# SBim Assess Modelling Guide for Revit



## **Modelling Guide**

Specifications and requirements in creating BIM models for the purposes of using automated model checker - SBim Assess

This modelling guide is built for Autodesk Revit-based modelling



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## 1 Introduction

SBim Assess is a rule-based checking program for conducting automated code compliance check with Building Information Model (BIM). Based on Industry Foundation Classes (.ifc) open format. SBim Assess is accommodated to suit users of different BIM modelling tools and is tailored specifically to support BCA's stipulated regulations for BIM model verification and submission processes in Singapore.

This modelling guide specifies the requirements in creating BIM models in REVIT for the purpose of using SBIM Assess. Currently, this guide only covers the modelling methods for the BCA regulations required for the Trial Testing.

## 1.1 IFC Export Settings

When exporting BIM Model file from Revit to IFC format, users must ensure that IFC Class Name for the relevant Revit Category is in the right export setting.

#### 1.1.1 Exporting the Grids

In order for the gridlines created in the BIM model to be displayed normally in SBim Assess, IFC Export option should be set as below:

#### (Revit → File → Export → Options → IFC Options)

In IFC Options, scroll down to Grids and set the IFC Class Name as IfcGrid.

Revit Category	IFC Class Name	IFC Type	^	Load
Lift	{ IfcBuildingElementProxy }			Standard
Lift Plan Cross	{ IfcBuildingElementProxy }			Save As
Masonry Quoin Stone	{ IfcBuildingElementProxy }			ouve Asim
Rainwater Downpipes	{ IfcBuildingElementProxy }			
Solid	{ IfcBuildingElementProxy }			
Toilet Cubicles	{ IfcBuildingElementProxy }			
Window Cill	{ IfcBuildingElementProxy }			
irids	lfcGrid			
uide Grid	Not Exported			
IVAC Zones	IfcZone			
Boundary	Not Exported			
Color Fill	Not Exported			
Interior Fill	Not Exported			
Reference Lines	Not Exported			
nports in Families	IfcBuildingElementProxy			
0	{ IfcBuildingElementProxy }			
AANOTGRID_E-	{ IfcBuildingElementProxy }			
AFIXRE-	{ IfcBuildingElementProxy }			
ASANIFIXR_E-	{ IfcBuildingElementProxy }			
ASDRNE-	{ IfcBuildingElementProxy }			
ATOPOPLVL_E-	{ IfcBuildingElementProxy }			
A-Anno-Scrn	{ IfcRuildingFlementProvv }		×	



## 1.1.2 Exporting the Model to IFC

#### Method 1: For Group Parameter Under "Identity Data"

For accurate checking results, the model should be exported to IFC 2x3 version with the following settings:

- IFC Version: IFC 2x3 Coordination View 2.0
- File Type: IFC
- Space boundaries: 1<sup>st</sup> Level
- Property Sets: Export Revit Property Sets, Export IFC common property sets, Export Base
   Quantities
- Level of Detail: High

#### $(\text{Revit} \rightarrow \text{File} \rightarrow \text{Export} \rightarrow \text{Option} \rightarrow \text{IFC} \rightarrow \text{Modify setup})$





#### Method 2: Group Parameter Under "IFC Parameters"

Due to the data loss in "IFC Parameters" during the export output, there is an alternative method during the stage of exporting, by using "Export user defined property sets".

#### (Revit $\rightarrow$ File $\rightarrow$ Export $\rightarrow$ Option $\rightarrow$ IFC $\rightarrow$ Modify setup)

- IFC Version: IFC 2x3 Coordination View 2.0
- File Type: IFC
- Space boundaries: 1<sup>st</sup> Level
- Property Sets: Export Revit Property Sets, Export IFC common property sets, Export Base Quantities, Export schedules as property sets, Export user defined property sets

   Load in the text file for SG\_Parameter
- Level of Detail: High

Parameter Type				
Project parameter	Modify Setup X			
(Can appear in schedules but not in ta				
<ul> <li>Shared parameter</li> <li>(Can be shared by multiple projects a appear in schedules and tags)</li> </ul>	<in-session setup="">       General Additional Content Property Sets Level of Detail Advanced         <ifc2x3 2.0="" coordination="" setup="" view="">       Export Revit property sets         <ifc2x3 2010="" bim="" concept="" design="" gsa="" setup="">       Seport IFC common property sets         <ifc2x3 coordination="" setup="" view="">       Export schedules as property sets         <ifc2x3 coordination="" setup="" view="">       Export schedules containing IFC, Pset, or Common in the title</ifc2x3></ifc2x3></ifc2x3></ifc2x3></in-session>			
Parameter Data Name: BCA_Accessible	<ifc2x3 extended="" fm="" handover="" setup="" view=""> <ifc4 reference="" setup="" view=""> <ifc4 design="" setup="" transfer="" view=""> Export user defined property sets C:\Users\Admin\Downloads\Pset Parameter\bca only\Pset_SC Paramet Export parameter mapping table Browse</ifc4></ifc4></ifc2x3>			
Discipline:				
Common	Export user defined property sets is another way of exporting specific selected properties. The parameters to be exported can also be specified in a text file. When Revit is installed, the default	e t		
Type of Parameter:	file is stored at this location:			
Yes/No 🗸	C:\ProgramData\Autodesk\ApplicationPlugins\IFC2018.bundle\Contents\2018\			
Group parameter under:	DefaultUserDefinedParameterSets.txt It serves as the basis for the individual data sheet and is structured as follows:			
Tooltip Description: <no description.="" edit="" paramete<="" th="" this="" tooltip=""><td><pre># User Defined PropertySet Definition File # Format: # Format: # PropertySet: <pset name=""> I[nstance]/T[ype] <element ','="" by="" list="" separated=""> # Property Name 1&gt; <data type=""> &lt;[opt] Revit parameter name, if different from IFC&gt; # <property 2="" name=""> <data type=""> &lt;[opt] Revit parameter name, if different from IFC&gt;</data></property></data></element></pset></pre></td><td></td></no>	<pre># User Defined PropertySet Definition File # Format: # Format: # PropertySet: <pset name=""> I[nstance]/T[ype] <element ','="" by="" list="" separated=""> # Property Name 1&gt; <data type=""> &lt;[opt] Revit parameter name, if different from IFC&gt; # <property 2="" name=""> <data type=""> &lt;[opt] Revit parameter name, if different from IFC&gt;</data></property></data></element></pset></pre>			

#### Contents in the Text File for SG\_Parameter:

#									
Propert IfcCove	ySet: ring, lfcSl	SG_Par lab, lfcFlc	ameter wTermina	l al	lfcWall,	lfcDoor,	lfcColumn,	lfcWindow,	lfcSpace,
	SG_Nar	me	Text						
	BCA_A	ccessible	Boolean	١					
	BCA_Ar	mbulant	Boolean	١					
	BCA_EI	derFriend	lly	Boolean	I				
	BCA_Fa	amilyFrier	ndly	Boolean	l				
	BCA_CI	hildFriend	lly	Boolean	l				
	BCA_M	odeOfVei	ntilation	Text					
	BCA_Ve	entilation	Opening	Text					
	BCA_Ar	reaCluste	rText						



## 1.2 Setting of "SG\_Name" Property

For clause checking based on the Room/Object classification system, the **SG\_Name** property should be created and a value according to the classification should be defined.

The steps for setting the property are as follows:

#### (Revit $\rightarrow$ Manage $\rightarrow$ Project Parameters $\rightarrow$ Add $\rightarrow$ Parameter Data)

- Name: SG\_Name
- Group Parameter under: Identity Data

Modify Select •	Shared Global Transfer Purge Project Parameters Parameters Project Standards Unused Units Settings	E Structural Settir E MEP Settings • B Panel Schedule
Project Parameters X	Barameter Type (Can appear in schedules but not in tags)	Categories Filter list:
Andilary Balcony BICA_Accessible BICA_Area Cluster BICA_BuildType BICA_DetectableWarning RCA_DetectableWarning BICA_DetectableWarning BIC	Select Parameter Data	MEP Fabrication Ductw     MEP Fabrication Hange     MEP Fabrication Hange     MeP Fabrication Hange     Mass     Materials     Materials     Mechanical Equipment     Model Groups
BCA_DwellingUnitType BCA_ElderlyFriendly BCA_HeightOfShelter BCA_LabourSavingsIndex BCA_Level BCA_Material	Isame: ISG, Name Discipline: Common Type of Parameter: Text Group parameter under: Compon Type of Parameter: Compon Type of Parameter: Compon Compon Type of Parameter: Compon Compon Compon Type of Parameter: Compon Comp	Pipe Accessories     Pipe Fittings     Pipe Insubations     Pipe PlacEholders     Pipes     Pipes     Pipes     Pipes     Pipes     Pipes     Pipes     Pipes

Figure 1. Setting Method for SG\_Name

Refer to Section 8: Appendix for Project Parameter and Shared Parameter Screenshots.



