



TOPIC 1

INTRODUCTION TO BIM

DCC50562 **BIM** COURSE MODULE

TOPIC 1

INTRODUCTION TO BIM

This module is prepared for the Polytechnics students to gain better understanding of the introduction to Building Information Modelling (BIM). It is structured in basic fundamental and step by step approach consist of the following:

- Definition and Concept
- BIM related to IR4.0
- BIM implementation in Malaysia
- Benefits of BIM Adoption
- BIM Terminologies
- Exploring the User Interface and Organizing Projects
- Assemble the basics of the Toolbox
- Configuring Templates and Standards

WHAT IS BIM?

The Building Information Modelling in the **Malaysian context** is defined as:

*“A **modelling technology** and associated set of processes to produce, communicate, analyse and use of **digital information models** throughout **construction project life-cycle**”*

WHAT IS BIM?



Modelling Technology

refers to the modelling tools used to develop the BIM Model.



Digital Information Models

refers to the intelligent 3D model that consist of comprehensive construction information.



Construction Project Life-Cycle

refers to the construction process starting from design, construction and management the building or infrastructure throughout project lifecycle.

WHAT IS BIM?

*“Building Information Modelling (BIM) is the **holistic process** of creating and managing information for a built asset. Based on **an intelligent model** and enabled by a **cloud platform**, BIM **integrates structured, multi-disciplinary data** to produce a **digital representation** of an asset across its lifecycle, **from planning and design to construction and operations.**”*

Source: Autodesk.com

WHAT IS BIM?

The **process of BIM** supports the creation of intelligent data that can be used throughout the lifecycle of a building or infrastructure project.



Plan

Inform project planning by combining reality capture and real-world data to generate context models of the existing built and natural environment.



Design

During this phase, conceptual design, analysis, detailing and documentation are performed. The preconstruction process begins using BIM data to inform scheduling and logistics.



Build

During this phase, fabrication begins using BIM specifications. Project construction logistics are shared with trades and contractors to ensure optimum timing and efficiency.



Operate

BIM data carries over to operations and maintenance of finished assets. BIM data can be used down the road for cost-effective renovation or efficient deconstruction too.

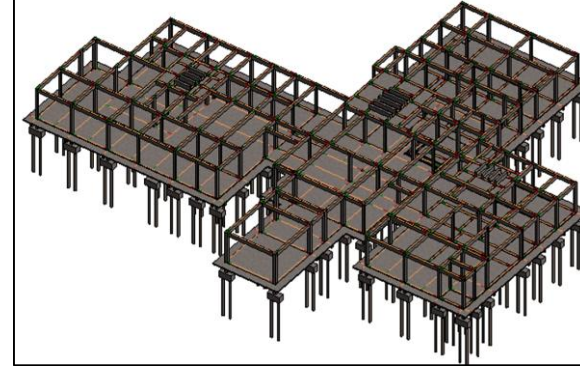
Source: Autodesk.com

CONSTRUCTION MODEL

Architecture detailed model



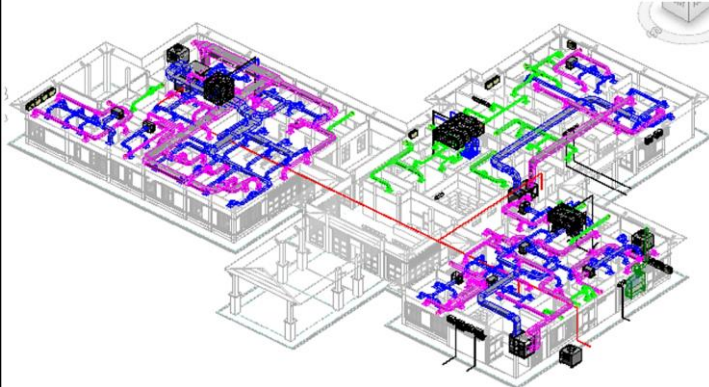
Structure detailed model



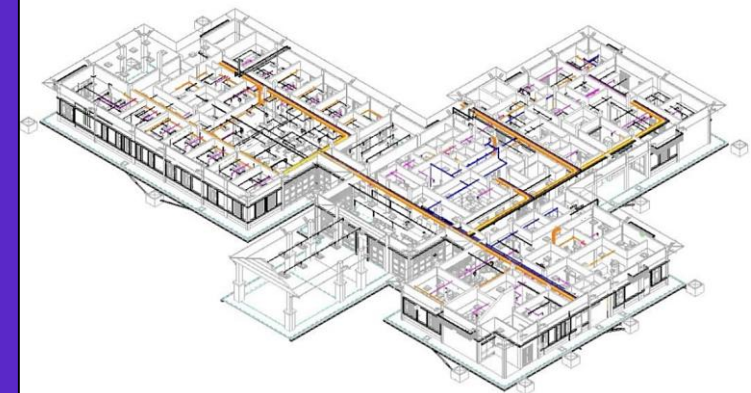
Combined detailed model



Mechanical detailed model



Electrical detailed model



<https://www.youtube.com/watch?v=QqHJ79ISLxA>



BIM CONCEPT

WHY BIM?



Traditionally, every construction process involves a complex network of construction players. Within this complex network, **exchange of information processes are fragmented and not coordinated in a systematic manner.** This leads to various issues of **inefficiency, inconsistency and redundant documents.** This could lead to **increased construction cost, delay and disputes.**

Source: CIDB (2016) BIM Guide 2: Readiness
<https://www.youtube.com/watch?v=suNadRnHy-U>

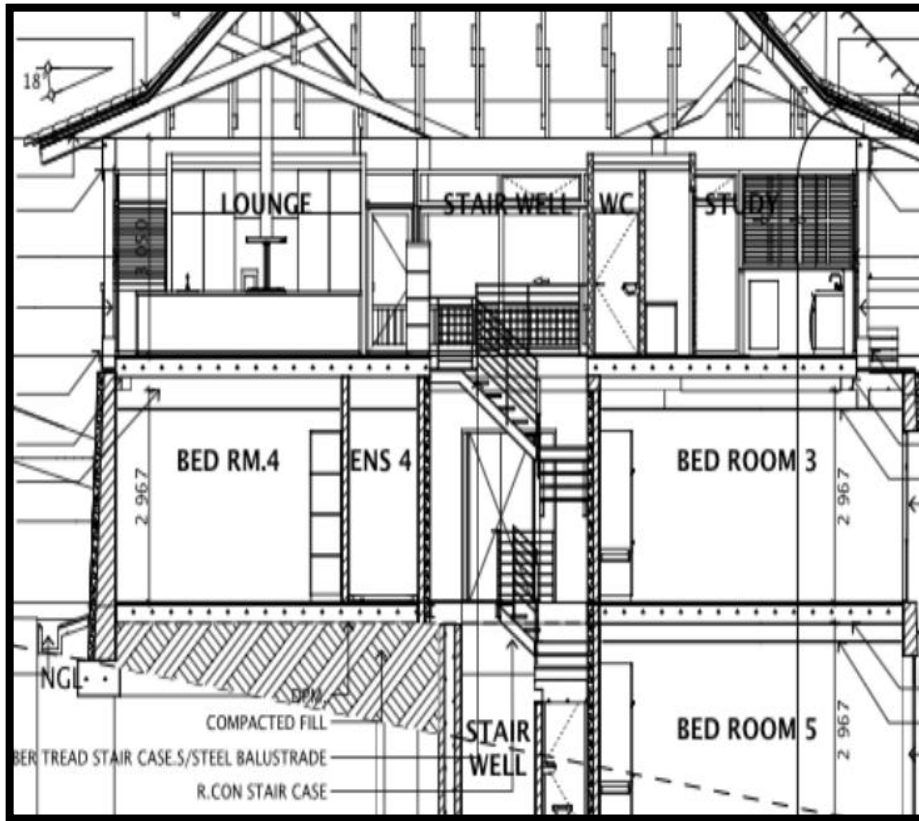
WHY BIM?



Adoption of BIM can **facilitate in streamlining collaboration among clients, consultants, contractors and all stakeholders.** BIM enables the construction players to move from disconnected communication process to a **systematic communication, collaboration and coordination process.**

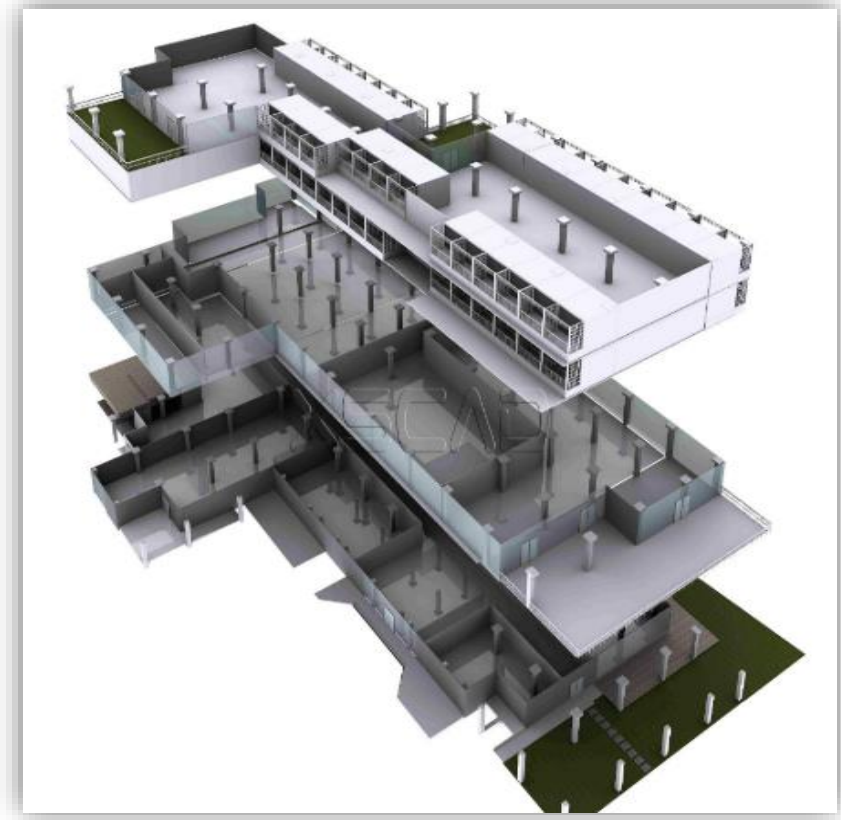
Source: CIDB (2016) BIM Guide 2: Readiness

BUILDING WORKS



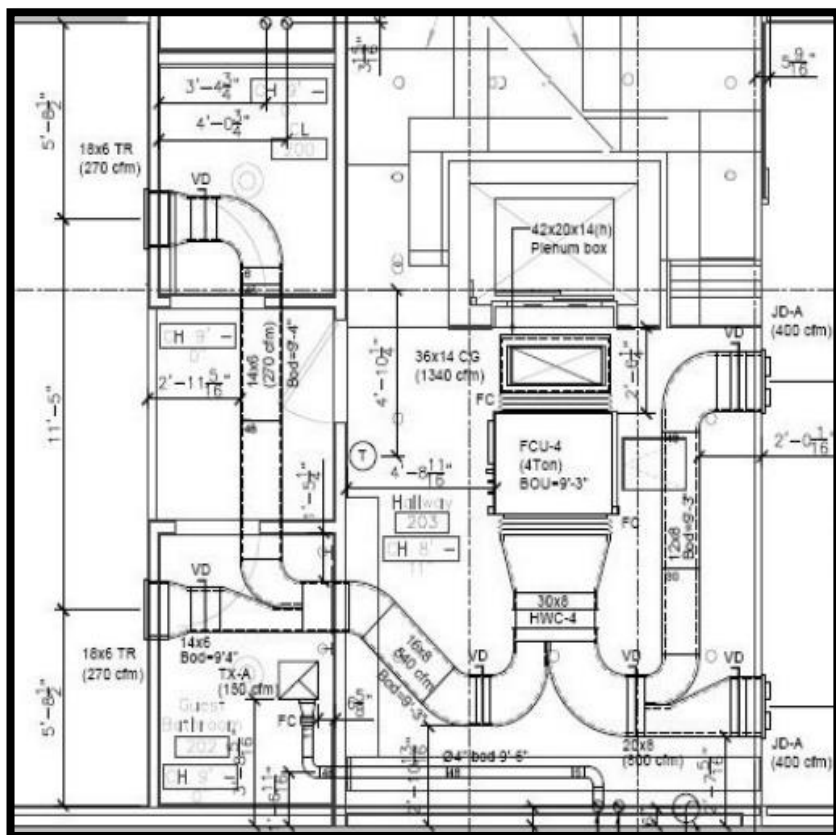
Conventional

VS



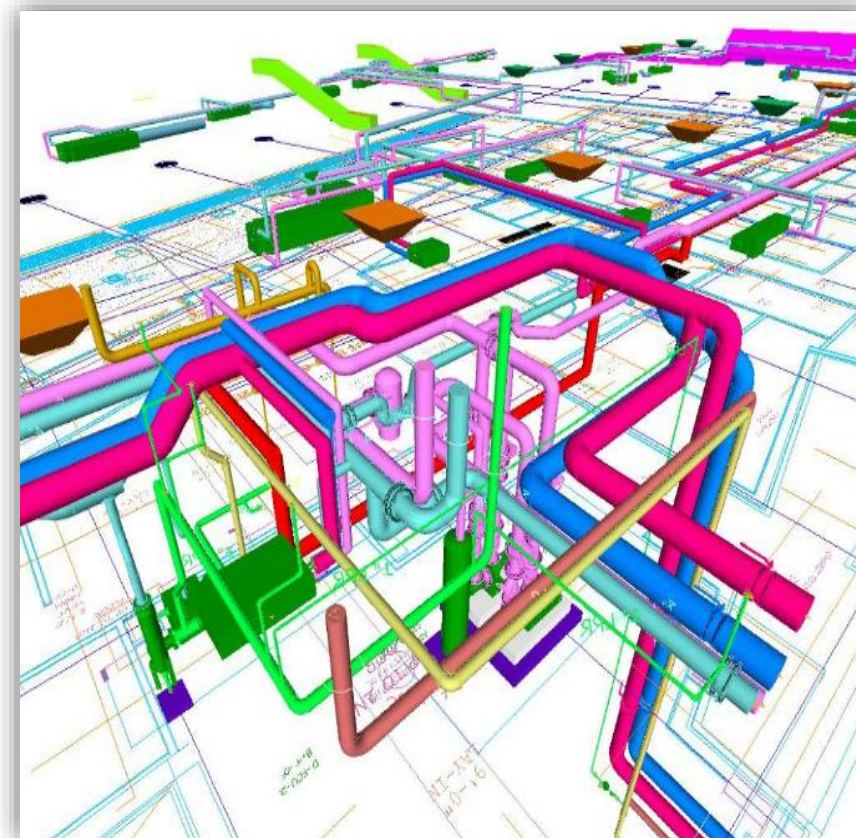
BIM

MECHANICAL, ELECTRICAL & PLUMBING



Conventional

VS

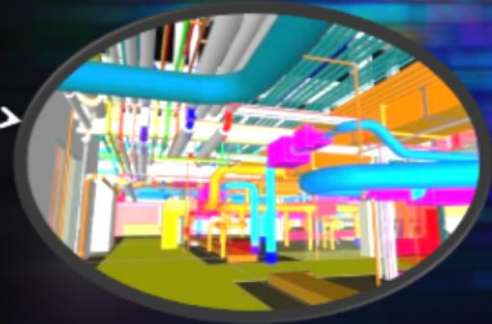


BIM

**PHYSICAL
Data**



**DIGITAL
MODEL**



OUTPUT

Documentation



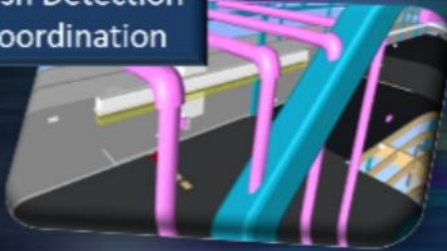
Scheduling



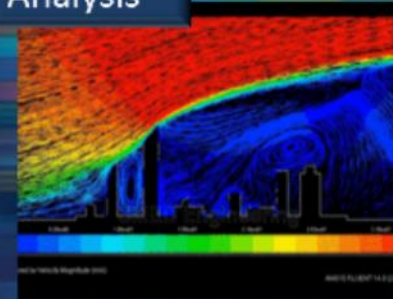
Visualisation



Clash Detection
/ Coordination



Analysis



Taking-off

Item	Quantity	Unit	Price	Total
Concrete	100	m³	120	12000
Steel	50	kg	20	1000
Brick	2000	units	5	10000
Labour	100	hours	100	10000
Material	500	m³	20	10000
Transport	100	km	100	10000
Other	100	units	100	10000

Cost Estimation





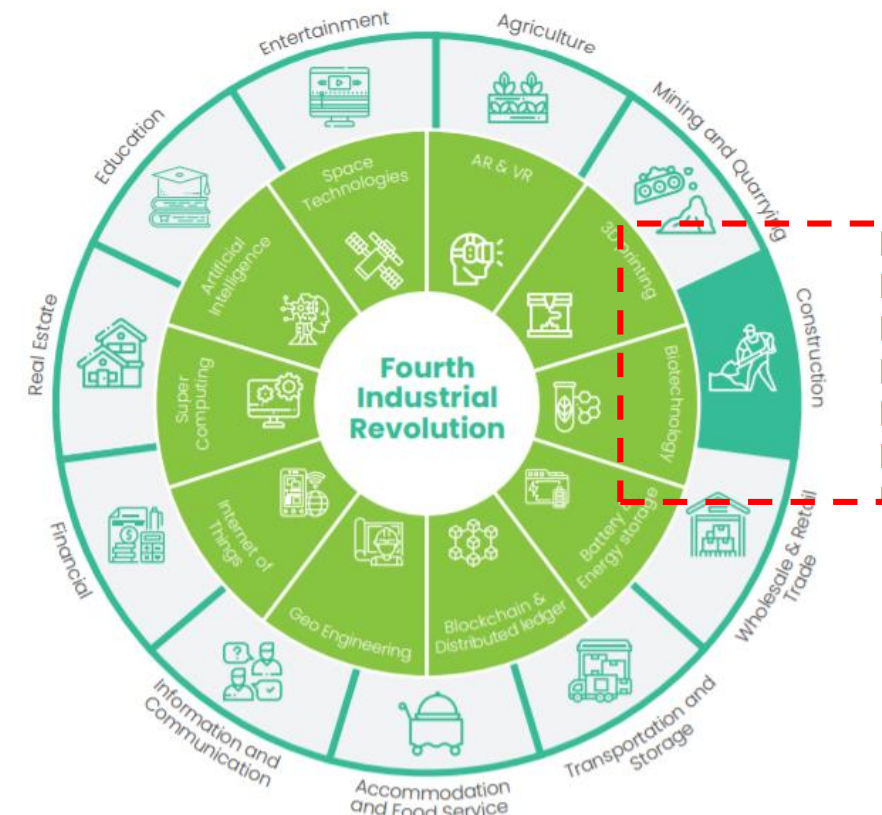
BIM RELATED TO INDUSTRIAL REVOLUTION 4.0

Source: Construction 4.0 Strategic Plan 2021-2025

- The term “**Fourth Industrial Revolution**” (IR4.0) was first proposed in **2011** during the **Hannover Fair** in the context of the goal of developing the German economy and later the terms as been spread to other parts of Europe.

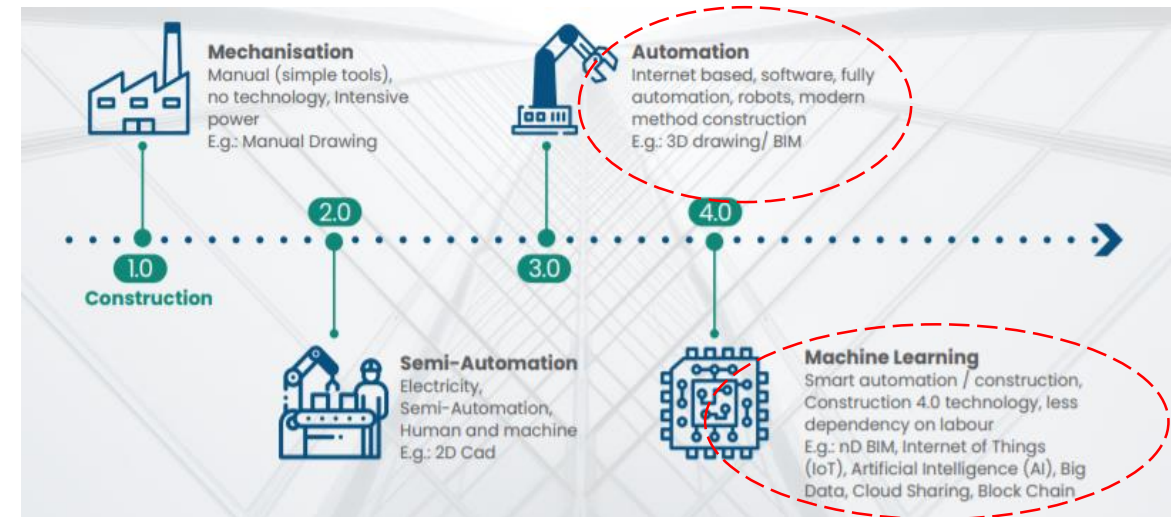
Author : World Economic Forum, 2016	Author : Klaus Schwab & Nicholas Davis, 2016	Author : Klaus Schwab, 2017	Author : Pranjal Sharma, 2017	Author : Antonella Petrillo, Raffaele Cioffi & Fabio De Felice, 2018
Definition	Definition	Definition	Definition	Definition
Advent of “cyber-physical systems (CPS)” involving entirely new capabilities for people and machines. While these capabilities are reliant on the technologies and infrastructure of the Third Industrial Revolution	A new chapter in human development, on par with the first, second, third Industrial Revolutions and once again driven by the increasing availability and interaction of a set of extraordinary technologies	Digital revolution which characterised by ubiquitous and mobile internet, by smaller and more powerful sensors that have become cheaper and by artificial intelligence (AI) and machine learning	Clutch of distinct yet connected technologies that are growing and evolving at a rapid pace	Integration of IT system and physical systems to get a cyber-physical system (CPS) that brings the real world in a virtual reality (VR).

Table 1. Definitions of the Fourth Industrial Revolution



Source: Construction 4.0 Strategic Plan 2021-2025

- **Construction 4.0** is defined as the process to **implement modern technology** in order to **encourage the digitisation of the construction industry** and its supply chain.
- Whilst, it also gives a definition of the transformation of the construction industry towards the Fourth Industrial Revolution, from **automated production to a greater level of digitalisation**.
- The **future of the construction industry** will be highly dependent on the adaptation of **new technologies and innovations to current processes**.
- **Adoption of new technologies** with new innovative methods will see a shift in how buildings and infrastructure projects being delivered.
- Projects will not solely focus on **better-performing buildings and infrastructure**, but also the **prospect of improving the quality of life for society**.



