

# **Chapter 1**

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## ***Introduction to Autodesk Revit Architecture 2010***

### **Learning Objectives**

**After completing this chapter, you will be able to:**

- *Understand the basic concepts and principles of Revit Architecture 2010.*
- *Understand different terms used in Revit Architecture.*
- *Understand the parametric behavior of Revit Architecture.*
- *Start the Revit Architecture 2010 program.*
- *Learn about different components of the User Interface screen of Revit Architecture.*
- *Access Revit Architecture 2010 Help and Tutorials.*

## INTRODUCTION TO Autodesk Revit Architecture

Welcome to the realm of Autodesk Revit Architecture, a powerful building modeler that has changed the outlook of the building industry about computer aided designs. Autodesk Revit Architecture is a design and documentation platform that enables you to use a single, integrated building information model to conceptualize, design, and finally document a project. Its integrated parametric modeling technology is used to create the information model of a project, collect and coordinate information across all its representations. In Autodesk Revit Architecture, drawing sheets, 2D views, 3D views, and schedules are a direct representation of the same building information model. Using its parametric change engine, you can modify the design at any stage of a project. These changes are automatically made and represented in all views of a project, resulting in the development of better designs, along with an improved coordination. The use of Autodesk Revit Architecture provides a competitive advantage and a higher profitability to architects and building industry professionals.

## Autodesk Revit Architecture AS A BUILDING INFORMATION MODELER

The history of computer aided design and documentation dates back to the early 1980s when architects began using this technology for documenting their projects. Realizing its advantages, information sharing capabilities were developed, especially to share data with other consultants. This led to the development of object-based CAD systems in the early 1990s. Before the development of these systems, objects such as walls, doors, windows were stored as a non-graphical data with the assigned graphics. These systems arranged the information logically, but were unable to optimize its usage in a building project. Realizing the advantages of the solid modeling tools, the mechanical and manufacturing industry professionals began using the information modeling CAD technology. This technology enabled them to extract data based on the relationship between model elements.

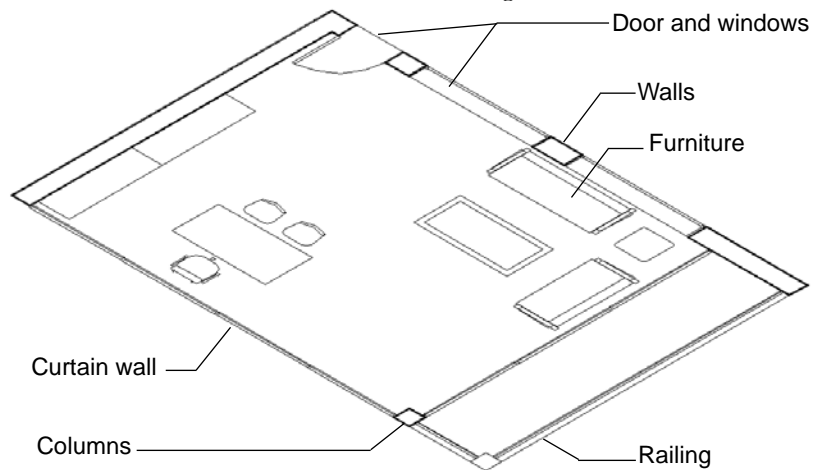
In 1997, a group of mechanical CAD technologists began working on a new software for the building industry. The Building Information Modeling (BIM) provided an alternative approach to building design, construction and management. This approach, however, required a suitable technology to implement and reap its benefits. In such a situation the use of parametric technology with the Building Information Modeling approach was envisaged as an ideal combination. They developed a software that was suitable for creating building projects. This led to the development of a software later came to be known as Autodesk Revit Building, and has now been changed to Autodesk Revit Architecture.

Autodesk Revit Architecture is a building design and documentation platform, in which a digital building model is created using the parametric elements such as walls, doors, windows, and so on. All building elements have inherent relationship with one another, which can be tracked, managed, and maintained by the computer.

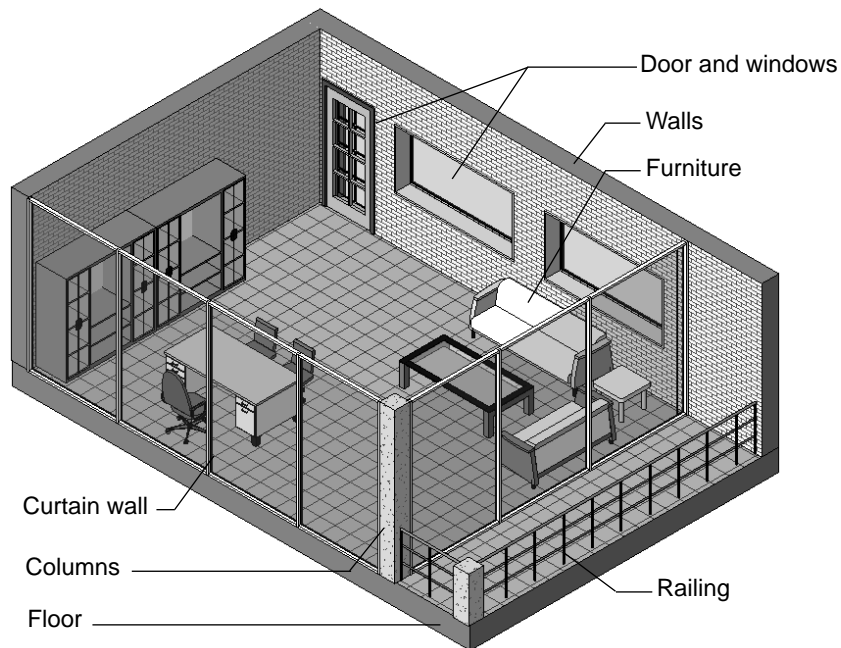
## BASIC CONCEPTS AND PRINCIPLES

Autodesk Revit Architecture enables you to envisage and develop a building model with actual 3D parametric building elements. It provides a new approach to the architectural thought and the implementation process. In a way, it replicates the way architects conceive a building. For

example, 2D CAD platforms mostly use lines to represent all elements, as shown in Figure 1-1. However, in Autodesk Revit Architecture, you can create a building model using 3D elements such as walls, floors, doors, and windows, as shown in Figure 1-2.



**Figure 1-1** CAD project created using 2D lines and curves



**Figure 1-2** Autodesk Revit Architecture project created using parametric building model

Using these 3D elements, you can visualize the architectural or interior project with respect to its scale, volume, and proportions. This enables you to study design alternatives and

develop superior quality design solutions. Autodesk Revit Architecture automates routine drafting and coordination tasks and assists in reducing errors in documentation. This, in turn, saves time, improves the speed of documentation, and lowers the cost for users.

## **Understanding the Parametric Building Modeling Technology**

A project in Autodesk Revit Architecture is created using the in-built parametric building elements. The term parametric refers to the relationship parameters between various building elements. Some relationships are made by Autodesk Revit Architecture itself, and others by the user. For example, doors, which have an inherent parametric relationship with walls, cannot be created without first creating a host wall. A door always moves with the host wall. Similarly, floors too are parametrically linked to walls. When you move walls, the floor extents are also modified automatically. Each building element has an in-built bidirectional associativity with many other elements in the project.

A building information model is created using different interdependent parametric building elements such as walls, floors, roof, ceiling, stairs, ramps, curtain walls, and so on. As they are bidirectionally associated elements, any change made in one element is automatically adopted by others. The integrated building information model thus created contains all data for a project. You can then create project presentation views such as plans, sections, elevations, and so on for documentation. As you modify the model while working in certain views, Autodesk Revit Architecture's parametric change engine automatically updates other views. This capability is, therefore, the underlying concept in Autodesk Revit Architecture.

Autodesk Revit Architecture's parametric change engine enables you to modify design elements at any stage of the project development. As changes are made immediately and automatically, it saves the time and effort of coordinating them in all other associated views, which, for most projects, is an inevitable part of the design process. Autodesk Revit Architecture's capability to coordinate between various aspects of the building design provides immense flexibility in the design and development process along with an error-free documentation.

Autodesk Revit Architecture also provides a variety of in-built parametric element libraries that can be selected and used to create a building model. It also provides you with the flexibility of modifying properties of these elements or create your own parametric elements, based on the project requirement.

## **Terms used in Autodesk Revit Architecture**

Before using Autodesk Revit Architecture, it is important to understand the basic terms used for creating a building model. Various terms in Autodesk Revit Architecture such as project, level, category, family, type, and instance are described next.

### **Autodesk Revit Architecture Project**

A project in Autodesk Revit Architecture is similar to an actual architectural or interior project. In an actual project, the entire documentation such as drawings, 3D views, specifications, schedules, cost estimates, and so on are inherently linked and read together. Similarly, in Autodesk Revit Architecture, a project not only includes the digital 3D building model but

also its parametrically associated documentation. Thus, all components such as the building model, its standard views, architectural drawings, and schedules combine together to form a complete project. A project file contains all project information such as building elements used in a project, drawing sheets, schedules, cost estimates, 3D views, renderings, walkthroughs, and so on. A project file also stores various settings such as environment, lighting, and so on. As data are stored in the same file, so it becomes easier for Autodesk Revit Architecture to coordinate the entire database.

## Levels in a Building Model

In Autodesk Revit Architecture, a building model is divided into different levels. These levels may be understood as infinite horizontal planes that act as hosts for different elements such as roof, floor, ceiling, and so on. The defined levels in a building model can, in most cases, relate to different floor levels, or stories of the building project. Each element that you create belongs to a particular level.

## Subdivisions of Elements into Categories and Subcategories

Apart from building elements, an Autodesk Revit Architecture project also contains other associated elements such as annotations, imported files, links, and so on. These elements have been divided into the following categories:

<b>Model Category</b>	: Consist of various building elements used in creating a building model such as wall, floor, ceiling, roof, door, window, furniture, stairs, curtain systems, ramps, and so on
<b>Annotation Category</b>	: Consist of annotations such as dimensions, text notes, tags, symbols, and so on
<b>Datum Category</b>	: Consist of datums such as levels, grids, reference planes, and so on
<b>View Category</b>	: Consist of interactive project views such as floor plans, ceiling plans, elevations, sections, 3D views, renderings, and walkthroughs

In addition to these four categories, other categories such as **Imported**, **Workset**, **Filter**, and **Revit Categories** can also exist, if the project has imported files, enabled worksets, or linked Autodesk Revit Architecture projects, respectively.

## Families in Autodesk Revit Architecture

Another powerful concept in Autodesk Revit Architecture is family. A family is described as a set of elements of the same category that can be grouped together based on certain common parameters or characteristics. Elements of the same family may have different properties, but they all have common characteristics. For example, **Double Hung** is a single window family, but it contains different sizes of double hung windows. Family files have a *.rfa* extension. You can load additional building component family from the libraries provided in Autodesk Revit Architecture package.

Families are further divided into certain types. Type or family type, as it is called, is a specific size or style of a family. For example, **Double Hung : 36” x 48”** is a window type. All uses of the same family type in a project have same properties. Family and family types can also be used to create new families using the **Family Editor**.

Instances are the actual usage of model elements in a building model or annotations in a drawing sheet. A family type, created in a new location, is identified as an instance of the family type. All instances of the same family type have same properties. Therefore, when you modify the properties of a family type, the properties of all its instances also get modified. The family categorization of Revit elements is given below:

- Model Category

:

Wall
- Family

:

Basic Wall
- Family type

:

Brick on Mtl. Studs
- Instance

:

Particular usage of a family type

The hierarchy of building elements in Autodesk Revit Architecture plays an important role in providing the flexibility and ease of managing a change in the building model. Figure 1-3 shows the hierarchy of categories and families in a typical Autodesk Revit Architecture project. The following is another example of the terms described in this section.

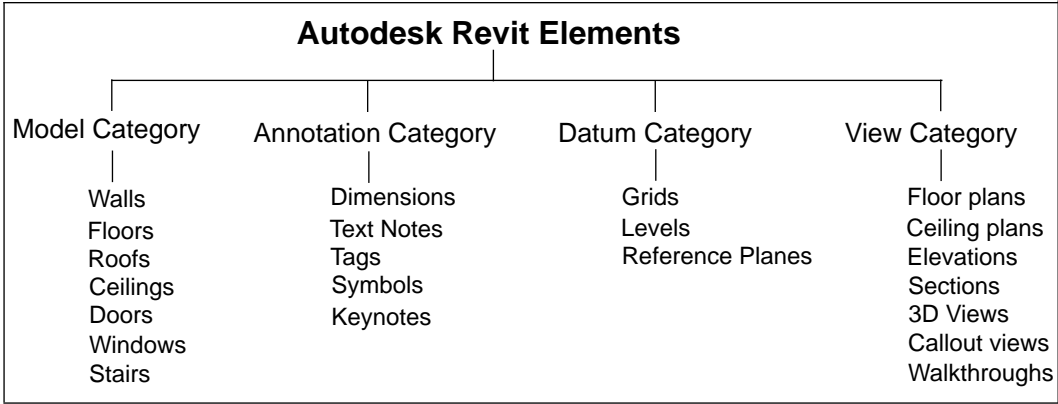


Figure 1-3 Hierarchy of Autodesk Revit Architecture categories and families

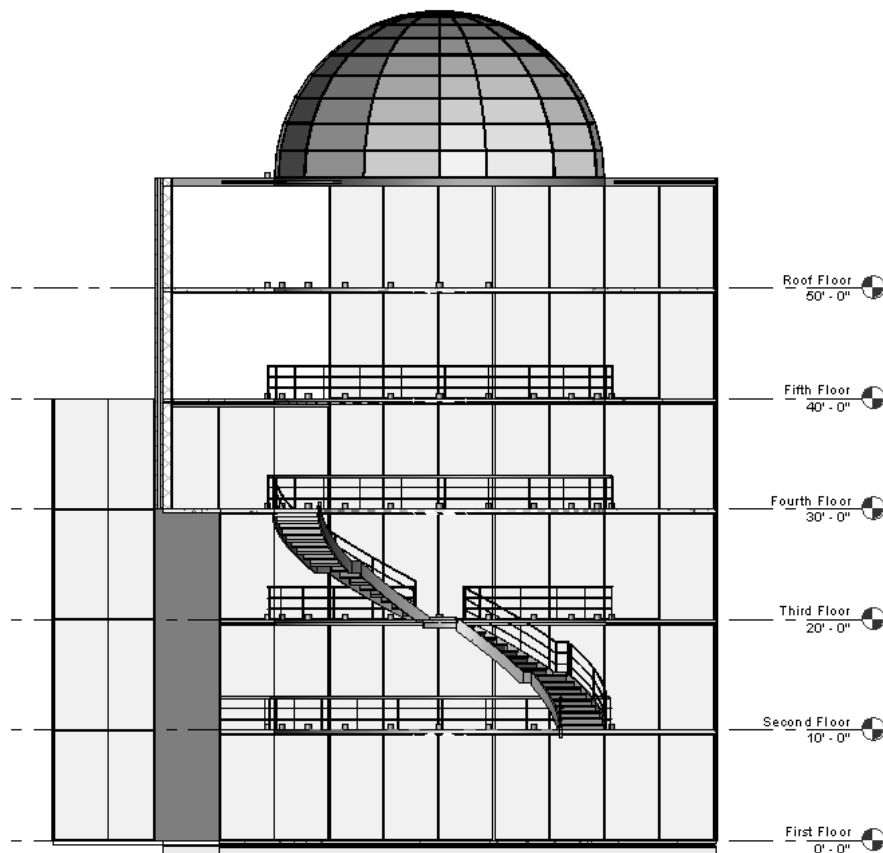
## Creating a Building Model Using Parametric Building Elements

Another classification of categories of elements followed in Autodesk Revit Architecture is based on their usage. Autodesk Revit Architecture uses five classes of element: host, component, annotation, view, and datum. Hosts are the element categories that form the basic structure of a building model and include model elements such as walls, floor, roof, and ceiling. Components are the elements that are added to host elements or act as stand-alone elements such as doors, windows, and furniture. Annotations are the 2D, view-specific elements that add content to the project documentation such as dimensions, tags, text notes, and so on. Views represent various orientations of a building model such as plans, elevations, sections, 3D views, and so

on. Datum refers to the reference elements that assist you in creating a building model, which include grids, levels, reference planes, and so on.

There is no specific methodology available for creating a building model in Autodesk Revit Architecture. It provides you with the flexibility of generating the building geometry based on the project requirement, design complexity, and other factors. However, the following steps describe a general procedure that may be followed for creating an architectural building models using the built-in parametric elements provided in Autodesk Revit Architecture.

The first step is to create the exterior walls of a building at the predefined lowest level (level 1). Next, create interior walls at that level and add components to the building model. Then, define the upper levels based on the story height of the building. You can also link the control height of the walls to the levels and extend the exterior walls to their full height. Next, create floors and roof using the defined levels. Add the site topography to the building model and then add site components to complete the building project. You can then create drawing sheets with the desired views for its presentation. Autodesk Revit Architecture also provides tools to create rendered 3D views and walkthroughs. Figure 1-4 shows an example of a building section with various building elements and annotations.



**Figure 1-4** Building section showing building elements and levels

## Visibility/Graphics Overrides, Scale, and Detail Level

Autodesk Revit Architecture enables you to control the display and graphic representation of a single element or the element category of various elements in project views by using the visibility and graphics overrides tools. You can select a model category and modify its linetype and detail level. This can also be done for various annotation category elements and imported files. These settings can be done for each project view based on its desired representation. You can also hide an element or an element category in a view using the **Hide in view** and **Isolate** tools. You can override the graphic representation of an element or an element category in any view using the **Visibility/Graphics** tool.

The scale is another important concept in an Autodesk Revit Architecture project. You can set the scale for each project view by selecting it from the available list of standard scales such as 1/16"=1'0", 1/4"=1'0", 1"=1'0", 1/2"=1'0", and so on. As you set a scale, Autodesk Revit Architecture automatically sets the detail level appropriate for it. There are three detail levels provided in an Autodesk Revit Architecture project: **Coarse**, **Medium**, and **Fine**. You can also set the detail level manually for each project view. Each detail level has an associated linetype and the detail lines associated with it. The details of annotations such as dimensions, tags, and so on are also defined by the selected scale.

## Extracting the Project Information

A single integrated building information is used to create and represent a building project. You can extract project information from a building model and create area schemes, schedule, and cost estimates, and then add them to the project presentation.

Autodesk Revit Architecture also enables you to export the extracted database to the industry standard Open Database Connectivity (ODBC) compliant relational database tables. The use of the building information model to extract database information eliminates the error-prone method of measuring building spaces individually.

## Creating an Architectural Drawing Set

After creating the building model, you can easily arrange the project views by plotting them on drawing sheets. Drawing sheets can also be organized in a project file based on the established CAD standards followed by the firm. In this manner, the project documentation can easily be transformed from the conceptual design stage to the design development stage and finally to the construction document stage. The project view on a drawing sheet is only a graphical representation of the building information model and therefore, any modification in it is immediately made in all associated project views, keeping the drawings set always updated.

## Creating an Unusual Building Geometry

Autodesk Revit Architecture also helps you conceptualize a building project in terms of its volume, shape, and proportions before working with actual building elements. This is possible by using the **Massing** tool, which enables you to create quick 3D models of buildings and conduct volumetric and proportion study on overall masses. It also enables you to visualize and create an unusual building geometry. The same massing model can then be converted into a building model with individual parametric building elements. It provides continuity in the generation of building model right from sketch design to its development.



## **Flexibility of Creating Special Elements**

Autodesk Revit Architecture provides a large number of in-built family types of various model elements and annotations. Each parametric element has the associated properties that can be modified based on the project requirement.

Autodesk Revit Architecture also enables you to create the elements that are designed specifically for a particular location. The in-built family editor enables you to create new elements using family templates. This provides you with the flexibility of using in-built elements for creating your own elements. For example, using the furniture template, you can create a reception desk that is suitable for a particular location in the design.

## **Creating Structural Layouts**

Autodesk Revit Architecture's structural tools enable you to add structural elements to a building model. An extensive in-built library of structural elements has been provided in Autodesk Revit Architecture. You can add structural columns, beams, walls, braces, and so on to the project. Thus, structural consultants can also incorporate their elements in the basic architectural building model and check for inconsistency, if any.

## **Working on Large Projects**

In Autodesk Revit Architecture, you can work on large projects by linking different building projects together. For a large project that consists of a number of buildings, you can create individual buildings as separate projects and then link all of them into a single base file. The database recognizes the linked projects and includes them in the project representation of the base file.

For example, while working on a large educational institution campus, you can create separate project files for academic building, administration area, gymnasium, cafeteria, computer centre, and so on, and then link them into the base site plan file. In this manner, large projects can be subdivided and worked upon simultaneously.

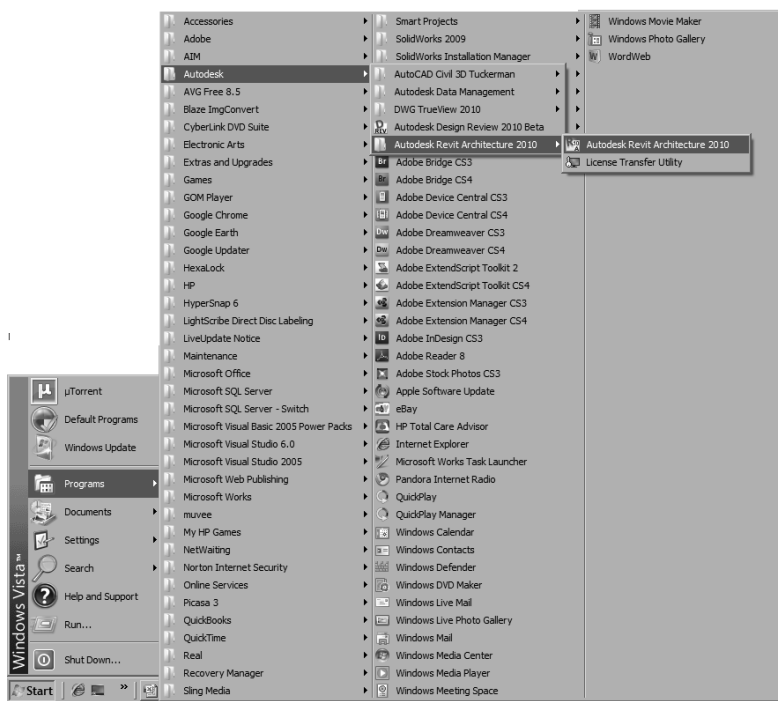
## **Working in Large Teams and Coordinating with Consultants**

Worksets, in Autodesk Revit Architecture, enable the division of the building model into small editable set of elements. The worksets can be assigned to different teams working on the same project and then their work can easily be coordinated in the central file location. The effort required to coordinate, collaborate, and communicate the changes between various worksets is taken care of by computer. Various consultants working on a project can be assigned a workset with a set of editable elements. They can then incorporate their services and modify the associated elements.

For example, a high rise commercial building project can be divided into different worksets with independent teams working on exterior skin, interior walls, building core, toilet details, finishes, and so on. The structural consultants can be assigned the exterior skin and the core workset, in which they can incorporate structural elements. Similarly, the rest of the teams can work independently on different worksets.

# STARTING Autodesk Revit Architecture 2010

When you turn on your computer, the operating system is automatically loaded. You can start Autodesk Revit Architecture by double-clicking on the **Autodesk Revit Architecture 2010** icon on the desktop or from the windows taskbar by choosing the **Start** button at the lower left corner of the screen (default position). Next, choose **Programs > Autodesk > Autodesk Revit Architecture 2010 > Autodesk Revit Architecture 2010**, as shown in Figure 1-5. Note that this path is for the Windows Vista operating system



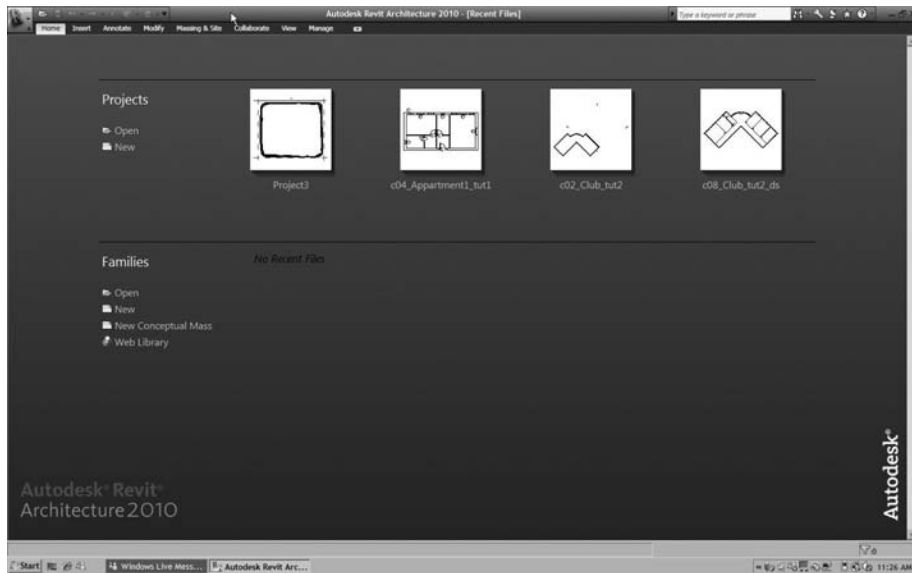
*Figure 1-5 Starting Autodesk Revit Architecture 2010 using the taskbar shortcut menu*



**Note**  
*The path for starting Autodesk Revit Architecture depends on the Operating System being used.*

On doing so, the inactive interface screen with the **New Workshop Features** dialog box will be displayed. Select any of the required radio buttons from the window and choose the **OK** button; the **New Workshop Features** will be closed and the interface screen will be displayed, as shown in Figure 1-6. The screen has two sections: **Projects** and **Families**. The **Projects** section allows you to open a new or an existing project and the **Families** section allows you to open a new or existing family.

To open an existing project file, choose the **Open** button from the **Projects** section; the **Open** dialog box will be displayed. Browse to the respective location in the dialog box and select the required file. Now, choose the **Open** button to open the file.



**Figure 1-6** The interface screen display of Autodesk Revit Architecture 2010

To open a new project file, choose the **New** option from the **Projects** area of the interface; the **New Project** dialog box will be displayed. Make sure that the **Project** radio button is selected in the **New Project** dialog box and choose the **OK** button; the project file will open and the interface screen will be activated.

## USER INTERFACE

In Autodesk Revit Architecture 2010, the user interface has been completely redesigned. As compared to Autodesk Revit Architecture 2009, the toolbar, menu bar, and Design Bar have been replaced by the ribbon in Autodesk Revit Architecture 2010. The ribbon, contains task-based tabs and panels that streamline the architectural workflow and optimize the delivery time of a project. In Autodesk Revit Architecture 2010, when you select an element in the drawing area, the ribbon displays a contextual tab that comprises of tools corresponding to the selected element. Autodesk Revit Architecture is similar to many other Microsoft Windows based programs. Its main parts are **Ribbon**, **Options Bar**, **Project browser**, **Drawing Area**, **Status Bar**, and **View Control Bar**, as shown in Figure 1-7.



### Note

*In Autodesk Revit Architecture 2010, you cannot switch between the menu-based interface of Revit Architecture 2009 and the ribbon-based interface of Autodesk Revit Architecture 2010.*

## Invoking Tools

To perform an operation, you can invoke the required tools by using any one of the following two options:

**Ribbon:** You can invoke all necessary tools from the ribbon.

**Shortcut Keys:** Some tools can also be invoked using keys on the keyboard.

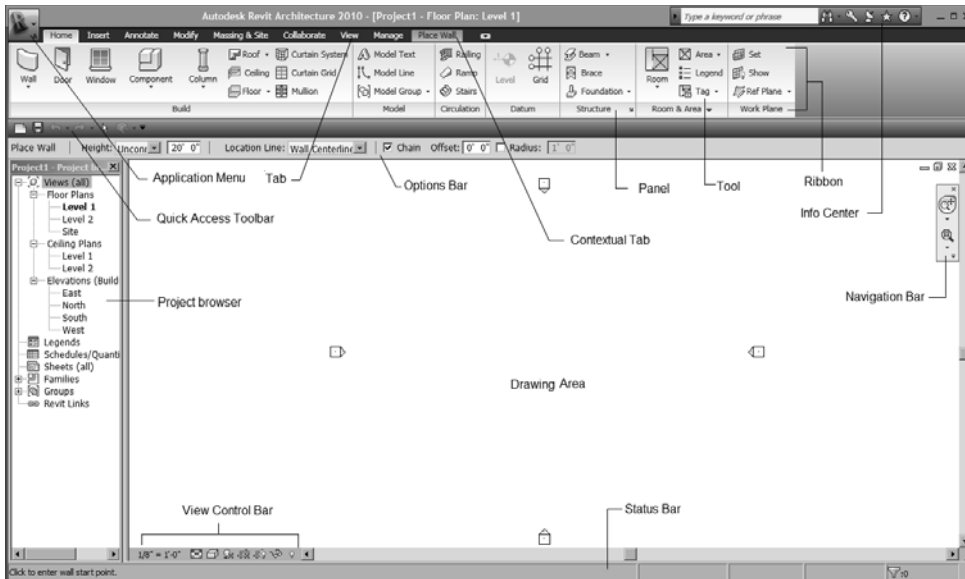


Figure 1-7 Autodesk Revit Architecture 2010 user interface screen

## Title Bar

The Title bar, docked on the top portion of the user interface, displays the program's logo, program's name, name of the current project, and the view opened in the viewing area. **Project 1- Floor Plan: Level 1** is the default project and view.

## Ribbon

The ribbon, shown in Figure 1-8, is a new interface that is used to invoke tools. When you create or open a file, the ribbon is displayed at the top in the screen. It comprises of task-based tabs and panels, refer to Figure 1-8, which provides all tools necessary for creating a project. The tabs and panels in the ribbon can be customized according to the need of the user. This can be done by moving the panels and changing the view states of the ribbon (changing the ribbon view state is discussed ahead in this chapter). The ribbon has three types of buttons; namely, general button, drop-down button, and split button. These buttons can be used from the panels.

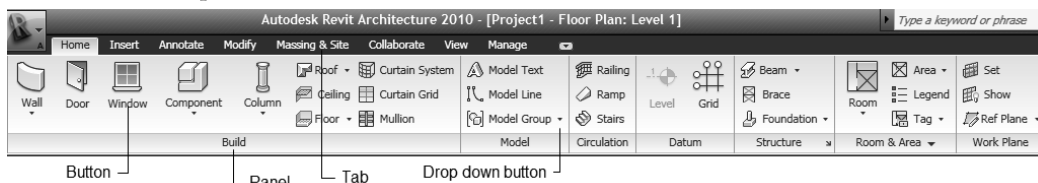


Figure 1-8 Different components of a ribbon



**Tip:** Tooltips appear when you rest the cursor over any tool icon in the ribbon. The name of the tool appears in the box, assisting you to identify each tool icon.

Moving the Panels

In the ribbon, you can move a panel and place it anywhere in the screen. To do so, click on the panel label in the ribbon, hold the mouse and drag the panel to a desired place on the screen. Next, use the tools of the moved panel and place the panel back to the ribbon. To do so, place the cursor on the moved panel and choose the **Return Panels to Ribbon** button from the upper right corner of this panel, as shown in Figure 1-9; the panel will return to the ribbon.

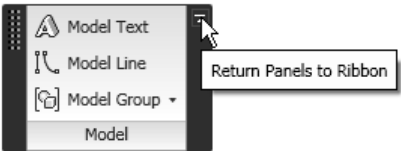


Figure 1-9 Choosing the *Return Panels to Ribbon* button

Changing the View States of the Ribbon

The ribbon can be displayed in three view states by selecting any of the following three options: **Show Full Ribbon**, **Minimize to Panel Tiles**, and **Minimize to Tabs**. To use these options, move the cursor and place it over the down arrow on the right of the **Manage** tab (refer to Figure 1-10) in the ribbon; the down arrow will be highlighted. Now, right-click on the down arrow; a flyout will be displayed. Place the cursor over the **Minimize** option in the flyout; a cascading menu will be displayed, as shown in Figure 1-10. On choosing the **Show Full Ribbon** option from the cascading menu, the entire ribbon will be displayed. If you choose the **Minimize to Panel Tiles** option, the ribbon will display the tabs and panel labels. On choosing the **Minimize to Tabs** option, the ribbon will display only the tabs.

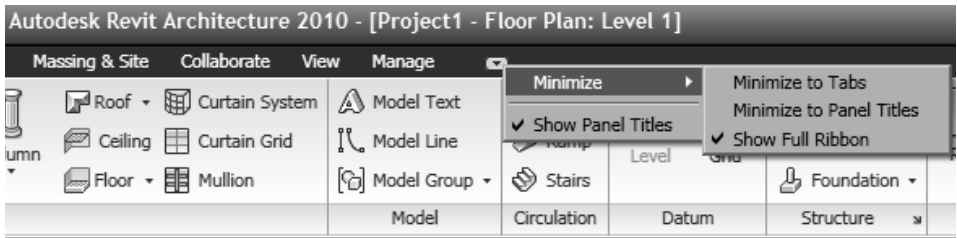


Figure 1-10 Various options in the cascading menu for changing the view state of the ribbon

The following table describes various tabs in the ribbon and their functions:

Tab	Description
Home	Contains tools for creating building model
Create	This tab is only available in <b>Family Editor</b> . It contains tools that are used to create a family
Insert	Contains tools to insert or manage secondary files such as raster image files and CAD files
Annotate	Contains tools for documenting a building model such as adding texts and dimensions
Modify	Contains tools for editing elements and the selected data

Massing & Site	Contains tools for modeling and modifying conceptual mass and site elements
Collaborate	Contains tools for collaborating the project with other team members (internal and external).
View	Contains tools used for managing and modifying the current view and also for switching views.
Manage	Contains tools for specifying the project and system parameters, and settings.

### Contextual Tabs in the Ribbon

These tabs are displayed when you use certain tools or select elements. These tabs contain a set of tools that relates only to the context of that tool or element.

For example, when you invoke the **Window** tool, the **Place Window** contextual tab is displayed. This tab shows three panels: **Selection**, **Element**, and **Model**. The **Selection** panel contains the **Modify** tool. The **Element** panel consists of the **Element Properties** button and the **Type Selector (Change Element Type)** drop-down list. The **Model** panel consists of necessary tools that are used to load model families or create the model of a window in a drawing. The contextual ribbon tab closes when the tool invoked to displayed this tab is closed.

### Application Frame

The application frame helps you manage projects in Autodesk Revit Architecture. It consists of **Application** button, **Application Menu**, **Quick Access Toolbar**, **InfoCenter**, and **Status Bar**. These are discussed next.

#### Application Button



The **Application** button is displayed at the top-left corner of the Revit interface. This button is used to display **Application Menu** as well as close it.

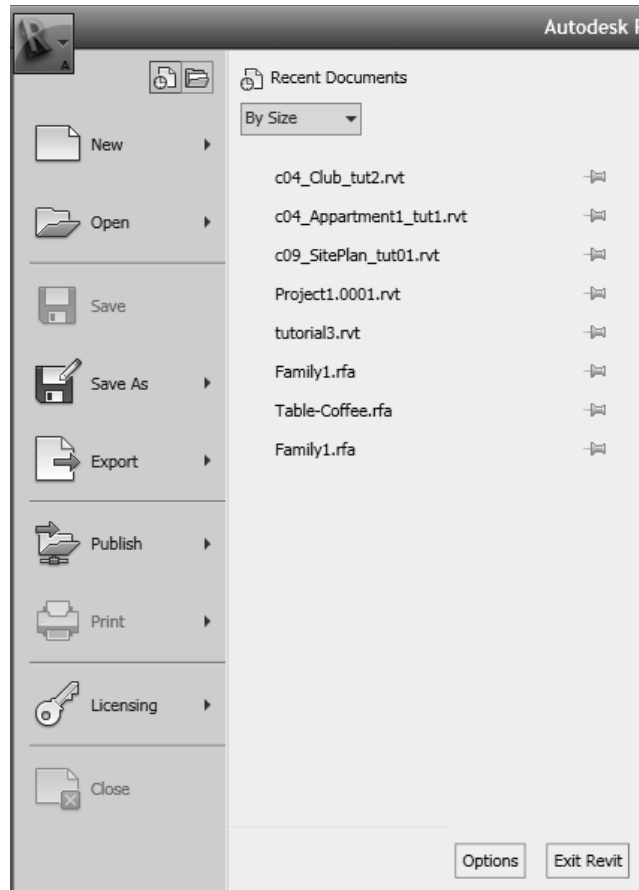
#### Application Menu

The **Application Menu** contains the tools that provide access to many common file actions such as **Open**, **Close**, and **Save**. Click the down arrow on the **Application** button to display tools. Alternatively, press ALT+F to display tools in the **Application Menu**, as shown in Figure 1-11.

#### Quick Access Toolbar

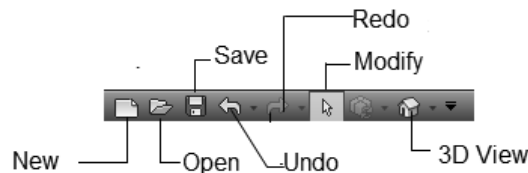
The **Quick Access Toolbar**, as shown in Figure 1-12, contains options to undo and redo changes, open and save a file, create a new file, and so on.

By default, the **Quick Access Toolbar** contains the following options: **New**, **Open**, **Save**, **Redo**, **Undo**, **Modify**, and **3D View**. You can customize the display of **Quick Access Toolbar** by adding more tools and removing unwanted tools. To add a button from the panel of the ribbon



*Figure 1-11 The Application Menu*

to **Quick Access Toolbar**, place the cursor over the button; the button will be highlighted. Next, right-click; a flyout will be displayed. Choose **Add Quick Access Toolbar** from the flyout displayed; the highlighted button will be added to **Quick Access Toolbar**.



*Figure 1-12 The Quick Access Toolbar*

## InfoCenter

You can use **InfoCenter** to search information related to Revit Architecture (Help), display the **Subscription Center** panel for subscription services and product updates, and display the **Favorites** panel to access saved topics. Figure 1-13 displays various tools in **InfoCenter**.

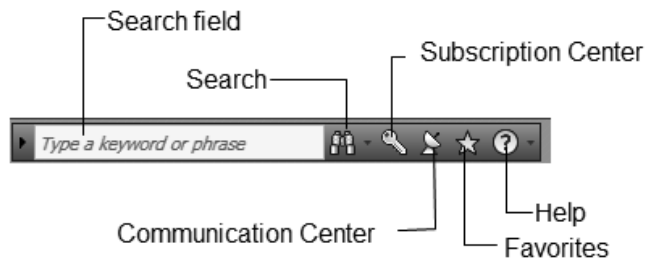


Figure 1-13 The InfoCenter

### View Control Bar

The **View Control Bar** is located at the lower left corner of the drawing window, as shown in Figure 1-14. It can be used to access various view-related tools. The **Scale** button shows the scale of the current view. You can choose this button to display a flyout that contains standard drawing scales. From this flyout, you can then select the scale for the current view. The **Detail Level** button is used to set the detail level of a view. You can select the required detail level as: **Coarse**, **Medium**, and **Fine**. Similarly, the **Model Graphics Style** button enables you to set the display style. The options for setting the display style are: **Wireframe**, **Hidden Line**, **Shading**, and **Shading with Edges**.

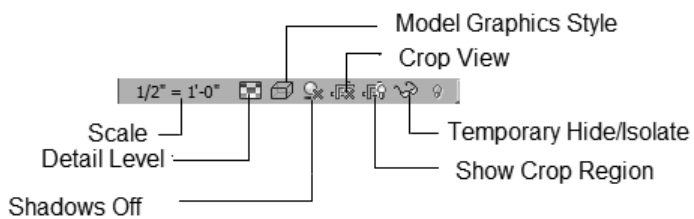


Figure 1-14 The View Control Bar

### Status Bar

The **Status Bar** is located at the bottom of the interface screen. When the cursor is placed over an element or component, the **Status Bar** displays the name of the family and type of the corresponding element or components. It also displays prompts and messages to help you use the selected tools.

### Options Bar

The **Options Bar** provides information about the common parameters of the component type and the options for creating or editing it. The **Options Bar** changes its appearance based on the type of component selected or being created. You can also modify the properties of the component by entering a new value in the edit box for the corresponding parameter in the **Options Bar**. For example, the **Options Bar** for the **Wall** tool displays various options to create a wall, as shown in Figure 1-15.



Figure 1-15 The Options Bar with different options to create a wall



## Type Selector (Change Element Type)

The **Type Selector** drop-down list is located in the **Element** panel of the tab for the currently invoked tool. For example, on invoking the **Wall** tool, the **Place Wall** tab will be displayed. From the **Type Selector** drop-down list in the **Element** panel of this tab, you can select the required type of the wall. The **Type Selector** drop-down list has been referred as the **Change Element Type** drop-down list from Chapter 2 to Chapter 5 of this textbook.

The content in the **Type Selector** drop-down list keeps on changing, depending upon the current function of the tool or the elements selected. When you place an element or a component in a drawing, you can use the **Type Selector** drop-down list to specify the type of element or component. You can also use this drop-down list to change the existing type of a selected element to a different type.

## Drawing Area

The Drawing Area is the actual modeling area, where you create and view the building model. It covers the major portion of the interface screen. You can draw various building components in this area using the pointing device. The position of the pointing device is represented by the cursor. The Drawing Area also has the standard Microsoft Windows functions and buttons such as close, minimize, maximize, scroll bar, and so on. These buttons have the same function as that of the other Microsoft Windows-based program.

## Project browser

The **Project browser** is located below the ribbon. It displays project views, schedules, sheets, families, and groups in a logical, tree-like structure, as shown in Figure 1-16 and helps you to open and manage them. To open a view, double-click on the name of the view, or drag and drop the view in the Drawing Area. You can close the **Project browser** or dock it anywhere in the Drawing Area.



### Note

If the **Project browser** is not displayed on the screen, choose the **View** tab from the ribbon and then choose **Windows > User Interface**. Next, select the **Project browser** check box from the flyout displayed.

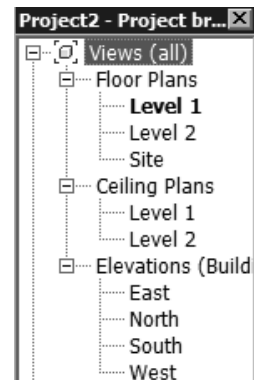


Figure 1-16 The **Project browser**

The **Project browser** can be organized to group the views and sheets based on the project requirement. For example, while working on a large project with a number of sheets, you can organize the **Project browser** to view and access specific sheets.



### Note

In the **Project browser**, you can expand or contract the view listing by selecting the '+' or '-' sign, respectively. The current view in the drawing window is highlighted in bold letters. The default project file has a set of preloaded views.

## Keyboard Accelerators

In Autodesk Revit Architecture, accelerator keys have been assigned to some of the frequently used tools. These keys are shortcuts that you can type through the keyboard to invoke the corresponding tool. Accelerator keys corresponding to a tool appear as a tooltip when you move the cursor over the tool.



**Tip:** As you become accustomed to using Autodesk Revit Architecture, you will find these **Keyboard Accelerators** quite useful because they save the effort of browsing through the menus.

