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Intelligent transport systems — Geographic Data Files (GDF) GDF5.1 —

Part 1: Application independent map data shared between multiple sources

Systèmes de transport intelligents — Fichiers de données géographiques (GDF) GDF5.1 —

Partie 1: Données cartographiques partagées entre sources multiples et indépendantes des applications

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

A list of all parts in the ISO 20524 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

GDF5.1 (the ISO 20524 series) is an evolution of GDF5.0 that introduces the concept of Sharable Features, takes cooperative ITS (Cooperative ITS) needs into account and is harmonized with the European public transportation standard EN 12896:2012 (TRANSMODEL). This last harmonization was made in the framework of the European Opticities project.

GDF5.1 consists of two parts:

- GDF5.1 Part 1 (this document) contains GDF5.0 specification except Public Transport Theme specification which has been revised and is now described in Part 2.

- GDF5.1 Part 2 (ISO 20524-2) is dedicated to Sharable Features, Cooperative ITS and Public Transport.

This document presents the specification for GDF5.1 Part 1. GDF5.0 entities are unchanged but Public Transport Theme entities have been removed and corresponding sections and figures are deprecated and refer to GDF5.1 Part 2 (ISO 20524-2). In order to ensure the consistency between GDF5.0 and GDF5.1 Part 1 (this document), the numbering of common figures in both versions has been conserved. GDF5.1 Part 1 (this document) is divided into several parts.

After the introductory clauses, the overall conceptual data model is specified. In it, the basic building blocks of GDF and their interrelations are explained. It contains a specification of the different types of topology supported by this document. It furthermore describes how database representations of real world objects, referred to as Features, are defined. It describes the characteristics of Features, called Attributes, and the topological and non-topological interrelations between Features. Finally, it describes the organization of the Features in GDF. Semantically, Features are organized in different Feature Themes. Logically and physically, Features are organized in Sections by area or in Layers by contents.

In the Feature Catalogue, the different Features supported by this document are defined. A special case is the Features from the Services Feature Theme. Because the requirements for this Feature Theme are highly market-oriented, the Services Feature Theme does not contain any normative Features, but contains an annex comprising an informative list of service definitions to assist users of this document (see Annex C).

In the Attribute Catalogue, the different characteristics of Features, called Attributes, are defined. A usage matrix outlines applicability of Attributes per Feature Theme and per Relationship.

In the Relationship Catalogue, the different non-topological (i.e. semantic) Relationships which Features have been defined. Relationships may relate Features of different Feature Themes, or those from the same or different Section and/or Layer.

In the Feature representation rules, the possible geometrical ways in which the individual Features may be represented are specified for each topology type. This document supports zero-, one- and two-dimensional primitives and up to four-dimensional coordinates.

The specification of Features, Attributes and Relationships by no means dictates mandatory inclusion. The actual contents of GDF, apart from a minimum set of metadata elements as specified in the delivery formats, is not specified by this document since this is considered to be an issue between clients and vendors. This document allows the introduction of user-defined Features, Attributes and Relationships.

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In certain cases, different alternative ways of modelling and representation are offered. Representing Features in different geographical areas also may require the use of different basic representation mechanisms, e.g. character sets, projection systems. It is important that all of these individual choices associated with GDF are specified. Furthermore, GDF should essentially be self-contained and be readable without any external specification. In order to make this possible, this document specifies ways of describing GDF by means of metadata, captured by the Metadata Catalogue.

Apart from providing a standard for the definition of geographic road databases, this document also specifies mechanisms for data exchange and delivery. In order to facilitate the definition and exchange of data, a logical view of the data organization is important. This logical view is presented in the Logical Data Structures. The data structures are specified using the data description language ESN.

Two physical implementations for data exchange and delivery are specified: the Media Record Specifications (ASCII flat file) and the XML schema specifications. These physical implementations are limited to the data specification present in GDF5.1 Part 1 (this document).

These specifications support the explicit registration of updated information, thereby allowing map databases to continue to reflect ground truth over time.

Features, Attributes and Relationships appear in the physical GDF as codes. These codes are specified in Annex A. Codes used in the metadata are given in Annex B, which is an informative part of this document. In order to access the most up-to-date information, the user is referred to the original source organization. Annex C contains the specification of Features of the theme Services as an informative part of this document. In Annex D, the syntax for specifying temporal aspects of geographic information is described. The specific rules for organizing GDF in different spatial subdivisions (Sections) is described in Annex E. As informative parts of this document, guidelines for the formation of Level 2 Features from the Feature Theme Roads and Ferries are given in Annex F. A list of local Administrative Area names in different countries is provided in Annex G, as well as illustrative examples for the description of the (non-hierarchical) geopolitical structures and their components in a number of countries. Finally, the use of notation and phonetic Attributes for character strings are illustrated in the informative Annex H. Annex H provides a range of examples showing how the different notation- and phoneme-related Attribute properties may be used to qualify name strings, in both their written and their pronounced form.

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Intelligent transport systems — Geographic Data Files (GDF) GDF5.1 —

Part 1: Application independent map data shared between multiple sources

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1 Scope

This document specifies the conceptual and logical data model and physical encoding formats for geographic databases for Intelligent Transport Systems (ITS) applications and services. It includes a specification of potential contents of such databases (data dictionaries for Features, Attributes and Relationships), a specification of how these contents shall be represented, and of how relevant information about the database itself may be specified (metadata).

The focus of this document is on ITS applications and services and it emphasizes road and road-related information. ITS applications and services, however, also require information in addition to road and road-related information.

EXAMPLE 1 ITS applications and services need information about addressing systems in order to specify locations and/or destinations. Consequently, information about the administrative and postal subdivisions of an area is essential.

EXAMPLE 2 Map display is an important component of ITS applications and services. For proper map display, the inclusion of contextual information such as land and water cover is essential.

EXAMPLE 3 Point-of-Interest (POI) or service information is a key feature of traveller information. It adds value to end-user ITS applications and services.

Typical ITS applications and services targeted by this document are in-vehicle or portable navigation systems, traffic management centres, or services linked with road management systems, including public transport systems.

The Conceptual Data Model has a broader focus than ITS applications and services. It is application independent, allowing for future harmonization of this document with other geographic database standards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 690, *Information and documentation — Guidelines for bibliographic references and citations to information resources*

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ISO 639-2, *Codes for the representation of names of languages — Part 2: Alpha-3 code*

NOTE 1 Codes are available at http://www.loc.gov/standards/iso639-2/

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

NOTE 2 Codes are available at https://www.iso.org/obp/ui

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 General terms

3.1.1
cartographic primitive
atomic construction element in a cartographic representation

EXAMPLES Node, Edge and Face.

3.1.2
data file
collection of related data records having a homogeneous structure

Note 1 to entry See Reference [1].

3.1.3
data record
record containing Feature-related data

3.1.4
global record
record that logically precedes the data records and contains control parameters, data definition and documentation necessary to interpret companion data records

Note 1 to entry See Reference [2].

3.1.5
Medium Unit
object for data storage that may be considered as a physically undivided whole

EXAMPLE One floppy disk, one magnetic tape, a CD, or a DVD.

3.1.6
multi-media
any kind of data other than conventional data

EXAMPLE Graphical, audio or visual data.

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3.1.7
Multi-media Object
piece of multi-media to be processed by an application

EXAMPLE A picture, a text, a movie, or a sound.

3.1.8
repeating Attribute Type
Attribute Type that may have multiple values associated to one and the same instance of a particular Feature Class

3.1.9
Spatial Domain
description of the limits of a geographical area to which a particular set of data belongs spatially

3.1.10
source material
origin of data in analogue or digital representation, stored on any kind of data medium

3.1.11
topology
field of mathematics that deals with characteristics of geometric structures that are preserved after continual variation

Note 1 to entry See Reference [3].

3.1.12
transcription
rendering of geographic names from a non-alphabetic script into an alphabetic one or vice versa

Note 1 to entry See Reference [4].

Note 2 to entry The term is also applied to initial recording in script of hitherto unwritten names.

3.2 Mathematical terms

3.2.1
Area Feature
two-dimensional Feature, defined by one or more Faces

3.2.2
Edge
directed sequence of non-intersecting Line Segments with Nodes at each end

Note 1 to entry See Reference [1].

3.2.3
enclave
small part of an area enclosed by another area, seen from the area to which that part belongs

3.2.4
exclave
small part of an area enclosed by another area, seen from the enclosing area

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3.2.5
Face
two-dimensional element bounded by a closed sequence of Edges and by zero or more sets of non-intersecting closed sequences of Edges within the first sequence of Edges

Note 1 to entry The Face is the atomic two-dimensional element.

3.2.6
graph
set of points and a set of arrows, with each arrow joining one point to another, whereby the points are called Nodes of the graph, and the arrows are called the Edges of the graph

Note 1 to entry See Reference [1].

3.2.7
Intermediate Point
point, other than a Node, that defines the shape of an Edge

3.2.8
Line Feature
one-dimensional Feature defined as a sequence of one or more Edges

3.2.9
Node
zero-dimensional element that is a topological junction of two or more Edges, or an end point of an Edge

Note 1 to entry See Reference [1].

3.2.10
non-planar graph
graph which may not be embedded in a plane

3.2.11
planar graph
graph which may be embedded in a plane, i.e. it may be drawn on the plane so that Edges intersect only at a Node mutually incident with them

3.2.12
point
zero-dimensional element that specifies geometric location specified by one coordinate pair or triplet

Note 1 to entry See Reference [1].

3.2.13
Line Segment
Segment
direct connection between two Intermediate Points, two Nodes or a Node and an Intermediate Point

3.2.14
valency
degree
number of Edges which are incident with a particular Node

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3.3 Geodetical terms

3.3.1
control point
point having known coordinates in the real world, identifiable with a corresponding point in a map or an aerial photograph or satellite image

3.3.2
ellipsoidal height
distance between a point and the reference ellipsoid, measured along the ellipsoidal normal

3.3.3
geodetic datum
mathematical surface that approximates a portion of the earth's surface

3.3.4
geoid
model of the figure of the earth that coincides with the mean sea level over the oceans and continues in continental areas as an imaginary sea level surface, defined by spirit level

Note 1 to entry At every place, geoid level/surface is perpendicular to the pull of gravity. The shape is irregular but may, for most purposes, be approximated by an oblate ellipsoid.

3.3.5
Geoid Undulation
difference between the orthometric height and the ellipsoidal height, measured along the ellipsoid normal

3.3.6
height
elevation
(vertical) distance between a point and the reference height level or the reference ellipsoid

Note 1 to entry On land maps, the reference level is commonly the mean sea level.

3.3.7
horizontal reference system
reference system for positions

3.3.8
magnetic declination
angle between Magnetic North and True North

Note 1 to entry See Reference [4].

3.3.9
map projection
transformation method used to represent the curved earth surface on a plane

3.3.10
offset
pair of values subtracted from all coordinate values in order to shorten these coordinate values

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3.3.11
orthometric height
distance between a point and the geoid, measured along the perpendicular line

3.3.12
reference ellipsoid
oblate ellipsoid of revolution that is used to approximate the figure of the geoid

Note 1 to entry It is specified by two parameters: a semi-major axis a (equatorial radius of the earth) and a semi-minor axis b (polar radius). The flattening f is defined as: $f = (a - b)a$.

3.3.13
reference height level
level to which all terrestrial heights are referred

Note 1 to entry It changes from country to country and it forms part of the national coordinate system for surveying and mapping.

3.3.14
reference system
coordinate system on which a national survey is based

Note 1 to entry See Reference [4].

3.3.15
vertical reference system
reference system for elevations

3.3.16
world geodetic system
WGS
set of standard reference ellipsoids that define latitude, longitude and height for every point on the earth

3.4 GDF terms

NOTE All Feature Classes mentioned below are defined in the Feature Catalogue.

3.4.1
Album
collection of related Datasets (logical sub-division) and, if applicable, Volumes (physical sub-division)

3.4.2
Attribute
characteristic of a Feature which is independent of other Features

Note 1 to entry See Reference [1].

3.4.3
Attribute Code
alphanumeric identifier for an Attribute Type

Note 1 to entry See Reference [5].

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3.4.4
Attribute Name
name associated to an Attribute Type

Note 1 to entry See Reference [5].

3.4.5
Attribute Type
defined characteristic of a Feature, which is independent of the other Features

3.4.6
Attribute Value
specific quality or quantity assigned to an Attribute

Note 1 to entry See Reference [1].

3.4.7
Dataset
sub-division of Album, which in turn may be sub-divided into Sections

Note 1 to entry A large set of data covering a particular geographic area may be considered a Dataset.

3.4.8
District
area regarded as a geographical unit, which is defined by the delivery of a specific public or private sector service

3.4.9
Feature
database representation of a real-world object

3.4.10
Feature Category
type of representation of a Feature, including Point, Line, Area and Complex Feature

3.4.11
Feature Class
categorization of a Feature

3.4.12
Feature Class Code
alphanumeric identifier for a Feature Class

Note 1 to entry See Reference [5].

3.4.13
Feature Name
name associated with a Feature Class

Note 1 to entry See Reference [1].

3.4.14
Feature Theme
specified group of related Features

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3.4.15
field
set of characters representing one unit of data

3.4.16
Layer
certain subset of a Dataset based upon information contents

3.4.17
Manoeuvre
ordered sequence of a Road Element, a Junction and one or more Road Elements, and optionally associated with a Traffic Sign

3.4.18
Place
administrative area of the types: Order-i Area, Country, Supra-National Area, Administrative Place A-Z or Named Area Feature of the types: Built-up Area, Named Area, District

3.4.19
Property
combination of Attribute and Relationship values which pertain to a Feature and which together define a certain characteristic of the Feature

3.4.20
Relationship Code
alphanumerical identifier for a Relationship

3.4.21
Relationship name
name associated with a Relationship Type

Note 1 to entry See Reference [1].

3.4.22
Relationship Type
defined characteristic of a Feature which is dependent on other Features

3.4.23
Semantic Relationship
Relationship
characteristic of a Feature involving other Features

3.4.24
Section
spatial subset of a Dataset

Note 1 to entry The coverage area of a map sheet, confined by geographic coordinates, may be considered a Section.

3.4.25
Transportation Element
Road Element, Pathway, Railway Element, Path, Ferry Connection, Water Body, Water Boundary Element, Junction, Railway Element Junction or Water Boundary Junction

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3.4.26
turn
ordered sequence of a Road Element, a Junction and a Road Element

Note 1 to entry A turn is a special case of a Manœuvre, relating exactly two Road Elements.

3.4.27
Volume
smallest physical unit of a medium

Note 1 to entry A single Volume may contain one or more GDF Datasets depending on Dataset size.

EXAMPLE A magnetic tape, a floppy disk.

4 Symbolization and notation elements

Many of the basic concepts of GDF are best expressed diagrammatically in data models. The Unified Modeling Language (UML) [6] has been adopted as the conceptual modeling language for GDF.

Annex I provides a summary of the UML Class Diagram notation conventions used in this document.

5 Overall conceptual data model

5.1 Conceptual data models in GDF

The general data model of GDF is presented in Figure 1 and Figure 2, Figure 4 through Figure 8, and Figure 10 through Figure 18. Detailed sub-schemas are presented in the respective clauses. The data model diagrams convey a range of dedicated terms describing concepts of the GDF model; according to UML practise, these terms are spelled using "CamelCase" notation. Textual descriptions complementing the graphical descriptions use initial capitals for each constituent word of a given GDF term.

The general data model—serving as meta-model for the respective semantic models of the individual Feature classes (see Feature Catalogue), of the individual Attribute types (see Attribute Catalogue), and of the individual Relationship Types (see Relationship Catalogue)—are presented and explained in detail in the remainder of this clause. Each Feature class, Attribute type, and Relationship Type may be considered an instance of the generic UML classes for Feature class, Attribute type, and Relationship Type, respectively, in the meta-model. This two-level notion is implemented using UML class sub-typing.

While IDs are usually not part of a conceptual model, it has been decided to explicitly include them here due to their conceptual relevance. This refers to the fact that they provide a means of unique identification of elements regardless of a particular physical realization of the GDF conceptual model. This, despite the fact that certain physical realizations may not require the use of physical IDs. Consequently, transition between different physical realizations will not result in loss of information.

5.2 The general data model of GDF

5.2.1 The Feature model

In the centre of the model in Figure 1 resides the “Feature” which is a database representation of a real world geographic object. Examples of real world geographic objects are roads or buildings. Note that in this diagram “Feature” has the meaning of Feature instance, i.e. an individual occurrence of a geographic object, such as the Eiffel Tower in Paris.

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Figure 1 shows that each Feature shall belong to exactly one Feature Class and exactly one Feature Theme. The diagram also shows that Feature Classes and Feature Themes are uniquely referenced by a name and a code.

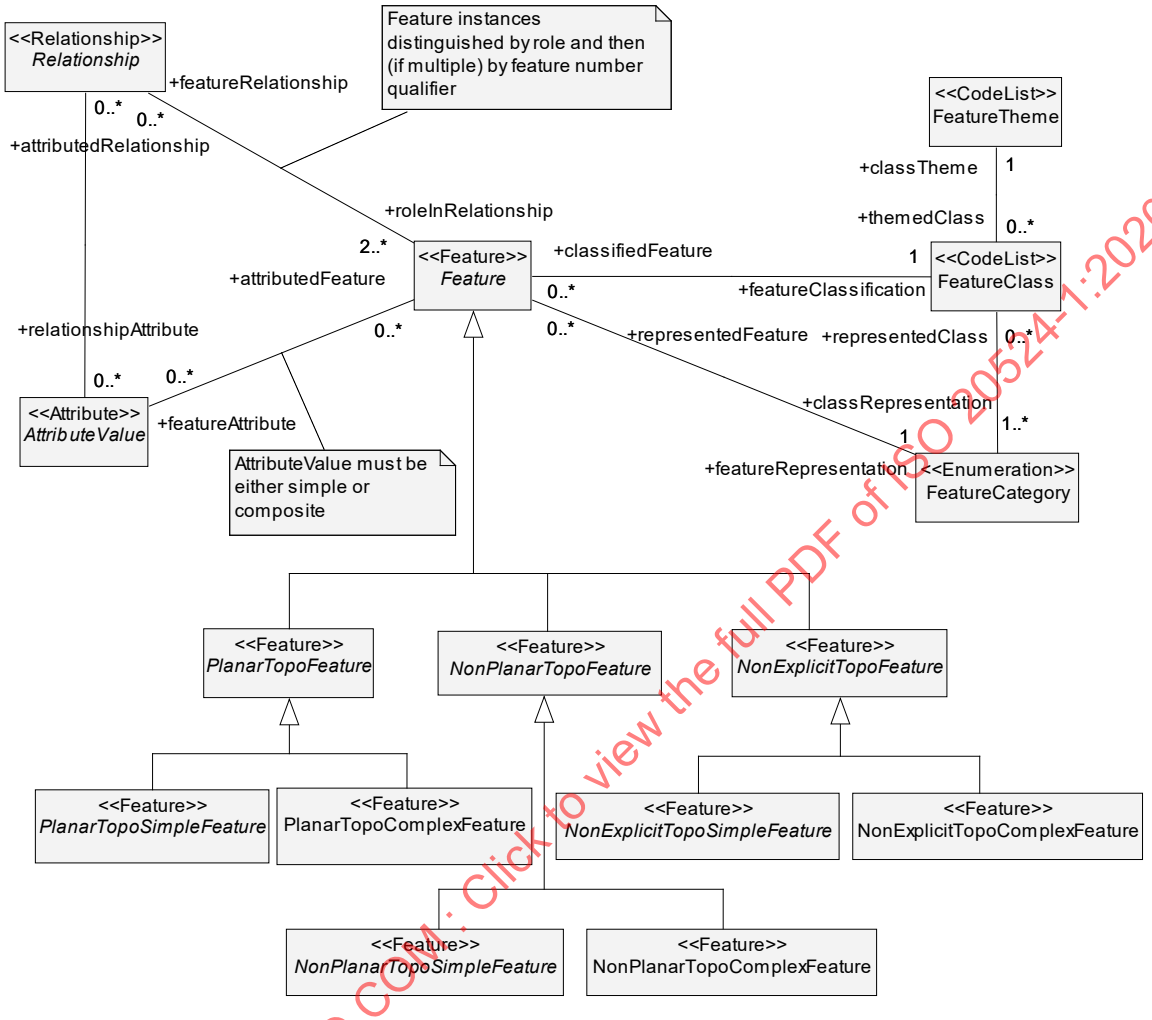


Figure 1 — Overall Conceptual Data Model

Each Feature belongs to exactly one Feature Class. This constraint is indicated in Figure 1 by the depiction of Feature Class with a multiplicity of 1 in the association between classes Feature and Feature Class. Thus, neither classless Features (Features belonging to no Feature Class) nor hybrid Features (Features belonging to multiple Feature Classes) are allowed in a GDF.

