

Autodesk®

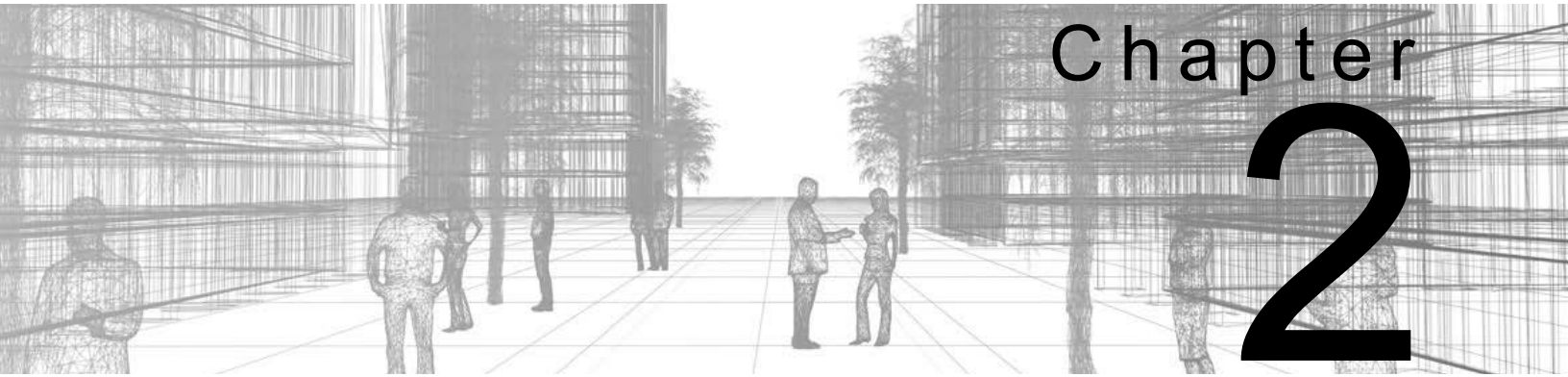
Revit® 2023 Architecture Fundamentals



Better Textbooks. Lower Prices.
www.SDCpublications.com

Visit the following websites to learn more about this book:





Chapter 2

Starting a Project

Starting a project in Revit begins by using a template. You can then link in a CAD file or an existing Revit model, if these are available. From there, you can add the framework for a building, including levels to define vertical heights and grids to define the structural layout for architectural and structural columns.

Learning Objectives in This Chapter

- Link and import CAD files to be used as a basis for developing a design.
- Link and import raster image and PDF files.
- Link existing Revit models to develop and coordinate with other disciplines.
- Add and modify levels to define floor-to-floor heights and other vertical references.
- Add and modify grids to provide locations for model elements.

2.1 Selecting a Project Template

New projects are based on a project template file. The template file includes preset levels, views, and some families, such as wall styles and text styles. When using templates, most of the views are set to display only the elements specific to the template, so it is best practice to select a template that reflects your company's discipline.

- Check with your BIM manager about which template you need to use for your projects. Your company might have more than one based on the type of project you are designing.

How To: Start a New Project

1. In the *File* tab, expand  (New) and click  (Project), as shown in Figure 2–1, or press <Ctrl>+<N>.

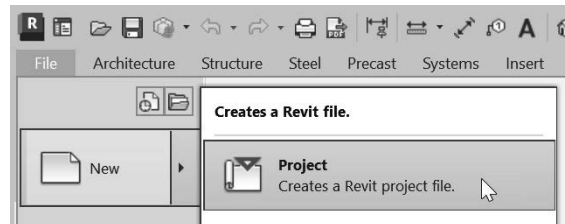


Figure 2–1

2. In the New Project dialog box (shown in Figure 2–2), select the template that you want to use and click **OK**.

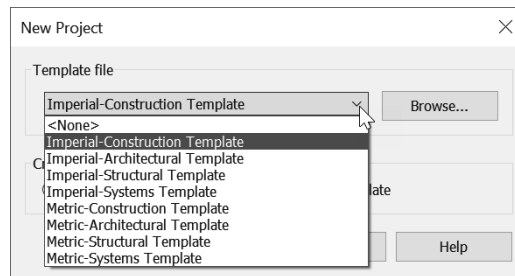


Figure 2–2

The list of template files is set in the Options dialog box in the File Locations tab. It might vary depending on the installed product and company standards.

Hint: Revit Worksharing

If established by your company that worksharing is needed, you would typically want to start a worksharing project on your local network once a project has been created.

- For more information on worksharing, see *A.9 Introduction to Revit Worksharing*.
- For more information about establishing and using worksets, refer to the ASCENT guide *Autodesk Revit: Collaboration Tools*.

Linking and Importing CAD Files

When you select an imported or linked CAD file, you can see in the tooltip that it is called an Import Symbol.

2.2 Linking and Importing Files

CAD files can be imported or linked into a Revit project. As an example, a designer might lay out a floor plan using the standard 2D AutoCAD software, and you then need to incorporate that information into your structural model. In addition, many renovation projects start with existing 2D drawings. Instead of redrawing from scratch, link or import the CAD file (as shown in Figure 2–3) and trace over it in Revit. You can also print a hybrid drawing that is part Revit project and part imported/linked drawing.

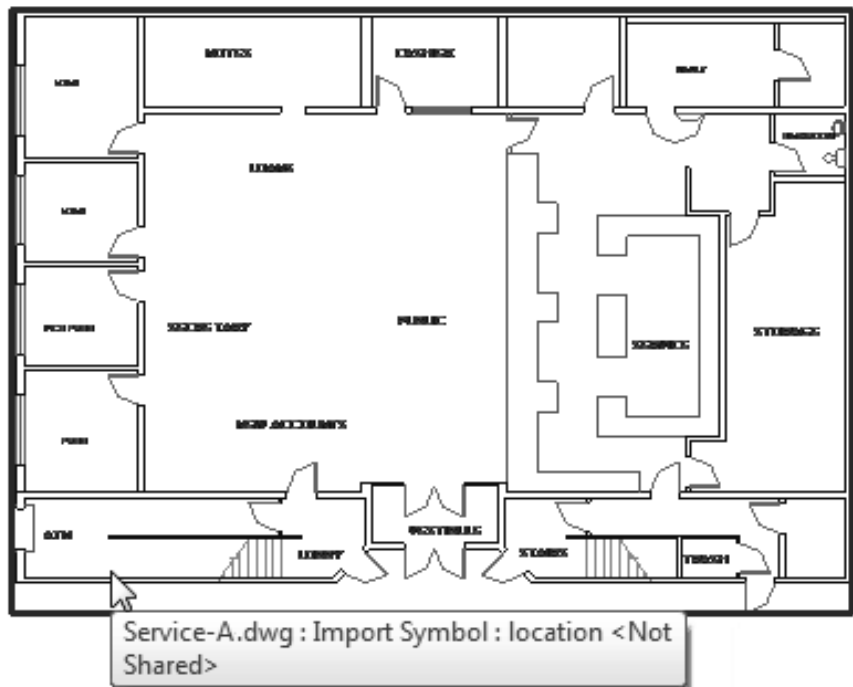




Figure 2–3

- When you hover your cursor over an imported or linked CAD file, a tooltip displays indicating that it is an import file.
- CAD file formats that can be imported or linked include AutoCAD® (DWG and DXF), MicroStation (DGN), 3D ACIS modeling kernel (SAT), Trimble SketchUp (SKP), FormIt (AXM), 3D Shape (OBJ and STL), and Rhino (3dm).
- When linking or importing a CAD file, you can specify a level or a named horizontal reference plane in the project to position the CAD file at.

Linking vs. Importing

- **Link:** A connection is maintained with the original file and the link updates if the original file is updated.
- **Import:** No connection is maintained with the original file. It becomes a separate element in the Revit model.

How To: Link or Import a CAD File

1. Open the view into which you want to link or import the file.
 - For a 2D file, this should be a 2D view. For a 3D file, open a 3D view.
2. In the *Insert* tab>Link panel, click  (Link CAD), or in the *Insert* tab>Import panel, click  (Import CAD).
3. In the Link CAD Formats (shown in Figure 2–4) or Import CAD Formats dialog box, select the file that you want to import.
 - Select a file format in the **Files of type** drop-down list to limit the files that are displayed.

The dialog boxes for Link CAD Formats and Import CAD Formats are the same.

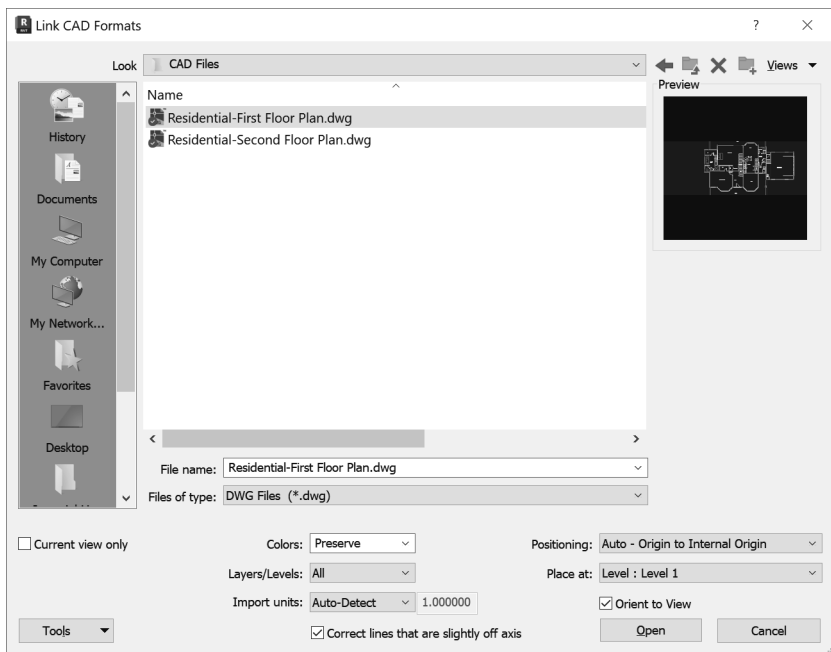


Figure 2–4

- If **Current view only** is selected, as shown in Figure 2–5, you can set all options except the *Place at* and the *Orient to View* options. The view will only display in the current view.

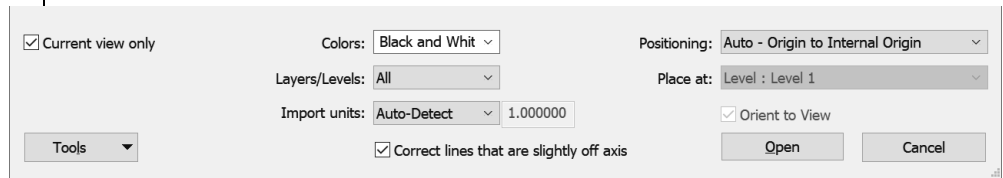


Figure 2–5

- If you would like to place the CAD file at a level or reference plane, verify **Current view only** is unchecked and set the *Place at* option, as shown in Figure 2–6.

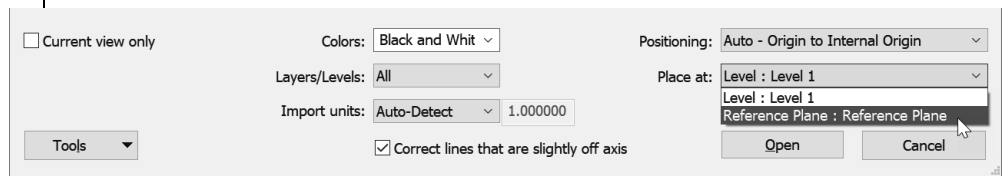


Figure 2–6

- Click **Open**.

Link and Import Options

Current view only	Determine whether the CAD file is placed in every view, or only in the current view. This is especially useful if you are working with a 2D floor plan that you only need to have in one view.
Colors	Specify the color settings. Typical Revit projects are mainly black and white. However, other software frequently uses color. You can Invert the original colors, Preserve them, or change everything to Black and White .
Layers/Levels	Indicates which CAD layers are going to be brought into the model. Select how you want layers to be imported: All , Visible , or Specify...
Import units	Select the units of the original file, as required. Auto-Detect works in most cases.
Correct lines...	If lines in a CAD file are off axis by less than 0.1 degree, selecting this option straightens them. It is selected by default.

Positioning	<p>Specify how you want the imported file to be positioned in the current project:</p> <table border="0"> <tr> <td>Auto - Center to Center</td> <td>Auto - Center to Center</td> </tr> <tr> <td>Auto - Origin to Internal Origin</td> <td>Auto - Origin to Internal Origin</td> </tr> <tr> <td>Manual - Origin</td> <td>Auto - By Shared Coordinates</td> </tr> <tr> <td>Manual - Center</td> <td>Manual - Origin</td> </tr> <tr> <td></td> <td>Manual - Center</td> </tr> </table> <p>Import option Linking option</p> <p>The default position is Auto - Origin to Internal Origin.</p>	Auto - Center to Center	Auto - Center to Center	Auto - Origin to Internal Origin	Auto - Origin to Internal Origin	Manual - Origin	Auto - By Shared Coordinates	Manual - Center	Manual - Origin		Manual - Center
Auto - Center to Center	Auto - Center to Center										
Auto - Origin to Internal Origin	Auto - Origin to Internal Origin										
Manual - Origin	Auto - By Shared Coordinates										
Manual - Center	Manual - Origin										
	Manual - Center										
Place at	<p>Select a level or named reference plane at which to place the imported file. If you selected Current view only, this option is grayed out.</p>										
Orient to View	<p>Used to orient the CAD file on import/link.</p>										

- When a file is positioned **Auto - Origin to Internal Origin**, it is pinned in place and cannot be moved. To move the file, click on the pin to unpin it, as shown in Figure 2–7.

