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Editor: Paul Scarponcini

Contributors: Erik Stubkjær

OGC InfraGML 1.0: Part 7 – LandInfra Land Division - Encoding Standard

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Contents

1. Scope.....	8
2. Conformance.....	8
3. References.....	9
4. Terms and Definitions.....	9
4.1 Land Division Terms	10
5. Conventions	10
5.1 Abbreviations.....	10
5.2 UML Package and Class Diagrams	10
5.3 Requirements	10
6. InfraGML Parts.....	11
7. Requirements Classes for this Part	14
7.1 Structural Overview of Requirements Classes	14
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: LandDivision.....	16
7.2.1 Implementation decisions regarding OGC 15-111r1 UML	16
7.2.2 Specific Requirements for this Requirements Class.....	16
7.3 Requirements Class: Condominium	18
7.3.1 Implementation decisions regarding OGC 15-111r1 UML	18
7.3.2 Specific Requirements for this Requirements Class.....	18
8. Media Types for any data encoding(s).....	19
Annex A: Conformance Class Abstract Test Suite (Normative).....	20
A.1 Conformance class: LandDivision.....	20

A.2	Conformance class: Condominium.....	20
Annex B:	Sample XML (Informative).....	21
B. 1	Complete land division and condominium example.....	21
B. 2	Bounding Elements example	28
B. 3	Condominium example.....	43
Annex C:	Revision history	51
Annex D:	Bibliography	52

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

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 7 addresses the LandDivision and Condominium Requirements Classes from LandInfra.

ii. Keywords

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

OGC document, LandInfra, InfraGML, infrastructure, land parcel, real estate, immovable property, condominium, strata title

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 2nd 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The Open Geospatial Consortium shall not be held responsible for identifying any or all such patent rights.

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.

iv. Submitting organizations

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

Bentley Systems, Inc.

Aalborg University, Dept. of Development & Planning

Trimble Inc.

Leica Geosystems

Autodesk

v. Submitters

All questions regarding this submission should be directed to the editor or the submitters:

Name	Affiliation
Paul Scarponcini, SWG chair	Bentley Systems, Inc.
Erik Stubkjær	Aalborg University, Dept. of Development & Planning
Leif Granholm	Trimble Inc.
Johnny Jensen	Trimble Inc.
Hans-Christoph Gruler, SWG co-chair	Leica Geosystems
Orest Halustchak	Autodesk

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 interests in land. 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 7 of InfraGML addresses the following subject area(s): land division and condominium. These subject areas are commonly termed ‘cadastral survey’, but this term is avoided here, as it includes surveying, which is addressed by Part 6 of InfraGML. Two InfraGML Requirements Classes are included: LandDivision and Condominium. An application can conform to InfraGML without supporting all other parts of InfraGML, for example the Survey Requirements Classes of Part 6. However, to claim support for LandDivision, an application must also support the InfraGML Core and to claim support for Condominium, an application must in addition support the LandDivision Requirements Class.

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 site¹.

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 07-036, *OpenGIS® Geography Markup Language (GML) Encoding Standard*, v3.2.1, August 27, 2007

OGC 10-129r1, *OGC® Geography Markup Language (GML) — Extended schemas and encoding rules*, v3.3, February 7, 2012

OGC 15-111r1, *OGC Land and Infrastructure Conceptual Model Standard (LandInfra)*, v1.0, August 2nd, 2016.

OGC 16-100, *OGC InfraGML 1.0: Part 0 – LandInfra Core – Encoding Standard*, v1.0, June, 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. Only terms not already appearing there are listed below.

¹ www.opengeospatial.org/cite

4.1 Land Division Terms

4.1

cadastral survey

survey of the **boundary** of an **interest in land**

Note 1 to entry: **Cadastral survey** is performed for the initial formation of property units, as well as for re-establishment of missing boundaries and subsequent changes of the boundaries.

Note 2 to entry: Demarcation of **boundary** with **survey monument** and documentation in terms of a **statement** is covered by this standard, while adjudication (the process leading to determination of rights in land) and registration (the official recording by the pertinent agency) is out of scope.

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/infragml/part7/1.0>. 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:

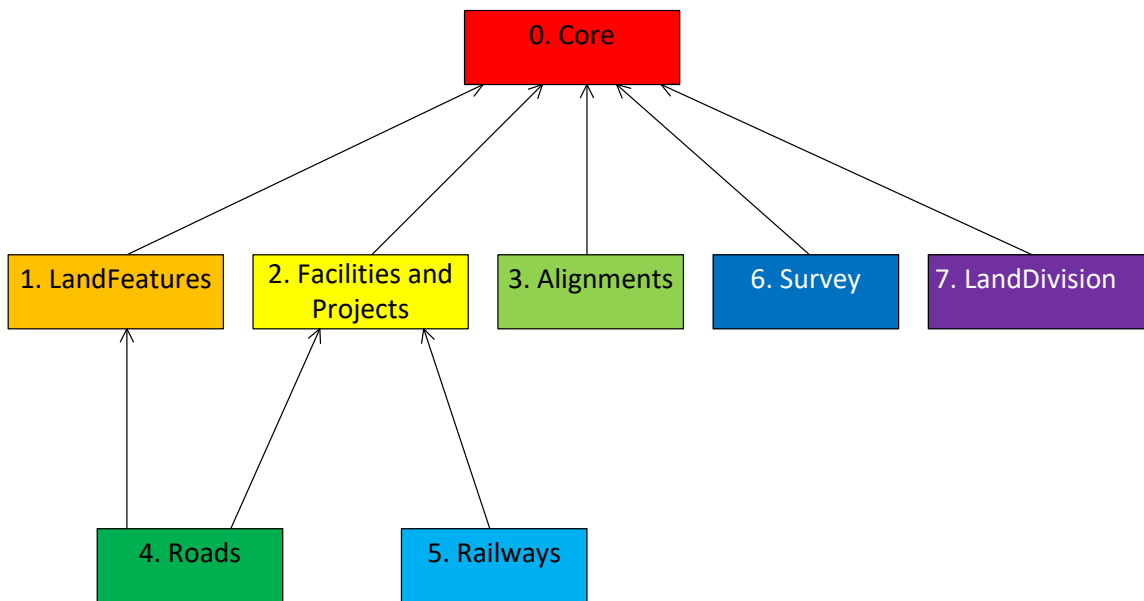


Figure 1. InfraGML Part Dependencies

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):

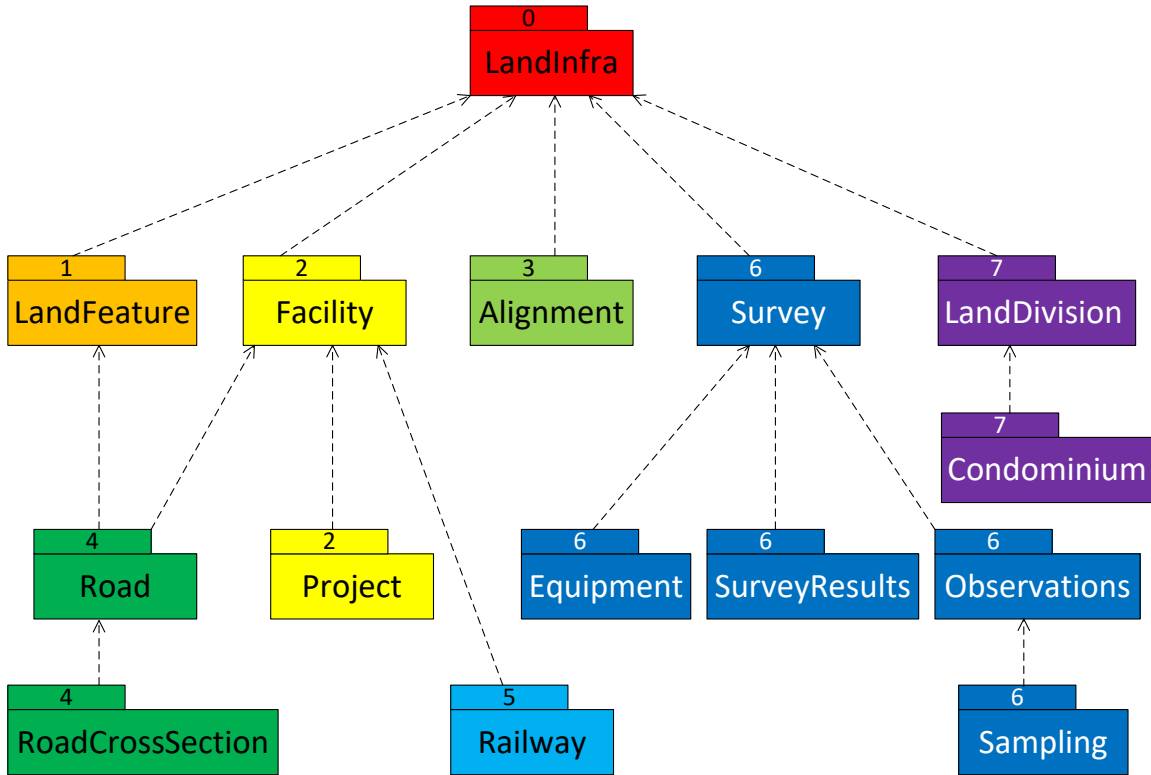


Figure 2. LandInfra Requirements Classes grouped into InfraGML Parts

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 (Core 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 the Requirements Classes.

