UNIVERZITET U BEOGRADU

ARHITEKTONSKI FAKULTET

BULEVAR KRALJA ALEKSANDRA 73/II, BEOGRAD

Arhitektonski fakultet Univerzitet u Beogradu
Zimski semestar 2013/2014
Kurs // Integrisano modeliranje arhitektonskih objekata 01 - REVIT //
Zadatak // Modeliranje projekta SP1 //
Rukovodilac predmeta // Doc. Marijana Devetakovic //
Student // Uros Vukovic 29_2011 //

CONTENTS

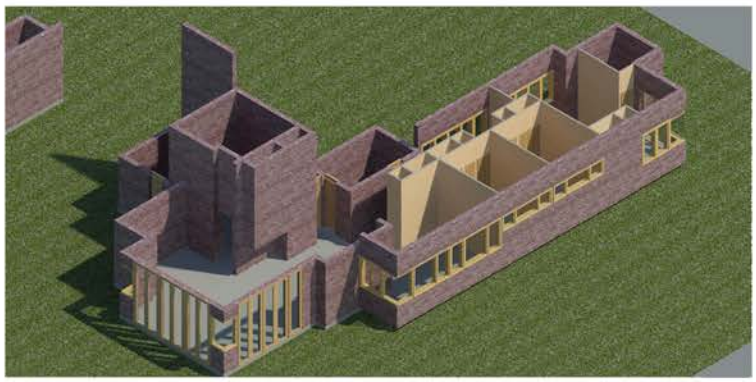
Modeling Exterior and Interior Walls

Many designers begin the building modeling process by creating elements that represent the exterior and interior walls of the proposed building.

In Autodesk® Revit® software, you create walls by using the Wall tool to sketch lines that indicate where walls should be placed. As you sketch these lines, 3D wall elements are created in the model and appear in other model views.

The characteristics of the walls created are determined by the properties of the wall type that you have selected. You can specify the materials and structure of the walls being placed, as well as wall height and many other physical properties.

As you place or reposition walls in the building model, Revit software automatically joins the walls that intersect.

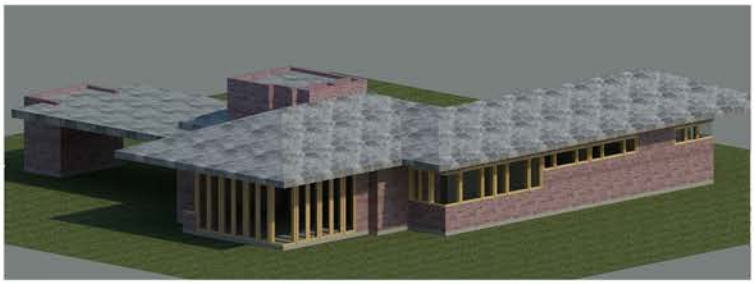


Adding Doors and Windows

After placing exterior and interior walls, a common next step for many designers is to add doors and windows to the model. Doors are typically placed on the exterior walls to facilitate access and egress from the building as well as on the interior walls to enable circulation between the rooms. In Revit software, doors are hosted by wall elements. You create a door by using the Door tool to choose a door component and then place it in a wall that has already been modeled.

Windows are typically placed on exterior walls of a building to provide ventilation, daylighting, and emergency egress. In Revit software, windows are also hosted by wall elements. So the pattern for procedure for placing window components is similar to doors. You use the Window tool to choose a window component and then place it in a wall element.

The characteristics of the doors and windows placed are determined by the properties of the door and windows types that you have selected. You can specify the features, sizes, and materials by selecting different types as you place them. You can also easily change the properties of a door or window by selecting it and choosing a new type.



Creating Floors and Roofs

Most buildings also include a floor underfoot and a roof overhead. So to complete the complete the building model, designers will add these elements.

The shape of many roofs is determined by the location of the walls that support it. For these roofs, a simple strategy for designing the roof is to trace the boundary of the exterior walls (which is also called the footprint), and then specify which edges of the roof will be sloped. The shape of the roof is then determined by the intersections between the sloping roof planes.

In Revit software, the Roof by Footprint tool enables you to use that simple strategy, sketching lines or picking walls that indicate the boundaries of the roof and specifying which edges should create sloped roof planes. The characteristics of the roof created—including the materials and structure, as well as the slope—are determined by the properties of the roof type that you have selected.

The steps for creating floor elements in Revit is very similar to creating roofs. You open the Floor tool and then sketch lines or pick walls to indicate the boundaries of the floor. The primary difference is that most floors are not sloped (although they can be if that is appropriate for the model). The materials and structure of a floor are determined by choosing the floor type.

Modeling Walls Types, Structures, and Design Features

All walls placed in a building model have a wall type associated with them. The wall type includes a definition of the layers and materials that determine the thickness of the wall, so choosing the correct type for every wall is very important for creating accurate building models.
As you place new walls in your model, Autodesk® Revit® software automatically chooses the same type as the last wall created. You can accept this type or choose a different wall type using the Type Selector. You can also change the wall type after walls have been placed, but it is typically more efficient and better practice to choose the proper wall type as you place new walls.
You can create new wall types to model materials and wall assemblies that are needed for your design. And you can specify settings that determine the height of the top and bottom of the wall in the Properties palette.