For more information on importing and linking CAD files, see the ASCENT guide Autodesk Revit: Collaboration Tools.

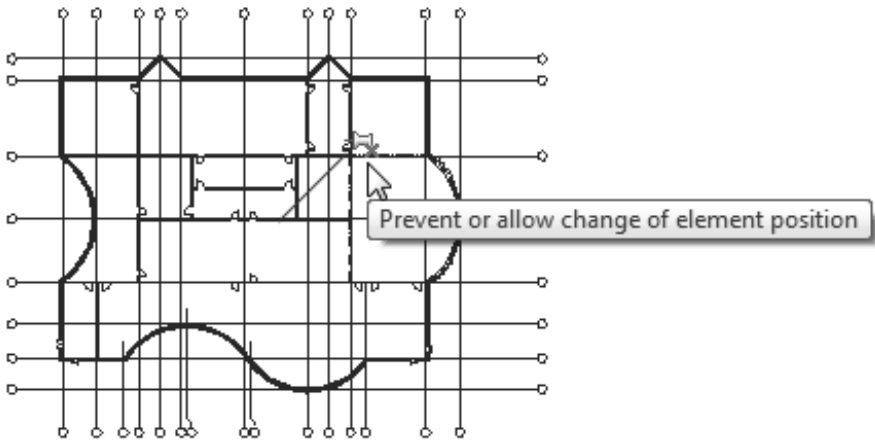


Figure 2–7

Linking and Importing Raster Image Files

Raster images are made up of pixels or dots in a file that create a picture. For example, a raster file is created when you scan a blueprint and then import or link it into Revit to reference or trace. You can add raster images to any 2D view, including sheet views (as shown in Figure 2–8). They can be used as background views or as part of the final drawing. Imported or linked images can be placed behind model objects and annotations.

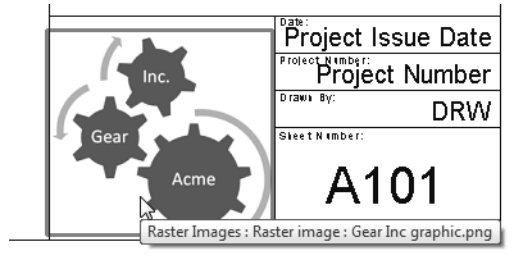




Figure 2–8

For more information about the different types of files and how to import them, refer to the ASCENT guide Autodesk Revit: Collaboration Tools.

- Link a PDF or raster image into a 2D view if you need to reference a file that will be updated throughout the project cycle and to keep the project’s file size from increasing when importing files.
- Linked PDFs or raster images can be scaled, rotated, and moved just like an imported PDF or raster image. Any changes made to the PDF or raster image will update in the project it is linked into when you open the project.
- A PDF can be imported into Revit as a raster image. If the PDF contains vector data, you can snap to the elements in the PDF.

How To: Import and Link an Image

To...	Then...
Import an image file	In the <i>Insert</i> tab>Import panel, click  (Import Image).
Link an image file	In the <i>Insert</i> tab>Link panel, click  (Link Image).

1. In the Import Image or Link Image dialog box, select the image you want to insert. You can insert .BMP, .JPG, .JPEG, .PNG, and .TIF files.

- Click **Open**. Four blue dots and an “x” illustrate the default size of the image file, as shown on the left in Figure 2–9. Click on the screen to place the image. It displays with the shape handles still visible, as shown on the right in Figure 2–9.

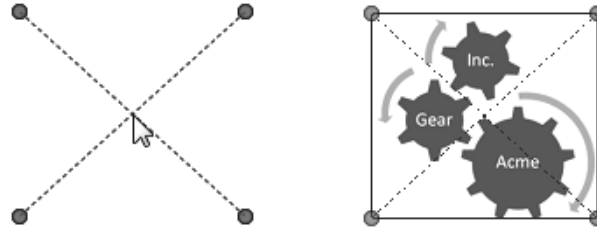


Figure 2–9

- In Properties, you can adjust the height and width and also set the *Draw Layer* to either **Background** or **Foreground**, as shown in Figure 2–10.

Dimensions	
Width	1' 5 185/256"
Height	1' 1 41/64"
Horizontal Scale	1.000000
Vertical Scale	1.000000
Lock Proportions	<input checked="" type="checkbox"/>
Other	
Draw Layer	Background

Figure 2–10

- You can select more than one image at a time and move them as a group to the background or foreground.
- In the *Modify | Raster Images* tab (shown in Figure 2–11), you can access the Arrange options and **Manage Images**.

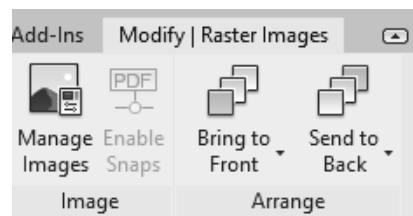




Figure 2–11

Linking and Importing PDF Files

PDF files are often created for sharing information with people that do not have the original program and when you do not want anyone to change the original information. They can also be used as underlays when the original information includes vector data.

How To: Import and Link a PDF File

To...	Then...
Import a PDF file	In the <i>Insert</i> tab>Import panel, click  (Import PDF).
Link a PDF file	In the <i>Insert</i> tab>Link panel, click  (Link PDF).

1. In the Import PDF or Link PDF dialog box, navigate to the location where the PDF file is stored, select it, and click **Open**.
2. In the Import PDF or Link PDF dialog box (Figure 2–12 shows the Import PDF dialog box), select the page you want to import/link and click **OK**.

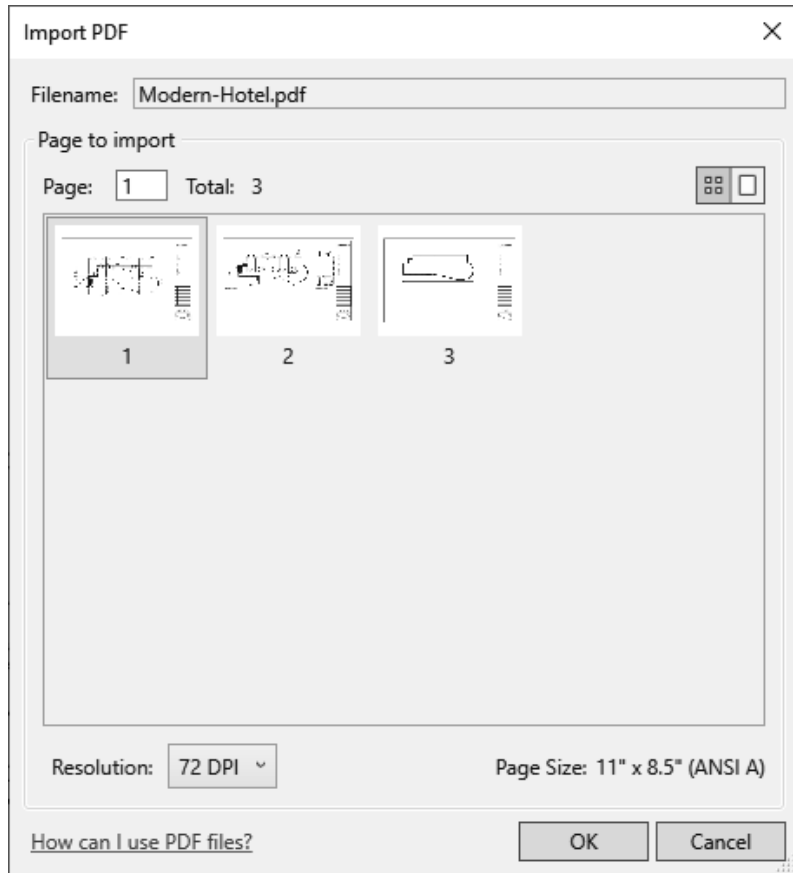


Figure 2–12

- Only one page can be imported/linked at a time, but you can import/link additional pages by repeating the process.

3. In Properties, you can specify the size and scale of the image, as shown in Figure 2–13.
 - If the PDF comes from a vector source, you can also choose to enable snaps and trace over the elements in the PDF.
 - The Foreground/Background status can also be set in the Options Bar and in Properties.

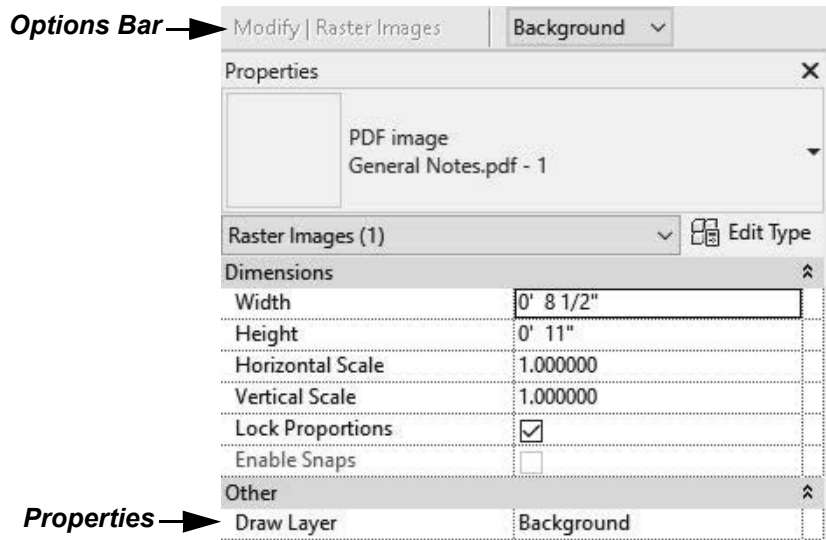


Figure 2–13

2.3 Linking in Revit Models

You can link Revit models directly into a project. These models can be an existing building that you are creating an addition to, as shown in Figure 2–14, or engineering models that you are checking to ensure that they line up with your model. They are also used for campus-like projects where the same building is repeated multiple times. They are full 3D models.

A linked model automatically updates when the original file is changed.

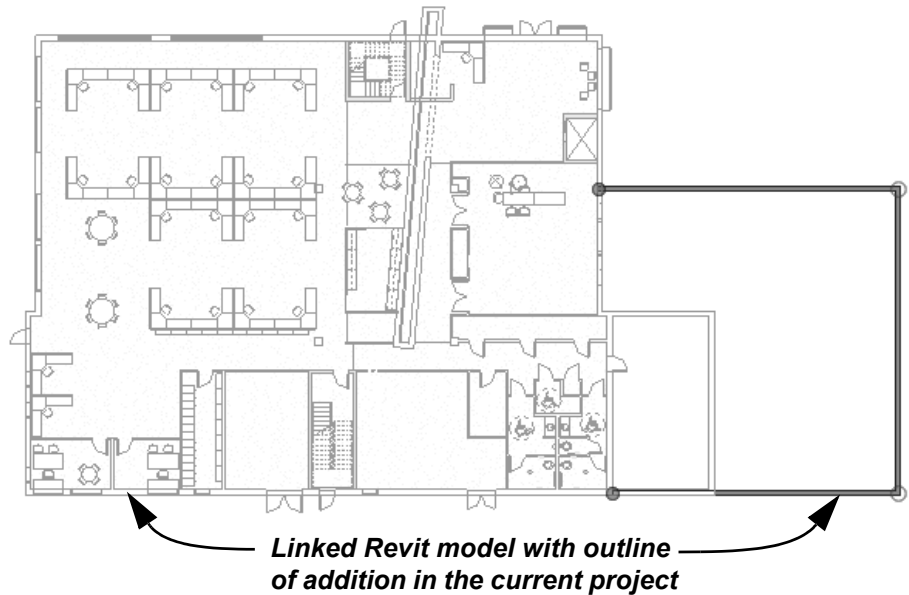



Figure 2–14

- Architectural, structural, and MEP models created in Revit can be linked to each other as long as they are from the same release cycle.
- When you use linked models, clashes between disciplines can be detected and information can be passed between disciplines.
- Revit models are always linked. They cannot be imported.

How To: Add a Linked Model to a Host Project

1. In the *Insert* tab>Link panel, click  (Link Revit).
2. In the Import/Link RVT dialog box, select the file that you want to link. Before opening the file, set the *Positioning*, as shown in Figure 2–15.

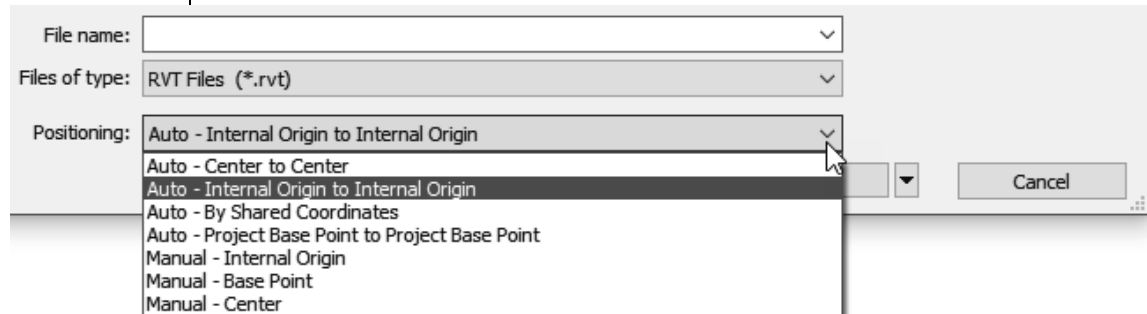


Figure 2–15

3. Click **Open**.
4. Depending on how you decide to position the file, it is automatically placed in the project or you can manually place it with the cursor.

As the links are loading, do not click on the screen or click any buttons. The more links present in a project, the longer it takes to load.