## DIALOG BOXES

Certain Autodesk Revit Architecture tools, when invoked, display a dialog box. The dialog box is a convenient method of accessing and modifying parameters related to that tool. For example, when you choose **Save As > Project** from **Application Menu**, the **Save As** dialog box is displayed, as shown in Figure 1-17. A dialog box consists of various parts such as the dialog label, radio buttons, text or edit boxes, check boxes, slider bars, image box, and tool buttons, which are similar to other windows-based programs. Some dialog boxes contain the [...] button, which displays another related dialog box. There are certain buttons such as **OK**, **Cancel**, and **Help**, which appear at the bottom of most of the dialog boxes. The names of the buttons imply their respective functions. The button with a dark border is the default button.

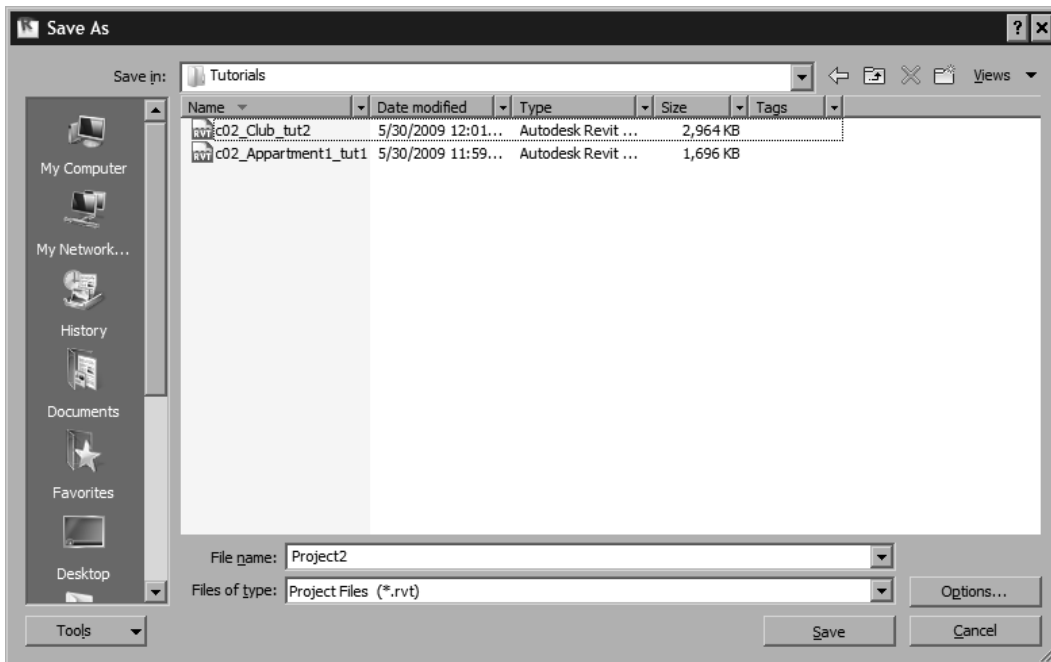


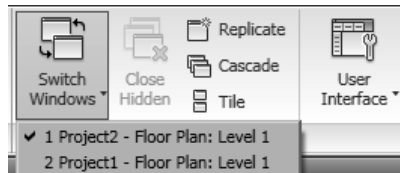
Figure 1-17 The **Save As** dialog box

## MULTIPLE DOCUMENT ENVIRONMENT

The multiple document environment feature allows you to open more than one project at a time in a single Autodesk Revit Architecture session. This is very useful when you want to work on different projects simultaneously and make changes with reference to each other.

Sometimes, you may need to incorporate certain features from one project into the other. With the help of multiple document environment, you can open multiple projects and then use the **Cut**, **Copy** and **Paste** tools from the **Clipboard** panel of the **Modify (type of element)** tab to transfer the required components from one project to another. These editing tools can also be invoked by using the CTRL+C and CTRL+V keyboard shortcuts.

To access the opened projects, choose **Windows > Switch Windows** from the **View** tab; a flyout will be displayed showing the name of different project files opened, as shown in Figure 1-18. Like other Microsoft Windows-based programs, you can select and view the opened projects using the **Cascade** and **Tile** options from the **Windows** panel of the **View** tab. The cascaded view of projects is shown in Figure 1-19.



**Figure 1-18** Choosing the *Switch Windows* option

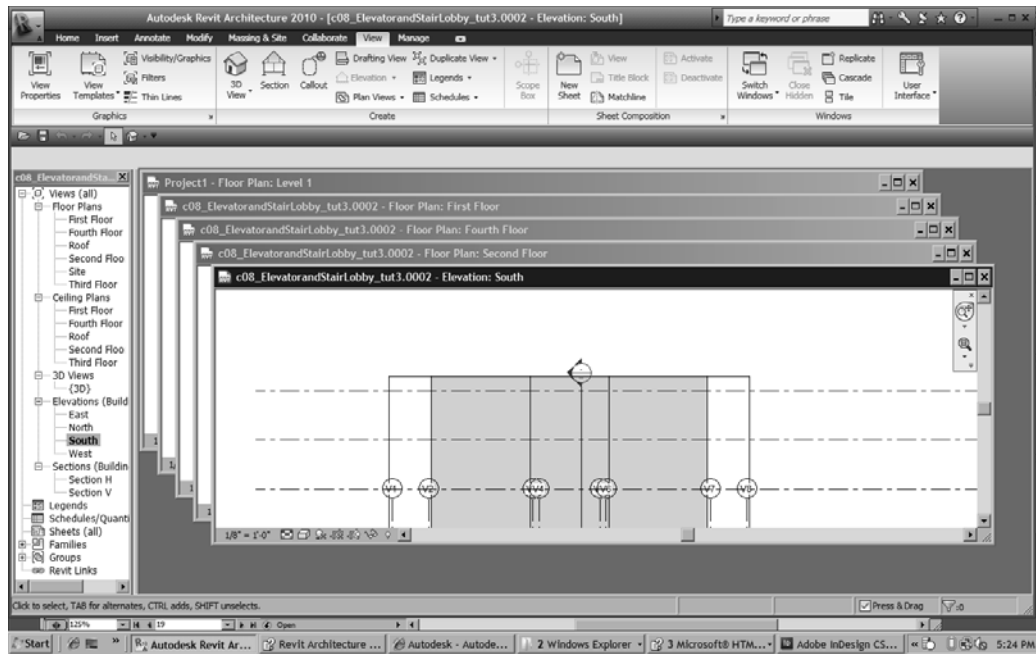


**Tip:** You can open a number of views at the same time. The **Tile** and **Cascade** options in the **Windows** panel of the **View** tab are used to arrange the views.

## INTEROPERABILITY OF Autodesk Revit Architecture

The models or geometries created in Revit Architecture can easily be exported to AutoCAD based programs, such as 3ds Max and Max Design, in the DWG file format. This enables you to visualize and create photorealistic exterior and interior renderings for your project designs. You can also transfer drawings from Revit Architecture to Google SketchUp to visualize your projects in a better way. Revit Architecture 2010 comes with Google Earth plugin for publishing Revit models to it.

Revit Architecture 2010 follows a wide range of industry standards and supports various CAD file formats such as DWF, DGN, DWG, DGN, IFC, SKP, and SAT. For image files, it supports JPG, TIFF, BMP, PNG, AVI, PAN, IVR, and TGA file formats. Besides these, the formats that are supported by Revit Architecture include ODBC, HTML, TXT, gbXML, XLS, and MDB. Revit Architecture is compatible with any CAD system that supports the DWG, DXF, or DGN file format. Revit Architecture can import the models and geometries as ACIS solids. This enables designers to import models from AutoCAD Architecture and AutoCAD MEP (Mechanical, Electrical, and Plumbing) software and to link and import 3D information to Revit Architecture. This feature makes Autodesk Revit Architecture 2010 an efficient, user-friendly, and compatible software.



*Figure 1-19 The cascaded view of the project*

## BUILDING INFORMATION MODELING AND Autodesk Revit Architecture 2010

Building Information Modeling (BIM) is defined as a design technology that involves the creation and use of coordinated, internally consistent, and computable information about a building project in design and construction. BIM covers spatial relationships, geographic information, quantities, and properties of building components. Using this technology, you can demonstrate the entire life cycle of a building project starting from the process of construction, facility operation, and information about quantities and shared properties of elements. BIM enables the circulation of virtual information model from the design team to contractors and then to the owner thereby adding changes and their knowledge to update the model at each stage of transfer. The ability to keep information up-to-date and make it available in an integrated digital environment enables the architects, owners, builders, and engineers to have clear vision of the project before the commencement of actual construction. It enables them to make better and faster decisions as well as to improve the quality and profitability of projects. Autodesk Revit Architecture 2010 is a specially designed platform based on BIM. Revit Architecture 2010 is the best example of the BIM technology. Revit Architecture's parametric model represents a building as an integrated database of coordinated information. In Revit, change anywhere is change everywhere. Any change made in your project at any stage is reflected in the entire project, and also, due to the parametric behavior of elements, the project is updated automatically according to the changes made anywhere in the project. Also, the integration of Revit Architecture with the available in-built commercial tools such as solar studies, material takeoffs, and so on greatly simplifies the project design and reduces the time consumed by these analyses, thereby enabling faster decision making.

# Autodesk Revit Architecture HELP

Autodesk Revit Architecture provides help to easily understand various tools and methods used in it. To access the help feature, click on the down arrow on the right of the **Help** button in **InfoCenter**; a drop-down menu containing help options will be displayed, as shown in Figure 1-20. The help options are discussed next.



Figure 1-20 A drop-down menu displaying help options

## Autodesk Revit Architecture 2010 Help

On choosing the **Help** button from the **InfoCenter**, the **Revit Architecture Help** dialog box will be displayed, as shown in Figure 1-21. You can access help on various tools and other aspects of the program in a number of ways by using the F1 key. The four tabs provided in this dialog box to facilitate your search are discussed next.



**Tip:** You can also search for a topic using wildcards (\* , ? ) and boolean operators (AND, OR, NEAR, NOT). These boolean operators can be accessed by clicking on the right arrow next to the edit box.

### Contents Tab

The **Contents** tab is chosen by default and displays the help topics by titles, pertaining to different sections of Autodesk Revit Architecture such as **Using Help**, **Start a New Project**, and so on, refer to Figure 1-21. To select a title, click on the corresponding book icon or choose the '+' sign on the left; the icon will become an open book with a '-' sign and a list of topics associated with that category will be displayed. Click on the '+' sign to expand the subheadings, until you reach the help topic that has a question mark '?' displayed in it. Next, select the topic to display the information about it in the display window present on the right of the dialog box.



**Tip:** The **Help** and '?' buttons can be used to provide assistance related to the contents of the dialog box.

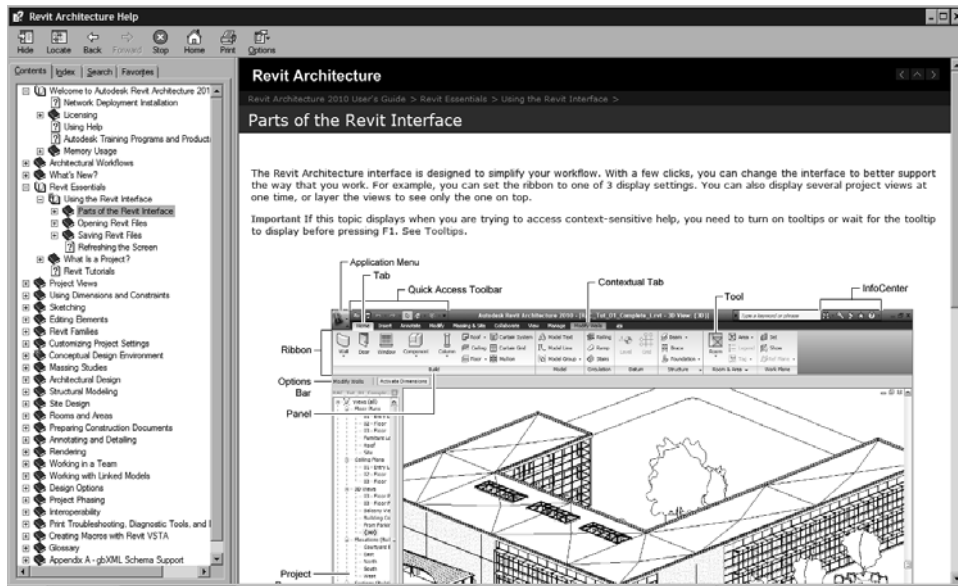


Figure 1-21 The Revit Architecture Help dialog box

## Index Tab

The **Index** tab displays the complete index of tools and options of Autodesk Revit Architecture in an alphabetical order. To search for information about a tool or an option, type the name of the tool or its related word in the edit box. As you type the letters for the search in the edit box, the listing in the list area keeps on changing, displaying possible topics with those initials. If Autodesk Revit Architecture finds any reference to the word entered, it will automatically be highlighted in the list area. You can choose the **Display** button below the list area to view information on a specific subject.

## Search Tab

The **Search** tab is used to access the help files related to certain keywords. Three check boxes: **Search previous results**, **Match similar words**, and **Search titles only** have been provided in this tab to narrow down the search to a specific topic. On typing the keyword in the edit box, you can select one or more of these options and then choose the **List Topics** button. A list of help files related to the keyword entered appears. Choose the topic from the **Select topic** list box and then choose the **Display** button to view its help. The listed topics for the typed word appear with ranks in the **Select topic** list box. A search is ranked according to the number of matching words found in that topic.

## Favorites Tab

Using the **Favorites** tab, you can create a list of favorite topics that you need to access frequently. The **Current Topic** edit box displays the topic that you last viewed in any other tab of Autodesk Revit Architecture Help. Use the **Add** button to include that title in your list of favorite topics. Similarly, you can add other topics to this list and create an information database. You can remove a topic from the list by using the **Remove** button. You can also choose the **Display** button to view the help files related to each topic.

**Note**

*The list of favorite topics created by you is saved at the time of quitting the Autodesk Revit Architecture session and becomes available for your reference in future sessions.*

## Context Sensitive Help

If you need help specific to a selected tool or a dialog box, Autodesk Revit Architecture provides several options to access the relevant information. Many dialog boxes contain the **Help** button and can be used to view help on that dialog box and related topics. If the **Help** button is not available, you can press the F1 key, while the dialog box is open, to access the related information.

To inquire about a tool button, place the cursor over the button of a tool, a **Help** message box will be displayed. Now, you can press the F1 key to view more help contents pertaining to the button, in a separate window.

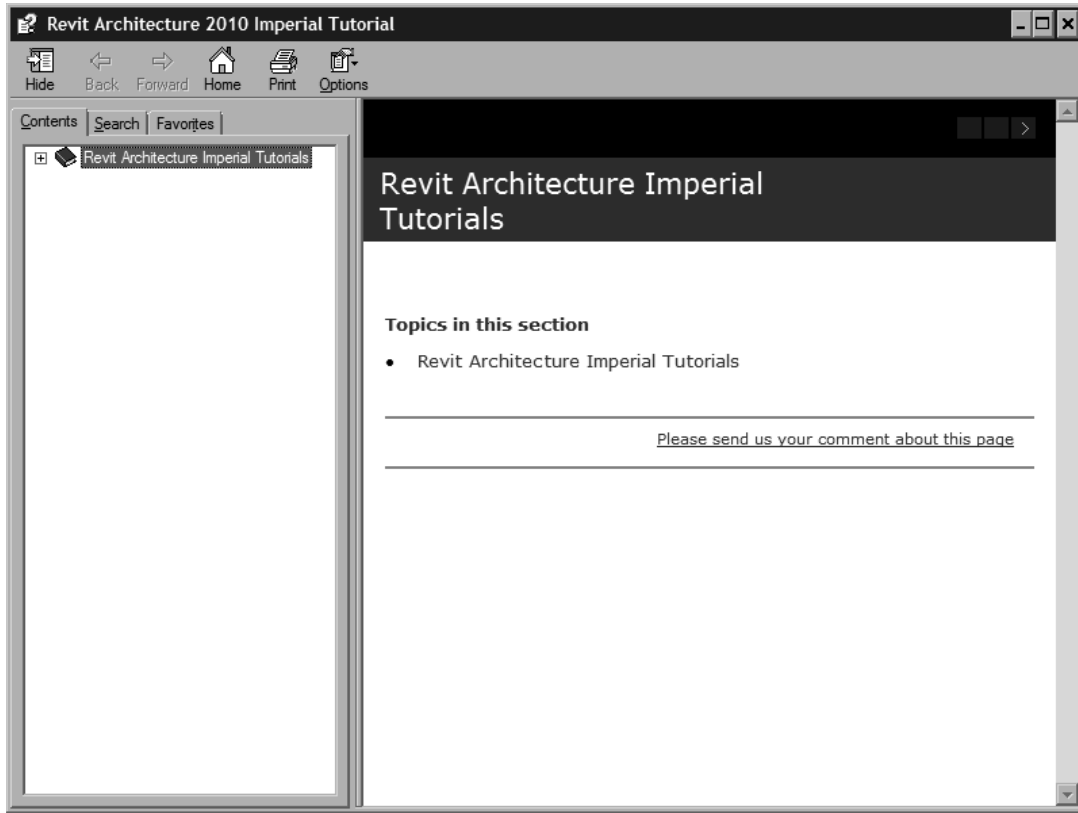
To turn off the **Help** tooltips for buttons, choose **Application Menu > Options**; the **Options** dialog box will be displayed. In the **General** tab of this dialog box, select the **None** option from the **Tooltip assistance** drop-down list in the **Notifications** area. Now, choose **OK** to close the **Options** dialog box.

## User Interface Overview

To take a quick lesson on how Autodesk Revit Architecture works, choose **Help > User Interface Overview** from the **InfoCenter**; the **Revit Architecture User Interface Overview** window will be displayed. In this window, choose the **A4** or **Letter** button placed at the lower right corner of the window; a PDF file will open. This file that takes you through the user interface of Autodesk Revit Architecture 2010 that will let you understand the placement of basic tools in Autodesk Revit Architecture.

## Tutorials

The imperial tutorial exercises and datasets are available on the Autodesk website. To access them, you need to download the tutorial files and datasets from the website. To do so, choose **Help > Tutorials** from **InfoCenter**. The **Revit Architecture 2010 Imperial Tutorial** window will be displayed, as shown in Figure 1-22. Follow the instructions displayed in the window to access the Revit tutorials and datasets. Once you have downloaded the tutorials and datasets from the website, the **Revit Architecture 2010 Imperial Tutorial** window will be displayed every time you access the tutorials. **Revit Architecture 2010 Imperial Tutorial** window has a link **Developing Your Designs, Documenting Your Projects**, and so on. It has three tabs: **Context**, **Search**, and **Favorites** to help you access the relevant information. These tabs have functions similar to the tabs in the **Revit Architecture Help** dialog box.



*Figure 1-22 The Revit Architecture 2010 Imperial Tutorial dialog box*



# Chapter 2

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## Getting Started with Revit Architecture

### Learning Objectives

**After completing this chapter, you will be able to:**

- *Start a new project.*
- *Set units of various measurement parameters for a project.*
- *Understand the concept of snaps, dimensions, and object snaps.*
- *Save a project.*
- *Modify parameters and settings of a project.*
- *Close a project and exit Revit Architecture.*
- *Open an existing project.*
- *Explore the building model using viewing tools.*
- *Use the Navigation tools.*

In this chapter, as you start learning to create a new building project, you will also learn the methods of creating the initial setups such as units, snaps, and others.

## STARTING A NEW PROJECT

Shortcut Key:

CTRL+N

Application Menu:

New > Project

In Autodesk Revit Architecture, a project is considered as a single database that contains all information related to building design. As such, the three-dimensional models drawn using this software are called building information models. Starting from geometry to construction data, each project file contains the complete information of the building design

In Revit Architecture, whenever you start a new project, the new project file uses the default settings defined in a project template, called default.rte. To start a new project, choose the **Application** button from **Application Menu**, as shown in Figure 2-1. From **Application Menu**, choose **New > Project**; the **New Project** dialog box will be displayed, as shown in Figure 2-2. Using this dialog box, you can select an existing .rte template file format to use it for the new project.

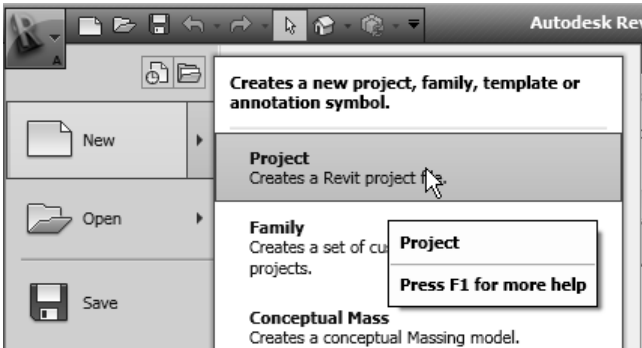


Figure 2-1 Choosing the *Project* option from the cascading menu

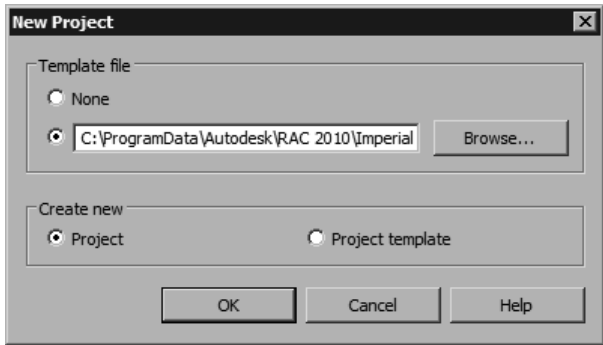


Figure 2-2 The *New Project* dialog box

A template file has various project parameters such as units and views, already saved in it. On using it, the new project will adopt the same parameters as the template file. The default template file is *default.rte*. The difference between a template and a project file is that the template files have a *.rte* extension whereas the project files have a *.rvt* extension. You can either select any of the template files provided in Revit Architecture or create your own file. Any project file can be saved as a template file. You can select the file to be used as a template by clicking on the **Browse** button in the **New Project** dialog box. To create a new project, select the **Project** radio button and to create a template, select the **Project template** radio button.

**Note**

*If you select the **None** and **Project** radio buttons from the **Template file** and **Create New** areas, respectively, a new project file will be created without a template file, but with the default settings of Autodesk Revit Architecture.*

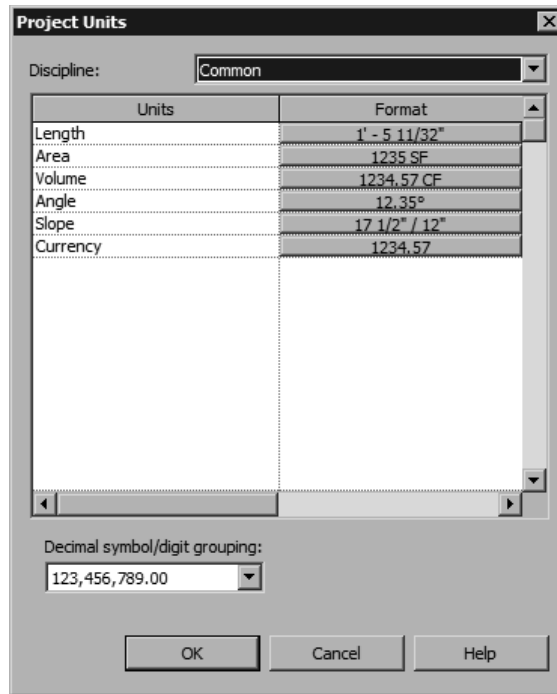
## SETTING UNITS

**Ribbon:** Manage > Project Settings > Project Units  
**Shortcut Key:** UN

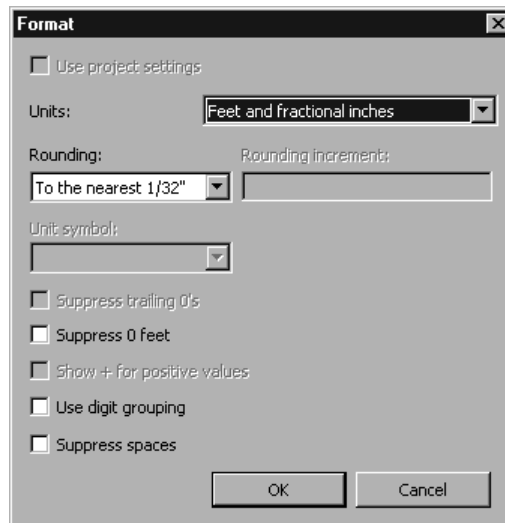
Units are the important parameters of a project. While installing the program, Revit Architecture prompts you to set the default unit as Imperial (feet and inches) or Metric (meter). The default selection of unit helps you start your project with a specific type of unit as per the conventions followed in the industry. To set units, choose **Project Settings > Project Units** from the **Manage** tab of the ribbon; the **Project Units** dialog box will be displayed, as shown in Figure 2-3. Project units are grouped into three disciplines: **Common**, **Structural**, and **Electrical**. Each discipline has a set of measurement parameters. You can select any of these disciplines from the **Discipline** drop-down list of this dialog box. In this drop-down list, the **Common** option is selected by default. As a result, various measurement parameters such as **Length**, **Area**, **Volume**, **Angle**, **Slope**, and **Currency** will be displayed in the **Project Units** dialog box. The **Format** column in the dialog box displays the current unit format for the corresponding parameter in the **Units** column. You can preview and select the possible digit grouping and decimal separators from the **Decimal symbol/digit grouping** drop-down list, which is at the lower left corner of the dialog box, refer to Figure 2-3.

### Length Unit Setting

In Autodesk Revit Architecture, you can assign a different unit for the measurement of length in the **Project Units** dialog box. To do so, click in the **Format** column in the **Length** row; the **Format** dialog box will be displayed. This dialog box displays the units of length and its settings, as shown in Figure 2-4. You can select the desired unit from the **Units** drop-down list in the dialog box. The options that can be selected from the drop-down list are **Decimal feet**, **Feet and fractional inches**, **Decimal inches**, **Fractional inches**, **Meters**, **Centimeters**, **Millimeters**, and **Meters and Centimeters**. After selecting the desired unit, you can specify the rounding value for the selected unit. To do so, select the desired option from the **Rounding** drop-down list in the **Format** dialog box. Note that by default, the **Rounding increment** edit box in the **Format** dialog box is inactive. To make it active, select the **Decimal feet** or **Decimal inches** option from the **Units** drop-down list and then select **Custom** from the **Rounding** drop-down list. The default value in the **Rounding** edit box is



*Figure 2-3 The Project Units dialog box*



*Figure 2-4 The Format dialog box*

1. You can change the default value by entering a value in this edit box. Similarly, the **Units symbol** drop-down list will be inactive for the **Feet and fractional inches**, **Fractional inches**, and **Meters and Centimeters** options in the **Units** drop-down list. You can select the desired option from the **Units symbol** drop-down list to specify the measurement symbol that you want to add along with the unit of length. For example, to use the symbol 'm' after all metric

length measurements, you can select **m** from the drop-down list as the measurement symbol. In the **Format** dialog box, you can select the **Suppress spaces** check box to remove all spaces around the dash from the length strings. For example, you can remove spaces in the dash when a length string is expressed in feet and fractional inches to denote a particular measurement.



**Tip:** While selecting a rounding value from the **Rounding** drop-down list in the **Format** dialog box, you should consider the extent of detailing that may be required for the project and then select it. For projects that requires too much detailing, a lower rounding value may be set. This parameter, however, can be modified at any time during the project development.

## Area Unit Setting

In the **Project Units** dialog box, you can assign a unit for measuring area. To do so, click in the **Format** column for the **Area** parameter; the **Format** dialog box will be displayed. In this dialog box, you can set the unit for measuring area from the **Units** drop-down list that contains various options for units of area such as **Square Feet**, **Square Meters**, **Acres**, and so on. The **Square feet** option is selected by default in this drop-down list, if you select Imperial units at the time of installing Revit Architecture. The settings for rounding, rounding increment, and unit symbol for the area units can be made from their respective drop-down lists and edit boxes.

## Volume and Angle Unit Settings

The units for volume and angle can also be set similar to that of the length and area. You can set the unit for the volume measurement by selecting any of the options such as **Cubic yards**, **Cubic feet**, **Cubic meters**, **Liters**, and **US gallons** from the **Units** drop-down list in the **Format** dialog box of the **Volume** parameter. Similarly, you can specify the unit for the angle measurement by selecting the required option from the **Units** drop-down list in the **Format** dialog box of the **Angle** parameter. You can select either **Decimal degrees** or **Degrees minutes seconds** from the **Units** drop-down list for specifying the unit for the volume measurement.

## Slope Setting

To specify the unit for the slope measurement, click in the **Format** column for the **Slope** parameter; the **Format** dialog box will be displayed. In this dialog box, you can specify the desired unit settings by selecting the required option from the **Units** drop-down list. The **Units** drop-down list contains various options such as **Ratio : 12**, **Ratio :10**, **Rise / 12"**, **Rise 1 / 1'-0"**, **Rise / 1000mm**, **Decimal degrees**, and **Percentage** as the unit of the slope measurement. The default option for the **Imperial** unit setting in the drop-down list is **Decimal degrees**.



**Tip:** As soon as you change the units and choose the **OK** button to close the **Format** dialog box, the numbers and units shown for each measurement parameter in the **Project Units** dialog box are modified to the new settings. You can modify their settings and format any time during the project.

## Currency Setting

In Revit Architecture 2010, you can set the unit for currency as well. You can select different types of currency symbols from the **Unit symbol** drop-down list in the **Format** dialog box of the **Currency** parameter.

**Note**

*You can only format the display of units as they are represented on the screen or printout using the **Project Units** dialog box. The actual values for these units in the project may be different. For example, if you set the wall length rounding to the nearest 1', the wall may show this rounded value, but the actual length of the wall might be in fractional feet.*

## SNAP SETTINGS

**Ribbon:** Manage > Project Settings > Settings > Snaps

The **Snaps** tool is one of the most productive tools available while creating and editing elements in a building model. This tool represents the ability of the cursor to snap or jump to the preset increments or specific object properties of various elements such as endpoint, midpoint, and so on. To invoke the **Snaps** tool, choose **Project Settings > Settings > Snaps** from the **Manage** tab of the ribbon; the **Snaps** dialog box will be displayed, as shown in Figure 2-5. This dialog box has three areas, **Dimension Snaps**, **Object Snaps**, and **Temporary**. These areas are discussed next.

**Note**

*The settings in this dialog box apply to all the projects opened in the session and are not saved with a particular project.*

### Dimension Snaps

Revit Architecture enables you to set increments for adding various elements of the project. The dimension snap is the increment, in which the cursor moves while creating components. Revit Architecture automatically adjusts the dimension snap values as the views are zoomed. The default settings are: **4'; 0'6"; 0'1"; 0'1/4"**. Note that every incremental value is separated by a semicolon (;). You can also set the increments by typing the values that are separated by a semicolon. For example, to create an interior layout plan in which the length of the partitions is in 5' modules, counter top width is 2' and the thickness of partitions is 4", you can enter the values for the dimension snaps as 5'; 2'; 4". This will enable the cursor to move in these increments and help create the layout with relative ease.

The angular dimension snap increments can be set in a similar manner by entering the values in the **Angular dimension snap increments** edit box, if desired. This parameter is quite useful for projects that have a radial geometry.



**Tip:** The **Dimension Snaps** parameter should be set based on the scale and the amount of detailing required for the project. You may set smaller increments for working on a detail or a small portion of a building.

### Object Snaps

Object Snaps, a useful tool for creating and editing elements in Revit Architecture, refers to the cursor's ability to snap to geometric points on an element such as endpoints, midpoint, perpendicular, and so on. The advantage is that you do not need to specify the exact point. When enabled, the appropriate object snap is displayed as soon as the cursor is close to an element. For example, it is virtually impossible to pick the exact endpoint to start a wall from an endpoint of an already drawn wall. But when you enable the endpoint object snap,

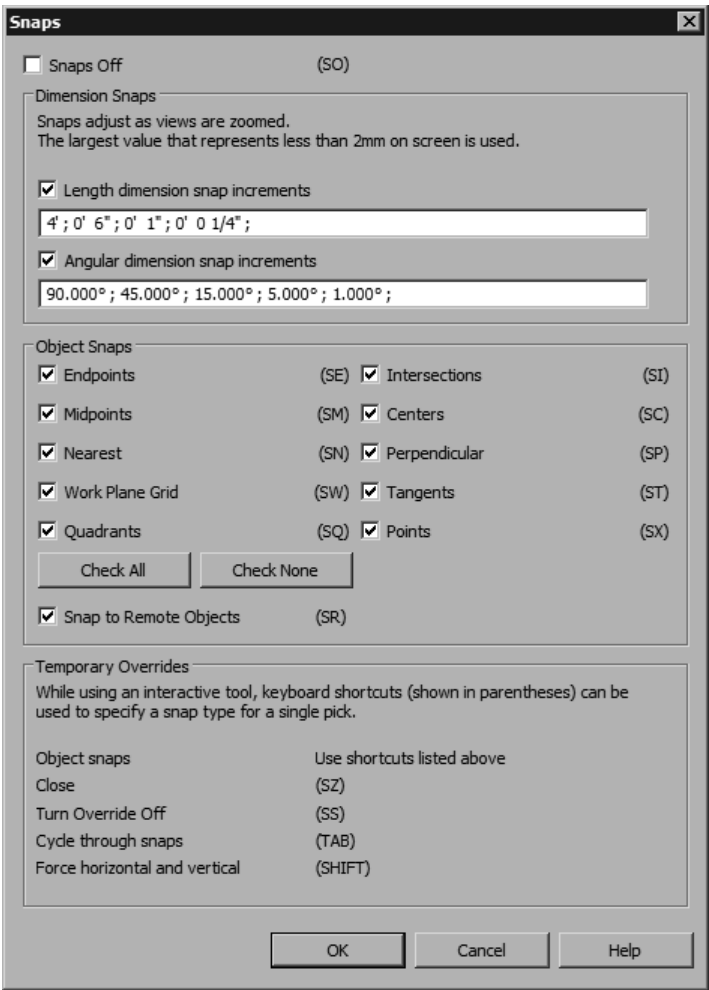


Figure 2-5 The Snaps dialog box

the cursor automatically jumps or snaps to the endpoint of this wall. This helps to start the new wall from the endpoint. This, besides making the drawing accurate, later helps in adding dimensions to the project.



**Note**

*The object snaps tool works only with the objects that are visible on the screen. A tooltip, with the same name as the object snap, is also displayed when you bring the cursor close to snap point.*

Various object snaps modes are available in Revit Architecture such as **Endpoints**, **Midpoints**, **Nearest**, **Work Plane Grid**, **Quadrants**, **Intersections**, **Centers**, **Perpendicular**, **Tangents**, **Points**, and **Snap to Remote Objects**.

The use of each object snap corresponds to its respective name. The **Work Plane Grid** snap option enables you to snap to a point on a reference plane already defined in the model. For example, you can place a furniture component exactly on the floor by snapping to the floor

level reference plane. You can also snap to the object that is closest to the cursor using the **Snap to Remote Objects** option.



**Tip:** The **Snap** tool is frequently used, not only while creating various building elements but also while editing and placing them. By using this feature efficiently, you can improve the performance and accuracy of your project besides making modeling much simpler.

Each object snap mode has a geometrical shaped marker to identify it from the other object snaps. For example, the endpoint object snap is indicated by a square, midpoint by a triangle, nearest by a cross, and so on. To use an object snap mode, move the cursor over the object. You will notice a marker that appears as you move it close to the snap point. To select the appropriate snap point, click when the corresponding marker or tooltip is displayed.

In Revit Architecture, all the enabled object snaps work simultaneously. You can turn off all the snap options including the dimension snaps and object snaps by checking the **Snaps Off** check box located at the top of the **Snaps** dialog box. Alternatively, you can type **SO** on the keyboard to turn them off and on while using a tool. The **Check All** and **Check None** buttons can be used to enable or disable the object snaps, respectively.

## Temporary Overrides

The **Temporary Overrides** options provide you the alternative of overriding snaps setting for a single use only. For example, if you have not selected the **Endpoints** object snap in the **Snaps** dialog box and you want to use this option while working with a tool, you need not open the **Snaps** dialog box and set this option. Instead, you can type the shortcut, **SE** in this case, to temporarily activate the endpoint object snap. Once you have used this object snap option, snapping to the endpoint is automatically turned off.

You can toggle between various object snap options available at the same location using the TAB key on the keyboard. Hold down the SHIFT key to create the elements vertically or horizontally. This restricts the movement of the cursor in the orthogonal directions only. Once you release the SHIFT key, the cursor resumes its movement in all directions. You can select the **Snaps Off** check box to disable all types of snapping.

## SAVING A PROJECT

<b>Application Menu:</b>	Save As > Project
<b>Shortcut key:</b>	CTRL+S

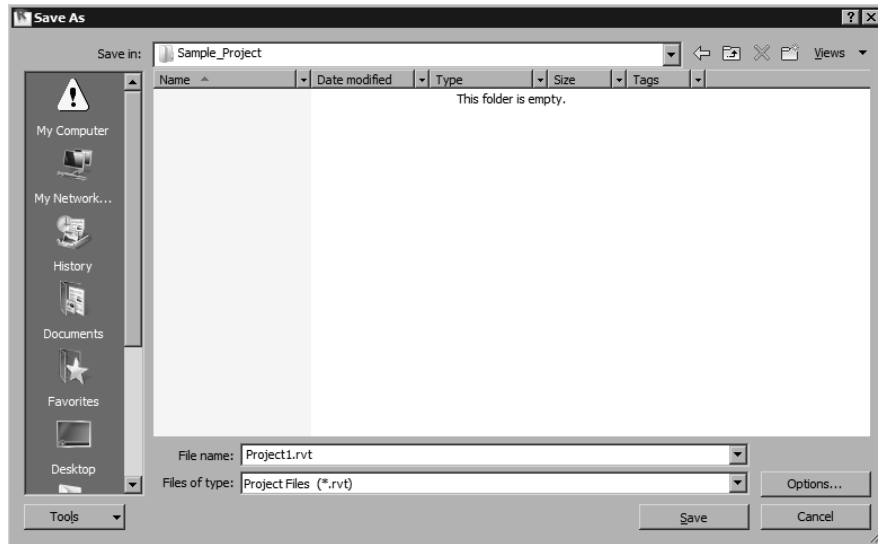
You must save your work before closing a project or exiting a Revit Architecture session. You have the option of saving the project file in a permanent storage device, which may be a hard disk or a removable disk such as a CD, floppy or USB. Also, you must save your work at regular intervals to avoid loss due to any error in the computer's hardware or software.

## Using the Save As Tool

In Autodesk Revit Architecture 2010, you can save your project file to the desired location. To do so, click the **Application** button and then choose **Save As > Project** from the **Application Menu**;



the **Save As** dialog box will be displayed, as shown in Figure 2-6. Alternatively, you can save the project file by choosing the **Save** button from the **Quick Access Toolbar**.



*Figure 2-6 The Save As dialog box*

In the **Save As** dialog box, the **Save in** drop-down list displays the current drive and path in which the project file will be saved. The list box below the **Save in** drop-down list shows all folders available in the current directory. The **File name** edit box can be used to enter the name of the file to be assigned to the project. The **Places List** area in the left of the **Save As** dialog box contains shortcuts for the folders that are frequently used.

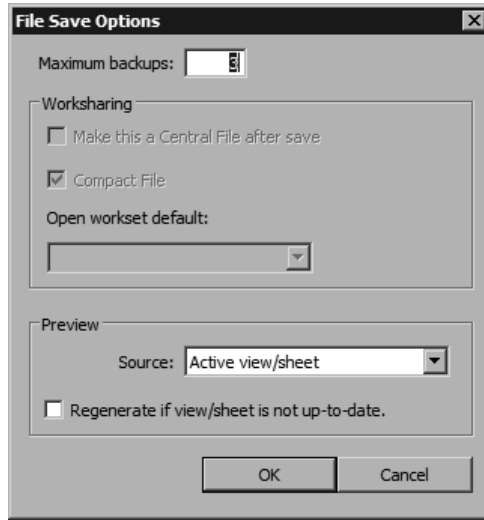
## Using the Options Button

You can use different file saving features by choosing the **Options** button from the **Save As** dialog box. On choosing this button, the **File Save Options** dialog box will be displayed, as shown in Figure 2-7. Using the **Maximum backups** edit box from this dialog box, you can specify the maximum number of backup files that you need to store for the project. In Autodesk Revit Architecture, the non-workshared projects have three backup files and the workshared projects have twenty backup files, by default. The options in the **Preview** area enable you to specify the image to be used as the preview of the project file. This image is used at the time of opening a project file. You can specify the view of the model to be used as a preview image from the **Source** drop-down list in the **Preview** area of the **File Save Options** dialog box.



**Tip:** The selection of large number of backup files for storing may use a lot of resources on the hard disk.

The **Active view/sheet** is the default option for previewing a project file. For example, to make the **Floor Plan: Level 1** the preview image, select it from the drop-down list. Whenever you select this project file, the preview will always show the **Floor Plan: Level 1**, irrespective of the last active view.



**Figure 2-7** The *File Save Options* dialog box



**Tip:** The *Preview* image acts as a thumbnail to identify a project file. You must select a view that will help you identify the project file easily.

Select the **Regenerate if view/sheet is not up-to-date** check box to see the preview with the latest modifications. Selecting this check box will update the preview image on closing the project file.



**Note**

*Revit Architecture updates the preview image continuously. Therefore, selecting the **Regenerate if view/sheet is not up-to-date** check box can consume considerable resources.*

## Using the Save Tool

<b>Application menu:</b>	Save
<b>Shortcut Key:</b>	CTRL+S



Once the project is saved using the **Save As** tool, you do not need to re-enter the file parameters to save it again. To save a project to the hard disk, click the **Application** button and then choose the **Save** option from the **Application Menu**, as shown in Figure 2-8. While saving the project for the first time, the **Save As** dialog box is displayed, even if you invoke the **Save** tool.

Alternatively, you can save your project by choosing the **Save** button from the **Quick Access Toolbar**. As you save your project file, Revit Architecture updates it automatically without prompting you to re-enter the file name and path.

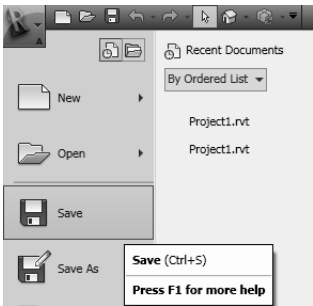


Figure 2-8 Accessing the *Save* tool from *Application Menu*

## CONFIGURING GLOBAL SETTINGS

In Autodesk Revit Architecture, you can configure global settings by using the **Options** dialog box. This dialog box can be invoked by choosing the **Options** button from the **Application** menu. The **Options** dialog box, as shown in Figure 2-9, contains eight tabs: **General**, **Graphics**, **File Locations**, **Rendering**, **Spelling**, **SteeringWheels**, **ViewCube**, and **Macros**. The options of these tabs are discussed next.

