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Drafted by: SSP
Project-id BI IDS

BIM Island IDS-project - Report

1 Introduction

BIM Island and buildingSMART Danmark has collaborated on a joint project to create a selection on IDS's based on CCI and the Construction Element Specification with the aim of presenting a proof-of-concept for the Icelandic construction industry.

This document served as input for the selection of elements, LOD's and properties to cover in this task as well as a summary of the findings from the project.

2 Scope

At a start-up meeting on March 6th, 2025, it was decided that we will make one IDS for each of the following disciplines:

1. Architectural
2. Structural
3. Heating, water and sanitation
4. Ventilation
5. Electrical

The IDS's will be created at LOD 325.

This document will specify the selected elements, LOD's and properties.

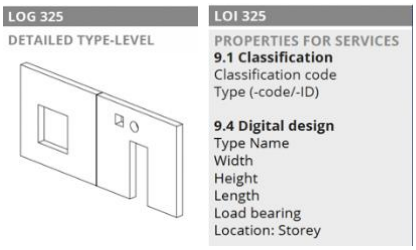
3 Suggested elements

3.1 Architectural

Windows.

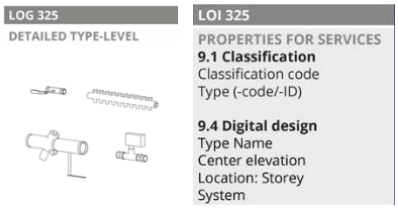
3.2 Structural

Concrete walls.



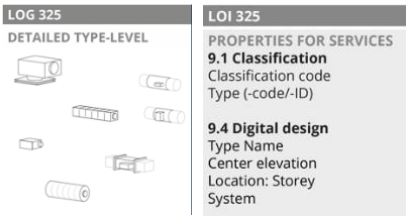
3.3 Water, heating and sanitation

Pumps and valves.



3.4 Ventilation

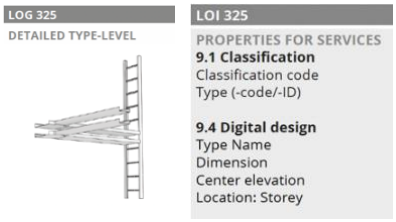
Duct silencer and dampers.



3.5 Electrical

Cabling carriers at LOD 325.

Cable carrier fittings are also considered but it is yet to be decided.



4 Selection of properties

This section lists properties along a specification of how they are handled in IFC for each of the selected elements and LOD's. The section also describes selected CCI properties and how they should be exported from IFC.

4.1 Construction element specifications

Element	Property	Handling in IFC	CES deviation	(I)nstance (T)ype (R)elation
Window at LOD 325	CCI Type-ID	CCI Type ID property.		T
	CCI Class Code	CCI classification code.		T
	Type Name	ObjectType attribute for IfcWindow		I
	Overall Width	OverallHeight attribute for IfcWindow		I
	Overall Height	OverallWidth attribute for IfcWindow		I
	Location: Storey	Name of a related IfcBuildingStorey entity		R

Element	Property	Handling in IFC	CES deviation	(I)nstance (T)ype (R)elation
	Fire exit	FireExit property in property set Pset_WindowCommon	x	I
	Construction	Name attribute for a related IfcWindowType	x	R
	Firetechnical class	FireRating property in Pset_WindowCommon property set		T
	Acoustic rating	AcousticRating property in Pset_WindowCommon property set		T
Concrete wall at LOD 325	CCI Type-ID	CCI Type ID property.		T
	CCI Class Code	CCI classification code.		T
	Type Name	ObjectType attribute for IfcWall		I
	Width	Width quantity from Qto_WallBaseQuantities quantity set		I
	Height	Height quantity from Qto_WallBaseQuantities quantity set		I
	Length	Length quantity from Qto_WallBaseQuantities quantity set		I
	Load bearing	LoadBearing property from Pset_WallCommon property set		I
	Location: Storey	Name of a related IfcBuildingStorey entity		R
Pump at LOD 325	CCI Type-ID	CCI Type ID property.		T
	CCI Class Code	CCI classification code.		T
	Type Name	ObjectType attribute for IfcPump		I
	Center elevation	Custom property InvertElevation in custom property set ePset_PumpOccurence.	x	I
	Location: Storey	Name of a related IfcBuildingStorey entity		R
	System	Name attribute of related IfcDistributionSystem entity	x	R
Valve at LOD 325	CCI Type-ID	CCI Type ID property.		T
	CCI Class Code	CCI classification code.		T
	Type Name	ObjectType attribute for IfcValve		I
	Center elevation	Custom property InvertElevation in custom property set ePset_ValveOccurence	x	I
	Location: Storey	Name of a related IfcBuildingStorey entity		R
	System	Name attribute of related IfcDistributionSystem entity	x	R
Duct silencer at LOD 325	CCI Type-ID	CCI Type ID property.		T
	CCI Class Code	CCI classification code.		T
	Type Name	ObjectType attribute for IfcDuctSilencer		I
	System	Name attribute of related IfcDistributionSystem entity		R
	Center elevation	Custom property InvertElevation in custom property set ePset_DuctSilencerOccurence.	x	I
	Location: Storey	Name of a related IfcBuildingStorey entity		R
Damper at LOD 325	CCI Type-ID	CCI Type ID property.		T
	CCI Class Code	CCI classification code.		T

