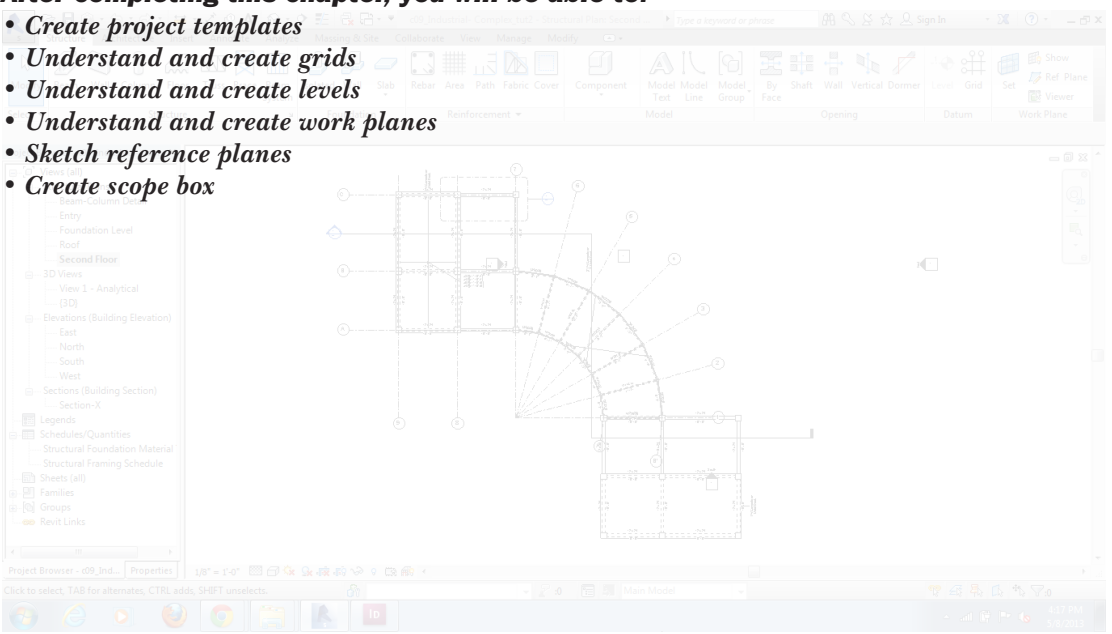
Chapter 3

Setting up a Structural Project

Learning Objectives

After completing this chapter, you will be able to:

- *Create project templates*
- *Understand and create grids*
- *Understand and create levels*
- *Understand and create work planes*
- *Sketch reference planes*
- *Create scope box*



In the previous chapter, you learned to open a new file and create initial setups. Now, after opening a new file and creating initial setups such as units and snaps, you need to learn about creating advanced setups such as creating the project templates, levels, and grids for your project. These advance setups help you to start your project more efficiently and accurately.

In this chapter, you will learn to create a project template, save the project template and then create structural grids and levels for a structural project. Further, you will learn the use of Work Planes and Reference Planes in a project.

PROJECT TEMPLATE

Project templates are files that can be opened while starting a new project. These files, commonly known as template files, contain predefined settings for projects, display of annotations, display of graphics, and so on. Similarly, for the display of graphics, the template files contain predefined settings for materials, line styles, line weights, line patterns, and structural symbols.

Project templates provide initial conditions for a project. In Autodesk Revit, you will find in-built templates that are saved with *.rte* file extension when you install the software. You can also create your own template based on the project requirement. In Revit, any new template-based project inherits all families, settings (such as units, fill patterns, line styles, line weights, and view scales), and geometry from the template.

Template files carry project-specific information. You may have different project template files for different types of projects. For example, for a concrete structure, you may not use steel members for your design purpose. For this kind of project, you may require a template that carries families with more concrete sections and less steel members. A template file can also carry predefined levels and grids and thus saves a lot of time while starting up a new project. Schedules for footings, columns, piers, and other structural elements can also be a part of a project template.

In the next sections, you will learn how to create custom templates and use them in a structural project.

Creating a Custom Project Template

In Autodesk Revit, there are various methods to create a custom project template. The common method is to open an existing template file and modify its settings based on the project requirement and then save it as a different template file. You can also create a custom project template by starting a blank project file, defining all settings such as naming the viewports, creating levels, adding grids, and others, and then saving it as a template (.rte) file. For certain projects, you can create a template file which includes geometry that can be used repeatedly as a base for the new projects. For example, if you have defined geometry for a shopping complex and want to include this geometry whenever you start a new project, you can save the file that includes this geometry as a template. Each time you open a project with this template, the geometry is included.

Creating a New Template from a Blank Project File

Application Menu: New > Project

In Revit, you can create a new template file from a blank project file or use the default template file (*Structural Analysis-Default.rte* for Imperial and *Structural Analysis-DefaultMetric.rte* for Metric). To create a template file from a blank project file, choose **New > Project** from the **Application Menu**; the **New Project** dialog box will be displayed. In the **Template file** area of this dialog box, select the **<None>** option from the drop-down list. Next, select the **Project template** radio button in the **Create new** area and choose the **OK** button; the **Undefined System of Measurement** dialog box will be displayed, as shown in Figure 3-1. This dialog box prompts you to select a system of measurement for your project.

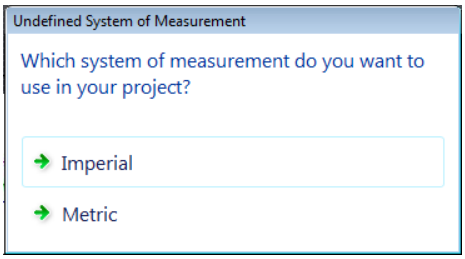


Figure 3-1 *The* ***Undefined System of Measurement*** *dialog box*

You can choose the **Imperial** or **Metric** option from this dialog box. If you choose the **Imperial** option, a template file containing all default unit settings in Imperial unit system will open. Similarly, if you choose the **Metric** option, the template file containing default units in the Metric unit system will open. After opening the template file, you can modify its existing settings based on your project environment and then save the modified file as a template file. To do so, choose **Save As > Template** from the **Application Menu**; the **Save As** dialog box will be displayed. In this dialog box, select a folder from the **Save in** drop-down list and enter a name for the template file in the **File name** edit box. Note that the **Template Files (*.rte)** option is selected from the **Files of type** drop-down list. After entering the file name, choose the **Save** button; the template file will be saved with the settings defined in the blank project file.

Note

You can also select the template file, Structural Analysis-Default.rte for Imperial and Structural Analysis-DefaultMetric.rte for Metric, to create a new template file from a blank project. To do so, select the ***Structural Template*** *option from the drop-down list in the* ***Template file*** *area of the* ***New Project*** *dialog box, and then choose the* ***OK*** *button.*

Tip

You can change the default template file displayed in the ***New Project*** *dialog box. To do so, invoke the* ***Options*** *dialog box by choosing the* ***Options*** *button from the* ***Application Menu****. Next, in the* ***Project template file*** *area of the* ***File Locations*** *tab, click in the* ***Path*** *column corresponding to the* ***Structural Template*** *name; a browse button will be displayed. Choose the browse button; the* ***Browse For Template File*** *dialog box will be invoked. In this dialog box, select the file that is to be made default template file and then choose the* ***Open*** *button. Next click* ***OK*** *button to save changes.*

Creating a New Project Template from an Existing Project Template

To speed up your project, you may be required to use predefined template files. These template files contain predefined information or settings pertaining to the project you need to start. To use these template files, choose **New>Project** from the **Application Menu**; the **New Project** dialog box will be displayed. In this dialog box, ensure that the **Project template** radio button in the **Create new** area is selected. Now, to select the desired template file for your project, choose the **Browse** button; the **Choose Template** dialog box will be displayed, as shown in Figure 3-2. In this dialog box, browse to the desired folder to locate the template file. Next, select the template file from the folder and choose the **Open** button; the **Choose Template** dialog box will close and the **New Project** dialog box will be displayed again. In this dialog box, keep the default setting and choose the **OK** button; a new project file will open, which inherits all project settings from the selected template file.

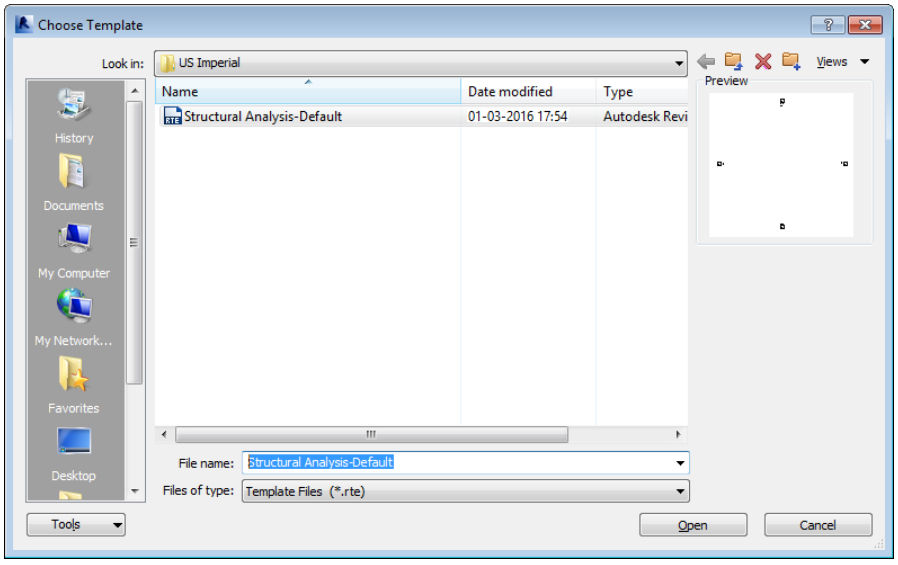


***Figure 3-2** The **Choose Template** dialog box*

Settings for the Project Template

While creating a project template, you can predefine certain settings based on your project requirement. To start a new project template, you need to fill in the information specific to the project. The information includes the name of the project, project number, client's name, and so on. These information are useful while publishing or plotting the drawing. Next, you need to enter the project settings. These settings include units, snaps, the line styles for components and lines, fill patterns for materials, and more. Some of the settings such as units and snaps have already been discussed in Chapter 2.

After modifying the project settings, you can create settings for families. The families in a project template can be system families and loaded families. While defining the settings for the project template, you can modify or duplicate system families (for example, walls) as required for the project. You can also load the commonly used families, user-defined families, and title blocks.

After setting families in the project template, you can modify or create settings for project views. These settings include plan views (Structural Plans), levels, schedules, sheets, and so on. There are other settings that can be made for the project template other than those discussed. These are visibility/graphics settings, and the plot (Print) settings. The settings for the project information are discussed in the next section.

Setting the Project Information

When you create a project template, you can also set the project information. To do so, choose the **Project Information** tool from the **Settings** panel of the **Manage** tab; the **Project Information** dialog box will be displayed, refer to Figure 3-3. In this dialog box, you can specify various settings related to the project information displayed in the **Instance Parameters** area. To enter information regarding the **Organization Name**, **Organization Description**, **Building Name**, and **Author** of the project, click on the **Value** fields of their corresponding parameters and enter appropriate values in them. Similarly, to edit the energy settings of the project, choose the **Edit** button in the **Value** field of the **Energy Settings** parameter; the **Energy Settings** dialog box will be displayed. In this dialog box, you can specify various settings related to the type of the building, site location of the building, and the level that will represent the ground plane of the site. To do so, click on the **Value** fields corresponding to the **Building Type**, **Location**, and **Ground Plane** parameters and specify the desired values in them. You can also choose the **Edit** button corresponding to the **Other Options** parameter from the **Advanced** area of the **Project Information** dialog box. On doing so, **Advanced Energy Settings** dialog box will be displayed. You can specify various advance settings like HVAC system, building type, building operating schedule and so on from the **Advanced Energy Settings** dialog box. Choose the **OK** button twice; the settings will be applied and the **Energy Settings** dialog box will be closed and the **Project Information** dialog box will be displayed.

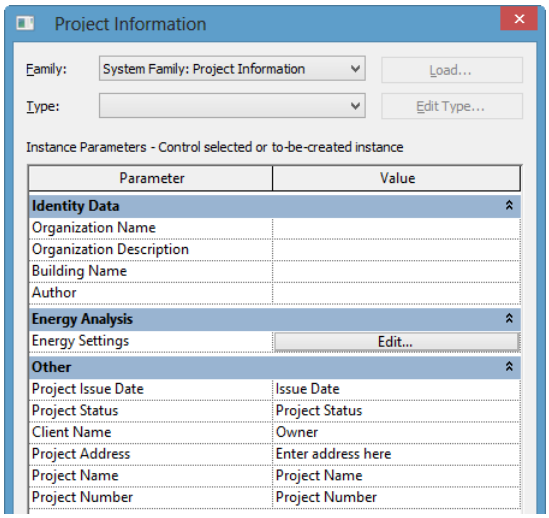


Figure 3-3 *Partial view of the* ***Project Information*** *dialog box used for setting the project information*

In the **Project Information** dialog box, you can enter the information regarding the start or issue date of the project. To do so, click on the **Value** field of the **Project Issue Date** parameter and enter a valid date in the **Project Information** dialog box. Similarly, to specify the status of

the project, click on the **Value** field of the **Project Status** parameter and specify a valid status of the project.

To enter the address of location of the project, choose the browse button in the **Value** field of the **Project Address** parameter; the **Edit Text** dialog box will be displayed. In the text area of this dialog box, enter a suitable address and choose the **OK** button; the address of the project will be updated.

Next, specify the name and number of the project in the **Value** fields of the **Project Name** and **Project Number** parameters, respectively. After entering the appropriate information in the **Project Information** dialog box, choose the **OK** button; the **Project Information** dialog box will be closed and the project information entered will be updated.

In addition to the parameters discussed in the **Project Information** dialog box, you can add more parameters for entering project information. To do so, choose the **Project Parameters** tool from the **Settings** panel of the **Manage** tab; the **Project Parameters** dialog box will be displayed. Choose the **Add** button from this dialog box; the **Parameter Properties** dialog box will be displayed, as shown Figure 3-4. Ensure that the **Project parameter** radio button is selected in the **Parameter Type** area of this dialog box. Next, select the **Project Information** check box from the **Categories** area. In the **Parameter Data** area, enter the name of the parameter data in the **Name** edit box. For example, you can specify **Engineer's Name** as the name of the parameter. Next, you need to assign a discipline for the new parameter. To do so, select an appropriate option from the **Discipline** drop-down list. For example, to assign a discipline for the **Engineer's Name** parameter, ensure that the **Common** option is selected in the **Discipline** drop-down list.

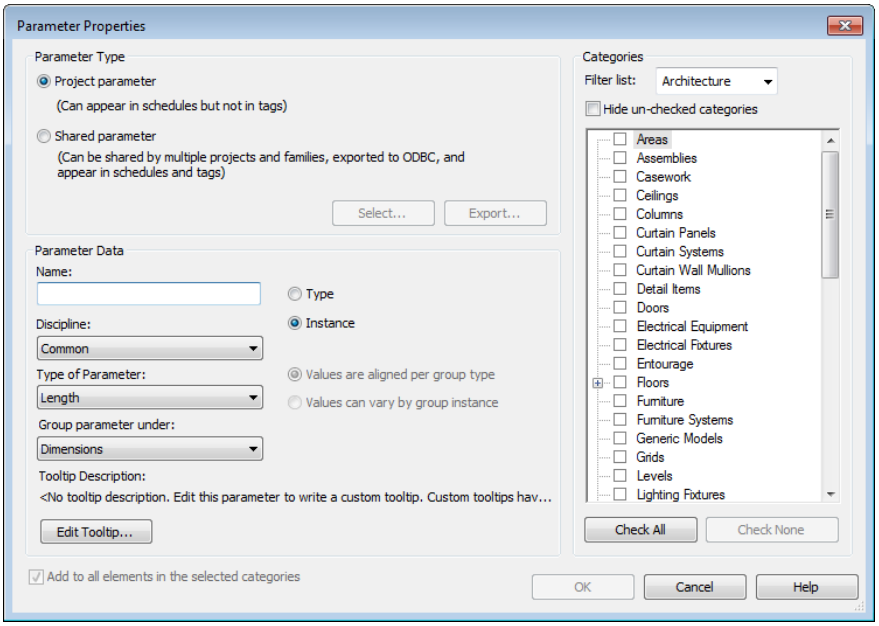


Figure 3-4 *The* ***Parameter Properties*** *dialog box*

To assign type and group for the **Engineer's Name** parameter, select the **Text** options from both the **Type of Parameter** and **Group parameter under** drop-down lists. Next, choose the **OK** button; the **Project Parameters** dialog box will be displayed with the added parameter displayed in the list box. Choose the **OK** button from this dialog box; the newly created project parameter will be added in the **Project Information** dialog box. Figure 3-5 shows the partial view of the **Project Information** dialog box for the project information with **Engineer's Name** as the added parameter.

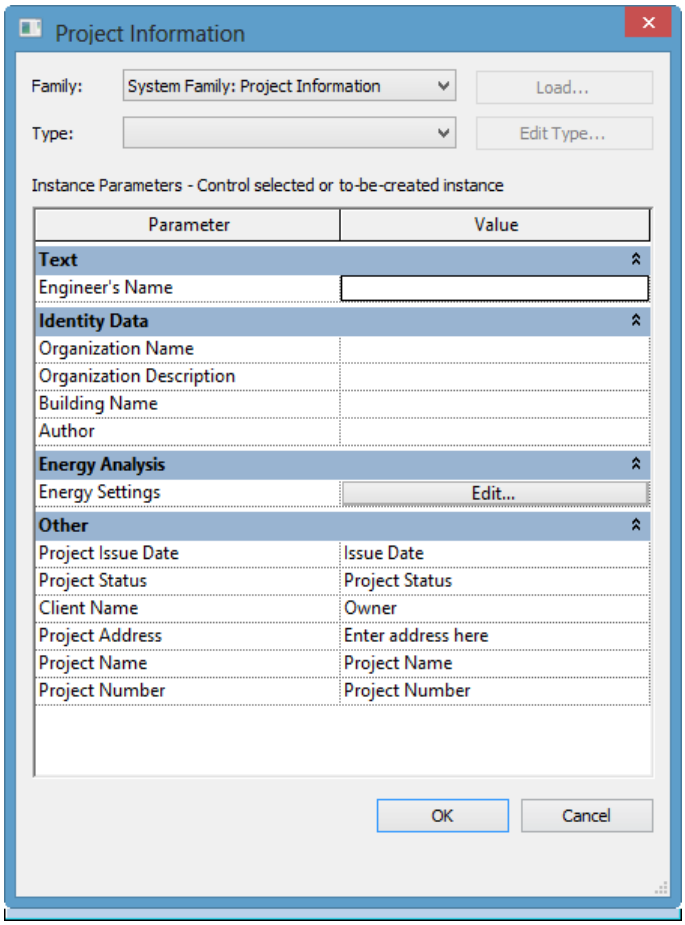


Figure 3-5 *The* ***Project Information*** *dialog box displaying the newly added parameter*

Setting the Project Location

For each project in Autodesk Revit, you need to define a location with respect to a coordinate system. This definition includes the geographical location (azimuth) of a project, which needs the latitude and longitude of the nearest city and the coordinate system of the host model and the linked model (if present).

To define the geographical location of a project, choose the **Location** tool from the **Project Location** panel of the **Manage** tab; the **Location Weather and Site** dialog box will be displayed,

as shown in Figure 3-6. This dialog box contains three tabs: **Location, Weather** and **Site**. The **Location** tab is chosen by default. In the **Define Location by** drop-down list of this tab, the **Internet Mapping Service** option is selected by default. As a result, you can use the bing map service to find out the geographical location of a desired place. To find out the geographical location, type it in the **Project Address** edit box and then choose the **Search** button; the location searched will be displayed in a map.