2.4 Modifying Imported/Linked Files

When you select an imported/linked file, you can modify it by arranging the Foreground/Background status, modifying its Type Properties, querying information about elements in the file, and deleting layers. You can also modify the Visibility/Graphic Overrides of each imported/linked instance.

- An imported/linked file is called an *import symbol* once it is inserted into a project, as shown in Figure 2–16.

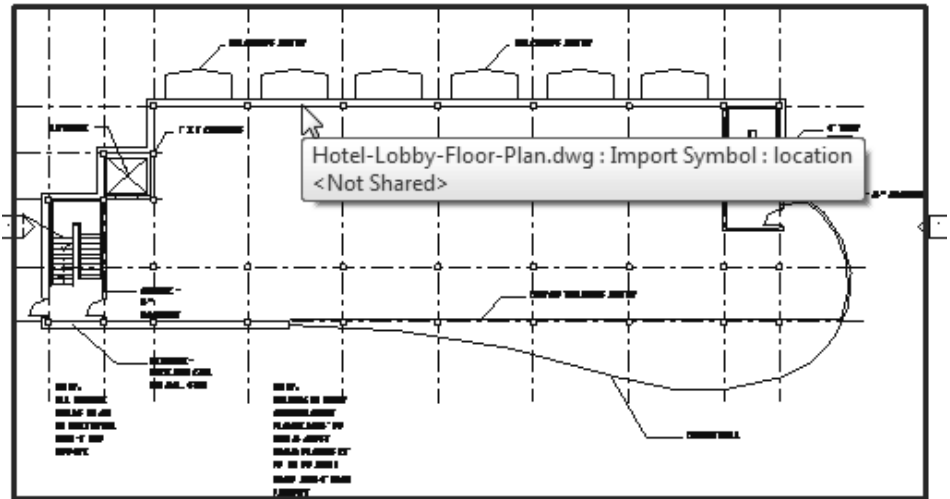


Figure 2–16

Setting an Imported or Linked File to Halftone

To see the difference between the host model elements and the linked or imported file, you can set the linked/imported file to halftone, as shown in Figure 2–17.

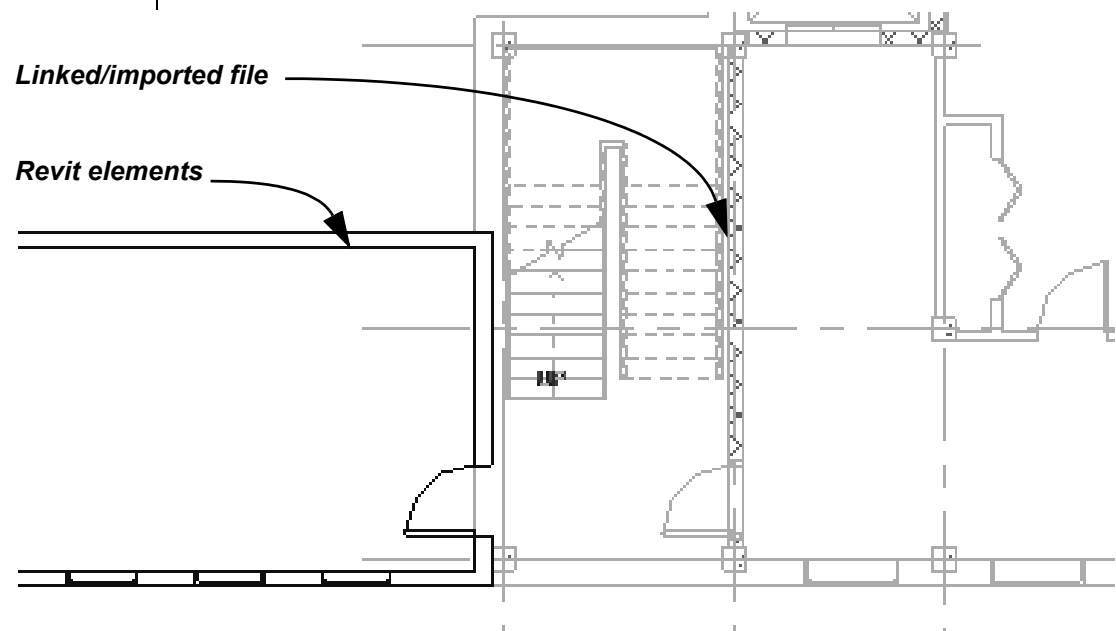


Figure 2-17

How To: Set an Element Halftone

1. Select the imported file.
2. Right-click and select **Override Graphics in View>By Element...**
3. In the View Specific Element Graphics dialog box, select **Halftone**, as shown in Figure 2-18.

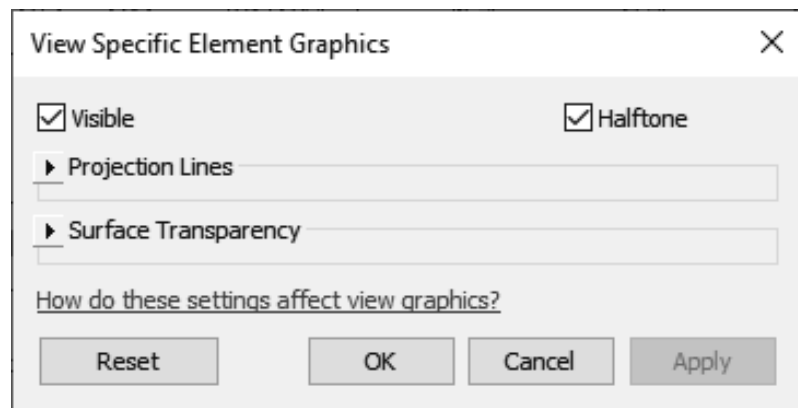


Figure 2-18

4. Click **OK**.
 - You can use this method to set any element or category to halftone.

Draw Layer

Linked CAD files are typically in the background of a view. To change this, select the CAD file in the view and in the Options Bar or in Properties, in the *Other* section, change the *Draw Layer* to **Foreground**.

Editing Raster Files

Select an imported/linked image to make changes. Once it is selected, you can resize the image as you did when you first inserted it or specify the *Width* and *Height* values in Properties.

- Select **Lock Proportions** in the Options Bar to ensure that the length and width resize proportionally to each other when you adjust the size of an image.
- Use the standard modification tools to **Move, Copy, Rotate, Mirror, Array, and Scale** images. Images can also be grouped together into detail groups.
- The Foreground/Background status can also be set in the Options Bar and in Properties, as shown in Figure 2–19.

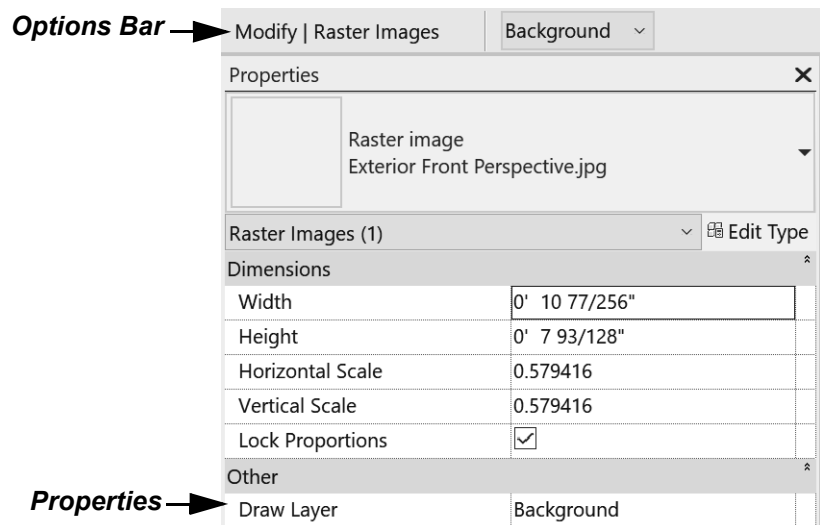


Figure 2–19

- In the *Modify | Raster Images* tab > Arrange panel (shown in Figure 2–20), use the Arrange tools to move images to the front or back of other images or objects.

- You can snap to edges of images, as shown in Figure 2–21.

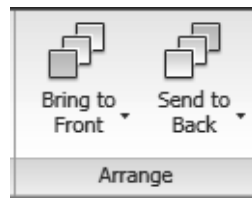


Figure 2–20

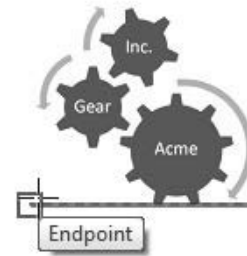





Figure 2–21

Managing Links

The Manage Links dialog box (shown in Figure 2–22) enables you to reload, unload, add, and remove links, and it also provides access for you to set other options. To open the Manage Links dialog box, in the *Insert* tab>Link panel, click

 (Manage Links). Alternatively, you can go to the *Manage* tab>Manage Projects panel and click  (Manage Links).

- You can also select the link and click  (Manage Links) in the *Modify | RVT Links* tab>Link panel.

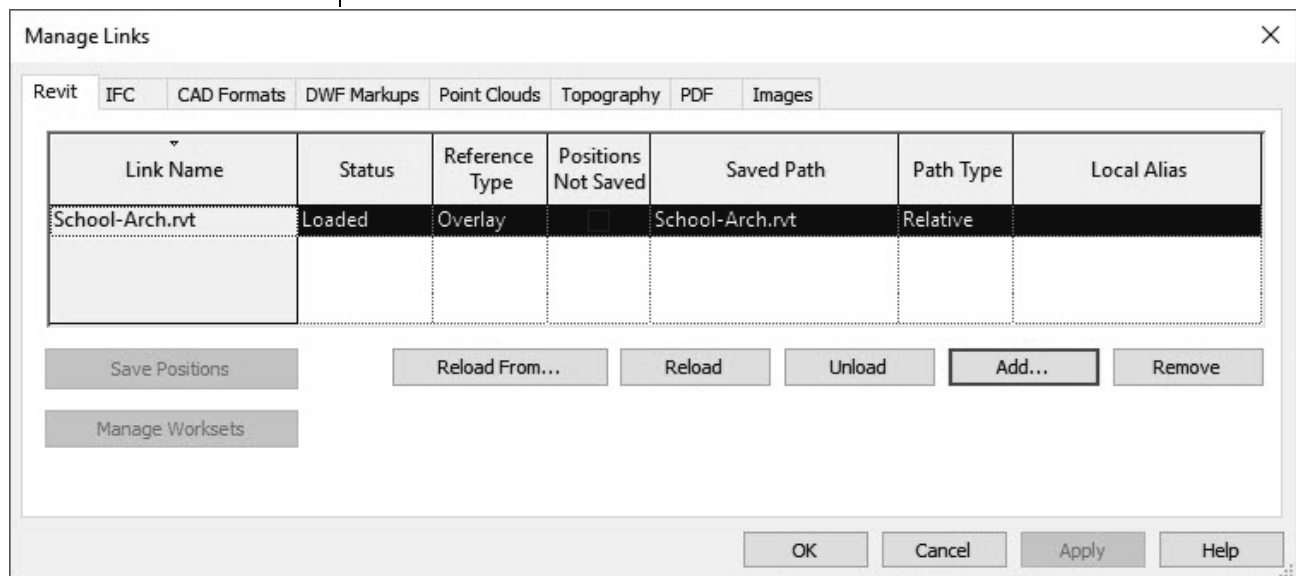


Figure 2–22

- The Manage Links dialog box does not show imported CAD files.
- You can manage both imported and linked images and PDFs.

Some of these options are also available in the Project Browser.

*Expand the Revit Links node, then right-click on the Revit Link and select **Reload**, **Unload**, or **Reload From....***

The following options are available:

- **Reload From:** Opens the Add Link dialog box, which enables you to select the file you want to reload. Use this if the linked file location or name has changed.
- **Reload:** Reloads the file without additional prompts.
- **Unload:** Unloads the file so that the link is kept, but the file is not displayed or calculated in the project. Use **Reload** to restore it.
- **Add:** Opens the Import/Link RVT dialog box, which enables you to link additional models into the host project.
- **Remove:** Deletes the link from the file.

Links can be nested into one another. How a link responds when the host project is linked into another project depends on the option in the *Reference Type* column.

- **Overlay:** The nested linked model is not referenced in the new host project.
- **Attach:** The nested linked model displays in the new host project.


The option in the *Path Type* column controls how the location of the link is remembered.

- **Relative**
 - Searches the root folder of the current project.
 - If the file is moved, the software still searches for it.
- **Absolute**
 - Searches the entire file path where the file was originally saved.
 - If the original file is moved, the software is not able to find it.
- Other options control how the linked file interfaces with worksets and shared positioning.

Modifying the Visibility of Imported/Linked Files

If you have used the imported/linked file as a guideline for tracing, you can toggle off the visibility of the entire image using the Visibility/Graphic Overrides dialog box, without removing it from the project in case you need it later. You can also toggle off individual layers or levels.

How To: Hide individual Layers

1. In the *View* tab>Graphics panel, click  (Visibility/Graphic Overrides), or type **VG** or **VV** to open the Visibility/Graphic Overrides dialog box.
2. Switch to the *Imported Categories* tab. It displays a list for each imported instance and their layers/levels, as shown in Figure 2–23.
3. To have the linked/imported file display in halftone, check the box in the *Halftone* column.

