

# Table of Contents

<b>Dedication</b>	iii
<b>Preface</b>	xvii

## **Chapter 1: Introduction to Autodesk Revit Architecture 2016**

Introduction to Autodesk Revit Architecture	1-2
Autodesk Revit Architecture as a Building Information Modeler	1-2
Basic Concepts and Principles	1-3
Understanding the Parametric Building Modeling Technology	1-4
Terms Used in Autodesk Revit Architecture	1-4
Creating a Building Model using Parametric Building Elements	1-6
Visibility/Graphics Overrides, Scale, and Detail Level	1-7
Extracting the Project Information	1-8
Creating an Architectural Drawing Set	1-8
Creating an Unusual Building Geometry	1-8
Flexibility of Creating Special Elements	1-8
Creating Structural Layouts	1-9
Working on Large Projects	1-9
Working in Large Teams and Coordinating with Consultants	1-9
Starting Autodesk Revit Architecture 2016	1-9
User Interface	1-11
Invoking Tools	1-12
Title Bar	1-12
Ribbon	1-12
Application Frame	1-14
Status Bar	1-16
View Control Bar	1-16
Options Bar	1-16
Type Selector	1-17
Drawing Area	1-17
Project Browser	1-18
Keyboard Accelerators	1-18
Properties Palette	1-18
Dialog Boxes	1-19
Multiple Document Environment	1-20
Interoperability of Autodesk Revit Architecture	1-20
Building Information Modeling and Autodesk Revit Architecture 2016	1-21

Autodesk Revit Architecture Help	1-21
Using the Revit Architecture 2016 Help	1-22
Worksharing Using Revit Server	1-23
Working with BIM 360	1-24
Sharing Models with BIM 360	1-24

## Chapter 2: Starting an Architectural Project

Introduction	2-2
Starting a New Architectural Project	2-2
Project Units	2-3
Length Unit	2-4
Area Unit	2-5
Volume Unit	2-5
Angle Units	2-5
Slope Unit	2-5
Currency Unit	2-6
Mass Density Unit	2-6
Snaps Tool	2-6
Dimension Snaps Area	2-7
Object Snaps Area	2-8
Temporary Overrides Area	2-9
Saving a Project	2-9
Saving the Project File	2-9
Using the Save Tool	2-11
Configuring Global Settings	2-11
General Tab	2-12
User Interface Tab	2-13
Graphics Tab	2-14
File Locations Tab	2-15
Rendering Tab	2-16
Check Spelling Tab	2-17
SteeringWheels Tab	2-18
ViewCube Tab	2-19
Macros Tab	2-20
Closing a Project	2-21
Exiting Autodesk Revit Architecture	2-21
Opening an Existing Project	2-21
Opening an Existing Project Using the Open Tool	2-22
Model Display Tools	2-25
Using the Zoom Tools	2-25
Using the Orient Options	2-26
Navigation Tools	2-27
Other Display Options	2-30
Tutorial 1 Apartment 1	2-31
Tutorial 2 Club	2-35
Self-Evaluation Test	2-39
Review Questions	2-40

Exercise 1 Apartment 2	2-41
Exercise 2 Elevator and Stair Lobby	2-41

### **Chapter 3: Creating Walls**

Introduction	3-2
Creating a Building Project	3-2
Sequence of Creating a Building Model	3-2
Understanding Wall Types	3-3
Creating Architectural Walls	3-4
Working With Stacked Walls	3-17
Creating a Stacked Wall	3-18
Adding Interior Walls	3-18
Adding Wall Sweeps and Wall Reveals	3-21
Wall Sweeps	3-21
Wall Reveals	3-23
Tutorial 1 Apartment 1	3-26
Tutorial 2 Club	3-32
Tutorial 3 Apartment 1 - Interior Walls	3-38
Tutorial 4 Club - Interior Walls	3-44
Tutorial 5 Office - Stacked Wall	3-49
Self-Evaluation Test	3-57
Review Questions	3-57
Exercise 1 Apartment 2	3-58
Exercise 2 Elevator and Stair Lobby	3-59
Exercise 3 Club-Interior Walls	3-59