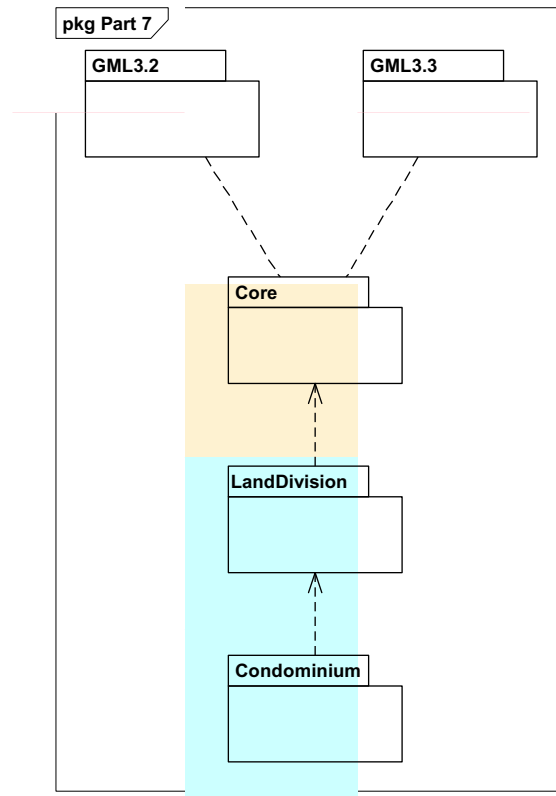


Figure 3. Requirements Classes for this Part and their Dependencies

7.1.1 Requirement Classes Defined in This Part

LandDivision

Land can be divided up into LandDivisions. These can either be public (political, judicial, or executive) or private in nature. The former are AdministrativeDivisions and the latter are InterestsInLand. Both of these are specified in the LandDivision Requirements Class, though condominium interests in land are specified in a separate, Condominium

Requirements Class. The geometrical shape of these spatial units is modelled independently from their administrative or legal status, (see LandInfra UML, **Error! Reference source not found. Error! Reference source not found.**).

Condominium

A CondominiumUnit is a concurrent ownership of real property that has been divided into private and common portions [2, 3]. The privately owned part is made up of clearly demarcated, floor related parts of a building (BuildingPart), as specified by a CondominiumScheme. CondominiumUnit owners are members of a mandatory owners' association. Moreover, each CondominiumUnit has a share in the common parts of the property.

The Condominium Requirements Class includes information about condominium units, buildings and schemes. The Condominium Requirement Class is dependent on the LandDivision Requirement Class.

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 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, documents, professional, survey marks, surveys, sets, and feature associations. LandInfra 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: LandDivision

Requirements Class	
/req/landdivision	
Target type	Conforming application
Name	LandDivision
Dependency	/req/core (from InfraGML Part 0)
Requirement	/req/landdivision/elements

7.2.1 Implementation decisions regarding OGC 15-111r1 UML

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

1. GML will not allow an element to be associated with another element if it is already on the part side of a composition association. For example, if, as the 15-111r1 Figure 62 UML shows, LandParcel is a compositional part of LandPropertyUnit, then it cannot also be associated with Easement. Therefore the composition association has been replaced by a mandatory, uni-directional (1..*) association from LandPropertyUnit to LandParcel. The LandParcel-Easement association has been simplified to become uni-directional from Easement to LandParcel.

7.2.2 Specific Requirements for this Requirements Class

Requirement	/req/landdivision/elements
	A conforming application shall support the LandDivision XML elements listed in Table 1 below, in accordance with the GML XSD specified in http://schemas.opengis.net/infragml/part7/1.0/land-division.xsd .

An application conforming to this standard shall support the LandDivision XML elements listed below in Table 1 in accordance with the GML XSD specified in <http://schemas.opengis.net/infragml/part7/1.0/land-division.xsd>. LandDivision XML element names are shown with a XML namespace prefix of “lild”. Corresponding LandInfra UML classes are shown with their LandInfra Requirements Class prefix of “LandDivision”.

InfraGML XML element	LandInfra UML Class
lild:AdministrativeDivision	LandDivision::AdministrativeDivision
lild:BEExplicitFace	LandDivision::BEExplicitFace
lild:BEExtrudedFace	LandDivision::BEExtrudedFace
lild:BEFace	LandDivision::BEFace
lild:BEImplicitFace	LandDivision::BEImplicitFace

lild:BEPoint	LandDivision::BEPoint
lild:BESolid	LandDivision::BESolid
lild:BEString	LandDivision::BEString
lild:BEText	LandDivision::BEText
lild:BoundingElement	LandDivision::BoundingElement
lild:Easement	LandDivision::Easement
lild:ExtrusionLimit	LandDivision::ExtrusionLimit
lild:InterestInLand	LandDivision::InterestInLand
lild:LandDivision	LandDivision::LandDivision
lild:LandParcel	LandDivision::LandParcel
lild:LandPropertyUnit	LandDivision::LandPropertyUnit
lild:Ownership	LandDivision::Ownership
lild:PropertyUnit	LandDivision::PropertyUnit
lild:Signatory	LandDivision::Signatory
lild:SpatialUnit	LandDivision::SpatialUnit
lild:Statement	LandDivision::Statement
lild:SuperficieObject	LandDivision::SuperficieObject
lild:SurveyMonument	LandDivision::SurveyMonument

Table 1. InfraGML LandDivision XML elements with corresponding LandInfra UML classes

7.3 Requirements Class: Condominium

Requirements Class	
/req/condominium	
Target type	Conforming application
Name	Condominium
Dependency	/req/landdivision
Requirement	/req/condominium/elements

7.3.1 Implementation decisions regarding OGC 15-111r1 UML

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

1. LandInfra UML specifies CondominiumBuilding as subtype of Facility::Building, thereby creating a dependency on InfraGML Part 2 Facility. While this modelling is adequate, the benefit does not outweigh the cost of dependency. Waiting for linking with IFCs, CondominiumBuilding is here made subtype of LandInfra::Feature, similar to the modelling chosen for SuperficieObject (LandInfra UML 7.10.2.6)
2. GML will not allow an element to be associated with another element if it is already on the part side of a composition association. For example, if, as the 15-111r1 Figure 69 UML shows, BuildingPart is a compositional part of CondominiumBuilding, then it cannot also be associated with CondominiumUnit. Therefore the composition association has been replaced by a mandatory, uni-directional association from BuildingPart to CondominiumBuilding. The redundant CondominiumScheme-CondominiumBuilding association can now be dropped, as it is possible to determine the CondominiumBuildings participating in a CondominiumScheme by tracing from CondominiumScheme to CondominiumUnit to BuildingPart to CondominiumBuilding.

7.3.2 Specific Requirements for this Requirements Class

Requirement	/req/condominium/elements
	A conforming application shall support the Condominium XML elements listed in Table 2 below, in accordance with the GML XSD specified in http://schemas.opengis.net/infragml/part7/1.0/condominium.xsd .

An application conforming to this standard shall support the Condominium XML elements listed below in Table 2 in accordance with the GML XSD specified in <http://schemas.opengis.net/infragml/part7/1.0/condominium.xsd>. Condominium XML element names are shown with a XML namespace prefix of “lic”. Corresponding LandInfra UML classes are shown with their LandInfra Requirements Class prefix of “Condominium”.

InfraGML XML element	LandInfra UML Class
----------------------	---------------------

lic:BuildingPart	Condominium::BuildingPart
lic:CondominiumBuilding	Condominium::CondominiumBuilding
lic:CondominiumScheme	Condominium::CondominiumScheme
lic:CondominiumUnit	Condominium::CondominiumUnit

Table 2. InfraGML Condominium 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: LandDivision

<u>/conf/landdivision</u>		
Requirements	<u>/req/landdivision</u>	
Dependency	<u>/conf/core</u> (from InfraGML Part 0)	
Test	<u>/conf/landdivision/elements</u>	
	Requirement	<u>/req/landdivision/elements</u>
	Test purpose	Verify that the conforming application supports the LandDivision XML elements listed in Table 1 in accordance with the GML XSD specified in http://schemas.opengis.net/infragml/part7/1.0/land-division.xsd .
	Test method	Inspect the GML output to verify the above requirement.
	Test type	Capability

A.2 Conformance class: Condominium

<u>/conf/condominium</u>		
Requirements	<u>/req/condominium</u>	
Dependency	<u>/conf/landdivision</u>	
Test	<u>/conf/condominium/elements</u>	
	Requirement	<u>/req/condominium/elements</u>
	Test purpose	Verify that the conforming application supports the Condominium XML elements listed in Table 2 in accordance with the GML XSD specified in http://schemas.opengis.net/infragml/part7/1.0/condominium.xsd
	Test method	Inspect the GML output to verify the above requirement.
	Test type	Capability

Annex B: Sample XML (Informative)