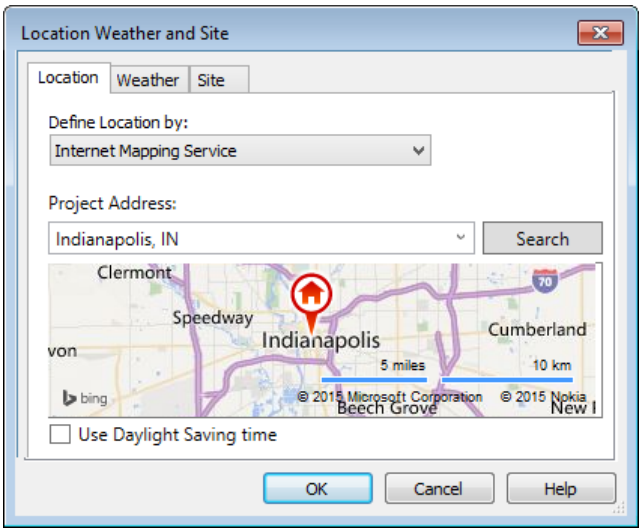


Figure 3-6 *The options in the* ***Location*** *tab of the* ***Location Weather and Site*** *dialog box*

Alternatively, you can select the **Default City List** option from the **Define Location by** drop-down list. This option is selected to specify a city nearest to the project location and to define the latitude and longitude of the location. To specify the nearest city, select an option from the **City** drop-down list; the **Latitude** and **Longitude** edit boxes will display the corresponding values for the latitude and longitude of the selected city. If the name of a city is not available in the **City** drop-down list, then enter the values of latitude and longitude in the **Latitude** and **Longitude** edit boxes, respectively. You can choose the **Site** tab in the **Location Weather and Site** dialog box to name the current setting of the location. The options in the **Site** tab are shown in Figure 3-7. In this tab, the name(s) of location(s) is (are) displayed in the **Sites defined in this project** list box. By default, the **Internal (current)** location is listed and selected in the list box.

To define a different location for the project, choose the **Duplicate** button from the **Location Weather and Site** dialog box; the **Name** dialog box will be displayed. Enter a name in the **Name** edit box and choose the **OK** button; the **Name** dialog box will be closed and the name of the new location will be listed in the **Sites defined in this project** list box. After you have added a location, you will notice that the **Delete** and **Make Current** buttons are active. You can choose the **Delete** button to delete location(s) apart from the current location. A current location is a location being currently used. To make a location current, select the location from the **Sites defined in this project** list box and choose the **Make Current** button. Note that after you have made a location current, the name of the location is suffixed with the word **(current)**.

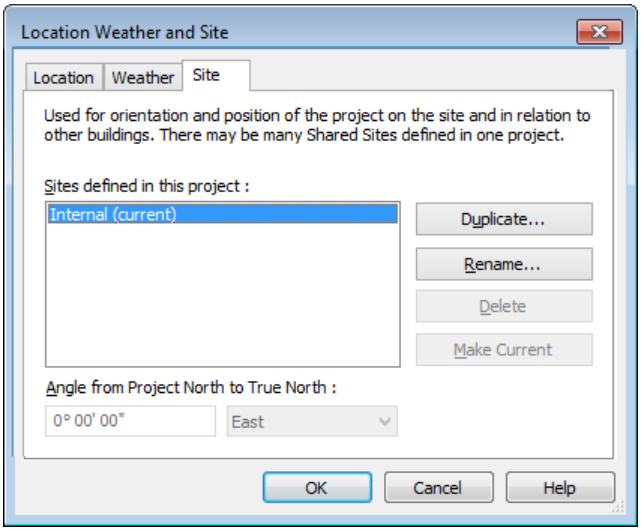
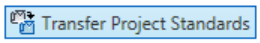


***Figure 3-7** The options in the **Site** tab of the **Location Weather and Site** dialog box*

Transferring Project Standards

Ribbon: Manage > Settings > Transfer Project Standards



When you create a template file, you can copy project standards from another project to the current file. These standards include various project settings such as Family Types (only system families, not loaded families), Line Weight, Line Styles, Line Patterns, Materials, and View Templates. To transfer project standards to the template file (target file), open the source file from which standards are to be copied. Next, choose the **Transfer Project Standards** tool from the **Settings** panel of the **Manage** tab; the **Select Items To Copy** dialog box will be displayed, as shown in Figure 3-8.

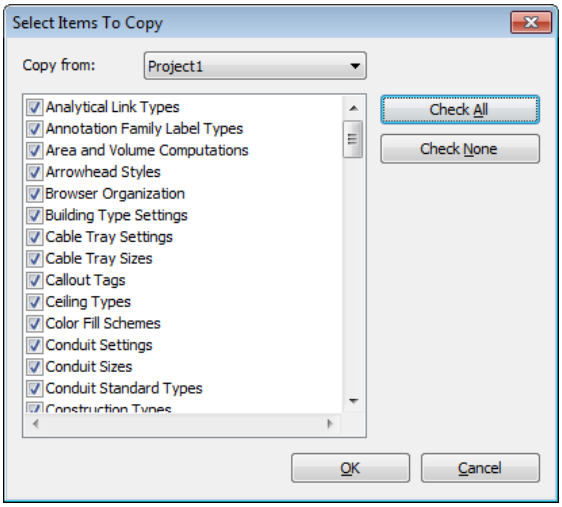


***Figure 3-8** The **Select Items To Copy** dialog box*

In the **Select Items To Copy** dialog box, click on **Copy from** drop-down list; the list of opened projects will be displayed in the drop-down list. Next, select any of the projects from which you want to copy standards. Note that when you select a source project from this list, the standards included in the project along with their respective check boxes are displayed. By default, all check boxes in the list box are selected. You can keep the check boxes selected for the standards you want to copy to the template file and clear rest of them. If you want to clear all check boxes for fresh selection, you can choose the **Check None** button located on the right of the list box. Similarly, to select all check boxes, you can choose the **Check All** button. After selecting the check boxes for the standards that you want to transfer, choose the **OK** button; the **Select Items To Copy** dialog box will be closed. Note that if the selected standards are already present in the template file, the **Duplicate Types** message box will appear, refer to Figure 3-9. You can choose the **Overwrite** button from this message box to overwrite the common standards or choose the **New Only** button to transfer the standards that are present in the template file. After you have chosen the required options, the selected standards will be copied to the destination file.

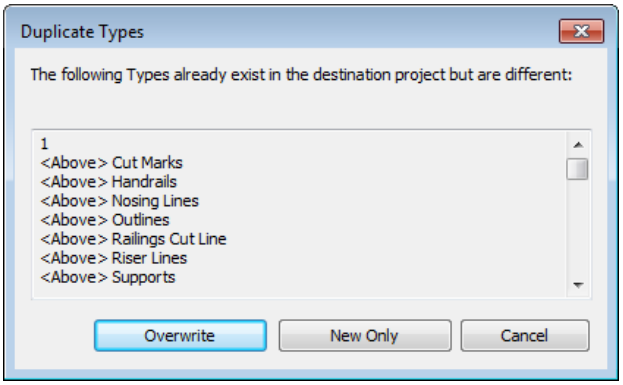


***Figure 3-9** The **Duplicate Types** message box*

Setting the Browser Organization

While creating a project template, you can organize the **Project Browser**. To do so, choose the **Browser Organization** tool from **View > Windows > User Interface** drop-down; the **Browser Organization** dialog box will be displayed, as shown in Figure 3-10.

This dialog box contains two tabs: **Views** and **Sheets**. The **Views** tab is chosen by default. The options in this tab are used to select, edit, or create a browser organization for the views present in the project. In the list box of the **Views** tab, the list of default browser organizations is displayed with their respective check boxes. By default, the check box for **all** browser organization is selected. You can edit the settings of the check boxes displayed. To do so, click on the name of the browser organization whose settings you want to change, and then choose the **Edit** button; the **Browser Organization Properties** dialog box will be displayed, refer to Figure 3-11. This dialog box contains two tabs: **Filtering** and **Grouping and Sorting**. The **Filtering** tab is chosen by default. The options in the **Grouping and Sorting** tab are used to create group by sorting the project views, refer to Figure 3-11. After specifying the options in the **Grouping and Sorting** tab, you can choose the **Filtering** tab to apply a filter to the project views.

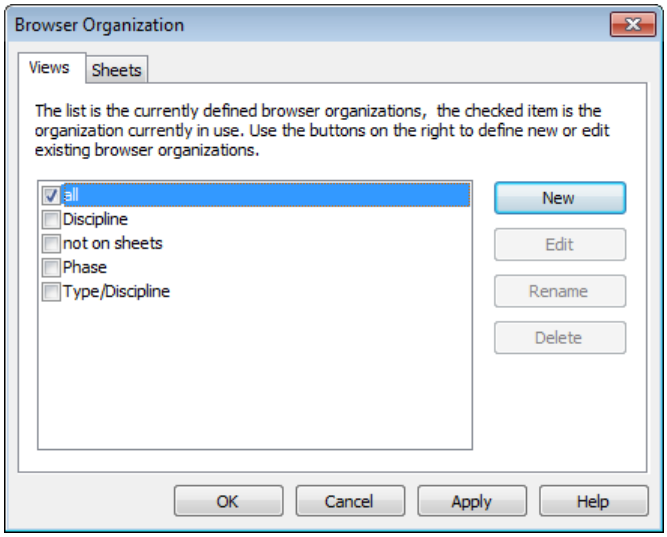


Figure 3-10 *The* ***Browser Organization*** *dialog box*

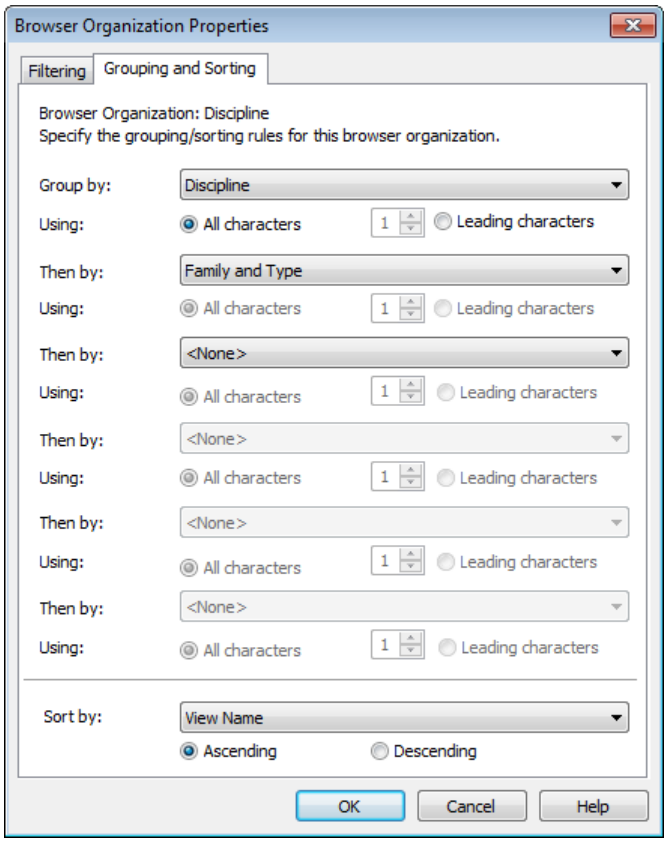


Figure 3-11 *The options in the* ***Grouping and Sorting*** *tab of the* ***Browser Organization Properties*** *dialog box*

In the **Filter by** area of this tab, you can specify view property, filter operator, and filter value, refer to Figure 3-12. After specifying options in the **Filtering** and **Grouping and Sorting** tabs, choose the **OK** button from this dialog box; the **Browser Organization Properties** dialog box will close and the settings of the selected browser organization will be edited. Similarly, you can also create a new browser organization for the project views. To do so, ensure that the **Views** tab is chosen from the **Browser Organization** dialog box and then choose the **New** button from it; the **Create New Browser Organization** dialog box will be displayed. In this dialog box, you can enter the name of the new browser organization in the **Name** edit box and then choose the **OK** button; the **Browser Organization Properties** dialog box will be displayed. The options in this dialog box have already been discussed.

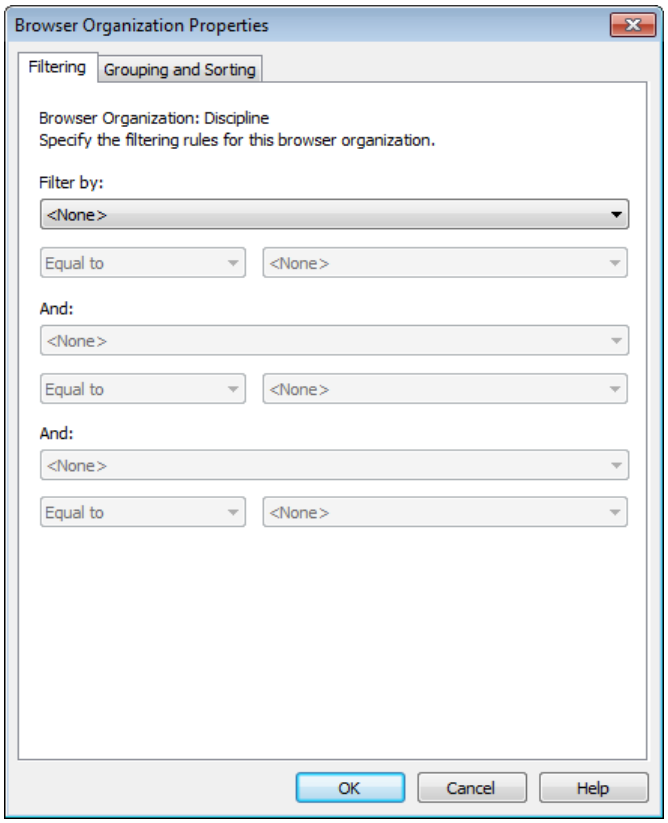


Figure 3-12 *The options in the* ***Filtering*** *tab of the* ***Browser Organization Properties*** *dialog box*

As you created browser organization for a project view, you can also create browser organization for sheets. To do so, choose the **Sheets** tab from the **Browser Organization** dialog box. The **Sheets** tab displays a list box containing the list of default browser organizations for sheets. The options in this tab are similar to those discussed for the **Views** tab.

USING LEVELS

Creating levels is one of the important tasks in a BIM project. In any structural model of a building project, levels define horizontal planes for placing the level-hosted elements, such as walls, roofs, foundations, floors, slabs, beams, columns, and ceilings.

In Revit, you can use the **Level** tool to add new levels by sketching the required level lines in the elevation or section views. By default, all level lines have associated labels that display the name and elevation of the level. There are two types of level that you can create: story and nonstory. The procedure to create these levels is discussed later in this chapter. A story level defines a floor, roof, or ceiling of a building. You can create a level for each known story in a structural model. The main characteristic of story levels is that they have corresponding plan views. In a project view, the level bubble for a story level will be displayed in blue.

On the other hand, a nonstory level does not hold any plan view but can act as host for placing objects and information. The examples of a nonstory level are top of wall, top of foundation, and top of slab. The level bubble for a nonstory level is displayed in black. Figure 3-13 shows both types of levels in the **East** elevation view of a structural model. In this figure, the **T.O. Columns** and **Column Splice** levels are nonstory levels and the rest of the levels are story levels.

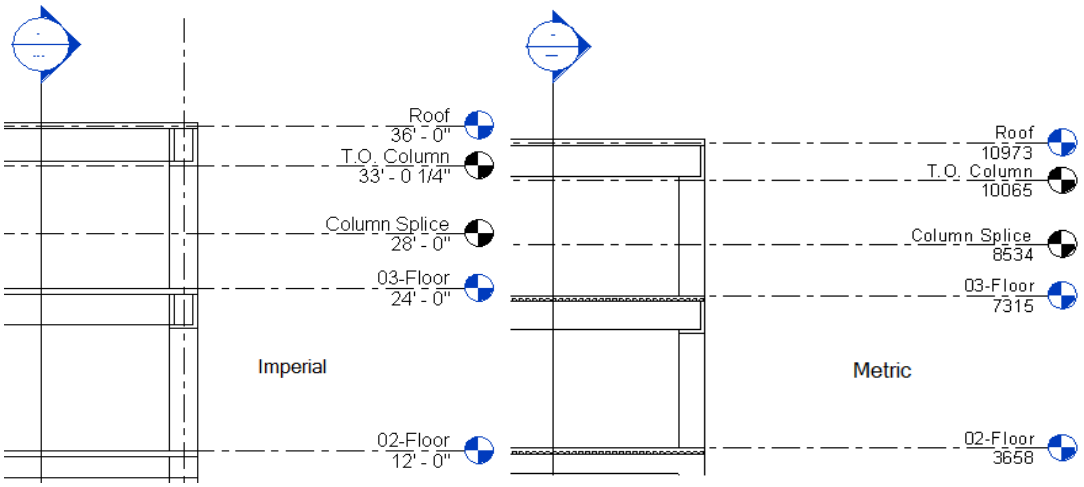


Figure 3-13 *Different types of level in the* ***East*** *elevation view*

In Autodesk Revit, when you use the default template file for creating a new project file, it loads two predefined levels: **Level 1** and **Level 2**. These levels are displayed in the elevation or section view. You can view any of the elevations or section views using the **Project Browser**. Levels can be added, renamed, and modified at any time during the project development. In the following sections, you will learn more about properties of levels, creating levels, modifying levels, and working with levels.

Understanding Controls in a Level

A typical level is represented by a level line, level bubble, level name, level elevation, and so on, as shown in Figure 3-14. You can modify the appearance of a level by using these controls and parameters. The level name is an editable parameter which refers to different levels.

The level elevation is the distance of the level from the base level. The visibility of level bubble on either sides of the level line can be controlled by using the bubble display control. The length alignment control can be used to align level lines. Autodesk Revit provides the 2D or 3D extent control for datums when you select them. As a result, you can change their extents

in one or multiple views in which they are visible. When a datum is in the 3D mode, any modification made in the 3D view is propagated in all views of the structural model. On the other hand, the 2D mode can be used to modify the datum in a specific view, thereby making it view-specific. In the next section, you will learn about adding levels in your project.

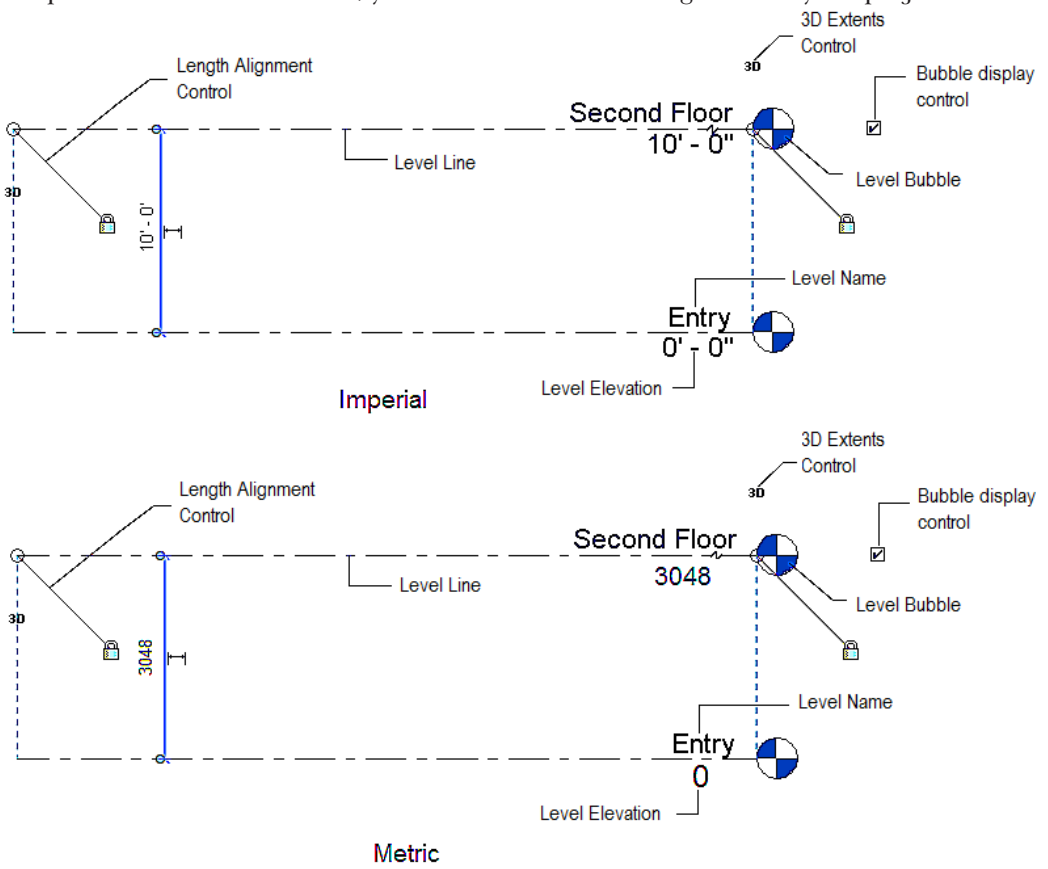


Figure 3-14 *Various controls of a typical level*

Adding Levels

Ribbon: Structure > Datum > Level
Shortcut Keys: LL

In Autodesk Revit, you can create multiple levels in an elevation or a section view. To create a level, invoke the **Level** tool from the **Datum** panel of the **Structure** tab, as shown in Figure 3-15; the **Modify | Place Level** tab will be displayed. In this tab, choose any of the sketching options displayed in the **Draw** panel to create levels in your project. Alternatively, you can invoke the **Level** tool by pressing **LL**. After invoking the **Level** tool, you can select a level type from the **Type Selector** drop-down list in the **Properties** palette. There are three options in this drop-down list: **Level: 1/4" Head**, **Level: Story Level**, and **Level: Story Level-no head** in the **Imperial** unit system and **Level: 8mm Head** option for the **Metric** unit system. If you select the **Level: 1/4" Head** option of **Imperial** or **Level: 8mm Head** of **Metric** from the **Type Selector** drop-down

list, level lines will be added as dashed lines along with the level bubbles. If you select the **Level: Story Level** option from the drop-down list, level lines will be added with continuous line along with the level bubbles. Similarly, by selecting the **Level: Story Level-no head** option, you can add level lines as continuous lines without level bubbles.