## 2 Vehicle Parking Component

The car parking lot should be modelled using the **Parking Component** family object. Car parking lots modelled using lines, rectangles or symbols in the traditional CAD method will not be detected in the model checker. The 'Car Parking Lot' must consist of a Surface or Solid.

#### Setting of 'SG\_Name' Property

For clause checking based on the Room/Object classification system, the **SG\_Name** property should be created and a value according to the classification should be defined. (*Refer to Section 1.2*)

Project Parameters				
Name	SG_Name			
Discipline	Common			
Type of Parameter	Text			
Group parameter under	Identity Data			
Categories	Parking			
Parameter Type	Select 'Instance' and select 'Values are aligned per group type'			

All types of car parking lot should be categorised under SG\_Name: "Parking\_Lot".

## 2.1 Standard Car Parking Lot

To create a Standard Car Parking Lot Object, the steps are as follows:

(Revit  $\rightarrow$  Massing & Site  $\rightarrow$  Parking Component  $\rightarrow$  Properties)

- Family: Car Parking Lot
- **Type:** Standard Car Parking Lot
- **SG\_Name:** Parking\_Lot



Massing & Site Collaborate View	Type Properties	× • • • •	Properties	×
	Family: Car Parking Lot Type: Standard Car Parking Lot	Load Duplicate	Car Par	king Lot
Toposurface Site Parking B Component Component	Type Parameters	Rename	Standa	rd Car Parking Lot
Mar dal Otta	Parameter	Value = ^	Parking (1)	🗸 🗄 Edit Type
Model Site	Materials and Finishes	*	Constraints	×
	Material	Paint - White Lining	Lovel	Decomont 2
	Dimensions	*	Levei	Basement 2
	Parking Length	4800.0	Host	Level : Basement 2
	Identify Wath		Offset	0.0
	Keynote 022/185		Moves With Near	
	Type Image			
	Model		Identity Data	
	Manufacturer		Image	
ř –	Type Comments		Comments	
	URL		Mark	
	Description		IVIDIK	
	Assembly Code		BCA_Accessible	
	Assembly Description		BCA_FamilyFriendly	
	Type Mark		SG Name	Parking Lot
	Consider March	+	Phosing	
			Phasing	
	<< Preview OK	Cancel Apply	Phase Created	New Construction
			Phase Demolished	None

Figure 2. Setting of Standard Car Parking Lot

To edit the 'Car Parking Lot' object, click on the object and under the object **Properties** window, click **Edit Type.** Modify the name of the described object under **SG\_Name.** 

Modify the size of the car park lot under **Dimensions**  $\rightarrow$  **Parking Length** (4800mm), **Parking Width** (2400mm).

Family:	Car Parking Lot	× ۱	bao
Туре:	Standard Car Parking Lot	~ Du	plicate
		Re	name
Type Parar	meters		
	Parameter	Value	=
Material	s and Finishes		*
Material		Paint - White Lining	
Dimensi	ons		*
Parking L	.ength	4800.0	
Parking \	Width	2400.0	1
Identity	Data		*
Keynote		Q22/185	Π
Type Ima	ige		
Model			
Manufac	turer		
Type Co	mments		
URL			
Descript	ion		
Assembl	y Code		
Cost			
Assembl	y Description		
Туре Ма	rk		
0	Nl la		

Figure 3. Setting the size of Standard Car Parking Lot



## 2.2 Accessible Car Parking Lot

## 2.2.1 Regulations of Accessible Car Parking Lot

Document	Clause No.	Regulation	
Code on		<b>Parking Provision</b> Where vehicle parks are required accessible parking lots for vehicles shall be in accordance with Table 1.	to be provided, the number of driven by persons with disabilities
Accessibility	/ /	Table 1. Accessil	ble Parking Lots
in the built environment	3.5.1.1	Number of vehicle park lots	Number of accessible lots
2013		First 50 lots(1-50)	1
		Next 50 lots(51-100)	1
		Every subsequent 200 lots or any part thereof	1
Code on Accessibility in the built environment 2013	3.5.2.1b	Accessible Vehicle Parking Lots An accessible vehicle parking lot sha 4800mm by 3600mm for angled park	all have the minimum dimensions of ting as illustrated in Figure 4. Vertical sign on wall Symbol of Access Symbol of Access for Accessible Lots
Code on Accessibility in the built environment 2013	6.9.5	Family Car Parking Lots Family car parking lots shall have the in length by 3600mm wide	ne minimum dimension of 4800mm



## 2.2.2 Setting of Property

To define the property of accessibility, the steps are as follows: (**Revit**  $\rightarrow$  **Manage**  $\rightarrow$  **Project** parameters  $\rightarrow$  click 'Modify' button  $\rightarrow$  Setting the Parameter properties)

Modify Select V	t Shared Global Transfer Purge Project Parameters Parameters Project Standards Unused Units Settings	E Structural Setti B MEP Settings -
Project Parameters	Parameter Type Project parameter (Gan appear in schedules but not in tags)	Categories Filter list: <a href="https://www.als-view.edu/categories">https://www.als-view.edu/categories</a>
Ancillary Balcony BCA_Accessible Modify	Shared parameter     (Can be shared by multiple projects and families, exported to ODBC, and     appear in schedules and tags)     Select Export	MEP Fabrication Pipewe     Mass     Materials     Mechanical Equipment     Model Groups
INC D DECE ( HIGTOR	Parameter Data	Nurse Call Devices     Parking     Parts
BCA_Area Custer BCA_BuildType BCA_DetectableWarning BCA_DwellingUnitType BCA_ElderlyFriendly BCA_HeightOfShelter BCA_HeightOfShelter	Name: BCA_Accessible • Type Discipline: • Instance Common • • • • Values are aligned for group hore.	Pipe Accessories     Pipe Accessories     Pipe Insulations     Pipe Placeholders     Pipes

Figure 5. Setting of property set of "BCA\_Accessible" property

#### **Parameter Properties**

Project parameters							
Name	BCA_Accessible	BCA_FamilyFriendly					
Discipline	Common						
Type of Parameter	Yes/No						
Group parameter under	Identity Data						
Categories	Parking						
Parameter Type	Select <b>'Instance'</b> an aligned per group type	id select 'Values are e'					



#### 2.2.3 Creating an Accessible Car Parking Lot Object

To create an Accessible Car Parking Lot Object, the steps are as follows: (Revit  $\rightarrow$  Massing & Site  $\rightarrow$  Parking Component  $\rightarrow$  Properties)

- Family: Car Parking Lot
- Type: Accessible Car Parking Lot
- Identity Data:
  - SG\_Name: Parking\_Lot
  - BCA\_Accessible: Yes (Tick)
- Dimensions:
  - Parking Length: 4800mm
  - Parking Width: 3600mm

Type Properties		×	Properties	×
Family: Car Parking Lot Type: Accessible Car Parking Lot	Load Duplicate Rename.		Car Parl Accessi	king Lot ble Car Parking Lot
Type Parameters	Value		Parking (1)	v 🔠 Edit Type
Materials and Emishes	value	<u> </u>	Constraints	\$
Material	Paint - White Lining		Level	Basement 2
Dimensions		*	Host	Level : Basement 2
Parking Length	4800.0			
Parking Width	3600.0		Offset	0.0
🔨 ldentity Data	'	*	Moves With Near	
Keynote	Q22/185		Identity Data	\$
Type Image			Image	1
Model			inage	
Manufacturer			Comments	
Type Comments			Mark	
Description			RCA Accessible	
Assembly Code				
Cost			BCA_FamilyFriendly	
Assembly Description			SG_Name	Parking_Lot
Type Mark			Phasing	\$
Lonni Class Number			Phase Created	New Construction
<< Preview OK	Cancel Appl	y .	Phase Demolished	None

Figure 6. Setting of the Accessible Car Parking Lot (Dimension & Property)



#### 2.2.4 Creating Family Car Parking Lot

To create an Family Car Parking Lot Object, the steps are as follows: (Revit  $\rightarrow$  Massing & Site  $\rightarrow$  Parking Component  $\rightarrow$  Properties)

- Family: Car Parking Lot
- Type: Family Car Parking Lot
- Identity Data:
  - SG\_Name: Parking\_Lot
  - BCA\_FamilyFriendly : Yes (Tick)