B.1 Complete land division and condominium example

The following XML example document demonstrates all attributes and roles from all classes contained in the LandDivision and Condominium RCs, except for bounding elements which are shown in Annex **Error! Reference source not found.**

```
<?xml version="1.0" encoding="UTF-8"?>
<li:LandInfraDataset xmlns:lic="http://www.opengis.net/infragml/condominium/1.0"
xmlns:lild="http://www.opengis.net/infragml/landdivision/1.0"
xmlns:li="http://www.opengis.net/infragml/core/1.0" xmlns:gml="http://www.opengis.net/gml/3.2"
gml:id="c00" xmlns:gmlr="http://www.opengis.net/gml/3.3/lr"
xmlns:gmlro="http://www.opengis.net/gml/3.3/lro" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/infragml/condominium/1.0
Part7Condominium0410.xsd">
  <li:datasetID>
    <li:ID>
      <li:identifier>ldco</li:identifier>
      <li:scope>OGC LandInfra</li:scope>
    </li:ID>
  </li:datasetID>
  <li:dateTime>2017-05-05T10:00:00</li:dateTime>
  <li:datasetVersion>1.0</li:datasetVersion>
  <li:application>manual</li:application>
  <li:author>Erik Stubkjær, Aalborg University, Denmark</li:author>
  <li:infraVersion>1.0</li:infraVersion>
  <li:language>English</li:language>
  <li:defaultCRS xlink:href="urn:ogc:def:crs:EPSG::4094"/>
  <!-- Administrative Division -->
  <li:feature>
    <lild:AdministrativeDivision gml:id="ad1">
      <lild:adID>
        <lild:ID>
          <li:identifier>851</li:identifier>
        </lild:ID>
      </lild:adID>
      <lild:adType>Municipality</lild:adType>
      <lild:shapeAndLocation>
        <lild:SpatialUnit gml:id="ad1su">
          <lild:spatialUnitID>
            <lild:ID>
              <li:identifier>Aalborg</li:identifier>
            </lild:ID>
          </lild:spatialUnitID>
          <lild:dimension>2D</lild:dimension>
          <lild:boundingElement/>
        </lild:SpatialUnit>
      </lild:shapeAndLocation>
      <lild:ownedBy xlink:href="ad2"/>
    </lild:AdministrativeDivision>
  </li:feature>
</li:feature>
```

```

<lild:AdministrativeDivision gml:id="ad2">
  <lild:adID>
    <lild:ID>
      <li:identifier>DK05</li:identifier>
    </lild:ID>
  </lild:adID>
  <lild:adType>Region</lild:adType>
  <lild:isoCode>DK-81</lild:isoCode>
  <lild:shapeAndLocation>
    <lild:SpatialUnit gml:id="ad2su">
      <lild:spatialUnitID>
        <lild:ID>
          <li:identifier>Nordjylland</li:identifier>
        </lild:ID>
      </lild:spatialUnitID>
      <lild:dimension>2D</lild:dimension>
      <lild:boundingElement/>
      <!-- See file 'complete bounding elements example 20170410 pxs.xml' -->
    </lild:SpatialUnit>
  </lild:shapeAndLocation>
  <lild:part xlink:href="ad1"/>
</lild:AdministrativeDivision>
</li:feature>
<!-- Easement with Statement -->
<li:feature>
  <lild:Easement gml:id="es">
    <lild:documentation>
      <lild:Statement gml:id="st1">
        <li:documentID>
          <li:ID>
            <li:identifier>12</li:identifier>
          </li:ID>
        </li:documentID>
        <li:documentType>easementEstablishment</li:documentType>
        <li:documentContent>DocumentContent.odt</li:documentContent>
        <lild:type xlink:href="http://example.com/StatementType#easementEstablishment"
          xlink:title="easementEstablishment"/>
        <lild:draftsman>
          <li:Professional gml:id="pr1">
            <li:fullName>Peter P</li:fullName>
            <li:type xlink:href="http://example.com/ProfessionalType#landSurveyor"
              xlink:title="landSurveyor"/>
            <li:company>ABC</li:company>
            <li:registration>LicenseW1986-23</li:registration>
            <li:licensingCountry>DK</li:licensingCountry>
          </li:Professional>
        </lild:draftsman>
      </lild:Statement>
    </lild:documentation>
    <lild:caseID>
      <lild:ID>
        <li:identifier>123</li:identifier>
      </lild:ID>
    </lild:caseID>
    <lild:landRecordingDocumentId>
      <lild:ID>
        <li:identifier>LRident234</li:identifier>
      </lild:ID>
    </lild:landRecordingDocumentId>
  </lild:Easement>
</li:feature>

```

```

</lild:landRecordingDocumentId>
<lild:signatory>
  <lild:Signatory gml:id="sig1">
    <lild:signingParty>Sanny Sandy</lild:signingParty>
    <lild:role xlink:href="http://example.com/SigningRole#owner" xlink:title="owner"/>
    <lild:signingDate>2016-03-03</lild:signingDate>
  </lild:Signatory>
</lild:signatory>
</lild:Statement>
</lild:documentation>
<lild:easementID>
  <lild:ID>
    <li:identifier>234</li:identifier>
  </lild:ID>
</lild:easementID>
<lild:type xlink:href="http://example.com/EasementType#rightOfWay"
  xlink:title="RightOfWay"/>
<lild:beneficiaryParty>Current owner of LandParcel 'lp'</lild:beneficiaryParty>
<lild:permittedUse>Context-specific description of the permitted use</lild:permittedUse>
<lild:across xlink:href="lp"/>
</lild:Easement>
</li:feature>
<!-- SurveyMonument -->
<li:feature>
  <lild:SurveyMonument gml:id="sm">
    <lild:type xlink:href="http://example.com/SurveyMonumentType#boundaryMark"
      xlink:title="boundaryMark"/>
    <lild:documentation xlink:href="st1"/>
  </lild:SurveyMonument>
</li:feature>
<!-- PropertyUnit -->
<li:feature>
  <lild:PropertyUnit gml:id="pu">
    <lild:documentation xlink:href="st1"/>
    <lild:propertyUnitID>
      <lild:ID>
        <li:identifier>123</li:identifier>
        <li:scope>X municipality</li:scope>
      </lild:ID>
    </lild:propertyUnitID>
    <lild:ownership>
      <lild:Ownership gml:id="os">
        <lild:name>Sanny Sandy</lild:name>
        <lild:relativeShare>100</lild:relativeShare>
        <lild:ownerAddress>Next Village Road 5</lild:ownerAddress>
      </lild:Ownership>
    </lild:ownership>
  </lild:PropertyUnit>
</li:feature>
<!-- LandPropertyUnit with LandParcel -->
<li:feature>
  <lild:LandPropertyUnit gml:id="lpu">
    <lild:documentation/>
    <lild:propertyUnitID>
      <lild:ID>
        <li:identifier>123</li:identifier>

```

```

</lild:ID>
</lild:propertyUnitID>
<lild:ownership xlink:href="os"/>
<lild:postAddress>Post address of LandPropertyUnit</lild:postAddress>
<lild:landParcel>
  <lild:LandParcel gml:id="lp">
    <lild:cadastralParcelId>
      <lild:ID>
        <li:identifier>13g</li:identifier>
        <li:scope>H Township</li:scope>
      </lild:ID>
    </lild:cadastralParcelId>
    <lild:parcelArea uom="m2">927</lild:parcelArea>
    <lild:currentLandUse>Residential</lild:currentLandUse>
    <lild:plannedLandUse>Residential, low and detached</lild:plannedLandUse>
    <lild:parcelState>current</lild:parcelState>
    <lild:shapeAndLocation>
      <lild:SpatialUnit gml:id="su2">
        <lild:spatialUnitID>
          <lild:ID>
            <li:identifier>13/23</li:identifier>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>2D</lild:dimension>
        <lild:boundingElement>
          <lild:BEStrng gml:id="e">
            <lild:boundingElementID/>
            <lild:isComplete>true</lild:isComplete>
            <lild:geometry>
              <gml:Polygon gml:id="f">
                <gml:exterior>
                  <gml:LinearRing>
                    <gml:pos>397291.57 1317064.10</gml:pos>
                    <gml:pos>397338.29 1317063.42</gml:pos>
                    <gml:pos>397337.93 1317049.88</gml:pos>
                    <gml:pos>397336.13 1317043.45</gml:pos>
                    <gml:pos>397291.50 1317044.11</gml:pos>
                    <gml:pos>397291.57 1317064.10</gml:pos>
                  </gml:LinearRing>
                </gml:exterior>
              </gml:Polygon>
            </lild:geometry>
            <lild:stringType>ring</lild:stringType>
          </lild:BEStrng>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </lild:shapeAndLocation>
    <lild:within xlink:href="ad1"/>
  </lild:LandParcel>
</lild:landParcel>
</lild:LandPropertyUnit>
</li:feature>
<!-- SuperficieObject with Statement -->
<li:feature>
  <lild:SuperficieObject gml:id="so1">
    <lild:superficieID>

```



```

    <lild:ID>
      <li:identifier>345</li:identifier>
    </lild:ID>
  </lild:superficieID>
  <lild:type>Shelter</lild:type>
  <lild:ownership>
    <lild:Ownership gml:id="os2">
      <lild:name>Civil Defence Agency</lild:name>
      <lild:ownerAddress>CDA address</lild:ownerAddress>
    </lild:Ownership>
  </lild:ownership>
  <lild:encumbranceScheme>
    <lild:Statement gml:id="st2">
      <li:documentID>
        <li:ID>
          <li:identifier>456</li:identifier>
        </li:ID>
      </li:documentID>
      <li:documentType/>
      <li:documentContent>Details on location, access and relation to surface LandParcels,
which may be formally provided through LandParcel, SpatialUnit, and
Easement</li:documentContent>
    </lild:Statement>
  </lild:encumbranceScheme>
</lild:SuperficieObject>
</li:feature>
<!-- BuildingPart with CondominiumBuilding -->
<li:feature>
  <lic:BuildingPart gml:id="bp1">
    <lic:floorNumber>3</lic:floorNumber>
    <lic:subSurfaceFloor>>false</lic:subSurfaceFloor>
    <lic:floorArea uom="m2">87</lic:floorArea>
    <lic:buildingPartType>condominiumMainPart</lic:buildingPartType>
    <lic:shapeAndLocation/>
    <lic:partOf>
      <lic:CondominiumBuilding gml:id="cb1">
        <lic:buildingNumber>567</lic:buildingNumber>
        <lic:parcelLocation xlink:href="lp"/>
      </lic:CondominiumBuilding>
    </lic:partOf>
  </lic:BuildingPart>
</li:feature>
<!-- CondominiumScheme with CondominiumUnits -->