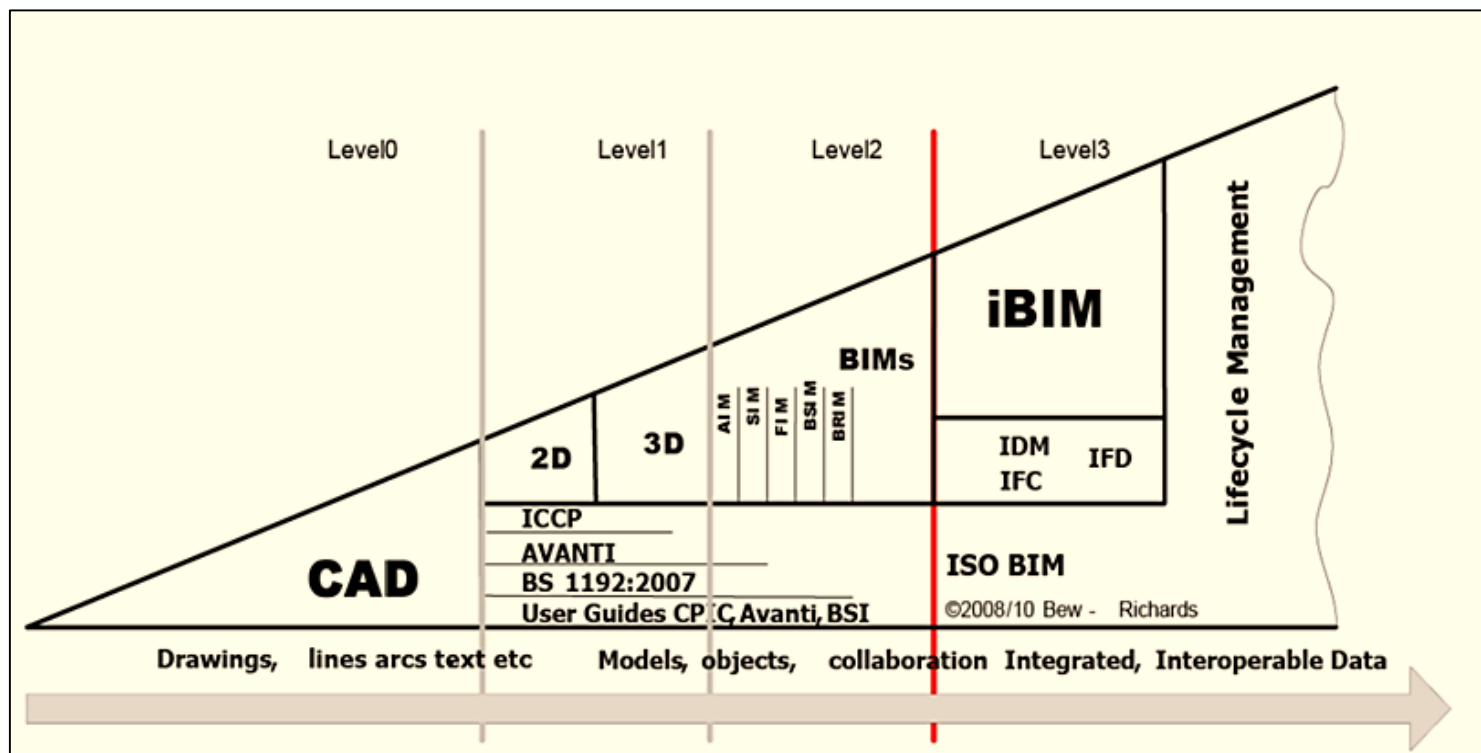
Source: Construction 4.0 Strategic Plan 2021-2025



BIM IMPLEMENTATION IN MALAYSIA

Source: CIDB (2016) BIM Guide 2: Readiness

BIM MATURITY LEVEL



Level 0 BIM is an unmanaged Computer Aided Design (CAD) including 2D drawings, and text with paper-based or electronic exchange of information but without common standards and processes.

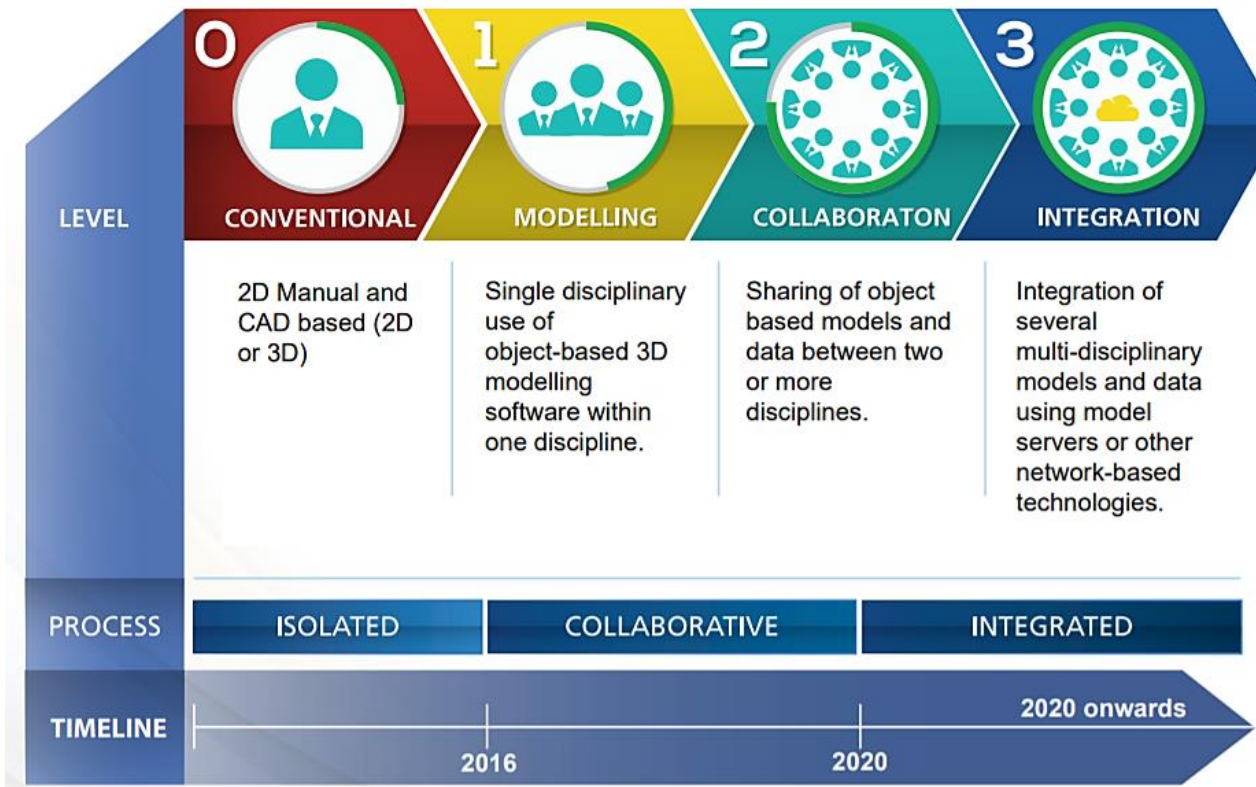
Level 1 BIM is managed by CAD, with the increasing introduction of spatial coordination, standardized structures and formats as it moves towards Level 2 BIM.

Level 2 BIM is managed 3D environment with data attached, but created in separate discipline-based models.

Level 3 BIM is a single collaborative, online, project model with construction sequencing (4D), cost (5D) and project lifecycle information (6D). This is sometimes referred to as 'iBIM' (integrated BIM).

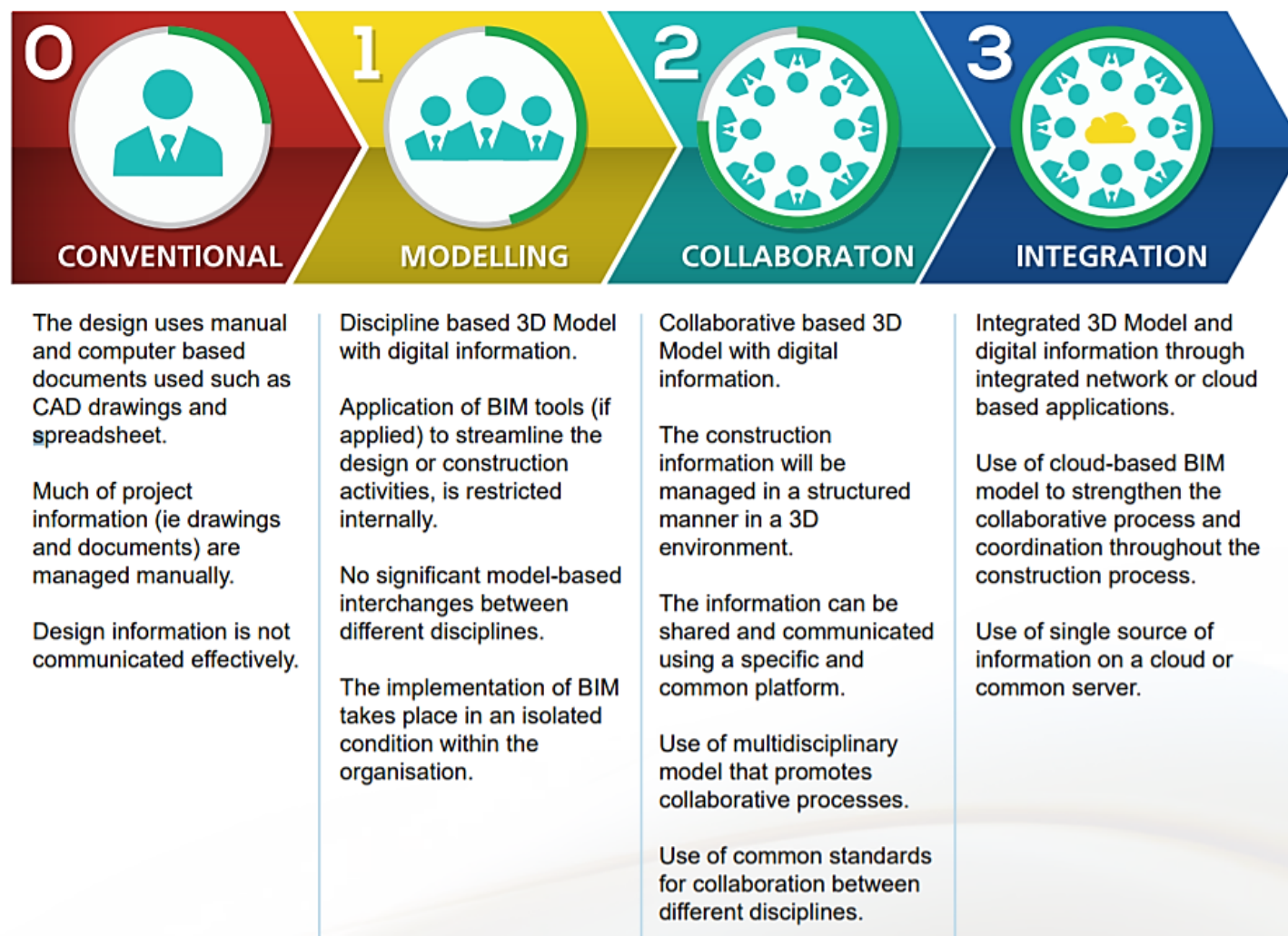
BIM IMPLEMENTATION IN MALAYSIA

- The BIM process evolves in a few stages where each stage is **identified by the level of information collaboration**. The process of collaborated information **determines the maturity of BIM process**.
- The figure below illustrates the BIM Maturity and implementation process.



BIM IMPLEMENTATION IN MALAYSIA

The detail explanation of each level :





BENEFITS OF BIM ADOPTION IN MALAYSIA

Source: CIDB (2016) BIM Guide 2: Readiness

BENEFITS OF BIM ADOPTION IN MALAYSIA

- The benefits of BIM adoption in Malaysia could be defined into two (2) categories :
 - i. **National level; and**
 - ii. **Organisational/project level**
- To support the aspiration of Malaysia construction industry as in **Construction Industry Transformation Programme (CITP) 2016-2020**, the overarching goal of BIM adoption is to become a catalyst to transform the industry to a higher level by enhancing productivity and efficiency.
- At project and organisational level, BIM is expected to **enhance the collaborative integrated design during the planning and design, construction and facility management throughout the project lifecycle.**

BENEFITS OF BIM ADOPTION IN MALAYSIA

- The following figures illustrate the BIM adoption at **national and organisational/project level**.

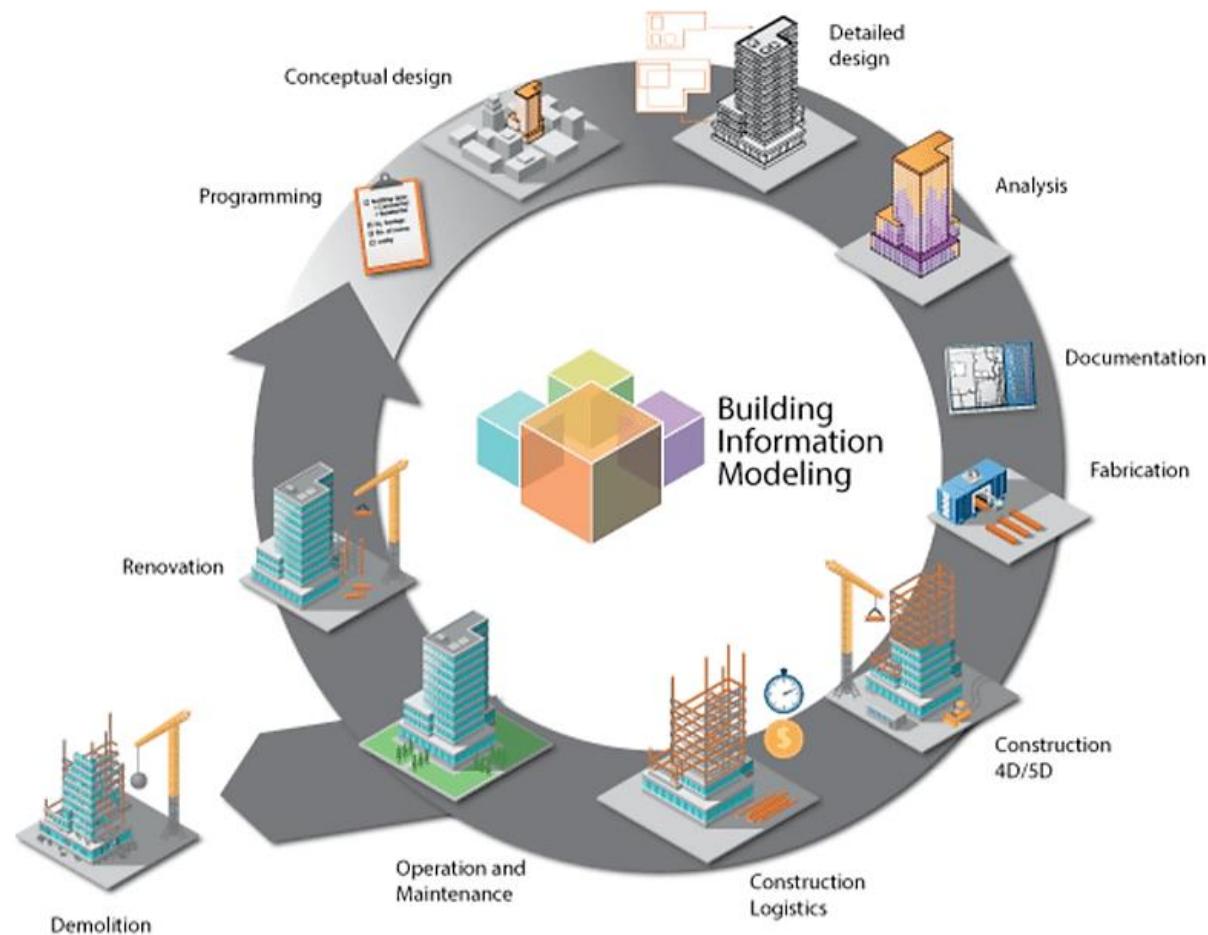
National Level



Enhance
productivity and efficiency

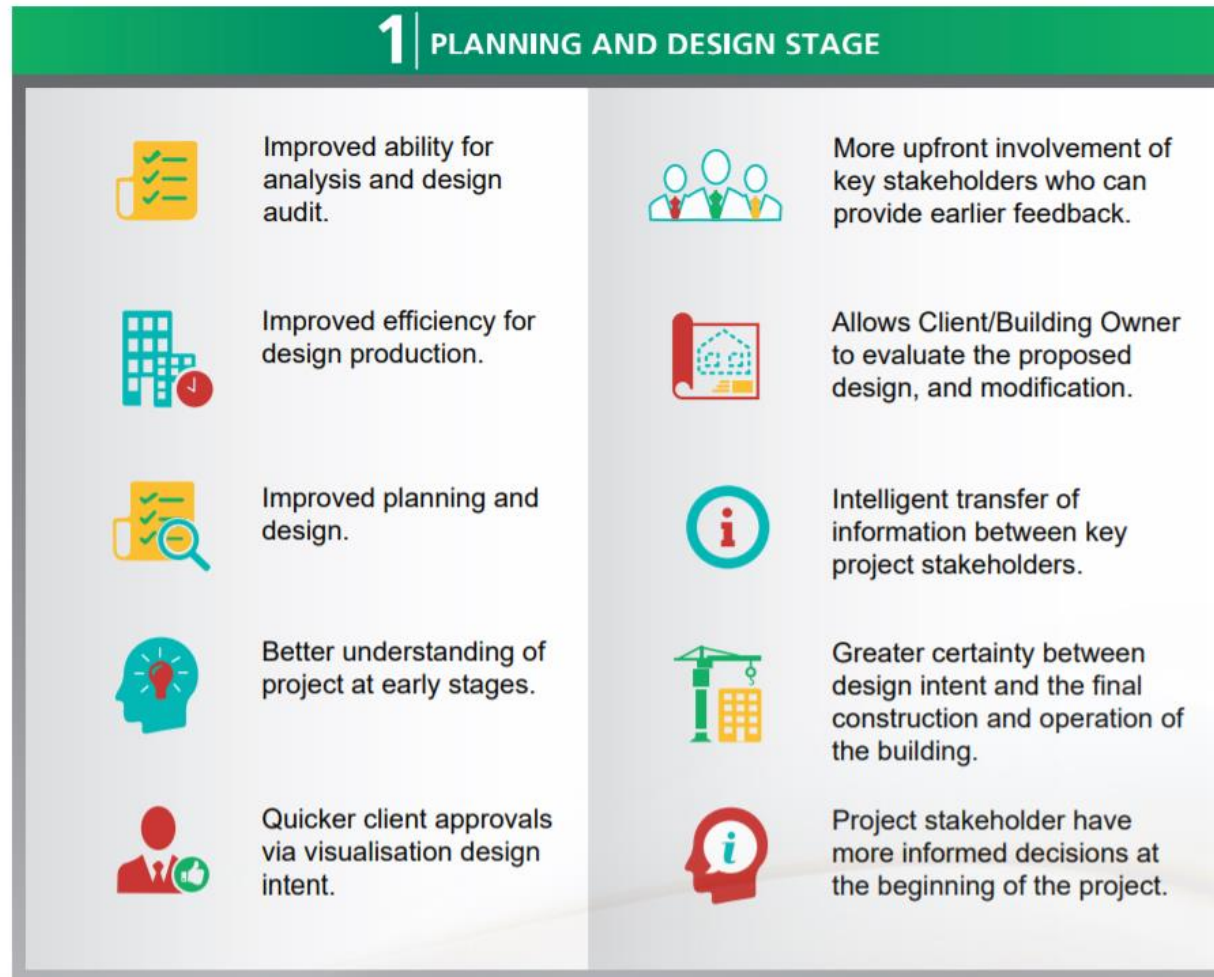
BENEFITS OF BIM ADOPTION IN MALAYSIA

Organisational/project level



BENEFITS OF BIM ADOPTION IN MALAYSIA

The following statement illustrate the BIM adoption at **organisational/project level**.



BENEFITS OF BIM ADOPTION IN MALAYSIA

2 | CONSTRUCTION STAGE



Better outcomes through collaboration.



Improved multi-party communication.



Reduces project risk.



Increased prefabrication.



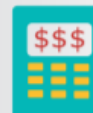
Enhanced project performance.



Reduces waste.



Improved safety and quality.



Reduces unbudgeted construction changes.



Ensure project documentation is coordinated, timely and in an accessible form.



Improve coordination between client-consultant-contractor.

BENEFITS OF BIM ADOPTION IN MALAYSIA

3 | FACILITY MANAGEMENT STAGE



To create and maintain facilities in more efficient, lower carbon emissions, more effective and safer places to live and work.



Provide a single source of accurate and up-to-date information for FM activities.



To systematically design maintenance strategy based on the information of design information, asset history lifecycle cost.



Better information for the whole life cycle of asset management.



Better lifecycle data for facility management.



Enhanced evaluation on maintenance approach based on cost.

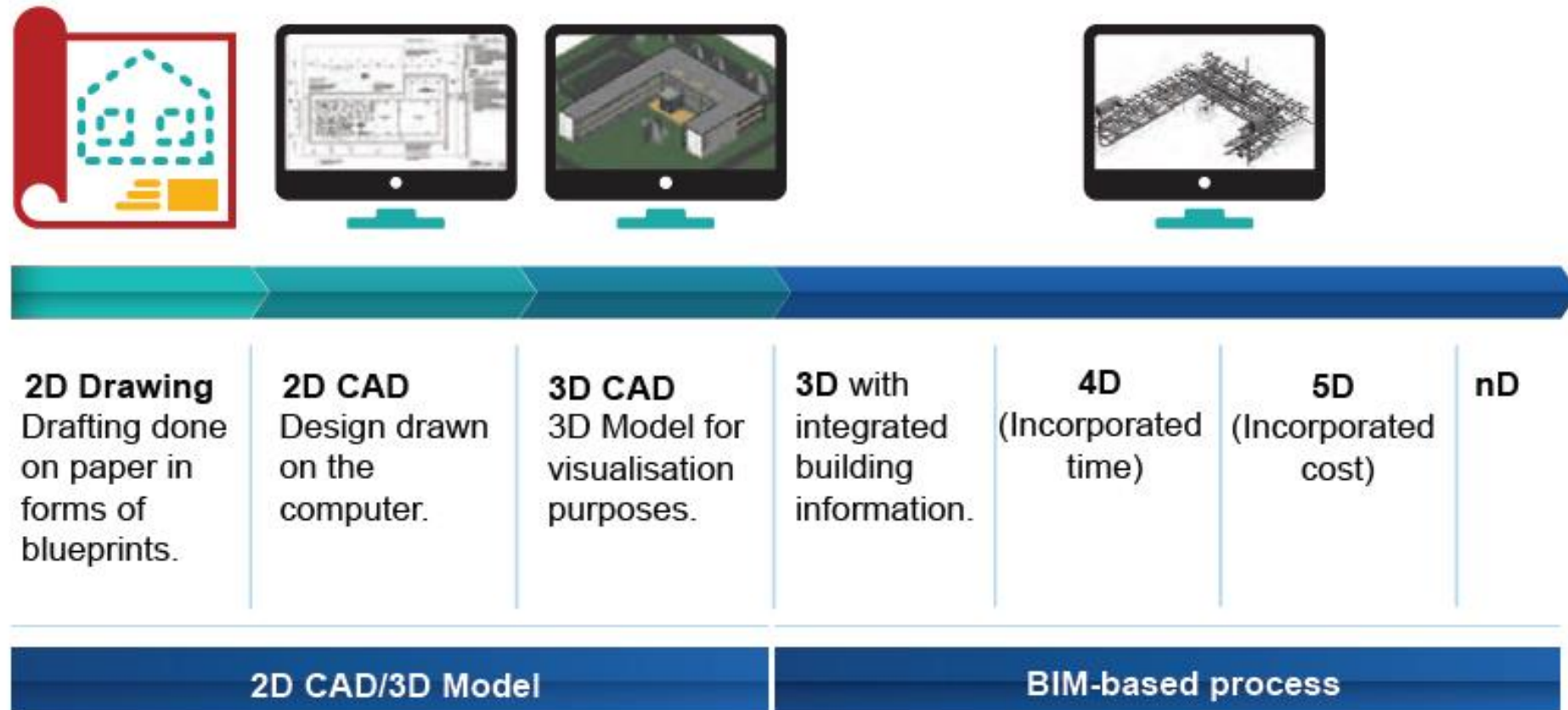


Maintain up-to-date facility and equipment



Allow for future updates of current asset information.

BIM DIMENSIONS



Source: CIDB (2016) BIM Guide 2: Readiness

BIM DIMENSIONS





BIM TERMINOLOGIES

Source: Mastering Autodesk Revit 2020

WHAT IS PROJECT?

