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## OGC InfraGML 1.0: Part 2 – LandInfra Facilities and Projects – Encoding Standard

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## Contents

1. Scope.....	8
2. Conformance.....	8
3. References.....	9
4. Terms and Definitions.....	9
5. Conventions .....	9
5.1 Abbreviations .....	9
5.2 UML Package and Class Diagrams.....	10
5.3 Requirements.....	10
6. InfraGML Parts.....	11
7. Requirements Classes for this Part .....	13
7.1 Structural Overview of Requirements Classes.....	13
7.1.1 Requirement Classes Defined in This Part .....	14
7.1.2 Dependent Requirement Classes Defined in Other Parts .....	15
7.1.3 Other Standards upon which the Requirement Classes of this Part Depend	15
7.2 Requirements Class: Facility.....	15
7.2.1 Implementation decisions regarding OGC 15-111r1 UML.....	15
7.2.2 Specific Requirements for this Requirements Class.....	17
7.3 Requirements Class: Project.....	18
7.3.1 Implementation decisions regarding OGC 15-111r1 UML.....	18
7.3.2 Specific Requirements for this Requirements Class.....	19
8. Media Types for any data encoding(s).....	19
Annex A. Conformance Class Abstract Test Suite (Normative).....	20
A.1 Conformance class: Facility.....	20
A.2 Conformance class: Project.....	20

Annex B.	Sample XML (Informative) .....	21
B. 1	Complete Facility and Project XML .....	21
Annex C.	Revision history .....	24
Annex D.	Bibliography .....	25

## Figures

Figure 1. InfraGML Part Dependencies.....	12
Figure 2. LandInfra Requirements Classes grouped into InfraGML Parts.....	13
Figure 3. Requirements Classes for this Part and their Dependencies .....	14
Figure 4. InfraGML Facility Logical Model UML.....	17

## **i. Abstract**

This OGC InfraGML Encoding Standard presents the implementation-dependent, GML encoding of concepts supporting land and civil engineering infrastructure facilities specified in the OGC Land and Infrastructure Conceptual Model Standard (LandInfra), OGC 15-111r1. Conceptual model subject areas include land features, facilities, projects, alignment, road, railway, survey (including equipment, observations, and survey results), land division, and condominiums.

InfraGML is published as a multi-part standard. This Part 2 addresses the Facility and Project Requirements Classes from LandInfra.

## **ii. Keywords**

The following are keywords to be used by search engines and document catalogues.

OGC document, LandInfra, InfraGML, infrastructure, civil, facility, project

## **iii. Preface**

In order to achieve consensus on the concepts supporting land and civil engineering infrastructure facilities, a UML Conceptual Model, LandInfra, was approved as an OGC standard in August, 2016. This model provides a unifying basis for encodings including but not limited to InfraGML, including similar work in buildingSMART International. It can also provide a framework for discussing how other software standards relate to LandInfra.

As an OGC standard, LandInfra follows the OGC modular specification standard, OGC 08-131r3. Because of the breadth of LandInfra, its subject areas are divided into separate Requirements Classes. This InfraGML encoding similarly is divided into Requirements Classes which are then grouped into Parts. A Part may address multiple LandInfra Requirements Classes but each Requirements Class is addressed in a single part. Because Requirements Classes may depend on other Requirements Classes (see LandInfra Figure 1, “Requirements Classes as UML Packages with their dependencies”), the reader of this InfraGML Part may need to conform to Requirements Classes in other Parts as well.

Note that this InfraGML encoding standard is a target of LandInfra and therefore this standard conforms to the Requirements Classes in LandInfra. On the other hand, an application claiming conformance to this InfraGML encoding standard must conform to the Requirements Classes contained in this InfraGML standard.

There are several reasons for separating InfraGML into Parts. Because they are likely to have separate authors, the rate at which each Part is completed may vary. It would not be advisable to wait until all Parts complete before any can be released as separate OGC standards. Multiple Parts will also allow each subject to have its own standards life cycle. One Part can be updated independent of other Parts, subject to dependency constraints. And of course, it should be easier for the application software developer to only deal with Parts relevant to their application.

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*Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.*

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The following organizations submitted this Document to the Open Geospatial Consortium (OGC):

Bentley Systems, Inc.

Leica Geosystems

Swedish Transport Administration

Trimble Inc.

Autodesk

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## 1. Scope

InfraGML is a GML encoding standard of the LandInfra Conceptual Model standard, OGC 15-111r1. InfraGML is provided as a set of individual though inter-dependent Parts, each of which is a GML standard.

The overall scope of this InfraGML Encoding Standard is infrastructure facilities and the land on which they are constructed. Also included is the surveying necessary for the setting out and as-built recording of these facilities and land interests. Primarily having a civil engineering point of view, InfraGML is relevant across all life cycle phases of a facility. Subject areas include land features, facilities, projects, alignment, road, railway, survey (including equipment, observations, and survey results), land division, and condominiums.

