

Chapter 14

Rendering Views and Creating Walkthroughs

Learning Objectives

After completing this chapter, you will be able to:

- *Create a rendering scene.*
- *Set natural and artificial lighting.*
- *Use different materials and textures.*
- *Render 3D views using the Raytracing tool.*
- *Create and render a walkthrough.*
- *Add people and vehicles to the building model.*
- *Use the Decal tool.*

As described in the previous chapter, creating three dimensional views for a building model enables you to visualize the building exterior or interior. To create realistic effects in a 3D view, it becomes necessary to apply the materials to the building elements and render the view. Rendered exterior views of a building not only depict its overall scale, shape and volume, but also represent the proposed exterior finishes, as envisaged by the architect. A rendered interior three dimensional view can be used to represent various interior elements, such as interior partitions, furniture, plants, and interior finishes.

A three dimensional walkthrough is another powerful medium to present a building or an interior project. You can simulate the movement of an eye or a camera by specifying its path around or through the building model. Autodesk Revit Building automatically generates a virtual walkthrough by rendering each frame. A well rendered walkthrough can form an impressive part of a project presentation.

This chapter describes various tools used to render a project view. It also explains the method of changing the material composition of various modeling elements and modifying the rendering properties to achieve the desired effect. The later part of the chapter describes the use of various tools to create walkthroughs.

RENDERING VIEWS

Menu Bar: View > Rendering

The created building model can be easily rendered using various tools provided in Autodesk Revit Building. When you choose **View > Rendering** from the menu bar, a cascading menu is displayed. Using it, you can access various tools related to the rendering procedure. The **Rendering** tab in the **Design Bar** can also be used to access these tools, as shown in Figure 14-1. If the **Rendering** tab is not displayed, you can right-click on the **Design Bar** and select **Rendering**.



Note

Rendering tools are available only when a 3D view is opened in the drawing window.

The options in the **Rendering** tab are related to the various aspects of the rendering procedure. **Raytrace** is the basic tool used for rendering a view. Lighting is an important parameter in the rendering process and can be used quite effectively to create realistic exterior and interior views. Tools, such as **Radiate**, **Lighting**, **Light Group**, and **Daylights** enable you to control the effect of lighting on the building model. The **Settings**, **Image Size**, and **Adjust Image** tools can be used to set the parameters related to the quality of the rendered image. The **Capture Rendering** and **Export Image** tools are used to save the rendered image to the project file or an alternate location. The **Radiosity** tool assists you in making the rendering of interior views more realistic.

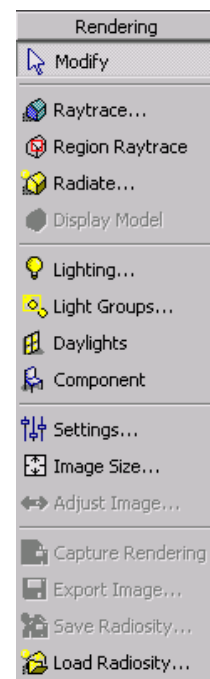
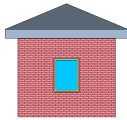


Figure 14-1 The **Rendering** tab in the **Design Bar**

Before rendering the created orthographic or perspective view, you may need to add various site features to the building model, such as, plants, people, signage, parking, vehicles, and so on. These elements can be added, based on the project requirement. Chapter 8 describes the procedure for adding some of these components to the project. Adding people and signage are described later in this chapter.



Tip: Site components not only provide the site content to a building model, but also help in relating the view to the scale of the project. Adding plants and virtual people in a rendering scene makes the view look more realistic.

The **Shading** tool enables you to view the building model with the surfaces of elements shaded according to the material color settings and the default light location. Choose **View > Shading** from the menu bar to view the building model with shaded surfaces. You can choose **View > Shading with Edges** from the menu bar to view the model in a shaded mode with all the visible edges clearly drawn. This tool affects only the current view, but the shaded view can be saved for future reference by choosing **View > Orient > Save View** from the menu bar.



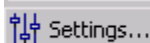
Note

The **Shading** tool graphically represents the materials used in the building model. The shading effects may vary based on the hardware graphics settings.

Each parametric element used in the Autodesk Revit Building model contains complete information about its material, composition, and finishes. Therefore, you do not need to specify materials individually to each element. You can, however, modify their properties to select a different material finish for each them. To view the project finishes, you must first understand the usage of various rendering tools, which are described next.

Rendering Scene Settings

Menu Bar:	View > Rendering > Settings
Design Bar:	Rendering > Settings



The **Settings** tool is used to set up parameters related to the rendering scene. Before rendering a view, you need to create a rendering scene, which contains information regarding various rendering parameters, such as lighting, raytrace setting, and radiosity. Based on the project requirement, you can set different values for each of these parameters. The settings for the rendering scene can be saved and can also be used to render other views in the project. In this manner, you save time on reproducing the same rendering settings for different views.

When you choose the **Settings** tool for the first time, the **Scene Selection** dialog box is displayed, as shown in Figure 14-2. A rendering scene, created earlier, can be selected from the drop-down list of the **Name** parameter. To create a new scene, choose the **New** radio button. You can enter the desired name of the new scene in the **Name** edit box.

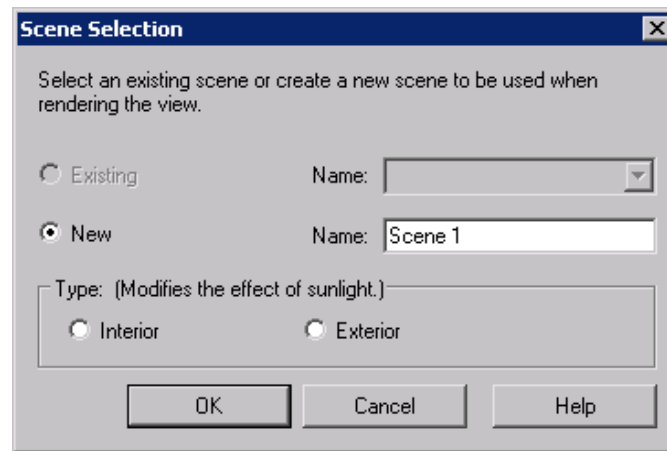


Figure 14-2 The Scene Selection dialog box

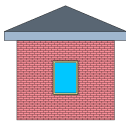
Selecting the Scene Type

Based on the lighting requirement of the view, you can create two types of scenes, **Exterior** and **Interior**. The difference between the two is the lighting effect. In a project, lighting effects are created using skylight, lighting fixtures, light reflected from the ground, and light reflected from other surfaces. When you select the **Exterior** option, Autodesk Revit Building uses the sunlight to render the scene. This option is suitable for views that do not require elaborate lighting effects. Therefore, the time required to render an exterior scene is reduced. The **Interior** option disables the natural lighting effects and enables you to create them by specifying individual light sources. This option is more time consuming, because you need to set up the lighting sources and their parameters. It is more suitable for creating special lighting effects, especially for night and interior views.



Note

When you choose the **Settings** tool for the first time for the view, the **Scene Selection** dialog box is displayed. The next time you choose this tool, the **Render Scene Settings** dialog box is displayed.



Tip: You can also choose **Settings > Render Scene** from the menu bar to directly access the **Render Scene Settings** dialog box.

After specifying the rendering scene type, you can use the **Render Scene Settings** dialog box to set up the detailed parameters related to the rendering process, as shown in Figure 14-3.

The **New**, **Rename**, and **Delete** buttons can be used to create a new scene, rename, and delete an existing scene respectively. The **Scene Settings** section enables you to set up a rendering scene. If necessary, you can again choose the scene type in this dialog box.

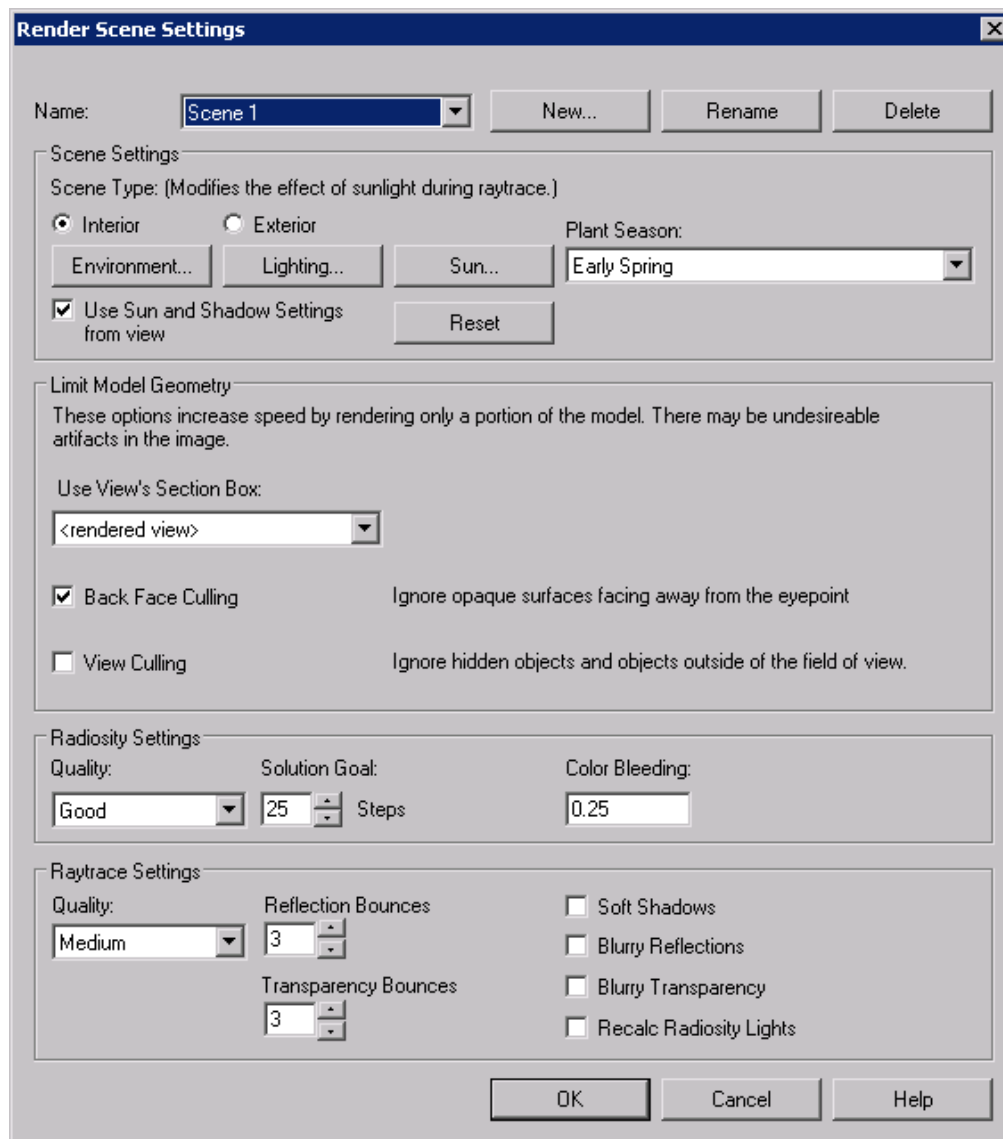


Figure 14-3 The *Render Scene Settings* dialog box

Rendering Environment Settings

The rendering environment refers to the surrounding settings of the building model. It includes parameters such as background, clouds, haze, ground plane, and so on. You can choose the **Environment** button in the **Render Scene Settings** dialog box to set the environment in the displayed **Environment** dialog box, as shown in Figure 14-4.

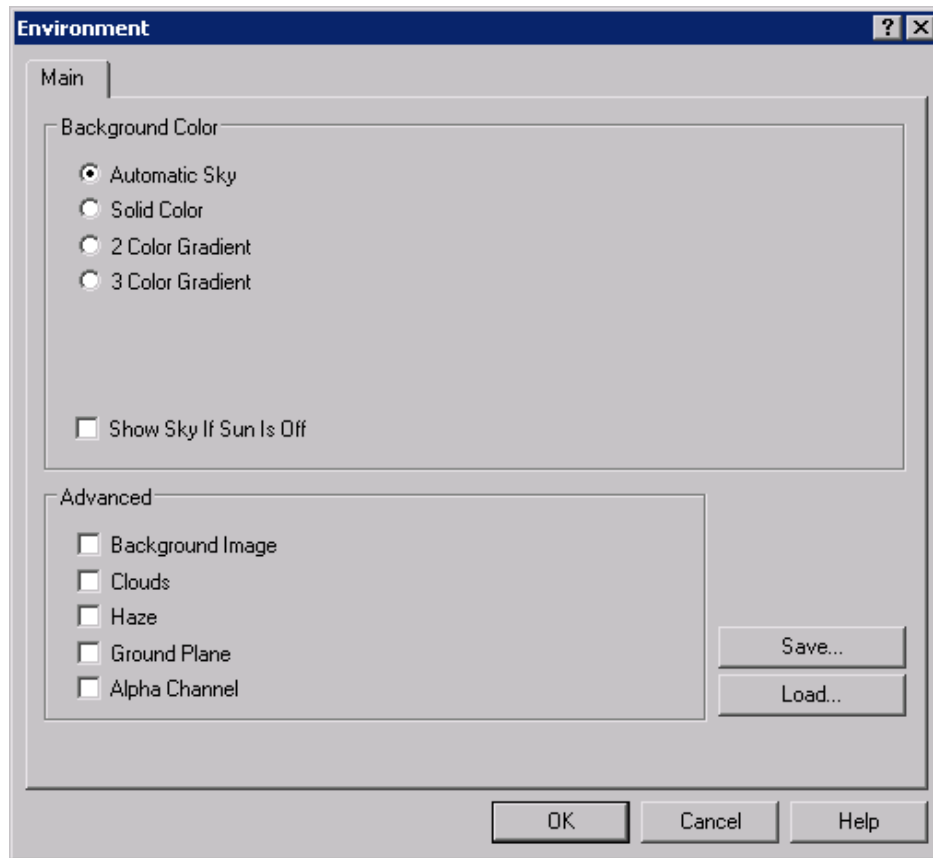


Figure 14-4 The Environment dialog box

Background Settings

The options in the **Background Color** section can be used to set the background color.

The **Automatic Sky** setting treats the background as the sky and uses the time of the day and the season to determine the color.

The **Solid Color** option enables you to use a single color as the background. When you choose this option, the default color is displayed in a rectangle. Click inside it to choose a different color. The **Color Picker** dialog box with the **Palettes** tab is displayed, as shown in Figure 14-5. You can set the desired background color in it. The **Bars** tab, as shown in Figure 14-6, can also be used to set the background color.

The **2 Color Gradient** option enables you to vary the background color between two selected colors. The **Upper**, **Middle**, and **Lower** spinners can be used to blend them.

The **3 Color Gradient** option enables you to specify and blend three colors for the background.

With the **Show Sky If Sun Is Off** checkbox selected, the sky will be displayed in the background when the sun is off.

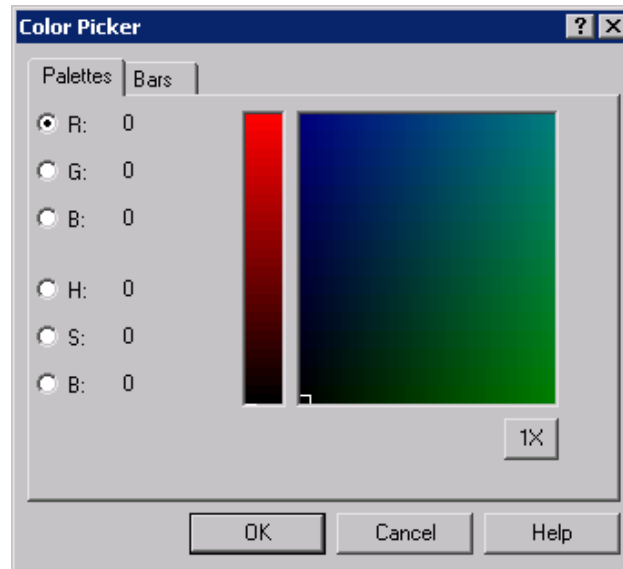


Figure 14-5 The **Palettes** tab of the **Color Picker** dialog box

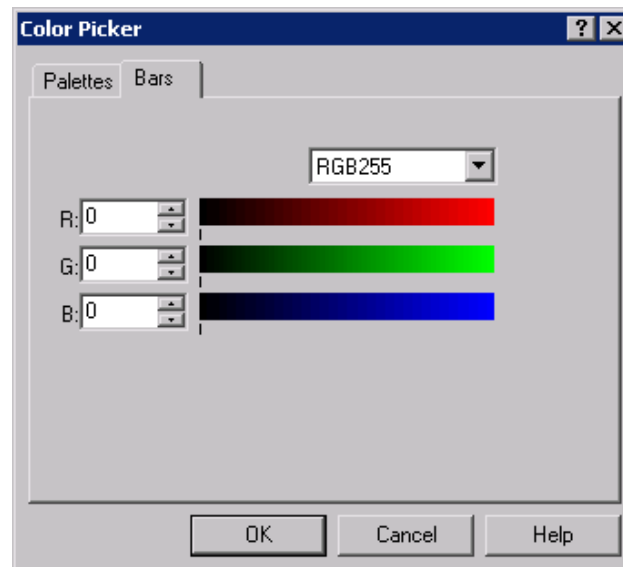
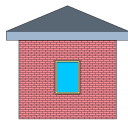


Figure 14-6 The **Bars** tab of the **Color Picker** dialog box

The **Advanced** section of the **Environment** dialog box provides additional features for setting the background for the rendering.