A Feature may have zero or more Attributes. Attributes serve to represent characteristics of a Feature that are independent of other Features.

A Relationship is used to associate two or more Features together. However, a Feature is not required to participate in a Relationship. A Relationship may have zero or more Attributes.

Each Feature is of exactly one Feature Category. A Feature Category is uniquely referenced by a Name and a Code. GDF defines four Feature Categories – Point, Line, Area and Complex. Collectively, Point, Line, and Area Features are referred to as Simple Features. Complex Features are aggregations of other Features, either Simple, Complex or in combination.

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5.2.2 Graph topology

The first subdivision of Features relates to the topology of the underlying graph with which the Features are defined. The GDF supports three different types of graph topologies: Planar topology, Non-planar topology and Non-explicit topology:

- Non-explicit topology: No topological relations between objects are explicitly defined. That is, topological relations are only defined via coordinate values.

- Non-planar topology: Topological relations are explicitly defined; objects may fully or partially coincide, or intersect or overlap each other.

- Planar topology: Topological relations are explicitly defined; objects shall not fully or partially coincide, and shall not intersect or overlap each other. Intersecting objects or overlapping objects are broken-up into object fragments, whereby common parts (such as a street coinciding with a boundary) are present only once.

In exceptional cases this document also supports the explicit definition of topology on the Feature level[2)].

Non-explicit topology gives the possibility to define and process data for which topological relations are less relevant (e.g. map display data) in a very efficient way. Non-planar topology gives the possibility to perform network operations efficiently. Planar topology gives also the possibility to efficiently integrate area information in network operations.

In the GDF model, the rendering method chosen for planar topology is the full integration method, and for non-planar topology the connectivity method. Both methods are further described below.

Obviously since planar topology is a special case of non-planar topology it is quite possible to have utilized the "connectivity" approach to render the planar topology case. However, it is even conceivable (although less likely) to make use of the full integration method to render non-planar topology. It is important not to confuse the rendering choice with the topology choice.

In planar topology, the zero- and one-dimensional basic building blocks, Nodes and Edges, form a graph. In special cases where in reality two Point Features are located above each other, a single Node is being defined (possibly connected by a vertical Edge (of “length” zero) representing a Line Feature, e.g. an lift between different building levels). Furthermore, in the GDF model of topological planarity, a fully topologically integrated representation is provided for Area Features. Area Features are defined by referencing the two-dimensional building blocks, Faces, which make up that Area Feature (Figure 2).

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2) This document allows the following additional explicit definitions of topology:

The start and end Point Feature of a Line Feature.

The start and end Complex Feature of a Complex Feature.

Through the use of Relationships (See below: The Relationship Model).

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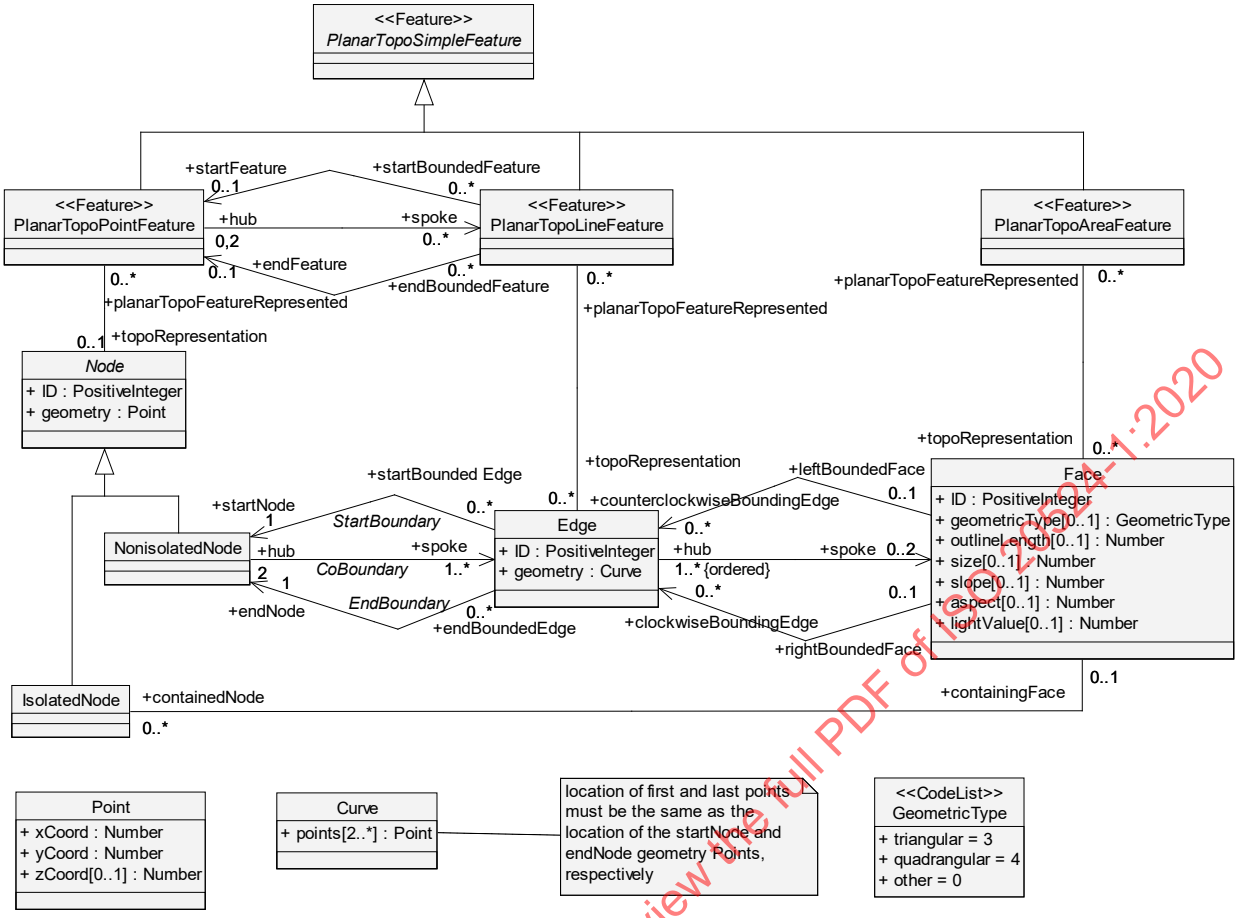


Figure 2 — Conceptual data model of Planar Topological Simple Features

Here, an Area Feature shall have at least one Face and a Face at least one Edge. This constraint is depicted in Figure 2 by the hub and spoke association between Face and Edge. The relation between a Face and its composing Edges is determined by the location of the Face relative to the Edge (left or right) relative to the direction of an Edge or, when approached from the Face, by the orientation of the Edge (clockwise or counter clockwise) when seen from the inside or the outside of the Face. This means that an Edge which bounds two Faces will have a clockwise orientation in the definition of one Face and a counter-clockwise orientation in the definition of the other Face (See Figure 3).

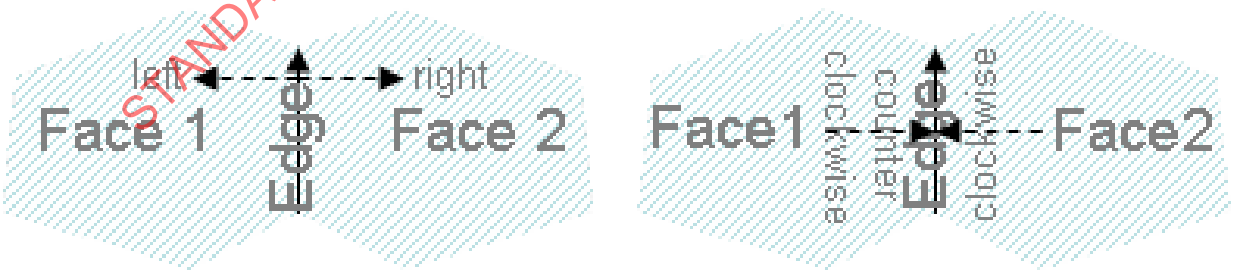


Figure 3 — Relation between Faces and bounding Edges

In non planar topology the Nodes and Edges together form a non-planar graph. That is, where in reality two Line Features cross at different levels (e.g. two roads crossing via a bridge), the Edges which represent these Line Features cross without forming a Node on the point of crossing. Also, in special cases where in reality two Point Features are located above each other, two Nodes are being defined (possibly

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connected by a vertical Edge representing a Line Feature, e.g. an lift between different building levels). In the GDF model of topological non-planarity, Faces do not exist, i.e. only topological connectivity is represented. Two dimensional Features are defined by referencing the Edges making up this boundary (Figure 4).

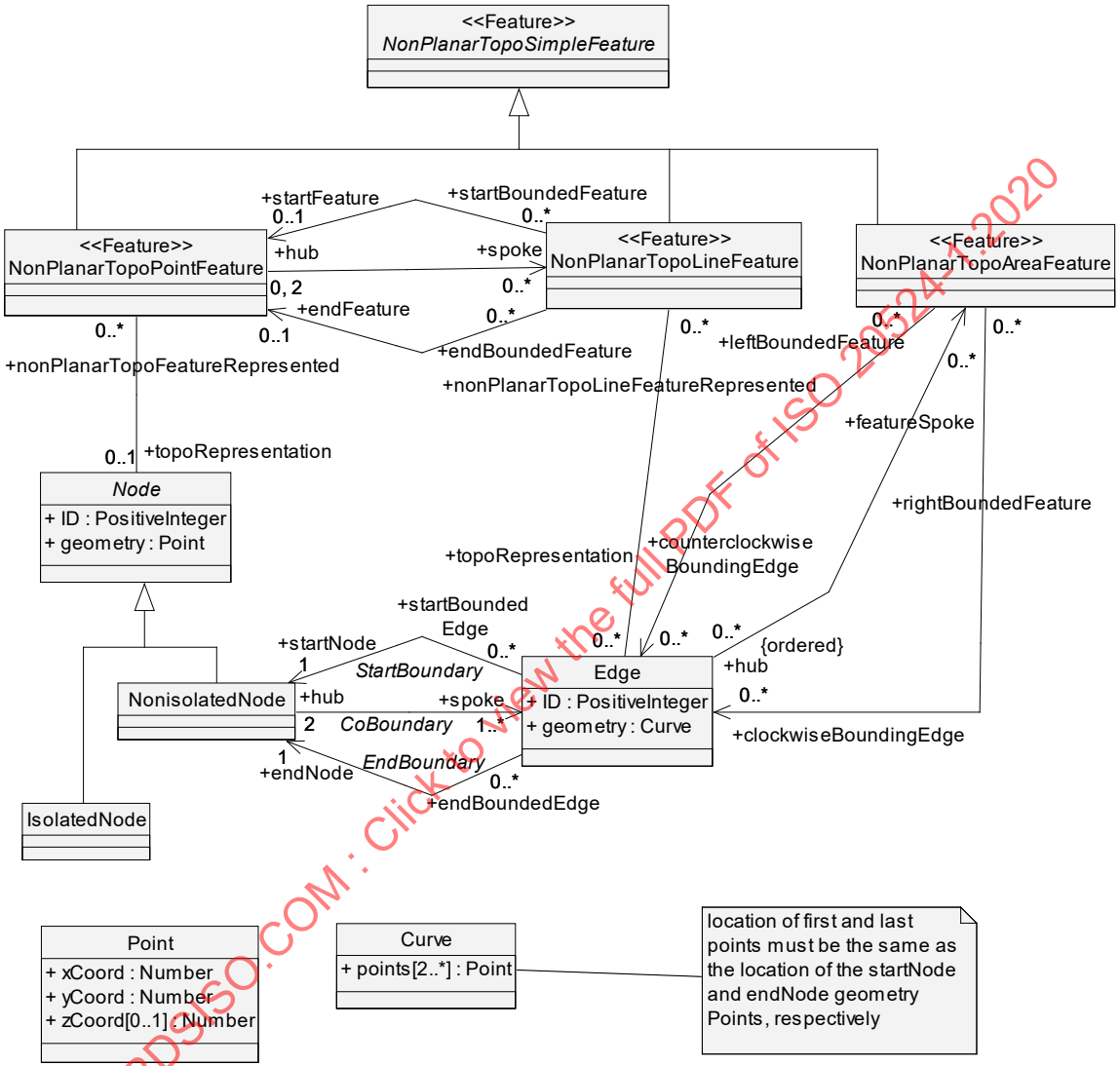


Figure 4 — Conceptual data model of Non-planar Topological Simple Features

As is stated above, in planar topology, the basic graph represents objects in a single plane. Reality however is not planar. Roads for instance may cross each other at different grades. This non-planarity shall be introduced on the Feature level[3)].

In non-explicit topology the basic building blocks of zero-, one-and two- dimensional Features are Dots (zero dimensional), Polylines (one dimensional) and Polygons (two dimensional). Dots, Polylines and Polygons are defined without explicit topological relations.

In the remainder of this chapter, the planar topology and the non-planar topology will be both referred to as "topology" and the corresponding Features as topological Features, while the non-explicit

3) In addition to this, this document allows the definition of the height level of Edges (See 10.2.4.5).

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topological way will be referred to as the non-explicit topology or NET way and its corresponding Features as “non-explicit topological or NET Features”.

In topology, Features are defined by the basic building blocks Nodes, Edges and Faces. Figure 2 and Figure 4 show that a topological Point Feature is always represented by exactly one Node, a topological Line Feature by one or more Edges and a topological Area Feature either by one or more Faces or by one or more Edges forming one or more closed boundaries. The lowest part of each Figure illustrates how the basic building blocks Node, Edge and Face (Face in planar topology only) are mutually related in each of the supported topologies. Within the conceptual model Nodes may be broken down into two types. Isolated Nodes are Nodes which do not coincide with other geometry. Otherwise a Node is considered a non-isolated Node which means it is connected to one or more Edges.

In non-explicit topology, Features are defined by the basic building blocks Dots, Polylines and Polygons. Figure 5 shows that a NET Point Feature is always represented by exactly one Dot, a NET Line Feature by exactly one Polyline and a NET Area Feature by exactly one Polygon. As may be seen, no relations are defined between these basic building blocks, thus signifying their non-explicit topological nature. An important distinction here is that in contrast with topology there is no reuse within the building blocks--neither a Polyline reuses (references) Dots, nor a Polygon reuses Polylines. Thus, shared geometry never occurs and overlapping Features need to have their building blocks replicated. In non-explicit topology reuse may occur in the definition of Complex Features.

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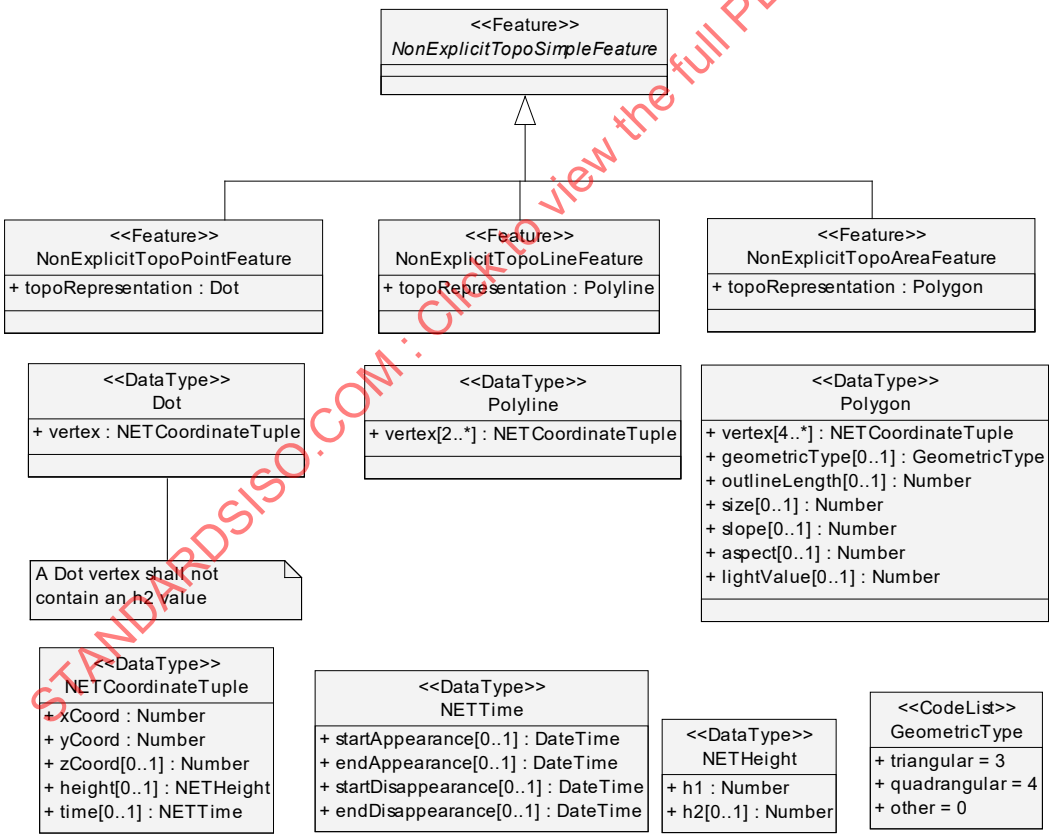


Figure 5 — Conceptual data model of NET Simple Features

It is not allowed to mix the use of topologies, i.e. a GDF Layer may only contain data from one type of topology (See Figure 14 and Figure 15).

One should note that the multiplicity of classes representing the basic geometric building blocks (Nodes, Edges and Faces) in the associations with the classes representing Features with the different Feature

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Categories (Point, Line and Area) in planar and non-planar topology have zero as begin value. This indicates that geometry-less Features are allowed. I.e. this document allows the definition of Features for which the geometry is not defined.

5.2.3 Levels in GDF

The different objects together making up a GDF are conceptually divided over three different levels, Level-0, Level-1 and Level-2. The topological primitive building blocks, Node, Edge, and Face, reside on Level-0. The Simple Features, as referred to in the previous paragraph and in the data models there together make up Level-1. Simple Features may form aggregated Features which are called Complex Features. Complex Features comprise Level-2. Figure 6, Figure 7 and Figure 8 give the data model of Complex Features for the three different types of topologies. As may be seen in these figures, Complex Features may only consist of Features defined with the same topology.