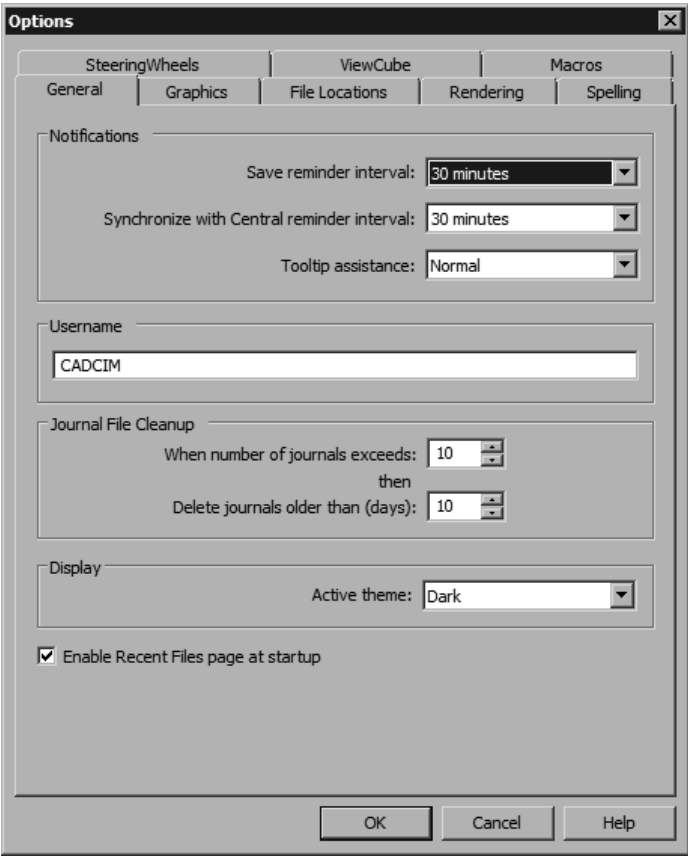


Figure 2-9 Setting file options using the *Options* dialog box

## General Tab

The **General** tab is the default tab and contains four areas, **Notifications**, **Username**, **Journal File Cleanup**, and **Display**. These areas are discussed next.

### Setting Notifications

Revit Architecture provides you the option of setting reminders to save work at regular intervals. You can set the time interval at which Revit Architecture will remind you to save the project file. The default value for the **Save Reminder interval** parameter is **30** minutes. You can specify the time interval by clicking on the down-arrow key and selecting the interval from the drop-down list. If you do not want a reminder, you can select the **No reminders** option from the drop-down list. Similarly, you can set the value for the **Synchronize with Central reminder interval** parameter.

The **Tooltip assistance** refers to a tooltip that is displayed with the cursor when it is close to a tool, snap, or an element. It can be set to the required level by selecting the appropriate option from the **Tooltip assistance** drop-down list. **Normal** is the default option that is selected in this drop-down list. Note that the tooltip will appear more frequently in your drawing if you select **High** in the **Tooltip assistance** drop-down list.

### Setting the Username

In Autodesk Revit Architecture you can create a unique identification for a particular session. To do so enter a name in the edit box that is displayed in the **Username** area of the **General** tab. The name that you will enter in this edit box will be used for editing permissions in a multi-user Revit Architecture environment.



#### Note

*When you run Autodesk Revit Architecture in your system for the first time, you will notice that the Windows login name is displayed as the default username in the edit box in the **Username** area.*

### Setting the Journal File Cleanup

Journal files are the text files that are used to resolve technical problems that may occur during the Revit Architecture session and they record every step during the session. Whenever you encounter any technical problem with the software, you can run this file to detect the problem as well as recover the lost files or steps that had caused the problem. In Autodesk Revit Architecture 2010, these files are saved in the following default location: *C:\Program Files\Autodesk Revit Architecture 2010\Journals*. These files are saved each time you close the Revit Architecture session. As such the quantity of these files keeps on increasing until you remove these files from their location. To retain certain files and clean others, you can use the **Journal File Cleanup** area in the **General** tab of the **Options** dialog box. This area contains two spinners: **When number of journal exceeds** and **Delete journals older than (days)**. You can set the required values in these spinners to retain the files that are recently created. For example, if you need to delete journal files if their number exceeds 15 and if they were created before 30 days. Then, in such a situation, set the value in the **When number of journal exceeds** spinner to **15** and the value in the **Delete journals older than (days)** spinner to **30**.

## Setting the Display of the User Interface

In the **Display** area of the **General** tab, the **Active theme** drop-down list is available. From this drop-down list, you can select two options: **Dark** and **Light**. On selecting any of these options, the display of Autodesk Revit Architecture user interface will change.

## Graphics Tab

The **Graphics** tab enables you to configure the display card of your computer to improve the performance of the display. You can also use this tab to assign colors for the selection, highlights and alerts, and enable anti-aliasing for 3D views. In the **Graphics Mode** area of this tab, select the **Use Hardware Acceleration** check box to enable hardware accelerators. On doing so, the large models in your project will be displayed faster on refreshing the views. In addition, it will help you speed up the process of switching between the windows of views and the creation and modification of annotations in your project.

In the **Colors** area of the **Graphics** tab, select the **Invert background color** check box to toggle the color of the background and elements. The **Selection color** parameter refers to a color that an element acquires when it is selected. The default color is **RGB 059-115-255**. To use any other color, click the button on the right of the **Selection color** parameter and select the desired color from the **Color** dialog box. Revit Architecture uses the **Alert Color** button to highlight elements when an error occurs.

## File Locations Tab

By using the **File Locations** tab, you can set the path for various files and directories that are accessed frequently, as shown in Figure 2-10. The path for these files is set at the time of installing Revit Architecture, but you can modify the location by choosing the corresponding **Browse** button and specifying a new path. The default template file location can be changed, in case you wish to use a custom made template file for your projects. Revit Architecture uses the default path for user files for saving or opening a project. You can also specify the default path for family template files using the corresponding **Browse** button.

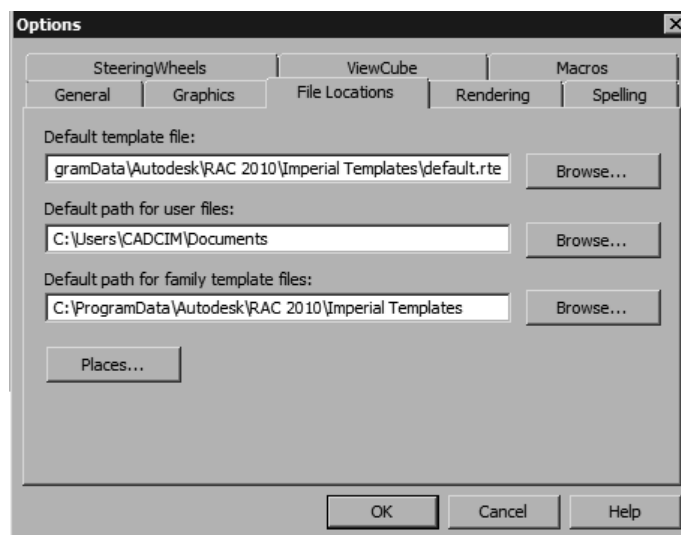


Figure 2-10 The **File Locations** tab of the **Options** dialog box

## Rendering Tab

Autodesk Revit Architecture 2010 uses the mental ray rendering engine for its rendering process. The mental ray has its own library, named Render Appearance Library. This library stores information about render appearances for materials, default RPC contents in the software, and other information relevant to the rendering process. The Render Appearance Library is a read-only library and is loaded into the following default location while installing the Revit Architecture software: *C:\Program Files\Autodesk Revit Architecture 2010\Data\Rendering\assetlibrary\_base.fbx*.

However, if you need to access the **Render Appearance Library**, which is not stored in its default location, click the **Browse** button in the **Render Library Location** area of the **Rendering** tab. In addition to the default **Render Appearance Library** location, you can also specify the paths for the additional image files defining texture, bump map, custom color for the render appearance that you can use in the project. These image files are not present with the software and therefore, you need to specify their paths to use them. To do so, choose the **Add Value** button, in the **Additional Render Appearance Paths** area and specify the required path in the displayed field or choose the **Browse** button; the **Browse for Folder** dialog box will be displayed. In this dialog box, select the desired path and choose the **Open** button to add the path in the field.

## Spelling Tab

Revit Architecture provides you the option to run spell check to find spelling errors in the text and then rectify them. You can choose the **Spelling** tab to display its options. Various self-explanatory settings can be selected from the **Settings** list. In the **Main Dictionary** area of this tab, you can select the type of dictionary, to be used as main dictionary for the spelling check, from the Autodesk Revit drop-down list. Apart from the main dictionary, you can also use additional dictionaries such as the personal and building industry dictionaries. This facilitates the use of various personal and industry related terms in the text matter of the project. There are many words that are not included in the main dictionaries but are frequently used in the building industry. For example, the abbreviation for concrete 'conc' is not available in the main dictionaries. The additional building industry dictionary has many such words and abbreviations that can be used in the text matter of the project without being prompted for errors while checking spellings. You can also add or remove words from your personal and building industry dictionary. Choose any of the **Edit** buttons available in the **Additional Dictionaries** area to view the list of words. You can enter or remove any word from these lists using the cursor and keyboard. To run spell check in your drawing, choose **Annotate > Text > Spelling** from the ribbon; the **Spelling** dialog box will be displayed, wherein you can rectify the spelling errors in the text by selecting the correct spelling and then choosing the **Change** button in the dialog box, as shown in Figure 2-11. Alternatively, you can press the F7 key to display the **Spelling** dialog box, refer to Figure 2-11, and then make necessary corrections in the text.

## SteeringWheels Tab

The **SteeringWheels** tab in the **Options** dialog box is chosen to control the visibility, appearance and operational tools of different types of SteeringWheels. This tab has seven different areas of control to use the SteeringWheels, as shown in Figure 2-12. The areas are discussed next.

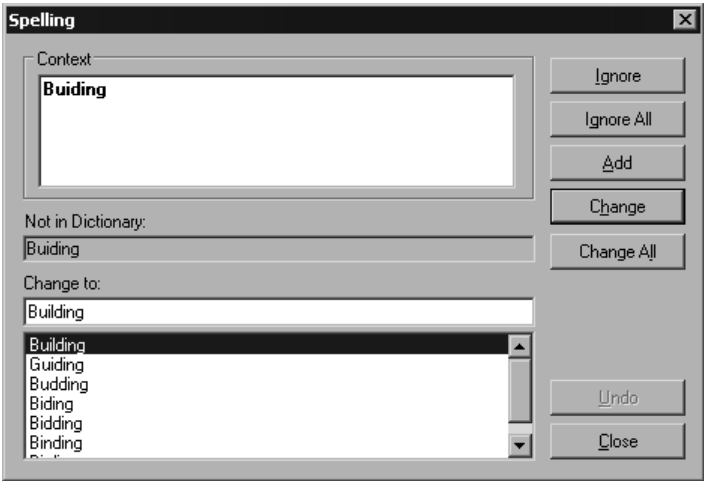


Figure 2-11 The *Spelling* dialog box

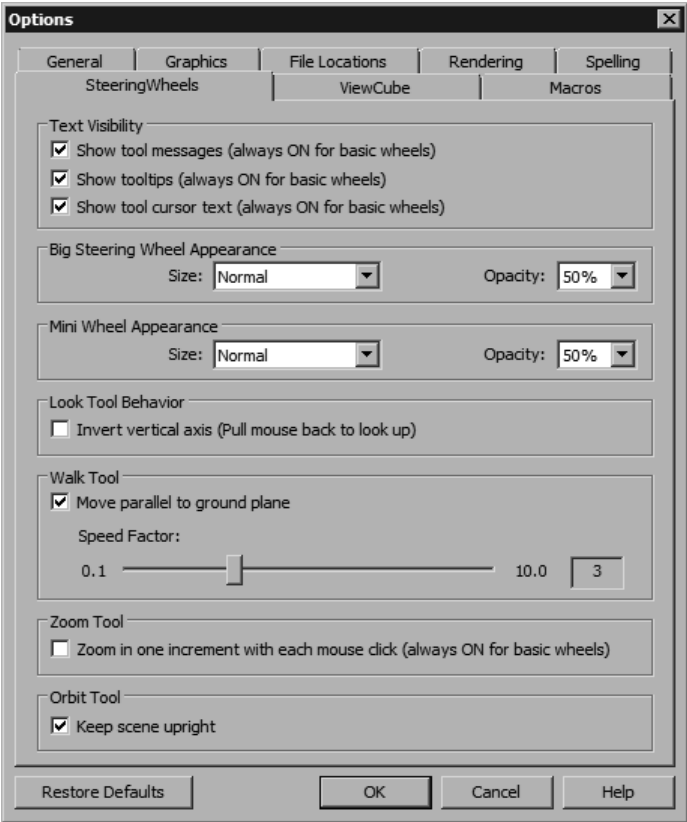


Figure 2-12 The *SteeringWheels* tab of the *Options* dialog box

## Text Visibility Area

You can control the display of tool messages, tooltips, and tool cursor of the SteeringWheels by using the options in the **Text Visibility** area of the **SteeringWheels** tab.

You need to select the **Show tool messages** check box to enable the visibility of tool messages in SteeringWheels. To display the tooltips along with the SteeringWheels, select the **Show tooltips** check box in this area. Similarly, to control the display of the cursor text when a -tool is active, use the **Show tool cursor text** check box. Select this check box to display the cursor text when the tool is active.

## Big Steering Wheel Appearance and Mini Wheel Appearance Areas

To set the size of the SteeringWheels, select the required option from the **Size** drop-down list in the corresponding areas and set its size to small, normal, or large. Similarly, you can set the transparency of the SteeringWheels by selecting the required option from the **Opacity** drop-down list.

## Look Tool Behavior and Walk Tool Areas

In the **Look Tool Behavior** area of the **SteeringWheels** tab, select the **Invert Vertical Axis** check box to change the vertical axis movement of the view. Selecting the check box enables the view to move in the same direction as the cursor in the vertical axis.

In the **Walk Tool** area of the **SteeringWheels** tab, use the **Speed Factor** slider to change the speed of the walk, when using the **Walk** tool of the SteeringWheels. Select the **Constrain Walk Move parallel to ground plane** check box in the **Walk Tool** area to constrain the movement angle of the walk to ground plane.

## Zoom Tool and Orbit Tool Areas

Select the **Zoom in one increment with each mouse click** check box in the **Zoom Tool** area to enable the zooming operation with a single click.

In the **Orbit Tool** area, select the **Keep scene upright** check box to maintain the perpendicularity between the sides of the model and the ground plane while using the **Orbit** tool.

## ViewCube Tab

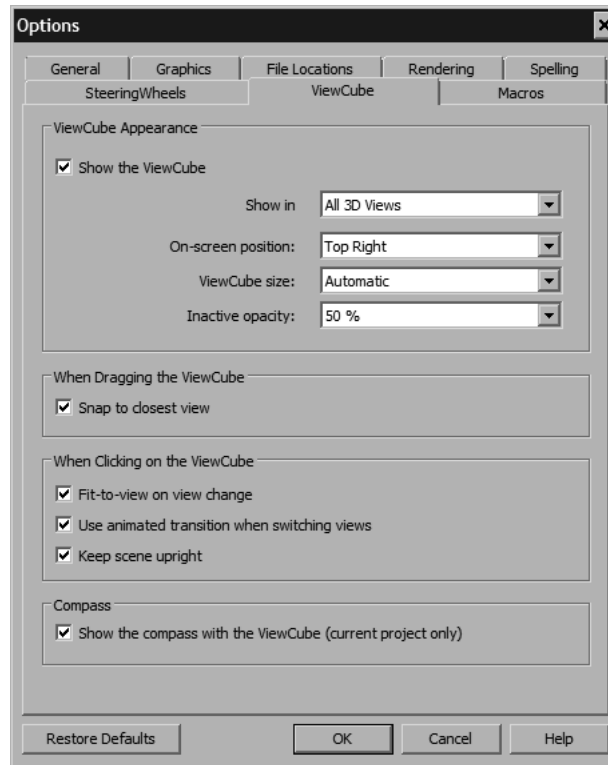
The **ViewCube** tab in the **Options** dialog box is used to edit various settings of the ViewCube. It has four different areas of modification, **ViewCube Appearance**, **When Dragging the ViewCube**, **When Clicking on the ViewCube**, and **Compass** as shown in Figure 2-13. These areas are discussed next.

### ViewCube Appearance Area

The appearance and display of the **ViewCube** can be controlled by the **ViewCube Appearance** area in the **ViewCube** tab.

In the **ViewCube Appearance** area, the **Show the ViewCube** check box is selected by default, so the ViewCube will be visible. If you clear this check box, the **ViewCube** will disappear and all options in the **ViewCube** tab will be deactivated.





*Figure 2-13 The ViewCube tab of the Options dialog box*

In the **ViewCube Appearance** area you can use various drop-down lists to align, resize, and change the transparency of the ViewCube.

Select the options from the **On-screen Position** drop-down list to align the ViewCube on the screen. Similarly, if you want to resize the ViewCube, then select the required option from the **ViewCube size** drop-down list. You can also set the opacity of the inactive ViewCube by selecting various options from the **Inactive Opacity** drop-down list.

### When Dragging the ViewCube Area

Select the **Snap to closest view** check box in the **When Dragging the ViewCube** area in the **ViewCube** tab to enable the snap to select the closest view in the ViewCube.

### When Clicking on the ViewCube Area

Select the **Fit-to-view on view change** check box in the **When Clicking on the ViewCube** area to fit the view on screen while changing the viewing direction. The **Use animated transition on switching views** check box is selected by default in this area that enables the view to change in animation. Clearing this check box will result in the change of view without any animation, when using the ViewCube. Select the **Keep scene upright** check box to keep the sides of the ViewCube and the sides of the view perpendicular to the ground plane. Clear the check box to turn around the model in full 360-degree swing. Clearing this check box can be useful when you are editing a family.

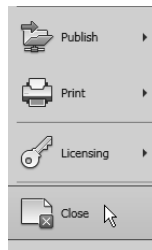
## Compass Area

The **Show the compass with the ViewCube** check box in the **Compass** area is selected by default. As a result, the compass along with the ViewCube will be visible in the drawing.

In the **ViewCube** tab, you can choose the **Restore Defaults** button to restore the default settings that were changed in its different areas.

## CLOSING A PROJECT

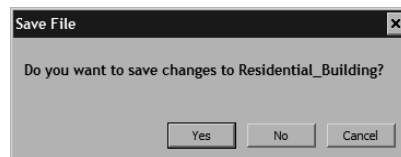
To close a project, choose the **Application** button and then select the **Close** option from the displayed **Application Menu**, as shown in Figure 2-14. If you have already saved the latest changes, the project file will be closed. Otherwise, Revit Architecture will prompt you to save the changes through the **Save File** confirmation box. You can save the changes by choosing the **Yes** button or discard them by choosing the **No** button. You can also choose the **Cancel** button to return to the interface and continue working on the project file. You can also use the **Close** button (X) in the drawing window to close the project.



*Figure 2-14 Accessing the Close option from Application Menu*

## EXITING A PROJECT

To exit a Revit Architecture session, choose the **Exit Revit** button from the **Application Menu**. Even if the project is open, you can still choose the **Exit Revit** button to close the file and exit Revit Architecture. In case, the project has not been saved, it enables you to save the work through the **Save File** confirmation box, as shown in Figure 2-15. If you choose the **No** button, all changes that were not saved will be lost. You can also use the **Close** button (X) of the main Revit Architecture window (in the title bar) to end the Revit Architecture session.



*Figure 2-15 The Save File confirmation box*



**Tip:** You must be cautious while choosing the **No** button in the **Save File** confirmation box because it discards all the changes made in the project since the last save.

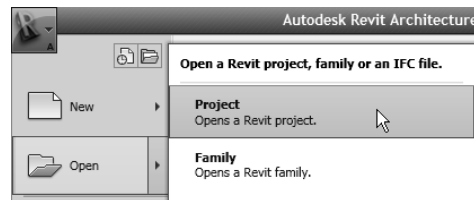
## OPENING AN EXISTING PROJECT

In Revit Architecture, several options are available to open an existing project.

### Opening an Existing Project Using the Open Tool

**Application Menu:** Open > Project  
**Shortcut Key:** CTRL+O

To open an existing project file, choose **Open > Project** from the **Application Menu**, as shown in Figure 2-16. Alternatively, you can open a project by choosing the **Open** button from **Quick Access Toolbar** or by pressing CTRL+O. On invoking the **Open** tool, the **Open** dialog box will be displayed, as shown in Figure 2-17. In this dialog box, you can open a particular project file by accessing the appropriate folder using the **Look in**



*Figure 2-16 Opening an existing project using the Application Menu*

drop-down list. The **Preview** area of the **Open** dialog box shows the preview of the selected project file. It helps you select a particular file by viewing its contents, even if you are not sure about the file name. The window icons such as the **Views** menu, placed along with the **Look in** drop-down list help you select a project file based on its size, type, and the date when it was last saved. On choosing the **Thumbnails** option from the **Views** menu, you can preview the contents of the project files inside the selected folder in the file list area, as shown in Figure 2-18. The **Places** list is located on the left in the **Open** dialog box. You can add or remove folders from the **Places** list by choosing the **Options** button from the **Application Menu**. On doing so, the **Options** dialog box will be displayed. Choose the **File Locations** tab from the dialog box, and then choose the **Places** button from it; the **Places** dialog box will be displayed, as shown in Figure 2-19.



**Tip:** The names of the recently opened files are displayed at the end of the **File** menu in the interface. On starting Revit Architecture, you can click the name of the project file that you wish to open.

The **Places** dialog box contains two columns: **Library Name** and **Library Path**. You can add or remove folders in the libraries list to create a list of frequently accessed folders. The four buttons on the left of the **Places** dialog box can be used to create or delete a library, or move it up and down in the list. To create a new library, choose the **Add Value** button, which is the third button from the top; a new library will be added to the defined path. By default, the name of the new library in the **Library Name** section will be **NewLibrary1**. Change the name of the new library and then click in the **Library Path** column to display the browse button. Choose the browse button and select the folder to be added in the libraries list using the **Browse for Folder** dialog box. Choose the **Open** button after selecting the folder; the new folder gets

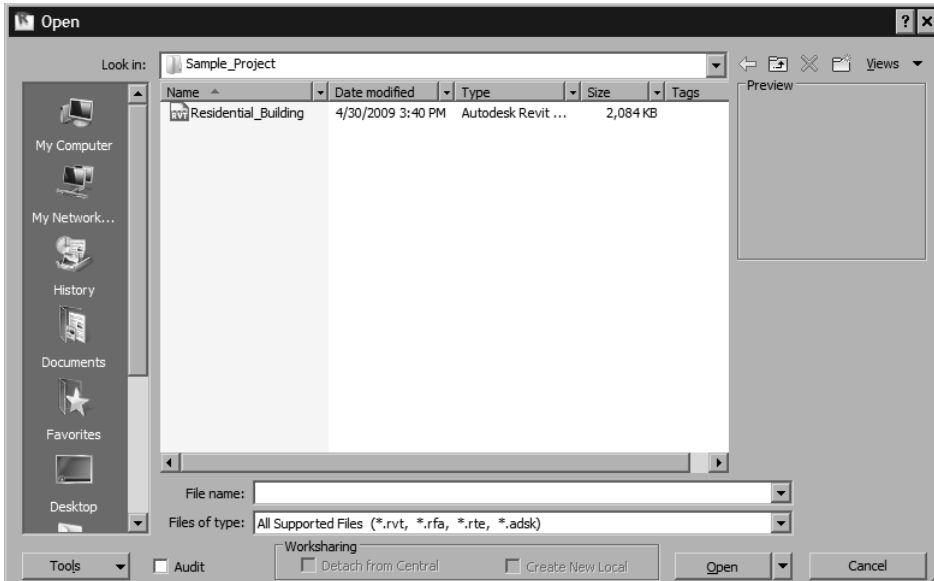


Figure 2-17 The **Open** dialog box

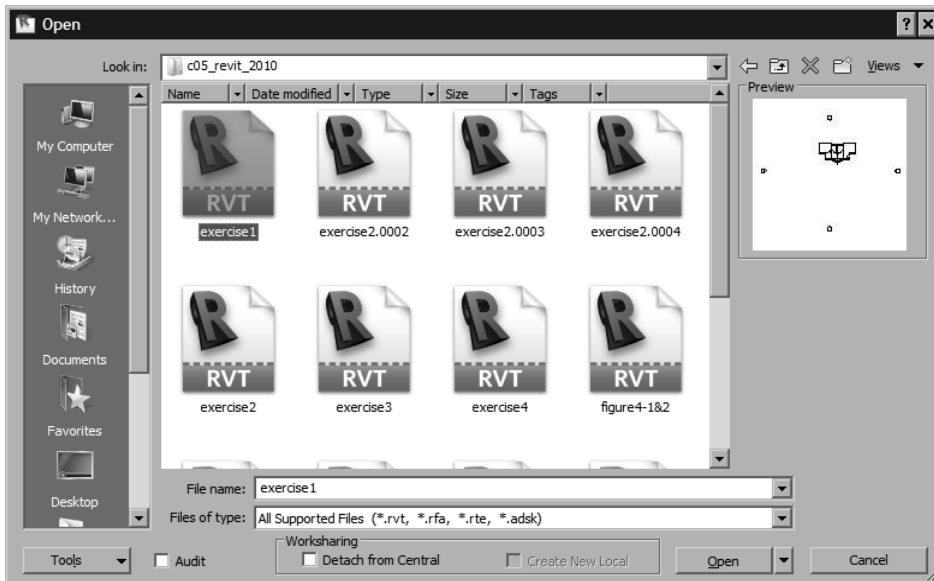


Figure 2-18 Previewing the contents inside the file using the **Thumbnails** option



**Tip:** By default, the preview of a file is the last active view or sheet at the time it was last saved. You can set the preview to a particular view from the **Options** button in the **Save As** dialog box.

added to the list. If required choose the upward arrow button in the **Places** dialog box to move the folder up to the top of the list. Similarly, you can choose the down arrow button to move it down. To delete any library, select the library and choose the **RemoveValue** button. Choose

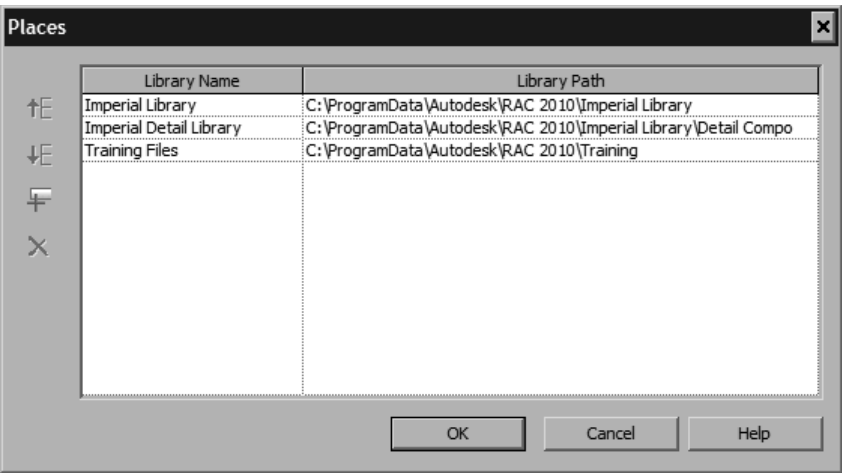


Figure 2-19 The Places dialog box



**Tip:** When you rest the cursor on the project file name, a tooltip appears, which provides you the information regarding the type and size of the project file.

the **OK** button in the **Places** dialog box to exit, and then close the **Options** dialog box. When you invoke the **Open** tool next time, the new folder icon will be displayed in the places list.

Once the file to be opened has been selected, its name will be displayed in the **File Name** edit box of the **Open** dialog box and its preview will be displayed in the **Preview** area.



**Note**  
If you try opening an already opened file, which has been modified in the Revit Architecture session, a message box appears, prompting you to close the file first and reopen it. In case you open a file that has been created using an older version of Revit, the **Program Upgrade** message box is displayed. It mentions that the file is being upgraded to the latest file format and that this is a onetime process. Once the file is opened, it gets upgraded to Autodesk Revit Architecture 2010 version.



**Tip:** The names of the recently opened files are displayed in the **Application Menu**. On starting Revit Architecture, you can click the name of the project file that you wish to open.

### Using the Windows Explorer to Open an Existing Project

Apart from using the **Open** tool from the Revit Architecture interface, you can also open files directly from the **Windows Explorer** by using the methods discussed next.

A file can be opened by double-clicking on its icon in the **Windows Explorer**. It opens the project file in the latest Revit Architecture session. If Revit Architecture is not running, double-click on the file icon to start Revit Architecture and then open the file.

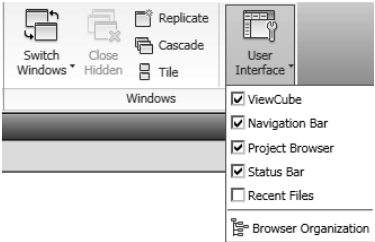
Another method of opening a project file is by dragging the project file icon from the **Windows Explorer** and dropping it into the drawing window of the Revit Architecture interface. You can also select, drag, and drop more than one file in the drawing window. In this case, Revit Architecture prompts you to open the files in separate windows. Choose the **OK** button to open all files in the same Revit Architecture session.

## MODEL DISPLAY TOOLS

As described earlier, in Revit Architecture, you can create the building model using the 3D parametric elements. Various tools are provided to view the building model. Based on the requirement, you can use these tools to navigate and edit elements in the building model.

### Using the Zoom Tools

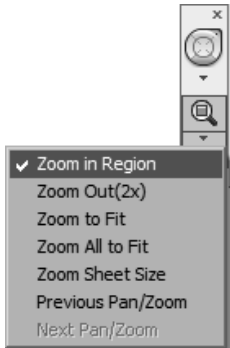
The **Zoom** tools are used to enlarge or reduce a project view in the viewing area. To use this tool, you need to invoke the **Navigation Bar** in your drawing. To do so, choose **Window > User Interface** from the **View** tab of the ribbon; a cascading menu will be displayed, as shown in Figure 2-20. In the cascading menu, select the **Navigation Bar** check box; the **Navigation Bar** will be displayed in the viewing area. In the **Navigation Bar**, click on the down arrow below the **Zoom in Region** tool; a cascading menu will be displayed, as shown in Figure 2-21. This cascading menu displays different zooming options, which are discussed next.



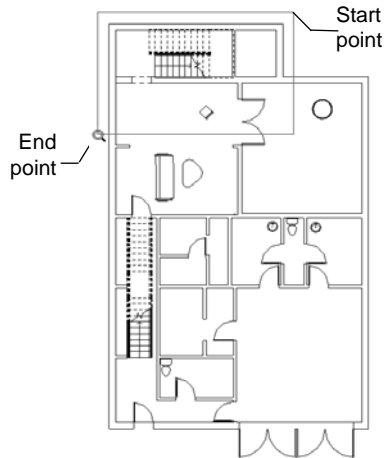
*Figure 2-20 Selecting the Navigation Bar check box from the displayed cascading menu*

### Zoom In Region

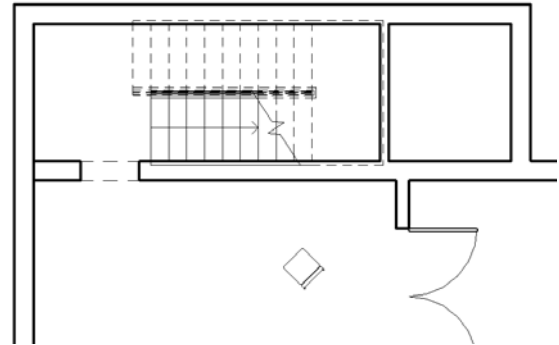
This tool is used to zoom into a specified area or window. When you invoke the **Zoom In Region** tool from the **Navigation Bar**, the cursor is replaced by a magnifying glass. To zoom into an area, you need to define a rectangular window by picking its diagonally opposite corners. You can click at a point to specify the start point of the window. When you move the cursor, a dynamic rectangular window is created whose one corner is the specified point and the other corner is attached to the cursor. Move the cursor across the area you want to enlarge. When the area is enclosed in the rectangle, click to specify the diagonally opposite corners of the zoom window. The specified portion of the current view is enlarged. For example, to work on the stairs of the building plan, you can invoke the **Zoom In Region** tool and click to specify the two opposite corners of the window, as shown in Figure 2-22. The resulting enlarged view is shown in Figure 2-23.



*Figure 2-21 Different zooming options in the cascading menu*



**Figure 2-22** Specifying the corners of the zoom window



**Figure 2-23** The resulting enlarged view

### Zoom Out(2X)



This tool is used to zoom out of the existing view by twice the size of the current view. This means, when you invoke this tool, the new view will show twice the length and width of the original view.

### Zoom To Fit and Zoom All to Fit



The **Zoom To Fit** tool is used to display all the contents of the project in the current view. On invoking this tool, the drawing window will adjust to show all the elements that have been created in a view. If there are multiple windows open with different zoom factors, invoke the **Zoom All to Fit** tool to perform **Zoom To Fit** in all the windows.

### Zoom Sheet Size



The **Zoom Sheet Size** tool is used to fit the drawings in the default sheet size displayed in the **Paper** tab of the printer's **Properties** dialog box. This dialog box will be displayed on choosing the **Properties** button in the **Print** dialog box.

### Previous Pan/Zoom and Next Pan/Zoom

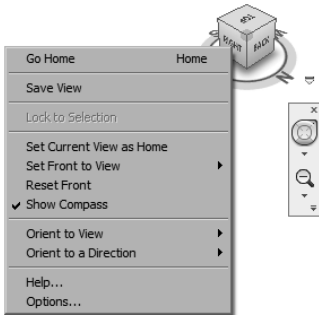
The **Previous Pan/Zoom** tool reverts back to the last displayed view using zoom or pan, whereas the **Next Pan/Zoom** tool is a toggle tool to show the next displayed view.

### Using the Orient Tool

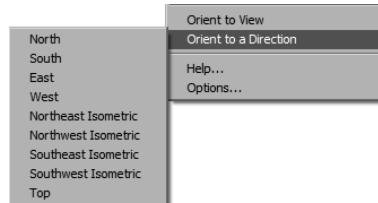
In Revit Architecture, you can view a building model in 3D from the preset viewpoints using the **Orient** tool.

To activate the **Orient** tool, first you need to activate the 3D view by double-clicking on {3D} under the **3D Views** head in the **Project browser**. Alternatively, you can also activate the 3D view by choosing **Create > 3D View > Default 3D** from the **View** tab of the ribbon. On doing so, the current view will orient to the default 3D view along with the ViewCube displayed at

the upper-right corner of the drawing area. Now, place the cursor over the ViewCube and right-click; a shortcut menu will be displayed, as shown in Figure 2-24. Now, in the shortcut menu, click on the **Orient to a Direction** option; a cascading menu will be displayed, as shown in Figure 2-25. From this cascading menu, select the appropriate view that will be displayed in the drawing window.



*Figure 2-24 Options in the shortcut menu of the **ViewCube***



*Figure 2-25 Options in the cascading menu of the **Orient to Direction** tool*

## Navigation Tools

Autodesk Revit Architecture 2010 navigation tools help you navigate and maneuver into your model in different directions and views. Two new navigation tools have been added in Autodesk Revit Architecture 2010, the SteeringWheels and the ViewCube, and these are discussed next.

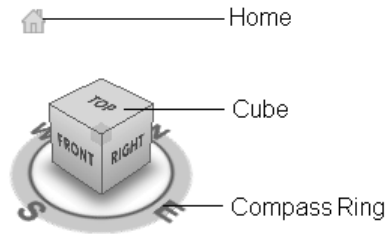
### ViewCube

The ViewCube is an interactive 3D navigation tool that appears in all 3D views of Revit Architecture 2010. By default, the **ViewCube** tool is visible at the top right corner of your drawing area.

The **ViewCube** navigation tool comprises of a cube, a compass ring at the base with various directions marked on it, and a home icon that helps you set the default view, as shown in Figure 2-26. The **ViewCube** navigation tool is displayed in your drawing area either in the active or inactive state, as shown in Figures 2-27 and 2-28. By default, the ViewCube in its inactive state and it appears partially transparent over your drawing area, so as to prevent the obstruction of the view of your model. Whereas, in its active state, the ViewCube appears opaque and distinct and obstructs the view of your model. You can change the size, on-screen placement, visibility of the compass, and the inactive opacity of the ViewCube as per your requirement. To do so, choose the **ViewCube** tab from the **Options** dialog box as discussed earlier.

In the ViewCube, there are twenty-six defined areas, comprising of faces, edges, and corners. The twenty-six defined areas can be divided into three categories, corner, edge, and face, as shown in Figure 2-29. Out of the twenty-six defined areas, six areas represent the standard orthographic views of a model such as top, bottom, front, back, left, and right. The standard orthographic views are set by clicking on one of the faces on the ViewCube. The other twenty areas are defined to access the angular views of a model.





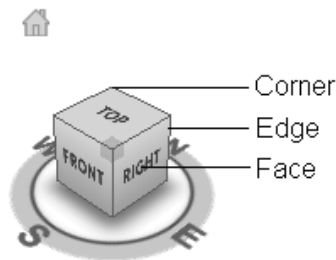
**Figure 2-26** The ViewCube and its various components



**Figure 2-27** The ViewCube in the active state



**Figure 2-28** The ViewCube in the inactive state



**Figure 2-29** Different area on the ViewCube

When you move the cursor on the faces, edges, or vertices of an active ViewCube, the corresponding area gets highlighted in dark-gray color. These highlighted regions are called hotspots. While using the ViewCube, you can click on these hotspots to orient your view as per your requirement.

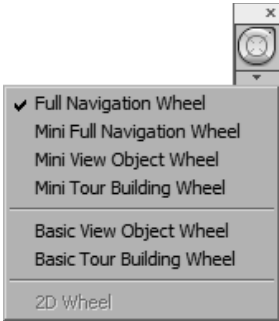
## SteeringWheels

The **SteeringWheels** navigation tools are tracking menus that comprise of multiple navigation features in a single interface. Using the features in these tools, you can pan, zoom, walk, look, and adjust the view of your model as per your requirement. The **SteeringWheels** tool

is divided into different sections known as wedges. Each wedge represents a unique function for navigation.

To activate the **SteeringWheels** navigation tool in your model, press the F8 key. The **SteeringWheels** tool will appear according to the state of view in which you are working. If you are currently working in a 2D view, you can use the 2D **SteeringWheels** tool. Similarly you can use the 3D **SteeringWheels** tool when you are working in the 3D view.

In Autodesk Revit Architecture 2010, you can access various types of SteeringWheels from the **Navigation Bar**. In the **Navigation Bar**, click on the down arrow below the default **Full Navigation Wheel** tool; a shortcut menu with various types of Steering Wheels will be displayed, as shown in Figure 2- 30.



**Figure 2-30** Shortcut menu displaying various types of SteeringWheels

To navigate the 2D view, you can use the 2D navigation wheel, as shown in Figure 2-31. The 2D navigation wheel has three navigation tools, **Zoom**, **Pan**, and **Rewind**. **Zoom** is a common navigation tool for enlarging or reducing the viewing scale of the model. You can use the **Pan** tool for traversing across the model view. The **Rewind** tool can be used to see the views of the previous zooming states which are saved temporarily.



**Figure 2-31** The 2D Steering Wheels navigation tool

The 3D **SteeringWheels** navigation tools help you navigate through your 3D views. Based on the size and appearance, the 3D SteeringWheels is categorized into two groups, Mini Steering Wheels and Big SteeringWheels.

The Mini SteeringWheels are classified into three types, **Mini View Object Wheel**, **Mini Tour Building Wheel**, and **Mini Full Navigation Wheel**, as shown in Figure 2-32.

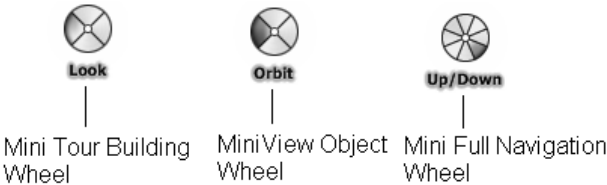


Figure 2-32 Types of Mini SteeringWheels for 3D Views

The **Mini View Object Wheel** has four distinct navigation tools, **Pan**, **Zoom**, **Rewind**, and **Orbit**. Similarly, the **Mini Tour Building Wheel** comprises of four unique navigation options, **Up/Down**, **Look**, **Walk**, and **Rewind**. The **Full Navigation Wheel** comprises of eight wedges with each wedge defining an unique navigation function. The **Mini Full Navigation Wheel** combines all the functions of the **Mini View Object Wheel** and **Mini Tour Building Wheel**. The Big SteeringWheels has the similar classification as that of the Mini SteeringWheels, as shown in Figure 2-33, and it has the same navigation tools as that of the Mini SteeringWheels with the only difference in their appearances on screen.

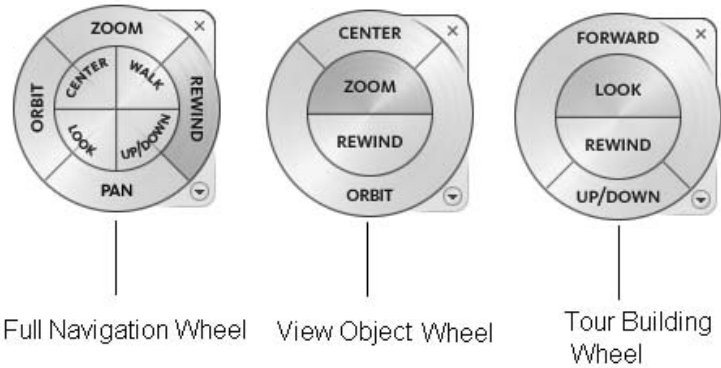
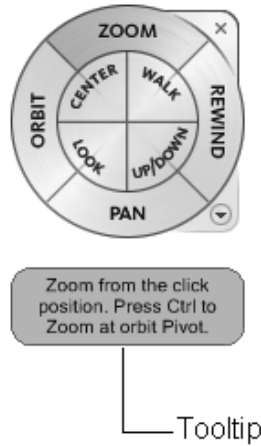


Figure 2-33 Appearance of Big SteeringWheels

As you put your cursor over any of the navigation tools, the tooltips and messages are displayed, as shown in Figure 2-34. The tooltips inform you regarding the tool that you want to use and provide instruction for using it. You can control the visibility of the tooltips and the tool messages while using the SteeringWheels by using the **Options** dialog box, as discussed earlier in this chapter.

While using the **SteeringWheels** navigation tool, you can activate the available navigation tools by clicking and holding the left mouse button over any one of the wedges. After holding the



**Figure 2-34** Appearance of the tooltip with the *SteeringWheels*

left mouse button and dragging it over the drawing area, you can use the selected navigation tool for reorienting your view. Now, to exit the selected navigation tool, release the left mouse button.

## Other Display Options

Revit Architecture provides five options to view the building model in different modes of shading. You can select these options by clicking on the **Model Graphics Style** button from the **View Control Bar**, and then selecting the desired option from the shortcut menu that will be displayed. There are four options that are available in the shortcut menu and are described next.

- Wireframe** : Displays the model with all lines and edges without surfaces
- Hidden Line** : Displays the model with lines and edges by removing those which are hidden by surfaces
- Shading** : Displays the building model with the surfaces shaded with respect to the material shading and default lighting effect
- Shading with Edges** : Displays the model with shaded surfaces and all visible lines and edges



### Note

*By default, these options affect the current view only. However, you can save the shading effects by saving the shaded view in the project file.*

## TUTORIALS

In the following chapters, you will setup two projects, an apartment complex and a club building. Some portions of these two projects will be completed in the tutorials and the rest are given as exercises. The tutorials and exercises form a sequence and to complete these projects, you will need to complete the tutorials and exercises in the previous chapters. The following tutorials will familiarize you with the tools and concepts discussed in this chapter such as starting Revit Architecture, opening a new project, setting units, setting snaps, saving and closing the project.