### **Chapter 4: Using Basic Building Components-I**

Introduction	4-2
Adding Doors in a Building Model	4-2
Adding Doors	4-2
Understanding Door Properties	4-4
Adding a Door to a Wall	4-7
Adding Windows in a Building Model	4-9
Adding Windows	4-10
Understanding Window Properties	4-10
Adding a Window to a Wall	4-13
Doors and Windows as Wall Openings	4-15
Openings in the Wall	4-16
Tutorial 1 Apartment 1	4-16
Tutorial 2 Club	4-27
Self-Evaluation Test	4-33
Review Questions	4-34
Exercise 1 Apartment 2	4-35
Exercise 2 Elevator and Stair Lobby	4-36
Exercise 3 Club - Hall 2	4-37

## Chapter 5: Using the Editing Tools

Introduction	5-2
Creating a Selection Set	5-2
Selecting Multiple Elements	5-2
Isolating Elements Using the Selection Box	5-3
Selecting Elements Using Advanced Tools	5-3
Restoring the Selection	5-4
Using the Filter tool	5-4
Moving and Copying Elements	5-6
Moving the Elements by Changing the Temporary Dimensions	5-7
Moving the Elements by Dragging	5-7
Moving the Elements by Dragging the End-Joint Components	5-7
Moving the Elements by Selecting and Dragging	5-8
Using the Move Tool	5-8
Using the Copy Tool	5-10
Trimming and Extending Elements	5-10
Using the Trim/Extend to Corner Tool	5-10
Using the Trim/Extend Single Element Tool	5-11
Using the Trim/Extend Multiple Elements Tool	5-12
Cutting and Pasting Elements	5-14
Cutting Elements	5-14
Copying Elements to the Clipboard	5-14
Pasting Elements from the Clipboard	5-14
Rotating Elements	5-15
Mirroring Elements	5-16
Mirroring Elements using the Mirror - Pick Axis Tool	5-17
Mirroring Elements using the Mirror - Draw Axis Tool	5-18
Creating an Offset	5-19
Creating an Array of Elements	5-21
Linear Array	5-21
Radial Array	5-23
Matching Elements	5-25
Aligning Elements and Working with Constraints	5-25
Deleting Elements	5-26
Splitting Element	5-27
Splitting with Gap	5-28
Splitting Faces	5-28
Grouping Element	5-29
Creating Groups by Selecting Elements in the Project Views	5-29
Creating Groups Using the Group Editor	5-30
Creating a Detail Group	5-30
Creating Model and Attached Detail Groups	5-31
Placing Groups	5-32
Swapping Groups	5-32
Modifying Groups	5-33
Excluding Elements from a Group	5-33
Saving and Loading Groups	5-34

Converting Groups to Linked Models	5-34
Deleting Groups	5-35
Creating Similar Elements	5-36
Pinning and Unpinning Elements	5-36
Scaling Elements	5-37
Using Diagnostic Tools	5-38
Measuring Distance between References and Along an Element	5-38
Selecting Elements Using the Element ID	5-39
Assemblies	5-39
Creating Assemblies	5-40
Editing Assemblies	5-40
Creating Assembly Views and Sheets	5-40
Tutorial 1 Apartment 1	5-41
Tutorial 2 Club	5-46
Tutorial 3 Office- Assembly Views	5-51
Self-Evaluation Test	5-59
Review Questions	5-60
Exercise 1 Apartment 2	5-61
Exercise 2 Club	5-62
Exercise 3 Elevator and Stair Lobby	5-63
Exercise 4 Office	5-64

## **Chapter 6: Working with Datum Plane and Creating Standard Views**

Introduction	6-2
Working with Levels	6-2
Understanding Level Properties	6-3
Adding Levels	6-6
Modifying Level Parameters	6-8
Hiding Elements in a View	6-10
Controlling the Visibility of Levels	6-10
Working with Grids	6-11
Creating Grids	6-11
Modifying Grids	6-16
Grid Properties	6-17
Customizing the Grid Display	6-20
Controlling the Visibility of Grids	6-21
Reference Planes	6-21
Work Planes	6-22
Setting a Work Plane	6-22
Controlling the Visibility of Work Planes	6-23
Working with Project Views	6-24
Viewing a Building Model	6-24
Visibility/Graphic Overrides of an Element	6-25
Visibility/Graphic Overrides of an Element Category	6-26
Making Elements Transparent	6-27
Using the Temporary Hide/Isolate Tool	6-28
Plan Views	6-29