The **Background Image** check box is used to select an image to be used as the background. When you select this check box, the **Select Bitmap** dialog box is displayed. You can use the **Thumbnail** option in the **View Menu** to preview the available backgrounds, as shown in Figure 14-7. You can select the appropriate image to be used as the background, using this dialog box.



Tip: You can use any image for the background, which can be a scanned photograph, art work, or a digital image. Autodesk Revit has a number of preloaded images, which are available in the **Revit 8.0 > Rendering > AccuRenderRedist > Support > background** folder.

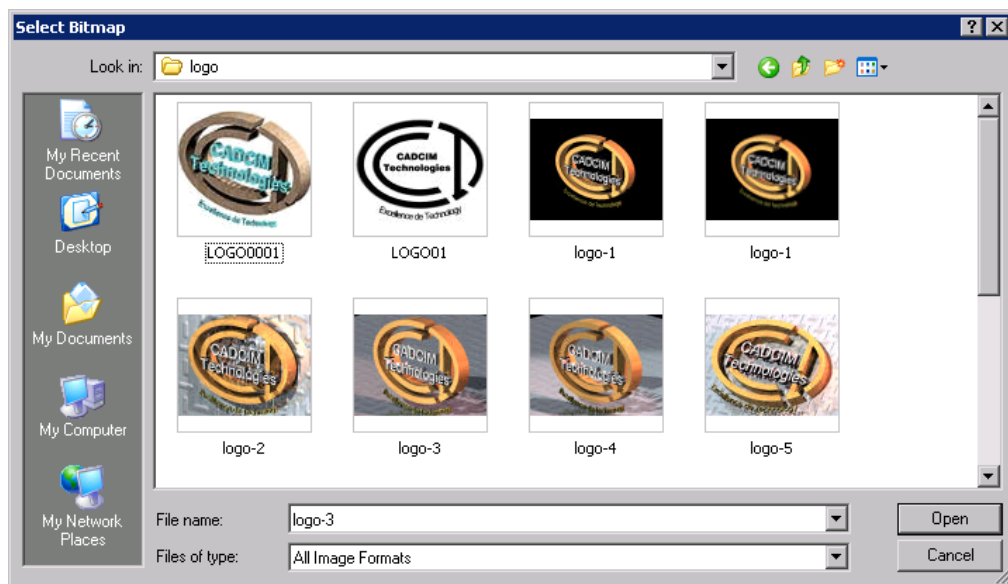


Figure 14-7 The **Select Bitmap** dialog box with the **Thumbnail** view menu option selected

When you select the background file, the **Background Image** tab is added to the **Environment** dialog box. Autodesk Revit Building prompts you to customize the appearance of the image using the **Background Image** tab, as shown in Figure 14-8. Upon selecting the **Image** button, the **Load Image** dialog box is displayed. It can be used to change the selected background image and also set the masking style to **Color** or **Alpha Channel**. The **Color** masking enables you to add color to a portion of the image. You can set the **Sensitivity** and **Blur** parameters and use the dropper tool to add the color. All the pixels within the range of the color of the selected point will be masked by the specified color.

The **Opacity** parameter in the **Background Image** tab enables you to control the transparency of the background image. The lesser the opacity value, the more transparent is the background image.

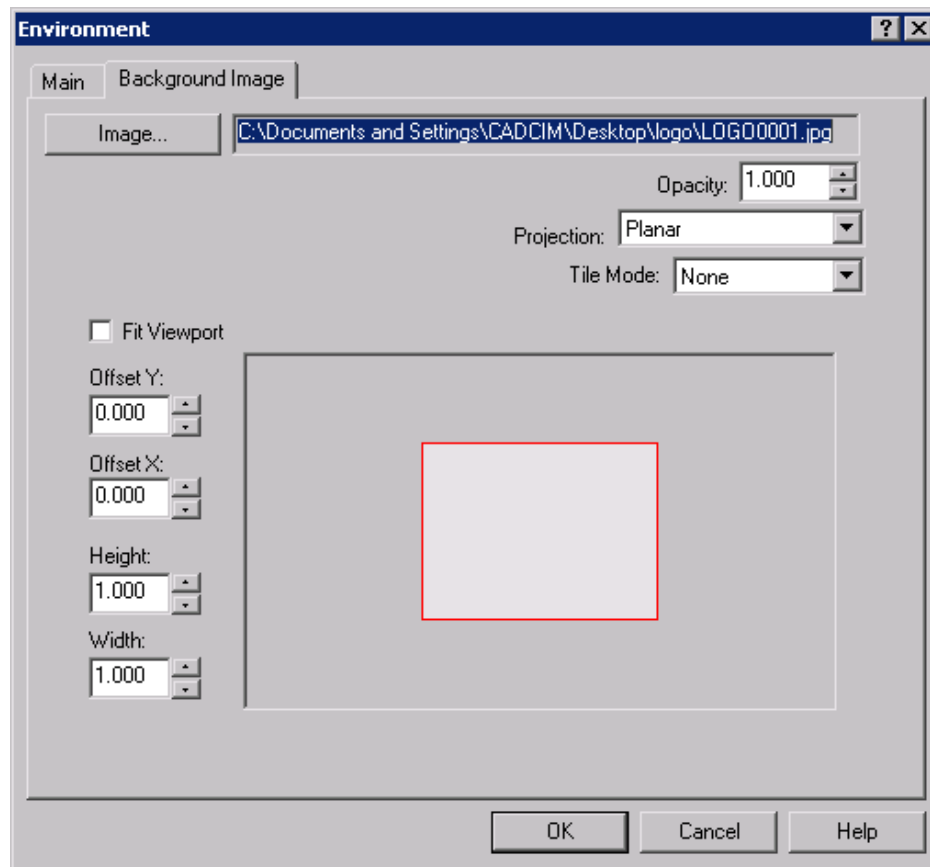


Figure 14-8 The **Background Image** tab in the **Environment** dialog box

Using the **Projection** parameter, you can map the background image to a planar, cylindrical, or spherical shape. Each projection option has its own set of controls for adjusting the image.

The **Planar** projection uses a flat image as a background for the rendered view. When you use this option, rendered images with different viewpoints will have the same two-dimensional background.



Note

*As the background is projected as a two-dimensional image, the **Planar** option may not be suitable while creating walkthroughs.*

Options have been provided to adjust the planar image with respect to the rendered view. The light gray rectangle indicates the extents of the view and the red rectangle represents the background image. By default, the background image fits the rendered view and you can use the mouse to reposition it. You can also use the **Offset Y** and **Offset X** spinners on the left side of the **Environment** dialog box to position the background image with respect to the rendered view.

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The **Height** and **Width** spinners can be used to resize the image proportionate to the view.

The **Cylindrical** projection option maps the background image around an imaginary cylinder surrounding the building model to generate a panoramic view from different viewpoints. It is suitable for creating walkthroughs and animations. You can specify the size and position of the mapped image using its corresponding parameters, as shown in Figure 14-9. The **Altitude** and the **Azimuth** parameters control the vertical and horizontal positioning of the image, respectively. The **Top** and **Bottom** spinners specify the extent of the image and the values that can be used to set up the altitude angles above or below the XY plane. The **Azimuth** and **Width** parameters specify the horizontal orientation and size of the image. The azimuth angle indicates the angle relative to the XY plane, while the **Width** spinner is used to specify the angular width of the background image.

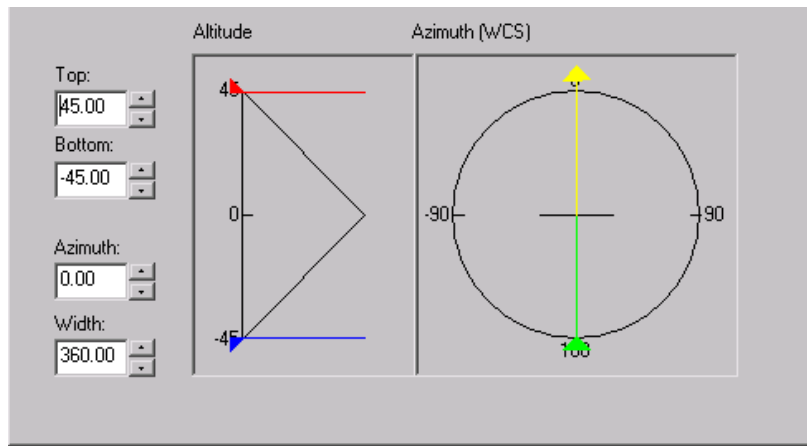


Figure 14-9 Parameters to setup a cylindrical projection of the background image

The **Spherical** projection option maps the image to an imaginary sphere around the building model. The use of this option depends on the type of background image. It is a suitable alternative for applying a background for animations. Various parameters are provided to adjust the size and position of the image.

The **Tile Mode** parameter, provided in the **Background Image** tab of the **Environment** dialog box, can be used to create a tiled background. A small image can be tiled and used as a wallpaper to act as a background. The tile mode can be used with the planar, cylindrical, or spherical options.

Clouds Settings

Autodesk Revit Building's AccuRender has built-in clouds that are generated mathematically. To use this feature, select the **Clouds** check box from the **Environment** dialog box. The **Clouds** tab is displayed, as shown in Figure 14-10. You can use the controls to customize the appearance of clouds.

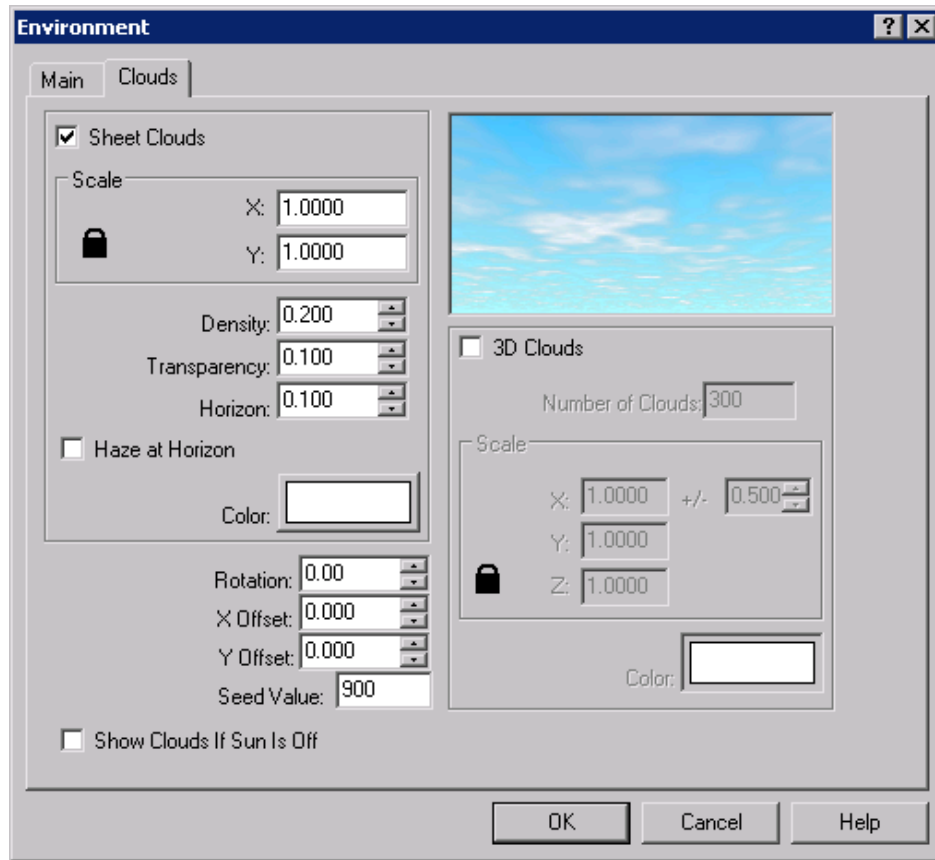
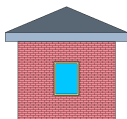


Figure 14-10 The Clouds tab in the *Environment* dialog box

Two types of clouds are available in AccuRender, **Sheet Clouds** and **3D Clouds**. **Sheet Clouds** are 2D images of clouds. The **Scale**, **Density**, and **Transparency** controls can be used to control their respective parameters. The **Horizon** control can be used to adjust the gap between the clouds and the horizon.

The **Haze at Horizon** check box is used to place a band of clouds at the horizon. You can select the color of the clouds by clicking inside the **Color** rectangle and selecting the color from the **Color Picker** dialog box. The **Rotation**, **X Offset**, **Y Offset**, and **Seed Value** controls enable you to adjust other parameters of the clouds.

The **3D Clouds** option uses the clouds modeled as 3D objects, which has texture and bumpmapping. The **Number of Clouds** edit box can be used to increase or decrease the total number of individual clouds. The **Scale** controls can be used to alter their size with respect to their current size. The +/- control adds randomness to the scale and produces variable size clouds.



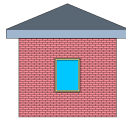
Tip: The **3D Clouds** option creates more realistic 3D effects for the background, but it is not suitable for rendering orthographic views.

Adding Haze to the Environment

By selecting the **Haze** check box, you can add haze to the background image. You can create the haze with varying intensity, from a slight depth to a dense fog. The haze is displayed only after the raytracing process is completed. The **Haze** tab displays the controls to change its appearance. You can use the **Color** drop-down list to select the haze color. The **Strength** spinner enables you to set the strength of the haze color with respect to the normal raytracing color. The **Distance** edit box is used to specify the distance of the point where the haze will have the maximum strength from the selected viewpoint. The haze gradually increases from the viewpoint to the specified distance.

Using a Ground Plane

The **Ground Plane** tool provides an infinite horizontal plane for the building model. This means that you do not need to create an extra element to act as the ground plane. The ground plane can be created at a specified elevation, the value for which can be set in the **Height Above XY Plane** edit box in the **Ground Plane** tab. The **Material** button can be used to select the material for the ground plane. The procedure for selecting the material is described later in this chapter. The created ground plane is not displayed in the building model. It appears only in the raytraced view.



Tip: You can use a combination of the above-mentioned environment tools to create a realistic 3D environment in the rendered view.

Saving and Loading Environment Settings

The **Save** button in the **Environment** dialog box allows you to save the environment settings to a file with **.en** as the extension. The saved environment settings can be used in other projects by loading it using the **Load** button.

Lighting Settings

Lighting is an important aspect of the rendering process and affects the overall appearance of elements and the materials in the rendered view. It not only enables you to view the building model but can also be used to express its mood or ambience. For example, for a shopping mall exterior, a vibrant mood can be created by using bright afternoon lights with sharp shadows. On the other hand, for a residential building exterior, soft evening lights can be used to give a relaxing ambience. Similarly, a showroom interior view can be brightly lit and a bar interior view can be given an accent lighting. Autodesk Revit Building enables you to add and control the properties of a variety of artificial lighting fixtures, based on the project requirement.

Controlling Natural Lighting

By default, Autodesk Revit Building adds the sun as a source of natural light. For rendering building models, AccuRender recognizes two different types of lighting, exterior lighting and interior daylighting.

Exterior lighting consists of two components, light transmitted directly from the sun and the light reflected from the sky, ground, and surrounding objects. AccuRender calculates the intensity of the direct lighting based on the date, time, and location of the sun. It also estimates the indirect lighting such that both the building exterior and the outdoor objects are properly illuminated.

Interior daylighting is used to provide a natural light to the interiors of the building model. To enable it, you need to specify the source from where the daylight enters the building model. For example, you can specify the exterior windows as the source of interior daylight. The AccuRender allows the daylight to enter the building model through the selected windows. This results in realistically rendered interior views. In Autodesk Revit Building, the **Daylights** tool is used only for interior lighting. Daylighting is discussed later in the chapter.

**Note**

The affects of modifying the source of lighting are only visible when the model is rendered.

When you use the **Shading** tool for an exterior view, a uniformly distributed illumination is provided to the model. However, to generate a night or late evening view, you can easily “switch off” the sun. Choose **Lighting** from the **Rendering** tab in the **Design Bar** or the **Lighting** button in the **Render Scene Settings** dialog box to display the **Scene Lighting** dialog box. It displays all the sources and groups of lighting that have been added to the project. To turn off a lighting source, clear the corresponding **On** check box. Select it again to turn it on. When the source is turned on, you can increase or decrease the brightness of the light source by entering the **Dimmer** value, which can vary between 0 and 2. The procedure for creating and using the light groups is described later in this chapter.

Modifying Sun and Sky Settings

Autodesk Revit Building enables you to modify the properties associated with the sun, such as location, shadows, date, time, and so on. To do so, choose the **Sun** button from the **Render Scene Settings** dialog box to display the **Sun and Sky Settings** dialog box, as shown in Figure 14-11. By default, this dialog box has two tabs, **Settings** and **Colors**.

Modifying Cloudiness, Sky Intensity and Soft Shadows

The **Settings** tab in the **Sun and Sky Settings** dialog box enables you to specify other lighting parameters. The cloudiness intensity can be specified in the **Cloudiness** spinner. It can be varied from clear (0.0) to completely overcast (1.0). The cloudiness setting affects the direct and indirect natural light calculations for an exterior view. Various properties of shadows can be modified by entering the values for **Softness**, **Jitter**, and **Sample** parameters. Although Autodesk Revit Building calculates the intensity of the exterior lighting based on the solar angles, you can also modify it manually. The intensity of the direct and indirect components of natural lighting can be multiplied by entering their corresponding values in the **Sun** and **Sky**, spinners respectively.