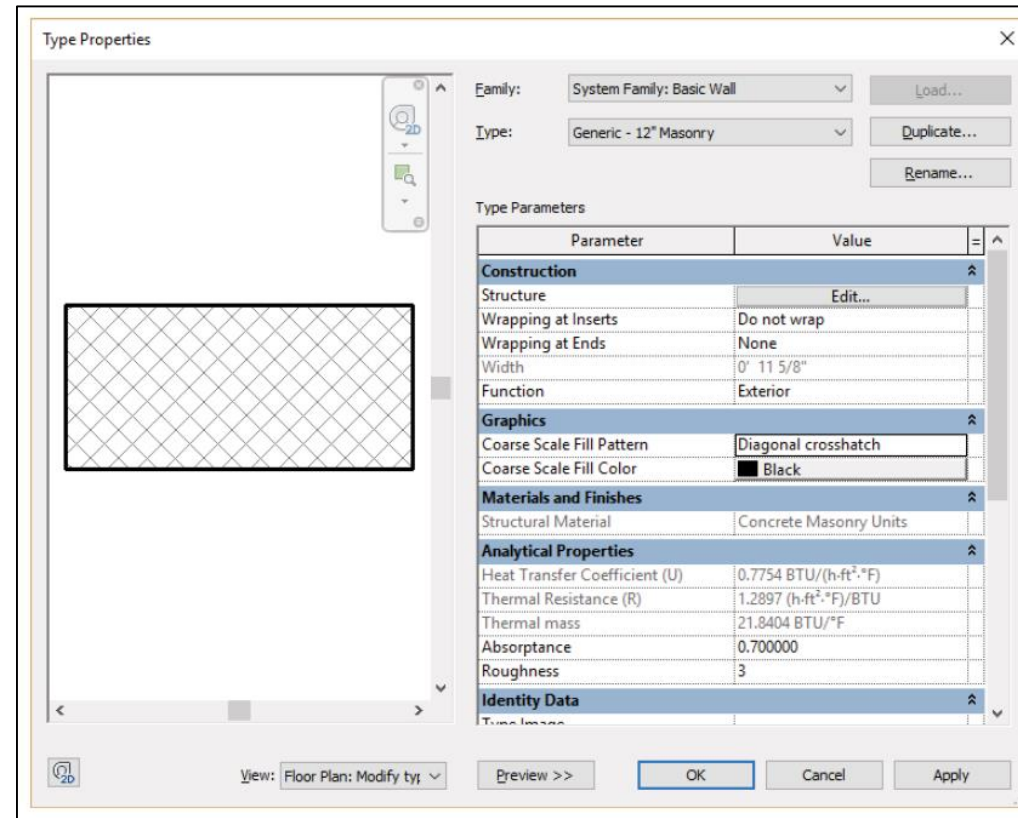
- Project is **an effort** that involves a series of activities and resources, aimed to achieve a certain output, considering constraints like time, quality and cost and which often introduces a change.
- Construction projects are **the organized effort** to construct a building or structure. In the fields of civil engineering and architecture, construction projects involve the process that consists of tangibly assembling an infrastructure or building.

WHAT IS PARAMETER?

- All content in an Revit project has ***parameters***, which are simply the information or data about something.
- Parameters can affect many different aspects of an object, such as visibility, behavior, size, shape, and material.
- There are two (2) kinds of parameters: ***Type and Instance***.

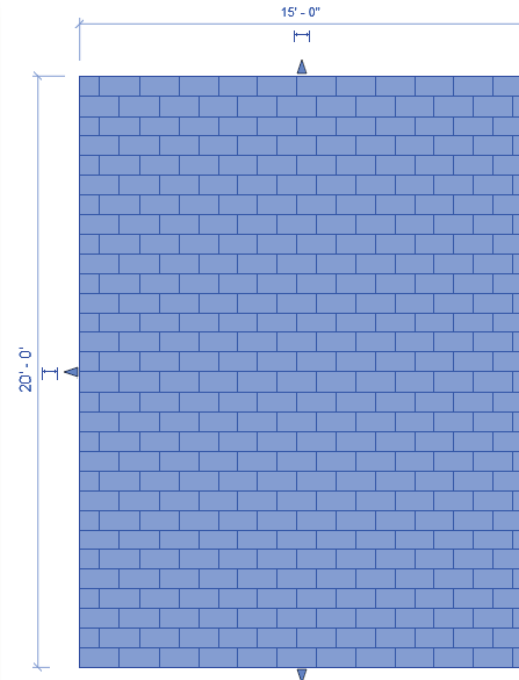
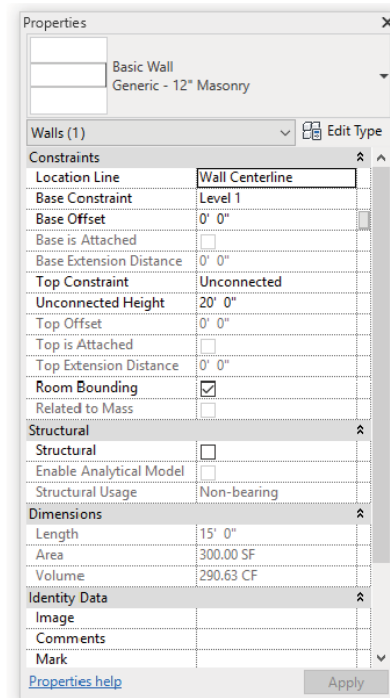
WHAT IS PARAMETER?

- **Type parameters** control information about every element of the **same type**. For example, if the material of a piece of furniture is designated as a type parameter and you change it, **the material for all the furniture of that type will change**.

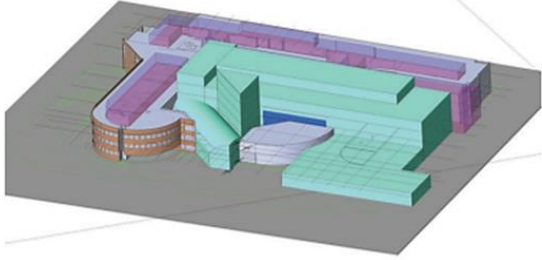
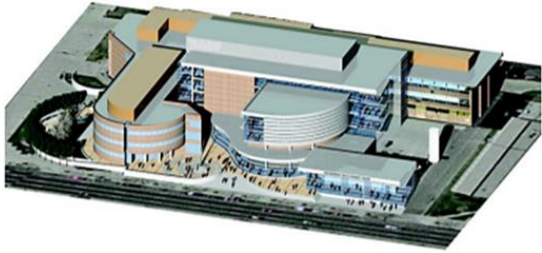


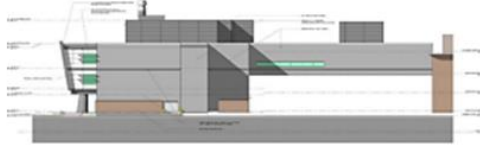
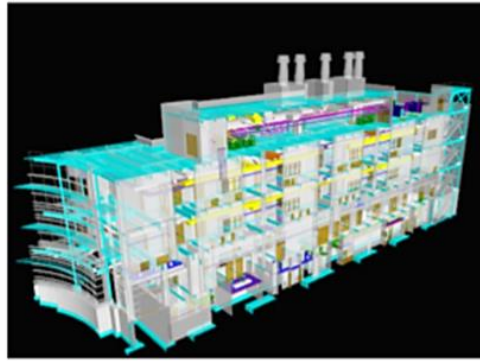
WHAT IS PARAMETER?

- **Instance parameters** control only the instances that you have selected. So if the material of the piece of furniture that you have selected is an *instance* parameter, you will be **editing only the selected elements**.
- Instance parameters can be constantly exposed in the **Properties palette**. Selecting something initially displays the instance parameters.



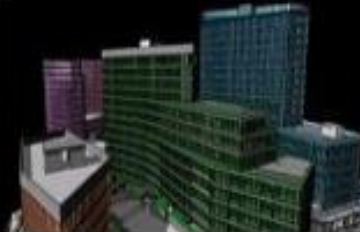
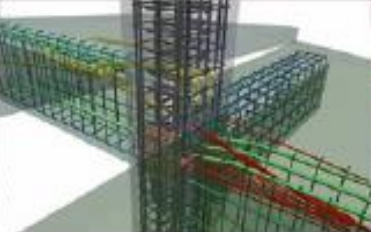
LEVEL OF DEVELOPMENT (LOD)

PHASE	LEVEL OF DEVELOPMENT
Planning	LOD 100- Conceptual 
Preliminary Design	LOD 200- Approximate Geometry 

PHASE	LEVEL OF DEVELOPMENT
Detail Design	LOD 200- Approximate Geometry 
Construction	LOD 300- Precise Geometry 
Close-out/ Handover	LOD 500- As-built 

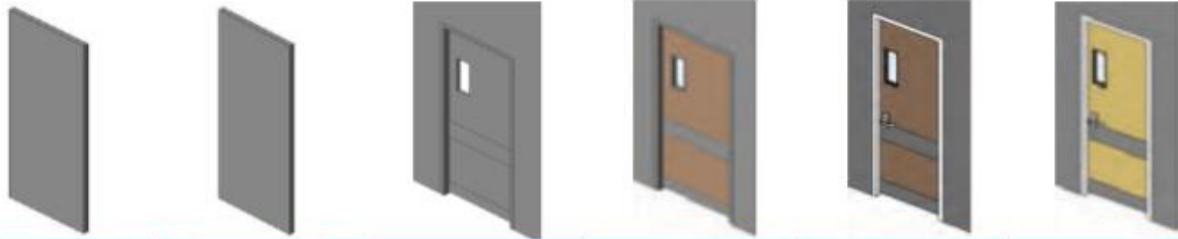
- Defined as **the content and reliability of Building Information Models** throughout construction project life-cycle.
- Using elements with predetermined LOD allows determining the expected BIM content on the object level at different phases.

LEVEL OF DEVELOPMENT (LOD)

DESCRIPTION				
100	200	300	400	500
Non-geometric data • Orientation • Line work • Areas • Volume zones	Generic elements show in 3D • Approx. size • Approx. shape • Approx. location	Specific elements confirmed 3D object geometry • Exact size • Exact location • Typical Details	Shop Drawing / Fabrication • Connection Details • Material • Manufacturer	As-Built • Actual
				

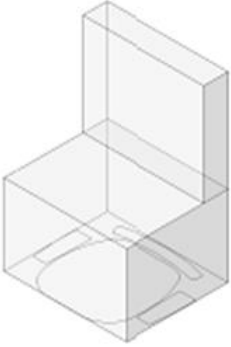
LEVEL OF DETAIL (LOd)

A simple example can be illustrated in the diagram below:

Family							
Stage		Concept	Preliminary	Detailed	Construction	As-Built	Operation
LOD		100	200	300	400	500	600
Dimension	Width	-	900mm	900mm	900mm	900mm	900mm
	Height	-	1800mm	1800mm	1800mm	1800mm	1800mm
	Thickness	-	50mm	50mm	50mm	50mm	50mm
Material		-	-	Wood	Wood	Wood	Wood
Finishing		-	-	Painting	Painting	Painting	Vanish
Identity data	Manufacturer	-	-	-	XY Sdn.Bhd	XY Sdn.Bhd	WZ Sdn.Bhd
	Model	-	-	-	XD 001	XD 001	F 005
	Fire rated	-	-	2 Hours	2 Hours	2 Hours	2 Hours
	Cost	-	-	-	RM200	RM200	RM250
	Installation date	-	-	-	12.08.16	12.08.16	02.03.16

- The degree of information detail (geometrical and non-geometrical) throughout the project life cycle.
- Progression of each Lod carries detailed specifications accordingly.
- The examples of attributes of LOd are size, volume, shape, height, and orientation.

LEVEL OF DETAIL (LOd)

LOD 100	LOD 200	LOD 300	LOD 400	LOD 500
				
Concept (Presentation)	Design Development	Documentation	Construction	Facilities Management
DESCRIPTION: Office Chair Arms, Wheels WIDTH: 700 DEPTH: 450 HEIGHT: 1100 MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: 100	DESCRIPTION: Office Chair Arms, Wheels WIDTH: 700 DEPTH: 450 HEIGHT: 1100 MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: 200	DESCRIPTION: Office Chair Arms, Wheels WIDTH: 700 DEPTH: 450 HEIGHT: 1100 MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: 300	DESCRIPTION: Office Chair Arms, Wheels WIDTH: 685 DEPTH: 430 HEIGHT: 1085 MANUFACTURER: Herman Miller, Inc MODEL: Mirra LOD: 400	DESCRIPTION: Office Chair Arms, Wheels WIDTH: 685 DEPTH: 430 HEIGHT: 1085 MANUFACTURER: Herman Miller, Inc MODEL: Mirra PURCHASE DATE: 01/02/2013
(Only data in red is useable)				

practicalBIM.net © 2013

Therefore LOd for a chair might go:

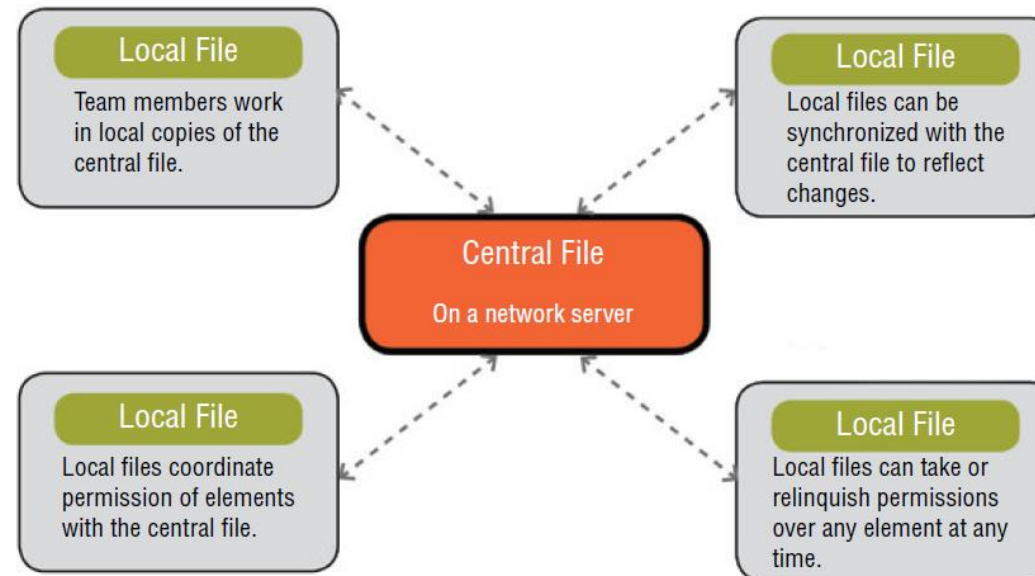
- LOD 100 = there is a chair
- LOD 200 = there is a chair that has nominal space requirement of 500 x 500
- LOD 300 = there is a chair with arm rests and wheels
- LOD 400 = manufacturer and model number.
- LOD 500 = manufacturer and model number, supplier, date purchased

or in general terms:

- LOD 100 = there is a thing
- LOD 200 = there is a thing about this size
- LOD 300 = there is a thing with these functions and options
- LOD 400 = it is this particular thing.
- LOD 500 = this particular thing provided by this person on this date.

WHAT IS COLLABORATION?

- Most architecture projects **involve multiple people working together at any given time**.
- It is common in design for many people to work collaboratively to meet deadlines and create a set of design documents.
- Revit has tools that allow for a **collaborative design and documentation process** while giving multiple people simultaneous **access to the same file**.
- This unique functionality is known as **worksharing**.



Source: Mastering Autodesk Revit 2020

The worksharing concept



BIM TOOLS

Source: Mastering Autodesk Revit 2020

BIM SOFTWARE DEVELOPERS

GRAPHISOFT.
A NEMETSCHEK COMPANY



AUTODESK jadi pilihan kerana murah, modeling cantik, detailing



licence 1k utk
1 tahun

AVEVA
CONTINUAL PROGRESSION



BIM SOFTWARE DEVELOPERS

Product Name	Provider	BIM Uses	Category	Website Link
Allplan Architecture Allplan Engineering	Nemetschek	Universal BIM planning tool with extensive CAD functionality. Supports the entire planning process in engineering and design offices, as well as construction companies	Architecture	www.allplan.com www.nemetschek.com
ArchiCAD	Nemetschek Graphisoft	Focus on architecture, design, and creativity, combined with cutting-edge technology and innovation, allowing architects to design buildings.	Architecture	www.graphisoft.com www.nemetschek.com
AutoCAD AutoCAD Architecture AutoCAD Mechanical AutoCAD Electrical AutoCAD Civil 3D	Autodesk	2D and 3D computer-aided design and drafting software application used in architecture, construction, and manufacturing to assist in the preparation of blueprints and other engineering plans.	Architecture Structural MEP	www.autodesk.com
CypeCAD / CypeCAD LT Cype 3D	Cype	Analysis and design of reinforced concrete and steel structures	Structural	www.cype.com
CypeCAD MEP	Cype	Design of the envelope, distribution and services of the building	MEP	www.cype.com
Graitec Advance BIM Designers Advance CAD Advance Concrete Advance Steel	Graitec Group	Superior solution for the structural analysis and design of Reinforced Concrete, Steel and Timber structures.	Structural	www.graitec.com
Microstation	Bentley	Provides the power & versatility to precisely view, model, document, & visualize information-rich 2D & 3D designs of all types and scales for professionals in every discipline on infrastructure projects of every type.	Architecture	www.bentley.com
Revit Architecture Revit Structure Revit MEP	Autodesk	Supports BIM workflow from concept to construction. Use for modeling designs with precision, optimize performance, and collaborate more effectively. Also a 4D BIM capable with tools to plan and track various stages in the building's lifecycle, from concept to construction and later demolition.	Architecture Structural MEP	www.autodesk.com
Renga Architecture	Ascon Group	Focused on making design comfortable, and on making all tools available in 3D.	Architecture	www.rengacad.com www.ascon.net
SketchUp Pro	Trimble	Mainly for concepting, visualization, communication, and planning. An intuitive way to design, document and communicate your ideas in 3D.	Architecture	www.trimble.com www.sketchup.com
Tekla Structures	Trimble	Models created in the software carry the accurate, reliable and detailed information needed for successful construction execution.	Structural	www.tekla.com www.trimble.com
TiffinBIM Architecture TiffinBIM Structure TiffinBIM MEP	Innovacia Sdn Bhd	A local product powered by European technology, used for the object-oriented creation of architectural plans and sections, interactive 3D previews and realistic visualisation.	Architecture Structural MEP	www.innovacia.com.my www.tiffinbim.com.my www.trn2u.com
Vectorworks Architect	Nemetschek	Offers a full range of design and documentation capabilities with a user-friendly interface	Architecture Engineering	www.vectorworks.net www.nemetschek.com



BIM SOFTWARE PLATFORM IN POLITEKNIK

WHAT IS AUTODESK REVIT?

- Autodesk Revit software is a **BIM application for authoring parametric 3D models** that generate geometry with embedded information for the design and construction of buildings and infrastructure.
- It is from these intelligent models that **plans, sections, elevations, perspectives, details, and schedules**—all of the necessary instruments to document the design of a building—can be derived.
- Drawings created using Revit are not a collection of 2D lines and shapes that are interpreted to represent a building but **live views extracted from virtual building models**.
- These models are **a compilation of intelligent components that contain not only geometric attributes but also data informing decisions** about the building at every stage of the process, including occupancy.

Source: Mastering Autodesk Revit 2020



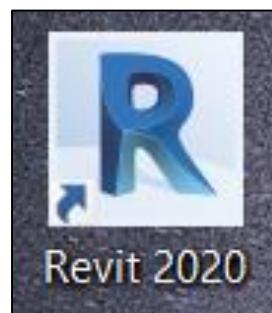
REVIT USER INTERFACE

Source: Mastering Autodesk Revit 2020



KEMENTERIAN PENGAJIAN TINGGI

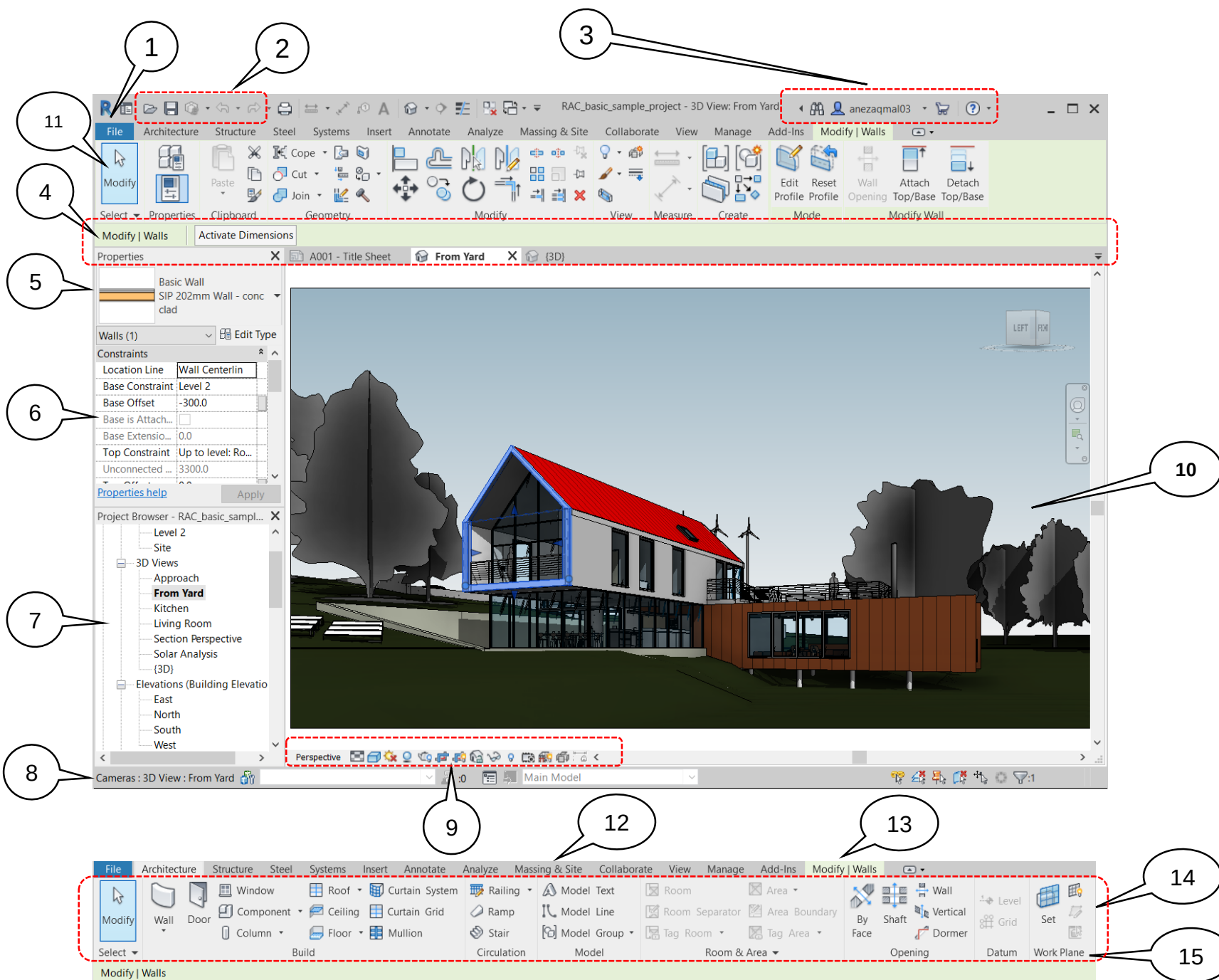
POLITEKNIK
MALAYSIA



R AUTODESK® **REVIT® 2020**



A AUTODESK.



NO	DETAILS
1	FILE TAB
2	QUICK ACCESS TOOLBAR
3	INFO CENTER
4	OPTIONS BAR
5	TYPE SELECTOR
6	PROPERTIES PALETTE
7	PROJECT BROWSER
8	STATUS BAR
9	VIEW CONTROL BAR
10	DRAWING AREA
11	RIBBON
12	TABS ON THE RIBBON
13	A CONTEXTUAL TAB ON THE RIBBON, PROVIDING TOOLS RELEVANT TO THE SELECTED OBJECT OR CURRENT ACTION
14	TOOLS ON THE CURRENT TAB OF THE RIBBON
15	PANELS ON THE RIBBON

NAVIGATION METHODS



ViewCube

A 3D navigation tool known as the ViewCube is available in most Autodesk design software. This tool will appear by default **in the upper-right corner of any 3D view**. Click any face of the cube to orient the view to that face or click a corner of the cube to orient to an axonometric angle.



SteeringWheels

Another method of navigation that is unique to Autodesk software is the SteeringWheels tool. This tool can be activated by pressing the **F8 key**, by pressing **Shift+W**, or by using the **Navigation bar**.