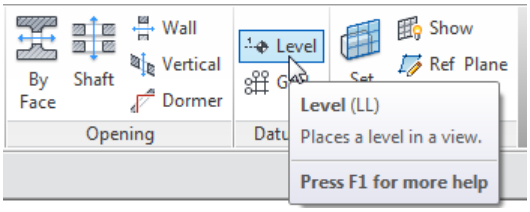


Figure 3-15 *Invoking the* ***Level*** *tool*

You can choose the **Line** (default) or **Pick Lines** tool from the **Draw** panel of the **Modify | Place Level** tab to sketch the level line. Notice that the **Make Plan View** check box is selected in the **Options Bar**. This implies that when a level is added, Autodesk Revit treats it as a story level under the **Structural Plans** head in **Project Browser**. As a result, the level created will be displayed under the **Structural Plans** head in **Project Browser**. While working with the **Level** tool, if you clear the **Make Plan View** check box from **Options Bar**, a nonstory level will be created. As a result, the associated views will not be created. The **Offset** edit box in the **Options Bar** can be used to add a level at a specified distance from the selected point or element.

To add a level, invoke the **Level** tool and move the cursor near the existing level line. The temporary dimension displayed indicates the perpendicular distance between the nearest level and the cursor. To add a level at the specified distance from the existing level line, enter the perpendicular distance value in the **Imperial** and **Metric** template, as shown in Figure 3-16. Next, click to specify the first point and move the cursor to left or right. You will notice that the level line, level name, and elevation appear and move with the cursor. On moving the cursor above the endpoint of the existing level line, a dashed alignment line appears, indicating its alignment with the existing level, as shown in Figure 3-17. When the alignment line appears, click to specify the endpoint of the level line.

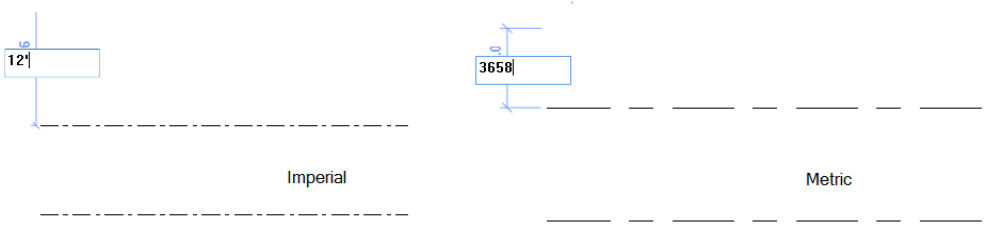


Figure 3-16 *Entering the perpendicular distance value*

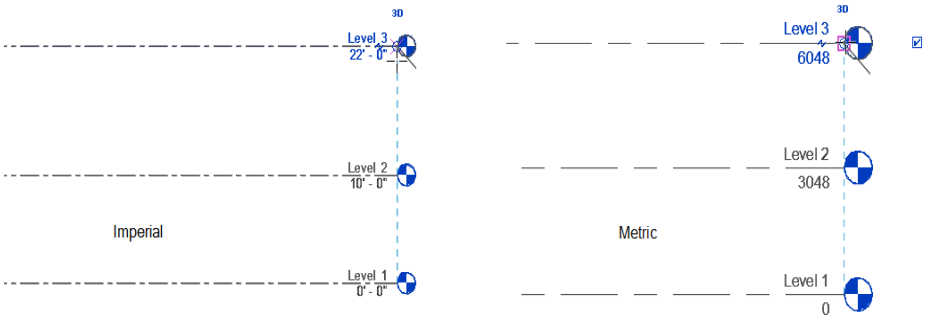


Figure 3-17 *The appearance of a dashed alignment line along with the cursor*

Note

Although levels are infinite horizontal planes, you are required to specify the start point and endpoint of level line. However, the placement of a level line can be useful in elevation and section views.

The recently added level when selected will be highlighted and will display two square boxes, one on either side of the level, as shown in Figure 3-18 in both **Imperial** and **Metric** unit system. These boxes are used to control the visibility of the level bubble. They can be checked or cleared to make the bubble visible or invisible, respectively, at the desired side(s). The two small circles representing the drag controls for the level line can be used to increase or decrease its length. The padlocks act as the length alignment control for the alignment of all level lines. When the padlock is locked, if you change the length of a level line, all level lines aligned to it will increase or decrease simultaneously. To modify the length of a single level line, unlock the control and then modify its length.

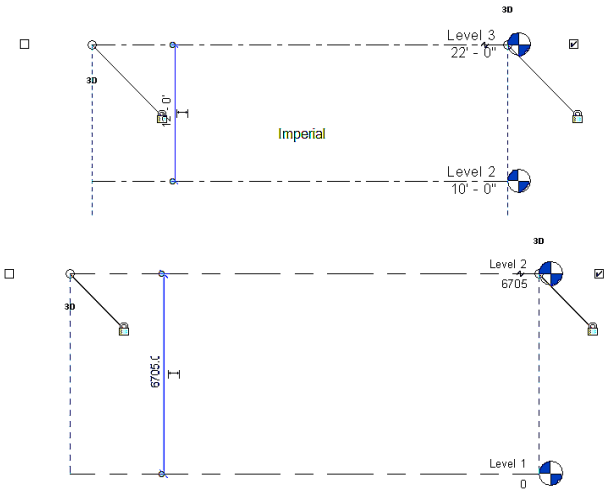


Figure 3-18 *The selected level displaying one check box on its right and left in both the* ***Imperial*** *and* ***Metric*** *template files*

Instance and Type Properties of a Level

Like other structural and building elements used in Autodesk Revit project, levels also have associated types and instance properties. To view and modify the instance properties of a level, select the level from the drawing; the instance properties of the selected level will be displayed in

the **Properties** palette, as shown in Figure 3-19. You can use this palette to view and modify the type properties of the selected level. To do so, choose the **Edit Type** button; the **Type Properties** dialog box will be displayed. Alternatively, you can display this dialog box by choosing the **Type Properties** tool from the **Properties** panel of the **Modify | Levels** contextual tab. You can use the **Type Properties** dialog box to modify and view the type properties of the level selected from the drawing. The parameters in the **Properties** palette and the **Type Properties** dialog box are discussed next.

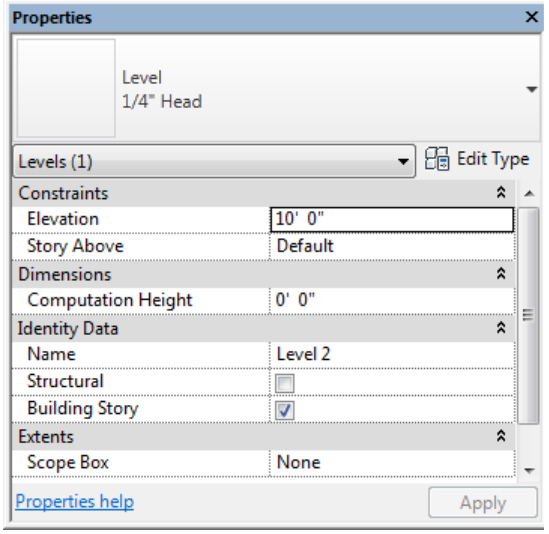


Figure 3-19 *The instance properties of a level displayed in the* ***Properties*** *palette*

Instance Properties of a Level

When you change the instance property of a selected level, the properties of the selected instance are changed. Different instance properties of a level are described in the following table:

Parameter Name	Description
Elevation	Specifies to the vertical height of a level from the elevation base.
Story Above	Specifies the building story above the current level. By default, the next highest level will be specified for this parameter. To change the value of this parameter, click on the value field corresponding to this parameter; a drop-down list will be displayed. The drop-down list will display all the levels above the current level. You can select any of these levels to specify it as the story above the current level.
Computation Height	Specifies the computation height for a level. This value is entered to calculate the area, perimeter, and volume of a room.

Name	Specifies the name assigned to the selected level in the model.
Structural	Specifies that the current level is a structural level. To specify this parameter, select the check box displayed in the value field corresponding to this parameter.
Building Story	Specifies whether the current level will be a building story or not. A building story is a floor level such as first, second, third, and more. By default, the check box corresponding to this parameter is selected; As a result, the current level will become a building story.
Scope Box	Specifies to the scope box assigned to the level that controls its visibility in different views.

Type Properties of a Level

The type properties of a level can be viewed and modified in the **Type Properties** dialog box, refer to Figure 3-20.

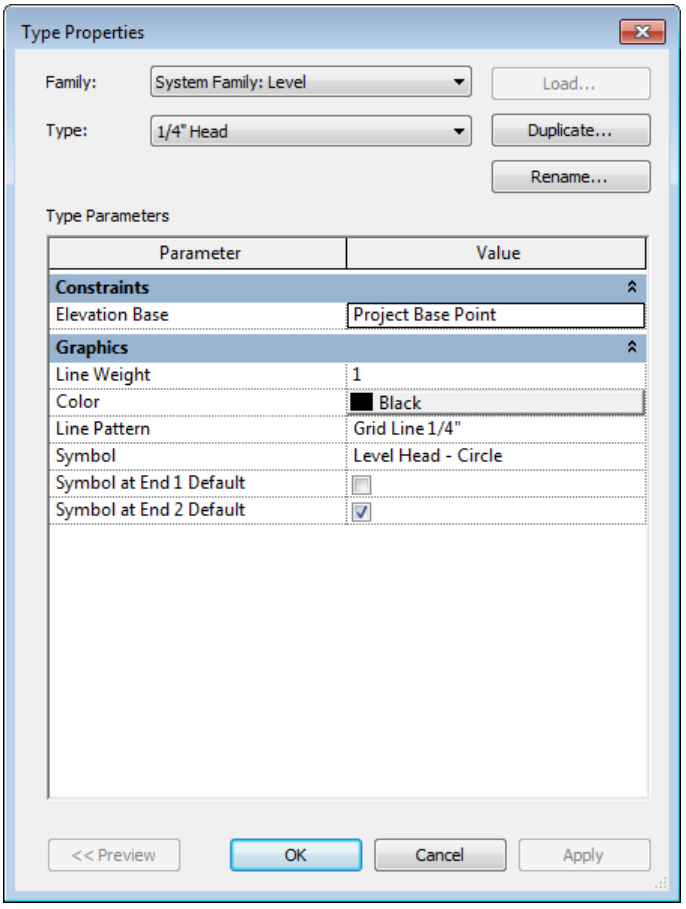


***Figure 3-20** The **Type Properties** dialog box of the selected level*

When you change the type properties of a level, all instances of the level are modified. In the **Type Properties** dialog box, you can modify the value of a parameter by clicking on its **Value** field and selecting a new value from the drop-down list or entering a new value in the field. Different level type properties are described in the table given next.

Parameter Name	Value and Description
Elevation Base	Describes the elevation base value with respect to project or the shared origin.
Line Weight	Refers to the weight of a line defining the level. It can be selected from the drop-down list.
Color	Refers to the color of a level line and can be selected from the available colors. The default color is black.
Line Pattern	Used to set the linetype of a level line.
Symbol	Refers to the symbol indicating level and can be selected from the drop-down list. The **None** option can be selected if the level head is not required.
Symbol at End 1 Default	Check box is used if a bubble is required at the left end of a level line.
Symbol at End 2 Default	Check box is used if a bubble is required at the right end of a level line.

Tip

It is recommended that you name the building story level according to the floor such as first floor, second floor, or roof. This helps in referring to their corresponding plan views. This will also help in editing the level-hosted elements. The names assigned to the levels are also reflected in the schedules created for the project.

Changing the Level Parameters

While working in a structural project, you may need to change various parameters of a level based on your project requirement. The type and instance parameters can be changed by using the **Properties** palette and the **Type Properties** dialog box. The options in this dialog box have already been discussed in the previous sections. Further, you can change the level type by selecting a level and then selecting a different level type from the **Type Selector** drop-down list. In Revit, some of the parameters can also be modified by clicking on the level element in the drawing window and entering a new value. For example, after selecting a level, you can click on its name. On doing so, an edit box will appear with the present name highlighted. Remove the present name, type a new name, and then click again or press ENTER. Note that if you are renaming the level for the first time, Autodesk Revit will prompt you to specify whether you want to rename all the corresponding views. If you choose to rename the views, the name of the associated views will also be changed in the **Project Browser**. Similarly, you can also modify the elevation of a level by selecting the elevation value below the elevation name and entering a new elevation value in the edit box displayed on clicking it, as shown in Figure 3-21. When you enter a new value, the level automatically moves to the specified elevation.

Alternatively, you can move levels by simply dragging them to the desired location. To do so, select a level line and drag it to the desired location. As you drag the level line, the elevation level changes dynamically with respect to the cursor location.

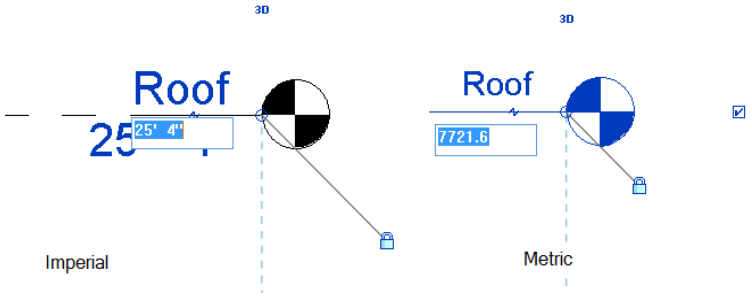


Figure 3-21 *Entering a value for the new elevation in the edit box*

It is recommended to hold the SHIFT key to constrain the cursor to move vertically. After dragging the level line to the desired location, release the mouse button; the level will be relocated to a new position. While working on a project, you may need to quickly view the structural plan of a level that is displayed in the elevation. To do so, open an elevation view and move the cursor near a level line until it gets highlighted. Next, right-click on the highlighted level line; a shortcut menu will be displayed. From the shortcut menu, choose the **Go to Floor Plan** option to open the corresponding floor plan for the level, as shown in Figure 3-22.

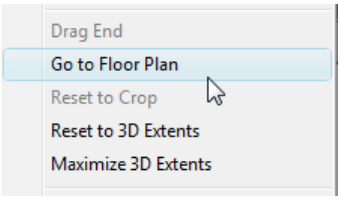


Figure 3-22 *Choosing the **Go to Floor Plan** option from the shortcut menu*

Tip

When you select a level, its distance from the adjacent levels is displayed. Click on the corresponding temporary dimension and enter a new value to move the level to a new location.

For certain levels, you may want to move the level bubble to a different location. On selecting a level, you will notice that a break control appears below its name, next to the level bubble. The break control can be used to break the level line and move the level bubble away from it. On clicking this control, you will notice that the level name and the level bubble are also moved to the new location and an extension line is created. Figure 3-23 illustrates the appearance of the bubble dots after they are moved. Notice that as the bubble is moved, it appears with two blue dots. You can use the blue dots to place the level bubble at the appropriate location.

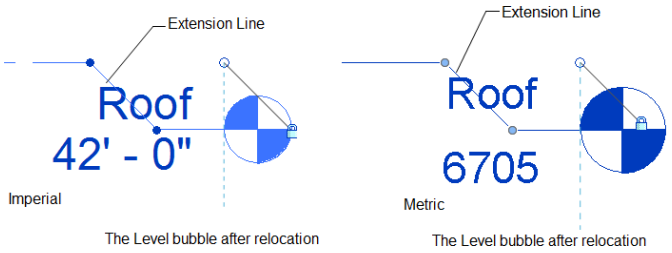


Figure 3-23 *The level bubble after its relocation*

Controlling the Visibility of Levels

While working in an elevation view or a section view, sometimes you may need to hide some or all level lines to avoid congestion of construction lines. This helps in viewing the detail lines for sections and elevations properly. To do so, in the elevation view or section view, select the level line that you need to hide, and then right-click; a shortcut menu will be displayed. From this shortcut menu, choose **Hide in View > Elements**, as shown in Figure 3-24; the selected level line will be hidden.

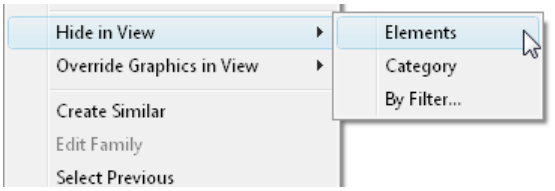


Figure 3-24 *Choosing the* ***Elements*** *option from the shortcut menu*

If you need the hidden level line to be visible, choose the **Reveal Hidden Elements** button from the **View Control Bar**; the hidden level line will appear red in the drawing area. Next, right-click on the level appearing in red color in the drawing area; a shortcut menu will be displayed. Choose **Unhide in View > Element** from the shortcut menu. Next, choose the **Close Reveal Hidden Elements** button from **View Control Bar**; the hidden level will appear.

Similar to hiding a single level line, you can also hide all levels that are displayed in an elevation or a section view. To do so, select any level from the view and right-click; a shortcut menu will be displayed. Choose **Hide in View > Category** from the shortcut menu; all levels in the view will hide.

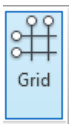
GRIDS

Grids are the essential features that will help you to align and place structural elements such as columns, beams, and walls in a structural plan. With grids, you can easily trace the exact location of a desired column or any other structural elements. Grids are definite vertical planes represented as lineworks in the plan, elevation, and section views.

You can add grids as lines or arcs. You can also create them from existing lines, or link/import them from other software such as AutoCAD Architecture, Revit Architecture, and AutoCAD and then convert them to revit grids. In the following sections, you will learn how to create, modify, and understand the grids.

Creating Grids

Ribbon: Structure > Datum > Grid
Shortcut Key: GR



To create a grid, invoke the **Grid** tool from the **Datum** panel of the **Structure** tab; the **Modify | Place Grid** tab will be displayed, as shown in Figure 3-25. The options in the **Modify | Place Grid** tab can be used to assign and change the element properties (instance and type) of the grid, to select a type for grid, and to draw grid in the desired plan or elevation.

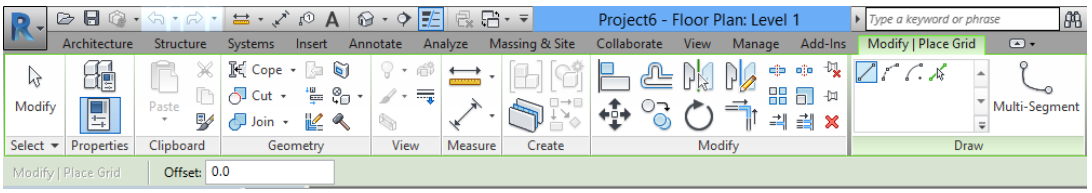


Figure 3-25 *The options in the* ***Modify | Place Grid*** *tab*

Before you start sketching grids, you need to assign their element properties (instance or type) using the **Properties** palette. To do so, invoke the **Grid** tool; the **Properties** palette will display the parameters that can be added to the grid. In the palette, you will notice that the value assigned to the **Scope Box** parameter is **None**, which implies that no scope box will be assigned to the grid to be added. Next, in the palette, choose the **Edit Type** button; the **Type Properties** dialog box will be invoked. In this dialog box, you can change the type parameters of grids, as discussed next.