```

```

<li:feature>
  <lic:CondominiumScheme gml:id="cs1">
    <li:documentID>
      <li:ID>
        <li:identifier>678</li:identifier>
      </li:ID>
    </li:documentID>
    <li:documentType>CondominiumScheme</li:documentType>
    <lild:type xlink:href="http://example.com/StatementType#condominiumScheme"
      xlink:title="condominiumScheme"/>
    <lild:draftsman xlink:href="pr1"/>
    <lild:caseID>
      <lild:ID>
        <li:identifier>789</li:identifier>
      </lild:ID>
    </lild:caseID>
    <lild:signatory>
      <lild:Signatory gml:id="s3">
        <lild:signingParty>sp</lild:signingParty>
        <lild:signingDate>2017-03-03</lild:signingDate>
      </lild:Signatory>
    </lild:signatory>
    <lic:buildingDescription>Free-text building description</lic:buildingDescription>
    <lic:unit>
      <lic:CondominiumUnit gml:id="cu1">
        <lild:documentation/>
        <lild:propertyUnitID>
          <lild:ID>
            <li:identifier>12</li:identifier>
          </lild:ID>
        </lild:propertyUnitID>
        <lild:ownership/>
        <!-- Unknown at the time of subdivision -->
        <lic:shareInJointFacilities>23/108</lic:shareInJointFacilities>
        <lic:condominiumUseType
          xlink:href="http://example.com/CondominiumUseType#residential"
          xlink:title="residential"/>
        <lic:designUnitID/>
        <!-- Optional id for use during construction -->
        <lic:mainPart>
          <lic:BuildingPart gml:id="bp2">
            <lic:floorNumber>1</lic:floorNumber>
            <lic:subSurfaceFloor>>false</lic:subSurfaceFloor>
            <lic:buildingPartType>condominiumMainPart</lic:buildingPartType>
            <lic:shapeAndLocation/>
            <lic:partOf xlink:href="cb1"/>
          </lic:BuildingPart>
        </lic:mainPart>
        <lic:accessoryPart>
          <lic:BuildingPart gml:id="bp3">
            <lic:floorNumber>0</lic:floorNumber>
            <lic:subSurfaceFloor>>true</lic:subSurfaceFloor>
            <lic:buildingPartType>condominiumAccessoryPart</lic:buildingPartType>
            <lic:shapeAndLocation/>
            <lic:partOf xlink:href="cb1"/>
          </lic:BuildingPart>
        </lic:accessoryPart>
      </lic:CondominiumUnit>
    </lic:unit>
  </lic:CondominiumScheme>
</li:feature>

```

```

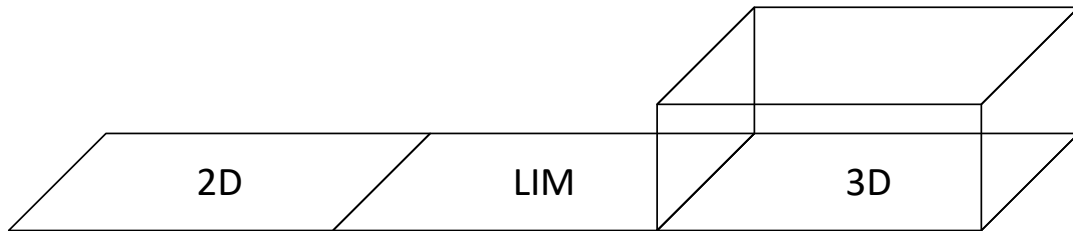
    </lic:accessoryPart>
  </lic:CondominiumUnit>
</lic:unit>
<lic:unit>
  <lic:CondominiumUnit gml:id="cu2">
    <lild:documentation/>
    <lild:propertyUnitID>
      <lild:ID>
        <li:identifier>23</li:identifier>
      </lild:ID>
    </lild:propertyUnitID>
    <lild:ownership/>
    <lic:shareInJointFacilities>10/108</lic:shareInJointFacilities>
    <lic:mainPart>
      <lic:BuildingPart gml:id="bp4">
        <lic:floorNumber>2</lic:floorNumber>
        <lic:subSurfaceFloor>>false</lic:subSurfaceFloor>
        <lic:buildingPartType>condominiumMainPart</lic:buildingPartType>
        <lic:shapeAndLocation/>
        <lic:partOf xlink:href="cb1"/>
      </lic:BuildingPart>
    </lic:mainPart>
  </lic:CondominiumUnit>
</lic:unit>
</lic:CondominiumScheme>
</li:feature>
</li:LandInfraDataset>

```

B. 2 Bounding Elements example

This example demonstrates how Bounding Elements are encoded. Every type is included as if it were valid for Land Parcels, though some may be more appropriate for Condominium Building Parts. Coordinate values are chosen for clarity and may therefore not be realistic for real Land Parcels or Building Parts. See OGC 15-111r1 for a complete definition of the various types of Bounding Elements.

The first three Spatial Units demonstrate the difference in dimension only and are not complete in definition, as they lack Bounding Elements.



```
<?xml version="1.0" encoding="UTF-8"?>
<LandInfraDataset xmlns="http://www.opengis.net/infragml/core/1.0"
xmlns:lild="http://www.opengis.net/infragml/landdivision/1.0"
xmlns:gml="http://www.opengis.net/gml/3.2"
gml:id="BE"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gmlr="http://www.opengis.net/gml/3.3/lr"
xmlns:gmlro="http://www.opengis.net/gml/3.3/lro"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/infragml/landdivision/1.0
Part7LandDivision0410.xsd">
  <datasetID>
    <ID>
      <identifier>BE</identifier>
    </ID>
  </datasetID>
  <dateTime>2017-03-22T10:00:00</dateTime>
  <datasetVersion>1.0</datasetVersion>
  <application/>
  <author>Paul Scarponcini</author>
  <infraVersion>1.0</infraVersion>
  <language>English</language>
  <defaultCRS/>
  <feature>
    <lild:LandPropertyUnit gml:id="lpu1">
      <lild:documentation></lild:documentation>
      <lild:propertyUnitID>
        <lild:ID>
          <identifier></identifier>
        </lild:ID>
      </lild:propertyUnitID>
      <lild:ownership></lild:ownership>
    </lild:LandPropertyUnit>
  </feature>
</LandInfraDataset>
```

```

<!-- -->
<!-- 2D Land Parcel -->
<!-- -->
  <lild:landParcel>
    <lild:LandParcel gml:id="lp2D">
      <lild:cadastralParcelId>
        <lild:ID>
          <identifier></identifier>
        </lild:ID>
      </lild:cadastralParcelId>
      <lild:parcelArea uom="sf">5000</lild:parcelArea>
      <lild:shapeAndLocation>
        <lild:SpatialUnit gml:id="su2D">
          <lild:spatialUnitID>
            <lild:ID>
              <identifier></identifier>
            </lild:ID>
          </lild:spatialUnitID>
          <lild:dimension>2D</lild:dimension>
          <lild:boundingElement></lild:boundingElement>
        </lild:SpatialUnit>
      </lild:shapeAndLocation>
    </lild:LandParcel>
  </lild:landParcel>
<!-- -->
<!-- LIM Land Parcel -->
<!-- -->
  <lild:landParcel>
    <lild:LandParcel gml:id="lpLIM">
      <lild:cadastralParcelId>
        <lild:ID>
          <identifier></identifier>
        </lild:ID>
      </lild:cadastralParcelId>
      <lild:parcelArea uom="sf">5000</lild:parcelArea>
      <lild:shapeAndLocation>
        <lild:SpatialUnit gml:id="suLIM">
          <lild:spatialUnitID>
            <lild:ID>
              <identifier></identifier>
            </lild:ID>
          </lild:spatialUnitID>
          <lild:dimension>liminal</lild:dimension>
          <lild:boundingElement></lild:boundingElement>
        </lild:SpatialUnit>
      </lild:shapeAndLocation>
    </lild:LandParcel>
  </lild:landParcel>
<!-- -->
<!-- 3D Land Parcel -->
<!-- -->
  <lild:landParcel>
    <lild:LandParcel gml:id="lp3D">
      <lild:cadastralParcelId>
        <lild:ID>
          <identifier></identifier>

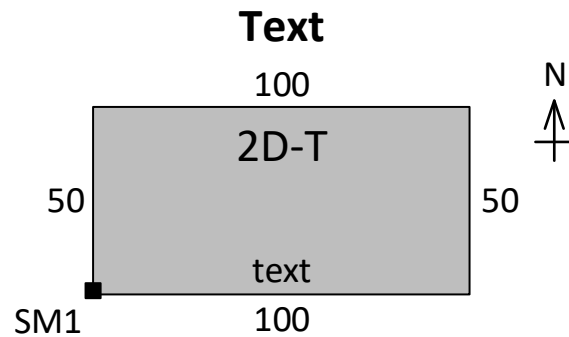
```

```

</lild:ID>
</lild:cadastralParcelId>
<lild:parcelArea uom="cf">1000000</lild:parcelArea>
<lild:shapeAndLocation>
  <lild:SpatialUnit gml:id="su3D">
    <lild:spatialUnitID>
      <lild:ID>
        <identifier></identifier>
      </lild:ID>
    </lild:spatialUnitID>
    <lild:dimension>3D</lild:dimension>
    <lild:boundingElement></lild:boundingElement>
  </lild:SpatialUnit>
</lild:shapeAndLocation>
</lild:LandParcel>
</lild:landParcel>

```

The 2D-T Spatial Unit demonstrates the use of the BEText Bounding Element in 2D:



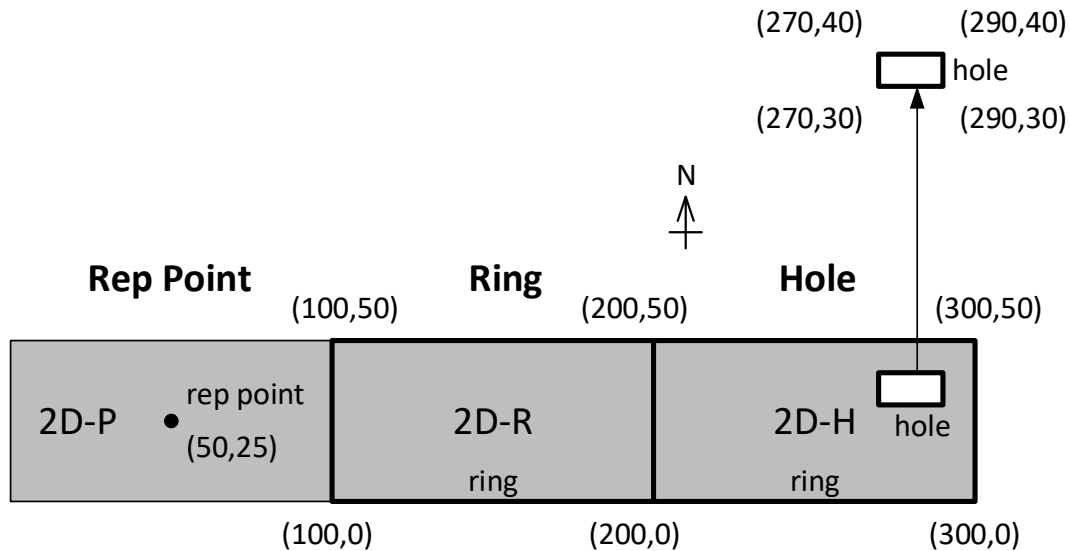
```

<!-- -->
<!-- 2D-T Land Parcel -->
<!-- -->
<lild:landParcel>
  <lild:LandParcel gml:id="lp2D-T">
    <lild:cadastralParcelId>
      <lild:ID>
        <identifier></identifier>
      </lild:ID>
    </lild:cadastralParcelId>
    <lild:parcelArea uom="sf">5000</lild:parcelArea>
    <lild:shapeAndLocation>
      <lild:SpatialUnit gml:id="su2D-T">
        <lild:spatialUnitID>
          <lild:ID>
            <identifier></identifier>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>2D</lild:dimension>
        <lild:boundingElement>
          <lild:BEText gml:id="text1">
            <lild:boundingElementID></lild:boundingElementID>
          </lild:BEText>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </lild:shapeAndLocation>
  </lild:LandParcel>
</lild:landParcel>