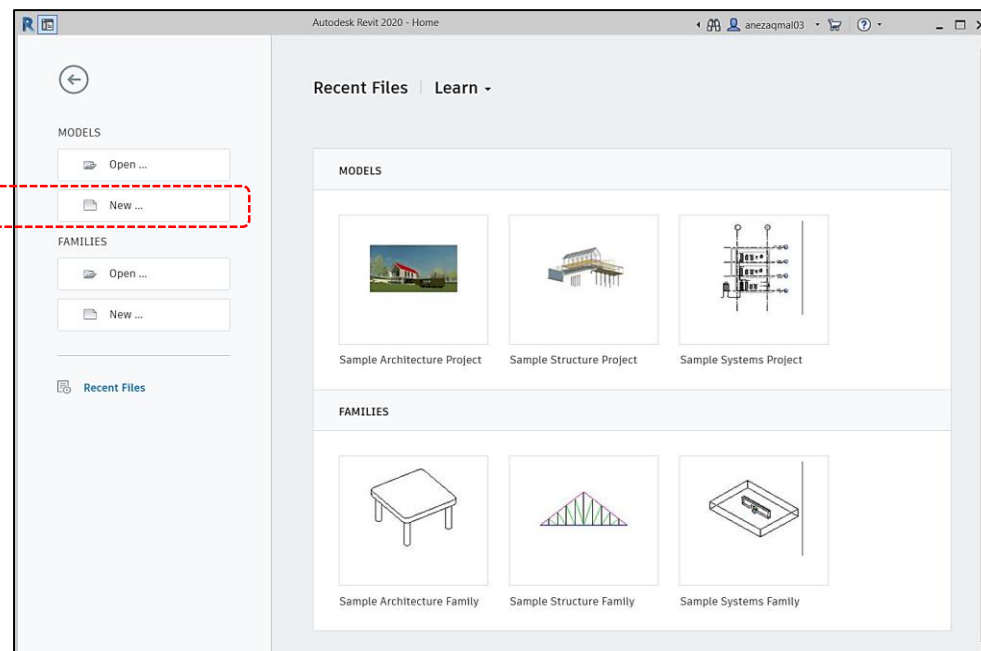


Navigation Bar

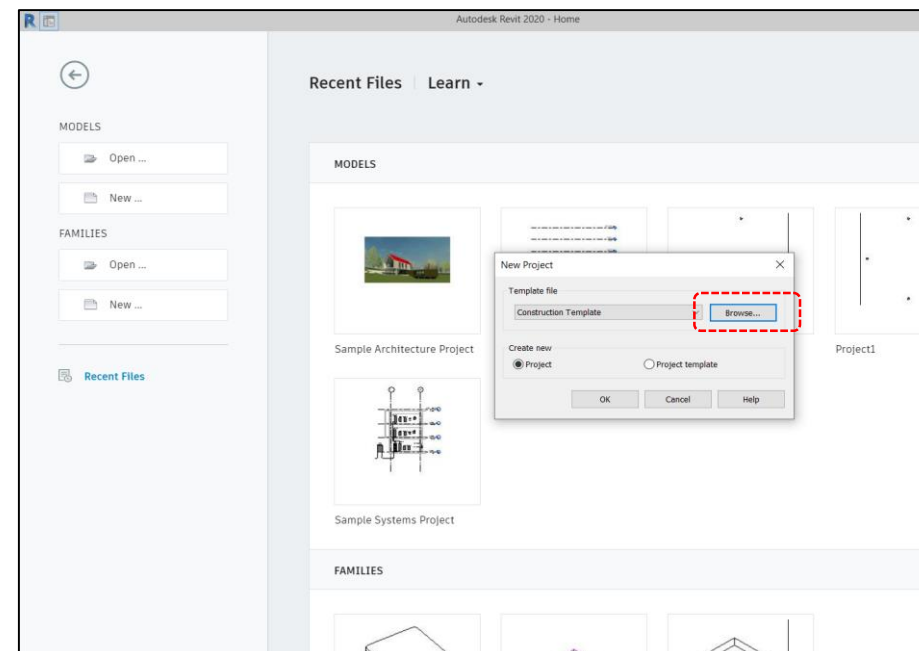
Access to the most common navigating tools is also provided in the Navigation bar located **at the right side of the drawing area**. From here you can launch any of the Steering Wheels and all the zoom/pan commands from the flyout buttons.

ORGANIZING PROJECTS *(Starting from scratch)*

Example for **Architecture** project is as follows:

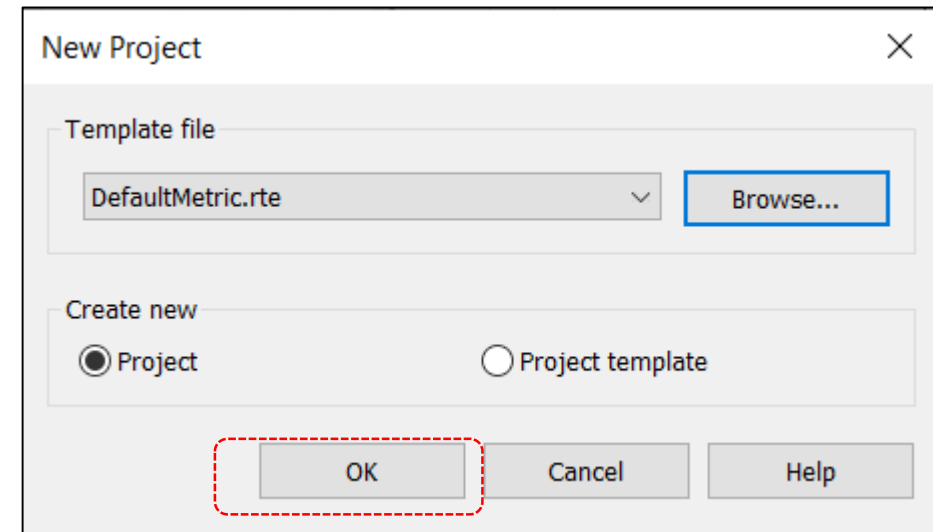
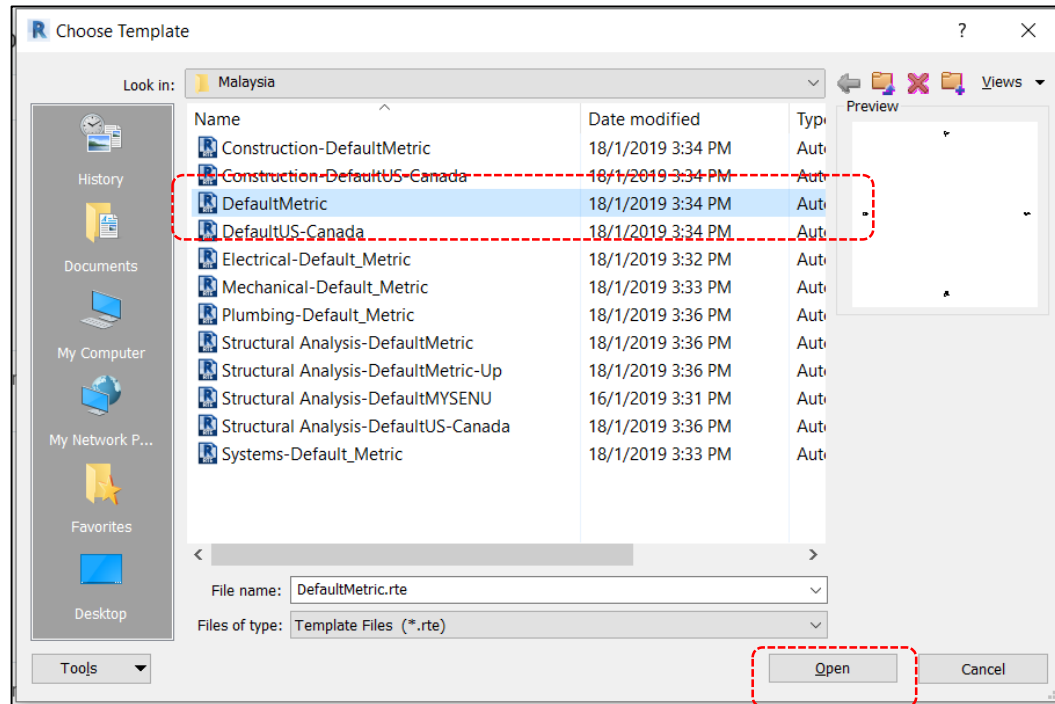


1. Click **“New project”**



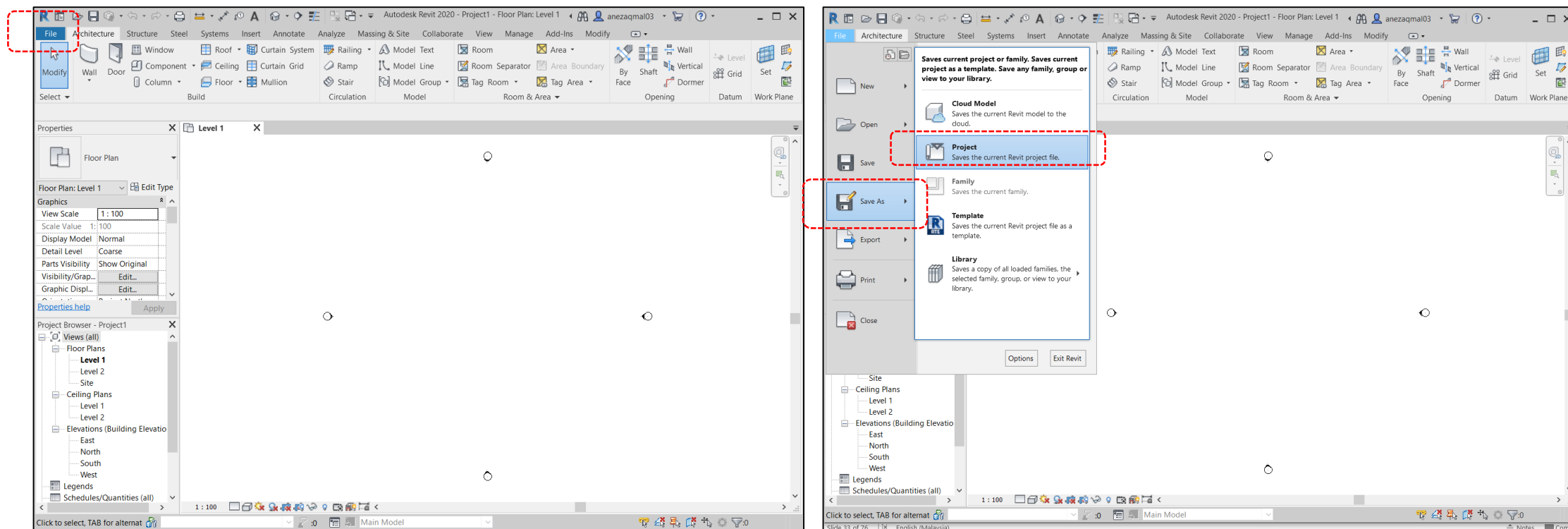
2. Select **“Browse”**

ORGANIZING PROJECTS *(Starting from scratch)*



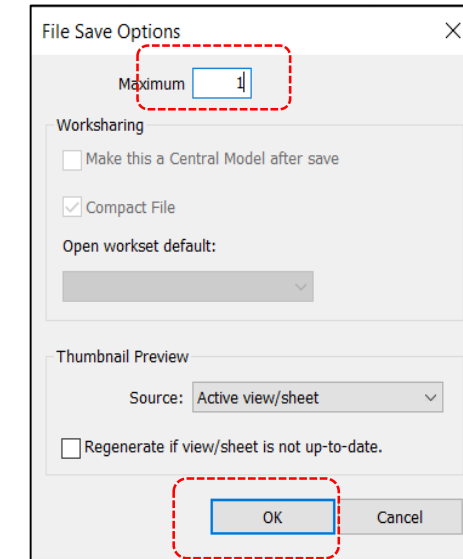
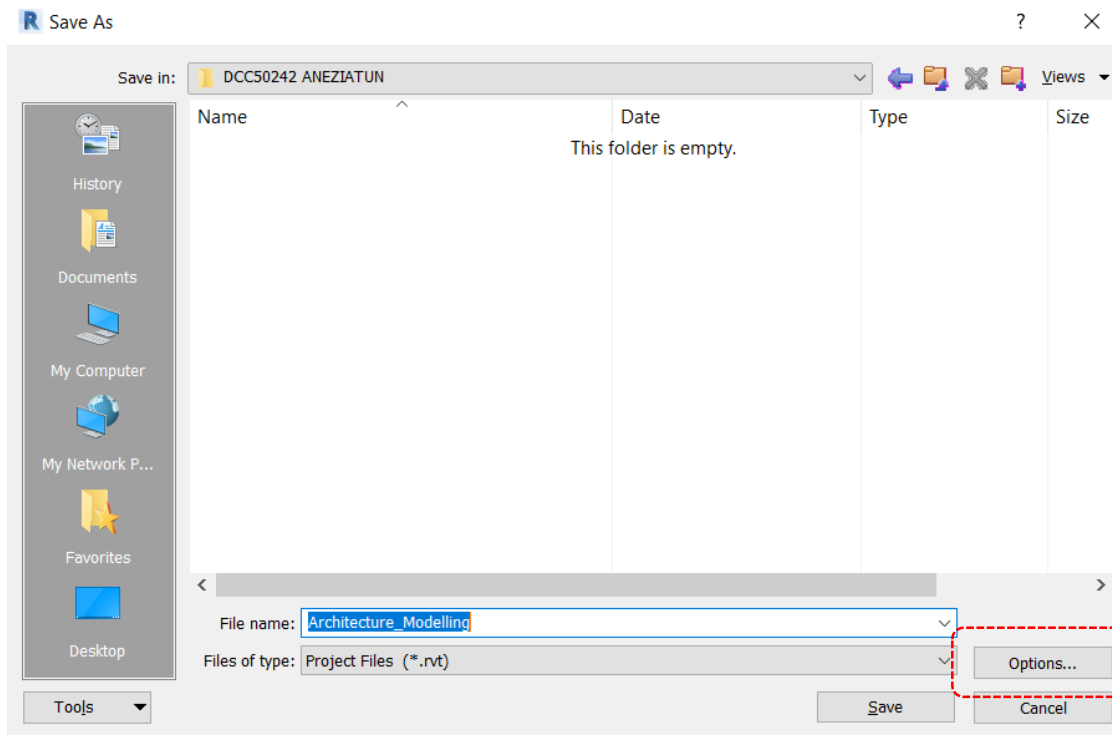
3. Choose **“DefaultMetric”**, Click **“Open”** and click **“OK”**

ORGANIZING PROJECTS *(Starting from scratch)*

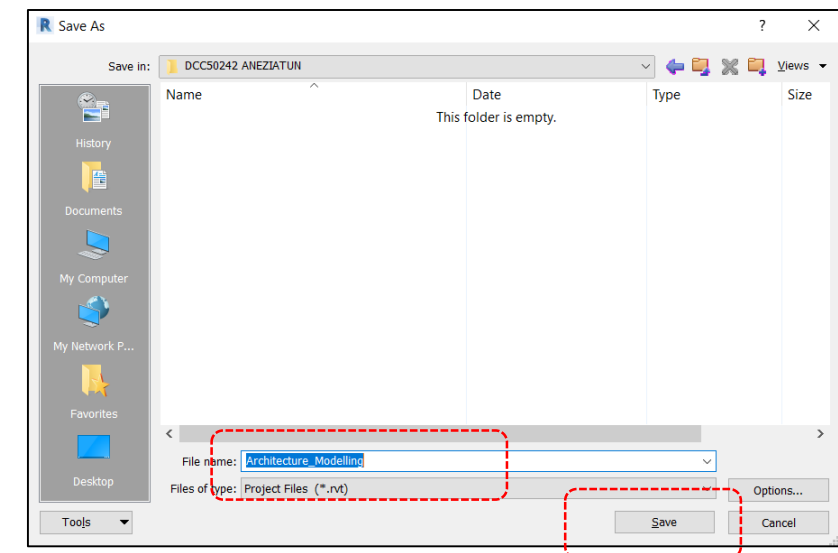


3. To save the project, click on the **“File Tab”**, select **“Save As”**, then select **“Project”**.

ORGANIZING PROJECTS *(Starting from scratch)*

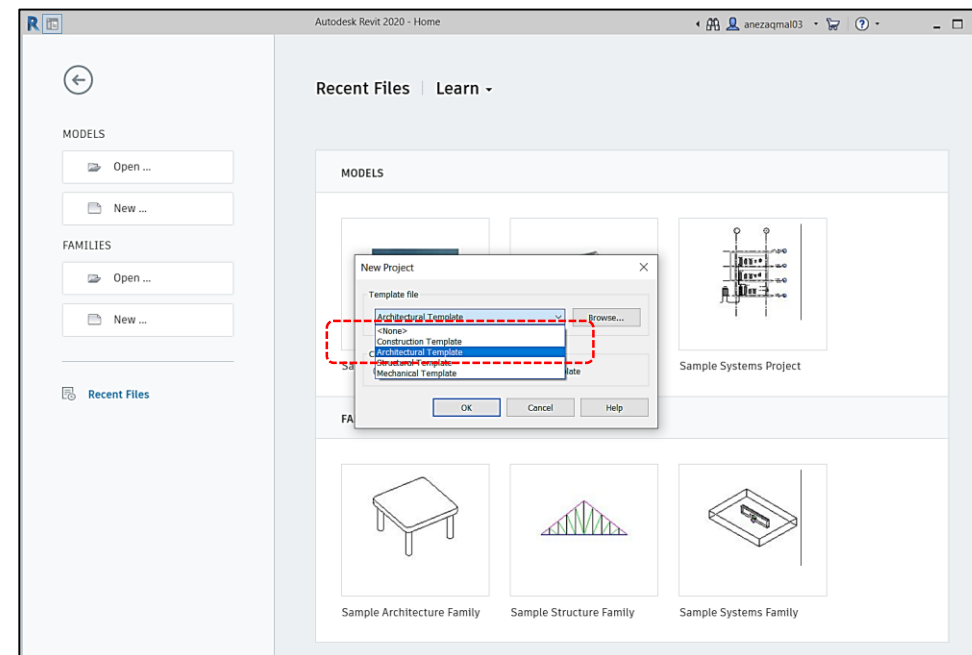
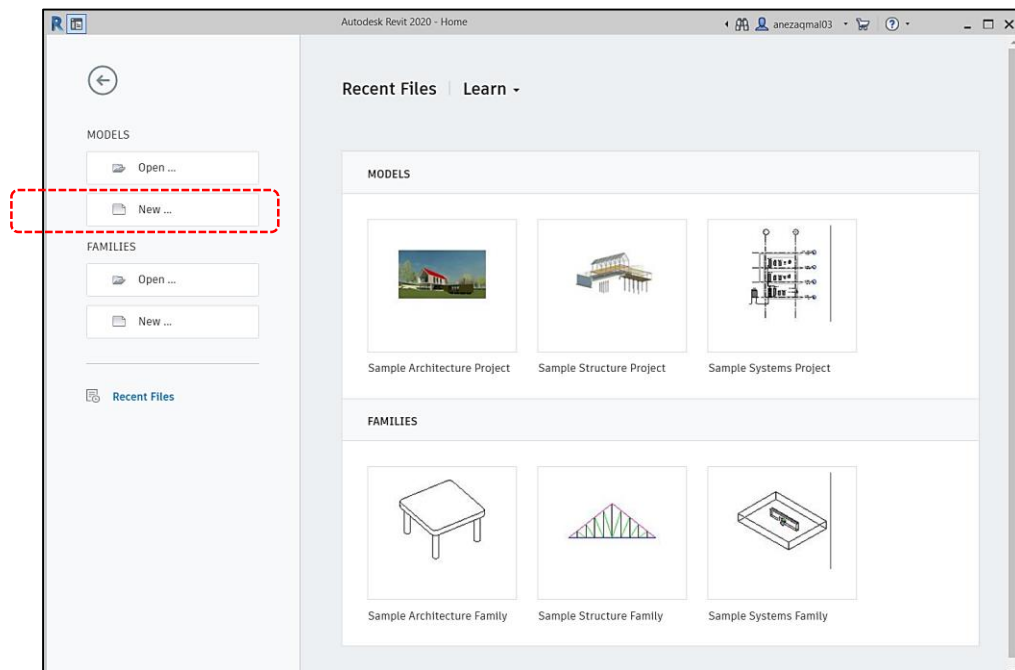


4. Click **“Options”**, enter the value **“1”** on Maximum Backup and click **“OK”**.
5. Change **File name** example **“Architecture_Modelling”** *(or any name regarding to your project)*, Files of type to **Project Files (*.rvt)** and click **“Save”**.



ORGANIZING PROJECTS *(using templates)*

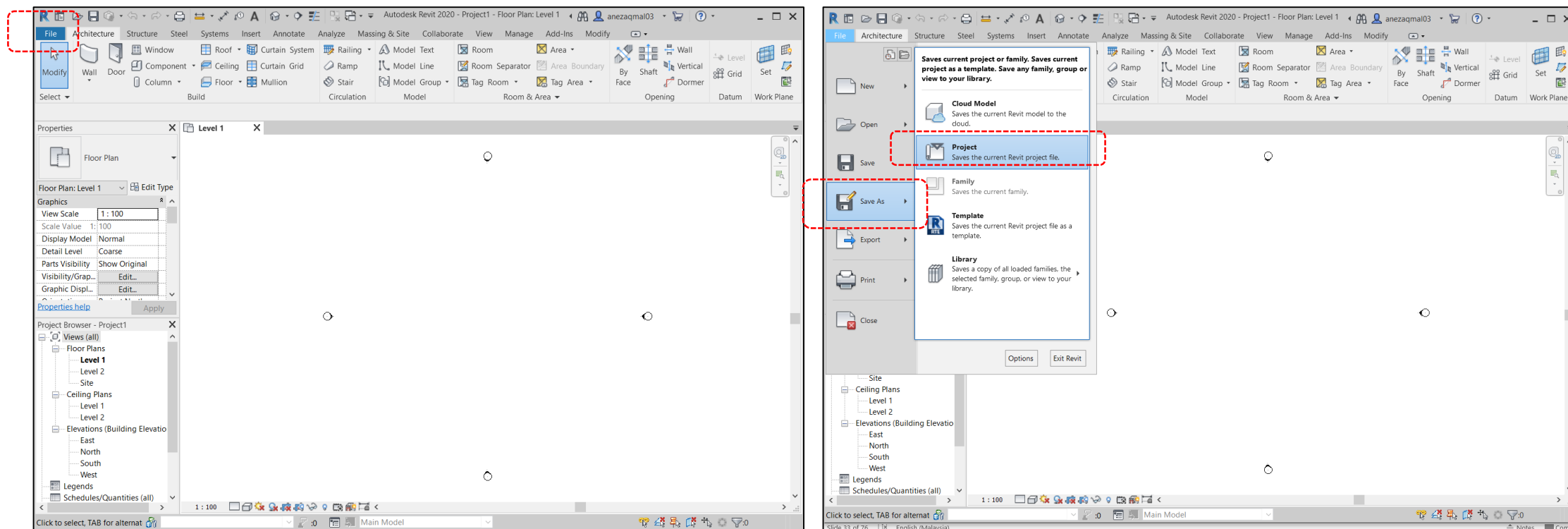
Example for **Architecture project** using templates that already in template file is as follows:



1. Click “**New project**”

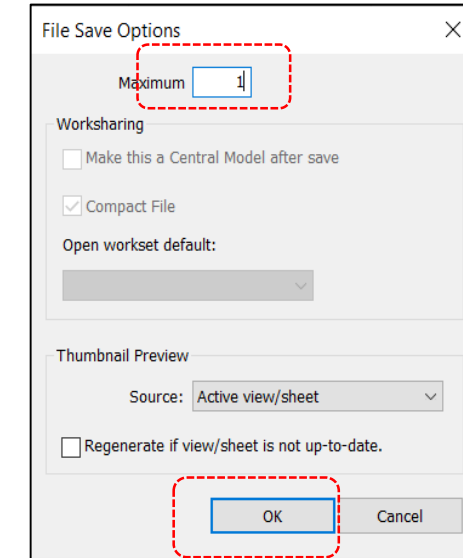
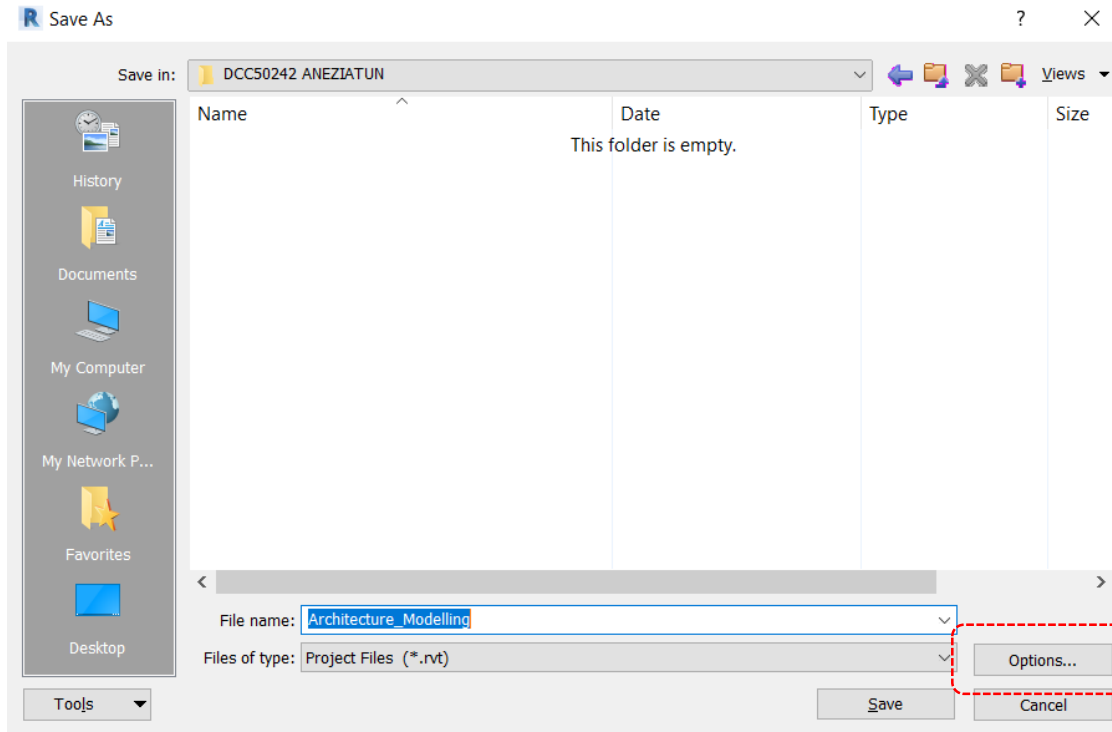
2. Select drop down and click “**Architecture Templates**”

ORGANIZING PROJECTS *(using templates)*

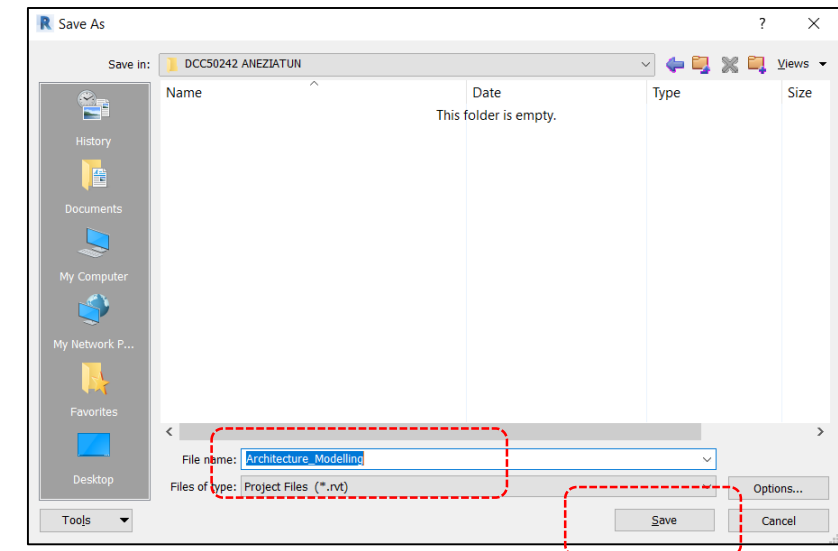


3. To save the project, click on the **“File Tab”**, select **“Save As”**, then select **“Project”**.

ORGANIZING PROJECTS *(using templates)*



4. Click **“Options”**, enter the value **“1”** on Maximum Backup and click **“OK”**.
5. Change **File name** example **“Architecture_Modelling”** *(or any name regarding to your project)*, **Files of type** to **Project Files (*.rt)** and click **“Save”**.