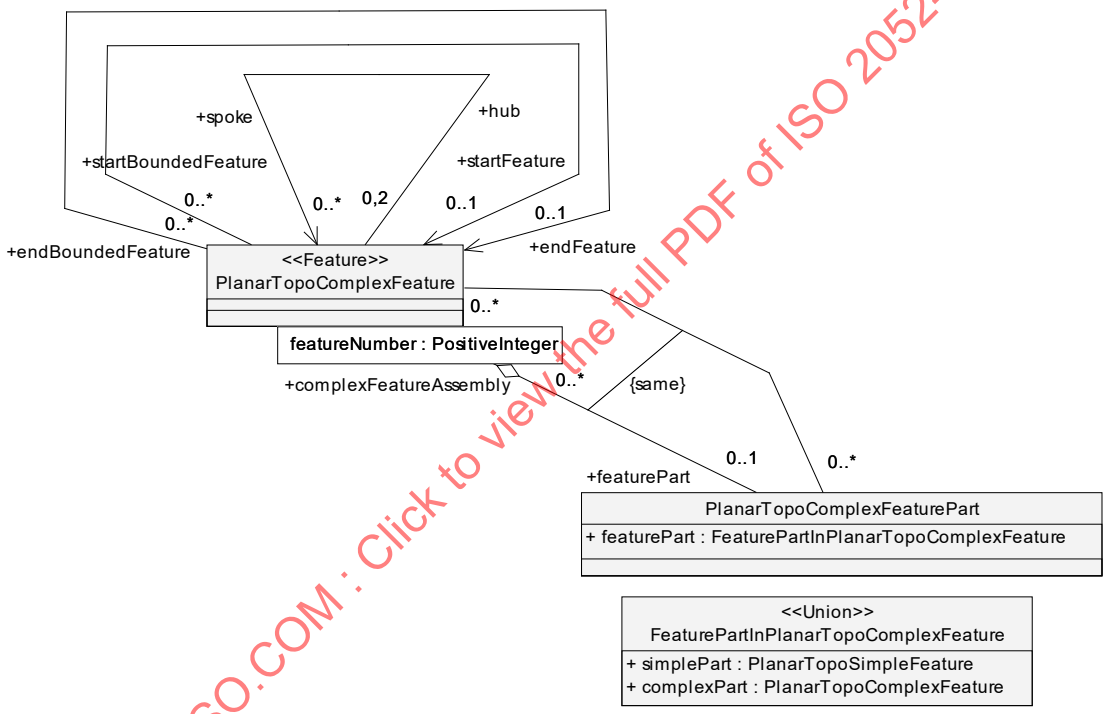


Figure 6 — Conceptual data model of Planar Topology Complex Features

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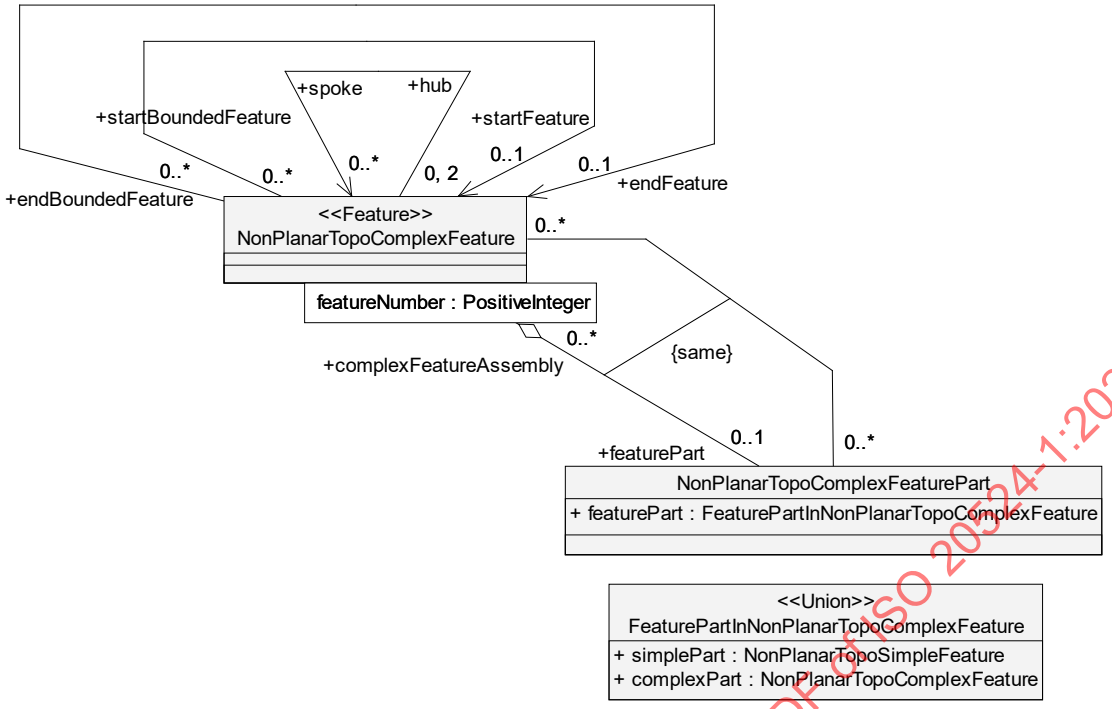


Figure 7 — Conceptual data model of Non-planar Topology Complex Features

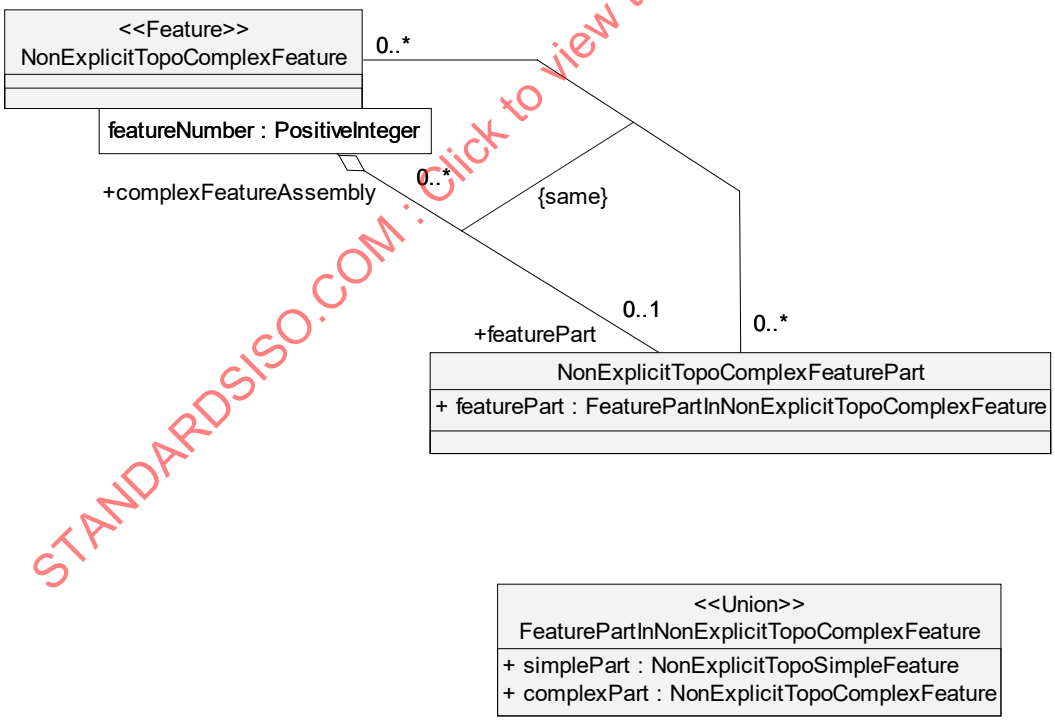


Figure 8 — Conceptual data model of Non-Explicit Topology Complex Features

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5.2.4 Height modelling and time modelling

So far, the different types of topology have been described in terms of their ability to define two dimensional objects. This document however supports various levels of 3-dimensional modelling and also includes the possibility to model objects in a space-time continuum.

All different types of topology assume a two-dimensional plane to which the different Features are referred to. This document also supports the definition of elevation above this plane in the sense that all geometries defined (by Nodes, Edges, Faces, Dots, Polylines or Polygons) may be given an elevation value representing terrain height.

In addition to this, non-explicit topology supports the 3-dimensional representation of Features. Next to their horizontal and elevation geometrical definition, Features are represented 3 dimensionally by a specification for each horizontal position of their minimum height and their maximum height above the terrain. In most cases the minimum height will be zero representing a Feature which extends from the ground a certain height vertically. This refers for instance to the case in which a normal building, located on the terrain with a certain height is represented. In certain cases however a Feature will extend from a certain height above the ground a certain height vertically. This refers for instance to arch shaped buildings which have a certain part starting a certain height above the ground and extending further upward (See Figure 9).

In non-planar and planar topology 3-dimensional aspects may be modelled via an Attribute solution. If a given Non-Explicit Topology Feature is subject to both 3-dimensional representation models (namely 3-dimensional characteristics on Feature level as well as 3-dimensional characteristics of Attributes of the Feature in question), the 3-dimensional characteristics on Feature level shall be given priority over the 3-dimensional characteristics on Attribute level.

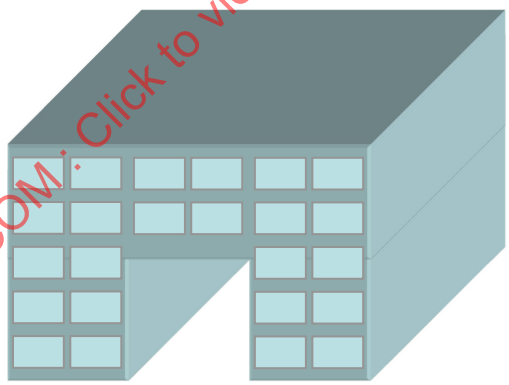


Figure 9 — Example of an arch shaped building

This document also supports terrain modelling in which a 3-dimensional representation of the terrain may be defined. Four different methods are offered for this which include support for Triangular Irregular Networks (TIN's), contour lines and point grids. For the TIN support Faces and Polygons have been extended with enhanced geometric properties such as triangle size and slope. Contour Lines and Point Grids are modelled as Features and Attributes.

This document also supports the representation of temporal characteristics of Features. This is supported for Non-Explicit Topology Features. This is done by extending each horizontal position of a Feature with four temporal definitions. These definitions stand for the moment of start of appearance (construction start), the moment of end appearance (opening), the moment of start of disappearance (closure) and the end of disappearance (demolition end). In this way the existence of a Feature over time may be represented. In non-planar and planar topology temporal aspects may be modelled via an

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Attribute solution. Here the Time Domain Model of GDF (See also 5.7) is applied whereby the start time and the duration of a certain construction status may be defined.

If a given Non-Explicit Topology Feature is subject to both time models (namely temporal characteristics on Feature level as well as temporal characteristics of Attributes of the Feature in question), the temporal characteristics on Feature level shall be given priority over the temporal characteristics on Attribute level.

5.3 Attribute model

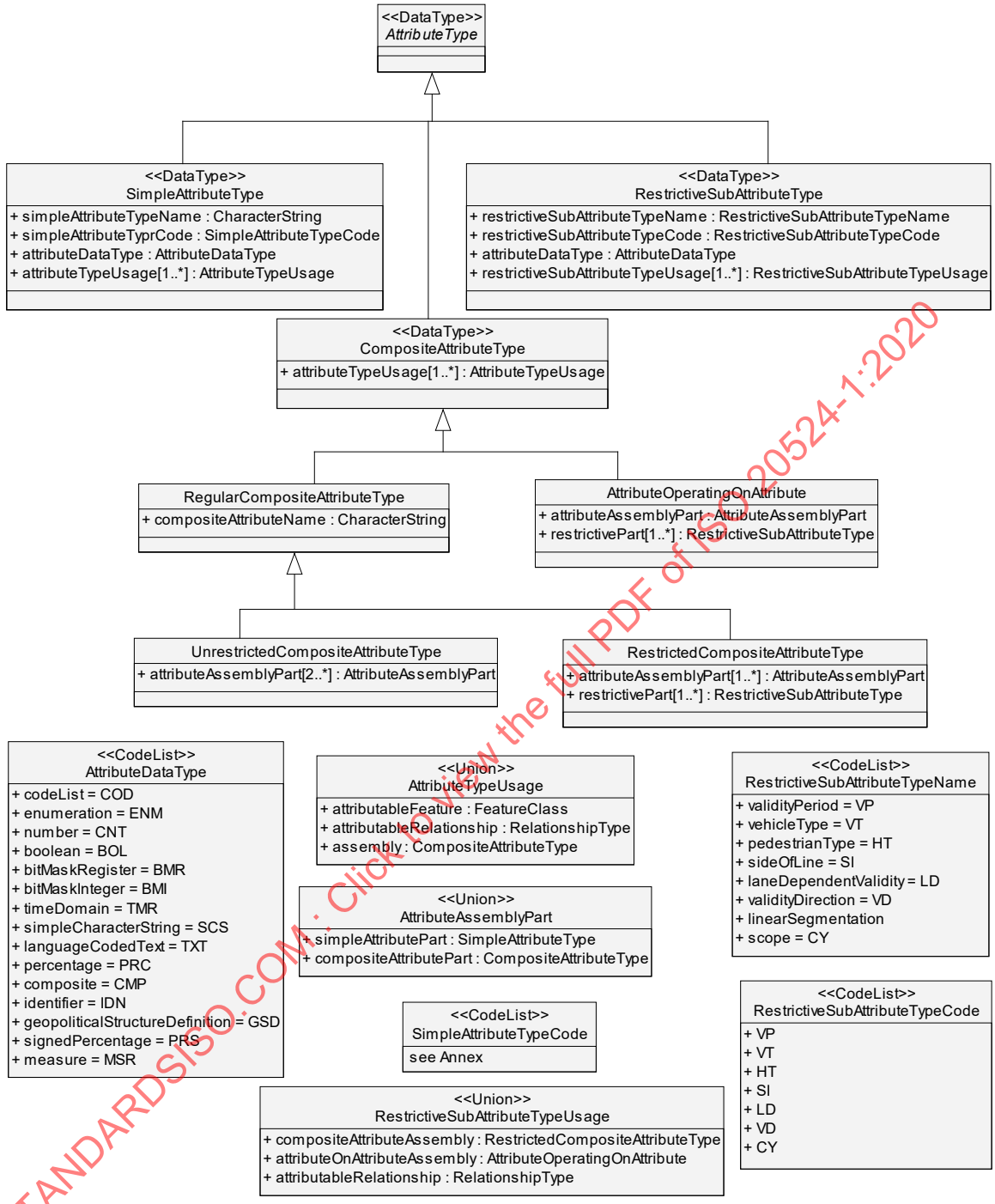
Characteristics of Features which are independent of other Features are modelled as Attributes. Attributes are of a certain Attribute Type identified by a name and code. The value of an Attribute instance is called an Attribute Value. Attribute data types include among others a code, text, an ID or number. This document defines Attributes relevant for ITS applications and specifies which Attributes may be used in combination with which Features. For Complex Features, Attributes may be defined for a Complex Feature as a whole (assembly) or for a particular Feature part on an instance by instance basis.

In certain cases, Attribute Values are defined within the GDF itself. In other cases only, the domain of the Attribute Value is specified. This is the case when the Attribute Value is a measure (e.g. Average Speed) or is defined by a string of characters (e.g. Official Street Name Text). Another case relates to user-defined Attributes. User-defined Attributes are defined by the user within the context of a particular GDF. Certain Attributes that have been defined in the GDF do not have their Attribute Values defined. For example, the Attribute Value of Multimedia File Attachment is the reference to external files rendered in binary, XML, or other physical encodings.

The Attribute Catalogue defines a set of Attribute Types and corresponding reference names and codes. It also defines the Feature Class and/or the Relationship Type to which a particular Attribute Type may be attached. Figure 10 and Figure 11 give the conceptual data model for this. The diagram shows that an Attribute may be an aggregation of other Attributes. Such an Attribute is called a Composite Attribute, as opposed to a normal (non-aggregated) or Simple Attribute. A Composite Attribute consists of a number of Sub-Attributes. Semantically, a Composite Attribute specifies an aggregated value, which is composed of a number of values, specified by the value of the respective Sub-Attribute. Their appearance in a Composite Attribute specifies the fact that they represent partial information and that the complete information may be found in the other Sub-Attributes of the Composite Attribute.

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Figure 10 — Conceptual data model for Attribute Types

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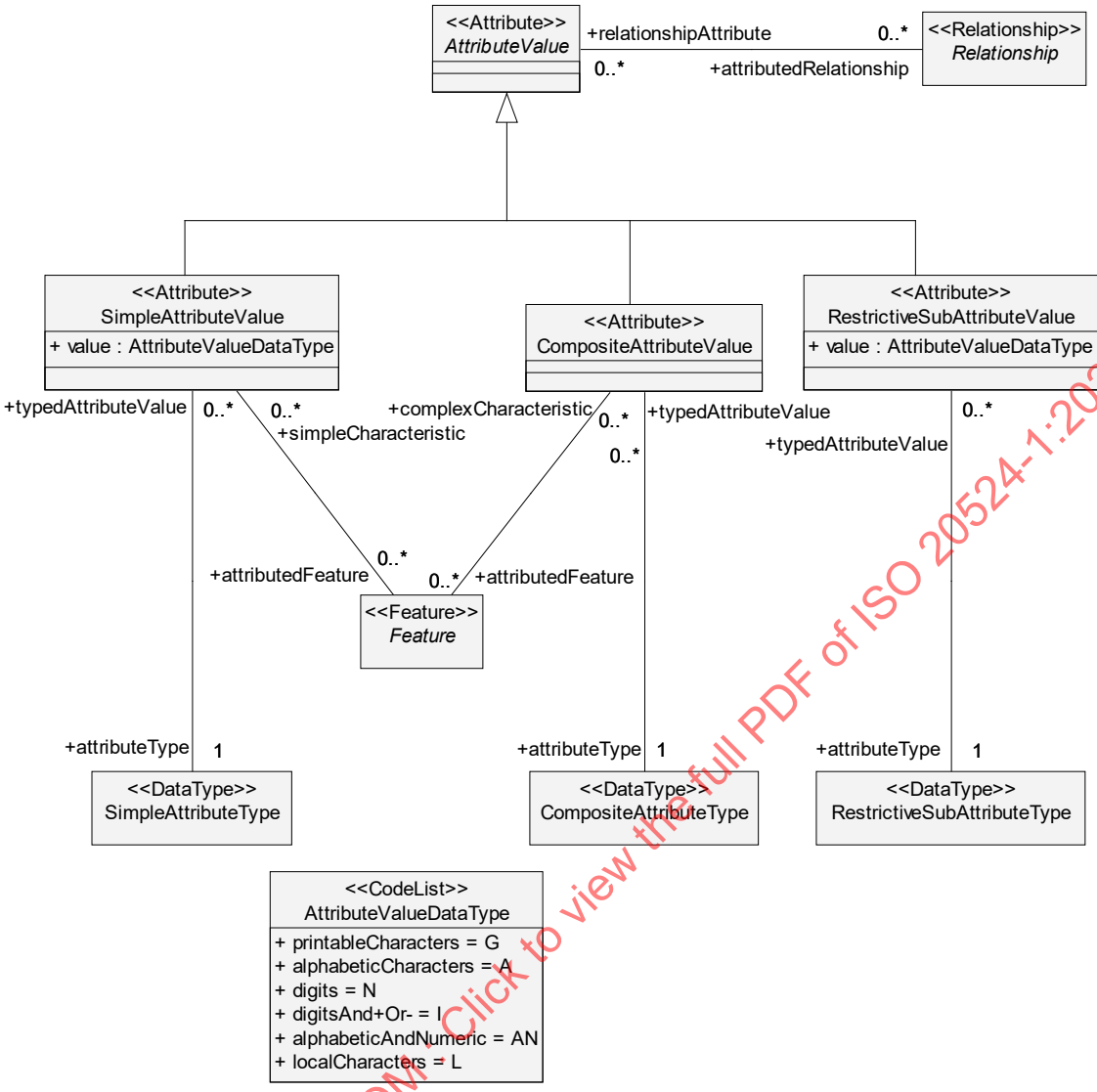


Figure 11 — Conceptual data model for Attribute Values

In most cases, like values of normal Attributes, Sub-Attributes values are independent. Cases where Sub-Attribute Values are not independent are cases where an Attribute (Simple or Composite) are combined with a so-called Restrictive Sub-Attribute operating in said Attribute. In these cases, the validity of the Attribute is restricted to the value specified in the Restrictive Sub-Attribute. Restrictive Sub-Attributes values may never be attached to a Feature individually. They shall always appear in combination with the Attribute they restrict. Restrictive Sub-Attribute Values may be attached individually to Relationship. In these cases, they restrict validity of the Relationship.

Each Sub-Attribute of a Composite Attribute is either a Simple Attribute, a Composite Attribute, or a Restrictive Sub-Attribute. Any Sub-Attribute being a Composite Attribute recursively builds a hierarchical tree of Sub-Attribute sets at different hierarchical scope level. In case a Restrictive Sub-Attribute operates on a (Simple or Composite) Attribute, it implies representing a different scope level then said Attribute.

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5.4 Relationship model

A Semantic Relationship specifies a meaningful relation between two or more Features, which are not necessarily of different classes. Furthermore, the Features in a Semantic Relationship may be in the same or in different Sections or Layers.

Semantic Relationships with a common structure (e.g. linking Feature A to Feature B, where the instances of A are always of the same class and where the instances of B are always of the same class) and with a common meaning, are grouped into a Relationship Type. A particular Relationship Type is uniquely referred to by a Name and Code (see Figure 12).

Relationships are in many cases binary, i.e. involving two Features. However, there are instances when three or more Features are involved in a Relationship. For example, the Relationship Prohibited Manoeuvre requires a Road Element, a Junction and at least one other Road Element, each playing a pre-defined and recognizable role.

A Relationship may be further qualified by means of Attributes. Similar to Attributes attachable to Complex Features assemblies and attachable to their parts, Attributes of a Relationship may be attached to a Relationship as a whole or to a particular Feature partner (per role). The set of attached Attributes may or may not be an ordered set. Whether the Attributes of a particular Relationship need to be an ordered sequence is explicitly specified.