```

```
<lild:isComplete>>true</lild:isComplete>
<lild:geometry>
  "Beginning at Survey Monument SM1, thence North 50 feet, thence East 100 feet,
  thence South 50 feet, thence West 100 feet to the point of beginning"
</lild:geometry>
</lild:BEText>
</lild:boundingElement>
</lild:SpatialUnit>
</lild:shapeAndLocation>
</lild:LandParcel>
</lild:landParcel>
```

The 2D-P Spatial Unit demonstrates the use of the BEPoint Bounding Element in 2D, where a single representative point within the Land Parcel is used. The 2D-R Spatial Unit demonstrate the use of the BEString ring type of Bounding Element in 2D, where the exterior boundary is specified as a closed linestring geometry. 2D-H extends the ring example to include an interior ring defining a hole boundary.



```

<!-- -->
<!-- 2D-P Land Parcel -->
<!-- -->
<lild:landParcel>
  <lild:LandParcel gml:id="lp2D-P">
    <lild:cadastralParcelId>
      <lild:ID>
        <identifier></identifier>
      </lild:ID>
    </lild:cadastralParcelId>
    <lild:parcelArea uom="sf">5000</lild:parcelArea>
    <lild:shapeAndLocation>
      <lild:SpatialUnit gml:id="su2D-P">
        <lild:spatialUnitID>
          <lild:ID>
            <identifier></identifier>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>2D</lild:dimension>
        <lild:boundingElement>
          <lild:BEPoint gml:id="point1">
            <lild:boundingElementID></lild:boundingElementID>
            <lild:isComplete>>false</lild:isComplete>
            <lild:geometry>
              <gml:Point gml:id="p1">
                <gml:pos>50 25</gml:pos>
              </gml:Point>
            </lild:geometry>
          </lild:BEPoint>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </lild:shapeAndLocation>
  </lild:LandParcel>
</lild:landParcel>

```



```

        </gml:Point>
        </lild:geometry>
        </lild:BEPoint>
        </lild:boundingElement>
        </lild:SpatialUnit>
        </lild:shapeAndLocation>
        </lild:LandParcel>
    </lild:landParcel>
<!-- -->
<!-- 2D-R Land Parcel -->
<!-- -->
<lild:landParcel>
  <lild:LandParcel gml:id="lp2D-R">
    <lild:cadastralParcelId>
      <lild:ID>
        <identifier></identifier>
      </lild:ID>
    </lild:cadastralParcelId>
    <lild:parcelArea uom="sf">5000</lild:parcelArea>
    <lild:shapeAndLocation>
      <lild:SpatialUnit gml:id="su2D-R">
        <lild:spatialUnitID>
          <lild:ID>
            <identifier></identifier>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>2D</lild:dimension>
        <lild:boundingElement>
          <lild:BEString gml:id="ring1">
            <lild:boundingElementID></lild:boundingElementID>
            <lild:isComplete>true</lild:isComplete>
            <lild:geometry>
              <gml:LineString gml:id="ls1">
                <gml:pos>100 0</gml:pos>
                <gml:pos>200 0</gml:pos>
                <gml:pos>200 50</gml:pos>
                <gml:pos>100 50</gml:pos>
                <gml:pos>100 0</gml:pos>
              </gml:LineString>
            </lild:geometry>
            <lild:stringType>ring</lild:stringType>
          </lild:BEString>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </lild:shapeAndLocation>
  </lild:LandParcel>
</lild:landParcel>
<!-- -->
<!-- 2D-H Land Parcel -->
<!-- -->
<lild:landParcel>
  <lild:LandParcel gml:id="lp2D-H">
    <lild:cadastralParcelId>
      <lild:ID>
        <identifier></identifier>
      </lild:ID>

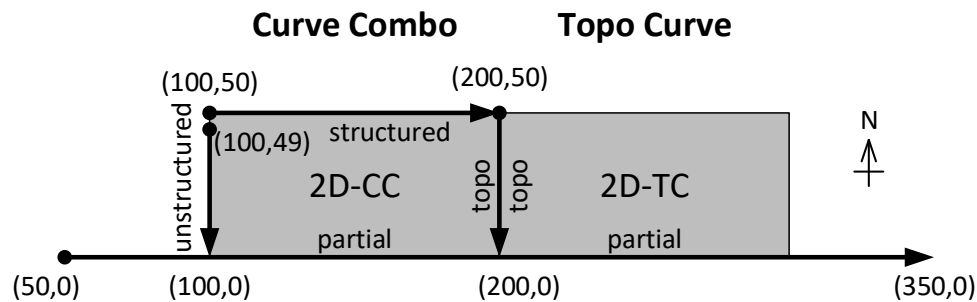
```

```

</lild:cadastralParcelId>
<lild:parcelArea uom="sf">4800</lild:parcelArea>
<lild:shapeAndLocation>
  <lild:SpatialUnit gml:id="su2D-H">
    <lild:spatialUnitID>
      <lild:ID>
        <identifier></identifier>
      </lild:ID>
    </lild:spatialUnitID>
    <lild:dimension>2D</lild:dimension>
    <lild:boundingElement>
      <lild:BEStrng gml:id="hole1">
        <lild:boundingElementID></lild:boundingElementID>
        <lild:isComplete>true</lild:isComplete>
        <lild:geometry>
          <gml:MultiCurve gml:id="mc1">
            <gml:curveMember>
              <gml:LineString gml:id="ls2">
                <gml:pos>200 0</gml:pos>
                <gml:pos>300 0</gml:pos>
                <gml:pos>300 50</gml:pos>
                <gml:pos>200 50</gml:pos>
                <gml:pos>200 0</gml:pos>
              </gml:LineString>
            </gml:curveMember>
            <gml:curveMember>
              <gml:LineString gml:id="ls3">
                <gml:pos>270 30</gml:pos>
                <gml:pos>270 40</gml:pos>
                <gml:pos>290 40</gml:pos>
                <gml:pos>290 30</gml:pos>
                <gml:pos>270 30</gml:pos>
              </gml:LineString>
            </gml:curveMember>
          </gml:MultiCurve>
        </lild:geometry>
        <lild:stringType>ring</lild:stringType>
      </lild:BEStrng>
    </lild:boundingElement>
  </lild:SpatialUnit>
</lild:shapeAndLocation>
</lild:LandParcel>
</lild:landParcel>

```

The 2D-CC Spatial Unit demonstrate the use of the other four types of BEString Bounding Elements in 2D: partial, unstructured, structured, and topological. The partial type specifies that only part of the common boundary (linestring ls4) is used by 2D-CC. The 2D-TC Spatial Unit demonstrates how a Bounding Element geometry (linestring ls7) can be shared by two Spatial Units (in opposite directions). Note that 2D-TC uses another part of the common boundary (linestring ls4)



```

<!-- -->
<!-- 2D-CC Land Parcel -->
<!-- -->
<lid:landParcel>
  <lid:LandParcel gml:id="lp2D-CC">
    <lid:cadastralParcelId>
      <lid:ID>
        <identifier></identifier>
      </lid:ID>
    </lid:cadastralParcelId>
    <lid:parcelArea uom="sf">5000</lid:parcelArea>
    <lid:shapeAndLocation>
      <lid:SpatialUnit gml:id="su2D-CC">
        <lid:spatialUnitID>
          <lid:ID>
            <identifier></identifier>
          </lid:ID>
        </lid:spatialUnitID>
        <lid:dimension>2D</lid:dimension>
        <lid:boundingElement>
          <lid:BEString gml:id="partial1">
            <lid:boundingElementID></lid:boundingElementID>
            <lid:isComplete>>false</lid:isComplete>
            <lid:geometry>
              <gml:LineString gml:id="ls4">
                <gml:pos>50 0</gml:pos>
                <gml:pos>350 0</gml:pos>
              </gml:LineString>
            </lid:geometry>
            <lid:stringType>partial</lid:stringType>
          </lid:BEString>
        </lid:boundingElement>
        <lid:boundingElement>
          <lid:BEString gml:id="unstructured1">
            <lid:boundingElementID></lid:boundingElementID>