#### • Dimensions:

- o Parking Length: 4800mm
- o Parking Width: 3600mm

Type Properties		×	Properties		×
Family: BCA_ParkingLot1 Type: Family Car Parking L	ots v	Load Duplicate Rename	BCA_Parkin Family Car	gLot1 Parking Lots	•
Type Parameters	1		Parking (1)	🗸 🔠 Edit Type	9
Parameter	Value	=	Constraints	\$	2
Materials and Finishes	Paint	^	Level	BASEMENT PLAN	
Dimensions		*	Host	Floor : Floor Slab 30	
Length	4800.0		Offset	0.0	
Sym_offset	3.0		Moves With Nearb		
Width	3600.0		Identity Data		\$
Identity Data		*	Image		
Type Image			inage	•	{
Keynote			Comments		
Model			Mark		
Manufacturer			BCA_Accessible		T.
Type Comments			SG Name	Parking lot	
URL			DCA FamilyFriendly		
Description			BCA_FamilyFriendly		
Assembly Code		L •	Phasing	*****	2
			Phase Created	New Construction	
<< Preview Of	Cancel	Apply	Phase Demolished	None	

Figure 7 Setting of the Family Car Parking Lot(Dimension & Property)



## **3 Vertical Circulation**

## 3.1 Lift

## 3.1.1 Regulations of Lift

Document	Clause No.	Regulation
Code on Accessibility in the built environment 2013	4.9.1.3	LIFTS DESIGNED FOR WHEELCHAIR USERS Lift lobby space for lifts designed for wheelchair users shall have clear manoeuvring space of 1200mm x 1500mm deep as illustrated in Figure 8.
Code on Accessibility in the built environment 2013	4.9.2.1	Lift Size The minimum internal lift car dimension shall be 1200mm wide by 1400mm deep.
Code on Accessibility in the built environment 2013	4.9.3.1	<b>Door width</b> The lift car shall have a clear door opening of at least 900mm
Approved Document	K.2.2	LIFT AND ESCALATOR A building comprising 5 or more storeys (including the ground level) shall be provided with one or more passenger lifts



## 3.1.2 Setting of Lift Property

To define the accessibility for Lift, the following properties are required:

- **BCA\_Accessible** (*Refer to Section 2.2.2*)
- SG\_Name (Refer to Table below)

#### **Parameter Properties**

Project parameters				
Name	BCA_Accessible	SG_Name		
Discipline	Common	Common		
Type of Parameter	Yes/No	Text		
Group parameter under	Identity Data			
Categories	Mass			
Parameter Type	Select <b>'Instance'</b> an aligned per group type'	d select 'Values are		



### 3.1.3 Creating the Lift Car Object

Lift car object is required for lift internal dimension checking (Clause D.4.9.2.1).

To create the Lift Car by using Mass, the steps are as follows: (Revit  $\rightarrow$  Massing & Site  $\rightarrow$  In-Place Mass  $\rightarrow$  Name  $\rightarrow$  Drawing mass line  $\rightarrow$  Create Form  $\rightarrow$ Solid Form  $\rightarrow$  Finish Mass  $\rightarrow$  Properties  $\rightarrow$  SG\_Name: Lift\_Car)

To create the Lift Car by Component, the steps are as follows: (Revit  $\rightarrow$  Architecture  $\rightarrow$  Component  $\rightarrow$  Lift Car  $\rightarrow$  Properties  $\rightarrow$  SG\_Name : Lift\_Car)

- SG\_Name: Lift\_Car
- **Dimensions:** Minimum internal lift car dimension shall be 1200mm wide by 1400mm deep.



Figure 9 Create Lift object by using mass

#### **Caution!**

- The lift car object shall be modelled only at the 1<sup>st</sup> Storey level. Lift massing to follow typical lift car height constraint.
- The lift shaft (room/ space) shall be modelled from the bottom level to top level in a single space. (*Refer to Section 3.1.5*)



### 3.1.4 Settings for Accessible Lift

For the checking of Accessible Lift, the following properties are required for an accessible lift object:

- SG\_Name: Lift\_Car
- BCA\_Accessible: Yes (Tick)
- Size of accessible lift: 1200mm (width) x1400mm(depth)



Figure 10. Settings for Accessible Lift

#### 3.1.5 Creating the Lift Space

Lift space objects are required for Lift Lobby manoeuvring space & Clear door opening checking (Clause D.4.9.1.3 & D.4.9.3.1).

To create the Lift Space, the steps are as follows: (Revit  $\rightarrow$  Architecture  $\rightarrow$  Room  $\rightarrow$  Properties  $\rightarrow$  Identity Data)

• SG\_Name: LIFT



Figure 11. Setting of Lift Space object



### 3.1.6 Creating the Door/ Door opening object

Door/Door opening objects are required for **clear door opening** checking (Clause D.4.9.3.1).

- For the checking of clear door opening, the door/door opening objects must be in contact with the Lift space object.
- The door opening objects have to be modelled by using **Wall Opening** function.
- For checking of the clear door opening, opening object (IfcOpeningElement) have to be found beside the lift space.

	Door ob	ject		_	Doc	or opening	j object
Elevator D 1200 x 210	or-Center1	ЪЪ	13	La Artikacher Valade	Digene Rev Cotate Autor Re Bord	Address Partiana PC4K Model Ing Rang Dan Woold Model Model Tart Line Group Chroken Model	I factorgular thought that Opening COS Room Tog Area Area Trag Brack Room B Area -
ors (1) Astraints rvel	1ST STOREY PLAN			Inspire Environment Automation Indu, 972, UNEXAN D. S.C. Steven (Instructionmentor) 1.127 1.120 1.121 1.121 1.121	R	<u>۱</u> ۹۰۰۹	Ψ 
diruction sme Type SjExternal	2			P     P	Rectangular Straight Inail Opening (1) v [1] 101 Comhuints Top Offinit [11005.8 Raie Offinit -192	L 🛙	
IS.Internal Id. Jocation aterials and Finishes				- KGA (P, GA-100 STOREY - KGA (P, GO-300 STOREY - KGA	Unconnected Integrit 2405-4 kaa Constraint 157 EDORD (Aan) Tap Combant up to load 4TH STOREY PL Phase Constraint Phase Constraint Integrite Constrain	47 <b>-</b>	ACN
me Material Kih Kity Data Ioge			┍┯╶╶┚		Plat LOTIDUM ID.0		
mments sk äng sse Created	3388 a		┍╶╴╴╴	- 66.4 (7),64 (7),450 (3108) - 66.4 (7),65 (7),44 (5) (508) - 66.4 (7),65 (7),44 (508) - 66.4 (7),67 (4) (508) - 66.4 (7),67 (4) (508) - 66.4 (7),77 (5) (5) (508) - 66.4 (7),77 (5) (5) (5) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7			
e Demolished rameters ficapAccessible	None		▋▋▁▋▐──▕				
AcousticRating			¥╤═╌╧╶─╵	- RCATELENATION 3 - RCATELENATION 3 - RCATELENATION 4 - Oracitor Iduality Section - RCATELETON 4-4 - RCATELETON 4-4			++
A PullSideFired			<u> </u>	Active State State     Active State State     Active State State     Active State State     Active			
PushSideFixed PushSideVaries r rd Height	2005.0			- 60, 77, 61, 50, 41, 50, 77, 76, 76, 77, 77, 77, 77, 77, 77, 77	Poperties help Ann		
A_Accessible	2			L BOA PP OF SOM 204 STORY NO			

Figure 12. Clear door opening of Lift



## 3.2 Staircase

## 3.2.1 Regulations for Staircase

Document	Clause No.	Regulation
Approved Document	E.3.3.1	Width of staircase The clearance of the width of every staircase shall not be less than 900mm.
Approved Document	E.3.4.1	<b>Risers and treads</b> The height of a riser shall not be more than 175mm.
Approved Document	E.3.4.2	Risers and treads The width of a tread shall not be less than 275mm. Landing Landing Riser height Landing Figure 13. Measurement of Riser & Tread
Approved Document	E.3.4.2.a	<b>Risers and treads</b> Notwithstanding paragraph E.3.4.2, the width of a tread of any staircase in any <b>residential unit shall not be less than 225mm.</b>
Approved Document	E.3.4.2.b	<b>Risers and treads</b> Notwithstanding paragraph E.3.4.2, the width of a tread of any staircase in any <b>industrial building shall not be less than 250mm.</b>
Approved Document	E.3.4.3	<b>Risers and treads</b> The width of the tread of any tapered step shall be taken as that when measured at a distance of 500mm from the narrower end.
Approved Document	E.3.4.4	<b>Risers and treads</b> The risers and tread within each flight of stairs shall be of uniform height and size:



		A tolerance of 5mm between two consecutive steps in any flight of staircase is acceptable
Approved Document	E.3.5.1	Landing A landing shall be provided at every floor level and door opening
Approved Document	E.3.5.2	Landing Except for spiral staircases, an intermediate landing shall be provided in between floor levels at intervals of not more than 18 risers
Approved Document	E.3.5.3	Landing The clear width of any landing, measured from the handrail or kerb to the wall or external railing of the landing, shall not be less than 900mm. Clear space boundary line Minimum one tread size Figure 14. Measurement of landing width
Approved Document	E.3.5.4	Landing A landing shall not have any step or drop
Approved Document	E.3.5.5	Landing Notwithstanding paragraph E.3.5.4, one winder is allowed in every 90 degrees turn in the staircase of any dwelling unit.
Approved Document	E.3.6.1	Handrails A handrail shall be provided on at least one side of the flight of staircase.
Approved		



Document	E.3.6.2	Handrails
		The height of the handrail shall be between 750mm and 1000mm above the pitch line.

