Part 2 - The UML Model Report

Common Schema Elements

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2. Complete contributor list for IfcRail can be found in Appendix B.
3. Complete contributor list for IfcRoad can be found in Appendix C

Table of Contents

Package: Common Schema

The Common Schema (CS) conceptual model contains many concepts covering various topics which have been deemed common across domains. This work is subdivided into manageable packages based on topic units; these packages are further organised by the taxonomy of the IFC. All packages have a dependency on the IFC baseline schema which represents the IFC model at its latest candidate release state of IFC 4.2. This is because all new concepts within the model derive from existing IFC concepts within IFC 4.2. this package also contains proposed modifications to existing elements within the IFC.

Within the common schema each package is fully described, and each concept enumerated with descriptions, relationships and property/quantity set assignments.

Package: Annotations

This package contains concepts that represents common annotations within a model. These elements are graphical representation within the geometric (and spatial) context of a project, that adds a note or meaning to the objects which constitutes the project model.
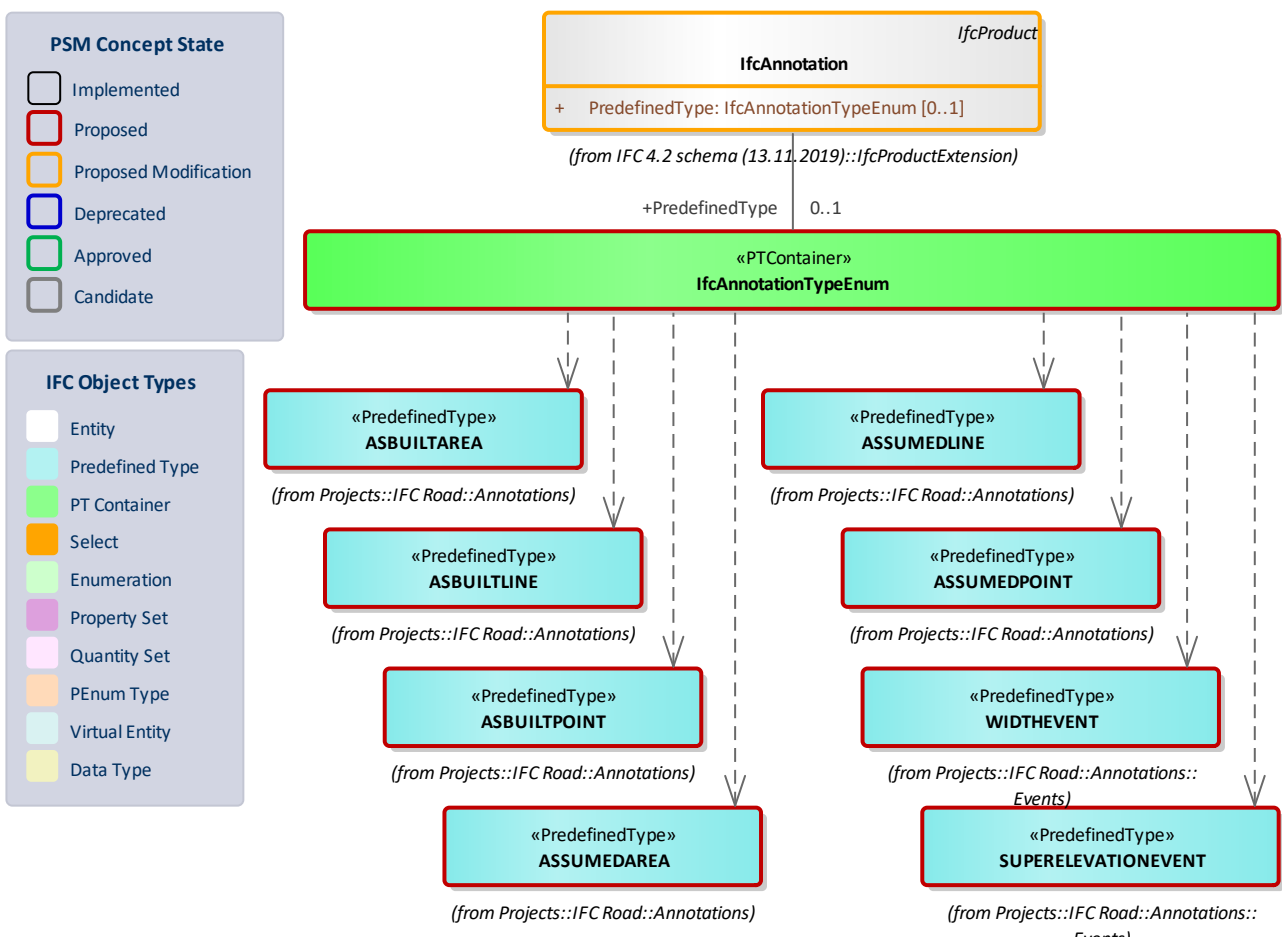
Figure 1: Annotations - Modifications and extensions to annotation elements

Class: IfcAnnotation

An annotation is an information element within the geometric (and spatial) context of a project, that adds a note or meaning to the objects which constitutes the project model. Annotations include additional points, curves, text, dimensioning, hatching and other forms of graphical notes. It also includes virtual or symbolic representations of additional model components, not representing products or spatial structures, such as event elements, survey points, contour lines or similar.

   NOTE Additional presentation information (often 2D) such as tag number or hatching, that is directly related to a particular product representation is included within the IfcProductDefinitionShape having various IfcShapeRepresentation's of the IfcElement (and its subtypes). Only those presentation information, that cannot be directly related to a single product, have to be wrapped within the IfcAnnotation.

If available, the annotation should be related to the spatial context of the project, by containing the annotation within the appropriate level of the building structure (site, facility, facility part or building, storey, or space). This is handled by the IfcRelContainedInSpatialStructure relationship.

The IfcAnnotation can provide specific 0D, 1D, and 2D geometric items as representation of the annotation, offering annotation point, curves, and surfaces. In addition to the predefined type values in IfcAnnotationTypeEnum, the following values can be used for the ObjectType (with PredefinedType attribute value USERDEFINED).

'Annotation point' is an annotation provided by a point that has additional semantic. The inherited attribute ObjectType should be used to capture the type of point annotation, some suggested values are:

- **'SurveyPoint'**: A single survey point represented by a Cartesian point. A property set may add the conditions (method, accuracy, etc. to the survey point).
- **'SurveyArea'**: A set of survey points represented by Cartesian point. These coordinates are determined relative to the coordinates of a reference point, which acts as the datum for the survey. Properties attached apply equally to all points. The difference in elevation of the survey points enables terrain to be determined.

'Annotation curve' is an annotation provided by a curve that has additional semantic. The inherited attribute ObjectType should be used to capture the type of curve annotation, some suggested values are:

- **'ContourLine'**: A line of constant elevation typically used on geographic maps where the spacing of lines at constant intervals of elevation may be used as an indication of slope.
- **'IsoBar'**: A line of constant pressure typically used on weather maps or to show pressure gradient in spaces, chambers or externally.
- **'IsoLux'**: A line of constant illumination typically used to show the distribution of illumination levels and/or day lighting in a space or externally.
- **'IsoTherm'**: A line of constant temperature typically used to show the distribution and effect of heating or cooling within a space or to show temperature distribution on a geographic map.

'Annotation surface' is an annotation provided by a surface that has additional semantic. The inherited attribute ObjectType should be used to capture the type of surface annotation, some suggested values are:

- 'SurveyArea': A surface patch based on survey points.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcProduct	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcAnnotationTypeEnum	[0..1]	

Predefined Type: SUPERELEVATIONEVENT

Full Identifier: **IfcAnnotationTypeEnum.SUPERELEVATIONEVENT**

A kind of event that specifies the superelevation (cross slope) at a specific location along a road alignment, and the type of transition from the previous location. The locations are specified using an IfcLinearPlacement measured along the alignment axis curve.

The element(s) that are affected by the superelevation event is currently proposed to be specified by containing the event in a specific lateral breakdown element of the road spatial structure (e.g. a Lane).

Status: **Proposed**

Package: **Events**

Predefined Type Properties			
Predefined Type Container	IfcAnnotationTypeEnum	**Parent Entity**	IfcAnnotation
Stereotype	«PredefinedType»		
Property sets	Pset_Superelevation		

Predefined Type: WIDTHEVENT

Full Identifier: **IfcAnnotationTypeEnum.WIDTHEVENT**

A kind of event that specifies the width at a specific location along a road alignment, and the type of transition from the previous location. The locations are specified using an IfcLinearPlacement measured along the alignment axis curve.

The element(s) that are affected by the width event is currently proposed to be specified by containing the event in a specific lateral breakdown element of the road spatial structure (e.g. a Lane or the entire carriageway).

Status: **Proposed**

Package: **Events**

Predefined Type Properties			
Predefined Type Container	IfcAnnotationTypeEnum	**Parent Entity**	IfcAnnotation
Stereotype	«PredefinedType»		
Property sets	Pset_Width		

Predefined Type: ASSUMEDPOINT

Full Identifier: **IfcAnnotationTypeEnum.ASSUMEDPOINT**

A single extra point (assumption or interpretation), used to complement survey data in initial state modelling.

Status: **Proposed**

Package: **Annotations**

Predefined Type Properties			
Predefined Type Container	IfcAnnotationTypeEnum	**Parent Entity**	IfcAnnotation
Stereotype	«PredefinedType»		
Property sets	Pset_Uncertainty		

Predefined Type: ASSUMEDLINE

Full Identifier: **IfcAnnotationTypeEnum.ASSUMEDLINE**

A set of extra points on a line (breakline) as an assumption or interpretation, used to complement survey data in initial state modelling.

Status: **Proposed**

Package: **Annotations**

Predefined Type Properties			
Predefined Type Container	IfcAnnotationTypeEnum	**Parent Entity**	IfcAnnotation
Stereotype	«PredefinedType»		
Property sets	Pset_Uncertainty		

Predefined Type: ASSUMEDAREA

Full Identifier: **IfcAnnotationTypeEnum.ASSUMEDAREA**

A set of extra points on a surface as an assumption or interpretation, used to complement survey data in initial state modelling.

Status: **Proposed**

Package: **Annotations**

Predefined Type Properties			
Predefined Type Container	IfcAnnotationTypeEnum	**Parent Entity**	IfcAnnotation
Stereotype	«PredefinedType»		
Property sets	Pset_Uncertainty		

Predefined Type: ASBUILTPOINT

Full Identifier: **IfcAnnotationTypeEnum.ASBUILTPOINT**

A single as-built survey point.

Status: **Proposed**

Package: **Annotations**

Predefined Type Properties			
Predefined Type Container	IfcAnnotationTypeEnum	**Parent Entity**	IfcAnnotation
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: ASBUILTLINE

Full Identifier: **IfcAnnotationTypeEnum.ASBUILTLINE**

A set of as-built survey points on a line (e.g. breakline).

Status: **Proposed**

Package: **Annotations**

Predefined Type Properties			
Predefined Type Container	IfcAnnotationTypeEnum	**Parent Entity**	IfcAnnotation
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: ASBUILTAREA

Full Identifier: **IfcAnnotationTypeEnum.ASBUILTAREA**

A set of as-built survey points on a surface.

Status: **Proposed**

Package: **Annotations**

Predefined Type Properties			
Predefined Type Container	IfcAnnotationTypeEnum	**Parent Entity**	IfcAnnotation
Stereotype	«PredefinedType»		
Property sets			

PDT Container: IfcAnnotationTypeEnum

This enumeration defines the different types of Annotation elements an IfcAnnotation object can represent.

Status: **Proposed**

Package: **Annotations**

Container Properties			
Parent Entity	IfcAnnotation	**Stereotype**	«PTContainer»
Contains	EXISTING	PROPOSED	
		IfcAnnotationTypeEnum.NON_PHYSICAL_SIGNAL	
		IfcAnnotationTypeEnum.USERDEFINED	

		IfcAnnotationTypeEnum.ASBUILTAREA
		IfcAnnotationTypeEnum.ASBUILTLINE
		IfcAnnotationTypeEnum.ASBUILTPOINT
		IfcAnnotationTypeEnum.ASSUMEDAREA
		IfcAnnotationTypeEnum.ASSUMEDLINE
		IfcAnnotationTypeEnum.ASSUMEDPOINT
		IfcAnnotationTypeEnum.SUPERELEVATIONEVENT
		IfcAnnotationTypeEnum.WIDTHEVENT

Package: Physical Elements

This package contains concepts that represents common physical elements that make up constructed facilities. These elements are positioned and/or contained within the logical spatial structure of the project (refer to spatial elements). These elements typically have geometric shape, location, made of materials and other physical properties.

Package: Built Elements

This package addresses the modelling of elements that derive from IfcBuiltElement or IfcBuiltElementType. These comprise all elements that are primarily part of the construction of a built facility. Built elements are all physically existent and tangible things. Typical examples include walls, doors, beams or slabs.
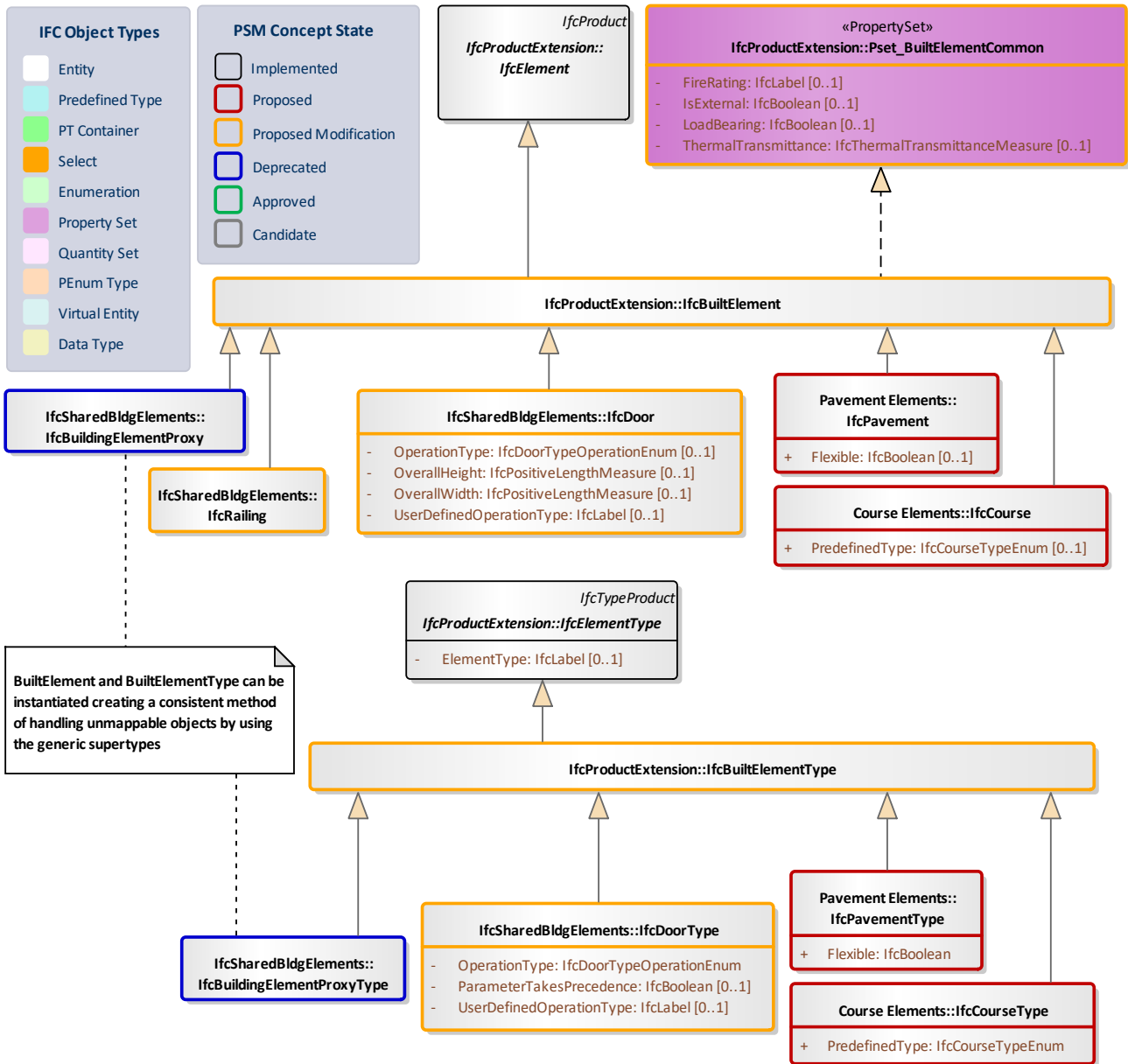
Figure 2: Built Elements (additions only) - modifications and extension to built elements

Class: IfcBuiltElement

The built element comprises all elements that are primarily part of the construction of a built facility, i.e., its structural and space separating system. Built elements are all physically existent and tangible things

> NOTE Definition from ISO 6707-1: Major functional part of a building, examples are foundation, floor, roof, wall.

This _IfcBuiltElement_ is a generalization of all elements that participate in a building system. Typical examples of __IfcBuiltElement__'s are (among others):

- built elements within a space separation systems
- built elements within an enclosure system (such as a facade)
- built elements within a fenestration system
- built elements within a load bearing system
- built elements within a foundation system

> EXAMPLE built elements are walls, curtain wall, doors, columns, pile, and others.

REMOVE{ The _IfcBuiltElement_ is an abstract entity that cannot be instantiated. For arbitrary building elements, that cannot be expressed by a subtype of _IfcBuiltElement_, use _IfcBuiltElementProxy_.}

The IfcBuiltElement can be instantiated in the case when arbitrary built elements cannot be expressed by a subtype of IfcBuiltElement.

> HISTORY New entity in IFC1.0

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets	Pset_BuiltElementCommon		

Inheritance Statement			
Subtype Of	IfcElement		
Subtypes	EXISTING		PROPOSED
	IfcWindow	IfcMember	IfcNavigationElement
	IfcStairFlight	IfcCurtainWall	IfcMooringDevice
	IfcWall	IfcFooting	IfcEarthworksElement
	IfcStair	IfcDeepFoundation	IfcRail
	IfcSlab	IfcColumn	IfcCourse
	IfcShadingDevice	IfcChimney	IfcKerb
	IfcRampFlight	IfcCovering	IfcTrackElement
	IfcRoof	IfcBearing	IfcPavement
	IfcRamp	IfcBeam	
	IfcPlate		

Class: IfcBuiltElementType

The _IfcBuiltElementType_ provides the type information for _IfcBuiltElement_ occurrences.

> NOTE The product representations are defined as representation maps (at the level of the supertype IfcTypeProduct , which gets assigned by an element occurrence instance through the _IfcShapeRepresentation.Item[1]_ being an _IfcMappedItem_.

A built element type is used to define the common properties of a certain type of built element that are applied to all occurrences of that type. It is used to define a built element specification (i.e. the specific product information, that is common to all occurrences of that product type). Built element types (or the instantiable subtypes) may be exchanged without being already assigned to occurrences.

REMOVE{ The _IfcBuildingElementType_ is an abstract type that cannot be instantiated. For arbitrary building element types, that cannot be expressed by a subtype of _IfcBuildingElementType_, use _IfcBuildingElementProxyType_.}

The IfcBuiltElementType can be instantiated in the case when arbitrary built element types cannot be expressed by a subtype of IfcBuiltElementType .

Occurrences of subtypes of the _IfcBuildingElementType_ are represented by instances of the appropriate subtypes of _IfcBuildingElement_.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement			
Subtype Of	IfcElementType		
Subtypes	EXISTING		PROPOSED
	IfcBeamType	IfcRampFlightType	IfcKerbType
	IfcBearingType	IfcRampType	IfcNavigationElementType
	IfcChimneyType	IfcRoofType	IfcRailType
	IfcColumnType	IfcShadingDeviceType	IfcTrackElementType
	IfcCoveringType	IfcSlabType	IfcMooringDeviceType
	IfcCurtainWallType	IfcStairFlightType	IfcPavementType
	IfcDeepFoundationType	IfcStairType	IfcCourseType
	IfcMemberType	IfcWallType	
	IfcPlateType	IfcWindowType	
	IfcRailingType	IfcFootingType	

Class: IfcBuildingElementProxy

The _IfcBuildingElementProxy_ is a proxy definition that provides the same functionality as subtypes of _IfcBuildingElement_, but without having a predefined meaning of the special type of building element, it represents.

Proxies can also be used as spatial place holders or provisions, that are later replaced by special types of elements.

One use of the proxy object is a provision for voids, i.e. where a particular volume of space is requested by an engineering function that might later be accepted or rejected. If accepted it is transformed into a void within a building element, like a wall opening, or a slab opening. The provision for voids is exchanged as an _IfcBuildingElementProxy_ with the _PredefinedType_ = ProvisionForVoid. Such proxy shall have a swept solid geometry, where the profile of the swept solid lies on/near the surface of the referred building element and the extrusion depths is equal to or bigger then (in case of round or otherwise irregular element shape) the thickness of the building element. The appropriate property set should be attached.

In addition to the provision for voids, the building element proxy can also represent a provision for space, often the necessary space allocation for mechanical equipment that will be determined in a later design phase. The provision for space is exchanged as an _IfcBuildingElementProxy_ with the _PredefinedType_ = ProvisionForSpace.

Other usages of _IfcBuildingElementProxy_ include:

- The _IfcBuildingElementProxy_ can be used to exchange special types of building elements for which the current specification does not yet provide a semantic definition.
- The _IfcBuildingElementProxy_ can also be used to represent building elements for which the participating applications can not provide a semantic definition.

> HISTORY New entity in IFC2x.

bSI Documentation

Status: **Deprecated**

Package: **IfcSharedBldgElements**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	EXISTING	PROPOSED

Class: IfcBuildingElementProxyType

IfcBuildingElementProxyType defines a list of commonly shared property set definitions of a building element proxy and an optional set of product representations. It is used to define an element specification (i.e. the specific product information, that is common to all occurrences of that product type).

  NOTE The product representations are defined as representation maps (at the level of the supertype _IfcTypeProduct_, which gets assigned by an element occurrence instance through the _IfcShapeRepresentation.Item[1]_ being an _IfcMappedItem_.

A building element proxy type is used to define the common properties of a certain type of a building element proxy that may be applied to many instances of that\S\ type to assign a specific style. Building element proxy types\S\ may be exchanged without being already assigned to occurrences.

  NOTE Although an building element proxy does not have a predefined ontological meaning the provision of a type may be helpful in sharing information among multiple occurrences. Applications that provide type information for element types not yet included in the current IFC specification can use the _IfcBuildingElementProxyType_ to exchange such types.

The occurrences of the _IfcBuildingElementProxyType_ are represented by instances of _IfcBuildingElementProxy_.

bSI Documentation

Status: **Deprecated**

Package: **IfcSharedBldgElements**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcBuiltElementType	
Subtypes	EXISTING	PROPOSED

Property Set: Pset_BuiltElementCommon

$bSI Documentation

Status: **ProposedModification**

Set Properties			
Applicable Entities	IfcBuiltElement	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
FireRating	IfcLabel	[0..1]	Fire rating for the element. It is given according to the national fire safety classification.
IsExternal	IfcBoolean	[0..1]	Indication whether the element is designed for use in the exterior (TRUE) or not (FALSE). If (TRUE) it is an external element and faces the outside of the building.
LoadBearing	IfcBoolean	[0..1]	Indicates whether the object is intended to carry loads (TRUE) or not (FALSE).
ThermalTransmittance	IfcThermalTransmittance Measure	[0..1]	Thermal transmittance coefficient (U-Value) of an element.

Package: Access Elements

This package addresses the modelling of elements that derive from IfcDoor or IfcDoorType . These comprise elements that are primarily used to provide controlled access.
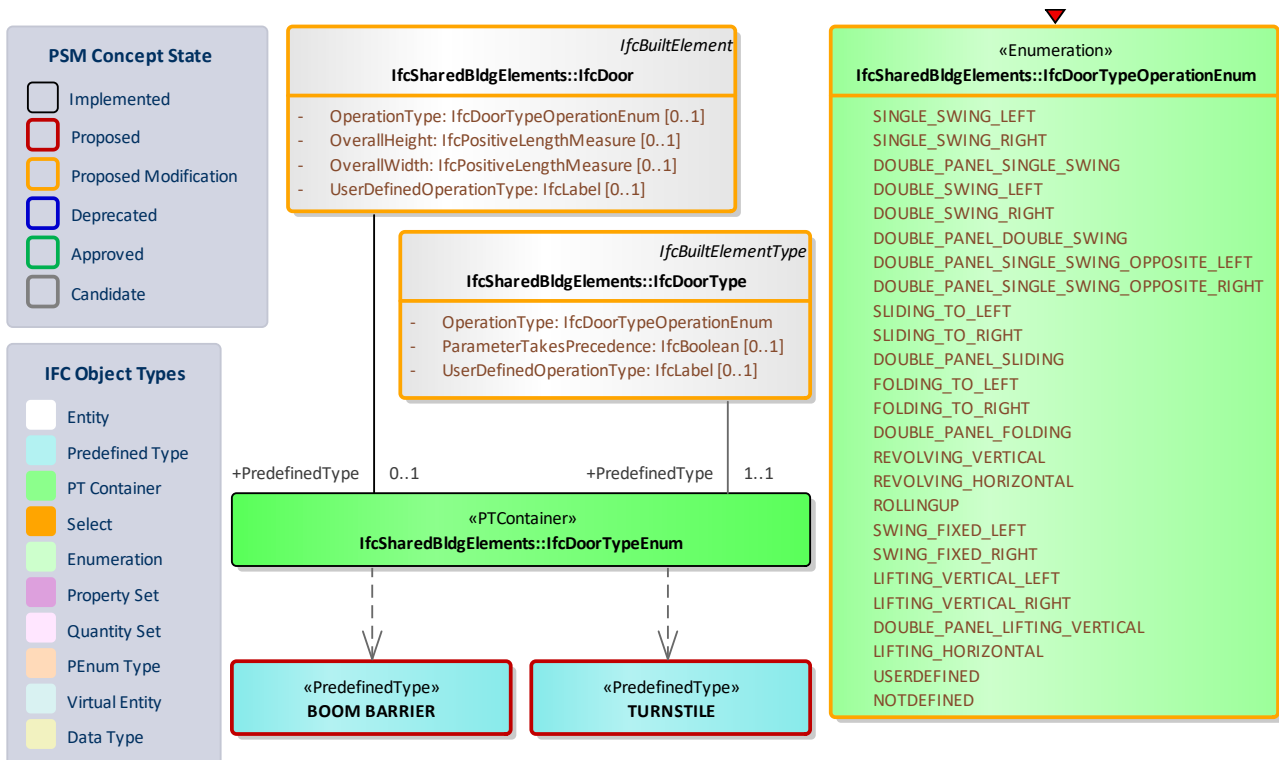
Figure 3: Access Elements - modification and extension to access elements

Class: IfcDoor

The door is a built element that is predominately used to provide controlled access for people, goods, animals and vehicles. It includes constructions with hinged, pivoted, sliding, and additionally revolving and folding operations. REMOVE: A door consists of a lining and one or several panels.

NOTE Definition according to ISO 6707-1: construction for closing an opening, intended primarily for access with hinged, pivoted or sliding operation.

The _IfcDoor_ defines a particular occurrence of a door inserted in the spatial context of a project. A door can:

- be inserted as a filler in an opening using the _IfcRelFillsElement_ relationship, then the _IfcDoor_ has an inverse attribute _FillsVoids_ provided; NOTE View definitions or implementer agreements may restrict the relationship to only include one door into one opening
- be part of an element assembly, in general an _IfcCurtainWall_, using the _IfcRelAggregates_ relationship, then the _IfcDoor_ has an inverse attribute _Decomposes_ is provided;
- be a "free standing" door, then the _IfcDoor_ has no inverse attributes _FillsVoids_ or _Decomposes_ provided.

This specification provides two entities for door occurrences:

- _IfcDoorStandardCase_ used for all occurrences of doors, that have a "Profile" shape representation defined to which a set of shape parameters for lining and framing properties apply. Additionally it requires the provision of an _IfcDoorType_ that references one _IfcDoorLiningProperties_ and on to many _IfcDoorPanelProperties_; NOTE see _IfcDoorStandardCase_ for all specific constraints imposed by this subtype.

- _IfcDoor_ used for all other occurrences of doors, particularly for doors having only "Brep", or "SurfaceModel" geometry without applying shape parameters.

The actual parameters of the door and/or its shape are defined by the _IfcDoor_ as the occurrence definition (or project instance), or by the _IfcDoorType_ as the specific definition (or project type). The following parameters are given:

at the _IfcDoor_ or _IfcDoorStandardCase_ for occurrence specific parameters. The _IfcDoor_ specifies:

- the door width and height
- the door opening direction (by the y-axis of the _ObjectPlacement_)* at the _IfcDoorType_, to which the _IfcDoor_ is related by the inverse relationship _IsTypedBy_ pointing to _IfcRelDefinesByType_, for type parameters common to all occurrences of the same type.

at the IfcDoorType, to which the IfcDoor is related by the inverse relationship IsTypedBy pointing to IfcRelDefinesByType, for type parameters common to all occurrences of the same type.

- the operation type (single swing, double swing, revolving, etc.)

- the door hinge side (by using two different styles for right and left opening doors)
- the construction material type
- the particular attributes for the lining by the _IfcDoorLiningProperties_
- the particular attributes for the panels by the _IfcDoorPanelProperties_

The geometric representation of _IfcDoor_ is given by the _IfcProductDefinitionShape_, allowing multiple geometric representations. The _IfcDoor_ may get its parameter and shape from the _IfcDoorType_. If an _IfcRepresentationMap_ (a block definition) is defined for the _IfcDoorType_, then the _IfcDoor_ inserts it through the _IfcMappedItem_.

The geometric representation of _IfcDoor_ is defined using the following (potentially multiple) _IfcShapeRepresentation_''s for its _IfcProductDefinitionShape_:

- **'Profile'**: A''Curve3D'' consisting of a single losed curve defining the outer boundary of the door (lining). The door parametric representation uses this profile in order to apply the door lining and panel parameter. If not provided, the profile of the _IfcOpeningElement_ is taken.
- **'FootPrint'**: A ''GeometricCurveSet'', or ''Annotation2D'' representation defining the 2D shape of the door
- **'Body'**: A ''SweptSolid'', ''SurfaceModel'', or ''Brep'' representation defining the 3D shape of the door.

In addition the parametric representation of a (limited) door shape is available by applying the parameters from _IfcDoorType_ referencing _IfcDoorLiningProperties_ and _IfcDoorPanelProperties_. The purpose of the parameter is described at those entities and below (door opening operation by door type).

The overall size of the _IfcDoor_ to be used to apply the lining or panel parameter provided by the _IfcDoorType_ is determined by the IfcShapeRepresentation with the RepresentationIdentifier = ''Profile''.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgElements**

Class Properties			
Status	ProposedModification	Is Abstract	
Property sets			

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	EXISTING	PROPOSED
	IfcDoorStandardCase	

Class Attributes

Name	Type	Multiplicity	Definition
OperationType	IfcDoorTypeOperationEnum	[0..1]	Type defining the general layout and operation of the door type in terms of the partitioning of panels and panel operations. NOTE The _OperationType_ shall only be used, if no type object _IfcDoorType_ is assigned, providing its own _IfcDoorType.OperationType_.
OverallHeight	IfcPositiveLengthMeasure	[0..1]	Overall measure of the height, it reflects the Z Dimension of a bounding box, enclosing the body of the door opening. If omitted, the _OverallHeight_ should be taken from the geometric representation of the _IfcOpening_ in which the door is inserted. NOTE The body of the door might be taller then the door opening (e.g. in cases where the door lining includes a casing). In these cases the _OverallHeight_ shall still be given as the door opening height, and not as the total height of the door lining.
OverallWidth	IfcPositiveLengthMeasure	[0..1]	Overall measure of the width, it reflects the X Dimension of a bounding box, enclosing the body of theE door opening. If omitted, the _OverallWidth_ should be taken from the geometric representation of the _IfcOpening_ in which the door is inserted. NOTE The body of the door might be wider then the door opening (e.g. in cases where the door lining includes a casing). In these cases the _OverallWidth_ shall still be given as the door opening width, and not as the total width of the door lining.
UserDefinedOperationType	IfcLabel	[0..1]	Designator for the user defined operation type, shall only be provided, if the value of _OperationType_ is set to USERDEFINED.