The scope of this Part 2 of InfraGML addresses the following subject area(s): facility and project. Two Requirements Classes, InfraGML Facility and InfraGML Project are included. Both are optional in that an application can conform to InfraGML without supporting either, for example by only supporting the Survey Requirements Classes in Part 6. However, to claim support for Facility, an application must also support the InfraGML Core Requirements Class. To claim support for Project, an application must also support the InfraGML Facility and Core Requirements Classes.

## 2. Conformance

The InfraGML encoding standard defines requirements, grouped into Requirements Classes, for applications which read and write information about infrastructure facilities and the land on which they are constructed, including the surveying necessary for the setting out and as-built recording of these facilities and land interests.

The OGC modular specification (OGC 08-131r3) defines “standardization target” as the entity to which requirements of a standard apply. It further notes that the standardization target is the entity which may receive a certificate of conformance for a requirements class. The standardization target type for this standard is therefore:

- software applications which read/write data instances, i.e. XML documents that encode land, infrastructure facility, and survey data for exchange

Conformance with this standard shall be checked using all the relevant tests specified in Annex A (normative) of this document. The framework, concepts, and methodology for testing, and the criteria to be achieved to claim conformance are specified in the OGC Compliance Testing Policies and Procedures and the OGC Compliance Testing web site<sup>1</sup>.

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<sup>1</sup> [www.opengeospatial.org/cite](http://www.opengeospatial.org/cite)



In order to conform to this OGC encoding standard, a standardization target shall choose to implement the core conformance class and any of the other conformance classes with their dependencies. Conformance classes are based on Requirements Classes which are specified in this and possibly other Parts of the InfraGML standard.

All requirements classes and conformance classes described in this document are owned by the standard(s) identified. Note that Conformance Classes for this Part of InfraGML may require conformance with Conformance Classes from other Parts of InfraGML.

### **3. References**

The following normative documents contain provisions that, through reference in this text, constitute provisions of this Part of InfraGML. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

OGC: OGC 07-036, *OpenGIS® Geography Markup Language (GML) Encoding Standard*, v3.2.1, 2007

OGC: OGC 10-129r1, *OGC® Geography Markup Language (GML) — Extended schemas and encoding rules*, v3.3, 2012

OGC: OGC 15-111r1, *OGC Land and Infrastructure Conceptual Model Standard (LandInfra)*, v1.0, 2016.

OGC: OGC 16-100, *OGC InfraGML 1.0: Part 0 – LandInfra Core – Encoding Standard*, v1.0, 2017

### **4. Terms and Definitions**

This document uses the terms defined in Sub-clause 5.3 of [OGC 06-121r8], which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this standard.

The LandInfra standard contains a long list of terms and definitions relevant to the scope of InfraGML. As these will not be repeated here, the reader is directed to Clause 4 of LandInfra.

### **5. Conventions**

#### **5.1 Abbreviations**

In this document the following abbreviations and acronyms are used or introduced:

GML	Geography Markup Language
ISO	International Organization for Standardization
OGC	Open Geospatial Consortium
UML	Unified Modeling Language
XML	eXtensible Markup Language

## 5.2 UML Package and Class Diagrams

The LandInfra standard contains UML diagrams for the concepts supported by InfraGML. As these will not be repeated here, the reader is directed to Clause 7 of LandInfra. UML will only appear in InfraGML in the rare cases where LandInfra is extended by InfraGML.

## 5.3 Requirements

When referred to in a Requirement or Requirements Class, the boxes contained in the LandInfra UML figures may all be called “Classes” even if they are data types, enumerations, code lists, unions etc. In most cases, these will be encoded as XML elements in InfraGML.

When an InfraGML Requirement states that “A conforming application shall support the [Requirements Class] XML elements listed in Table <n> in accordance with the GML XSD in this standard.”, the XSD was developed to support the UML for the corresponding LandInfra Requirements Class as follows:

- a) all classes shown as blue boxes for the corresponding LandInfra Requirements Class UML diagrams;
- b) all attributes, attribute cardinalities, and attribute data types of these classes (usually shown in subsequent diagrams);
- c) all associations, navigation, roles, and role cardinalities connected to the blue classes;
- d) all classes shown as beige boxes (another Requirements Class) in the diagrams connected to the blue box classes by association or used as attribute data types; and
- e) all classes shown as pink boxes (another Standard) in the figure connected to the blue box classes by association or used as attribute data types.

Note that, in rare cases, the OGC 15-111r1 UML may be altered. In such cases, the alterations are declared in the first subclause of each Requirements Class, entitled “Implementation decisions regarding OGC 15-111r1 UML”. Logical Model UML diagrams may be included if the implementation constraints of GML (or XML) dictate that the Conceptual Model cannot be implemented directly as shown in OGC 15-111r1.