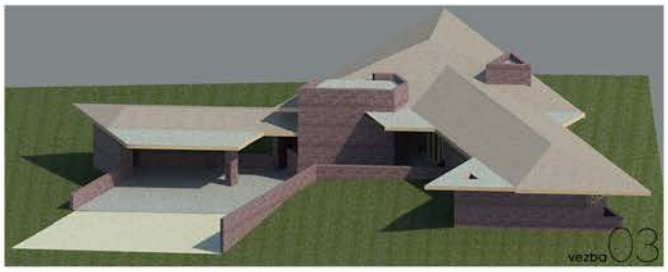
Placing Doors, Windows, and Wall Openings

In Revit, doors, windows, and wall openings are modeled as components that are hosted by walls. You place these elements by opening the Door tool, Window tool, or Wall Opening tool, and then placing the component in a wall that has already been modeled.
While they are similar in many ways, the specific pieces contained in each type of component differ slightly because they include unique parts needed to perform their architectural functions:

- Door components cut an opening in a wall, which is filled by a door frame and one or more swinging, sliding, or folding door panels. Many door types also include interior and exterior trim.
- Window components cut an opening in a wall, which is filled by a window frame and one or more swinging or sliding sash panels. Many window types also include interior and exterior trim.
- Wall openings cut an opening in a wall, but include no panels or other parts to fill the openings. Wall opening components are also available in the Revit Library to create non-rectangular shapes, and some components include trim.

You can change the sizes of doors and windows by choosing different types in the Type Selector or duplicating an existing type and changing its dimension properties to create a new size.
Doors and windows can be placed individually, or you can use arrays to quickly place many components using an even spacing. All of the elements in the array will be identical to the first and be spaced evenly along the length of the array.
After placing a door, window, or opening, you can adjust its:

- Horizontal placement—by dragging the element along the wall or adjusting the temporary dimensions to precisely place it.
- Vertical placement—by adjusting the Header or Sill height properties.
- Orientation—by selecting the element and clicking its control arrows to flip the exterior and interior sides.
- Hinge side (for doors only) and swing—by selecting the element and clicking its control arrows to change the location of the hinge and the direction that the panels swing.



Creating Roof with Different Shapes and Slopes

The Roof by Footprint tool in Revit enables you to create roofs with many different shapes and forms by sketching or picking the roof boundary and specifying which edges of the roof should create sloping roof planes. Using this tool, you can create model the common roof shapes typical of most architectural styles, for example

- Hip roofs—all roofs edges are slope-defining.
- Gable roofs—some roof edges are not slope-defining, and gable end walls appear at these edges.
- Shed roofs—one roof edge is slope-defining.
- Flat roofs—no roof edges are slope-defining.

You can also build up more complex roof shapes by creating several independent roof elements to model gambrel roofs, mansard roofs, clerestory roofs, and dormer roofs. Where the edge of one roof intersects the face of another roof, you can join them to automatically determine the geometry of the intersection.
Revit also provides a Roof by Extrusion tool that enables you to create roof surfaces by extruding a surface from a sketched roof profile. This tool provides great flexibility for creating roofs that cannot be defined using simple sloped planes, for example a curving roof or barrel vault.

Curtain Wall Elements

Curtain walls provide separation between spaces, but typically do not support structural loads. They are often used to create very sleek, modern exterior skins for buildings or to separate interior spaces where high visibility is desired (for example, between a lobby and a conference room). Curtain walls are composed of:

- Panels—often made of glass, but a wide variety of materials can be used
- Grids—horizontal and vertical divisions that subdivide the wall
- Mullions—members that frame the panels and provide support for the weight of the panels as well as resistance to wind and other lateral loads

Designing Curtain Grid Patterns

Curtain walls are created using Autodesk® Revit® software's Wall tool and placed using the same techniques as other wall types. The key difference is that you must choose one of the special curtain wall types (which are listed after the basic wall types) from the Type Selector in the Properties palette.

When creating a curtain wall, you can:

- Create a single wall panel that you will manually subdivide by adding grids and mullions to it.
- Use a previously defined curtain wall type that specifies the grid pattern and mullion types as part of the type definition.

Regardless of which method you use to create a curtain wall, you can easily modify (add, remove, or move) grids and change the mullions as desired to accurately model your design.

You specify a curtain wall's horizontal and vertical grid layout (as well as the mullions to be placed at the panel and wall edges) by editing its type and instance properties. You set the pattern for each direction independently, and the layout options include:

- None—creates no grids.
- Fixed number—divides the wall into panels of equal size. The number of panels is set as an instance property each wall.
- Fixed distance—places grids at the fixed distance specified. Smaller panels will be created at the beginning or end of the pattern if the total length to be divided is not an even multiple of the distance specified.
- Maximum spacing—divides the wall into panels of equal size that are as big as possible without exceeding the maximum specified.

Minimum spacing—divides the wall into panels of equal size that are as small as possible but that are no smaller than the minimum specified.