Click to have the imported/linked file display in halftone

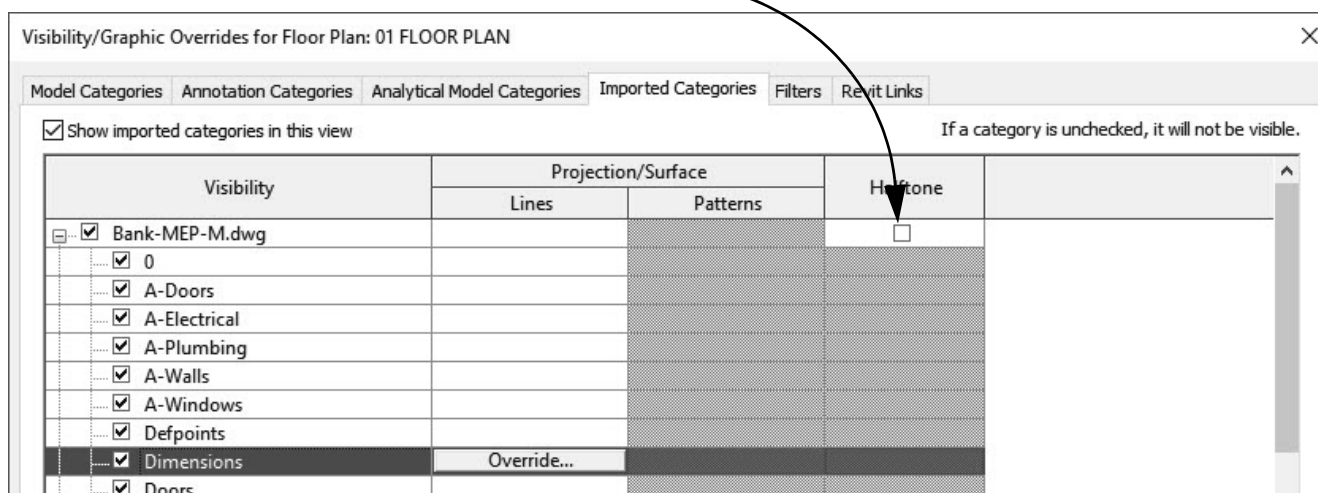



Figure 2–23

4. Click the plus sign beside the file name to expand a list of the layers or levels in that file.
5. Clear the check mark from the individual layers that you do not want to display.
 - Typically, these layers contain similar information, such as all windows or all notes in a drawing. However, it is not as definite as using Revit elements. An item might have been misplaced on a different layer and, if so, it does not toggle off.
6. Close the dialog box.
 - To toggle off the entire file, clear the checkmark next to the file name.

Temporarily Hide/Isolate

You might want to temporarily remove linked or imported files from a view, modify the project, and then restore the elements. Instead of completely toggling the elements off, you can temporarily hide them.

Select the elements you want to hide (make invisible) or isolate (keep displayed while all other elements are hidden) and click

 (Temporary Hide/Isolate). Select the method you want to use, as shown in Figure 2–24.

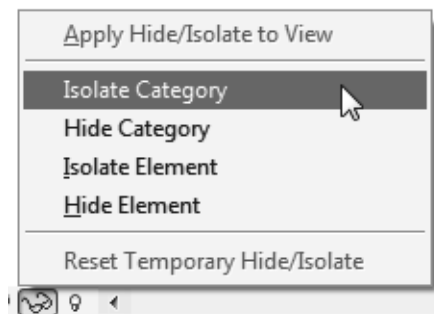


Figure 2–24

- The category or elements are hidden or isolated. A cyan border displays around the view with a note in the upper left corner, as shown in Figure 2–25. It indicates that the view contains temporarily hidden or isolated elements.

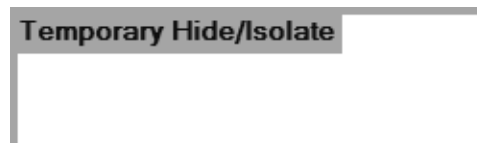



Figure 2–25

- Click  (Temporary Hide/Isolate) again and select **Reset Temporary Hide/Isolate** to restore the elements to the view.
- If you want to permanently hide the elements in the view, select **Apply Hide/Isolate to View**.
- Elements that are temporarily hidden in a view are not hidden when the view is printed.

Hide Elements in a View

When working in views, you can quickly hide linked or imported files. To hide the imported or linked file, select it and right-click to display the shortcut menu, then select **Hide in View** and select either **Elements** or **Category**, as shown in Figure 2–26.

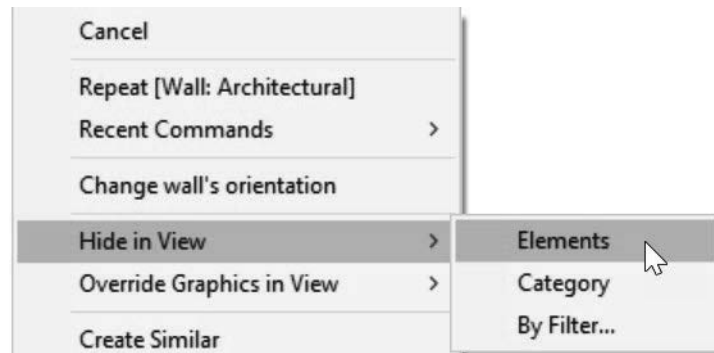


Figure 2–26

Practice 2a

Start a Project and Link Files

Practice Objectives

- Start a Revit project.
- Link a CAD file.
- Link a Revit file.

In this practice, you will start a Revit project, then import floor plans created in AutoCAD and use them as a base layout for the first floor lobby and for a typical guest floor. You will then link in a Revit model that includes a standard poolhouse and platform for the building, as shown in Figure 2–27.

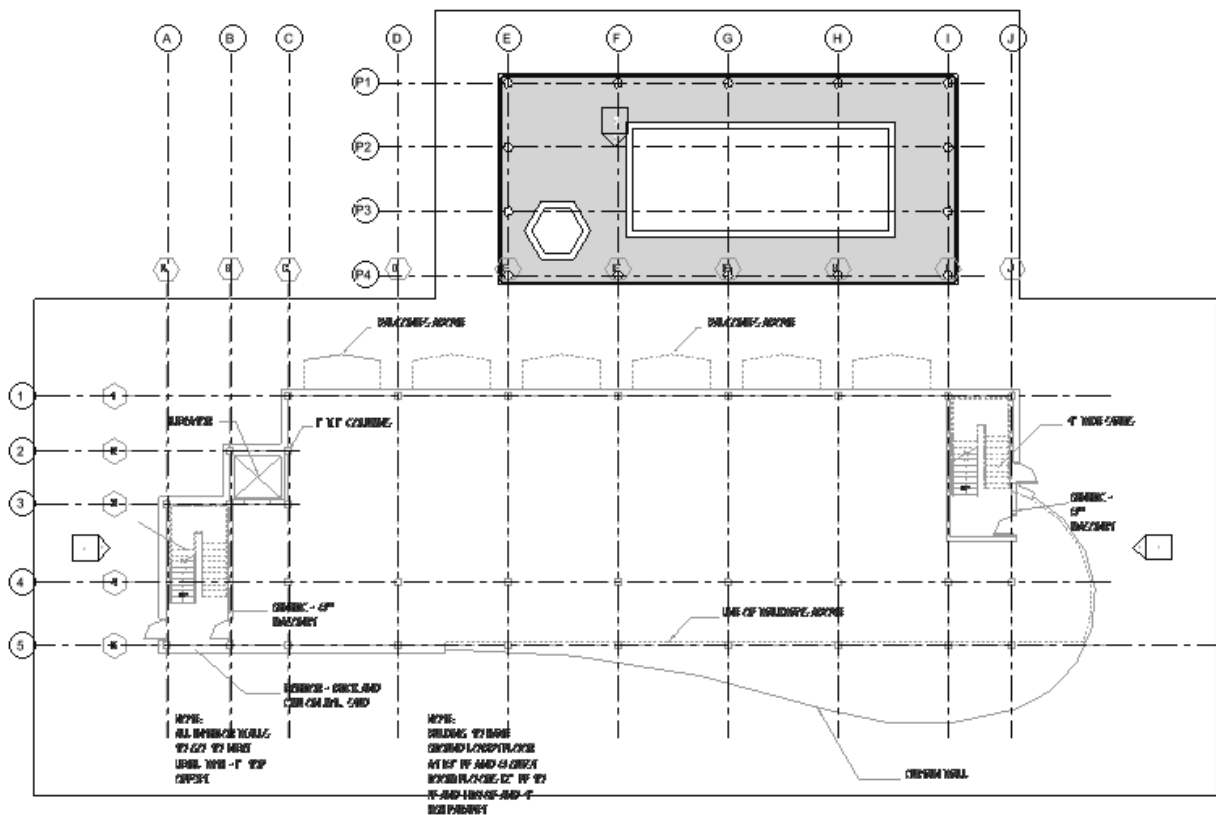




Figure 2–27

Task 1 - Start a project.

1. In the *File* tab, expand  (New) and click  (Project).
 - Alternatively, if you are on the Home screen, click the **New** button under the *MODEL* section.

2. In the New Project dialog box, expand the *Template file* list, select the default **Imperial-Architectural Template**, and click **OK**. (There are no elements in this file, only datums and basic views.)
3. Save the project as **Hotel-Start.rvt**.
4. Review the Project Browser and note that the project has default floor plan, ceiling plan, and elevation views. By default, the **Floor Plans: Level 1** view is open and displays in bold in the Project Browser, as shown in Figure 2–28.

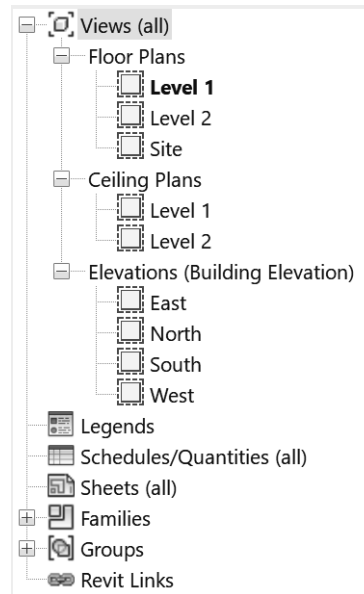



Figure 2–28

Task 2 - Link a CAD file.

1. In the *Insert* tab>Link panel, click  (Link CAD).
2. In the Link CAD Formats dialog box, navigate to the practice files *CAD Files* folder and select the file **Hotel-Level-1.dwg**, then set the following options:
 - Select **Current view only**
 - *Colors:* **Black and White**
 - *Layers/Levels:* **All**
 - *Import Units:* **Auto-Detect**
 - *Positioning:* **Auto - Origin to Internal Origin**
3. Click **Open**. The linked CAD file is placed in the project on the **Floor Plans: Level 1** view.

4. Select the linked CAD file. It is a single imported symbol and pinned in place because it was imported origin to internal origin.
5. In the Options Bar, change *Background* to **Foreground**.
6. With the CAD file still selected, right-click and select **Override Graphics in View>By Element....**
7. In the View-Specific Element Graphics dialog box, select **Halftone** and click **OK**.
8. Click in an empty space in the view to release the selection. The linked file displays in halftone, as shown in Figure 2–29.

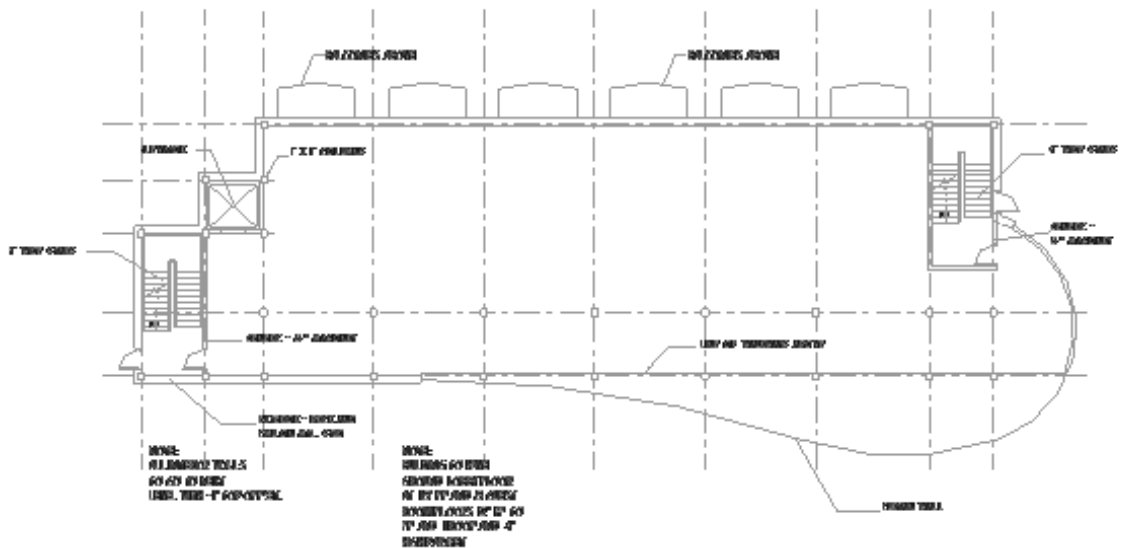





Figure 2–29

9. Open the **Floor Plans: Level 2** view. The CAD file linked in Level 1 does not display because you specified to link the CAD file with **Current view only** selected.
10. Link the CAD file **Hotel-Level-2.dwg** using the options that were used for Level 1.
11. Override the graphics and set the linked file to **Halftone**.
12. Save the project.

Task 3 - Link in a Revit file.

1. In the Quick Access Toolbar, click  (Default 3D View). Neither of the linked CAD files display in this view.
2. In the *Insert* tab>Link panel, click  (Link Revit).