In most cases, the InfraGML XML derived from the LandInfra UML follows the rules in OGC 07-036, GML, Annex E, UML-to-GML application schema encoding rules.

The only normative version of the GML XSD (XML schema definition) for all Parts of the InfraGML Encoding Standard is available from the official OGC XML schema repository at <http://schemas.opengis.net>. Any occurrences of all or part of this XSD contained within this document are to be considered to be informative only.

The URI base for the LandInfra Conceptual Model standard is <http://www.opengis.net/spec/landinfra/1.0>. All URIs of Requirements Classes, Requirements, and Conformance Classes contained in that standard are relative to this base.

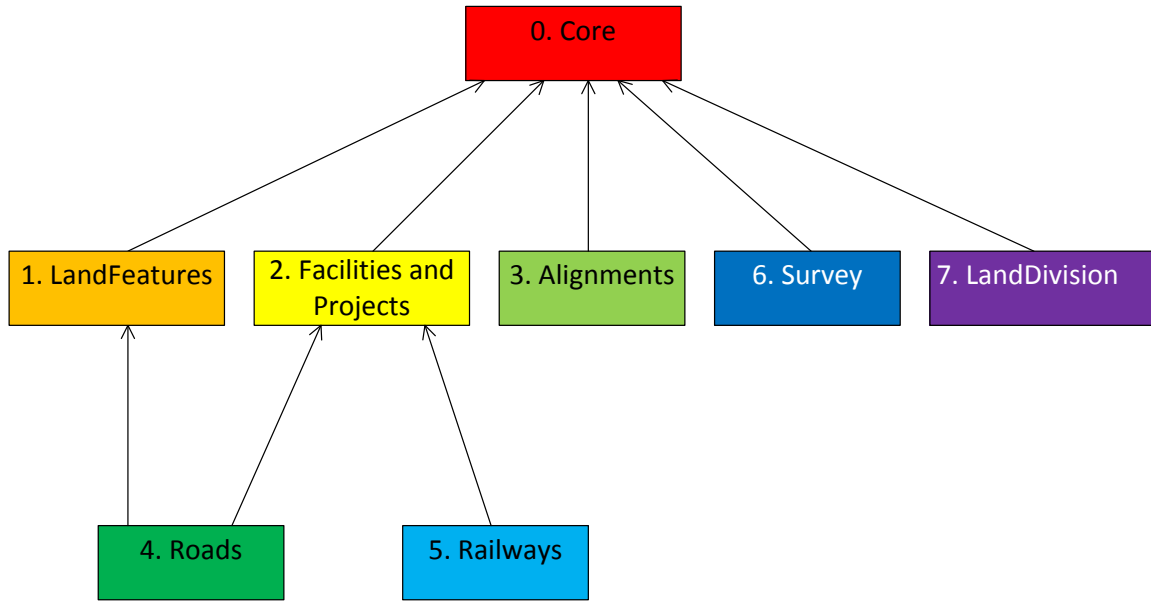
The URI base for this InfraGML encoding standard is <http://www.opengis.net/spec/infragml/part2/1.0>. All URIs of Requirements Classes, Requirements, and Conformance Classes contained in this standard are relative to this base.

## 6. InfraGML Parts

The InfraGML encoding standard has been divided into Parts. These Parts enable the grouping of LandInfra subject areas (Requirements Classes) into individual OGC encoding standards. All of these InfraGML encoding standards have a similar name: “OGC 16-10n, OGC® InfraGML 1.0: Part n - <part name> - Encoding Standard”, where Part numbers and names are as follows:

n	<part name>
0	LandInfra Core
1	LandInfra LandFeatures
2	LandInfra Facilities and Projects
3	LandInfra Alignments
4	LandInfra Roads
5	LandInfra Railways
6	LandInfra Survey
7	LandInfra LandDivision

Some InfraGML Parts depend upon other parts:



*Figure 1. InfraGML Part Dependencies*

The boxes above represent InfraGML Parts. Arrows show Part dependencies.

The Part dependencies derive from the dependencies of the InfraGML Requirements Classes contained in these Parts. The reader should rely more on the InfraGML Requirements Class dependencies and only use the Part dependencies as a guide for knowing which InfraGML Part standards to consider.