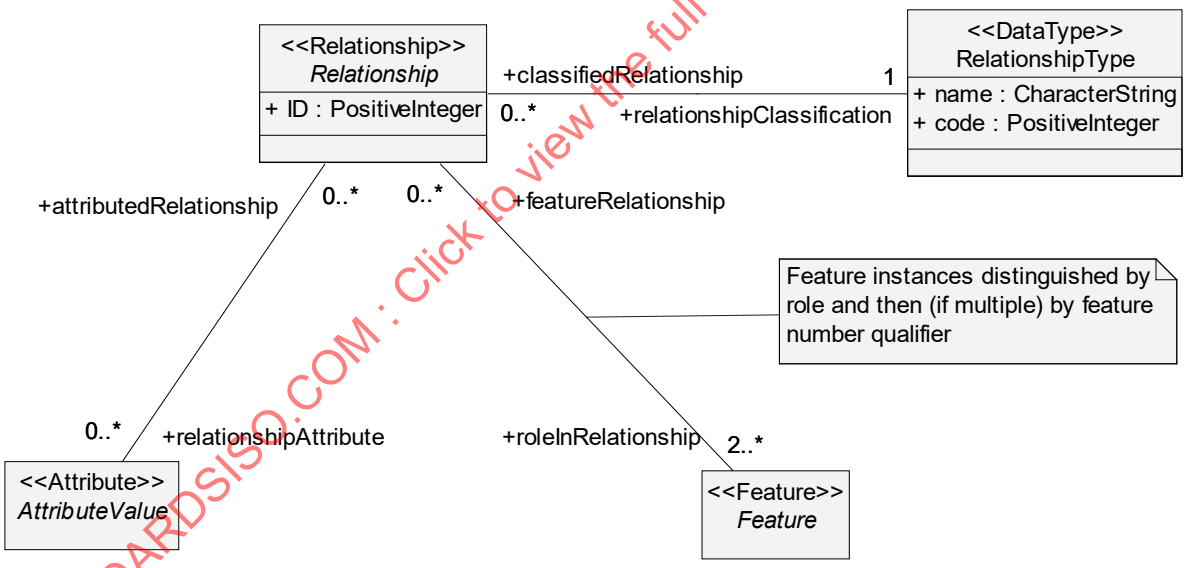


Figure 12 — Conceptual data model for Relationships

5.5 Linear referencing

GDF supports an ISO 19148-compatible mechanism of linearly referencing positions along Line Features. This allows to map different sets of corresponding Line Features to each other (such as Road Elements on one hand and Anchor Sections embodying a Linear Datum on the other hand) by means of linear assignments, to position Point Features along Line Features by means of point assignments, and to designate the validity of Attribute properties to a confined linear extent along a Line Feature in terms of linear segmentation.

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5.6 Feature representation scheme

The Feature Model, the Attribute Model and the Relationship Model may be considered as being valid for a wide range of applications. The Feature Representation Scheme is application specific in the sense that it specifies the representation needs of applications that share the same representation needs. The Feature Representation Scheme contained in the current standard specifies the needs of ITS applications. From these needs it follows for instance that a Road Element shall always be represented by a Line Feature. Another Feature Representation Scheme (not contained) may specify that a Road Element shall be represented by an Area Feature.

The most important role of the Feature Representation Scheme is to specify to which Feature Category or categories a particular Feature Class shall or may belong. Seven different categories are distinguished: Topological Point, Line and Area Features, Complex Features and non-explicit Topological Point, Line and Area Features.

In Figure 13, two different possibilities are conceivable for a particular Feature Class:

1. all instances shall be of one and the same category,

2. some instances may be of one category, other instances of another one.

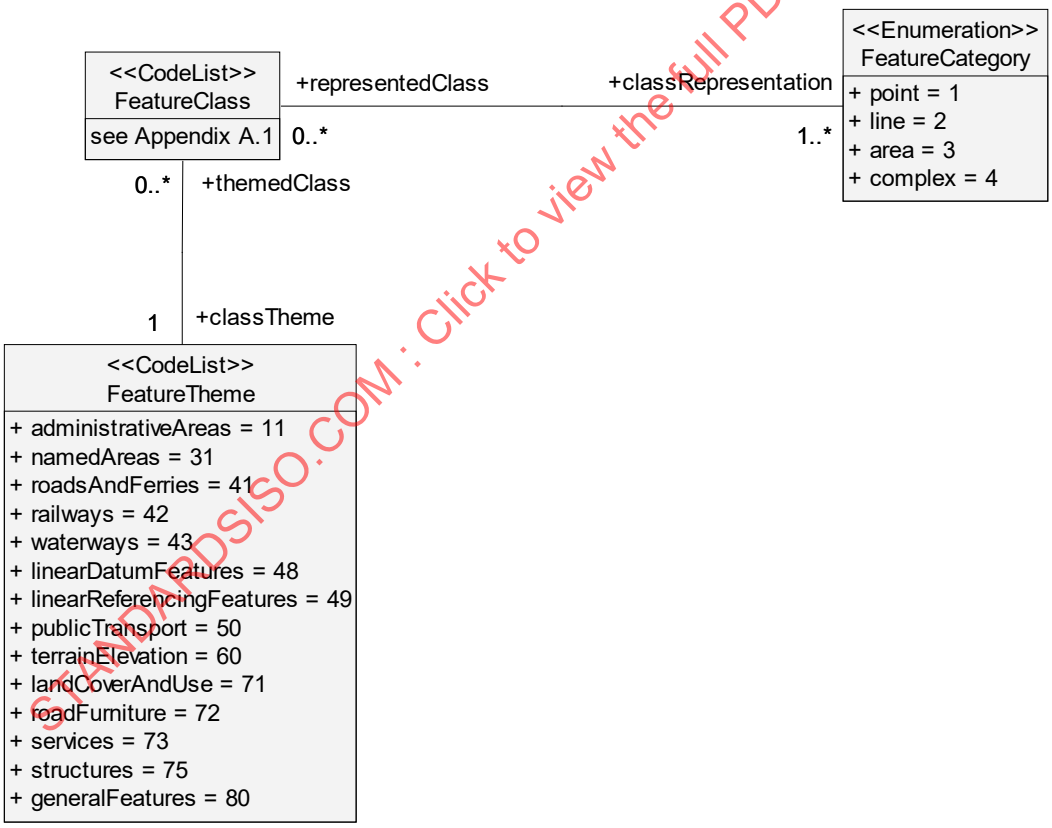


Figure 13 — Conceptual data model for Feature Representation

5.7 Time modelling

GDF supports the definition of temporal aspects. These may relate to Features, Attributes or Relationships. Temporal aspects of Features already have been conceptually described in 5.2.4. In this paragraph reference was made to the GDF Time Domain Model. The GDF Time Domain Model also is used

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to define temporal aspects of Attributes and Relationships. The model uses starting time, ending time and duration as basic elements to describe a specific period. Time expressions may either be modelled as a starting time and an ending time, or as a starting time and a duration. In special cases Time expressions may consist of a starting time alone or a duration alone. In addition to sharply defined time components (e.g. January 1, 2009 at 0h:00) this document also supports the definition of more fuzzy time components (e.g. after sunrise). The time domain model is applied in certain "time-relevant" Attributes. Through this mechanism the time during which a certain Attribute or Relationship is valid may be modelled.

5.8 Data management: organisation of Feature data into Layers and Sections

The contents of a digital road map may be thought of as being structured spatially and according to the Feature content. This document identifies the need to define a GDF as a set of different independent chunks of data. For this, the following conceptual model is provided.

Figure 14 through Figure 18 depict the overall structure under which Features are organised within a GDF. Figure 14 shows that one complete GDF is contained in an Album. An Album shall be composed of one or more Datasets, whereby each Dataset contains a certain aerial subset of the total area covered by the GDF. Each Dataset shall be composed of one or more Layers (see 10.1.3 for more on Albums and Datasets). Generally, the area covered by a Dataset and a Layer coincides. A Layer represents a division according to the Feature contents. It contains Feature data of one or more Feature Themes, of a uniform topology. Thus, a Layer may contain exclusively Features represented under planar topology, non-planar topology, or non-explicit topology, but not a mixture (see Figure 15). This also means, that Planar Topo Section comprises Nodes, Edges and Faces as its primitives, whereas Non Planar Topo Section comprises only Nodes and Edges (See Figure 16).

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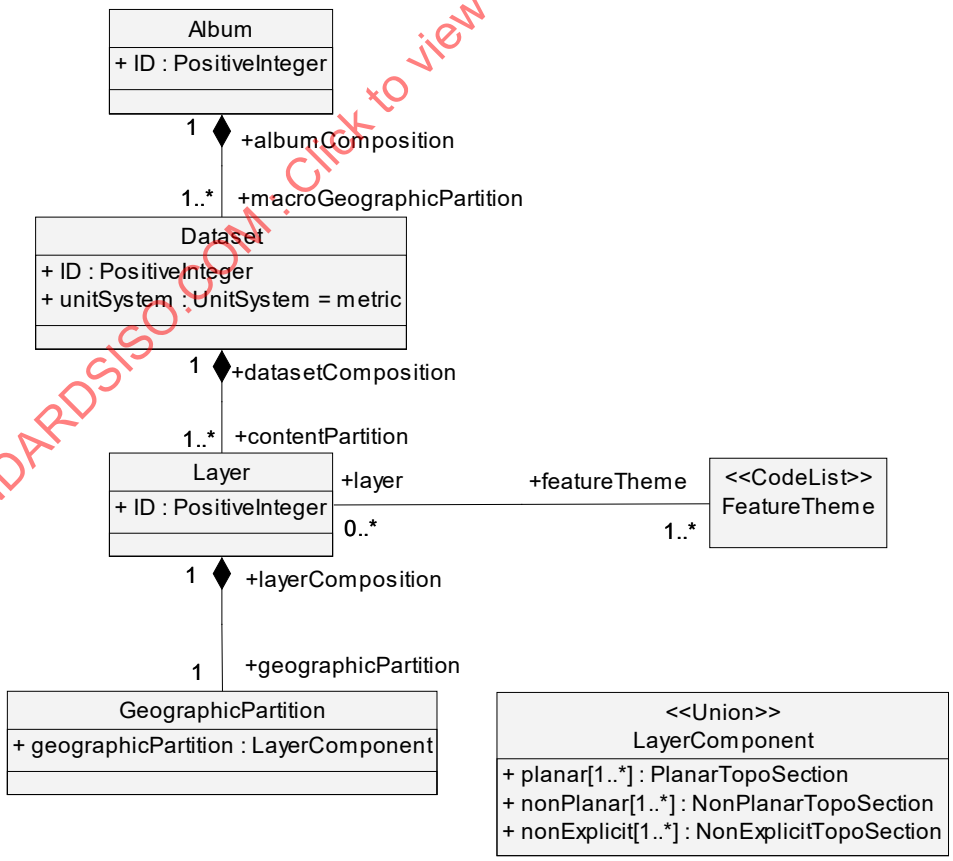


Figure 14 — Organization of data in Albums, Datasets, Layers and Sections

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A Layer shall be composed of one or more Sections, each of which represents a different geographic area. Figure 15 shows that the topology-based Sections of Figure 14 are composed of Features of their corresponding topologies. Thus, a Planar Topo Section shall be composed of one or more Planar Topo Features and so on. Sections may take the form of rectangular meshes or more natural areas like Administrative Areas. All Layers in a Dataset may have Sections with the same spatial extend or Sections with a Layer specific spatial subdivision may be defined.

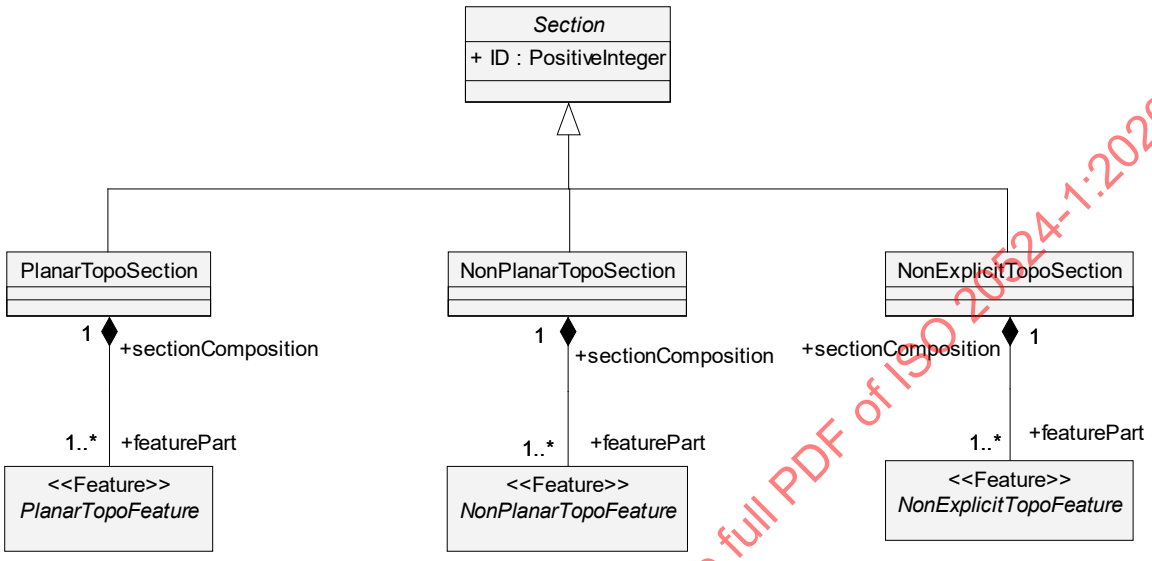


Figure 15 — Composition of Sections

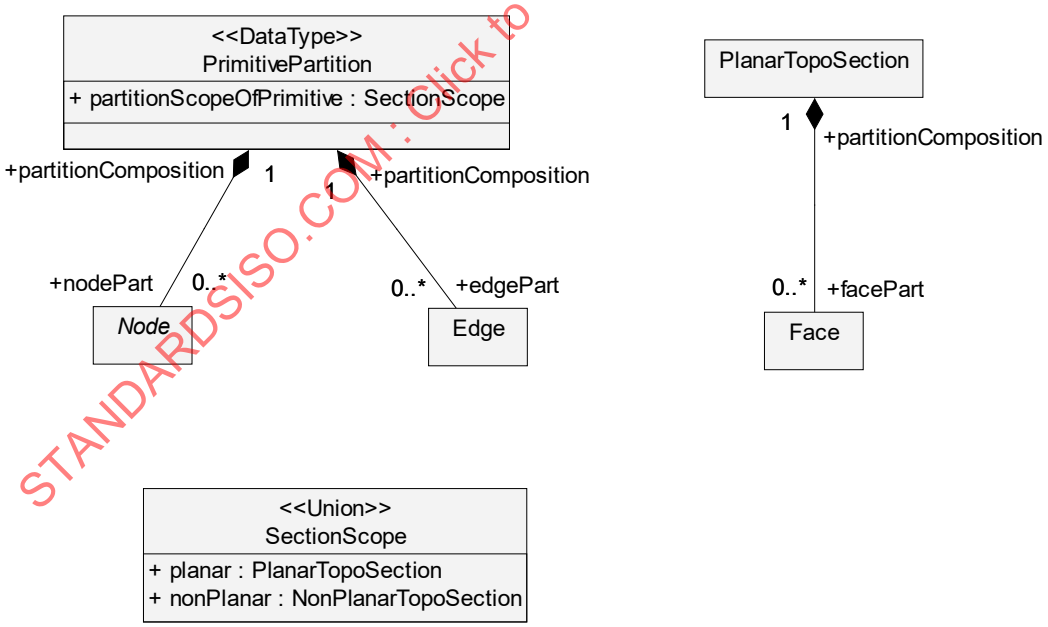


Figure 16 — Section Primitives

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Each instance of an Attribute or a Relationship, respectively, may exist locally (partition scope is the Section), semi-globally (partition scope is the Layer), or globally (partition scope is the Dataset). This is depicted in Figure 17.

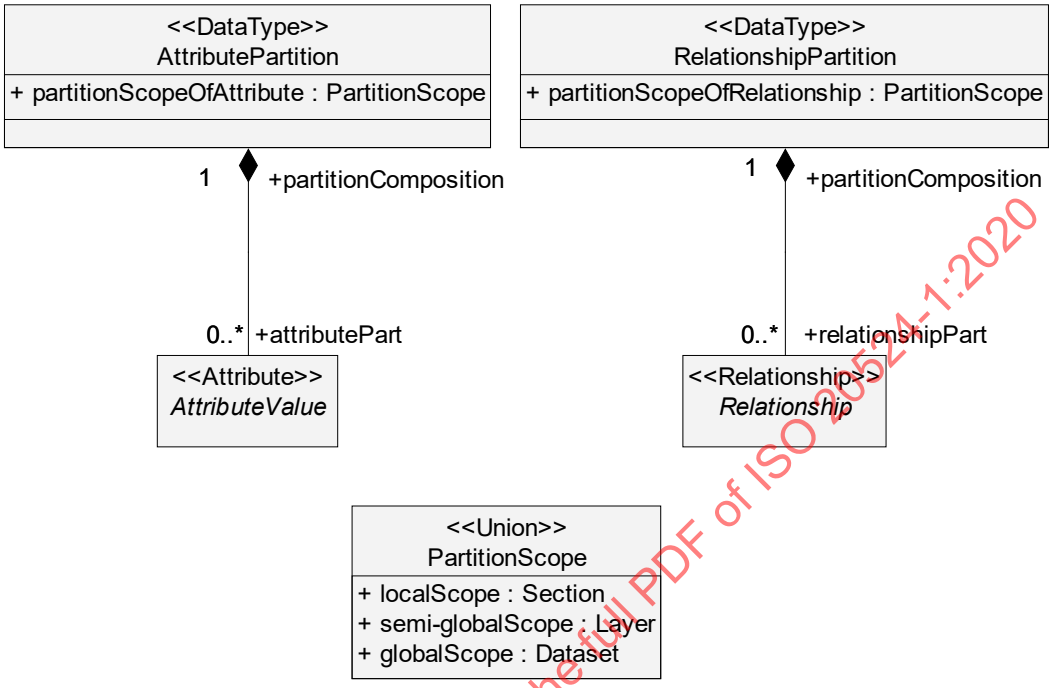


Figure 17 — Attribute and Relationship Partitioning Scope

At Section borders and Dataset borders (i.e. where a Section borders coincides with the Dataset border), Feature continuity is given by conversion information in terms of "translation" of Feature IDs (see Figure 18). The local instance of a Feature is logically connected to a foreign instance of the Feature that resides in an adjacent Section or Dataset. Annex A provides further details about this principle of GDF segmentation.

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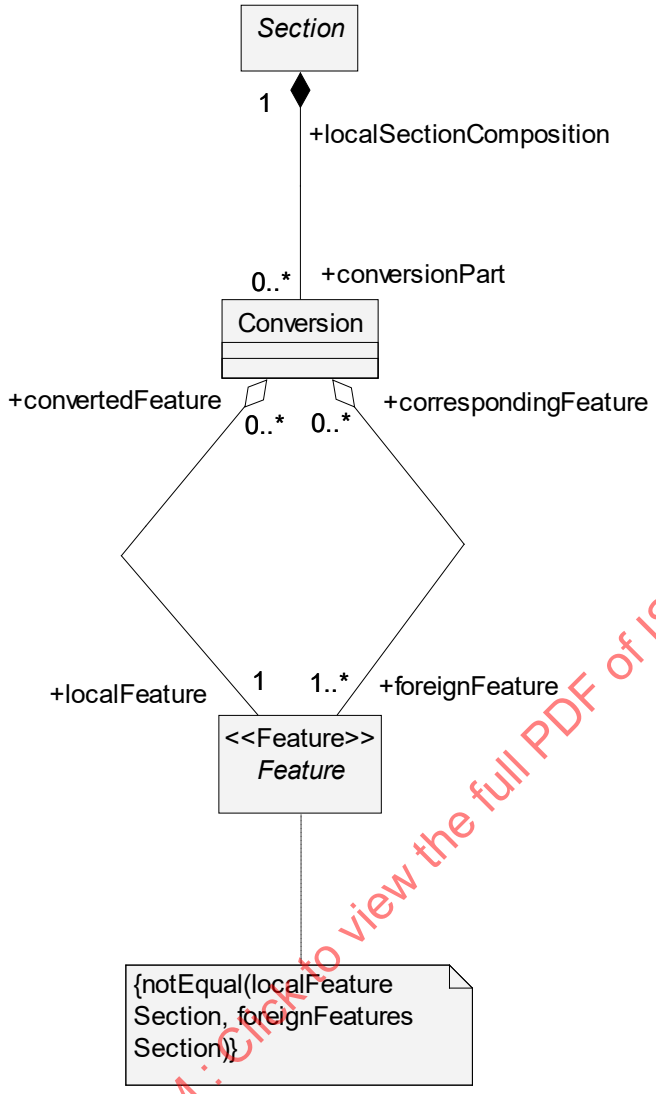


Figure 18 — Feature Conversion

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6 Feature Catalogue

6.1 Generic specifications

6.1.1 Features and Feature Themes

In GDF real world objects or activities at a certain location are represented by “Features”. Examples of real world objects are roads and buildings. Examples of activities at a certain location are the services. Features such as “Roads” and “Ferries” may be grouped together into “Feature Themes” (for instance “Roads and Ferries”).