Type Parameters of a Grid

Before sketching a grid, you can assign its type parameters. To do so, choose the **Type Properties** tool from the **Properties** panel in the **Modify | Place Grid** tab; the **Type Properties** dialog box will be displayed. Figure 3-26 shows the partial view of the dialog box. In this dialog box, you can change values for various type parameters, which are given in the following table:

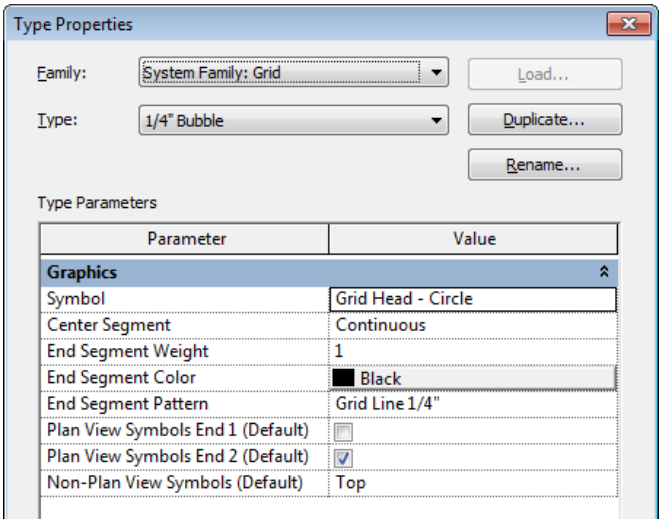


Figure 3-26 *Partial view of the* ***Type Properties*** *dialog box*

Parameter Name	Value and Description
Symbol	Refers to the display of symbol at the end grid.
Center Segment	Refers to the display type of the center segment of a grid line. You can select **Continuous**, **None**, or **Custom** from the drop-down list.
Center Segment Weight	Refers to the line weight of the center segment, if the **Center Segment** parameter is set to **Custom**.
Center Segment Color	You can assign a color to the center segment, if the **Center Segment** parameter is set to **Custom**.
Center Segment Pattern	Refers to the line type of the center segment if the **Center Segment** parameter is set to **Custom**. You can select various line types from the drop-down list.
End Segment Weight	Refers to the line weight of a grid line, if the **Center Segment** parameter is set to **Continuous**, **None** or **Custom**.
End Segment Color	Refers to the color assigned to a grid line, if the **Center Segment** parameter is set to **Continuous**, **None** or **Custom**.
End Segment Pattern	Refers to the line type of the grid line if the **Center Segment** parameter is set to **Continuous**, **None** or **Custom**.
End Segments Length	Refers to the length of each end segment as measured in the sheet, if only the **Center Segment** parameter is set to **None** or **Custom**.
Plan View Symbols End 1 (Default)	Refers to the default visibility status of the symbol at end 1 of the grid line in the plan view. By default, the check box is cleared. If you select the check box, the visibility of the symbol at end 1 in the plan view will be turned on.
Plan View Symbols End 2 (Default)	Refers to the default visibility status of the symbol at end 2 of grid line in the plan views. By default, the check box is selected. If you clear the check box, the visibility of symbol at end 2 in the plan view will be turned off.
Non-Plan View Symbols (Default)	Refers to the default visibility status of the grid line in sections and elevations other than in the plan views. You can control the visibility of the symbol at the top and bottom of grid line by selecting various options from the drop-down list.

Sketching the Grids

After assigning the type parameters in the **Type Properties** dialog box, you can now start sketching the grid line. To sketch the grid line, invoke any of the sketching tools from the **Draw** panel of the **Modify | Place Grid** tab. The **Draw** panel of the **Modify | Place Grid** tab contains four tools: **Line**, **Start-End-Radius Arc**, **Center-ends Arc**, and **Pick Lines**, as shown in Figure 3-27. The use of these sketching tools is discussed next.

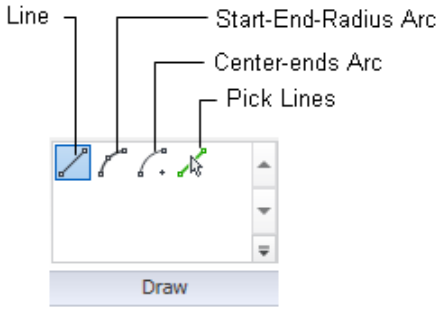


Figure 3-27 *The sketching tools in the* ***Draw*** *panel*

Sketching a Grid Using the Line Tool

The **Line** tool in the **Draw** panel of the **Modify | Place Grid** tab is invoked by default. To start sketching the grid line, click at the desired location in the drawing area to specify its start point. Notice that as you move the cursor, a grid line with one end fixed at the specified point and the other end attached to the cursor is created. A temporary angular dimension, indicating the angle of the grid line with the horizontal axis is also displayed, as shown in Figure 3-28. Click to specify the endpoint of the grid line when the appropriate angular dimension is displayed. You can also sketch an arbitrary inclined grid line and then click on the angular dimension to enter a new value of the angle. To draw orthogonal grids, hold the SHIFT key and restrain the movement of the cursor to the horizontal and vertical axes.

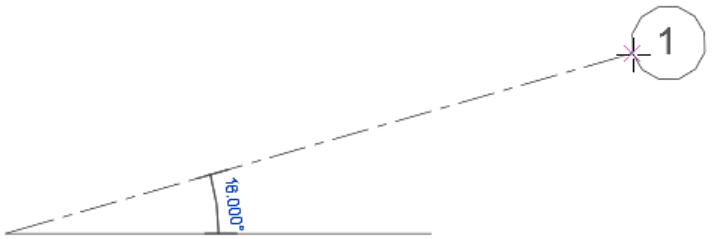


Figure 3-28 *Temporary angular dimension displayed while sketching the grid*

When you click to specify the endpoint, a grid is created and its controls are highlighted, as shown in Figure 3-29. Also, the recently added grid is highlighted and displays one square box on either side. These boxes are used to control the visibility of grid bubble. They can be selected or cleared to make the grid bubble visible or invisible on the desired side(s), respectively. The two circles on the start point and the endpoint can be dragged to extend or reduce the extent of the grid line.

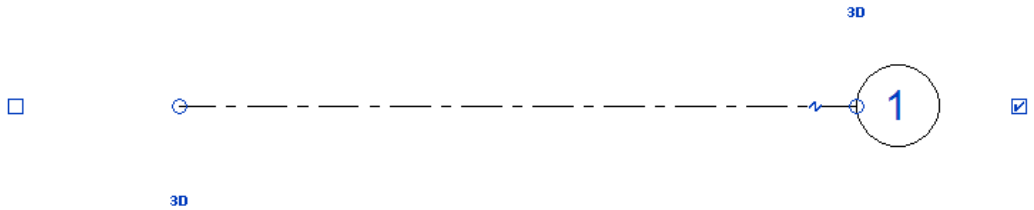


Figure 3-29 *The highlighted controls of the grid created*

Similarly, when you sketch a new grid line near an existing one, a temporary dimension indicating the distance between them is displayed. You can enter a value in the edit box to specify the distance, as shown in Figure 3-30. Alternatively, you can move the cursor to the desired location using the temporary dimensions and click to specify the start point of the second grid line. Then, move the cursor horizontally to the right, and when the alignment line appears, click to specify the endpoint of the grid line.

Tip

It is recommended that you draw grid lines with the endpoints aligned to each other. You can use the alignment line that is displayed when the cursor is moved to its proximity. The ***Lock*** *constraints can be used to drag the extents of the single or multiple grid line.*

On doing so, the second grid line will be created. Notice that the name of this grid is 2. Autodesk Revit automatically numbers the grid lines as they are created. Similarly, you can draw more parallel grid lines. The **Offset** edit box in the **Options Bar** is used to specify the offset distance of a grid line from the desired point. To create vertical grid lines, specify the start point below the first grid line. Next, move the cursor vertically upward and click below the last horizontal grid line to specify the endpoint. You can create multiple vertical grid lines by using the method used for creating multiple horizontal lines.

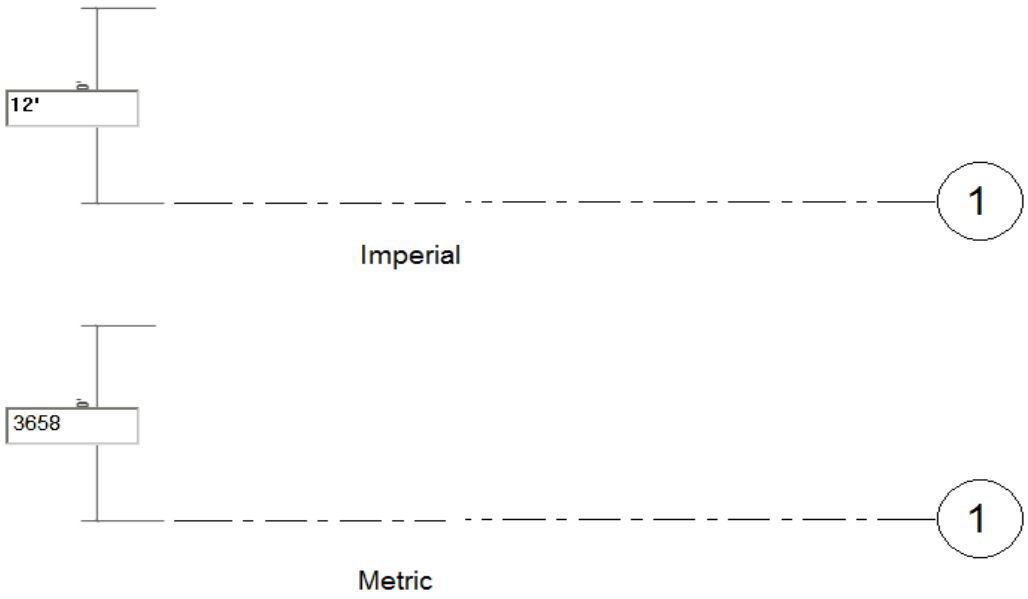


Figure 3-30 *Distance value entered in the edit box for another grid*

You can also create a rectangular grid pattern that is aligned at a given angle to the horizontal axis. You can also specify different angles for grid lines and create grid patterns based on your project requirement.

Sketching a Curve Grid

You can sketch curved or radial grid patterns based on your project requirement. To do so, invoke the **Start-End-Radius Arc** or **Center-ends Arc** tools from the **Draw** panel of the **Modify | Place Grid** tab.

After you have invoked the **Start-End-Radius Arc** tool, click at a point in the drawing area to specify the start point of the curved grid. Next, click at an appropriate location to locate the endpoint of the grid. On doing so, the curved grid will emerge with the temporary dimension displayed for the radius. Enter a suitable value for the radius or click in the drawing area; the curved grid will be created. Alternatively, after invoking the **Start-End-Radius Arc** tool, you can create multiple curved grids by selecting the **Radius** check box from the **Options Bar**. To do so, enter a suitable value in the edit box next to the **Radius** check box and then pick the start point and endpoint in the drawing to create an arc. You can also use the **Center-ends Arc** tool to create arcs by defining its center point, start point, and endpoint.

While sketching a structural grid, generally a combination of radial and linear grid patterns is used. Figure 3-31 shows a grid pattern created by using both the line and arc tools.

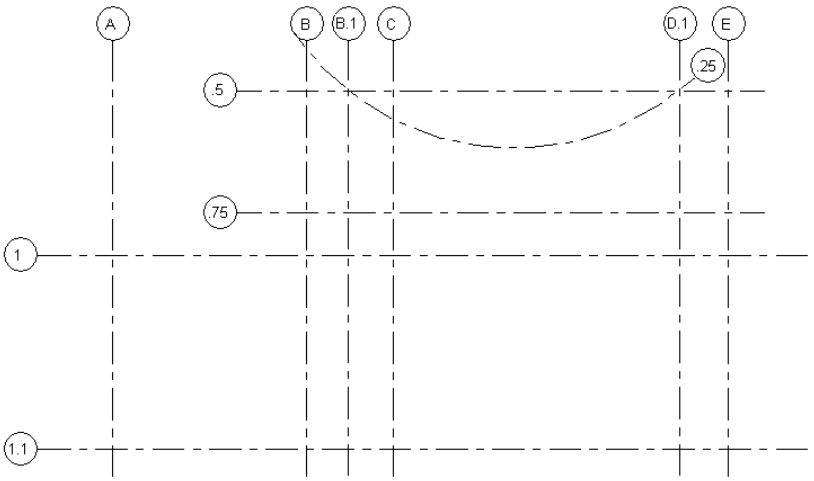


Figure 3-31 *An example of a grid pattern created using an arc and straight grid lines*

Tip

*You can also use different editing tools such as **Copy**, **Array**, **Mirror**, **Move**, and so on to create grid patterns. Autodesk Revit numbers grids intuitively. For example, if you create an array of a grid named A, the new grids will sequentially be named as B, C, D, E, and so on.*

Creating Grids Using the Pick Lines Tool

The **Pick Lines** tool is useful for creating grid lines that are aligned to existing elements. When you choose this tool from the **Draw** panel of the **Modify | Place Grid** tab and move the cursor near an existing element, the cursor snaps to certain object properties such as the interior face of walls, centerlines of columns, and so on. Click when the desired property

of the element is highlighted; Autodesk Revit automatically creates a grid line along the specified alignment of element.

For example, to create grid lines for the structural wall profile, invoke the **Pick Lines** tool from the **Draw** panel and move the cursor near the curved exterior wall. As you move the cursor over the wall, it will snap to the interior and exterior faces. Click when the interior face is highlighted, as shown in Figure 3-32; a grid line aligned with the interior face of the wall will be displayed, as shown in Figure 3-33. Similarly, you can click on the other wall segments to create a grid pattern required for the building.

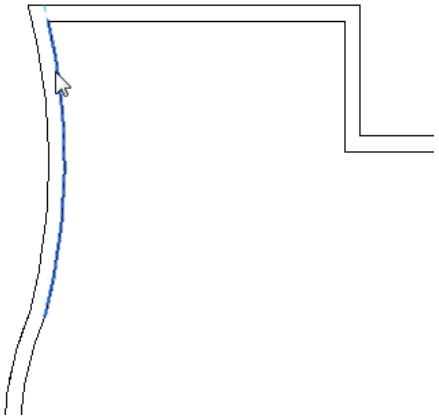


Figure 3-32 *The interior face of the wall highlighted*

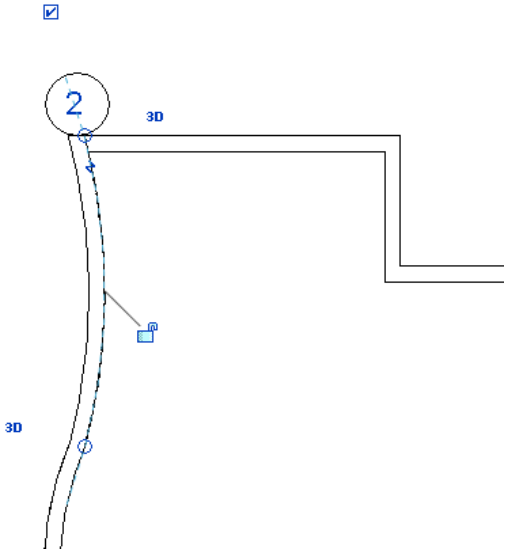


Figure 3-33 *Grid line created from the edge of the interior face of the wall*

If the cursor does not snap to the centerline of the wall, you can align the grid lines along the center of the wall by specifying the distance value of the centerline from the interior face in the **Offset** edit box and then use the **Pick Lines** tool to select the interior face.

Creating Multi-Segmented Grids

In Autodesk Revit, you can create grids having more than one segment. To create a multi-segmented grid, choose the **Grid** tool from the **Datum** panel of the **Structure** tab; the **Modify | Place Grid** tab will be displayed. In the **Draw** panel of this tab, choose the **Multi-Segment** tool; the **Modify | Edit Sketch** tab will be displayed. In the **Draw** panel of the tab, the **Line** tool is chosen by default. As a result, the grid segment that you will draw will be a straight line. In the **Draw** panel, you can choose other sketching tools such as **Start-End-Radius Arc**, **Center-ends Arc**, **Tangent-end Arc**, and others depending on the requirement of the sketch of the grid lines in the project. In the **Options Bar** the **Chain** check box is selected by default. As a result, the grid will be created from end-to-end in a chain. If you clear this check box you need to specify start and end points for each grid segment that will be created. In the **Options Bar**, you can enter a suitable value in the **Offset** edit box to specify an offset distance by which the grid segment will be offset from the point you specify in the drawing area.

In the **Options Bar**, the **Radius** check box is cleared by default. As a result, no fillet or curve will be created at the join of the grid segment. On selecting the **Radius** check box, the edit box next to it will be enabled. As a result, you can specify a suitable value in it to set the fillet radius of the curve that will be created at the join of two grid segments. Next, after specifying the desired options in the **Options Bar**, click in drawing area to start the multi-segment grid line. Now, click in the drawing area to specify the endpoint of the grid line.

Modifying Grids

Grids can be modified before or after they are created. To modify a grid, you need to select the grid and modify its properties using the **Properties** palette. Some of the parameters can also be modified by selecting the grid in the drawing window and entering the new values. For example, after selecting the grid, you can click on its name and assign it a new name. Similarly, you can modify the distance between the grids by selecting the temporary dimension and entering a new value. When you enter a new value, the grid automatically moves to the specified distance.

You can also move multiple grids by simply dragging them to the desired locations. To do so, click and select a single grid. Then, hold the CTRL key and click to select multiple grids. Next, you can drag the grid(s) to the desired location. Hold the SHIFT key to restrain the movement of the cursor in the orthogonal direction. When you move the cursor near a grid, it gets highlighted. At this stage, right-click and then choose the **Properties** option from the shortcut menu to display the **Properties** palette, if it is not displayed in the interface of Revit. You can also choose other options from the shortcut menu such as **Select Previous**, **Select All Instances**, and so on to select other grids. For certain grids, you may need to move or offset grid bubble to a different location. To do so, select a grid; a blue circle will appear on each of its endpoints. Also, the grid line break control will appear near the grid bubble. This control is used to create a grid bubble offset. You can click on this control and use the drag controls displayed to move the grid bubble to the desired location. The grid name also moves to the new location. Note that an extension line is also created along it.

Customizing the Grid Display

In Revit, you can customize the grid display. You can change the color, line weight, and line type of the entire grid line or part of the grid line such as center segment and end segment. You can also change the display of symbols at the end of the grid line.

Changing the Continuous Grid Line

A grid line is said to be continuous when the **Center Segment** parameter in the **Type Properties** dialog box is set to **Continuous**. You can change the line type, line weight, and color of the end segments using various options available in the **Type Properties** dialog box. Similarly, you can change the display of a symbol at the ends of a grid by using the other options available in the **Type Properties** dialog box.

Creating a Grid Line with Central Gap

You can create a grid line with central gap between its two end segments. To do so, select the **1/4" Bubble Custom Gap** or **1/4" Bubble Gap** option from the **Type Selector** drop-down list for Imperial unit system in the **Properties** palette. In Metric, you can select the option **6.5mm Bubble Custom Gap** or **6.5mm Bubble Gap** option from the **Type Selector** drop-down list.

Then, set the **Center Segment** parameter in the **Type Properties** dialog box to **None**. Figure 3-34 shows the display of grid line with gap between the two segments. You can also change the display properties of the end segments, as discussed above.