Elevation Views	6-30
Section Views	6-33
Using the Scope Box Tool	6-37
Tutorial 1 Apartment 1	6-39
Tutorial 2 Club	6-48
Self-Evaluation Test	6-55
Review Questions	6-55
Exercise 1 Apartment 2	6-56
Exercise 2 Elevator and Stair Lobby	6-57

## Chapter 7: Using Basic Building Components-II

Introduction	7-2
Creating Architectural Floors	7-2
Sketching the Floor Boundary	7-4
Creating Roofs	7-7
Creating Roofs by Footprint	7-7
Creating Roofs By Extrusion	7-10
Modifying Roof Properties and Editing Shapes	7-14
Shape Editing Tools for Structural Floors	7-18
Modify Sub Elements	7-18
Add Point	7-19
Add Split Line	7-20
Pick Supports	7-20
Reset Shape	7-20
Creating Ceilings	7-20
Creating an Automatic Ceiling	7-20
Sketching a Ceiling	7-21
Using the Pick Walls Method	7-22
Modifying a Ceiling	7-22
Rooms	7-24
Adding Rooms	7-24
Calculating Room Volumes	7-28
Cutting Openings in a Wall, Floor, Roof, and Ceiling	7-29
Joining Walls with Other Elements	7-32
Using the Attach Top/Base and Detach Top/ Base Tools	7-32
Tutorial 1 Apartment 1	7-33
Tutorial 2 Club	7-38
Self-Evaluation Test	7-46
Review Questions	7-47
Exercise 1 Apartment 2	7-48
Exercise 2 Elevator and Stair Lobby	7-49

## Chapter 8: Using Basic Building Components-III

Introduction	8-2
Using Components in a Project	8-2
Adding Components	8-2

Adding Stairs	8-6
Adding Stair By Component	8-6
Converting a Stair Component to a Sketch	8-13
Adding Stairs by Sketching Runs	8-13
Adding Stairs by Sketching the Boundary and Riser Lines	8-15
Modifying Stairs Properties	8-18
Adding Railings	8-20
Adding Railings by Sketching the Path	8-20
Modifying Railing Properties	8-20
Modifying Railing Joints	8-21
Adding Ramps	8-21
Using Curtain Systems in a Project	8-23
Creating a Curtain Wall Using the Wall: Architectural Tool	8-24
Creating a Curtain Wall by Picking Lines	8-25
Creating a Curtain System on a Face	8-25
Adding Curtain Grids	8-27
Modifying Curtain System Panels	8-27
Adding Doors and Awnings to a Curtain System	8-28
Adding Mullions	8-29
Copying Elements from One Level to Another	8-30
Using the Pasting Tools	8-30
Tutorial 1 Apartment 1	8-30
Tutorial 2 Club	8-39
Tutorial 3 Elevator and Stair Lobby	8-41
Self-Evaluation Test	8-49
Review Questions	8-50
Exercise 1 Apartment 2	8-50

## Chapter 9: Adding Site Features

Introduction	9-2
Working with Site Features	9-2
Creating a Toposurface	9-3
Creating Topographical Subregions	9-5
Splitting a Topography	9-6
Merging Toposurfaces	9-7
Creating a Topography Using Imported Data	9-7
Setting the Site Properties	9-9
Adding Property Lines	9-10
Sketching Property Lines	9-10
Creating Property Lines Using Distances and Bearings	9-11
Creating Building Pads	9-12
Adding Site Components	9-15
Adding Parking Components	9-17
Adding Labels to Contours	9-17
Tutorial 1 Site Plan	9-18
Self-Evaluation Test	9-35
Review Questions	9-35