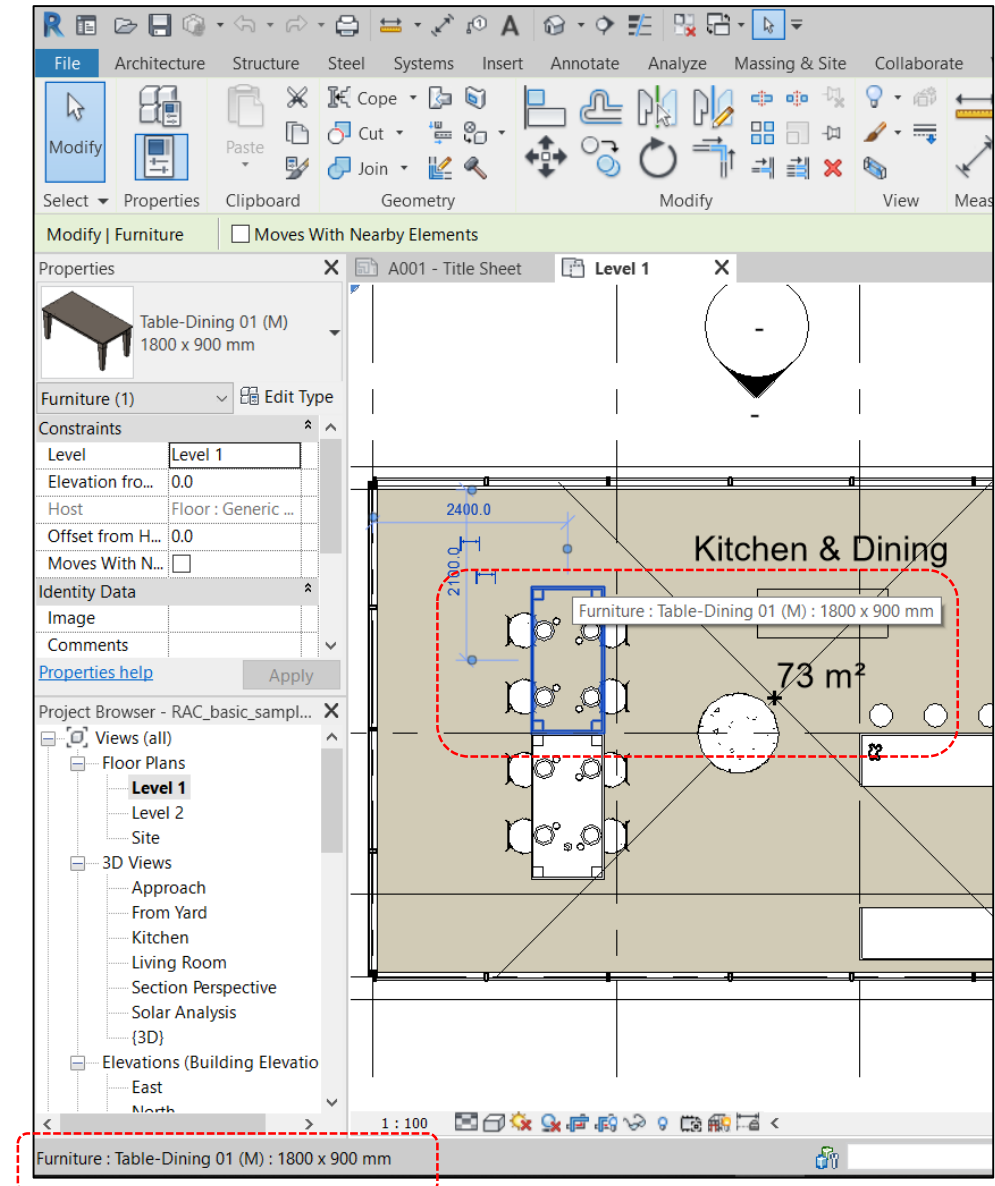


THE BASIC OF THE TOOLBOX

Source: Mastering Autodesk Revit 2020

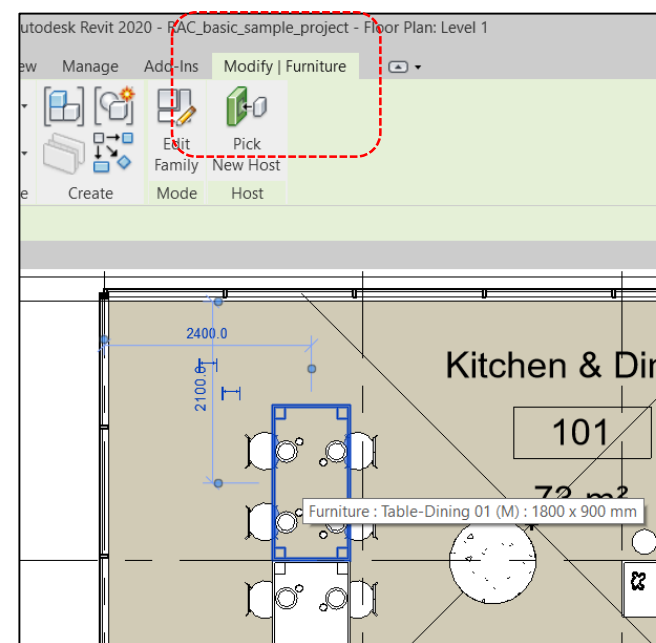
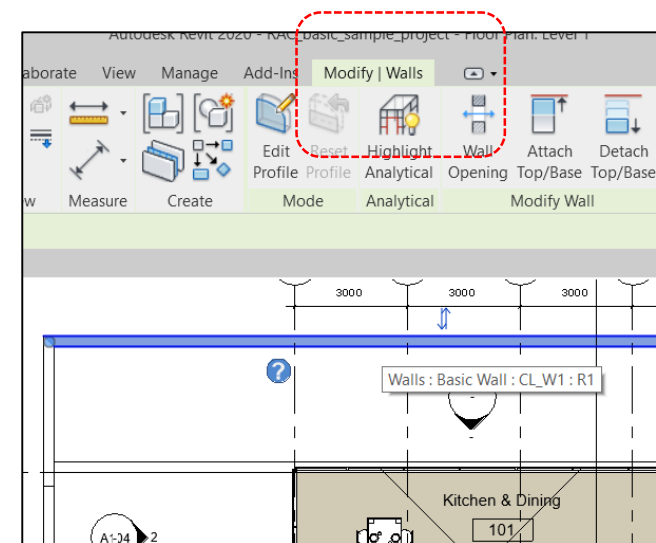
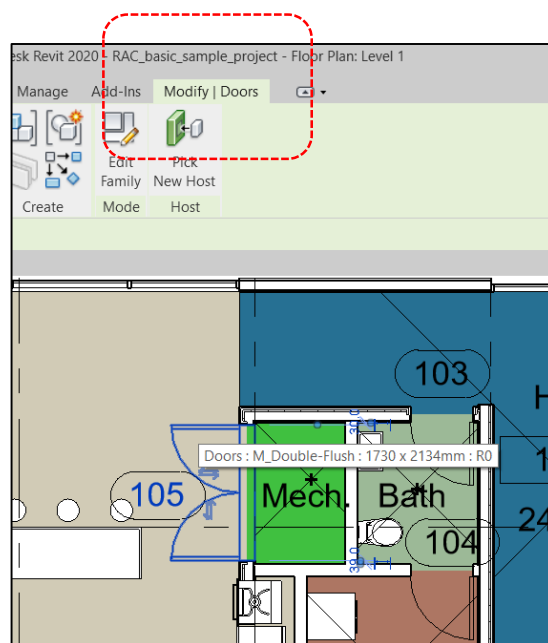
SELECTING ELEMENTS

- Revit was one of the first programs that had the **ability to highlight elements** as you hovered the mouse pointer over them, before actually clicking to select.
- Not only does this give you a clear idea of what you are about to select, but it also **displays information about that object in the status bar and in a tooltip near the mouse pointer**.
- When you hover over any element in Revit, it highlights; **click the highlighted element, and it turns blue**, indicating that it is **selected**.



SELECTING ELEMENTS

- Once an element is selected, the ribbon changes to **Modify mode**, where **consistent editing tools are located on the left side** and **context-sensitive tools appear to the right**.
- Notice the subtle differences in the ribbon, when a wall, door and furniture are selected.



SELECTING ELEMENTS

Add or Subtract:

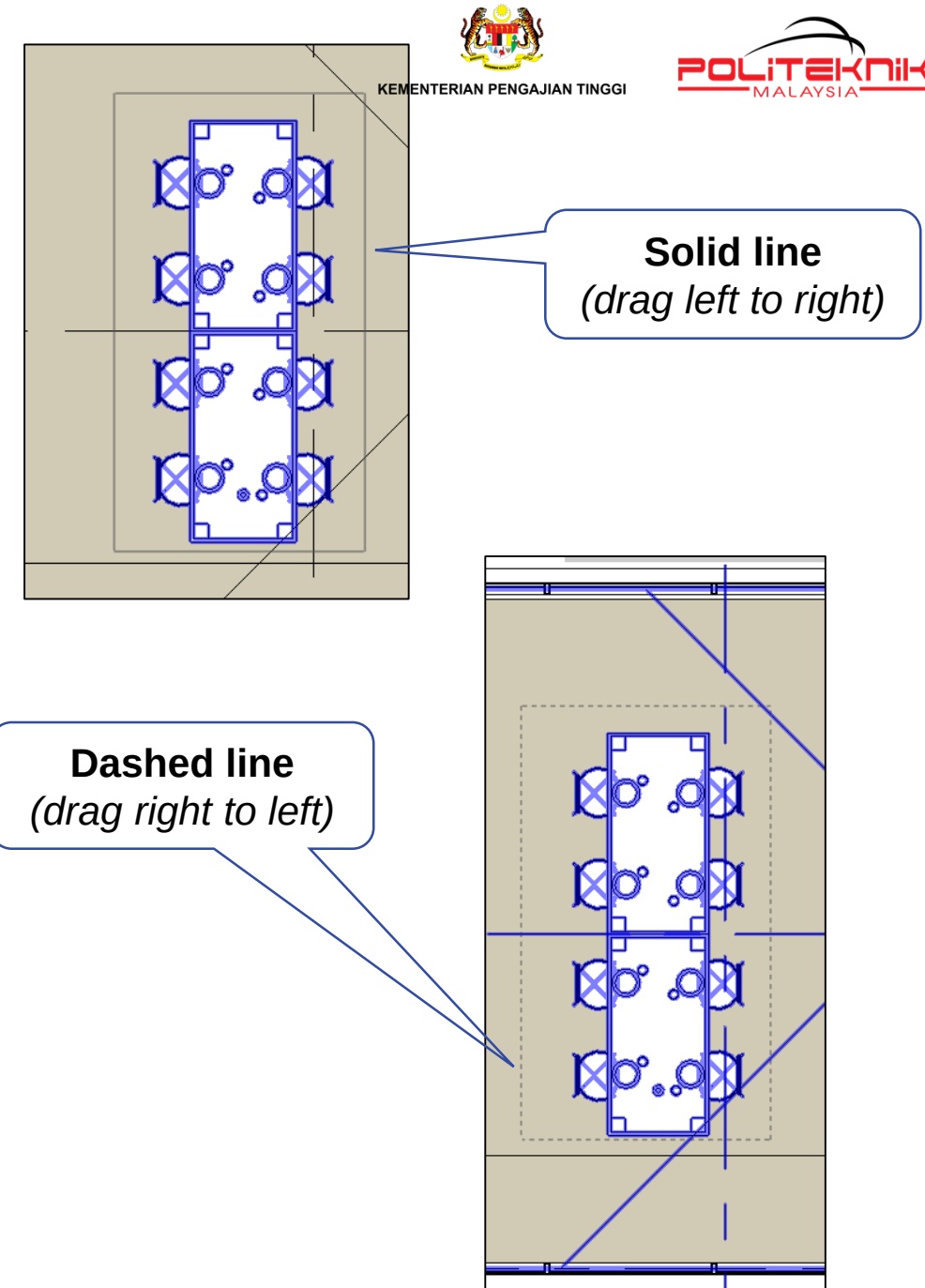
- You can build a selection of individual elements by using the **Ctrl** and **Shift** keys on your keyboard.
- To **add elements**, press and hold the **Ctrl key**, then click an element.
- To **remove elements**, press and hold the **Shift key**, then click an element.
- Notice that the mouse pointer indicates a **plus sign (+)** when you hold the Ctrl key and a **minus sign (-)** when you hold the Shift key.



SELECTING ELEMENTS

Window:

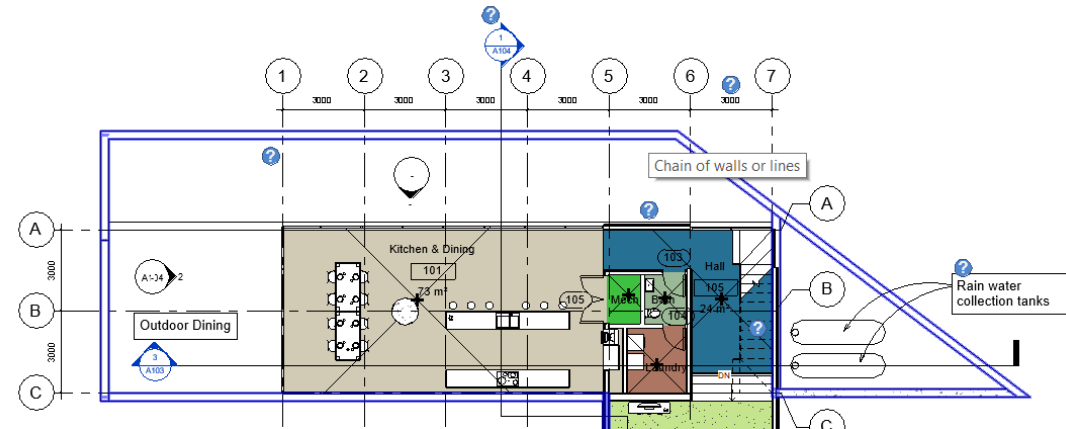
- To select a large number of elements in a view window, you can click and drag the mouse to form two different types of selection windows.
- Click and **drag from left to right**, and only the elements completely within the window will be selected—this implied window is displayed as a **solid line**.
- Click and **drag from right to left**, and any element within or crossing the window will be selected—this implied window is displayed as a **dashed line**.
- To activate either window-selection tool, you must begin by clicking in a blank area (not on an element) within the view window.



SELECTING ELEMENTS

Chain:

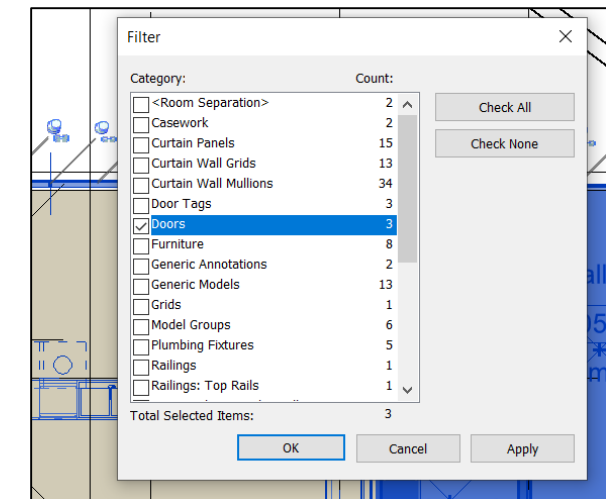
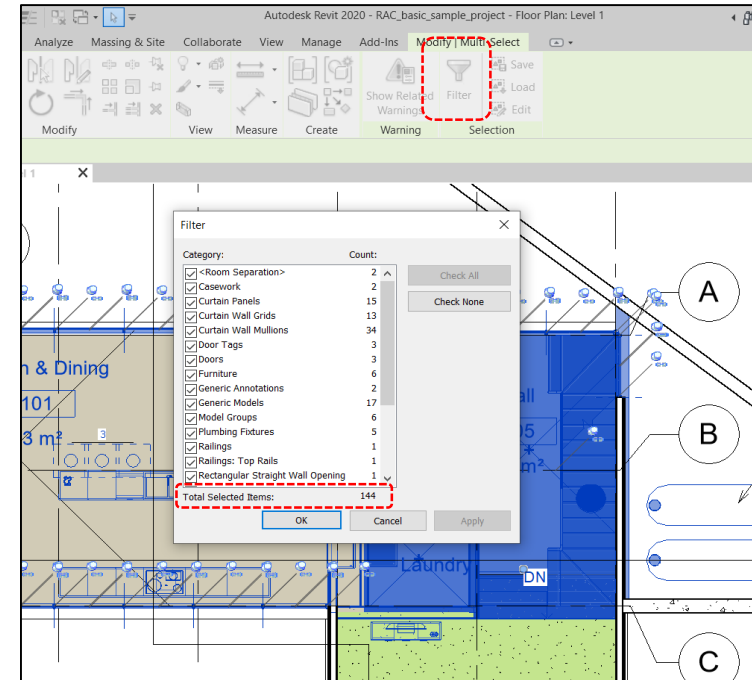
- Chain-select is an **intelligent method for selecting connected elements such as walls, lines, sketch segments, and line-based components.**
- To activate this mode, hover (but don't click) your mouse over one linear element that is connected to several other linear elements.
- While the element is pre-selected, **press the Tab key once** and the connected elements will be pre-selected.
- You can then click to select the chain of elements. the status bar; it will indicate *“Chain of walls or lines”* when you have selected correctly



SELECTING ELEMENTS

Filtering Your Selection:

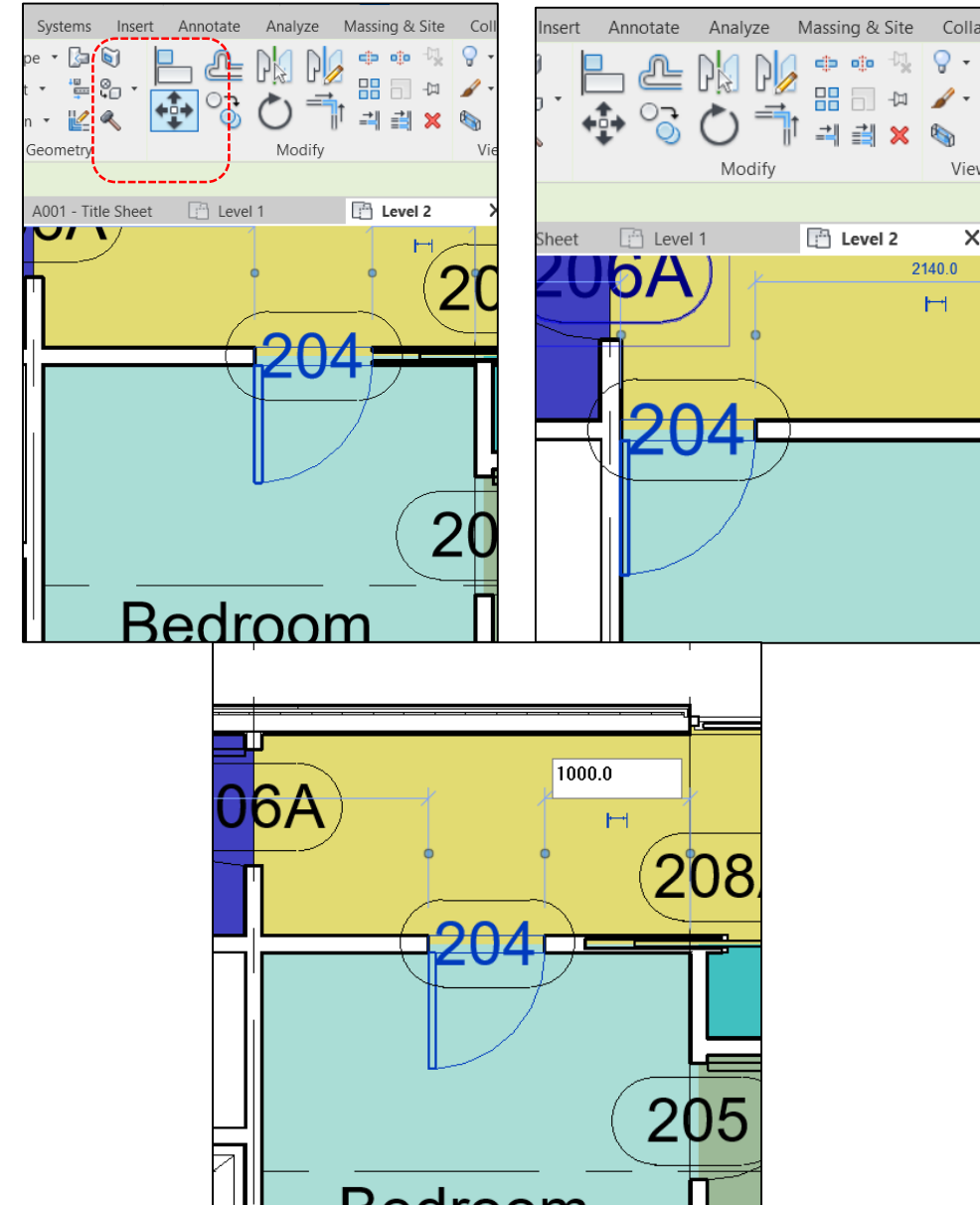
- Once you have elements selected, a count of selected objects is displayed at the right end of the status bar.
- You can also filter the selection into object categories by **clicking the Filter icon** in the status bar or ribbon.
- Using the **Filter tool**, you can limit the selection to just the Doors category—or perhaps Doors and Door Tags.