3. Navigate to the practice files *Revit Link Files* folder and select **Hotel-Pool.rvt**. Verify that the *Positioning* is set to **Auto - Internal Origin to Internal Origin** and click **Open**.
4. In the View Control Bar, change the *Visual Style* to  (Shaded).
5. Select one of the levels and type **VH** to hide in view.
6. Type **ZF** to fit all the model to the view or **ZA** to zoom all, as shown in Figure 2–30.

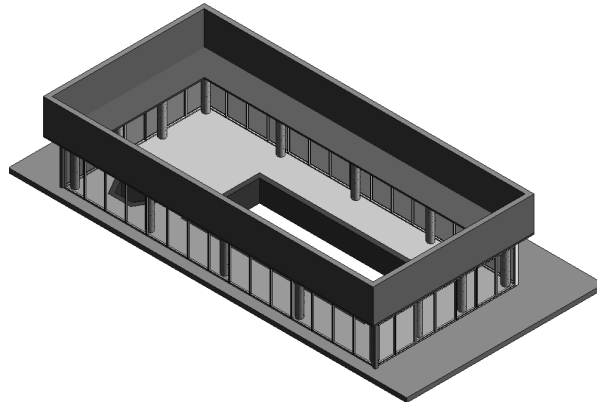


Figure 2–30

7. Along the top of the view window, select the *Level 1* tab to switch back to this view. Both the linked CAD file and linked Revit file display in this view.
8. Open the Visibility/Graphic Overrides dialog box by typing **VV**.
9. Click on the *Revit Links* tab. Next to **Hotel Pool.rvt**, check the checkbox for **Halftone**, as shown in Figure 2–31.

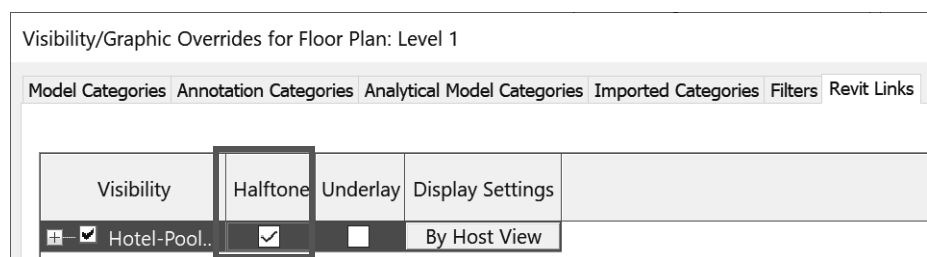


Figure 2–31

10. Click **OK**.
11. Select the text that is part of the CAD file below the platform and in Properties, in the *Other* section, change the *Draw Layer* to **Foreground**.
12. Save and close the project.

2.5 Setting Up Levels




Levels define stories and other vertical heights, such as the parapet and other reference heights shown in Figure 2–32. The default template includes two levels, but you can define as many levels in a project as required. They can go below 0'-0" or in the negative (for basements) as well.




Figure 2–32

- You must be in an elevation or section view to define levels.
- Once you constrain an element to a level, it moves with the level when the level is changed.

How To: Create Levels

1. Open an elevation or section view.
 2. In the *Architecture* tab>Datum panel, click  (Level), or type **LL**.
 3. In the Type Selector, set the level head type, if needed.
 4. In the Options Bar, select or clear **Make Plan View** as needed. You can also click **Plan View Types...** to select the types of views to create when you place the level.
 5. In the *Modify | Place Level* tab>Draw panel, click either  (Pick Lines) to select an element or  (Line) to sketch a level.
 6. Continue adding levels as needed.
- Level names are automatically incremented as you place them. This automatic numbering is most effective when you use names such as Floor 1, Floor 2, etc. (as opposed to First Floor, Second Floor, etc.). In addition, this makes it easier to find the view in the Project Browser.

You specify above or below the offset by hovering the cursor on the needed side.

- A fast way to create multiple levels is to use the  (Pick Lines) option. In the Options Bar, specify an *Offset*, select an existing level, and then pick above or below to place the new level, as shown in Figure 2–33.

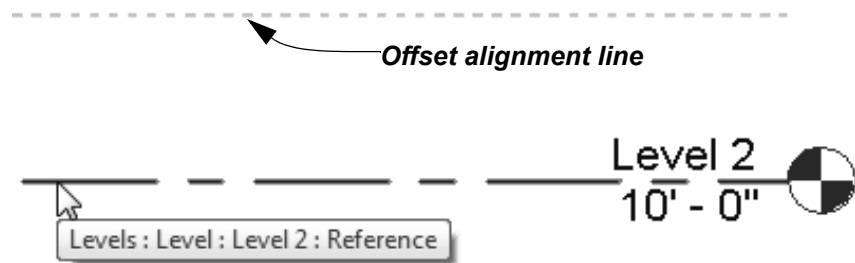



Figure 2–33

- When using the  (Line) option, alignments and temporary dimensions help you place the line correctly, as shown in Figure 2–34.

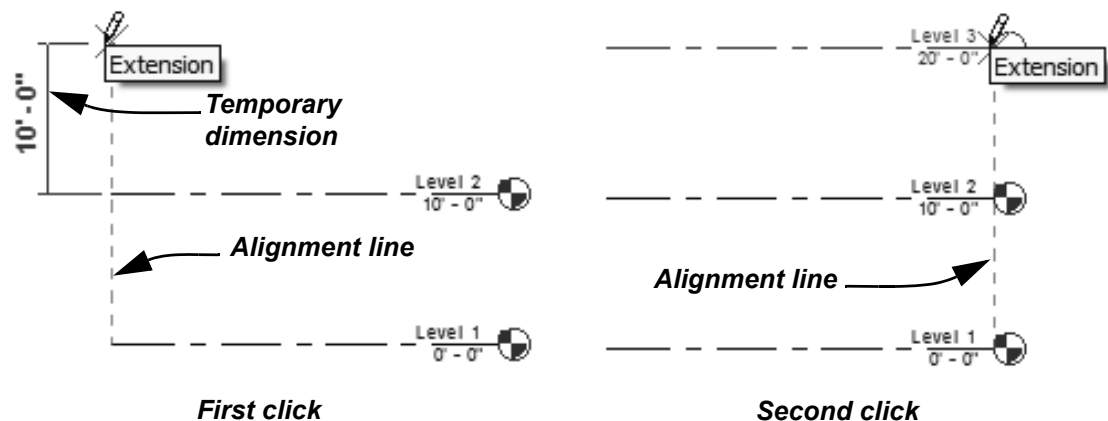



Figure 2–34

- Sketch the level lines from left to right or right to left to keep consistent.
- You can also use  (Copy) to duplicate level lines. The level names are incremented but a plan view is not created. These are called **reference levels**.
- Levels display in the default 3D view. They can be modified and copied, but cannot be created in this view.
- Levels can be hidden in any view.

Modifying Levels

You can change levels using standard controls and temporary dimensions, as shown in Figure 2–35 to the levels' appearance. You can also make changes to the name and height of the level by selecting on the individual items in the view as well as change these in Properties. You can change just the name of the level in the Project Browser but not the height.

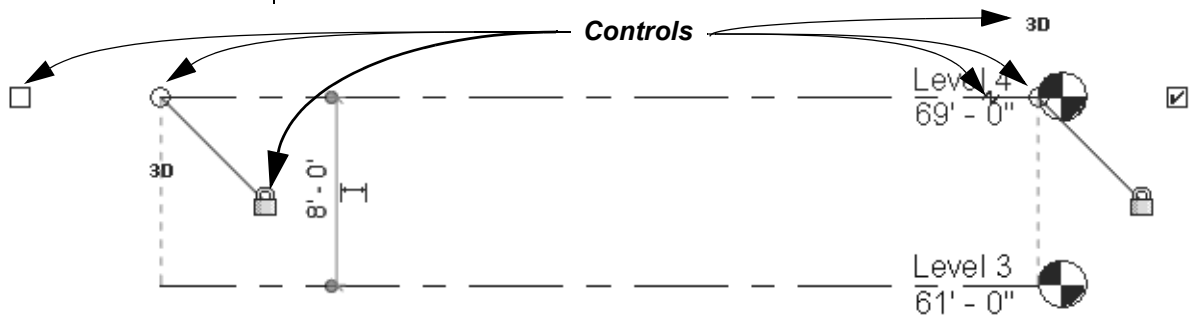


Figure 2–35

- (Hide / Show Bubble) displays on either end of the level line and toggles the level head symbol and level information on or off.
- (Switch to 3d / 2d extents) controls whether any movement or adjustment to the level line is reflected in other views (3D) or only affects the current view (2D).
- (Modify the level by dragging its model end) at each end of the line enables you to drag the level head to a new location.
- (Create or remove a length or alignment constraint) controls whether the level is locked in alignment with the other levels. If it is locked and the level line is stretched, all of the other level lines stretch as well. If it is unlocked, the level line stretches independent of the other levels.
- (Add Elbow) to add a jog to the level line, as shown in Figure 2–36. Drag the shape handles to new locations as needed. This is a view-specific change.

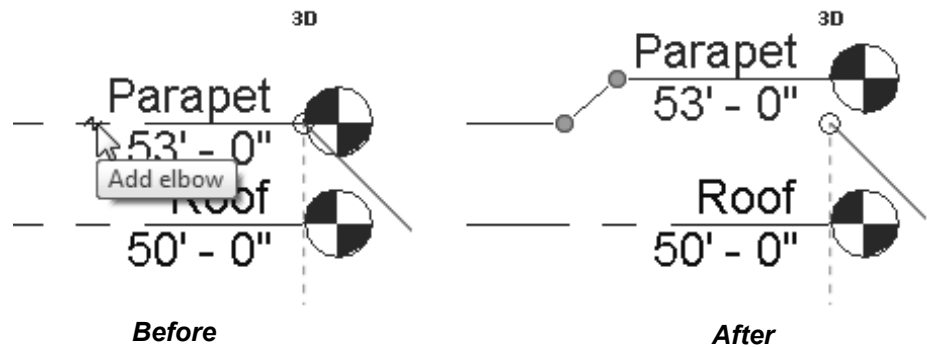


Figure 2-36

- To change the level name or elevation, double-click on the information next to the level head, or select the level and modify the *Name* or *Elevation* fields in Properties, as shown in Figure 2-37.

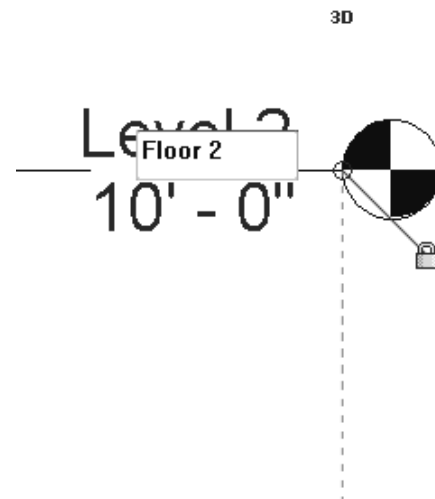
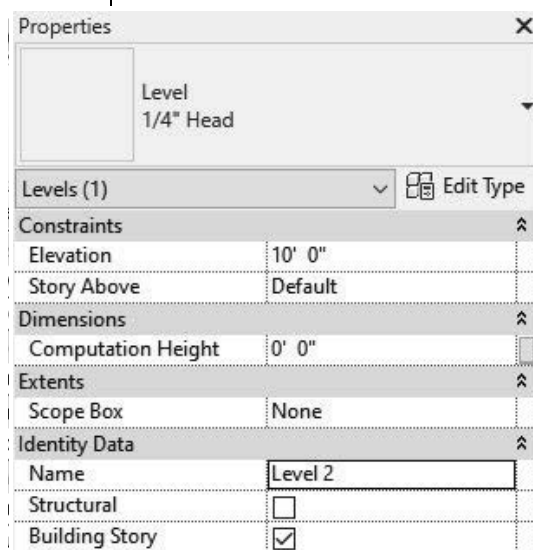


Figure 2-37

- When you rename a level, an alert box opens, prompting you to rename the corresponding views, as shown in Figure 2-38.

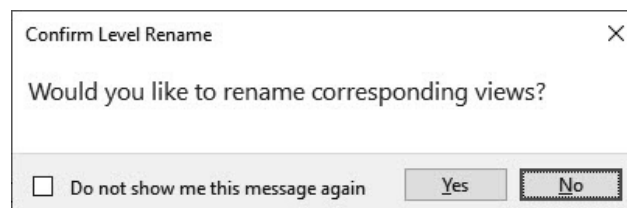


Figure 2-38

- The view is also renamed in the Project Browser.

Hint: Copying Levels and Grids from Other Projects

Levels and grid lines can be added by drawing over existing levels or grids in an imported or linked CAD file. It can also be copied and monitored from a linked Revit file. Some projects might require both methods.

- For more information on using the Copy/Monitor tools, see the ASCENT guide *Autodesk Revit: Collaboration Tools*.
- If you delete a level, the views related to that level are also deleted. A warning displays, as shown in Figure 2–39.

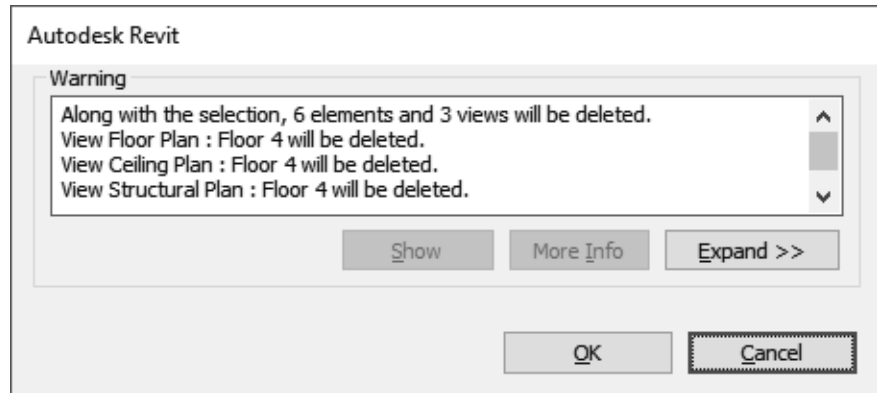


Figure 2–39

Creating Plan Views

Typically, you do not need to create plan views for levels that specify data, such as the top of a storefront window or the top of a parapet.