Exercise 1 Site Plan	9-36
Exercise 2 Museum Site Plan	9-37

## Chapter 10: Using Massing Tools

Introduction	10-2
Understanding Massing Concepts	10-2
Creating the Massing Geometry	10-3
Creating a Massing Geometry in the Family Editor	10-4
Editing a Massing Geometry in the Family Editor	10-10
Creating Cuts in a Massing Geometry Using the Family Editor	10-11
Placing the Massing Geometry in a Project	10-13
Creating the In-Place Mass in a Project	10-14
Massing in Conceptual Design Environment	10-15
Interface of the Conceptual Design Environment	10-15
Creating Masses in Conceptual Design Environment	10-15
Creating Building Elements from the Massing Geometry	
Using Building Maker Tools	10-20
Creating Walls by Selecting Faces	10-20
Creating Floors by Selecting Faces	10-21
Creating Roofs by Selecting Faces	10-22
Creating Curtain Systems by Selecting Faces	10-22
Controlling the Visibility of a Massing Geometry	10-23
Adding other Building Elements	10-23
Creating Families	10-24
Creating In-Place Families	10-25
Creating Families Using Standard Family Templates	10-26
Tutorial 1 Office Building 2	10-34
Tutorial 2 Architectural Column	10-50
Self-Evaluation Test	10-65
Review Questions	10-65
Exercise 1 Office Towers	10-67
Exercise 2 Stadium	10-68

## Chapter 11: Adding Annotations and Dimensions

Introduction	11-2
Adding Tags	11-2
Tagging Elements by Category	11-3
Tagging All Elements in a View	11-6
Tagging Treads or Risers	11-8
Room Tags	11-9
Room Separation	11-9
Tagging Rooms	11-11
Keynotes	11-11
Loading Keynote File	11-12
Placing Keynotes	11-13
Adding Keynote Legends	11-15



Adding Symbols	11-16
Adding Dimensions	11-17
Types of Dimensions	11-17
Dimensioning Terminology	11-19
Adding Permanent Dimensions	11-20
Adding Alternate Dimension Units	11-24
Baseline and Ordinate Dimensions	11-25
Editing Dimensions	11-27
Controlling the Display of Tick Marks and Dimension Arrows	11-28
Creating Linear Wall Dimensions Automatically	11-29
Adding Spot Dimensions	11-30
Placing a Spot Dimension	11-30
Modifying Spot Dimension Properties	11-31
Converting Temporary Dimensions to Permanent Dimensions	11-31
Tutorial 1 Apartment 1	11-33
Self-Evaluation Test	11-43
Review Questions	11-43
Exercise 1 Club	11-45
Exercise 2 Elevator and Stair Lobby	11-46
Exercise 3 Building 1	11-47

## **Chapter 12: Creating Project Details and Schedules**

Project Detailing in Autodesk Revit Architecture	12-2
Creating Details Using a Building Model	12-2
Callout View	12-3
Displaying the Callout View	12-5
Modifying Callout View Properties	12-5
Adding Details to the Callout View	12-7
Crop Regions	12-8
Model Crop Region	12-8
Annotation Crop Region	12-8
Creating Drafted Details	12-14
Creating a Drafting View	12-14
Drafting a Detail	12-15
Line Style Settings	12-15
Using Line Weights	12-16
Using Line Patterns	12-18
Adding Text Notes	12-19
Creating Text Notes	12-19
Editing Text Notes	12-20
Creating a Model Text	12-22
Revision Clouds	12-24
Creating the Revision Cloud	12-24
Adding a Revision Tag	12-25
Using Schedules in a Project	12-27
Generating a Schedule	12-27
Exporting Schedule to Excel Sheet	12-31
Creating a Legend View	12-33

Tutorial 1 Apartment 1 - Callout View	12-34
Tutorial 2 Apartment 1 - Schedules	12-46
Tutorial 3 Road Section Detail	12-50
Self-Evaluation Test	12-56
Review Questions	12-57
Exercise 1 Club - Drafted Detail	12-58
Exercise 2 General - Sketch Detail	12-58
Exercise 3 Club - Schedules	12-59

## Chapter 13: Creating Drawing Sheets and Plotting

Introduction	13-2
Creating Drawing Sheets	13-2
Adding a Drawing Sheet to a Project	13-2
Adding Views to a Drawing Sheet	13-5
Modifying View Properties	13-6
Panning the Viewports Added to the Sheet	13-8
Adding Schedules to a Drawing Sheet	13-8
Modifying a Building Model in a Drawing Sheet	13-10
Creating Guide Grid	13-10
Duplicate Dependent Views	13-11
Creating Dependent Views	13-11
Adding Matchline to Dependent Views	13-13
Adding Views to Sheet	13-14
Adding View Reference	13-15
Printing in Autodesk Revit Architecture	13-15
Printing Drawing Sheets and Project Views	13-16
Selecting and Modifying the Printer Settings	13-17
Using the Print Setup Dialog Box	13-19
Previewing the Print Setup	13-21
Tutorial 1 Apartment 1	13-22
Self-Evaluation Test	13-27
Review Questions	13-27
Exercise 1 Club	13-28
Exercise 2 Urban House	13-29