### 3.2.2 Creating a Standard Staircase

Staircases are required for the checking of width of staircase, risers & treads and landings (Clause No. E.3.3.1, E.3.4.1, E.3.4.2, E.3.4.2.a, E.3.4.2.b, E.3.4.4, E.3.5.1, E.3.5.2, E.3.5.3, E.3.5.4, E.3.6.1, E.3.6.2).

To create a standard staircase, the steps are as follows:

(Revit  $\rightarrow$  Architecture  $\rightarrow$  Stair  $\rightarrow$  Choose the drawing method: 'Straight'  $\rightarrow$  Adjust the Dimension: Run width  $\rightarrow$  Adjust the Dimension: Riser height/Tread depth  $\rightarrow$  Drawing Stair  $\rightarrow$  Click 'Railing'  $\rightarrow$  Set the Railing option  $\rightarrow$  Click 'Finish Edit Mode')



Figure 15. Creating a Standard Staircase





Figure 16. Dimensions of Standard Stair Object

Table D.	Catting	of Ctoudoud	C4-: 0	hia at a a a rulin.		
Table 2:	Setting	of Standard	Stair Ol	oject according	j to I	Regulation

Setting of Stair				
Regulation	Revit Category	Insert Data		
E.3.3.1 Stair Clear Width	Actual Run Width	More than 900mm		
E.3.4.1 Maximum Riser Height	Actual Riser Height	(Height of Level) / (Number of Risers) ≤ <b>175mm</b>		
E.3.4.2 Tread width – All except industrial development		More than 275mm		
E.3.4.2.a Tread width – Residential	Actual Tread Depth	More than 225mm		
E.3.4.2.b Tread width - Industrial		More than 250mm		
E.3.4.4 Treads/Risers Uniformed Width/Height	Actual Riser Height / Actual Tread Depth	Riser height $\leq$ <b>175</b> $\pm$ <b>5mm</b> Tread width $\geq$ 275/225/250 $\pm$ 5mm		
E.3.5.2 Maximum Treads/Flights	Number of Risers - 1	Number of Risers - 1 ≤ <b>18</b>		
E.3.5.3 Clear Landing Width	Actual Run Width	More than 900mm		
E.3.6.1 Handrail provided to 1 side	Railing	Every type except for no stair object		
E.3.6.2 Handrail Height above pitch line	Railing	<b>1000mm</b> ≥ Railing Height ≥ <b>750mm</b>		

**Items E.3.5.1 and E.3.5.4**, which are not specified in the **Table 2**, are naturally satisfactory if drawn in the accordance to Figure 15 as the landings are automatically generated by **'Automatic Landing'** function.



### 3.2.3 Spiral Staircase

Spiral staircases are required for the width of spiral staircase, treads checking (Clause No. E.3.3.1, E.3.4.1, E.3.4.3, E,3.4.4, E.3.5.1, E.3.6.1).

To create a spiral staircase, the steps are as follows:

(Revit  $\rightarrow$  Architecture  $\rightarrow$  Stair  $\rightarrow$  Choose the drawing method: 'Spiral'  $\rightarrow$  Adjust the Dimension: Run width  $\rightarrow$  Adjust the Dimension: Riser height/Tread depth  $\rightarrow$  Drawing Stair  $\rightarrow$  Click 'Railing'  $\rightarrow$  Set the Railing option  $\rightarrow$  Click 'Finish Edit Mode')



Figure 17. Drawing Order of Spiral Stair



Setting of Stair		
Regulation	Revit Category	Insert Data
E.3.3.1 Stair Clear Width	Actual Run Width	More than 900mm
E.3.4.1 Maximum Riser Height	Actual Riser Height	(Height of Level) / (Number of Risers) ≤ <b>175mm</b>
E.3.4.3 Width of Tread for Tapered Step		More than <b>275mm</b> (All except in industrial development) More than <b>225mm</b> (Residential) More than <b>250mm</b> (Industrial)
E.3.4.4 Treads/Risers Uniformed Width/Height	Actual Riser Height / Actual Tread Depth	Riser height ≤ <b>175</b> ± 5mm Tread width ≥ <b>275/225/250</b> ± 5mm
E.3.6.1 Handrail provided to 1 side	Railing	Every type except for no stair object
E.3.6.2 Handrail Height above pitch line	Railing	1000mm ≥ Railing Height ≥ 750mm

## Table 3 Setting of Spiral Stair according to Regulation

### **Caution!**

For spiral staircase regulation, the tread width checking is measured from the narrow side(inside) at an offset of 500mm, so it should be modelled sufficiently wide.



#### 3.2.4 Winder Staircase

Winder staircases are required for the checking of width of winder staircase, treads, flight and turn degrees checking (Clause No. E.3.3.1, E.3.4.1, E.3.4.3, E,3.4.4, E.3.5.1, E.3.5.2, E.3.6.1).

To create a winder staircase, the steps are as follows:

(Revit  $\rightarrow$  Architecture  $\rightarrow$  Stair  $\rightarrow$  Choose the drawing method: 'L-Shape Winder'  $\rightarrow$  Drawing Stair  $\rightarrow$  Click 'Railing'  $\rightarrow$  Set the Railing option  $\rightarrow$  Click 'Finish Edit Mode')



Figure 18. Drawing Order of Winder Stair



Setting of Stair					
Regulation	Revit Category	Insert Data			
E.3.3.1 Stair Clear Width	Actual Run Width	More than 900mm			
E.3.4.1 Maximum Riser Height	Actual Riser Height	(Height of Level) / (Number of Risers) ≤ <b>175mm</b>			
E.3.4.3 Width of Tread for Tapered Step		More than <b>275mm</b> (All except in industrial development) More than <b>225mm</b> (Residential) More than <b>250mm</b> (Industrial)			
E.3.4.4 Treads/Risers Uniformed Width/Height	Actual Riser Height / Actual Tread Depth	Riser height ≤ <b>175</b> ± 5mm Tread width ≥ <b>275/225/250</b> ± 5mm			
E.3.5.2 Maximum Treads/Flights	Number of Risers - 1	Number of Risers - 1 ≤ <b>18</b>			
E.3.5.5 1 Winder Allowed/90° Turn in Staircase	L-Shape Winder	Degree of Path Line is <b>less than 90</b> °			
E.3.6.1 Handrail provided to 1 side	Railing	Every type except for no stair object			
E.3.6.2 Handrail Height above pitch line	Railing	1000mm ≥ Railing Height ≥ 750mm			

#### Table 4. Setting of Winder Stair according to Regulation

#### **Caution!**

For winder staircase regulation, the tread width review is measured from the narrow side(inside) at an offset of 500mm, so it should be modelled sufficiently wide.

#### For special cases such as E.3.5.1/E.3.5.4 (Landing)

For Clauses **E.3.5.1/E.3.5.4**, if the slab object associated with the staircase is modelled, it is automatically checked and there is no specific setting in the stair function.