InfraGML Parts include the following LandInfra 1.0 Requirements Classes (UML Packages):

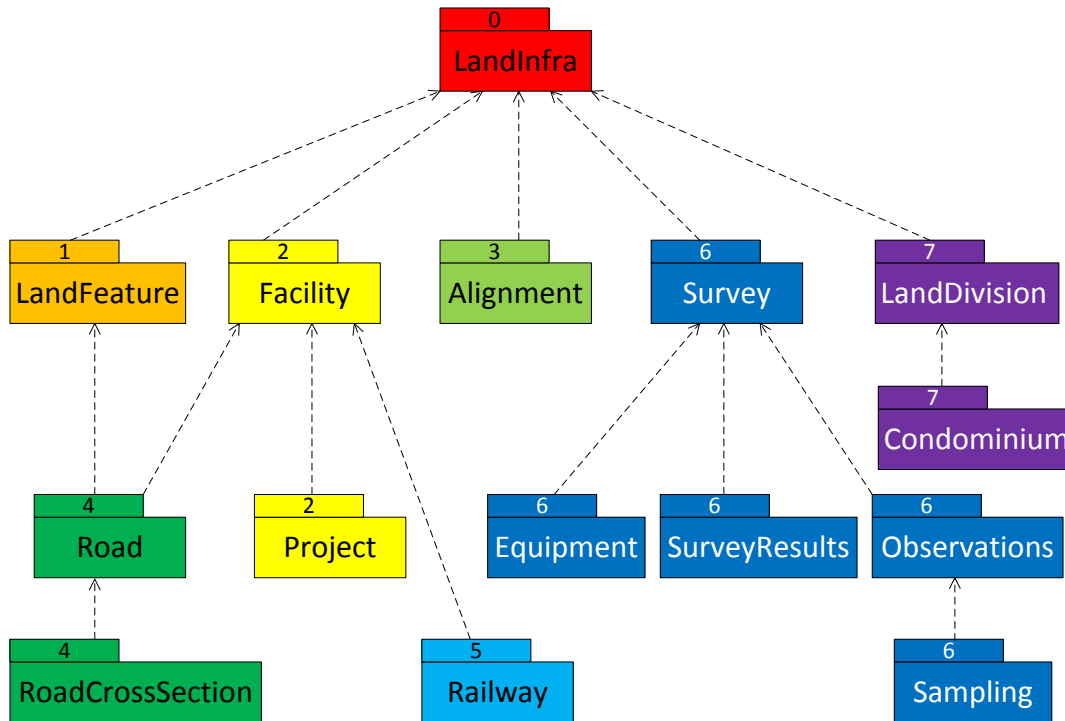


Figure 2. LandInfra Requirements Classes grouped into InfraGML Parts

The boxes above and their names represent LandInfra Requirements Classes. The numbers are InfraGML Part numbers. Dependency arrows shown above are dependencies between LandInfra Requirements Classes.

## 7. Requirements Classes for this Part

### 7.1 Structural Overview of Requirements Classes

The Requirements Classes for this Part of the InfraGML encoding standard (shown in blue in Figure 3 below) are defined in this Clause 7. Requirements Classes from other Parts upon which this Part's Requirements Classes are dependent (shown in beige in Figure 3 below) are listed here but defined in the documentation of their respective Parts. External OGC and ISO standards on which Requirements Classes in this Standard depend (shown in pink in Figure 3 below) are also listed. Below is a brief summary of the function of each of these Requirements Classes.

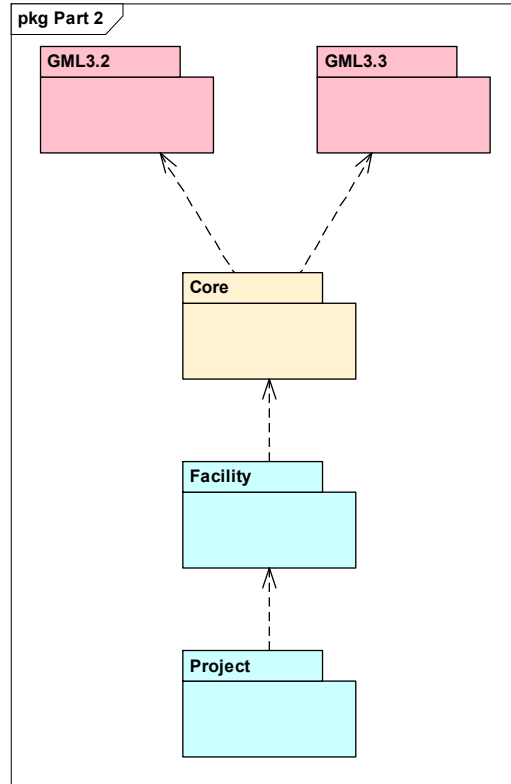


Figure 3. Requirements Classes for this Part and their Dependencies

### 7.1.1 Requirement Classes Defined in This Part

#### Facility

Facilities include collections of buildings and civil engineering works and their associated siteworks. The Facilities Requirements Class includes the breakdown of facilities into discipline specific facility parts and introduces the notion of elements which make up these parts. The Facilities Requirements Class only provides general support for facilities themselves, allowing subsequent Requirements Classes to focus on specific types of the parts that make up facilities, such as road and railway. This Requirements Class is optional in order to allow for the condition where all of the InfraGML dataset information is not facility related, such as one containing only survey or land division information.