Modifying the Sun and Sky Color

Autodesk Revit Building's AccuRender enables you to set the sun and sky color using two different methods provided in the **Color** tab of the **Sun and Sky Settings** dialog box. The first method, that is also the default method, enables you to set the colors using the color temperatures for different time of the day. Using this photometric method, you can manually specify the color temperature values in degrees Kelvin. You also have the option of selecting the color from the color swatch, by clicking the color box for the specific time of the day, such as midday, sunrise/sunset, clear sky, and so on. The colors can be selected, both for **Direct Sunlight** and **Skylight** components. The second method enables you to directly specify the

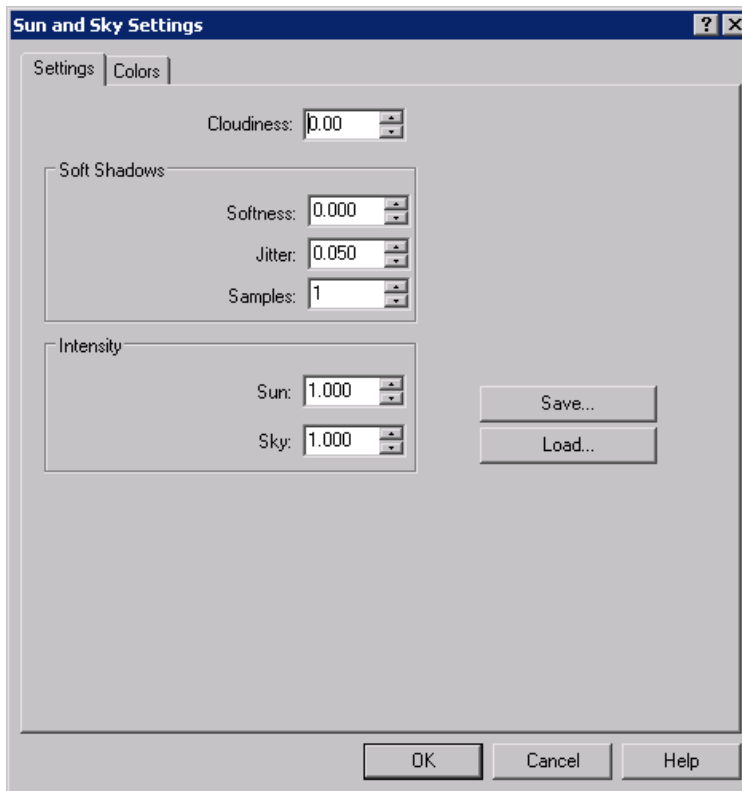
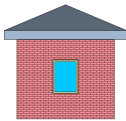


Figure 14-11 The Sun and Sky Settings dialog box

color of these two components. You can select **Direct (RGB)** from the **Method** drop-down list and then click on the appropriate box to select the color from the **Color Picker** dialog box.



Tip: The sun and sky settings can be saved to a file with a .su extension, using the **Save** button in the **Settings** tab. You can load a previously saved setting, by choosing the **Load** button in the **Sun and Sky Settings** dialog box.

Modifying the Sunlight Settings

Choose **Settings > Sun and Shadows Settings** from the menu bar and use the **Sun and Shadows Settings** dialog box, as shown in Figure 14-12, to modify the parameters related to the sunlight. There are two methods of controlling the sunlight settings.

The first method is to specify the angle of the sun, by entering the place, date, and time of the project. You can select the **By Date, Time and Place** radio button in the **Sun and Shadows Settings** dialog box. The **Date** edit box can be used to specify the date. The **Place** tab of the dialog box can be used to identify the location of the project. Choose the arrow key beside the **Place** display box to display the **Manage Place and Locations** dialog box. Prominent cities are enlisted in the **City** drop down list. If the project is located in one of these enlisted cities, you

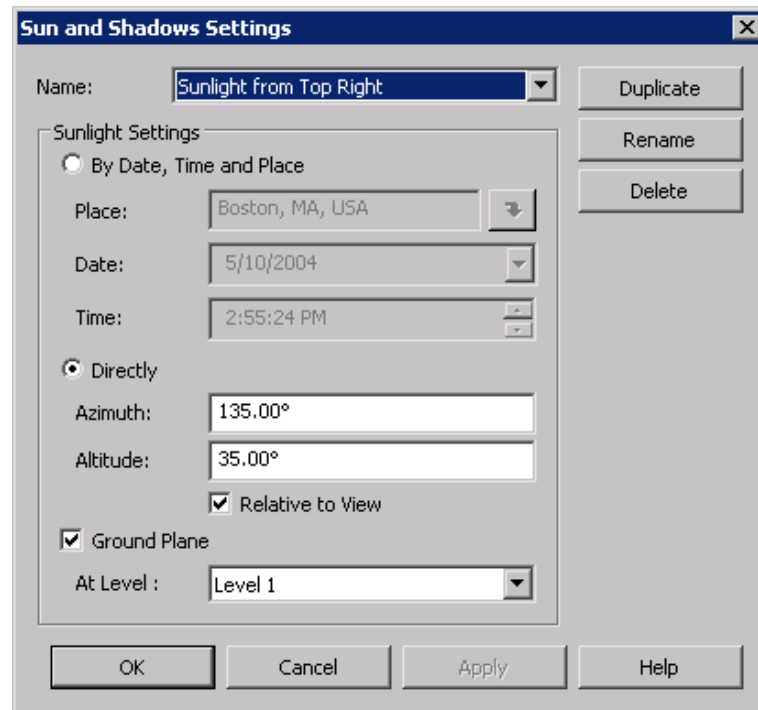


Figure 14-12 The *Sun and Shadows Settings* dialog box

can select its name and Autodesk Revit Building automatically specifies other parameters, such as latitude, longitude, and time zone. In case the project location is not in one of these cities, you can directly enter the values for the **Latitude** and **Longitude** of the specified place. Based on the location, time, and date specified by you, Autodesk Revit Building calculates the azimuth and altitude values to get the solar angles.

The second method is to specify the azimuth and altitude directly. The **Directly** radio button can be selected (default option) in the **Sun and Sky Settings** dialog box. You can then enter the **Azimuth** and **Altitude** values in their respective edit boxes. You can also control the visibility of the ground plane by using the **Ground Plane** check box. The **At Level** drop-down list enables you to select the level for defining the ground plane.



Note

Autodesk Revit Building assumes north for the building model as the positive Y direction, which points toward the top of the drawing window. You can, however, modify the north alignment, using **Locations** tab of the **Manage Place and Locations** dialog box to set the orientation of the model.

Adding Artificial Lights to a Project

Artificial light can be easily added to a project and the building model. The lights are added from the light fixture families. Choose **File > Load from Library > Load Family** from the menu bar. Various lighting fixtures are provided in the **Lighting Fixtures** subfolder of the **Imperial Library** folder. The **Exterior** folder contains the families of exterior lights. You can select the appropriate family of light fixtures and load it into the project file. To add the light to the building model, choose **Component** from the **Modelling** tab in the **Design Bar**, select the light fixture from the **Type Selector Bar**, and click at the desired location in the ceiling or floor plan of the appropriate level.

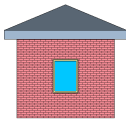


Note

The light fixtures can be added in the appropriate plan only. The exterior floor mounted lighting fixtures, such as street lights and bollard lights can be added to the floor plan, whereas other ceiling mounted fixtures can be added only in the corresponding ceiling plan (with a false ceiling). The fixtures are visible only when the appropriate plan is displayed in the drawing window.

Modifying the Properties of the Lighting Fixture

You can modify various properties of a lighting fixture before or after adding it to the project. After selecting it, choose the **Properties** button to display the **Element Properties** dialog box. Certain instance parameters, such as **Level**, **Phase Created**, and so on, can be modified in this dialog box. To modify the type properties of the light fixture, choose the **Edit/New** button. The **Type Properties** dialog box is displayed. Based on the fixture selected, its type properties are displayed and they can be modified. One of the most important type properties is **Lumens**, which is the photometric unit of the light output. Another important property is the **Wattage** of the light fixture, which is the measure of the radiant energy. You can modify the value of **Lumens** and **Wattage** in the **Type Properties** dialog box to achieve the desired illumination effect. Other properties associated with the light fixture, such as lamp, material of fixture, and so on, can also be modified.



Tip: You can add a variety of lighting fixtures to a building model, such as bracket lights, table lamps, spot lights, and so on, based on the project requirement. Each type of a lighting fixture has certain associated type properties that can be modified. For example, on adding a spot light, you can easily modify properties such as **Spot Beam Angle**, **Spot Spread Angle**, and **Spot Tilt Angle** to achieve the desired effect in the rendered image.

Using Light Groups

Menu Bar:	View > Rendering > Light Groups
Design Bar:	Rendering > Light Groups



Autodesk Revit Building enables you to group all the light fixtures in a scene, using the **Light Group** tool. Choose **View > Rendering > Light Groups** from the menu bar. Alternatively, you can choose **Light Groups** from the **Rendering** tab in the **Design Bar**. The **Create Light Group** dialog box is displayed, in which you can enter the name of the light group. Choose the **OK** button to close the dialog box. You can then select the light fixtures to be added to that light group. The **Rename** and

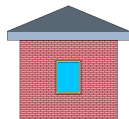
Delete buttons available in the **Options Bar**, are used to rename or delete a light group. The **New** button is used to create a new light group. The grouped light fixtures are displayed in the **Scene Lighting** dialog box. You can switch-off or switch-on the group of lights using the corresponding **On** check box. You can also use the **Dimmer** edit box to vary the light intensity.

Using Radiosity

Menu Bar: View > Rendering > Radiate
Design Bar: Rendering > Radiate

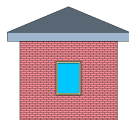


The **Radiate** tool is used to activate the **Radiosity** feature. AccuRender's Radiosity feature is a process of illuminating the building model by distributing light from the light sources, which falls on various elements and surfaces in the rendering scene. This process is executed in steps. The first step involves the light source distributing light to all the elements in the scene. The surfaces on which the light falls further distribute the light they have accumulated to the surrounding elements. This process is repeated a number of times, until the residual light level falls below the specified tolerance level. In this manner, AccuRender calculates the illumination for a rendering scene. Using the radiosity solution, you can create rendered views that have realistic lighting effects showing a more accurate distribution of light. The results of this feature can also be used to analyze the lighting in the building model.



Tip: The radiosity feature should be used judiciously, as it may not be appropriate for all building views. It is, usually, most suitable for rendering small interior views that contain indirect lighting. It is generally not appropriate for large or complex models and exterior views. The use of radiosity also requires more memory and a larger disk space, based on the complexity of the model. The addition of radiosity steps also increases the time required for the rendering processing to be completed.

To use radiosity, you need to specify at least one source of light in the building model. You can use the **Daylight** tool to specify the exterior windows to act as sources of light. When you choose the **Radiate** tool from the **Rendering** tab of the **Design Bar**, the radiosity solution is applied for the view and the image is rendered using the **Raytrace** tool (rendering using raytracing is discussed later in the chapter).



Tip: While the radiosity solution is being applied to the scene, the **Options Bar** displays various options to control it. The calculated residual lighting and the completed steps are also displayed in the **Options Bar**. The **Continue** button can be used to apply additional radiosity steps for the rendered image, if required. The **Reload Scene** button can be used to clear the calculations applied and start all over again. You can press the **ESC** button on the keyboard to cancel the radiosity process.

The **Save Radiosity** and **Load Radiosity** tools, available in the **Rendering** tab of the **Design Bar**, can be used to save and load the radiosity settings. These settings are saved with **.rad** extension. These tools can also be invoked from the cascading menu that is displayed by choosing **View > Rendering** from the menu bar.

Using Materials and Textures

As described in the previous chapters, Autodesk Revit Building's powerful parametric technology enables you to use built-in elements, such as walls, windows, doors, furniture, and so on, to create a building model. You have the option of using these elements with their current properties or modify them based on the project requirement. Like other properties, material and texture are also predefined properties of building elements. For example, a wall may consist of a number of layers, such as metal studs, wood, brick, and so on. Each layer has a predefined material assigned, which is displayed with a fill pattern.

Autodesk Revit Building enables you to use the building elements with their predefined material settings or change their appearance in terms of their material properties. To view the properties of an element, select it and choose the **Properties** button. The **Element Properties** dialog box displays the instance properties. Choose the **Edit/New** button to display the **Type Properties** dialog box and then, choose the **Edit** button for the **Structure** type parameter to display the **Edit Assembly** dialog box showing the layers and composition of the selected element. The predefined materials for an element (or a layer in the element) are displayed in the **Material** column, as shown in Figure 14-13. Click in the **Material** column for the appropriate layer and then click on the down arrow to display the **Materials** dialog box, as shown in Figure 14-14.

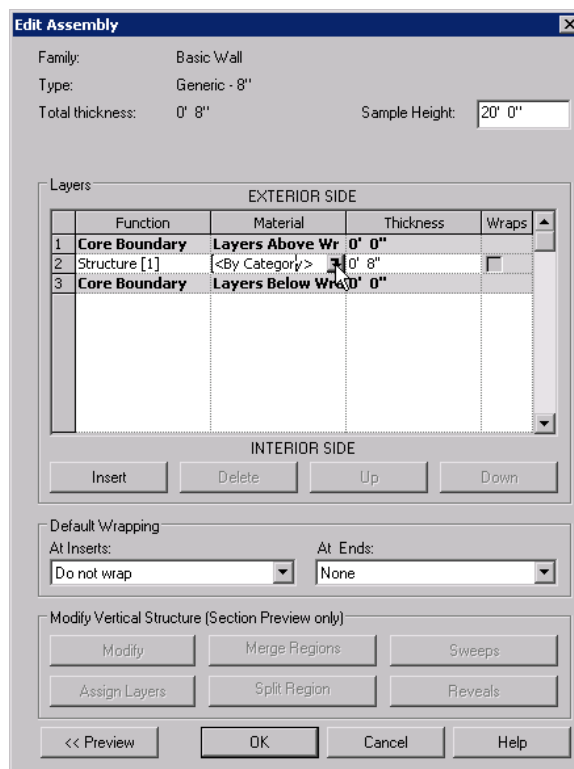


Figure 14-13 The **Edit Assembly** dialog box showing the material properties of the layers of the composite wall for the exterior wall

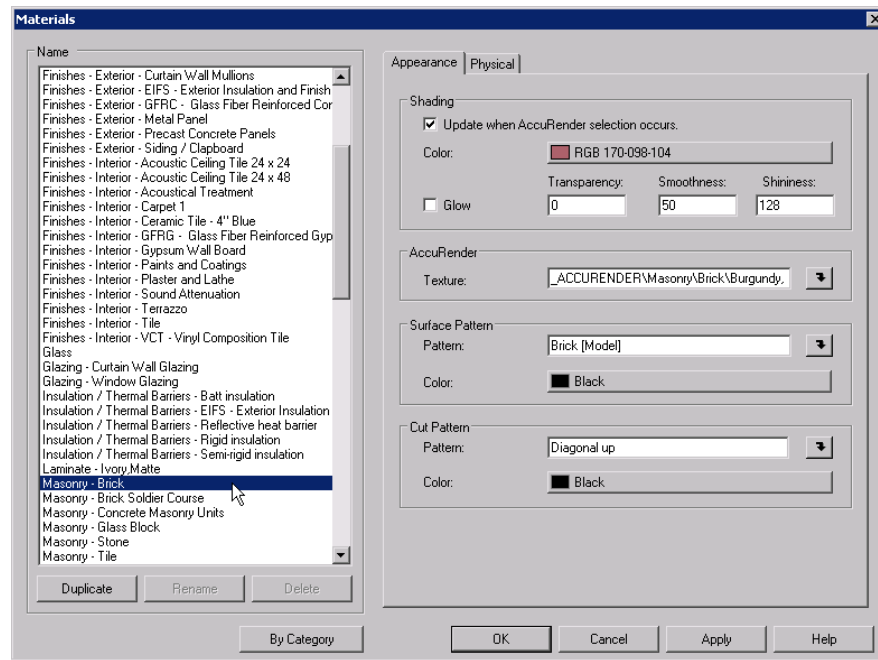


Figure 14-14 The Materials dialog box

The **Materials** dialog box displays the list of predefined material styles available in Autodesk Revit Building's AccuRender and their corresponding properties. You can modify them or create a new material style. To create a new material style, select a material with similar properties and then choose the **Duplicate** button. The name to be assigned to the new material can be entered in the **New Material** dialog box. The new material name is added to the list of materials available. The **Rename** or **Delete** buttons can be used to rename or delete the material styles. You can then select this material and change its properties, such as shading, texture, surface pattern, and so on, to create a new material.

The shading section of the **Materials** dialog box is used to set the properties that are related to the appearance of the material, when it is shaded, using the **Shaded** or **Shaded with Edges** tool. The color can be selected by clicking in the color bar and selecting the color from the **Color** dialog box. The **Glow** check box can be selected to produce a glowing effect in the shaded view. The degree of transparency can be specified in the **Transparency** edit box. The value can vary between 0 (Opaque) to 100 (fully transparent). Similarly, values for **Smoothness** and **Shininess** parameters can be varied between 0 to 100 and 0 to 128, respectively.

Like predefined materials, Autodesk Revit Building's AccuRender also has numerous predefined textures. The **Texture** edit box can be used to specify the texture and material. To view the predefined materials and textures, click on the arrow key besides the **Texture** edit box. This displays the **Material Library** dialog box, as shown in Figure 14-15.