Adjusting Grids and Mullions

You can edit the grid layout of existing curtain walls—adding, removing, or moving entire grids or selected segments—using the Curtain Grid tool.

With the Curtain Grid tool selected, you hover the cursor over the horizontal or vertical edges of a curtain panel, and Revit suggests potential grid locations that would divide it into even increments (for example, halves or thirds). You can also align curtain grids to other elements in your model by snapping to faces, reference planes, or levels.

When adding curtain grids to a wall, you can use placement options to:

- Add grid lines across all segments (the entire face).
- Add grid lines to one segment (a single panel).
- Add grid lines across all segments except ones that you pick to exclude.

Use the Mullion tool to place mullions on any grid line segment, on an entire grid lines, or on all of the curtain wall's grid lines and boundaries.

Creating and Using Curtain Panel Types

When you create a curtain wall using a type-defined layout or add grids using the Curtain Grid tool, Revit subdivides the wall into curtain panels with the same type properties.

By default, curtain panels are set to a type named Glazed, which specifies a transparent glass material. You change a curtain panel's type by selecting it and choosing another type from the Type Selector.

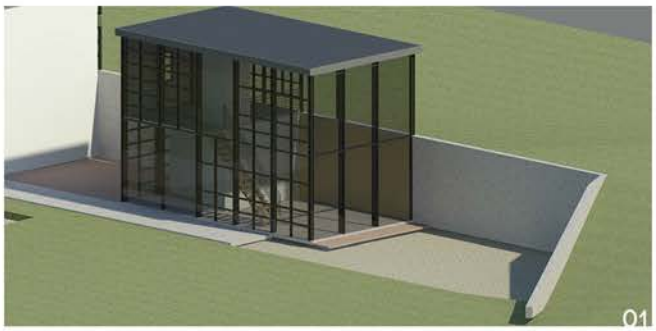
You can also create new curtain panel types to model panels with different properties (for example, different colors, materials, or transparencies) by duplicating an existing type and setting the material properties to create the desired effect.

Placing Doors in Curtain Systems

Curtain wall systems behave like basic walls in many ways, but one key difference is that they cannot host standard door objects.

You add doors to curtain walls in Revit by replacing curtain panel elements (which are typically stationary or fixed) with a special panel type that provides door functionality.

Before replacing a fixed curtain panel with a door panel type, you should adjust the curtain grid lines by adding or removing segments to create a panel with dimensions that match the size of the desired door panel.



Creating Simple Stairs and Ramps

Figure 1.4.1 Stair elements—treads, risers, stringers, and railings

As shown in Figure 1.4.1, stairs are typically composed of many elements, including:

- Treads the the horizontal surfaces that you step on.
- Risers the vertical surfaces between the treads.
- Stringers the supports for the treads and risers, which can be located at the sides of the stair or in the center (underneath the treads and risers).
- Railings on one or both sides of the stair.

Using Autodesk® Revit® software's Stair tool, specify a few key characteristics, and Revit automatically creates a stair with all of these elements.

The simplest way to create a stair is to:

- Specify the essential properties that set the height and length of the stair the levels of the top and bottom of the stair.
- Sketch the run line an imaginary line that specifies the direction and length of each stair section.

Revit automatically calculates the number of risers required to connect the top and bottom levels and reports the number of risers created as you sketch the run line.

Ramps are created in a similar way using the Ramp tool, which also appears in the Circulation panel of the Home tab:

- Specify the top and bottom levels.
- Sketch the run line.

Revit automatically calculates the length of the ramp required using a slope of 1/12 for accessibility, but you can customize this slope as needed.

Modeling Custom Stair Shapes

You can change a stair in many ways to fit your requirements and the space available:

- Use the Move or Rotate tool to reposition or reorient the stair.
- Alter the stair properties (for example, the number of risers, tread length, or stair width) in the Properties palette.
- Edit the sketch that defines the stair's layout to change the boundary shape or the placement and shape of the risers.

You can also sketch curved run lines to create curved or spiral stairs. When creating spiral stairs, keep in mind that a curved stair run is limited to a rotation of 360°. If you need to model a stair with greater rotation, create several segments, then move and join them to create a continuous run.

Modeling Floor and Ceiling Openings and Adding Railings

While the Stairs tool automatically creates all of the stair elements needed to connect between two levels, it does not cut openings in the floors or ceilings that separate those levels. You can create these openings in two ways:

- Use the Edit Boundary tool and adjust the floor or ceiling boundary sketch to include the layout of the opening.
- Place a vertical opening or shaft opening element.

When creating stairs and ramps, Revit automatically adds railings to these circulation elements for safety. You can use the Railings tool to adjust these railings or add new ones in locations where they are needed:

- Around floor openings
- At exposed edges of floors and balconies

Modeling Elevators and Shafts

Modeling an elevator in the Revit software requires several steps:

- Placing an elevator component
- Creating a vertical shaft to cut openings in floors and ceilings
- Adding walls around the elevator shaft
- Cutting openings in the shaft walls for the doors on each floor

If an elevator component is not included into your model, you can load one from an external library.