#### Project

A project is an activity related to the improvement of a facility, including design and/or construction. This class may be for the creation, modification, or elimination of the entire facility or a part of the facility. The Project Requirements Class includes information about projects and their decomposition into project parts. In order to allow

for the condition where none of the InfraGML dataset information is project related, this Requirements Class is optional.

### 7.1.2 Dependent Requirement Classes Defined in Other Parts

The Requirements Classes defined in this Part are dependent on the following Requirements Classes from other Parts.

#### Part 0. LandInfra Core

LandInfra Core is the core Requirements Class and is the only mandatory Requirements Class. This class contains information about the Land and Infrastructure dataset that can contain information about facilities, land features, land division, documents, survey marks, surveys, sets, and feature associations. LandInfra Core also contains the definition of types common across other Requirements Classes, such as the Status CodeList.

### 7.1.3 Other Standards upon which the Requirement Classes of this Part Depend

For external OGC and ISO standards on which Requirements Classes in this Standard depend, a brief summary of the function of each of these Standards is described below.

#### GML 3.2

OGC 07-036, OpenGIS® Geography Markup Language (GML) Encoding Standard, v3.2 provides most of the geometry types (e.g., Point, LineString, Polygon) used for spatial representations in this Standard. Defines Coordinate Reference Systems. Supports the General Feature Model upon which this Standard is based.

#### GML 3.3

OGC 10-129r1, OGC® Geography Markup Language (GML) — Extended schemas and encoding rules, v3.3 defines the linear referencing concepts (e.g., linear element, distance along, Linear Referencing Methods) used for linearly referenced locations in this Standard.

## 7.2 Requirements Class: Facility

Requirements Class	
<b>/req/facility</b>	
Target type	Conforming application
Name	Facility
Dependency	<b>/req/core</b> (from InfraGML Part 0)
Requirement	<b>/req/facility/elements</b>
Requirement	<b>/req/facility/subtypes</b>

### 7.2.1 Implementation decisions regarding OGC 15-111r1 UML

The following implementation decisions have been made regarding the OGC 15-111r1 Facility Requirements Class UML:

1. Element causes problematic multiple inheritance for both PhysicalElement and PositioningElement. Element is therefore not implemented. The aggregation association from FacilityPart to Element therefore becomes an aggregation association from FacilityPart to PhysicalElement. PhysicalElement is made Abstract. The Element.ElementID becomes a more specific ID for the PhysicalElement subtypes (e.g., RoadElement.elementID).

2. In Part 3 Alignment, Alignment is changed from being a subtype of PositioningElement to being a subtype of Feature to allow it to act as a linear element. PositioningElement is no longer needed and is therefore not implemented in InfraGML as it has no purpose or properties.

3. Because the Facility Requirements Class is not dependent upon the Project Requirements Class, the association between Facility::FacilityPart and Project::ProjectPart cannot be implemented in the Facility Requirements Class GML. It is implemented in the Project Requirements Class GML since the Project Requirements Class is dependent upon the Facility Requirements Class.

The Logical Model UML is therefore:



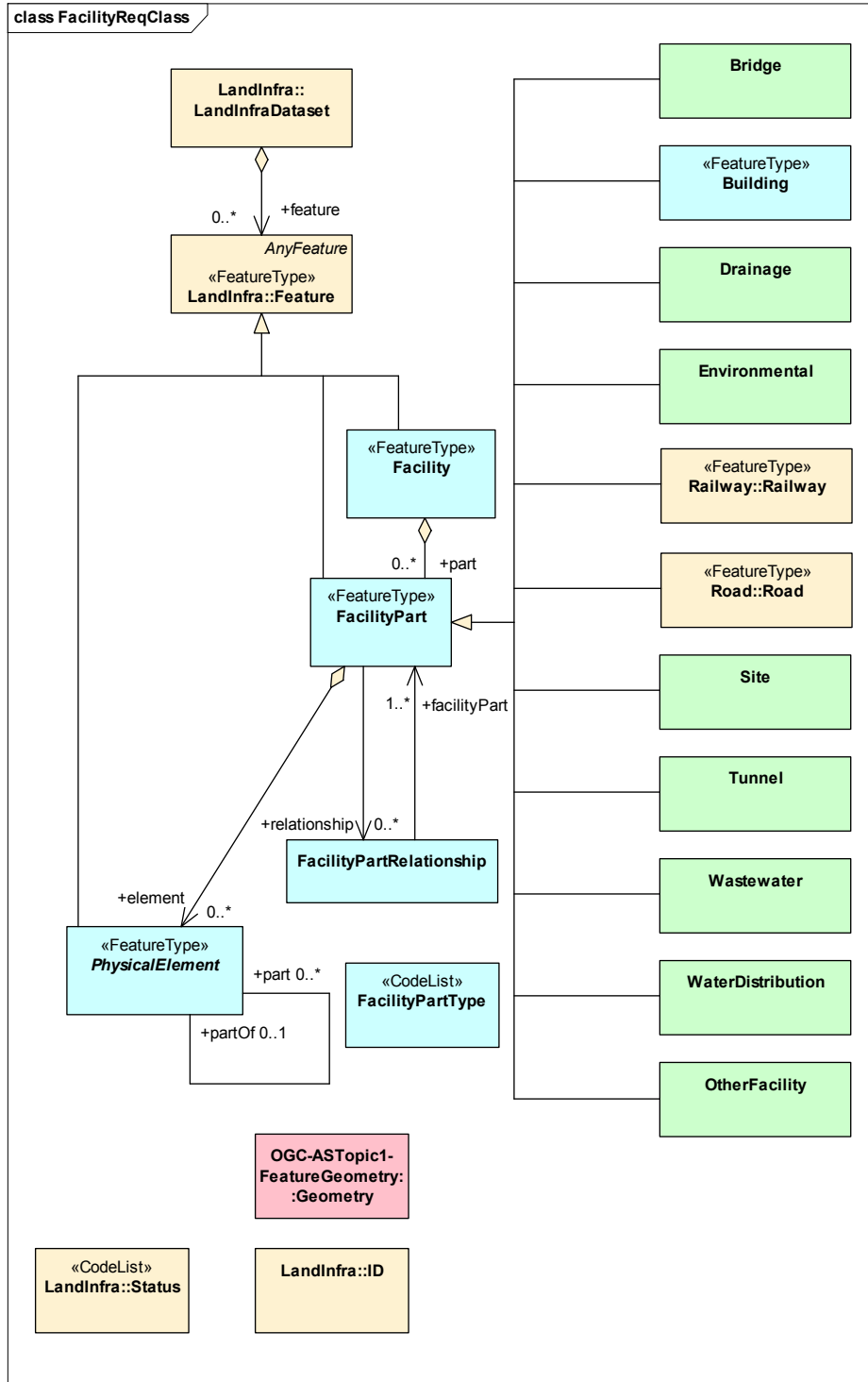


Figure 4. InfraGML Facility Logical Model UML

### 7.2.2 Specific Requirements for this Requirements Class

<b>Requirement</b>	<b><a href="#">/req/facility/elements</a></b>  A conforming application shall support the Facility XML elements listed in Table 1 in accordance with the GML XSD specified in <a href="http://schemas.opengis.net/infragml/part2/1.0/facility.xsd">http://schemas.opengis.net/infragml/part2/1.0/facility.xsd</a> .
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An application conforming to this standard shall support the Facility XML elements listed below in Table 1 in accordance with the GML XSD specified in <http://schemas.opengis.net/infragml/part2/1.0/facility.xsd>. Facility XML element names are shown with a XML namespace prefix of “lif”. Corresponding LandInfra UML classes are shown with their LandInfra Requirements Class prefix of “Facility”.

<b>InfraGML XML element</b>	<b>LandInfra UML Class</b>
lif:Building	Facility::Building
lif:Facility	Facility::Facility
lif:FacilityPart	Facility::FacilityPart
lif:FacilityPartRelationship	Facility::FacilityPartRelationship
lif:PhysicalElement	Facility::PhysicalElement

*Table 1. InfraGML Facility XML elements with corresponding LandInfra UML classes*

An application conforming to this standard shall specify which of the LandInfra FacilityPart subtypes it supports.

<b>Requirement</b>	<b><a href="#">/req/facility/subtypes</a></b>  A conforming application shall specify which of the LandInfra FacilityPart subtypes it supports.
--------------------	---

### 7.3 Requirements Class: Project

<b>Requirements Class</b>	
<b><a href="#">/req/project</a></b>	
Target type	Conforming application
Name	Project
Dependency	<b><a href="#">/req/facility</a></b>
<b>Requirement</b>	<b><a href="#">/req/project/elements</a></b>

#### 7.3.1 Implementation decisions regarding OGC 15-111r1 UML

The following implementation decisions have been made regarding the OGC 15-111r1 LandInfra Requirements Class UML:

1. For consistency with the aggregation association between Facility::Facility and Facility::FacilityPart, the composition association between Project::Project and Project::ProjectPart has been implemented as an aggregation association.