## Chapter 14: Creating 3D Views

Introduction	14-2
Three-Dimensional (3D) Views	14-2
Creating Orthographic Views	14-3
Dynamically Viewing Models Using Navigation Tools	14-4
Using the Orient Tool	14-11
Generating Perspective Views	14-12
Locking and Unlocking 3D Views	14-17
Using the Section Box	14-18
Tutorial 1 Apartment 1	14-19
Tutorial 2 Club	14-24
Self-Evaluation Test	14-28

Review Questions	14-29
Exercise 1 Apartment 1	14-30
Exercise 2 Office Building 1	14-31
Exercise 3 Office Building 2	14-32
Exercise 4 Hotel Building	14-33

## Chapter 15: Rendering Views and Creating Walkthroughs

Rendering in Revit Architecture	15-2
Rendering Workflow	15-2
Introduction to Materials	15-5
Applying Lights	15-15
Using Decals and Entourages	15-17
Rendering Settings	15-20
Creating a Walkthrough	15-26
Creating the Walkthrough Path	15-26
Editing and Playing the Walkthrough	15-27
Recording a Walkthrough	15-30
Autodesk 360   Rendering	15-31
Rendering in Cloud	15-32
Accessing Render Gallery	15-33
Tutorial 1 Apartment 1	15-33
Tutorial 2 Office Building 2	15-48
Self-Evaluation Test	15-54
Review Questions	15-55
Exercise 1 Club	15-56
Exercise 2 Apartment 1 - Night View	15-56
Exercise 3 Hotel Building - Walkthrough	15-57

## Chapter 16: Using Advanced Features

Introduction	16-2
Creating Structural Components	16-2
Creating Structural Walls	16-3
Creating Structural Columns	16-5
Adding Structural Beams and Braces	16-7
Cutting Openings in Beams, Braces, and Columns	16-8
Generating Multiple Design Options	16-9
Generating Design Options for a Project	16-10
Presenting Design Options	16-11
Using Area Analysis Tools	16-12
Area Schemes	16-12
Area Plans	16-13
Area Schedules	16-15
Color Schemes	16-17
Creating Color Schemes	16-17
Modifying Color Scheme	16-21
Masking Regions	16-21
Adding Masking Regions to a Project	16-22

Adding Masking Region to a Detail Family	16-22
Adding Masking Regions to a Model Family	16-23
Creating Displaced Views	16-23
Using Project Phasing Tools	16-24
Understanding Phasing Concepts	16-24
Linking Building Models and Sharing Coordinates	16-26
Linking or Importing Models	16-27
Linking Revit Models	16-30
Nested Linked Models	16-31
Converting Linked Models to Groups - Binding Links	16-33
Managing Links	16-35
Including Elements of Linked Models in Schedules	16-36
Applying the Color Schemes of the Host Model to Rooms and Areas of the Linked Models	16-36
Copying Linked Model Elements	16-37
Worksharing Concepts	16-37
Worksharing Using Workset Tools	16-38
Process of Worksharing	16-38
Saving Methodology in Worksharing	16-44
Element Ownership Concepts	16-44
Purging Unused Element Families	16-45
Transferring Project Standards	16-45
Organizing the Project Browser	16-47
Generating Shadows	16-47
Revit Architecture Solar Studies	16-47
Generating Still Solar Study	16-48
Creating an Animated Solar Study	16-51
Point Cloud	16-54
Inserting a Point Cloud File	16-54
Point Cloud Visibility	16-54
Using a Point Cloud File in a Project	16-55
Revit Architecture Interoperability	16-55
Interoperability with Autodesk 3ds Max and Autodesk 3ds Max Design	16-55
Interoperability with Google SketchUp	16-56
Publishing Tips in Revit Architecture 2016	16-58
Tutorial 1 Apartment 1	16-59
Tutorial 2 Apartment Complex	16-71
Self-Evaluation Test	16-82
Review Questions	16-82
Exercise 1 Apartment 2	16-83
Exercise 2 Apartment Complex	16-85
<b>Student Project- City Mall</b>	<b>SP-1</b>
<b>Index</b>	<b>I-1</b>