### Tutorial 1

### Apartment 1

In this tutorial, you will create a new project file for the *Apartment 1* project with the following parameters.  
(Expected time: 15 min)

1. Template file- **Imperial Templates > default.rte**.
2. Project Units- **Feet and fractional inches**, Rounding- **To the nearest 1/2"**.
3. Length dimension snap increment- **5';2'6";3";0'1/2"**.
4. File name to be assigned- *c02\_Apartment1\_tut1.rvt*

The following steps are required to complete this tutorial:

- a. Start a Revit Architecture session.
- b. Use **default.rte** as the template file for the project, refer to Figure 2-35.
- c. Set **Feet and fractional inches** as the project units using the **Project Units** dialog box, refer to Figure 2-36.
- d. Set **5';2'6";3"; 0'1/2"** as the length dimension snap increment using the **Snaps** dialog box.
- e. Set **Endpoint, Midpoint, Nearest, Perpendicular, Work Plane Grid**, and **Intersection** as the object snaps in the **Snaps** dialog box.
- f. Save the project as *c02\_Apartment 1.rvt* using the **Save As** tool, refer to Figure 2-37.
- g. Close the project using the **Close** tool.

### Starting Autodesk Revit Architecture 2010

1. Start Revit Architecture by choosing **Start > Programs > Autodesk > Autodesk Revit Architecture 2010 > Autodesk Revit Architecture 2010**. The program is loaded and the user interface screen is displayed.

### Opening a New Project

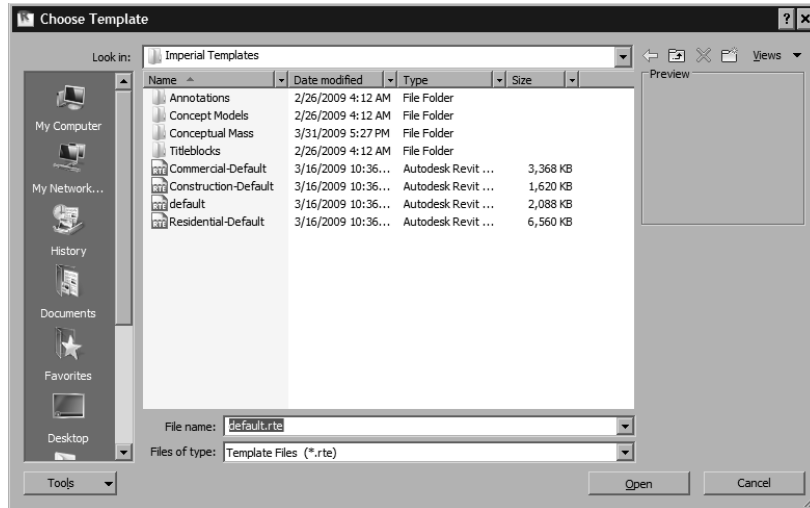
1. Click on the **Application** button; **Application Menu** is displayed. Choose **New > Project** from this menu; the **New Project** dialog box is displayed.



### Using the Template File

To use the template file for the project, you need to access the appropriate folder and select the required template file.

1. In the **New Project** dialog box, choose the **Browse** button; the **Choose Template** dialog box is displayed, showing a list of the template files available in the **Imperial Templates** folder.
2. In the **Choose Template** dialog box, the **default.rte** template file is already selected as the default template file, as shown in Figure 2-35. Choose the **Open** button to close the **Choose Template** dialog box and assign the selected template file to the **New Project** dialog box.



*Figure 2-35 Selecting the template file from the **Choose Template** dialog box*

3. Use the **Project** radio button (default) to create a project file and choose the **OK** button to close the **New Project** dialog box; the **default.rte** template file is loaded. Notice that the **Project browser** now shows different levels and views which have already been created in the selected template file.

## Setting the Units

1. To set the units for the project, choose **Project Settings > Project Units** from the **Manage** tab of the ribbon; the **Project Units** dialog box is displayed.
2. Click in the **Format** column next to the **Length** parameter; the **Format** dialog box is displayed.
3. In the **Format** dialog box, click on the **Units** drop-down list for setting the length units. Select **Feet and fractional inches** (default option).
4. Click on the **Rounding** drop-down list and select the **To the nearest 1/2"** option, as shown in Figure 2-36.
5. Choose the **OK** button; the **Project Units** dialog box is displayed. Again, choose the **OK** button to apply the specified units and exit the displayed dialog box.

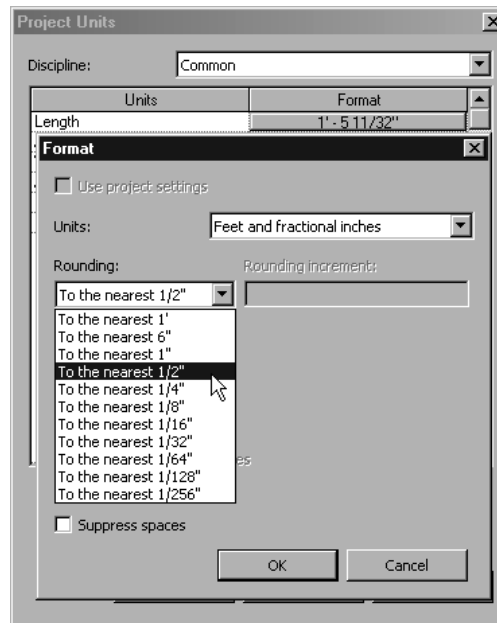


Figure 2-36 Setting the *Rounding* parameter in the **Format** dialog box

## Setting Dimension and Object Snaps

To set the dimension snaps and object snaps, use the **Snaps** tool. These settings are made based on the type of the project and the amount of detailing required.

1. Choose **Project Settings > Settings > Snaps** from the **Manage** tab of the ribbon; the **Snaps** dialog box is displayed. In the **Length dimension snap increments** edit box, type **5';2'6";3"; 0'1/2"**. (Refer to the **Snap Settings** section of this chapter to know more about the **Snaps** tool)
2. In the **Object Snaps** area, click on the **Quadrants**, **Centers**, **Tangents**, and **Points** check boxes to disable them. Leave the other options such as **Endpoints**, **Midpoints**, **Nearest**, **Perpendicular**, **Work Plane Grid**, **Snap to Remote Objects**, and **Intersections** enabled. Choose the **OK** button to apply the settings and exit the **Snaps** dialog box.

## Saving the Project

The project parameters set in the previous steps are an integral part of the project file. To save this project file with these settings, use the **Save** tool.

1. To save the project, choose the **Save** option from the **Application Menu**. As you are saving the project for the first time, the **Save As** dialog box is displayed.
2. Browse to the *Documents* folder and create a folder with the name *revit\_2010*.
3. Open the *revit\_2010* folder and save the file with the name *c02\_Apartment1\_tut1.rvt*, as shown in Figure 2-37.

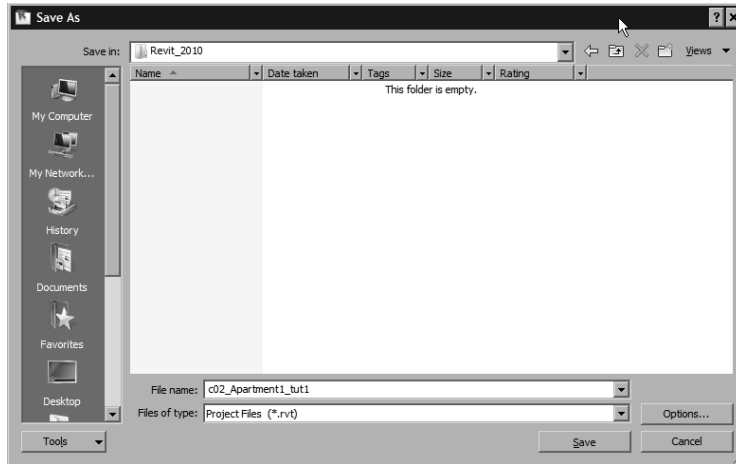


Figure 2-37 Saving the project using the *Save As* dialog box

## Closing the Project

1. To close the project, choose the **Close** option from **Application Menu** in the ribbon. As you have already saved the latest changes made to the project file, choose **Close** to close the project file.

## Tutorial 2

## Club

In this tutorial, you will create a new project file for the *Club* project using the following parameters.  
(Expected time: 15 min)

1. Template file- **Imperial Templates > Commercial-Default.rte**.
2. Project Units- **Feet and fractional inches**.
3. Length dimension snap increment- **10';2'6";1'; 0'3"**.
4. Object snaps to be set- all available object snaps.
5. File name to be assigned- *c02\_Club\_tut2.rvt*

The following steps are required to complete this tutorial:

- a. Start a Revit Architecture session.
- b. Use **Commercial-Default.rte** as the template file by accessing the **Imperial Templates** folder.
- c. Set **Feet and fractional inches** as the project units using the **Project Units** dialog box.
- d. Set **10';2'6";1'; 0'3"** as the length dimension snap increment in the **Snaps** dialog box.
- e. Enable all the object snaps using the **Snaps** dialog box.
- f. Save the project as *c02\_Club\_tut2.rvt* using the **Save As** tool.
- g. Close the project using the **Close** tool



## Starting Revit Architecture and Opening a New Project

1. Start a new Revit Architecture session by double-clicking on the Autodesk Revit Architecture 2010 shortcut icon on the desktop. The program is loaded and the user interface screen is displayed. In case, the Revit Architecture session is already running, this step can be ignored and the project file can be opened directly.
2. Choose **New > Project** from **Application Menu**; the **New Project** dialog box is displayed.

## Using the Template File

As given in the project parameters, you need to use the **Commercial-Default** template file for this project. This template file can be selected from the **New Project** dialog box.

1. In the **New Project** dialog box, choose the **Browse** button; the **Choose Template** dialog box is displayed. From the **Imperial Templates** folder of the displayed dialog box, select the **Commercial-Default** template file and choose **Open**. Choose **OK** to exit the **New Project** dialog box.

The **Commercial-Default.rte** template file is loaded. Notice that the **Project browser** now shows several levels that are preloaded in the template file.

## Setting Units

You can set the units for various measurement parameters using the **Project Units** dialog box.

1. Choose **Project Settings > Project Units** from the **Manage** tab of the ribbon; the **Project Units** dialog box is displayed.
2. Click in the **Format** column next to the **Length** unit; the **Format** dialog box is displayed. In this dialog box, make sure that the **Feet and fractional inches** option (default option) is selected.
3. Click on the **Rounding** drop-down list and select **To the nearest 1/4"**.
4. Choose **OK** to return to the **Project Units** dialog box. Next, choose the **OK** button to apply the settings and return to the user interface screen.

## Setting Dimensions and Object Snaps

Next, access and modify the settings in the **Snaps** dialog box. You need to specify the dimension snap increment and enable all object snap options.

1. Choose **Project Settings > Settings > Snaps** from the **Manage** tab of the ribbon; the **Snaps** dialog box is displayed.
2. In **Object Snaps** area, click on the **Check All** button to enable all object snaps options.

3. In the **Length dimension snap increments** edit box, enter **10';2'6";1'; 0'3"**; and then choose the **OK** button to apply the settings and exit the **Snaps** dialog box.

## Saving the Project

In this section, you will save the project and the settings using the **Save As** dialog box.

1. To save the project with the settings, choose **Save As > Project** from the **Application Menu**. As you are saving the project for the first time, the **Save As** dialog box is displayed.
2. Browse to the `revit_2010` folder and enter **c02\_Club\_tut2** in the **File name** edit box. Notice that the **File of type** drop-down list shows **Project Files (\*.rvt)** as the default option.
3. Choose the **Save** button to save the project as `c02_Club_tut2.rvt`. The project is saved in the specified location.

## Closing the Project

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

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

## Self-Evaluation Test

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

1. You can open only one Revit Architecture project at a time. (T/F)
2. In Revit Architecture, all enabled object snaps work together. (T/F)
3. While saving a project file for the first time, when you choose the **Save** option from **Application Menu**, the **Save As** dialog box is displayed. (T/F)
4. A project file can be opened by double-clicking on the file name in the Windows Explorer. (T/F)
5. You can save any project file as a template file. (T/F)
6. The shortcut key to use the **Save** option is \_\_\_\_\_.
7. To specify the location of the default template file, you can use the \_\_\_\_\_ tab in the **Options** dialog box.
8. The \_\_\_\_\_ button in the **Save As** dialog box can be used to specify the maximum number of backup(s) for a project file.

9. The \_\_\_\_\_ option of Revit Architecture enables you to override the snap settings for a single pick only.
10. You can add folders to the \_\_\_\_\_ in the **Save As** dialog box to access the frequently used folders directly.

## Review Questions

Answer the following questions:

1. You can modify the project unit settings anytime during the project. (T/F)
2. The project file name and path have to be specified each time you save the project. (T/F)
3. You cannot control the visibility of the tooltip assistant. (T/F)
4. The **Save reminder interval** drop-down list that is available in the **General** tab of the **Options** dialog box is used to specify the time interval between the reminder prompts to save the project file. (T/F)
5. If the changes made to a project file have not been saved, on choosing the **Close** option, Revit Architecture prompts you to save the changes before closing it. (T/F)
6. You can open only one project file at a time in a Revit Architecture session. (T/F)
7. You can add words to the additional dictionaries for checking spellings. (T/F)
8. Which of the following options is not an object snap option?
  - a) **Endpoint**
  - b) **Work Plane Grid**
  - c) **Dimension**
  - d) **Centers**
9. Which of the following keys can be used to toggle between the object snap options available at the same point?
  - a) TAB
  - b) CTRL
  - c) ALT
  - d) F3
10. Which of the following shortcut keys is used to activate the SteeringWheels.
  - a) F2
  - b) F6
  - c) CTRL
  - d) F8

## Exercises

### Exercise 1

### Apartment 2

Create a new project file for the *Apartment 2* project with the following parameters.

(Expected time: 15 min)

1. Template file- **Imperial Templates > default.rte**
2. Project Units- **Feet and fractional inches**
3. Length dimension snap increment- **5';2'6";3"; 0'1/2"**
4. File name to be assigned- *c02\_Apartment2\_ex1.rvt*

### Exercise 2

### Elevator and Stair Lobby 2

Create a new project file for the *Elevator and Stair Lobby* project with the following parameters.

(Expected time: 15 min)

1. Template file- **Imperial Templates > default.rte**
2. Project Units- **Feet and fractional inches**
3. Length dimension snap increment- **5';1';3"; 0'1"**
4. File name to be assigned- *c02\_ElevatorandStairLobby2\_ex2.rvt*

### Answers to Self-Evaluation Test

1. F, 2. T, 3. T, 4. T, 5. T, 6. CTRL+S, 7. File Locations, 8. Options, 9. Temporary Overrides, 10. Places list

# Chapter 3

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## Creating the First Project

### Learning Objectives

**After completing this chapter, you will be able to:**

- *Understand the concept of walls.*
- *Understand the properties of walls.*
- *Use the sketching tools to create walls.*
- *Create exterior walls based on the given parameters.*
- *Create interior walls based on the given parameters.*



In the previous chapter, you have learned about the procedure of starting and saving a new project. In this chapter, you will learn how to use walls as the basic element of a building project.

## CREATING A BUILDING PROJECT

In Autodesk Revit Architecture, the term ‘project’ comprises of not only the physical building model but also its associated documentation such as drawings, views, schedules, areas, and so on. The first step in creating a project is to create the building model. In Autodesk Revit Architecture, you can create it using the following two different methods:

**Method 1:** Create a building model using individual building elements such as walls, windows, doors, floors, roofs, and so on.

**Method 2:** Create a building model using the **Massing** tools and conceptualize the overall building shape and volume before working with individual elements.



**Tip:** You can also use the combination of the above two methods. You can generate building mass using the Massing tools and then convert it into a building model with individual building elements.

The selection of method depends on different project parameters such as project magnitude, building shape, building technology, current documentation stage of a project, industry parameters, and so on. The use of the **Massing** tool to create a building geometry will be described later in Chapter 10. The following few chapters of this textbook describe the usage of individual building components to develop a building model.

Autodesk Revit Architecture provides you with several tools to add individual building elements such as wall, floor, roof, and so on for creating a building model. Several predesigned element types have been provided for each building element in Autodesk Revit Architecture’s libraries. You have the flexibility to either use the predesigned element types or create your own element type to create a building model.

## Sequence of Creating a Building Model

The sequence of using building elements for creating a building model may also depend on various parameters such as building type, building volume, building shape, and so on. For most of the building projects, the sequence given below may be adopted.

Step 1: Start the model by creating the exterior walls of the building at Level 1 (lowest level).

Step 2: Create interior walls at the desired locations.

Step 3: Add doors and windows to the exterior and interior walls at the desired location.

Step 4: Add the floor to the building model.

Step 5: Add the roof to the building model.

Step 6: Add the structural or architectural grid and structural elements.

Step 7: Add stand-alone components such as furniture items and plumbing fixtures.

Step 8: Add text and annotations to different spaces.

Step 9: Create dimensions for different parameters of the project.

Step 10: Create project details and documentation.

Step 11: Create the rendered 3D views and walkthrough.

In Autodesk Revit Architecture, each building element is a three-dimensional parametric entity. This means, on adding elements, you also add the related information and specification about them. One of the most important elements in a building model is the wall that defines the basic spatial arrangement of the building and that acts as the host for doors and windows.

## Understanding Wall Types

Autodesk Revit Architecture provides you with several predefined wall types based on their usage such as **Exterior**, **Interior**, **Retaining**, **Foundation**, and **Curtain**.

### Exterior Wall Type

This category constitutes the wall types that are primarily used for generating the exterior skin of the building model. It has predefined wall types such as **Brick on CMU**, **Brick on Mtl. Stud**, **CMU Insulated**, and so on.

### Interior Wall Type

The interior walls are used as the interior partitions in a building project. These walls are non-bearing in character. The predefined interior walls provided in Autodesk Revit Architecture have a dry wall construction with a metal stud frame and varying thickness.

### Retaining Wall Type

As the name suggests, the primary function of the retaining walls is to retain the earth. You can either use the retaining walls provided in the program or set the function of any wall type as retaining. For example, you can select a wall from the drawing and select **Retaining - 12" Concrete** from the **Change Element Type** drop-down list. On doing so, the current wall type of the wall will be changed to retaining.

### Foundation Wall Type

The walls that form the foundation or substrate of the main building structure belong to this category. To create a foundation wall, the **Foundation - 12" Concrete** option is provided as the predefined foundation wall type in the **Change Element Type** drop-down list.

### Curtain Wall Type

Apart from these wall types, Autodesk Revit Architecture also has predefined curtain walls or screen walls that consists of panels and mullions.

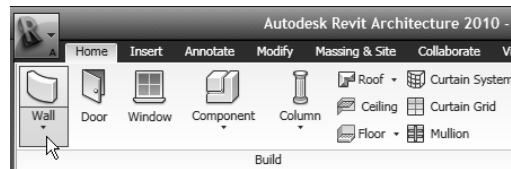
Autodesk Revit Architecture provides you with the flexibility of creating your own wall type. The walls that you will create can have different functions, which can be modified, depending on their functional usage.

## Creating Walls

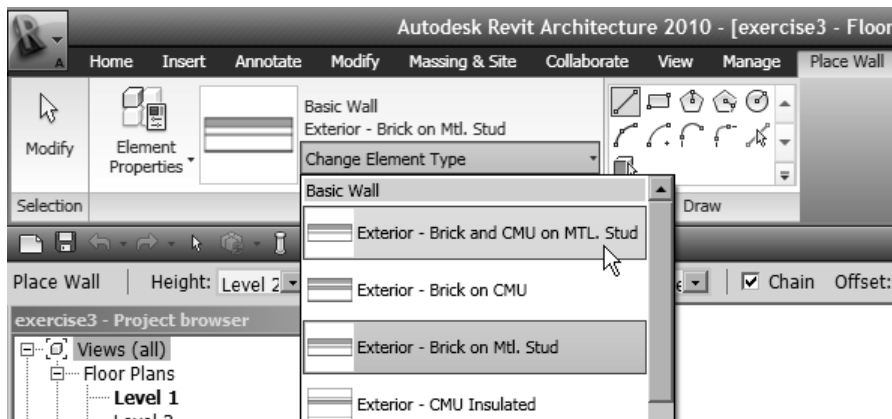
**Ribbon:** Home > Build > Wall  
**Shortcut Key:** WA

In this section, you will learn the method of creating and editing exterior walls. In Autodesk Revit Architecture, each wall type has specific predefined properties such as its usage, composition, material, characteristics, finish, height, and so on. You can select the wall type based on its specific usage in the project. Walls, like most other model elements, can be created in a plain view or a 3D view.

To create an exterior wall, first you need to invoke the **Wall** tool and then select the appropriate exterior wall type. To invoke the **Wall** tool, choose **Build > Wall** from the **Home** tab of the ribbon, as shown in Figure 3-1; the **Place Wall** tab will be displayed. In this tab, you can select the type of wall from the **Change Element Type** drop-down list in the **Element** panel, as shown in Figure 3-2.



*Figure 3-1 Invoking the Wall tool from the ribbon*



*Figure 3-2 Selecting the wall type from the Change Element Type drop-down list*

## Wall Properties

In Autodesk Revit Architecture, wall, like other elements, has two sets of properties, type and instance. These set of properties control the appearance and the behavior of the element concerned.



Wall Instance Properties

To access the instance properties of a wall, invoke the **Wall** tool from the ribbon and then choose **Element > Element Properties > Instance Properties** from the **Place Wall** tab of the ribbon. The **Instance Properties** dialog box will be displayed, as shown in Figure 3-3.

The **Instance Properties** dialog box contains the **Family** and **Type** drop-down lists. You can select the family and the type of the proposed wall, respectively from these drop-down lists. The **Instance Parameters** table in this dialog box shows various parameters and their corresponding values for the specified instance of the element. Using it, you can specify the instance parameters of the wall element that you will create. The options in this table depend on the type and instance of the selected element or the element to be created as well as on the options selected in the **Type** and **Family** drop-down lists. The instance properties of exterior walls are displayed in different categories such as **Constraints**, **Structural**, **Dimensions**, and **Identity Data**, each representing a set of properties corresponding to the title. You can use the twin arrows on the extreme right of the title to collapse the table of properties for each title. Some of the important instance parameters are discussed next.

The **Location Line** parameter indicates the reference line used for creating a wall. In a 3D environment, the location line refers to a plane in the wall that does not get modified, even if the wall parameters are changed. Click on the **Value** column; a drop-down list will be displayed. Click on the displayed arrow to view the available options. The options in the drop-down list are discussed next.

<b>Wall Centerline</b>	-	Center line of the entire composite wall
<b>Core Centerline</b>	-	Center line of the structural core of the wall
<b>Finish Face: Exterior</b>	-	Exterior face of the wall as the location line
<b>Finish Face: Interior</b>	-	Interior face of the wall as the location line
<b>Core Face: Exterior</b>	-	Exterior face of the core
<b>Core Face: Interior</b>	-	Interior face of the core

The location line is indicated by a dashed line, which appears while sketching a wall segment. For example, on selecting **Wall Centerline** as the location line parameter, you will notice a dashed line in the middle of the wall, as shown in Figure 3-4. When you select **Finish Face: Interior**, it appears on the interior face of the wall, see Figure 3-5.



Note

*As the design is developed, you may need to modify certain parameters of the exterior wall such as its thickness and composition, based on the final selection of materials and their specifications. Considering this flexibility, the location line parameter enables you to create walls.*

In Autodesk Revit Architecture, you can specify the height of walls by applying the base and top constraints with respect to the levels defined in the project. This means once you set the base and height parameter of a top story and apply these constraints, all walls will be sketched with the same base and the top. To create a wall segment that is not related to these components and levels, you can type the desired height in the **Value** column of the **Unconnected Height** instance parameter. The default value for the unconnected height is 20'0".

Instance Properties

Family: System Family: Basic Wall

Type: Exterior - Brick on Mtl. Stud

Load...

Edit Type...

Instance Parameters - Control selected or to-be-created instance

Parameter	Value
Constraints	
Location Line	Wall Centerline
Base Constraint	Level 1
Base Offset	0' 0"
Base is Attached	<input type="checkbox"/>
Base Extension Distance	0' 0"
Top Constraint	Unconnected
Unconnected Height	20' 0"
Top Offset	0' 0"
Top is Attached	<input type="checkbox"/>
Top Extension Distance	0' 0"
Room Bounding	<input checked="" type="checkbox"/>
Related to Mass	<input type="checkbox"/>
Structural	
Structural Usage	Non-bearing
Dimensions	
Area	
Volume	
Identity Data	
Comments	
Mark	

OK

Cancel

Figure 3-3 The *Instance Properties* dialog box for the *Exterior - Brick on Mtl. Stud* wall type

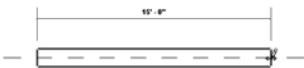


Figure 3-4 Wall on selecting *Wall Centerline* as the location line

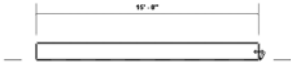


Figure 3-5 Wall on selecting *Finish Face: Interior* as the location line



**Tip:** The selection for **Location Line** parameter should be based on your design intent. For example, to create walls defined by exact interior dimensions, you can select **Finish Face: Interior** as the location line value. Once this parameter is selected, any addition or reduction of wall thickness in the project will be done towards its outer face.

The instance parameters for walls and their usage are given next. The values of some of the instance parameters will be available only after an instance is created. The instance parameters of the wall are given in the table below.

Instance Parameter	Description
Location Line	Line or reference plane for sketching the wall
Base Constraint	Level or reference plane of the base of a wall
Base Offset	Height of a wall from its base constraint
Base is Attached	Check box showing whether or not the base of the wall is attached to any other element
Base Extension Distance	Distance of the base of the layers in a wall
Top Constraint	Whether the wall height is defined by specified levels or is unconnected
Unconnected Height	Explicit height of a wall
Top Offset	Distance of the top of a wall from the top constraint
Top Extension Distance	Distance of the top of a layer on a wall
Room Bounding	Whether the wall constitutes the boundary of a room
Related to Mass	Whether the wall relates to a massing geometry
Structural Usage	Defines the specific structural usage of a wall
Length	Shows the value of the length of a wall
Area	Shows the value of the surface area of a wall
Volume	Shows the value of the volume of a wall
Comments	Specific comments that give description of a wall
Mark	To add a unique value or label to each wall
Phase Created	Phase in which a wall is created
Phase Demolished	Phase in which a wall was demolished

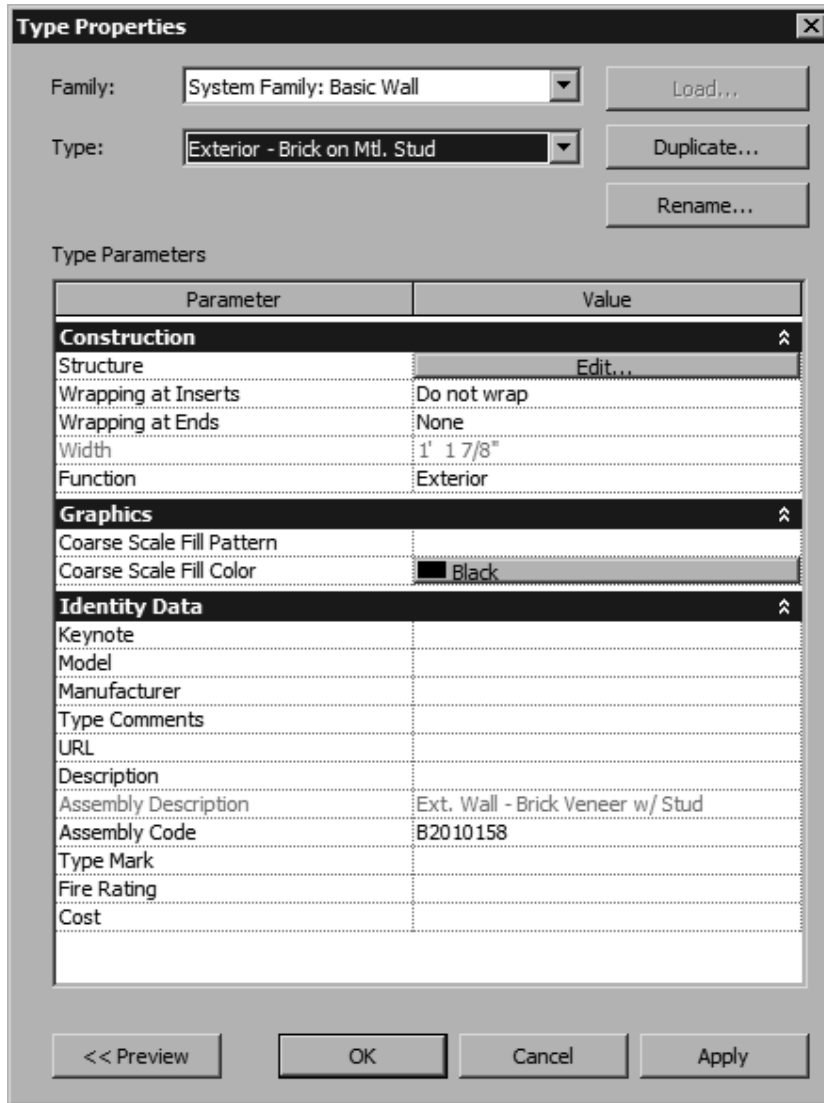


**Tip:** For most projects, it is easier to set the levels first and then create the walls. You do not need to specify the height because you have already specified the height between the levels. You can also set some of the parameters of the wall component such as height, top constraint, and location line from the **Options Bar**.

Type Properties of Wall

The type properties of a wall specify the common parameters shared by certain elements in a family. Any changes made in the type property of a wall element will affect all instances or individual elements of that family in the project.

To modify the type properties of an element, invoke the **Wall** tool from the **Home** tab of the ribbon; the **Place Wall** tab will be displayed. Next, from this tab, choose **Element > Element Properties > Type Properties**; the **Type Properties** dialog box will be displayed, as shown in Figure 3-6. Using this dialog box, you can modify the type properties of the selected wall type such as **Structure**, **Wall Function**, **Coarse Scale Fill Pattern**, and so on. You can also define the composition of the wall type. To do so, choose the **Edit** button in the **Value** column of the **Structure** parameter; the **Edit Assembly** dialog box will be displayed. In Autodesk Revit Architecture, a wall is a composite building element and can consist of several layers. Choose



**Figure 3-6** The *Type Properties* dialog box for the *Exterior- Brick on Mtl. Stud* wall type

the **Preview** button from the **Edit Assembly** dialog box to view the graphical representation of layers, as shown in Figure 3-7.

Each layer of the composite wall is assigned with a specific function and priority based on its usage. The layers available in Autodesk Revit Architecture can be broadly classified into the categories given next.

**Structure [1]**- Consists of main supporting element of the structure such as concrete, brick, wood, metal stud, and so on.

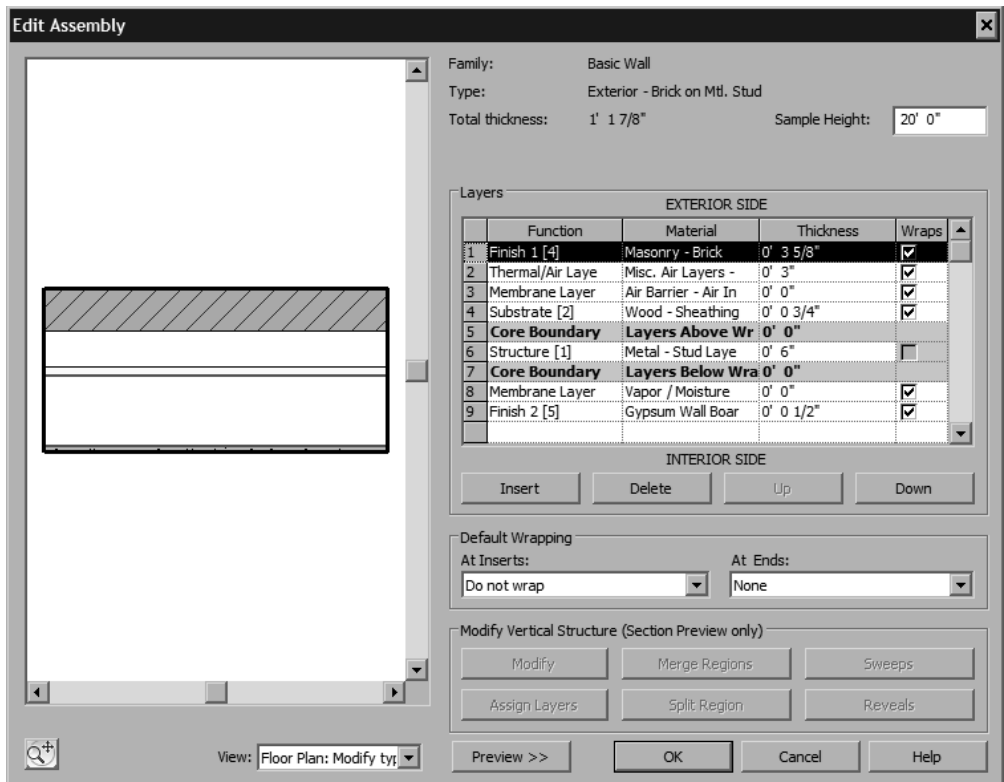


Figure 3-7 The **Edit Assembly** dialog box with the **Preview** button chosen

**Substrate [2]** - Consists of material that functions as substructure, such as foundation and plywood.

**Thermal/Air Layer** - Indicates the air cavity or the thermal insulation layer.

**Membrane Layer** - A zero thickness layer primarily for the prevention against water vapor penetration.

**Finish 1 [4]** - Exterior finish such as metal, brick, and stone.

**Finish 2 [5]** - Interior finish such as paint, gypsum wall board, and so on.



**Note**

The numbers placed next to certain layers show the priority set of the layer and enables Autodesk Revit Architecture to work out the joinery detail of wall segments at corners and intersections according to the priority. When joined, a higher priority layer takes precedence over a lower priority layer.

The **Layers** area in the **Edit Assembly** dialog box displays multiple layers of the selected wall, each with a specific function, material, and thickness. The layer on the top of the table represents the exterior side of a wall and the last layer represents the interior face. The **Layers**

area, refer to Figure 3-7, displays the selected wall type. In this case, it is **Exterior- Brick on Mtl. Stud**. This wall type has nine layers. The **Material** column displays the material specification, whereas the **Thickness** column displays the thickness of each layer. The total thickness of this composite wall is the sum of thickness of all layers. In the present case, the total thickness of wall is **1'1 7/8"** which is given beside the **Total thickness** parameter on the top of the dialog box. You can click on the **View** drop-down list and select **Section: Modify type attributes** to view the section of the wall.

Autodesk Revit Architecture enables you to add or remove layers using the **Insert** and **Delete** buttons provided below the **Layers** area in the **Edit Assembly** dialog box. To shift the layers, choose the **Up** and **Down** buttons. You can also create your own layers. You will learn more about materials, layers, and composite walls in the later chapters.

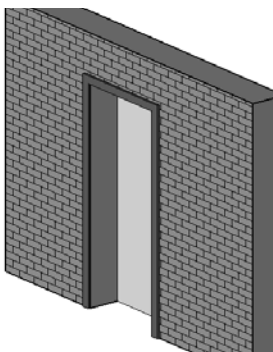
The **Default Wrapping** area in the **Edit Assembly** dialog box, has two drop-down lists namely, **At Inserts** and **At Ends**. These options allow wrapping of the compound walls at the end and at the inserts (for door and window openings). The wrapping in the walls can be viewed in the plan view. You can select different options to allow wrapping from the **At Inserts** and **At Ends** drop-down lists in the **Default Wrapping** area. The Figures 3-8 to 3-11 illustrate the wrapping options.

## Sketching Walls

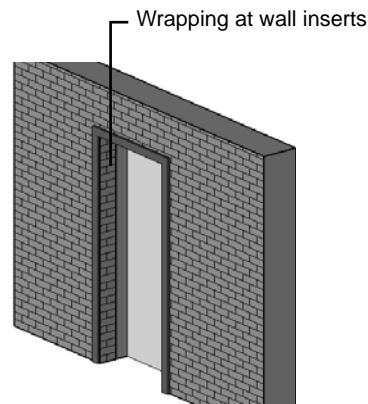
The next step after selecting the wall type from the **Change Element Type** drop-down list in the **Element** panel is to select the sketching tool. Autodesk Revit Architecture provides several sketching tools to sketch the walls of different shapes. These tools, along with the **Options Bar**, can be invoked from the **Draw** panel in the **Place Wall** tab of the ribbon, as shown in Figure 3-12.

## Using Sketching Tools

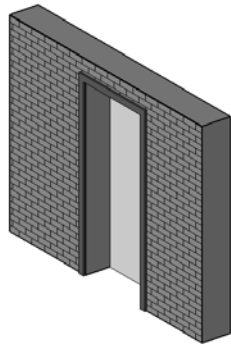
In Autodesk Revit Architecture 2010, you can access the sketching tools from the **Draw** panel and the **Options Bar** in the **Place Wall** tab of the ribbon. The **Line** tool is the default option for sketching the walls.



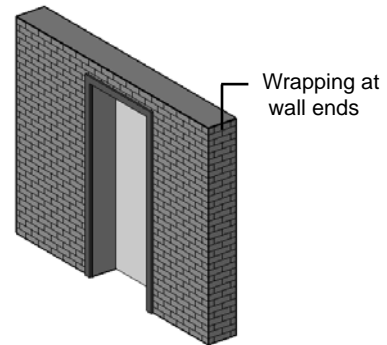
**Figure 3-8** The wall created with the **Do not wrap** option selected from the **At Inserts** drop-down list in the **Default Wrapping** area



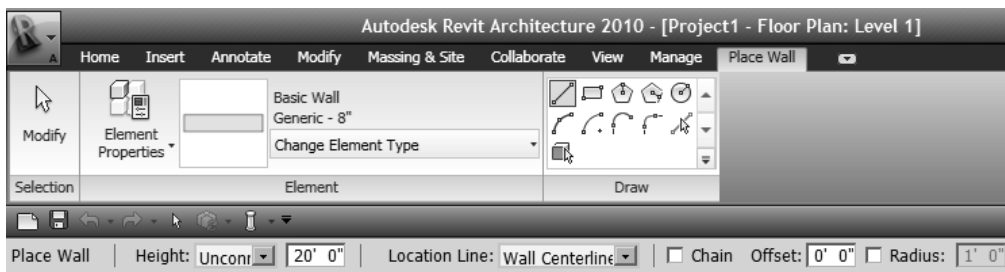
**Figure 3-9** The wall created with the **Exterior** option selected from the **At Inserts** drop-down list in the **Default Wrapping** area



**Figure 3-10** The wall created with the **None** option selected from the **At Ends** drop-down list in the **Default Wrapping** area




**Figure 3-11** The wall created with the **Exterior** option selected from the **At Ends** drop-down list in the **Default Wrapping** area

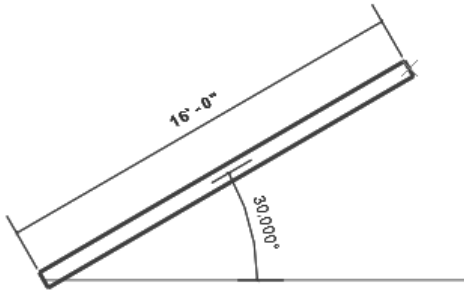


**Figure 3-12** Wall sketching options available in the **Draw** panel and the **Options Bar** of the ribbon

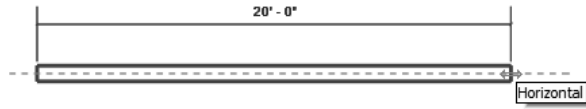
### Sketching Straight Wall Profiles

 You can sketch straight walls using the **Line** sketching tool by specifying the start point and the endpoint of the wall segment. To specify the location of the start point, click in the drawing area. On moving the cursor in the drawing, you will notice that a wall segment is starting from the specified point and the dimension that changes dynamically appears on it. This dimension is called the temporary dimension or listening dimension, and it shows the length and angle of the wall segment at any given location of the cursor, as shown in Figure 3-13. Also, notice that the cursor moves in increments by the value set in the **Dimension Snaps** option of the **Snaps** dialog box (See Chapter 2, Setting Snaps). The angle subtended by the wall on the horizontal axis is also displayed and it keeps changing dynamically as you move the cursor to modify the inclination of the wall. Also notice that, on bringing the cursor near the horizontal or the vertical axis, a dashed line will appear on the wall segment. This is called the alignment line and it helps you sketch the components with respect to the already created components. You will also notice a tooltip is displayed indicating that the wall segment being sketched is horizontal, as shown in Figure 3-14.

Autodesk Revit Architecture provides you the flexibility of specifying the length of the walls in different ways. The first option is to specify the starting point of the wall, move the cursor in the desired direction and click when the angle and the temporary dimension attain the required values. The second option is to sketch the wall and then modify its length and angle to the exact value. For example, to sketch a 18'0" long horizontal wall after specifying the starting



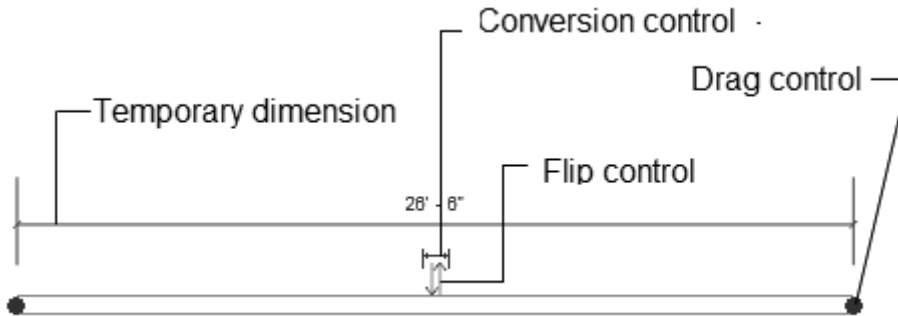
**Figure 3-13** Sketching a wall using the *Line* option



**Figure 3-14** Sketching a horizontal wall

point, you can move the cursor to the right until you see a dashed horizontal line parallel to the sketched wall. Click when the temporary dimension shows 20'0" approximately. Note that the length of the wall may not be exactly 18'0". You can now use the wall controls to modify the dimensions of the wall to its exact value.

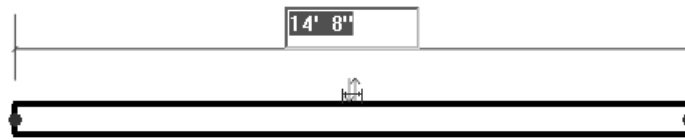
To modify the wall, select the wall segment and view its control and properties. As you select the wall segment, it gets highlighted in blue and three symbols appear in blue above the wall segment, as shown in Figure 3-15.



**Figure 3-15** Highlighted wall displaying its controls

The exact dimension of the sketched wall is visible in the dimension text of the temporary dimension. The conversion control symbol, which appears below the dimension value, is used to convert the temporary dimension into a permanent dimension. The two blue arrows, which also appear on the upper face of the wall, indicate the flip control symbol for the sketched walls. They appear on the side interpreted as the exterior face of the wall. By default, the walls drawn from the left to right have the external face on the upper side and the walls drawn from the top to bottom have it on the right side. You can flip the orientation of the wall by clicking on the arrows symbol. Alternatively, you can place the cursor over the flip control symbol and notice the change in its color. After the color of the flip control changes, press SPACEBAR to flip the wall. The two blue dots that appear at the two ends of the wall segments are the drag control symbols. You can use them to stretch and resize the walls. To set the wall to the exact length, click on the temporary dimension; an edit box will appear showing the current dimension of the wall segment. Now, you can replace it by typing the exact length, in this case **14' 8"**, in the edit box, as shown in Figure 3-16. The length of the wall will be modified to 14' 8".