```

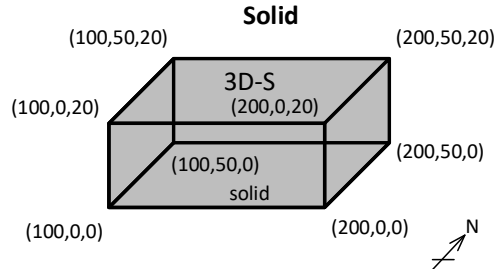
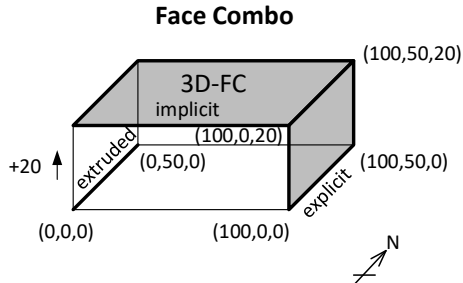
```

    <lild:isComplete>>false</lild:isComplete>
    <lild:geometry>
      <gml:LineString gml:id="ls5">
        <gml:pos>100 49</gml:pos>
        <gml:pos>100 0</gml:pos>
      </gml:LineString>
    </lild:geometry>
    <lild:stringType>unstructured</lild:stringType>
  </lild:BEString>
</lild:boundingElement>
<lild:boundingElement>
  <lild:BEString gml:id="structured1">
    <lild:boundingElementID></lild:boundingElementID>
    <lild:isComplete>>false</lild:isComplete>
    <lild:geometry>
      <gml:LineString gml:id="ls6">
        <gml:pos>100 50</gml:pos>
        <gml:pos>200 50</gml:pos>
      </gml:LineString>
    </lild:geometry>
    <lild:stringType>structured</lild:stringType>
    <lild:direction>reverse</lild:direction>
  </lild:BEString>
</lild:boundingElement>
<lild:boundingElement>
  <lild:BEString gml:id="topo1">
    <lild:boundingElementID></lild:boundingElementID>
    <lild:isComplete>>false</lild:isComplete>
    <lild:geometry>
      <gml:LineString gml:id="ls7">
        <gml:pos>200 50</gml:pos>
        <gml:pos>200 0</gml:pos>
      </gml:LineString>
    </lild:geometry>
    <lild:stringType>topological</lild:stringType>
    <lild:direction>reverse</lild:direction>
  </lild:BEString>
</lild:boundingElement>
</lild:SpatialUnit>
</lild:shapeAndLocation>
</lild:LandParcel>
</lild:landParcel>
<!-- -->
<!-- 2D-TC Land Parcel -->
<!-- -->
<lild:landParcel>
  <lild:LandParcel gml:id="lp2D-TC">
    <lild:cadastralParcelId>
      <lild:ID>
        <identifier></identifier>
      </lild:ID>
    </lild:cadastralParcelId>
    <lild:parcelArea uom="sf">5000</lild:parcelArea>
    <lild:shapeAndLocation>
      <lild:SpatialUnit gml:id="su2D-TC">
        <lild:spatialUnitID>

```

```
<lild:ID>
  <identifier></identifier>
</lild:ID>
</lild:spatialUnitID>
<lild:dimension>2D</lild:dimension>
<lild:boundingElement xlink:href="partial1">
</lild:boundingElement>
<lild:boundingElement>
  <lild:BEString gml:id="topo2">
    <lild:boundingElementID></lild:boundingElementID>
    <lild:isComplete>>false</lild:isComplete>
    <lild:geometry xlink:href="ls7"></lild:geometry>
    <lild:stringType>topological</lild:stringType>
    <lild:direction>forward</lild:direction>
  </lild:BEString>
</lild:boundingElement>
</lild:SpatialUnit>
</lild:shapeAndLocation>
</lild:LandParcel>
</lild:landParcel>
```

The last two Spatial Units are 3D. The first, 3D-FC has a combination of the three BEFace types of Bounding Elements: extruded, explicit, and implicit. Only three sides of the Spatial Unit have been specified. The 3D-S provides a complete geometry definition, using a solid geometry type.



```

<!-- -->
<!-- 3D-FC Land Parcel -->
<!-- -->
<lild:landParcel>
  <lild:LandParcel gml:id="lp3D-FC">
    <lild:cadastralParcelId>
      <lild:ID>
        <identifier></identifier>
      </lild:ID>
    </lild:cadastralParcelId>
    <lild:parcelArea uom="cf">1000000</lild:parcelArea>
    <lild:shapeAndLocation>
      <lild:SpatialUnit gml:id="su3D-FC">
        <lild:spatialUnitID>
          <lild:ID>
            <identifier></identifier>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>3D</lild:dimension>
        <lild:boundingElement>
          <lild:BEEextrudedFace gml:id="extruded1">
            <lild:boundingElementID></lild:boundingElementID>
            <lild:isComplete>>false</lild:isComplete>
            <lild:geometry>
              <gml:LineString gml:id="ls8">
                <gml:pos>0 0 0</gml:pos>
                <gml:pos>0 50 0</gml:pos>
              </gml:LineString>
            </lild:geometry>
            <lild:lowerLimit>
              <lild:Limit>
                <lild:distance>0</lild:distance>
              </lild:Limit>
            </lild:lowerLimit>
            <lild:upperLimit>
              <lild:Limit>
                <lild:distance>20</lild:distance>
              </lild:Limit>
            </lild:upperLimit>
          </lild:BEEextrudedFace>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </lild:shapeAndLocation>
  </lild:LandParcel>
</lild:landParcel>

```

```

        </lild:upperLimit>
    </lild:BEExtrudedFace>
</lild:boundingElement>
<lild:boundingElement>
    <lild:BEExplicitFace gml:id="explicit1">
        <lild:boundingElementID></lild:boundingElementID>
        <lild:isComplete>>false</lild:isComplete>
        <lild:geometry>
            <gml:PolyhedralSurface gml:id="surf1">
                <gml:patches>
                    <gml:PolygonPatch>
                        <gml:exterior>
                            <gml:Ring>
                                <gml:curveMember>
                                    <gml:LineString gml:id="ls9">
                                        <gml:pos>100 0 0</gml:pos>
                                        <gml:pos>100 50 0</gml:pos>
                                        <gml:pos>100 50 20</gml:pos>
                                        <gml:pos>100 0 20</gml:pos>
                                        <gml:pos>100 0 0</gml:pos>
                                    </gml:LineString>
                                </gml:curveMember>
                            </gml:Ring>
                        </gml:exterior>
                    </gml:PolygonPatch>
                </gml:patches>
            </gml:PolyhedralSurface>
        </lild:geometry>
    </lild:BEExplicitFace>
</lild:boundingElement>
<lild:boundingElement>
    <lild:BEImplicitFace gml:id="implicit1">
        <lild:boundingElementID></lild:boundingElementID>
        <lild:isComplete>>false</lild:isComplete>
        <lild:geometry>top</lild:geometry>
    </lild:BEImplicitFace>
</lild:boundingElement>
</lild:SpatialUnit>
</lild:shapeAndLocation>
</lild:LandParcel>
</lild:landParcel>
<!-- -->
<!-- 3D-S Land Parcel -->
<!-- -->
<lild:landParcel>
    <lild:LandParcel gml:id="lp3D-S">
        <lild:cadastralParcelId>
            <lild:ID>
                <identifier></identifier>
            </lild:ID>
        </lild:cadastralParcelId>
        <lild:parcelArea uom="cf">1000000</lild:parcelArea>
        <lild:shapeAndLocation>
            <lild:SpatialUnit gml:id="su3D-S">
                <lild:spatialUnitID>
                    <lild:ID>

```

```

<identifier></identifier>
</lild:ID>
</lild:spatialUnitID>
<lild:dimension>3D</lild:dimension>
<lild:boundingElement>
<lild:BESolid gml:id="solid1">
<lild:boundingElementID></lild:boundingElementID>
<lild:isComplete>true</lild:isComplete>
<lild:geometry>
<gml:Solid gml:id="s1">
<gml:exterior>
<gml:Shell>
<gml:surfaceMember>
<gml:Polygon gml:id="west">
<gml:exterior>
<gml:Ring>
<gml:curveMember>
<gml:LineString gml:id="ls10">
<gml:pos>100 50 0</gml:pos>
<gml:pos>100 0 0</gml:pos>
<gml:pos>100 0 20</gml:pos>
<gml:pos>100 50 20</gml:pos>
<gml:pos>100 50 0</gml:pos>
</gml:LineString>
</gml:curveMember>
</gml:Ring>
</gml:exterior>
</gml:Polygon>
</gml:surfaceMember>
<gml:surfaceMember>
<gml:Polygon gml:id="north">
<gml:exterior>
<gml:Ring>
<gml:curveMember>
<gml:LineString gml:id="ls11">
<gml:pos>200 50 0</gml:pos>
<gml:pos>100 50 0</gml:pos>
<gml:pos>100 50 20</gml:pos>
<gml:pos>200 50 20</gml:pos>
<gml:pos>200 50 0</gml:pos>
</gml:LineString>
</gml:curveMember>
</gml:Ring>
</gml:exterior>
</gml:Polygon>
</gml:surfaceMember>
<gml:surfaceMember>
<gml:Polygon gml:id="east">
<gml:exterior>
<gml:Ring>
<gml:curveMember>
<gml:LineString gml:id="ls12">
<gml:pos>200 0 0</gml:pos>
<gml:pos>200 50 0</gml:pos>
<gml:pos>200 50 20</gml:pos>
<gml:pos>200 0 20</gml:pos>