Class: IfcDoorType

The element type _IfcDoorType_ defines commonly shared information for occurrences of doors. The set of shared information may include:

- common properties within shared property sets
- common material information
- common operation type definitions
- common shape representations

A door type defines the particular parameter of the lining and one (or several) panels through the _IfcDoorLiningProperties_ and the _IfcDoorPanelProperties_ as predefined property sets applicable to doors only.

It is used to define a door specification, or door style (i.e. the specific product information that is common to all occurrences of that door type). Door types may be exchanged without being already assigned to occurrences.

   NOTE The product representations are defined as representation maps (at the level of the supertype _IfcTypeProduct_, which gets assigned by an element occurrence instance through the _IfcShapeRepresentation.Item[1]_ being an _IfcMappedItem_.

Occurrences of the _IfcDoorType_ within building models are represented by instances of _IfcDoor_ or _IfcDoorStandardCase_.

Operation type use definition

The _IfcDoorTypeOperationEnum_ defines the general layout of the door type and its symbolic presentation. Depending on the enumerator, the appropriate instances of _IfcDoorLiningProperties_ and _IfcDoorPanelProperties_ are attached in the list of _HasPropertySets_. The _IfcDoorTypeOperationEnum_ mainly determines the hinge side (left hung, or right hung), the operation (swinging, sliding, folding, etc.) and the number of panels.

   NOTE There are different definitions in various countries on what a left opening or left hung or left swing door is (same for right). Therefore the IFC definition may derivate from the local standard and may need to be mapped appropriately.

See geometry use definitions at _IfcDoorTypeOperationEnum_ for the correct usage of opening symbols for different operation types.

Material Use Definition

The material of the _IfcDoorType_ is defined by the _IfcMaterialConstituentSet_ or as fall back by _IfcMaterial_ and attached by the _IfcRelAssociatesMaterial_._RelatingMaterial_. It is accessible by the inverse _HasAssociations_ relationship.

The following keywords for _IfcMaterialConstituentSet.MaterialConstituents[n].Name_ shall be used:

- 'Lining' - to indicate that the material constituent applies to to the door lining
- 'Framing' - to indicate that the material constituent applies to to the door framing, if not provided, the ''Lining'' material information applied to frams as well

- 'Glazing' - to indicate that the material constituent applies to to the glazing as well

If the fall back single _IfcMaterial_ is referenced, it applies to the lining and framing of the door.

Geometry Use Definitions:

The _IfcDoorType_ may define the common shape of door occurrences. The common shape can be defined by

- applying shape parameters defined within the associated _IfcDoorLiningProperties_ and _IfcDoorPanelProperties_ applied to the ''Profile'' geometric representation. It is only applicable if the _IfcDoorType_ has only occurrences of type _IfcDoorStandardCase_ (See geometric use definition of _IfcDoorStandardCase_ for further information).
- applying the _RepresentationMaps_ attribute to refer to a list of _IfcRepresentationMap_''s, that allow for multiple geometric representations (e.g. with _IfcShapeRepresentation_''s having an _RepresentationIdentifier_ ''Box'', ''Profile'', ''FootPrint'', or ''Body'')

NOTE The product shape representations are defined as _RepresentationMaps_ (attribute of the supertype _IfcTypeProduct_), which get assigned by an element occurrence instance through the _IfcShapeRepresentation.Item[n]_ being an _IfcMappedItem_. See _IfcTypeProduct_ for further information.

NOTE The values of attributes _RepresentationIdentifier_ and _RepresentationType_ of _IfcShapeRepresentation_ are restricted in the same way as those for _IfcDoor_ and _IfcDoorStandardCase_

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgElements**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcBuiltElementType	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
OperationType	IfcDoorTypeOperationEnum		Type defining the general layout and operation of the door type in terms of the partitioning of panels and panel operations.
ParameterTakesPrecedence	IfcBoolean	[0..1]	The Boolean value reflects, whether the parameter given in the attached lining and panel properties exactly define the geometry (TRUE), or whether the attached style shape take precedence (FALSE). In the last case the parameter have only informative value. If not provided, no such information can be infered.
UserDefinedOperationType	IfcLabel	[0..1]	Designator for the user defined operation type, shall only be provided, if the value of _OperationType_ is set to USERDEFINED.

Predefined Type: BOOM BARRIER

Full Identifier: **IfcDoorTypeEnum.BOOM_BARRIER**

A boom barrier (also known as a boom gate) is a bar, or pole pivoted to allow the boom to block vehicular or pedestrian access through a controlled point.

Status: **Proposed**

Package: **Access Elements**

Predefined Type Properties			
Predefined Type Container	IfcDoorTypeEnum	**Parent Entity**	IfcDoor
Stereotype	«PredefinedType»		IfcDoorType
Property sets			

Predefined Type: TURNSTILE

Full Identifier: **IfcDoorTypeEnum.TURNSTILE**

A mechanical gate consisting of revolving arms, allowing only one person at a time to pass through.

Status: **Proposed**

Package: **Access Elements**

Predefined Type Properties			
Predefined Type Container	IfcDoorTypeEnum	**Parent Entity**	IfcDoor
Stereotype	«PredefinedType»		IfcDoorType
Property sets	Pset_DoorTypeTurnstile		

Enumeration: IfcDoorTypeOperationEnum

This enumeration defines the basic ways to describe how an IfcDoor or IfcDoorType operate, as shown in Figure 1. It combines the partitioning of the access barrier into single or multiple REMOVE{door} panels and the operation types of those panels.

In the most common case of swinging doors the _IfcDoorTypeOperationEnum_ defined the hinge side (left hung or right hung) and the opening direction (opening to the left, opening to the right). Whether the door opens inwards or outwards is determined by the local coordinate system of the _IfcDoor_REMOVE{, or _IfcDoorStandardCase_.}

> NOTE There are different definitions in various countries on what a left opening or left hung or left swing door is (same for right). Therefore the IFC definition terms may derive from the local standard and may need to be mapped appropriately.

> HISTORY New Enumeration in IFC4.

{ .change-ifc2x4}

> IFC4 CHANGE The new _IfcDoorTypeOperationEnum_ replaces the use of _IfcDoorStyleOperationEnum_ that is deprecated from IFC4 onwards.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgElements**

Enumerators

Name	Definition
SINGLE_SWING_LEFT	Door with one panel that opens (swings) to the left. The hinges are on the left side as viewed in the direction of the positive y-axis. NOTE Direction of swing (whether in or out) is determined at the IfcDoor
SINGLE_SWING_RIGHT	Door with one panel that opens (swings) to the right. The hinges are on the right side as viewed in the direction of the positive y-axis. NOTE Direction of swing (whether in or out) is determined at the IfcDoor

DOUBLE_PANEL_SINGLE_SWING	Door with two panels, one opens (swings) to the left the other opens (swings) to the right. NOTE Direction of swing (whether in or out) is determined at the IfcDoor
DOUBLE_SWING_LEFT	Door with one panel that swings in both directions and to the left in the main traffic direction. Also called double acting door.
DOUBLE_SWING_RIGHT	Door with one panel that swings in both directions and to the right in the main traffic direction. Also called double acting door.
DOUBLE_PANEL_DOUBLE_SWING	Door with two panels, one swings in both directions and to the right in the main traffic direction the other swings also in both directions and to the left in the main traffic direction.
DOUBLE_PANEL_SINGLE_SWING_OPPOSITE_LEFT	Door with two panels that both open to the left, one panel swings in one direction and the other panel swings in the opposite direction. NOTE Direction of swing (whether in or out) is determined at the IfcDoor
DOUBLE_PANEL_SINGLE_SWING_OPPOSITE_RIGHT	Door with two panels that both open to the right, one panel swings in one direction and the other panel swings in the opposite direction. NOTE Direction of swing (whether in or out) is determined at the IfcDoor
SLIDING_TO_LEFT	Door with one panel that is sliding to the left.
SLIDING_TO_RIGHT	Door with one panel that is sliding to the right.
DOUBLE_PANEL_SLIDING	Door with two panels, one is sliding to the left the other is sliding to the right.
FOLDING_TO_LEFT	Door with one segmented panel that is folding to the left.
FOLDING_TO_RIGHT	Door with one segmented panel that is folding to the right.
DOUBLE_PANEL_FOLDING	Door with two segmented panels, one is folding to the left the other is folding to the right.
REVOLVING_VERTICAL	An entrance door consisting of a number of leaves revolving around a central vertical axis (the panels are described by a single IfcDoor panel property).
REVOLVING_HORIZONTAL	An entrance door consisting of a number of leaves or posts revolving around a central horizontal axis (the panels are described by a single IfcDoor panel property).
ROLLINGUP	Door that opens by rolling up. NOTE Whether it rolls up to the inside or outside is determined at the IfcDoor.
SWING_FIXED_LEFT	Door with one panel that opens (swings) to the left and one fixed panel. The hinges of the swinging panel are on the left side as viewed in the direction of the positive y-axis. NOTE Direction of swing (whether in or out) is determined at the IfcDoor

SWING_FIXED_RIGHT	Door with one panel that opens (swings) to the right and one fixed panel. The hinges of the swinging panel are on the right side as viewed in the direction of the positive y-axis. NOTE Direction of swing (whether in or out) is determined at the IfcDoor
LIFTING_VERTICAL_LEFT	Access opening with one panel that lifts vertically, directly upward or rotates about a pivot located on the left side in the direction of the positive y-axis.
LIFTING_VERTICAL_RIGHT	Access opening with one panel that lifts vertically, directly upward or rotates about a pivot located on the right side in the direction of the positive y-axis.
DOUBLE_PANEL_LIFTING_VERTICAL	Access opening with two panels that lifts vertically, directly upward or rotates about a pivot located on the left and the right side in the direction of the positive y-axis.
LIFTING_HORIZONTAL	Access opening with one panel that lifts by rotating along a horizontal access. NOTE location of horizontal access (e.g. Top or bottom of opening) is determined at the IfcDoor.
USERDEFINED	
NOTDEFINED	

Package: Course Elements

This package addresses the built elements that represent Courses. Courses are usually made of a single aggregate material laid on site on top of another horizontal or nearly horizontal built element.
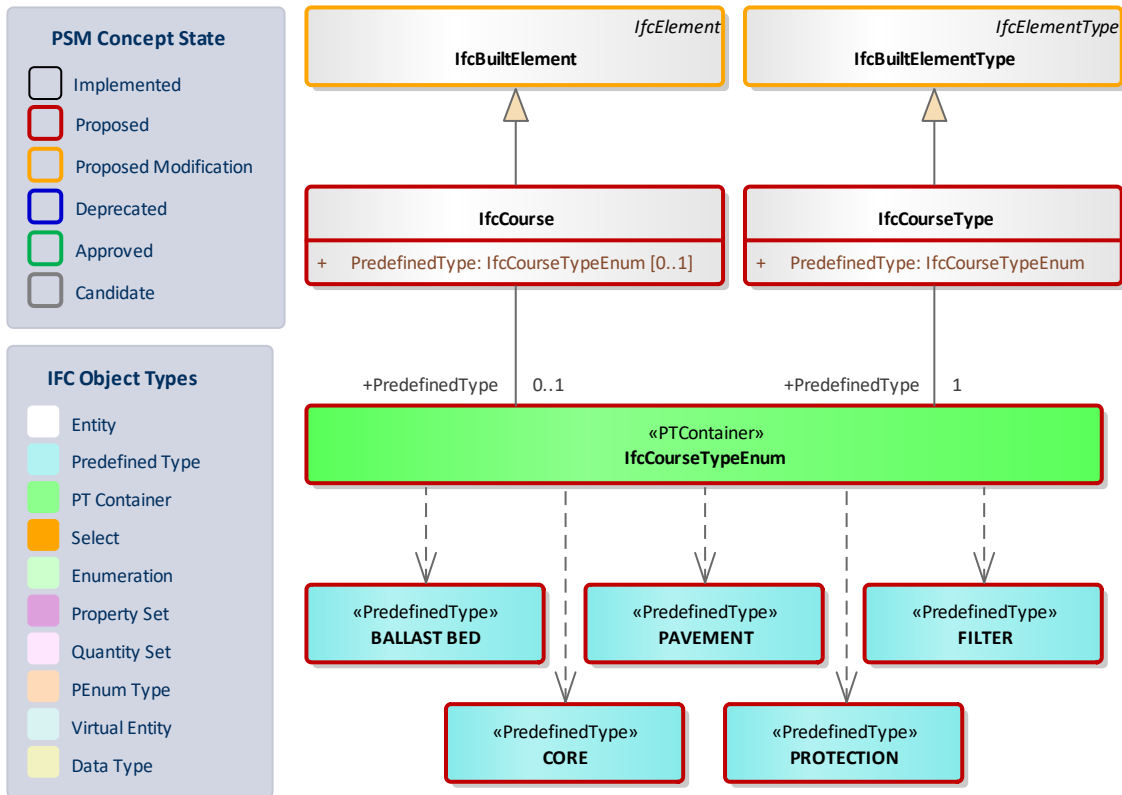
Figure 4: Course Elements - new extension to cover course elements

Class: IfcCourse

A built element whose length greatly exceeds its thickness and often also its width, usually of a single material laid on site on top of another horizontal or nearly horizontal built element. A course is distinctive from a earthworks element in that a course is a graded granular (which can be bound or unbound) material that is generally processed in some fashion, where as earthworks elements are soil earthen based structure that can be formed by removal and transport of general ground material.

Structurally a course does not have capacity to carry loads over open span, or to be removed or replaced as a single unit. examples of courses include:

- Graded aggregate layers
- Graded sand layers
- Cement bounded material (CBM)
- Asphalt layers

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_CourseApplicationConditions Pset_BoundedCourseCommon Pset_CourseCommon		

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcCourseTypeEnum	[0..1]	Identifies the predefined type of a course element from which the type modelled, may be set. This type may associate additional specific property sets. NOTE The PredefinedType shall only be used, if no IfcCourseType is assigned, providing its own IfcCourseType.PredefinedType.

Class: IfcCourseType

The IfcCourseType provides the type information for IfcCourse occurrences.

A course is a built element whose length greatly exceeds its thickness and often also its width, usually of a single material laid on site on top of another horizontal or nearly horizontal built element. A course is distinctive from a earthworks element in that a course is a graded granular (which can be bound or unbound) material that is generally processed in some fashion, where as earthworks elements are soil earthen based structure that can be formed by removal and transport of general ground material.

Structurally a course does not have capacity to carry loads over open span, or to be removed or replaced as a single unit.

Class Properties

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_CourseApplicationConditions Pset_BoundedCourseCommon Pset_CourseCommon		

Inheritance Statement

Inheritance Statement		
Subtype Of	IfcBuiltElementType	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcCourseTypeEnum		Identifies the predefined types of a course element from which the type modelled, may be set.

PDT Container: IfcCourseTypeEnum

This container defines the different predefined types of course elements that can further specify an IfcCourse or IfcCourseType.

Status: **Proposed**

Package: **Course Elements**

Container Properties			
Parent Entity	IfcCourseType IfcCourse	**Stereotype**	«PTContainer»
Contains	EXISTING	PROPOSED	
		IfcCourseTypeEnum.BALLASTBED IfcCourseTypeEnum.PAVEMENT IfcCourseTypeEnum.FILTER IfcCourseTypeEnum.CORE IfcCourseTypeEnum.PROTECTION CourseTypeEnum.ARMOUR	

Predefined Type: BALLAST BED

Full Identifier: **IfcCourseTypeEnum.BALLASTBED**

Layer composed of broken stones under the sleepers.

Status: **Proposed**

Package: **Course Elements**

Predefined Type Properties			
Predefined Type Container	IfcCourseTypeEnum	Parent Entity	IfcCourseType
Stereotype	«PredefinedType»		IfcCourse
Property sets			

Predefined Type: CORE

Full Identifier: **IfcCourseTypeEnum.CORE**

A core course is the bulk internal structure of aggregate structures.

Status: **Proposed**

Package: **Course Elements**

Predefined Type Properties			
Predefined Type Container	IfcCourseTypeEnum	Parent Entity	IfcCourseType
Stereotype	«PredefinedType»		IfcCourse
Property sets			

Predefined Type: FILTER

Full Identifier: **IfcCourseTypeEnum.FILTER**

An Intermediate layer whose primary function is to prevent the washing through of fine materials.

Status: **Proposed**

Package: **Course Elements**

Predefined Type Properties			
Predefined Type Container	IfcCourseTypeEnum	Parent Entity	IfcCourseType
Stereotype	«PredefinedType»		IfcCourse

Predefined Type: PAVEMENT

Full Identifier: **IfcCourseTypeEnum.PAVEMENT**

A layer within a pavement structure that forms a paved area or road.

Status: **Proposed**

Package: **Course Elements**

Predefined Type Properties			
Predefined Type Container	IfcCourseTypeEnum	**Parent Entity**	IfcCourseType
Stereotype	«PredefinedType»		IfcCourse
Property sets			

Predefined Type: PROTECTION

Full Identifier: **IfcCourseTypeEnum.PROTECTION**

Layer with the primary task to provide protection against erosion and scour.

Status: **Proposed**

Package: **Course Elements**

Predefined Type Properties			
Predefined Type Container	IfcCourseTypeEnum	**Parent Entity**	IfcCourseType
Stereotype	«PredefinedType»		IfcCourse
Property sets			

Package: Members

This package addresses the built elements that represent members. Members represents a linear structural element from an architectural or structural modelling point of view.
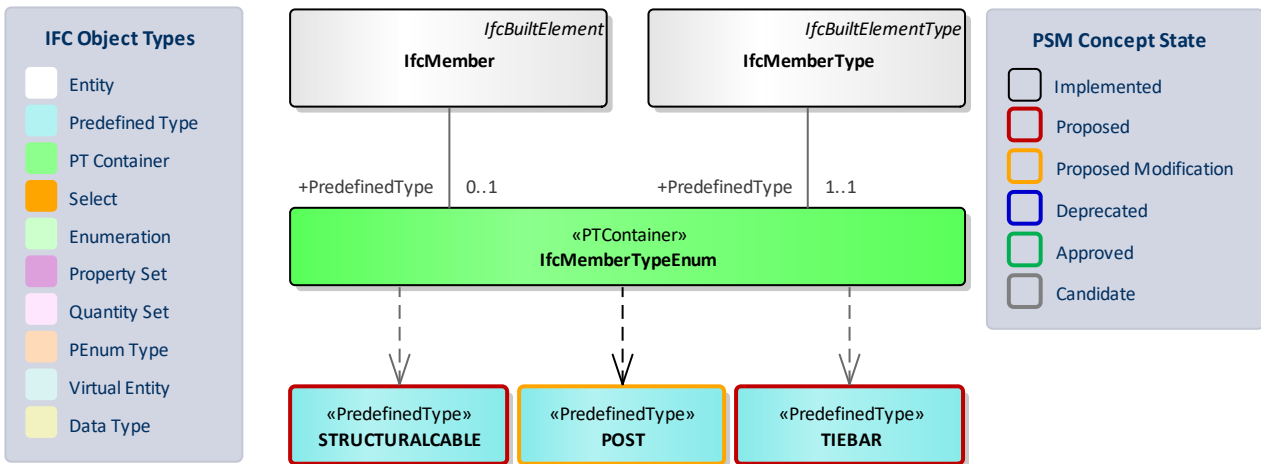
Figure 5: Members - modification and extension to member elements

Predefined Type: POST

Full Identifier: **IfcMemberTypeEnum.POST**

FORMER: A linear member (usually used vertically) within a roof structure to support purlins.

PROPOSED: A linear (usually vertical) member used to support something or to mark a point.

Status: **ProposedModification**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcMemberTypeEnum	**Parent Entity**	IfcMember
Stereotype	«PredefinedType»		IfcMemberType
Property sets	Pset_PostProtectionAndSafety		

Predefined Type: STRUCTURALCABLE

Full Identifier: **IfcMemberTypeEnum.STRUCTURALCABLE**

A linear cable element used to secure or stabilise a structure by resisting lateral and longitudinal loading through tension only, but cannot resist compression. usually formed of a flexible cable or wire.

Predefined Type Properties			
Predefined Type Container	IfcMemberTypeEnum	**Parent Entity**	IfcMember
Stereotype	«PredefinedType»		IfcMemberType
Property sets			

Predefined Type: TIEBAR

Full Identifier: **IfcMemberTypeEnum.TIEBAR**

A linear bar element used to secure or stabilise a structure by resisting lateral and longitudinal loading through tension and or compression. usually formed by a solid bar.

Status: **Proposed**

Package: **Members**

Predefined Type Properties			
Predefined Type Container	IfcMemberTypeEnum	**Parent Entity**	IfcMember
Stereotype	«PredefinedType»		IfcMemberType
Property sets			

Package: Pavement Elements

This package addresses the built elements that represent pavements. A pavement provides an even surface to sustain loads from vehicles or pedestrians.
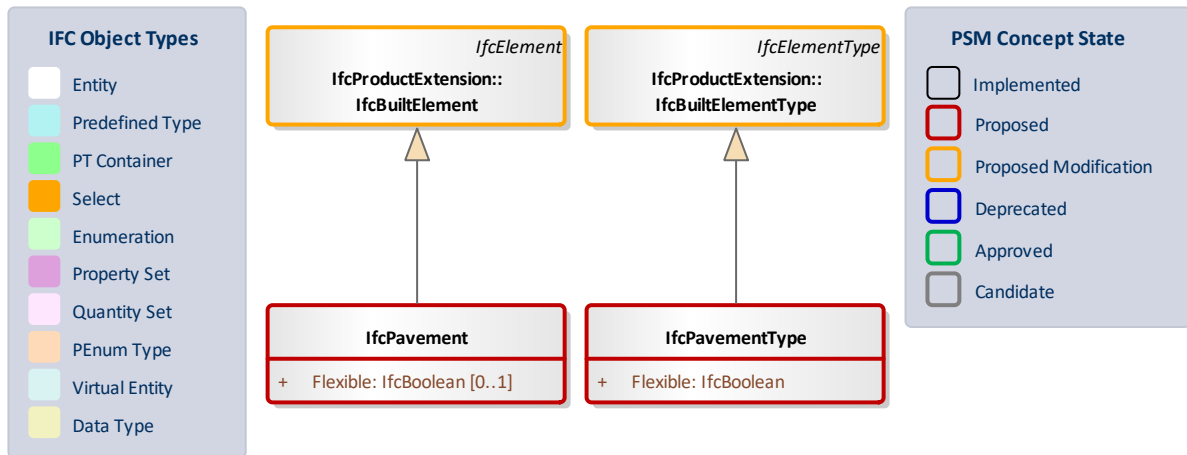
Figure 6: Pavement Elements - new extension to cover pavement elements

Class: IfcPavement

Type of built element in a road or other paved area to provide an even surface sustaining loads from vehicles or pedestrians, usually comprising several courses.

NOTE Definition from ISO 6707-1: road, runway, or similar construction above the subgrade.

Status: **Proposed**

Package: **Pavement Elements**

Class Properties			
Status	Proposed	Is Abstract	
Property sets	Pset_PavementSurfaceCommon		

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
Flexible	IfcBoolean	[0..1]	Boolean to identify the pavement type as a Flexible or Rigid structure.

Class: IfcPavementType

The IfcPavementType provides the type information for IfcPavement occurrences.

A pavement is a type of built element in a road or other paved area to provide an even surface sustaining loads from vehicles or pedestrians, usually comprising several courses.

Status: **Proposed**

Package: **Pavement Elements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_PavementSurfaceCommon		

Inheritance Statement		
Subtype Of	IfcBuiltElementType	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
Flexible	IfcBoolean		Boolean to identify the pavement type as a Flexible or Rigid structure.

Package: Railing Elements

This package addresses the built elements that represent railings. Railings are a frame assembly adjacent to human or vehicle circulation spaces and at some space boundaries. Designed as an optional physical support, or to prevent injury or damage, either by falling or collision.
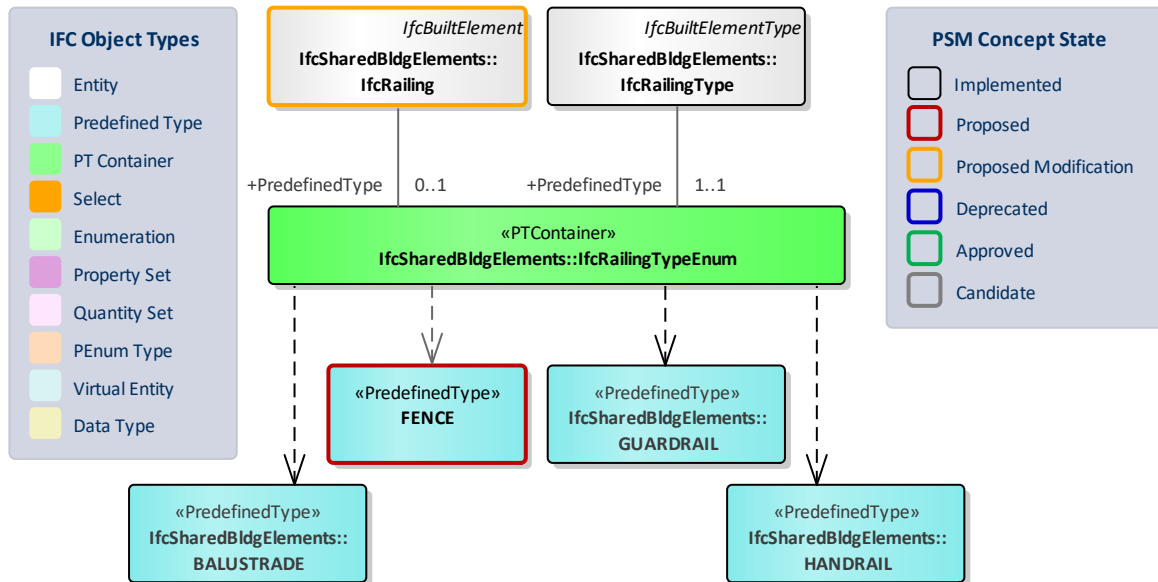
Figure 7: Railing Elements - modification and extension to railing elements

Class: IfcRailing

The railing is a frame assembly adjacent to human or vehicle circulation spaces and at some space boundaries where it is used in lieu of walls or to complement walls. REMOVE{ Designed to aid humans, either as an optional physical support, or to prevent injury or damage, either by falling or collision.} Designed as an optional physical support, or to prevent injury or damage, either by falling or collision.

> HISTORY New entity in IFC2.0

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgElements**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	[IfcBuiltElement](#)	
Subtypes	EXISTING	PROPOSED

Predefined Type: FENCE

Full Identifier: **IfcRailingTypeEnum.FENCE**

NOTE Definition from ISO6707-1: non-load bearing vertical construction, usually lightweight, which bounds or subdivides an external area.

Status: **Proposed**

Package: **Railing Elements**

Predefined Type Properties			
Predefined Type Container	[IfcRailingTypeEnum](#)	**Parent Entity**	[IfcRailing](#) [IfcRailingType](#)
Stereotype	«PredefinedType»		
Property sets			

Package: Slab Elements
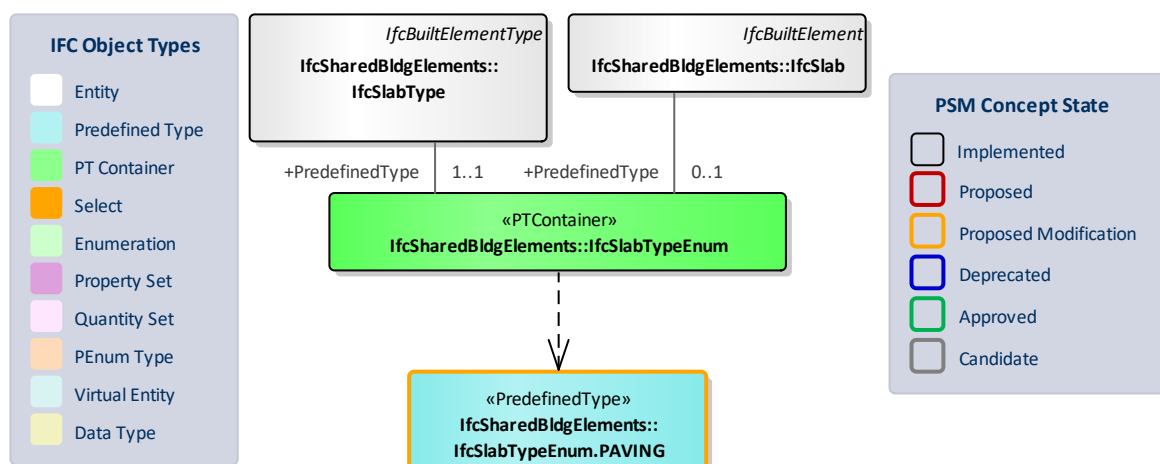
Figure 8: Slab Elements -

Predefined Type:

Full Identifier: **IfcSlabTypeEnum.PAVING**

Rigid pavement course of a road or other paved area, usually concrete.

Status: **ProposedModification**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcSlabTypeEnum	**Parent Entity**	IfcSlab
Stereotype	«PredefinedType»		IfcSlabType
Property sets			

Package: Civil Elements

This package addresses the modelling of elements that derive from IfcCivilElement or IfcCivilElementType. These are a generalization of all elements within a civil engineering works. The IfcCivilElement was introduced as a stub for future extensions of this specification to include an object model for civil engineering works, but subsequent developments have used different mechanisms for civil elements therefore these elements are no longer required within the schema and will be deprecated.
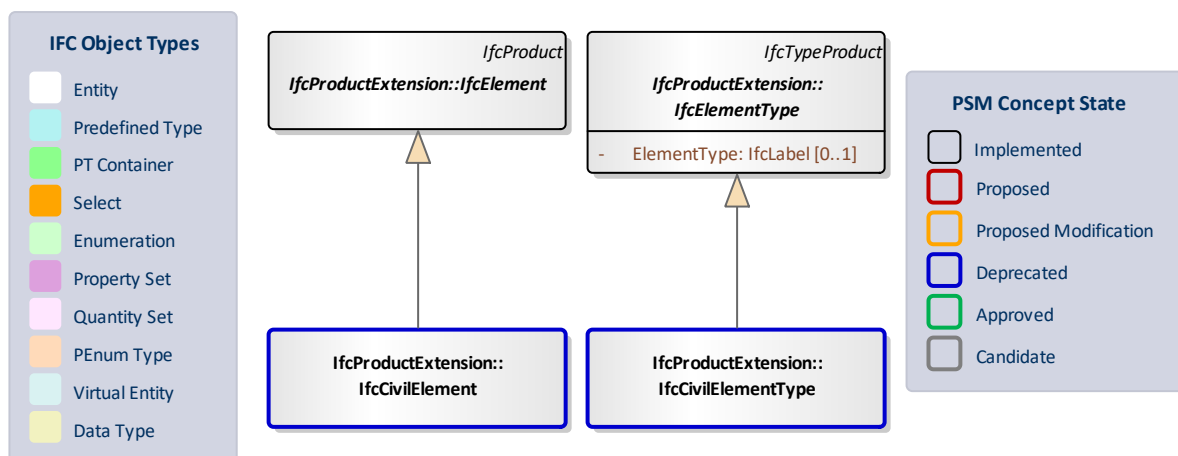
Figure 9: Civil Elements - Deprecation of civil elements

Class: IfcCivilElement

An IfcCivilElement is a generalization of all elements within a civil engineering works that cannot be represented as BuildingElements, DistributionElements or GeographicElements. Depending on the context of the construction project, included building work, such as buildings or factories, are represented as a collection of IfcBuiltElement's, distribution systems, such as piping or drainage, are represented as a collection of IfcDistributionElement's, and other geographic elements, such as trees, light posts, traffic signs etc. are represented as IfcGeographicElement's.