**Figure 3-16** Specifying the exact length of the wall

Alternatively, you can create a straight wall by typing the dimension of the length before choosing the endpoint. As soon as you start typing the length, an edit box appears above the dimension line. Enter the value of the length and press ENTER to create a wall segment of the specified length. To sketch a wall at a given angle, sketch it at any angle and then click on the angular dimension symbol; an edit box will appear. In the edit box, you can enter the exact angular dimension from the horizontal axis to which the wall will be inclined.



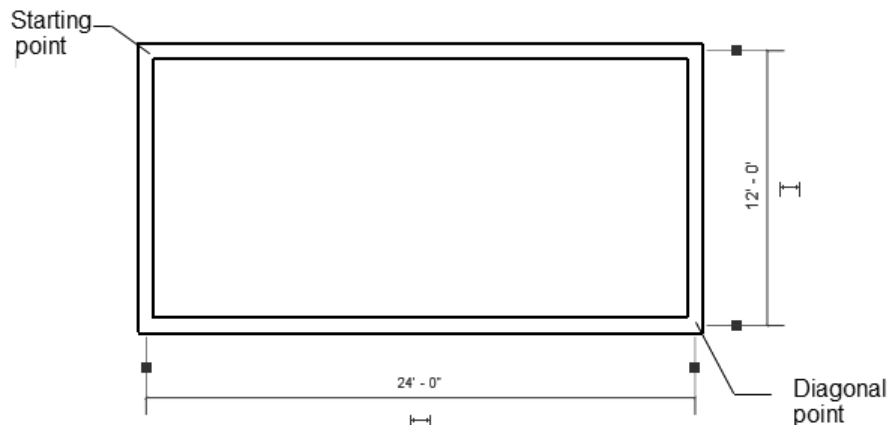
### Note

The **Project browser** shows **Level 1** in bold letters. This indicates that the wall has been sketched in that level.

## Sketching Rectangular Wall Profiles



You can invoke the **Rectangle** sketching tool from the **Draw** panel in the **Place Wall** tab of the ribbon to sketch a rectangular wall profile. After you invoke the **Rectangle** tool, click on the screen to specify the location of one corner of the rectangular wall to be drawn. Next, move the cursor away from the point; a rectangular wall profile will be displayed along with the temporary dimension between the two parallel walls. Now, move the cursor to the desired location and when the temporary dimension attains the desired value, click to specify the diagonally opposite corner of the profile; the rectangular wall will be created along with the temporary dimensions displayed. Alternatively, you can also create a rectangular wall profile by sketching it using some rough dimension and then modifying its size. This can be done by clicking on the temporary dimension of the sketched profile and entering the exact distance in the edit box, as shown in Figure 3-17. The size of the rectangle will be modified to the exact values.



**Figure 3-17** Creating and modifying a rectangular wall profile

### Sketching Polygonal Wall Profiles



You can sketch a polygonal wall profile using any one of the tools, **Inscribed Polygon** or **Circumscribed Polygon** from the **Draw** panel in the **Place Wall** tab of the ribbon.

When you invoke any of these tools, various options for polygon creation are displayed in the **Options Bar**. In this bar, you can specify the number of sides of the polygon in the **Sides** edit box. The polygonal profile can be created by specifying the radius of the inscribed or circumscribed circle. To draw an inscribed polygon, choose **Draw > Inscribed Polygon** in the **Place Wall** tab of the ribbon and then specify the desired number of sides, height (if unconnected), and offset value in the respective edit boxes in the **Options Bar**. Next, click in the drawing area to specify the center of the polygon, and then drag the cursor and click again to get the desired radius; the inscribed polygon will be created. Similarly, a circumscribed polygon can also be created by choosing **Draw > Circumscribed Polygon** in the **Place Wall** tab of the ribbon.

### Sketching Circular Wall Profiles



The **Circle** sketching tool can be used to sketch a circular wall profile. To invoke this tool, invoke the **Circle** tool from the **Draw** panel of the **Place Wall** tab and click in the drawing area to specify the center point of the circular wall. You will notice that a circular wall profile is extending dynamically with the specified point as the center and the other end attached to the cursor. The temporary radial dimension will also be displayed, as shown in the Figure 3-18. Click when the desired value for the radius is displayed. Alternatively, before clicking on the second point, type the value for the radius of the circular profile. As you type, the value will be displayed in the edit box. Press ENTER to complete the profile. Notice that the dimension that you entered is the distance of the center point to the location line of the profile.

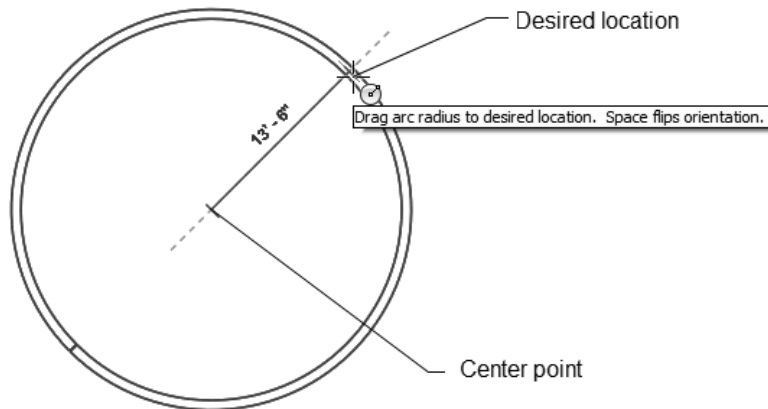


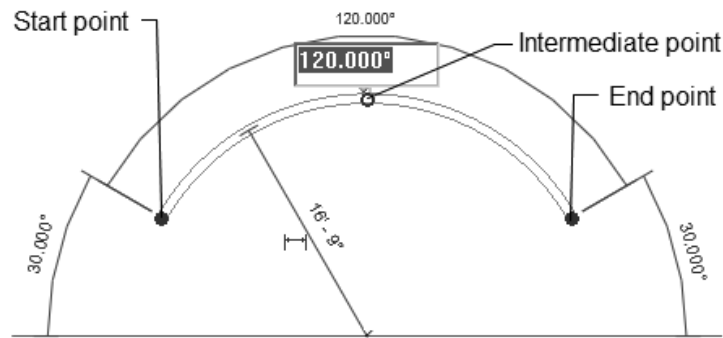
Figure 3-18 Sketching the circular wall profile

### Sketching Start-End-Radius Arc



The **Start-End-Radius Arc** sketching tool in the **Draw** panel in the **Place Wall** tab of the ribbon enables you to sketch an arc wall by specifying the start point, end point, and the intermediate point that determines the radius of the arc. To create an arc wall, invoke the **Start-End-Radius Arc** tool from the **Draw** panel of the **Place Wall** tab; you will be prompted to specify the start point of the proposed arc wall. Specify the start point by clicking in the drawing area. Now, you will be prompted to specify the endpoint of the curved wall. Specify

the endpoint of the curved wall; a curved wall with a variable radius stretches dynamically between the two specified points. Specify the location of the third point between the two specified points to specify the subtended angle or the radius of the arc. As you specify the third point, the angular and radial temporary dimensions are displayed along with the curve on the screen. Next, click in the drawing area to specify the third point; the curved wall will be sketched. You can also modify the sketched wall to the desired curvature parameters such as radius, angle subtended, orientation, and so on. To modify the curvature, select the sketched wall, click on the parameter such as the angular dimension and enter the new value, as shown in Figure 3-19. You can also use the drag controls to increase or decrease the extent of the wall. The central blue dot can be used to stretch the wall, keeping the subtended angle constant.

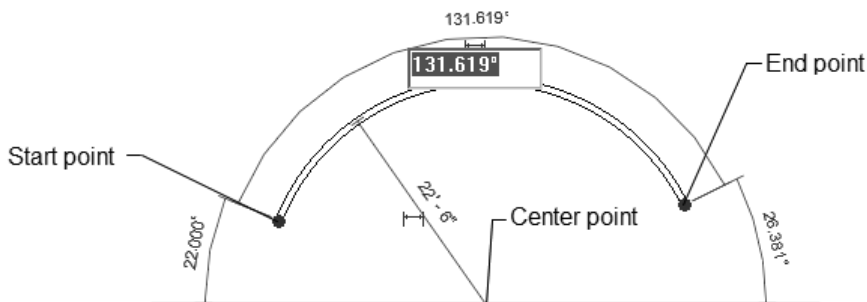


*Figure 3-19 Sketching and modifying a curved wall profile*

### Sketching Center-ends Arc



You can sketch a curved wall by specifying its center point and two endpoints. To do so, choose **Draw > Center-ends Arc** from the **Place Wall** tab of the ribbon. Next, click in the drawing area to specify the location of the center point and then move the cursor. Click when the desired value of the radius is displayed. You can also type the radius value and then press ENTER. The point that you specify will be taken as the start point of the wall. Next, click in the drawing area again to specify the endpoint of the arc wall. Note that the curved wall segment can be extended up to 180-degree. When the angle exceeds 180-degree, the wall will flip the side. Once the wall is sketched, you can select it and modify its parameters such as its subtended angle and radius. You can also modify the curvature keeping the radius fixed by using the drag controls, as shown in Figure 3-20.



*Figure 3-20 Sketching a curved wall profile using the Center-ends Arc sketching tool*

### Sketching Tangent End Arcs



To sketch a curved wall profile that starts tangentially from an existing wall, invoke the **Tangent End Arc** tool. To do so, choose **Draw > Tangent End Arc** from the **Place Wall** tab of the ribbon; the start point of the wall can be specified as the end point of an existing wall. After specifying the start point, move the cursor to the desired distance and click to define the curved wall profile.

### Sketching Fillet Arcs

To create a curved fillet wall between the two existing walls, choose **Draw > Fillet Arc** in the **Place Wall** tab of the ribbon. Now, one by one, click on the two walls to create a fillet close to the desired fillet end. A fillet wall will appear, showing its possible locations, as shown in Figure 3-21. Click to specify the location of the fillet. Once the fillet wall is sketched, you can modify its radius by clicking on it and typing its value. Notice that the walls are automatically trimmed after placing the fillet arc.

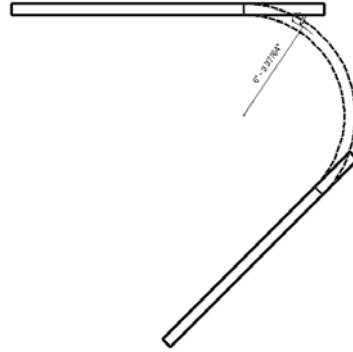


Figure 3-21 Sketching a fillet arc wall profile

### Using the Chain Option

The **Chain** option in the **Options Bar** is used to create a continuous wall profile with a number of wall segments. It enables you to create a continuous wall with wall segments connected end to end. The end point of the previous wall becomes the start point of the next wall. To enable the **Chain** option, select the check box before or while sketching the wall profile. You can also use this option while using different sketching options.

### Using the Offset Option

The **Offset** option is used to create a wall that starts at a specified offset distance from a point defined in an existing element. You can enter the offset distance value in the edit box provided in the **Options Bar**. However, the shape of the resulting wall depends on the sketching tool selected. After entering the offset value and selecting the sketching option, click near the element to define the offset distance. When you move the cursor, the wall will start at the specified distance from the selected point. For example, this option can be used for creating boundary walls that are placed at a specific distance from the building profile.



**Tip:** An appropriate sketching option should be selected based on the desired wall profile. You can also sketch walls using a combination of available sketching options.

### Using the Radius Option

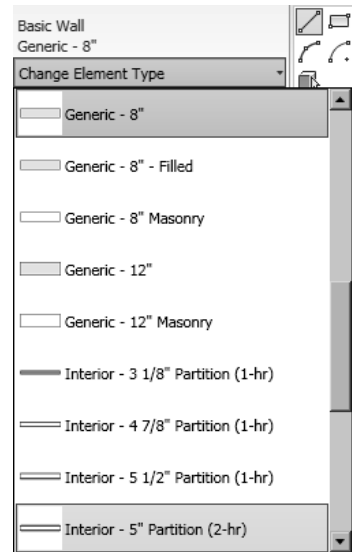
The **Radius** option is used to specify the radius while sketching a circular, curved, or a fillet wall. You can type the value of the radius in the text box before or after invoking the desired sketching tool.

## SKETCHING INTERIOR WALLS

In Autodesk Revit Architecture, interior walls form a separate family of wall types. They differ

from the exterior wall types based on their usage, material specifications, and non load-bearing character. Several predefined interior wall types are provided in the Autodesk Revit Architecture libraries.

To view the interior wall types, choose **Build > Wall** from the **Home** tab in the ribbon; the **Place Wall** tab will be displayed. From this tab, select the **Change Element Type** drop-down list in the **Element** panel. The **Change Element Type** drop-down list displays different type of walls available in Autodesk Revit Architecture. The wall types that may be used as interior walls have been assigned the prefix **Interior**. Based on the project requirement, you can select the appropriate interior wall type from the drop-down list. For example, **Interior- 5" Partition (2-hr)** is a type of interior wall with a 2-hour fire rating and can be selected from the **Change Element Type** drop-down list, as shown in Figure 3-22.



**Figure 3-22** Selecting the interior wall type from the **Change Element Type** drop-down list

To view and specify the instance properties of an interior wall type, choose **Element > Element Properties > Instance Properties** from the **Place Wall** tab of the ribbon; the **Instance Properties** dialog box will be displayed, as shown in Figure 3-23. This dialog box shows various instance parameters of the selected wall such as **Unconnected Height**, **Location Line**, **Structural Usage**, **Top Constraint**, and so on. You can modify these parameters by entering a new value or selecting the required value from the corresponding **Value** column in the **Instance Properties** dialog box.

The sketching options explained earlier (for exterior walls) can also be used for sketching interior walls. When you sketch the interior walls, the top constraint of the interior walls is automatically set to a level above the current level.



#### Note

*The interior walls do not create a neat junction with the exterior walls as they have different composition and characteristics. Walls are the host elements for other building elements such as doors and windows. Therefore, deleting walls will delete all their dependent elements as well.*

The basic composition of an interior wall type can be viewed by choosing **Element > Element Properties > Type Properties** in the **Place Wall** tab of the ribbon. On doing so, the **Type Properties** dialog box will be displayed, showing different type parameters of the selected wall type.

To view the structural composition of a wall type, choose the **Edit** button for the **Structure** type parameter; the **Edit Assembly** dialog box will be displayed, showing layers for the corresponding wall type. For example, the **Interior - 5" Partition (2-hr)** wall type comprises



**Tip:** The **Location Line** parameter in the **Instance Properties** dialog box of wall selected is useful for creating interior walls. You can create interior walls at a specified distance from another existing wall using the **Finish Face: Interior** option.



**Tip:** Besides the **Change Element Type** drop-down list, wall types are also listed under the **Families** head in the **Project browser**. Left-click on the plus sign (+) next to the **Families** head to view the families available in Autodesk Revit Architecture. Click the '+' symbol next to the **Wall** subhead and then the one next to the **Basic Wall** subhead to display various basic wall types. Select and right-click on any wall type to display a shortcut menu with the options that can be used for editing. For example, to select all instances of a particular wall type from the drawing, right click on the corresponding wall type and then choose the **Select All Instances** option from the shortcut menu.

**Instance Properties**

Family: System Family: Basic Wall Load...

Type: Interior - 5" Partition (2-hr) Edit Type...

Instance Parameters - Control selected or to-be-created instance

Parameter	Value
<b>Constraints</b>	
Location Line	Wall Centerline
Base Constraint	Level 1
Base Offset	0' 0"
Base is Attached	<input type="checkbox"/>
Base Extension Distance	0' 0"
Top Constraint	Up to level: Level 2
Unconnected Height	10' 0"
Top Offset	0' 0"
Top is Attached	<input type="checkbox"/>
Top Extension Distance	0' 0"
Room Bounding	<input checked="" type="checkbox"/>
Related to Mass	<input type="checkbox"/>
<b>Structural</b>	
Structural Usage	Non-bearing
<b>Dimensions</b>	
Area	
Volume	
<b>Identity Data</b>	
Comments	
Mark	

OK Cancel

**Figure 3-23** The **Instance Properties** dialog box for the **Interior - 5" Partition (2-hr)** wall type



**Tip:** While creating a new wall type, you can specify whether a wall is an exterior or interior wall. To do so, invoke the **Type Properties** dialog box of the wall to be created and click in the **Value** field of the **Function** parameter; a drop-down list will be displayed. From this drop-down list, you can select the **Exterior** option to assign exterior wall type function to the selected wall. Similarly, you can select the **Interior** option to assign the interior wall type function to the wall.

of seven layers with different materials and thickness. You can use the **Insert** and **Delete** buttons to modify the wall type. The **Preview** button shows a graphic view of the **Interior-5” Partition(2 -hr)** wall type, as shown in Figure 3-24.

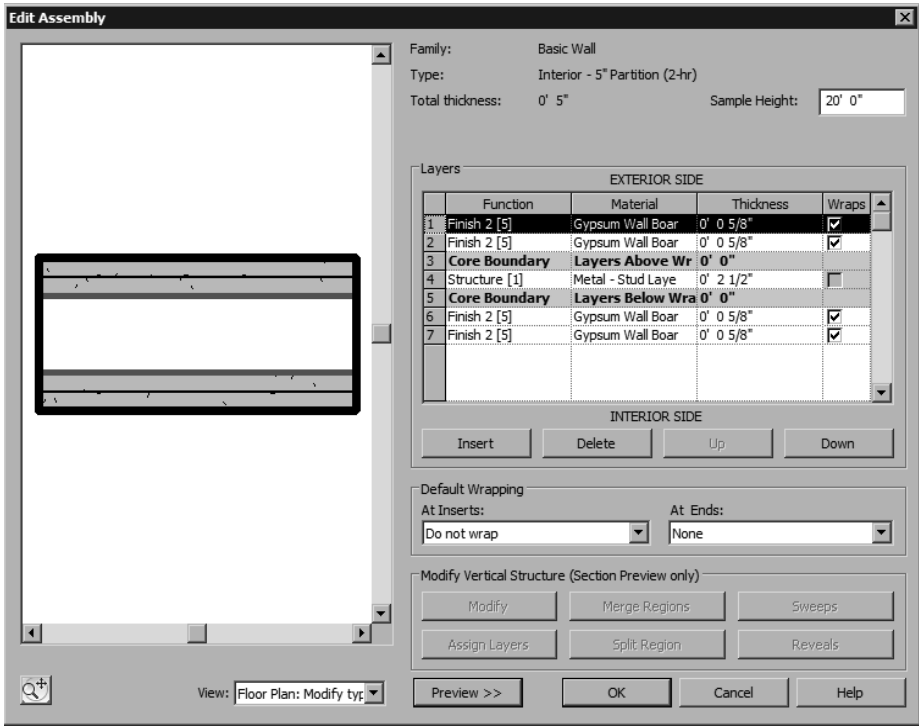


Figure 3-24 The *Edit Assembly* dialog box for the **Interior-5” Partition (2-hr)** wall type

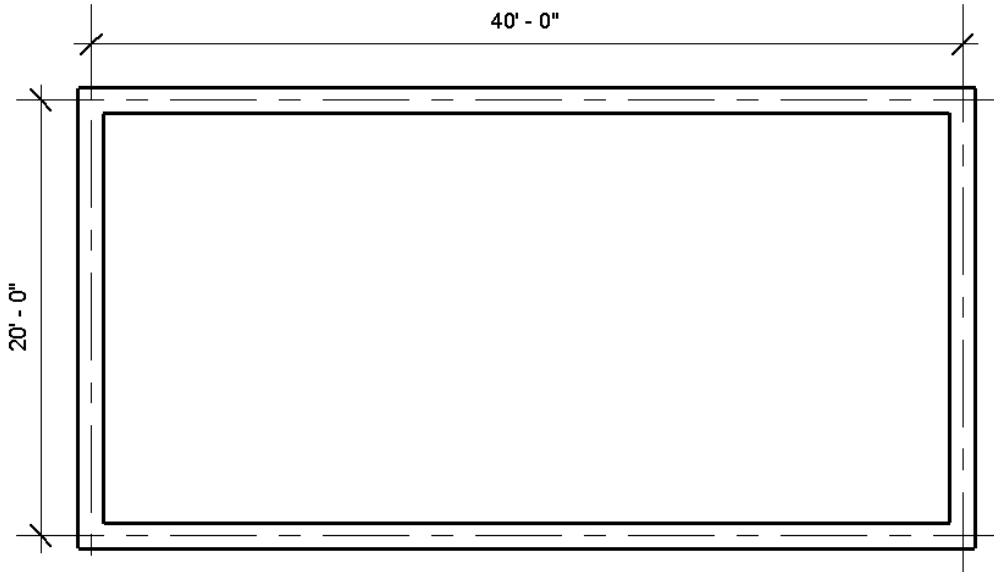
The following tutorials are designed to familiarize you with the concepts of invoking the **Wall** tool, selecting the wall type, modifying its properties, using the sketching options, and sketching a wall with the given parameters.

# TUTORIALS

## Tutorial 1 Apartment 1

Create the exterior walls of a two-room apartment based on the sketch plan shown in Figure 3-25. The dimensions have been given only for reference and are not to be created in this tutorial. The parameters to be used for creating the exterior walls are given next.

(Expected time: 30 min)



*Figure 3-25 Sketch plan for creating exterior walls for the Apartment 1 project*

1. Project file-c02\_Apartment\_tut1.rvt created in Tutorial 1 of Chapter 2.
2. Exterior wall type- **Basic Wall: Exterior - Brick on Mtl. Stud**
3. Location line parameter- **Wall Centerline**; Top Constraint- **Up to Level 2**

The following steps are required to complete this tutorial:

- a. Open the *Apartment 1* project file created in Tutorial 1 of Chapter 2.
- b. Invoke the **Wall** tool from the ribbon.
- c. Select the exterior wall type **Exterior - Brick on Mtl. Stud** from the **Change Element Type** drop-down list.
- d. Modify **Top Constraint- Up to level: Level 2** and **Location Line - Wall Centerline** as wall properties using the **Element Properties** button, refer to Figure 3-26.
- e. Invoke the **Line** sketching tool and then sketch the exterior walls based on the given parameters, refer to Figures 3-26 through 3-35.

## Opening an Existing Project

1. Choose **Open > Project** from the **Application Menu** and open the *c02\_Apartment1\_tut1.rvt* project file. You can also download this file from:  
[http://www.cadcim.com/Revit\\_2010/Revit\\_2010.htm](http://www.cadcim.com/Revit_2010/Revit_2010.htm) link.

## Invoking the Wall Tool and Selecting the Wall Type

As mentioned earlier, to start sketching the wall, you must invoke the **Wall** tool from the ribbon and select the wall type to be used (**Exterior - Brick on Mtl. Stud** in this case).

1. Invoke the **Wall** tool by choosing **Build > Wall** from the **Home** tab of the ribbon; the **Place Wall** tab is displayed.

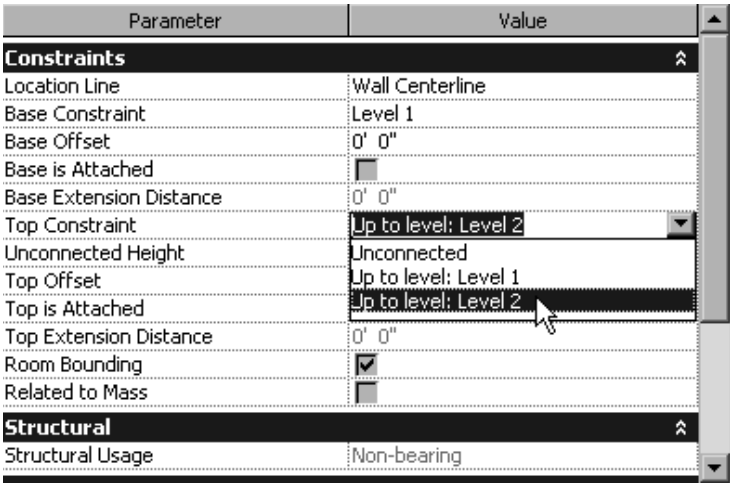


- 2. From the **Element** panel of the **Place Wall** tab, select the **Exterior - Brick on Mtl. Stud** from the **Change Element Type** drop-down list.

**Modifying Properties of the Exterior Wall**

After selecting the wall type, you need to modify the properties of the wall type using the **Instance Properties** dialog box. The **default.rte** template file used for this project has two predefined levels: **Level 1** and **Level 2**.

- 1. Choose **Element > Element Properties > Instance Properties** in the **Place Wall** tab of the ribbon; the **Instance Properties** dialog box is displayed.
- 2. Make sure that the **Location Line** parameter has **Wall Centerline** as the default value. Click on the field under the **Value** column for the **Top Constraint** instance parameter; a drop-down list is displayed. Select **Up to level: Level 2** from this drop-down list, as shown in Figure 3-26. Exit the dialog box by choosing the **OK** button to return to the interface screen.



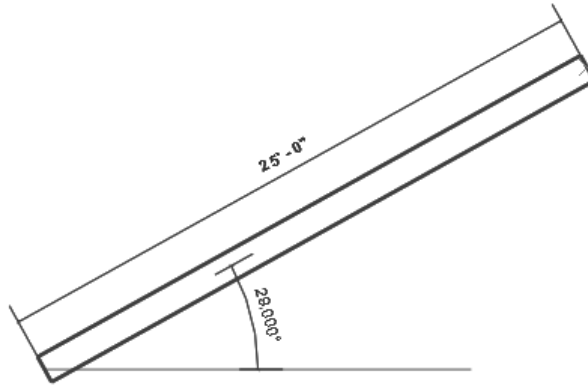
*Figure 3-26 Setting the Top Constraint parameter using the Instance Properties dialog box*

**Sketching the First Exterior Wall Segment**

To sketch a wall, you need to select an appropriate sketching tool from the **Draw** panel in the **Place Wall** tab of the ribbon. The exterior walls of the given sketch of the Apartment 1 project can be created using the **Rectangle** option. You will, however, use the **Line** option to learn and understand the usage of this tool for sketching the straight walls.

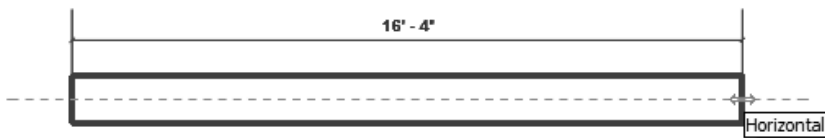
- 1. Choose the **Line** tool from the **Draw** panel in the **Place Wall** tab of the ribbon and then ensure that the **Chain** check box is cleared in **Options Bar**.
- 2. To specify the start point of the first wall segment, click between the four inward arrow keys. Next, move the cursor toward the right hand side. Notice that a wall segment starts from the specified point and a temporary dimension appears, which changes dynamically as you move the cursor. This shows the length of the wall segment at any given location of the cursor.

3. Right click in the drawing area; a shortcut menu is displayed. Choose the **Zoom In Region** option from the shortcut menu and zoom into the area to get a closer view of the sketched wall segment, as shown in Figure 3-27 (for zooming techniques, see Chapter 2- Getting Started with Revit Architecture).



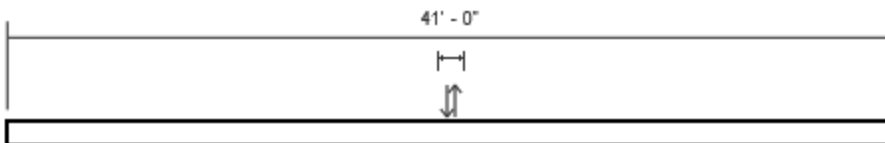
*Figure 3-27 The angle and temporary dimensions are displayed on the wall being sketched*

4. Move the cursor on the horizontal axis so that the dashed line appears at the central axis of the wall segment, as shown in Figure 3-28. Notice the two-sided arrow attached to the endpoint of the wall. This indicates that the wall segment being sketched is horizontal. A tooltip indicating the horizontal alignment is also displayed.



*Figure 3-28 Sketching a horizontal wall segment*

5. Move the cursor to the right until the temporary dimension shows the value to be more than 40'0". Click at this location as the endpoint of the wall segment and press ESC twice; the wall is created. The created wall shows its temporary dimension, a dimension symbol, and a twin-arrow symbol, as shown in Figure 3-29. Note that, if the dimension is not displayed, you need to click on the created wall to display the dimension.



*Figure 3-29 The sketched horizontal wall with its controls*

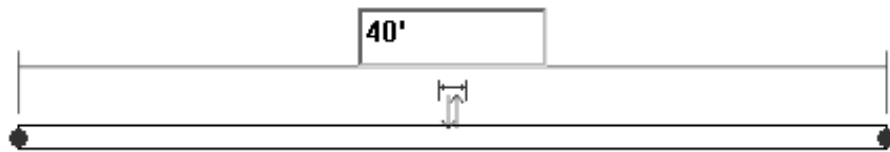
**Note**

You can create a wall of exactly 40'0" length using the dimension snaps set in the **Snaps** dialog box. The only purpose of creating a wall more than the desired length in this step is to explain how to modify the length of the sketched wall to the exact value.

## Modifying the Length of the Sketched Exterior Wall

You will now modify the length of the sketched wall to the actual dimension, as given in the Apartment 1 sketch.

1. Select the created wall and click on the displayed temporary dimension. An edit box appears showing the current dimension of the wall segment.
2. Enter **40'0"** in the edit box, as shown in Figure 3-30 and then press ENTER. The wall length is modified to 40'0". Press ESC to exit from the **Modify Walls** tab.



**Figure 3-30** Modifying the length of a wall segment using temporary dimensions



**Tip:** To exit the current tool, invoke any other tool or right-click and choose **Cancel** from the shortcut menu to discontinue it.

**Note**

By default, the exterior face of the walls drawn from the left to right is on the upper face and for those drawn from the top to bottom on the right face. Similarly, the exterior face of the walls drawn from the right to left is on the lower face, and for those drawn from the bottom to top on the left side. Hence, you can minimize the use of the flip tool by sketching the walls in the appropriate direction.

## Sketching Other Exterior Wall Segments

In this sections, you need to create other exterior wall segments using the **Endpoint** object snap tool.

1. Choose **Build > Wall** in the **Home** tab of the ribbon; the **Wall** tool is invoked. Now, bring the cursor close to the right endpoint of the first wall segment. When the cursor shows a square box at the endpoint (indicating the **Endpoint** object snap), as shown in Figure 3-31, click to specify the start point of the second wall segment.
2. As you move the cursor, a dynamic wall starts with one end attached to the specified point and the other attached to the cursor. Move the cursor vertically downward so that you



**Figure 3-31** Starting a second exterior wall segment using the **Endpoint** object snap option

see a dashed vertical line inside the wall segment. Now, enter **20'0"** as the value of the length; an edit box is displayed with the dimension that you have entered, as shown in Figure 3-32. Press ENTER; the second wall segment is sketched to exactly 20'0" length. Notice that the intersection of the first and the second wall segment has been intuitively filled or completed.

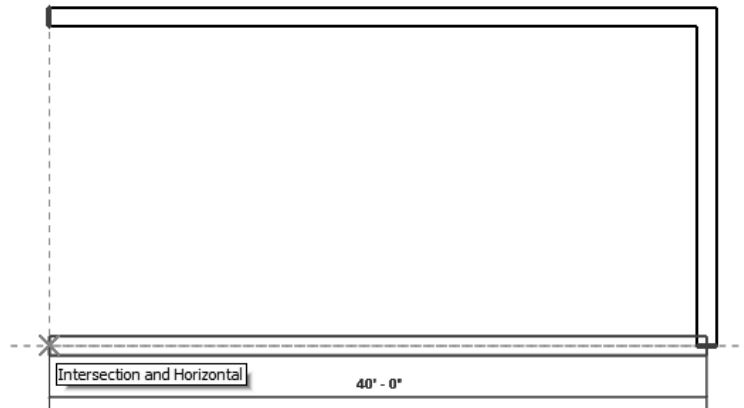


**Figure 3-32** Creating the second exterior wall segment

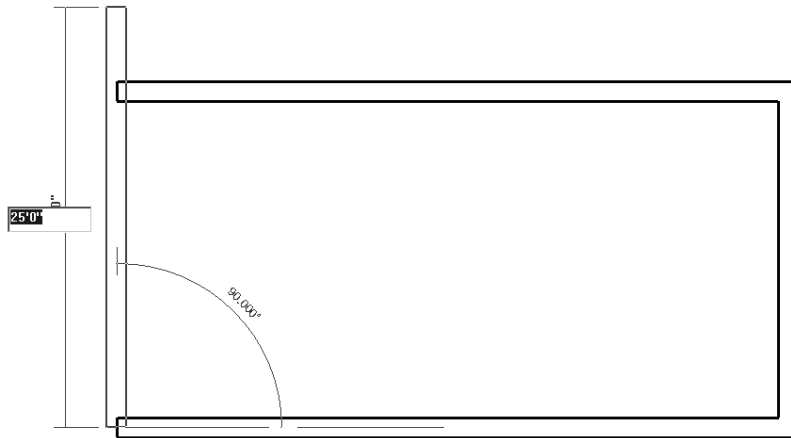
3. To draw the third wall segment, use the **Chain** option. Enable it by selecting the **Chain** check box from the **Options Bar**.
4. Move the cursor close to the endpoint of the second wall segment and click when the endpoint object snap is displayed. The third wall segment starts from this specified point. Move the cursor horizontally towards the left. Now, hold the SHIFT key while moving the cursor.

Notice that the cursor can now move only in the orthogonal directions i.e. horizontal and vertical directions. When the length of the wall segment is around 40'0", a vertical dashed line originates from the start point of the first wall segment. The alignment line shows the point on the third wall segment that is in plumb with the first point. An intersection snap symbol indicated by an X appears at this point, as shown in Figure 3-33.

5. Click when the intersection snap symbol is displayed to specify the location of the endpoint of the third wall segment.
6. You have enabled the **Chain** option and therefore, the next wall segment automatically starts from the last specified point. Hold the SHIFT key and move the cursor vertically upward. Enter **25'0"**, as shown in Figure 3-34 and press ENTER to create a vertical wall segment. The fourth wall segment is created.



**Figure 3-33** *Creating the third wall segment*



**Figure 3-34** *Sketching the fourth exterior wall segment*



**Note**

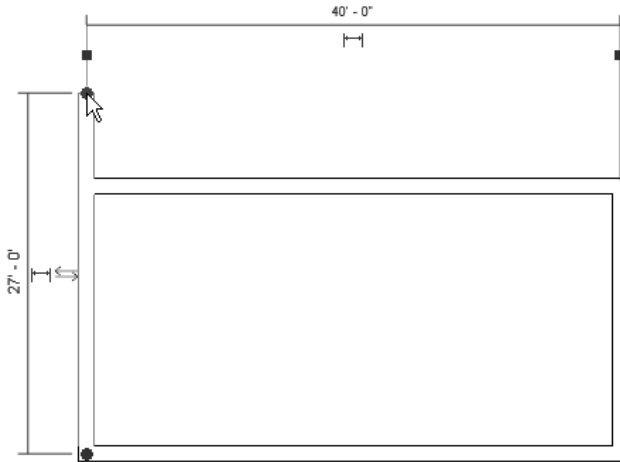
*The only purpose of creating a wall of more than the desired length in this step is to explain how to stretch the wall to the exact length.*

7. Press ESC twice to exit the **Wall** tool.

## Stretching the Wall Segment

You will now stretch the wall segment to reduce its length to the desired dimension by using the drag controls.

1. Select the fourth wall segment to display its controls. The two blue dots at its two endpoints are the drag controls. Move the cursor near the upper dot; the color of the drag control symbol changes, as shown in Figure 3-35. Press and hold the left mouse button at this point and drag the cursor vertically downward and bring it close to the start point of the

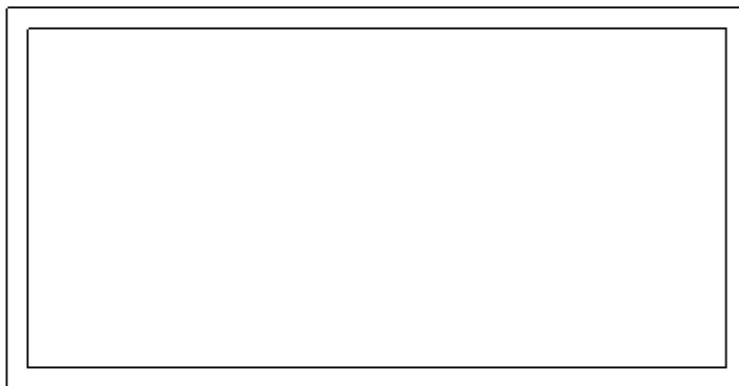


**Figure 3-35** Using the drag control to modify the length of wall

first wall segment. The endpoint object snap is displayed at the intersection of two walls and the tooltip shows **Endpoint and Vertical**.

2. Release the left mouse button at the intersection point to reduce the length of the fourth wall segment; the first and fourth wall segments are joined at the corner with their ends completed. Note that if these wall segments do not join at the corner on releasing the left mouse button, then you need to click at their intersection.
3. Press ESC to remove the wall segment from the selection set. The external wall profile is completed for this tutorial, as shown in Figure 3-36.
4. Choose **Save As > Project** from **Application Menu**; the **Save As** dialog box is displayed. Enter **c03\_Apartment1\_tut1** in the **File name** edit box and then choose **Save**.

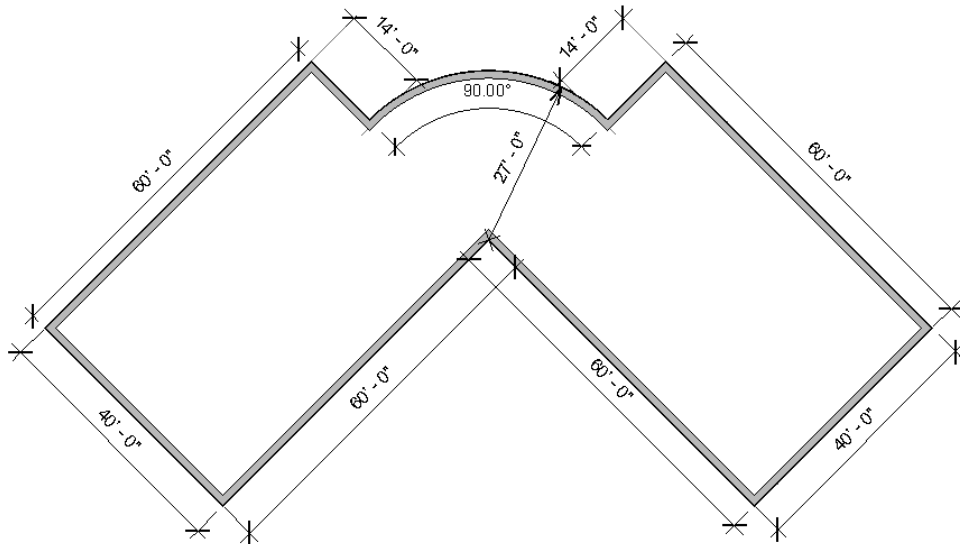
This completes the creation of the external wall segments for the *Apartment 1* project.



**Figure 3-36** The completed exterior wall profile

**Tutorial 2****Club**

Create the exterior walls of the club building whose sketch plan is shown in Figure 3-37. The given dimensions are measured from the exterior faces and are not to be created. The parameters to be used for different elements are given next. **(Expected time: 30 min)**



**Figure 3-37** Sketch plan for the Club project

1. Project- *c02\_Club\_tut2.rvt* project created in Tutorial 2 of Chapter 2.
2. Exterior wall type- **Exterior - Split Face and CMU on Mtl. Stud.**
3. Unconnected height of walls- **15'0"**.
4. All inclined walls are at 45-degree to the horizontal axis.

The following steps are required to complete this tutorial:

- a. Open the *c02\_Club\_tut2.rvt* project file created in Tutorial 2 of Chapter 2.
- b. Invoke the **Wall** tool.
- c. Select the exterior wall type: **Exterior- Split Face and CMU on Mtl. Stud.**
- d. Set the unconnected height to **15'0"**.
- e. Change the **Location Line** parameter to **Finish Face: Exterior**, refer to Figure 3-38.
- f. Select the **Line** sketching option and sketch the inclined wall profile using the **Chain** option, refer to Figures 3-39 through 3-45.
- g. Use the **Center-ends Arc** sketching option to create the curved wall, refer to Figures 3-46 and 3-47.

## Opening the Project

1. Choose **Open > Project** from **Application Menu** and open the *c02\_Club\_tut2.rvt* project file created in Tutorial 2 of Chapter 2. You can also download this file from: [http://www.cadcim.com/Revit\\_2010/Revit\\_2010.htm](http://www.cadcim.com/Revit_2010/Revit_2010.htm) link.

## Invoking the Wall Tool and Selecting the Wall Type

First, you will invoke the **Wall** tool from the ribbon and then select the specified exterior wall type **Exterior - Split Face and CMU on Mtl. Stud**, as given in the project parameters.

1. Choose **Build > Wall** from the **Home** tab of the ribbon; the **Place Wall** tab is displayed.
2. In the **Element** panel of the **Place Wall** tab, select **Exterior - Split Face and CMU on Mtl. Stud** from the **Change Element Type** drop-down list.

## Modifying Properties of the Exterior Wall

Next, you will use the **Instance Properties** dialog box to modify the unconnected height to 15'0". The dimensions given in the sketch are exterior wall face dimensions, therefore, you need to set the location line parameter to **Finish Face: Exterior**.

1. Choose **Element > Element Properties > Instance Properties** in the **Place Wall** tab of the ribbon; the **Instance Properties** dialog box is displayed. In the **Value** column of this dialog box, replace the current value for the **Unconnected Height** parameter by entering **15'0"**.
2. Click in the **Value** column of the **Location Line** parameter and choose the **Finish Face: Exterior** option, as shown in Figure 3-38. Choose the **OK** button to accept the specified values and close the dialog box to return to the interface screen.

## Sketching the Inclined Exterior Walls

Start creating the exterior wall profile by first sketching the inclined walls first in a sequence such that the exterior face of the wall is on the external side. You will use the **Chain** option to sketch the continuous wall profile. Once you create the first inclined wall, the other parallel and perpendicular walls can be easily created using the alignment lines and different object snaps options.

1. To create the straight wall, choose the **Line** tool in the **Draw** panel from the **Place Wall** tab of the ribbon.
2. In the **Options Bar**, enable the **Chain** option by selecting its check box, if it is not already checked.
3. To start sketching the first inclined wall segment, click inside the four arrow keys in the drawing window and move the cursor upward toward the right. Move the cursor to an inclination such that the angle subtended to the horizontal axis is 45 degrees.



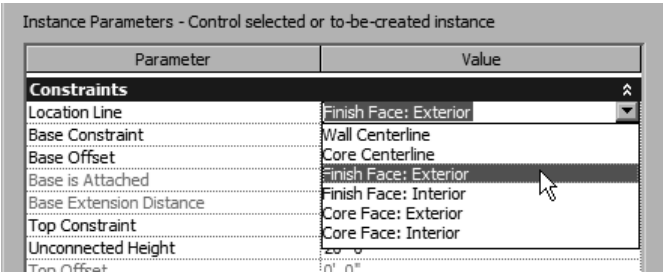


Figure 3-38 Setting the location line parameter in the *Instance Properties* table of the *Instance Properties* dialog box

4. Enter the value **14'0"** to specify the length of the first wall segment; the value is displayed in the edit box, as shown in Figure 3-39. Press ENTER to create the first wall segment of the specified length.
5. The **Chain** option is enabled and therefore the second wall segment starts from the last specified point. Move the cursor downward towards the right and right-click to invoke the shortcut menu. Choose **Snap Overrides > Perpendicular** from the displayed shortcut menu; the perpendicular snap symbol appears at the end of the wall. Enter **60'0"**, see Figure 3-40. The wall perpendicular to the first inclined wall is created.