## 3.3 Ramp

## 3.3.1 Regulation of Ramp

Document	Clause No.	Regulation				
Code on		Changes in Levels Any change in level of the floor surface, the gradient of the slope shall conform below Table				
Accessibility		Changes in Vertical Rise (mm) Gradient not steeper than				
in the built environment	4.5.1	0 to 15 1 : 2				
2013		more than 15 to 50 1 : 5				
		more than 50 to 200 1 : 10				
		Exceeding 200 1 : 12				
Code on Accessibility in the built environment 2013	4.6.5.2	Landings Landings shall have a level platform of 1500mm or more				
Code on Accessibility in the built environment 2013	4.6.6.1	Ramp Handrails         A ramp run with a rise greater than 175mm shall have handrails that :         (a) Are on both sides;         (b) Are placed at a height of between 800mm and 900mm above the floor level; and         (c) Are continuous along the entire length of the ramp				
Code on Accessibility in the built environment 2013	4.6.6.2	<b>Ramp Handrails</b> Handrail extensions shall extend horizontally for a distance of 300mm or more beyond the top and bottom of the ramp to provide support for persons who may need help to negotiate the ramp				





## 3.3.2 Setting of Accessible Ramp

In the SBim Assess, items related to ramp are checked only for the accessible ramp. So accessible ramp is defined by using 'BCA\_Accessible' property. (Clause No. 4.5.1, 4.6.5.2, 4.6.6.1, 4.6.6.2)

Project Parameters			
Name	BCA_Accessible		
Discipline	Common		
Type of Parameter	Yes/No		
Group parameter under	Identity Data		
Categories	Ramps		
Parameter Type	Select ' <b>Instance'</b> and select 'Values are aligned per group type'		



## Create the Accessible Ramp

Create an accessible ramp object by adding the accessible property to the ramp object:

The configuration screen in Revit is shown below Figure 19.

- Identity Data:
  - BCA\_Accessible : Yes(Tick)

Properties Access	sible Ramp	× —			
	······	torey	Level - BCAA_ArchI_140413_OKv2.0003.rvt		23 3D View: (3D) - BCAA_Archi_140413_0Kv2.0003.rvt
Ramp Ramp 1 is to 12		-			Lemporary Hide/Isolate
Ramps (1)	V 🖓 Edit 1	Туре		e	the later of the l
Constraints	/	*			
Base Level	BASEMENT PLAN				
Base Offset	-925.0				
Top Level	DRIVEWAY LEVEL				Intension
Top Offset	0.0				Extension
Multistory Top Level	None			and the second s	
Graphics		*			No. 1997
Up text	UP				No. 1997
Down text	DN				
Up label			` m→		The second secon
Down label			~~~~~		
Show Up arrow in all views					
Dimensions		*			
Width	3600.0				
Identity Data		*			
Image					
Comments					
Mark					
BCA_Accessible					
Phasing		~			
Phase Created	New Construction				
Phase Demolished	None	Ľ			
IFC Parameters		<b>^</b>		v	
RequiredSlope		D 🔅	34-124-11-1	ي. <	1:100 🖾 🗃 🗽 💃 🖘 🥀 約 🎯 兄 9 🖽 🛞 🗇 🖬 🗸

Figure 19 Setting of Accessible Ramp(Property & Dimension)

Setting of Ramp				
Regulation	Revit Category	Insert Data		
4.5.1 Gradient Change		Change level: 0-15mm ≤ gradient 1:2 Change level: 15-50mm ≤ gradient 1:5 Change level: 50-200mm ≤ gradient 1:10 Change level: more than 200mm ≤ gradient 1:12		
4.6.5.2 Size of Landing	Width	More than <b>1500mm</b>		
4.6.6.1 Handrail Both Sides & Continuous	Railing	Railing object is existed on <b>both sides &amp;</b> Continuous		
4.6.6.2 Handrail Extension	Railing extension	More than 300mm		



## 4 Horizontal Circulation

All spaces in the model should be classified according to the "SG\_Name" classification.

Setting of 'SG\_Name' Property (Refer to Section 1.2 for details on how to set up)

Project Parameters			
Name	SG_Name		
Discipline	Common		
Type of Parameter	Text		
Group parameter under	Identity Data		
Categories	Rooms, Areas		
Parameter Type	Select ' <b>Instance'</b> and select 'Values are aligned per group type'		

## 4.1 Headroom

## 4.1.1 Regulation of Headroom

Document	Clause No.	Regulation
Approved Document	C.3.2.1	Headroom The headroom of every room, access route and circulation space shall not be less than <b>2.0m</b>
Approved Document	C.3.2.2	Headroom For sheltered car parks, the headroom at parking lots and driveway shall not be less than <b>2.2m</b>



### 4.1.2 Naming – Space (Room)

Space object is required for all spaces where headroom checking is required, except for circular staircases and spaces which are exempted from headroom checking. (*Refer to Table 6*)

#### Space Naming Rules Cases:

Headroom	<ul> <li>Room (All Rooms)</li> <li>Circulation Space: Corridor, Lobby, Hall etc.</li> <li>SG_Name: CIRCULATION_SPACE, STAIRCASE</li> </ul>
Exemption	<ul> <li>Store Room</li> <li>Equipment Room</li> <li>Mechanical Room</li> <li>Attic Level (Building Storey): space area &lt; 10m<sup>2</sup></li> <li>SG_Name; STORE_ROOM, MEP, ATTIC</li> </ul>

Among the exemption items, if the area of the space object included in the **Attic Level is less than 10m**<sup>2</sup>, all objects are excluded from the headroom checking.



Figure 20. Room Objects for Headroom Checking



#### 4.1.3 Headroom Check for Driveway, Parking Lot Objects

Driveway and Parking lot objects are required for headroom checking, with the SG\_Name: "PARKING".

To create a **space object**, the steps are as follow:

#### (Revit $\rightarrow$ Architecture $\rightarrow$ Room $\rightarrow$ Properties $\rightarrow$ Identity Data)

• **SG\_Name:** PARKING



Figure 21. Settings of Space Object (Room) for Driveway



#### Creating a Driveway by using Mass

The steps are as follows: (Revit  $\rightarrow$  Massing & Site  $\rightarrow$  In-Place Mass  $\rightarrow$  SG\_Name: 'PARKING"  $\rightarrow$  Drawing mass line  $\rightarrow$  Create Form  $\rightarrow$  Solid Form  $\rightarrow$  Finish Mass)



Figure 22. Drawing Order of Driveway by using Mass function

#### Creating a Driveway by using Slab

The steps are as follows: (Revit  $\rightarrow$  Architecture  $\rightarrow$  Floor  $\rightarrow$  Edit Type  $\rightarrow$  Duplicate  $\rightarrow$  Name: 'Driveway'  $\rightarrow$  Drawing floor's outline  $\rightarrow$  Finish)



Figure 23. Drawing Order of Driveway by using Floor function



#### Creating a Car Parking Lot by using Parking Component

User must follow how to define the **Parking Lot** (Section 2.1) by placing the Car Parking Lot Object.

• **SG\_Name:** Parking\_Lot

Massing & Site C	ollaborate View	Type Properties	× ×	Properties	×
Toposurface Site	Parking Bu	Family: Car Parking Lot Type: Standard Car Parking Lot Type Parameters	Coad Cuplicate Rename	Car Par Standar	king Lot rd Car Parking Lot
compon	1 au	Parameter	Value = ^	Parking (1)	🗸 🔠 Edit Type
Mode	el Site	Materials and Finishes	۵	Constraints	
		Material	Paint - White Lining	Constraints	
Properties		Dimensions	*	Level	Basement 2
Car Par Standar	king Lot d Car Parking Lot	Parking Length	4800.0	Host	Level : Basement 2
	CD C III	Parking Width	2400.0	0.00	
Parking (1)	~ Em Edit	Islandity Data	8	Offset	0.0
Level	Basement 2	Identity Data			
Host	Level : Basement	Keynote	Q22/185	Moves With Near	
Offset	0.0	Type Image			البيا
Identity Data		Type mage		Ildentity Data	2
Image		Model			
Comments		Manufacturer		Image	
Mark					
BCA_Accessible		Type Comments		Comments	
SG_Name	Parking_Lot	URL			
Phasing			+	Mark	
Phase Created	New Construction	Description		IN GIR	
Phase Demolished	INONE	Assembly Code		BCA_Accessible	
		Cost			
		Assembly Description		BCA_FamilyFriendly	
		Type Mark	~ ~	SG_Name	Parking_Lot
		Ionaidea Marka		Phasing	*
		<< Preview OK	Cancel Apply	Phase Created	New Construction
				Phase Demolished	None

Figure 24. Place the Car Parking Lot Objects for the Headroom Checking



## 4.2 Door

## 4.2.1 Regulations of Door

Document	Clause No.	Regulation
Code on Accessibility in the built environment 2013	4.4	<b>Door</b> Width of Clear opening Sliding / Swing Door is more than <b>850mm</b>
Code on Accessibility in the built environment 2013	4.4.6.1	<ul> <li>Manoeuvring Space</li> <li>(a) On the pull side, a minimum space of 600mm adjacent to the leading edge of the door with a minimum clear floor space of 1500mm wide by 1500mm deep; and</li> <li>(b) On the push side, a minimum space of 300mm adjacent to the leading edge of the door with a minimum clear floor space of 1200mm by 1200mm deep.</li> <li>1500 min the push side, a minimum space of 300mm adjacent to the leading edge of the door with a minimum clear floor space of 1200mm by 1200mm deep.</li> <li>1500 min the push side, a minimum space of 300mm adjacent to the leading edge of the door with a minimum clear floor space of 1200mm by 1200mm deep.</li> <li>1500 min the push side the door with a minimum clear floor space of 1200 min the push side the door with a minimum clear floor space of 1200 min the push side the push s</li></ul>



#### 4.2.2 Creating an Accessible Door

The checking of "Clear Door Width" and "Manoeuvring Space" applies to all Accessible Doors.