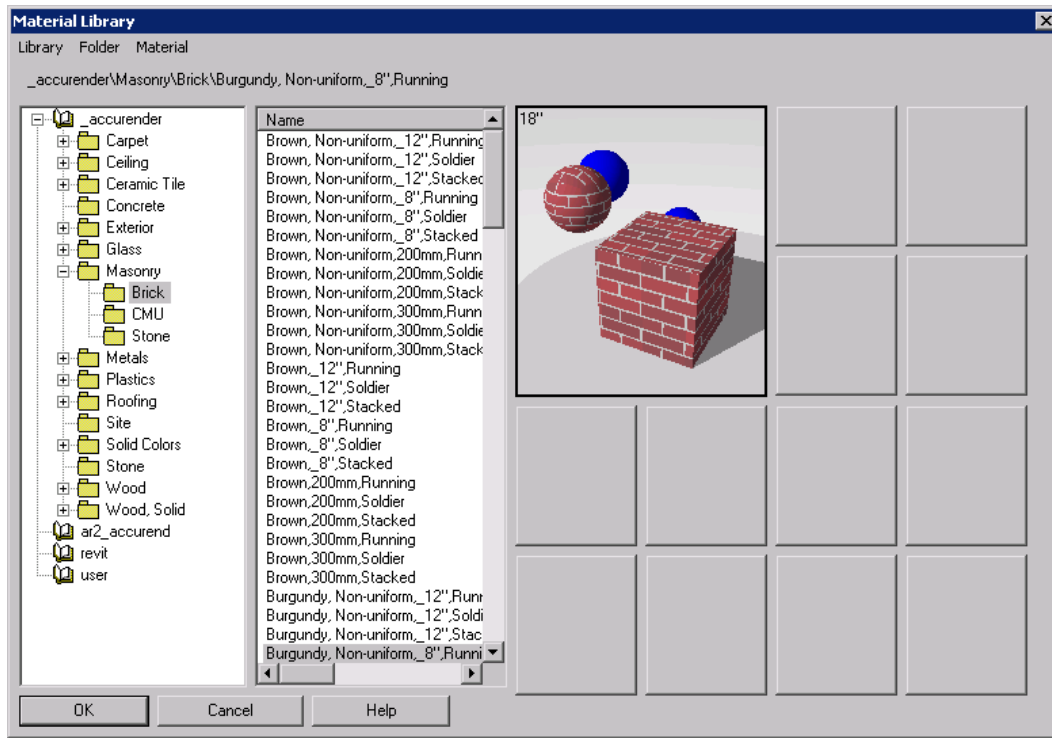
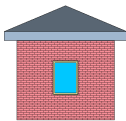


Figure 14-15 The Material Library dialog box

Selecting and Previewing Available Materials and Textures

The **Material Library** dialog box displays the available libraries containing various predefined materials and textures. Click on the library name to expand it and view all the folders. Materials are listed in folders based on their material category. For example, **Wood** folder contains a variety of textures related to different types of wood. You can navigate the folders and subfolders by clicking on the folder name, till a list of materials is displayed in the **Name** list.

When you select a material from this list, its rendered view is displayed in the preview pane on the right of the **Name** list. You can scroll through the list of available textures and select the most appropriate material based on its rendered preview image. The smaller panes can be used to display the preview images of the additional selected material. When you click on the smaller pane, the preview image of the selected material is saved in it. Right-click inside the smaller pane and choose **Replace** to replace the material in the smaller pane with the material in the larger pane. The **Clear** option can be used to remove the material from the smaller pane.



Tip: The rendered preview images in the smaller panes can be used to view and compare various selected materials in a rendered view. This enables you to match color and texture for the materials to be used in the interior or exterior view, before actually rendering the scene.

Creating a New Material Library and Folder

To create a new material library, choose **Library > New** from the menu bar provided on the top of the **Material Library** dialog box. The **Save As** dialog box is displayed, which is used to save the new material library with a *.mli* extension, in the appropriate folder.

Similarly, you can create material folders for the selected materials at the appropriate place in the material folders tree by choosing **Folder > New** from the menu bar in the **Material Library** dialog box. For example, you may want to create a new folder for marble inside the existing **Stone** folder. The **Folder > Delete** tool can be invoked to delete the selected folder.

Editing Existing Materials

After selecting the material, choose **Material > Edit** from the menu bar in the **Material Library** dialog box. Alternatively, move the cursor over the material name or preview image and right-click. You can then choose **Edit** from the shortcut menu to edit the selected material. The **Material Editor** dialog box is displayed, as shown in Figure 14-16.

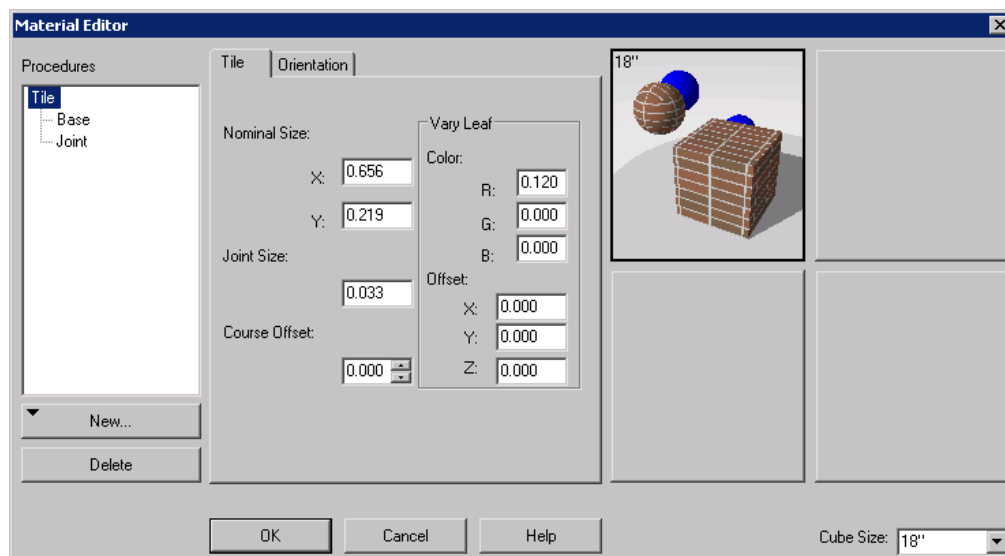
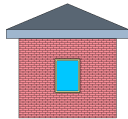


Figure 14-16 The **Material Editor** dialog box

Based on the selected material, the **Material Editor** dialog box displays various tabs. The **Procedures** list displays the list of simple materials that combine to form the actual material texture and pattern. For simple materials, such as glass, plastic, solid colors, and so on, there is only a single item in the list: **Base**. For more complex materials there may be two or more items. The items are displayed in a tree like format and depict the combination of simple materials that combine to form the complex material. For example, wood may be considered as a combination of a base material over which various rings are superimposed.

Using the **Material Editor** dialog box, you can edit each of the items displayed in the **Procedures** list. Various attributes of the selected item are displayed in the properties area on the right of the **Procedures** list. The properties are grouped in tabs. For example, when you select **Base** from the **Procedures** list, four tabs are displayed in the properties area of the dialog box: **Main**, **Transparency**, **Maps**, and **Highlight**. Each tab contains the modifiable properties related to the tab title. You can modify these properties to achieve the appropriate material texture and pattern.

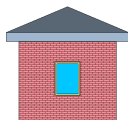


Tip: It is advisable not to modify the predefined standard materials in Autodesk Revit's AccuRender library, because certain AccuRender objects use them. It is also advisable to create a copy of the material using the **Duplicate** button provided in the **Materials** dialog box. You can then rename the material and edit the desired properties.

Creating a New Material

Apart from using the available materials from the material library, Autodesk Revit Building's AccuRender also enables you to create new materials, using two methods. The first method is to use a predefined material as a template and then modify its relevant properties. To create a new material using this method, select the material in the **Material Library** dialog box and choose **Material > New > Use Current Material as Template**. This opens the **Material Editor** dialog box that can be used to modify the relevant properties. When you choose the **OK** button, after modifying the properties, the **Save Material As** dialog box is displayed. You can give an appropriate name to the new material and save it in the desired material library.

The second method to create a new material is to start from the scratch and define each property of the material. You can choose **Material > New > Default Gray** from the menu bar of the **Material Editor** dialog box. This opens the **Material Editor** dialog box with a single base item in the **Procedures** list. You can then add simple materials, using the **New** button and modify the desired properties. The new material that is created can then be saved in the desired folder.



Tip: The tabs displayed for the selected material in the **Material Editor** dialog box can be used efficiently to create a variety of materials. AccuRender enables you to modify a number of parameters associated with each property, such as color, texture, reflectivity, self-illuminance, transparency, and so on.

Using the Paint Tool

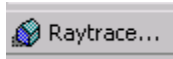
Menu Bar:	Tools > Paint
Toolbar:	Tools > Paint
Shortcut Key:	PT



The **Paint** tool is used to apply a material to a selected face of an element without modifying its material properties or those of the family. The element families that can be painted include walls, floor, ceiling, roof, and so on. To paint a face of an element, invoke the **Paint** tool and select the paint type from the **Type Selector Bar**. Move the cursor near the face to highlight it and click to apply the selected paint to the face.

Rendering Views Using the Raytrace Tool

Menu Bar: View > Rendering > Raytrace
Design Bar: Rendering > Raytrace
Shortcut Key: RR



The **Raytrace** tool is the basic tool used for rendering 3D views with photorealistic effects. To invoke the **Raytrace** tool, open the view and choose **View > Rendering > Raytrace** from the menu bar.

The process of raytracing involves calculation of the lighting based on the brightness, reflectivity, and transparency of various materials in the scene. Autodesk Revit Building's AccuRender traces the rays of light from the light sources to the objects and then to the viewer's eye or the camera. The quality of light reflected from each material is based on its material properties. The properties of materials and light are then used to calculate the color and intensity of each pixel that forms the rendered image. The final rendered image is generated based on the light sources, objects in the scene, and the camera position.

Setting Raytrace Properties

Before invoking the **Raytrace** tool, you can set the properties related to the desired quality of final rendered image. Choose **Settings > Render Scene** from the menu bar to display the **Scene Selection** dialog box. Select the type of scene to be rendered to display the **Render Scene Settings** dialog box. The parameters provided in the **Raytrace Settings** section of the dialog box, shown in Figure 14-17, can be used to set various properties.

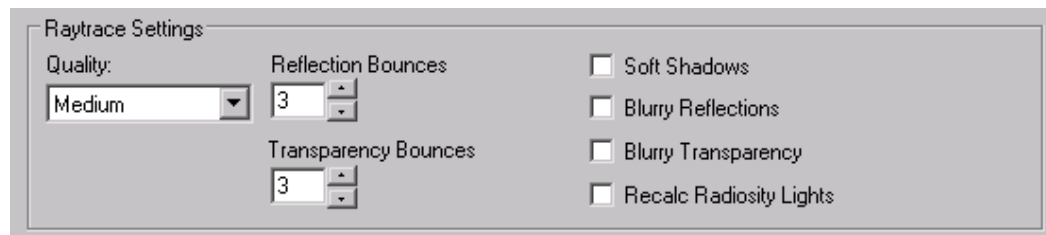
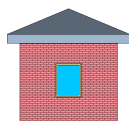


Figure 14-17 The **Raytrace Settings** section in the **Render Scene Settings** dialog box

In the **Quality** drop-down list, select from the available antialiasing options, **Draft**, **Medium**, **Good**, **Better**, **Best**. The antialiasing process involves improving the level of each pixel of the rendered image. Increasing the quality of the raytracing improves the quality of the output image.

The **Reflection Bounces** and **Transparency Bounces** parameters indicate the number of levels of reflection or transparency that are permitted. The higher the value, the longer is the rendering time. The value varies between 0 and 20.



Tip: Increasing the antialiasing quality, increases the time consumed for the rendering process. Therefore, you may use a lower antialiasing level to preview an image and then use a higher level to render the final image.

Autodesk Revit Building automatically generates shadows using the light sources and the objects in the rendered scene. The **Soft Shadows** check box can be selected to produce more realistic shadows. This option is useful in generating rendered images with a soothing or relaxing ambience.

The **Blurry Reflections** option can be selected to modify the look of the reflections in the glass, whereas the **Blurry Transparency** option changes the look of objects behind the glass.

You also have the option of recalculating the shadows casted during the radiosity process. Select the **Recalc Radiosity Lights** check box to enable the recalculations.



Note

*The **Recalc Radiosity Light** option results in a longer rendering time, but it can be used with a high aliasing and soft shadows to produce high quality rendered images.*

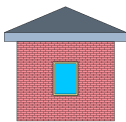
Using the Raytrace Tool Options

As described earlier, to render a 3D view, you first need to open it in the drawing window. Before you use the **Raytrace** tool, setup the parameters for the rendering scene, such as environment, scene selection, lighting, radiosity, and so on. You can then choose **View > Rendering > Raytrace** from the menu bar to invoke the **Raytrace** tool. The **Options Bar** displays the options and settings that can be used before starting the raytracing process, as shown in Figure 14-18. These options are discussed next.



Figure 14-18 The **Options Bar** displaying the raytracing option

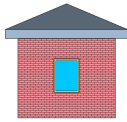
The **Type** drop-down menu can be used to select the type of rendering. Three options are provided, **By Camera**, **Cylindrical**, and **Spherical**. The **By Camera** option can be selected to create a planar rendering. The view is rendered in a single plane, as it is visible from the camera position. The **Cylindrical** option creates a cylindrical panoramic image, as if the image has been imposed on the inner face of a cylinder. The **Spherical** option creates a rendered image, as if it has been projected on the inner surface of a sphere.



Tip: The **Cylindrical** option may be used while rendering exterior views. The **Spherical** option can be used while rendering interior views. Using this option, you can present the ceiling, walls, and floor in a panoramic view.

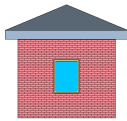
The **Scene** drop-down list enables you to select the rendering scene. The **Resolution** drop-down list can be used to select the resolution of the rendered image. The higher the resolution, the better the quality of the image.

The **Image Size** parameter edit boxes can be used to set the width and height of the image in pixels before rendering the view. The default width and height is based on the current 3D view and the selected resolution.



Tip: The image size can also be set by choosing the **Image Size** tool from the **Rendering** tab in the **Design Bar**. The **Image Size** dialog box is displayed and you can set the resolution, width, and height in this dialog box.

After setting the parameters, you can select the **Go** button in the **Options Bar** to start the raytracing rendering process. Autodesk Revit Building begins rendering the displayed 3D view. The progress indicator, located at the bottom right corner of the screen, displays the progress of the rendering process. To cancel the rendering process, press the ESC key or choose the **Cancel** button next to the progress indicator. Autodesk Revit Building displays a warning, when the raytracing is interrupted and you can choose to stop or continue the rendering process. The rendered image is displayed in the display window.



Tip: The rendering time is based on a number of parameters, such as, image size, resolution, lights, and complexity of the building model. This may consume considerable memory resources, which are not released until the rendered 3D view is closed. After the rendered image is displayed, you can use the **Dynamic View** tool to zoom and scroll the rendered image. You can also right-click over it and choose **Zoom Image 1:1** from the shortcut menu to display the image with the same pixel size as that of the screen.

Using the Display Model Tool

Menu Bar: View > Rendering > Display Model
Design Bar: Rendering > Display Model



The **Display Model** tool enables you to remove the effect of raytracing on the building model in the drawing window. To invoke this tool, choose the **Display Model** tool from the **Rendering** tab in the **Design Bar** or choose **View > Render > Display Model** from the menu bar. The building model is displayed without the rendering effects. However, the rendering information generated so far is retained.

Selecting the Plant Season

You can also specify the plant season for the rendering scene by choosing **Settings > Render Scene** from the menu bar. The **Render Scene Settings** dialog box is displayed. Select the appropriate plant season from the **Plant Season** drop-down list.

The selected plant season affects the appearance of the plants in the rendered view. For example, when **Summer** is selected as the plant season, a deciduous tree in the model will be rendered with all the leaves, whereas, if **Winter** is selected as the plant season, the same tree will appear without leaves. This is another example of the flexibility and power of Autodesk Revit Building's rendering capabilities.

Using the Region Raytrace Tool

Menu Bar: View > Rendering > Region Raytrace
Design Bar: Rendering > Region Raytrace

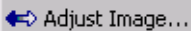


The **Region Raytrace** tool is used to render only a part of the 3D view. This tool is useful while rendering complex building models. You can first render a portion of the displayed 3D view to check the lighting, raytrace quality, and finishes, before rendering a complete view. The portion to be rendered can be selected by defining a window. For example, while rendering an exterior 3D view, you can define a window such that a portion of the exterior wall finish, ground plane and glazing are enclosed. The rendered image of this small portion can help you assessing the quality of the entire image and modify the various element properties.

After invoking the **Region Raytrace** tool, move the cursor to the 3D view and click to start the rectangle. When you move the cursor, a dynamic rectangle is generated. Enclose the portion of the view to be rendered inside it and click to specify its diagonal end. The raytracing process is initialized immediately after the rectangle is defined and the rendered image for the defined portion is displayed in the drawing window.

Adjusting the Rendered Image

Menu Bar: View > Rendering > Adjust Image
Design Bar: Rendering > Adjust Image



The **Adjust Image** tool can be used to adjust the parameters of the rendered image. When this tool is invoked, the **Adjust Image** dialog box is displayed, as shown in Figure 14-19.

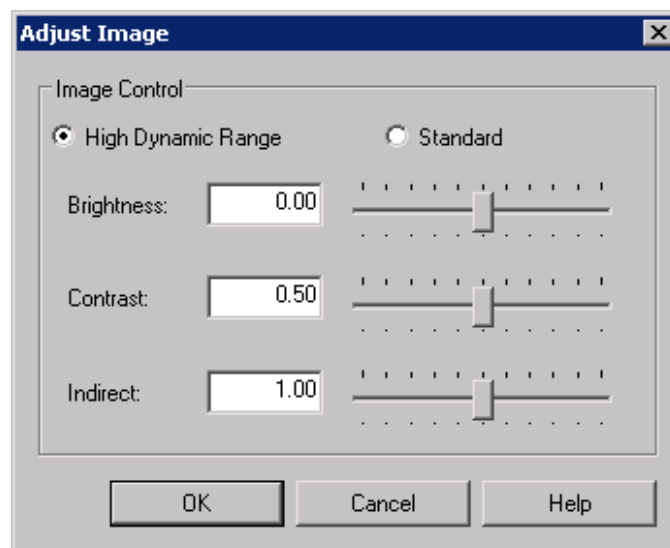
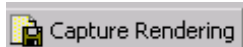


Figure 14-19 The *Adjust Image* dialog box

You can use the sliders for the **Brightness** and **Contrast** parameters to adjust the corresponding value for the rendered image in the **Adjust Image** dialog box. The **Indirect** parameter refers to the indirect lighting effect in the image and can be varied using the slider. The **High Dynamic Range** radio button can be selected to achieve more contrast and a better color saturation, whereas, the **Standard** radio button can be used for a lesser contrast and muted colors.