```



```

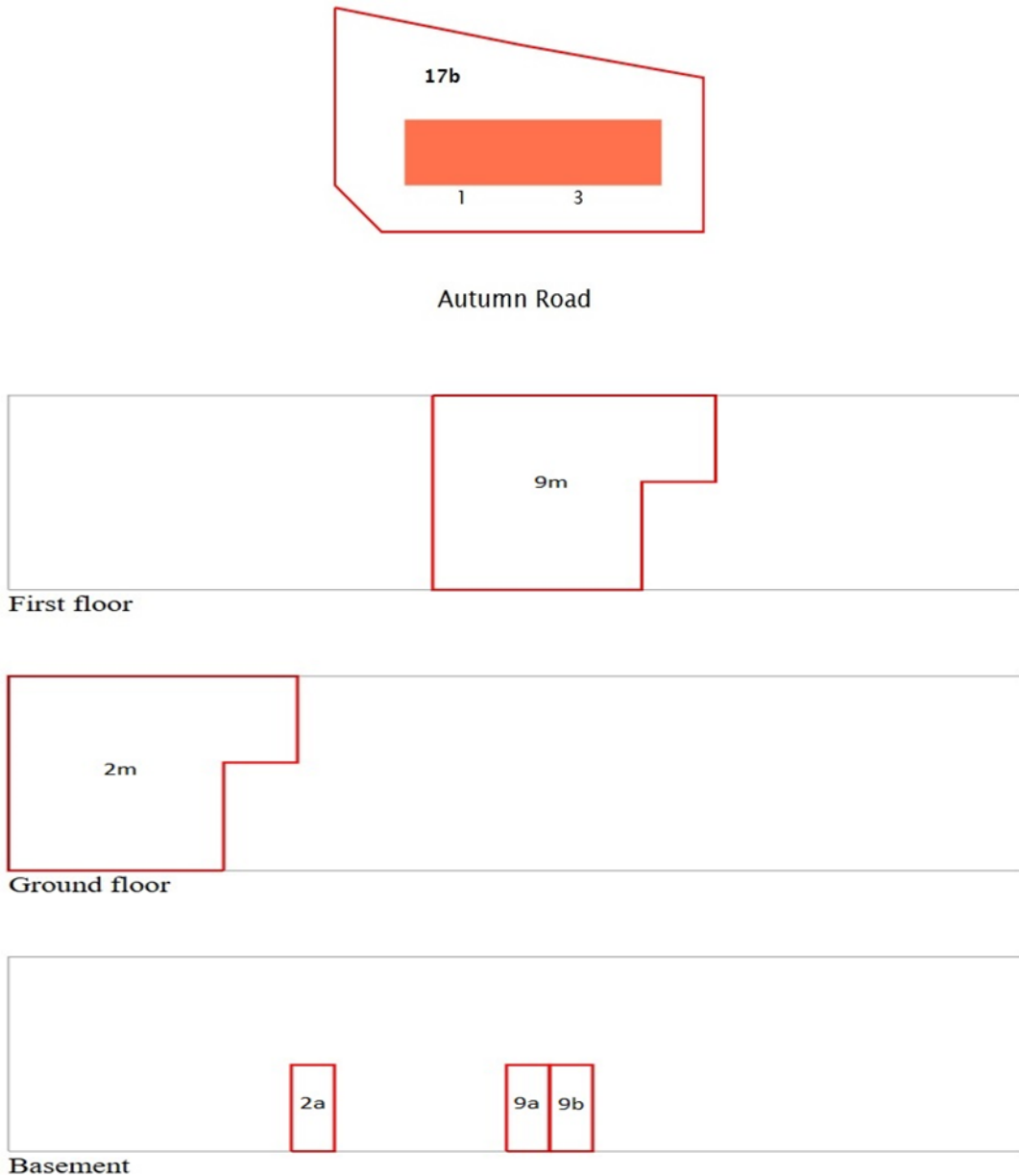
        <gml:pos>200 0 0</gml:pos>
      </gml:LineString>
    </gml:curveMember>
  </gml:Ring>
</gml:exterior>
</gml:Polygon>
</gml:surfaceMember>
<gml:surfaceMember>
  <gml:Polygon gml:id="south">
    <gml:exterior>
      <gml:Ring>
        <gml:curveMember>
          <gml:LineString gml:id="ls13">
            <gml:pos>100 0 0</gml:pos>
            <gml:pos>200 0 0</gml:pos>
            <gml:pos>200 0 20</gml:pos>
            <gml:pos>100 0 20</gml:pos>
            <gml:pos>100 0 0</gml:pos>
          </gml:LineString>
        </gml:curveMember>
      </gml:Ring>
    </gml:exterior>
  </gml:Polygon>
</gml:surfaceMember>
<gml:surfaceMember>
  <gml:Polygon gml:id="top">
    <gml:exterior>
      <gml:Ring>
        <gml:curveMember>
          <gml:LineString gml:id="ls14">
            <gml:pos>100 0 20</gml:pos>
            <gml:pos>200 0 20</gml:pos>
            <gml:pos>200 50 20</gml:pos>
            <gml:pos>100 50 20</gml:pos>
            <gml:pos>100 0 20</gml:pos>
          </gml:LineString>
        </gml:curveMember>
      </gml:Ring>
    </gml:exterior>
  </gml:Polygon>
</gml:surfaceMember>
<gml:surfaceMember>
  <gml:Polygon gml:id="bottom">
    <gml:exterior>
      <gml:Ring>
        <gml:curveMember>
          <gml:LineString gml:id="ls15">
            <gml:pos>100 50 0</gml:pos>
            <gml:pos>200 50 0</gml:pos>
            <gml:pos>200 0 0</gml:pos>
            <gml:pos>100 0 0</gml:pos>
            <gml:pos>100 50 0</gml:pos>
          </gml:LineString>
        </gml:curveMember>
      </gml:Ring>
    </gml:exterior>
  </gml:Polygon>
</gml:surfaceMember>

```

```
</gml:Polygon>  
</gml:surfaceMember>  
</gml:Shell>  
</gml:exterior>  
</gml:Solid>  
</lild:geometry>  
</lild:BESolid>  
</lild:boundingElement>  
</lild:SpatialUnit>  
</lild:shapeAndLocation>  
</lild:LandParcel>  
</lild:landParcel>  
</lild:LandPropertyUnit>  
</feature>  
</LandInfraDataset>
```

B. 3 Condominium example

A PropertyUnit consist of the LandParcel 17b with a building of two stairwells and three floors. The owner wants to subdivide the PropertyUnit into CondominiumUnits. In the example, the CondominiumUnits generally consist of an apartment and a storeroom, as specified in the CondominiumScheme below, here showing only two CondominiumUnits.



Jurisdiction-specific text which identifies the PropertyUnit and LandParcel(s) concerned, describes the building(s) to be subdivided, and declares the establishment of CondominiumUnits, which are detailed below. Completed with signatures of owner(s), professional and land registry recordings.					
Identifier	Location	BuildingParts: Id, type, use and (area)		Total area (sq.m)	Share
2	Autumn Road 1, ground floor left	2m Main	n/a (78)	84	10/110
		2a Accessory	n/a (6)		
9	Autumn Road 3, 1st floor left	9m Main	n/a (77)	87	11/110
		9a Accessory	n/a (5)		
		9b Accessory	n/a (5)		

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="CondominiumExample0518.xsl"?>
<li:LandInfraDataset xmlns="http://www.opengis.net/infragml/condominium/1.0"
xmlns:lild="http://www.opengis.net/infragml/landdivision/1.0"
xmlns:li="http://www.opengis.net/infragml/core/1.0" xmlns:gml="http://www.opengis.net/gml/3.2"
gml:id="c00" xmlns:gmlr="http://www.opengis.net/gml/3.3/lr"
xmlns:gmlro="http://www.opengis.net/gml/3.3/lro" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/infragml/condominium/1.0
Part7Condominium0410.xsd">
```

```
<li:datasetID>
  <li:ID>
    <li:identifier>c00</li:identifier>
    <li:scope>OGC LandInfraSWG</li:scope>
  </li:ID>
</li:datasetID>
<li:name>Part7 Condominium Dataset</li:name>
<li:description>LandInfra dataset to test content for Part7 Condominium</li:description>
<li:dateTime>2017-03-10T21:00:00</li:dateTime>
<li:datasetVersion>1.0</li:datasetVersion>
<li:application>>manual</li:application>
<li:author>Erik Stubkjær, Aalborg University, Denmark</li:author>
<li:infraVersion>1.0</li:infraVersion>
<li:language>English</li:language>
<li:defaultCRS/>
<!--
```

The present dataset is needed for establishment of CondominiumUnits. They consist of one or more parts of CondominiumBuilding(s). Future CondominiumUnits owners get exclusive rights to their CondominiumUnit as well as a mandatory share in the joint elements of the PropertyUnit: Roof, outer walls, technical installations, the LandParcel(s), etc. The sale and future owners are out of scope relative to the present condominiumSchemeEstablishment.

The LandSurveyor documents the requested through the present CondominiumScheme, which provides the data for the above tabular and graphical parts.

```
-->
<!-- The LandPropertyUnit to be subdivided into CondominiumUnits -->
<li:feature>
  <lild:LandPropertyUnit gml:id="lpu1">
    <lild:documentation xlink:href="st1"/>
    <lild:propertyUnitID>
      <lild:ID>
        <li:identifier>123</li:identifier>
        <li:scope>Recording District</li:scope>
```

```

</lild:ID>
</lild:propertyUnitID>
<lild:ownership>
  <lild:Ownership gml:id="o1">
    <lild:name>Peter</lild:name>
    <lild:ownerAddress>Some other place</lild:ownerAddress>
  </lild:Ownership>
</lild:ownership>
<lild:landParcel>
  <lild:LandParcel gml:id="lp1">
    <lild:cadastralParcelId>
      <lild:ID>
        <li:identifier>17b</li:identifier>
        <li:scope>Cadastral Township x of City y</li:scope>
      </lild:ID>
    </lild:cadastralParcelId>
    <lild:parcelArea uom="m2">1200</lild:parcelArea>
    <lild:shapeAndLocation>
      <lild:SpatialUnit gml:id="su1">
        <lild:spatialUnitID>
          <lild:ID>
            <li:identifier/>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>2D</lild:dimension>
        <lild:boundingElement>
          <lild:BEString gml:id="sub1">
            <lild:boundingElementID/>
            <lild:isComplete>true</lild:isComplete>
            <lild:geometry>
              <gml:LineString gml:id="sub11">
                <gml:posList srsDimension="2">830 910 830 1290 930 1390 1620 1390 1620 1060
                  1230 990 830 910</gml:posList>
              </gml:LineString>
            </lild:geometry>
            <lild:stringType>structured</lild:stringType>
          </lild:BEString>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </lild:shapeAndLocation>
  </lild:LandParcel>
</lild:landParcel>
</lild:LandPropertyUnit>
</li:feature>
<!-- The building to be subdivided and its location on the LandParcel -->
<li:feature>
  <CondominiumBuilding gml:id="cb1">
    <gml:description>Location of CondominiumBuilding on LandParcel</gml:description>
    <li:spatialRepresentation>
      <li:SpatialRepresentation>
        <li:geometry>
          <gml:LineString gml:id="fp1">
            <gml:posList srsDimension="2">980 1150 1530 1150 1530 1290 980 1290 980
              1150</gml:posList>
          </gml:LineString>
        </li:geometry>
      </li:SpatialRepresentation>
    </li:spatialRepresentation>
  </CondominiumBuilding>
</li:feature>

```