Element	Property	Handling in IFC	CES deviation	(I)nstance (T)ype (R)elation
	Type Name	ObjectType attribute for IfcDamper		I
	System	Name attribute of related IfcDistributionSystem entity		R
	Center elevation	Custom property InvertElevation in custom property set ePset_DamperOccurence.	x	I
	Location: Storey	Name of a related IfcBuildingStorey entity		R
Cable ladders at LOD 325	CCI Type-ID	CCI Type ID property.		I
	CCI Class Code	CCI classification code.		I
	Dimension	Properties NominalWidth and NominalHeight from property set ePset_CableCarrierSegmentTypeCommon		I
	Type Name	ObjectType attribute for IfcCableCarrierSegment.CABLELADDER		I
	Center elevation	Custom property InvertElevation in custom property set ePset_CableCarrierOccurence.	x	I
	Location: Storey	Name of a related IfcBuildingStorey entity		R
Cable conduits at LOD 325	CCI Type-ID	CCI Type ID property.		I
	CCI Class Code	CCI classification code.		I
	Dimension	Property NominalDiameter from property set ePset_CableCarrierSegmentTypeCommon		I
	Type Name	ObjectType attribute for IfcCableCarrierSegment.CONDUITSEGMENT		I
	Center elevation	Custom property InvertElevation in custom property set ePset_CableCarrierOccurence	x	I
	Location: Storey	Name of a related IfcBuildingStorey entity		R

Colour coding:

- Standard IFC properties, quantities and attributes
- Standard IFC concepts but approach can be discussed
- Custom properties in custom property sets

These changes have been implemented in the process of creating the first revision of the IDS files:

- The custom property CenterElevation has been renamed to InvertElevation because that name is already used by pipes in the Property set Pset_PipeSegmentOccurence. It is however not the center elevation but the elevation om the lowest internal point of the pipe.
- All elevations have been moved to “occurrence” property sets instead of ”type” property sets because this property is related to occurrences and not types.
- The type name is generally handled through the ObjectType property for all objects.
- Dimensions for electrical routing is taken from properties in a custom property set ePset_CableCarrierSegmentTypeCommon.

Questions regarding the location of properties in property sets:

- For Cable routing the properties NominalHeight, NominalWidth and NominalDiameter are in the property set Pset_CableCarrierSegmentTypeConduitSegment. It seems confusing that these properties are placed in the property set for a specific type, when they relate to all types of cable carriers. Therefore, we have added a ePset_CableCarrierSegmentTypeCommon custom property set for these properties.

4.2 CCI properties

Property	Standardized property	Property Set
Topnode	CCITopNode	CCI_Administrative
Classification	CCIClassCode	CCI_Administrative
Type ID	CCITypeID	CCI_Administrative
Functional ID	CCIFunctionalID	CCI_Administrative
Multi-level Location ID	CCIMultiLevelLocationID	CCI_Administrative

For CCI these decisions have been taken:

- Topnodes are generally required as a separate property. Classification and identification are generally without topnodes as specified in the specifications from BIM Island.

- The IDS will not require specific values for the classification codes but the structure of values for classification and identification properties will be checked using regular expressions.

These questions arose while creating the IDS for CCI classification and identification:

- Shall the requirement for topnode specify the value “[L]” for construction elements or shall other values be allowed – and which?
    - [C] Construction complex
    - [E] Construction entity
    - [S] Storey
    - [Z] Zone
    - [B] Built space
    - [A] Activity space
    - [P] Construction product
    - [D] Construction aid
    - [R] Construction process
    - [U] Construction document
    - [G] Construction agent

- How specific shall the requirements for the Functional ID be in respect to number of elements in the code and the combination of functional systems, technical systems and components.
- In the Icelandic requirements the prefix (+) for the Location ID is not specified.
- It must also be discussed how specific the requirement for the structure of the Location ID should be.

5 Property set file for Revit

This section describes issues relating to export from Revit specifically the Property set file.

The section is divided into subsections describing the different ways of assigning information to objects:

- As attributes
- As IFC properties in IFC property sets
- As IFC quantities in IFC quantity sets
- As custom properties in custom property sets
- As attributes to related objects

The Property set file being referred to in this section is the file: XXXX_IFCPropertySets_BI_IDS, which can be found in this folder in Teams.

The meaning of the characters in the cells in the tables are:

+ The information is required, and we are pretty sure it is handled correctly.
- The information is required but we still need to look at how we get it into the IFC file.

We encountered an issue because Revit will create duplicated property sets when it is selected to use both options Export **IFC common property sets** and **Export user defined property sets**. Because of this limitation we need to manage all standard IFC properties through Pset files for the IDS checks to run correctly.

5.1 Attributes

The export of attributes is not handled through the Property set file. Tests done so far indicates that the attributes are exported correctly out of the box.