All Features and Feature Themes in the GDF are referenced throughout the manual by a Feature name or Feature Theme Name. Most of these names are derived from terms commonly used in daily life (e.g. road, building). In order to distinguish a GDF Feature Name from these commonly used terms, the names of the Features and Feature Themes are written with an uppercase character at the beginning of each word (e.g. “Road Element” versus “road element”).

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6.1.2 Feature Class Codes

For data exchange the Features and Feature Themes are not referenced by their names but by a numeric code. A four-digit code is used for Features and a two-digit code for Feature Themes. A strict 1:1 relationship exists between Feature names and Feature Class Codes and between Feature Theme Names and Feature Theme Codes. A full list of codes is given in A.1.

6.1.3 Simple and Complex Features

GDF makes a distinction between Simple Features and Complex Features. A Simple Feature is a Feature not composed of other Features.

A Complex Feature is composed of Simple Features and/or other Complex Features. For example, an Intersection is a Complex Feature, made up of a set of Features such as Road Elements and Junctions. An example of a Complex Feature made up of other Complex Features is a Country made up of Order-1 (complex) Administrative Areas.

In case complex aggregations are subject to constraints (identifiable parts, ordered parts), this is explicitly specified.

6.1.4 Feature hierarchy

This document supports the need to define a Feature hierarchy. In a Feature hierarchy definition, a certain Feature Class may be defined as a sub-type of a more generically defined super type. In this way, an instance of a sub-type may be considered on its own generalisation level as an instance of that sub-type while at a higher generalisation level as an instance of its super type. As an example, one may consider a Hotel which has as a super type Lodging Facilities which in turn may have as a super type Tourist Facility.

6.1.5 Data model for the Feature Catalogue

Figure 19 shows that part of the data model that is relevant for the Feature Catalogue. It shows that Features are organised into different Feature Themes.

6.1.6 User-defined Features

This document supports the ability for a user to define Features that are not already defined. For these, special Feature Class Codes have been reserved. (See A.1.)

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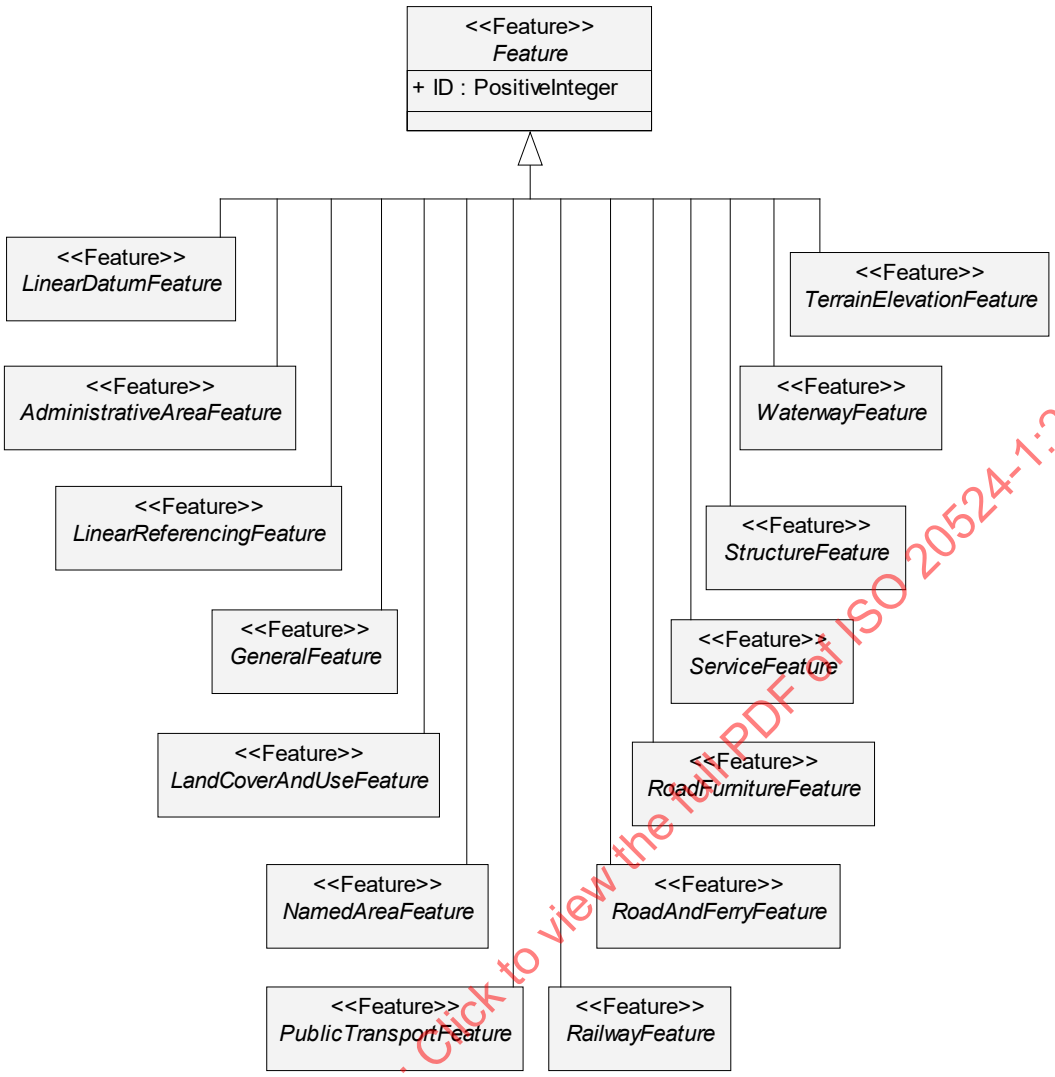


Figure 19 — Conceptual Data Model of the Feature Catalogue

Features from the different Feature Themes are discussed in the following sub-clauses.

In order to use Public Transport Feature Theme, please refer to Part 2.

6.2 Roads and Ferries

6.2.1 General overview

The road network is seen here primarily from the viewpoint of transportation and traffic. Ferry connections are therefore placed together with road network elements in one theme.

The road network may be represented at two different levels, Level 1 and Level 2. Level 1 describes the Simple Features such as Road Element, Junction, Ferry Connection, Enclosed Traffic Area, Address area Boundary Element and Address Area, whereas Level 2 describes the Complex Features such as Road, Intersection, Ferry and Aggregated Way.

The Data Model for Roads and Ferries is given in Figure 20 which describes Relationships between Features within and between Level 1 and Level 2.

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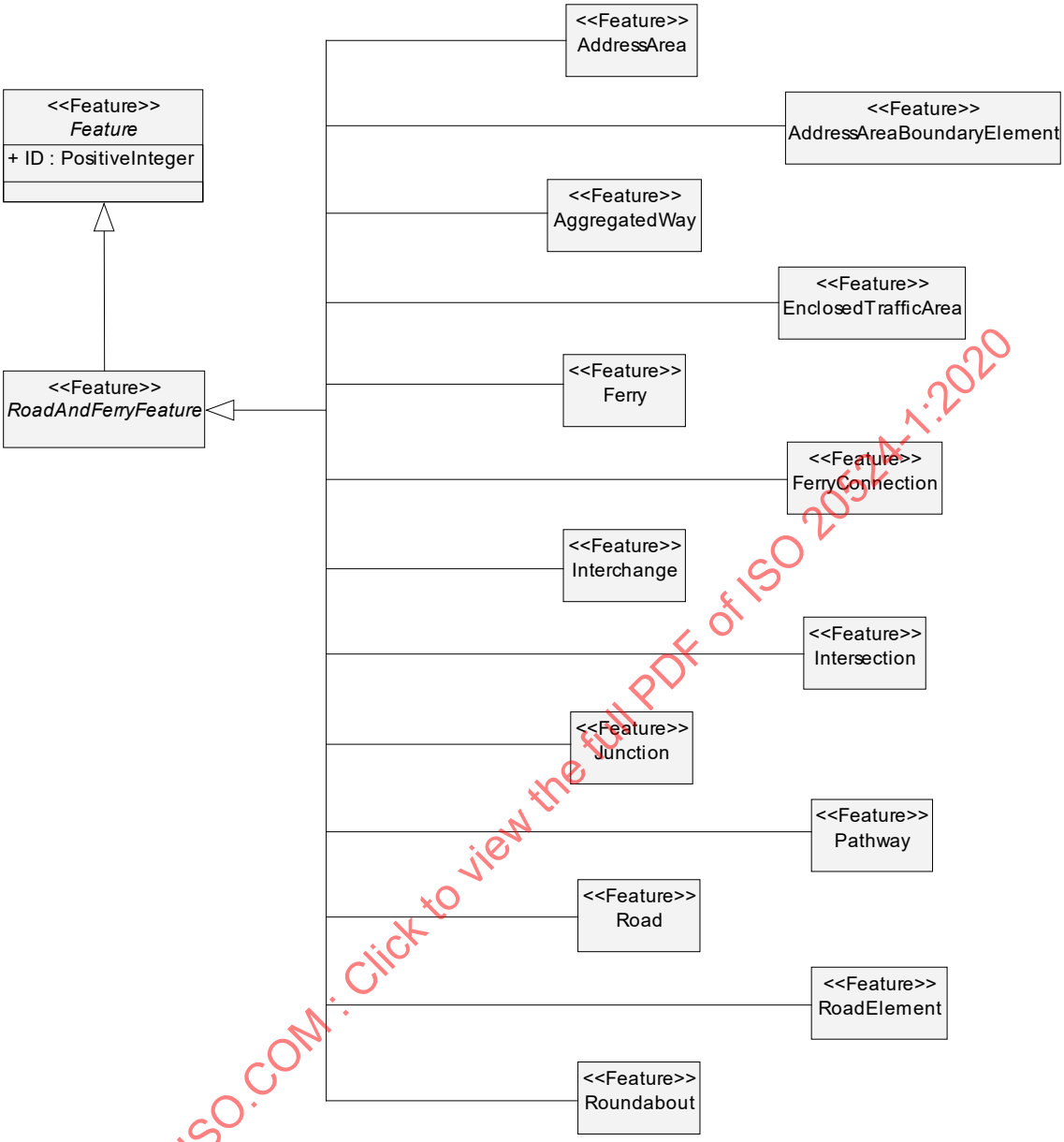


Figure 20-1 — Conceptual Data Model for Roads and Ferries

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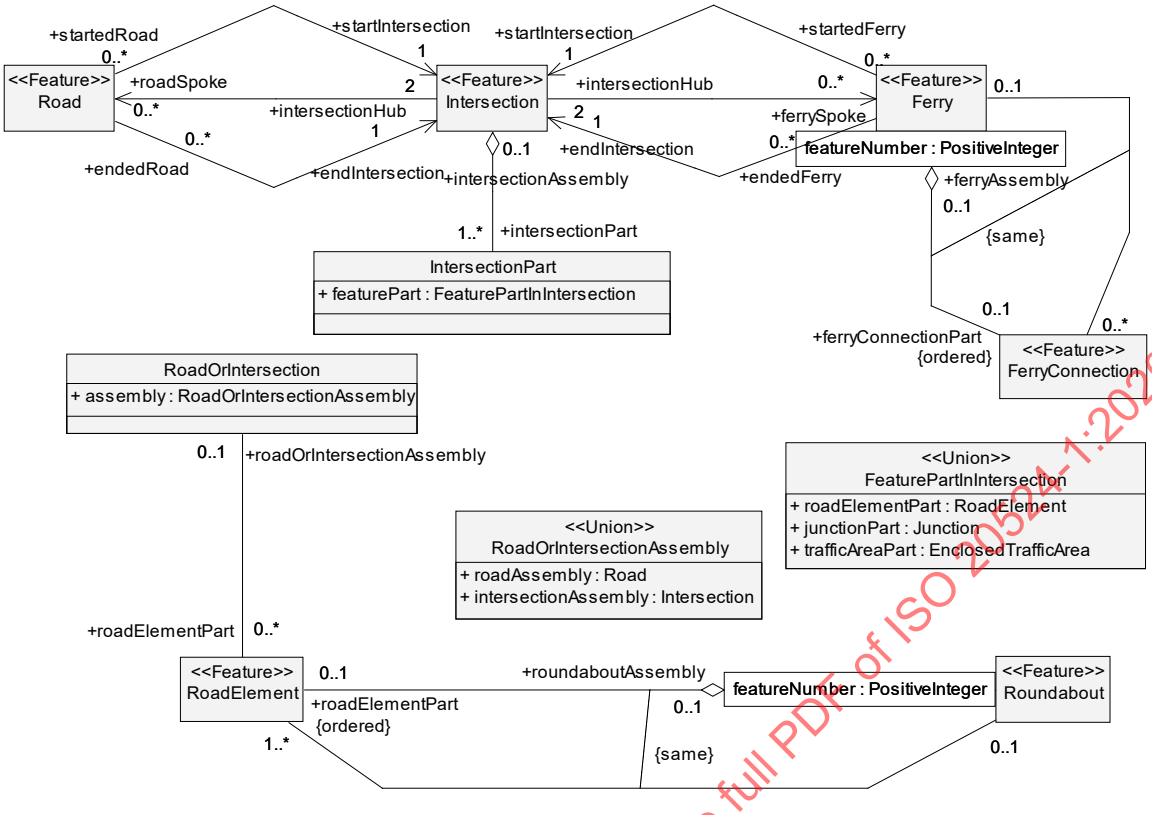


Figure 20-2 — Conceptual Data Model for Roads and Ferries

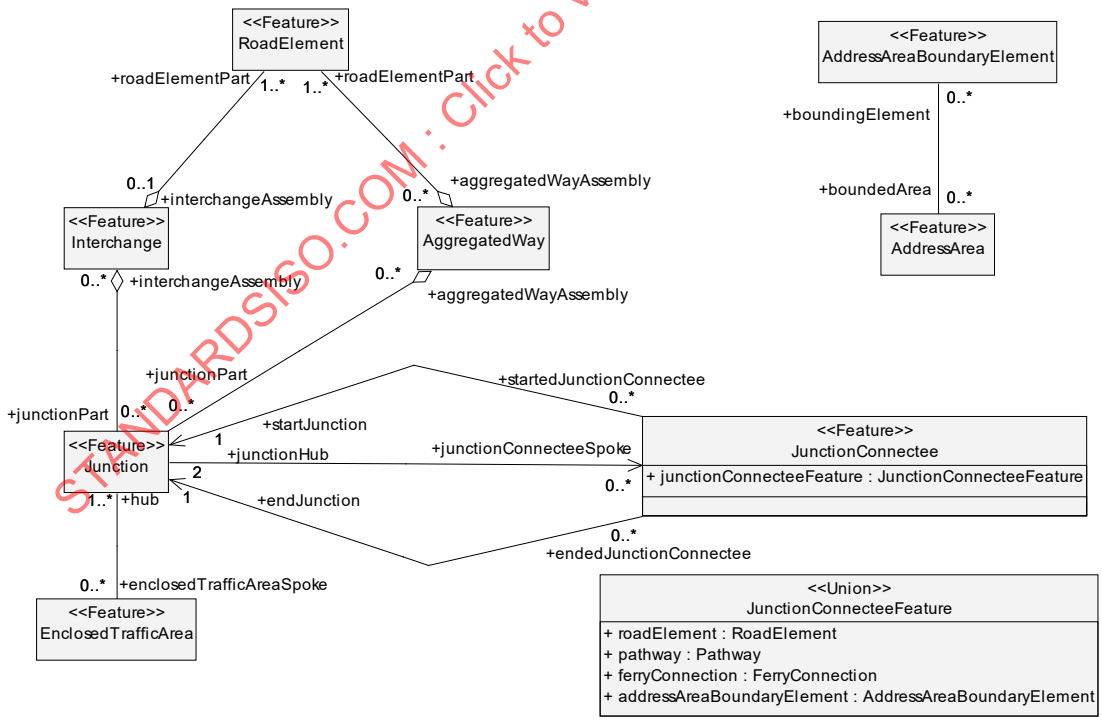


Figure 20-3 — Conceptual Data Model for Roads and Ferries

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6.2.2 Address Area

6.2.2.1 Definition

An area containing addresses which may not be related to one or more Road Element.

6.2.2.2 Description

In certain situations, addresses are defined in such a way that the information may not be related to one or more Road Element. Two different situations may be identified:

- The addresses are located in a square, which has a name that is different from the name of the Road Element(s) representing the road network on that square.
- The addresses are defined according to building blocks. In these cases, a building block has a name which differs from the name of an adjacent building block and of the Road Element which possibly divides the two building blocks.

An Address Area should always have a connection with the road network.

6.2.3 Address Area Boundary Element

6.2.3.1 Definition

A representation of the boundary of an Address Area.

6.2.3.2 Description

An Address Area Boundary Element describes the outer confinement of an Address Area. An Address Area Boundary Element is start and end bounded by a Junction that is defined where the Address Area intersects with the road network.

6.2.4 Aggregated Way

6.2.4.1 Definition

A set of associated Road Elements and, optionally, Junctions which share a common function or characteristic.

6.2.4.2 Description

An Aggregated Way is a Feature which has been defined by a user, for example a road authority, for the purpose of identifying and relating Features in their user-specified model to level 1 Features in the GDF.

A Road Element or Junction may belong to more than one Aggregated Way. Aggregated Ways do not have an implied topology; that is, they are not necessarily connected to other Aggregated Ways, and do not necessarily form a complete network.

6.2.5 Enclosed Traffic Area

6.2.5.1 Definition

Any confined area within which unstructured traffic movements are allowed.

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6.2.5.2 Description

EXAMPLE Industrial Site, Car Park, Harbour area, Camp Site, Military Area or Unstructured Traffic Square.

6.2.6 Ferry

6.2.6.1 Definition

A set of Ferry Connections that describe a passage of a particular ferry line.

6.2.6.2 Description

A Ferry plays the same role in the ferry network as a Road in a road network.

6.2.6.3 Aggregation constraints

A Ferry is composed of an ordered sequence of concatenated Ferry Connections.

6.2.7 Ferry Connection

6.2.7.1 Definition

A vehicle transport path between two fixed locations on the road network which uses a prescribed mode of transport.

EXAMPLE Boat ferry connection or rail ferry connection.

6.2.7.2 Description

Ferry Connection is the smallest independent unit of the transportation network operated by a ferry that is represented at Level 1.

Many situations look like the situation depicted in Figure 21. This is interpreted as one single Ferry Connection. But situations exist where one ferry service joins more than two locations as shown in Figure 22. This situation shall be interpreted as three different Ferry Connections: AB, BC and CA.

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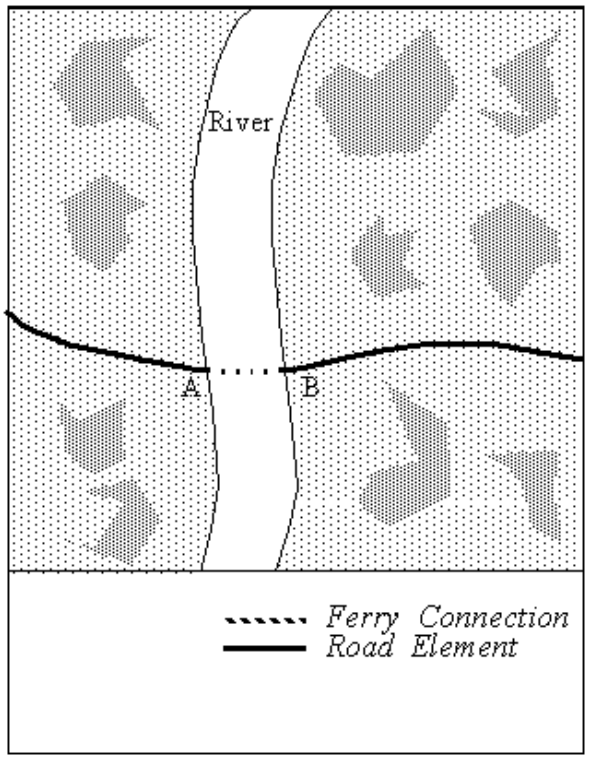


Figure 21 — Example of Ferry Connection joining two terminals

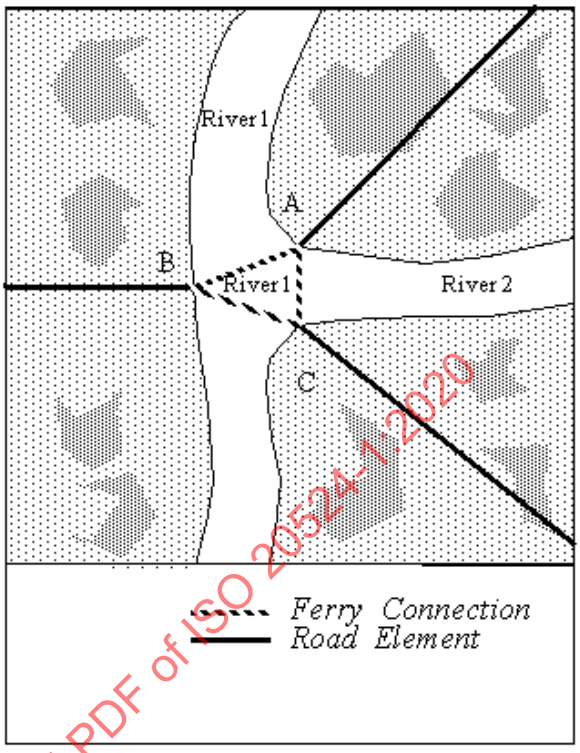


Figure 22 — Example of Ferry Connections joining three terminals

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6.2.8 Interchange

6.2.8.1 Definition

An Interchange is a collection of road sections, slip roads and/or carriageways dedicated to facilitating the movement of traffic through a crossing between two or more road ways.