The Shaft Opening tool is especially useful for modeling elevators because it can cut a vertical opening through many floors, ceilings, and roofs. When you move or modify the boundary of a shaft opening, the changes are automatically updated on every level.

Using Component Families

Autodesk® Revit® software enables you to use and create component families that can be easily modified to help meet the requirements of different projects. It offers great flexibility and to help increase your modeling productivity. You can easily change the parameters defined for existing component and create new types as needed with different dimensions, appearances, visibility, and performance characteristics. By creatively working with the parameters available, you can often adapt a single component family to model a wide variety of elements in your project.

Modeling In-Place Components

You can use the Model In-Place tool to create unique components when a suitable component family does not exist. The Model In-Place tool affords the designer flexibility and creativity in designing and specifying custom, one-of-a-kind components for use within a single project.
Revit software offers five methods to create model geometry:

- Extrusion—pushes or pulls a 2D Sketch Profile along z-axis of Work Plane that the sketch was created in.
- Blend—3D shape extrapolated from two 2D Sketch Profiles, one at bottom and another at top of shape, with blend depth determining transition between top and bottom shapes.
- Revolve—creates 3D shape by revolving a 2D Sketch Profile about specified axis.
- Sweep—drives a 2D Sketch Profile along a planar 2D Sketch Path.
- Swept blend—3D interpolation of two different 2D Sketch Profiles, each on located at opposite ends of a planar 2D Sketch Path.

These five methods can be combined to create almost any geometry required.

Adapting Components to Fit Your Needs

You can adapt existing component families to model objects with similar geometries. This approach is especially effective when components are available that have many common characteristics but are not exactly what you need. Rather than starting from scratch, it is often easier to edit an existing component family and change only the parts that are different.
You can open an existing component family in Revit software's family editor in two ways:

- Open the Revit family file using the Open command in the Revit menu, then choose Family in the submenu.
- Select an existing component placed in your project, then opening the Edit Family tool.

Either method opens the Revit family editor, where you can explore the existing forms (extrusions, blends, revolves, and sweeps) defined in the component and edit their properties as desired to create your component.
Be sure to save the adapted component using a new family with a new filename to avoid accidentally overwriting the existing version.

Creating New Families

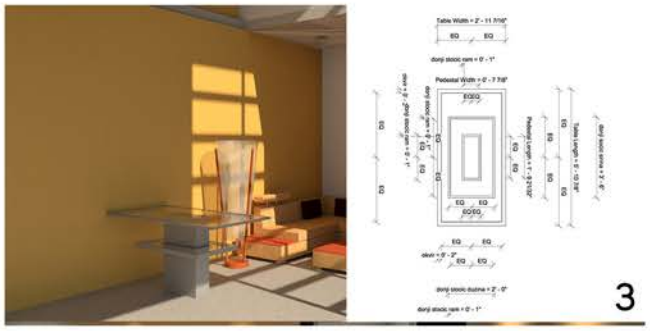
You can also create new component families from scratch to model objects that cannot be easily adapted from an existing component.
You create new components by opening the Revit family file using the New command in the Revit menu, and then choose Family in the submenu. Choose a template from the library that determines the category and hosting conditions for your component, and then define the component using tools in the Revit family editor:

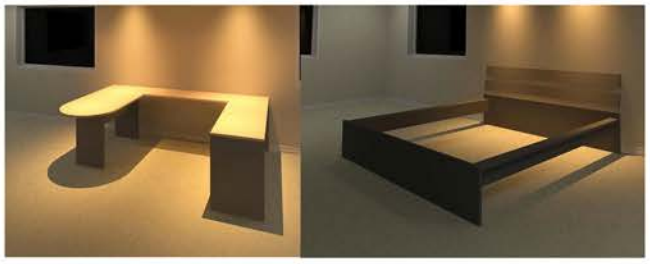
- Reference planes to establish the key boundaries.
- Dimensions and parameters to dynamically set their location.
- Solid and void forms (extrusions, blends, revolves, and sweeps) to define the parts of the components.
- Materials and parameters to dynamically assign them.

As you define new parametric components, plan the critical dimensions that will drive the geometry carefully. Be careful not to over-constrain the forms by locking too many dimensions or adding too many parametric constraints. This is a common pitfall, and Revit will warn you when all the constraints defined cannot be met. When this happens, examine the constraints that have been added carefully, determine which constraints are in conflict, and remove the constraints that are not truly needed.
Well-designed parametric components greatly improve your modeling efficiency, because they enable easy modification and repurposing by simply creating new types and adjusting the type and instance properties. While mastering the skills required to create new parametric component families can be challenging, the time is well invested and yields tremendous returns.


1


2


3



Creating Plan Views and Setting View Properties

When you create a new project, the Revit software automatically creates two types of plan views for each of the levels defined in the project template:

- Floor plans, which look down on a level from a cutting plane above
- Reflected ceiling plans, which look up to a level from a cutting plane below

While this initial set of views is typically sufficient to get started with your modeling, your views can get crowded and confusing as you add more elements and detail to the building model. Rather than trying to view all of the model information in a single view, it is typically a better practice to create many views of your model, each focusing on the types of information needed for a particular aspect of the design process.