### 7.3.2 Specific Requirements for this Requirements Class

<b>Requirement</b>	<p><b>/req/project/elements</b></p> <p>A conforming application shall support the Project XML elements listed in Table 2 in accordance with the GML XSD specified in <a href="http://schemas.opengis.net/infragml/part2/1.0/project.xsd">http://schemas.opengis.net/infragml/part2/1.0/project.xsd</a>.</p>
--------------------	---

An application conforming to this standard shall support the Project XML elements listed below in Table 2 in accordance with the GML XSD specified in <http://schemas.opengis.net/infragml/part2/1.0/project.xsd>. Project XML element names are shown with a XML namespace prefix of “lip”. Corresponding LandInfra UML classes are shown with their LandInfra Requirements Class prefix of “Project”.

<b>InfraGML XML element</b>	<b>LandInfra UML Class</b>
lip:Project	Project::Project
lip:ProjectPart	Project::ProjectPart

*Table 2. InfraGML Project XML elements with corresponding LandInfra UML classes*

## 8. Media Types for any data encoding(s)

Data for all Parts of the InfraGML encoding standard is encoded in GML-conformant XML documents. The standard MIME-type and sub-type for GML data should be used to indicate the encoding in internet exchange, as specified in MIME Media Types for GML, namely ‘application/gml+xml’.

## Annex A. Conformance Class Abstract Test Suite (Normative)

### A.1 Conformance class: Facility

<b><a href="#">/conf/facility</a></b>		
Requirements	<a href="#">/req/facility</a>	
Dependency	<a href="#">/conf/core</a> (from InfraGML Part 0)	
Test	<b><a href="#">/conf/facility/elements</a></b>	
	Requirement	<a href="#">/req/facility/elements</a>
	Test purpose	Verify that the conforming application supports the Facility XML elements listed in Table 1 in accordance with the GML XSD specified in <a href="http://schemas.opengis.net/infragml/part2/1.0/facility.xsd">http://schemas.opengis.net/infragml/part2/1.0/facility.xsd</a> .
	Test method	Inspect the GML output to verify the above requirement.
	Test type	Capability
Test	<b><a href="#">/conf/facility/subtypes</a></b>	
	Requirement	<a href="#">/req/facility/subtypes</a>
	Test purpose	Verify that the conforming application specifies which of the LandInfra FacilityPart subtypes it supports.
	Test method	Inspect the application to verify the above requirement is satisfied.
	Test type	Capability

### A.2 Conformance class: Project

<b><a href="#">/conf/project</a></b>		
Requirements	<a href="#">/req/project</a>	
Dependency	<a href="#">/conf/facility</a>	
Test	<b><a href="#">/conf/project/elements</a></b>	
	Requirement	<a href="#">/req/project/elements</a>
	Test purpose	Verify that the conforming application supports the Project XML elements listed in Table 2 in accordance with the GML XSD specified in <a href="http://schemas.opengis.net/infragml/part2/1.0/project.xsd">http://schemas.opengis.net/infragml/part2/1.0/project.xsd</a> .
	Test method	Inspect the GML output to verify the above requirement.
	Test type	Capability

## Annex B. Sample XML (Informative)

The following XML instance document attempts to demonstrate the use of most all of the elements supported by the specified Requirements Class(es), including all optional properties. All values are exemplary only and not intended to represent actual real world instance values. Not all xlink references are resolvable within this document.

### B.1 Complete Facility and Project XML

Example from Part2Facility0410.xsd and Part2Project0410.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<LandInfraDataset xmlns="http://www.opengis.net/infragml/core/1.0"
xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:li="http://www.opengis.net/infragml/core/1.0"
xmlns:lif="http://www.opengis.net/infragml/facility/1.0"
xmlns:lip="http://www.opengis.net/infragml/project/1.0"
xmlns:gmlr="http://www.opengis.net/gml/3.3/lr"
gml:id="ds2"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/infragml/project/1.0 Part2Project0410.xsd">
  <datasetID>
    <ID>
      <identifier>DS2</identifier>
      <scope>OGC LandInfraSWG</scope>
    </ID>
  </datasetID>
  <name>Sample Part2 Dataset</name>
  <description>LandInfra dataset to test all possible content for Part2 Facilities and
  Projects</description>
  <dateTime>2016-12-02T10:00:00</dateTime>
  <datasetVersion>1.0</datasetVersion>
  <application>manual</application>
  <author>Paul Scarponcini, Bentley Systems, Inc.</author>
  <infraVersion>1.0</infraVersion>
  <language>English</language>
  <defaultCRS xlink:href="crs1"/>
  <feature>
    <lif:Facility gml:id="f1">
      <lif:facilityID>
        <lif:ID>
          <identifier>101</identifier>
        </lif:ID>
      </lif:facilityID>
      <lif:type>campus</lif:type>
      <lif:status xlink:href="http://example.com/status#preliminaryDesigned"
      xlink:title="Preliminary Designed"/>
      <lif:footprint xlink:href="poly1" xlink:title="Polygon">
        </lif:footprint>
      <lif:part xlink:href="fp1"></lif:part>
      <lif:part xlink:href="b1"></lif:part>
    </lif:Facility>
  </feature>
```