MOVING ELEMENTS

Using the Move Tool:

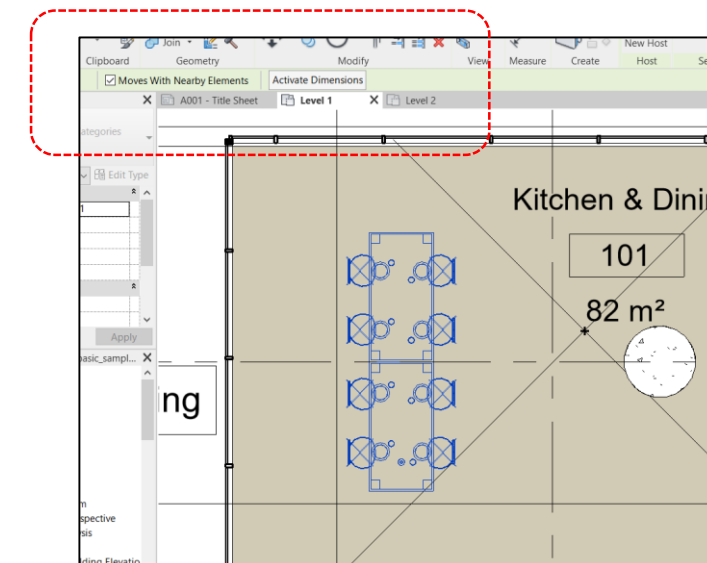
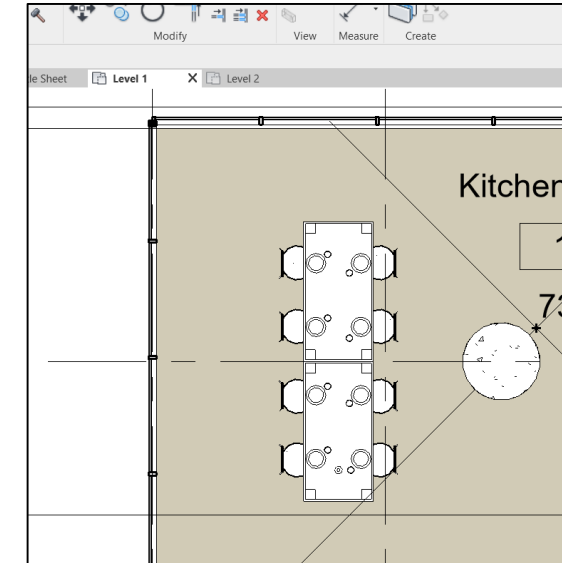
- Moving elements is a two-click process. First, you **define a start point**; then, you click to **define a destination**.
- If you know you need to move something a specific distance, it does not matter where your two picks take place. All that matters is that the **distance between the two clicks** is the specified distance and in the specified direction.
- Alternatively, you can guide the mouse pointer in the desired direction of the move and **key in the desired dimension value**.



MOVING ELEMENTS

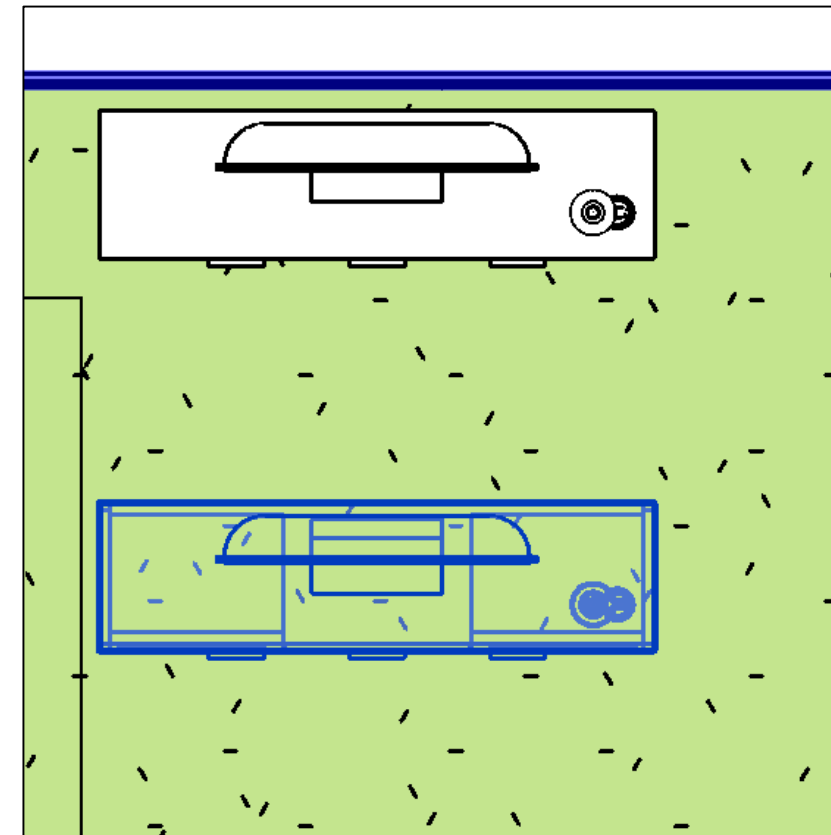
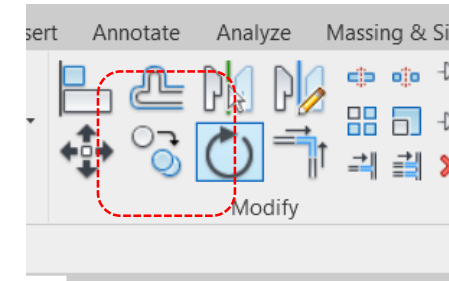
Moving with Nearby Elements:

- A simple way to constrain freestanding elements is to use the Moves With Nearby Elements option.
- When furnishing a space, for example, you probably want to align the furniture with an adjacent wall.
- If you change the design of the space, you want the furniture to follow the wall to the new location.
- For this purpose, **select the furniture** and then **select Moves With Nearby Elements** in the Options bar and **select to an adjacent wall and move**.



COPYING ELEMENTS

- The Copy tool is another modifying tool that is nearly identical to the Move tool.
- To activate this tool, **choose elements you want to copy and then select the Copy tool in the Modify tab in the ribbon.**
- Alternatively, **activate the Copy tool first, select elements you want to copy, and then press the Enter key to start the copy process.**
- Using the Options bar, you can choose to make **multiple copies** in one transaction by **selecting the Multiple option.**
- To quickly copy a single element without the precision of the Copy tool, **click and drag an element while pressing the Ctrl key on your keyboard.**

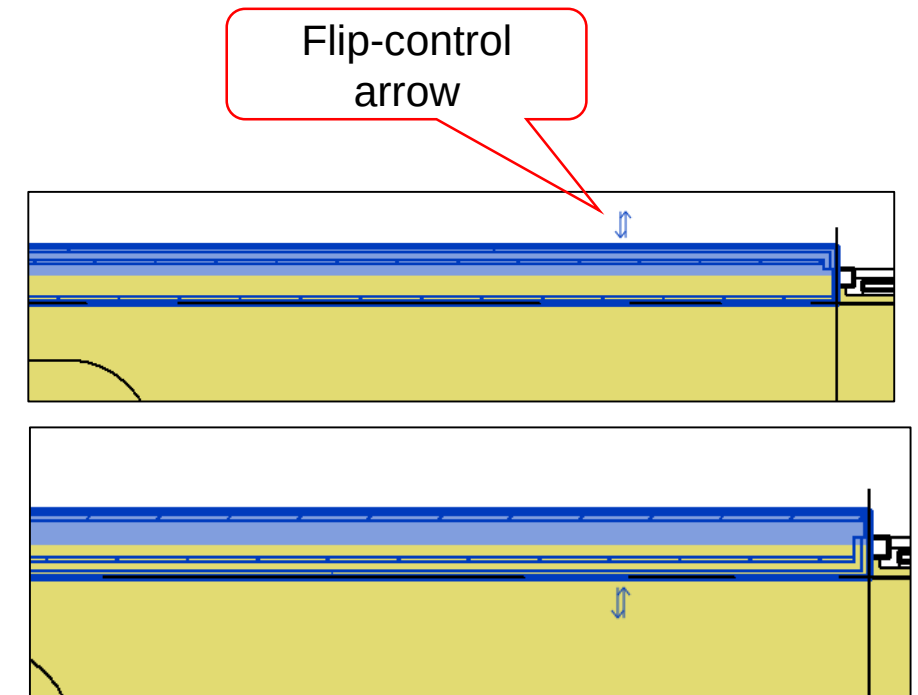
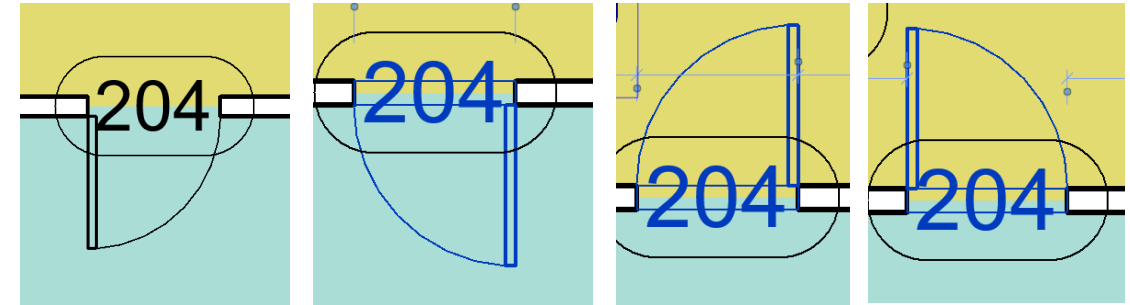


ROTATING AND MIRRORING ELEMENTS

Using the Spacebar

Doors, Windows and wall

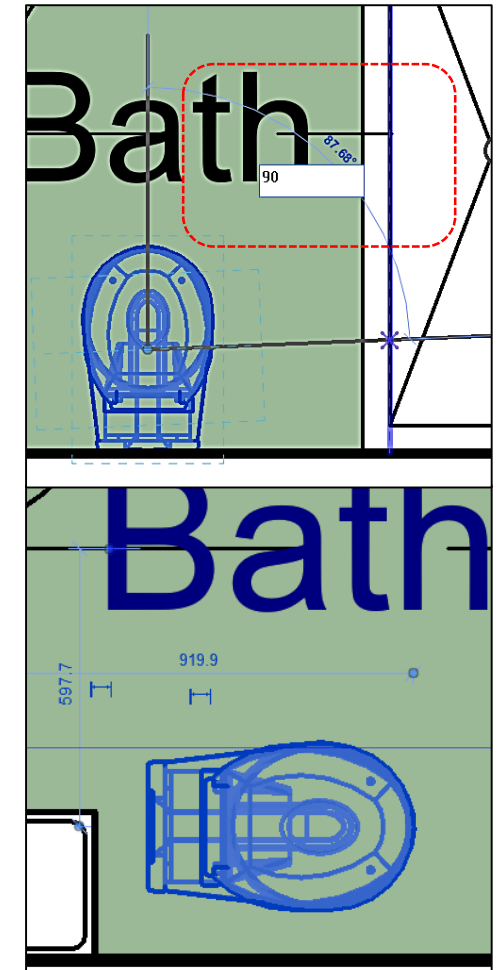
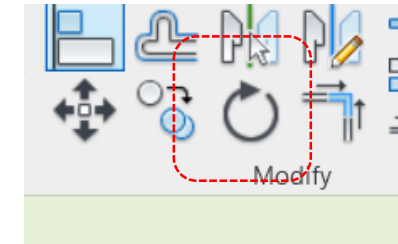
- If you have a door with its swing in the wrong direction, **select it and press the spacebar**. You can cycle through all **four possible orientations** of the door using the Spacebar.
- The same holds true for windows; however, many window families only let you **flip the window from inside to outside** because many windows are symmetrical in elevation.
- The **flip-control arrows** are always located **on the exterior side of walls**. Also use the spacebar to flip the direction of an object.



ROTATING AND MIRRORING ELEMENTS

Using the Rotate Tool

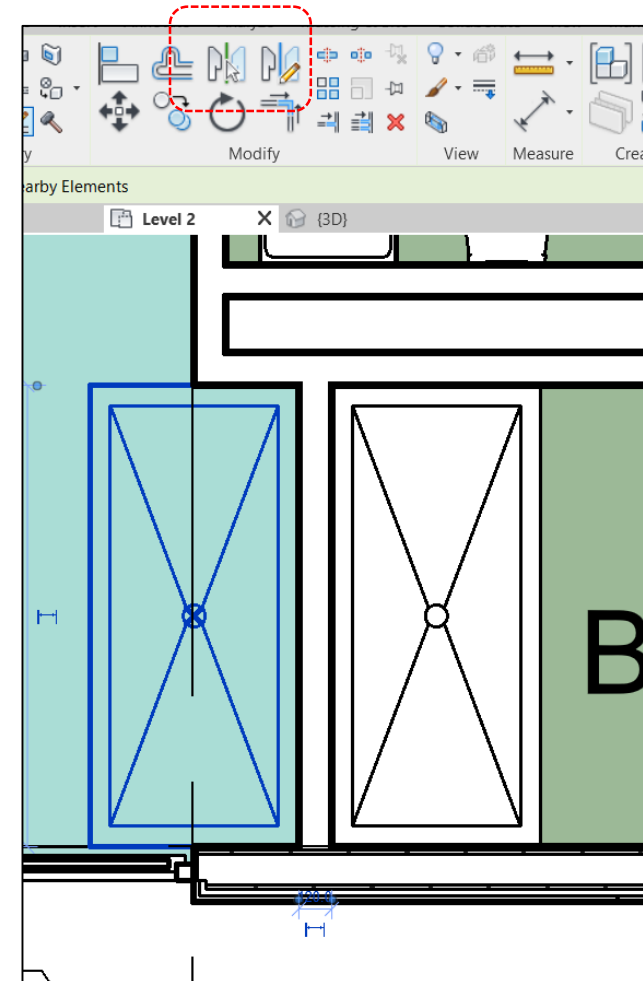
- To rotate an element, select it and click the Rotate tool in the Modify panel. Remember, you can also activate the Rotate tool first, select one or more elements, and then press Enter to begin the operation.
- This is a two-click operation similar to the Move and Copy tools.



ROTATING AND MIRRORING ELEMENTS

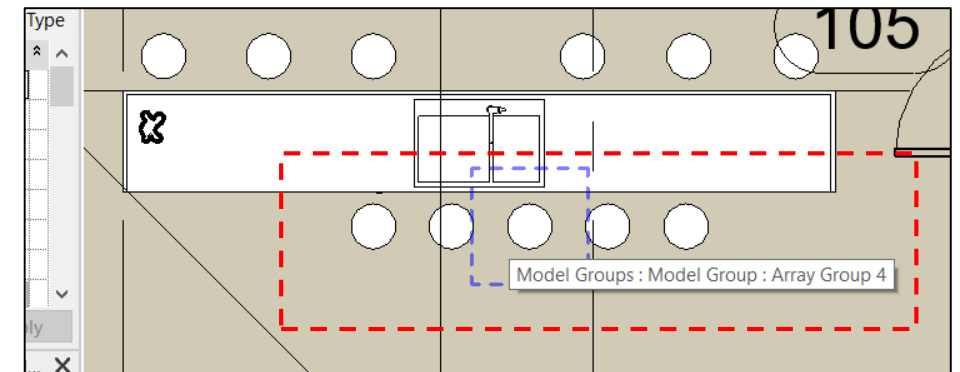
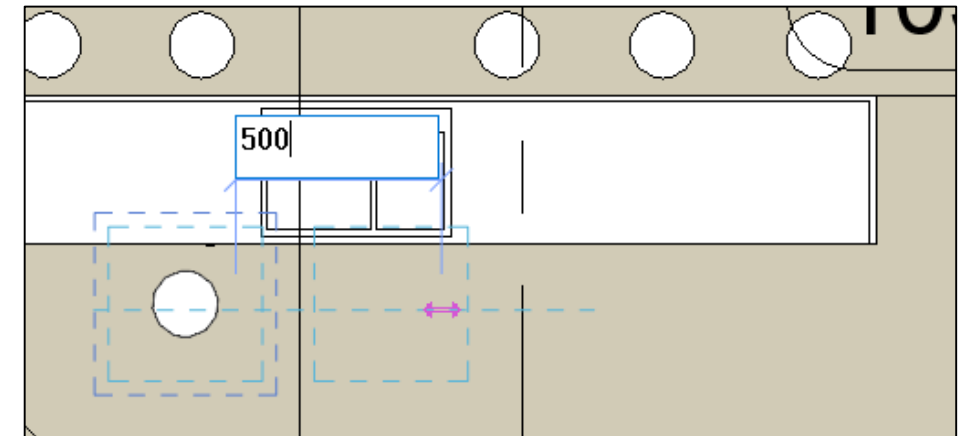
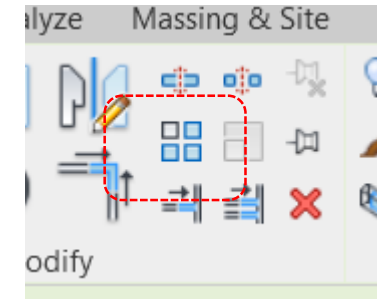
Using the Mirror Tool

- The Mirror tool allows you to mirror elements across an axis in order to create a mirror image of an element or multiple elements.
- You can either pick an existing reference in the model with the **Mirror – Pick Axis tool** or draw the axis interactively using the **Mirror – Draw Axis tool**.



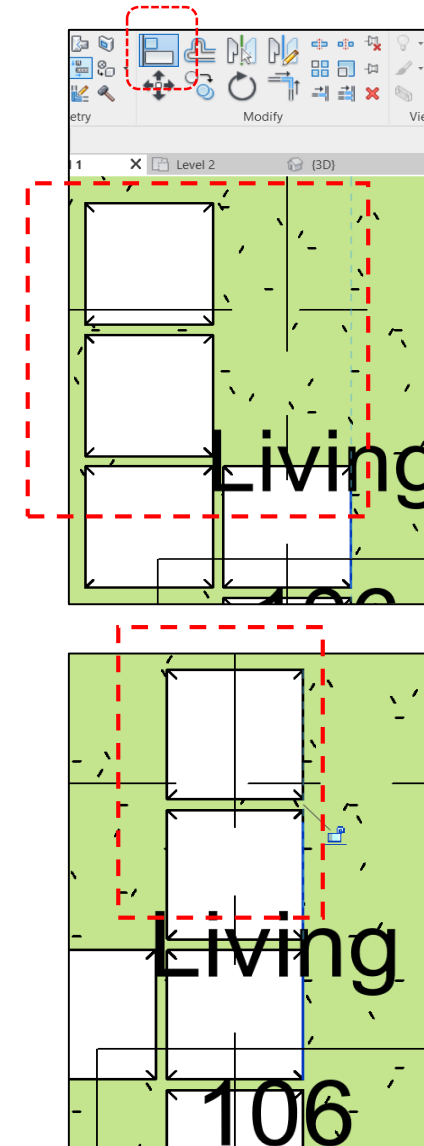
ARRAYING ELEMENTS

- The Array tool allows you to **copy instances of an element with equal spacing between the instances.**
- Like the other tools we have reviewed in the Modify tab of the ribbon, the array options are presented on the Options bar.



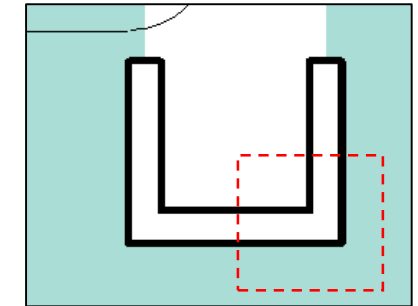
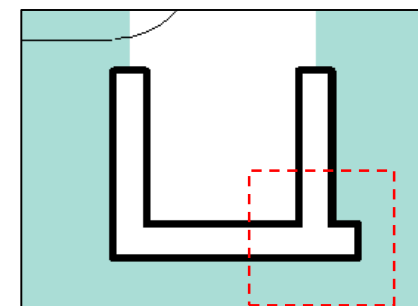
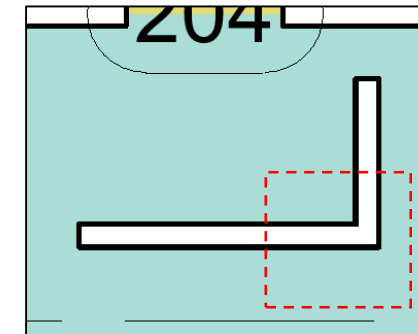
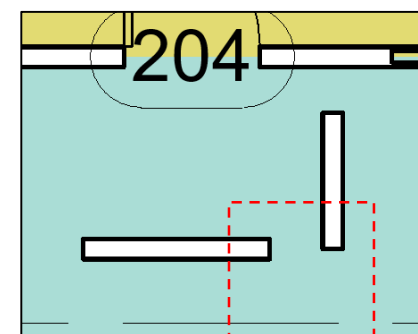
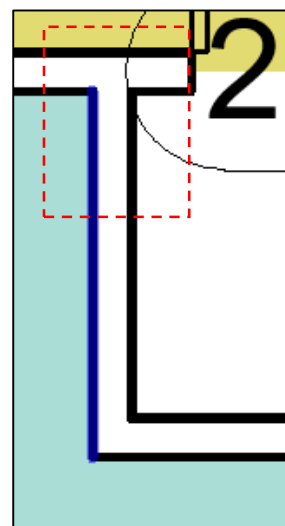
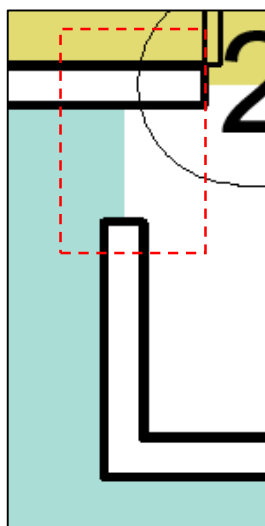
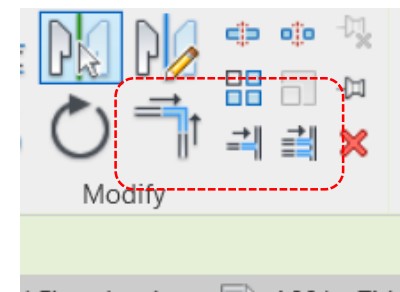
ALIGNING ELEMENTS

- To use the Align tool, activate it from the Modify tab in the ribbon and **first select the target reference—a reference to which you want to align another element.**
- Next, **select what you want to align to that reference—the part or side of the element whose position needs to be modified.**
- The second element picked is the one that always moves into alignment.



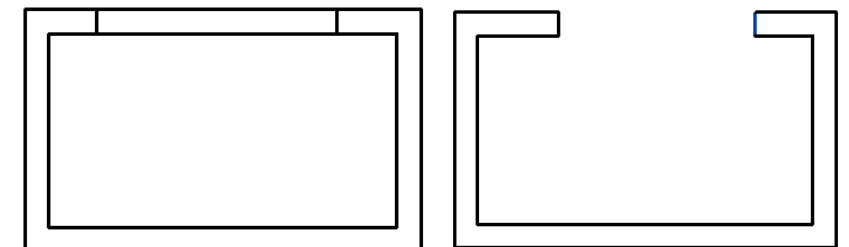
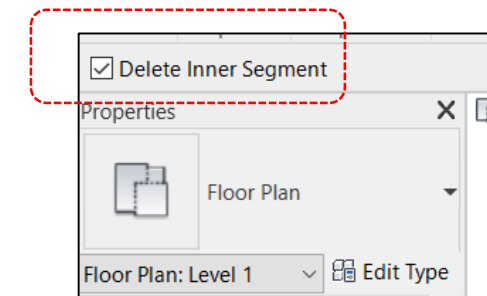
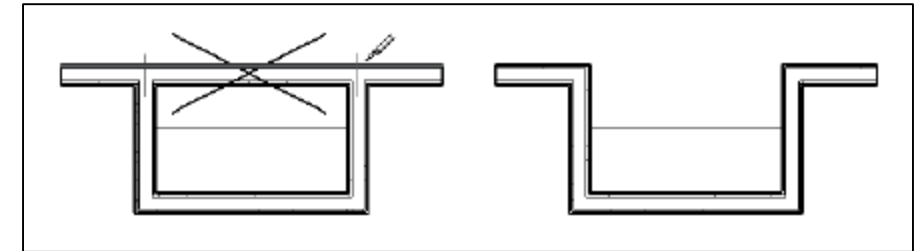
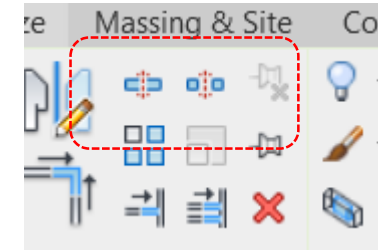
TRIMMING OR EXTENDING LINES AND WALLS

- You can trim and extend lines and walls to one another using the Trim/Extend tools on the Modify tab of the ribbon.
- To extend a wall or line, **first select a target reference**; then **select the element you want to extend to that target**.