Figure 3-34 *The display of a grid line with a central gap*

Creating a Grid Line with Center Segment

You can create a grid line with the center and end segments containing different display properties such as line color, line weight, and line pattern. To do so, select the **1/4" Bubble Custom Gap** or **1/4" Bubble Gap** option from the **Type Selector** drop-down list in the **Properties** palette for the Imperial unit system. In Metric, you can select the option **6.5mm Bubble Custom Gap** or **6.5mm Bubble Gap** option from the **Type Selector** drop-down list. Then, set the **Center Segment** parameter in the **Type Properties** dialog box to **Custom**. You can change the display properties of the center segment and end segments using various options available in the **Type Properties** dialog box.

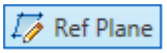
Controlling the Visibility of Grids

You can control the visibility of each grid or all grids in any of the project views. To do so, select a grid and right-click; a shortcut menu will be displayed. Choose **Hide in View > Category** from the shortcut menu; the grid category will be hidden in the current view. Similarly, you can also hide one particular grid by choosing **Hide in View > Elements** from the shortcut menu. On doing so, the selected grid will be hidden in the current view. However, the grid will be displayed in all the other views.

Alternatively, you can control the visibility of the grids by using the visibility/graphics feature of Autodesk Revit. To do so, select a grid from the drawing and choose the **Override by Category** tool from **Modify | Grids > View > Override Graphics in View** drop-down; the **View-Specific Category Graphics** dialog box will be displayed. Choose the **Open the Visibility Graphics dialog** button; the **Visibility/Graphic Overrides for Structural Plan: <view name>** dialog box for the current project view will be displayed. In the **Annotation Categories** tab of this dialog box, clear the check box for the visibility of grids; the visibility of all grids will turn off in the current view. You can also control the visibility of grids using the **Scope Box** feature.

WORKING WITH REFERENCE PLANES

Ribbon: Structure > Work Plane > Ref Plane
Shortcut Keys: RP



Reference planes help sketching and adding structural elements to a design. They can be used as datum planes to act as guidelines to create elements. They can also be used for creating new family elements. To create a reference plane, invoke the **Ref Plane** tool from the **Work Plane** panel of the **Structure** tab. Alternatively, enter **RP**; the **Modify | Place Reference Plane** tab will be displayed. In the **Draw** panel of this tab, the **Line** and **Pick**

Line tools are present, the **Line** tool is invoked by default. You can use this tool to draw a straight line or a chain of connected line segments to represent a reference plane. Before drawing a reference plane using the **Line** tool, you can use the **Offset** edit box in the **Options Bar** to specify a suitable offset distance for it. To draw a line for the reference plane, click at the desired location in the drawing window. Next, drag the cursor to a new location and release the left button to specify the endpoint of the reference line; the reference plane will be created. Select the reference plane and assign a name to it in the corresponding field of the **Name** parameter in the **Properties** palette.

Alternatively, you can draw a reference plane in your project view by selecting the edge of a wall, beam, column, or an existing model line in the drawing. To do so, invoke the **Ref Plane** tool as discussed earlier and then choose the **Pick Lines** option from the **Draw** panel of the **Modify | Place Reference Plane** tab. On doing so, you will be prompted to select an edge or a line from the drawing. Move the cursor toward the desired edge of an element; the edge of the element will be highlighted. Click on the highlighted edge to add a reference plane aligned to it.

WORKING WITH WORK PLANES

A work plane is a plane which is used to sketch elements. In Autodesk Revit, you can create and edit only those elements that are in the current work plane. A work plane can be horizontal, vertical, or inclined at any specified angle. Each generated view has an associated work plane. This plane is automatically defined for some standard views such as floor plans. For others, such as sections, elevations, and 3D views, you can set the work plane based on the location of the elements to be created or edited. The concept of work planes is especially useful for creating elements in elevations, sections, or inclined planes. You will learn more about the work planes in the following sections.

Setting a Work Plane

Ribbon: Structure > Work Plane > Set

You can set a work plane based on your project requirement. To set a work plane, invoke the **Set** tool from the **Work Plane** panel of the **Structure** tab; the **Work Plane** dialog box will be displayed, as shown in Figure 3-35. This dialog box shows the current work plane. You can also specify parameters for setting a new work plane in this dialog box. In the **Specify a new Work Plane** area, you will notice drop-down list is available on the right of the **Name** radio button. This drop-down list contains the options that can be levels, grids, and named reference planes. Select an option from the drop-down list to set the current work plane.

The **Pick a plane** radio button can be used to set a work plane along an existing plane. To do so, select this radio button and then an existing plane in the drawing. You can select the **Pick a line and use the work plane it was sketched in** radio button to create a work plane that is coplanar with the plane on which the selected line was created.

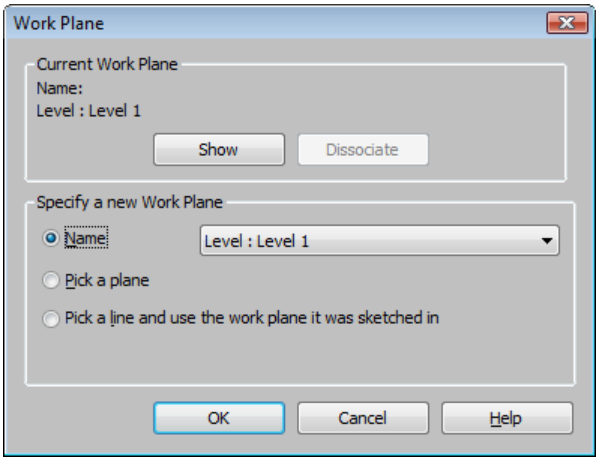


Figure 3-35 *The* ***Work Plane*** *dialog box*

Controlling the Visibility of Work Planes

Ribbon: Structure > Work Plane > Show

You can control the visibility of the current work plane by invoking the **Show** tool from the **Work Plane** panel of the **Structure** tab. The work plane appears as a grid in the current view. To hide it, choose the **Show** tool again.

You can also set the grid spacing for a work plane. To do so, select a work plane from the drawing; the work plane will be highlighted. Specify the spacing by entering a new value in the **Spacing** edit box in the **Options Bar**. You can also enter the spacing in the corresponding value field of the **Work Plane Grid Spacing** parameter in the **Properties** palette. You can snap to the work plane grid using the object snap tools. These tools can be used to create basic locations for columns and footings in a project view.

Using the Workplane Viewer Window

While working on a project you may require to modify elements at a specified workplane. To do so, you can use the **Workplane Viewer** window. This window displays temporary views of models present in the Project Environment and helps in editing the profile in forms, sweeps, blends, and swept blends. You can invoke the **Workplane Viewer** window by choosing the **Viewer** tool from the **Workplane** panel of the **Structure** tab.

WORKING WITH PROJECT VIEWS

While working on a structural model, you may need to view its different exterior and interior portions in order to add or edit elements in the design. Autodesk Revit provides various features and techniques that can be used to view the structural model. In this section, you will learn about the tools that help in working with views.

Viewing a Building Model

The default template file has certain predefined standard project views displayed in the **Views (all)** head of the **Project Browser**, refer to Figure 3-36. These views include structural plans, 3d views, and elevations. To open a view, double-click on its name; the corresponding view will be displayed in the viewing area. In the Revit interface, you can hide or unhide the **Project Browser**. To do so, choose the **User Interface** tool from the **Windows** panel of the **View** tab; a cascading menu will be displayed. By default, the **Project Browser** check box is selected in this cascading menu, which indicates that the **Project Browser** is displayed in your drawing. Clear this check box to hide the **Project Browser** in your drawing.

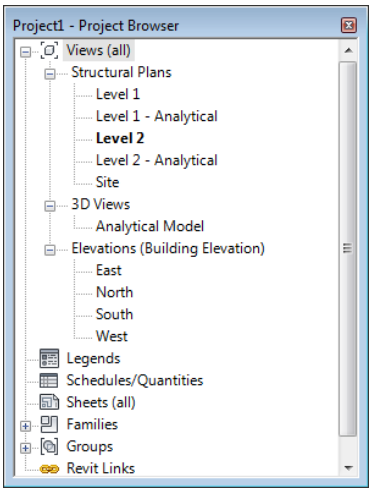


Figure 3-36 *The options displayed in the* ***Project Browser***

Autodesk Revit also enables you to add elements to a building model by simply dragging and dropping them directly from the **Project Browser** instead of using the **Type Selector** drop-down list.

When you open a new project, the viewing area displays four inward arrow symbols in the floor plan view, which indicates the four-side elevations: North, East, South, and West. You can use these symbols to view appropriate building elevation by double-clicking on them.

Controlling the Visibility of Elements in Views

To control the visibility of certain categories of elements, select the element from the drawing; the contextual tab related to it will be displayed in the ribbon. From the **View** panel of the displayed contextual tab, choose the **Override Graphics in View** drop-down menu; a list of available override tool will be displayed. Next, select the **Override by Category** option from the list; the **View-Specific Category Graphics** dialog box will be displayed. Choose the **Open the Visibility Graphics dialog** button; the **Visibility/Graphic Overrides for Structural Plan: <Level name>** dialog box for the specific view will be displayed. You can use the various tabs in this dialog box to hide different categories of elements.

SCOPE BOX

Ribbon: View > Create > Scope Box

The **Scope Box** tool helps you to control the visibility of the datum elements (grids, reference lines, and levels) in the project views. As described earlier in this chapter, these datum elements have infinite scope and they extend throughout the project. Using the **Scope Box** tool, you can create boundary limit for the visibility of these datum elements. You can also specify the views in which these datum elements become visible.

Creating a Scope Box

A scope box can be created in the plan view by invoking the **Scope Box** tool. You can invoke this tool from the **Create** panel of the **View** tab. Once this tool has been invoked, the **Options**

Bar displays the **Name** and **Height** edit boxes. You can enter the name and height of the scope box in their respective edit boxes. To create a scope box, move the cursor in the viewing area; the cursor will change into a cross symbol and will prompt you to draw scope box in the plan view. To define the scope box, click on its upper left corner, move the cursor to the lower right corner, and then click to specify the diagonally opposite ends. Note that the rectangle should be drawn in such a way that the elements that need to be visible are enclosed in it. The scope box with the assigned name will be created. When you select the scope box, drag controls are visible on it, as shown in Figure 3-37. These drag controls can be used to resize the scope box.

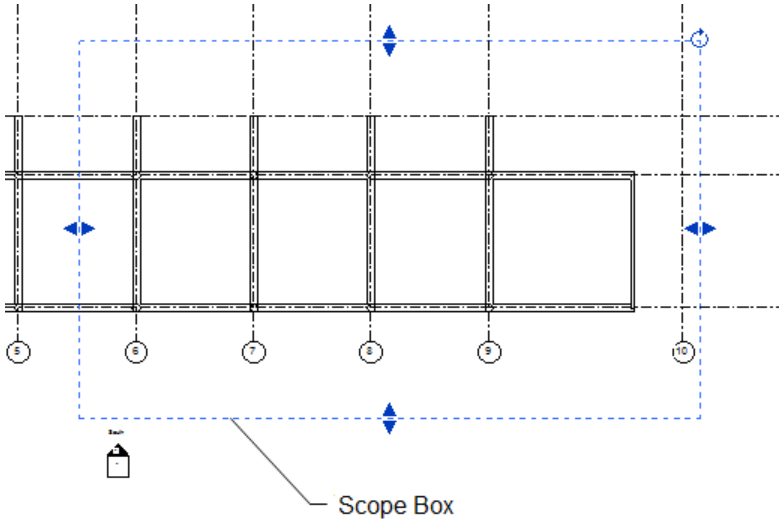


Figure 3-37 *The scope box displayed in the drawing*

Applying a Scope Box to Datum Elements

The visibility of datum elements can be controlled by associating them with a scope box. To associate the scope box created to the desired datum elements, select the scope box from the drawing; the properties of the selected scope box will be displayed in the **Properties** palette. Click on the value field corresponding to the **Scope Box** parameter and select the name of the scope box from the drop-down list. Next, choose the **Apply** button to apply property to the selected datum element. On doing so, you will notice that the datum elements that intersect the boundary of the assigned scope box will restrict its extent throughout the boundary of the scope box. Figures 3-38 and 3-39 illustrate the extent of the grid elements before and after applying the scope box to them.

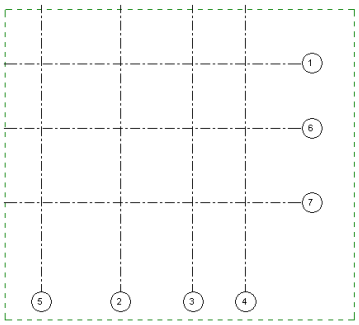


Figure 3-38 *Grids before applying the scope box*

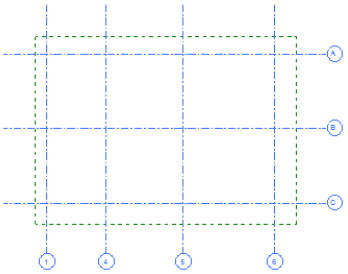


Figure 3-39 *Grids after applying the scope box*

Controlling the Visibility of a Scope Box

A scope box can be resized to limit its visibility for certain views. Its visibility can also be controlled for each view. To do so, select a scope box, and then in the **Properties** palette, choose the **Edit** button displayed in the value field for the **Views Visible** parameter; the **Scope Box Views Visible** dialog box will be displayed. This dialog box lists all views types and view names available in the project. The **Automatic visibility** column shows the current visibility of scope boxes. You can click on the **Override** column for a specific view and select the **Visible** or **Invisible** option from the drop-down list displayed to override the automatic visibility setting, refer to Figure 3-40.

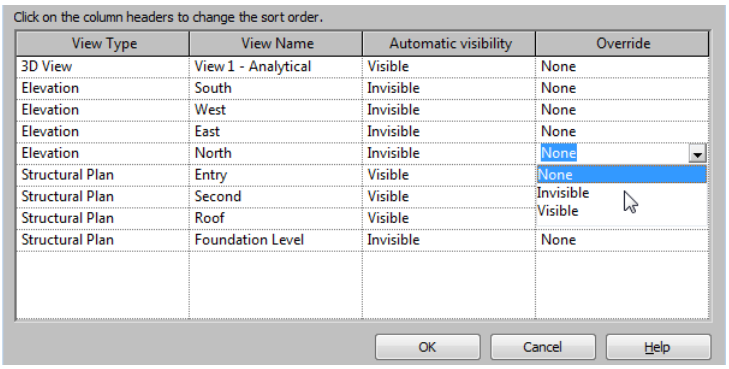


Figure 3-40 *Selecting an option from the drop-down list in the* ***Override*** *column*

TUTORIALS

Tutorial 1 Commercial Complex

In this tutorial, you will create various project settings such as project information, project location, and browser organization for the project created in Tutorial 1 of Chapter 2. Further, you will add levels and grids to the project file. Use the following project parameters and specifications:

(Expected time: 1 hr 15 min)

1. Rename Level 1 and Level 2 as **Below Grade** and **Entry**, respectively.

2. Specify the elevation of **Below Grade** and **Entry** levels as follows.
   For Imperial **-4’ 0”** and **0’ 0”**
   For Metric **-1219** mm and **0** mm

3. Levels to be added:
   For Imperial **Second Floor - Elevation 12’ 6”**
   Roof - Elevation 25’ 0”
   For Metric **Second Floor - Elevation 3810 mm**
   Roof - Elevation 7620 mm

4. File name to be assigned:
   For Imperial *c03_Commercial-Complex_tut1.rvt*
   For Metric *M_c03_Commercial-Complex_tut1.rvt*

The following steps are required to complete this tutorial:

a. Open Tutorial 1 of Chapter 2.
b. Set the project information, project location, and browser organization.
c. Modify existing levels and add new levels.
d. Add grid lines.
e. Save the project using the **Save As** tool.
f. Close the project using the **Close** tool.

Opening an Existing Project

In this section, you will open the project file created in Tutorial 1 of Chapter 2.

1. To open the project file, choose **Open > Project** from the **Application Menu**; the **Open** dialog box is displayed.

2. In this dialog box, browse to *C:\rst_2017\c02_rst_2017_tut* folder and then choose the *c02_Commercial-Complex_tut1.rvt* (for Imperial) or *M_c02_Commercial-Complex_tut1.rvt* (for Metric) project file. You can also download this file from *http://www.cadcim.com*. The path of the file is as follows: *Textbooks > Civil/GIS > Revit Structure > Exploring Autodesk Revit 2017 for Structure*

3. Choose the **Open** button from the **Open** dialog box to open the selected project file.

Setting the Project Information

In this section, you will add project information to the opened file. Further, you will define a parameter for the project information and add it to the project information of the project file.

1. To set the project information for the project, choose the **Project Information** tool from the **Settings** panel of the **Manage** tab; the **Project Information** dialog box is displayed.

2. In this dialog box, specify the project parameters as follows:

Parameter	Value
Project Issue Date	**01/01/2016**
Project Status	**Started**
Client Name	**Tickoo Institute of Emerging Technologies**
Project Address	**525, Andrews Drive Schererville**
Project Name	**Commercial Complex**
Project Number	**TIET/02/16**

3. In the **Project Information** dialog box, choose the **OK** button; the dialog box closes and the project parameters are saved in the project file.

4. Next, you need to create an additional instance parameter for the project information. To do so, choose the **Project Parameters** tool from the **Settings** panel of the **Manage** tab; the **Project Parameters** dialog box is displayed.

5. Choose the **Add** button from the **Project Parameters** dialog box; the **Parameter Properties** dialog box is displayed.

6. In the **Parameter Properties** dialog box, scroll the list in the **Categories** area and then select the **Project Information** check box.

7. In the **Parameter Data** area, ensure that the **Instance** radio button is selected. Now, enter the name **Project Engineer** in the **Name** edit box in the **Parameter Data** area.

8. Next, select the **Common** option from the **Discipline** drop-down list, if it is not selected by default.

9. Select the **Text** and the **Other** options from the **Type of Parameter** and **Group parameter under** drop-down lists, respectively.

10. Choose the **OK** button in the **Parameter Properties** dialog box; the **Project Parameters** dialog box is displayed, as shown in Figure 3-41.

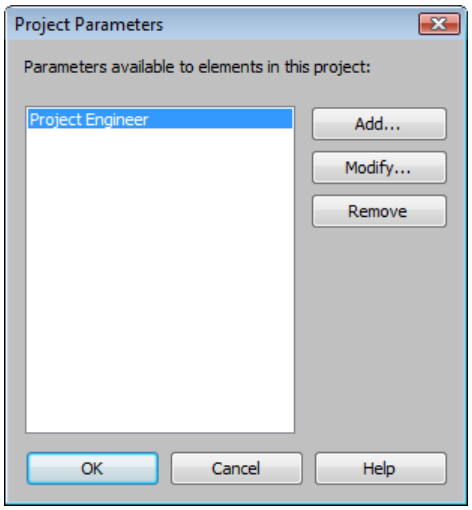


Figure 3-41 *The* ***Project Parameters*** *dialog box*

11. Choose the **OK** button; the **Project Parameters** dialog box is closed.

12. To enter the value for the new parameter, choose the **Project Information** tool from the **Settings** panel of the **Manage** tab; the **Project Information** dialog box is displayed.

13. In this dialog box, click in the **Value** field corresponding to the **Project Engineer** parameter and enter **Sham Tickoo**.

14. Next, choose the **OK** button; the **Project Information** dialog box closes and the value for the newly added parameter is saved in the project file.

Setting the Project Location

In this section, you will specify the geographical location of the project.

1. To specify the geographical location of the project, invoke the **Location** tool from the **Project Location** panel of the **Manage** tab; the **Location Weather and Site** dialog box is displayed.

2. In the **Location Weather and Site** dialog box, choose the **Site** tab and then the **Duplicate** button; the **Name** dialog box is displayed.

3. Enter **TIET-IN** in the **Name** edit box and then choose the **OK** button; the **Name** dialog box closes and the name entered is displayed and highlighted in the **Sites defined in this project** list box of the **Location Weather and Site** dialog box, refer to Figure 3-42.