By default, when you place a level, plan views for that level are automatically created. If **Make Plan View** was toggled off when adding the level, or if the level was copied, you can create plan views to match the levels.

- Level heads with views are blue and level heads without views are black, as shown in Figure 2–40.

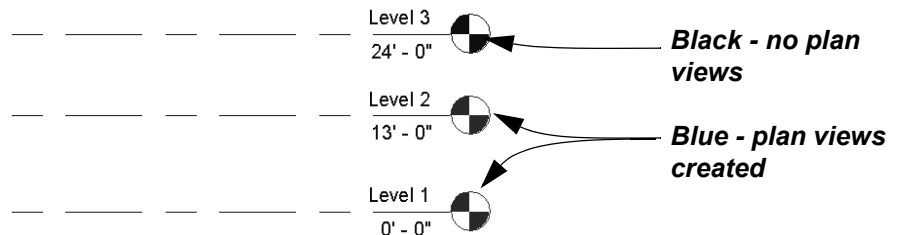



Figure 2–40

How To: Create Plan Views

1. In the **View** tab>**Create** panel, expand  (Plan Views) and select the type of plan view you want to create, as shown in Figure 2–41.
2. In the New Plan dialog box (shown in Figure 2–42), select the levels for which you want to create plan views. Hold <Ctrl> to select more than one level.
 - Clear **Do not duplicate existing views** to create a copy of an existing view.

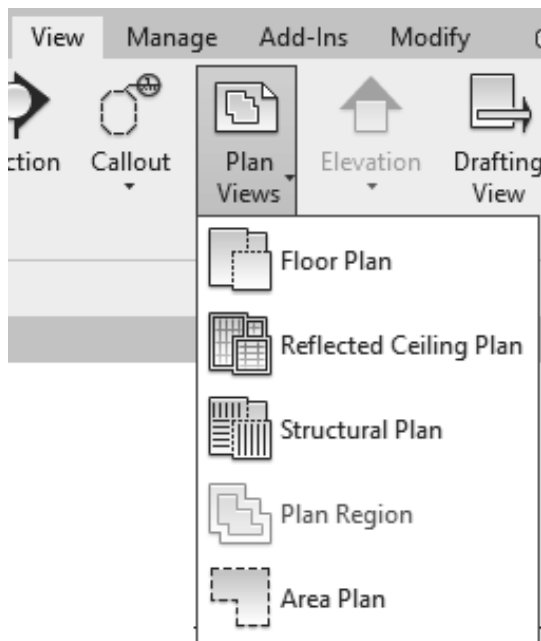


Figure 2–41



Figure 2–42

3. Click **OK**.

- Once a plan view is made from a level, you can double-click on the level head to open the related floor plan view. You create other plan views similar to creating a floor plan. Ceiling plans are typically created by default when you add a level with a view. If you do not want a level to have a ceiling plan, you can right-click on its name in the Project Browser and select **Delete**, as shown in Figure 2–43.

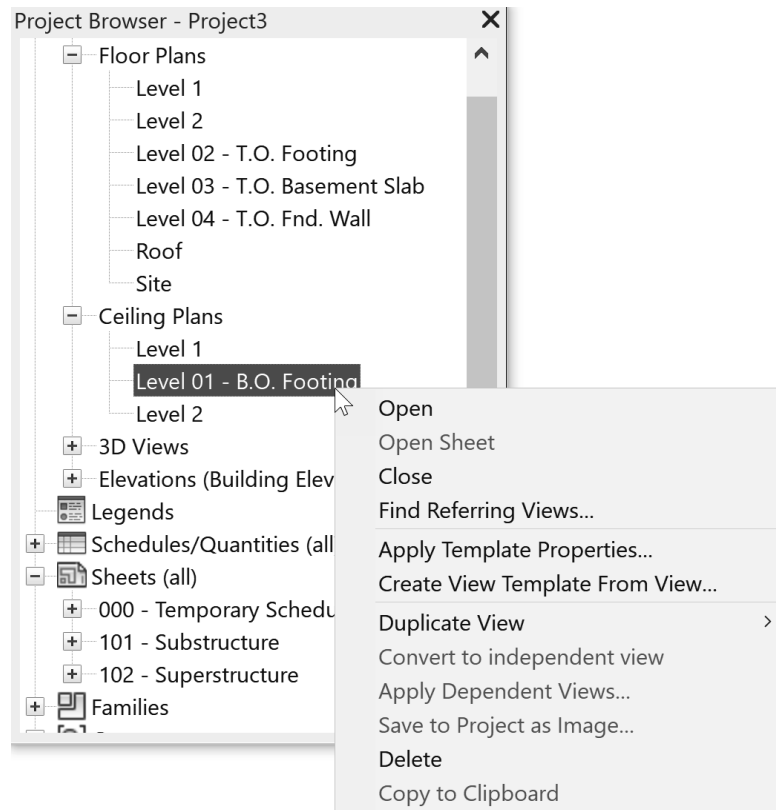


Figure 2–43

Practice 2b

Set Up Levels

Practice Objective

- Add and modify levels.

In this practice, you will set up the levels required in the Modern Hotel project, including the floors, the top of the footing, and the parapet, as shown in Figure 2–44. You should see the linked Revit model on your screen. (The RVT link has been hidden in the figure below for clarity.)

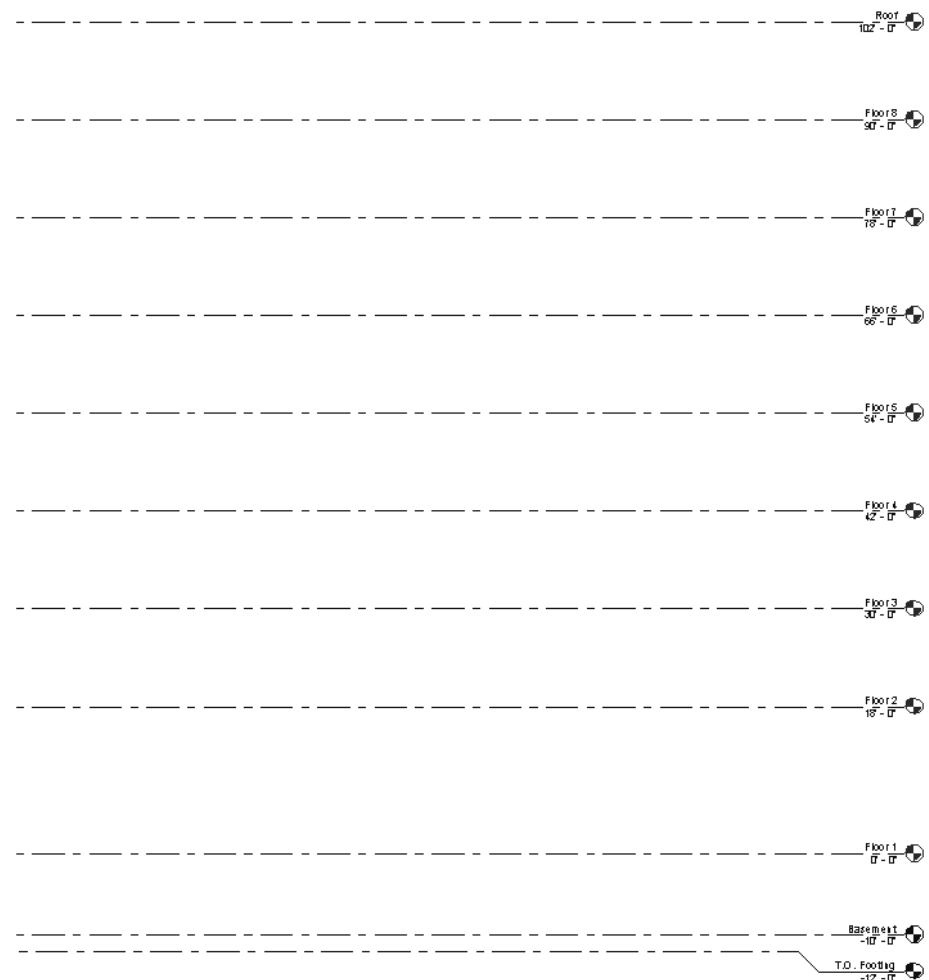



Figure 2–44

1. Open the project **Hotel-Levels.rvt** from the practice files folder.
2. Open the **Elevations (Building Elevation): North** view. You will see your project's **Level 1** and **Level 2** levels, as well as the levels and grid lines that are part of the linked Revit file.
3. Select the linked Revit file.

4. In the View Control Bar, expand  (Temporary Hide/Isolate) and select **Hide Element**. This toggles off the linked Revit file.
5. Zoom in on the level names.
6. Slowly click twice on the name *Level 1* and rename it to **Floor 1**, as shown in Figure 2–45. Press <Enter>.

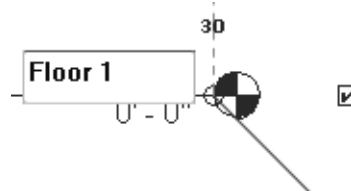



Figure 2–45

7. Click **Yes** or press <Y> when prompted to rename the corresponding views.
8. Repeat the process and rename *Level 2* as **Floor 2**. Click on the height of Floor 2 and change it from **10'-0"** to **18'-0"**.
9. In the *Architecture* tab>Datum panel, click  (Level).
10. In the Options Bar, verify that **Make Plan View** is selected. Click **Plan View Types....**
11. In the Plan View Types dialog box, click **Structural Plan** to deselect it (so that only **Ceiling Plan** and **Floor Plan** are selected), as shown in Figure 2–46. Click **OK**.

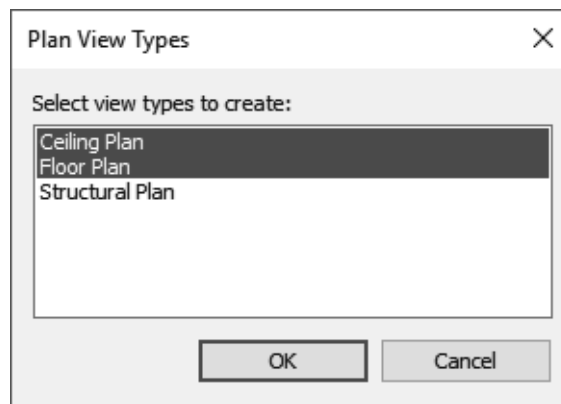






Figure 2–46

12. In the *Modify | Place Level* tab>Draw panel, click  (Pick Lines). In the Options Bar, set the *Offset* to **12'-0"**.

13. Hover the cursor over the level line of **Floor 2** and move the cursor slightly upward until you see the dashed alignment line display above the **Floor 2** level. Click to create the new level **Floor 3**.
14. Create additional levels until there are a total of nine levels, all with the *Offset* of **12'-0"**.
15. Click  (Modify) and select the **Floor 9** level.
16. Rename *Floor 9* as **Roof**. (Rename the corresponding views.)
17. Click  (Modify).
18. Start the **Level** command again.
19. In the *Modify | Place Level* tab>Draw panel, click  (Pick Lines).
20. In the Options Bar, clear the **Make Plan View** option and set the *Offset* to **5'-0"**. Create one additional level above the **Roof** level. This level does not need a plan view.
21. Rename the top level as **Parapet**, as shown in Figure 2–47.

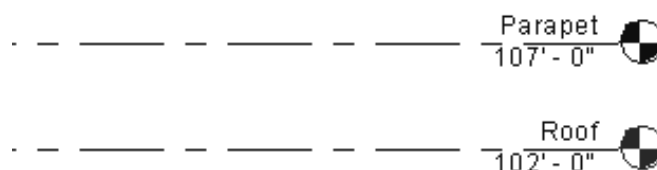





Figure 2–47

22. Zoom and pan to the Floor 1 level. Select the Floor 1 level line.
23. In the *Modify | Levels* tab>Modify panel, click  (Copy).
24. In the Options Bar, select **Multiple**.
25. In the view, click Floor 1's level line for the copy start point. For the second point, click below Floor 1 (the distance does not matter right now as you will set this in the next few steps).
26. Click again below the level you just placed to make two new levels below Floor 1.

27. Click  (Modify) to end the command.
28. Rename the level below Floor 1 to **Basement** and set the height to (negative) **-10'-0"**.
29. Rename the level below Basement to **T.O. Footing** and set the height to (negative) **-12'-0"**, as shown in Figure 2–48. You can modify the levels for clarity by selecting the level and clicking the  (Add Elbow) control between the level name and height.

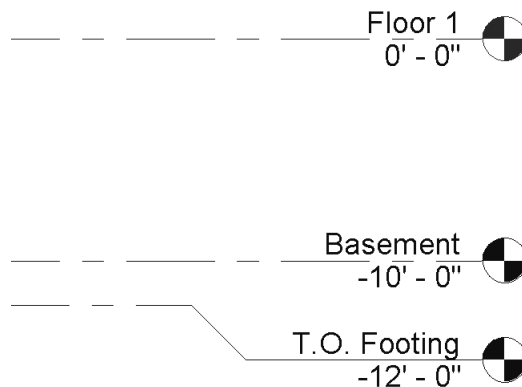












Figure 2–48

30. In the View Control Bar, select  (Temporary Hide/ Isolate) and select **Reset Temporary Hide/Isolate**.
31. Select the Floor 1 level line. Select  (Drag the extents of the level in the model) and drag the level over until it is far enough away from the linked model. The other levels will follow because of the alignment constraint.
32. Zoom out to display the entire project.
 - Because the Basement and T.O. Footing were copies of Floor 1, you need to create a floor plan view.
33. In the *View* tab>Create panel, expand  (Plan Views) and select  (Floor Plan).
34. In the New Floor Plan dialog box, select **Basement** and **T.O. Footing**. (Hint: Use <Ctrl> to select the two levels.)
35. Click **OK**. The floor plan views now show in the Project Browser and the T.O. Footing view (or the last view to be created) becomes the active view.