```

<feature>
  <lif:FacilityPart gml:id="fp1">
    <lif:facilityPartID>
      <lif:ID>
        <identifier>bridge1</identifier>
      </lif:ID>
    </lif:facilityPartID>
    <lif:type xlink:href="http://example.com/facilityPartType#bridge"
      xlink:title="Bridge"/>
    <lif:status xlink:href="http://example.com/status#preliminaryDesigned"
      xlink:title="Preliminary Designed"/>
    <lif:alternative>Design A</lif:alternative>
    <lif:relationship>
      <lif:FacilityPartRelationship gml:id="fpr1">
        <lif:relationship>supports</lif:relationship>
        <lif:description>bridge 1 carries road 1 across the Ob River</lif:description>
        <lif:facilityPart xlink:href="r1"></lif:facilityPart>
      </lif:FacilityPartRelationship>
    </lif:relationship>
  </lif:FacilityPart>
</feature>
<feature>
  <lip:Project gml:id="p1">
    <lip:projectID>
      <lip:ID>
        <identifier>5A</identifier>
      </lip:ID>
    </lip:projectID>
    <lip:projectStatus xlink:href="http://example.com/projectStatus#inPreliminaryDesign"
      xlink:title="In Preliminary Design"/>
    <lip:statusDate>2016-10-01</lip:statusDate>
    <lip:projectPart xlink:href="pp1">
      </lip:projectPart>
    </lip:Project>
  </feature>
  <feature>
    <lip:ProjectPart gml:id="pp1">
      <lip:projectPartID>
        <lip:ID>
          <identifier>5A Bridge 1</identifier>
        </lip:ID>
      </lip:projectPartID>
      <lip:alternative>DesignA</lip:alternative>
      <lip:status xlink:href="http://example.com/projectStatus#inPreliminaryDesign"
        xlink:title="In Preliminary Design"/>
      <lip:statusDate>2016-12-10</lip:statusDate>
      <lip:facilityPart xlink:href="fp1"></lip:facilityPart>
    </lip:ProjectPart>
  </feature>
  <feature>
    <lif:Building gml:id="b1">
      <lif:facilityPartID>
        <lif:ID>
          <identifier>Building102</identifier>
        </lif:ID>
      </lif:facilityPartID>
    </feature>
  </feature>

```

```

    <lif:type xlink:href="http://example.com/facilityPartType#building"
      xlink:title="Building"/>
    <lif:status xlink:href="http://example.com/status#inPlanning"
      xlink:title="In Planning"/>
  </lif:Building>
</feature>
<linearElement>
  <LinearElement gml:id="le1">
    <gmlr:feature>
      <Feature gml:id="elr1">
        <gml:description>Engineering Line of Reference linear element</gml:description>
        <gml:name>ELR1</gml:name>
      </Feature>
    </gmlr:feature>
    <gmlr:defaultLRM xlink:href="lrm1">
    </gmlr:defaultLRM>
    <gmlr:measure uom="m">1000</gmlr:measure>
  </LinearElement>
</linearElement>
<feature>
  <lif:PhysicalElement gml:id="phye1">
    <gml:name>span1</gml:name>
    <linearlyReferencedLocation>
      <LinearlyReferencedLocation>
        <linearAtLocation>
          <LinearAtLocation>
            <atPosition>
              <gmlr:PositionExpression gml:id="pe1">
                <gmlr:linearElement xlink:href="le1"></gmlr:linearElement>
                <gmlr:lrm xlink:href="lrm1"></gmlr:lrm>
                <gmlr:distanceExpression>
                  <gmlr:DistanceExpression gml:id="de1">
                    <gmlr:distanceAlong>350</gmlr:distanceAlong>
                  </gmlr:DistanceExpression>
                </gmlr:distanceExpression>
              </gmlr:PositionExpression>
            </atPosition>
          </LinearAtLocation>
        </linearAtLocation>
      </LinearlyReferencedLocation>
    </linearlyReferencedLocation>
    <lif:part xlink:href="phye2"></lif:part>
  </lif:PhysicalElement>
</feature>
<feature>
  <lif:PhysicalElement gml:id="phye2">
    <gml:name>deck1</gml:name>
    <lif:partOf xlink:href="phye1"></lif:partOf>
  </lif:PhysicalElement>
</feature>
</LandInfraDataset>

```

## Annex C. Revision history

Date	Release	Author	Paragraph modified	Description
20170307	102r1	Scarponcini	Figure 2	Dependency changes in Part 6
20170410	102r2	Paul Scarponcini	Annex B	Fixed GML striping



## **Annex D. Bibliography**

- [1] OGC: OGC 08-131r3 The Specification Model — A Standard for Modular specifications, Open Geospatial Consortium, 2009