You add new plan views by:

- Using the Plan View tool to create a new floor plan, reflected ceiling plan, or area plan for any of the project levels
- Duplicating an existing plan view and adjusting the properties of the new view

Creating additional views and customizing the information displayed does not change the underlying building model. All of the elements are still available in the model (regardless of visibility) and will be affected by changes made in any view.

You can set the properties of any view to precisely control how the elements in your building model will be displayed. You choose these settings by selecting a view in the Project Browser, then adjusting the view properties in the Properties palette.

The view properties vary slightly depending on the type of view, but the options available typically allow you to set:

- View range—the location of cutting plane (the imaginary plane that cuts through your building model to create the 2D view) as well as the depth beyond and in front of the cutting place to display in the view.
- Cropping—the crop region that limits the portion of the model that will be visible. Elements outside of the crop region are hidden in the view.
- Scale—the relationship between the size at which elements appear in printed views and their actual size. The scale also affects relative size of text annotations and dimensions that appear in the view.
- Level of detail—the amount of detail to show for the model elements. This setting ranges from Coarse (which displays simplified representations) to Fine (which displays the full detail).
- Underlay—another level that can be displayed to assist with tracing or aligning elements between levels.

You can use plan regions to adjust the view range settings used for specific areas in a plan view. This is useful when elements are not being displayed, because they are located outside the view range (for example, clerestory windows, which are located high on a wall above the cutting plane of a view) or on slightly offset levels (for example, floors in a split-level house).

Creating Elevation and Section Views

When you create a new project, the Revit software creates four elevation views named North, East, South, and West. These names describe the orientation of the elevation view relative to project north.

As you progress with your design and modeling, you will typically need to create additional elevation views and section views to focus on specific aspects of the project. You do this by:

- Using the Elevation tool to place an elevation tag that establishes the location and direction of the new elevation views.
- Using the Section tool to place a section line that determines the location of the cut plane and direction of the new section view.
- Duplicating an existing elevation or sections view.

Like plan view, you can set visibility graphics overrides and adjust the view properties to set the crop boundaries, view scale, level of detail, and visibility of model elements.

Creating 3D Views

You can create two types of 3D views in Revit:

- Default 3D views, which are orthogonal projections of the building model elements. In these views, the appearance of the model elements is not affected by their distance from your viewpoint. Orthogonal views are used when accurately representing the size of objects is important. They can depict views from the ground level, but they are typically used to present bird's-eye views.
- Perspective views, which use a camera metaphor to create a perspective projection. In these views, the appearance of the model elements is affected by distance. Objects that are near the viewpoint appear larger, while objects in the distance appear smaller. Perspective views are used when having a realistic understanding of how the design will be perceived by nearby viewers is important. They are often used to create interior or exterior renderings.

You create new 3D views in three ways:

- Using the 3D View tool (which appears on the View tab in the ribbon panel) and choosing the Default 3D View option. If this view has already been created, it will be opened instead.
- Duplicating the Default 3D View, which appears as {3D} in the Project Browser. The view properties and settings will be copied and used to create a new view, which will appear in the 3D View section of the Project Browser.
- Using the 3D View tool and choosing the Camera option, which allows you to specify the location and elevation of a camera object and a target for the camera view.

You can also add section boxes to your 3D views to cut away portions of the building model so that you can see inside. Each face of the section box acts as a cutting plane, so you can use the section box to create a wide variety of views to share your design and show the details of how it will be constructed—for example, 3D plans, 3D sections, and 3D detail views.

Adjust the Appearance of Elements in a View

You can change the appearance of the elements that appear in any view by adjusting the View Properties that control how objects are displayed.

Assigning Materials to Model Elements

You can assign materials to the elements in a building model to accurately display their appearance in shaded and rendered views. All elements in a building model have a material—either a default material based on the object category or a specific material that has been assigned through the element's type or instance properties. Materials are assigned to elements using this hierarchy:

- Defaults—using default materials, which typically display a solid gray color.
- Object style—using the materials assigned to an object category or subcategory.
- Type properties—using the materials assigned to all elements of the same type in the family's type properties.
- Instance properties—using the materials assigned to a single element through its instance properties.

If an element has properties that assign a material at a higher level in this hierarchy, lower-level settings will be overridden. For example, a furniture element that has materials assigned through its type properties will use those materials, rather than the default material assigned to the furniture category.

Changing Material Display and Render Appearance

Revit software includes an extensive library of predefined materials and rendering appearances, and you can edit the existing materials or duplicate them to create new ones as needed for your design.

Use the Material tool in the Manage tab to edit existing materials, create new ones, and specify how the materials will be displayed in views. You can set these options for hidden line, shaded, and consistent color views:

- Shading color
- Transparency
- Surface patterns (for cut and uncut surfaces)

You can also assign a render appearance to each of the materials that will be displayed:

- Views set to use the realistic visual style.
- Photorealistic views created using Revit software's rendering tools (which we will learn about in the next lesson).