The following attributes are used:

Attribute	Window	Concrete wall	Pump / Valve	Duct silencer / Damper	Cable routing
ObjectType	+	+	+	+	+
OverallHeight	-				
OverallWidth	-				

5.2 IFC properties in IFC property sets

Properties are managed through the property set file.

All properties in the table below has been added to the Property set file for the project.

Property set and property	Window	Concrete wall	Pump / Valve	Duct silencer / Damper	Cable routing
Pset_WindowCommon.FireExit	+				
Pset_WindowCommon.FireRating	+				
Pset_WindowCommon.AcousticRating	+				
Pset_WallCommon.LoadBearing		+			

5.3 IFC quantities in IFC quantity sets

The assumption is that quantities are managed through the property set file.

Quantity set and quantity	Window	Concrete wall	Pump / Valve	Duct silencer / Damper	Cable routing
Qto_WallBaseQuantities.Height		+			
Qto_WallBaseQuantities.Length		+			
Qto_WallBaseQuantities.Width		+			

5.4 Custom properties in custom property sets

Custom properties in custom property sets are managed through the Property set file.

The InvertElevation custom properties in the table below have been added to the property file but it is unclear which parameter in Revit to map to and if the parameter is even present in Revit for the objects in question.

The CCI properties have all been added to the Property set file.

Custom property set and custom property	Window	Concrete wall	Pump / Valve	Duct silencer / Damper	Cable routing
ePset_ValveOccurence.InvertElevation			+		
ePset_PumpOccurence.InvertElevation			+		

Custom property set and custom property	Window	Concrete wall	Pump / Valve	Duct silencer / Damper	Cable routing
ePset_DuctSilencerOccurence.InvertElevation				+	
ePset_DamperOccurence.InvertElevation				+	
ePset_CableCarrierConduitSegmentOccurence. InvertElevation					+
ePset_CableCarrierOccurence.InvertElevation					+
ePset_CableCarrierSegmentTypeCommon. NominalHeight					+
ePset_CableCarrierSegmentTypeCommon. NominalWidth					+
ePset_CableCarrierSegmentTypeCommon. NominalDiameter					+
CCI_Administrative.CCITopNode					
CCI_Administrative.CCIClassCode	+	+	+	+	+
CCI_Administrative.CCITypeID	+	+	+	+	+
CCI_Administrative.CCIFunctionalID					
CCI_Administrative.CCIMultiLevelLocationID					

5.5 Attributes to related objects

Attributes for related objects are not managed through the Property set file but seems to be handled out of the box by Revit, if the relation exits. Tests so far shows that relations to IfcBuildingStorey is present while relations to IfcTypeObject and IfcSystem are missing.

Related object and attribute	Window	Concrete wall	Pump	Duct silencer	Cabling routing
IfcBuildingStorey.Name	+	+	+	+	+
IfcDistributionSystem.Name			+	+	
IfcWindowType.Name	+				

6 Test process

6.1 Flow

The following steps has been worked through in several iterations:

1. Create IDS files based on Construction Element Specifications
2. Create Pset-files and set export options in Revit
3. Export IFC files from Revit
4. Check IFC files with IDS files from step 1
5. Evaluate results and go back to step 1 until we are satisfied with the results

6.2 Output from test process

The following material has been generated as the output from the project.

- Example IFC files
  - ARK_Boðaþing_R2026_without_IFC_common_property_sets.ifc
  - BUR_Boðaþing_R2026_without_base_quantities.ifc
  - LAG_Boðaþing_R2026.ifc
  - RAF_Boðaþing_R2026.ifc
- IDS files
  - SPECIFICATION FOR WINDOW.IDS
  - SPECIFICATION FOR CONCRETE WALL.IDS
  - SPECIFICATION FOR HEATING AND SANITATION COMPONENTS.IDS
  - SPECIFICATION FOR VENTILATION COMPONENTS.IDS
  - SPECIFICATION FOR ELECTRICAL ROUTING.IDS
  - SPECIFICATION FOR CCI.IDS
- Pset file
  - XXXX_IFCPropertySets_BI_IDS.txt
- IDS check files
  - ARK_Boðaþing_R2026_without_IFC_common_property_sets.ifc_SPECIFICATION FOR WINDOW.IDS.html.pdf
  - BUR_Boðaþing_R2026_without_base_quantities.ifc_SPECIFICATION FOR CONCRETE WALL.IDS.html.pdf
  - LAG_Boðaþing_R2026.ifc_SPECIFICATION FOR HEATING AND SANITATION COMPONENTS.ids.html.pdf
  - LAG_Boðaþing_R2026.ifc_SPECIFICATION FOR VENTILATION COMPONENTS.ids.html.pdf
  - RAF_Boðaþing_R2026.ifc_SPECIFICATION FOR ELECTRICAL ROUTING.IDS.htm.pdf
- IDS Test reports
  - IFC-IDS check_Architectural_20250708_0.docx
  - IFC-IDS check_Structural_20250708_0.docx
  - IFC-IDS check_Heating and sanitation components_20250708.docx
  - IFC-IDS check_Ventilation components_20250708.docx
  - IFC-IDS check_Electrical routing_20250708.docx