

Flow of Events for Use Case – Show Construction

Change Log	
16/10/2004	Renamed from UC-ShowConstruction
01/11/2004	Finalized for pre-integrated model

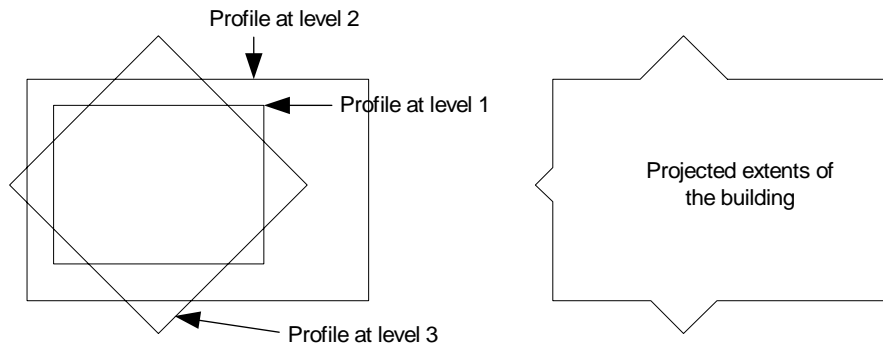
Overview

Used to show all buildings and constructions. It is used for both above ground constructions and below ground constructions, the designation of above/below ground being determined by provision of elevation coordinates.

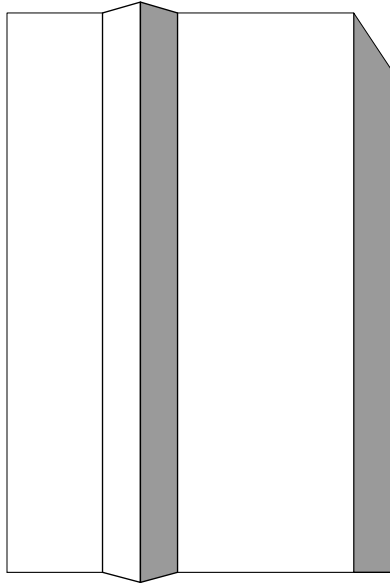
The primary objective is to show the shape representation of the construction and to identify what it is.

Shape representation may be either:

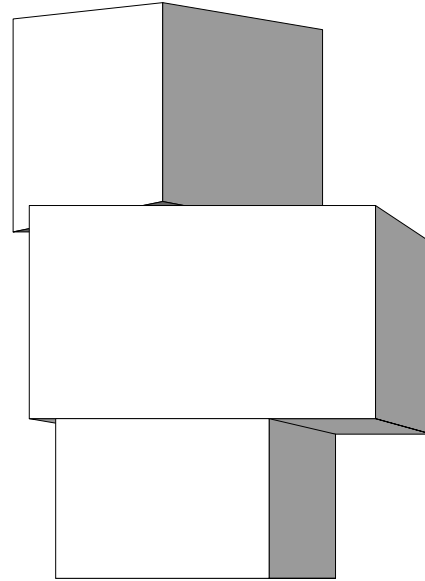
- 2 dimensional extents
This represents the 2 dimensional projected image of a building on the ground. Note that this may be either a shadow of the complete building as viewed from above taking into account any projections that may occur at varying heights of the building elevation or the building footprint.



- Simple 3 dimensional mass
This represents a 3D mass of a building developed by taking the extents of the building and extruding them through its overall height.



Simple extrusion of building extents



Complex extrusion of extents of vertical sections of building that are then aggregated into a single building

- Complex 3 dimensional mass
This represents a 3D mass of a building developed by taking the extents of each vertical section of the building and extruding them through the overall height of that section. The various vertical sections are then aggregated to form the complete complex building mass.
- Elemental
This represents a 3D model of a building developed using the building elements that form its external facade.

Process

Preconditions

- Shape representation of the building must be known in order for it to be shown (displayed)
- Location of the building or construction in the context of a map must be known.

Actors

Authority (for Base Map)

Applicant (for Situation Map)

Main Flow

Flow	Entity
1. Determine the type of building or construction to be used	IfcBuilding
2. Determine the placement with reference to the overall coordinate system. This placement will form the datum for the local coordinate system.	IfcPoint IfcAnnotationPoint
3. Determine the form in which the shape representation is to be shown. This may be done using either profiles and extrusion or boundary representation <ul style="list-style-type: none"> • If representation uses profiles and 	IfcShapeRepresentation

extrusion then <S1> • If representation uses boundary representation then <S2>	
4. Having determined the form in which the shape representation is to be shown, show the building or construction	

Subflows

S1: Show Representation Using Profile and Extrusion

Flow	Entity
1. If the 2D extents of the construction are to be represented then <S11>	
2. If the simple extruded 3D mass of the construction is to be represented then <S12>	
3. If the complex extruded 3D mass of the construction is to be represented then <S13>	

S11: Show Building Extents Using Profiles

Flow	Entity
1. Extents may be determined using one of the profiles available that include both parameterised profiles and arbitrary profiles	IfcProfileDef

S12: Show Building Mass Simple Using Profiles

Flow	Entity
1. Extrusion may be determined by obtaining the extents as in <S11>	IfcProfileDef
2. Height can then be applied to the extrusion to determine the building mass.	