Saving the Rendered Image

Menu Bar: View > Rendering > Capture Rendering
Design Bar: Rendering > Capture Rendering



The **Capture Rendering** tool enables you to save the rendered image with the project file. When you invoke this tool, Autodesk Revit Building saves the displayed rendered image and adds the view in the **Rendering** folder of the **Project Browser**. You can then edit or rename the rendered views using the right-click shortcut menu.



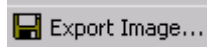
Note

When you use the **Capture Rendering** tool, the rendered image is not saved as a separate file on the disk. It remains an associated image inside the project file. You need to open it to view the captured image.

Using the **Capture Rendering** tool, you can create a series of rendered images associated with the project file. You can double-click on the view name in the **Project Browser** to display the image in the drawing window.

Exporting the Rendered Image

Menu Bar: View > Rendering > Export Image
Design Bar: Rendering > Export Image



The **Export Image** tool can be used to export the raytraced image from the project file and save it to a disk. After the raytraced image is displayed in the drawing window, choose the **Export Image** tool from the **Rendering** tab of the **Design Bar**. The **Save As** dialog box is displayed. You can save the image file in jpeg (*.jpg), TIFF (*.tif), BMP (*.bmp), or Targa (*.tga) format at the desired location.

ADDING ARCVISION, REAL PEOPLE, AND VEHICLES

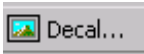
As described in the previous chapters, Autodesk Revit Building has a number of built-in elements, such as trees, parking, and other site components, that can be inserted into the building model to make it more realistic. Autodesk Revit Building also includes graphical real people and vehicles as a part of ArchVision's RPC product family. You can insert these elements to the building model to provide a reference scale to the project and make the rendered views more realistic.

To add ArchVision real people and vehicles to a building model, choose the **File > Load from Library > Load Family** from the menu bar. The **Imperial Library > Entourage** folder contains the families of real people and vehicles. Select the desired family to be loaded in the **Open** dialog box and choose the **Open** button to load it into the project file.

Choose the **Component** tool from the **Design Bar** and select the element to be added from the **Type Selector Bar**. Move the cursor to the drawing window and click to add the selected element to the appropriate floor plan or 3D view. You can use the **Rotate after placement** option available in the **Options Bar**, if required. You can then use the **Raytrace** tool to view the added elements.

USING THE DECAL TOOL

Menu Bar:	Modelling > Decal
Design Bar:	Modelling > Decal



The **Decal** tool is used to place an image on the face of a flat or cylindrical element in the building model. This tool can be used to represent signage, posters, billboards, and paintings in a rendered view.

A decal is an external graphic file that is linked to the project file. The file formats that can be used as decal are *jpeg*, *targa*, *tif*, and *bmp*. Since decal files are linked to the project file and not saved with it, the size of the project file is not increased. It is, however, advisable to save the decals along with the project file so that the link is maintained.

Placing a Decal

Upon invoking the **Decal** tool, the decal editor is activated and the **Edit Decal** dialog box is displayed, as shown in Figure 14.20. In the **Map** tab, choose the **Browse** button and open the desired decal file. The drop-down list in the **Masking** section can be used to select the appropriate option to add color or alpha channel masking.

The **Settings** tab can be used to set parameters related to the decal image, such as, color and bump. The **Double Sided** check box can be used to apply the decal image to both sides of the selected surface, and so can be used to create double-sided billboards.

The **Finish** tab provides other parameters related to the finish of the decal image. The **Reflective Finish** parameter can be adjusted to set the reflectivity of the surface on which the decal image is applied. The **Transparency** parameters control the transparency of the decal and so the extent of the visibility of the surface over which it is placed. You can also set the value of **Self Luminance** for the decal.

After setting these parameters, choose the **OK** button to close the **Edit Decal** dialog box. The **Options Bar** displays the size of the decal image. You can specify the desired size by entering the values of the **Width** and **Height** parameters. You can then move the cursor near the surface over which the decal is to be placed. When the desired surface or edge is highlighted, click to place the decal. In all views, except the rendered views, the decal appears as a rectangle with two diagonal lines.

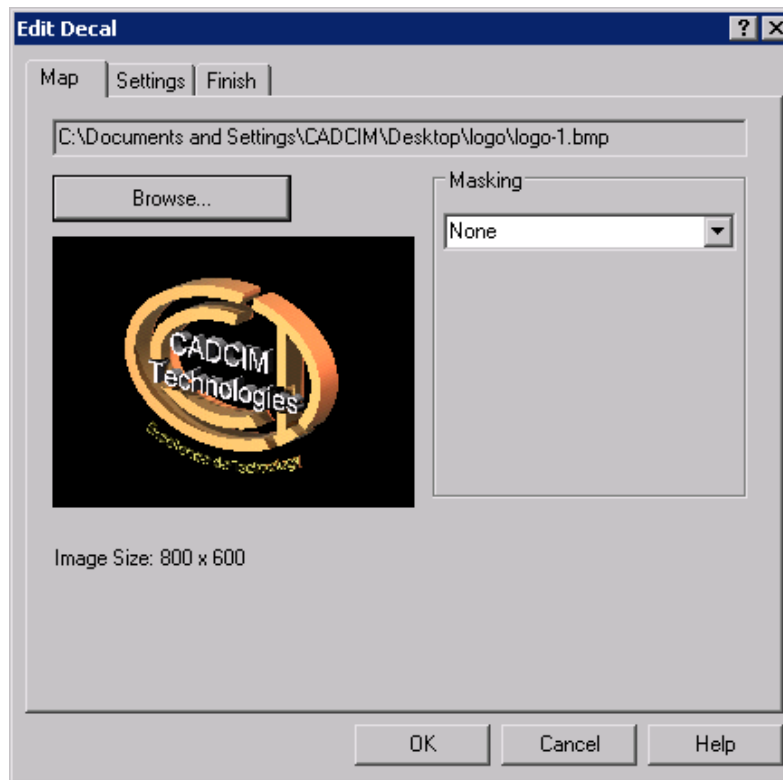
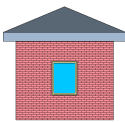


Figure 14-20 The *Edit Decal* dialog box



Tip: The decal editor remains activated after the decal is placed. You can add more decals of the same or different type in the building model.

Editing a Decal

To edit a decal, select it and modify its size using the **Width** and **Height** edit boxes in the **Options Bar**. You can also drag the controls at the four corners of the decal to resize it. The **Lock Proportions** check box, available in the **Options Bar**, can be cleared to resize the decal to a different aspect ratio. Choose the **Reset** button in the **Options Bar** to reset the size of the decal to the original size. You can also choose the **Properties** button, after selecting the decal and change its size in the instance parameters list. To modify the image of the decal, choose the **Edit/New** button in the **Element Properties** dialog box and choose the **Edit** button for the **AccuRender Attributes** type parameter. This displays the **Edit Decal** dialog box, which can be used to make the modification.

CREATING A WALKTHROUGH

Menu Bar: View > New > Walkthrough
Design Bar: View > Walkthrough



A well rendered walkthrough can form a very impressive part of a project presentation. Using Autodesk Revit Building's **Walkthrough** tool, you can easily generate a walkthrough for a building model, by rendering a series of 3D views defined by camera frames. The process involves specifying a walkthrough path, editing it, and finally, recording the walkthrough.

Creating the Walkthrough Path

The first step in creating a walkthrough is to define the walkthrough path, which is the path that the camera follows through the building model. In most cases, this path is defined in the plan view. But you can also use the section, elevation, and 3D views.

The walkthrough path is defined by specifying the points that form a spline in the project view. The specified points become the key frames in the walkthrough. Autodesk Revit Building automatically generates the additional intermediate frames between these key frames.

To create a walkthrough path, first open the view in which it is to be defined. When you invoke the **Walkthrough** tool, the **Options Bar** displays the options related to the path creation, as shown in Figure 14.21. The **Perspective** check box is selected, by default, to create the walkthrough using perspective views from the camera positions. You can clear the perspective check box to create walkthroughs as orthographic 3D views. In this case, you can also select the view scale using the **Scale** drop-down list.



Figure 14-21 The Options Bar showing the options for creating a walkthrough

The **Offset** edit box can be used to specify the height of the camera from the selected level. Using this option, you can move the camera upward or downward, while the specifying key frames along the walkthrough path. For example, by setting increasing values for the **Offset** parameter, you can move the camera upward, along a ramp or a flight of stairs

The **From** drop-down list displays all the defined levels in the project. You can select the level from which the offset camera height is specified. This parameter can be effectively used while creating an interior walkthrough at multiple levels.

To start creating the walkthrough path, click at the first point of the camera location. This point defines the first key frame of the walkthrough. As you move the cursor, Autodesk Revit Building displays three lines indicating the camera direction. Click to specify other points to create a spline defining the path of the camera. You can use the **Offset** and **From** options available in the **Options Bar** to modify the camera height, if required. After specifying the last point, choose the **Finish** button in the **Options Bar** to complete the walkthrough. The walkthrough path is

displayed in the drawing window in red. An example of a created walkthrough path is shown in Figure 14-22.

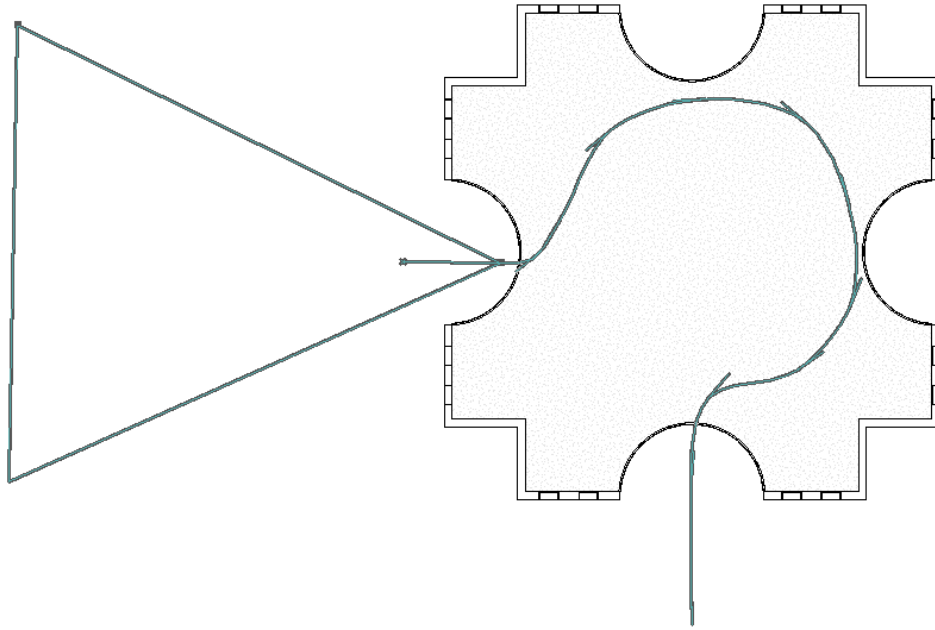


Figure 14-22 An example showing the created walkthrough path



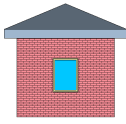
Note

You cannot edit the walkthrough path while creating it. You must first create the complete path and then edit it, as per requirement.

Editing and Playing the Walkthrough

When you create the walkthrough path, Autodesk Revit Building assigns **Walkthrough 1** as its name. It is added to the **Project Browser** under the **Walkthroughs** heading.

To view the walkthrough, double-click on its name in the **Project Browser** or right-click over the name and select **Open** from the shortcut menu. The drawing window displays the 3D view of the last frame. Select the image to display its crop boundary with the grips. You can use the grips to resize the crop region. Alternatively, you can use the **Size** button available in the **Options Bar**. When you choose this button, the **Crop Region Size** dialog box is displayed. You can enter the new values for the **Width** and **Height** parameters of the crop region. The **Field of View** radio button is selected to modify the aspect ratio of the crop region. The **Scale** radio button is used to scale the crop region by locking its aspect ratio. While scaling, you can either modify the width or the height to change the view scale, but the field of view remains the same.



Tip: After creating the walkthrough path, if you press the ESC key or click anywhere in the drawing area, it no longer remains visible. To display the path, right-click over the walkthrough name and choose the **Show Camera** option from the shortcut menu. The walkthrough path will be displayed in the current view. You can edit it using tools, such as **Move**, **Copy**, **Mirror**, and so on.

To play or edit the walkthrough, choose the **Edit Walkthrough** button available in the **Options Bar**, when the walkthrough path is displayed in the drawing area. Now, the key frames specified to create the path are highlighted by dots. The **Options Bar** displays the options for editing and playing the walkthrough, as shown in Figure 14-23.

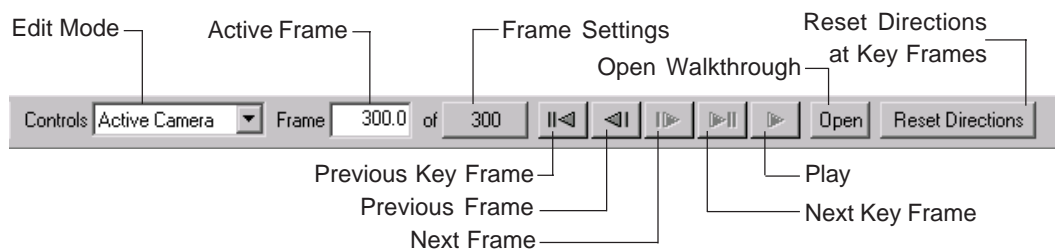


Figure 14-23 The **Options Bar** showing the options for editing and playing a walkthrough

The **Edit Mode** drop-down list is used to select the type of editing to be done to the walkthrough. It provides four options, **Active Camera**, **Path**, **Add Key Frame** and **Remove Key Frame**. These options are discussed next.

The **Active Camera** option is used to drag the camera along the path to the desired frame or key frame. As you move the camera, it snaps to the key frame. While using this option, you can drag the target point and the far clip plane of the camera at the key frames. At other additional frames, you can only modify the far clip plane.

The **Path** option in the **Edit Mode** drop-down list is used to edit the walkthrough path. When you choose this option, the key frames are converted into drag controls. You can drag them to modify the walkthrough path.

Choose the **Add Key Frame** option to add key frames to the created path. Move the cursor over the path and click at the desired locations to add them. Similarly, the **Remove Key Frame** option enables you to remove them by clicking on them.

The **Active Frame** edit box shows the frame of the current location of the camera. You can enter the new frame number in this edit box to view the location of the camera at that frame.

The **Frame Settings** button is used to set the properties of frames. When you choose this button, the **Walkthrough Frames** dialog box is displayed, as shown in Figure 14-24.

The total number of frames in the walkthrough can be set by entering the value in the **Total Frames** edit box in the **Walkthrough Frames** dialog box. Autodesk Revit Building automatically divides

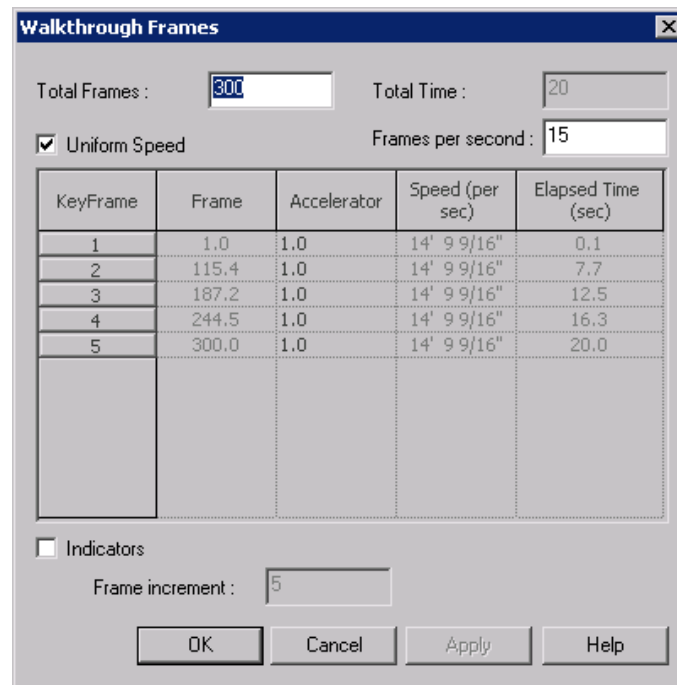
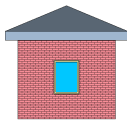


Figure 14-24 The **Walkthrough Frames** dialog box

the frames along the created walkthrough path. By default, the camera is set to traverse the path at a uniform speed, and therefore, the **Uniform Speed** check box is selected. You can change the speed of the walkthrough by entering a new value for the **Frames per second** parameter. The default value is 15. The lower the value, the slower will be the walkthrough.

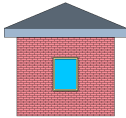


Tip: The value for the **Frames per second** parameter indicates the speed of the walkthrough. You can enter the value based on the total number of frames in the walkthrough. The **Total Time** text box displays the total walkthrough time based on the total frames and the frames per second. Lower values of the **Frames per second** parameter may result in a jerky walkthrough.