   NOTE The IfcCivilElement has been introduced as a stub for future extensions of this specification to include an object model for civil engineering works.

Civil elements are typically horizontally organized using a spatial structure expressed by spatial zones, therefore IfcCivilElement is spatially contained by default within an IfcSpatialZone.

   HISTORY New entity in IFC4.

bSI Documentation

Status: **Deprecated**

Package: **IfcProductExtension**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElement	
Subtypes	EXISTING	PROPOSED

Class: IfcCivilElementType

An IfcCivilElementType is used to define an element specification of an element used within civil engineering works. Civil element types include for different types of element that may be used to represent information for construction works external to a building. IfcCivilElementType's may include:

- linear elements such as sections of a roadway (including carriageway/pavement, verge, median, marker line, kerb etc.);
- elements for connections and junctions including traffic roundabouts, T junctions, 4 way junctions;
- elements for supporting structures such as piers, piles, pylons, and similar.

The specification of the specific types is provided by the inherited attribute IfcElementType.ElementType given as an IfcLabel.

NOTE This is due to the range of choices of element type that are available and their expression in different languages. It is not considered possible to create a reasonably full list of types within an enumeration. It is suggested that selection of the relevant type be drawn from an available ''feature catalogue''.

NOTE The IfcCivilElementType has been introduced as a stub for future extensions of this specification to include an object model for civil engineering works.

HISTORY New entity in IFC4.

bSI Documentation

Status: **Deprecated**

Package: **IfcProductExtension**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElementType	
Subtypes	EXISTING	PROPOSED

Package: Common Earthworks

This package addresses the modelling of common earthworks elements. These elements model the removal, transport and construction of earthen based structures and systems.

Package: Earthworks Cut Elements

This package addresses the modelling of earthworks cut elements. these represent the void generated from excavation and removal of earthen material.
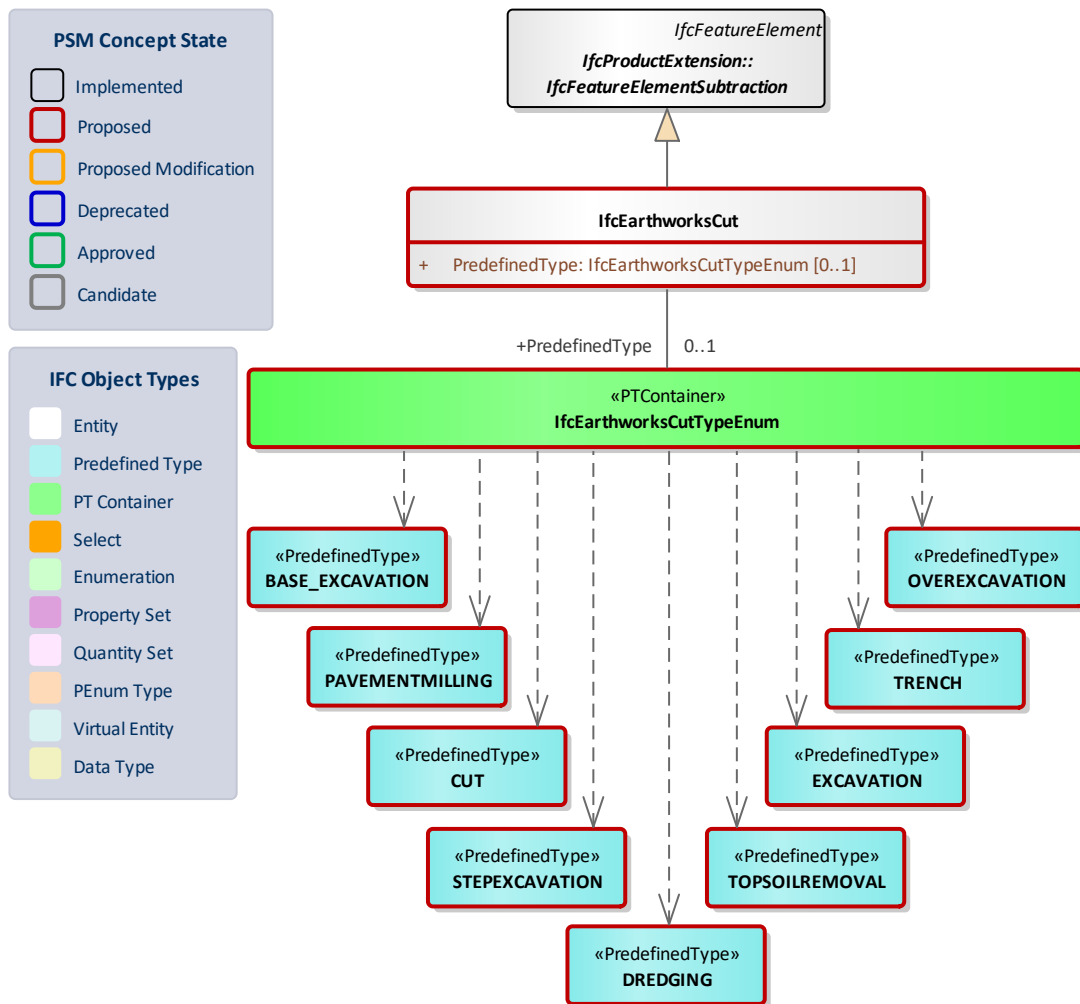
Figure 10: Earthworks Cut Elements - new extension to cover earthworks cut elements

Class: IfcEarthworksCut

The resulting void from modification of existing terrain or road structure by excavation or by other means of removing material.

NOTE Definition from ISO 6707-1: void that results from bulk excavation of material.

NOTE The material excavated and either used as fill or discarded as waste is not modelled as Cut, but may be handled as a different concept (Resource) in the future.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcFeatureElementSubtraction	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcEarthworksCutTypeEnum	[0..1]	Identifies the predefined type of a earthworks cut elements from which the type modelled, may be set. This type may associate additional specific property sets.

PDT Container: IfcEarthworksCutTypeEnum

This container defines the different predefined types of earthworks cut elements that can specify an IfcEarthworksCut.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Container Properties			
Parent Entity	IfcEarthworksCut	**Stereotype**	«PTContainer»
Contains	EXISTING	PROPOSED	
		IfcEarthworksCutTypeEnum.BASE_EXCAVATION	
		IfcEarthworksCutTypeEnum.OVEREXCAVATION	
		IfcEarthworksCutTypeEnum.TRENCH	
		IfcEarthworksCutTypeEnum.TOPSOILREMOVAL	

		IfcEarthworksCutTypeEnum.EXCAVATION
		IfcEarthworksCutTypeEnum.DREDGING
		IfcEarthworksCutTypeEnum.STEPEXCAVATION
		IfcEarthworksCutTypeEnum.CUT
		IfcEarthworksCutTypeEnum.PAVEMENTMILLING

Predefined Type: STEPEXCAVATION

Full Identifier: **IfcEarthworksCutTypeEnum.STEPEXCAVATION**

Removal of the soft part of the existing road slope, where it is dug into steps, when widening a road.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: EXCAVATION

Full Identifier: **IfcEarthworksCutTypeEnum.EXCAVATION**

General type of excavation when more accurate type is not specified.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: DREDGING

Full Identifier: **IfcEarthworksCutTypeEnum.DREDGING**

Underwater excavation to recover material or to create a greater depth of water.

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: TOPSOILREMOVAL

Full Identifier: **IfcEarthworksCutTypeEnum.TOPSOILREMOVAL**

Excavation where the topmost layer of soil containing organic material is cut or stripped. The removed topsoil can be used as fill (EarthworksElement) e.g. where planting is planned.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: OVEREXCAVATION

Full Identifier: **IfcEarthworksCutTypeEnum.OVEREXCAVATION**

Excavation that goes beyond the depth required for construction, in order to replace unsuitable material.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: CUT

Full Identifier: **IfcEarthworksCutTypeEnum.CUT**

Excavation where soil or rock below topsoil is cut to the depth required for the construction of facilities such as roads and railways. The removed material can be used as fill (EarthworksElement) for embankments or to form a level surface on which to build.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: PAVEMENTMILLING

Full Identifier: **IfcEarthworksCutTypeEnum.PAVEMENTMILLING**

Removal of expired material from top of pavement to be replaced by new material.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets	Pset_PavementMillingCommon		

Predefined Type: TRENCH

Full Identifier: **IfcEarthworksCutTypeEnum.TRENCH**

Excavation whose length greatly exceeds the depth and width. Trench is typically excavated for strip foundations or for buried services such as drainage or cabling.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets	Pset_TrenchExcavationCommon		

Predefined Type: BASE_EXCAVATION

Full Identifier: **IfcEarthworksCutTypeEnum.BASE_EXCAVATION**

Excavation for basements of buildings, abutments of bridges or similar structures either partially or completely below ground level.

Status: **Proposed**

Package: **Earthworks Cut Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksCutTypeEnum	**Parent Entity**	IfcEarthworksCut
Stereotype	«PredefinedType»		
Property sets			

Package: Earthworks Elements

This package addresses the modelling of earthworks elements. With 2 distinct forms of earthworks fill elements and the reinforcement of existing soil.
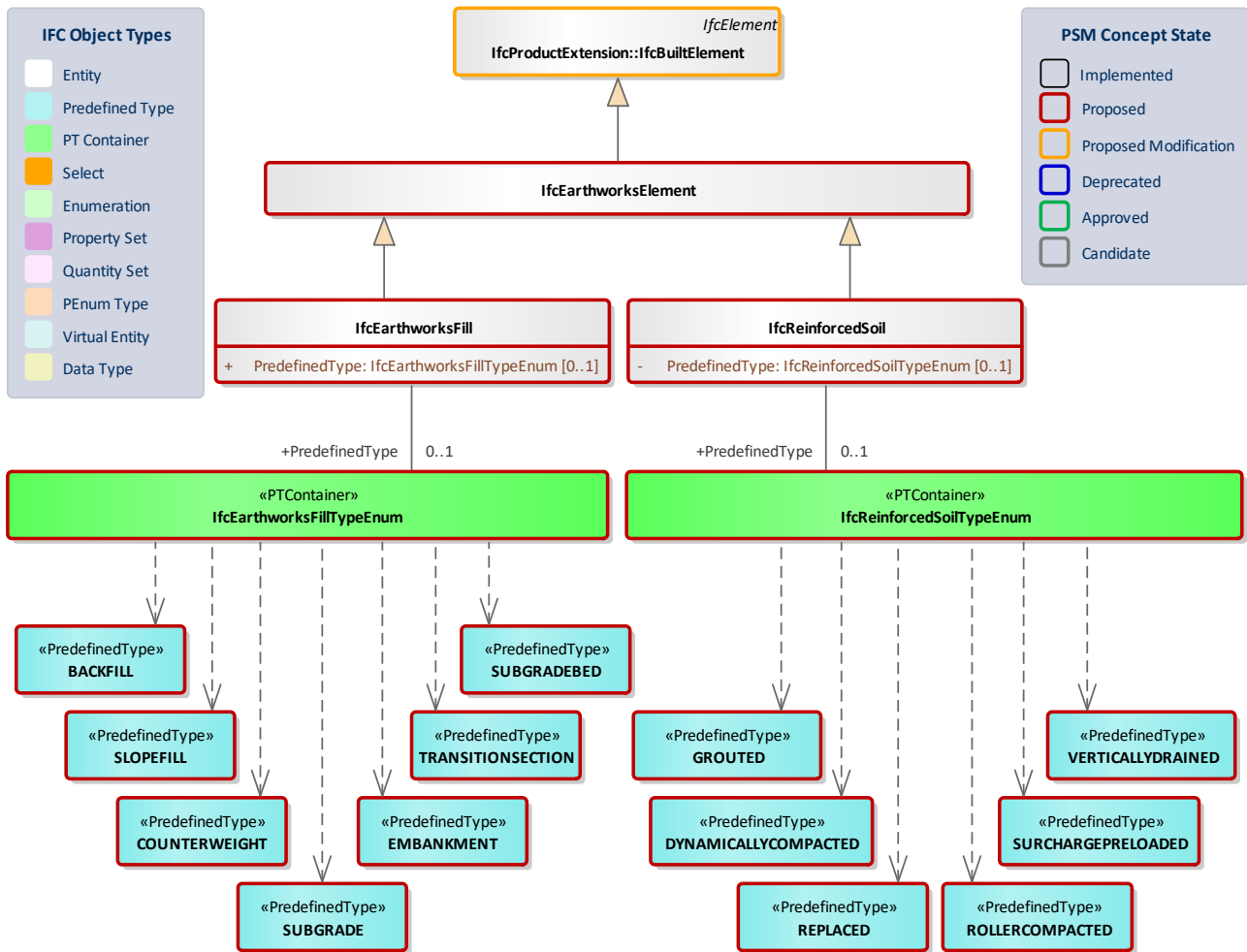
Figure 11: Earthworks Elements - new extension to cover Earthworks elements

Class: IfcEarthworksElement

A type of built element created by earthwork activities to build subgrade, to raise the level of the ground in general or reinforce or stabilize soil by some mechanical or chemical method.

Status: **Proposed**

Package: **Earthworks Elements**

Class Properties			
Status	Proposed	**Is Abstract**	

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	EXISTING	PROPOSED
		IfcReinforcedSoil
		IfcEarthworksFill

Class: IfcEarthworksFill

A type of earthworks element created by earthwork activities to build subgrade or to raise the level of the ground in general.

Status: **Proposed**

Package: **Earthworks Elements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcEarthworksElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcEarthworksFillTypeEnum	[0..1]	Identifies the predefined type of a earthworks fill elements from which the type modelled, may be set. This type may associate additional specific property sets.

PDT Container: IfcEarthworksFillTypeEnum

This container defines the different predefined types of earthworks fill elements that can specify an IfcEarthworksFill.

Status: **Proposed**

Package: **Earthworks Elements**

Container Properties			
Parent Entity	IfcEarthworksFill	**Stereotype**	«PTContainer»

	EXISTING	PROPOSED
Contains		IfcEarthworksFillTypeEnum.TRANSITIONSECTION
		IfcEarthworksFillTypeEnum.SUBGRADEBED
		IfcEarthworksFillTypeEnum.EMBANKMENT
		IfcEarthworksFillTypeEnum.SUBGRADE
		IfcEarthworksFillTypeEnum.SLOPEFILL
		IfcEarthworksFillTypeEnum.COUNTERWEIGHT
		IfcEarthworksFillTypeEnum.BACKFILL

Predefined Type: SUBGRADEBED

Full Identifier: **IfcEarthworksFillTypeEnum.SUBGRADEBED**

Upper part of the soil, natural or constructed, that supports the loads transmitted by the overlying structure of a road, runway, or similar hard surface.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksFillTypeEnum	**Parent Entity**	IfcEarthworksFill
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: SUBGRADE

Full Identifier: **IfcEarthworksFillTypeEnum.SUBGRADE**

Type of earthworks element forming the structure below pavement and above natural soil.

NOTE Definition from ISO 6707-1: upper part of the soil, natural or constructed, that supports the loads transmitted by the overlying structure of a road, runway, or similar hard surface.

NOTE Definition from PIARC: Upper layer of the natural ground upon which the pavement is constructed.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksFillTypeEnum	**Parent Entity**	IfcEarthworksFill

Stereotype	«PredefinedType»		
Property sets			

Predefined Type: COUNTERWEIGHT

Full Identifier: **IfcEarthworksFillTypeEnum.COUNTERWEIGHT**

Embankment built on the side of the main road structure to reduce the settlement of the road.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksFillTypeEnum	**Parent Entity**	IfcEarthworksFill
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: SLOPEFILL

Full Identifier: **IfcEarthworksFillTypeEnum.SLOPEFILL**

Side slope (batter) fill abutting the road structure or back slope fill.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksFillTypeEnum	**Parent Entity**	IfcEarthworksFill
Stereotype	«PredefinedType»		

Predefined Type: TRANSITIONSECTION

Full Identifier: **IfcEarthworksFillTypeEnum.TRANSITIONSECTION**

Section of subgrade to ensure the consistency of stiffness and prevent uneven settlement. Transition section may appear e.g. between: embankment and bridge abutment; embankment and transverse structure; cutting and tunnel; embankment and cutting.

Status: **Proposed**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksFillTypeEnum	**Parent Entity**	IfcEarthworksFill
Stereotype	«PredefinedType»		
Property sets	Pset_TransitionSectionCommon		

Predefined Type: EMBANKMENT

Full Identifier: **IfcEarthworksFillTypeEnum.EMBANKMENT**

Predominantly longitudinal type of earthworks element with no other particular assigned type according to its role in Pavement or Subgrade.

NOTE Definition from ISO6707-1: section of earthworks, often formed by cut or fill, where the finished ground level is above or below original ground level and whose length usually greatly exceeds its width.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksFillTypeEnum	**Parent Entity**	IfcEarthworksFill
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: BACKFILL

Full Identifier: **IfcEarthworksFillTypeEnum.BACKFILL**

Fill behind retaining walls or other structures such as quays, behind abutments and bridges.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthworksFillTypeEnum	**Parent Entity**	IfcEarthworksFill
Stereotype	«PredefinedType»		
Property sets			

Class: IfcReinforcedSoil

Soil reinforced or stabilized by some mechanical or chemical method.

Status: **Proposed**

Package: **Earthworks Elements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcEarthworksElement	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcReinforcedSoilTypeEnum	[0..1]	Identifies the predefined type of a reinforced soil elements from which the type modelled, may be set. This type may associate additional specific property sets.

PDT Container: IfcReinforcedSoilTypeEnum

This container defines the different predefined types of soil reinforcement that can specify an IfcReinforcedSoil.

Status: **Proposed**

Package: **Earthworks Elements**

Container Properties			
Parent Entity	IfcReinforcedSoil	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		IfcReinforcedSoilTypeEnum.VERTICALLYDRAINED	
		IfcReinforcedSoilTypeEnum.SURCHARGEPRELOADED	
		IfcReinforcedSoilTypeEnum.ROLLERCOMPACTED	
		IfcReinforcedSoilTypeEnum.REPLACED	
		IfcReinforcedSoilTypeEnum.GROUTED	
		IfcReinforcedSoilTypeEnum.DYNAMICALLYCOMPACTED	

Predefined Type: DYNAMICALLYCOMPACTED

Full Identifier: **IfcReinforcedSoilTypeEnum.DYNAMICALLYCOMPACTED**

The method of using dynamic tamping machine to drop the heavy hammer freely from the high place, compacting the soil and quickly improving the bearing capacity of the foundation.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcReinforcedSoilTypeEnum	**Parent Entity**	IfcReinforcedSoil
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: GROUTED

Full Identifier: **IfcReinforcedSoilTypeEnum.GROUTED**

A method of injecting some curable slurry into cracks or pores of a geotechnical foundation to improve its physical and mechanical properties.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcReinforcedSoilTypeEnum	**Parent Entity**	IfcReinforcedSoil
Stereotype	«PredefinedType»		

Predefined Type: REPLACED

Full Identifier: **IfcReinforcedSoilTypeEnum.REPLACED**

Dig out the soft soil in a certain range below the foundation ground and then backfill the area with high strength, low compressibility and no corrosive materials.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcReinforcedSoilTypeEnum	**Parent Entity**	IfcReinforcedSoil
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: ROLLERCOMPACTED

Full Identifier: **IfcReinforcedSoilTypeEnum.ROLLERCOMPACTED**

A kind of compacting method that adopts rolling machinery, repeated rolling and vibration to make foundation soil compacted, strength increased and compressibility decreased.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcReinforcedSoilTypeEnum	**Parent Entity**	IfcReinforcedSoil
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: SURCHARGEPRELOADED

Full Identifier: **IfcReinforcedSoilTypeEnum.SURCHARGEPRELOADED**

A method that applies load to the foundation to discharge pore water, and the foundation is consolidated to improve the foundation strength. Unloading when the carrying capacity reaches the required level.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcReinforcedSoilTypeEnum	**Parent Entity**	IfcReinforcedSoil
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: VERTICALLYDRAINED

Full Identifier: **IfcReinforcedSoilTypeEnum.VERTICALLYDRAINED**

A method to set vertical drainage measures in the foundation, so that pore water in the soil is discharged and the foundation strength is improved.

Status: **Proposed**

Package: **Earthworks Elements**

Predefined Type Properties			
Predefined Type Container	IfcReinforcedSoilTypeEnum	**Parent Entity**	IfcReinforcedSoil
Stereotype	«PredefinedType»		
Property sets			

Package: Earthworks Systems

This package addresses the modelling of earthworks systems. where earthworks elements and other products are grouped together for the earthworks management purposes.
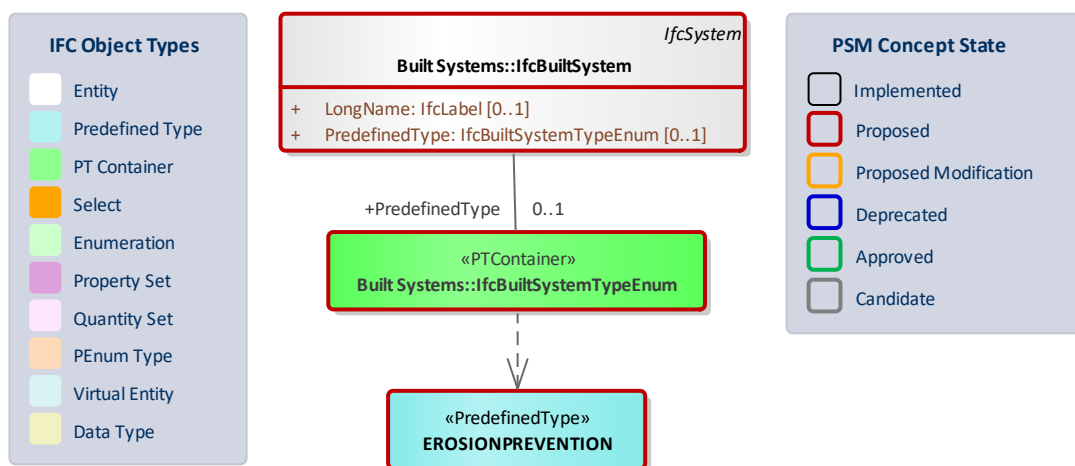
Figure 12: Earthworks Systems - modification and extension to built systems for earthworks

Class: IfcBuiltSystem

A built system is a group by which built elements are grouped according to a common function within the facility.

The group IfcBuiltSystem defines the occurrence of a specialized system for use within the context of a facilities physical or finishing fabric. Important functionalities for the description of a built system are derived from supertypes:

- From IfcSystem it inherits the ability to couple the built system via IfcRelReferencedInSpatialStructure to one or more IfcSpatialElement subtypes as necessary.
- From IfcGroup it inherits the inverse attribute IsGroupedBy, pointing to the relationship class IfcRelAssignsToGroup . This allows the grouping of built elements (instances of IfcBuiltElement subtypes, IfcFurnishingElement subtypes, IfcElementAssembly and IfcTransportElement).
- From IfcObjectDefinition it inherits the inverse attribute IsDecomposedBy pointing to the relationship class IfcRelAggregates. It provides the hierarchy between the separate (partial) building systems.

Status: **Proposed**

Package: **Built Systems**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcSystem	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
LongName	IfcLabel	[0..1]	Long name for a built system, used for informal purposes. It should be used, if available, in conjunction with the inherited Name attribute. NOTE In many scenarios the Name attribute refers to the short name or number of a built system, and the LongName refers to a descriptive name.
PredefinedType	IfcBuiltSystemTypeEnum	[0..1]	Predefined types of built systems.

PDT Container: IfcBuiltSystemTypeEnum

This enumeration identifies different types of built systems.

Status: **Proposed**

Package: **Built Systems**

Container Properties

Parent Entity	IfcBuiltSystem	Stereotype	«PTContainer»

	EXISTING	PROPOSED
Contains		IfcBuiltSystemTypeEnum.MOORING
		IfcBuiltSystemTypeEnum.MOORINGSYSTEM
		IfcBuiltSystemTypeEnum.TRACKCIRCUIT
		IfcBuildingSystemTypeEnum.EROSIONPREVENTION
		IfcBuiltSystemTypeEnum.LOADBEARING
		IfcBuiltSystemTypeEnum.OUTERSHELL
		IfcBuiltSystemTypeEnum.FOUNDATION
		IfcBuiltSystemTypeEnum.TRANSPORT
		IfcBuiltSystemTypeEnum.FENESTRATION
		IfcBuiltSystemTypeEnum.SHADING
		IfcBuiltSystemTypeEnum.REINFORCING
		IfcBuiltSystemTypeEnum.PRESTRESSING

Predefined Type: EROSIONPREVENTION

Full Identifier: **IfcBuildingSystemTypeEnum.EROSIONPREVENTION**

A grouping of elements into a built system for preventing unwanted relocation of material particles in earthworks slopes or rock faces.

Typical types of erosion prevention include:

- Planting
- Solid
- Framework
- Anchored framework
- Shotcrete
- Screening
- Geosynthetics (geotextiles)

Status: **Proposed**

Package: **Earthworks Systems**

Predefined Type Properties

Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		

Package: Geographic Elements

This package addresses the modelling of geographic elements. where geographic elements are the generalization of all elements within a geographical landscape.
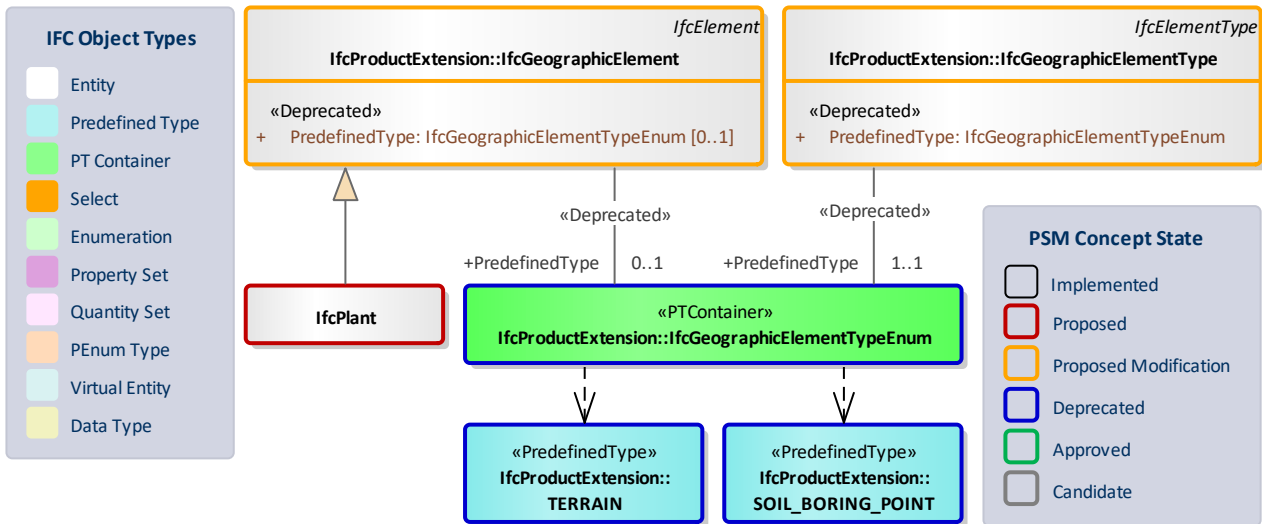
Figure 13: Geographic Elements - modification and extension to geographic elements

Class: IfcGeographicElement

An _IfcGeographicElement_ is a generalization of all elements within a geographical landscape. It includes occurrences of typical geographical elements, often referred to as features, such as trees or terrain. Common type information behind several occurrences of _IfcGeographicElement_ is provided by the _IfcGeographicElementType_. REMOVE {> NOTE Roads are now represented by _IfcCivilElement_.}

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElement	
Subtypes	EXISTING	PROPOSED
		IfcPlant

Class Attributes

Name	Type	Multiplicity	Definition
«Deprecated» PredefinedType	IfcGeographicElementTypeEnum	[0..1]	

Class: IfcGeographicElementType

An _IfcGeographicElementType_ is used to define an element specification of a geographic element (i.e. the specific product information, that is common to all occurrences of that product type). Geographic element types include for different types of element that may be used to represent information within a geographical landscape external to a building. Within the world of geographic information they are referred to generally as ''features''. _IfcGeographicElementType_''s include:

- point features such as seating, bus shelters, signage, trees;
- linear features such as layby''s;
- area features such as ponds, lakes, woods and forests;
- drainage such as catchment, reserver or outfall.

The specification of the specific types are given by the inherited attribute _IfcElementType.ElementType_ given as an _IfcLabel_.

Geographic element types are frequently identified in feature catalogs that are produced for particular purposes. The _IfcGeographicElementType_ entity enables the continued use of existing feature catalogs through capture of their identity and attributes.

Information from feature catalogs might be captured in various ways:

- via property sets, some of which will be specifically defined within the IFC property set catalog whilst others will be created for local use; this is the form of capture that is expected to be most widely used
- through use of the IFC classification model whereby features might be identified through an _IfcClassificationReference_ with additional description; in which case, any further attributes required would still need to be captured in property sets.

> NOTE This is due to the range of choices of element type thyat are available and their expression in different languages. It is not considered possible to create a reasonably full list of types within an enumeration. It is suggested that selection of the relevant type be drawn from an available ''feature catalog''.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties

Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement

Subtype Of	[IfcElementType]()	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
«Deprecated» PredefinedType	IfcGeographicElementTypeEnum		

PDT Container: IfcGeographicElementTypeEnum

This enumeration defines the different predefined types of geographic elements that can further specify an _IfcGeographicElement_ or an _IfcGeographicElementType_.

> NOTE Cuurently no other predefined types beside terrain are defined.

[bSI Documentation]()

Status: **Deprecated**

Package: **IfcProductExtension**

Container Properties

Parent Entity	[IfcGeographicElementType]() [IfcGeographicElement]()	**Stereotype**	«PTContainer»
Contains	**EXISTING**		**PROPOSED**
	[IfcGeographicElementTypeEnum.SOIL_BORING_POINT]() [IfcGeographicElementTypeEnum.TERRAIN]()		

Predefined Type: SOIL_BORING_POINT

Full Identifier: **IfcGeographicElementTypeEnum.SOIL_BORING_POINT**

Status: **Deprecated**

Package: **IfcProductExtension**

Predefined Type Properties			
Predefined Type Container	IfcGeographicElementTypeEnum	**Parent Entity**	IfcGeographicElementType
Stereotype	«PredefinedType»		IfcGeographicElement
Property sets			

Predefined Type: TERRAIN

Full Identifier: **IfcGeographicElementTypeEnum.TERRAIN**

Status: **Deprecated**

Package: **IfcProductExtension**

Predefined Type Properties			
Predefined Type Container	IfcGeographicElementTypeEnum	**Parent Entity**	IfcGeographicElementType
Stereotype	«PredefinedType»		IfcGeographicElement
Property sets			

Class: IfcPlant

Trees, shrubs, herbs, grasses, ferns, and mosses.NOTE: It is proposed to deprecate the PredefinedType attribute for existing IFC class IfcGeographicElement.