```

    </li:SpatialRepresentation>
  </li:spatialRepresentation>
  <buildingNumber>1234</buildingNumber>
  <parcelLocation xlink:href="lp1"/>
</CondominiumBuilding>
</li:feature>
<!-- The CondominiumScheme with CondominiumUnits and their BuildingParts. Of a total of 10
units, only two are shown -->
<li:feature>
  <CondominiumScheme gml:id="cs1">
    <li:documentID>
      <li:ID>
        <li:identifier>001</li:identifier>
      </li:ID>
    </li:documentID>
    <li:documentType>condominiumSchemeEstablishment</li:documentType>
    <lild:type
      xlink:href="http://example.com/StatementType#condominiumSchemeEstablishment"
      xlink:title="condominiumSchemeEstablishment"/>
    <lild:draftsman>
      <li:Professional gml:id="prof1">
        <li:fullName>Hans Pedometer</li:fullName>
        <li:type xlink:href="http://example.com/ProfessionalType#landSurveyor"
          xlink:title="landSurveyor"/>
        <li:company>Measurewell</li:company>
        <li:registration>LicenseX_1968-43</li:registration>
        <li:licensingCountry>DK</li:licensingCountry>
      </li:Professional>
    </lild:draftsman>
    <lild:caseID>
      <lild:ID>
        <li:identifier>Case2017-C23</li:identifier>
        <li:scope>Aalborg branch</li:scope>
      </lild:ID>
    </lild:caseID>
    <lild:signatory>
      <lild:Signatory gml:id="ld3">
        <lild:signingParty>Hans Pedometer</lild:signingParty>
        <lild:signingDate>2017-03-04</lild:signingDate>
      </lild:Signatory>
    </lild:signatory>
  </CondominiumScheme>
  <buildingDescription>Optional description of building</buildingDescription>
  <unit>
    <CondominiumUnit gml:id="cu2">
      <lild:documentation xlink:href="c61"/>
      <lild:propertyUnitID>
        <lild:ID>
          <li:identifier>2</li:identifier>
          <li:scope/>
        </lild:ID>
      </lild:propertyUnitID>
      <lild:ownership/>
      <lild:postAddress>Autumn Road 1, ground floor left</lild:postAddress>
      <shareInJointFacilities>10/120</shareInJointFacilities>
      <condominiumUseType/>
      <designUnitID/>
    </CondominiumUnit>
  </unit>

```

```

<mainPart>
  <BuildingPart gml:id="bp2m">
    <floorNumber>Ground floor</floorNumber>
    <subSurfaceFloor>>false</subSurfaceFloor>
    <buildingPartType>condominiumMainPart</buildingPartType>
    <shapeAndLocation>
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        <lild:spatialUnitID>
          <lild:ID>
            <li:identifier>2m</li:identifier>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>2D</lild:dimension>
        <lild:area uom="m2">78</lild:area>
        <lild:boundingElement>
          <lild:BEString gml:id="w7">
            <lild:boundingElementID/>
            <lild:isComplete>>true</lild:isComplete>
            <lild:geometry>
              <gml:LineString gml:id="w8">
                <gml:posList srsDimension="2">450 1510 100 1510 100 1060 570 1060 570
                  1260 450 1260 450 1510</gml:posList>
              </gml:LineString>
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          </lild:BEString>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </shapeAndLocation>
    <partOf xlink:href="cb1"/>
  </BuildingPart>
</mainPart>
<accessoryPart>
  <BuildingPart gml:id="bp2a">
    <floorNumber>Basement</floorNumber>
    <subSurfaceFloor>>true</subSurfaceFloor>
    <buildingPartType>condominiumAccessoryPart</buildingPartType>
    <shapeAndLocation>
      <lild:SpatialUnit gml:id="su3">
        <lild:spatialUnitID>
          <lild:ID>
            <li:identifier>2a</li:identifier>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>2D</lild:dimension>
        <lild:area uom="m2">6</lild:area>
        <lild:boundingElement>
          <lild:BEString gml:id="w10">
            <lild:boundingElementID/>
            <lild:isComplete>>true</lild:isComplete>
            <lild:geometry>
              <gml:LineString gml:id="w9">
                <gml:posList srsDimension="2">560 2160 560 1960 630 1960 630 2160 560
                  2160</gml:posList>
              </gml:LineString>
            </lild:geometry>
          </lild:BEString>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </shapeAndLocation>
  </BuildingPart>
</accessoryPart>

```

```

        <lild:stringType>structured</lild:stringType>
        </lild:BEStrng>
        </lild:boundingElement>
        </lild:SpatialUnit>
        </shapeAndLocation>
        <partOf xlink:href="cb1"/>
        </BuildingPart>
        </accessoryPart>
        </CondominiumUnit>
    </unit>
    <unit>
        <CondominiumUnit gml:id="cu9">
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            </lild:documentation>
            <lild:propertyUnitID>
                <lild:ID>
                    <li:identifier>9</li:identifier>
                    <li:scope/>
                </lild:ID>
            </lild:propertyUnitID>
            <lild:ownership/>
            <lild:postAddress>Autumn Road 3, 1st floor left</lild:postAddress>
            <shareInJointFacilities>11/120</shareInJointFacilities>
            <mainPart>
                <BuildingPart gml:id="bp9m">
                    <floorNumber>1st floor</floorNumber>
                    <subSurfaceFloor>>false</subSurfaceFloor>
                    <buildingPartType>condominiumMainPart</buildingPartType>
                    <shapeAndLocation>
                        <lild:SpatialUnit gml:id="su4">
                            <lild:spatialUnitID>
                                <lild:ID>
                                    <li:identifier>9m</li:identifier>
                                </lild:ID>
                            </lild:spatialUnitID>
                            <lild:dimension>2D</lild:dimension>
                            <lild:area uom="m2">77</lild:area>
                            <lild:boundingElement>
                                <lild:BEStrng gml:id="w1">
                                    <lild:boundingElementID/>
                                    <lild:isComplete>>true</lild:isComplete>
                                    <lild:geometry>
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                                            <gml:posList srsDimension="2">790 410 1250 410 1250 610 1130 610 1130 860
                                                790 860 790 410</gml:posList>
                                        </gml:LineString>
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                                </lild:BEStrng>
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                        </lild:SpatialUnit>
                    </shapeAndLocation>
                    <partOf xlink:href="cb1"/>
                </BuildingPart>
            </mainPart>
        </accessoryPart>
    </unit>

```



```

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  <floorNumber>Basement</floorNumber>
  <subSurfaceFloor>true</subSurfaceFloor>
  <buildingPartType>condominiumAccessoryPart</buildingPartType>
  <shapeAndLocation>
    <lild:SpatialUnit gml:id="su5">
      <lild:spatialUnitID>
        <lild:ID>
          <li:identifier>9a</li:identifier>
        </lild:ID>
      </lild:spatialUnitID>
      <lild:dimension>2D</lild:dimension>
      <lild:area uom="m2">5</lild:area>
      <lild:boundingElement>
        <lild:BEString gml:id="w3">
          <lild:boundingElementID/>
          <lild:isComplete>true</lild:isComplete>
          <lild:geometry>
            <gml:LineString gml:id="w4">
              <gml:posList srsDimension="2">980 2160 980 1960 1050 1960 1050 2160 980
                2160</gml:posList>
            </gml:LineString>
          </lild:geometry>
          <lild:stringType>structured</lild:stringType>
        </lild:BEString>
      </lild:boundingElement>
    </lild:SpatialUnit>
  </shapeAndLocation>
  <partOf xlink:href="cb1"/>
</BuildingPart>
</accessoryPart>
<accessoryPart>
  <BuildingPart gml:id="bp9b">
    <floorNumber>Basement</floorNumber>
    <subSurfaceFloor>true</subSurfaceFloor>
    <buildingPartType>condominiumAccessoryPart</buildingPartType>
    <shapeAndLocation>
      <lild:SpatialUnit gml:id="su6">
        <lild:spatialUnitID>
          <lild:ID>
            <li:identifier>9b</li:identifier>
          </lild:ID>
        </lild:spatialUnitID>
        <lild:dimension>2D</lild:dimension>
        <lild:area uom="m2">5</lild:area>
        <lild:boundingElement>
          <lild:BEString gml:id="w5">
            <lild:boundingElementID/>
            <lild:isComplete>true</lild:isComplete>
            <lild:geometry>
              <gml:LineString gml:id="w6">
                <gml:posList srsDimension="2">910 2160 910 1960 980 1960 980 2160 910
                  2160</gml:posList>
              </gml:LineString>
            </lild:geometry>
            <lild:stringType>structured</lild:stringType>
          </lild:BEString>
        </lild:boundingElement>
      </lild:SpatialUnit>
    </shapeAndLocation>
  </BuildingPart>
</accessoryPart>

```

```
</lild:BEString>
</lild:boundingElement>
</lild:SpatialUnit>
</shapeAndLocation>
<partOf xlink:href="cb1"/>
</BuildingPart>
</accessoryPart>
</CondominiumUnit>
</unit>
</CondominiumScheme>
</li:feature>
</li:LandInfraDataset>
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Annex C: Revision history

Date	Release	Author	Paragraph modified	Description
20170611	107r1	Paul Scarponcini	Annex B	Fixed GML striping; added complete example; removed Cadastre example
20170814	107r2	Paul Scarponcini	Annex E	Removed

Annex D: Bibliography

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

- [2] Des Ormeaux, Anne and Jean-Marie Lessard. Legal Dictionary of Property in Canada - Dictionnaire juridique de la propriété au Canada, [online], 2009. [dualjuridik.org, 6. November 2015]

- [3] UN/ECE. Guidelines on Condominium Ownership of Housing for Countries in Transition. Geneva, June 2003