To create an accessible door, there are 2 methods:

- (a) Adding "BCA\_Accessible" property to the Door
- (b) Creating an "Accessible Route" which is in contact with the Door

#### Adding the 'BCA\_Accessible' Property

For information on modifying Revit Project Property, please refer to Section 1.2.

Project parameters			
Name	BCA_Accessible		
Discipline	Common		
Type of Parameter	Yes/No		
Group parameter under	Identity Data		
Categories	Doors		
Parameter Type	Select ' <b>Instance'</b> and select 'Values are aligned per group type'		

Check the 'BCA\_Accessible' checkbox



Figure 26. Accessible Door by using Property



#### **Creating an Accessible Route**

Accessible Route on the door is defined by must placing the 'Accessible Route' on the door.

To create an accessible route, the steps are as follows (Refer to Section 4.3.2 for more details):

## (Revit $\rightarrow$ Architecture $\rightarrow$ Component $\rightarrow$ Place a component $\rightarrow$ Draw the 'SG\_Name: Accessible Route' on the door)

The system is able to check all the cases shown in **Figure 27** where the 'Accessible Route' is drawn on the door.



Figure 27. Drawing Method for the Accessible Door

#### Caution!

Do not use door objects with clearance box provided in the previous BCA Template. As the clearance box is recognized as a door object, it is difficult to check the door clear opening accurately.

In cases where the door is part of the curtain wall panel, the mullion around the curtain wall door must be removed because the curtain wall mullion may collide with the boundary of manoeuvring space.





Figure 28. Collision around the Curtain Wall Mullion



## 4.3 Accessible Route

## 4.3.1 Regulation of Accessible Route

Document	Clause No.	Regulation	
No.	Accessible Routes, Corridors and Paths The minimum width of the accessible routes, corr be as prescribe in Table 7. Table 7. Accessible Route Wid Building Type	ridors and paths shall <i>Iths</i> Minimum width of accessible route	
Code on Accessibility in the built environment	4.2	Residential developments, hotels, boarding houses, service apartments, workers' dormitories, hotels, halls of residence or dormitories etc. Schools, office buildings Factories, workshops, industrial buildings and offices/showroom areas in warehouse	1500mm
2013		Universities, colleges and similar institutions of learning Parks, open spaces and places of public resort Sport complexes and public swimming pools MRT stations and bus interchanges and passenger terminals Shopping centres or food centres, restaurants and eating establishments Hospitals, nursing homes, welfare homes and homes for the aged	1800mm



#### 4.3.2 Creating an Accessible Route

For the checking of "Primary Accessible Route Width for Wheelchair Users", the Accessible Route in the space is defined by creating an accessible route.

**Setting of 'SG\_Name' Property** (*Refer to Section 1.2 for details on how to set up*)

Project Parameters			
Name	SG_Name		
Discipline	Common		
Type of Parameter	Text		
Group parameter under	Identity Data		
Categories	Generic Models		
Parameter Type	Select <b>'Instance'</b> and select 'Values are aligned per group type'		

To create an accessible route, the steps are as follows:

## (Revit $\rightarrow$ Architecture $\rightarrow$ Component $\rightarrow$ Place a component $\rightarrow$ Draw the 'Accessible Route' in the space (Route part))

- Family: BCA\_BFAv2
- Type: AccessibleRoute-1500/1800
- Identity Data:
  - SG\_Name: Accessible\_Route
- Dimensions:
  - Accessible Route width: 1500mm (Typology: Residential Development/Industrial/Institution/School)
  - Accessible Route width: 1800mm (Typology: Commercial, Bridge, Jetty, Parks etc)





Users must place the 'Accessible Route' in the Access Route space as follows:

Figure 29. Drawing the Accessible Route in the Access Route Space



## 5 Sanitary Provision

## 5.1 Naming – Space (Sanitary)

#### Create the WC Compartment / Individual Washroom

Space objects are required for Sanitary provision checking.

Space Naming Rules Special Cases:

- For the Toilet Cluster SG\_Name: **WASHROOM** / Reference: **Toilet Cluster** (using Area function)
- For the WC Compartment SG\_Name: **WASHROOM\_COMPARTMENT** (using Room function)
- For the Individual Washroom SG\_Name: WASHROOM (using Room function)

**Setting of 'SG\_Name' Property** (*Refer to Section 1.2 for details on how to set up*)

Project Parameters			
Name	SG_Name		
Discipline	Common		
Type of Parameter	Text		
Group parameter under	Identity Data		
Categories	Rooms, Areas		
Parameter Type	Select ' <b>Instance'</b> and select 'Values are aligned per group type'		

Users must specify the SG\_Name under: Properties → Identity Data → SG\_Name





Figure 30. Setting of Room/Area Name for the Sanitary Checking

## 5.2 Setting of the 'BCA\_Accessible' Property

For **Accessible Toilet cluster**, use the '**BCA\_Accessible**' and '**Reference**' property and **SG\_Name** of rooms to define Accessible WC Compartment in Toilet Cluster:

- Toilet = Reference: Toilet Cluster
- Accessible WC Compartment = SG\_Name: WASHROOM\_COMPARTMENT + BCA\_Accessible

For **Accessible Individual Washroom**, use the **'BCA\_Accessible'** property and **SG\_Name** of rooms to define Accessible individual washroom:

• Accessible Individual Washroom = SG\_Name: WASHROOM + BCA\_Accessible

For information on modifying Revit Project Property, refer to Section 1.2.

Project parameters			
Name	BCA_Accessible	Reference	
Discipline	Common	Common	
Type of Parameter	Yes/No	Text	
Group parameter under	IFC Parameter $\rightarrow$ Identity Data	Identity Data	



Categories	Rooms, Areas
Parameter Type	Select ' <b>Instance'</b> and select 'Values are aligned per group type'

The space names and property definitions for sanitary item checking are shown in the Table 8.

 Table 8: Classification for the Sanitary Checking

Room Category	Used Function	Name	BCA_Accessible	Reference
Individual Washroom	Room	SG_Name: WASHROOM	No	-
Cluster of Toilet	Area	-	No	Toilet Cluster
WC Compartment	Room	SG_Name: WASHROOM_COMPARTMENT	No	-
Accessible Individual Washroom	Room	SG_Name: WASHROOM	Yes	-
Accessible WC Compartment	Room	SG_Name: WASHROOM_COMPARTMENT	Yes	-

## 5.3 Accessible Washroom Provision

## 5.3.1 Regulation of Washroom Provisions

Document	Clause No.	Regulation
Code on Accessibility in the built environment 2013	5.1.1	Sanitary Provision At every level of a non-residential building where toilets are provided, at least one accessible individual washroom shall be provided



Code on Accessibility in the built environment 2013	5.1.2	Sanitary Provision In non-residential buildings, other than factory, workshop, office/showroom areas in warehouses industrial buildings, where two or more clusters of toilets are provided at the same level but at different locations, the corresponding number of accessible individual washroom shall be provided. Each accessible individual washroom may be replaced with one accessible water closet compartment in the male and female toilets, provided that there is at least one accessible individual washroom on the same level.
		least one accessible individual washroom on the same level.

## 5.3.2 Creating the Accessible WC Compartment & Accessible Individual Washroom

The room name and property settings must be defined accurately (Table 8) for the checking of the **Provision of Accessible WC Compartment** and **Accessible Individual Washroom**.

- Toilet Cluster = Reference: "Toilet Cluster"
- Accessible WC Compartment = BCA\_Accessible' + SG\_Name: WASHROOM\_COMPARTMENT +
- Accessible Individual Washroom = 'BCA\_Accessible' + SG\_Name: WASHROOM





#### Figure 31. Setting of the Accessible Sanitary Rooms

#### Caution!

Toilet (drawn by area function) must contain all WC Compartments within the toilet cluster, as shown as **Figure 31**.