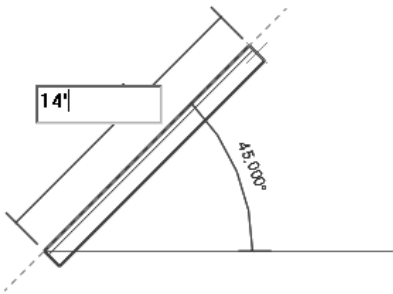


Figure 3-39 Sketching the first inclined wall segment

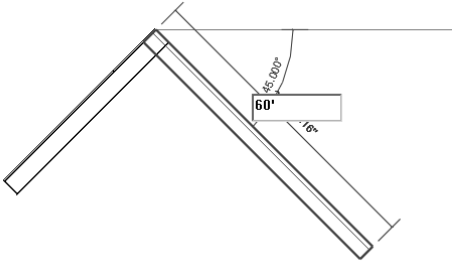
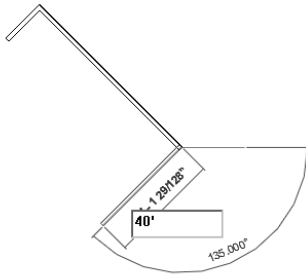


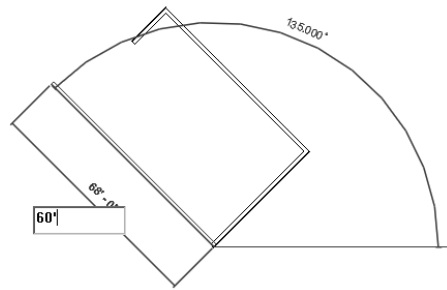
Figure 3-40 Sketching the second inclined wall segment

6. Similarly for the next wall, move the cursor downward to the left and choose the perpendicular snap override as in step 5. Enter 40'0" as length, as shown in Figure 3-41. Now, press ENTER to create the third inclined wall.
7. To create the next wall, move the cursor upward toward left and invoke the perpendicular snap override as in the step 5. Enter 60'0" as the wall segment length and press ENTER to create the fourth inclined wall segment, as shown in Figure 3-42.
8. Similarly, create the fifth inclined wall segment of 60'0" length, as shown in Figure 3-43.

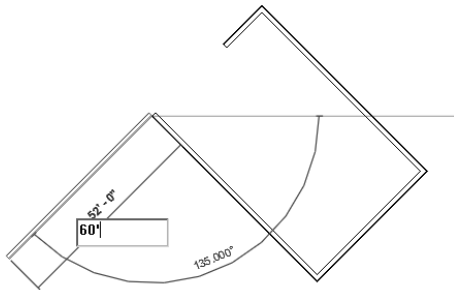
9. Next, create the connected wall segment of 40'0" length, as shown in Figure 3-44.



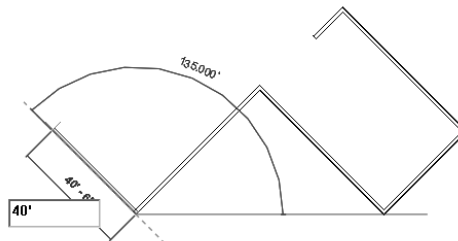
**Figure 3-41** Sketching the third inclined wall segment



**Figure 3-42** Sketching the fourth inclined wall segment



**Figure 3-43** Sketching the fifth inclined wall segment



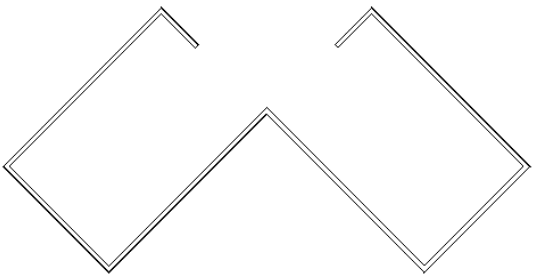
**Figure 3-44** Sketching the sixth inclined wall segment

9. Now, create the next two wall segments of 60'0" and 14'0" length to complete the inclined wall exterior profile, as given in the sketch plan and shown in Figure 3-45.
10. Press the ESC key to discontinue the wall at this point and finish sketching the inclined walls.

### Sketching the Curved Exterior Wall

Next, you will sketch the curved exterior wall profile based on the given parameters. You need to use the **Center-ends Arc** tool to create the curved wall segment.

1. Choose the **Center-ends Arc** button in the **Draw** panel from the **Place Wall** tab of the ribbon. Move the cursor in the drawing window and click on the outer intersection of the inclined walls to specify the center of the curved wall. Refer to Figure 3-46.
2. Move the cursor near the endpoint of the last sketched inclined wall segment. When 135-degree is displayed as the angular dimension, enter the value **27'0"** as the radius of the curved wall, as shown in Figure 3-46. The curved wall with the specified radius starts from the specified point.

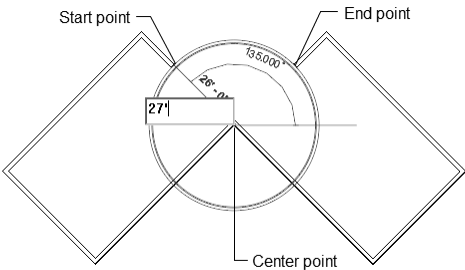


**Figure 3-45** The sketched inclined wall exterior profile

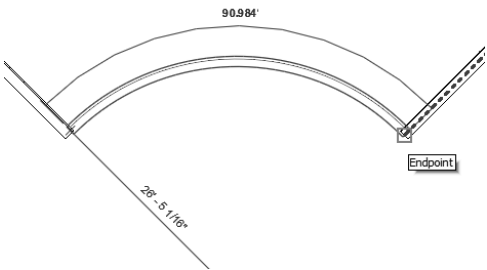


**Note** While tracking the wall, if the perpendicular or other snapping symbol does not appear, you can right click and choose **Snap Overrides**; a cascading menu will be displayed. Choose any snapping options from the displayed cascading menu. On doing so, the desired snapping symbol will appear for the specified point or action.

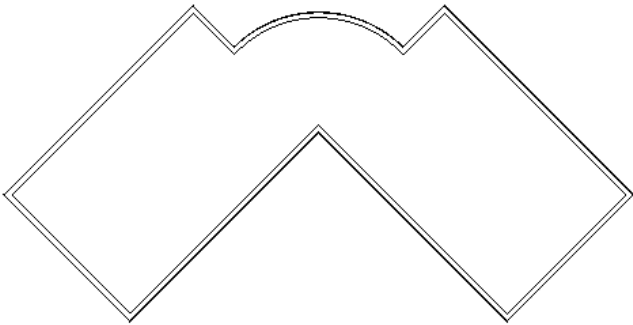
3. Move the cursor toward the right and click when the cursor snaps to the endpoint of the inclined wall, as shown in Figure 3-47. Now, press ESC twice to complete the exterior wall profile, as shown in Figure 3-48.



**Figure 3-46** Starting the curved wall segment

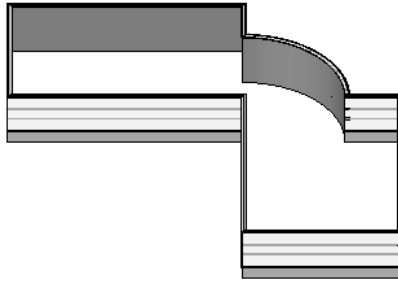


**Figure 3-47** Completing the curved wall segment



**Figure 3-48** Completed layout of the exterior walls for the Club project

4. From the **View Control Bar**, choose the **Model Graphics Style** button; a flyout is displayed. Choose the **Shading with Edges** option from the flyout.
5. Now, from the **View** tab of the ribbon, choose **Create > 3D View> Default 3D**. The view of the building model view will appear, as shown in Figure 3-49.



*Figure 3-49 3D view of the completed exterior wall profile*

6. Under the **Floor Plans** head in the **Project browser**, double-click on **Level 1** to return to the plan view.
7. Choose **Save As > Project** from **Application Menu**; the **Save As** dialog box is displayed. Enter **c03\_Club\_tut2** in the **File name** edit box and then choose **Save**.

## Tutorial 3

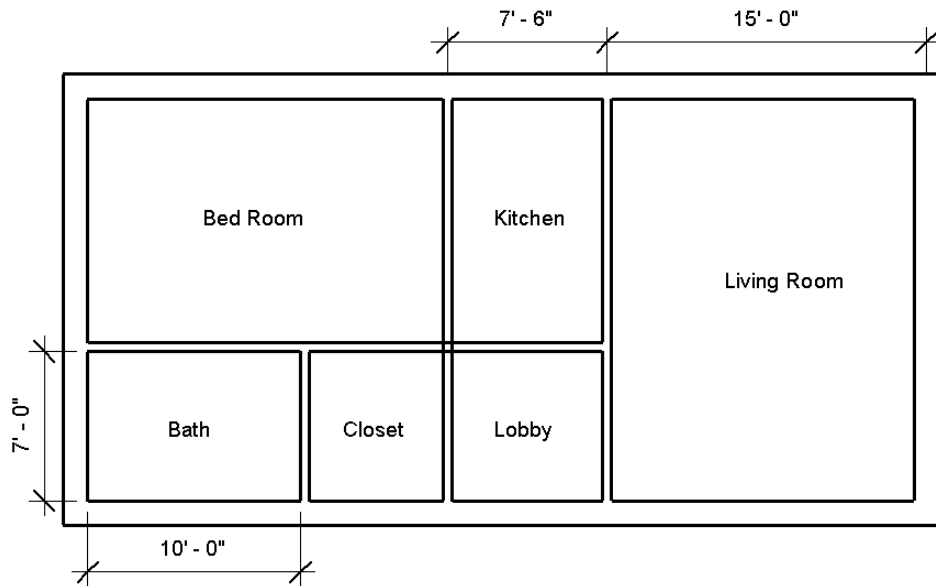
## Apartment 1 - Interior Walls

This completes the tutorial for creating the exterior wall profile for the Club project. In this tutorial, you will add interior walls to the apartment plan created in Tutorial 1 of this chapter. The interior walls to be created are the intermediate walls among various rooms, as shown in the plan sketch in Figure 3-50. The dimensions and text have been given for reference and are not to be created. The parameters to be used for different elements are given next.  
(Expected time: 30 min)

1. Project- *c03\_Apartment1\_tut1.rvt* project created in Tutorial 1 in this chapter.
2. Interior wall type- **Interior - 5" Partition (2-hr)**.
3. Location line parameter- **Wall Centerline**

The following steps are required to complete this tutorial:

- a. Open the *Apartment 1* project file created earlier in this chapter.
- b. Invoke the **Wall** tool and select the **Interior - 5" Partition (2-hr)**, refer to Figure 3-51.
- c. Set the location line parameter as **Location Line- Wall Centerline**.
- d. Select the **Line** sketching tool to sketch the straight walls.
- e. Sketch the interior walls based on the given parameters, refer to Figures 3-52 through Figure 3-58.
- f. Edit the interior walls location to achieve clear internal distances, refer to Figures 3-59 and Figure 3-60.



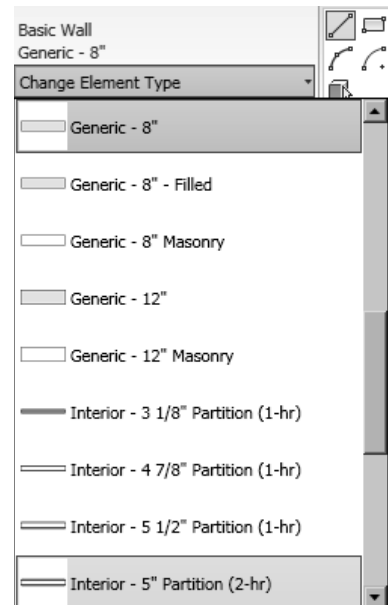
*Figure 3-50 Layout of internal walls for Apartment 1 project*

## Opening the Existing Project and Invoking the Wall Tool

1. Choose **Open > Project** from the **Application Menu** to open the *c03\_Apartment1\_tut1.rvt* project created earlier in this chapter. You can also download this file from: [http://www.cadcim.com/Revit\\_2010/Revit\\_2010.htm](http://www.cadcim.com/Revit_2010/Revit_2010.htm) link.
2. Invoke the **Wall** tool from the **Build** panel in the **Home** tab of the ribbon.

## Selecting the Interior Wall Type

1. On invoking the **Wall** tool, the **Place Wall** tab is displayed. From the **Element** panel in this tab, select **Interior - 5" Partition (2-hr)** from the **Change Element Type** drop-down list, as shown in Figure 3-51.
2. Ensure that the **Location Line** parameter in the **Options Bar** shows **Wall Centerlines**. Also, ensure that the **Chain** check box is cleared.

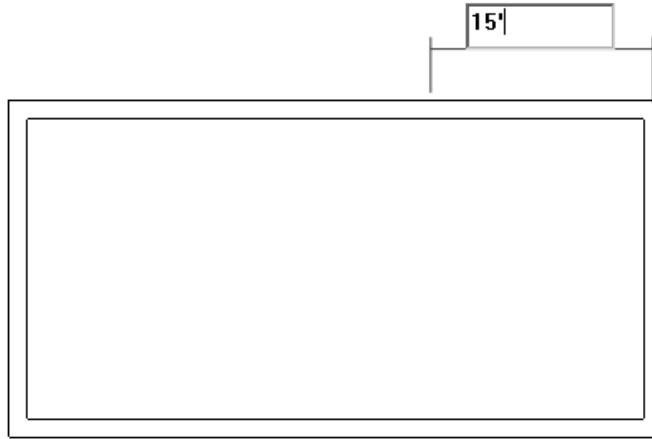


*Figure 3-51 Selecting the Basic Wall : Interior-5"Partition (2-hr) wall type*

## Sketching the First Interior Wall

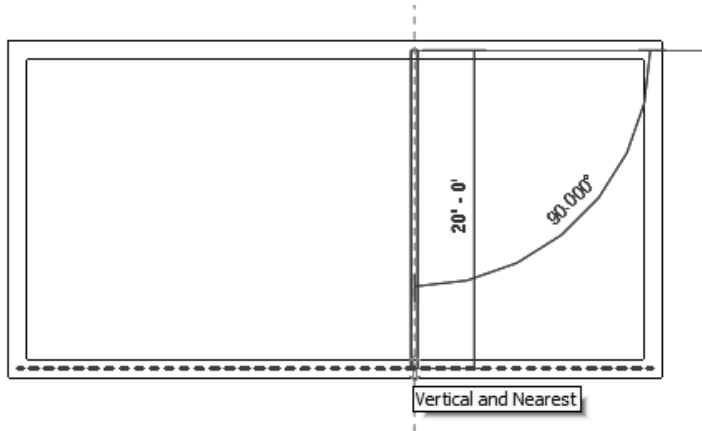
After selecting the interior wall type, start sketching the interior walls. Notice that the **Line** option is selected as the default option for sketching the walls.

1. Move the cursor near the top right endpoint of the wall structure. You will notice that a temporary dimension appears, which changes dynamically as you move the cursor away from it. This dimension shows the distance of the cursor from the nearest wall segment.
2. Enter **15'0"** from the keyboard, as shown in Figure 3-52. Now press ENTER; the starting point of the first interior wall is specified.



**Figure 3-52** Specifying the distance for starting the first interior wall segment

3. Next, move the cursor vertically downward near the lower exterior wall segment. When the **Vertical and Nearest** symbol appears, as shown in Figure 3-53, click to specify the location of the endpoint of the wall segment. The first interior wall segment is sketched.

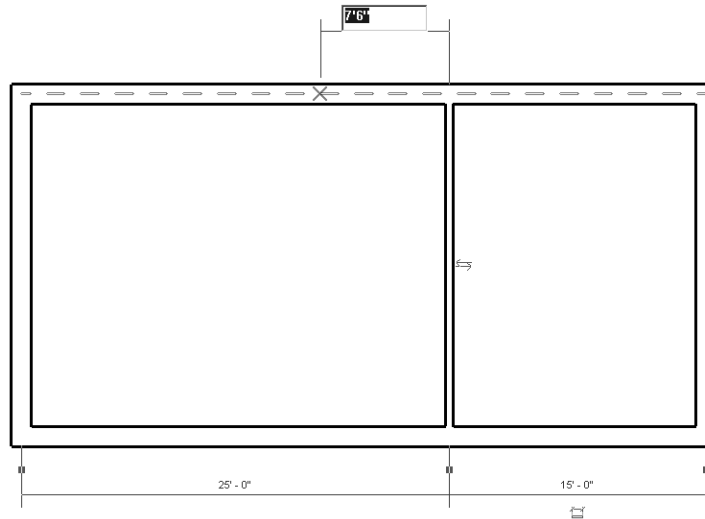


**Figure 3-53** Specifying the endpoint of the first interior wall segment

### Sketching Other Interior Walls

Similarly, you can sketch the other horizontal and vertical interior walls by specifying their start point and endpoint using different object snap options.

1. To sketch the second interior wall, move the cursor to the upper endpoint of the interior wall you just created and then move the cursor horizontally toward the left. Enter **7'6"**, when the temporary dimension and the intersection object snap appears, as shown in Figure 3-54. Now, press ENTER; the start of the second interior wall segment is specified on the upper horizontal exterior wall.

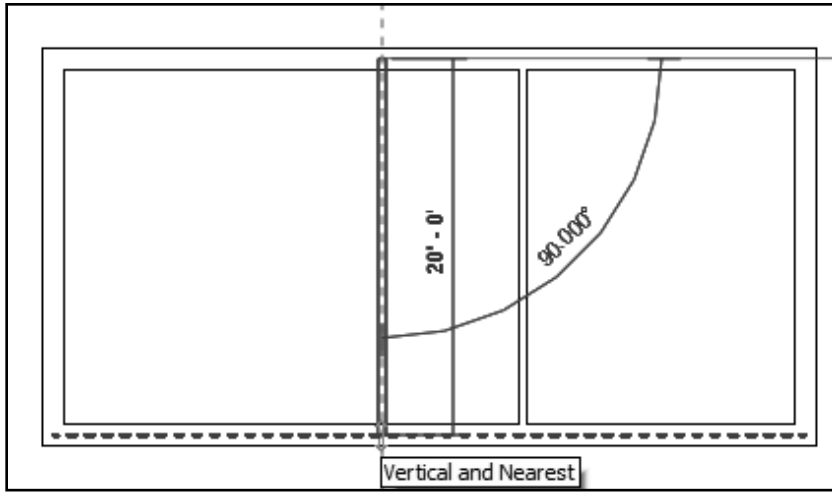


*Figure 3-54 Specifying the starting point of the second interior wall*

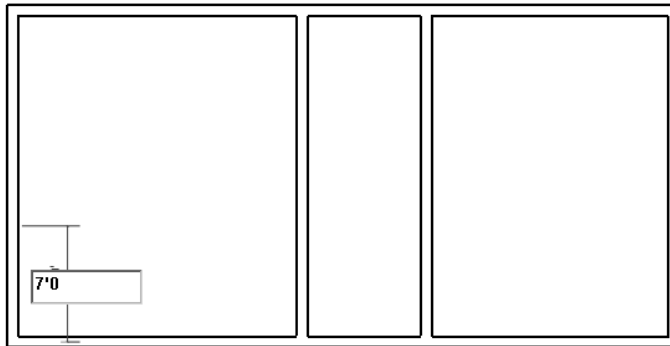
2. Press SHIFT and move the cursor downward. The cursor moves parallel to the vertical axis. Click near the lower external wall when the **Vertical and Nearest** symbol appears, as shown in Figure 3-55.

Next, you will sketch the interior walls of the bath. Since the internal dimensions have been provided for the interior walls, you will first sketch them using the wall centerlines and later move them to get the exact clearance distance of the bath walls.

3. Move the cursor to the lower left corner and then move it vertically upward. When the temporary dimension appears, enter **7'0"** and press ENTER to select the starting point of the third interior wall, as shown in Figure 3-56.
4. Press SHIFT and move the cursor horizontally towards the right until it reaches the first vertical interior wall. When the **Horizontal and Nearest** object snap symbol appears, click to specify the location of the endpoint of the third interior wall, as shown in Figure 3-57. The wall segment is created.
5. Similarly, move the cursor near the lower left corner and then move it horizontally toward the right. When the temporary dimension and the intersection object snap appears, enter the value **10'0"**, as shown in Figure 3-58 and then press ENTER.



*Figure 3-55 Sketching the second interior wall*



*Figure 3-56 Specifying the distance for sketching the third internal wall*

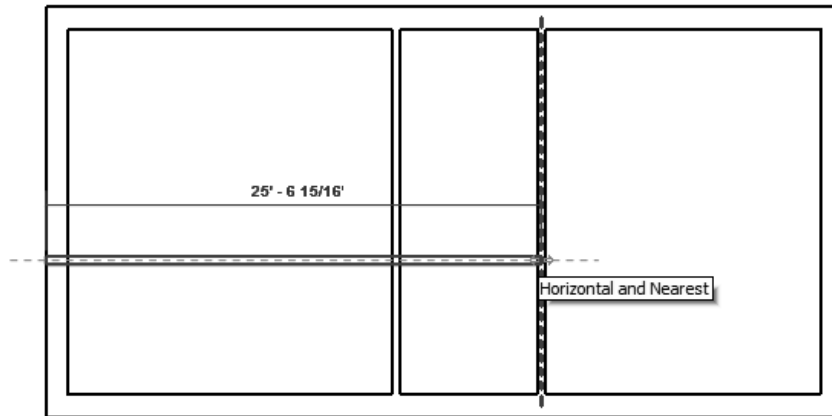
6. Press and hold the SHIFT key and move the cursor vertically upward until it reaches the horizontal interior wall. Click when the **Vertical and Nearest** symbol to specify the endpoint of the wall. Now, press ESC twice to finish the sketch of the wall.

### Moving Walls Using Witness Lines

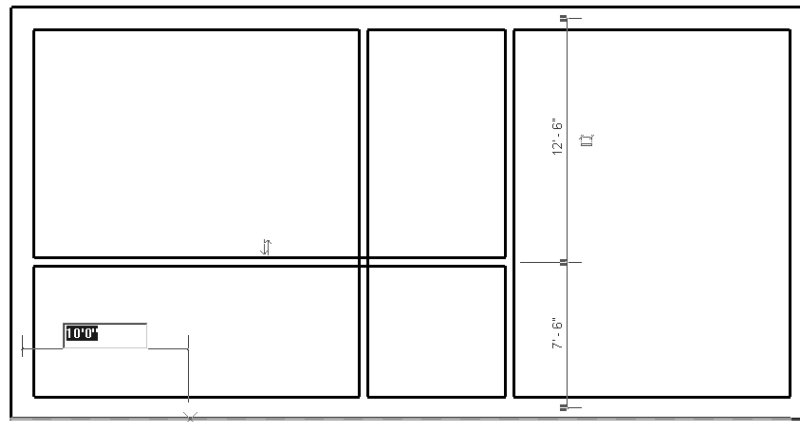
As the dimension of the bath walls is from the centerline of the external walls, you need to move the interior walls of the bath such that the internal dimensions are 7'0"X10'0" as specified in the sketch. Use the witness lines and specify these dimensions.

1. Select the last created interior wall from the drawing. The selected interior wall shows the centerline distances and its controls.
2. Three blue square dots define the extents of the dimensions. Click on the square dot on the extreme left. The dot and dimension witness line moves to the interior face of the exterior wall, as shown in Figure 3-59.



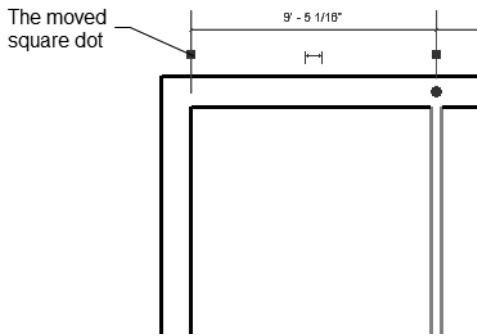


*Figure 3-57 Sketching the third interior wall segment*

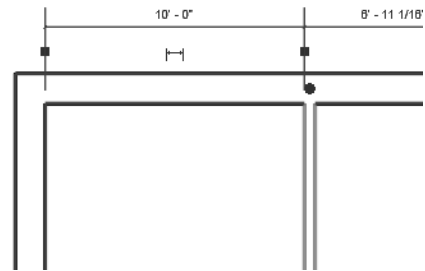


*Figure 3-58 Sketching the interior walls of the bath*

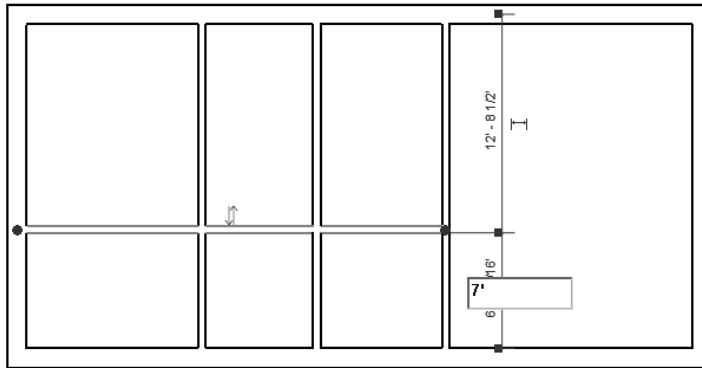
3. Similarly, click twice on the next square blue dot on the right to move it to the inner face of the third interior wall.
4. Now, click on the temporary dimension, enter the value **10'0"**, and then, press ENTER. The interior wall is moved to the desired distance 10'0" from the interior face of the exterior wall, as shown in Figure 3-60.
5. Similarly, to move the horizontal interior wall of the bath, select it and move both the witness lines toward the inner face by clicking on the square blue dots.
6. Click on the temporary dimension from the lower external wall and enter the value **7'0"**, as shown in Figure 3-61 and press ENTER. The interior wall is moved to the desired location. Now, press ESC to exit the **Modify Walls** tab.
7. This completes the interior wall layout for the *Apartment 1* project. The model will look similar to that shown in Figure 3-61.



**Figure 3-59** The square dot moved

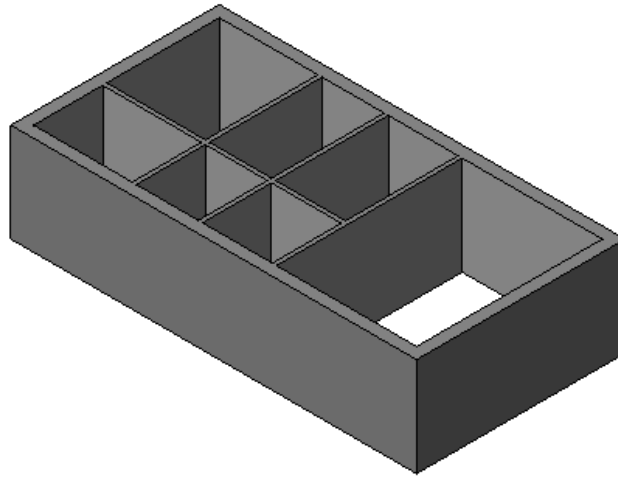


**Figure 3-60** The adjusted inner wall distance



**Figure 3-61** Entering the value to adjust the dimension of the horizontal interior wall

8. To view the building model in 3D, choose **Create > 3D View** from the **View** tab of the ribbon; a cascading menu is displayed. Now, from this cascading menu, choose **Default 3D View** option; the 3D view of the building model is displayed along with the **ViewCube** tool.
9. Now, choose the **Model Graphics Style** button from the **View Control Bar**; a flyout is displayed. Choose the **Shading with Edges** option from this flyout; the 3D view is displayed with shading with edges visible, as shown in Figure 3-62.
10. Choose **Save As > Project** from **Application Menu**; the **Save As** dialog box is displayed. Enter **c03\_Apartment1\_tut3** in the **File name** edit box and then choose **Save**.



*Figure 3-62 3D view of the Apartment 1 building model*

## Tutorial 4

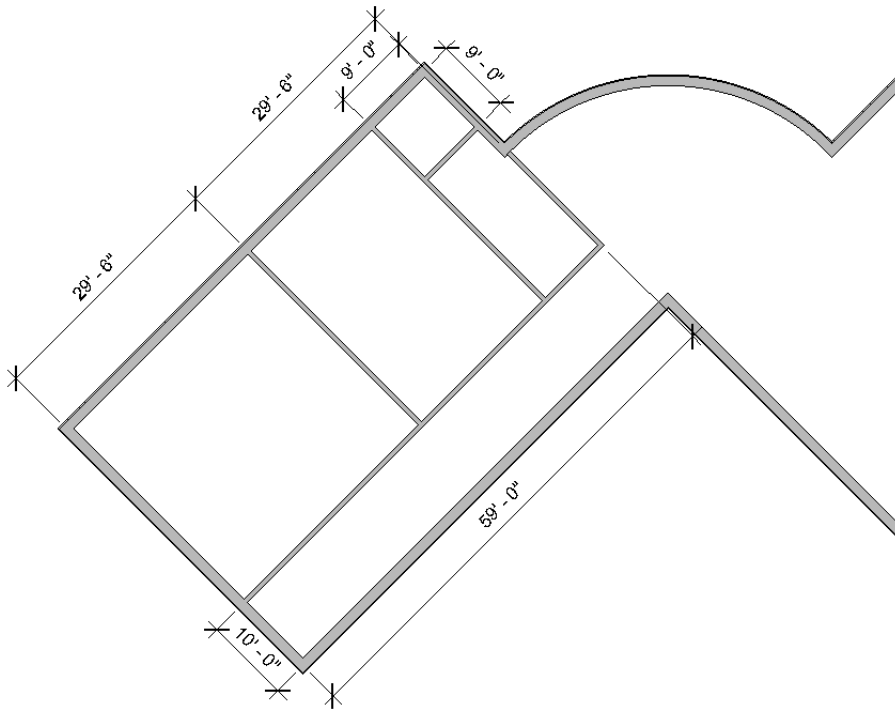
## Club - Interior Walls

Create the interior walls of the left portion of the club building whose exterior wall profile was created in Tutorial 2 earlier in this chapter. Create the walls, based on the sketch plan shown in Figure 3-63. The dimensions are given for the centerlines of the walls and are displayed only for drawing purpose. You do not need to dimension or add text to the building. The parameters to be used for different elements are given below. **(Expected time: 30 min)**

1. Project- *c03\_Club\_tut2.rvt* project created in Tutorial 2 of this Chapter.
2. Interior wall type-**Interior - 6 1/8" Partition (2-hr)**.
3. Unconnected height of walls- **12'0"**.
4. Location Line- **Wall Centerline**.
5. Inclined walls are parallel to the external walls and perpendicular to each other.

The following steps are required to complete this tutorial:

- a. Open the *c03\_Club\_tut2.rvt* project file created in Tutorial 2 of this Chapter.
- b. Invoke the **Wall** tool and select the **Interior - 6 1/8" Partition (2-hr)** wall type, refer to Figure 3-64.
- d. Set the unconnected height to **12'0"**
- e. Verify that the location line parameter is set to **Wall Centerline**.
- f. Select the **Line** sketching option to create the straight walls.
- g. Sketch the interior walls based on the given parameters, refer to Figures 3-65 through 3-71.



*Figure 3-63 Sketch plan for creating the interior wall of the left portion of the Club project*

### Opening the Existing Project and Invoking the Wall Tool

1. Open the *c03\_Club\_tut2.rvt* project file by choosing **Open > Projects** from the **Application Menu**. You can also download this file from:  
[http://www.cadcim.com/Revit\\_2010/Revit\\_2010.htm](http://www.cadcim.com/Revit_2010/Revit_2010.htm) link.
2. Click twice on **Level 1** under the **Floor Plans** node in the **Project browser** and invoke the **Wall** tool by choosing **Build > Wall** from the **Home** tab of the ribbon.

### Selecting the Interior Wall Type

Before creating the interior walls you need to select the wall type using the **Change Element Type** drop-down list .

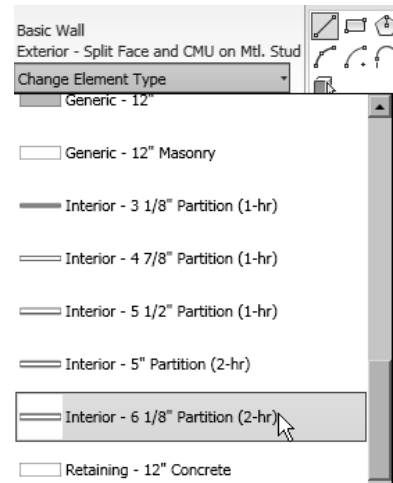
1. Select **Interior - 6 1/8" Partition (2-hr)** from the **Change Element Type** drop-down list, as shown in Figure 3-64, in the **Element** panel of the **Place Wall** tab of the ribbon.
2. Now, choose **Element > Element Properties > Instance Properties** in the **Place Wall** tab of the ribbon; the **Instance Properties** dialog box is displayed.
3. In the **Value** column for the **Top Constraint** parameter click to display a drop-down list and select the **Unconnected** option from it.
4. Next, click on the value column of the **Unconnected Height** parameter, and replace the current value by entering the new value **12'0"** in the cell.

- Choose the **OK** button to close the **Instance Properties** dialog box.

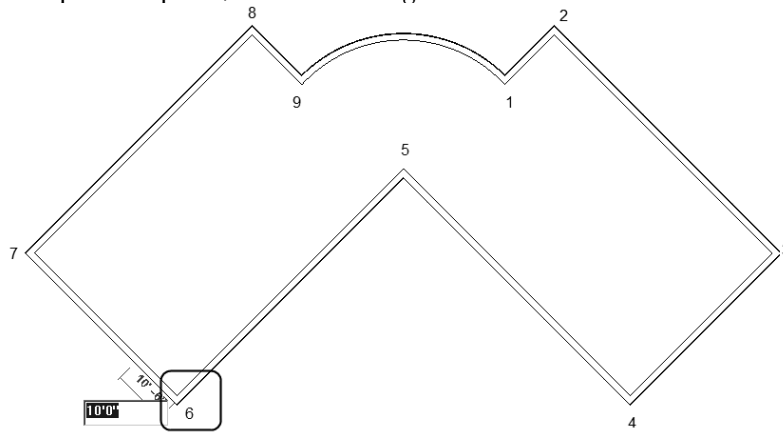
### Sketching the Interior Walls

The interior walls to be created are straight in nature, therefore you can use the **Line** option from the **Draw** panel to create them.

- Make sure that the **Wall Centerline** option is selected from the **Location Line** drop-down list in the **Options Bar**.
- Also, clear the **Chain** check box, if it is already selected in the **Options Bar**.
- Move the cursor close to the lower left corner, marked as 6, refer to Figure 3-65, and traverse upward along the centerline of extreme left wall of the building profile. When the temporary dimension appears, enter the value 10'0" and press ENTER to start the interior wall profile from the specified point, as shown in Figure 3-65.



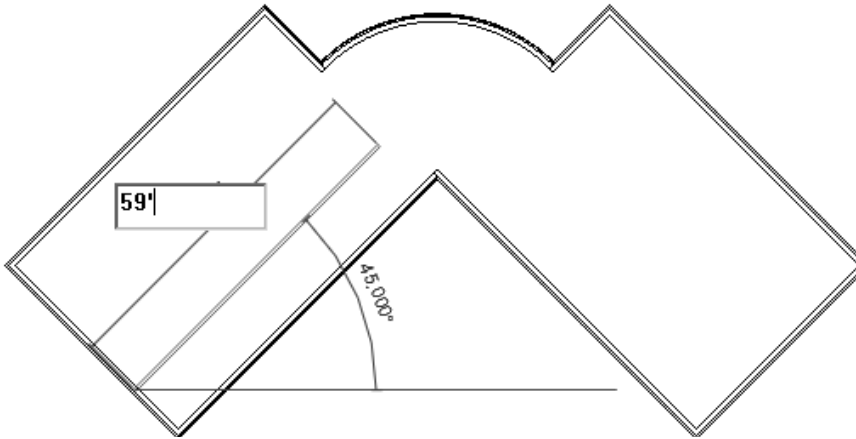
**Figure 3-64** Selecting the interior wall type from the **Change Element Type** drop-down list



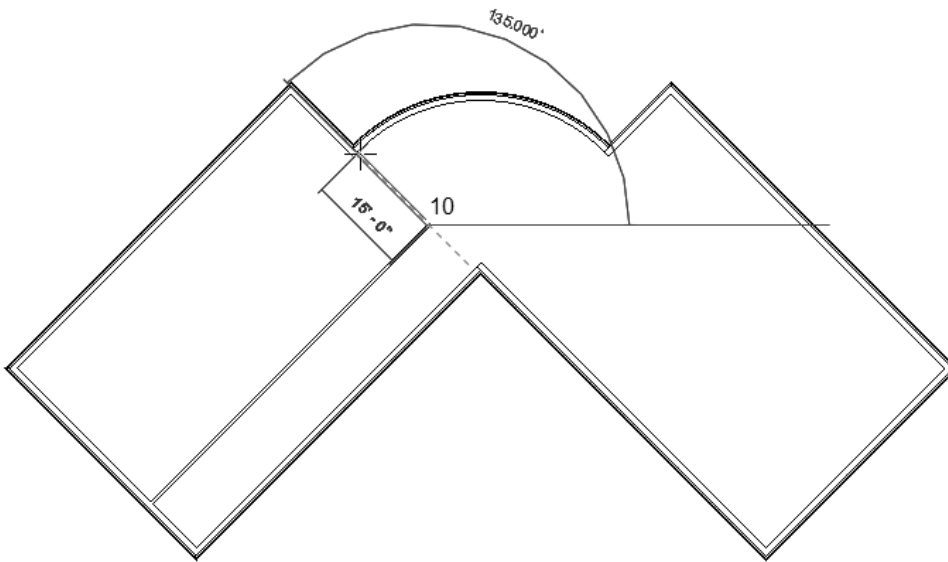
**Figure 3-65** Specifying the start point of the first interior wall

- Move the cursor 45-degree upward to the right. When a dashed line appears, enter the value **59'0"**, as shown in Figure 3-66 and press ENTER.
- Start the next wall from the endpoint of the last wall by clicking on its endpoint. Move the cursor upward towards the left such that it subtends an angle of 135 degrees with the horizontal and it reaches the exterior wall displaying the **Nearest** object snap, as shown in Figure 3-67. Click to specify the endpoint of the wall.
- Similarly, to start the next interior wall, bring the cursor close to the start end of the last created wall (marked as 10), refer to Figure 3-67. Then move the cursor away along the

center of the wall that is connected to the last created wall until the temporary dimension appears. When the temporary dimension appears, enter the value **10'0"** and press ENTER to specify the start point of the wall.

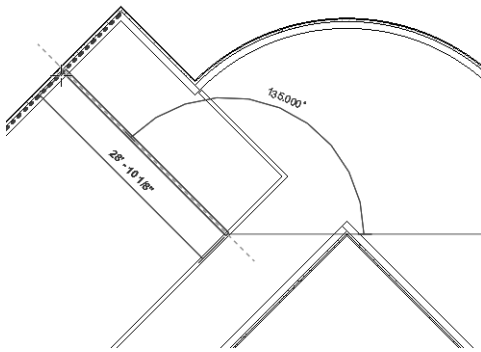


**Figure 3-66** Sketching the first interior wall of the Club project

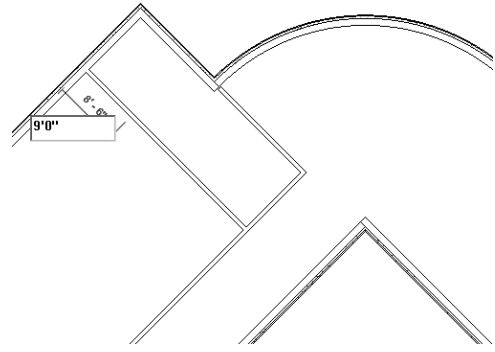


**Figure 3-67** Sketching the second interior wall

7. Move the cursor upward towards the left such that it subtends an angle of 135 degrees with the horizontal until it reaches the exterior wall and the **Nearest** object snap is displayed, as shown in Figure 3-68. Click to specify the endpoint of the wall.
8. Create the next wall by moving the cursor close to the last specified point. Next, move it downward towards the right. When the temporary dimension appears, enter the value **9'0"** and press ENTER to start the wall, as shown in Figure 3-69.

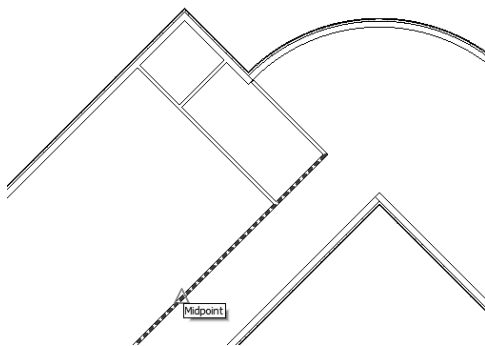


**Figure 3-68** Sketching the third interior wall

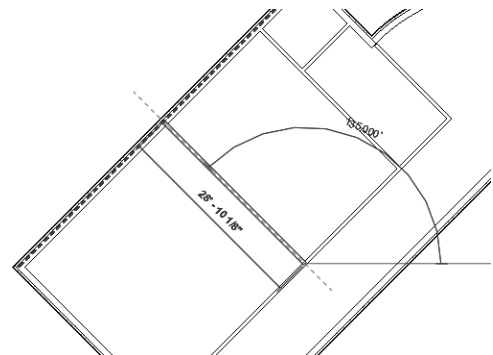


**Figure 3-69** Specifying the distance of the fourth interior wall

9. Move the cursor upward toward the right. Click on the exterior wall when the perpendicular object snap appears to specify the endpoint of the interior wall.
10. To create the next wall, bring the cursor close to the midpoint of the first interior wall until the midpoint object snap appears, as shown in Figure 3-70. Click in the drawing to start the wall.
11. Move the cursor upward left toward the exterior wall such that it subtends an angle of 135 degree with the horizontal and click when the nearest object snap appears on the exterior wall, as shown in Figure 3-71. Click to specify the endpoint and the wall is created. This completes the interior wall layout for the left portion of the Club project.
12. Choose **Save As > Project** from **Application Menu**; the **Save As** dialog box is displayed. Enter **c03\_Club\_tut4** in the **File name** edit box and then choose **Save**.
13. Now, choose **Close** from **Application Menu** to close the file.



**Figure 3-70** Starting the fifth interior wall from the midpoint of the first interior wall



**Figure 3-71** Completing the interior walls

## Self-Evaluation Test

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

1. You can modify the instance properties of a wall type in the **Instance Properties** dialog box. (T/F)
2. When you modify the instance properties of a wall, the instance properties of all the same wall types used in the project are modified. (T/F)
3. You can create a wall type of your choice by combining various layers. (T/F)
4. By default, when you sketch a wall from left to right, the lower face becomes the external face. (T/F)
5. You cannot modify the angle of an inclined wall after sketching it. (T/F)
6. The \_\_\_\_\_ dimension appears after you specify the start point of the wall and move the cursor.
7. You can use the \_\_\_\_\_ option to create a curved wall by specifying the center and the endpoints.
8. The \_\_\_\_\_ option enables you to sketch continuous wall segments that are connected end to end.
9. To create a wall starting at a specified distance from a point on an existing element, you can use the \_\_\_\_\_ option from the **Options Bar**.
10. The required wall type can be selected from the available wall types displayed in the \_\_\_\_\_ drop-down list.