Status: **Proposed**

Package: **Geographic Elements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_PlantCommon		
Inheritance Statement			
Subtype Of	IfcGeographicElement		
Subtypes	**EXISTING**	**PROPOSED**	

Package: Distribution Elements

Package: Signal
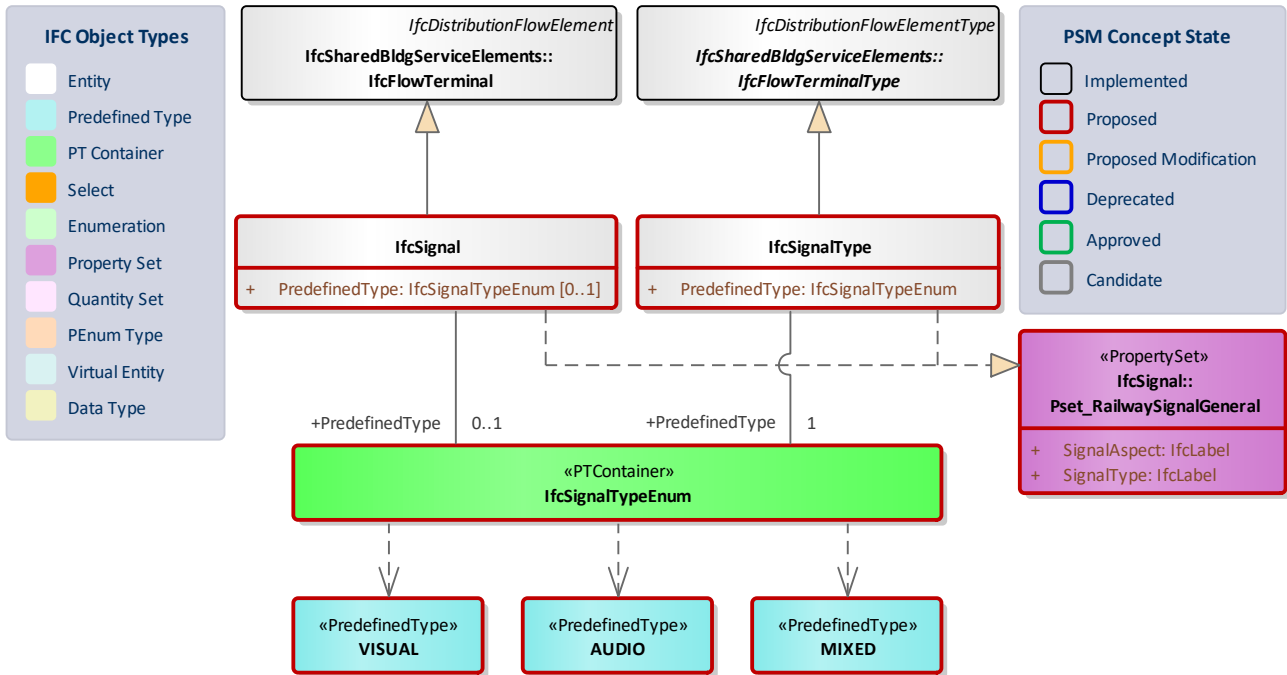
Figure 14: Signal - new extension to cover signal elements

Property Set: Pset_RailwaySignalGeneral

Status: **Proposed**

Set Properties			
Applicable Entities	IfcSignalType IfcSignal	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
SignalAspect	IfcLabel		
SignalType	IfcLabel		

Class: IfcSignal

A signal is an active device that conveys information or instructions to users, by means of an audio, visual signal or a combination of both.

The primary distinction from an IfcSign is that a signal is active and therefore a subtype of IfcFlowTerminal usually requiring power and data connections for its operation.

An instance of IfcSignal represents a singular signalling device in a larger assembled unit or connected system, such as an individual frame within a railway signal, a single light unit in a traffic light system or an audio signal or light mounted on a navigational buoy.

Signals can be physically aggregated together into an assembly which can include multiple signal instances (and also sign instances) and the associated supporting structural elements such as a simple pole or a rigid frame gantry (see Signal Assembly for examples).

Signals can be logically (functionally) grouped together into a signalling system (a type of distribution system) to represent a connected group of signals for example a group of traffic lights controlling an road intersection.

Status: **Proposed**

Package: **Signal**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_RailwaySignalGeneral		

Inheritance Statement		
Subtype Of	IfcFlowTerminal	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcSignalTypeEnum	[0..1]	Identifies the predefined type of a signal from which the type modelled, may be set. This type may associate additional specific property sets. NOTE The PredefinedType shall only be used, if no IfcSignalType is assigned, providing its own IfcSignType .PredefinedType.

Class: IfcSignalType

The IfcSignalType provides the type information for IfcSignal occurrences.

A signal is an active device that conveys information or instructions to users, by means of an audio, visual signal or a combination of the 2.

Status: **Proposed**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_RailwaySignalGeneral		

Inheritance Statement		
Subtype Of	IfcFlowTerminalType	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcSignalTypeEnum		Identifies the predefined type of a signal from which the type modelled, may be set.

PDT Container: IfcSignalTypeEnum

This container defines the different predefined types of signals that can specify an IfcSignal or IfcSignalType.

Status: **Proposed**

Package: **Signal**

Container Properties			
Parent Entity	IfcSignalType IfcSignal	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		IfcSignalTypeEnum.MIXED IfcSignalTypeEnum.AUDIO IfcSignalTypeEnum.VISUAL	

Predefined Type: AUDIO

Full Identifier: **IfcSignalTypeEnum.AUDIO**

A signal type formed of an active device conveying information by emitting an audio signal such as a beep, ring, horn or explosive sound.

Status: **Proposed**

Package: **Signal**

Predefined Type Properties			
Predefined Type Container	IfcSignalTypeEnum	**Parent Entity**	IfcSignalType
Stereotype	«PredefinedType»		IfcSignal
Property sets			

Predefined Type: MIXED

Full Identifier: **IfcSignalTypeEnum.MIXED**

A signal type formed of an active device conveying information in both a visual and audio manner.

Status: **Proposed**

Package: **Signal**

Predefined Type Properties			
Predefined Type Container	IfcSignalTypeEnum	**Parent Entity**	IfcSignalType
Stereotype	«PredefinedType»		IfcSignal
Property sets			

Predefined Type: VISUAL

Full Identifier: **IfcSignalTypeEnum.VISUAL**

A signal type formed of an active device conveying information in a visual manner such as a light, cluster of lights, or mechanical moving shapes.

Status: **Proposed**

Package: **Signal**

Predefined Type Properties			
Predefined Type Container	IfcSignalTypeEnum	**Parent Entity**	IfcSignalType
Stereotype	«PredefinedType»		IfcSignal
Property sets			

Package: Element Assemblies

This package addresses the built elements that represent assemblies. Assemblies are aggregations of other elements and components to form a larger manufactured unit that can be built on site or prefabricated off-site.
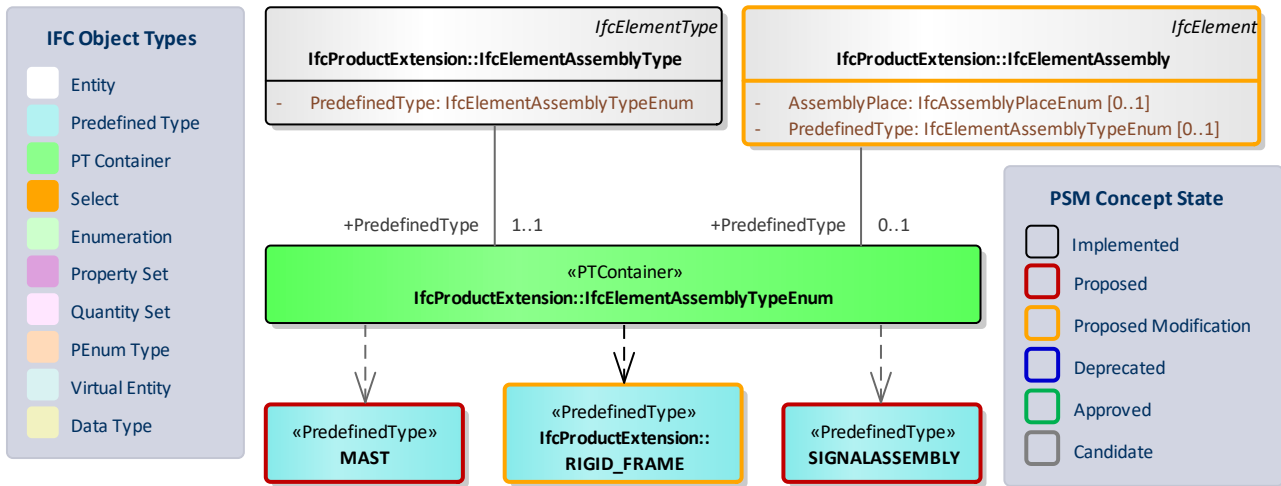
Figure 15: Assemblies - modification and extension to element assemblies

Class: IfcElementAssembly

The IfcElementAssembly represents complex element assemblies aggregated from several elements, such as discrete elements, building elements, or other elements.

> EXAMPLE Steel construction assemblies, such as trusses and different kinds of frames, can be represented by the IfcElementAssembly entity. Other examples include slab fields aggregated from a number of precast concrete slabs or reinforcement units made from several reinforcement bars. Also bathroom units, staircase sections and other premanufactured or precast elements are examples of the general IfcElementAssembly entity

> NOTE The IfcElementAssembly is a general purpose entity that is required to be decomposed. Also other subtypes of IfcElement can be decomposed.   REMOVE {with some dedicated entities such as _IfcWallElementedCase_ and _IfcSlabElementedCase_.}

The assembly structure can be nested, i.e. an IfcElementAssembly could be an aggregated part within another IfcElementAssembly.

> NOTE View definitions and/or implementer agreements may restrict the number of allowed levels of nesting.

The geometry of an IfcElementAssembly is generally formed from its components, in which case it does not need to have an explicit geometric representation. In some cases it may be useful to also expose an own explicit representation of the aggregate.

> NOTE View definitions or implementer agreements may further constrain the applicability of certain shape representations at the IfcElementAssembly in respect of the shape representations of its parts.

> HISTORY New entity in IFC2x2.

Informal Propositions:

1. The IfcElementAssembly shall have an aggregation relationship to the contained parts, i.e. the (INV) IsDecomposedBy relationship shall be utilized.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
AssemblyPlace	IfcAssemblyPlaceEnum	[0..1]	A designation of where the assembly is intended to take place defined by an Enum.
PredefinedType	IfcElementAssemblyType Enum	[0..1]	

Predefined Type: RIGID_FRAME

Full Identifier: **IfcElementAssemblyTypeEnum.RIGID_FRAME**

A structure built up of beams, columns, etc. with moment-resisting joints, such as gantry.

Status: **ProposedModification**

Package: **IfcProductExtension**

Predefined Type Properties			
Predefined Type Container	IfcElementAssemblyTypeEnum	**Parent Entity**	IfcElementAssemblyType
Stereotype	«PredefinedType»		IfcElementAssembly

Predefined Type: MAST

Full Identifier: **IfcElementAssemblyTypeEnum.MAST**

An assembly of plates, members, cables or fasteners that form a vertical structure for the support or mounting of other equipment such as lights, sonar or wireless transmitters.

Status: **Proposed**

Package: **Element Assemblies**

Predefined Type Properties			
Predefined Type Container	IfcElementAssemblyTypeEnum	**Parent Entity**	IfcElementAssemblyType
Stereotype	«PredefinedType»		IfcElementAssembly
Property sets			

Predefined Type: SIGNALASSEMBLY

Full Identifier: **IfcElementAssemblyTypeEnum.SIGNALASSEMBLY**

An assembly to physically aggregate together one or more signal instances (and also sign instances) including any supporting structural elements such as a simple pole or a rigid frame gantry.

Status: **Proposed**

Package: **Element Assemblies**

Predefined Type Properties			
Predefined Type Container	IfcElementAssemblyTypeEnum	**Parent Entity**	IfcElementAssemblyType
Stereotype	«PredefinedType»		IfcElementAssembly
Property sets			

Package: Element Components

This package addresses the modelling of minor items included in, added to or connecting to or between elements, which usually are not of interest from the overall building structure viewpoint. However, these small parts may have vital and load carrying functions within the construction. These items do not provide any actual space boundaries. Typical examples of components include different kinds of fasteners and various accessories.

Package: Impact Devices

This package addresses the common components that represent impact devices. An impact protection device functions to protect built elements from the effects of impact and vibration. this new element merges the previous elements of vibration damper and vibration isolator and adds further impact specific devices.
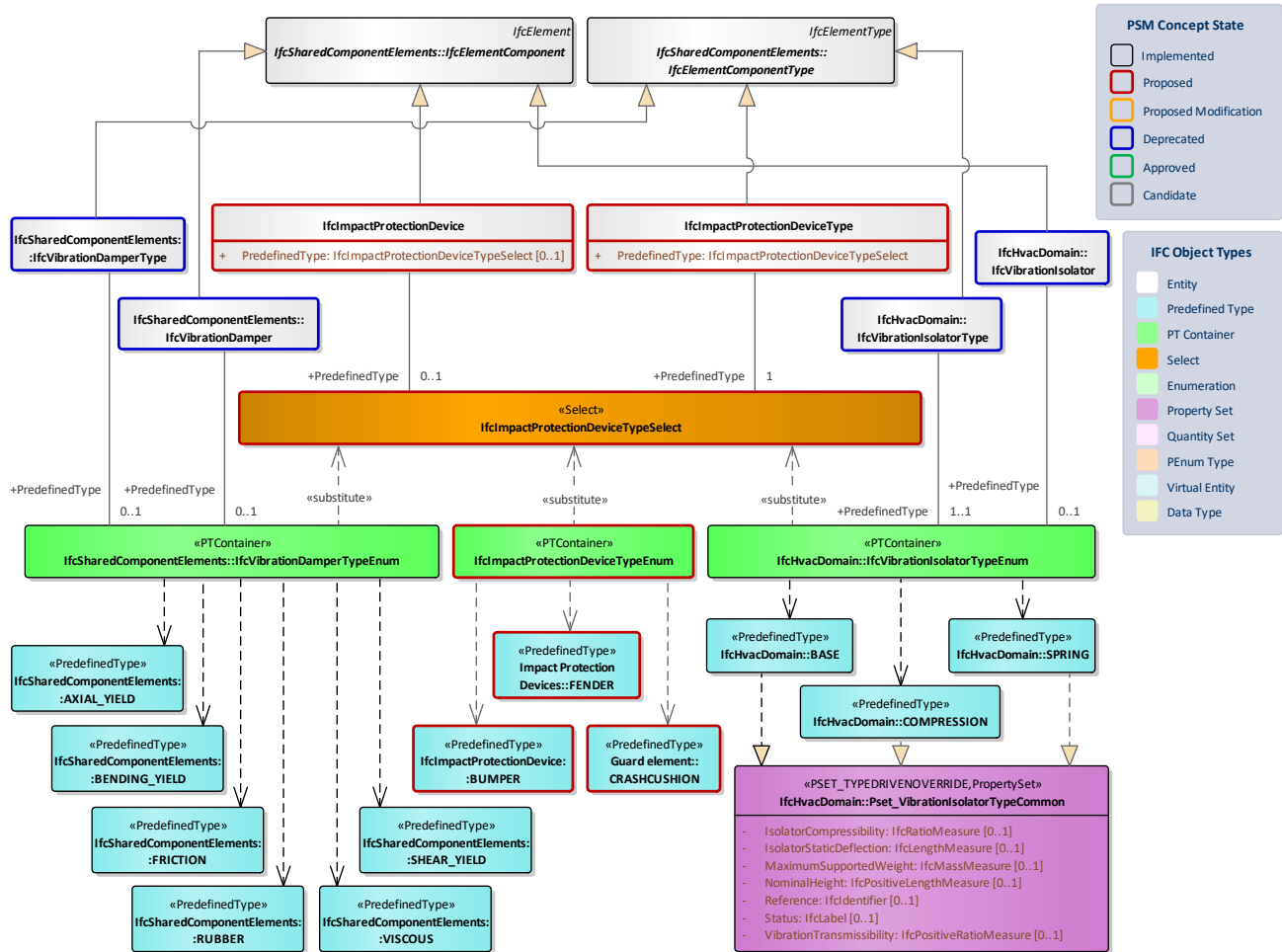
Figure 16: Impact Devices - modification and extension to impact devices

Class: IfcVibrationIsolator

A vibration isolator is a device used to minimize the effects of vibration transmissibility in a structure.

> HISTORY New entity in IFC4

bSI Documentation

Status: **Deprecated**

Package: **IfcHvacDomain**

Class Properties

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElementComponent	
Subtypes	**EXISTING**	**PROPOSED**

Class: IfcVibrationIsolatorType

The element component type **IfcVibrationIsolatorType** defines commonly shared information for occurrences of vibration isolators. The set of shared information may include:

- common properties with shared property sets
- common representations
- common materials
- common composition of elements

It is used to define a vibration isolator type specification indicating the specific product information that is common to all occurrences of that product type. The **IfcVibrationIsolatorType** may be declared within _IfcProject_ or _IfcProjectLibrary_ using _IfcRelDeclares_ and may be exchanged with or without occurrences of the type. Occurrences of **IfcVibrationIsolatorType** are represented by instances of _IfcVibrationIsolator_. Refer to the documentation at _IfcVibrationIsolator_ for supported property sets, materials, and composition.

> HISTORY New entity in IFC2x2

bSI Documentation

Status: **Deprecated**

Package: **IfcHvacDomain**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElementComponentType	
Subtypes	**EXISTING**	**PROPOSED**

Class: IfcVibrationDamper

A vibration damper is a device used to minimize the effects of vibration in a structure by dissipating kinetic energy. The damper may be passive (elastic, frictional, inertia) or active (in a system using sensors and actuators).

bSI Documentation

Status: **Deprecated**

Package: **IfcSharedComponentElements**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElementComponent	
Subtypes	EXISTING	PROPOSED

Class: IfcVibrationDamperType

bSI Documentation

Status: **Deprecated**

Package: **IfcSharedComponentElements**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElementComponentType	
Subtypes	EXISTING	PROPOSED

Predefined Type: FENDER

Full Identifier: **IfcImpactProtectionDeviceTypeEnum.FENDER**

A passive or active device formed of a damper and impact panel that is mounted on the quayside to protect against vessel impact.

Status: **Proposed**

Package: **Impact Protection Devices**

Predefined Type Properties			
Predefined Type Container	IfcImpactProtectionDeviceTypeEnum	**Parent Entity**	IfcImpactProtectionDeviceType IfcImpactProtectionDevice
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: BUMPER

Full Identifier: **IfcImpactProtectionDeviceTypeEnum.BUMPER**

A bumper is a buffer object at end of track that prevents driving over. It can be fixed on rails or the track panel or can also be a natural element (e.g. rock, sand).

Status: **Proposed**

Package: **IfcImpactProtectionDevice**

Predefined Type Properties			
Predefined Type Container	IfcImpactProtectionDeviceTypeEnum	**Parent Entity**	IfcImpactProtectionDeviceType IfcImpactProtectionDevice
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: CRASHCUSHION

Full Identifier: **IfcImpactProtectionDeviceTypeEnum.CRASHCUSHION**

NOTE Definition from EN1317-1:2010: road vehicle energy absorption device installed in front of one or more hazards to reduce the severity of impact

NOTE Definition from ISO6707-1: energy-absorbing device installed in front of a rigid object to reduce the severity of impact of a vehicle, (Impact barrier, US)

Predefined Type Properties			
Predefined Type Container	IfcImpactProtectionDeviceTypeEnum	**Parent Entity**	IfcImpactProtectionDeviceType IfcImpactProtectionDevice
Stereotype	«PredefinedType»		
Property sets			

Class: IfcImpactProtectionDevice

A impact protection device is a component used to protect other built elements from kinetic damage. impact protection devices currently come in 3 different varieties:

- A vibration damper used to minimize the effects of vibration in a structure by dissipating kinetic energy. The damper may be passive (elastic, frictional, inertia) or active (in a system using sensors and actuators).
- A vibration isolator is a device used to minimize the effects of vibration transmissibility in a structure.
- Impact devices that dissipate kinetic energy from impacting elements (such as vehicles) by deformation or elastic mechanics.

Status: **Proposed**

Package: **Impact Devices**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElementComponent	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcImpactProtection DeviceTypeSelect	[0..1]	Identifies the predefined type of a impact device from which the type modelled, may be set. This type may associate additional specific property sets. NOTE The PredefinedType shall only be used, if no IfcImpactProtectionDeviceType is assigned, providing its own IfcImpactProtectionDeviceType .PredefinedType.

Class: IfcImpactProtectionDeviceType

The IfcImpactProtectionDeviceType provides the type information for IfcImpactProtectionDevice occurrences.

A impact protection device is a component used to protect other built elements from kinetic damage.

Status: **Proposed**

Package: **Impact Devices**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcElementComponentType	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcImpactProtection DeviceTypeSelect		Identifies the predefined type of a impact device from which the type modelled, may be set.

PDT Container: IfcImpactProtectionDeviceTypeEnum

This container defines the different predefined types of kinetic impact protectors that can specify an IfcImpactProtectionDevice or IfcImpactProtectionDeviceType.

Status: **Proposed**

Package: **Impact Devices**

Container Properties			
Parent Entity	IfcImpactProtectionDeviceType IfcImpactProtectionDevice	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		IfcImpactProtectionDeviceTypeEnum.DAMPINGSYSTEM	
		IfcImpactProtectionDeviceTypeEnum.FENDER	
		IfcImpactProtectionDeviceTypeEnum.CRASHCUSHION	
		IfcImpactProtectionDeviceTypeEnum.BUMPER	

Select: IfcImpactProtectionDeviceTypeSelect

This is a select of enumerations to provide the option of groups of predefined types for an IfcImpactProtectionDevice or IfcImpactProtectionDeviceType.

Status: **Proposed**

Package: **Impact Devices**

Select Properties	
Stereotype	«Select»
Substitutions	IfcVibrationIsolatorTypeEnum IfcImpactProtectionDeviceTypeEnum IfcVibrationDamperTypeEnum

Package: Sign Elements

This package addresses the common components that represent signs. A Sign is a notice on display that gives information or instructions in a written, symbolic or other form.
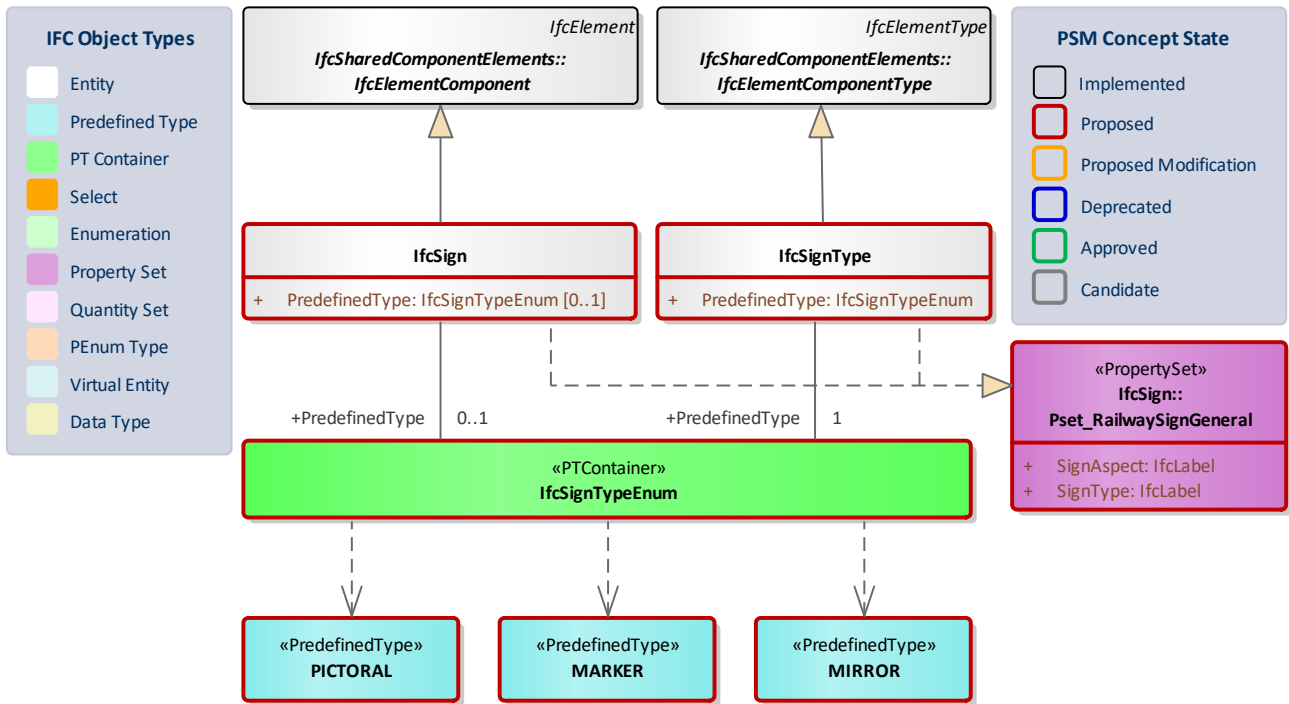
Figure 17: Sign Elements - new extension to cover sign elements

Property Set: Pset_RailwaySignGeneral

Status: **Proposed**

Set Properties

Applicable Entities	IfcSignType IfcSign	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
SignAspect	IfcLabel		
SignType	IfcLabel		

Class: IfcSign

A sign is a notice on display that gives information or instructions in a written, symbolic or other form. Signs are passive with the most common form of a pictorial panel. An instance of IfcSign refers to the occurrence

of an individual panel which can be applied to a surface such as a wall or be aggregated within a Signal Assembly which can include multiple sign occurrences and the associated supporting structural elements (see Signal Assembly for examples).

Status: **Proposed**

Package: **Sign Elements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_RailwaySignGeneral		

Inheritance Statement		
Subtype Of	IfcElementComponent	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcSignTypeEnum	[0..1]	Identifies the predefined type of a signs from which the type modelled, may be set. This type may associate additional specific property sets. NOTE The PredefinedType shall only be used, if no IfcSignType is assigned, providing its own IfcSignType .PredefinedType.

Class: IfcSignType

The IfcSignType provides the type information for IfcSign occurrences.

A sign is a notice on display that gives information or instructions in a written, symbolic or other form. Signs are passive with the most common form of a pictorial panel.

Status: **Proposed**

Package: **Sign Elements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_RailwaySignGeneral		

Inheritance Statement		
Subtype Of	IfcElementComponentType	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcSignTypeEnum		Identifies the predefined type of a signs from which the type modelled, may be set.

PDT Container: IfcSignTypeEnum

This container defines the different predefined types of signs that can specify an IfcSign or IfcSignType.

Status: **Proposed**

Package: **Sign Elements**

Container Properties			
Parent Entity	IfcSignType IfcSign	**Stereotype**	«PTContainer»
Contains	EXISTING	PROPOSED	
		IfcSignTypeEnum.MIRROR	
		IfcSignTypeEnum.MARKER	
		IfcSignTypeEnum.PICTORAL	

Predefined Type: MARKER

Full Identifier: **IfcSignTypeEnum.MARKER**

A Sign type formed of a vertical post (possibly with some lettering or symbols) usually used to delimitate distance or the location of some equipment.

Status: **Proposed**

Package: **Sign Elements**

Predefined Type Properties			
Predefined Type Container	IfcSignTypeEnum	**Parent Entity**	IfcSignType
Stereotype	«PredefinedType»		IfcSign
Property sets			

Predefined Type: MIRROR

Full Identifier: **IfcSignTypeEnum.MIRROR**

A sign type that provides information via a reflective mirror surface.

Status: **Proposed**

Package: **Sign Elements**

Predefined Type Properties			
Predefined Type Container	IfcSignTypeEnum	**Parent Entity**	IfcSignType IfcSign
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: PICTORAL

Full Identifier: **IfcSignTypeEnum.PICTORAL**

A Sign type formed of a flat plate with some written or symbolic images on it.

Status: **Proposed**

Package: **Sign Elements**

Predefined Type Properties			
Predefined Type Container	IfcSignTypeEnum	**Parent Entity**	IfcSignType IfcSign
Stereotype	«PredefinedType»		
Property sets			

Package: Surface Features

This package addresses the common components that represent surface features. A surface feature is a modification at (onto, or into) of the surface of an element.
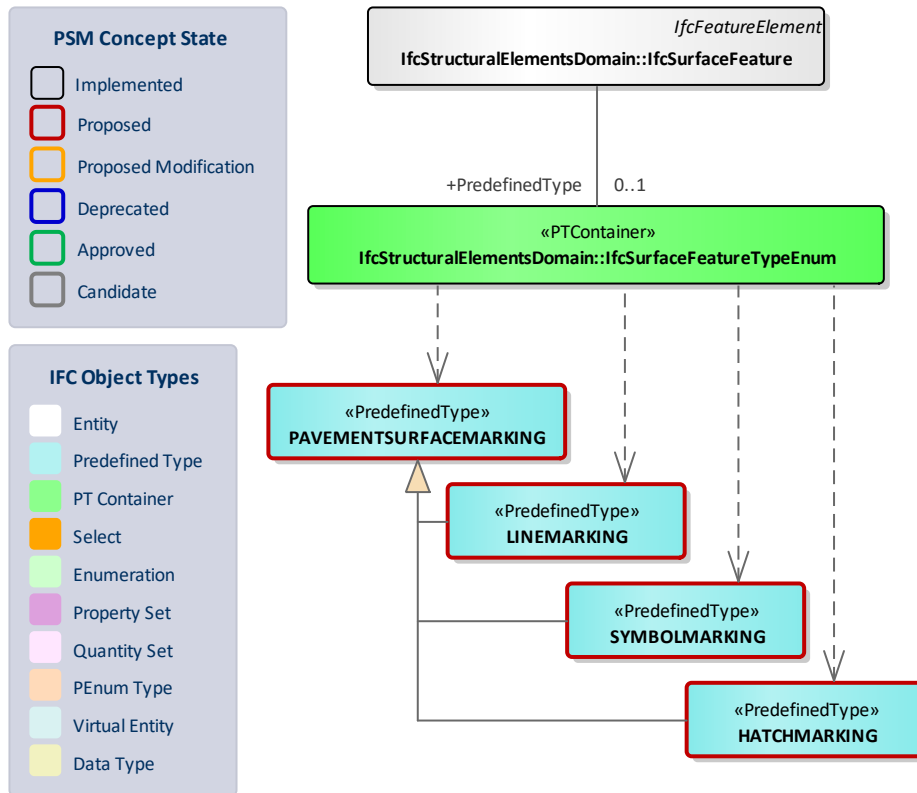
Figure 18: Surface Feature Elements - modification and extension to surface features

Predefined Type: HATCHMARKING

Full Identifier: **IfcSurfaceFeatureTypeEnum.HATCHMARKING**

surface markings defined by enclosed 2d shape with defined hatch fillings.

Status: **Proposed**

Package: **Surface Features**

Predefined Type Properties			
Predefined Type Container	IfcSurfaceFeatureTypeEnum	**Parent Entity**	IfcSurfaceFeature
Stereotype	«PredefinedType»		
Property sets	Pset_RoadMarkingCommon		

Predefined Type: LINEMARKING

Full Identifier: **IfcSurfaceFeatureTypeEnum.LINEMARKING**

2D lines painted on pavement surfaces to form boundaries, centrelines and edge markings.

Status: **Proposed**

Package: **Surface Features**

Predefined Type Properties			
Predefined Type Container	IfcSurfaceFeatureTypeEnum	**Parent Entity**	IfcSurfaceFeature
Stereotype	«PredefinedType»		
Property sets	Pset_RoadMarkingCommon Pset_MarkingLinesCommon		

Predefined Type: PAVEMENTSURFACEMARKING

Full Identifier: **IfcSurfaceFeatureTypeEnum.PAVEMENTSURFACEMARKING**

Painted or chemical lines or symbols on the surface of pavements (a road or paved area)

Status: **Proposed**

Package: **Surface Features**

Predefined Type Properties			
Predefined Type Container	IfcSurfaceFeatureTypeEnum	**Parent Entity**	IfcSurfaceFeature
Stereotype	«PredefinedType»		
Property sets	Pset_RoadMarkingCommon		

Predefined Type: SYMBOLMARKING

Full Identifier: **IfcSurfaceFeatureTypeEnum.SYMBOLMARKING**

Surface markings that convey information in the form of symbols and shapes such as arrows, text or pictorial symbols.

