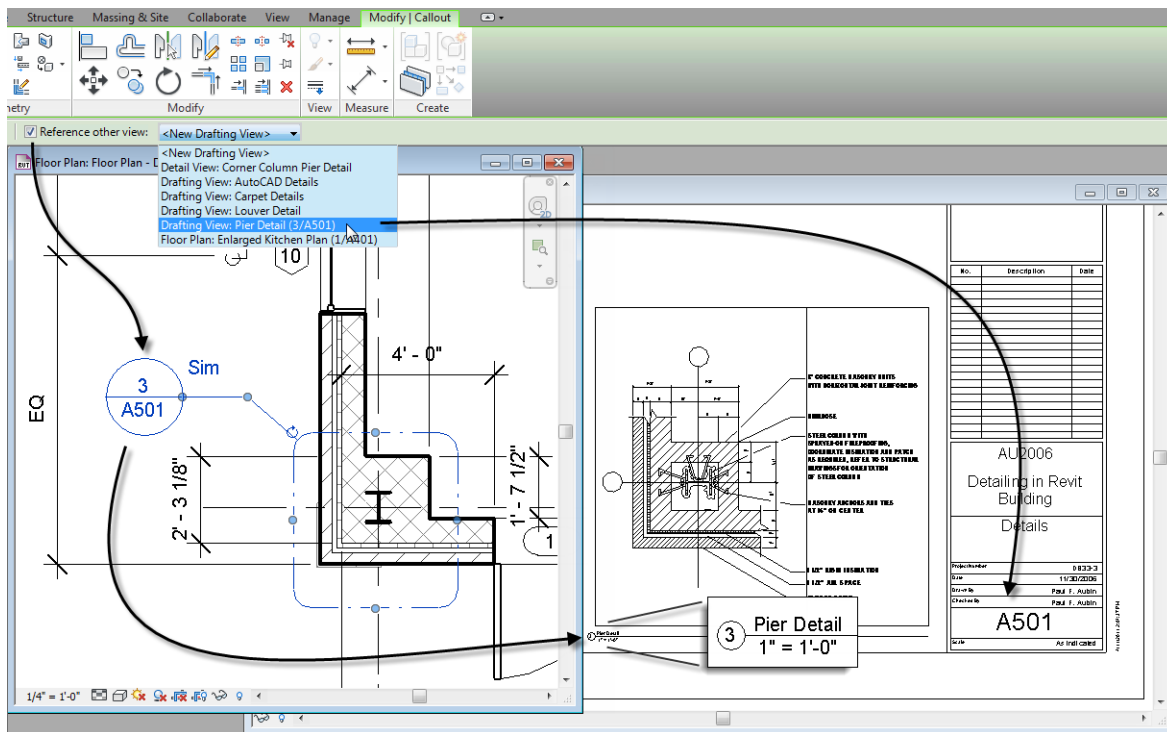
Figure 18 – Choose "Reference other view" to "point" a Callout to a Drafting view

This is simple to do. Just check the "Reference other view" box on the Options Bar *before* drawing the Callout or Section. When you drag the Detail view to a Sheet, it will update the Callout appropriately.
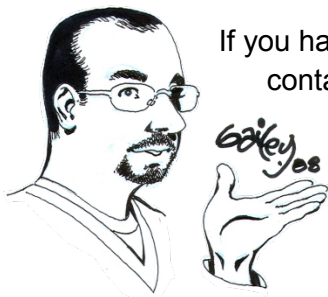
Further Study

You can find more information and tutorials in *The Aubin Academy Master Series: Revit Architecture*. Chapter 11 is devoted to detailing and annotation.

I also have Revit video training available on my website and at **www.lynda.com/trial/paubin**.

If you have any questions about this session or Revit in general, you can use the contact form at **www.paulaubin.com** to send me an email.

Thank you for attending.
Please fill out your evaluation.