## 5.4 Accessible Individual Washroom

Definitions for Accessible Individual Washroom follow Table 8.

|--|

Document	Clause No.	Regulation
Code on Accessibility in the built environment 2013	5.2.1.a	Accessible Individual Washrooms Accessible individual washrooms shall: Have minimum clear dimension between opposite walls of <b>1750mm</b> or more
Code on Accessibility in the built environment 2013	5.2.1.b	Accessible Individual Washrooms Accessible individual washrooms shall: Have a clear space of <b>900mm by 1500mm</b> or more adjacent to the water closet;
Code on Accessibility in the built environment 2013	5.2.2	Accessible Individual Washrooms An accessible individual washroom for the wheelchair user has clear space in front of WC more than <b>1000mm deep by 880mm width</b> .
Code on Accessibility in the built environment 2013	5.2.1.c	Accessible Individual Washrooms Accessible individual washrooms shall: Have a clear door opening more than 850mm

Note:



Of the items listed above, checking for **5.2.1.a/5.2.1.c** are automatically checked if they have been modelled accurately. Please refer to the above table for details.

#### 5.4.2 Creating the Water Closet Object

Object Name Specifications: 'Water Closet'

For the checking of Water Closet, the object is classified under SG\_Name: "Water\_Closet".

#### **Create Water Closet Object**

To create a new plumbing fixture object, the steps are as follows:

#### (Revit → System → Plumbing Fixtures → Identity Data → SG\_Name → Water\_Closet)

- Identity Data:
  - SG\_Name: Water\_Closet



Figure 32. Setting of Water Closet

It is important to specify the word 'Water\_Closet' into the SG\_Name if the IfcFlowTerminal object is meant to be a water closet.



#### 5.4.3 Place the Water Closet Object in Accessible Individual Washroom

Water closets are required for the checking of **Clear space** and **Front space** (Clause No. 5.2.1.b, 5.2.2).



Figure 33. Water Closet Placement in Accessible Individual Washroom



## 6 Ventilation

## 6.1 Ventilation

## 6.1.1 Regulation of Ventilation

Document	Clause No.	Regulation
Approved Document	G.2.1	Ventilation Ventilation shall be adequately provided in a building for its intended occupancy
Approved Document	G.2.2	Ventilation Residential building, other than houses built by the owners for their own use, shall be provided with natural ventilation for the purpose of paragraph G.2.1

## 6.1.2 Setting of Mode of Ventilation

For the checking of ventilation, the ventilation property of each space must be defined by using 'BCA\_ModeofVentilation' property. **Therefore, all rooms must have a Mode of Ventilation value.** 

Project Parameters			
Name	BCA_ModeofVentilation		
Discipline	Common		
Type of Parameter	Text		
Group parameter under	Identity Data		
Categories	Rooms,		
Parameter Type	Select ' <b>Instance'</b> and select 'Values are aligned per group type'		



## Setting of Ventilation Window

The configuration screen in Revit is shown below Figure 34.

- Identity Data:
  - BCA\_ModeOfVentilation: Mechanical Ventilation Natural Ventilation

Propert Mechani	cal Ventilation	Proper Natural Ventilation ×		
R	÷	R		
Rooms (1)	✓ 🕃 Edit Type	Rooms (1)	✓ Contraction Edit Type	
Constraints	×	Constraints	¥	
Dimensions	*	Dimensions	¥	
Identity Data	*	Identity Data	*	
Number	084	Number	084	
Name	02-01 KITCHEN	Name	02-01 KITCHEN	
SG_Name	10 EATING_PLACE	SG_Name	10 EATING_PLACE	
Image		Image		
Comments	Cafeteria, Foodcourt, Cafe, Ko	Comments	Cafeteria, Foodcourt, Cafe, Ko	
Occupancy		Occupancy		
Department		Department		
Base Finish		Base Finish		
Ceiling Finish	5	Ceiling Finish		
Wall Finish	<b>V</b>	Wall Finish		
Floor Finish		Floor Finish		
SG_UseGroup		SG_UseGroup		
BCA_Accessible		BCA_Accessible		
BCA_ModeOfVentilation	Mechanical Ventilation	BCA_ModeOfVentilation	Natural Ventilation	
BCA_ElderlyFriendly		BCA_ElderlyFriendly		
BCA_Ambulant		BCA_Ambulant		
Phasing	A	Phasing	\$	
Phase	New Construction	Phase	New Construction	
IFC Parameters	*	IFC Parameters	\$	
BCA_Area Cluster		BCA_Area Cluster		
BCA_Occupancy		BCA_Occupancy		

Figure 34. Setting of Mode of Ventilation



## 6.2 Natural Ventilation

6.2.1	Regulation of Natural	Ventilation
-------	-----------------------	-------------

Document	Clause No.	Regulation		
		Natural Ventilation		
Approved Document	G.3.2.1	Natural ventilation shall be provided by means of one or more openable windows or other openings with an aggregate area of not less than -		
		Natural Ventilation		
Approved Document	G.3.2.1.a	Natural ventilation shall be pro openable windows or other ope less than (a) 5% of the floor area of	ovided by means of one or more nings with an aggregate area of not f the room or space required to be	
		ventilated;		
		Natural Ventilation		
Approved Document	G.3.2.2.b	The windows or other openings shall be located such that they open to –		
		(b) An airwell with a minimu	m width of 3.0m	
		Natural Ventilation		
		The windows or other openings to –	shall be located such that they open	
Approved	G.3.2.2.b(i)	An airwell with a minimum width to the sky complying with Table C	of 3.0m and a minimum area open G.3.2.2(a)	
Document		Height	Minimum airwell size (m <sup>2</sup> )	
		<= 30m	10	
		Subsequent 3m	+1	
		Table G.3.2.2(a) – Dimen	sion of airwells	
		Natural Ventilation		
		The windows or other openings to –	shall be located such that they open	
Approved Document		An airwell with a minimum width to the sky complying with Table C	of 3.0m and a minimum area open 6.3.2.2(a)	
	G.J.Z.Z.D(II)	Height	Minimum airwell size (m <sup>2</sup> )	
		<= 30m	10	
		Subsequent 3m	+1	
		Table G.3.2.2(a) – Dimen	sion of airwells	



## 6.2.2 Setting for the Natural Ventilation Checking

For the checking of natural ventilation area, use the 'BCA\_VentilationOpening' property to define the ventilation rate of the windows, and define the airwell using SG\_Name.

Project parameters			
Name	BCA_VentilationOpening	SG_Name	
Discipline	Common	Common	
Type of Parameter	Integer	Text	
Group parameter under	Identity Data	Identity Data	
Categories	Windows	Rooms	
Parameter Type	Select 'Instance' and select 'Values are aligned per group type'		

### 6.2.3 Create the Ventilation Windows

Ventilation Windows are required for the checking of natural ventilation area ratio (Clause No.G.3.2.1, G.3.2.1.a, G.3.2.2.b, G.3.2.2.b(i), G.3.2.2.b.(ii)).

To create a new plumbing fixture object, the steps are as follows:

#### (Revit $\rightarrow$ Architecture $\rightarrow$ Window $\rightarrow$ Identity Data $\rightarrow$ BCA\_VentilationOpening $\rightarrow$ 0-100)

- Identity Data:
  - BCA\_VentilationOpening: 0-100(Percentage value)

Ventilation Window				
Propert	ventilatio			×
	Side hung casement2 1000/1200			•
Windows (1	)	~	🔠 Edit	Туре
Constraints				¥
Identity Data	8			*
Image		0		
Comments	Comments			
Mark		117		
BCA_VentilationOpening		80		
Phasing				- ~
Phase Created		New Construction		
Phase Den	nolished	None		
IFC Parameters			*	
SG_AcousticRating				
SG_RequiredFireRating				
FSSD_FireRating				
Other				\$
Head Heig	ht	2000.0		

Figure 35. Setting of Ventilation Window



#### 6.2.4 Space Naming - Airwell

For the checking Airwell related items, Airwell's space should be specified by using 'SG\_Name' property. (Clause No.G.3.2.2.b, G.3.2.2.b(i), G.3.2.2.b(ii))

Properties	Airwell ×	
R	Ţ	Ventilation Window
Rooms (1)	✓ 🔓 Edit Type	
Constraints	* ^	
Level	1ST STOREY PLAN	
Upper Limit	1ST STOREY PLAN	
Limit Offset	2438.4	
Base Offset	0.0	
Text	*	
Vent		
Dimensions	*	
Area	31.529 m²	
Perimeter	25650.0	
Unbounded Height	2438.4	
Volume	Not Computed	AINWELL
Computation Height	0.0	
Identity Data	\$	
Number	132	
Name	AIRWELL	
Image		
Comments		
Occupancy		
Department		
Base Finish		
Ceiling Finish		
Wall Finish		
Floor Finish		
SG_UseGroup		
BCA_Accessible		
BCA_ModeOfVentilation	Natural Ventilation	Opening
BCA_Ambulant		opennig
SG_Name	AIRWELL	
Diaper Changing Station		
Dharing.	······································	

Figure 36 Setting of Airwell

#### CAUTION!

If the value of the 'BCA\_VentilationOpening' property is absent or is 0, it is determined that it is not a ventilation window.