Status: **Proposed**

Package: **Surface Features**

Predefined Type Properties			
Predefined Type Container	IfcSurfaceFeatureTypeEnum	**Parent Entity**	IfcSurfaceFeature
Stereotype	«PredefinedType»		
Property sets	Pset_RoadSymbolsCommon Pset_RoadMarkingCommon		

Package: Geotechnical Elements

This package contains concepts that represents common geotechnics elements. These elements represent the existing and uncertain geology of the site in question. this information is exchanged for the purpose of informing future activities not to contain all collected analytical information.
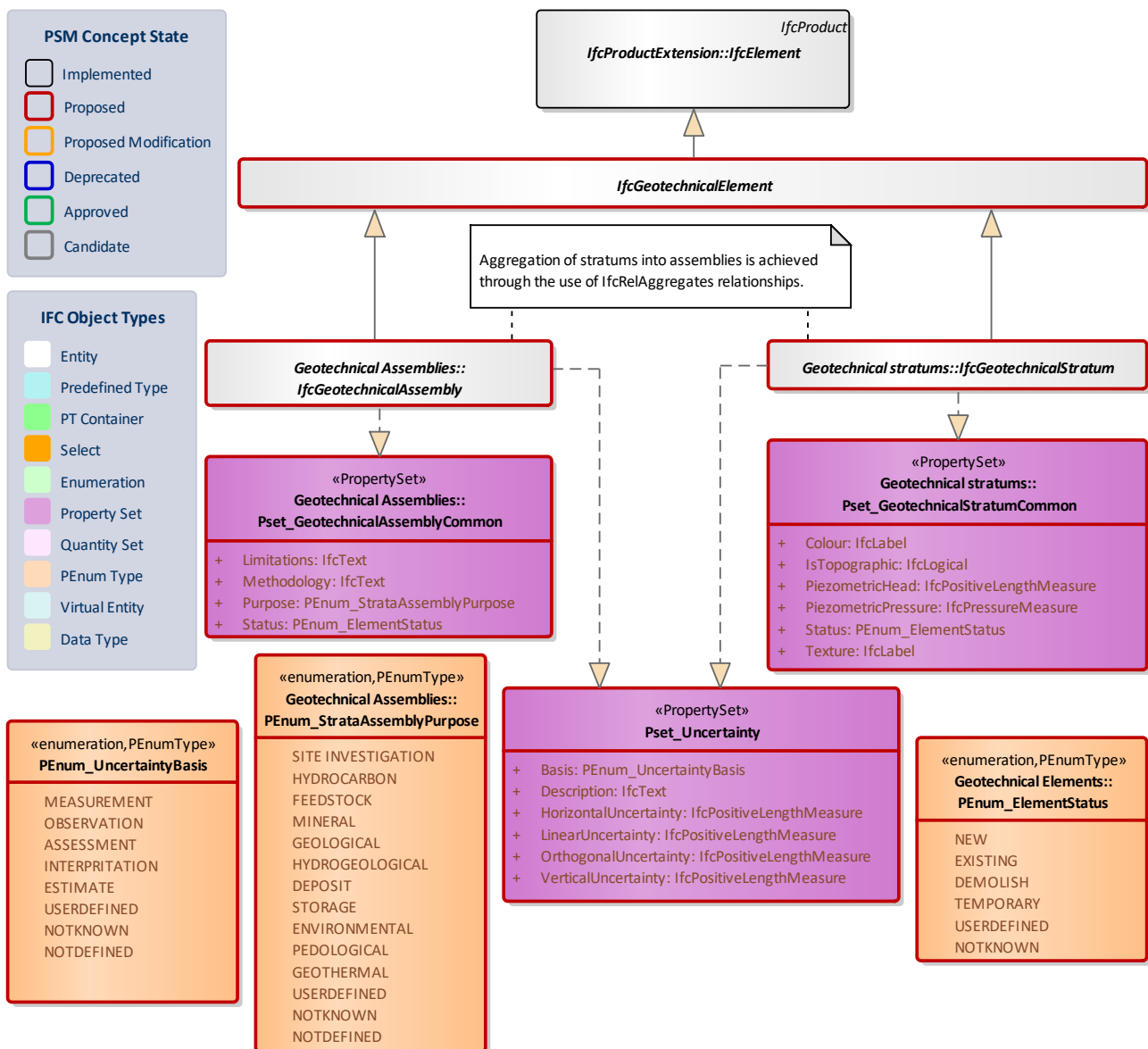
Figure 19: Geotechnical Elements - new extension to cover geotechnical elements

Class: IfcGeotechnicalElement

Abstract supertype for geotechnical entities.

Status: **Proposed**

Package: **Geotechnical Elements**

Class Properties			
Status	Proposed	**Is Abstract**	Abstract
Property sets	Pset_Uncertainty		

Inheritance Statement		
Subtype Of	IfcElement	
Subtypes	EXISTING	PROPOSED
		IfcGeotechnicalStratum
		IfcGeotechnicalAssembly

Property Set: Pset_Uncertainty

Property set capturing the geometric uncertainty regarding measurements including how the way that uncertainty was assessed.

Status: **Proposed**

Set Properties			
Applicable Entities	IfcAnnotationTypeEnum.ASSUMEDAREA IfcAnnotationTypeEnum.ASSUMEDLINE IfcAnnotationTypeEnum.ASSUMEDPOINT IfcGeotechnicalElement IfcGeotechnicalStratum IfcGeotechnicalAssembly	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
Basis	PEnum_UncertaintyBasis		Indication of the basis of the uncertainty
Description	IfcText		General description of the uncertainty associated to the element or feature, its source and implications.
HorizontalUncertainty	IfcPositiveLengthMeasure		Indicative (95%-100%) range diameter associated to the vertical shape and position in X, if different to the linear uncertainty.

LinearUncertainty	IfcPositiveLengthMeasure		Indicative (95%-100%) range diameter associated to the overall shape and position in XYZ.
OrthogonalUncertainty	IfcPositiveLengthMeasure		Indicative (95%-100%) range diameter associated to the horizontal shape and position in Y, if different to the horizontal uncertainty.
VerticalUncertainty	IfcPositiveLengthMeasure		Indicative (95%-100%) range diameter associated to the vertical shape and position in Z, if different to the linear uncertainty.

Property Set: Pset_Risk

An indication of exposure to mischance, peril, menace, hazard or loss.

HISTORY: Extended in IFC2x3

Refactored in IFC4.3

There are various types of risk that may be encountered and there may be several instances of Pset_Risk associated in an instance of an IfcProcess.

Specification of this property set incorporates the values of the Incom risk analysis matrix (satisfying AS/NZS 4360) together with additional identified requirements including UK PAS 1192-6.

bSI Documentation

Status: **ProposedModification**

Set Properties			
Applicable Entities	IfcGeotechnicalElement IfcProduct IfcProcess	**stereotype**	«PSET_TYPEDRIVENOVERRIDE»

Properties

Name	Type	Multiplicity	Definition
AssociatedActivity	IfcLabel	[0..1]	An indication or link to any associated activity or process that may trigger the hazard.
AssociatedLocation	IfcLabel	[0..1]	An indication or link to any associated location or space that may trigger the hazard.
AssociatedProduct	IfcLabel	[0..1]	An indication or link to any associated product or material that may trigger the hazard.
MitigatedRiskConsequence	PEnum_RiskRating	[0..1]	Indicates the level of severity of the consequences that the risk would have in case it happens.
MitigatedRiskLikelihood	PEnum_RiskRating	[0..1]	Identifies the likelihood of the hazard given the planned mitigation.

MitigatedRiskSignificance	PEnum_RiskRating	[0..1]	Identifies the significance of the risk given the mitigation of likelihood and consequence.
MitigationPlanned	IfcText	[0..1]	Identifies preventive measures to be taken to mitigate risk.
MitigationProposed	IfcText	[0..1]	Any proposed, but not yet agreed and irrevocable, mitigation of the likelihood and consequences of the hazard.
NatureOfRisk	IfcLabel	[0..1]	An indication of the generic nature of the risk that might be encountered. NOTE: It is anticipated that there will be a local agreement that constrains the values that might be assigned to this property. An example might be ''Fall'' or ''Fall of grille unit'' causing injury and damage to person and property.
RiskAssessmentMethodology	IfcLabel	[0..1]	An indication or link to the chosen risk assessment methodology, for example UK PAS1192-6 or a chosen ISO13100 annex.
RiskName	IfcLabel	[0..1]	A locally unique identifier for the risk entry that can be used to track the development and mitigation of the risk throughout the project life cycle
RiskType	PEnum_RiskType	[0..1]	Identifies the predefined types of risk from which the type required may be set.
UnmitigatedRiskConsequence	PEnum_RiskRating	[0..1]	Indicates the level of severity of the consequence that the risk would have in case it happens.
UnmitigatedRiskLikelihood	PEnum_RiskRating	[0..1]	Identifies the likelihood of the hazard prior to any specific mitigation.
UnmitigatedRiskSignificance	PEnum_RiskRating	[0..1]	Identifies the significance of the risk given the likelihood and consequence prior to any specific mitigation.

Enumeration: PEnum_UncertaintyBasis

Status: **Proposed**

Package: **Geotechnical Elements**

Enumerators

Name	Definition
MEASUREMENT	
OBSERVATION	
ASSESSMENT	

INTERPRETATION	
ESTIMATE	
USERDEFINED	
NOTKNOWN	
NOTDEFINED	

Enumeration: PEnum_ElementStatus

An Enumeration describing the state of an element

Status: **Proposed**

Package: **Geotechnical Elements**

Enumerators

Name	Definition
NEW	
EXISTING	
DEMOLISH	
TEMPORARY	
USERDEFINED	
NOTKNOWN	
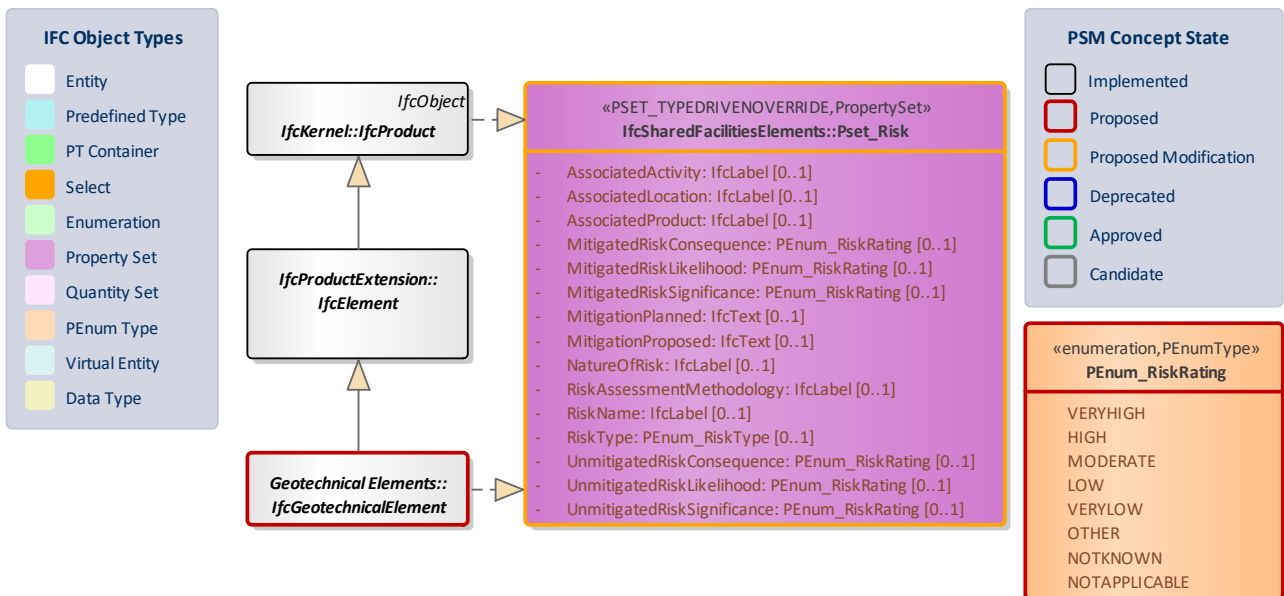
Figure 20: Geotechnical Risk - modification and extension to Risk property set

Enumeration: PEnum_RiskRating

An Enumeration describing the Scale used in risk analysis.

Status: **Proposed**

Package: **Geotechnical Elements**

Enumerators

Name	Definition
VERYHIGH	
HIGH	
MODERATE	
LOW	
VERYLOW	
OTHER	
NOTKNOWN	
NOTAPPLICABLE	

Package: Geotechnical stratums

package addressing the modelling of individual stratum occurrences within a geotechnical model.
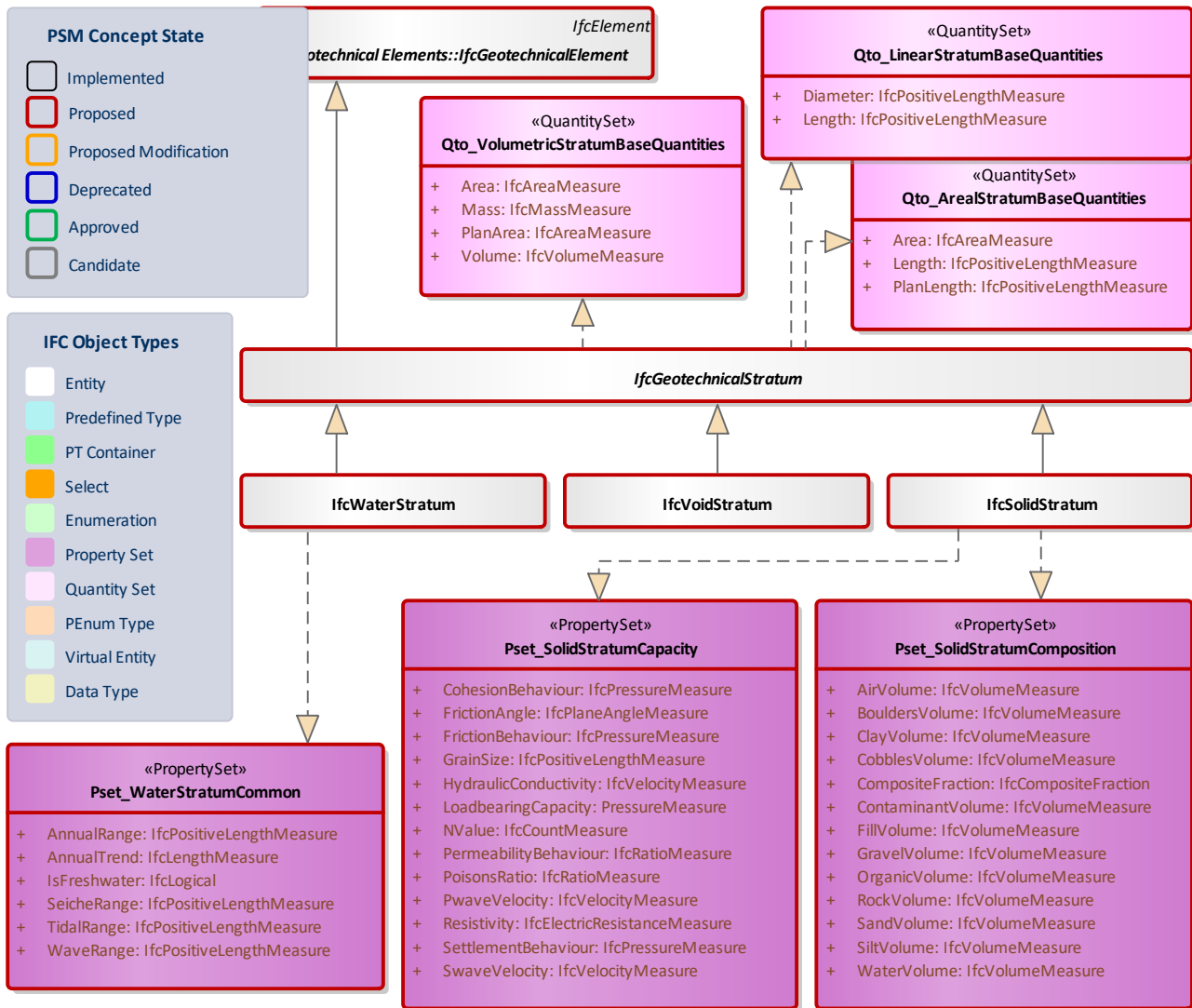
Figure 21: Geotechnical Stratums - new extension to cover geotechnical stratum elements

Class: IfcGeotechnicalStratum

Representation of the concept of an identified discrete almost homogenous geological feature with either an irregular solid or 'Yabuki' top surface shape or a regular voxel cubic shape. A stratum is represented as a discrete entity, specialised (sub typed) from IfcElement. A stratum may be broken down into smaller entities if properties vary across the stratum or alternatively properties may be described with bounded numeric ranges. A stratum may carry information about the physical form and its interpretation as a Geological Item (GML).

The shape representations used should correspond to the sub-type of IfcGeotechnicalAssembly in which it occurs

Status: **Proposed**

Package: **Geotechnical stratums**

Class Properties			
Status	Proposed	**Is Abstract**	Abstract
Property sets	Pset_Uncertainty Qto_ArealStratumBaseQuantities Qto_LinearStratumBaseQuantities Qto_VolumetricStratumBaseQuantities Pset_GeotechnicalStratumCommon		

Inheritance Statement		
Subtype Of	IfcGeotechnicalElement	
Subtypes	**EXISTING**	**PROPOSED**
		IfcVoidStratum IfcSolidStratum IfcWaterStratum

Class: IfcSolidStratum

Representation of the concept of an identified discrete almost homogenous solid geological or surface feature, including discontinuities such as faults, fractures, boundaries and interfaces that are not explicitly modelled.

Status: **Proposed**

Package: **Geotechnical stratums**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_SolidStratumCapacity Pset_SolidStratumComposition		

Inheritance Statement		
Subtype Of	IfcGeotechnicalStratum	
Subtypes	**EXISTING**	**PROPOSED**

Class: IfcVoidStratum

Representation of the concept of an identified discrete air filled geological feature, including caves and other voids

Status: **Proposed**

Package: **Geotechnical stratums**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcGeotechnicalStratum	
Subtypes	EXISTING	PROPOSED

Class: IfcWaterStratum

Representation of the concept of an identified discrete water filled geological or surface feature including lakes, rivers and seas.

Status: **Proposed**

Package: **Geotechnical stratums**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_WaterStratumCommon		

Inheritance Statement		
Subtype Of	IfcGeotechnicalStratum	
Subtypes	EXISTING	PROPOSED

Property Set: Pset_GeotechnicalStratumCommon

Properties describing the characteristics of any solid, water or void stratum. A status of 'New' should not be associated to a IfcGeotechnicalAssembly or IfcSolidStratum , as other entities are used for earthworks and courses.

Status: **Proposed**

Set Properties			
Applicable Entities	IfcGeotechnicalStratum	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
Colour	IfcLabel		Stratum colour
IsTopographic	IfcLogical		Is the stratum ever topmost and so a visible topographic feature
PiezometricHead	IfcPositiveLengthMeasure		Pressure head of water content.
PiezometricPressure	IfcPressureMeasure		Pressure of water content.
Status	PEnum_ElementStatus		Status of the element, predominately used in renovation or retrofitting projects. The status can be assigned to as "New" - element designed as new addition, "Existing" - element exists and remains, "Demolish" - element existed but is to be demolished, "Temporary" - element will exists only temporary (like a temporary support structure).
Texture	IfcLabel		Stratum texture

Quantity Set: Qto_ArealStratumBaseQuantities

Quantity measures associated to areal stratum such as in a geotechnical slice. Uncertainty is documented in Pset_Uncertainty.

Status: **Proposed**

Set Properties			
Applicable Entities	IfcGeotechnicalStratum	**stereotype**	«QuantitySet»

Quantities

Name	Type	Multiplicity	Definition
Area	IfcAreaMeasure		Area represented, if lower edge of stratum known.
Length	IfcPositiveLengthMeasure		Actual length of upper edge of slice.
PlanLength	IfcPositiveLengthMeasure		Projected plan length of upper edge of slice.

Quantity Set: Qto_LinearStratumBaseQuantities

Quantity measures associated to a linear stratum such as in a borehole. Uncertainty is documented in Pset_Uncertainty.

Set Properties			
Applicable Entities	IfcGeotechnicalStratum	**stereotype**	«QuantitySet»

Quantities

Name	Type	Multiplicity	Definition
Diameter	IfcPositiveLengthMeasure		Actual diameter of sample or segment.
Length	IfcPositiveLengthMeasure		Effective length sampled, if lower end of segment known

Quantity Set: Qto_VolumetricStratumBaseQuantities

Quantity measures associated to volumetric stratum such as in a geotechnical model. Uncertainty is documented in Pset_Uncertainty.

Set Properties			
Applicable Entities	IfcGeotechnicalStratum	**stereotype**	«QuantitySet»

Quantities

Name	Type	Multiplicity	Definition
Area	IfcAreaMeasure		Actual area of upper surface of shape.
Mass	IfcMassMeasure		Mass represented, if lower surface of stratum known.
PlanArea	IfcAreaMeasure		Projected plan area of upper surface of model.
Volume	IfcVolumeMeasure		Volume represented, if lower surface of stratum known.

Property Set: Pset_SolidStratumCapacity

Properties expressing the capacity of a stratum using physical measures. Regional and National conventions should be captured through classification and specific property sets.

Set Properties			
Applicable Entities	IfcSolidStratum	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
CohesionBehaviour	IfcPressureMeasure		Cohesive shear strength of a rock or soil that is independent of interparticle friction.
FrictionAngle	IfcPlaneAngleMeasure		Friction Angle is the tested inclination angle from horizontal.
FrictionBehaviour	IfcPressureMeasure		Friction shear strength of a rock or soil that is dependent on interparticle friction.
GrainSize	IfcPositiveLengthMeasure		Grain size diameter.
HydraulicConductivity	IfcVelocityMeasure		Hydraulic Conductivity (permeability) of soil for water, given with the K or Kf value in m/s
LoadbearingCapacity	PressureMeasure		Estimate of the loadbearing capacity of the stratum.
NValue	IfcCountMeasure		Blow count from standard penetration testing, to ISO 22476-3, ASTM D1586[1] and Australian Standards AS 1289.6.3.1, which correlates to other engineering properties of soils.
PermeabilityBehaviour	IfcRatioMeasure		Proportionality constant in Darcy's law which relates flow rate and viscosity to a pressure gradient applied to the porous media.
PoisonsRatio	IfcRatioMeasure		Ratio of transverse contraction strain to longitudinal extension strain in the direction of stretching force.
PwaveVelocity	IfcVelocityMeasure		P-wave velocity of a rock or soil.
Resistivity	IfcElectricResistanceMeasure		Electrical resistivity of a rock or soil (Ohm-m).
SettlementBehaviour	IfcPressureMeasure		Estimate of the settlement/compaction behaviour of the stratum.
SwaveVelocity	IfcVelocityMeasure		S-wave velocity of a rock or soil.

Property Set: Pset_SolidStratumComposition

Properties expressing the composition of a stratum using volume measures, implementing ISO14688 Part 2 Table 1 Primary fractions and composite fractions. Regional and National conventions should be captured through classification and specific property sets. Zero values may be omitted.

Status: **Proposed**

Set Properties			
Applicable Entities	IfcSolidStratum	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
AirVolume	IfcVolumeMeasure		Relative volume of air stratum constituents.
BouldersVolume	IfcVolumeMeasure		Relative volume of boulders (typically larger than 200mm) stratum constituents.
ClayVolume	IfcVolumeMeasure		Relative volume of clay (typically smaller than 0.002mm) stratum constituents.
CobblesVolume	IfcVolumeMeasure		Relative volume of cobbles (typically larger than 63mm) stratum constituents.
CompositeFraction	IfcCompositeFraction		Denomination into soil groups by composite fractions.
ContaminantVolume	IfcVolumeMeasure		Relative volume of contaminant stratum constituents.
FillVolume	IfcVolumeMeasure		Relative volume of fill (controlled placement of anthropogenic soil) stratum constituents.
GravelVolume	IfcVolumeMeasure		Relative volume of gravel (typically larger than 2mm) stratum constituents.
OrganicVolume	IfcVolumeMeasure		Relative volume of organic (peat/humus) stratum constituents especially soil.
RockVolume	IfcVolumeMeasure		Relative volume of rock stratum constituents.
SandVolume	IfcVolumeMeasure		Relative volume of sand (typically smaller than 2mm) stratum constituents.
SiltVolume	IfcVolumeMeasure		Relative volume of silt (typically smaller than 0.063mm) stratum constituents.
WaterVolume	IfcVolumeMeasure		Relative volume of water stratum constituents.

Property Set: Pset_GeotechnicalStratumCommon

Properties describing the characteristics of any solid, water or void stratum. A status of 'New' should not be associated to a IfcGeotechnicalAssembly or IfcSolidStratum , as other entities are used for earthworks and courses.

Status: **Proposed**

Set Properties			
Applicable Entities	IfcGeotechnicalStratum	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
Colour	IfcLabel		Stratum colour

IsTopographic	IfcLogical		Is the stratum ever topmost and so a visible topographic feature
PiezometricHead	IfcPositiveLengthMeasure		Pressure head of water content.
PiezometricPressure	IfcPressureMeasure		Pressure of water content.
Status	PEnum_ElementStatus		Status of the element, predominately used in renovation or retrofitting projects. The status can be assigned to as "New" - element designed as new addition, "Existing" - element exists and remains, "Demolish" - element existed but is to be demolished, "Temporary" - element will exists only temporary (like a temporary support structure).
Texture	IfcLabel		Stratum texture

Property Set: Pset_WaterStratumCommon

Properties expressing the composition and any variability in the height of the body of water. Ranges are non-negative describing a spread.

Status: **Proposed**

Set Properties			
Applicable Entities	IfcWaterStratum	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
AnnualRange	IfcPositiveLengthMeasure		Indicative (95%-100%) annual range in levels.
AnnualTrend	IfcLengthMeasure		Indicative (95%-100%) annual rise in level.
IsFreshwater	IfcLogical		Indication of freshwater (true,false or unknown)
SeicheRange	IfcPositiveLengthMeasure		Indicative (95%-100%) range between peaks and troughs of seiche (resonant) waves.
TidalRange	IfcPositiveLengthMeasure		Indicative (95%-100%) range between high and low tide levels.
WaveRange	IfcPositiveLengthMeasure		Indicative (95%-100%) range between peaks and troughs of waves

Package: Geotechnical Assemblies

package addressing the modelling of geotechnical assemblies within a geotechnical model.
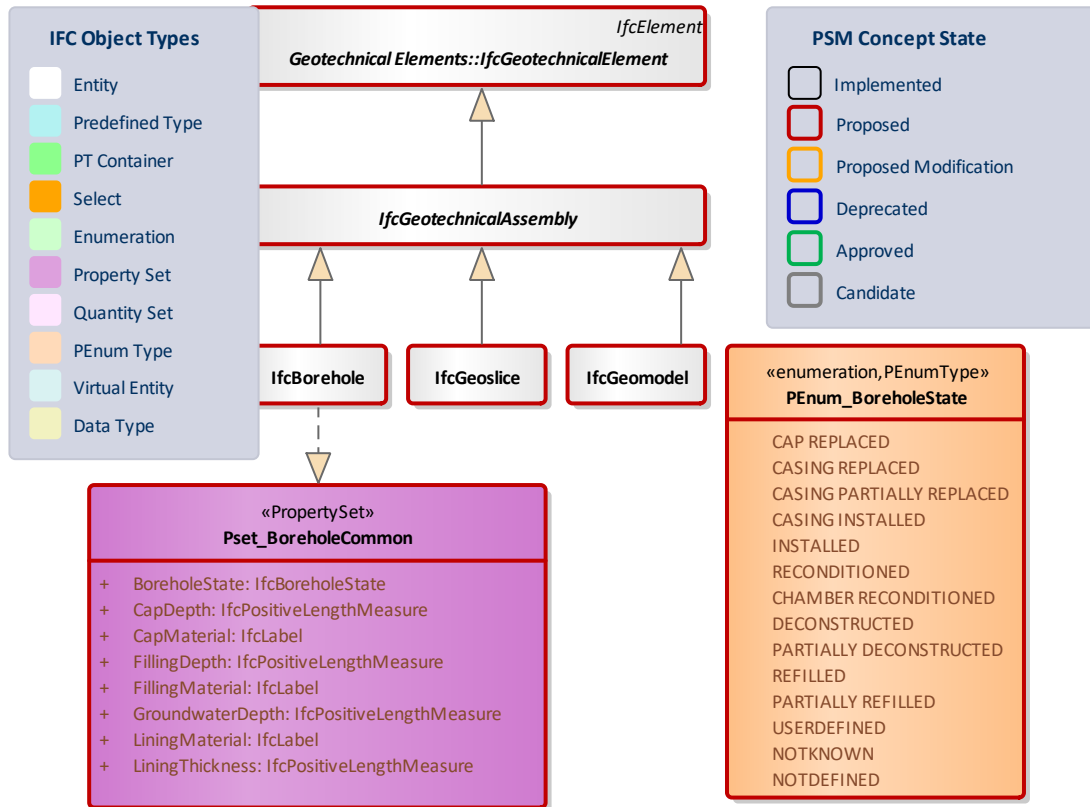
Figure 22: Geotechnical Assemblies - new extension to cover geotechnical assemblies

Class: IfcBorehole

Representation of the concept of a linear geological and geotechnical model, usually an interpretation but sometimes created direct from ground penetrating measurement

The assembly may contain one of more strata and other elements such as capping and lining. The contained subtypes of IfcGeotechnicalStratum will have shape representations made from straight or bent tubes reflecting the bore diameter, or discs if a 'Yabuki' top surface model is being used.

Status: **Proposed**

Package: **Geotechnical Assemblies**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_BoreholeCommon		

Inheritance Statement		
Subtype Of	IfcGeotechnicalAssembly	
Subtypes	EXISTING	PROPOSED

Class: IfcGeoslice

Representation of the concept of a sectional planar geological and geotechnical model, usually an interpretation but sometimes created direct from ground penetrating measurement. The assembly may contain one of more strata and anthropic elements. The contained subtypes of IfcGeotechnicalStratum will have shape representations made from polygons reflecting the visible section or poly lines if a 'Yabuki' top surface model is being used.

Status: **Proposed**

Package: **Geotechnical Assemblies**

Class Properties			
Status	Proposed	Is Abstract	
Property sets			

Inheritance Statement		
Subtype Of	IfcGeotechnicalAssembly	
Subtypes	EXISTING	PROPOSED

Class: IfcGeomodel

Representation of the concept of a volumetric geological and geotechnical model, usually an interpretation but sometimes created direct from ground penetrating measurement.

The assembly may contain one of more strata and other anthropic elements. The contained subtypes of IfcGeotechnicalStratum will have shape representations made from polyhedra or surfaces if a 'Yabuki' top surface model is being used.

Status: **Proposed**

Package: **Geotechnical Assemblies**

Class Properties			
Status	Proposed	Is Abstract	

Property sets	

Inheritance Statement		
Subtype Of	IfcGeotechnicalAssembly	
Subtypes	EXISTING	PROPOSED

Class: IfcGeotechnicalAssembly

Representation of the abstract concept of a geological and geotechnical model, usually an interpretation but sometimes created direct from ground penetrating measurement.

Use of an assembly is optional but can carry the methodology and uncertainty information.

Such assemblies will include IfcGeotechnicalStratum entity types and may include other entity types such as IfcPile, IfcSlab or IfcSensor to represent the capping, lining or logging equipment present.

IfcBorehole or IfcGeoSlice can have a physical reality as a construction hazard alongside being the carrier for the interpreted results. Geological hazards may be associated to any IfcGeotechnicalAssembly or IfcGeotechnicalStratum.

Status: **Proposed**

Package: **Geotechnical Assemblies**

Class Properties			
Status	Proposed	Is Abstract	Abstract
Property sets	Pset_Uncertainty Pset_GeotechnicalAssemblyCommon		

Inheritance Statement		
Subtype Of	IfcGeotechnicalElement	
	EXISTING	PROPOSED
Subtypes		IfcBorehole
		IfcGeoslice
		IfcGeomodel

Property Set: Pset_GeotechnicalAssemblyCommon

Properties describing the characteristics of any geotechnical model. A Status of 'New' should not be associated to a [IfcGeotechnicalAssembly](#) or [IfcGeotechnicalStratum](#), as other entities are used for earthworks and courses.