## Review Questions

Answer the following questions:

1. The **Location Line** parameter is an instance property of a wall. (T/F)
2. The value of the **Function** parameter in the **Type Properties** dialog box for an exterior wall is **Exterior**. (T/F)
3. You can add or delete layers of a composite wall type to create a new wall type. (T/F)



4. Once a wall is sketched, its dimension and angle cannot be modified. (T/F)
5. The **Chain** option can be enabled or disabled without exiting the wall tool. (T/F)
6. The usage of the wall can be changed by modifying the value of the **Function** parameter. (T/F)
7. While using the **Wall** tool, if you invoke any other tool, the **Wall** tool is discontinued. (T/F)
8. Which of the following sketching tools can be used to create a straight wall?
  - a) **Lines**
  - b) **Circles**
  - c) **Fillet Arc**
  - d) **Center-ends Arc**
9. Which of the following keys can be used to constrain the cursor to move in the orthogonal direction?
  - a) TAB
  - b) SHIFT
  - c) ALT
  - d) F3
10. Which of the following sketching tools can be used to create a curved wall?
  - a) **Polygon**
  - b) **Line**
  - c) **Fillet Arc**
  - d) **Rectangle**

## Exercises

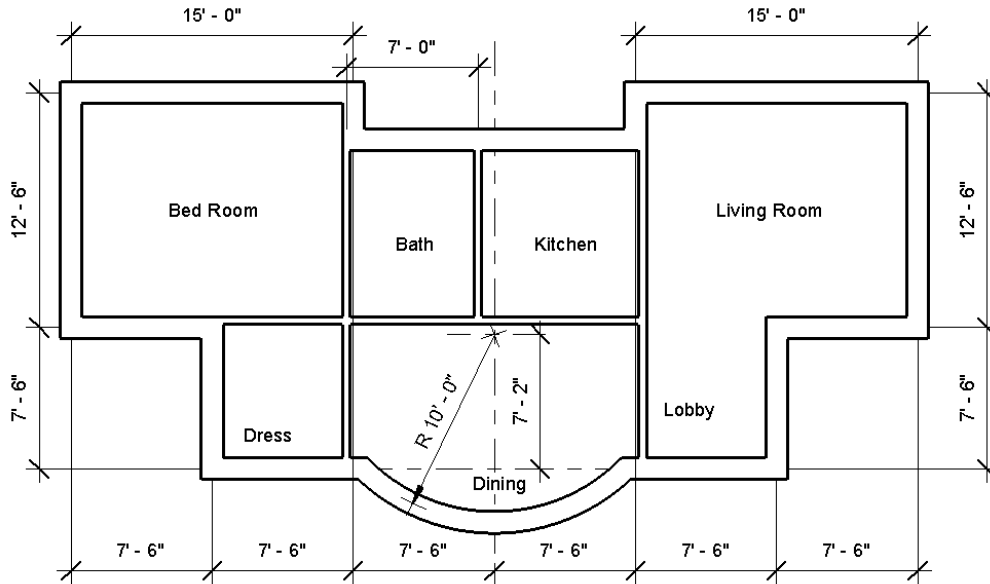
### Exercise 1

### Apartment 2

Create the exterior and interior walls of the *Apartment 2*, based on the Figure 3-72. The thick walls are the exterior walls and the thin walls are the interior walls. The dimensions and texts are not to be added. The project parameters for this exercise are given below.

(Expected time: 30 min)

1. Project File - *c02\_Apartment2\_ex1.rvt* created in Exercise 1 of Chapter 2.
2. Exterior wall type- **Exterior - Brick on Mtl. Stud**
3. Interior wall type- **Basic Wall: Interior - 5" Partition (2-hr)**.
4. Height of the wall- **Top Constraint - Upto Level 2**.
5. Location line parameter for the exterior walls- **Wall Centerline**.
6. Name of the file to be saved- **c03\_Apartment\_ex1**



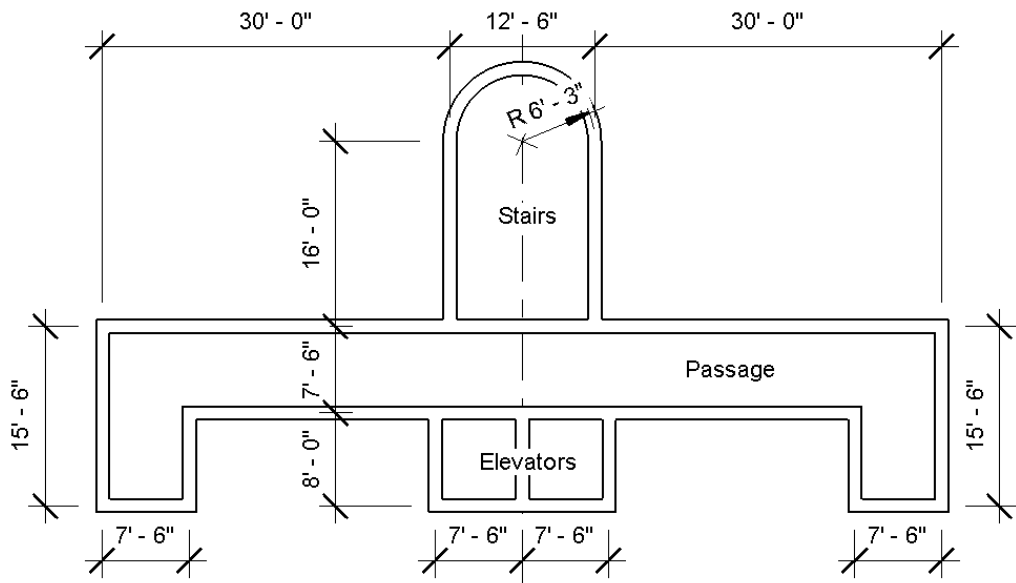
**Figure 3-72** The sketch plan for creating the exterior and interior walls for the Apartment 2 project

## Exercise 2

## Elevator and Stair Lobby

Create the exterior walls of the *Elevator and Stair Lobby* project, based on the Figure 3-73. Do not add dimensions or texts as they are only for reference. The project parameters for this exercise are given next. **(Expected time: 30 min)**

1. Project File - *c02\_ElevatorandStairLobby\_ex2.rvt* created in Exercise 2 of Chapter 2.
2. Exterior wall type- **Basic Wall Exterior Brick on Mtl. Stud.**
3. Height of the wall- **Top Constraint- Upto Level 2.**
4. Location line parameter- **Wall Centerline.**
5. Name of the file to be saved- **c03\_Elevator and StairLobby\_ex2**



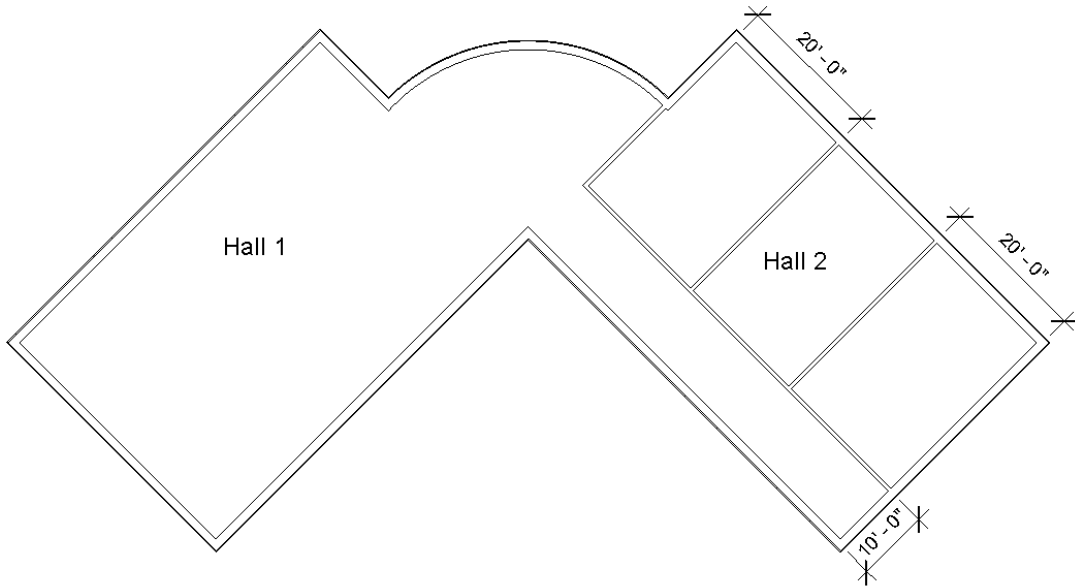
**Figure 3-73** Sketch plan for creating the exterior walls for the Elevator and Stair Lobby project

### Exercise 3

## Club-Interior Walls

Create the interior walls of Hall 2 of the *Club* project based on Figure 3-74. Do not dimension the sketch as these are only for reference. The project parameters for this exercise are given next. **(Expected time: 30 min)**

1. Project File - *c02\_Club\_ex3.rvt* created in Tutorial 2 of this chapter.
2. Interior wall type- **Basic Wall: Interior - 6 1/8" Partition (2-hr)**.
3. Unconnected height of walls- **12'0"**.
4. Location Line- **Wall Centerline**.
5. Inclined walls are parallel to the external walls and perpendicular to each other.
6. Name of the file to be saved- **c03\_Club\_ex3**



**Figure 3-74** Sketch plan for sketching the interior walls of right portion for the Club project

### Answers to Self-Evaluation Test

1. T, 2. F, 3. T, 4. F, 5. F, 6. Temporary, 7. Center- ends Arc, 8. Chain, 9. Offset, 10. Change Element Type

# Chapter 4

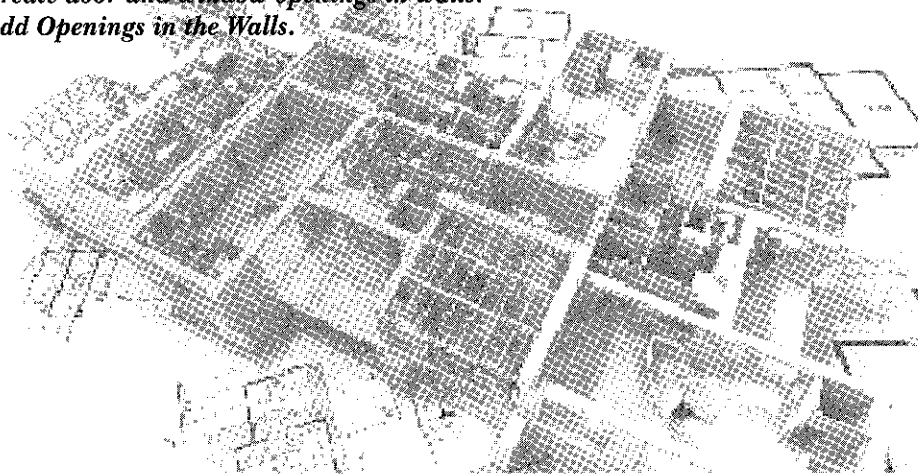
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## Using Basic Building Components-I

### Learning Objectives

**After completing this chapter, you will be able to:**

- *Understand the concept of doors.*
- *Understand various properties of doors.*
- *Add doors to the exterior and interior walls.*
- *Understand the concept of windows.*
- *Understand various properties of windows.*
- *Add windows to a building model.*
- *Create door and window openings in walls.*
- *Add Openings in the Walls.*



In the previous chapter, you learned how to create a building profile by using the exterior and interior walls. Like walls, doors and windows are also important elements of a building model. In this chapter, you will learn the process of selecting and adding doors and windows to a building model. Autodesk Revit Architecture has several in-built families of doors and windows. You will also learn to use these components and modify their properties.

## ADDING DOORS IN A BUILDING MODEL

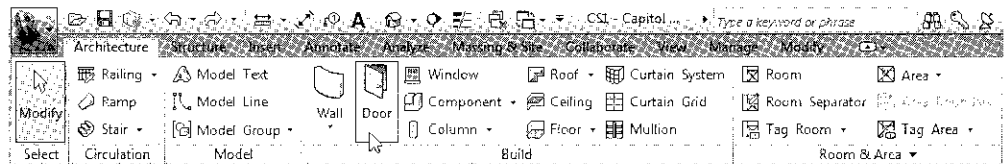
A door is one of the most frequently used components in a building model. It helps in accessing various exterior and interior spaces in a project. Autodesk Revit Architecture provides a variety of predefined door types. You can access these door types by using the options from the **Type Selector** drop-down list of the **Properties** Palette. You can also load other door types from the **US Imperial** folder. A wall acts as a host element for doors. This means that a door can be placed only if there exists a wall. When you add a door to a wall, Autodesk Revit Architecture intuitively creates an opening in it. The procedure for adding doors to a building model is described next.

### Adding Doors

**Ribbon:** Architecture > Build > Door

**Shortcut Keys:** DR

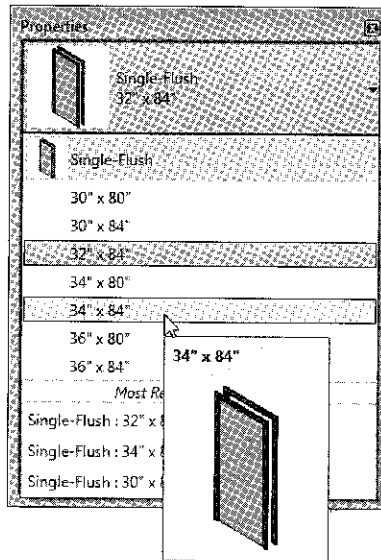
You can add doors to a building model by using the **Door** tool. You can invoke this tool from the **Build** panel, as shown in Figure 4-1. Alternatively, you can type **DR** to invoke this tool.



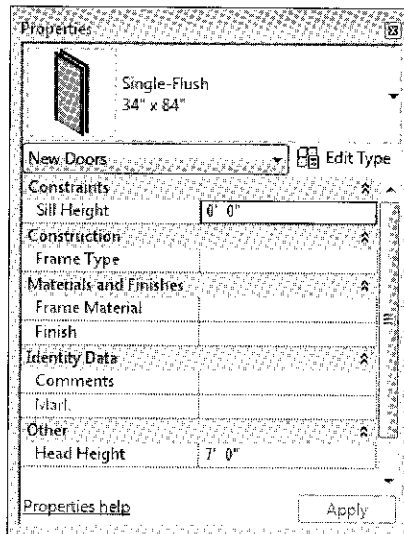
*Figure 4-1 Invoking the Door tool from the Build panel*

To add a door, invoke the **Door** tool; the **Modify | Place Door** tab will be displayed in the ribbon. In this tab, select the desired door type from the **Type Selector** drop-down list in the **Properties** Palette. This drop-down list displays in-built door types, as shown in Figure 4-2. Next, after selecting a door type, click on the desired location of a wall to add the door. After adding the door to the building model, you can view and modify its properties. To do so, select the door; the instance properties of the door will be displayed in the **Properties** Palette, as shown in Figure 4-3. You will learn more about adding doors to a wall later in this chapter.

Now, to modify the type properties of the selected door type, choose the **Edit Type** button from the **Properties** Palette; the **Type Properties** dialog box for the selected door type will be displayed, as shown in Figure 4-4. In this dialog box, change the parameters as per your requirement and then choose the **Preview** button to view the graphical image of the selected door type.



*Figure 4-2 Selecting the door type from the **Properties** Palette*



*Figure 4-3 The instance properties displayed for the **Single-Flush: 34\"**  
**84\"** door type*

## Understanding Door Properties

The **Type Properties** dialog box displays the values of different parameters of a door. The type parameters are arranged under various heads based on their properties such as **Construction**, **Materials and Finishes**, **Dimensions**, **Identity Data**, and **IFC Parameters**. The parameters associated with each property are listed under each head. For example, the **Dimensions** head

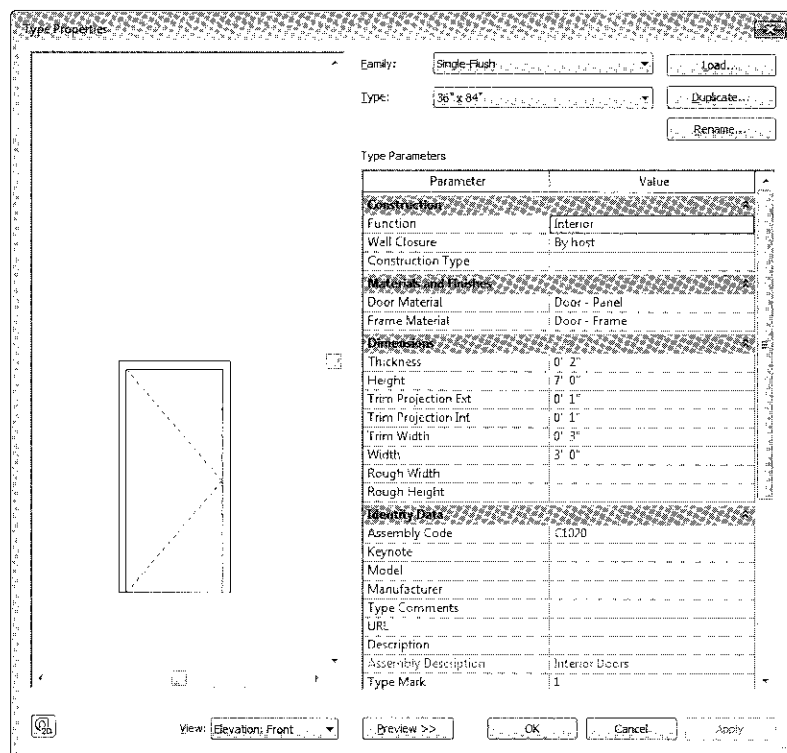


Figure 4-4 The Type Properties dialog box

these parameters or modifying them to the desired values. However, before modifying the type properties of a predefined door type, it is recommended to create a copy of the original door type and modify the desired properties of the new door type. The **Duplicate** button available on the top right corner in this dialog box can be used to create a copy of a door type. When you choose this button, the **Name** edit box will be displayed, prompting you to assign a name to the new door type. Enter a name in this edit box and choose the **OK** button; a new door type is created, which inherits the properties of the parent door type. Now, its parameters can be modified, as desired. Use the **Rename** button to give a new name to the selected door type. You can use the **Load** button provided on the top right corner of the dialog box to load a door type of the required family from the additional libraries.



#### Note

*Renaming a door type does not alter its properties. For example, if you rename 34"x 84" to 36"x 84", its width will still remain 34", irrespective of its name.*

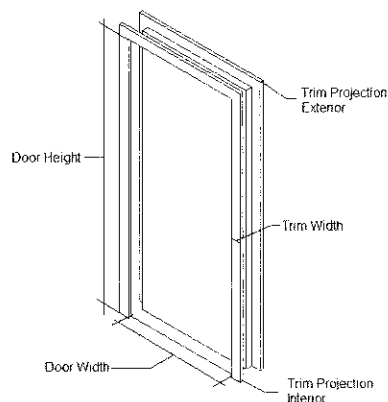
## Door Type Properties

If you change the type properties of a door, the properties of all instances of that door type in the project will also change. The door type properties are described in the table given next:



Parameter Name	Description
Function	Sets the door function value to Interior or Exterior. This value will be used at the time of scheduling
Wall Closure	Sets the layer wrapping for the door type
Construction Type	Describes the composition of the door
Door Material	Refers to the finish material of the door panel which can be selected from the available materials list
Frame Material	Refers to the finish material of the door frame and can be selected from the available materials list
Height	Sets the height of the door
Trim Projection	Thickness of the trim projection at the exterior side
Trim Projection	Thickness of the trim projection at the interior side
Trim Width	Width of the trim at both the sides
Width	Width of the door can be set in this column
Rough Width	Used for scheduling or exporting
Rough Height	Used for scheduling or exporting
Assembly Code	Refers to the assembly code for the door type that can be selected from the hierarchical list
Keynote	This is a new parameter available for all model elements, detail components, and materials under identity data
Model	Name to be given to the model door type
Manufacturer	Name of the manufacturer of the door type
Type Comments	Additional information or comments to be added to the door type, primarily for including in schedules
URL	Web link of the door type manufacturer
Description	Text describing the door type
Assembly	Text describing the assembly of the door type
Type Mark	Each door can be assigned a unique value that may be generated in a sequence of creation of the door type
Fire Rating	Fire rating of the door
Cost	Cost of the door, primarily for costing purpose

Some of the properties of the door are shown graphically in Figure 4-5.



*Figure 4-5 The door properties*

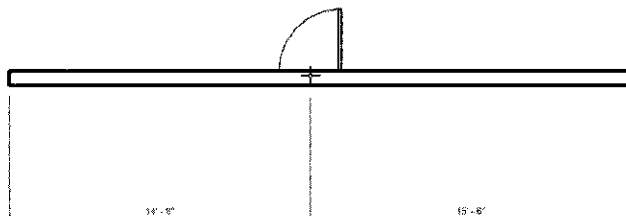
## Door Instance Properties

The door instance properties, available in the **Properties** Palette, refer to the instance properties of a particular door. On changing these properties, the properties of only a particular instance in the project are changed. The description of various instance parameters is given in the table next:

Parameter Name	Description
Level	Shows the layer to which the door belongs and can be used to move it to a different level
Sill Height	Refers to the distance or height of the sill of the door from the specified level
Frame Type	Refers to the type of frame used for the door instance
Frame Material	Specifies the material used for the frame of the instance
Finish	Refers to the finish applied to the door and frame
Comments	Describes the door instance
Mark	Specifies the mark of the selected door
Phase Created	Specifies whether the door is a part of the new construction or an existing construction
Phase Demolished	Specifies whether the door is a part of the existing building or a new structure, or none
Head Height	Refers to the height of the top of the door from the specified level

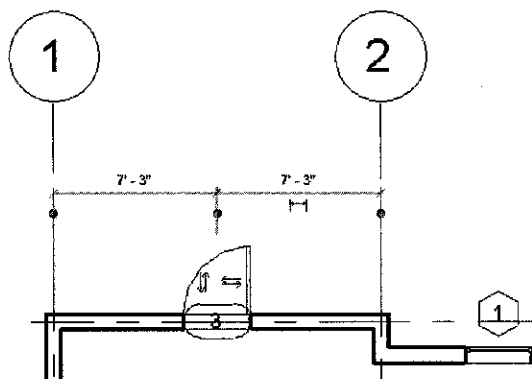
## Adding a Door to a Wall

Doors can be added to a building model in the plan, section, elevation or a 3D view, by clicking at the desired location in a wall. After invoking the **Door** tool and selecting the door type, move the cursor over the wall on which it is to be added. The '+' symbol over the cursor indicates that an element is being added. You will notice that the door symbol appears, when the cursor is moved over the wall. When the cursor comes close to the upper or lower face of the wall, the door symbol appears on it, as shown in Figure 4-6. The door symbol appears on the lower face when the cursor comes near to that face. Also, a temporary dimension appears indicating the distance of the center of the door opening from adjacent walls or wall edges.



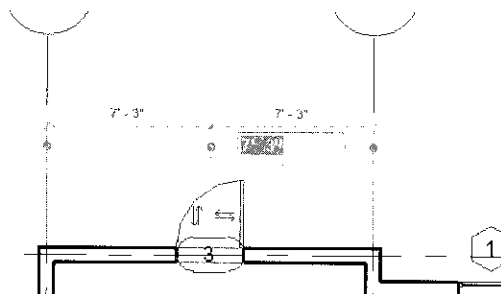
**Figure 4-6** Adding a door to an existing wall

Using the temporary dimensions displayed, you can add the door at the desired location. Alternatively, you can first add the door at an approximate location on the wall and then modify its location to the exact dimension. When a door is added, an opening is automatically created in the wall and the edges are also completed, as shown in Figure 4-7. After selecting the door, you will notice that the horizontal and vertical twin arrow symbols appear in the door along with a tag number. To flip the swing-side of the door, click on the twin arrow key that appears parallel to the wall edge. To shift the door to the other side of the wall, click on the twin arrow key that appears perpendicular to the wall edge (vertical, in this case).



**Figure 4-7** A door added along with its controls

To move the added door to the exact dimension, click on the particular temporary dimension text and enter the exact value, as shown in Figure 4-8. The door shifts to the desired location.



**Figure 4-8** Specifying the exact location of the door



### Note

*A door can be placed in any type of wall, regardless of the height of the door. Autodesk Revit Architecture displays alert messages, if the door is not placed appropriately.*

In Autodesk Revit Architecture, when doors are inserted, door tags are generated automatically. They assist in marking the doors and later, arranging them in the form of a schedule. The door type tag number increments sequentially when you place a door by using the **Door** tool or when you copy and paste it into the building model. You can, however, give a specific mark or tag to doors individually. The visibility of door tags can be controlled by using the **Visibility/Graphics Overrides for Floor Plan** dialog box. This dialog box can be invoked by typing **VG**, or by selecting the desired door from the drawing and choosing the **Visibility/Graphics** tool in the **Graphics** panel in the **View** tab. Next, if you want to hide the door tags, choose the **Annotation Categories** tab from the **Visibility/Graphics Overrides for Floor Plan** dialog box and clear the **Door Tags** check box. When you invoke the **Door** tool, the option for adding a horizontal or vertical door tag becomes available in the **Options Bar**. You can set the orientation of the door tags to horizontal or vertical by selecting the **Horizontal** or **Vertical** option from the drop-down list displayed in the **Options Bar**.

To change a door type, select the particular instance; the properties and the type of the selected door will be displayed in the **Properties** Palette. In the **Properties** Palette, select a new door type from the **Type Selector** drop-down list; the selected door will be replaced with the new door type.

In Autodesk Revit Architecture, you can create a new door type by using various tools. To create a new door type, choose the **Model In-place** tool from the **Mode** panel of the **Modify | Place Door** tab; the **Name** dialog box will be displayed. In this dialog box, enter a name in the **Name** edit box and choose the **OK** button; the dialog box will be closed and the **Modify** tab will be displayed. Using the tools from this tab, you can create the doors that are specifically designed for that instance.



### Note

*On invoking the **Model In-place** tool, the family editor mode will be activated. In this mode, you*

Apart from the door types available in the **Type Selector** drop-down list, you can use other door types from additional libraries. To access them, choose the **Load Family** tool in the **Mode** panel of the **Modify | Place Door**; the **Load Family** dialog box will be displayed. Additional door types are available in the **Doors** sub folder of the **US Imperial** folder. Select a door type to view its image in the **Preview** area, as shown in Figure 4-9. After selecting the door type, choose the **Open** button. The selected family of doors will be added to the **Type Selector** drop-down list in the **Properties** Palette for that project.

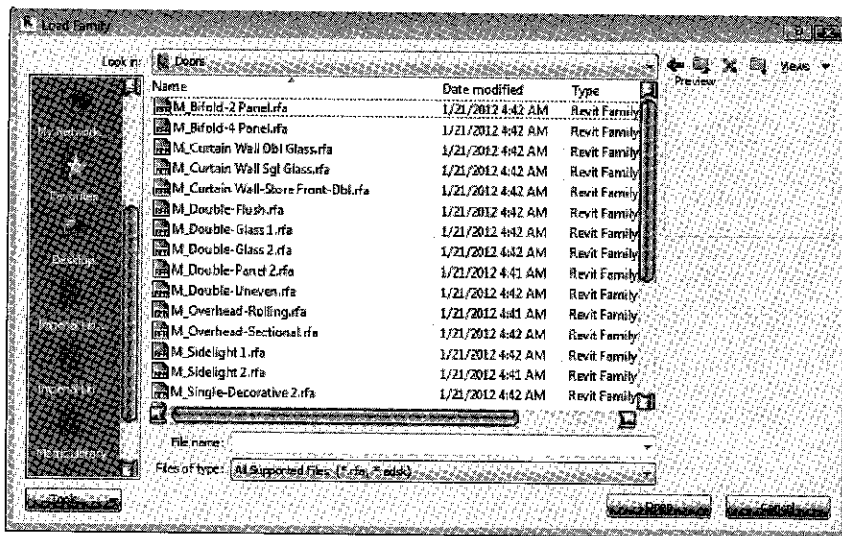


Figure 4-9 Using the **Load Family** dialog box to load additional door types



**Tip:** Using the **Options Bar**, you can set certain parameters before placing the components. For example, before placing the door, you can set the horizontal or vertical position of door tags and select the leader as well.

## ADDING WINDOWS IN A BUILDING MODEL

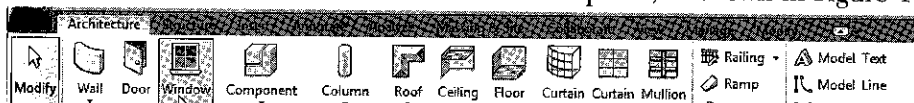
Windows form an integral part of any building project. Autodesk Revit Architecture provides several in-built window types that can be easily used and added to the building model. Like doors, windows are also dependent on the walls that act as their host element.

### Adding Windows

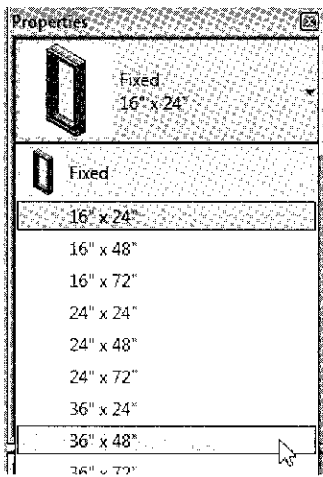
**Ribbon:** Architecture > Build > Window

**Shortcut Keys:** WN

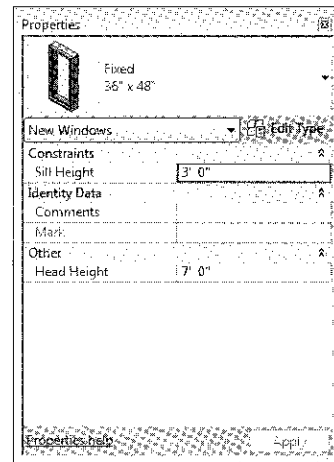
In Autodesk Revit Architecture, you can add windows to a building model by using the **Window** tool. To do so, invoke the **Window** tool from the **Build** panel, as shown in Figure 4-10; the



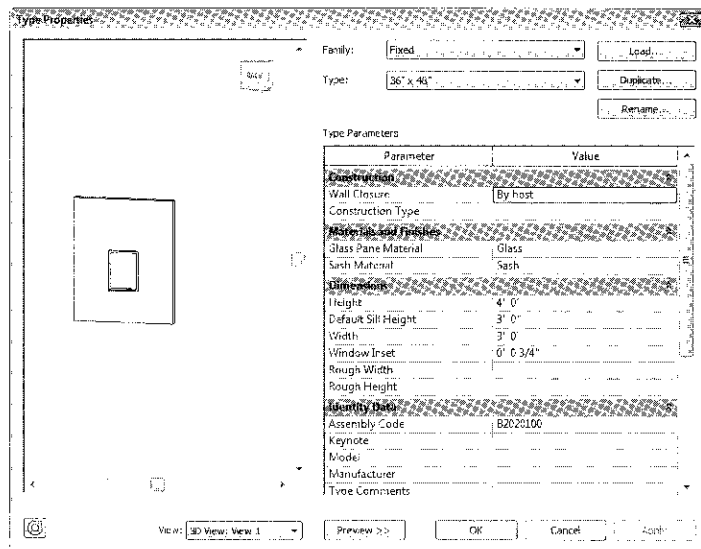
**Modify | Place Window** tab will be displayed. In this tab, select the window type from the **Type Selector** drop-down list in the **Properties** Palette, as shown in Figure 4-11. To add a window to a building model, move the cursor over the wall and click to place it either in the upper face or in the lower face. After adding the window, you can view or change its instance parameters. To do so, select the window from the drawing; the **Properties** Palette will be displayed, as shown in Figure 4-12. You can use this Palette to view and modify various instance parameters of the selected window such as its Level, Head Height, Sill Height and others. To modify and view the type parameters of the window, choose the **Edit Type** button in the **Properties** Palette; the **Type Properties** dialog box will be displayed. In this dialog box, choose the **Preview** button to view the graphical image of the selected window type, as shown in Figure 4-13.



**Figure 4-11** Selecting the window type from the **Type Selector** drop-down list



**Figure 4-12** The **Properties** Palette for the **Fixed: 36\"**



## Understanding Window Properties

The **Type Properties** dialog box displays the type parameters for different components of a window such as **Glass Pane Material**, **Sash Material**, **Default Sill Height**, **Width**, **Height**, and so on. You can click in the value column of each parameter and select from the available options or use the **Load** button provided on the top right corner of the dialog box to load a window family type from the additional libraries. The **Duplicate** button can be used to create a copy of the window type with a different name. The new window inherits the properties of the parent window type and its parameters can be modified as desired. By using the **Rename** button, you can give a new name to the selected window type.

### Window Type Properties

When you change the type properties of a window type, the properties of all instances of that window type in the project will also change. Various type parameters and their corresponding descriptions are given in the following table:

Parameter Name	Description
Wall Closure	Sets layer wrapping for the window type
Construction Type	Describes the composition of the window
Glass Pane Material	Refers to the finish and material of the glass pane and can be selected from the available materials list
Sash Material	Refers to the material assigned to the sash of the window
Height	The value used to set height of the window
Default Sill Height	Distance of the window from the bottom of the wall, the default value is 3'0"
Width	Refers to the width of the window
Window Inset	Refers to the inset of the window from the wall face
Rough Width	The value used for scheduling or exporting
Rough Height	Used for scheduling or exporting
Keynote	This is a new parameter available for all model elements, detail components, and materials under identity data
Model	Name to be given to the window type
Manufacturer	Name of the manufacturer of the window type
Type Comments	Additional information or comments to be added to the window type, primarily for creating schedules
URL	Weblink of the manufacturer
Description	Text describing the window type
Assembly Description	Text describing the assembly
Type Mark	Unique value assigned to each window

Figure 4-14 shows the window properties such as height, width, and sill height.

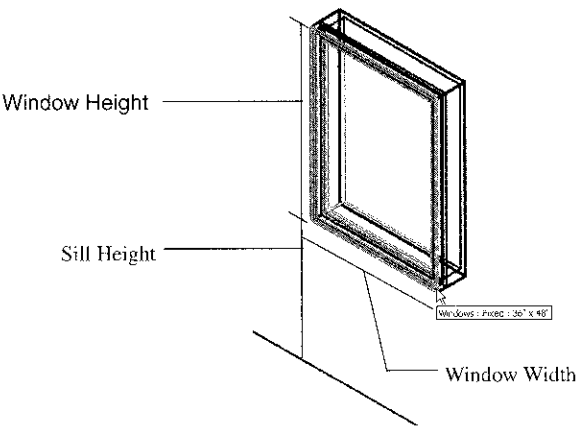


Figure 4-14 Graphic showing the window properties

Window Instance Properties

Changing the instance properties of a window, changes the properties of only that instance of the window in the project. The instance properties of a window are given in the table given next.

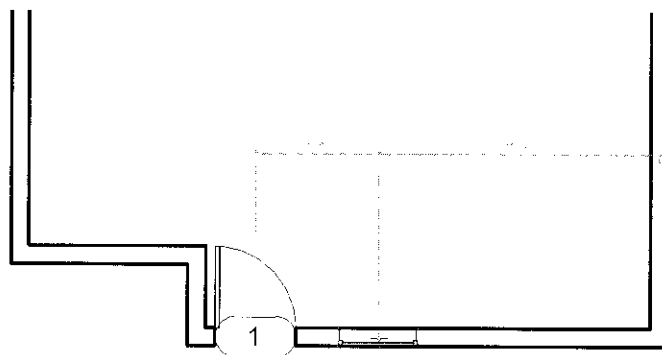
Parameter Name	Description
Level	Shows the layer to which the window belongs and can be used to move the window to a different level
Sill Height	Refers to the distance or height of the sill of the window from the specified level
Comments	Description of the window instance not covered in the type properties
Mark	Can be used to specify or modify the mark of the selected window
Phase Created	Specifies whether the window is part of a new construction or an existing construction
Phase Demolished	Specifies whether the window is a part of an existing building or new structure
Head Height	Refers to the height of the top of the window from the specified level

Adding a Window to a Wall

To add a window to a wall, invoke the **Window** tool from the **Architecture** tab of the ribbon and select the window type from the **Type Selector** drop-down list in the **Properties** Palette. Next,

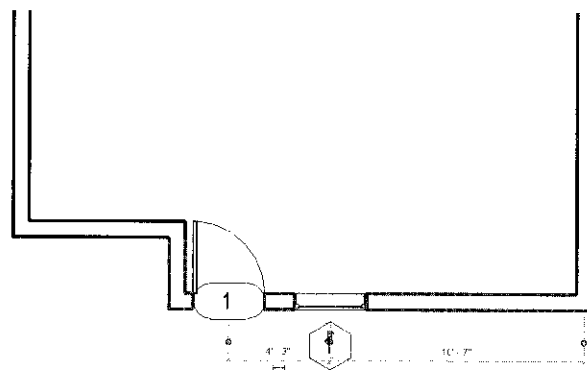


wall, the window appears on that face. The window appears on the upper face when the cursor comes near to it, as shown in Figure 4-15. Also, notice a temporary dimension, which indicates the distance of the center of the window opening from the adjacent walls or wall edges. You can use the temporary dimensions to add the window by clicking at the appropriate location



**Figure 4-15** Adding a window to an existing wall

on the wall. Autodesk Revit Architecture automatically creates an opening in the wall and the edges are also completed, as shown in Figure 4-16.

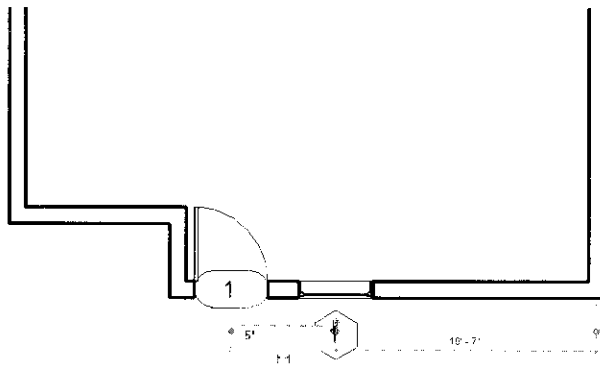


**Figure 4-16** Window added to an existing wall

You will also notice a twin arrow symbol on the window, along with a tag number. Click on the symbol to flip the orientation of the window. The flip arrow symbol will appear on the side that is interpreted as the inner side of the window. You can specify the exact position of the window with respect to the adjacent walls or edges after placing it at the approximate location. To specify the dimensional location of a window, click on the particular temporary dimension text and type the exact dimension, as shown in Figure 4-17. The window will shift to the desired location.



**Tip:** The depth of the window is automatically created, based on the thickness of the host wall. If you change the type of the host wall of a window, the depth of the associated window will change accordingly.



**Figure 4-17** Changing the location of the added window

Window tags are automatically generated in Autodesk Revit Architecture. Unlike doors, however, each window of the same type bears the same tag. Different window types have preassigned marks, which can be changed using the **Type Properties** dialog box. Window tags are used for creating the window schedule.



#### Note

The window tag numbers increment as you place or copy them in the project. You can also give them a specific tag number individually.

Similar to the door tags, the visibility of the window tags can also be controlled in the drawing. To hide the window tags, invoke the **Visibility/Graphics for Floor Plan** dialog box and choose the **Annotation Categories** tab from it. Next, clear the **Window Tags** check box.



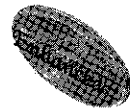
#### Note

On clearing the **Window Tags** check box in the **Annotation Categories** of the **Visibility/Graphics for Floor Plan** dialog box, the tags become hidden, but still remain a part of the project.

In Autodesk Revit Architecture, you can create the windows that are specifically designed for a location or an instance. To do so, choose the **Model In-place** tool from the **Mode** panel of the **Modify | Place Window** tab; the **Name** dialog box will be displayed. In this dialog box, enter the name of the window type in the **Name** edit box and choose the **OK** button; the dialog box will be closed and the **Modify** tab will be displayed. Now, the family editor mode will be activated, and in this mode, you can use various tools to create the in-place window. Apart from the window types displayed in the **Type Selector** drop-down list, you can access other window types as well. To add other window types in the **Type Selector** drop-down list, choose the **Load Family** tool from the **Mode** panel of the **Modify | Place Window** tab; the **Load Family** dialog box will be displayed. In this dialog box, add additional window types from the **Library > US Imperial > Windows** folder. Alternatively, you can use the **Revit Web Content Library** to download more window types to your project.

## DOORS AND WINDOWS AS WALL OPENINGS

Autodesk Revit Architecture also provides in-built opening types for door and windows. These types are available in the **Openings** subfolder of the **Libraries** > **US Imperial** folder that can be accessed from the **Load Family** dialog box. To invoke this dialog box, choose the **Load Family** tool from the **Load from Library** panel of the **Insert** tab.



To add an opening for door, invoke the **Load Family** dialog box and then from the **Openings** subfolder select any of the following family types: **Passage Opening-Cased** or **Passage Opening-Elliptical Arch**. After selecting any of the family type, choose the **Open** button in the **Load Family** dialog box; the selected family will be loaded in the project. Now, to place the selected opening type in the wall, choose the **Place a Component** tool from **Architecture** > **Build** > **Component** drop-down; the **Modify | Place Component** tab will be displayed. In the **Properties** Palette, ensure that the desired opening type is selected in the **Type Selector** drop-down list. Next, click in a desired location in the wall to insert the door opening. In the **Properties** Palette, you can also edit the width and height of the door opening.

Similar to adding a door opening, you can insert a window opening. To do so, invoke the **Load Family** dialog box and then select any of the two family types from the **Openings** subfolder: **Opening with Trim** or **Opening**. To place the window opening in the wall you will follow the same method as used for inserting the door opening.

## OPENINGS IN THE WALL

**Ribbon:** Architecture > Opening > Wall



You can create rectangular openings in a curved or straight wall. To cut an opening in a wall, you can use a plan, elevation, or sectional view. Generally, the sectional or elevation view is preferred, as locating and placing such views is easy.

To cut a rectangular opening in a wall, open a preferred elevation or section view in which the host wall of the opening is visible. (You will learn about creating the elevation and section views in Chapter 6 of this textbook). Next, choose the **Wall: Architectural** tool from the **Opening** panel of the **Architecture** tab and then select the wall that will host the opening. Next, click in the desired area in the wall to mark the start point or the first corner point of the rectangular opening. As you move the cursor, a rectangle with its temporary dimensions appears. Click at the desired point in the wall to mark the other corner point of the rectangular opening. Now, you can use the temporary dimensions displayed on the opening to modify the placement of the opening. Next, choose the **Modify** button from the **Select** panel to exit the tool. After exiting the tool, you can select the created opening to modify its properties such as its height, top offset, base offset, and so on from the **Properties** Palette.