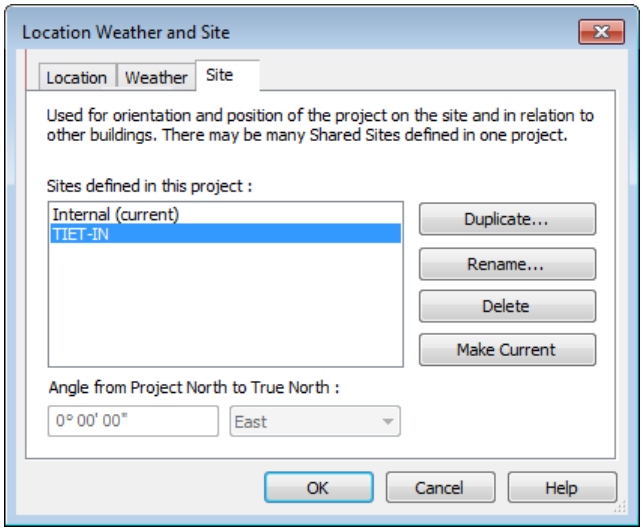


***Figure 3-42 TIET-IN** option selected in the **Sites defined in this project** list box of the **Site** tab*

4. Next, choose the **Location** tab in the **Location Weather and Site** dialog box; the options in this tab are displayed.

5. Select the **Default City List** option from the **Define Location by** drop-down list.

6. Next, select the **Indianapolis, IN** option from the **City** drop-down list.

7. Next, select the **Use Daylight Saving time** check box and then choose the **OK** button; the dialog box closes and the settings for the project location are saved in the project file.

Setting the Browser Organization

In this section, you will specify the settings for customizing the **Project Browser** displayed in the drawing area of the project.

1. To customize the **Project Browser**, choose the **Browser Organization** tool from **View > Windows > User Interface** drop-down; the **Browser Organization** dialog box is displayed.

2. Ensure that the **Views** tab is chosen, and then select the **Discipline** check box in this tab.

3. Next, choose the **Sheets** tab in the **Browser Organization** dialog box; the options in this tab are displayed.

4. In this dialog box, select the **Issue Date** check box.

5. Now to apply the modified settings, choose **Apply** and then **OK** from the **Browser Organization** dialog box; the modified settings are applied to the **Project Browser** and the **Browser Organization** dialog box is closed.

Modifying the Existing Levels

In this section, you will modify the existing levels in the project file. To do so, you need to select an elevation view from the **Project Browser** and then use the **Level** tool.

1. Before modifying the levels, move the cursor to the **Project Browser** and expand the Structural head and then the **Elevations (Building Elevation)** node. Now, double-click on the **North** node; the current view is changed to the North elevation view.

Note

*In the north elevation view, make sure that the **Hidden Line** option is chosen for the **Visual Style** in the **View Control Bar**.*

2. Next, zoom in the drawing area to make the text on the level lines visible. Click on the **Level 1** level line and move the cursor over the text **Level 1**; the text is highlighted.

3. Click on the text; an edit box is displayed.

4. Enter **Below Grade** in the edit box and press ENTER; the **Revit** message box is displayed. This message box prompts you to confirm whether or not to rename the corresponding view of the selected level.

5. Choose the **Yes** button; the name of the level changes in the **Project Browser**. Also, notice that the name of the view corresponding to the changed level has been changed under the **Structural Plans** head in the **Project Browser**.

6. Next, move the cursor over the elevation value of the **Below Grade** level; the elevation value is highlighted.

7. Click on the highlighted elevation value; an edit box is displayed.

8. Enter value in the edit box as given below:

   For Imperial **-4’ 0”**
   For Metric **-1219 mm**

   Press ENTER and then press ESC to exit from the modification controls.

9. Repeat the procedure followed in steps 2 through 7 to rename the **Level 2** level to **Entry** and modify its elevation as given below:

   For Imperial **0’0”**.
   For Metric **0** mm.

10. Next, right-click in the drawing area; a shortcut menu is displayed.

11. Choose the **Zoom To Fit** option from the shortcut menu; the extents of the level lines are displayed in the drawing area.

12. Next, select the **Below Grade** level line and then place the cursor over the grid length control displayed on the left.

13. Press the left mouse button and drag the mouse to the right; the level lines move along the cursor.

14. Click in the drawing area when the length of the level line reduces to half of their existing length.

15. Press ESC to exit from the edit controls.

16. Next, right-click in the drawing area and then choose **Zoom To Fit** from the shortcut menu; the current view fits the extent of the length of level lines.

Adding New Levels

In this section, you will add new levels to the project file using the **Level** tool.

1. To add a new level, choose the **Level** tool from the **Datum** panel of the **Structure** tab; the **Modify | Place Level** tab is displayed. Alternatively, you can press LL to activate the **Level** tool.

2. Move the cursor near the left endpoint of the **Entry** level line, and when the alignment line appears, type value in the edit box displayed as given below:
   For Imperial **12'6"**, refer to Figure 3-43.
   For Metric **3810 mm**
   Press ENTER.

3. Next, move the cursor toward the right side until the alignment line appears above the **Entry** level bubble and then click to complete the level line, as shown in Figure 3-44. A new level line is created, displaying the level name as **Level 3** and the elevation as **12'6"** for imperial and for metric the elevation is **3810** .

Figure 3-43 *Specifying the distance of the new level line*

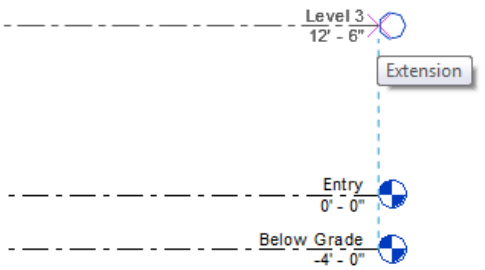


Figure 3-44 *Creating the new level line using the alignment line*

4. Without exiting the **Level** tool, repeat steps 2 and 3 to create a level line with the name **Level 4** at a distance from the **Level 3** level line as given below:
   For Imperial **12'6"**
   For Metric **3810**
   Note that the elevation of the **Level 4** level line is displayed as shown below:
   For Imperial **25' 0"**
   For Metric **7620**

5. Press ESC twice to exit from the **Level** tool.

6. Select the **Level 3** level line; the properties of the selected level line are displayed in the **Properties** palette.

7. In the **Properties** palette, click in the value field corresponding to the **Name** parameter and replace the existing name **Level 3** with **Second Floor**.

8. Choose the **Apply** button in this palette; the **Revit** message box is displayed.

9. In the **Revit** message box, choose the **Yes** button; the name of the level line **Level 3** changes to **Second Floor**. Also, notice that the name of the corresponding view in the **Project Browser** has changed to the new name.

10. Next, to rename the **Level 4** level view, select it from the drawing area; the properties of the selected level are displayed in the **Properties** palette.

11. Repeat steps 7 to 9 and rename **Level 4** to **Roof**.

12. Press ESC to exit from the tool.

13. Choose the **Level 1 - Analytical** option from the **Structural Plans** subhead in the Project Browser.

Note

*The **Structural Plans** head is a subhead in the **Structural** head of the **Views (Discipline)** hierarchy in the **Project Browser**.*

14. Right-click and then choose **Delete** from the displayed shortcut menu; the selected view name is deleted from the **Project Browser**.

15. Repeat steps 13 and 14 to delete the **Level 2- Analytical** option from the **Structural Plans** head.

Adding Grid Lines

In this section, you will add grids to the structural project. To add grids, you need to change the current view to the **Entry** level structural plan and then use the **Grid** tool.

1. Double-click on **Entry** from the **Structural Plans** head in the **Project Browser**; the **Entry** structural plan view will be displayed in the drawing area.

2. Invoke the **Grid** tool from the **Datum** panel of the **Structure** tab; the **Modify | Place Grid** tab is displayed.

3. In this tab, ensure that the **Line** tool is invoked from the **Draw** panel. Next, move the cursor toward the lower left corner of the drawing area and then click to specify the start point of the first grid line; a grid line with temporary dimensions for angle emerges, refer to Figure 3-45 for location.

4. Move the cursor vertically up (at an angle of 90° from the horizontal plane) and click when it reaches near the **North** elevation arrow, refer to Figure 3-46 for location.

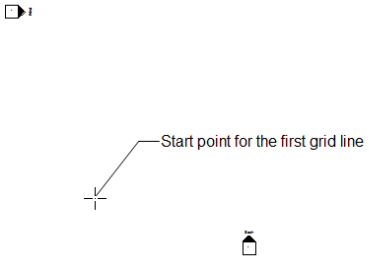


Figure 3-45 *Specifying the start point of the first grid line*

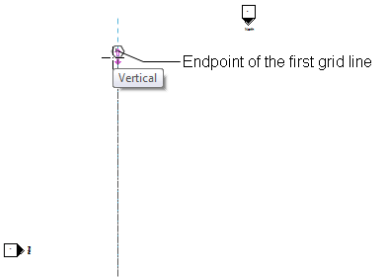


Figure 3-46 *Specifying the endpoint of the first grid line*

5. Now, move the cursor downward and position it near the right side of the endpoint of the grid line created previously, as shown in Figure 3-47.

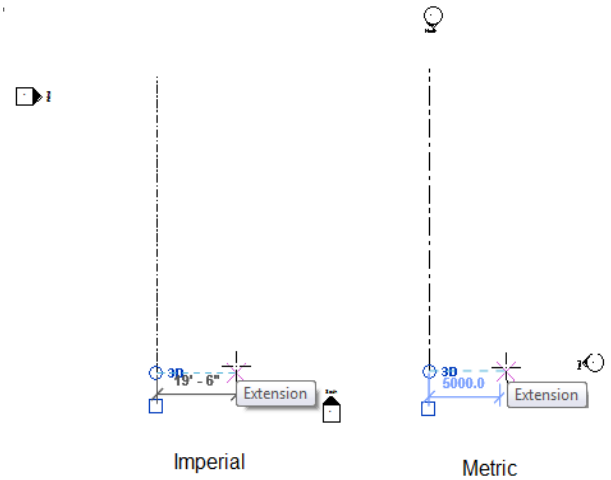


Figure 3-47 *Specifying the start point of the second vertical grid line*

6. As you place the temporary dimension near the endpoint, a temporary dimension appears with an extension line and the **Extension** snap. Enter value as given below:

   For Imperial **10'**
   For Metric **3048**

   Press ENTER; the second grid line starts at a distance of entered value from the start point of the first grid line.

7. Move the cursor vertically up and place it near the bubble of the first grid line.

8. Click when the **Vertical and Extension** snap is displayed; the second grid line is created.

9. Repeat steps 5 to 8 to create five more vertical grids with the distance specified in Figure 3-48.

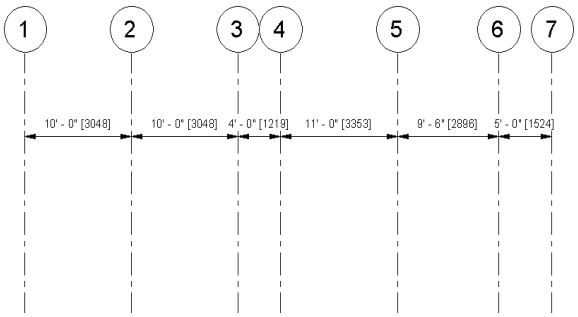


Figure 3-48 *Distance between the vertical grid lines*

10. After creating all the vertical grids, press ESC twice to exit the **Grid** tool.

11. To rename grids, select the vertical grid line marked **4**. Now, place the cursor over the text in the grid bubble of the selected grid line and click; an edit box is displayed, as shown in Figure 3-49.

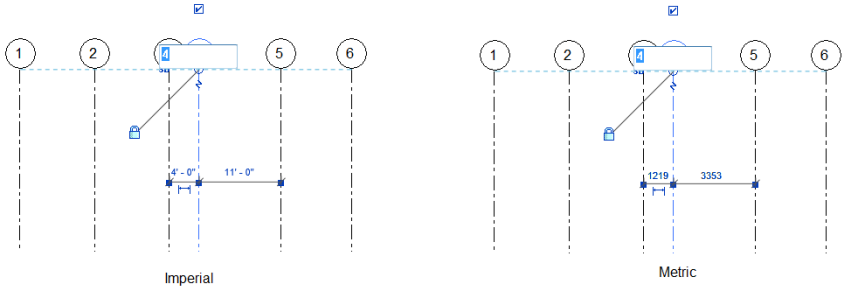


Figure 3-49 *Renaming the grid line using the edit box*

12. Enter **3.1** in the edit box and press ENTER; the selected grid line is renamed.

Note

While renumbering the grid line, you can use the ***Zoom in Region*** *and* ***Zoom Out(2x)*** *tools to view the grid numbers easily.*

13. Without exiting the editing mode, select the next grid marked **5** and then move the cursor over its grid bubble and click to display the edit box.

14. Enter **4** in the edit box and press ENTER to rename the selected line.

15. Repeat steps 11 and 12 to rename the grid lines marked **6** and **7** to **5** and **5.1**, respectively, as shown in Figure 3-50.

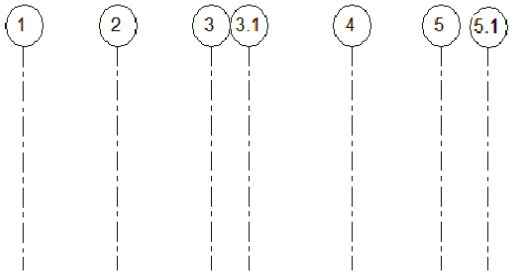


Figure 3-50 *The display of vertical grids after they are renumbered*

16. After renumbering all required vertical grids displayed in the drawing, press ESC to exit the editing mode.

17. To add horizontal grids, invoke the **Grid** tool from the **Datum** panel of the **Structure** tab.

18. Next, move the cursor toward the top right of the vertical grid line marked **5.1** and click at the location shown in Figure 3-51.

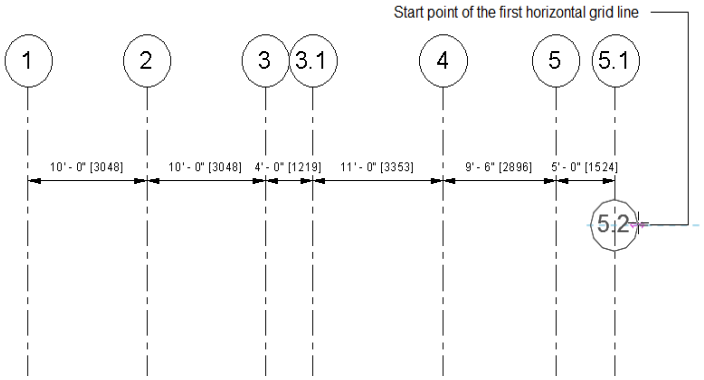


Figure 3-51 *The location of the start point of the first horizontal grid line*

19. Move the cursor horizontally toward the left until it has crossed the vertical grid line marked **1**. Click in the drawing area to create the first horizontal grid line, as shown in Figure 3-52.

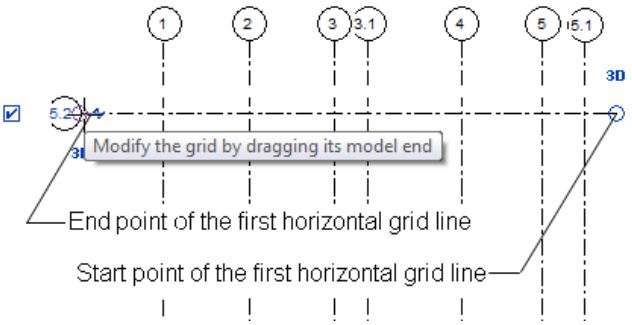


Figure 3-52 *The location of the start point and endpoint of the first horizontal grid line*

20. Move the cursor below the grid line alignment control of the start point of the first horizontal grid line (grid line created previously); an alignment line with a temporary dimension is displayed.

21. Type **8'** (or **2438 mm** for Metric); an edit box is displayed with the entered value. Press ENTER; the second horizontal grid line will start below the start point of the first horizontal grid line at a distance of **8'** (or **2438** mm in Metric) from it.

22. Move the cursor horizontally toward the left and place it below the grid bubble (marked **5.2**) of the first horizontal grid line when the alignment line appears.

23. Click when the **Horizontal and Extension** snap appears; the second horizontal grid line is created.

24. Repeat steps 20 to 23 to create the rest of horizontal grid lines and to rename them, refer to Figures 3-53 and 3-54.

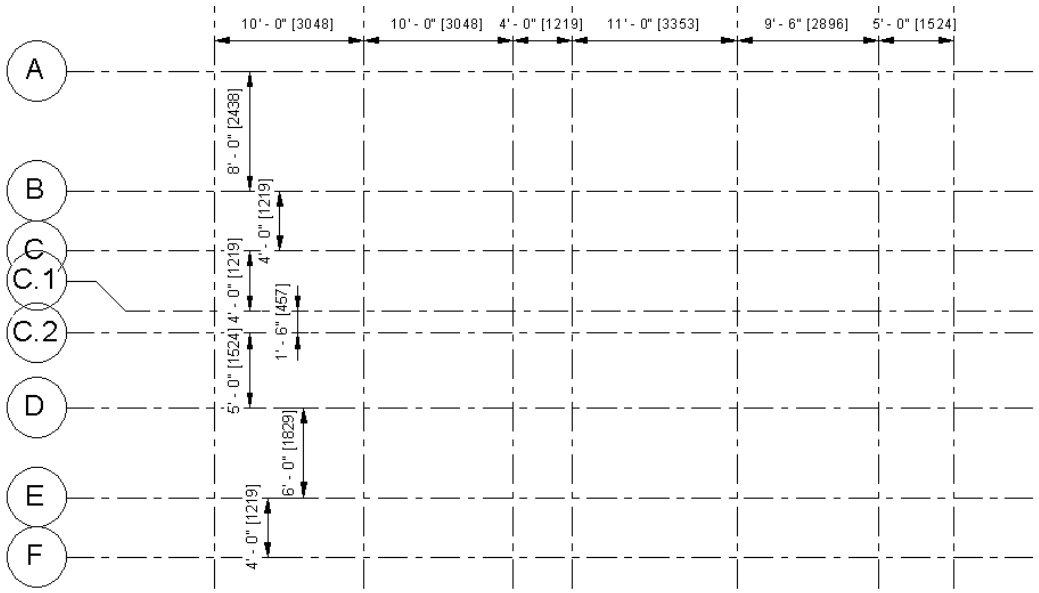


Figure 3-53 *The horizontal grid lines to be created with the specified names and distances*

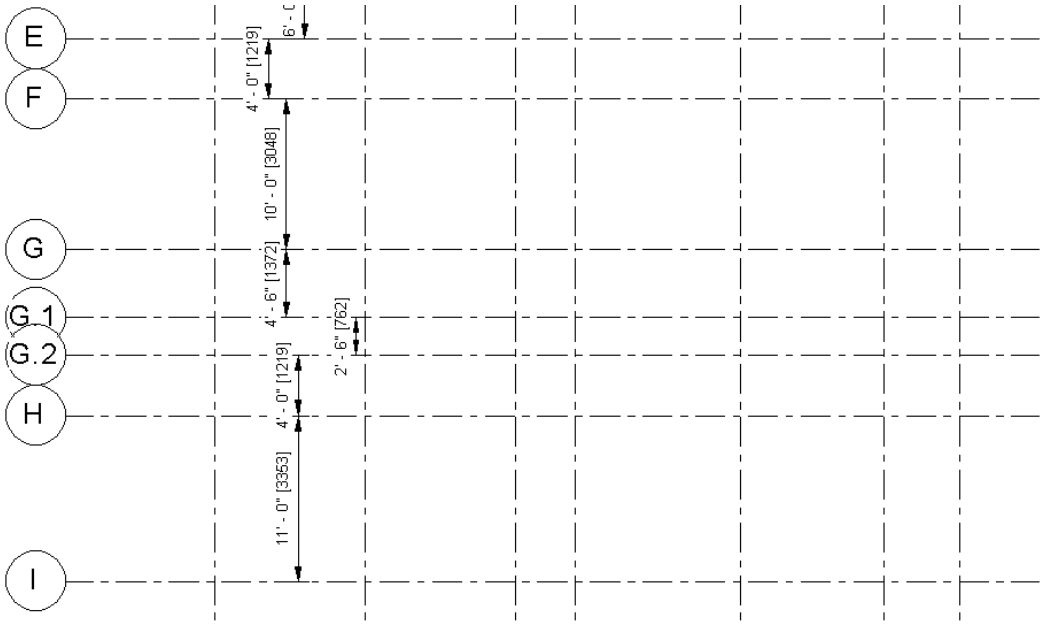


Figure 3-54 *The remaining horizontal grid lines in continuation of Figure 3-53*

Note

*To create the remaining horizontal grids from grid **B** to grid **I** refer to Figures 3-53 and 3-54. Note that both these figures are part of a single grid plan view. Figure 3-54 is in continuation with Figure 3-53 and is displayed separately to show the grid dimensions clearly. Further, the horizontal grids will be renamed using the same method used for vertical grids.*

Saving the Project

In this section, you will save the project file by using the **Save As** tool.