Status: **Proposed**

Set Properties			
Applicable Entities	[IfcGeotechnicalAssembly](#)	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
Limitations	IfcText		Limitations on usage.
Methodology	IfcText		Methodology used to prepare the contents of the geotechnical assembly.
Purpose	PEnum_StrataAssemblyPurpose		Purpose for which the borehole, section or volumetric model was created. (EU Inspire, boreholeML)
Status	PEnum_ElementStatus		Status of the element, predominately used in renovation or retrofitting projects. The status can be assigned to as "New" - element designed as new addition, "Existing" - element exists and remains, "Demolish" - element existed but is to be demolished, "Temporary" - element will exists only temporary (like a temporary support structure).

Property Set: Pset_BoreholeCommon

Properties describing the features of a borehole (if not modelled separately).

Status: **Proposed**

Set Properties			
Applicable Entities	[IfcBorehole](#)	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
BoreholeState	IfcBoreholeState		The state the borehole or trial pit has been left in. (boreholeML).
CapDepth	IfcPositiveLengthMeasure		Depth of cap (boreholeML).

CapMaterial	IfcLabel		Cap material or 'NOT CAPPED' or 'UNKNOWN' (boreholeML).
FillingDepth	IfcPositiveLengthMeasure		Depth of filling (boreholeML).
FillingMaterial	IfcLabel		Filling material or 'NOT FILLED' or 'UNKNOWN' (boreholeML).
GroundwaterDepth	IfcPositiveLengthMeasure		Depth groundwater encountered (boreholeML).
LiningMaterial	IfcLabel		Lining material or 'NOT LINED' or 'UNKNOWN' (boreholeML).
LiningThickness	IfcPositiveLengthMeasure		Lining thickness (boreholeML).

Property Set: Pset_GeotechnicalAssemblyCommon

Properties describing the characteristics of any geotechnical model. A Status of 'New' should not be associated to a IfcGeotechnicalAssembly or IfcGeotechnicalStratum, as other entities are used for earthworks and courses.

Status: **Proposed**

Set Properties			
Applicable Entities	IfcGeotechnicalAssembly	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
Limitations	IfcText		Limitations on usage.
Methodology	IfcText		Methodology used to prepare the contents of the geotechnical assembly.
Purpose	PEnum_StrataAssemblyPurpose		Purpose for which the borehole, section or volumetric model was created. (EU Inspire, boreholeML)
Status	PEnum_ElementStatus		Status of the element, predominately used in renovation or retrofitting projects. The status can be assigned to as "New" - element designed as new addition, "Existing" - element exists and remains, "Demolish" - element existed but is to be demolished, "Temporary" - element will exists only temporary (like a temporary support structure).

Enumeration: PEnum_StrataAssemblyPurpose

enumeration describing the purpose of a geotechnical assembly

Status: **Proposed**

Enumerators

Name	Definition
SITE INVESTIGATION	
HYDROCARBON	
FEEDSTOCK	
MINERAL	
GEOLOGICAL	
HYDROGEOLOGICAL	
DEPOSIT	
STORAGE	
ENVIRONMENTAL	
PEDOLOGICAL	
GEOTHERMAL	
USERDEFINED	
NOTKNOWN	
NOTDEFINED	

Enumeration: PEnum_BoreholeState

Enumeration describing the current state of a borehole

Status: **Proposed**

Package: **Geotechnical Assemblies**

Enumerators

Name	Definition
CAP REPLACED	
CASING REPLACED	
CASING PARTIALLY REPLACED	
CASING INSTALLED	
INSTALLED	
RECONDITIONED	
CHAMBER RECONDITIONED	
DECONSTRUCTED	
PARTIALLY DECONSTRUCTED	
REFILLED	
PARTIALLY REFILLED	

USERDEFINED	
NOTKNOWN	
NOTDEFINED	

Enumeration: PEnum_StrataAssemblyPurpose

enumeration describing the purpose of a geotechnical assembly

Status: **Proposed**

Package: **Geotechnical Assemblies**

Enumerators

Name	Definition
SITE INVESTIGATION	
HYDROCARBON	
FEEDSTOCK	
MINERAL	
GEOLOGICAL	
HYDROGEOLOGICAL	
DEPOSIT	
STORAGE	
ENVIRONMENTAL	
PEDOLOGICAL	
GEOTHERMAL	
USERDEFINED	
NOTKNOWN	
NOTDEFINED	

Package: Transport Elements (former Kinematics)

This package contains concepts that represents common transport elements in addition to element kinematics.
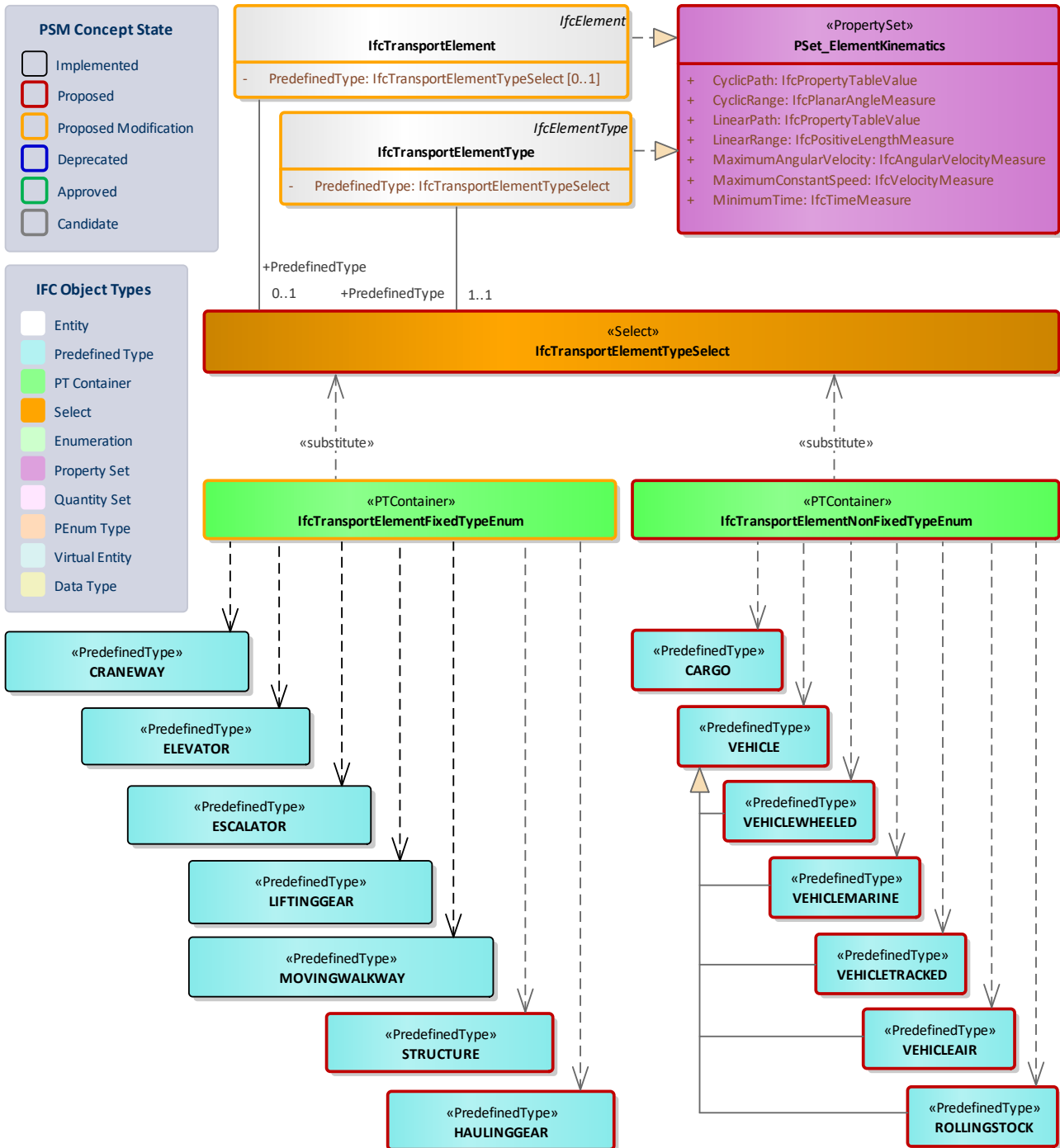

Figure 23: Transport Elements - modification and extension to transport elements

Class: IfcTransportElement

A transport element is a generalization of all transport related objects that move people, animals or goods within a REMOVE {building or building complex} Facility. The IfcTransportElement defines the occurrence of a transport element, that (if given), is expressed by the IfcTransportElementType .

> EXAMPLE Transportation elements include elevator (lift), escalator, moving walkway, etc.

> NOTE More detailed equipment that may be a part of a transportation device, like a lifting hook, is defined as _IfcDiscreteAccessory_. It maybe included as a part of the _IfcTransportElement_ by virtue of the objectified relationship _IfcRelAggregates_.

Transport element can describe fixed or non fixed elements, which can either be identified as specified operational assets within a facility or vehicles that interact with the facility as a user or customer.

In the case of operational assets, instances of IfcTransportElements can represent individual identifiable vehicles or structures with properties such as serial numbers, registration numbers etc. and be typed accordingly by instances of IfcTransportElementType.

In the case transport elements that interact as users or customers, such as cars on a road or vessels at a port, IfcTransportElementType is used to define element specifications which are used to design, analyse and provide operational constraints to the facility.

Depending on local classification systems transport elements and transportation systems in buildings are either considered as part of a built system, or as part of a built service system. Within IFC they are considered as part of a built system and may have to be mapped appropriately.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets	PSet_ElementKinematics		

Inheritance Statement		
Subtype Of	IfcElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcTransportElementTypeSelect	[0..1]	

PDT Container: IfcTransportElementFixedTypeEnum

This enumeration is used to identify **fixed** transport element types.

> HISTORY New enumeration in IFC2x.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Container Properties			
Parent Entity	IfcTransportElement IfcTransportElementType	**Stereotype**	«PTContainer»
Contains	**EXISTING**		**PROPOSED**
	IfcTransportElementTypeEnum.CRANEWAY IfcTransportElementTypeEnum.ELEVATOR IfcTransportElementTypeEnum.ESCALATOR IfcTransportElementTypeEnum.MOVINGWALKWAY IfcTransportElementTypeEnum.LIFTINGGEAR		IfcTransportElementFixedTypeEnum.HAULINGGEAR IfcTransportElementFixedTypeEnum.STRUCTURE

Class: IfcTransportElementType

The element type IfcTransportElementType defines commonly shared information for occurrences of transport elements. The set of shared information may include:

- common properties within shared property sets
- common material information
- common shape representations

It is used to define a transport element specification (i.e. the specific product information that is common to all occurrences of that beam type). Transport element types (or the instantiable subtypes) may be exchanged without being already assigned to occurrences.

The occurrences of the IfcTransportElementType are represented by instances of IfcTransportElement (or its subtypes).

> HISTORY New entity in IFC2x2.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets	PSet_ElementKinematics		

Inheritance Statement		
Subtype Of	IfcElementType	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcTransportElementTypeSelect		

Predefined Type: HAULINGGEAR

Full Identifier: **IfcTransportElementFixedTypeEnum.HAULINGGEAR**

A device used for hauling heavy goods. It may be manually operated or electrically or pneumatically driven.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementFixedTypeEnum	**Parent Entity**	IfcTransportElement IfcTransportElementType
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: STRUCTURE

Full Identifier: **IfcTransportElementFixedTypeEnum.STRUCTURE**

A Generic fixed structure that cannot be categorised as any other type of transport object that is responsible for the movement of goods, animals or people.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementFixedTypeEnum	**Parent Entity**	IfcTransportElement
Stereotype	«PredefinedType»		IfcTransportElementType
Property sets			

PDT Container: IfcTransportElementNonFixedTypeEnum

This enumeration is used to identify **non-fixed** or **mobile** transport element types.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Container Properties			
Parent Entity	IfcTransportElement IfcTransportElementType	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		IfcTransportElementNonFixedTypeEnum.ROLLINGSTOCK	
		IfcTransportElementNonFixedTypeEnum.VEHICLEAIR	
		IfcTransportElementNonFixedTypeEnum.CARGO	
		IfcTransportElementNonFixedTypeEnum.VEHICLETRACKED	
		IfcTransportElementNonFixedTypeEnum.VEHICLEMARINE	
		IfcTransportElementNonFixedTypeEnum.VEHICLEWHEELED	
		IfcTransportElementNonFixedTypeEnum.VEHICLE	

Predefined Type: CARGO

Full Identifier: **IfcTransportElementNonFixedTypeEnum.CARGO**

A mobile transport element that represents a discrete unit of cargo managed by a facility.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementNonFixedTypeEnum	**Parent Entity**	IfcTransportElement
Stereotype	«PredefinedType»		IfcTransportElementType
Property sets			

Predefined Type: ROLLINGSTOCK

Full Identifier: **IfcTransportElementNonFixedTypeEnum.ROLLINGSTOCK**

Refers to railway vehicles, including both powered and unpowered vehicles, for example locomotives, railroad cars, coaches, private railroad cars and wagons.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementNonFixedTypeEnum	**Parent Entity**	IfcTransportElement
Stereotype	«PredefinedType»		IfcTransportElementType
Property sets			

Predefined Type: VEHICLE

Full Identifier: **IfcTransportElementNonFixedTypeEnum.VEHICLE**

a generalisation of a vehicle that interacts with a facility (e.g. as a user/customer) or as a specified operational asset within the facility.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementNonFixedTypeEnum	**Parent Entity**	IfcTransportElement
Stereotype	«PredefinedType»		IfcTransportElementType
Property sets			

Predefined Type: VEHICLEAIR

Full Identifier: **IfcTransportElementNonFixedTypeEnum.VEHICLEAIR**

A specialisation of a vehicle that represents powered and unpowered flying vehicles, such as airplanes, helicopters, gliders etc.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementNonFixedTypeEnum	**Parent Entity**	IfcTransportElement
Stereotype	«PredefinedType»		IfcTransportElementType
Property sets			

Predefined Type: VEHICLEMARINE

Full Identifier: **IfcTransportElementNonFixedTypeEnum.VEHICLEMARINE**

A specialisation of a vehicle that operates on water as a marine vessel.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementNonFixedTypeEnum	**Parent Entity**	IfcTransportElement
Stereotype	«PredefinedType»		IfcTransportElementType
Property sets			

Predefined Type: VEHICLETRACKED

Full Identifier: **IfcTransportElementNonFixedTypeEnum.VEHICLETRACKED**

A specialisation of a vehicle that operates on land tracked (Caterpillar) vehicle.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementNonFixedTypeEnum	**Parent Entity**	IfcTransportElement
Stereotype	«PredefinedType»		IfcTransportElementType
Property sets			

Predefined Type: VEHICLEWHEELED

Full Identifier: **IfcTransportElementNonFixedTypeEnum.VEHICLEWHEELED**

A specialisation of a vehicle that operates on land as a multi wheeled vehicle such as a car, lorry, forklift etc.

Status: **Proposed**

Predefined Type Properties			
Predefined Type Container	IfcTransportElementNonFixedTypeEnum	**Parent Entity**	IfcTransportElement
Stereotype	«PredefinedType»		IfcTransportElementType
Property sets			

Select: IfcTransportElementTypeSelect

This is a select of enumerations to provide the option of groups of predefined types for an IfcTransportElement or IfcTransportElementType.

Status: **Proposed**

Package: **Transport Elements (former Kinematics)**

Select Properties	
Stereotype	«Select»
Substitutions	IfcTransportElementNonFixedTypeEnum
	IfcTransportElementFixedTypeEnum

Property Set: PSet_ElementKinematics

Definition from IAI: Information confirming that the element has cyclic and/or pathed kinematic behaviour. The resulting envelope may be availabe as a 'clearance' shape representation.

Status: **Proposed**

Set Properties			
Applicable Entities	IfcTransportElement IfcTransportElementType	**stereotype**	«PropertySet»

Properties

Name	Type	Multiplicity	Definition
CyclicPath	IfcPropertyTableValue		Represents the time:angle table of the kinematic behaviour.
CyclicRange	IfcPlanarAngleMeasure		Identifies the angular range of the kinematic behaviour
LinearPath	IfcPropertyTableValue		Represents the time:distance table of the kinematic behaviour.
LinearRange	IfcPositiveLengthMeasure		Identifies the linear range of the kinematic behaviour.

MaximumAngularVelocity	IfcAngularVelocityMeasure		Identifies the maximum angular velocity of the kinematic behaviour.
MaximumConstantSpeed	IfcVelocityMeasure		Identifies the maximum constant speed over the kinematic path.
MinimumTime	IfcTimeMeasure		Identifies the minimum time for the kinematic behaviour.

Package: Spatial Elements

This package contains concepts that represent common spatial elements and relationships that might be used to define a hierarchical project structure, in terms of locations and volumes. In addition, this package addresses the definition of common non-hierarchal elements such as spatial zones. The spatial structure is key to the organization of physical elements and also can act as an implicit placement structure within non-longitudinal structures.
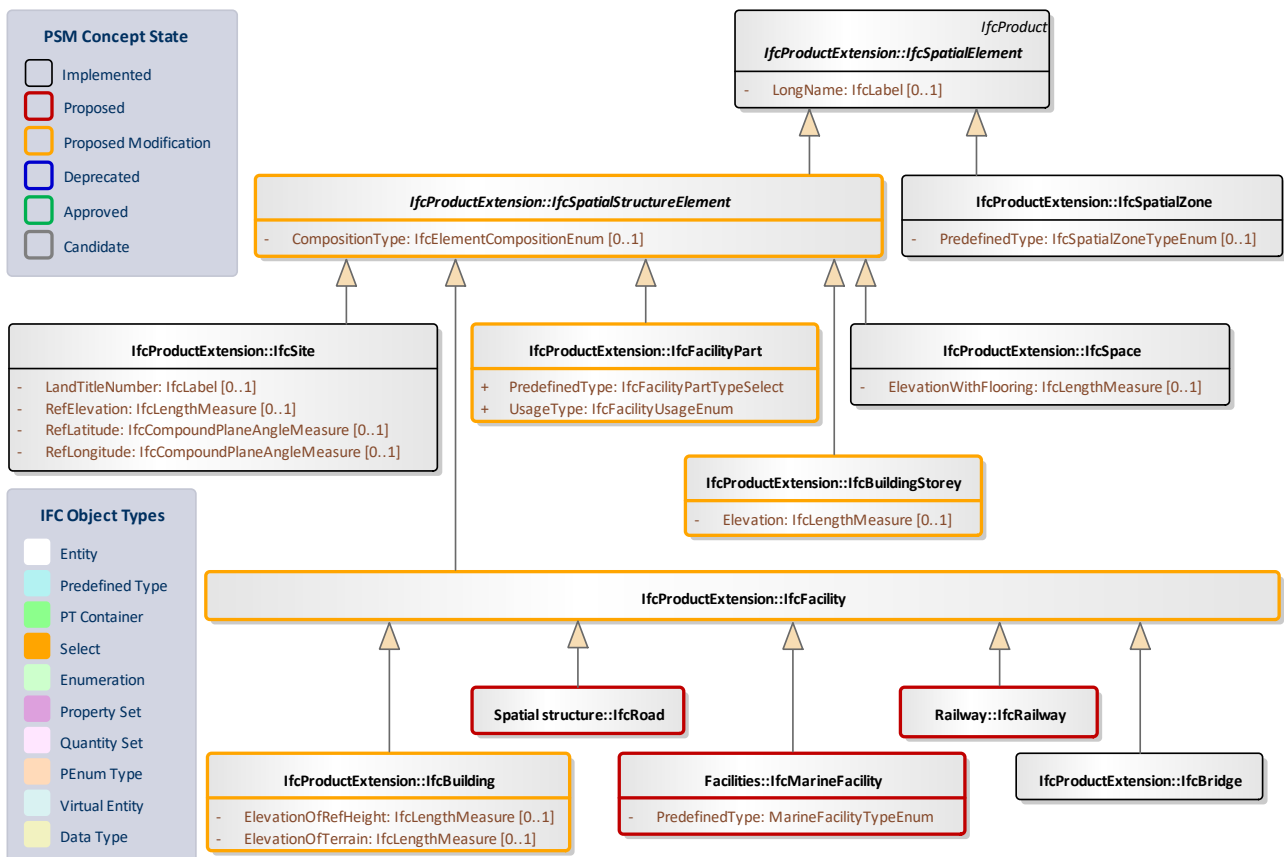
Figure 24: Spatial Elements - overview of common spatial elements

Class: IfcRoad

A route built on land to allow travel from one location to another, including highways, streets, cycle and foot paths, but excluding railways. As a type of Facility, Road provides the basic element in the project structure hierarchy for the components of a road project (i.e. any undertaking such as design, construction or maintenance).

NOTE Definition from ISO 6707-1: Way mainly for vehicles.

NOTE Definition from PIARC: Line of communication (travelled way) using a stabilized base other than rails or air strips, primarily for the use of road motor vehicles running on their own wheel.

Status: **Proposed**

Package: **Spatial structure**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcFacility	
Subtypes	EXISTING	PROPOSED

Class: IfcMarineFacility

A marine facility represents any major structure or entity that is specific to the ports and waterways domain. examples of this include quays, jetties, shipyards, breakwaters etc.

Status: **Proposed**

Package: **Facilities**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcFacility	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	MarineFacilityTypeEnum		

Class: IfcBuilding

A building represents a structure that provides shelter for its occupants or contents and stands in one place. The building is also used to provide a basic element within the spatial structure hierarchy for the components of a building project (together with site, storey, and space).

NOTE Definition from ISO 6707-1:

Construction work that has the provision of shelter for its occupants or contents as one of its main purpose and is normally designed to stand permanently in one place.

A building is (if specified) associated to a site. A building may span over several connected or disconnected buildings. Therefore building complex provides for a collection of buildings included in a site. A building can also be decomposed in (vertical) parts, where each part defines a building section. This is defined by the composition type attribute of the supertype *IfcSpatialStructureElements* which is interpreted as follow:

- **COMPLEX**: building complex
- **ELEMENT**: building
- **PARTIAL**: building section

The IfcBuilding is used to build the spatial structure of a building (that serves as the primary project breakdown and is required to be hierarchical). The spatial structure elements are linked together by using the objectified relationship IfcRelAggregates. Figure 150 shows the IfcBuilding as part of the spatial structure. It also serves as the spatial container for building and other elements.

NOTE Detailed requirements on mandatory element containment and placement structure relationships are given in view definitions and implementer agreements.
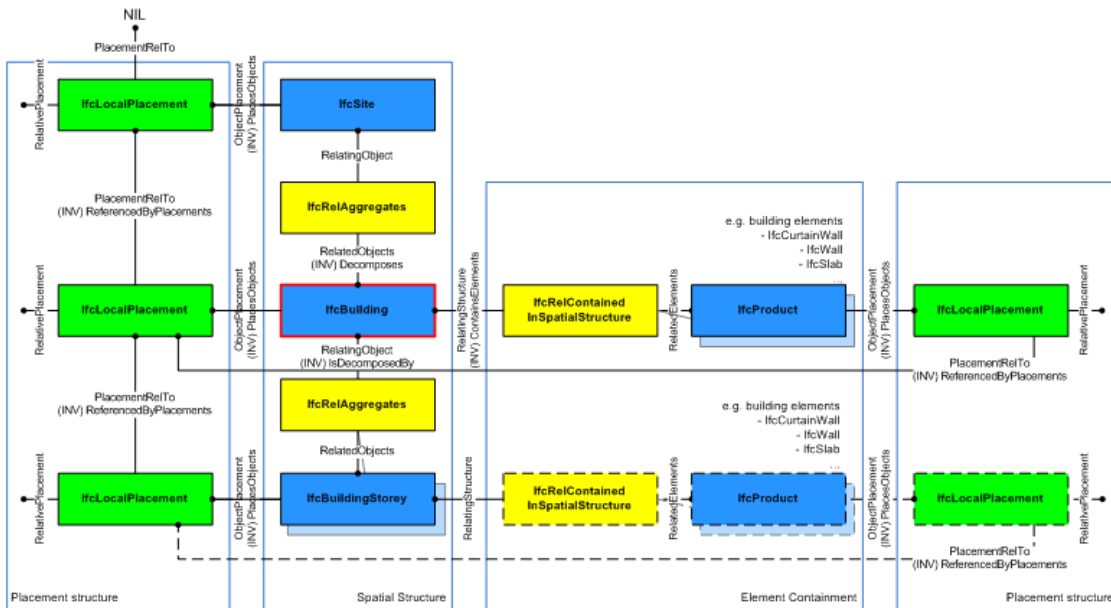
Figure 150 — Building composition

Systems, such as building service or electrical distribution systems, zonal systems, or structural analysis systems, relate to IfcBuilding by using the objectified relationship IfcRelReferencedInSpatialStructure.

Figure 151 describes the heights and elevations of the IfcBuilding . It is used to provide the height above sea level of the project height datum for this building, that is, the internal height 0.00. The height 0.00 is often used as a building internal reference height and equal to the floor finish level of the ground floor.

- base elevation of building provided by: *IfcBuilding.ElevationOfRefHeight*, it is usually the top of construction slab.
- base elevation of terrain at the perimeter of the building provided by: *IfcBuilding.ElevationOfTerrain*, it is usually the minimum elevation is sloped terrain
- total height of building, also referred to as ridge height (top of roof structure, e.g the ridge against terrain): provided by BaseQuantity with Name="TotalHeight"
- eaves height of building (base of roof structure, e.g the eaves against terrain): provided by BaseQuantity with Name="EavesHeight"
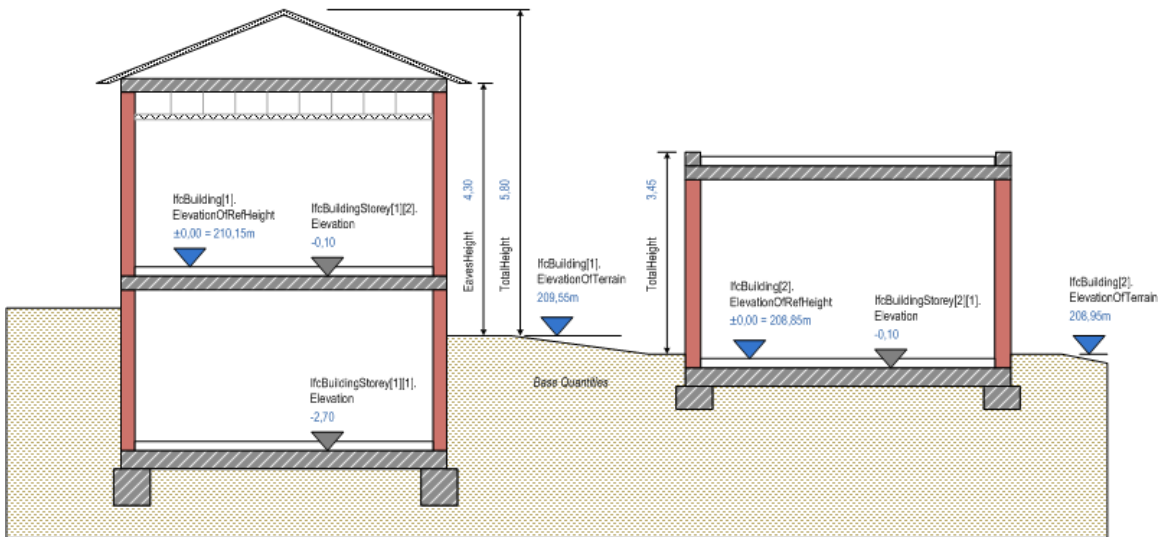
Figure 2 — Building elevations

HISTORY New entity in IFC1.0.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcFacility	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
ElevationOfRefHeight	IfcLengthMeasure	[0..1]	Elevation above sea level of the reference height used for all storey elevation measures, equals to height 0.0. It is usually the ground floor level.

ElevationOfTerrain	IfcLengthMeasure	[0..1]	Elevation above the minimal terrain level around the foot print of the building, given in elevation above sea level.

Class: IfcBuildingStorey

The building storey has an elevation and typically represents a (nearly) horizontal aggregation of spaces that are vertically bound.

A storey is (if specified) associated to a building. A storey may span over several connected storeys. Therefore storey complex provides for a collection of storeys included in a building. A storey can also be decomposed in (horizontical) parts, where each part defines a partial storey. This is defined by the composition type attribute of the supertype _IfcSpatialStructureElements_ which is interpreted as follow:

- **COMPLEX**: building storey complex
- **ELEMENT**: building storey
- **PARTIAL**: partial building storey

> EXAMPLE In split level houses, a storey is split into two or more partial storeys, each with a different elevation. It can be handled by defining a storey, which includes two or more partial storeys with the individual elevations.

The _IfcBuildingStorey_ is used to build the spatial structure of a building (that serves as the primary project breakdown and is required to be hierarchical). The spatial structure elements are linked together by using the objectified relationship _IfcRelAggregates_.

Figure 1 shows the _IfcBuildingStorey_ as part of the s patial structure. It also serves as the spatial container for building and other elements.

> NOTE Detailed requirements on mandatory element containment and placement structure relationships are given in view definitions and implementer agreements.

- elevation of storey provided by: _IfcBuildingStorey.Elevation_ as a local height value relative to _IfcBuilding.ElevationOfRefHeight_, it is usually the top of construction slab
- net height of storey, also referred to as total height or system height (top of construction slab to top of construction slab above): provided by BaseQuantity with Name="GrossHeight"
- net height of storey (top of construction slab to bottom of construction slab above): provided by BaseQuantity with Name="NetHeight"

> HISTORY New entity in IFC1.0

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement			
Subtype Of	IfcSpatialStructureElement		
Subtypes	**EXISTING**		**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
Elevation	IfcLengthMeasure	[0..1]	Elevation of the base of this storey, relative to the 0,00 internal reference height of the building. The 0.00 level is given by the absolute above sea level height by the ElevationOfRefHeight attribute given at IfcBuilding. > NOTE If the geometric data is provided (ObjectPlacement_ is specified), the Elevation value shall either not be included, or be equal to the local placement Z value.

Class: IfcFacility

A Facility (derived from SpatialStructureElement) may be an IfcBuilding, an IfcBridge, an IfcRailway, an IfcRoad, an IfcMarineFacility (or any other type of built facility defined in the future, such as REMOVE{IfcRoad, IfcRailway and} IfcTunnel).

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement			
Subtype Of	IfcSpatialStructureElement		
Subtypes	**EXISTING**		**PROPOSED**

	IfcBridge		IfcRailway
			IfcMarineFacility
			IfcRoad

Class: IfcFacilityPart

IfcFacilityPart provides for spatial breakdown of built facilities. It may be further specialised according to the type of facility being broken down.

[bSI Documentation](#)

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcSpatialStructureElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcFacilityPartTypeSelect		
UsageType	IfcFacilityUsageEnum		

Class: IfcSpatialStructureElement

A spatial structure element is the generalization of all spatial elements that might be used to define a spatial structure. That spatial structure is often used to provide a project structure to organize a building project.

A spatial project structure might define as many levels of decomposition as necessary for the building project. Elements within the spatial project structure are:

- site as [IfcSite](#)
- facility as _IfcFacility_, or any of its specific subtypes. REMOVE {specifically building as IfcBuilding bridge as IfcBridge }
- facility part as [IfcFacilityPart](#), REMOVE { or specifically storey as IfcBuildingStorey bridge part as IfcBridgePart }

- space as IfcSpace

or aggregations or parts thereof. The composition type declares an element to be either an element itself, or an aggregation (complex) or a decomposition (part). The interpretation of these types is given at each subtype of IfcSpatialStructureElement.

The IfcRelAggregates is defined as an 1-to-many relationship and used to establish the relationship between exactly two levels within the spatial project structure. Finally the highest level of the spatial structure is assigned to IfcProject using the IfcRelAggregates.