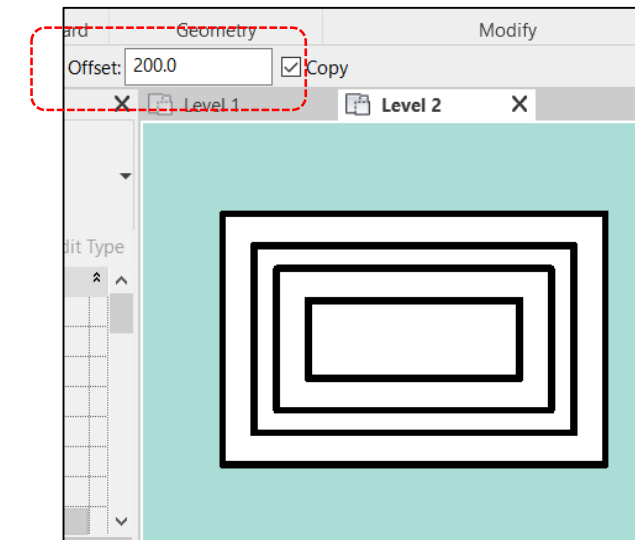
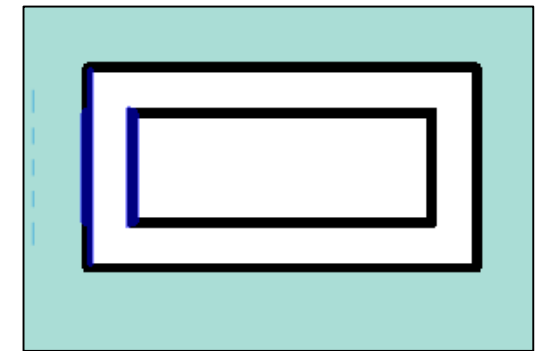
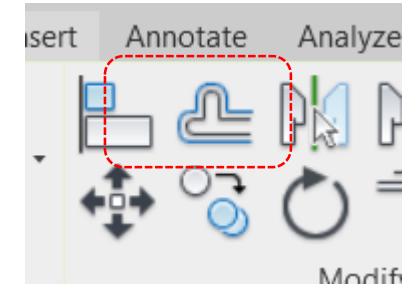
SPLITTING LINES AND WALLS

- The **Split Element** tool operates on walls and lines and lets you **divide an element into two pieces**.
- To **cut an element**, activate the **Split Element** tool from the Modify tab in the ribbon and **place the mouse pointer over the edge of a wall or line**.
- Before you click, you will see a **preview of the split line**. The **split line will automatically snap** to any adjoining geometry.
- The Options bar displays a nice feature called **Delete Inner Segment** that removes the need to use any of the Trim tools after a splitting operation.
- Using the **Split Element** tool with the **Delete Inner Segment** option checked, you can accomplish this with two clicks and get a clean condition without having to return with any of the Trim commands.



OFFSETTING LINES AND WALLS

- Offset is **similar to the Move and Copy** tools in that it moves and makes a copy of an element by offsetting it parallel to an edge you select.
- You can find the **Offset tool in the Modify tab** of the ribbon.
- You can also **specify an offset distance as an option in the Options bar to give an offset distance** or choose the Graphical option if you want to manually locate the offset element.

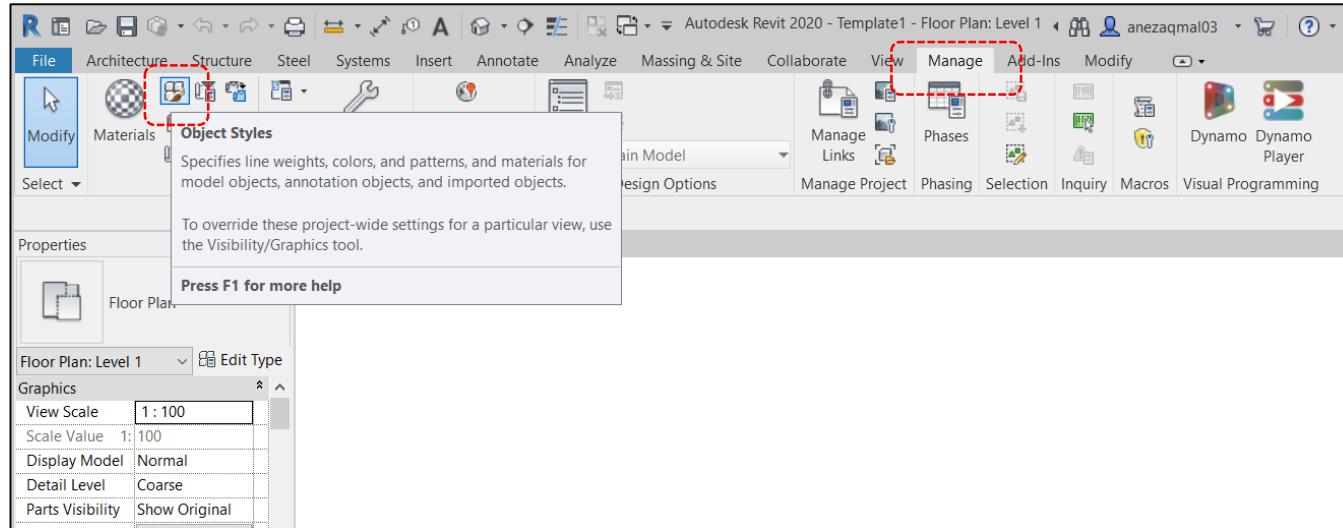




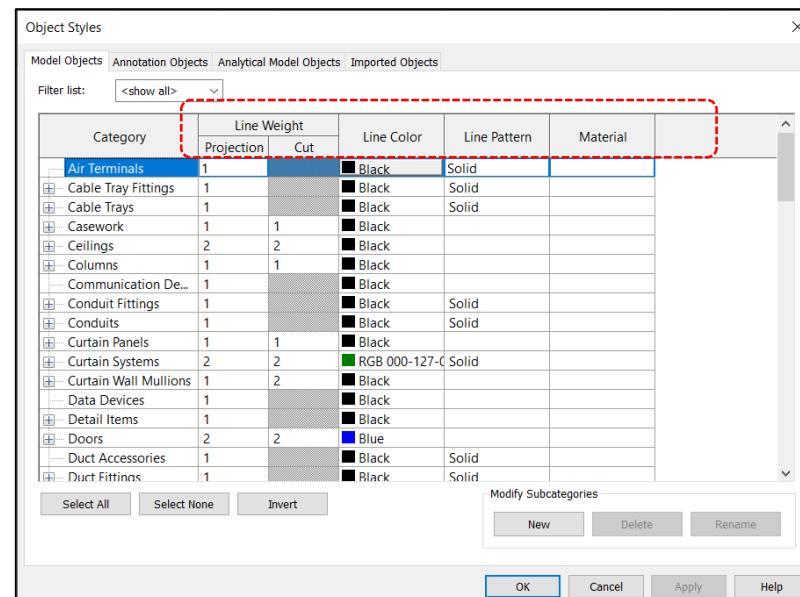
CONFIGURING TEMPLATES AND STANDARDS

Source: Mastering Autodesk Revit 2020

DISCOVERING OBJECT STYLES



Select the “**Manage**” tab and choose “**Object Styles**” from the Settings panels



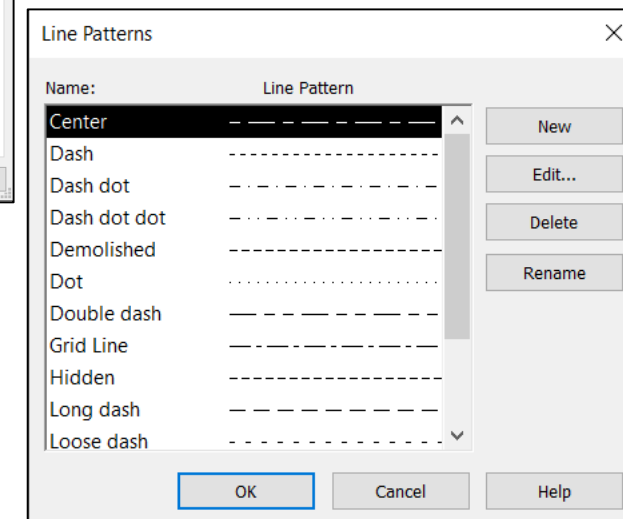
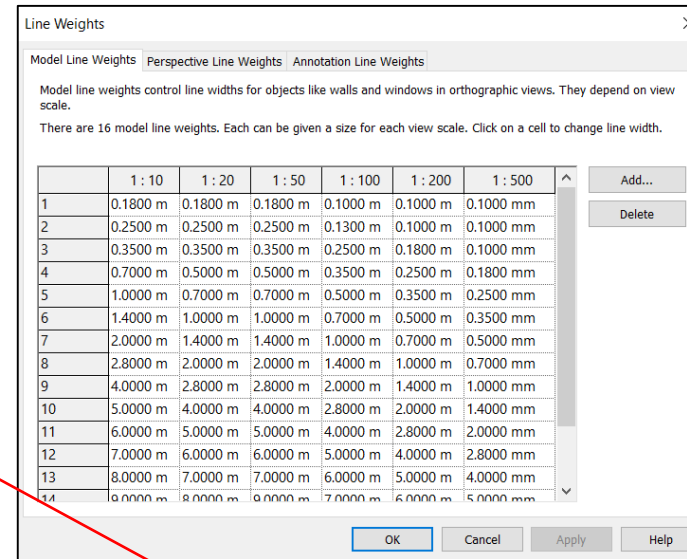
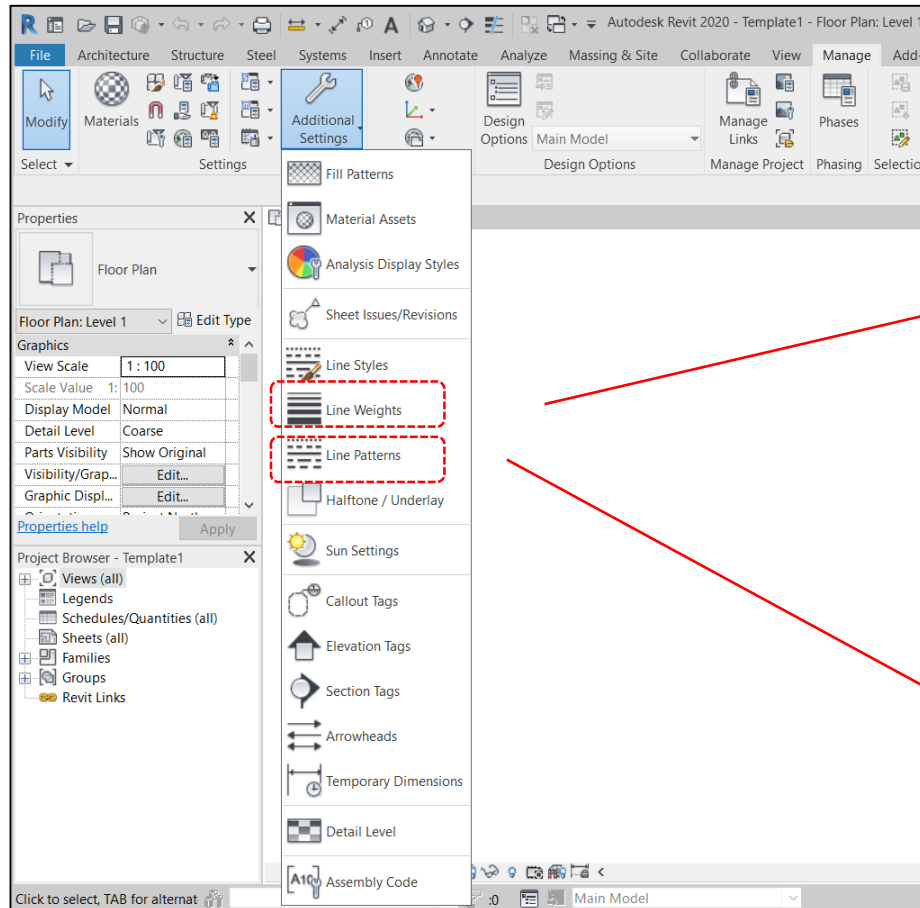
The dialog box is divided into four tabs: **Model Objects**, **Annotation Objects**, **Analytical Model Objects**, and **Imported Objects**.

Settings for **Line Weight**, **Line Color**, **Line Pattern**, and **Material** are established for each category.

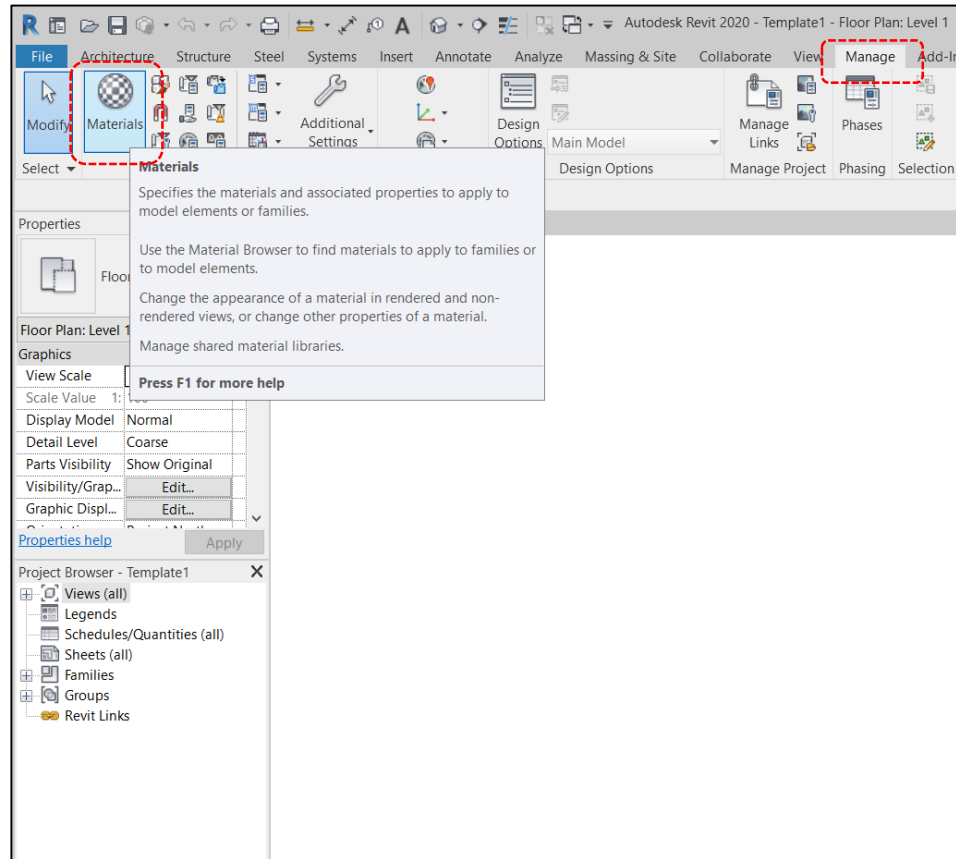


USING LINE SETTINGS

To open the line weight settings, click the **“Manage”** tab and choose **“Additional Settings”**, then click **“Line Weights”**

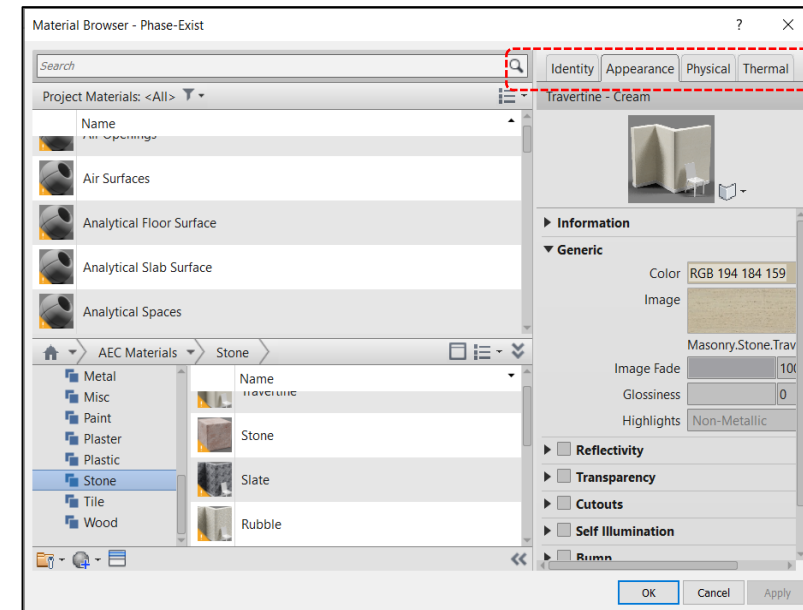


DEFINING MATERIALS

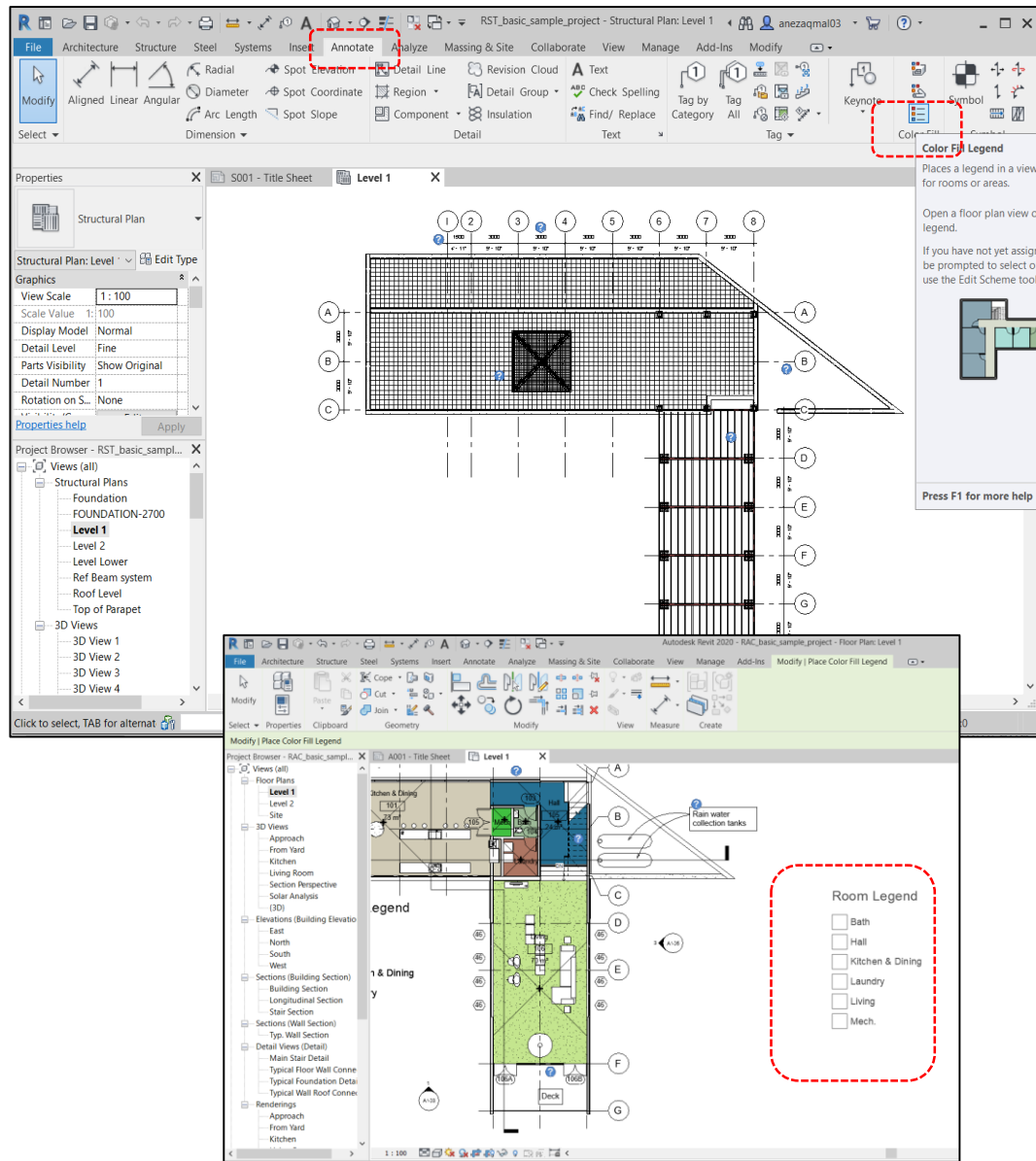


Switch to the “**Manage**” tab and choose “**Materials**” on the Settings panel to open the Material Browser

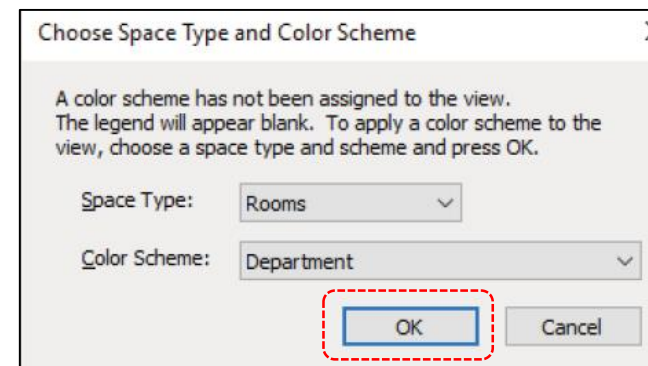
“**Materials**” are organized into groups of properties called **assets**, consisting of the following: **Identity, Graphics, Appearance, Physical, and Thermal.**



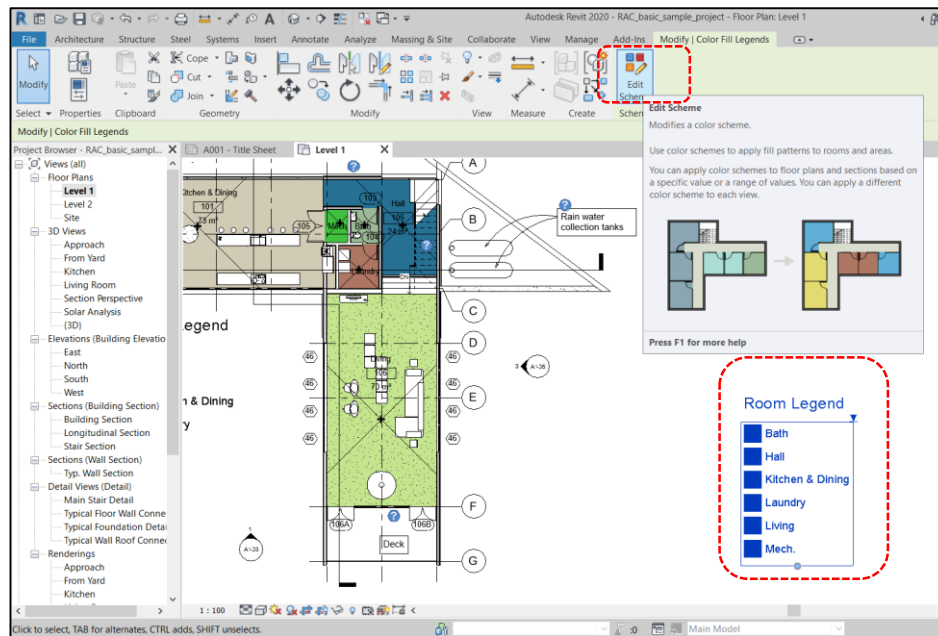
PRECONFIGURING COLOR SCHEMES



1. Activate any floor plan view from the Project Browser. On the “**Annotate**” tab, choose the “**Color Fill**” panel and select the “**Color Fill Legend**” tool.
2. Place a legend in the floor plan view, and you will see the “**Choose Space Type And Color Scheme**” dialog box. Set Space Type to Rooms and Color Scheme to Department (these choices can be modified later) and then click “**OK**”.