6.2.8.2 Description

An Interchange is a Complex Feature composed of all the Road Elements and Junctions forming a crossing.

EXAMPLE 1 Interchanges between Motorways or Freeways, composed of a collection of slip roads and the carriageways which connect these.

EXAMPLE 2 Interchanges between Motorways or Freeways and non-Freeways composed of a collection of slip roads and the carriageways which connect these.

EXAMPLE 3 Interchanges between multi- or single carriageways at grade. These may have the form of a simple crossing without slip roads, a crossing containing slip roads and a crossing in the form of a roundabout.

Distinct Interchanges may not share Road Elements, but they may share Junctions. Thus, an Interchange may cover more than two crossing roads when one of its slip roads leads to more than one road.

Two interchanges close together may share carriageways. In such a case, the two interchanges should be combined into one Interchange so that a single carriageway belongs to at most one interchange.

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6.2.9 Intersection

6.2.9.1 Definition

The Level 2 representation of a crossing. An Intersection may be part of a Level-2 network by bounding Roads and/or Ferries. It is a Complex Feature composed of one or more Level 1 Junctions, Road Elements and Enclosed Traffic Areas.

6.2.9.2 Similarities and differences between Intersection and Junction

At Level 2, the Feature Intersection plays a similar role as the Feature Junction does at Level 1. Generally, it bounds Roads and Ferries and joins them to other ones. The difference between an Intersection and a Junction lies in the degree of generalisation; where a multi-element crossing will be described at Level 1 by many Road Elements and Junctions; it may be represented at Level 2 by one single Intersection.

Rules for formation of Intersections may be found in Annex F.

6.2.10 Junction

6.2.10.1 Definition

A Feature that bounds a Road Element, a Pathway, an Address Area Boundary Element, or a Ferry Connection.

6.2.10.2 Description

A Road Element, a Pathway, an Address Area Boundary Element, or Ferry Connection always forms a connection between two Junctions, and a Road Element, a Pathway, an Address Area Boundary Element, or Ferry Connection is always bounded by exactly two Junctions. A Junction Feature represents the physical connection between its adjoining Road Elements, Pathways, Address Area Boundary Elements, and Ferry Connections.

6.2.10.3 Valency of a Junction

The number of Road Elements, Pathways, Address Area Boundary Elements, and/or Ferry Connections joining at a Junction is termed the Valency of a Junction.

EXAMPLE A Junction that connects a total of two Road Elements is called a two valent Junction.

The occurrence of Junctions that bound only two Features classes from Road Elements, Pathways, Address Area Boundary Elements, and Ferry Connections is generally restricted to the following situations:

- An extra Junction shall be defined at the end of a dead-end road which further continues as a Ferry Connection.
- An extra Junction may be used if two Road Elements or two Pathways have at least one different Attribute Value or participate in at least one different Relationship. Figure 23 uses the example of traffic restrictions.
- An extra Junction shall be used to avoid a Road Element or a Pathway having the same Junction at the start and at the end, as shown in Figure 24.

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- An extra Junction may be used to form independent complex Road Features. Figure 25, a Junction may be introduced to allow a complex Road Feature to be formed.

Junctions that bound only two Road Elements, bound only two Pathways, bound only two Address Area Boundary Elements, or bound only two Ferry Connections should not exist in the road network if none of the above conditions is fulfilled.

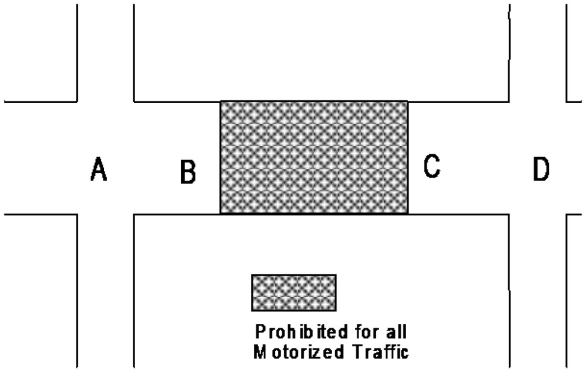


Figure 23 — A bivalent Junction (B,C) may be used to differentiate between Road Elements with different Attributes

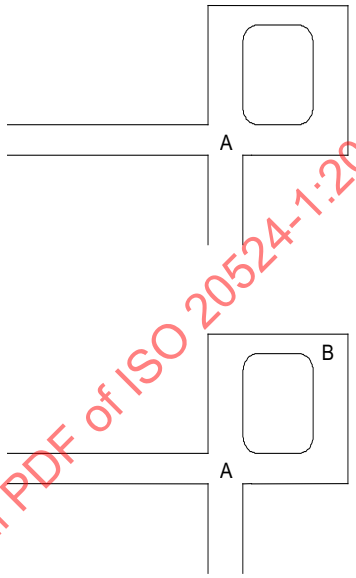


Figure 24 — A Road Element forming a loop shall be split by an extra bivalent Junction (B) to allow for describing Direction of Traffic Flow

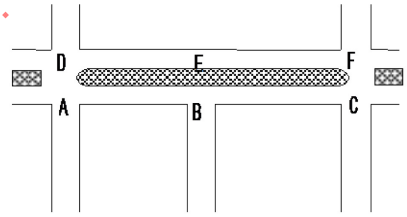


Figure 25 — Formation of Level 2 Road. Junction E may be inserted to allow for the representation of the Level 2 Intersection

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6.2.11 Pathway

6.2.11.1 Definition

A linear section of the earth which is exclusively designed for or the result of the movement of pedestrian and non-motorised/non-road vehicles.

6.2.11.2 Description

A Pathway serves as the smallest unit of the pedestrian and non-motorised vehicle transportation network that is independent and having a Junction at each end.

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Similar network composition rules apply for Pathways as for Road Element. Pathways and Road Elements, as well as Address Areas and Ferry Connections, are topologically connected via Junctions.

Pathways represent a complementary extension to the transportation network to specifically serve pedestrians and non-motorised/non- road vehicles. It typically has physical characteristics which prevent road vehicles from entering and includes surface and non-surface access such as out-door and in-door passage ways, sub-ways, stairs, lifts, and escalators. Roads which are blocked to prevent road vehicles from entering except for a certain period (e.g. a certain time of day, a certain day of week) or without a special permit shall be considered as Road Elements and not as Pathways. Where pedestrians or non-motorised/non-road vehicles use the network represented by Road Elements (or sidewalks/dedicated lanes along Road Elements, or pedestrian zones represented by Road Elements), no supplementary Pathway representation is required.

Pathways may carry a name, however often do not carry full addresses except in special cases such as shopping malls.

Within the context of this definition, pedestrian usage includes transportation aided by basic devices such as wheel chairs and scooters.

6.2.12 Road

6.2.12.1 Definition

A Level 2 Feature composed of one, many or no Road Elements and joining two Intersections. It serves as the smallest independent unit of a road network at Level 2.

6.2.12.2 Relation between Road, Road Element and Intersection

6.2.12.2.1 Construction Rules

A Road always forms a connection between two Intersections. Roads are defined in terms of the Road Elements that they contain. Below some basic construction rules are given. For a more elaborated description see Annex F.

6.2.12.2.2 A road containing one Road Element

This is the most common case and is illustrated by Figure 26. At Level 1 this road may be seen as consisting of one Road Element. At Level 2 the same road may be seen as one Road. Road CL 573 is bounded by the Intersections CS 203 and CS 204, and contains Road Element L 203.

6.2.12.2.3 A road containing two Road Elements

Figure 27 shows a dual carriageway. Both carriageways are physically separated and may be consequently interpreted as individual Road Elements.

At Level 2 however, both carriageways are considered as making up one single Road. Road CL 583 contains Road Elements L 452 and L 854 and is bounded by the Intersections CS 723 and CS 721.

In order to consider two Road Elements as forming a multi-carriageway, the following requirements shall be met.

- Each Road Element shall be a “one-way road”, as drawn in Figure 30.

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- It shall be possible to see the Road as one single functional unit. This is often indicated by the fact that the different Road Elements have the same road name or road number. Figure 32 shows a situation of a street having a service road at its side. The Road Element that represents the service road has a different road class to the Road Element representing the main road. Consequently, these two Road Elements do not form a multi-carriageway.

A Road may not be formed from Road Elements separated by a Road Element belonging to a different Road. This condition is illustrated in Figure 31. A main road is shown having service roads at both sides. Though they fulfil all the other requirements, Road Elements representing the service roads may not be considered as forming a Road because they are separated by the Road Element representing the main road.

Another situation where a Road consists of two Road Elements, is where the Road Elements are joined by two-valent Junctions.

6.2.12.2.4 A road containing more than two Road Elements

In occasional cases a Road may contain more than two Road Elements. Figure 28 shows an example: a road has two parts having a single carriageway and one part with separated carriageways. At Level 1, this road may be interpreted as four Road Elements. At Level 2 however, the road should be interpreted as one Road. Road CL 599 is built up by Road Elements L 258, L 259, L 260 and L 261.

Another situation where a Road consists of more than two Road Elements, is where the Road Elements are joined by two-valent Junctions.

6.2.12.2.5 A road containing no Road Elements

In rare cases a Road may contain no Road Elements at all. Figure 29 shows two sequential crossings between a dual carriageway and two single carriageways.

In the example, Level 2 is constructed from Level 1 by:

- The Road Elements L217, L218, L219, L220, L401, L402, L403, L501, L502, L503 and L504 and their connecting Junctions are mapped onto the Intersection CS754.

- The Road Elements L221, L222, L223, L224, L404, L405, L406, L505, L506, L507 and L508 and their connecting Junctions are mapped onto the Intersection CS755.

Consequently, no Road Elements remain that are mapped onto Road CL 891. This Road contains no Road Elements and is bounded by the Intersections CS 754 and CS 755.

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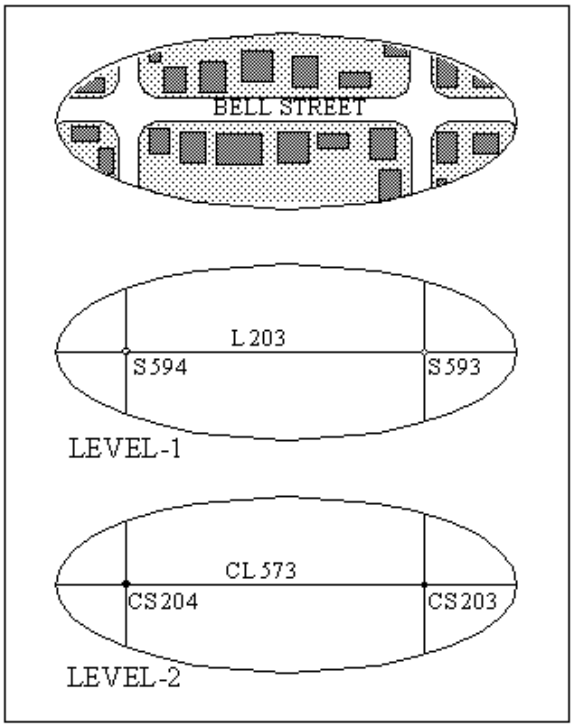


Figure 26 — A Road containing one Road Element

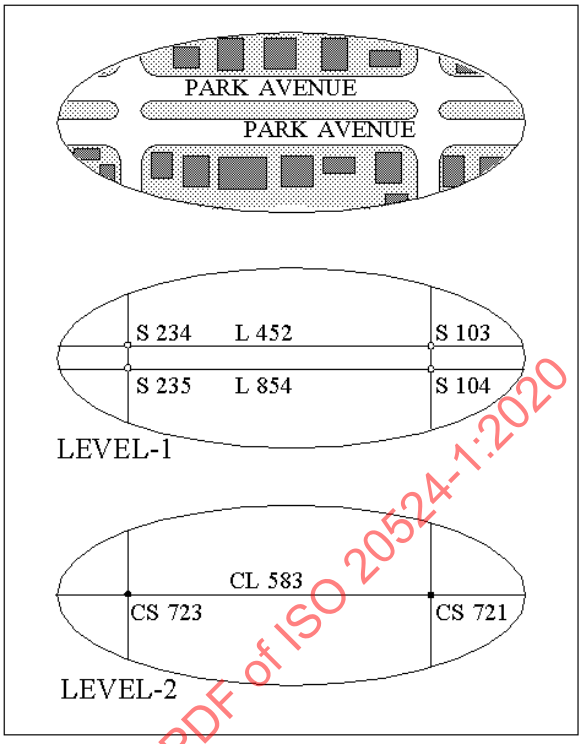


Figure 27 — A Road containing two Road Elements

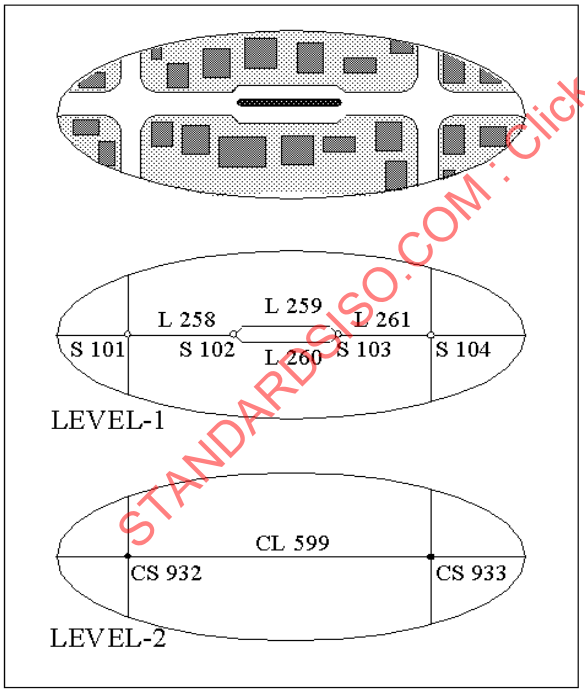


Figure 28 — A Road containing more than 2 Road Elements

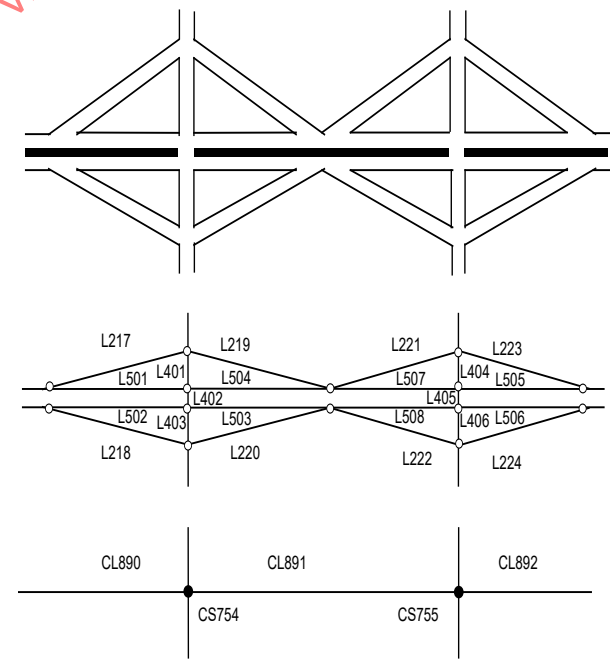
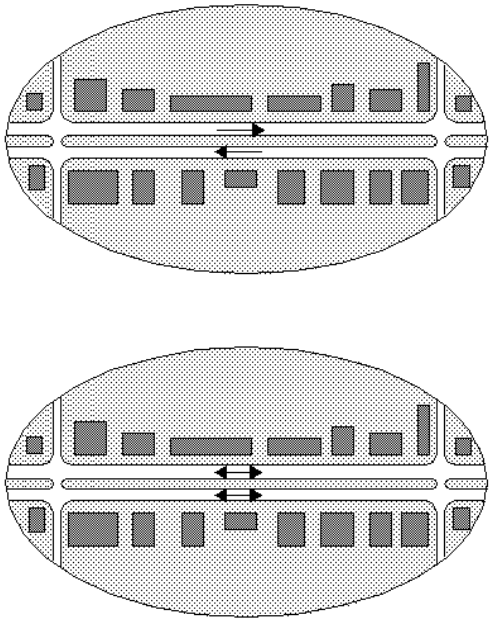


Figure 29 — Road CL891 contains no Road Elements

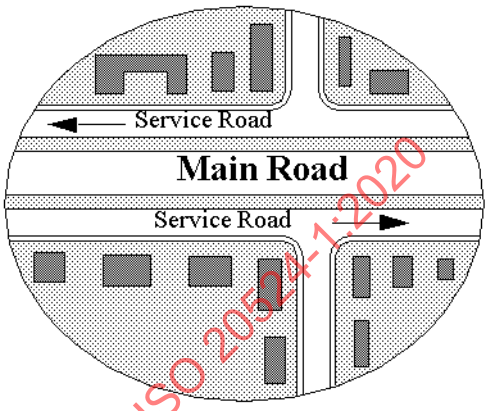
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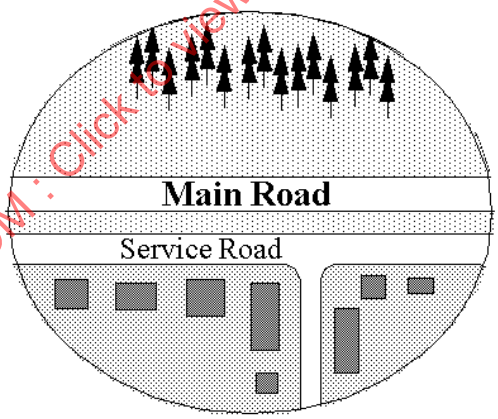
For a road to be considered as a multi-carriageway each Road Element shall be “one-way”.

Figure 30 — Guidelines for formation of Road



A Road may not be formed from Road Elements separated by a different road.

Figure 31 — Guidelines for formation of Road



A main road and a parallel service road are not to be considered as multi-carriageways. For a road to be considered as a multi-carriageway and declared as a Road, each Road Element usually has similar functional and physical characteristics.

Figure 32 — Guidelines for formation of Road

6.2.13 Road Element

6.2.13.1 Definition

A linear section of the earth which is designed for or the result of vehicular movement. It serves as the smallest unit of the road network at Level 1 that is independent and having a Junction at each end.

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6.2.13.2 Independence of Road Elements

Individual Road Elements shall be independent of one another. A change in the status of one Road Element shall not affect a change in another. In Figure 33 for example, AB, BE, ED, DC and CA are all Road Elements. Their independence is illustrated by the fact that a barrier placed on Road Element CD creates a no through road CD, but does not affect the status of the other Road Elements.