The subtypes of IfcSpatialStructureElement relate to other elements and systems by establishing the following relationships:

- **Containment of elements**: IfcRelContainedInSpatialStructure by inverse attribute _ContainsElements_, used to assign any element, like building elements, MEP elements, etc. to the spatial structure element in which they are primarily contained.
- **Reference of elements**: IfcRelReferencedInSpatialStructure by inverse attribute ReferencesElements, used to reference any element, like building elements, MEP elements, etc. in spatial structure elements, other then the one, where it is contained.
- **Reference of systems**: REMOVE {IfcRelServicesBuildings by inverse attribute _ServicedBySystems_, used to reference a sytem,} IfcRelReferencedInSpatialStructure by inverse attribute ReferencesElements, used to reference a system, like a building service or electrical distribution system, a zonal system, or a structural analysis system, that is assigned to this spatial structure element.

The subtypes of IfcSpatialStructureElement relate to each other by using the IfcRelAggregates relationship to build the project spatial structure. Figure 1 shows the use of IfcRelAggregates to establish a spatial structure including site, building, building section and storey. More information is provided at the level of the subtypes.
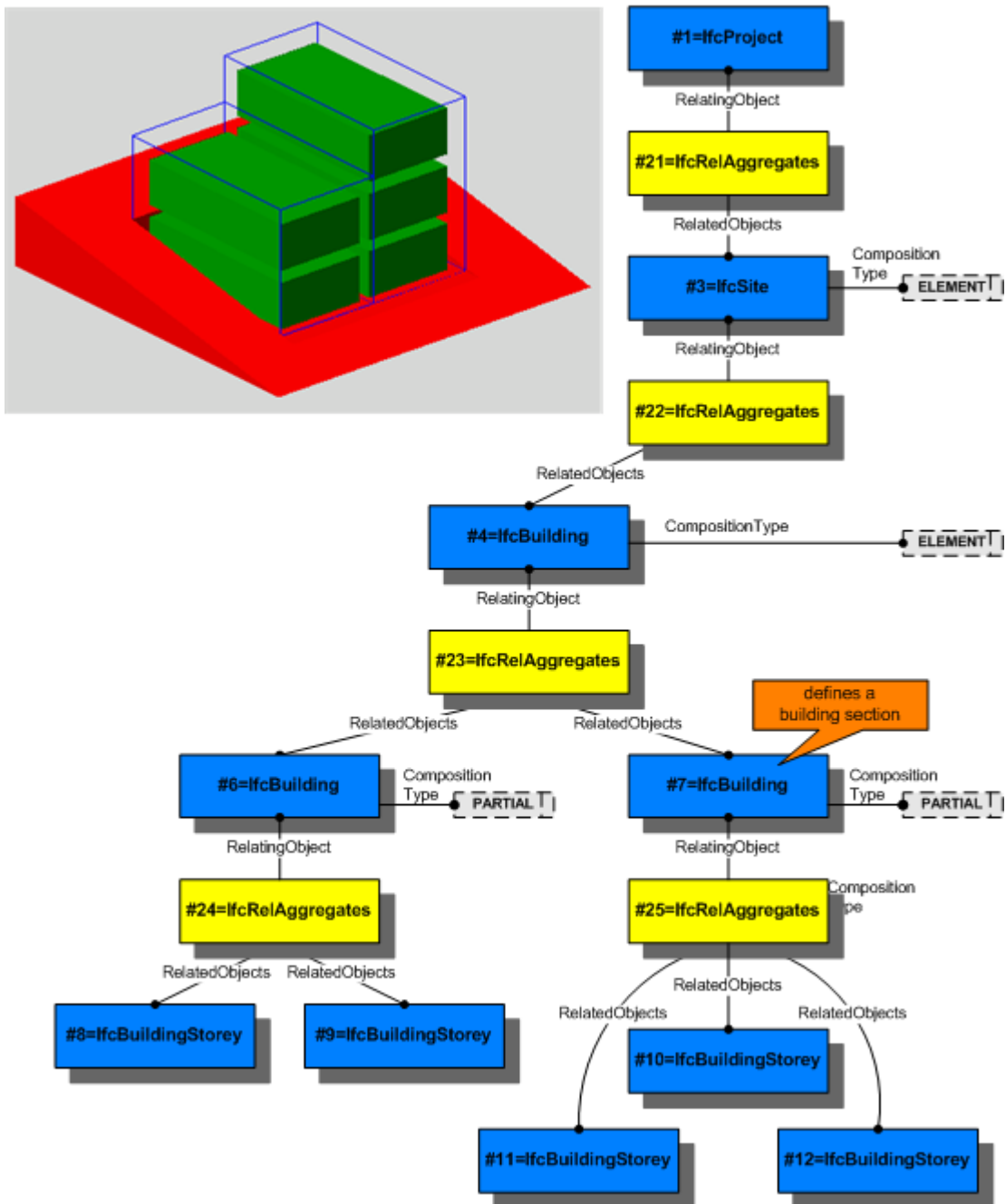
Figure — Spatial structure element composition

HISTORY New entity in IFC2x.

Informal Propositions:

1. The spatial project structure, established by the _IfcRelAggregates_, shall be acyclic.
2. A site should not be (directly or indirectly) associated to a building, storey or space.
3. A building should not be (directly or indirectly) associated to a storey or space.

4. A storey should not be (directly or indirectly) associated to a space.

[bSI Documentation](#)

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	Abstract
Property sets			

Inheritance Statement		
Subtype Of	[IfcSpatialElement](#)	
	EXISTING	PROPOSED
Subtypes	[IfcSite](#)	
	[IfcSpace](#)	

Class Attributes

Name	Type	Multiplicity	Definition
CompositionType	IfcElementCompositionEnum	[0..1]	Denotes, whether the predefined spatial structure element represents itself, or an aggregate (complex) or a part (part). The interpretation is given separately for each subtype of spatial structure element. If no _CompositionType_ is asserted, the dafault value ''ELEMENT''

Class: IfcRailway

An IfcRailway is a spatial structure element as a route from one location to another for guided passage of wheeled vehicles on rails. An IfcRailway acts as a basic spatial structure element that supports to break down a railway project into manageable parts.

Note: Definition according to ISO 6706: 2017: national or regional transport system for guided passage of wheeled vehicles on rails.

Status: **Proposed**

Package: **Railway**

Class Properties			
Status	Proposed	**Is Abstract**	

Property sets	Pset_RailwayEnergyFacility Pset_RailwayPowerSupplyFacility Pset_RailwayFacility

Inheritance Statement		
Subtype Of	IfcFacility	
Subtypes	EXISTING	PROPOSED

Package: Facility Parts

Facility parts represent the further sub-division of facilities in managed and location based parts or volumes. each of these parts also have a mid level functional requirement in relation to their parent facility.
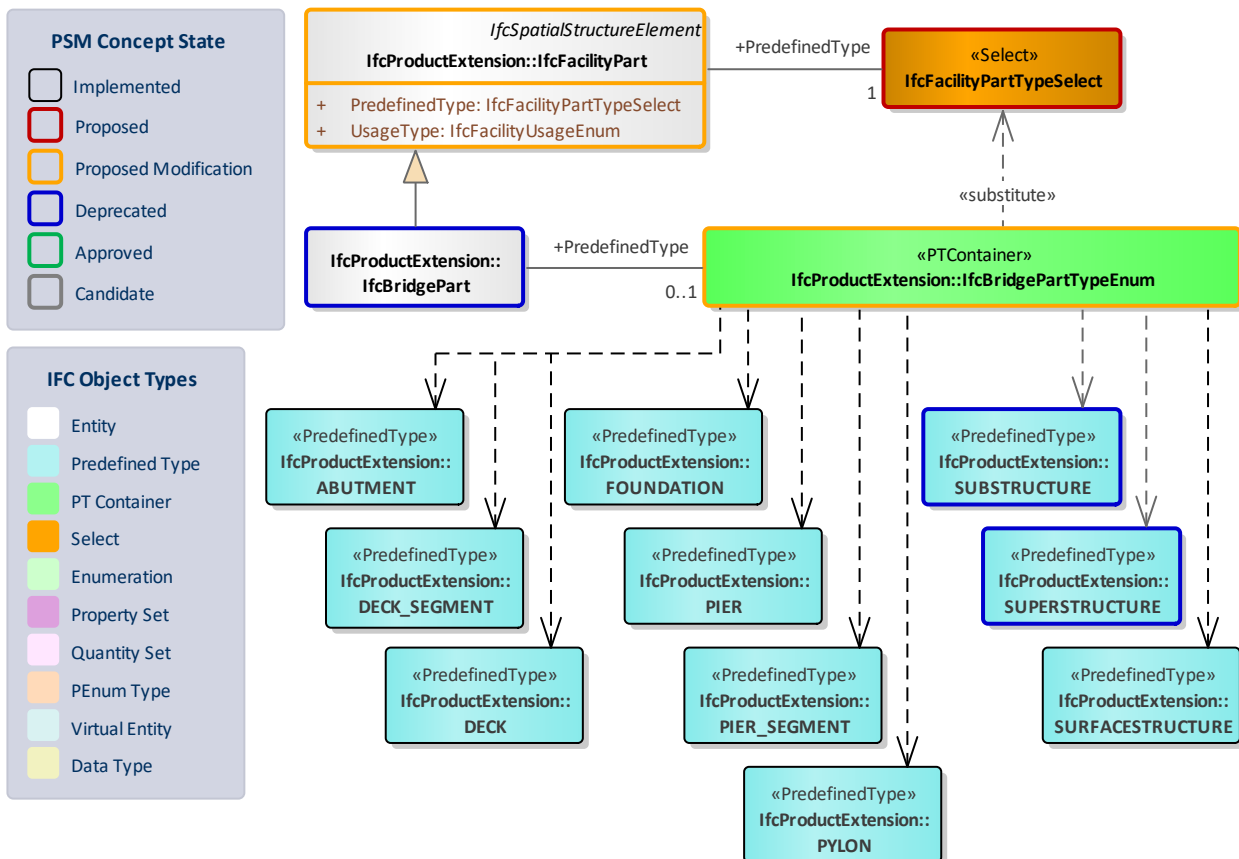
Figure 25: Deprecations - deprecations in spatial elements

Class: IfcBridgePart

In a bridge, BridgePart as subtype of FacilityPart represents the parts in breakdown structure according to local practices (e.g. Superstructure, Substructure, Foundation), and these can also be broken down further (e.g. Substructure as whole can be COMPLEX, while each abutment and pier would be ELEMENT, and a pier can be composed of separate towers (PARTIAL).

bSI Documentation

Status: **Deprecated**

Package: **IfcProductExtension**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcFacilityPart	
Subtypes	**EXISTING**	**PROPOSED**

PDT Container: IfcBridgePartTypeEnum

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Container Properties			
Parent Entity	IfcFacilityPart IfcBridgePart	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
	IfcBridgePartTypeEnum.SUPERSTRUCTURE		
	IfcBridgePartTypeEnum.SUBSTRUCTURE		
	IfcBridgePartTypeEnum.DECK		
	IfcBridgePartTypeEnum.DECK_SEGMENT		
	IfcBridgePartTypeEnum.ABUTMENT		
	IfcBridgePartTypeEnum.PYLON		
	IfcBridgePartTypeEnum.SURFACESTRUCTURE		
	IfcBridgePartTypeEnum.PIER		
	IfcBridgePartTypeEnum.PIER_SEGMENT		
	IfcBridgePartTypeEnum.FOUNDATION		

Predefined Type: SUBSTRUCTURE

Full Identifier: **IfcBridgePartTypeEnum.SUBSTRUCTURE**

Status: **Deprecated**

Package: **IfcProductExtension**

Predefined Type Properties			
Predefined Type Container	IfcBridgePartTypeEnum IfcFacilityPartCommonTypeEnum	**Parent Entity**	
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: SUPERSTRUCTURE

Full Identifier: **IfcBridgePartTypeEnum.SUPERSTRUCTURE**

Status: **Deprecated**

Package: **IfcProductExtension**

Predefined Type Properties			
Predefined Type Container	IfcBridgePartTypeEnum IfcFacilityPartCommonTypeEnum	**Parent Entity**	
Stereotype	«PredefinedType»		
Property sets			
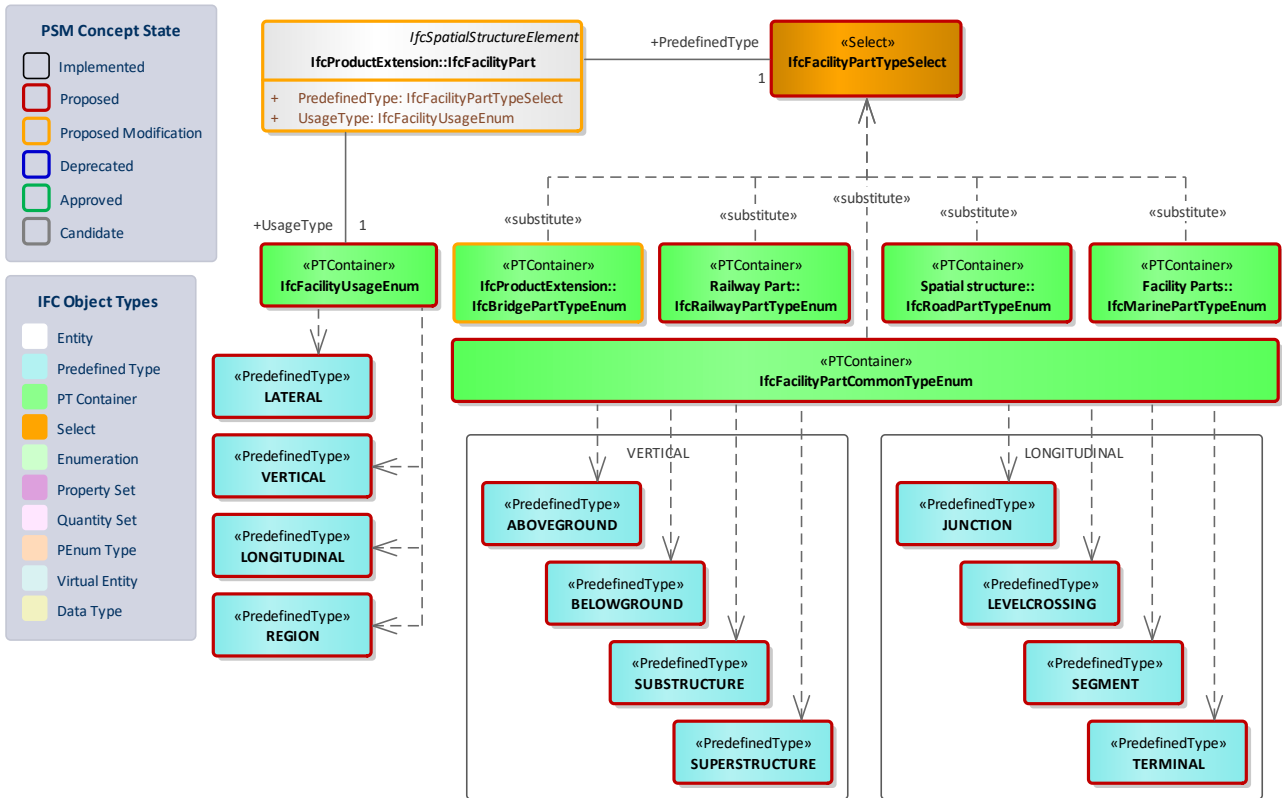
Figure 26: Facility Parts - modification extension of common facility parts

PDT Container: IfcRoadPartTypeEnum

Status: **Proposed**

Package: **Spatial structure**

Container Properties		
Parent Entity	IfcFacilityPart	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**
		IfcRoadPartTypeEnum.SOFTSHOULDER
		IfcRoadPartTypeEnum.HARDSHOULDER
		IfcRoadPartTypeEnum.ROADSIDEPART
		IfcRoadPartTypeEnum.ROADSIDE
		IfcRoadPartTypeEnum.SIDEWALK
		IfcRoadPartTypeEnum.SHOULDER
		IfcRoadPartTypeEnum.REFUGEISLAND
		IfcRoadPartTypeEnum.CENTRALISLAND
		IfcRoadPartTypeEnum.TRAFFICISLAND
		IfcRoadPartTypeEnum.PARKINGBAY

		IfcRoadPartTypeEnum.BUS_STOP	
		IfcRoadPartTypeEnum.PASSINGBAY	
		IfcRoadPartTypeEnum.LAYBY	
		IfcRoadPartTypeEnum.CENTRALRESERVE	
		IfcRoadPartTypeEnum.TRAFFICLANE	
		IfcRoadPartTypeEnum.ROADWAYPLATEAU	
		IfcRoadPartTypeEnum.CARRIAGEWAY	
		IfcRoadPartTypeEnum.TOLLPLAZA	
		IfcRoadPartTypeEnum.ROADSEGMENT	
		IfcRoadPartTypeEnum.ROUNDABOUT	
		IfcRoadPartTypeEnum.INTERSECTION	
		IfcRoadPartTypeEnum.PEDESTRIAN_CROSSING	
		IfcRoadPartTypeEnum.BICYCLECROSSING	
		IfcRoadPartTypeEnum.RAILWAYCROSSING	

PDT Container: IfcMarinePartTypeEnum

The predefined type container that collects all possible marine facility part types together into the implemented enumeration.

Status: **Proposed**

Package: **Facility Parts**

Container Properties			
Parent Entity	IfcFacilityPart	**Stereotype**	«PTContainer»
	EXISTING	**PROPOSED**	
Contains		IfcMarinePartTypeEnum.COPELEVEL	
		IfcMarinePartTypeEnum.ANCHORAGE	
		IfcMarinePartTypeEnum.VEHICLESERVICING	
		IfcMarinePartTypeEnum.WATERFIELD	
		IfcMarinePartTypeEnum.APPROACHCHANNEL	
		IfcMarinePartTypeEnum.CREST	
		IfcMarinePartTypeEnum.MANUFACTURING	
		IfcMarinePartTypeEnum.LOWWATERLINE	
		IfcMarinePartTypeEnum.CORE	
		IfcMarinePartTypeEnum.CILL_LEVEL	
		IfcMarinePartTypeEnum.BERTHINGSTRUCTURE	
		IfcMarinePartTypeEnum.CHAMBER	
		IfcMarinePartTypeEnum.STORAGE	

		IfcMarinePartTypeEnum.SHIPTRANSFER
		IfcMarinePartTypeEnum.GATEHEAD
		IfcMarinePartTypeEnum.GUDINGSTRUCTURE
		IfcMarinePartTypeEnum.BELOWWATERLINE
		IfcMarinePartTypeEnum.WEATHERSIDE
		IfcMarinePartTypeEnum.LANDFIELD
		IfcMarinePartTypeEnum.PROTECTION
		IfcMarinePartTypeEnum.LEEWARDSIDE
		IfcMarinePartTypeEnum.ABOVEWATERLINE
		IfcMarinePartTypeEnum.NAVIGATIONALAREA
		IfcMarinePartTypeEnum.HIGHWATERLINE

PDT Container: IfcBridgePartTypeEnum

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Container Properties				
Parent Entity	IfcFacilityPart IfcBridgePart		**Stereotype**	«PTContainer»
Contains	**EXISTING**		**PROPOSED**	
	IfcBridgePartTypeEnum.SUPERSTRUCTURE			
	IfcBridgePartTypeEnum.SUBSTRUCTURE			
	IfcBridgePartTypeEnum.DECK			
	IfcBridgePartTypeEnum.DECK_SEGMENT			
	IfcBridgePartTypeEnum.ABUTMENT			
	IfcBridgePartTypeEnum.PYLON			
	IfcBridgePartTypeEnum.SURFACESTRUCTURE			
	IfcBridgePartTypeEnum.PIER			
	IfcBridgePartTypeEnum.PIER_SEGMENT			
	IfcBridgePartTypeEnum.FOUNDATION			

PDT Container: IfcRailwayPartTypeEnum

The IfcRailwayPartTypeEnum defines the range of different types of railway part that can be specified.

Status: **Proposed**

Package: **Railway Part**

Container Properties			
Parent Entity	IfcFacilityPart	**Stereotype**	«PTContainer»
	EXISTING	PROPOSED	
Contains		IfcRailwayPartTypeEnum.LINESIDESTRUCTURE	
		IfcRailwayPartTypeEnum.TURNOUTSUPERSTRUCTURE	
		IfcRailwayPartTypeEnum.PLAINTRACKSUPERSTRUCTURE	
		IfcRailwayPartTypeEnum.DILATATIONSUPERSTRUCTURE	
		IfcRailwayPartTypeEnum.SUPERSTRUCTURE	
		IfcRailwayPartTypeEnum.SUBSTRUCTURE	
		IfcRailwayPartTypeEnum.TRACKSTRUCTURE	
		IfcRailwayPartTypeEnum.LINESIDESTRUCTUREPART	
		IfcRailwayPartTypeEnum.TRACKSTRUCTUREPART	

PDT Container: IfcFacilityPartCommonTypeEnum

Status: **Proposed**

Package: **Facility Parts**

Container Properties			
Parent Entity	IfcFacilityPart	**Stereotype**	«PTContainer»
	EXISTING	PROPOSED	
Contains		IfcFacilityPartCommonTypeEnum.LEVELCROSSING	
		IfcFacilityPartCommonTypeEnum.ABOVEGROUND	
		IfcFacilityPartCommonTypeEnum.TERMINAL	
	IfcBridgePartTypeEnum.SUBSTRUCTURE	IfcFacilityPartCommonTypeEnum.SUPERSTRUCTURE	
	IfcBridgePartTypeEnum.SUPERSTRUCTURE	IfcFacilityPartCommonTypeEnum.SUBSTRUCTURE	
		IfcFacilityPartCommonTypeEnum.SEGMENT	
		IfcFacilityPartCommonTypeEnum.JUNCTION	
		IfcFacilityPartCommonTypeEnum.BELOWGROUND	

Predefined Type: ABOVEGROUND

Full Identifier: **IfcFacilityPartCommonTypeEnum.ABOVEGROUND**

A vertical facility part for elements belonging to the space above the finished ground.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: BELOWGROUND

Full Identifier: **IfcFacilityPartCommonTypeEnum.BELOWGROUND**

A vertical facility part for the containment of elements below the finished ground. This may include for example earthworks elements and elements in a pavement structure.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: JUNCTION

Full Identifier: **IfcFacilityPartCommonTypeEnum.JUNCTION**

A longitudinal facility part providing an at grade junction between two or more segments of longitudinal facilities usually of the same type.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: LEVELCROSSING

Full Identifier: **IfcFacilityPartCommonTypeEnum.LEVELCROSSING**

A longitudinal facility part providing an at grade crossing between two or more different modes of transport e.g. road and railway or road and pedestrian.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: SEGMENT

Full Identifier: **IfcFacilityPartCommonTypeEnum.SEGMENT**

A longitudinal facility part encompassing a linear portion of the facility defined by some uniform characteristics, or a transition between segments of uniform characteristics.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: SUBSTRUCTURE

Full Identifier: **IfcFacilityPartCommonTypeEnum.SUBSTRUCTURE**

A vertical facility part comprising of an underlying or supporting structure. this can be above or below finished ground level.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		

Predefined Type: SUPERSTRUCTURE

Full Identifier: **IfcFacilityPartCommonTypeEnum.SUPERSTRUCTURE**

A vertical facility part comprising of the upper volume of a structure, usually forming the volume of operation or the receiving of live loading.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: TERMINAL

Full Identifier: **IfcFacilityPartCommonTypeEnum.TERMINAL**

A longitudinal facility part that represents a termination segment of a longitudinal facility such as the end of a breakwater, road or rail section.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

PDT Container: IfcFacilityUsageEnum

Status: **Proposed**

Package: **Facility Parts**

Container Properties			
Parent Entity	IfcFacilityPart	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		IfcFacilityUsageEnum.LONGITUDINAL	
		IfcFacilityUsageEnum.LATERAL	

		IfcFacilityUsageEnum.VERTICAL
		IfcFacilityUsageEnum.REGION

Predefined Type: LATERAL

Full Identifier: **IfcFacilityUsageEnum.LATERAL**

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityUsageEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: LONGITUDINAL

Full Identifier: **IfcFacilityUsageEnum.LONGITUDINAL**

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityUsageEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: REGION

Full Identifier: **IfcFacilityUsageEnum.REGION**

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityUsageEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: VERTICAL

Full Identifier: **IfcFacilityUsageEnum.VERTICAL**

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityUsageEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

Select: IfcFacilityPartTypeSelect

This is a select of enumerations to provide the option of groups of predefined types for an IfcFacilityPart.

Status: **Proposed**

Package: **Facility Parts**

Select Properties	
Stereotype	«Select»
Substitutions	IfcFacilityPartCommonTypeEnum
	IfcMarinePartTypeEnum
	IfcRailwayPartTypeEnum
	IfcBridgePartTypeEnum
	IfcRoadPartTypeEnum

Package: Relationships

Package addressing the definition of non-hierarchal relationships between spatial elements to provide connections across different hierarchies. such as the relationships between a road or railway section and a bridge.
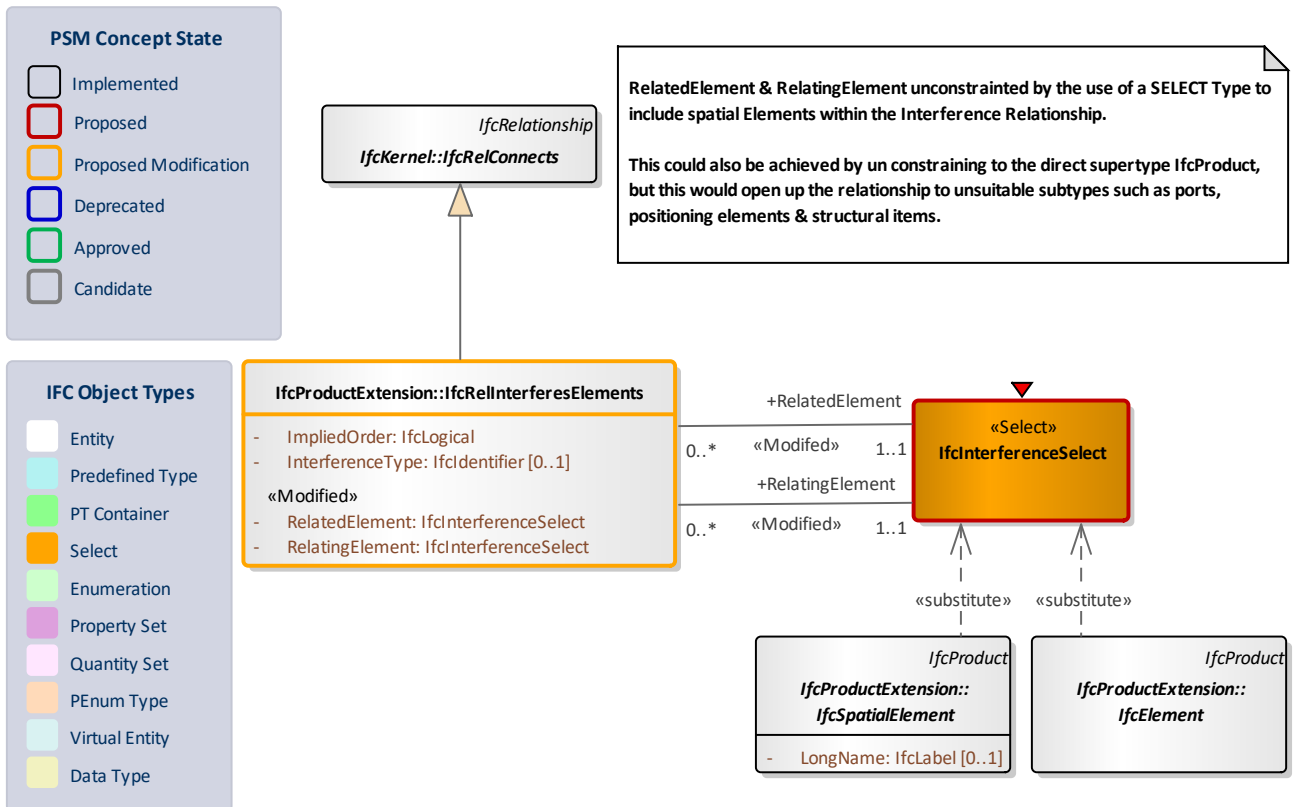
PSM Concept State
- Implemented
- Proposed
- Proposed Modification
- Deprecated
- Approved
- Candidate

IFC Object Types
- Entity
- Predefined Type
- PT Container
- Select
- Enumeration
- Property Set
- Quantity Set
- PEnum Type
- Virtual Entity
- Data Type

IfcRelationship
IfcKernel::IfcRelConnects

RelatedElement & RelatingElement unconstrained by the use of a SELECT Type to include spatial Elements within the Interference Relationship.

This could also be achieved by un constraining to the direct supertype IfcProduct, but this would open up the relationship to unsuitable subtypes such as ports, positioning elements & structural items.

IfcProductExtension::IfcRelInterferesElements
- ImpliedOrder: IfcLogical
- InterferenceType: IfcIdentifier [0..1]

«Modified»
- RelatedElement: IfcInterferenceSelect
- RelatingElement: IfcInterferenceSelect

+RelatedElement   0..* «Modifed» 1..1

+RelatingElement   0..* «Modifed» 1..1

«Select»
IfcInterferenceSelect

«substitute»   «substitute»

IfcProduct
IfcProductExtension:: IfcSpatialElement
- LongName: IfcLabel [0..1]

IfcProduct
IfcProductExtension:: IfcElement

Figure 27: Spatial Relationships - modification and extension of relationships between spatial elements

Class: IfcRelInterferesElements

The _IfcRelInterferesElements_ objectified relationship indicates that two elements interfere. Interference is a spatial overlap between the two elements. It is a 1 to 1 relationship. The concept of two elements interfering physically or logically is described independently from the elements. The interference may be related to the shape representation of the entities by providing an interference geometry.

- When the interference geometry is available it can be passed by the optional attribute _InterferenceGeometry_ pointing to _IfcConnectionGeometry_. The connection geometry is provided as a point, curve, surface, or volume within the local placement coordinate systems of the connecting elements. The _IfcConnectionVolumeGeometry_ is the default type to be used for interference in 3D space, as indicated in e.g. clash detections.
- If the interference geometry is omitted then the interference is provided as a logical relationship. Under this circumstance, the connection point, curve, surface, or solid has to be recalculated by the receiving application.

The _RelatingElement_ and _RelatedElement_ define the two elements in the relationship, that may have different roles. This is controlled by the attribute _ImpliedOrder_.

- _ImpliedOrder_=TRUE The _RelatingElement_ constitutes the primary element of the interference relationship. If the interference is to be resolved by subtracting the overlapping part, it should be subtracted from the _RelatingElement_. The net result would be the _RelatingElement_ subtracted by the _InterferenceGeometry_. This would be the case in interference relationships where the _RelatedElement_ creates a void in the _RelatingElement_ dynamically.
- _ImpliedOrder_=FALSE The _RelatingElement_ and _RelatedElement_ have no priority among each other. If the interference is to be resolved then no information about whether the _InterferenceGeometry_ should be subtracted from the _RelatingElement_ or thed _RelatedElement_ can be traced. This would be the case for clash detection results.
- _ImpliedOrder_=UNKNOWN No information about the priorities is provided.

> HISTORY New entity in IFC4.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcRelConnects	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
ImpliedOrder	IfcLogical		Logical value indicating whether the interference geometry should be subtracted from the _RelatingElement_ (if TRUE), or whether it should be either subtracted from the _RelatingElement_ or the _RelatedElement_ (if FALSE), or whether no indication can be provided (if UNKNOWN).
InterferenceType	IfcIdentifier	[0..1]	Optional identifier that describes the nature of the interference. Examples include ''Clash'', ''ProvisionForVoid'' (physical elements), and "Crosses", "PassesThrough" "PassesOver" "PassesUnder" (spatial elements).