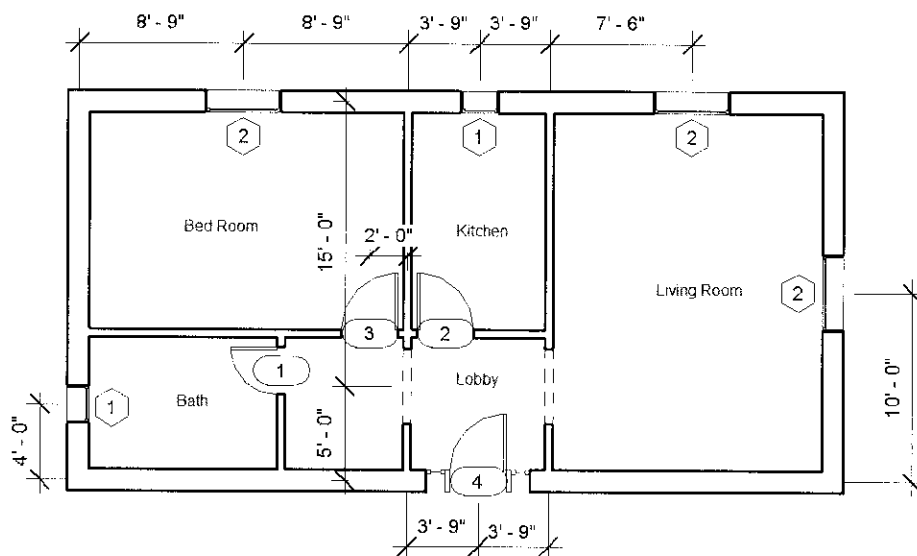
**Tip:** Press the shortcut keys **SM** to snap the inserts to the midpoint of the wall. This is known as jump snap.

## TUTORIALS

### Tutorial 1

### Apartment 1

In this tutorial, you will add doors and windows to the *c03\_Apartment1\_tut3.rvt* project file created in Tutorial 3 of Chapter 3. Refer to Figure 4-18 for adding these elements. The dimensions and the text have been given for reference and are not to be added. The project file name and parameters to be used are given next. **(Expected time: 30 min)**



*Figure 4-18 Sketch for adding doors and windows to the Apartment 1 project*

1. Project file- *c03\_Apartment1\_tut3.rvt* created in Tutorial 3 of Chapter 3.
2. Door types to be used
  - 1- **Single - Flush: 30"x 84"**
  - 2 and 3- **Single Decorative 2 - 36"x 84"** ( US Imperial)
  - 4- **Single Raised Panel with Sidelights - 36"x 84"** (US Imperial)
 Door openings- **Passage Opening-Cased (US Imperial)** resize to **7'0"**
3. Window types to be used
  - 1- **Fixed: 24"x48"**
  - 2- **Fixed: 48"x48"** (with modified width)

The following steps are required to complete this tutorial:

- a. Open the *c03\_Apartment1\_tut3.rvt* file created in Chapter 3.
- b. Invoke the **Door** tool.

- d. Add doors at approximate locations, refer to Figures 4-19 through 4-24.
- e. Load and add door openings, refer to Figure 4-25.
- f. Place the door opening to the exact location based on the given parameters, refer to Figure 4-26 and Figure 4-27.
- g. Invoke the **Window** tool.
- h. Select the window type by using the **Type Selector** drop-down list.
- i. Place the windows at approximate locations.
- j. Place the windows to the exact location as per the given dimensions, refer to Figures 4-28 through 4-34.

## Opening the Existing Project and Invoking the Door Tool

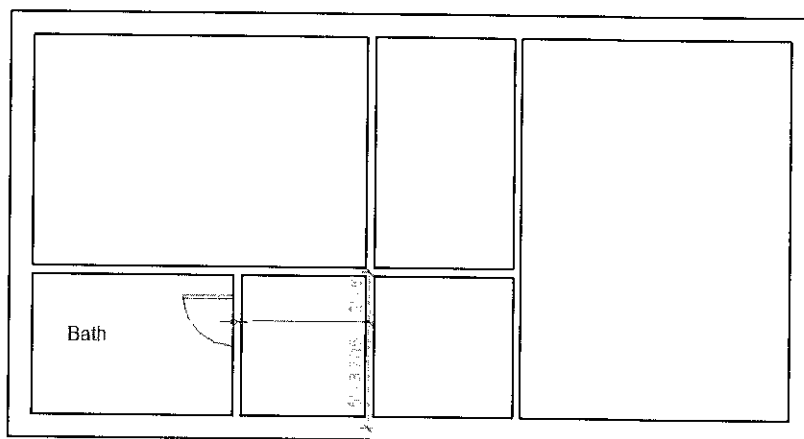
First, you need to open the specified project and invoke the **Door** tool from the **Architecture** tab.

1. Choose **Open > Project** from **Application Menu** and open the *c03\_Apartment1\_tut3.rvt* project file created in Tutorial 3 of Chapter 3. You can also download this file from <http://www.cadcam.com>. The path of the file is as follows: *Textbooks > Civil/GIS > Revit Architecture > Autodesk Revit Architecture 2013 for Architects and Designers*.
2. Invoke the **Door** tool from the **Build** panel of the **Architecture** tab. Alternatively, type **DR**.
3. On invoking the **Door** tool, the properties of the door to be added are displayed in the **Properties** Palette. In the Palette, select the **Single - Flush: 30" x 84"** type of door from the **Type Selector** drop-down list.

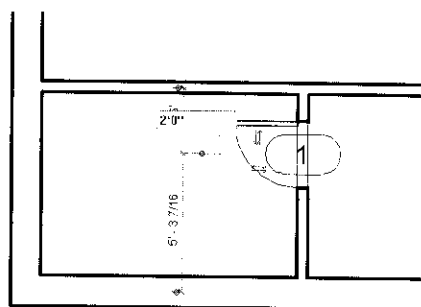
## Adding Doors

In this section, you need to add doors at the approximate location and then modifying its location by specifying the exact dimension. You will also use the **Load Family** tool to load the desired door type in the project.

1. Move the cursor close to the interior wall of the Bath area to display the door symbol, as shown in Figure 4-19. Notice that as you move to cursor, the side of the door is changed. Click on the interior wall; the door is created at the specified location.
2. To move the door to the exact location, choose the **Modify** button in the **Select** panel of the **Modify | Doors** tab and select the door added in the drawing; the selected door gets highlighted in blue and the controls and related temporary dimensions are displayed in it.
3. Since the location of the door is given with reference to the upper interior wall, click on the upper temporary dimension, and then enter **2'0"**, as shown in Figure 4-20. Next, press ENTER; the door moves to the specified location.
4. To place the door type 2, invoke the **Door** tool from the **Build** panel; the **Modify | Place Door** tab is displayed.



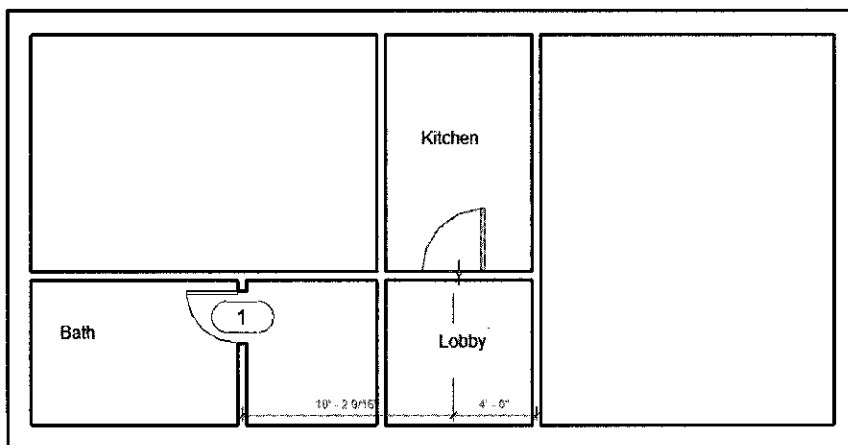
*Figure 4-19 Specifying the location of the bath door*



*Figure 4-20 Moving the door to the exact location*

5. Choose the **Load Family** tool in the **Mode** panel of this tab; the **Load Family** dialog box is displayed.
6. In this dialog box, choose the **Doors** subfolder from the **US Imperial** folder. Next, select the door family **Single Decorative 2** and choose the **Open** button.
7. In the **Type Selector** drop-down list, select the **Single Decorative 2 - 36" x 84"** door type, as specified in the project parameters.
8. Move the cursor near the interior wall common to the Lobby and the Kitchen areas, as shown in Figure 4-21, and click to add the kitchen door close to this location.
9. Choose the **Modify** button from the **Select** panel and then select the door inserted in the drawing; the door gets highlighted and its controls are displayed.

Notice that the door placed has the swing on the right side, whereas the sketch shows a



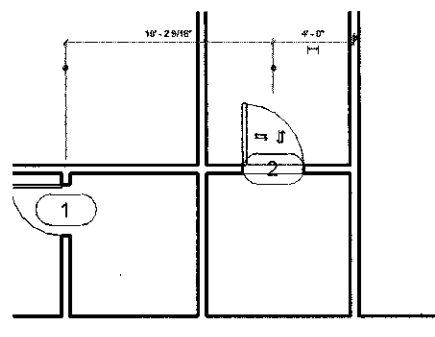
*Figure 4-21 Adding the door to the kitchen area*

10. Click on the horizontal arrow key to flip the swing side. The swing side of the door is changed, as shown in Figure 4-22.

11. Click on the right side dimension to set it to **5'6"**, as specified in the sketch plan.

12. Add the door of the same type in the bedroom area at a distance of **4' 8 9/16"** from the internal wall, as shown in Figure 4-23.

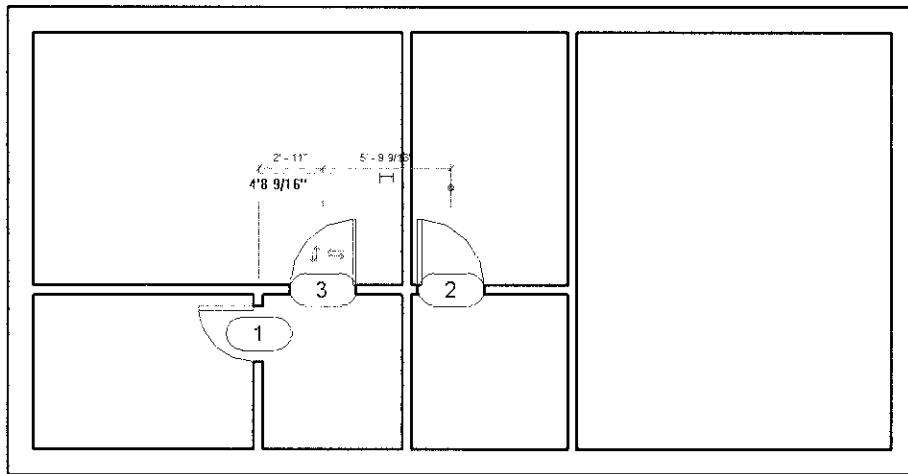
13. To create the entrance door of the apartment, choose the **Load Family** tool from the **Mode** panel of the **Modify | Place Door** tab; the **Load Family** dialog box is displayed. In this dialog box, add the **Single - Raised Panel with Sidelights** family type from the **Doors** subfolder to the **US Imperial** folder.



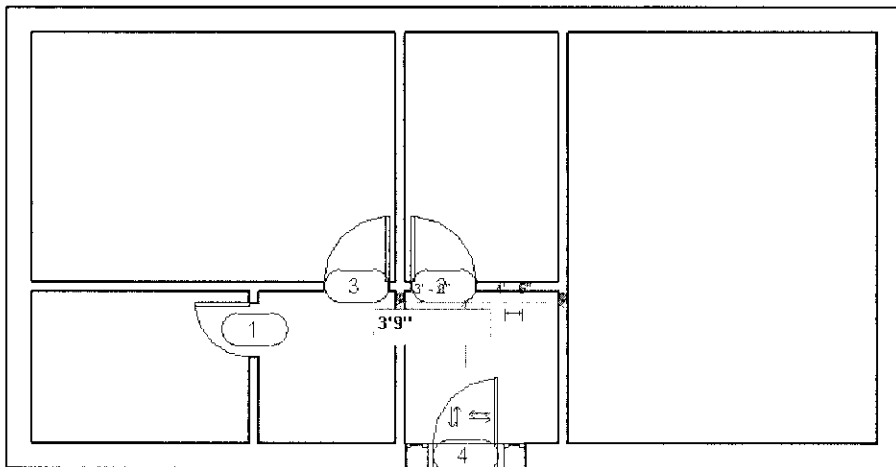
*Figure 4-22 Using the flip control to change the swing side of the door*

14. Ensure that the **Single - Raised Panel with Sidelights: 36" x 84"** option is selected in the **Type Selector** drop-down list, and then add the door in the lobby area, as per the sketch plan, refer to Figure 4-18. While adding the door, you can use the spacebar to flip the door swing side.

15. After adding the door, choose the **Modify** button and select the recently created door; the temporary dimension is displayed. Click on the left of the temporary dimension and then enter the value **3'9"**, as shown in Figure 4-24, to move the door to the exact location as given in the sketch plan. Now, press **ESC** to exit the **Modify | Doors** tab.



*Figure 4-23 Specifying the location of the door in the bedroom area*



*Figure 4-24 Specifying the location of the entrance door*

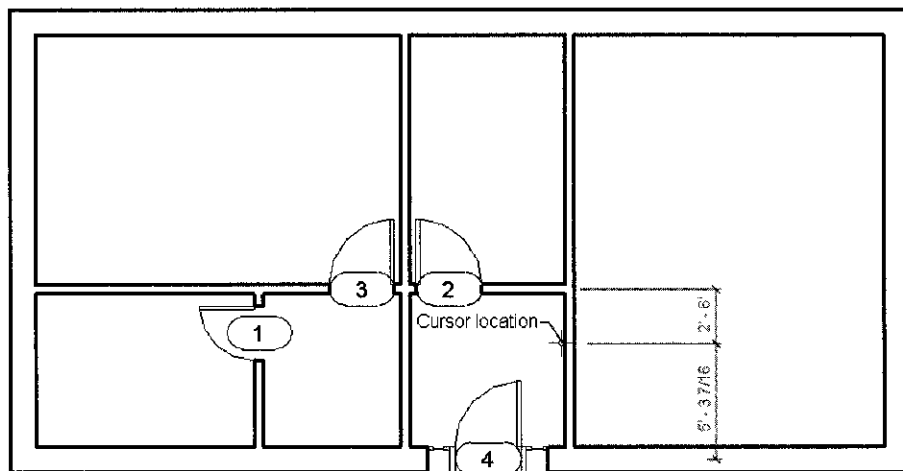
## Adding Door Openings

Next, you need to create two door openings in the lobby walls given in the sketch plan. The openings can be loaded as door families but are added to the model as components.

1. Choose the **Insert** tab and then choose the **Load Family** tool from the **Load from Library** panel; the **Load Family** dialog box is displayed.
2. In the **Load Family** dialog box, select the **Passage Opening-Cased** family from the **Openings** sub-folder of the **US Imperial** folder, and choose the **Open** button to load this family. The **Passage Opening - Cased** family gets added as a component type.

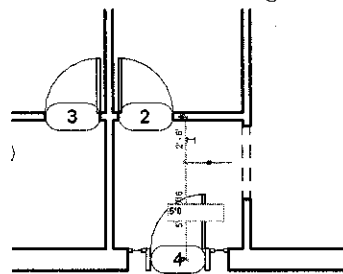


3. Invoke the **Place a Component** tool from **Architecture > Build > Component** drop-down; the **Modify | Place Component** tab is displayed.
4. Select the **Passage Opening - Cased 36" x 84"** option from the **Type Selector** drop-down list in the **Properties Palette**, if it is not selected by default.
5. Move the cursor near the location shown in Figure 4-25 and then click to specify the location for the center of the opening. The opening is created.



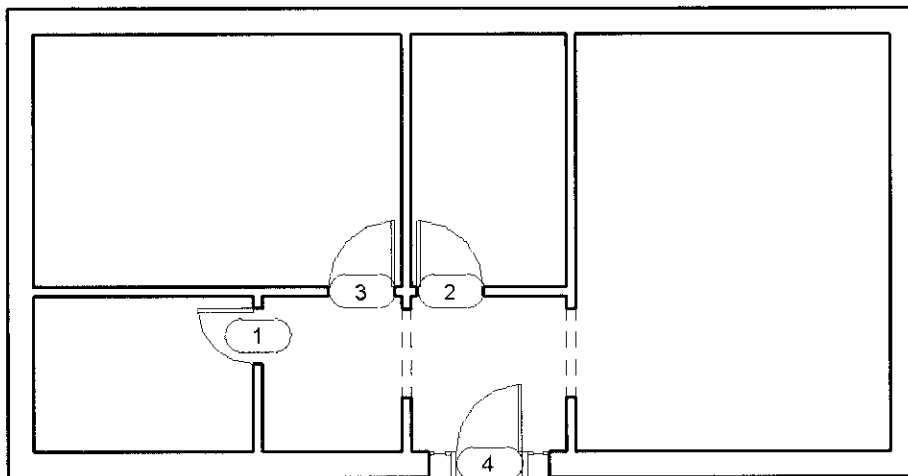
*Figure 4-25 Adding openings*

6. Now to modify the width of the opening, choose the **Modify** button from the **Select** panel and select the recently created opening from the drawing; the **Modify | Generic Models** tab is displayed.
7. In this tab, choose the **Type Properties** tool from the **Properties** panel; the **Type Properties** dialog box is displayed.
8. Choose the **Duplicate** button; the **Name** dialog box is displayed. In this dialog box, enter **48" x 84"** in the **Name** edit box. Choose the **OK** button to close the **Name** dialog box.
9. Click in the **Value** field of the **Width** parameter and enter **4'0"** as the new value.
10. Choose the **Apply** button and then the **OK** button in the **Type Properties** dialog box to close it.
11. To move the opening to the exact location, click on its temporary dimension, and enter **5'0"**, as shown in Figure 4-26. Next, press ENTER and ESC to accept the value entered and exit the editing mode.



*Figure 4-26 Specifying the exact location of the opening*

12. Similarly, create the opening of the same size on the opposite wall to complete the creation of doors and opening for the *Apartment 1* project. After adding them, the layout plan of the project will look similar to the plan shown in Figure 4-27.



*Figure 4-27 Layout plan with all doors and openings added*

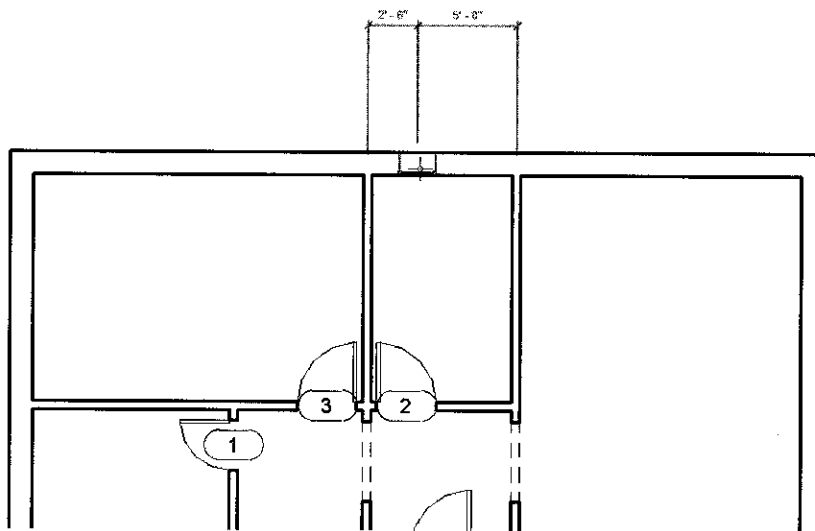


**Tip:** Doors and door openings can also be added in 3D view, sections, and elevations. You should, however, choose the appropriate view to place the door. You can use the temporary dimensions to place the door at the exact location. In case you add a door incorrectly (for example, if the door is not entirely placed on the wall), Autodesk Revit displays a message, alerting you about the conflict and prompting you to take an appropriate action.

## Adding Windows

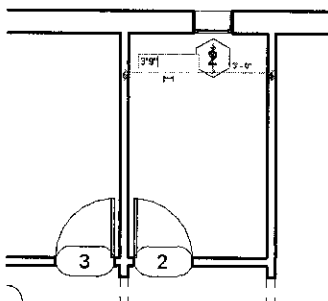
The procedure of adding windows is quite similar to that of adding doors. Invoke the **Window** tool, select the window type, and add the window at an approximate location. You can then modify its location based on the sketch provided.

1. Invoke the **Window** tool from the **Build** panel of the **Architecture** tab; the **Modify | Place Window** tab is displayed.
2. Click on the **Type Selector** drop-down list to view the in-built window types. To create the window number 1, select **Fixed 24" x 48"** from the drop-down list.
3. Move the cursor close to the exterior wall of the kitchen to display the window symbol, as shown in Figure 4-28. Add the window by clicking on the inner face of the exterior wall. The window is created at the specified location.
4. To move the window to the exact location, choose the **Modify** button from the **Select** panel and then select the window from the drawing; it gets highlighted in blue and its controls are displayed.

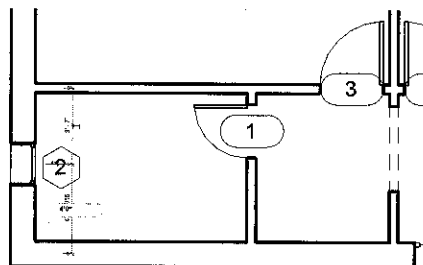


**Figure 4-28** Adding the kitchen window on the exterior wall

5. Click on the temporary dimension and enter **3'9"**, as shown in Figure 4-29. Press ENTER; the window is moved to the specified location. Similarly, add another window of the same type near the external wall of the bath by invoking the **Window** tool from the **Build** panel.
6. After adding the other window in the external wall of the bath, you need to move it to the exact location. To do so, select the window; it is highlighted in blue. Click on the temporary dimension; an edit box is displayed. Enter **4'0"** in the edit box, as shown in Figure 4-30, and then press ENTER. The window is moved to the desired location. Press the ESC key and exit.



**Figure 4-29** Specifying the exact location of the window



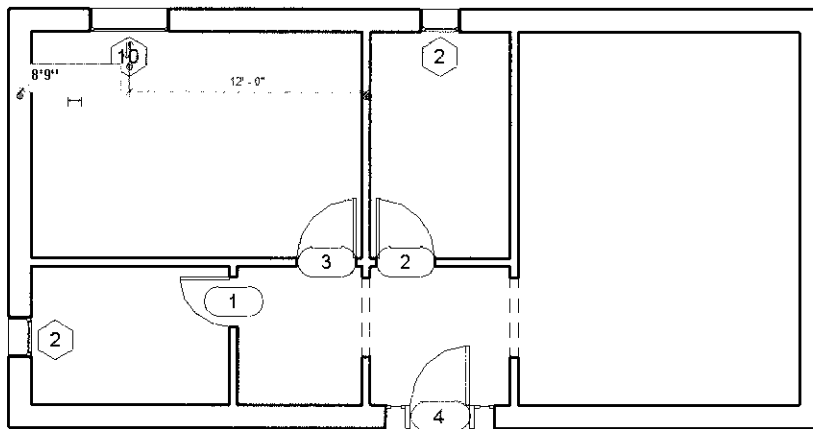
**Figure 4-30** Specifying the location of the bath window

Now, you need to add the windows of type 2 in the drawing. These windows have a modified width of 4'0". To add these windows, select the **Fixed: 24" x 48"** window type and create its duplicate. Modified width as 4'0" from the **Properties** panel.

7. Invoke the **Window** tool from the **Build** panel of the **Architecture** tab; the **Modify | Place Window** tab is displayed.
8. In the **Type Selector** drop-down list, select the **Fixed: 24" x 48"** window type. Then, choose the **Edit Type** button in the **Properties** Palette; the **Type Properties** dialog box is displayed.
9. In this dialog box, choose the **Duplicate** button; the **Name** dialog box is displayed. In the **Name** edit box, enter **48" x 48"** and then choose the **OK** button.
10. In the **Value** field for the **Width** type parameter, enter **4'0"** and then choose **Apply** and **OK** to close the **Type Properties** dialog box and to return to the drawing window.

Notice that the **Fixed: 48" x 48"** window type is added in the **Type Selector** drop-down list.

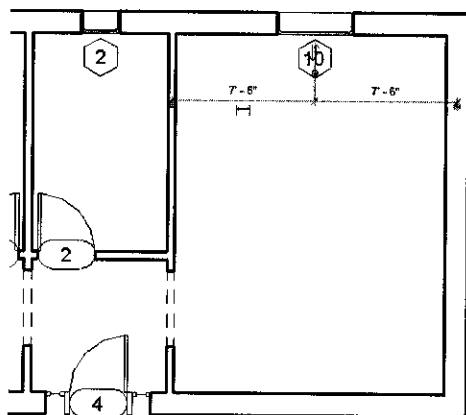
11. Move the cursor near the exterior wall of the bedroom and click to place the window. Press **ESC** twice to exit.
12. Now, select the added bedroom window; the window gets highlighted in blue color and its controls are displayed. Click on the temporary dimension displayed at the left and enter **8'9"** to specify the location of the bedroom window, as shown in Figure 4-31. The



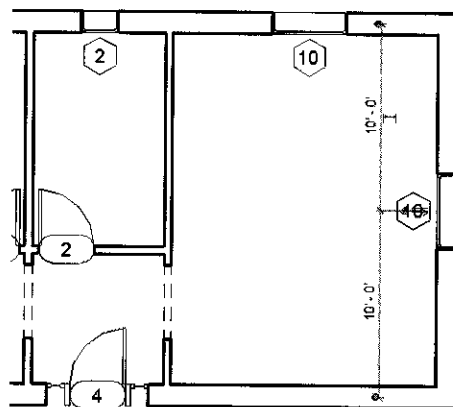
*Figure 4-31 Specifying the location of the bedroom window*

window is moved to the desired location. Similarly, add the windows of the same type to the walls of the living room and specify their respective locations based on the sketch plan given, refer to Figures 4-32 and 4-33.

13. To change the window tag numbers, move the cursor over the number in any of the window tags marked 2 (tag number may vary) and double-click; an edit box is displayed. Enter **1** in the edit box and press **ENTER**; the **Revit** command line is displayed. Choose **Yes** in the



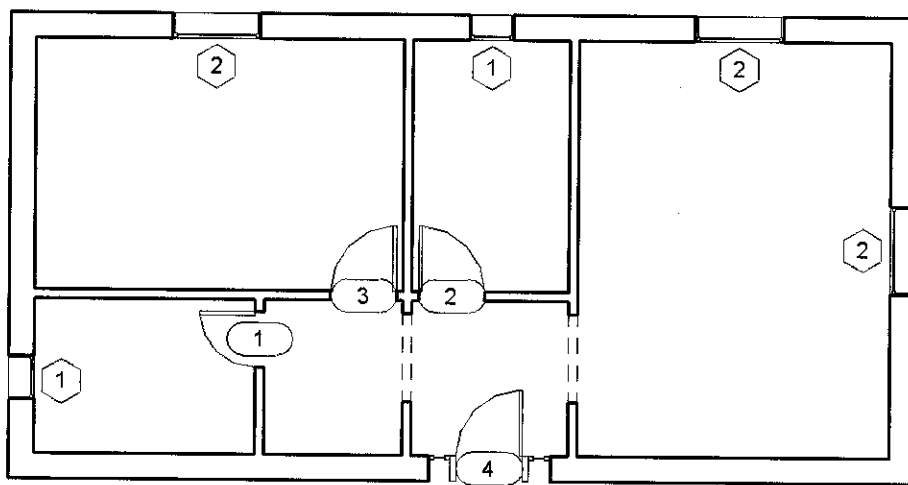
**Figure 4-32** Specifying the location of the first living room window



**Figure 4-33** Adding the second living room window using temporary dimensions

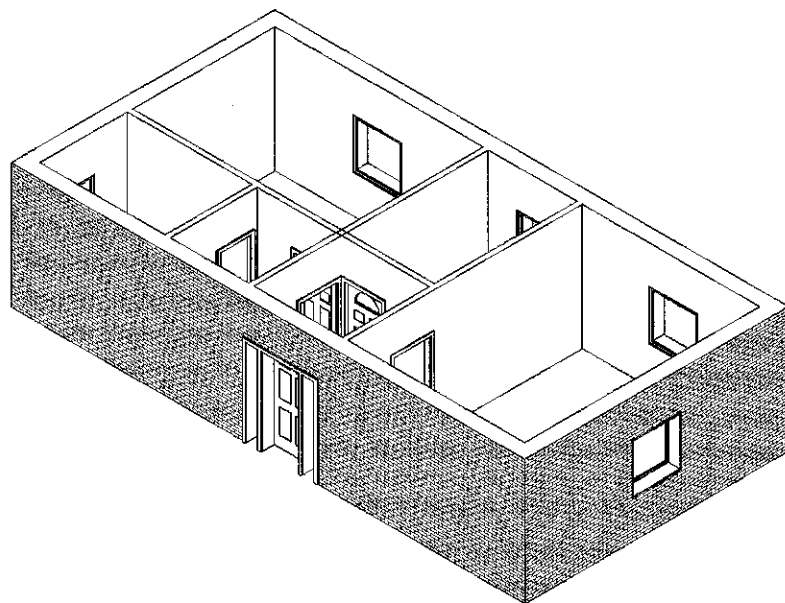
2 with the tag mark 1 and those marked 10 with the tag mark 2, refer to Figure 4-34. You will notice that the tag marks of other instances of the same window type are immediately modified.

This completes the tutorial of creating doors and windows for the *Apartment 1* project. The Level 1 plan should look similar to the plan shown in Figure 4-34.



**Figure 4-34** Completed project plan with renamed window tags

14. To view the plan in 3D, choose the **Default 3D View** tool from **View > Create > 3D View** drop-down; the 3D view of the project is displayed, as shown in Figure 4-35.



*Figure 4-35 3D view of the Apartment 1 project*

15. Choose **Save As > Project** from **Application Menu**; the **Save As** dialog box is displayed. Enter **c04\_Apartment1\_tut1** in the **File name** edit box and choose **Save**; the file is saved.
16. Choose **Close** from **Application Menu** to close the project file.

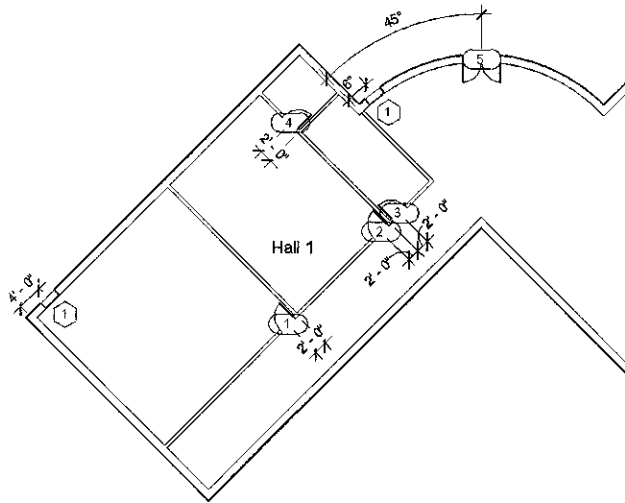
## Tutorial 2

## Club

In this tutorial, you will add doors and windows to Hall 1 and Lounge of the *Club* project created in Exercise 3 of Chapter 3. The centerline dimensions of the location of the doors and windows are given in Figure 4-36. You will create the doors and windows of Hall 2 in Exercise 2 later in this chapter. Use the following project file and parameters for this tutorial.

**(Expected time: 30 min)**

1. Project file- *c03\_Club\_ex3.rvt* file created in Exercise 3 of Chapter 3.
2. Door types to be used
  - 1, 2, and 3- **Single- Glass 1- 36" x 84" (US Imperial)**
  - 4- **Single- Flush: 36" x 84"**
  - 5- **Double- Glass 2 - 72"x 84" (US Imperial)**
3. Window types to be used



**Figure 4-36** Sketch plan for adding doors and windows to the Club project

The following steps are required to complete this tutorial:

- Open the *c03\_Club\_ex3.rvt* file created in Chapter 3.
- Invoke the **Door** tool.
- Select the door type by using the **Type Selector** drop-down list.
- Add the door at approximate locations, refer to Figures 4-37 through 4-44.
- Change the placement of the door to the desired location.
- Invoke the **Window** tool and select the window type using the **Type Selector** drop-down list.
- Add the window at approximate locations, refer to Figures 4-45 through 4-47.
- Modify the placement of windows to the exact location, based on the given sketch plan.

## Opening the Existing Project and Invoking the Door Tool

First, you need to open the *Club* project and then invoke the **Door** tool.

- Choose **Open > Project** from **Application Menu** and open the *c03\_Club\_ex3.rvt* project file created in Exercise 3 of Chapter 3. You can also download this file from <http://www.cadcam.com>. The path of the file is as follows: *Textbooks > Civil/GIS > Revit Architecture > Autodesk Revit Architecture 2013 for Architects and Designers*.
- Invoke the **Door** tool from the **Build** panel of the **Architecture** tab; the **Modify | Place Door** tab is displayed. Alternatively, type **DR**.

## Selecting a Door Type

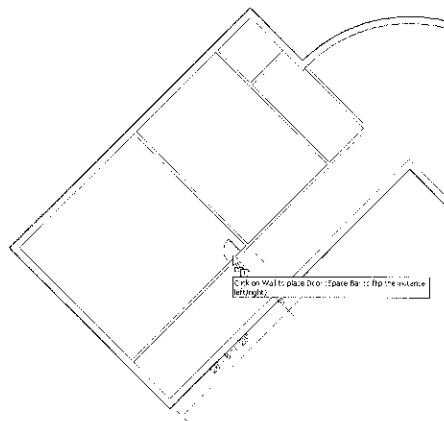
Select the door type 1 and add it to the project. The project parameters indicate that the

1. Choose the **Load Family** tool from the **Mode** panel in the **Modify | Place Door** tab; the **Load Family** dialog box is displayed.
2. In this dialog box, choose the **Doors** folder and select the door type **Single - Glass 1**. Choose **Open** to load the family of this door type; various door types of the loaded door family are added to the **Type Selector** drop-down list.
3. In the **Type Selector** drop-down list, select the **Single-Glass 1: 36" x 84"** option, if it is not selected by default.

## Adding Doors

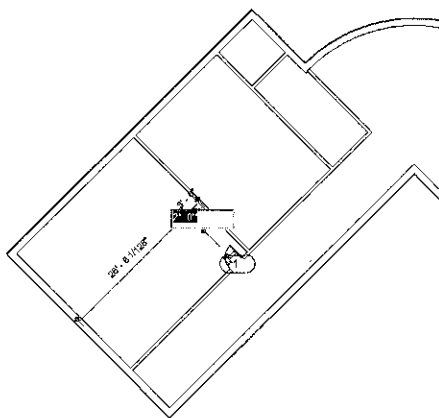
You can add a door at its exact location by clicking at an approximate point in its host wall and then modifying its location by specifying the exact dimension. First you need to add the door type 1 and then the other door types.

1. Move the cursor close to the interior wall face to display the door symbol, as shown in Figure 4-37. Notice that the side of the door changes as you move the cursor.
2. Place the door by clicking on the interior wall and then press ESC twice to exit. On doing so, the door is added to the exact location.
3. To move the door to the exact location, select the door; it gets highlighted in blue and its controls are displayed.
4. As the location of the door is given with reference to the interior wall, click on the temporary dimension and enter **2'0"**, as shown in Figure 4-38. Press ESC to exit the setting of dimensions. The door moves to the desired location.
5. Add the next door using the same door type by clicking at the approximate location, as shown in Figure 4-39. Press ESC twice.
6. Click on the temporary dimension between the door center and the interior wall and enter the value **2'0"** in the edit box, as shown in Figure 4-40. The door moves to the desired location.
7. Add another door at the location shown in Figure 4-41. You may need to use the flip arrows to orient the door swing in the desired direction.
8. To place the next door type, select **Single: Flush - 36" x 84"** from the **Type Selector** drop-down list, as specified in the project parameters.
9. Move the cursor near the interior wall and click to add the door close to the location

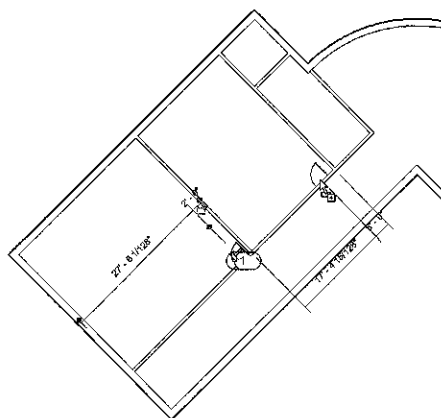


*Figure 4-37 Adding the door*

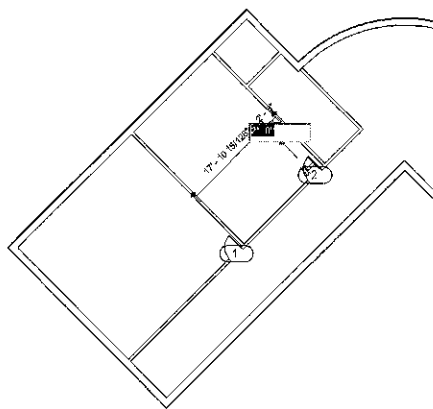




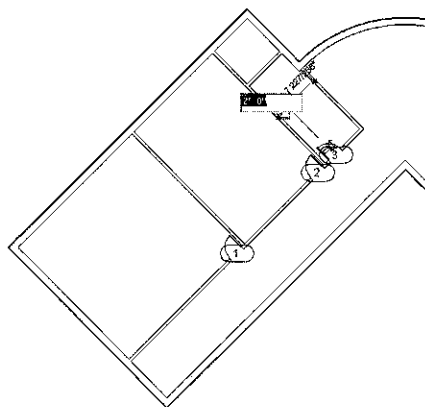
**Figure 4-38** Editing the location of the door



**Figure 4-39** Adding next door



**Figure 4-40** Editing the location of the next door



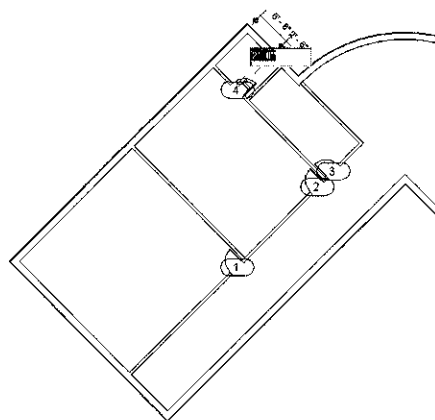
**Figure 4-41** Specifying the location of the next door



### Note

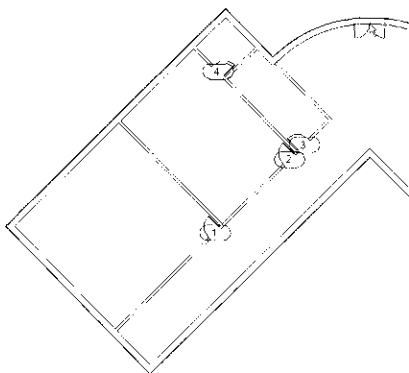
Depending on the placement of the cursor, the door side and swing might not be the same as desired. If required, click on the flip control arrows or the door swing arrows to achieve the desired orientation.

10. Choose the **Modify** button from the **Select** panel in the **Modify | Place Door** tab and select the door added last in the drawing; it gets highlighted in blue and its controls are displayed.

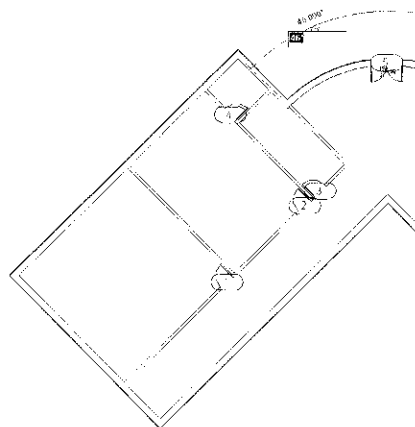


**Figure 4-42** Specifying the location of the next door

12. To create the entrance door, invoke the **Door** tool again and then choose the **Load Family** tool from the **Mode** panel; the **Load Family** dialog box is displayed. In the dialog box, load **Double-Glass 2** from the **US Imperial > Doors** folder.
13. Select the **Double - Glass 2: 72" x 84"** door type from the **Type Selector** drop-down list in the **Properties** Palette, if it is not selected by default.
14. Move the cursor near the main door location, as shown in Figure 4-43. Press SPACEBAR to flip the swing side of the door to the desired side, if required, and click to create the door.
15. Click on the temporary dimension and set the angle to 46 degrees, as shown in Figure 4-44. Press ENTER.



*Figure 4-43 Adding the entrance door*

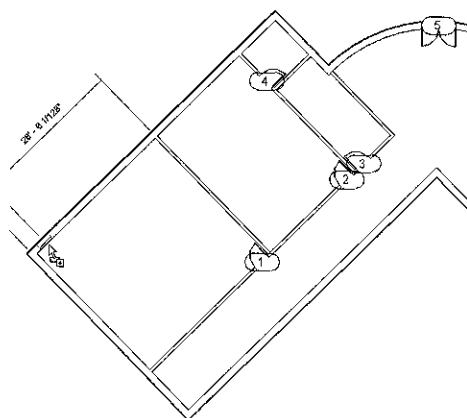


*Figure 4-44 Specifying the angular dimension*

## Adding Windows

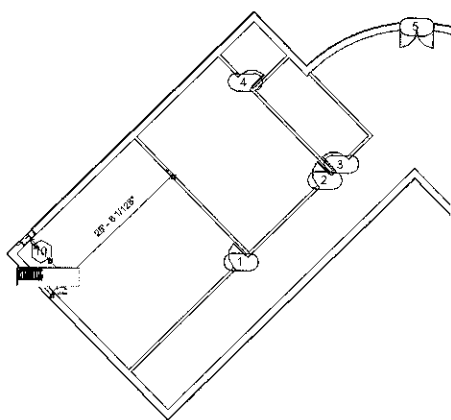
The procedure for adding windows is similar to that for adding doors. After invoking the window tool and selecting the required window type, click at the approximate location to add it. The location can then be modified to the exact dimension, as specified in the sketch plan.

1. Choose **Window** from the **Build** panel of the **Architecture** tab; the **Modify | Place Window** tab is displayed.
2. Select the **Fixed 36" x 48"** option from the **Type Selector** drop-down list in the **Properties** Palette.
3. Move the cursor close to the exterior wall of Hall 1 to display the window symbol, as shown in Figure 4-45. Add the window by clicking on the exterior wall.

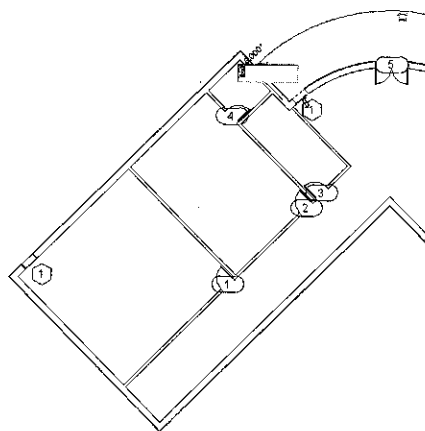


**Figure 4-45** *Moving the cursor near the wall of Hall 1 to add window*

4. Next, to move the window to the exact location, choose the **Modify** button from the **Select** panel. Then, select the window, click on the temporary dimension, and enter **4'0"**, as shown in Figure 4-46. The window moves to the desired location.
5. Repeat Step 3 to add another window by clicking near the left end of the curved wall.
6. Select the window created and enter **6** as the angular dimension, as shown in Figure 4-47. The window moves to the desired location.



**Figure 4-46** *Editing the location of the window*



**Figure 4-47** *Adding windows*

7. Next, ensure that the window is selected. Then, click on the window tag; an edit box is displayed. Enter **1** in the edit box and press ENTER; the **Revit** message box is displayed. Choose **Yes**; the window tag is renamed.

This completes the tutorial of adding doors and windows to the *Club* building project.