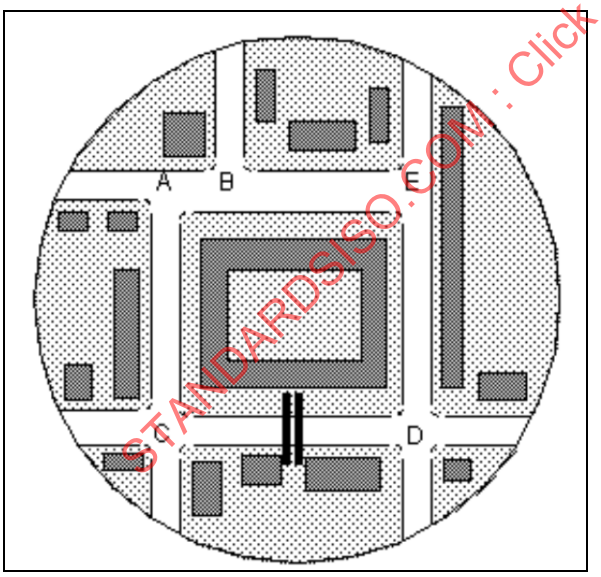
Road Elements may also have a distinguishing set of Attributes. For example, in Figure 34, Road Elements AF, FB have different names. AD, DE and EC have different restrictions. Within the context of the Attributes Official Name and Direction of Traffic Flow, the elements AF, FB, AD, DE, EC and BC may be considered as being the smallest independent units and may consequently be considered as individual Road Elements. Alternatively, changes in Attributes along a single road element may be described by stating the starting and ending positions along the road element for which the Attribute is valid. This procedure is further described in the Attribute Catalogue (see Clause 8, Relation between Attributes and Features: Segmented Attributes)

6.2.13.3 Aggregation rules

Any additions to the Attributes of a Road Element, such as a restriction, or another name, may require it to be split into two or more separate Road Elements. In the example of Figure 23, the addition of a width restriction may cause the Road Element BC to be split into three new elements in order to be able to distinguish the influence of the narrow bridge from the other parts of the road. Alternatively, the limits for which Attributes are valid along a road element may be described together with the Attribute Value.

In Figure 35 carriageways are considered as being independent and consequently are treated as two individual Road Elements. A road with a physical separation between two parts of a road may be represented by two different Road Elements. Alternatively, the physical separation may be indicated by Attributes.

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NOTE Road Element CD is independent of other Road Elements. When CD is blocked, traffic can still flow on other elements.

Figure 33 — Independence of Road Elements by function

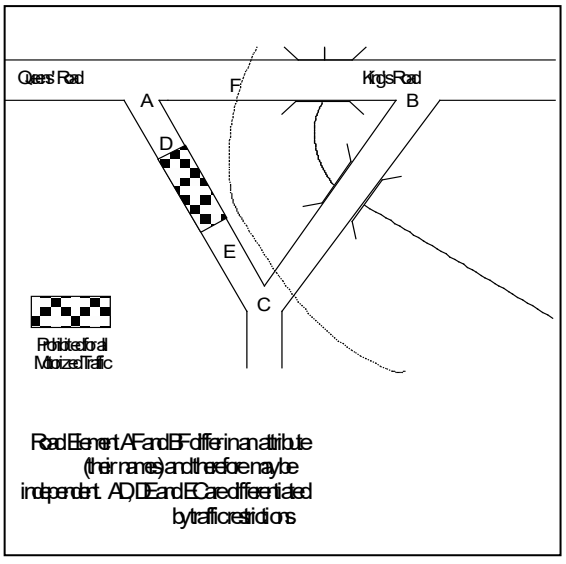


Figure 34 — Independence of Road Elements by Attribute

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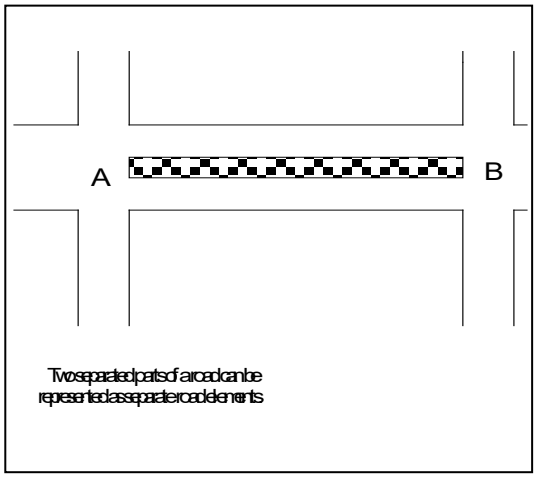


Figure 35 — Road Elements as separated Carriageways

6.2.14 Roundabout

6.2.14.1 Definition

A Roundabout is a simple closed one-way loop in the road network that regulates traffic flow at the meeting of roads at grade.

6.2.14.2 Description

A Roundabout is a Complex Feature composed of all the Road Elements and Junctions forming the closed loop plus all the Road Elements and Junctions belonging to each Intersection along the loop (See Figure 36).

A Roundabout is differentiated from other traffic control Features by requiring special real time driving instructions of the form “take the third exit from the roundabout”. Alternate terms for roundabout are traffic circle and rotary.

6.2.14.3 Aggregation constraints

A Roundabout is composed of an ordered sequence of concatenated Road Elements.

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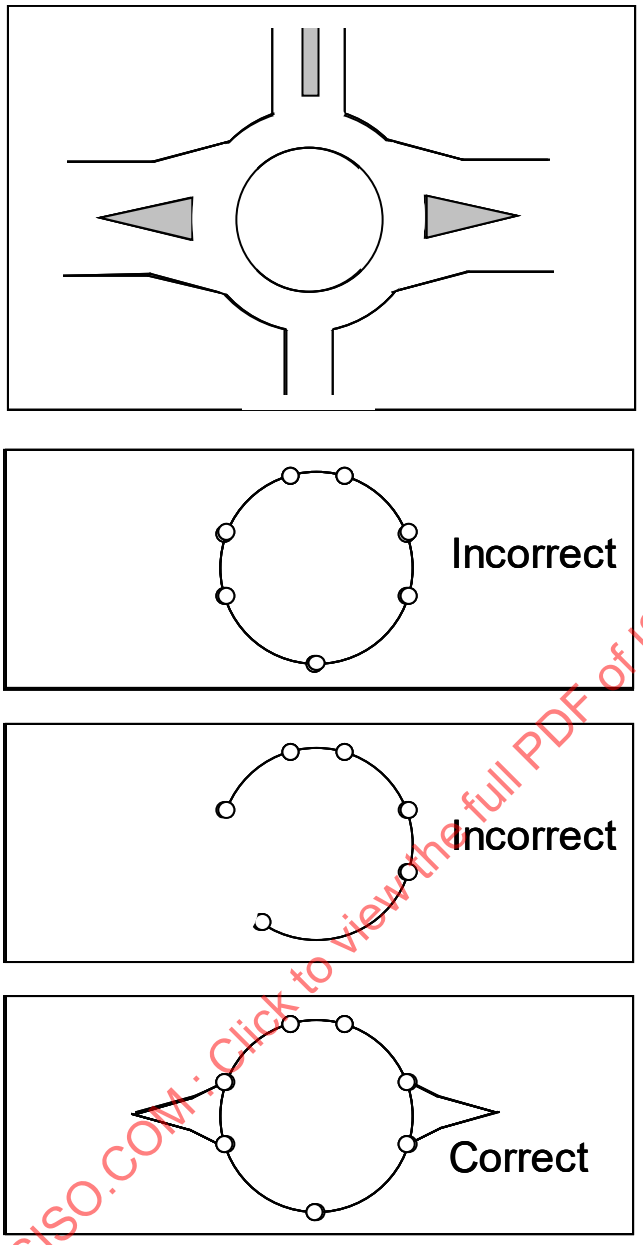


Figure 36 — Guidelines for the definition of a Roundabout

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6.2.15 Topological relations between Junctions, Road Elements, Pathways, Enclosed Traffic Areas, Ferry Connections and Address Areas Boundary Elements

6.2.15.1 Introduction

Road Elements, Ferry Connections, Pathways, Address Area Boundary Elements, and Junctions are mutually dependent: a change in the first set will cause a change in the second one and vice versa.

A Junction is defined at the intersection of two or more road centrelines.

A Junction is also defined at the end of a dead-end road, at the intersection of a Road Element and a Pathway, of a Pathway and a Pathway, a Road Element (or Pathway) and an Enclosed Traffic Area, of a Road Element (or Pathway) and a Ferry Connection or of a Road Element (or Pathway) and an Address Area Boundary Element.

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6.2.15.2 General

The set of Junctions, Road Elements, Pathways, Enclosed Traffic Areas, Address Area Boundary Elements and Ferry Connections shall be constructed in such a way that it represents the topological relations in the road transportation network correctly.

This important requirement is illustrated in Figure 37. This figure shows a T-junction. The correct interpretation is to see it as consisting of three Road Elements AB, BC and BD joining at Junction B.

6.2.15.3 Grade separated crossings

Grade separated crossings between Transportation Elements involve objects such as bridges, viaducts, aqueducts and tunnels

Road Elements and/or Pathway at Grade separated crossings do not share a Junction. If a Junction is present at the location of the Grade separation, it either is connected to the lower set of Transportation Elements or to the higher but never to both.

6.2.15.4 Squares

Traffic squares, which are not completely unstructured, but which have some legally defined traffic flow or internal structure which prescribe a traffic flow, shall be considered as being composed of different Road Elements.

EXAMPLE A fountain, flower beds, and/or painted lines on the road surface.

Figure 38 shows a traffic square with a grass bed in its centre. The traffic square is composed of the sequence of Road Elements AB, BC, CD and DA which together form a closed ring.

Figure 39 shows an area where traffic movements are not regulated in a strict geometrical sense. These are considered Enclosed Traffic Areas. These Features are represented as an area at which the incoming Road Elements end in a Junction. The Enclosed Traffic Area itself forms the topological connection between these Road Elements. Inside the area, Road Elements may be defined which have only topological, and not a geometrical, significance.

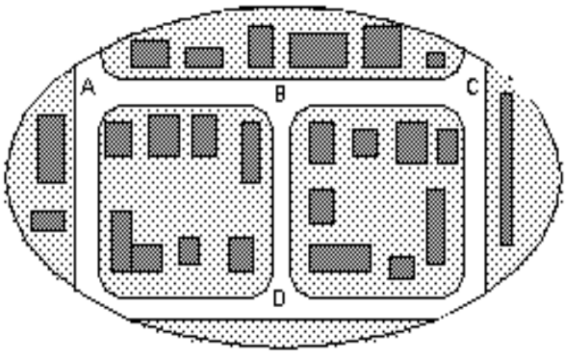
Squares that are exclusively designated for pedestrian movement, traversal and sojourn are always modelled via Enclosed Traffic Areas as certain characteristics for motorised traffic (e.g. prescribed traffic flow) do not apply. These Features are represented as an area at which the incoming Pathways (as well as potential Road Elements) ends in a Junction. The Enclosed Traffic Area itself forms the topological connection between these Pathways (and Road Elements). Next to open spaces in urban environments, Pedestrian Squares may include courtyards and in-door halls.

6.2.15.5 Parking areas

Parking areas are to be considered Enclosed Traffic Areas (see 6.2.5), or in case of representation of a Point Feature as a Service.

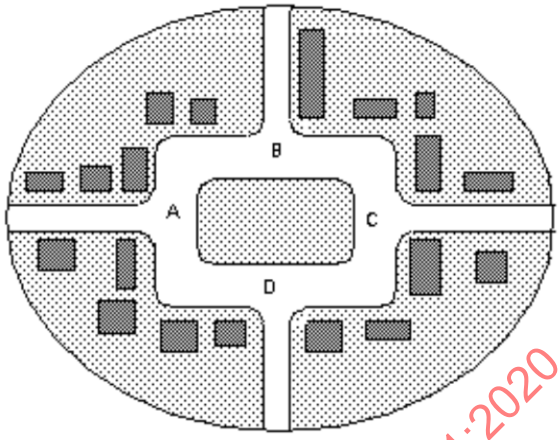
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NOTE Junctions and Road Elements are constructed such that they represent the road network correctly.

Figure 37 — Topological Requirements



NOTE Traffic Squares which have some internal structure are represented by different Road Elements.

Figure 38 — Topological Requirements for Structured Squares

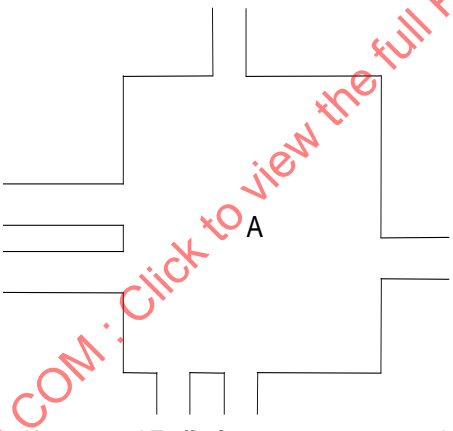


Figure 39 — Unstructured Traffic Area

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6.3 Administrative Areas

6.3.1 General overview

For administrative purposes, the territory of a country may be divided into regions that have further subdivisions, forming a hierarchy of administrative units. Some countries may have Administrative Areas that are not part of such a hierarchy.

NOTE Hierarchies are meant in a narrow mathematical-spatial sense, in terms of subsequent topological inclusions.

The highest order of hierarchical Administrative Areas (within a national context) is called the Country. The subdivisions of a Country are called Order-i Areas where i ranges from 1 to 8. The number of Administrative Area orders is, with rare exceptions, fixed for a country. Some Order-8 Areas may be subdivided by Order-9 Areas in case the represented Administrative Areas are not present countrywide.

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This document identifies the need to model administrative units which cover multiple countries. These are called Supra-National Administrative Areas.

An Administrative Area outside a hierarchical scheme is called an Administrative Place n, where n represents an upper-case letter. The exact relation to other Administrative Areas is recorded by the Place within Place Relationship.

The Data Model for Administrative Areas is shown in Figure 40, Figure 41, Figure 42 and Figure 43.

Annex G.1 shows for a number of countries how the generic Features Order-i Area may be substituted by native terms and languages. To specify how this may be done in a particular GDF this document provides Metadata structures.

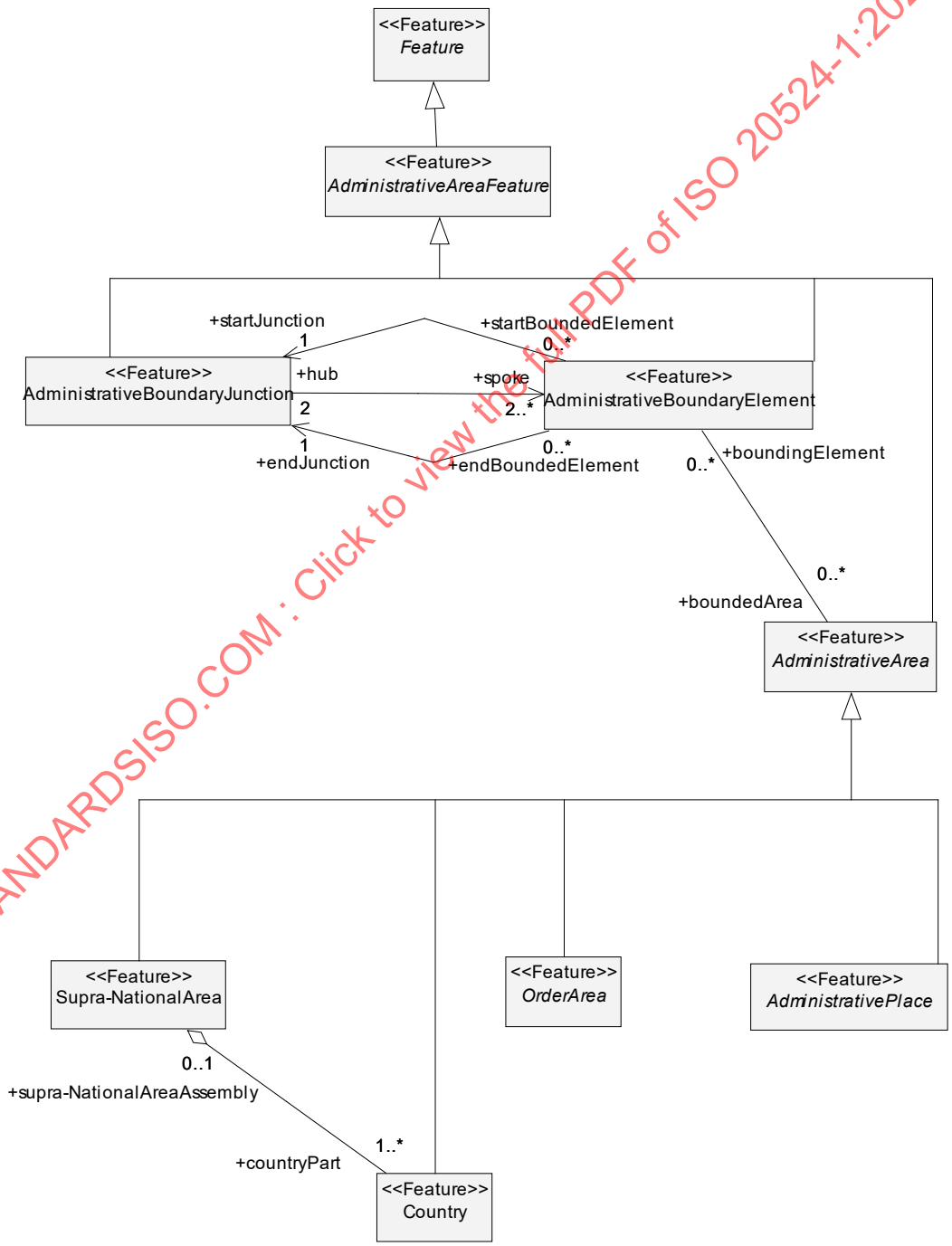


Figure 40 — Conceptual Data Model for Administrative Areas

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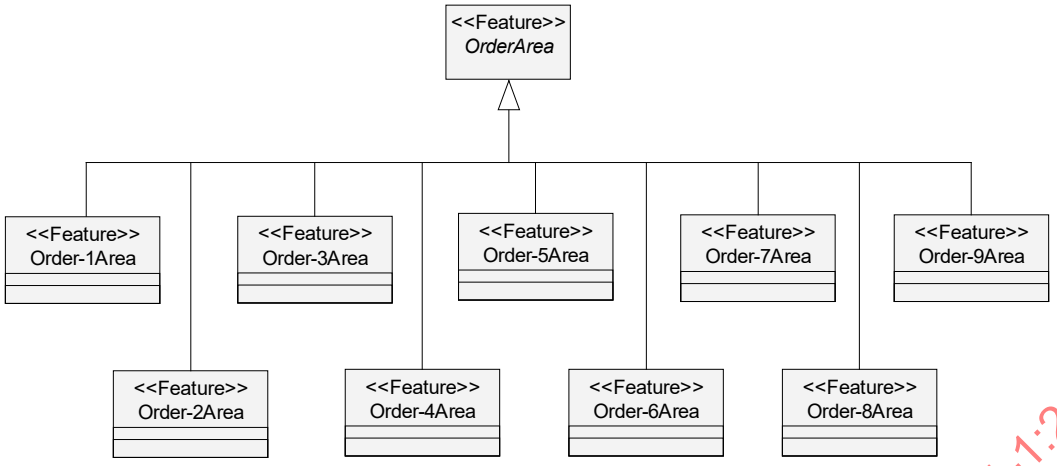
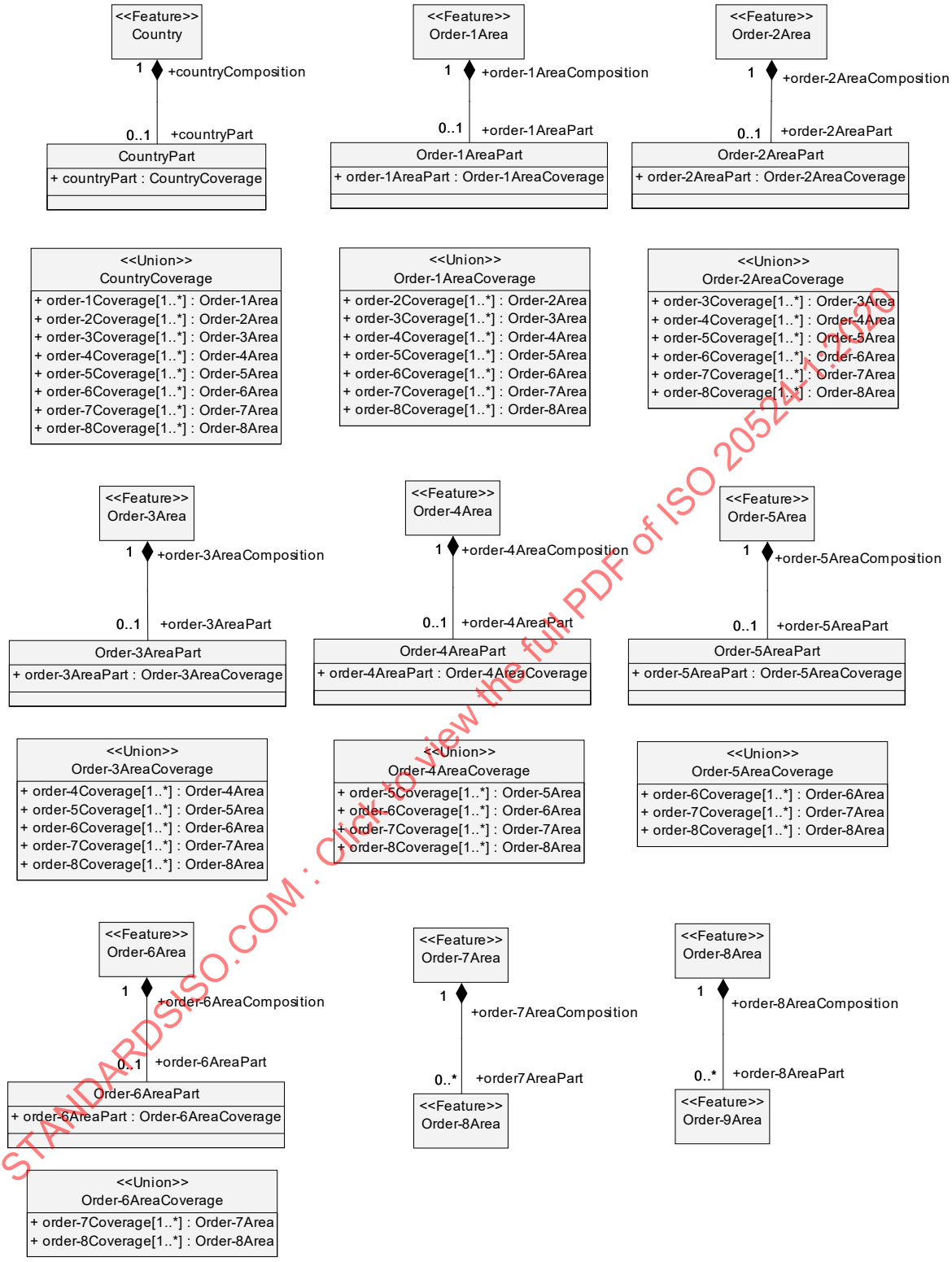