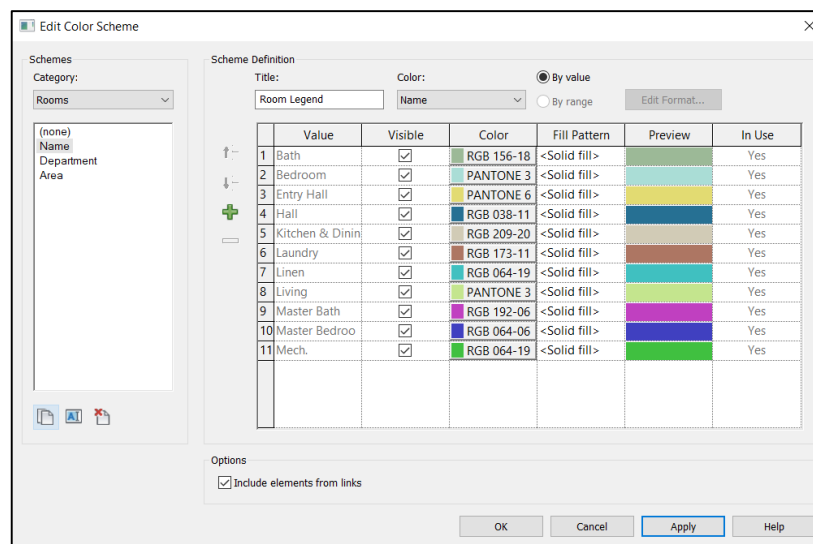
PRECONFIGURING COLOR SCHEMES



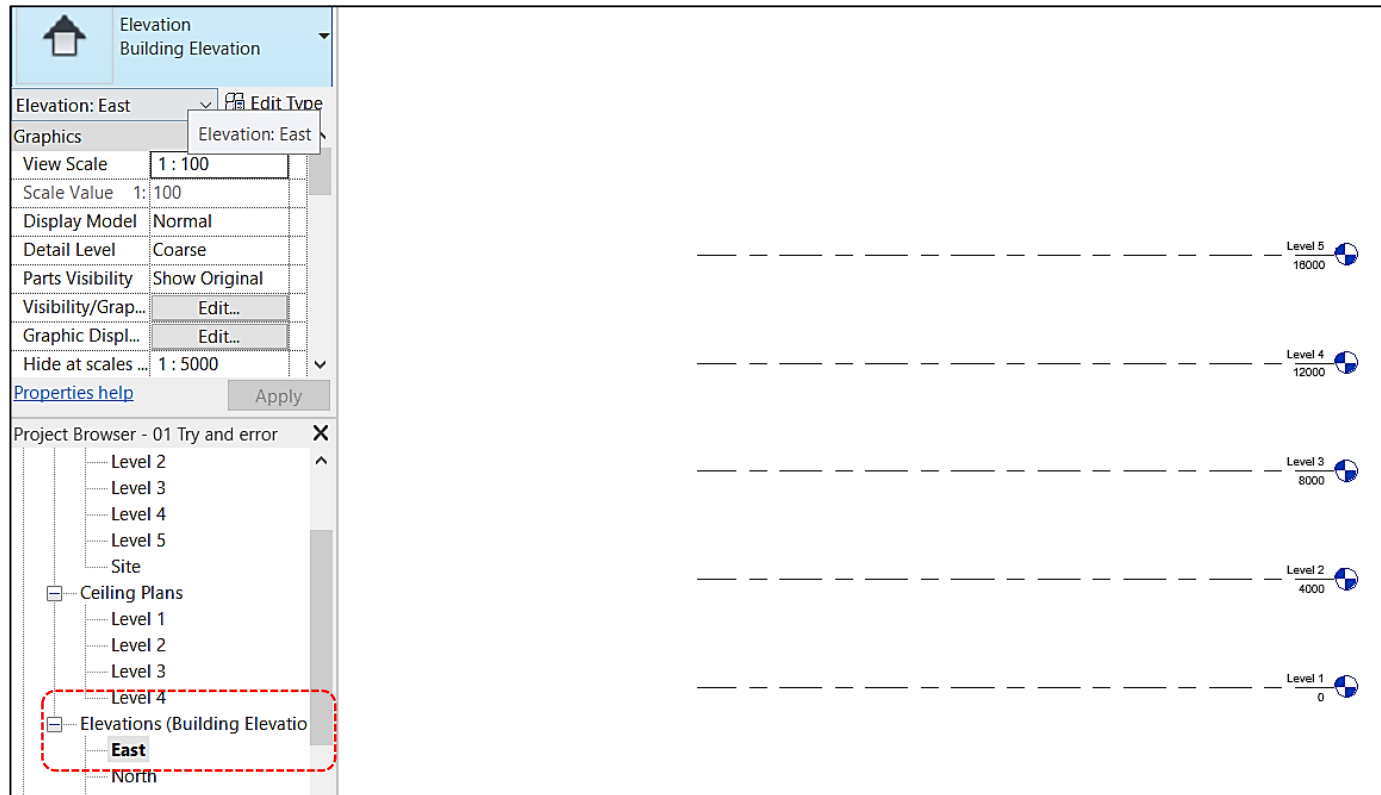
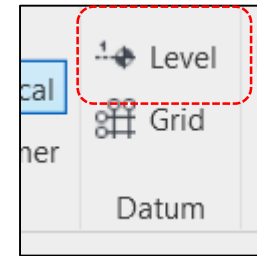
3. Select the “**color fill legend**” you placed in the previous step, and click the “**Edit Scheme**” icon at the right end of the ribbon. The “**Edit Color Scheme**” dialog box will appear.

4. Click the “**Add Value**” icon (the plus symbol) to populate the list of departments in the Scheme Definition area. Choose colors and fill patterns according to your graphic requirements.

5. Click “**OK**” to close the dialog box.



CONSTRUCT ELEVATION LINE

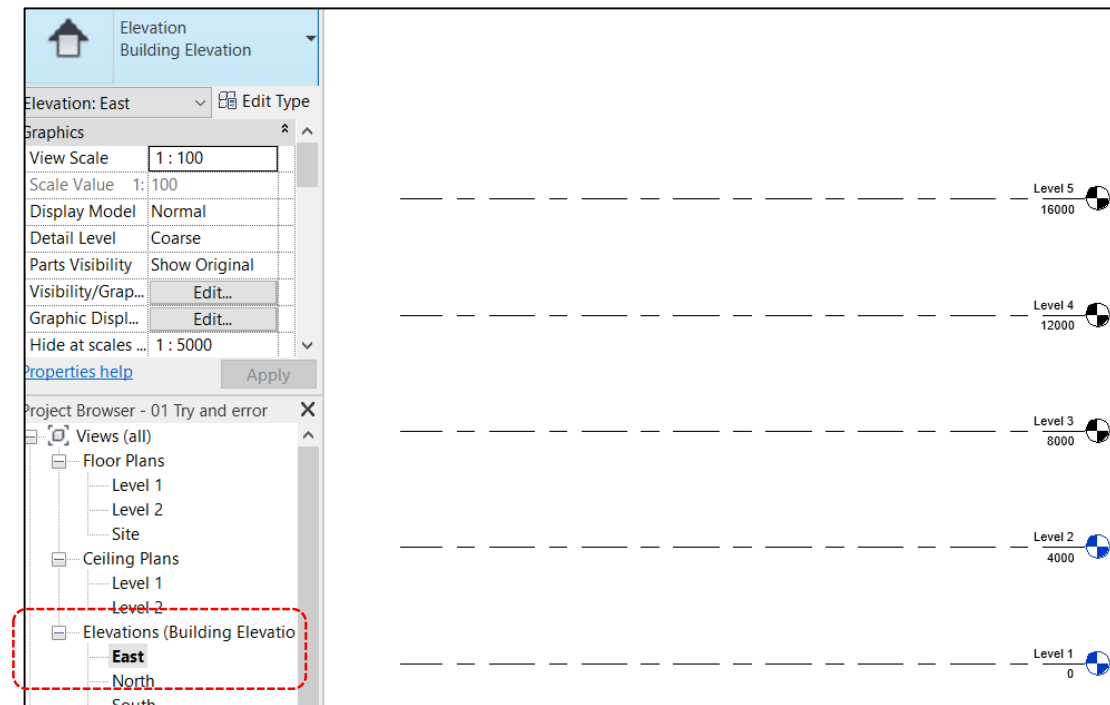


1. On the **Project Browser**, under **Elevation (Building Elevation)**, double click on **East**.
2. Revit will show **East view** in the **Drawing Area**.
3. There are two level shown, Level 1 at 0mm and Level 2 at 4000mm as the default elevation.
4. Clicks **Architecture Tab** and click **Level**.
5. Move the mouse **4000mm above** the existing elevation Level 2 and **click upward**.
6. Drag the mouse parallel to the end of Level 2 line and click again.

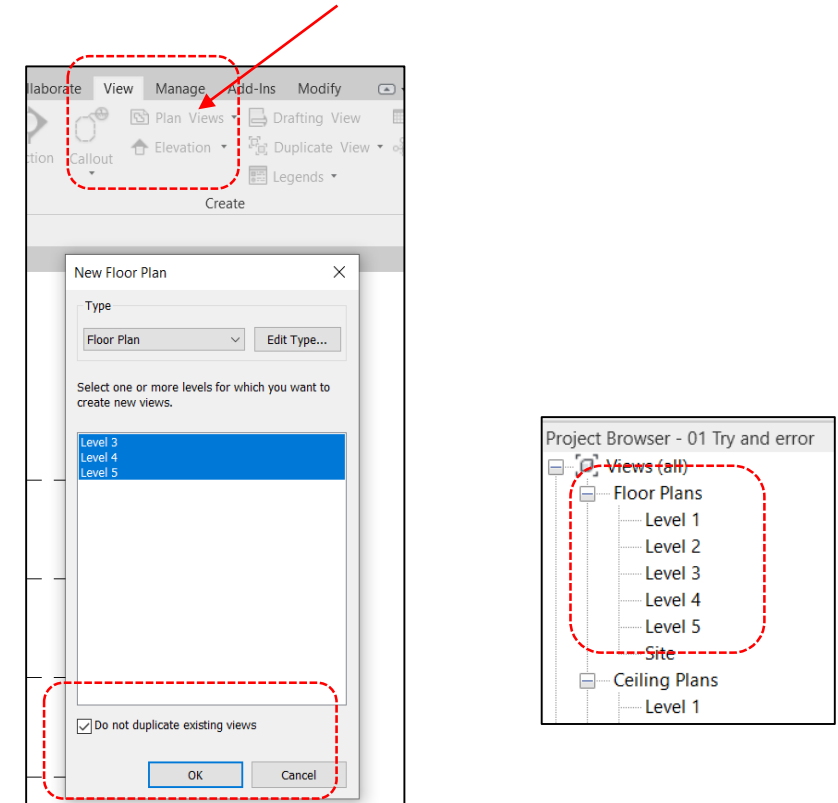
CONSTRUCT ELEVATION LINE (USING ARRAY)



KEMENTERIAN PENGAJIAN TINGGI



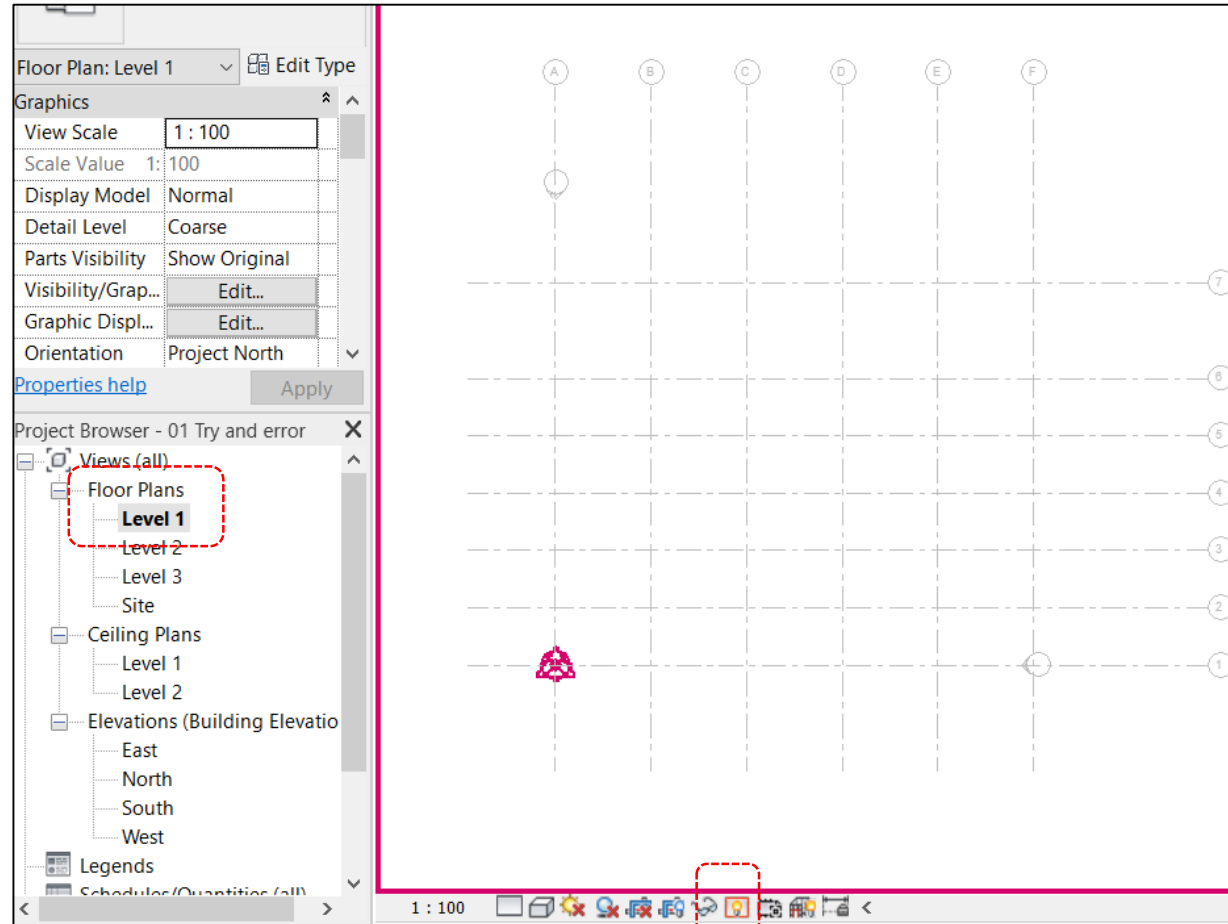
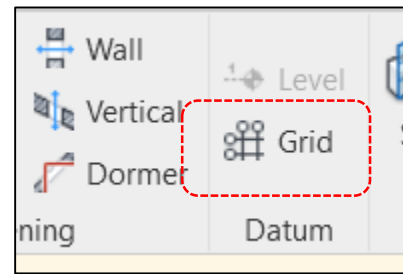
1. Select **elevation Level 2**
2. Click **Array**
3. On **Option Bar**, make sure that:
 - **Linear array** selected
 - **Uncheck Group and Associate**
 - Enter value **4** in numbers
 - Tick **Move to: 2nd**
4. Click Level 2, **drag the mouse upward** and key in value of **4000mm** then press **Enter** on the keyboard.



By **array level line**, the floor plan and ceiling plan **will not automatically be created**.

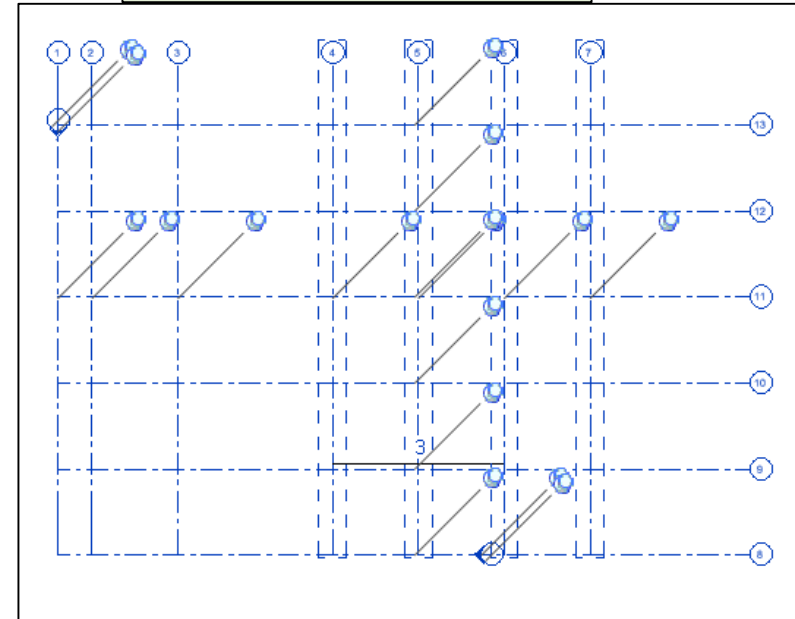
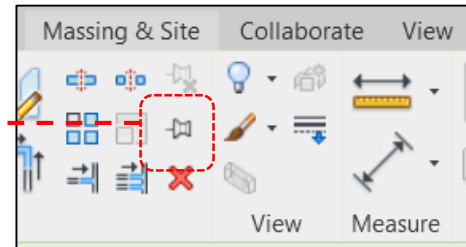
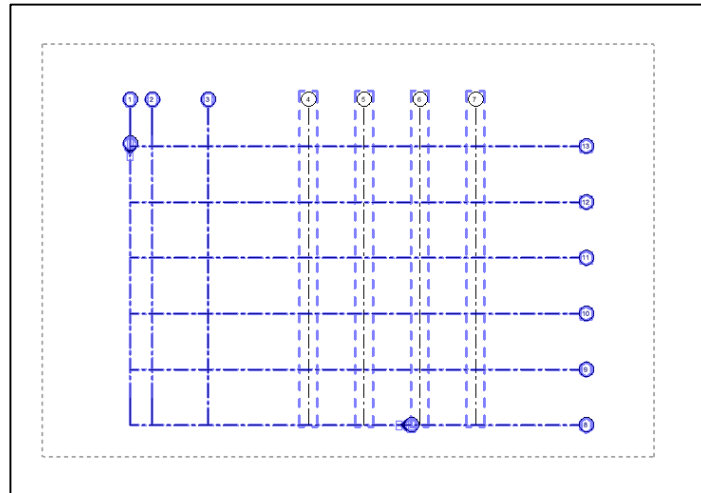
1. To create view for each floor plan in **Project Browser**, firstly on the **View Tab**, click at **Plan Views** drop down and select **Floor Plan**.
2. On the **New Floor Plan Dialogue Box**, select **all the floor plan**, make sure that **Do Not Duplicate Existing View is checked** and then click **OK**.
3. All Floor Plan will be viewed in Project Browser.

CONSTRUCT GRIDLINE



1. On **Project Browser**, under **Floor Plans**, double click on **Level 1**.
2. On **View Control Bar**, click **Reveal Hidden Element** (to show Project Base Point and Survey)
3. Click **Architecture Tab**
4. Click **Grid**
5. Click and drag to **create vertical gridline** and name it as **A**. Ensure gridline A intersect at **Project Base Point**.
6. Using **Array**, construct other vertical gridlines at a **4000mm spacing** and name using the **Alphabet in sequence**.
7. **Repeat** step 5 and 6 for **horizontal gridlines** and name using **numbers in sequence**. Ensure that **gridline A and 1** intersect at **Project Base Point (0,0)**.

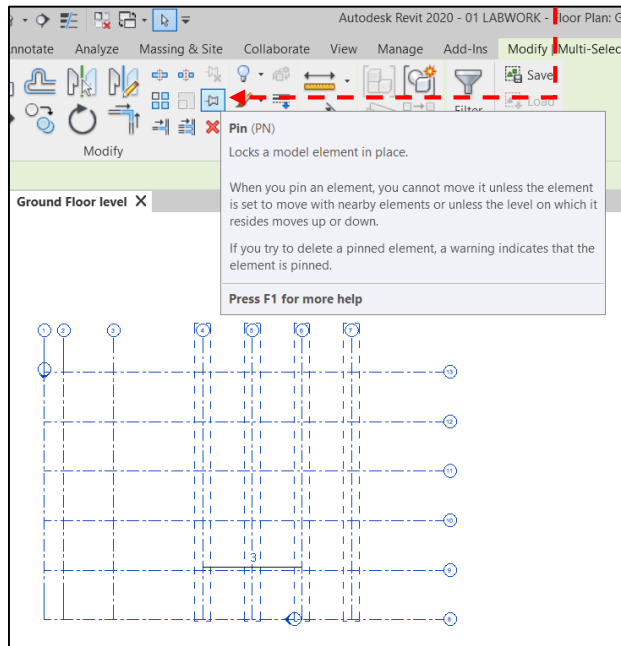
PIN THE GRIDLINES OR ELEMENT



1. Select the elements to be pinned, and then click **Pin** in **Modify** Tab.

Or

2. Click **Pin** in **Modify** tab, select the elements to be pinned, and then press **Enter**.



ROLES AND RESPONSIBILITIES TO SUPPORT BIM PROCESS:

Roles	Responsibilities
BIM Manager	• Deliver change management process for BIM implementation in organisation/project. • Facilitate the use of BIM Methodology and tools to support efficient delivery of the project. • Provide information on delivery process, accuracy of the model and timing of the project including the pre/post contract BIM Execution Plan (BEP). • Ensure effective communication between client, contractor and the design team. • Review and monitor BIM process.
BIM Coordinator	• Manage and maintain a fully coordinated of BIM model to ensure all information is up to date and correct. • Create BIM model and assess clash detection and alter the model accordingly. • Create and manage BIM content library. • Manage the co-ordination of information between the involved parties. • Manage process of exchange, collaboration and coordination of BIM Model with involved parties. • Maintain BIM Execution Plan and workflow.
BIM Modeller	• Produce BIM Model according to the relevant design discipline. • Ensure construction documents accuracy based on discipline BIM Modelling. • Follow BIM content standards and development procedures. • Prepare his own discipline model and/or content for BIM Coordination.

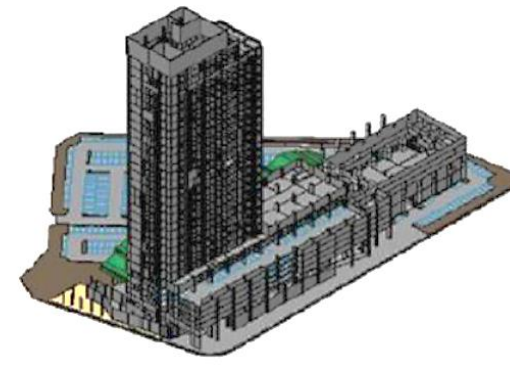
NOTABLE PROJECTS IN MALAYSIA USING BIM



**NATIONAL CANCER
INSTITUTE, PUTRAJAYA**



**MALAYSIAN ANTI-CORRUPTION
COMMISSION BUILDING, SHAH
ALAM**



**ADMINISTRATION BUILDING
KUALA TERENGGANU CITY
COUNCIL**



**GOVERNMENT HEALTH
CLINIC (KK5), MARAN**



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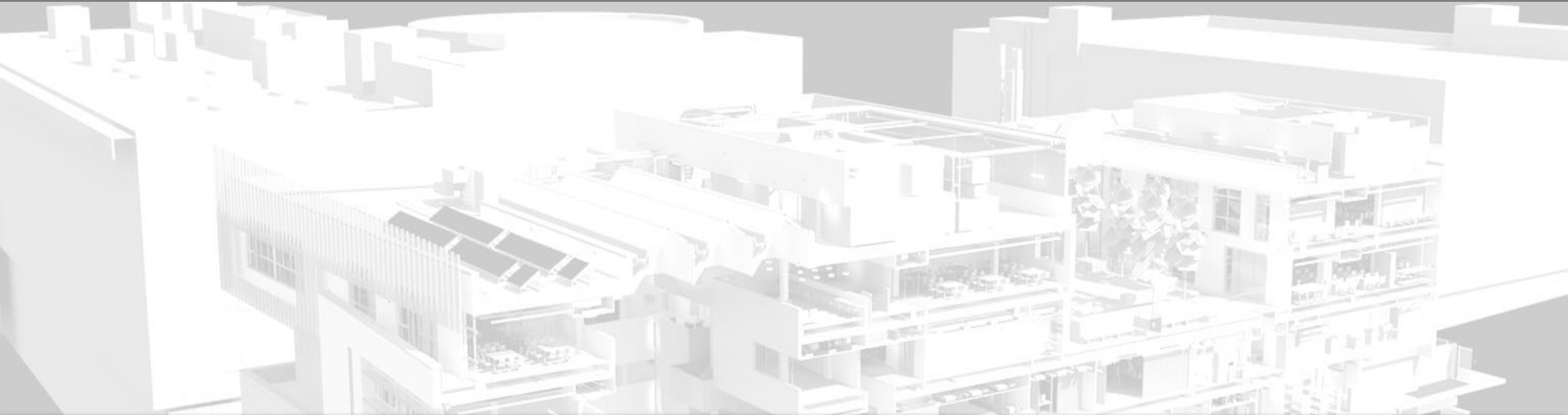
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THANK YOU