36. Create a new ceiling plan view. In the *View* tab>Create panel, expand  (Plan Views) and select  (Reflective Ceiling Plan).
37. In the New RCP dialog box, select **Basement** and click **OK**.
38. Select the *Floor 1* tab above the view window to make it the active view.
39. Close any open views by going to the Quick Access Toolbar and clicking  (Close Inactive Views).
40. Open the **Default 3D** view.
41. Because you hid the levels when linking in the models, you need to unhide them. In the View Control Bar, click  (Reveal Hidden Elements).
42. Select one level and in the *Modify | Levels* tab>Reveal Hidden Elements panel, click  (Unhide Category).
43. In the View Control Bar, click  (Close Reveal Hidden Elements).
44. In the Project Browser, select both the **Parapet** and **Roof** views in the *Ceiling Plans* section. Right-click and select **Delete** to delete the views.
45. Save and close the project.

2.6 Creating Grids

Grids are annotation elements that display in most views, including plan, ceiling, section, and elevation views. They help organize your design when developing a layout and describe the pattern and location for columns, as shown in Figure 2–49. Grids can be multi-segmented, arcs, or straight lines, and they can be hidden in the view if needed.

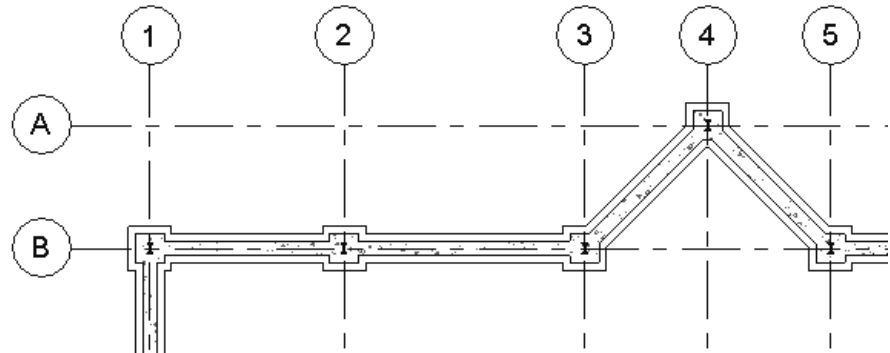



Figure 2–49

Each line or arc in a grid is a separate entity and can be placed, moved, and modified individually.

Grids cannot be drawn in a 3D view but grids can be displayed in a 3D view, perspective view, or in a 3D view with a selection box. and when you click on a grid, the surface contour displays.

How To: Create a Grid

1. In the *Architecture* tab>Datum panel, click  (Grid), or type **GR**.
2. In the Properties Type Selector, select the grid type, which will control the size of the bubble and the linestyle.
3. In the *Modify | Place Grid* tab>Draw panel, shown in Figure 2–50, select the draw method you want to use.

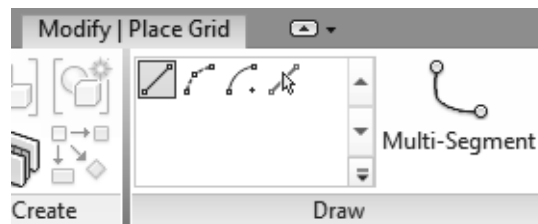


Figure 2–50

4. In the Options Bar, set the *Offset* if needed.
5. Start drawing grid lines.

If you are upgrading a model to the 2023 version, you will need to turn on the grids.

- Grids can be sketched at any angle, but you should ensure that all parallel grids are sketched in the same direction (e.g., from left to right or from bottom to top).
- When using the Multi-Segment tool, shown in Figure 2–51, sketch the line and click (Finish Edit Mode) to complete the command.

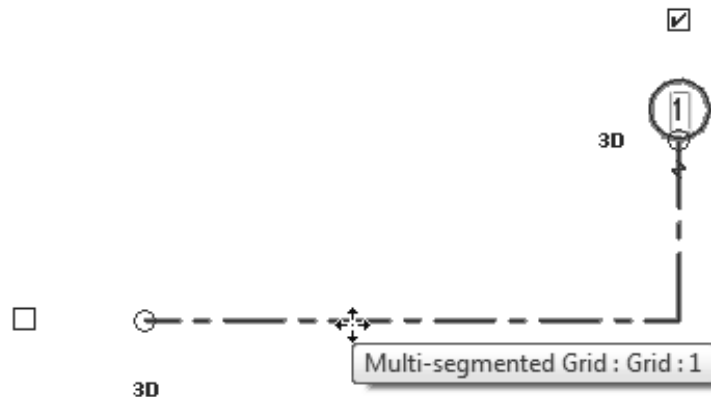


Figure 2–51

How To: Show Grids in 3D

1. Open a 3D or perspective view and press <Esc> twice to verify nothing is selected.
2. In Properties, click **Edit...** next to *Show Grids*, as shown in Figure 2–52.

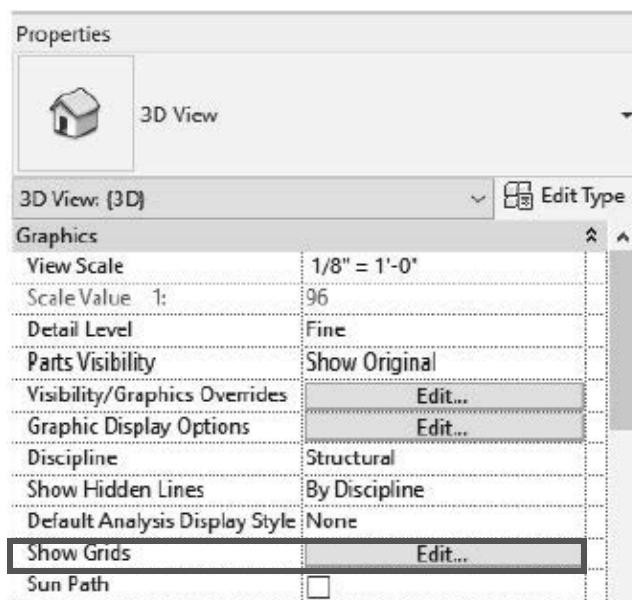


Figure 2–52

3. In the Show Grids dialog box, select the level(s) that you want the grids to display at in the 3D view, as shown in Figure 2–53.

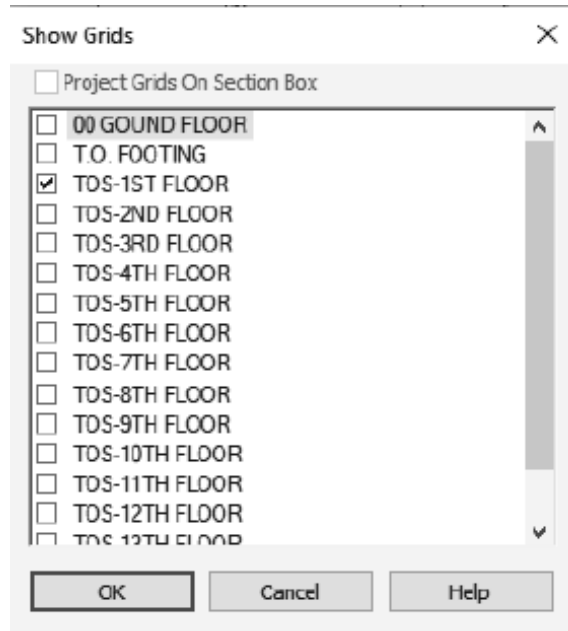


Figure 2–53

4. Click **OK**.
5. (Optional) To display the grids on the bottom of a section box, in Properties, verify that **Section Box** is selected, and click **Edit...** next to *Show Grids*.
6. In the Show Grids dialog box, select only the **Project Grids On Section Box** option, as shown in Figure 2–54, and click **OK**.

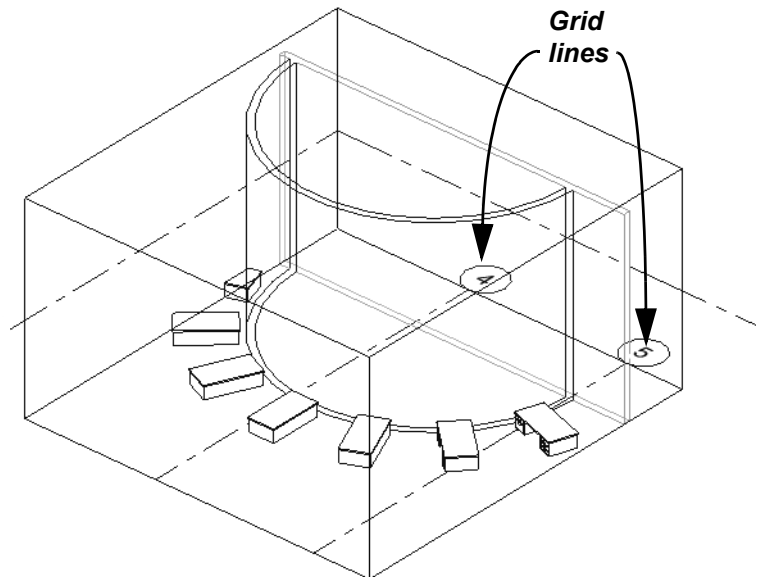
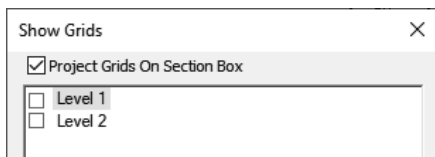


Figure 2–54

Modifying Grid Lines

Grid lines are very similar to level lines. You can modify grid lines using controls, alignments, and temporary dimensions in the view (as shown in Figure 2–55). You can change the bubble type using the Type Selector.

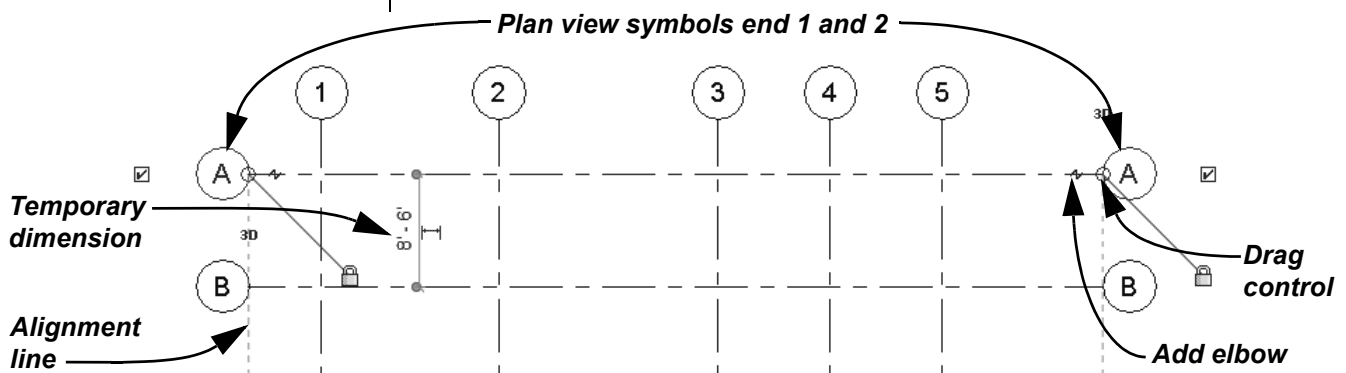



Figure 2–55

- Grid numbers can be numbers, letters, or a combination of the two. To modify a grid number, double-click on the number in the bubble and type the new letter/number. You can also change the grid number by entering a new *Name* in Properties.
- Grid numbers increment automatically.
- In a 3D view, you can modify the grid line name and adjust the grid line and grid distance.
 - Click the  (Drag the extents of the grid in the model) control to lengthen the grid line.
 - Modify the temporary dimension (as shown in Figure 2–56) to change the grid line's distance from another grid line.

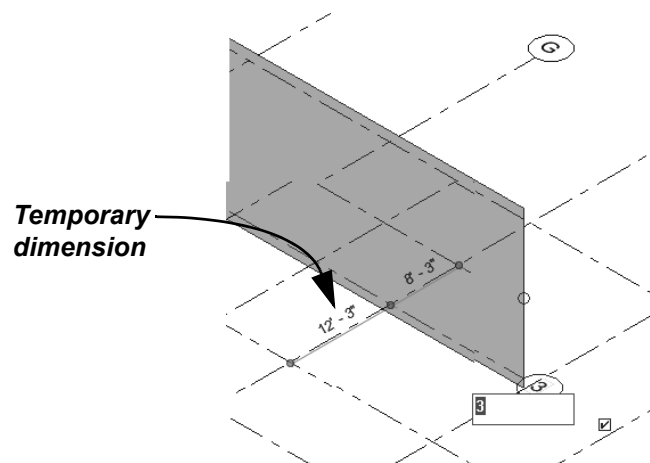


Figure 2–56

- Change the grid line name by selecting the bubble and typing in a new name; alternatively, the name can be changed in Properties.
- In Type Properties, change the way the grid **Plan View Symbols Ends** display, as shown in Figure 2–57. The first pick point is plan view symbol end 1 and the second pick point is plan view symbol end 2.