## 7 Barrier

## 7.1 Safety Barrier

7.1.1 Regulation of Safety Barrier

Document Clause Regulation



	No.	
Approved Document	H.2.1	Safety from Falling Where there is a vertical drop in level of 1.0m or more, appropriate measure shall be taken to prevent people from falling from height.
Approved Document	H.3.2.1.a	Height of Barrier The height of a barrier shall not be less than – (a) <b>1.0m at all location</b> except for locations indicated in (b);
Approved Document	H.3.2.1.b	<ul> <li>Height of Barrier</li> <li>The height of a barrier shall not be less than –</li> <li>(b) 900mm at the lower edge of the window and gallery or balcony with fixed seating in areas such as theatres, cinemas and assembling halls.</li> </ul>
Approved Document	H.3.4.1	Size of Opening The lowest part of the barrier (being at least 75mm measured from the finished floor level) shall be built with no gap, in order to prevent any object from falling through the base of the barrier.

#### **CAUTION!**

**"Human Accessible"** areas are defined based on the existence of space objects. Hence, if a "space object" is modelled, the space will be deemed as a space where building occupants may enter.

**Site topography** must be modelled to prevent any false error from arising when checking for "Safety from Falling".

#### 7.1.2 Creating a Barrier

For general safety barrier items (H.3.2.1.a, H.3.2.1.b, H.3.4.1), the system automatically recognizes based on space and barrier object (**Wall, Railing etc.**). Therefore, no specific modelling method is required.



## 8 Appendix

## 8.1 Project Parameter Screenshot

## 8.1.1 SG\_Name

Parameter Properties	×
Parameter Type  Project parameter (Can appear in schedules but not in tags)  Shared parameter (Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)  Select Export	Categories Filter list: <show all="">    Hide un-checked categories   Cutain Panels   Cutain Systems   Cutain Wall Mullions   Doors   Generic Models</show>
Parameter Data Name: SG_Name Discipline: Common Type of Parameter:  Type of Values are aligned per group type Text	<ul> <li>✓ Mass</li> <li>✓ Parking</li> <li>✓ Plumbing Fixtures</li> <li>✓ Ramps</li> <li>✓ Walls</li> <li>✓ Windows</li> </ul>
Group parameter under: Identity Data Tooltip Description: <no a="" custom="" description.="" edit="" ha<br="" parameter="" this="" to="" tooltip="" tooltip.="" tooltips="" write="">Edit Tooltip Add to all elements in the selected categories</no>	Check All Check None



## 8.2 Shared Parameter Screenshots

## 8.2.1 BCA\_VentilationOpening

Parameter Properties	×
Parameter Type	Categories
Project parameter	Filter list: <show all=""> ~</show>
(Can appear in schedules but not in tags)	Hide un-checked categories
Shared parameter	Windows
(Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)	
Select Export	
Parameter Data	
Name:	
BCA_VentilationOpening	
Discipline:   Instance	
Common	
Type of Parameter:  Ovalues are aligned per group type	
Text OValues can vary by group instance	
Group parameter under:	
Identity Data $\checkmark$	
Tooltip Description:	
<no a="" custom="" description.="" edit="" ha.<="" parameter="" td="" this="" to="" tooltip="" tooltip.="" tooltips="" write=""><td>•</td></no>	•
Edit Tooltip	Check All Check None
Add to all elements in the selected categories	OK Cancel Help

## 8.2.2 BCA\_ModeOfVentilation

Parameter Properties		X
Parameter Type Project parameter (Can appear in schedules but not in to Shared parameter (Can be shared by multiple projects a appear in schedules and tags)	ags) and families, exported to ODBC, and Window Snip Select Export	Categories Filter list: <a href="https://www.all&gt;withide-un-checked-categories">www.all&gt;withide-un-checked-categories</a> The Rooms
Parameter Data Name: BCA_ModeOfVentilation Discipline: Common Type of Parameter: Text	<ul> <li>Type</li> <li>Instance</li> <li>Values are aligned per group type</li> <li>Values can vary by group instance</li> </ul>	
Group parameter under: Identity Data	ter to write a custom tooltip. Custom tooltips ha	Check All Check None
Add to all elements in the selected cate	gories	OK Cancel Help



## 8.2.3 BCA\_FamilyFriendly

Parameter Properties	×
Parameter Type  Project parameter (Can appear in schedules but not in tags)  Shared parameter (Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)  Select Export	Categories Filter list: <show all="">    Hide un-checked categories</show>
Parameter Data Name: BCA_FamilyFriendly Discipline: Common Type of Parameter: Yes/No Yalues are aligned per group type Yes/No Values can vary by group instance Group parameter under:	
Identity Data       Image: Comparison of the selected categories         Tooltip Description: <no a="" custom="" description.="" edit="" ha<="" parameter="" td="" this="" to="" tooltip="" tooltip.="" tooltips="" write="">         Edit Tooltip</no>	Check All Check None OK Cancel Help

## 8.2.4 BCA\_ElderlyFriendly

Parameter Properties	×
Parameter Type  Project parameter (Can appear in schedules but not in tags)  Shared parameter (Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)  Select Export	Categories Filter list: <a href="https://www.show.all&gt;">&gt;</a> I Hide un-checked categories Rooms
Parameter Data         Name:         BCA_ElderlyFriendly         Discipline:         O Type         Discipline:         O Type         O Type         Discipline:         O Type         Values are aligned per group type         Yes/No         Values can vary by group instance	
Group parameter under:          Identity Data         Tooltip Description: <no a="" custom="" description.="" edit="" ha<="" parameter="" td="" this="" to="" tooltip="" tooltip.="" tooltips="" write="">         ✓ Add to all elements in the selected categories</no>	Check All Check None OK Cancel Help



## 8.2.5 BCA\_Area Cluster

Parameter Properties	×
Parameter Type  Project parameter (Can appear in schedules but not in tags)  Shared parameter (Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)  Window Snip Select Export	Categories Filter list: <show all="">    Hide un-checked categories     Rooms</show>
Parameter Data Name: BCA_Area Cluster Discipline: Common Type of Parameter: Text Values are aligned per group type O Values can vary by group instance	
Group parameter under:          IFC Parameters         Tooltip Description: <no a="" custom="" description,="" edit="" ha<="" parameter="" td="" this="" to="" tooltip="" tooltip.="" tooltips="" write=""></no>	Check All Check None
Add to all elements in the selected categories	OK Cancel Help

## 8.2.6 BCA\_Ambulant

Parameter Properties	×
Parameter Type         Project parameter         (Can appear in schedules but not in tags)         Shared parameter         (Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)         Window Snip         Select	Categories Filter list: <show all="">    Hide un-checked categories   Plumbing Fixtures   Rooms</show>
Parameter Data Name: BCA_Ambulant Discipline: Common Type of Parameter: Yes/No Yes/No Values are aligned per group type Yes/No Values can vary by group instance Group parameter under: Identity Data Tooltip Description: <no a="" custom="" description.="" edit="" ha="" parameter="" td="" this="" to="" tooltip="" tooltip.="" tooltip<="" tooltips="" write=""><td>Check All Check None</td></no>	Check All Check None
Add to all elements in the selected categories	OK Cancel Help



## 8.2.7 BCA\_Accessible

Parameter Properties	×
Parameter Type  Project parameter (Can appear in schedules but not in tags)  Shared parameter (Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)  Select Export	Categories Filter list: <show all="">    Hide un-checked categories   Ooors   Generic Models   Mass   Mass   Parking   Ramps   Rooms</show>
Parameter Data         Name:         BCA_Accessible       Type         Discipline:       Instance         Common       Values are aligned per group type         Yes/No       Values can vary by group instance         Group parameter under:       Values can vary by group instance         Identity Data          Tooltip Description: <no a="" custom="" description.="" edit="" ha<="" parameter="" td="" this="" to="" tooltip="" tooltip.="" tooltips="" write=""></no>	Specialty Equipment
Add to all elements in the selected categories	OK Cancel Help





2-Stage Innovation Grant Stage 2 POC Prototype – SBim Assess

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