You can also vary the speed of the walkthrough by clearing the **Uniform Speed** check box in the **Walkthrough Frames** dialog box. The table in the **Walkthrough Frames** dialog box contains five columns and displays the frame properties, which are automatically generated based on the parameters specified for the walkthrough. When you clear the **Uniform Speed** check box, the **Accelerator** column in the table becomes editable. You can click on the **KeyFrame** number column to display where the key frame appears on the walkthrough path. A camera icon is also displayed at the selected key frame. The **Accelerator** column displays the numerical values to change the speed of the walkthrough at specific key frames. You can enter values in the range of .1 and 10.

The **Indicators** check box can be used to display intermediate camera indicators, along the walkthrough path. This assists in visualizing the distribution of frames along the path. The increment, at which the indicators are displayed, can be set in the **Frame Increment** edit box.

To play the walkthrough, various buttons are available in the **Options Bar**, as shown in Figure 14-23. To display the walkthrough view, enter the frame number you wish to view in the **Active Frame** edit box and choose the **Open** button to display the perspective view for the specified frame. You can select the view type to display from the **View** menu. For example, you can select the **Shading with Edges** view type from the **View** menu. The **Play** button can then be chosen to play the walkthrough, which is played in the drawing window based on the selected view type and the specified walkthrough parameters.



Tip The **Open** button can also be used to view the changes while editing the walkthrough path. You can first go to the desired frame using the **Active Frame** edit box and then choose the **Open** button. The view of the camera from the specified frame is displayed in the viewing window.

**Note**

When you create a walkthrough, it becomes a part of the project file and is not saved to the disk as a separate file. To save it to a disk, you need to record the walkthrough.

Recording a Walkthrough

Menu Bar: File > Export > AVI

Autodesk Revit Building enables you to record the created walkthrough to a disk. The **AVI** tool can be used to export the walkthrough. Open the walkthrough and choose **File > Export > AVI** from the menu bar. When you choose this tool, the **Save As** dialog box is displayed, as shown in Figure 14-25. It provides various parameters to export and save the walkthrough to a disk.

The **File Name** edit box displays the default name and location of the walkthrough file. The **Output Length** section enables you to select the frames to be exported. The **All frames** radio button can be selected to save all the frames in the walkthrough. Alternately, you can choose the **Frame range** radio button and specify the range of frames to be exported. The **Frames per second** edit box enables you to specify the speed at which the frames will be recorded.

The **Format** section provides options to specify the type and quality for recording the walkthrough. You can select the view type to be used for generating and recording the walkthrough from the **Display mode** drop-down list. To record a rendered view of the frames, choose the **Raytracing** option. You can also specify the quality of the recording by specifying the pixel sizes in the **Pixel dimensions** edit boxes.

Choose the **Save** button from the **Save As** dialog box to start recording the walkthrough. On choosing the **Raytracing** option as the display mode, you are prompted to select the scene and modify the render scene setting, if required. Then Autodesk Revit Building displays the **Video Compression** dialog box that enables you to select a video compressor from a list of compressors installed on your computer. When you choose the **OK** button, the dialog box closes and Autodesk Revit Building starts recording the walkthrough. The progress indicator and status bar at the bottom of the screen display the progress of the processes being executed.

The recorded file can now be viewed using any of the media players. The animation can be viewed without opening Autodesk Revit Building.

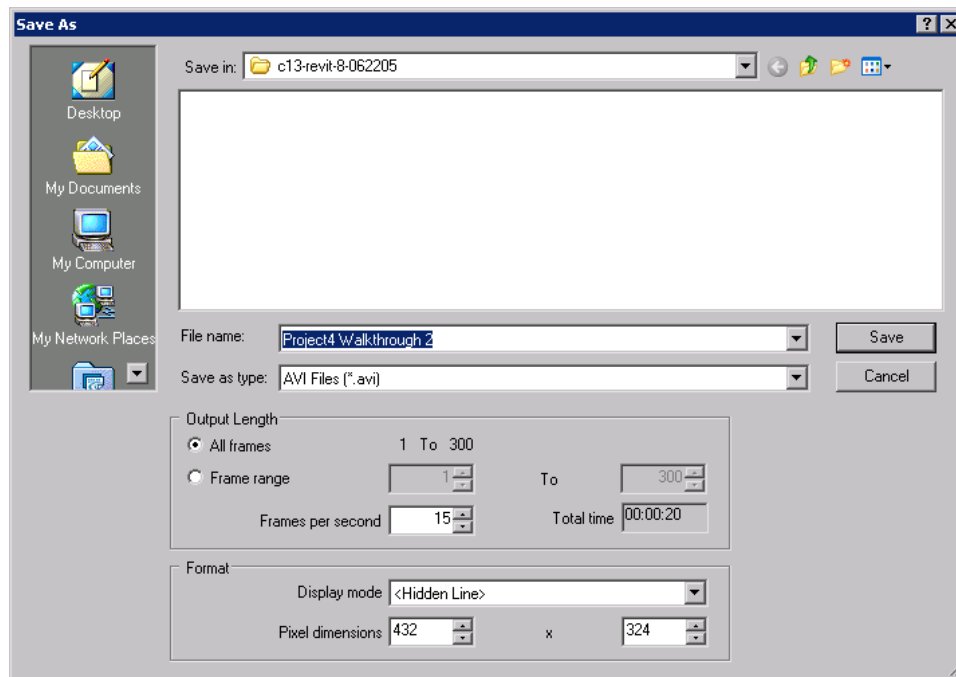


Figure 14-25 The *Save As* dialog box for exporting an AVI file

TUTORIALS

Tutorial 1

Apartment 1

Using the project file created in Tutorial 1 of Chapter 13, render the interior view of the living room for the first floor of the *Apartment 1*, as shown in Figure 14-26. Replace the existing finishes of materials assigned to the floor, wall, ceiling, and chair with the following new materials/textures (given with their path). Also, create a 200-frame interior walkthrough at eye level using the path shown in Figure 14-27. **(Expected time: 45 min)**

1. New material for walls: **_ACCURENDER\Solid Colors\Browns and Tans\Computer Beige,Light,Matte**
2. New material for ceiling: **_ACCURENDER\Solid Colors\Whites\Linen, Matte**
3. New material for floor: **Finish Interior- VCT- Vinyl Composition Tile**
4. New cushion material for **Chair-Corbu**: **_ACCURENDER\Solid Colors\Browns and Tans\Coral,Medium,Matte**

Add lights based on the given parameters and as shown in Figure 14-28 and Figure 14-29. Their exact location is not important for this tutorial.

1. Light Fixtures to be loaded and used from the **Imperial Library > Lighting Fixture** folder:
Table Lamp 1: 100 watt Incandescent
Pendant- Disk: 150 watt Incandescent



Figure 14-26 Rendering the interior view of the living room

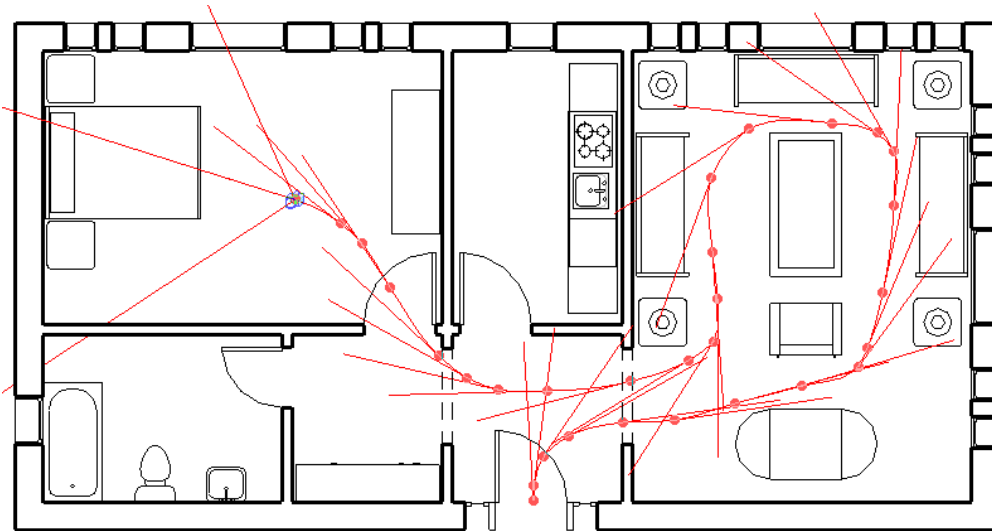


Figure 14-27 Sketch plan showing the walkthrough path for the Apartment 1 project

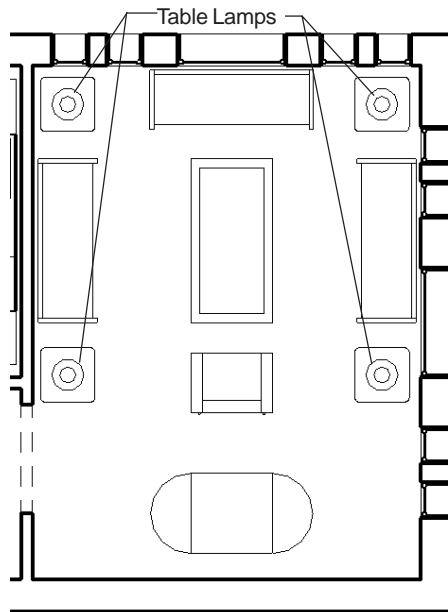


Figure 14-28 Sketch floor plan for adding table lamps to the living room

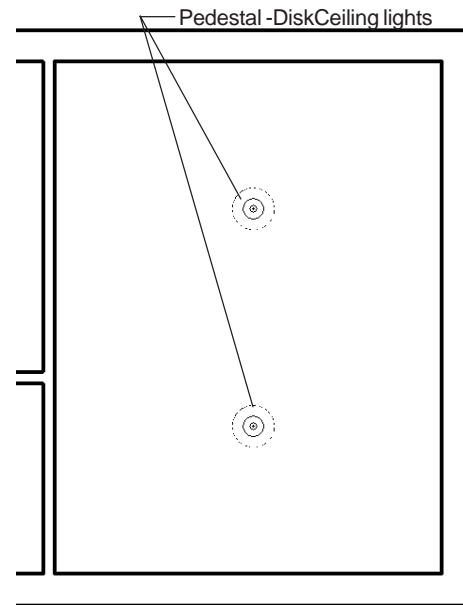


Figure 14-29 Sketch ceiling plan for adding ceiling lights to the living room

The following steps are required to complete this tutorial:

- Open the specified project file and the first floor plan view.
- Use the **Paint** tool to apply materials to the floor.
- Use the material editor to change the finishes of the ceiling and walls and the textile of the chair; refer to Figures 14-30 and 14-31.
- Load lighting fixtures and add them to the floor and ceiling plan, refer to Figures 14-32 through 14-36.
- Set the rendering scene.
- Use the **Radiosity** tool.
- Render the interior view using the **Raytrace** tool, refer to Figure 14-37.
- Specify the walkthrough path and create a walkthrough, refer to Figures 14-38 and 14-39.

Opening the Project File and the First Floor Plan View

- Choose **File > Open** from the menu bar and open the *Apartment 1.rvt* file, created in Tutorial 1 of Chapter 13.
- Double-click on **First Floor** in the **Floor Plans** head of the **Project Browser** to open the corresponding floor plan in the drawing window.

As the dimensions and tags are not required for this tutorial, you can restrain their visibility in this view by using the **Visibility/Graphics** tool.

3. Choose **View > Visibility/Graphics** from the menu bar and clear the check boxes for **Dimensions**, **Furniture Tags**, and **Room Tags** in the **Annotation Categories** tab.

Modifying the Finishes of Materials Using the Paint Tool

Next, you need to modify the finishes of the materials used in the building model. You will use the **Paint** tool to apply the material to the floor in the section view. Although the **Paint** tool can be used to modify the material parameter of the other elements too, you will use the material editor in this tutorial.

1. Double-click on **Section X** from the **Project Browser** to display the section in the drawing window.
2. Choose **Tools > Paint** from the menu bar to invoke the **Paint** tool and then from the **Type Selector Bar** select **Finishes : Interior - VCT - Vinyl Composition Tile**.
3. Move the cursor near the top of the floor in the section view and click when it is highlighted. The selected material is applied to the floor top.

Modifying the Finishes of Materials Using the Material Editor

To modify finishes of other elements, you will use the material editor.

1. Choose the **Modify** tool from the **Basics** tab in the **Design Bar**.
2. Move the cursor over the exterior wall and when it is highlighted, click to select it.
3. Choose the **Properties** button to display the **Element Properties** dialog box and then choose the **Edit/New** button to display the **Type Properties** dialog box.
4. Click the **Edit** button in the **Value** column for the **Structure** parameter to display the **Edit Assembly** dialog box.

The finishes and structure of the selected wall type are displayed in the **Layers** table and are arranged with the exterior finish as the first and the interior finish as the last layer, as shown in Figure 14-30. Because the material properties of the interior finish needs to be modified, you will modify the last layer (**Finish 2 [5]**).

5. Click in the **Material** column for the **Finish 2 [5]** layer and then the arrow button to display the **Materials** dialog box.
6. Click on the arrow button for the **AccuRender Texture** parameter. This displays the **Material Library** dialog box.
7. Navigate to the **_ACCURENDER\Solid Colors\Browns and Tans** folder to display the list of material textures in the **Name** list.
8. Select **Computer Beige,Light,Matte** from the **Name** list. The color and texture of the selected material is displayed in the large pane on the right of the **Name** list.

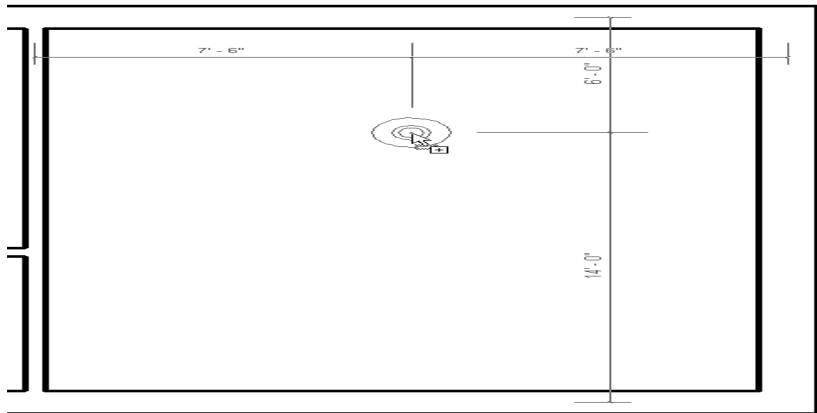


Figure 14-30 The *Layers* table in the *Edit Assembly* dialog box for the exterior wall type

9. Click inside the small pane to add the selected texture to the library.
10. Similarly, select and add the textures, **Coral,Medium,Matt** from the **_ACCURENDER\Solid Colors\Browns and Tans** and **Linen,Matte** from the **_ACCURENDER\Solid Colors\Whites** folder to the library. The **Material** dialog box will appear similar to the illustration shown in Figure 14-31.

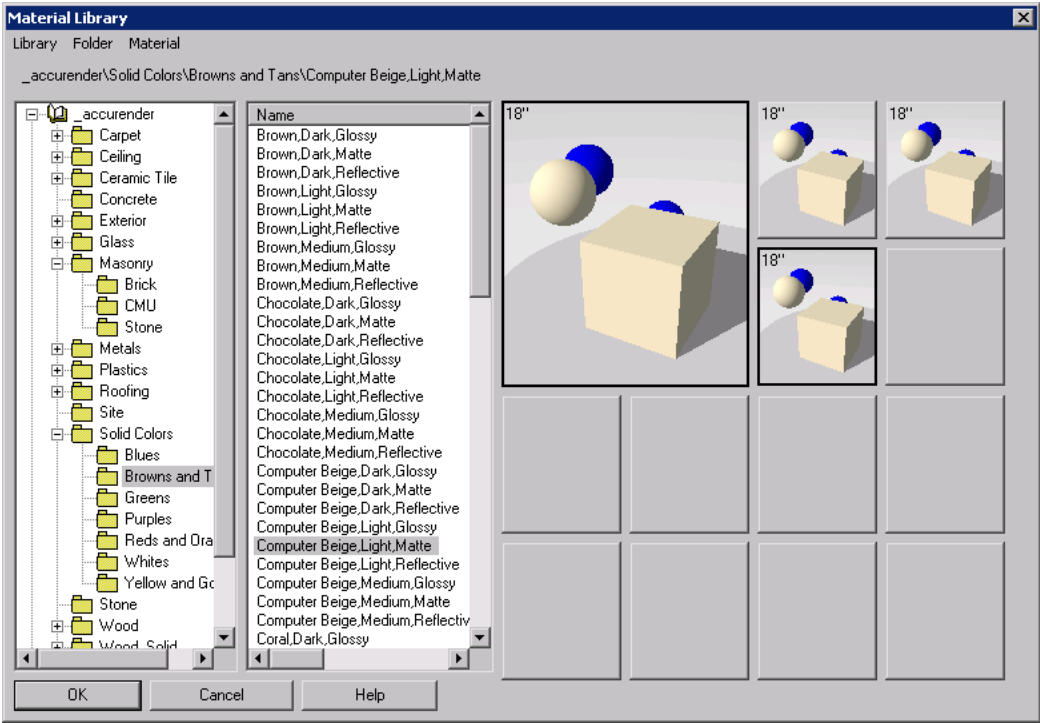


Figure 14-31 The added materials in the *Material Library* dialog box

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11. Click in the first small pane to select the first added texture **Computer Beige,Light,Matte** and choose the **OK** button to return to the **Materials** dialog box. Return to the drawing window by choosing the **OK** button for all the opened dialog boxes.