1. To save the project, choose the **Save As > Project** option from the **Application Menu**. On doing so, the **Save As** dialog box is displayed.

2. In this dialog box, browse to the C:*rst_2017* location and create a folder with name *c03_rst_2017_tut*. Now, open the *c03_rst_2017_tut* folder and enter **c03_Commercial-Complex_tut1** (for Imperial) **or M_c03_Commercial-Complex_tut1** (for Metric) in the **File name** edit box.

3. Choose the **Save** button; the **Save As** dialog box closes and the project file is saved.

Closing the Project

1. To close the project, choose the **Close** option from the **Application Menu**.

   The file is closed and this completes Tutorial 1 of Chapter 3.

Tutorial 2 Industrial Complex

In this tutorial, you will create various project settings such as project information, project location, and browser organization for the project created in the Tutorial 2 of Chapter 2. Further, you will add levels and grids to the project file. Use the following project specifications:

(Expected time: 1 hr 15 min)

1. Rename Level 1 and Level 2 as **Foundation Level** and **Entry**, respectively.

2. Specify the elevation of **Foundation Level** and **Entry** levels.
   For Imperial **-6’ 0”** and **0’ 0”**
   For Metric **-1829 mm** and **0 mm**

3. Levels to be added:
   For Imperial **Second Floor - Elevation 10’ 0”**
   Roof - Elevation 24’ 0”
   For Metric **Second Floor - Elevation 10’ 0”**
   Roof - Elevation 7315 mm

4. File name to be assigned:
   For Imperial *c03_Industrial-Complex_tut2.rvt*.
   For Metric *M_c03_Industrial-Complex_tut2.rvt*.

   The following steps are required to complete this tutorial:

a. Open the Tutorial 2 of Chapter 2.
b. Set project information and project location.
c. Modify existing levels and add new levels.
d. Add grid lines.
e. Resizing and renaming the grid lines.
f. Save the project using the **Save As** tool.
g. Close the project by using the **Close** tool.

Opening the Existing Project

In this section, you will open the project file created in the Tutorial 1 of Chapter 2.

1. To open the project file, choose **Open > Project** from the **Application Menu**; the **Open** dialog box is displayed.

2. In this dialog box, browse to *C:\rst_2017\c02_rst_2017_tut* folder and then choose the *c02_Industrial-Complex_tut2.rvt* (for Imperial) *or M_c02_Industrial-Complex_tut2.rvt* (for Metric) project file. You can also download this file from *http://www.cadcim.com*. The path to download this file is as follows: *Textbooks > Civil/GIS > Revit Structure > Exploring Autodesk Revit 2017 for Structure*.

3. Choose the **Open** button from the **Open** dialog box; the selected project file opens in the drawing window.

Setting the Project Information

In this section, you will add the project information to the industrial complex project file.

1. To set the project information, choose the **Project Information** tool from the **Settings** panel of the **Manage** tab; the **Project Information** dialog box is displayed.

2. In the **Project Information** dialog box, specify the project parameters as follows:

Parameter	Value
Project Issue Date	**01/01/2016**
Project Status	**Started**
Client Name	**CADCIM Technologies**
Project Address	**525, Andrews Drive Schereville**
Project Name	**Industrial Complex**
Project Number	**CIT/02/16**

3. Choose the **OK** button; the **Project Properties** dialog box closes and the project parameters are saved in the project file.

4. Next, create an additional instance parameter for the project information. To do so, choose the **Project Parameters** tool from the **Settings** panel in the **Manage** tab; the **Project Parameters** dialog box is displayed.

5. Choose the **Add** button from the dialog box; the **Parameter Properties** dialog box is displayed.

6. In this dialog box, scroll the list in the **Categories** area and then select the **Project Information** check box.

7. In the **Parameter Data** area of the **Parameter Properties** dialog box, enter **Project Manager** in the **Name** edit box.

8. Next, in the same area, ensure that the **Instance** radio button is selected and then ensure that the **Common** option is selected in the **Discipline** drop-down list.

9. Select the **Text** and **Other** options from the **Type of Parameter** and **Group parameter under** drop-down lists, respectively.

10. Next, choose the **OK** button from the **Parameter Properties** dialog box; the **Project Parameters** dialog box is displayed.

11. Choose the **OK** button from the **Project Parameter** dialog box; the dialog box closes.

12. To enter the value for the new parameter, choose the **Project Information** tool from the **Settings** panel of the **Manage** tab; the **Project Information** dialog box is displayed.

13. In this dialog box, click in the **Value** field corresponding to the **Project Manager** parameter and enter **Sham Tickoo**.

14. Now, choose the **OK** button; the **Project Information** dialog box closes and the value for the newly added parameter is saved in the project file.

Setting the Project Location

In this section, you will specify the geographical location of the project.

1. To specify the geographical location of the project, choose the **Location** tool from the **Project Location** panel of the **Manage** tab; the **Location Weather and Site** dialog box is displayed.

2. Ensure that the **Location** tab is chosen in this dialog box. Then, select the **Internet Mapping Service** option from the **Define Location by** drop-down list.

Note

*While selecting the **Internet Mapping Service** option from the **Define Location by** drop-down list, ensure that the internet is connected to your system. If the internet is not connected, a message box will be displayed below the **Project Address** edit box, informing that the connection could not be established to the Internet Mapping Service.*

3. In the **Project Address** edit box, delete the default text, and enter **Indianapolis IN**, and then choose the **Search** button; the desired location is displayed on the map in the area below the edit box. Note that the search uses the bing map service to display the location, refer to Figure 3-55.

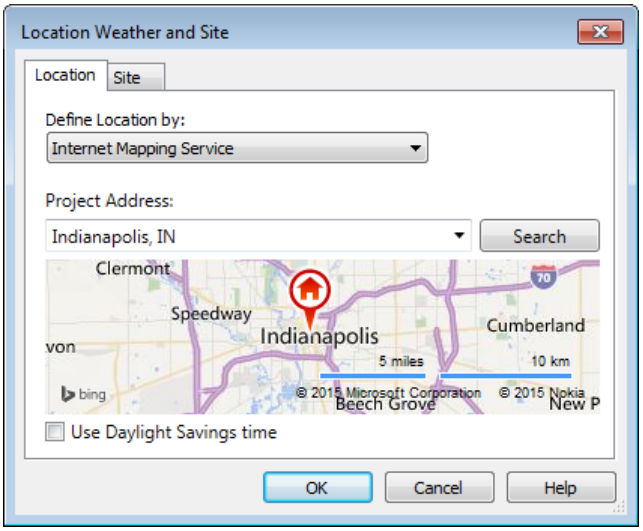


***Figure 3-55** The desired location displayed in the **Location Weather and Site** dialog box*

4. Next, choose the **Site** tab from the **Location Weather and Site** dialog box and then choose the **Duplicate** button; the **Name** dialog box is displayed.

5. Enter **CADCIM-IN** in the **Name** edit box and then choose the **OK** button; the **Name** dialog box closes and the name entered is displayed and highlighted in the **Sites defined in this project** list box.

6. Now, choose the **Make Current** button and then choose the **OK** button; the **Location Weather and Site** dialog box closes and the settings for the project location are saved in the project file.

Modifying the Existing Levels

In this section, you will modify the existing levels in the project file. To do so, you need to select an elevation view from the **Project Browser** and then use the **Level** tool.

1. Before modifying levels, move the cursor to the **Project Browser** and then double-click on the **South** option displayed under the **Elevation (Building Elevation)** head; the current view is changed to the **South** elevation view.

Note

*In the **South** elevation view, make sure that the **Hidden Line** option is chosen for the visual style in the **View Control Bar**.*

2. Next, zoom in the drawing area to make the text on the level lines visible. Click on the **Level 1** level line and move the cursor over the text **Level 1**; the text is highlighted.

3. Again, click on the text; an edit box is displayed.

4. Enter **Foundation Level** in the edit box and press ENTER; the **Revit** message box is displayed, prompting you to confirm whether or not to rename the corresponding view of the selected level.

5. In the **Revit** message box, choose the **Yes** button; the name of the level is changed. Also, notice that the name of the view corresponding to the level changes in the **Structural Plans** head of the **Project Browser**.

6. Next, move the cursor over the elevation value of the **Foundation Level** level; the elevation value gets highlighted.

7. Click on the highlighted elevation value; an edit box is displayed.

8. Enter value in the edit box as given below:

   For Imperial **-6’ 0”**
   For Metric **-1829 mm**

   Press ENTER and then press ESC to exit from the modification.

9. Repeat steps 2 to 8 to rename **Level 2** level to **Entry** and modify its elevation as given below:
   For Imperial **0’ 0”**
   For Metric **0 mm**

10. Next, right-click in the drawing area; a shortcut menu is displayed.

11. Choose the **Zoom to Fit** option from the shortcut menu; the extent of the level lines are displayed in the drawing area.

12. Next, select the **Foundation Level** level line and place the cursor over the grid length control displayed on the left.

13. Press and hold the left mouse button and drag the mouse to the right; the level lines move along the cursor.

14. Click in the drawing area when the length of the level line reduces to almost half of its existing length.

15. Next, press ESC to exit from the edit controls.

16. Right-click in the drawing area and then choose **Zoom to Fit** from the shortcut menu displayed; the current view fits the extent of the length of the level lines.

Adding New Levels

In this section, you will add two levels to the project file using the **Level** tool.

1. To add a new level, invoke the **Level** tool from the **Datum** panel of the **Structure** tab.

2. To create a nonstory level, clear the **Make Plan View** check box in the **Options Bar**.

3. Now, move the cursor near the left endpoint of the **Foundation Level** level line, and when the alignment line appears, enter the following values:
   For Imperial **6”**
   For Metric **152 mm**
   Press ENTER.

4. Move the cursor toward the right until the alignment line appears above and across the **Foundation Level** level bubble. Next, click to complete the level line. The new level line is created. It displays the level name as **Level 3** and the elevation as given below:
   For Imperial **-5’ 6”**
   For Metric **-1676 mm**

5. Without exiting the **Level** tool, select the **Make Plan View** check box in the **Options Bar**.

6. Move the cursor above the left endpoint of the **Entry** level line and when the alignment line appears, enter value as given below:
   For Imperial **10'**
   For Metric **3048 mm**
   Next, press ENTER.

7. Move the cursor toward the right till the alignment line appears above the **Entry** level bubble, and click to complete the level line. The new level line is created. It displays the level name as **Level 4** and the elevation.
   For Imperial **10' - 0"**
   For Metric **3048 mm**

8. Repeat steps 6 and 7 to create a level line with the default name **Level 5** at a distance of given distance from **Level 4**.
   For Imperial **14'**
   For Metric **4267 mm**
   Note that the elevation of the **Level 5** level line is displayed as:
   For Imperial **24' 0"**
   For Metric **7315 mm**

9. Next, press ESC twice to exit the **Level** tool.

10. Select the **Level 3** level line; the properties of the selected level line are displayed in the **Properties** palette.

11. In the **Properties** palette, click in the value field corresponding to the **Name** parameter and replace the existing name **Level 3** with **T.O.F**.

12. Choose the **Apply** button in the palette; the **Revit** message box is displayed

13. Choose the **Yes** button from the message box; the **Revit** message box closes and the name of the level line changes in the project view.

14. To rename the **Level 4** level, select it from the drawing area; the properties of the selected level are displayed in the **Properties** palette.

15. In the **Properties** palette, click in the value field corresponding to the **Name** parameter and replace the existing name **Level 4** with **Second Floor**.

16. Choose the **Apply** button in the palette; the **Revit** message box is displayed.

17. Choose the **Yes** button from the message box; the **Revit** message box closes. Notice that the name of the selected level line as well as its corresponding view name have been changed.

18. Repeat steps 13 to 16 and rename the **Level 5** to **Roof**.

19. Press ESC to exit the **Level** tool.

20. Now, move the cursor to the **Project Browser** and choose the **Level 1 - Analytical** option from the **Structural Plans** head.

21. Right-click and then choose **Delete** from the shortcut menu; the name of the selected view is deleted from the **Project Browser**.

22. Repeat steps 19 and 20 to delete the **Level 2 - Analytical** option from the **Structural Plans** head.

Adding Grid Lines

In this section, you will add grids to the project using the **Grid** tool.

1. To add grids, change the current view to the **Entry** structural plan view. To do so, double-click on **Entry** from the **Structural Plans** head in the **Project Browser**; the **Entry** structural plan view is displayed in the drawing area.

2. Invoke the **Grid** tool from the **Datum** panel of the **Structure** tab; the **Modify| Place Grid** tab is displayed.

3. Ensure that the **Line** tool is invoked from the list box in the **Draw** panel of this tab. Then, move the cursor toward the lower left corner of the drawing area (near the **South** elevation arrow) and click; a grid line emerges, as shown in Figure 3-56.

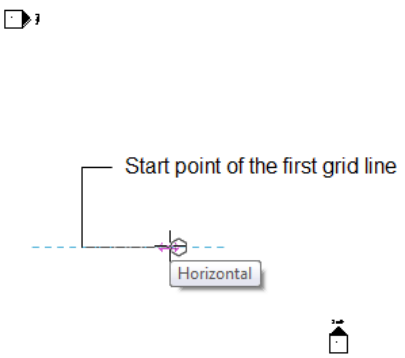


Figure 3-56 *The location for the start point of the first horizontal grid line*

4. Move the cursor horizontally to the right and click when it reaches a point below the **East** elevation arrow; refer to Figure 3-57 for location.

5. Next, right-click in the drawing area; a shortcut menu is displayed. Choose **Snap Overrides > Endpoints** from the shortcut menu.

6. Move the cursor near the left endpoint of the first grid (grid created earlier) and place the cursor on it until it (the first grid line) is highlighted and the **Endpoint** snap appears.

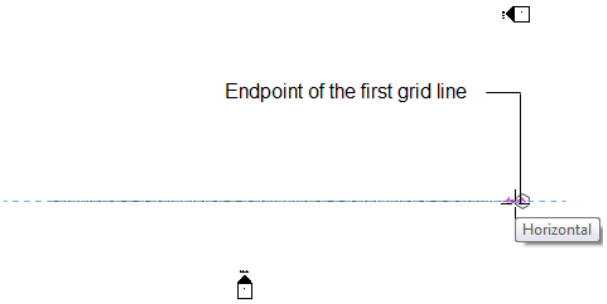


Figure 3-57 *The location for the endpoint of the first horizontal grid line*

7. Next, click as the **Endpoint** snap appears and the first grid line is highlighted; a grid line appears that displays the temporary dimension of its angle measured from the horizontal axis.

8. Next, move the cursor toward the right and above the grid bubble of the grid line created earlier.

9. Click when the temporary angular dimension displays **15.00°** and an alignment line appears from the endpoint of the previous grid line, refer to Figure 3-58.

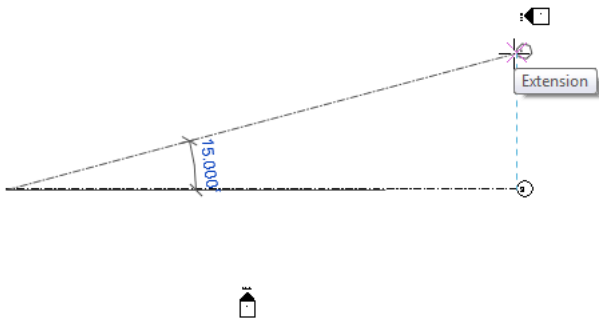


Figure 3-58 *The grid line displaying the angular dimension and an alignment line*

10. Repeat steps 5 to 9 to create the remaining five grid lines that emerge from the start point of the first grid line. The temporary dimensions that you will consider to create the five radial grids are : **30°**, **45°**, **60°**, **75°**, and **90°**, refer to Figure 3-59.

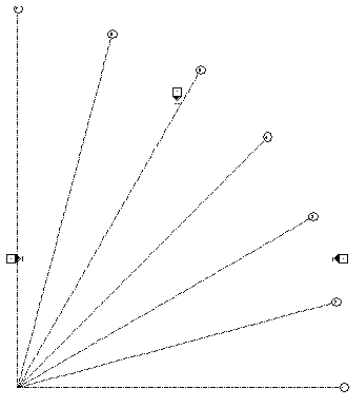


Figure 3-59 *The radial grid lines with varying angles*

Note

Whenever a grid is created, you need to use the ***Endpoints*** *snap override option to align the endpoint of each grid with the endpoint of the grid created earlier.*

11. Press ESC twice to exit the **Grid** tool.

12. Right-click in the drawing area and then choose **Zoom to Fit** from the shortcut menu.

13. Now, invoke the **Grid** tool from the **Datum** panel of the **Structure** tab.

14. Choose the **Center-ends Arc** tool from the list box in the **Draw** panel of the **Modify | Place Grid** tab.

15. Now move the cursor toward the start point of the first grid line and click when the **Endpoint** snap appears; a circle appears with temporary dimensions denoting its radius and the start angle of the arc with the first grid line.

16. Move the cursor vertically upward along the last grid line created (the vertical grid line).

17. When the linear temporary dimension displays **36'** (or 10973 mm in Metric) and the angular temporary dimension displays **90°**, enter **30'** (or 9144 mm in Metric) and press ENTER; a curved arc emerges and starts from a distance of **30'** (or 9144 mm in Metric) from the start point of the first grid line.

18. Move the cursor clockwise until it is placed below the first grid line and click when the first alignment line with the **Extension** snap emerges from the start point of the first grid line.

19. Now, repeat steps 15 to 18 to create a curved grid line with a radial distance of **50'** (or **15240 mm** in Metric) from the start point of the first grid, refer to Figure 3-60.

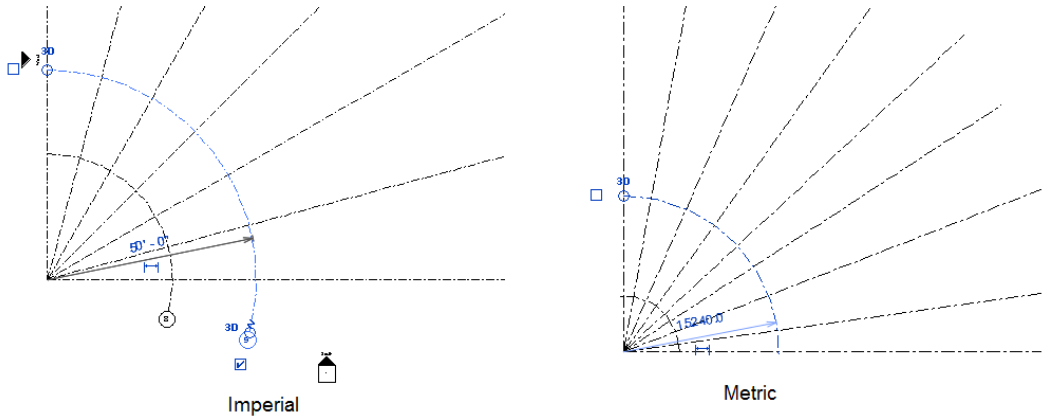


Figure 3-60 *The curved grid lines created*

20. Next, press ESC to exit the **Grid** tool.

21. To complete the grid pattern for the project, invoke the **Grid** tool and use the **Line** tool from the list box in the **Draw** panel of the **Modify |Place Grid** tab, to create the remaining grids with the specified distance, as shown in Figure 3-61.