S13: Show Building Mass Complex

Flow	Entity
1. Each section of the building should be defined as an IfcBuilding whose CompositionType attribute should be set to PARTIAL	IfcBuilding IfcBuilding.CompositionType=PARTIAL
2. The extents of each vertical section of the building should be determined by selecting from one of the available profile definitions as in <S11> and each section extruded as in <S12>	
3. Surfaces for each section of the building should be determined	
4. The sections of the building should be aggregated into a single instance of IfcBuilding using IfcRelAggregates. The resulting aggregation should be defined as an IfcBuilding whose CompositionType attribute should be set to ELEMENT.	IfcBuilding IfcRelAggregates

S2: Show Representation Using Boundary Representation

Flow	Entity
1. If the 2D extents of the construction are to be represented then <S21>	
2. If the external shape of the construction is to be represented using boundary representation <S22>	
3. If the external elemental construction of the building is to be represented then <S23>	

S21: Show Extents Using Curves

Flow	Entity
1. Extents may be determined by using curves, the type of curve being determined from one of the subtypes available in IfcCurve	IfcCurve

S22: Show Building Mass Simple Using Surfaces

Flow	Entity
1. Building mass may be described geometrically using a set of surfaces that define the exterior of the building	

S23: Show Building Elements

Flow	Entity
1. Determine each building element (IfcBuildingElement subtypes) that is to be used to define the external façade of the building. Selected from: <ul style="list-style-type: none">• Wall• Door• Window• Roof• Other semantic element types that may be appropriate	IfcBuildingElement subtypes
2. Determine other elements that might need to be treated as a building element but that are not semantically described in IFC and assign them as proxy elements (IfcBuildingElementProxy)	IfcBuildingElementProxy
3. Determine the feature elements (IfcFeatureElement subtypes) that are to be applied to the building façade <ul style="list-style-type: none">• Opening• Projection	IfcFeatureElement subtypes
4. Assert the relationships between instances of IfcBuildingElement and instances of IfcFeatureElement (using IfcRelVoidsElement and IfcRelFillsElement)	IfcRelVoidsElement IfcRelFillsElement

Post Conditions

Geometry of all existing constructions will be shown according to the specified form of representation.

IFC Usage and Extension Requirements

Existing Entity/Class Usage

<i>Entity Class Name</i>	<i>Usage</i>
IfcAnnotationPoint	Qualified geometry point that represents the datum point of a property or construction.
IfcBuilding	Used to identify a building or a part of a building (in the case of a complex mass). IfcBuilding.CompositionType needs to be set to either PARTIAL or ELEMENT depending on whether a whole or part of a building is being represented.
IfcBuildingElementProxy	Subtype of IfcBuildingElement Used to identify any construction that may be like a building and that needs to be represented but that is not otherwise specified as a building It can also be used to represent an element of a construction that is not otherwise semantically defined.
IfcDoor	Subtype of IfcBuildingElement
IfcOpeningElement	Describes the opening made in an element (which may be a building element or other type of element)
IfcRelVoidsElements	Relationship class used to assert the openings made in an element for inclusion of doors/windows
IfcRelFillsElement	Relationship class used to assert the filling relationship made between building elements
IfcRoof	Subtype of IfcBuildingElement Note that IfcRoof is a container for all the components of the roof only; individual parts of the roof are identified as IfcSlab
IfcSlab	Subtype of IfcBuildingElement Used to identify individual elements of a roof construction. May also be used generally to define parts of other constructions required.
IfcWall	Subtype of IfcBuildingElement Used to identify main vertical elements of a building
IfcWallStandardCase	Subtype of IfcBuildingElement Used to identify main vertical elements of a building
IfcWindow	Subtype of IfcBuildingElement
IfcRepresentation	The representation items that are related in a specified representation context as the representation of some concept.
IfcRepresentationItem	Element of data that participates in one or more representations or contributes to the definition of another representation item
IfcGeometricRepresentationItem	A representation item having geometric position or orientation or both ** primarily used by virtue of its subtypes which can include model representation forms such as surface models, solid models etc.
IfcMappedItem	The use of an existing representation (the mapping source - mapped representation) as a representation item in a second representation.
IfcShapeRepresentation	A specific kind of representation that represents a shape

Existing Entity/Class with Proposed Modification

<i>Entity Class Name</i>	<i>Usage</i>

<i>A R M</i>	<i>Attribute</i>	<i>Cardinality</i>	<i>Datatype</i>	<i>Definition</i>

<i>A R M</i>	<i>#</i>	<i>Type (DER, U, WHERE)</i>	<i>Proposition</i>

New Entity/Class Requirement

<i>Entity Class Name</i>	<i>Usage</i>

<i>Attribute</i>	<i>Cardinality</i>	<i>Datatype</i>	<i>Definition</i>

<i>#</i>	<i>Type (DER, U, WHERE)</i>	<i>Proposition</i>

Existing Property Set Usage

<i>Property Set Name</i>	<i>Usage</i>

Existing Property Set with Proposed Modification

<i>Property Set Name</i>	<i>Usage</i>

<i>A R M</i>	<i>Property</i>	<i>Type</i>	<i>Datatype</i>	<i>Unit</i>	<i>Definition</i>

New Property Set Requirement

<i>Name:</i>	
<i>Applicability:</i>	
<i>Applicable Classes:</i>	
<i>Applicable Type Value:</i>	
<i>IFC Version:</i>	
<i>Definition:</i>	

<i>Property</i>	<i>Type</i>	<i>Datatype</i>	<i>Unit</i>	<i>Definition</i>

Issue List

<i>Question</i>	<i>Answer</i>
Do we need to include ramps and stairs in the list of building elements to be supported? Are these likely to appear in a model?	[16.10.2004 JDW] Probably not but are allowed in the use case for the present.