This applies the selected texture to the **Finishes - Interior - Gypsum Wall Board** material. As the interior walls also use the same material, their texture is also modified. The ceiling also uses the gypsum wall board material and to modify its texture, you can create a copy of the material and then modify its texture.

12. Open the first floor ceiling plan and select the false ceiling of all the rooms using the filter tool. Choose the **Properties** button.
13. Navigate to the **Edit Assembly** dialog box to display the layers of the false ceiling.
14. Click in the **Material** column for the **Finish 2 [5]** layer to display the **Materials** dialog box. The **Finishes - Interior - Gypsum Wall Board** is the selected material.
15. Choose the **Duplicate** button and enter the name **Finishes - Interior - Gypsum Wall Board - Ceiling** in the **Name** dialog box. Choose the **OK** button to close the dialog box. The copied material is added in the material name list.
16. Click on the down-arrow button for the **AccuRender Texture** parameter to display the **Material Library** dialog box showing the selected textures.
17. Click inside the small pane showing the **Linen,Matte** texture and choose the **OK** button. Return to the drawing window by clicking **OK** four times.

Next, you need to modify the texture of the chair textile. You can open the first floor plan view to select the chair.

18. Open the first floor plan view in the drawing window using the **Project Browser**.
19. Select the **Chair : Corbu** in the living room and navigate to the **Type Properties** dialog box.
20. Click in the **Value** column for the **Cushion Material** type parameter to display the **Materials** dialog box.
21. Create a copy of the **Textile - Black Material** using the **Duplicate** button and name it **Textile - Coral**.
22. Click on the down-arrow button for the **AccuRender Texture** parameter to display the **Material Library** dialog box showing the selected textures.
23. Click inside the small pane showing the **Coral,Medium,Matte** texture and choose the **OK** button to return to the **Materials** dialog box. Return to the drawing window.

This applies the coral texture to the cushion material.

Loading and Adding Light Fixtures to the Building Model

Next, you will load the specified light fixtures and add them to the floor and ceiling plan

1. From the **Basics** tab of the **Design Bar**, invoke the **Component** tool.
2. Choose the **Load** button from the **Options Bar** to display the **Open** dialog box.
3. Navigate to the **Imperial Library > Lighting Fixtures** folder and load **Table Lamp 1** and **Pendant- Disk** fixtures using the CTRL key.
4. From the **Type Selector Bar**, select the **Table Lamp 1: 100 watt Incandescent** fixture.
5. Move the cursor near the center of the side tables in the living room and click when the midpoint object snap is displayed, as shown in Figure 14-32.
6. Select the added table lamp and choose the **Properties** button to display the **Element Properties** dialog box.
7. Enter the value **1'3"** in the **Value** column for the **Offset** instance parameter and choose the **OK** button to close the dialog box.
8. Use the **Copy** tool with the **Multiple** option to copy the added lamp to the other three side tables, as shown in Figure 14-33.

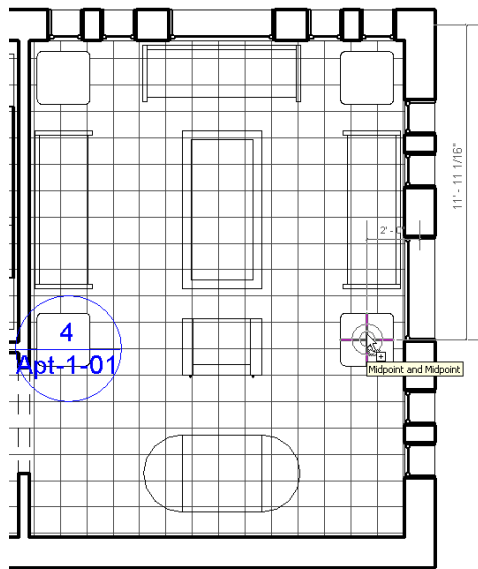


Figure 14-32 Adding lamp to the side table

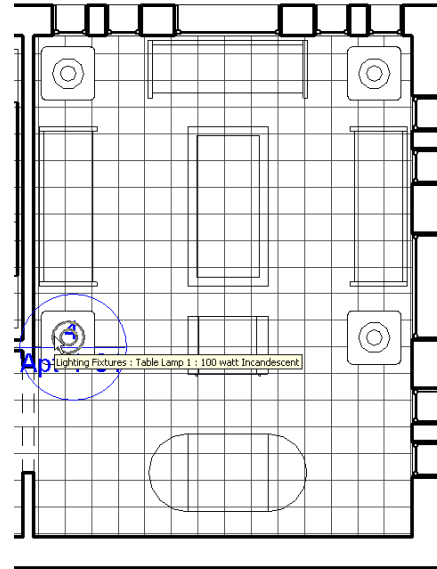


Figure 14-33 Creating multiple copies of the table lamp component

9. Double-click on **First Floor** under the **Ceiling Plans** head in the **Project Browser** to display the ceiling plan view.

10. Invoke the **Component** tool again and from the **Type Selector Bar**, select the **Pendant- Disk: 150 watt Incandescent** fixture.
11. Move the cursor over the sitting area in the living room and click to add the light fixture at the approximate location, as shown in Figure 14-34.

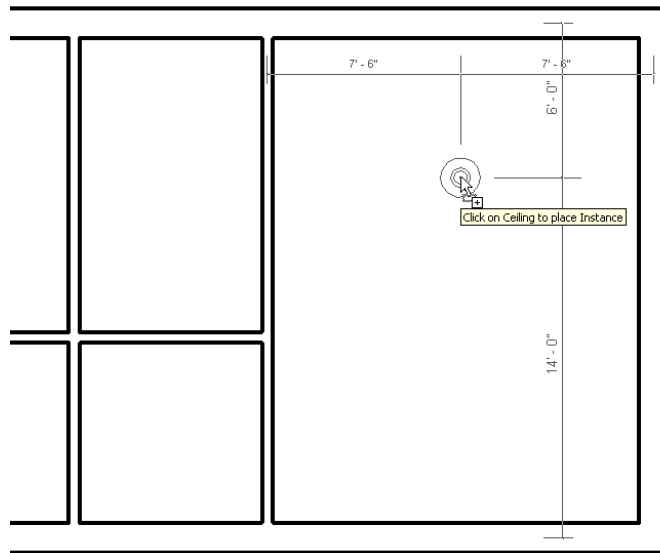


Figure 14-34 Adding the first light fixture in the ceiling plan

12. Similarly, add the same fixture to the other side of the living room, as shown in Figure 14-35.

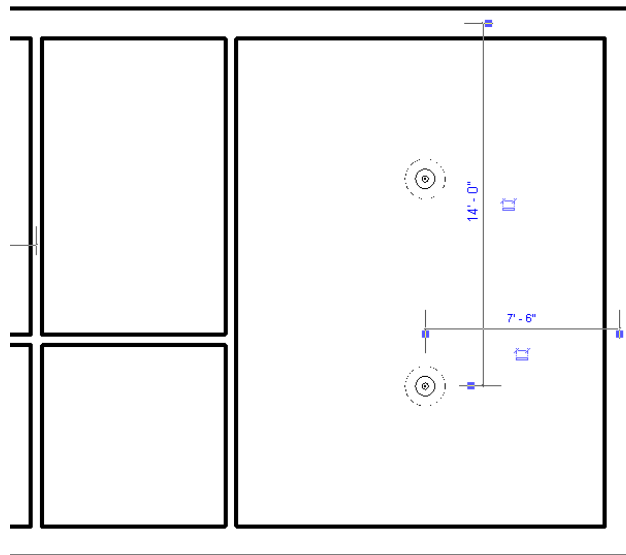


Figure 14-35 Adding the second light fixture in the ceiling plan

Double-click on **Living Room** under the **3D Views** head in the **Project Browser** to view the 3D view with the added light fixtures and entourage elements, as shown in Figure 14-36.

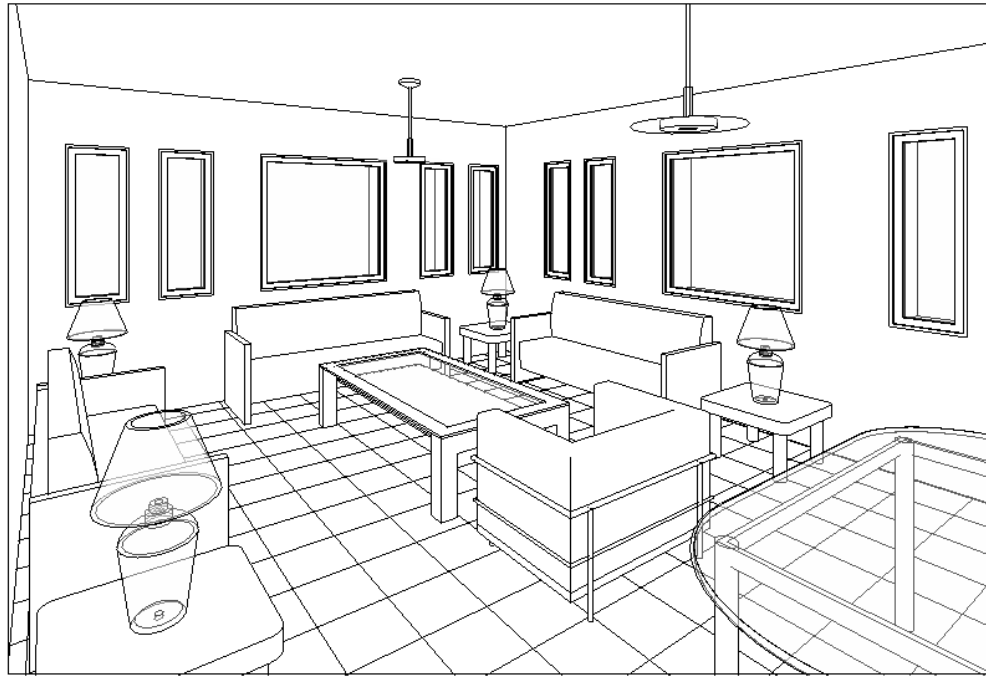


Figure 14-36 The interior 3D view of the living room with the added light fixtures

Setting Up the Interior Rendering Scene

You will now provide the information required to set up the rendering scene.

1. Choose **Settings** from the **Rendering** tab in the **Design Bar**.
2. In the **Scene Selection** dialog box, enter the name **Living room interior view** in the **Name** edit box.
3. Select the **Interior** radio button in the **Type** section and choose the **OK** button.
4. In the **Render Scene Settings** dialog box, choose the **OK** button.
5. Choose **Settings > Sun and Shadows Settings** from the menu bar to display the **Sun and Shadows Settings** dialog box
6. Select the **By Date, Time and Place** radio button.
7. Click on the arrow key for the **Place** parameter.

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8. In the **Manage Place and Locations** dialog box, select **Chicago,IL,USA** from the **City** drop-down list and choose the **OK** button.
9. In the **Date** edit box, set the date to **3/ 1/2005**.
10. In the **Time** edit box, set the time to **11:00:00 AM**.
11. Clear the **Ground Plane** check box.
12. Choose the **OK** button in the **Sun and Shadows Setting** dialog box.

Defining Daylighting

The exterior windows can be selected as additional light sources to illuminate the interior view.

1. Under the **Floor Plans** head in the **Project Browser**, double-click on **First Floor** to display the first floor plan view.
2. In the **Rendering** tab, choose the **Daylights** tool.
3. Select the exterior windows one by one in the first floor plan to define the transparent elements through which light can enter the interior spaces.

Using the Radiosity Tool

The **Radiosity** tool can be used to distribute the illumination from various light sources throughout the interior view.

1. Under the **3D Views** head in the **Project Browser**, double-click on **Living Room** to display the living room 3D view.
2. From the **Rendering** tab, choose the **Radiate** tool. The **Radiosity Information** dialog box is displayed informing you about the use of the **Radiosity** feature.
3. In the **Radiosity Information** dialog box, choose the **OK** button to start the radiosity process.

Autodesk Revit Building starts the radiosity solution for the view. The process may take a few minutes, depending on the system configuration. The **Status Bar** and **Options Bar** displays the progress of the process. When the process is completed, the radiosity view is displayed.

Rendering the Interior View Using the Raytrace Tool

The interior view can now be rendered using the **Raytrace** tool.

1. In the **Rendering** tab, choose the **Raytrace** tool. The **Options Bar** displays the options that can be specified for the raytracing process.
2. In the **Options Bar**, from the **Resolution** drop-down list, select **Medium (150dpi)**.
3. In the **Options Bar**, click on the **GO** button to start the raytracing process.

Autodesk Revit Building starts the raytracing process for the interior view. The **Status Bar** and the **Progress Monitor** displays the progress of the process. When the process is completed, the rendered image is displayed in the drawing window, as shown in Figure 14-37.



*Figure 14-37 The interior 3D view of the living room rendered using the **Raytrace** tool*

4. In the **Rendering** tab, choose the **Capture Rendering** option to add the rendered image to the project file. The image is added as **3D View 1**, under the **Renderings** head in the **Project Browser**.
5. Right-click on the name **3D View 1** under the **Renderings** head and rename it to **Living Room**.

Generating the Walkthrough

The **Walkthrough** tool is used to generate a walkthrough. You will specify the walkthrough path in the floor plan view.

1. In the **Project Browser**, under the **Floor Plans** head, double-click on **First Floor**.
2. In the **Design Bar**, open the **View** tab and choose **Walkthrough**. The **Options Bar** shows the options related to creating a walkthrough path. The cursor changes into a pencil, prompting you to sketch the walkthrough path.
3. Start sketching the walkthrough path by clicking at the first point near the center of the main entrance door of the apartment. Ensure that the first point specified is inside the lobby area and not outside the entrance door. Move the cursor toward the living room and click to specify multiple points in such a manner that they form a counterclockwise loop around the center table in the living room.



Note

The dots indicate the specified points and have been shown only as an illustration. They are not displayed when the walkthrough path is being specified.

4. Similarly, move the cursor across the lobby and inside the bed room and click to specify multiple points of the walkthrough path, as shown in Figure 14-38. The exact location of these points is not critical.

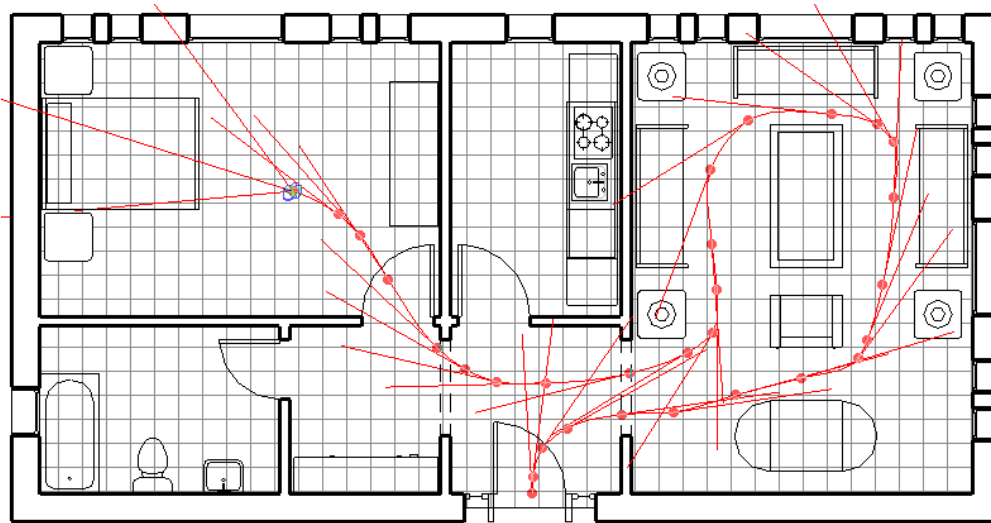


Figure 14-38 Sketch plan showing the walkthrough path for the Apartment 1 project

5. After specifying the last point, choose the **Finish** button from the **Options Bar** to complete the walkthrough path.

The generated walkthrough is added in the **Project Browser** as **Walkthrough 1** under the new **Walkthroughs** head. You can now modify the total frames for the walkthrough using the **Edit Walkthrough** button.

6. In the **Options Bar**, choose the **Edit Walkthrough** button.
7. Click on the **Frame Setting** button displayed as **300** as the total frames.
8. In the **Walkthrough Frames** dialog box, enter the value **200** in the **Total Frames** dialog box and choose the **OK** button. This modifies the total number of frames in the walkthrough from 300 to 200, as specified for this tutorial.

Recording the Walkthrough

The walkthrough is recorded by exporting it using the **AVI** tool. You first need to open the walkthrough and adjust the field of view of the camera.

1. In the **Options Bar**, enter **1** as the value in the **Active Frame** edit box and choose the **Open** button. The first frame is opened in the drawing window.
2. Right-click inside the drawing window and choose **Zoom Out (2X)** from the shortcut menu.
3. Drag the extents of the rectangle to modify the field of view for the camera such that the view resembles the illustration shown in Figure 14-39.
4. Right-click again and choose **Zoom To Fit** to enlarge the view.
5. Choose **File > Export > AVI** from the menu bar.
6. In the **Save As** dialog box, specify an appropriate path and a file name for the rendered walkthrough file.
7. In the **Display mode** drop-down list, select **AccuRender**.
8. Choose the **Save** button.
9. The **Scene Selection** dialog box shows the **Living room interior view** as the selected scene. Choose the **OK** button.
10. In the **Render Scene Settings** dialog box, choose the **OK** button.
11. In the **Video Compression** dialog box, choose the **OK** button.