To change a material's render appearance, open the Materials dialog box, then switch to the Render Appearance tab, where you can browse the library of render appearances by material type or search to find specific items. You can:

- Replace the current render appearance by choosing a new one from the library.
- Adjust the settings to change or fine-tune the current render appearance.

Creating Exterior Rendered Views

Autodesk Revit software can render photorealistic views that accurately portray the materials selected as well as the effect of lighting and shadows. Rendered views are useful for presenting your design to clients and other reviewers who want to preview the appearance of the finished building.

You can render any 3D orthogonal or perspective view to create a photorealistic image.

Open the Rendering dialog box by clicking the Show Rendering Dialog button in the View Control Bar, where you can specify these settings:

- Quality—the overall quality of the rendered image, ranging from Draft to Presentation quality. Higher-quality images are more realistic, but take much longer to produce.
- Output resolution—the number of dots per inch (DPI) to produce in the rendered image. Higher-resolution images are useful when they will be blown up or printed at high quality, but also take longer to produce because more data is computed.
- Lighting scheme—the sources of light that will provide illumination. For exterior renderings, the sun is typically the primary light source.
- Background—the appearance of the sky. If you prefer, you can specify a background image rather than using Revit software's automatically generated sky.

The rendering settings chosen has a very dramatic effect on the amount of time required to render a view. For this reason, it is typically wise to:

- Start by testing your renderings at draft quality to see the results quickly.
- Use these draft renderings to identify any elements that need to be adjusted or corrected (for example, materials that are not assigned properly).
- Create another rendering at draft or low quality to confirm the adjustments. You can limit the region rendered to focus on the area where these elements appear, rather than rendering the entire view.
- When all the changes are confirmed and you are confident about the rendering results, create a final rendering using medium, high, or presentation quality.

Creating Interior and Nighttime Rendered Views

You can also create photorealistic renderings of interior 3D views to see materials selected and explore lighting effects. Interior views can be rendered to show the effect of daylight transmitted through openings, windows, and curtain walls. But, depending on the sun's position and time of day, you will often need to supplement the sunlight with artificial light sources (for example, lamps, surface fixtures, and recessed lights).

You can use artificial lights to:

- Explore the effects of using different lighting schemes and fixtures to illuminate a space.
- Create evening or nighttime renderings that will be lit primarily through artificial lighting.

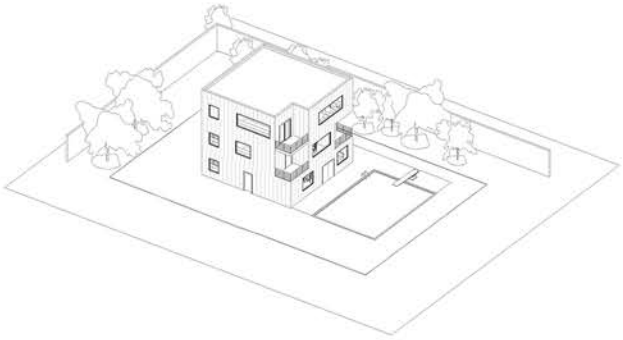
To use artificial lighting, place lighting fixture components in your building model. Then use the artificial lighting controls in the Rendering dialog box to specify the light settings used in each view.

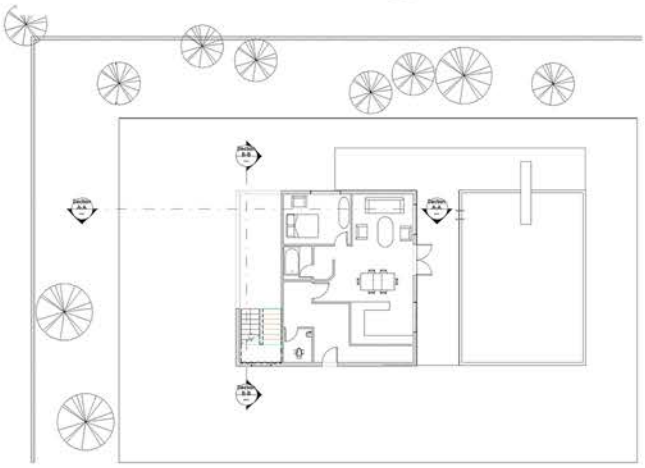
Renderings that use artificial lights can take a long time to run (up to several hours, depending on your computer's hardware and the rendering settings chosen) because the effects of the light produced by each fixture that is turned on must be calculated. When using artificial lights, choose your rendering settings very carefully:

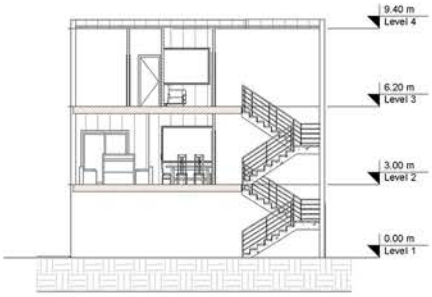
- Use draft renderings to get quick results and identify any problematic elements.
- Limit the region rendered to focus on specific areas as you test the effect of lighting settings.
- Turn off any lighting fixtures that are not needed to provide light for this view.
- Adjust the exposure settings to control the overall brightness of the image and the highlights and shadows.
- Reserve the higher-quality settings for final renderings, when you are confident about the expected results.