«Modified» RelatedElement	IfcInterferenceSelect		
«Modified» RelatingElement	IfcInterferenceSelect		
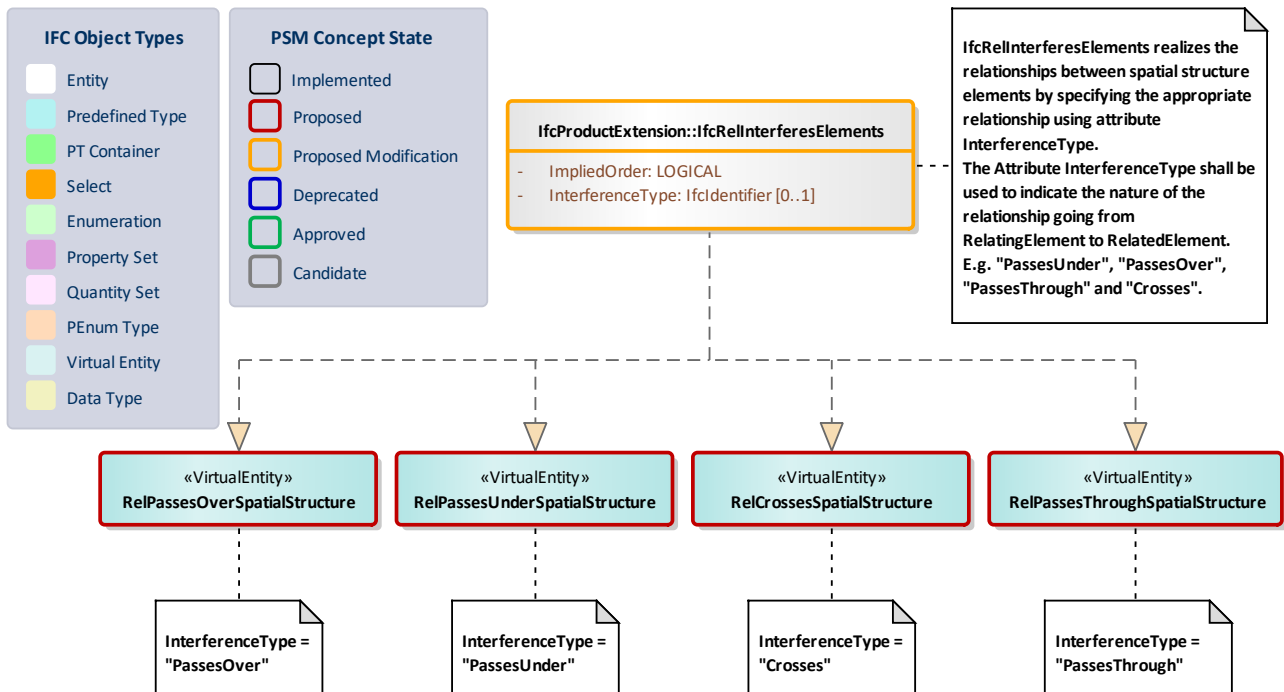
Figure 28: Spatial Relationships Realization - realization of most important spatial interference types

Class: IfcRelInterferesElements

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	Is Abstract	
Property sets			

Inheritance Statement			
Subtype Of			
Subtypes	EXISTING	PROPOSED	

Class Attributes

Name	Type	Multiplicity	Definition
ImpliedOrder	LOGICAL		
InterferenceType	IfcIdentifier	[0..1]	

Virtual Entity: RelCrossesSpatialStructure

Spatial relationship where one spatial element intersects with another spatial element at the same grade such as a level crossing or pedestrian crossing.

Entity Properties	
Realizing Parent	IfcRelInterferesElements
Notes	InterferenceType = "Crosses"

Virtual Entity: RelPassesOverSpatialStructure

Spatial relationship where one spatial element passes over another such as a road passing over a bridge

Entity Properties	
Realizing Parent	IfcRelInterferesElements
Notes	InterferenceType = "PassesOver"

Virtual Entity: RelPassesThroughSpatialStructure

Spatial relationship where one spatial element passes through another such as a road moving through a tunnel.

Entity Properties	
Realizing Parent	IfcRelInterferesElements
Notes	InterferenceType = "PassesThrough"

Virtual Entity: RelPassesUnderSpatialStructure

Spatial relationship where one spatial element passes under another such as a road passing under a bridge

Entity Properties	
Realizing Parent	IfcRelInterferesElements
Notes	InterferenceType = "PassesUnder"

Select: IfcInterferenceSelect

A select type that groups together physical and spatial elements for the purpose of defining interferences between these elements.

Status: **Proposed**

Package: **Relationships**

Select Properties	
Stereotype	«Select»
Substitutions	IfcElement
	IfcSpatialElement

Package: Spatial zones

this package contains concepts which represent common spatial zones used to define non-hierarchal volumes within a project.
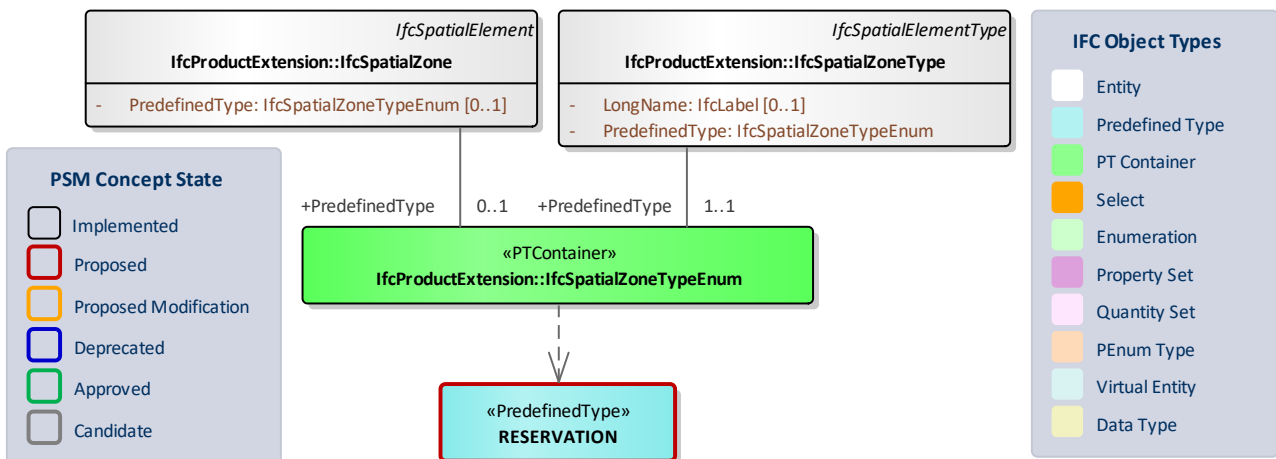

Figure 29: Spatial zones - modification and extension to spatial zones

Predefined Type: RESERVATION

Full Identifier: **IfcSpatialZoneTypeEnum.RESERVATION**

A spatial zone that marks some sort of reservation within the project extent.

Status: **Proposed**

Package: **Spatial zones**

Predefined Type Properties			
Predefined Type Container	IfcSpatialZoneTypeEnum	**Parent Entity**	IfcSpatialZoneType
Stereotype	«PredefinedType»		IfcSpatialZone
Property sets	Pset_RailwaySignallingReservation Pset_RailwayTelecomReservation Pset_RailwayReservation Pset_RailwayEnergyReservation		

Package: Systems

This package contains concepts that represent common systems within a facility or project that form a logical/functional grouping of physical elements.

Package: Built Systems

Groups by which building elements are grouped according to a common function within the facility.
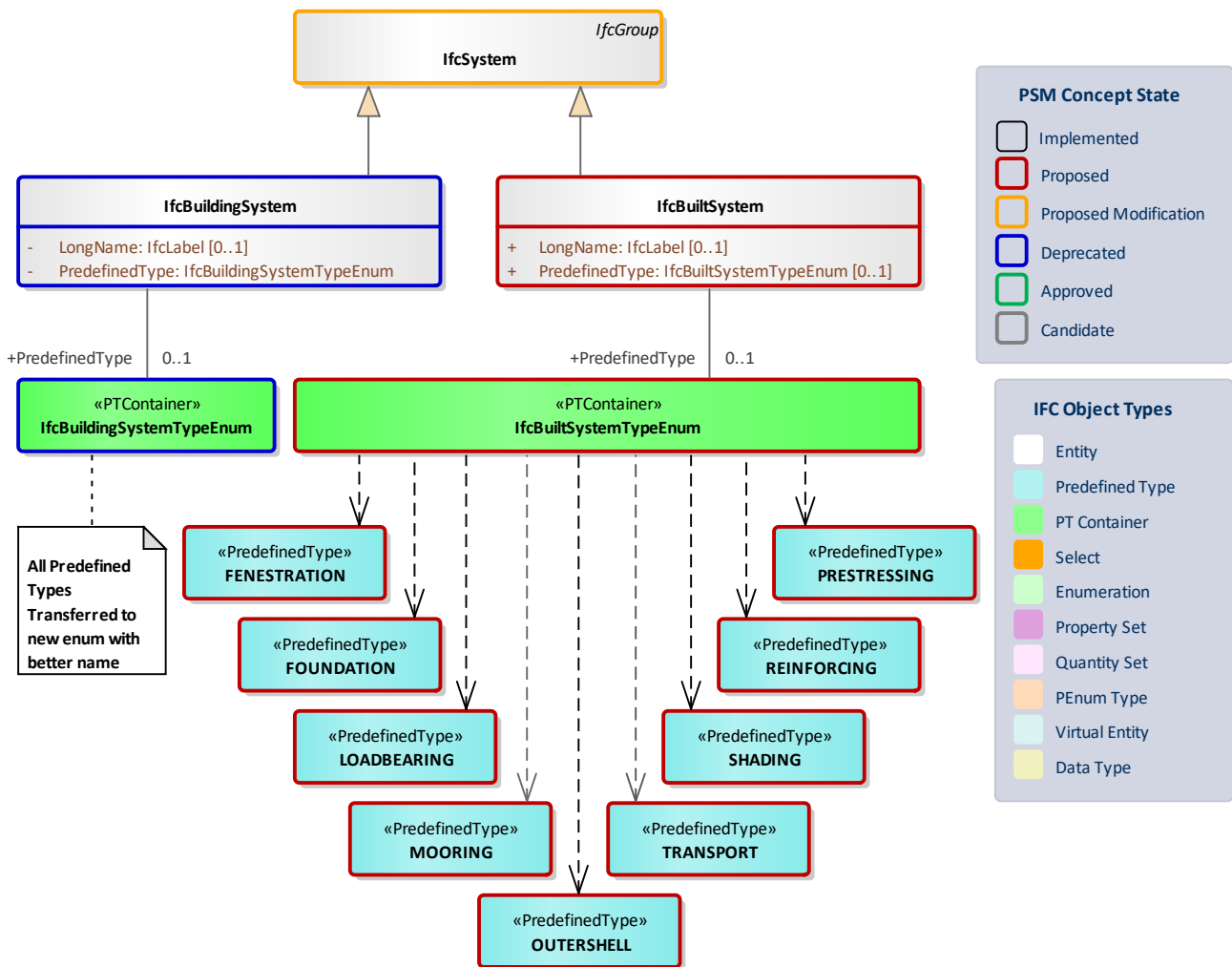
Figure 30: Built Systems - modification and extension to built systems

Class: IfcSystem

A system is an organized combination of related parts within an AEC product, composed for a common purpose or function or to provide a service. A system is essentially a functionally related aggregation of products. The grouping relationship to one or several instances of _IfcProduct_ (the system members) is handled by _IfcRelAssignsToGroup_.

> NOTE The use of _IfcSystem_ often applies to the representation of building services related systems, such as the piping system, cold water system, etc. Members within such a system may or may not be connected using the connectivity related entities (through _IfcDistributionPort_).

> HISTORY New entity in IFC1.0

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcGroup	
Subtypes	EXISTING	PROPOSED
	IfcZone	IfcBuiltSystem

Class: IfcBuildingSystem

A building system is a group by which building elements are grouped according to a common function within the facility.

The group _IfcBuildingSystem_ defines the occurrence of a specialized system for use within the context of a building and finishing fabric. Important functionalities for the description of a building system are derived from supertypes:

- From _IfcSystem_ it inherits the ability to couple the building system via _IfcRelServicesBuildings_ to one or more _IfcSpatialElement_ subtypes as necessary.
- From _IfcGroup_ it inherits the inverse attribute _IsGroupedBy_, pointing to the relationship class _IfcRelAssignsToGroup_. This allows to group building elements (instances of _IfcBuildingElement_ subtypes, _IfcFurnishingElement_ subtype, _IfcElementAssembly_ and _IfcTransportElement_).
- From _IfcObjectDefinition_ it inherits the inverse attribute _IsDecomposedBy_ pointing to the relationship class _IfcRelAggregates_. It provides the hierarchy between the separate (partial) building systems.

bSI Documentation

Status: **Deprecated**

Package: **IfcSharedBldgElements**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcSystem	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
LongName	IfcLabel	[0..1]	Long name for a building system, used for informal purposes. It should be used, if available, in conjunction with the inherited _Name_ attribute.\X\0D > NOTE In many scenarios the _Name_ attribute refers to the short name or number of a building system, and the _LongName_ refers to a descriptive name.
PredefinedType	IfcBuildingSystemTypeEnum		

PDT Container: IfcBuildingSystemTypeEnum

This enumeration identifies different types of building systems.

> HISTORY New enumeration in IFC4.

bSI Documentation

Status: **Deprecated**

Package: **IfcSharedBldgElements**

Container Properties			
Parent Entity	IfcBuildingSystem	**Stereotype**	«PTContainer»
Contains	EXISTING		PROPOSED

Predefined Type: FENESTRATION

Full Identifier: **IfcBuiltSystemTypeEnum.FENESTRATION**

System of doors, windows, and other fillings in opening in a building envelop that are designed to permit the passage of air or light.

Status: **Proposed**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: FOUNDATION

Full Identifier: **IfcBuiltSystemTypeEnum.FOUNDATION**

System of shallow and deep foundation element that transmit forces to the supporting ground.

Status: **Proposed**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: LOADBEARING

Full Identifier: **IfcBuiltSystemTypeEnum.LOADBEARING**

System of built elements that transmit forces and stiffen the construction.

Status: **Proposed**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: OUTERSHELL

Full Identifier: **IfcBuiltSystemTypeEnum.OUTERSHELL**

System of built elements that provides the outer skin to protect the construction (such as the facade).

Status: **Proposed**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: PRESTRESSING

Full Identifier: **IfcBuiltSystemTypeEnum.PRESTRESSING**

System of elements providing pre-stressing to the structure, including typically manufactured products such as tendons, anchorages (active, dead, coupling), ducts, vents and deviators, and in-situ concrete segments, tendon spacers, blisters and additional reinforcements.

Status: **Proposed**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: REINFORCING

Full Identifier: **IfcBuiltSystemTypeEnum.REINFORCING**

System of elements providing reinforcing to the structure.

Status: **Proposed**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem

Stereotype	«PredefinedType»		
Property sets			

Predefined Type: SHADING

Full Identifier: **IfcBuiltSystemTypeEnum.SHADING**

System of shading elements (external or internal) that permits the limitation or control of impact of natural sun light.

Status: **Proposed**

Package: **IfcSharedBldgElements**

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

Predefined Type: TRANSPORT

Full Identifier: **IfcBuiltSystemTypeEnum.TRANSPORT**

System of all transport elements in a facility that enables the transport of people or goods.

Status: **Proposed**

Package: **IfcSharedBldgElements**

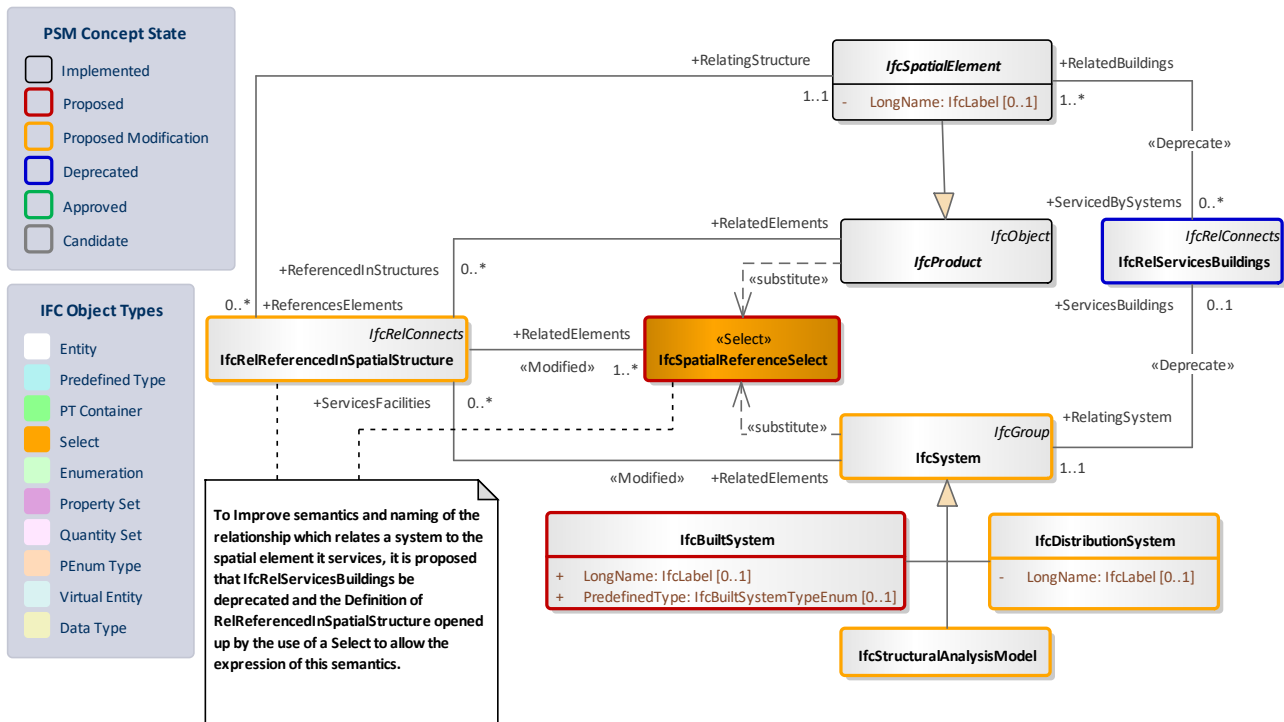| **Predefined Type Properties**			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

Figure 31: System Relationships - modification and extension to cover relating systems to spatial elements

Class: IfcRelReferencedInSpatialStructure

The objectified relationship, IfcRelReferencedInSpatialStructure is used to assign elements in addition to those levels of the project spatial\S\ structure, in which they are referenced, but not primarily contained. It is also used to connect a system to the relevant spatial element that it serves.

NOTE The primary containment relationship between an element and the spatial structure is handled by IfcRelContainedInSpatialStructure.

Any element can be referenced to zero, one or several levels of the spatial structure. Whereas the IfcRelContainedInSpatialStructure relationship is required to be hierarchical (an element can only be contained in exactly one spatial structure element), the IfcRelReferencedInSpatialStructure is not restricted to be hierarchical.

EXAMPLE A wall might be normally contained within a storey, and since it does not span through several stories, it is not referenced in any additional storey. However a curtain wall might span through several stories, in this case it can be contained within the ground floor, but it would be referenced by all additional stories, it spans.

Predefined spatial structure elements to which elements can be assigned are

- site as IfcSite
- facility as IfcFacility or its subtypes IfcBridge, IfcBuilding, IfcMarineFacility, IfcRailway or IfcRoad

- part of facility as IfcFaciltityPart, or more specifically as IfcBuildingStorey or IfcSpace

Elements can also be references in a spatial zone that is provided as IfcSpatialZone.

Figure 167 shows the use of IfcRelContainedInSpatialStructure and IfcRelReferencedInSpatialStructure to assign an IfcCurtainWall to two different levels within the spatial structure. It is primarily contained within the ground floor, and additionally referenced within the first and second floor.
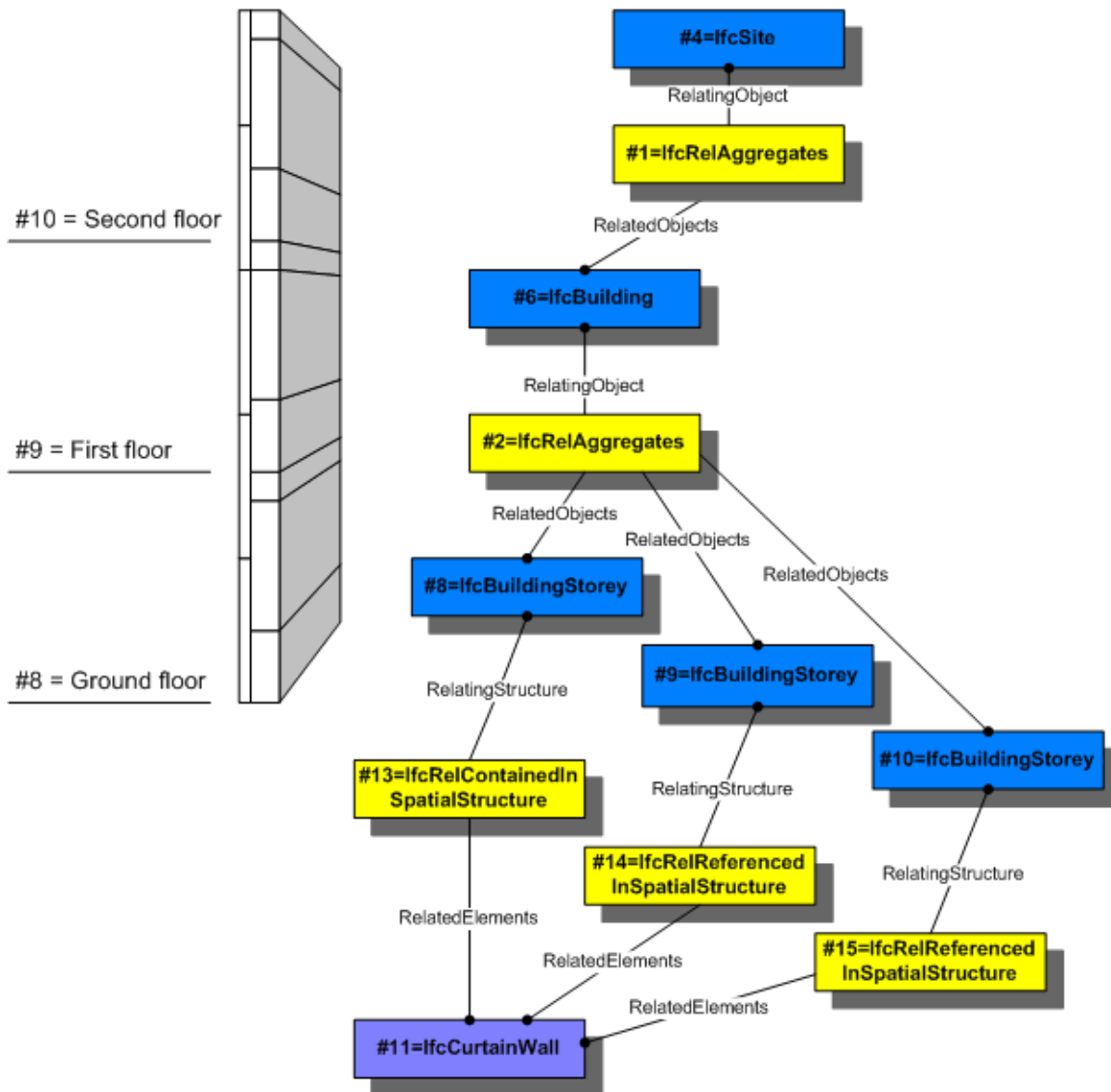

Figure 167 — Relationship for spatial structure referencing

  HISTORY New entity in IFC2x3.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcRelConnects	
Subtypes	**EXISTING**	**PROPOSED**

Class: IfcRelServicesBuildings

The _IfcRelServicesBuildings_ is an objectified relationship that defines the relationship between a system and the sites, buildings, storeys, spaces, or spatial zones, it serves. Examples of systems are:

- building service systems (heating, cooling, waste water system) represented by instances of _IfcDistributionSystem_;
- building systems (fenestration, shading) represented by instances of _IfcBuildingSystem_;
- zones as collection of logically grouped spaces represented by instances of _IfcZone_
- idealized structural analysis systems represented by instances of _IfcStructuralAnalysisModel_.

> NOTE The name _IfcRelServicesBuildings_ is a known anomaly, as the relationship is not restricted to buildings anymore.

> HISTORY New entity in IFC1.0.

bSI Documentation

Status: **Deprecated**

Package: **IfcProductExtension**

Class Properties			
Status	Deprecated	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcRelConnects	
Subtypes	**EXISTING**	**PROPOSED**

Class: IfcDistributionSystem

A distribution system is a network designed to receive, store, maintain, distribute, or control the flow of a distribution media. A common example is a heating hot water system that consists of a pump, a tank, and an interconnected piping system for distributing hot water to terminals.

The group IfcDistributionSystem defines the occurrence of a specialized system for use within the context of building services or utilities for built facilities.

Important functionalities for the description of a distribution system are derived from existing IFC entities:

- From IfcSystem it inherits the ability to couple the built system via IfcRelReferencedInSpatialStructure to one or more IfcSpatialElement subtypes as necessary.
- From IfcGroup it inherits the inverse attribute IsGroupedBy, pointing to the relationship class IfcRelAssignsToGroup . This allows the grouping of distribution elements (instances of IfcDistributionElement subtypes).
- From IfcObjectDefinition it inherits the inverse attribute IsDecomposedBy pointing to the relationship class IfcRelAggregates. It provides the hierarchy between the separate (partial) distribution systems. For example, an electrical main circuit may be aggregated into branch circuits.

HISTORY New entity in IFC4.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcSystem	
Subtypes	EXISTING	PROPOSED
	IfcDistributionCircuit	

Class Attributes

Name	Type	Multi.	Definition
LongName	IfcLabel	[0..1]	Long name for a distribution system, used for informal purposes. It should be used, if available, in conjunction with the inherited _Name_ attribute. > NOTE In many scenarios the _Name_ attribute refers to the short name or number of a distribution system or branch circuit, and the _LongName_ refers to a descriptive name.

Class: IfcStructuralAnalysisModel

The IfcStructuralAnalysisModel is used to assemble all information needed to represent a structural analysis model. It encompasses certain general properties (such as analysis type), references to all contained structural members, structural supports or connections, as well as loads and the respective load results.

Important functionalities for the description of an analysis model are derived from existing IFC entities:

- From IfcSystem it inherits the ability to couple the built system via IfcRelReferencedInSpatialStructure to one or more IfcSpatialElement subtypes as necessary.
- From IfcGroup it inherits the inverse attribute IsGroupedBy, pointing to the relationship class IfcRelAssignsToGroup . This allows the grouping of structural members (instances of IfcStructuralMember), and supports (instances of IfcStructuralConnection) which belong to a specific analysis model.

NOTE Loads (as instances of IfcStructuralAction) are not included through IsGroupedBy. Loads are assigned through the LoadedBy attribute relationship, using load groups as a grouping mechanism. Only top-level load groups should be referenced via LoadedBy, i.e. load combinations if any load combinations exist, or load cases if no load combinations exist in this analysis model.

NOTE Results (as instances of IfcStructuralReaction) are not included through IsGroupedBy. Results are assigned through the HasResults attribute relationship, using result groups as a grouping mechanism.

- From IfcObjectDefinition it inherits the inverse attribute IsDecomposedBy pointing to the relationship class IfcRelAggregates. It provides the hierarchy between the separate (partial) analysis models.

HISTORY New entity in IFC2x2.

Informal Propositions

1. If one or more structural item (instance of a subtype of IfcStructuralItem) is grouped into an IfcStructuralAnalysisModel, the attribute SharedPlacement shall be provided with a value.
2. The ObjectPlacement of all structural items which are grouped into the same instance of IfcStructuralAnalysisModel shall refer to the same instance of IfcObjectPlacement as IfcStructuralAnalysisModel.SharedPlacement.

NOTE This rule is necessary to achieve consistent topology representations. The topology representations of structural items in an analysis model are meant to share vertices and edges und must therefore have the same object placement.

NOTE A structural item may be grouped into more than one analysis model. In this case, all these models must use the same instance of IfcObjectPlacement.

bSI Documentation

Status: **ProposedModification**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcSystem	
Subtypes	EXISTING	PROPOSED

Class: IfcBuiltSystem

A built system is a group by which built elements are grouped according to a common function within the facility.

The group IfcBuiltSystem defines the occurrence of a specialized system for use within the context of a facilities physical or finishing fabric. Important functionalities for the description of a built system are derived from supertypes:

- From IfcSystem it inherits the ability to couple the built system via IfcRelReferencedInSpatialStructure to one or more IfcSpatialElement subtypes as necessary.
- From IfcGroup it inherits the inverse attribute IsGroupedBy, pointing to the relationship class IfcRelAssignsToGroup . This allows the grouping of built elements (instances of IfcBuiltElement subtypes, IfcFurnishingElement subtypes, IfcElementAssembly and IfcTransportElement).
- From IfcObjectDefinition it inherits the inverse attribute IsDecomposedBy pointing to the relationship class IfcRelAggregates. It provides the hierarchy between the separate (partial) building systems.

Status: **Proposed**

Package: **Built Systems**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcSystem	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
LongName	IfcLabel	[0..1]	Long name for a built system, used for informal purposes. It should be used, if available, in conjunction with the inherited Name attribute. NOTE In many scenarios the Name attribute refers to the short name or number of a built system, and the LongName refers to a descriptive name.
PredefinedType	IfcBuiltSystemTypeEnum	[0..1]	Predefined types of built systems.

PDT Container: IfcBuiltSystemTypeEnum

This enumeration identifies different types of built systems.

Status: **Proposed**

Package: **Built Systems**

Container Properties				
Parent Entity	IfcBuiltSystem		**Stereotype**	«PTContainer»
Contains	EXISTING		PROPOSED	
			IfcBuiltSystemTypeEnum.MOORING	
			IfcBuiltSystemTypeEnum.MOORINGSYSTEM	
			IfcBuiltSystemTypeEnum.TRACKCIRCUIT	
			IfcBuildingSystemTypeEnum.EROSIONPREVENTION	
			IfcBuiltSystemTypeEnum.LOADBEARING	
			IfcBuiltSystemTypeEnum.OUTERSHELL	
			IfcBuiltSystemTypeEnum.FOUNDATION	
			IfcBuiltSystemTypeEnum.TRANSPORT	
			IfcBuiltSystemTypeEnum.FENESTRATION	
			IfcBuiltSystemTypeEnum.SHADING	
			IfcBuiltSystemTypeEnum.REINFORCING	
			IfcBuiltSystemTypeEnum.PRESTRESSING	

Predefined Type: MOORING

Full Identifier: **IfcBuiltSystemTypeEnum.MOORING**

System of components and elements responsible for keeping or holding an element (a vessel, platform or set of catenary lines) in a desired position.

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

Select: IfcSpatialReferenceSelect

Select Properties	
Stereotype	«Select»
Substitutions	IfcProduct
	IfcSystem

Appendix A – IFC Common Schema Contributor List

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The Finnish Transport and Infrastructure Agency, *Finland*	Tarmo Savolainen
The Swedish Transport Administration, *Sweden*	Peter Axelsson

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Note: names and companies are simply listed alphabetically

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Note: names and companies are simply listed alphabetically

Appendix C – IFC Road Contributor List

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Property lead/OGC Liaison:	Johnny Jensen, Trimble

WP5, Prototypical implementation, Participating software vendors

Aplitop, Autodesk, Bentley, KICT / Midas IT, TUM, Autodesk, TUM, Obermeyer/ProVI, 12D, Trimble, AKG, Tool, Card-1, CGS-Labs, Istram, SierraSoft, Catenda

Note: names and companies are simply listed alphabetically