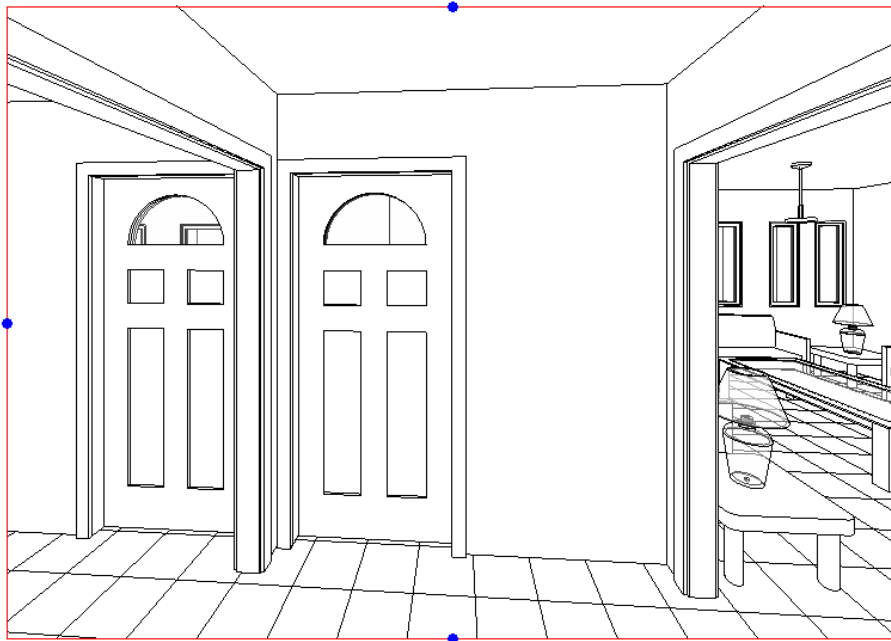


Figure 14-39 First frame of the walkthrough with the modified field of view

This starts the rendering and recording process for each frame of the walkthrough. The progress of this process is displayed in the **Status Bar**. When the procedure is completed, the file is recorded at the specified location. You can then use any of the media players to view the walkthrough file.

12. Choose **File > Save** from the menu bar to save the project file.
13. Choose **File > Close** from the menu bar to close the project file.

This completes the tutorial for rendering the interior view and generating a walkthrough for the Apartment 1 project.

Tutorial 2**Office Building 2**

Render the exterior view of the *Office Building 2* project using the file created in Exercise 3 of Chapter 13. Replace the existing finishes of materials assigned to the exterior walls with the following new materials/textures (given with their path) and add trees to the project based on the first floor plan view shown in Figure 14-40. Render the 3D view 1 based on the rendered view shown in Figure 14-41 (note that the stairs and railings shown in the figure are not part of the project) **(Expected time: 30 min)**

1. New material for the exterior wall finish: **AR2_ACCUREND\cmu,ceramic faced,rust**
2. Trees to be loaded and used from **Imperial Library\Planting\Tree - Deciduous : Acer Rubrum 30'**.
3. Background image for rendering: **Revit 7.0 > Rendering > AccuRender Redist > SUPPORT > background\NSKY02B.jpg**
4. Ground plane material: **_ACCURENDER\Site\Brick Paver, Herringbone, Siena.**

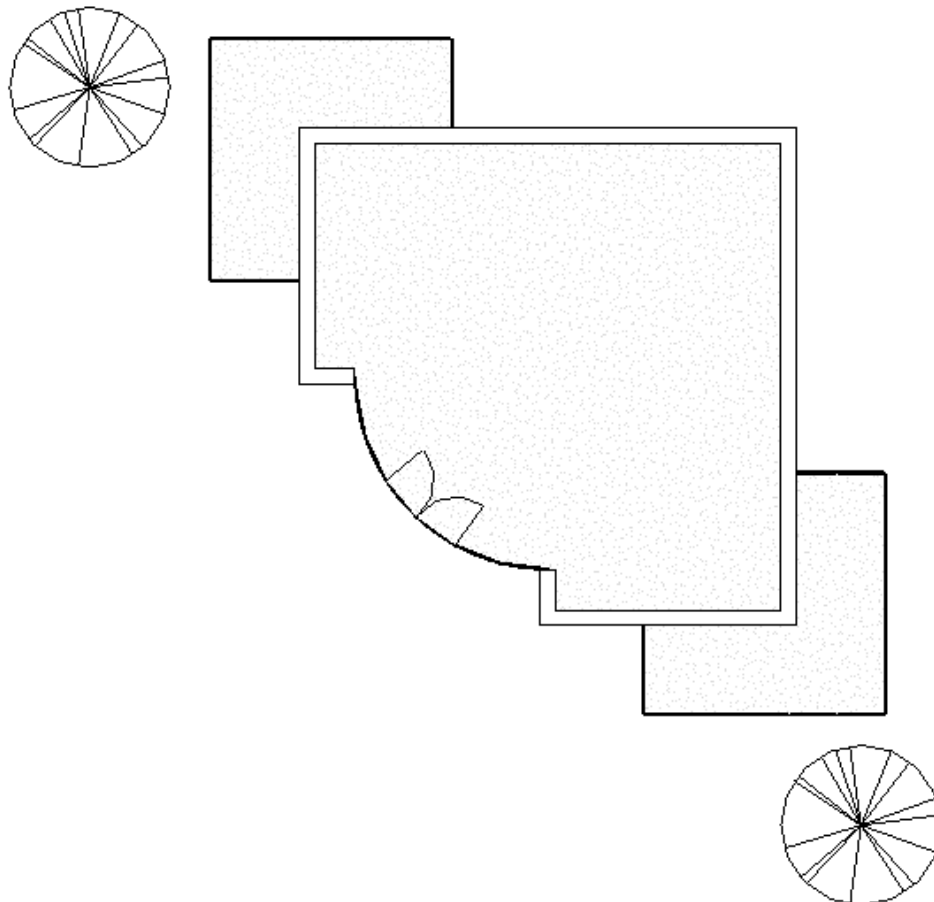


Figure 14-40 Sketch plan for adding trees to the Office building 2 project

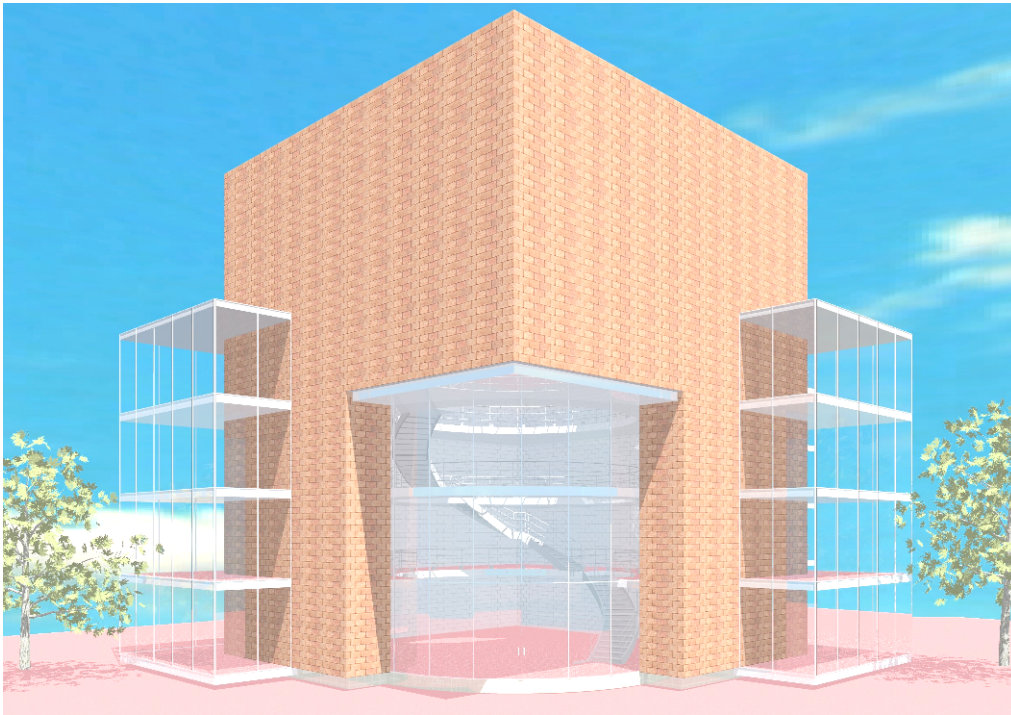


Figure 14-41 Rendered exterior view for exercise Office Building 2 project

The following steps are required to complete this tutorial:

- a. Open the specified project file and the first floor plan view.
- b. Use the **Paint** tool to apply materials to the exterior walls.
- c. Add trees to the exterior view.
- d. Set up the rendering scene and its environment parameters.
- e. Render the view using the **Raytrace** tool.

Opening the Project File and the First Floor Plan View

1. Choose **File > Open** from the menu bar and open the *Office-2.rvt* file, created in Exercise 3 of Chapter 13.
2. Double-click on **First Floor** in the **Floor Plans** head of the **Project Browser** to open the corresponding floor plan in the drawing window.

Modifying the Finishes of the Exterior Wall Using the Paint Tool

You will first create a new material and then use the **Paint** tool to apply it over the exterior walls.

1. Choose **Settings > Materials** from the menu bar.

2. In the **Materials** dialog box, select the **Finishes- Exterior- Metal Panel** and choose the **Duplicate** button.
3. In the **New Material** dialog box, enter the name of the new material as **Finishes - Exterior - Cladding** and choose the **OK** button.
4. Click on the down-arrow button for the **AccuRender Texture** parameter to display the **Material Library** dialog box.
5. Click on **AR2_ACCUREND** to display the textures in the folder in the **Name** list.
6. From the **Name** list, select **cmu, ceramic faced, rust** and choose the **OK** button.
7. In the **Materials** dialog box, choose the **OK** button.

You can now use the **Paint** tool to apply the created texture to the exterior walls.

8. Use the **Zoom In Region** tool to enlarge the main building in the first floor plan.
9. Choose **Tools > Paint** from the menu bar to invoke the **Paint** tool.
10. From the **Type Selector Bar** select **Finish: Exterior Cladding**.
11. Move the cursor over the exterior face of the wall and when it is highlighted, click to apply the material. This results in the selected material being applied to the exterior surface of the wall.
12. Apply the selected texture to the exterior faces of the other three walls, visible in the plan view.

You may open the 3D view and then choose **View > Shading with Edges** to graphically view the modified exterior finish. Return to the plan view.

Adding Trees to the Exterior View

You will use the **Component** tool to load and add the specified planting elements to the building model. The specified trees can be added at the location given in the sketch plan.

1. From the **Basics** tab of the **Design Bar**, invoke the **Component** tool.
2. Choose the **Load** button from the **Options Bar** to display the **Open** dialog box.
3. Navigate to the **Imperial Library > Planting** folder and load **Tree - Deciduous**.
4. From the **Type Selector Bar**, select **Tree - Deciduous : Acer Rubrum 30'**.
5. Move the cursor near the location shown in the sketch plan for the tutorial and click to add the planting element.

6. Similarly, click again at the diagonally opposite corner of the office building to add another instance of the planting element, based on the given sketch plan.

Setting Up the Exterior Rendering Scene

You will now provide the information required to set up the rendering scene. You need to open the 3D view to make the rendering tools available in the **Design Bar**.

1. Open the exterior **3D View 1** in the drawing window using the **Project Browser**.
2. Choose **Settings** from the **Rendering** tab in the **Design Bar**.
3. In the **Scene Selection** dialog box, enter the name **Exterior view** in the **Name** dialog box.
4. Select the **Exterior** radio button in the **Type** section and choose the **OK** button.
5. In the **Render Scene Settings** dialog box, choose the **Environment** button.
6. In the **Environment** dialog box, select the check box for **Background Image**.
7. In the **Select Bitmap** dialog box, navigate to the **Revit 7.0 > Rendering > AccuRender Redist > SUPPORT > background** folder, select the bitmap file **NSKY02B.jpg**, and choose the **Open** button.
8. In the **Background Image** tab, select **Cylindrical** from the drop-down list for the **Projection** parameter.
9. In the **Main** tab of the **Environment** dialog box, select the **Ground Plane** check box.
10. In the **Ground Plane** tab of the **Environment** dialog box, choose the **Material** button. Navigate to the **_ACCURENDER\Site** folder and select the material **Brick Paver, Herringbone, Siena**. Choose the **OK** button to return to the **Environment** dialog box.
11. Choose the **OK** button in the opened dialog boxes to return to the drawing window.
12. Choose the **Settings > Sun and Shadows Settings** from the menu bar.
13. In the **Sun and Shadows Settings** dialog box, ensure that the **Directly** radio button is selected.
14. In the **Azimuth** edit box, enter the value **-135**.
15. In the **Altitude** edit box, enter the value **60** and choose the **OK** button to return to the drawing window.

Rendering the Exterior View

The exterior view can now be rendered using the **Raytrace** tool.

1. In the **Rendering** tab, choose the **Raytrace** tool.

The **Options Bar** displays the options that can be used for the raytracing process.

2. In the **Options Bar**, click on the **Resolution** drop-down list and select **Presentation (300 dpi)**.
3. In the **Options Bar**, click on the **GO** button to start the raytracing process.

Autodesk Revit Building starts the raytracing process for the interior view. The **Status Bar** and the progress monitor displays the progress of the process. When the process is complete, the rendered image is displayed in the drawing window, as shown in Figure 14-41.

6. In the **Rendering** tab, choose **Capture Rendering** to add the rendered image to the project file. The image is added as **3D View 1** under the **Renderings** head.
7. Right-click on the name **3D View 1** under the **Renderings** head and rename it to **Exterior View 1**.

This completes the tutorial of rendering the exterior view of the Office Building- 2 project.

8. Choose **File > Save** from the menu bar to save the project file.
9. Choose **File > Close** from the menu bar to close the project file.

Self-Evaluation Test

Answer the following questions and then compare your answers with those given at the end of the chapter.

1. You can save a rendered scene setting and use it for rendering other views in the project. (T/F)
2. When you select the **Interior** option in the **Scene Selection** dialog box, Autodesk Revit Building disables the natural lighting effects. (T/F)
3. The **Automatic Sky** option uses the time of the day and the season to determine the background color. (T/F)
4. You cannot modify the predefined materials in the material library. (T/F)
5. While generating a walkthrough, the height of the camera cannot be modified. (T/F)

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6. Using the _____ parameter, you can map the background image to a flat or a curved shape.
7. The _____ tool is used to render only a portion of the 3D view.
8. The _____ tool illuminates the building model by distributing light from the light sources on the element surfaces.
9. The _____ option provides an infinite horizontal base plane for a building model.
10. By choosing the _____ option, you can add keyframes to the created path.

Review Questions

Answer the following questions.

1. The radiosity feature of Autodesk Revit Building is more suitable for rendering interior views.
(T/F)
2. Each Autodesk Revit Building building element has a predefined material associated with it.
(T/F)
3. The **Decal** tool is used to add 3D text to a plane. (T/F)
4. While generating a walkthrough, Autodesk Revit Building automatically generates intermediate frames between the specified keyframes. (T/F)
5. You can vary the speed of the camera while creating a walkthrough. (T/F)
6. You can create a new material using the tool provided in Autodesk Revit Building. (T/F)
7. On choosing the **Clouds** option, you cannot vary the number of clouds in a background. (T/F)
8. Which of the following parameters controls the light output of a lighting fixture?

a) Lumen	b) Wattage
c) Light fixture height	d) Assembly Code
9. Which of the following environment setting options enables Autodesk Revit Building to automatically generate the sky color, based on the date, times and location specified?

a) Background Image	b) Automatic Sky
c) Alpha Channel	d) Ground Plane

10. Which of the following parameters affects the speed of a walkthrough?

- a) Offset
- b) Indicators
- c) Frames per second
- d) Total Time

Exercises

Exercise 1

Club

Using the *Club.rvt* project file created in Tutorial 2 of Chapter 13, render the entrance view, as shown in Figure 14-42. Assume all the information required for this exercise.

(Expected time: 30 min)

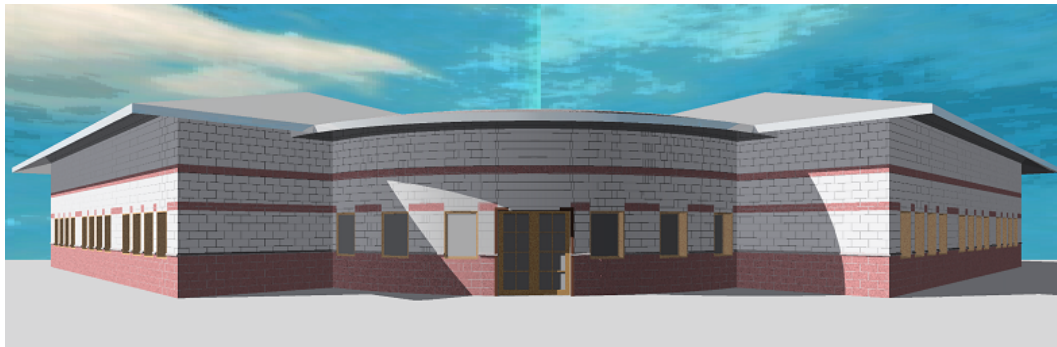


Figure 14-42 Rendered exterior view of the Club project

Exercise 2

Apartment 1 - Night View

Using the project file created in Tutorial 1 of this chapter, render the night time living room 3D view, as shown in Figure 14-43. You need to modify the time settings to 10 pm.

(Expected time: 30 min)



Figure 14-43 Rendered night-time interior view of the living room

Answers to Self-Evaluation Test

1. T, 2. T, 3. T, 4. F, 5. F, 6. Projection, 7. Region Raytrace, 8. Radiosity, 9. Ground Plane, 10. Add Key Frames