Exercise 01 :Creating house for the family with three members

Create a model of a simple house for a family (two adults and a kid).
The volume of the house should not exceed 10x10x10m.

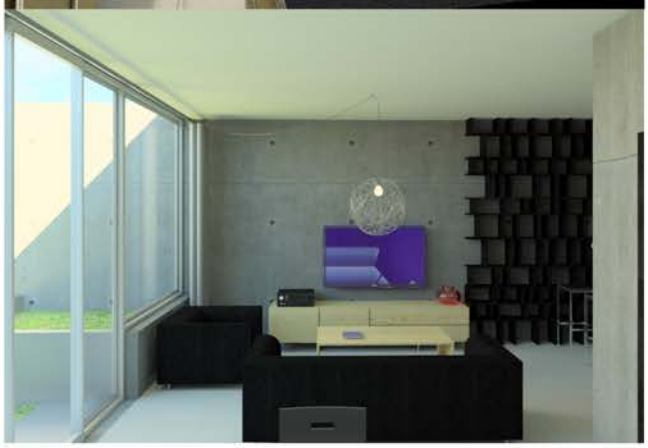




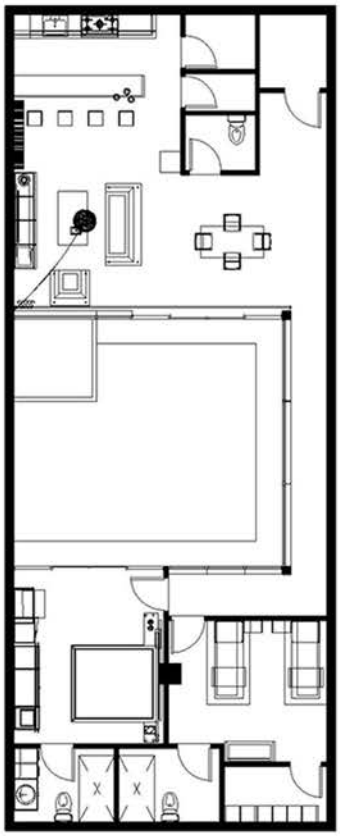


Studio Project 1 // SP1 //
UNITS

Unit interor and exterior design

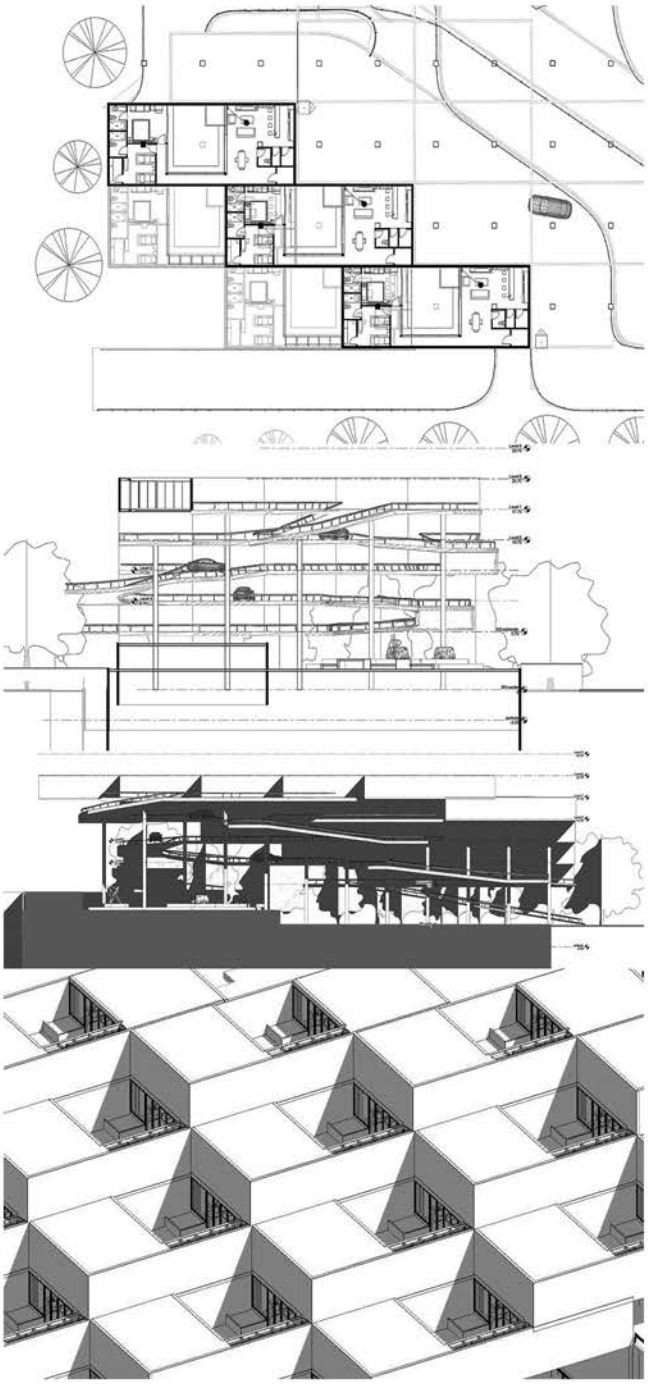


UNIT DESIGN



Studio Project 1 // SP1 //
STRUCTIRE

Design of the structure fo 23 unit



FINAL WORK

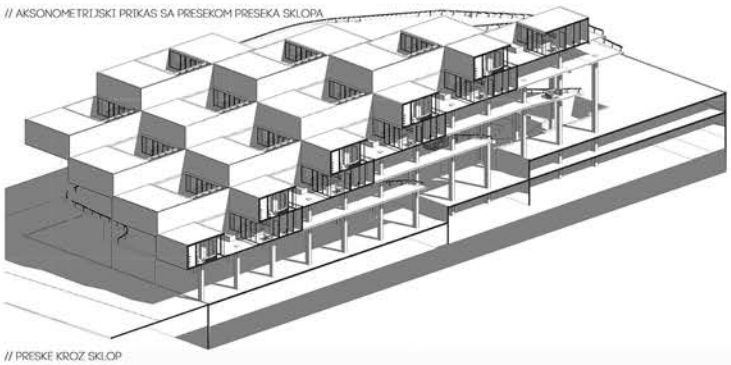
SP1 interor and exterior design

UNIVERZITET U BEOGRADU
ARHITEKTONSKI FAKULTET
BULEVAR KRALJA ALEKSANDRA 73/II, BEOGRAD