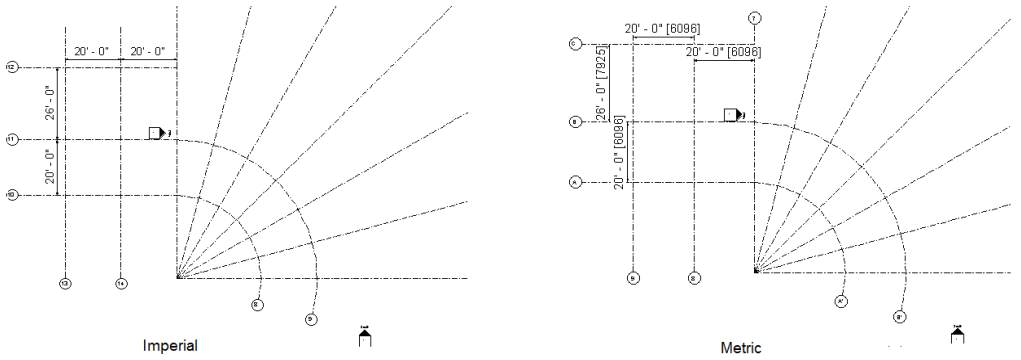


Figure 3-61 *The dimensions of the remaining grid lines*

Resizing the Grid Lines

In this section, you will resize the grids using the drag controls.

1. To start resizing, select the first grid line of the project and then move the cursor toward its endpoint near the grid bubble, as shown in Figure 3-62.

2. Now, press and drag the cursor toward the left and release the mouse when the cursor along with the grid endpoint reaches to the location shown in Figure 3-63.

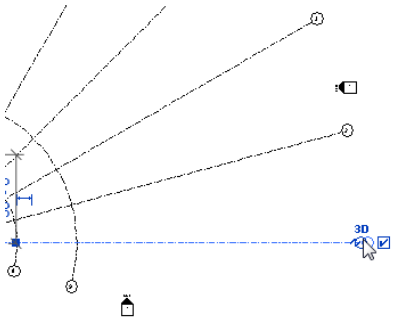


Figure 3-62 Moving the cursor toward the endpoint

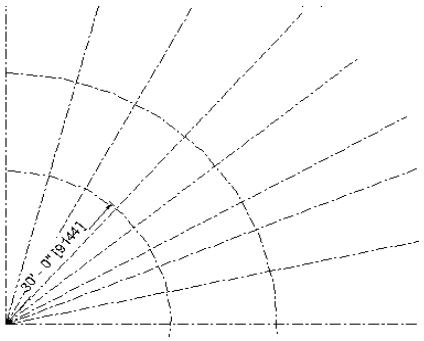


Figure 3-63 Dragging the grid endpoint to resize

3. Press ESC to exit from the editing mode.

4. Select the other grids individually and repeat steps 1 to 4 to resize all the grids in the project view.

Note

While resizing the grids, you can align them in reference to their previous grids with the help of the alignment control.

Renaming Grids

In this section, you will rename all grids created in the previous section.

1. To rename grids, select the curved grid, as shown in Figure 3-64.

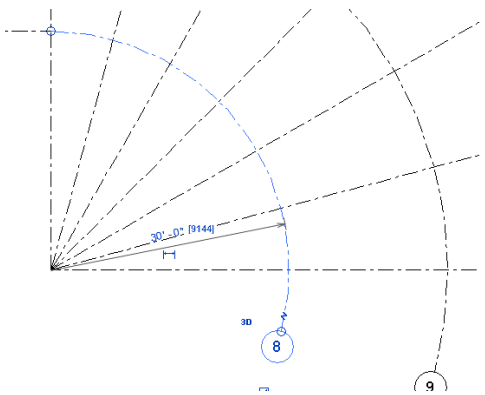


Figure 3-64 Selecting the curved line to rename

2. Move the cursor over the grid bubble of the selected grid and click; an edit box is displayed. Enter **A'** in the displayed edit box and press ENTER. The selected curved grid is renamed.

3. Press ESC to exit the editing mode.

4. To rename all the grids in the project, select them individually and repeat steps 2 and 3. Refer to Figure 3-65 for new names of the grids.

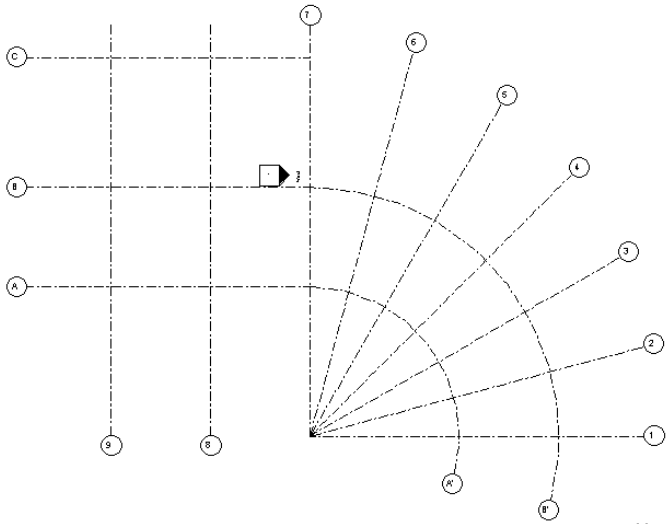


Figure 3-65 *The grid lines with new names*

Saving the Project

In this section, you will save the project file using the **Save As** tool.

1. Choose **Save As > Project** option from the **Application Menu**; the **Save As** dialog box is displayed.

2. In this dialog box, browse to the *C:\rst_2017\c03_rst_2017_tut* location and enter **c03_Industrial-Complex_tut2** (for Imperial) or **M_c03_Industrial-Complex_tut2** (for Metric) in the **File name** edit box.

3. Now, choose the **Save** button; the **Save As** dialog box closes and the project file is saved.

Closing the Project

1. Choose the **Close** option from **Application Menu**.

   The file is closed and this completes Tutorial 2 of Chapter 3.

Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. _____ is the default template file in Autodesk Revit 2017.

2. To define the geographical location of a project, you need to invoke the _____ tool from the **Manage** tab.

3. To transfer project standards from the source file to the target file, you need to invoke the _____tool from the **Manage** tab.

4. You can use the _____tool to manage the **Project Browser**.

5. In a grid line, you can create a gap between two end segments by setting the_____ parameter in the **Type Properties** dialog box to **None**.

6. You can use the_____option in the **Options Bar** to create a grid line that starts at a specified offset distance from a point defined in the drawing area.

7. _____can be used as datum planes to act as guideline for creating elements.

8. The visibility of a work plane grid can be controlled by using the _____tool from the **Work Plane** panel of the **Structure** tab.

9. In Revit, you can include project information to the schedules of linked models. (T/F)

10. The visibility of level bubble on either sides of a level line cannot be controlled. (T/F)

11. To add the name of the author in a project, you need to invoke the _____ tool from the **Manage** tab.

Review Questions

Answer the following questions:

1. The visibility of datum elements can be controlled by using the_____ tool.

2. The **Project Browser** displays the _____ folder, which contains the element families loaded into the project file.

3. To create browser organization for sheets, choose the _____ tab from the **Browser Organization** dialog box.

4. To add levels to a project view, you need to invoke the **Level** tool from the _____ panel.

5. You can use the_____tool to create curved grids.

6. To make a hidden level line visible, choose _____from the **View Control Bar**.

7. A _____level does not hold any plan view but acts as a host for placing objects and information.

8. You can clear the _____check box in the **Options Bar** of the **Modify | Place Level** tab to create a nonstory level.

9. You cannot copy project standards from a project to the current project. (T/F)

10. A work plane can be horizontal, vertical, or inclined at any specified angle. (T/F)

EXCERCISES

Exercise 1 Academic Institution

In this exercise, you will create project information for the project created in the Exercise 1 of Chapter 2. Further, you will add levels and grids to the project file. Refer to Figure 3-66 for grid dimensions and names. Use the following project specifications:

(Expected time: 1 hr 15 min)

1. Project file to be used:
   For Imperial *c02_Academic-Institution_exer1.rvt.*
   For Metric *M_ c02_Academic-Institution_exer1.rvt.*

2. Rename Level 1 and Level 2 as **Foundation Level** and **Entry**, respectively.

3. Specify the elevation of **Foundation Level** and **Entry** levels as:
   For Imperial **-5'6" 0"** and **0' 0"**.
   For Metric **-1676 mm** and **0 mm**, respectively.

4. Story levels to be added:
   For Imperial **Second Floor - Elevation 12' 6"**
   Roof - Elevation 25' 0"
   For Metric **Second Floor - Elevation 3810 mm**
   Roof - Elevation 7620 mm

5. Nonstory level to be added:
   For Imperial **T.O.F- Elevation -5'**
   For Metric **T.O.F- Elevation -1524 mm**

6. Project information to be added:

Project Issue Date	**01/01/2017**
Project Status	**Started**
Client Name	**CADCIM Technologies**
Project Address	**525, Andrews Drive Schereville**
Project Name	**Academic Institution**
Project Number	**AI/03/13**

7. Grids to be added to the **Entry** project view using the dimensions and names as shown in Figure 3-66.
8. File name to be assigned:
   For Imperial *c03_Academic-Institution_exer1.rvt.*
   For Metric *M_c03_Academic-Institution_exer1.rvt.*

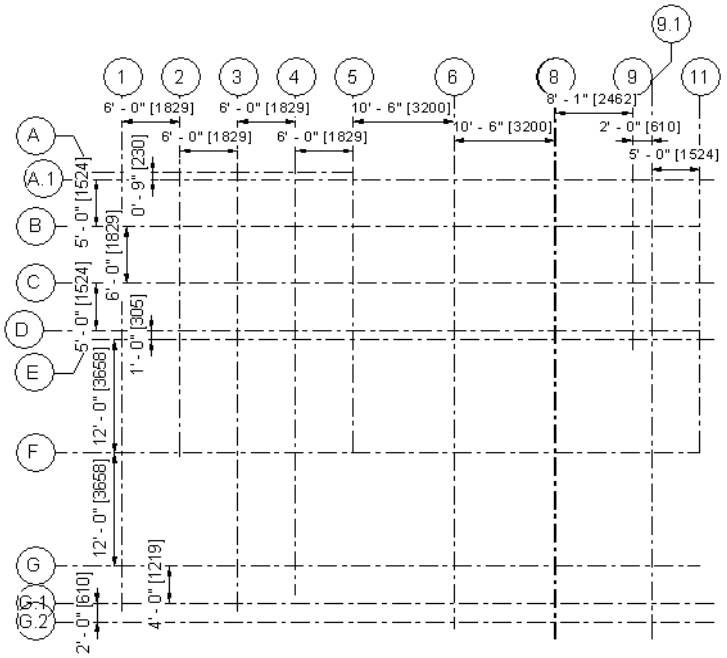


Figure 3-66 *The grid lines with new names for the Academic Institution structure*

Exercise 2 Factory Shed

In this exercise, you will add levels and grids to the project file created in Exercise 2 of Chapter 2. Refer to Figure 3-67 for grid dimensions and names. Use the following project specifications:

(Expected time: 1 hr 15 min)

1. Project file to be used:
   For Imperial *c02_Factory-Shed_exer2.rvt.*
   For Metric *M_c02_Factory-Shed_exer2.rvt.*

2. Rename Level 1 and Level 2 as **Below Ground** and **Plinth**, respectively.

3. Specify the elevation of **Below Ground** and **Plinth** levels.
   For Imperial **-2'0"** and **1'0"**, respectively
   For Metric **-610 mm** and **305 mm**

4. Story levels to be added:
   For Imperial **Second Floor - Elevation 14'**
   Roof - Elevation 24' 0"
   For Metric **Second Floor - Elevation 4200 mm**
   Roof - Elevation 7315 mm

5. Grids to be added in the **Plinth** project view using dimensions and names, as shown in Figure 3-67.

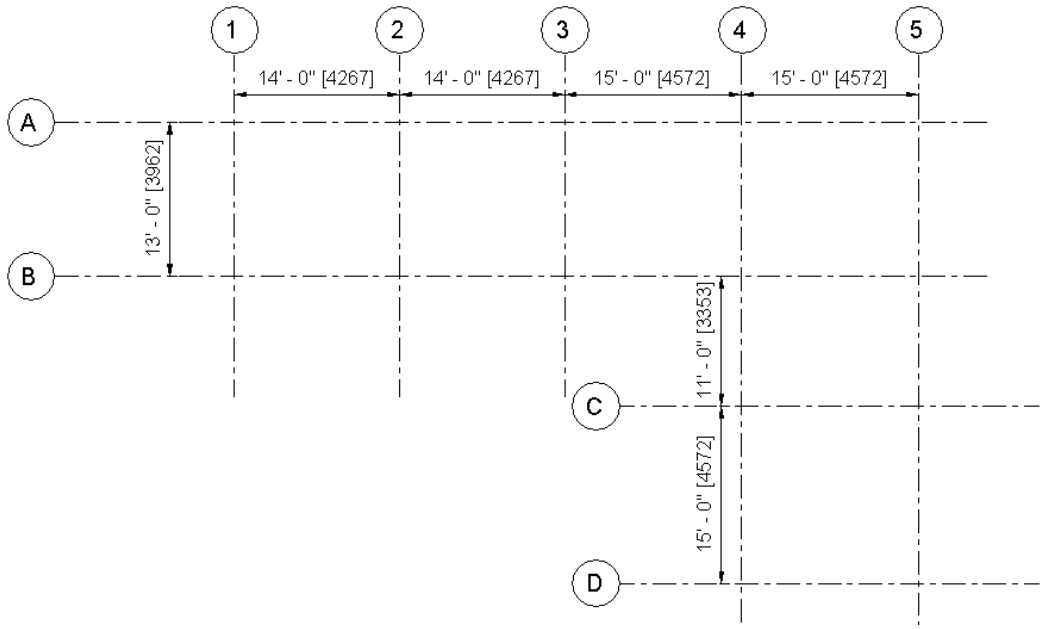


Figure 3-67 *The grid lines with new names for the Factory Shed structure*

6. File name to be assigned: *c03_Factory-Shed_exer2.rvt*.

Exercise 3 Residential Building

Download the *c03_Residential_Build_exer3* file from *http://www.cadcim.com*. The path of the file is as follows: *Textbooks > Civil/GIS > Revit Structure > Exploring Autodesk Revit 2017 for Structure*. In this exercise open the *c03_Residential_Build_exer3* file (for Imperial) and *M_c03_Residential_Build_exer3* file (for Metric) and add levels and grids to it. Refer to Figures 3-68, 3-69, and 3-70. Further, you will add project information to the project. Use the following specifications to complete the exercise: **(Expected time: 45 min)**

1. Rename Level 1 and Level 2 as **Subgrade** and **GL**, respectively.

2. Specify the elevation of **Subgrade** and **GL** levels.
   For Imperial **-4'6" 0"** and **0' 0"**.
   For Metric **-1372 mm** and **0 mm**

3. Story levels to be added: For Imperial **FL- Elevation 11'0"**
   TL- Elevation 19'-6"
   For Metric **FL- Elevation 3353 mm**
   TL- Elevation 5944 mm
4. Nonstory level to be added:
   For Imperial **T.O.F- Elevation -4'**
   For Metric **T.O.F- Elevation -1219 mm**

5. Project information to be added:

Project Issue Date		**01/01/2015**
Project Status		**Started**
Client Name		**CADCIM Technologies**
Structural Consultant		**CADCIM-Structural Engineers**
Mechanical Consultant		**Sham Tickoo**
Quantity Surveyors		**CADCIM-Quantity Surveyors**
Project Name		**Residential Building**
Documented Contract Commencement Date		**20/09/2015**
Documented Contract Completion Date		**31/07/2017**
Provisional Period Allowed in Contract		**30 Days**
Gross Area of the Project	For Imperial	**1200 sq. ft.**
	For Metric	**112 sq. meter**

6. File name to be assigned:

For Imperial *c03_Residential_Build_exer3_final.*
For Metric *M_ c03_Residential_Build_exer3_final.*

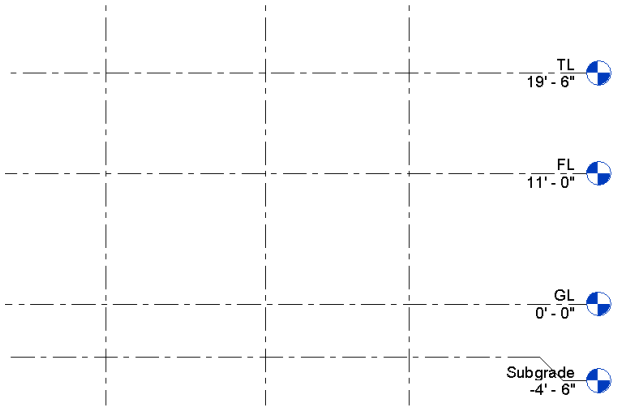


Figure 3-68 *Elevation of the project displaying the name of the levels and their respective elevations*

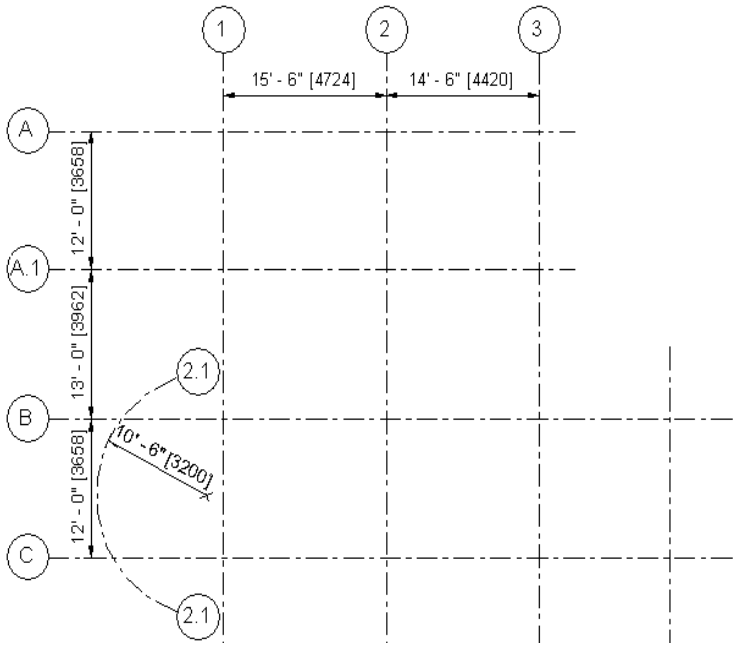


Figure 3-69 *The grid lines with the specified names and distances*

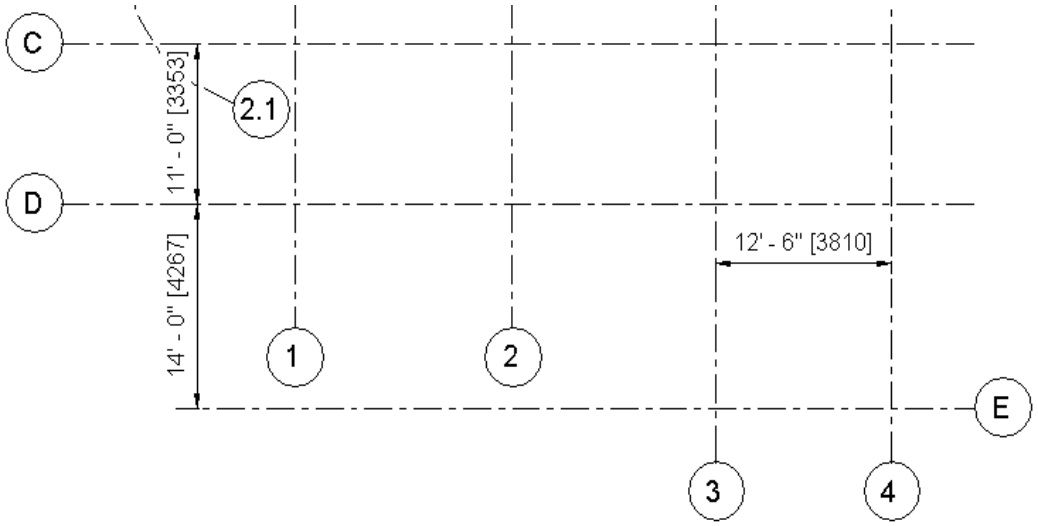


Figure 3-70 *The remaining grid lines in continuation of Figure 3-69*

Answers to Self-Evaluation Test

1. Structural Analysis-Default, **2. Location**, **3. Transfer Project Standards**, **4. Browser Organization**, **5. Center Segment**, **6. Offset**, **7. Reference Planes**, **8. Show**, **9.** T, **10.** F, **11. Project Parameters**