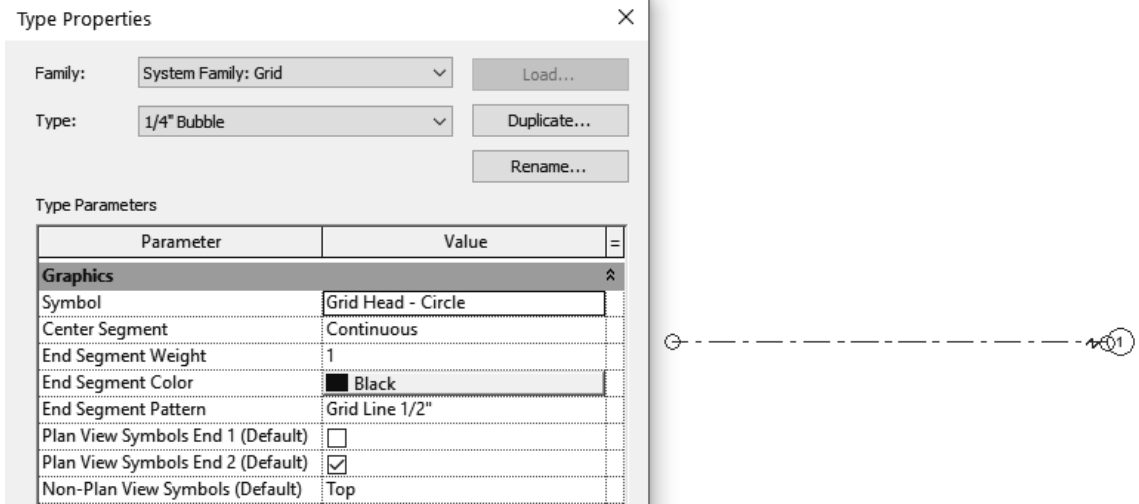


Figure 2–57

Hint: Propagating Datum Extents

If column grids do not display in a view, this might be due to adding a level after the grid lines were added. To display the grid lines in plan views, select the grid lines in a view in which they are displayed. In the *Modify | Grids* tab>Datum panel, click



(Propagate Extents). In the Propagate datum extents dialog box (shown in Figure 2–58), select the views to project the grid lines to.

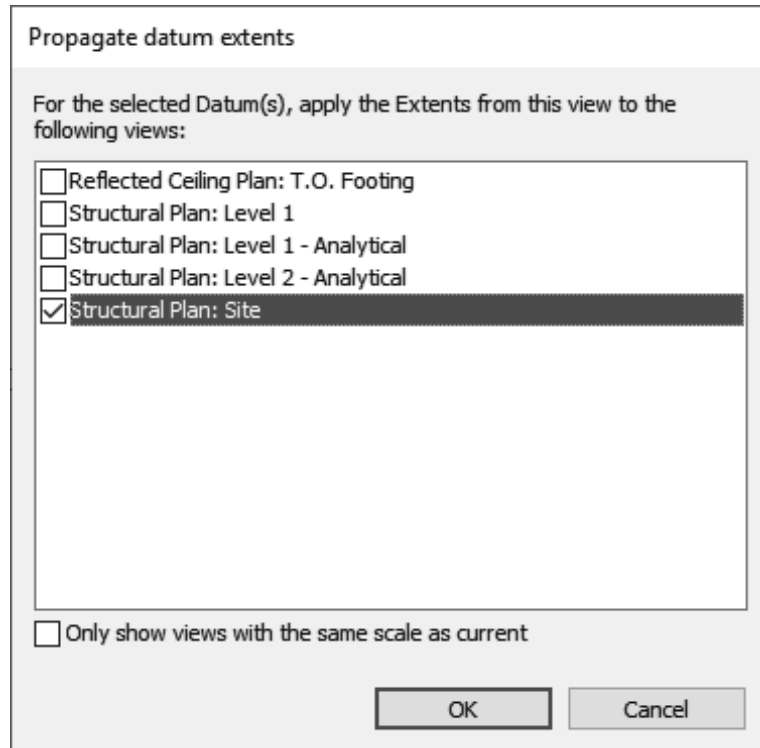



Figure 2–58

- This also works for levels.

-  (Propagate Extents) is particularly useful to make grid lines display the same in all views.






Practice 2c

Add Grids

Practice Objective

- Add and modify grid lines.

In this practice, you will add grid lines using information in the imported file.

1. Open the project **Hotel-Grids.rvt** from the practice files folder.
2. From the Project Browser, open the **Floor Plans: Floor 1** view.
3. Select the linked Revit file with the pool (**Hotel-Pool.rvt**). In the View Control Bar, expand  (Temporary Hide/Isolate) and select **Hide Element**.
4. In the *Architecture* tab>Datum panel, click  (Grid).
5. In the *Modify | Place Grid* tab>Draw panel, click  (Pick Lines).
6. Select the first vertical grid line on the left of the linked file. Zoom into the grid and click inside the bubble, type **A**, and press <Enter>.
7. Continue selecting the vertical grid lines displayed in the imported file. The letters automatically increment.
8. Click the first horizontal grid line and change the letter in the bubble to **1**.
9. Continue selecting the horizontal grid lines. The numbers automatically increment.
10. Click  (Modify) to end the command.
11. Select the CAD file (**Hotel-Level-1.dwg**). In the View Control Bar, expand  (Temporary Hide/Isolate) and select **Hide Element**.

12. Only the grids should now display, as shown in Figure 2–59. Check the lengths of all grid lines. Modify the length by dragging the ends if needed.

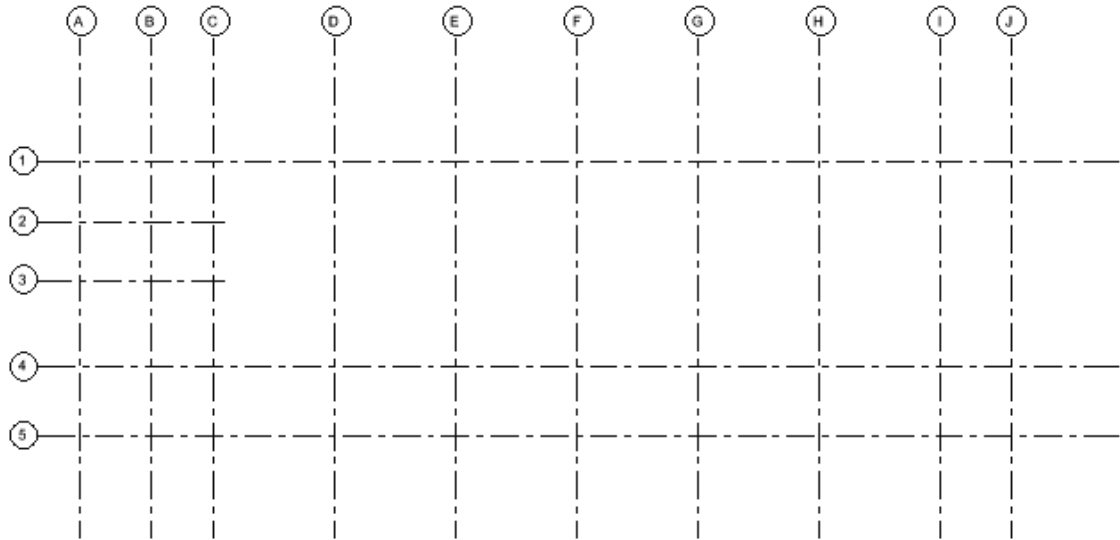





Figure 2–59

13. In the View Control Bar, select  (Temporary Hide/ Isolate) and select **Reset Temporary Hide/Isolate**.
14. Open the default 3D view by selecting the tab at the top of the view. Note that you do not see the grids.
15. Click  (Modify).
16. In Properties, in the *Graphics* section, click **Edit...** next to *Show Grids*.
17. In the Show Grids dialog box, select **Floor 1** and click **OK**.
18. The grids now display. Select the linked Revit file with the pool (**Hotel-Pool.rvt**).

19. In the View Control Bar, expand  (Temporary Hide/Isolate) and select **Hide Element** to see the grids unobstructed as shown in Figure 2–60.

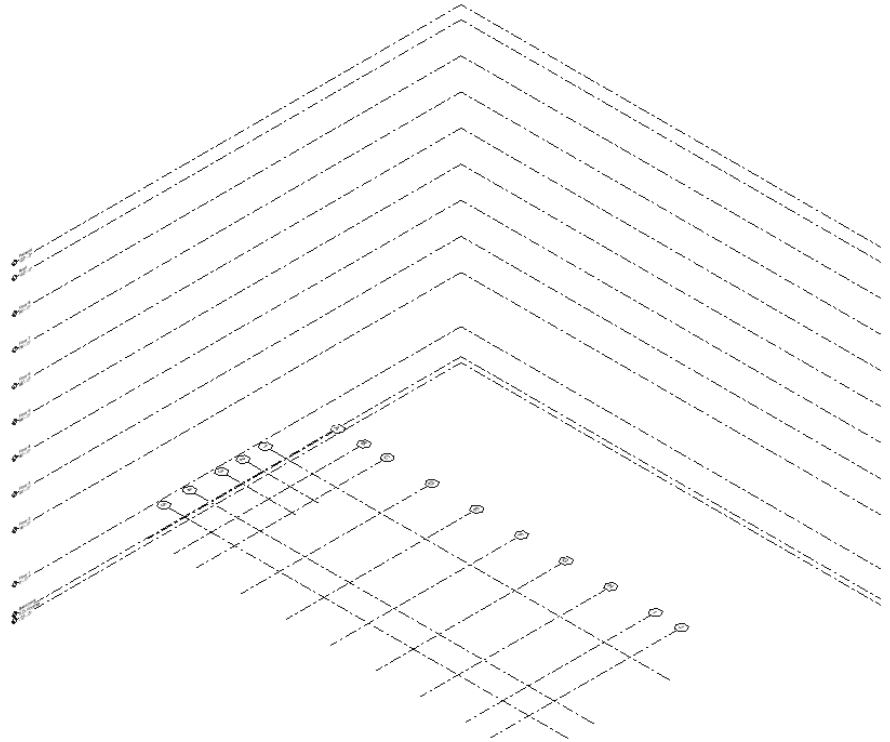



Figure 2–60

20. In the View Control Bar, select  (Temporary Hide/Isolate) and select **Reset Temporary Hide/Isolate**.
21. Save and close the project.

Chapter Review Questions

1. What type of view do you need to be in to add a level to your project?
 - a. Any non-plan view.
 - b. As this is done using a dialog box, the view does not matter.
 - c. Any view except for 3D.
 - d. Any section or elevation view.
2. How do you line up grid lines that might be different lengths, as shown in Figure 2–61?

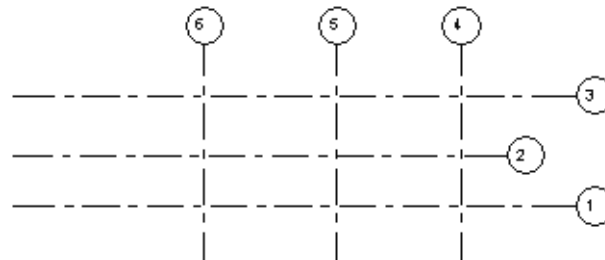




Figure 2–61











- a. Use  (Trim/Extend Multiple Elements) to line them up with a common reference line.
 - b. Select the grid line and use the drag control to line up with the other grid lines.
 - c. Select the grid line, right-click and select **Auto-Align**.
 - d. In Properties, change the *Length* and then use  (Move) to get them into position.
3. Grids can be displayed in a 3D view.
 - a. True
 - b. False
 4. In order for architectural columns to move with grids, what needs to be selected when placing the column?
 - a. In the ribbon, select **At Grids**.
 - b. Set the *Top Constraint* to grids.
 - c. Columns always move with grids no matter what type.
 - d. In Properties, select **Moves With Grids**.

5. Which of the following types of CAD formats can you import into Revit? (Select all that apply.)
 - a. .DWG
 - b. .XLS
 - c. .SAT
 - d. .DGN

6. Imported CAD files cannot be reloaded in the Manage Links dialog box.
 - a. True
 - b. False

7. To modify linked CAD files, you need to open what dialog box?
 - a. Type Properties
 - b. Link CAD
 - c. Manage Links
 - d. Insert from File

Command Summary

Button	Command	Location
	Grid	<ul style="list-style-type: none"> • Ribbon: <i>Architecture</i> tab>Datum panel • Shortcut: GR
	Import CAD	<ul style="list-style-type: none"> • Ribbon: <i>Insert</i> tab>Import panel
	Level	<ul style="list-style-type: none"> • Ribbon: <i>Architecture</i> tab>Datum panel • Shortcut: LL
	Link CAD	<ul style="list-style-type: none"> • Ribbon: <i>Insert</i> tab>Link panel
	Link PDF	<ul style="list-style-type: none"> • Ribbon: <i>Insert</i> tab>Link panel
	Link Revit	<ul style="list-style-type: none"> • Ribbon: <i>Insert</i> tab>Link panel
	Multi-Segment (Grid)	<ul style="list-style-type: none"> • Ribbon: <i>Modify</i> <i>Place Grid</i> tab>Draw panel
	Import PDF	<ul style="list-style-type: none"> • Ribbon: <i>Insert</i> tab>Import panel
	Propagate Extents	<ul style="list-style-type: none"> • Ribbon: <i>Modify</i> <i>Grids</i> or <i>Modify</i> <i>Levels</i> tab>Datum panel
	Temporary Hide/Isolate	<ul style="list-style-type: none"> • View Control Bar