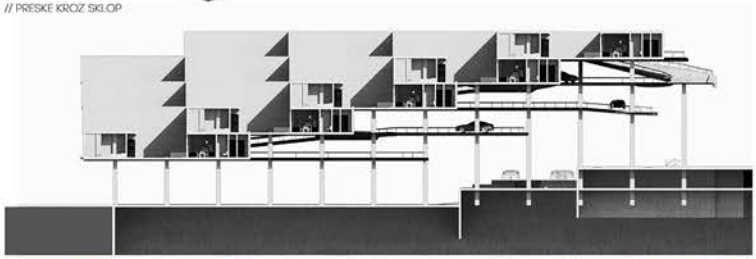
Arhitektonski fakultet Univerzitet u Beogradu
Zimski semestar 2013/2014
Kurs // Integrisano modeliranje arhitektonskih objekata 01 - REVIT //
Zadatak // Modeliranje projekta SP1 //
Rukovodilac predmeta // Doc. Marijana Devetakovic //
Student // Uros Vukovic 29_2011 //

AUTODESK
REVIT

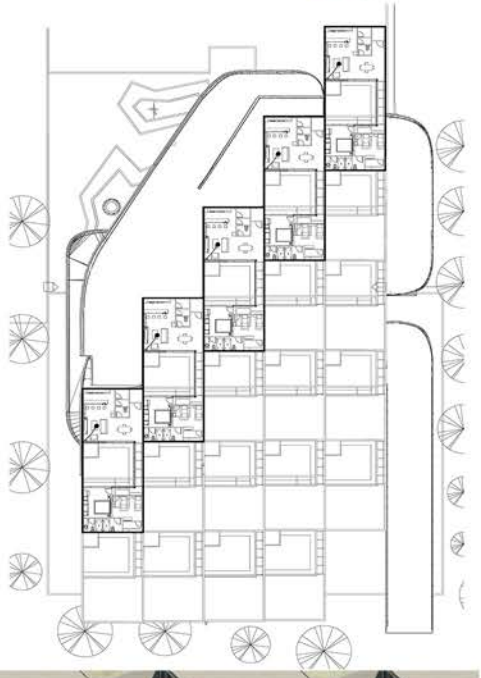
// AKSONOMETRIJSKI PRIKAS SA PRESEKOM PRESEKA SKLOPA



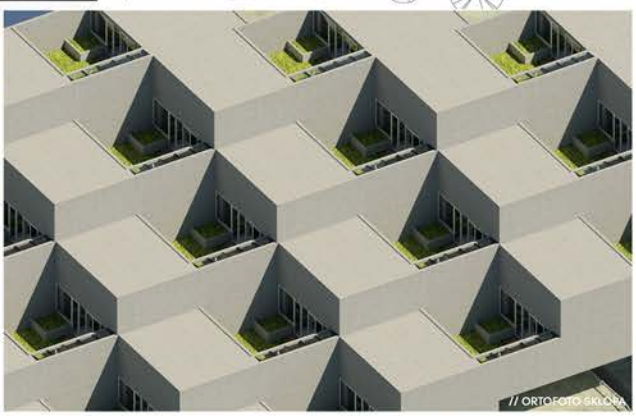
// PRESEK KROZ SKLOP



// OSNOVA -V- ETAZE



// PRIKAZ UNUTRASNJEG DVORISTA



// ORTOFOTO SKLOPA

// PRIKAZ ENETERIJERA STAMBENE JEDINICE

// PRESEK SKLOPA

// PRIKAZ ENETERIJERA STAMBENE JEDINICE