Figure 41 — Conceptual Data Model for Administrative Areas (Order Areas)

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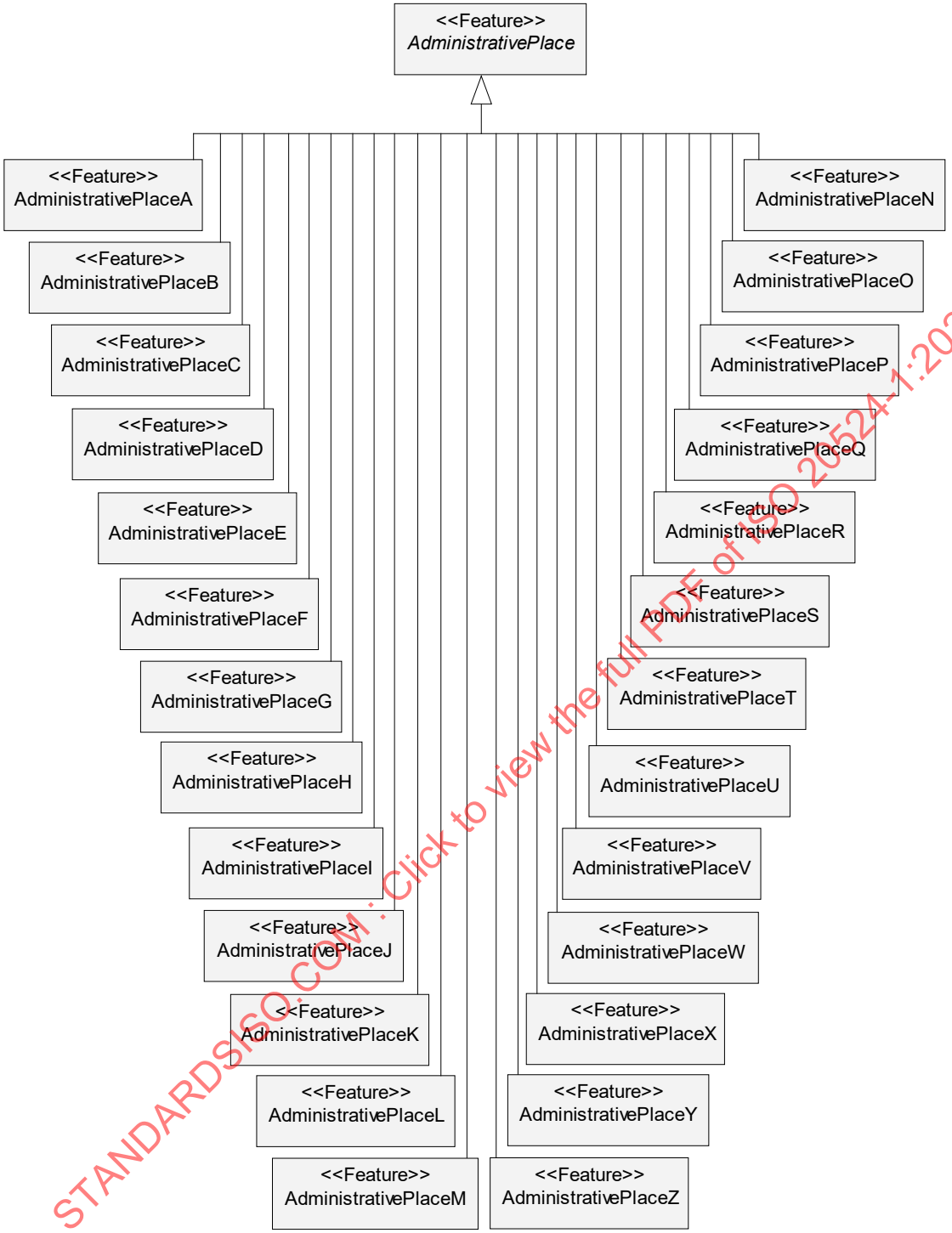
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Figure 42 — Conceptual Data Model for Administrative Areas (Order Area Coverage)

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Figure 43 — Conceptual Data Model for Administrative Areas (Administrative Places)

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6.3.2 Administrative Area (abstract)

6.3.2.1 Definition

Administrative Area is abstract class of Administrative Place, Country, Order Area and Supra-National Area Feature.

6.3.2.2 Description

See Figure 40. As an abstract class, Administrative Area may not be instantiated.

6.3.3 Administrative Boundary Element

6.3.3.1 Definition

The smallest unit of a boundary of an Administrative Area.

6.3.3.2 Description

The same Administrative Boundary Element may be used to bound several Administrative Areas.

6.3.3.3 Constraints

An Administrative Boundary Element is bounded by exactly two Administrative Boundary Junctions. These need not necessarily be different Nodes (see Figure 44). An Administrative Boundary Element may never bound the same Administrative Area twice (see Figure 45).

6.3.4 Administrative Boundary Junction

6.3.4.1 Definition

The location where Administrative Boundary Elements join.

6.3.4.2 Constraints

An Administrative Boundary Junction connects one or more Administrative Boundary Elements. It will typically bound three but in exceptional cases just two. A Bivalent junction is only permitted as a result of omitting a boundary of a lower order area. Figure 46 illustrates the case when an Administrative Boundary Junction connects one single Administrative Boundary Element.

6.3.5 Administrative Place (abstract)

6.3.5.1 Definition

Administrative Place is abstract class of Feature Administrative Place A to Z.

6.3.5.2 Description

See Figure 43. As an abstract class, Administrative Place may not be instantiated.

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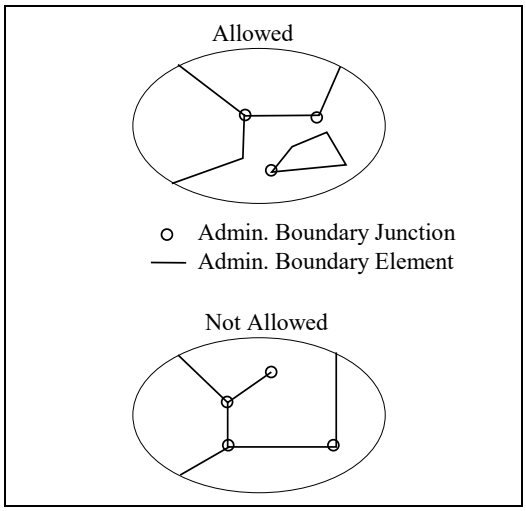


Figure 44 — Administrative Boundary Elements and Administrative Boundary Junctions (case 1)

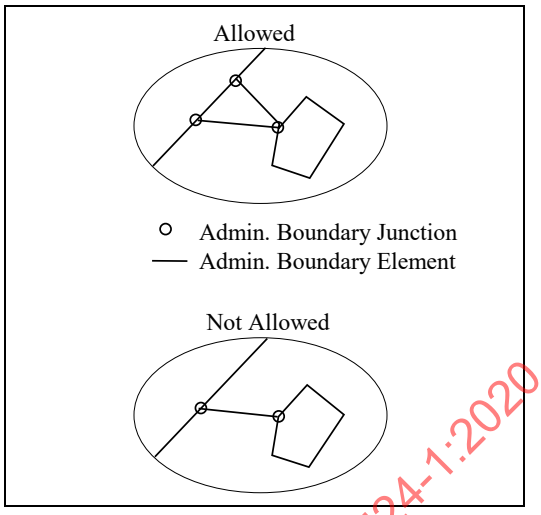


Figure 45 — Administrative Boundary Elements and Administrative Boundary Junctions (case 2)

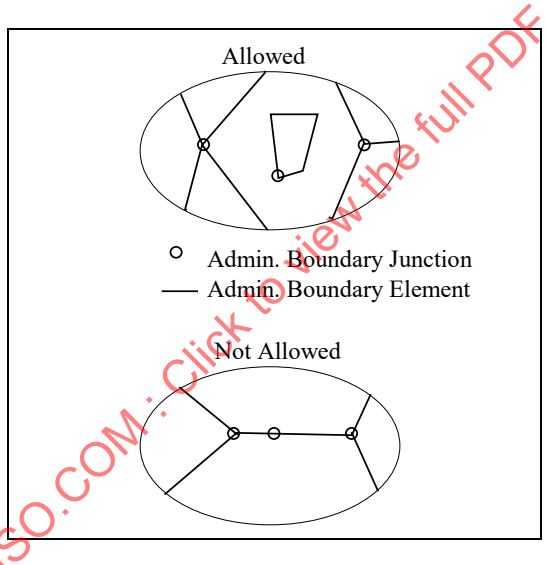


Figure 46 — Administrative Boundary Elements and Administrative Boundary Junctions (case 3)

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6.3.6 Administrative Place A to Z

6.3.6.1 Definition

An area defined for administrative purposes outside a hierarchical structure.

6.3.6.2 Description

An Administrative Place fails to be part of the hierarchy by either:

- not forming a complete subdivision of an Order-i Area or Country, or
- lying in more than one Order-i Area.

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26 Administrative Place Feature Classes have been defined. They are named “Administrative Place n”, where n ∈ {A,B,...}. These are 26 placeholders for Places defined by Metadata. No order is implied among the members of the set.

6.3.7 Country

6.3.7.1 Definition

A country as defined by national boundaries.

6.3.7.2 Description

A Country shall be subdivided into Order-i Areas in a uniform manner. A Country having no subdivisions should be composed of a single Order-8 Area.

6.3.8 Order Area (abstract)

6.3.8.1 Definition

Order Area is abstract class of Order-1 Area, Order-2 Area, Order-3 Area, Order-4 Area, Order-5 Area, Order-6 Area, Order-7 Area, Order-8 Area, and Order-9 Area Feature.

6.3.8.2 Description

See Figure 41. As an abstract class, Order Area may not be instantiated.

6.3.9 Order-1 to 7 Areas

6.3.9.1 Definition

An Order-i Area, where i ∈{1,2,..7}, is part of an intermediate level of the administrative hierarchy of a country.

6.3.9.2 Description

In some Countries, these intermediate levels may not exist. Annex G lists some examples.

6.3.10 Order-8 Area

6.3.10.1 Definition

An Order-8 Area is part of the lowest order of the administrative hierarchy in the country that is present countrywide.

6.3.10.2 Description

In a country with no administrative divisions, there is only one Order-8 Area and it is coextensive with the country. Annex G lists some examples by country of Order-8 Area names.

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6.3.11 Order-9 Area

6.3.11.1 Definition

The Administrative Area level that is a subdivision of Order-8 Area.

6.3.11.2 Description

Some Order-8 Areas may be split into smaller units. This may be the case for one single Order-8 Area or for all Order-8 Areas in a particular region.

EXAMPLE 1 Rotterdam.

EXAMPLE 2 All municipalities in Bavaria.

These smaller units are classed as Order-9 Areas.

6.3.12 Supra-National Area

6.3.12.1 Definition

An area comprised of whole Countries that have established common supra-national administrative functions.

6.3.12.2 Description

EXAMPLE The European Union.

6.4 Named Areas

6.4.1 General overview

Named areas are areas that have a distinguishing functional or physical purpose. These may include areas with a concentration of homes and buildings that designate residential areas, areas with a commonly known name, or areas that are serviced by the same service provider, such as police precincts, or school districts.

The Data Model for Named Areas is shown in Figure 47.

6.4.2 Boundaries (abstract)

6.4.2.1 Definition

Boundaries is abstract class of Boundary Element and Boundary Junction.

6.4.2.2 Description

See Figure 47. As an abstract class, Boundaries may not be instantiated.

6.4.3 Boundary Element

6.4.3.1 Definition

The smallest unit of a boundary which delimits Features of the theme Named Areas.

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6.4.3.2 Description

A boundary is formed between two adjacent Bounded Areas of similar type. A Boundary Element of a Bounded Area may coincide with an Administrative Boundary Element of an Administrative Area.

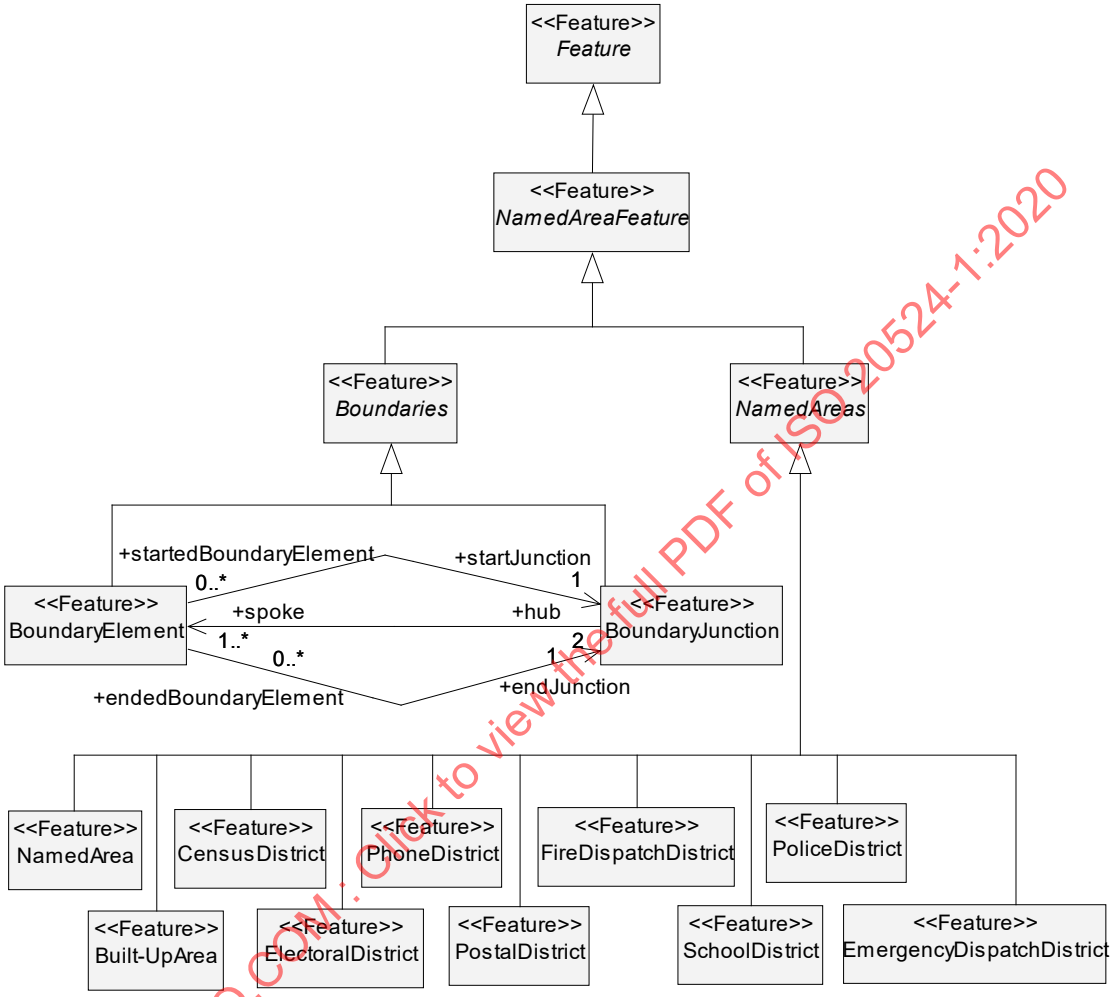


Figure 47 — Conceptual Data Model for Named Areas

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6.4.3.3 Constraints

A Boundary Element is bounded by exactly two Boundary Junctions. These need not necessarily be different Nodes. A Boundary Element may never bound the same Bounded Area twice. See Figure 45.

6.4.4 Boundary Junction

6.4.4.1 Definition

The location where Boundary Elements join.

6.4.4.2 Constraints

A Boundary Junction joins/connects one, three or more Boundary Elements. It will typically bound three but never two. The Administrative Areas equivalent Boundary Junction has several illustrations to elucidate these constraints (see Figure 44, Figure 45 and Figure 46).

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6.4.5 Bounded Area (abstract)

6.4.5.1 Definition

Bounded Area is abstract class of Named Area, Built-Up Area, and District Feature.

6.4.5.2 Description

See Figure 47. As an abstract class, Bounded Area may not be instantiated.

6.4.6 Built-up Area

6.4.6.1 Definition

An area with a concentration of buildings. In these areas, an inner-city speed limit generally applies.

6.4.6.2 Description

No exact Relationship exists between a Built-up Area and a municipality. In some cases, a Built-up Area relates to exactly one municipality having the same name. However, in rural areas in particular, one municipality may contain several small Built-up Areas. Also, situations exist (Paris, Brussels) in which a Built-up Area, referenced by most people by one single name, is spread over several municipalities or other kinds of Administrative Areas.

6.4.7 Census District

6.4.7.1 Definition

Area that defines a unit that exists to collect and generate statistical information.

6.4.8 District (abstract)

6.4.8.1 Definition

District is abstract class of Census District, Elective District, Emergency Medical Dispatch District, Fire Dispatch District, Phone District, Police District, Postal District and School District Feature.

6.4.8.2 Description

See Figure 47. As an abstract class, District may not be instantiated.

6.4.9 Electoral District

6.4.9.1 Definition

Area that defines a unit that exists to report the results on the vote and manage political activities.

6.4.10 Emergency Medical Dispatch District

6.4.10.1 Definition

Area defined for managing the dispatch of emergency medical personnel.

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6.4.11 Fire Dispatch District

6.4.11.1 Definition

Area defined for managing the dispatch of fire fighters.

6.4.12 Named Area

6.4.12.1 Definition

A clearly or fuzzy bounded area, covering a region having its own commonly used name to identify this particular region.

6.4.12.2 Description

EXAMPLE The Black Forest, The Alps, or The Riviera.

6.4.13 Named Areas (abstract)

6.4.13.1 Definition

Named Areas is abstract class of Elective District, Census District, Fire Dispatch District, Emergency Medical Dispatch District, Built-up Area, Named Area, School District, Phone District, Police District, and Postal District.

6.4.13.2 Description

See Figure 47. As an abstract class, Named Areas may not be instantiated.

6.4.14 Phone District

6.4.14.1 Definition

Area that defines a unit responsible for the delivery of telephone services usually associated with one area code.

6.4.15 Police District

6.4.15.1 Definition

Area defined for managing the dispatch of police officers.

6.4.16 Postal District

6.4.16.1 Definition

Area defined as a unit for postal services expressed by a name.

6.4.17 School District

6.4.17.1 Definition

Area that defines which educational institution services are provided for its residents.

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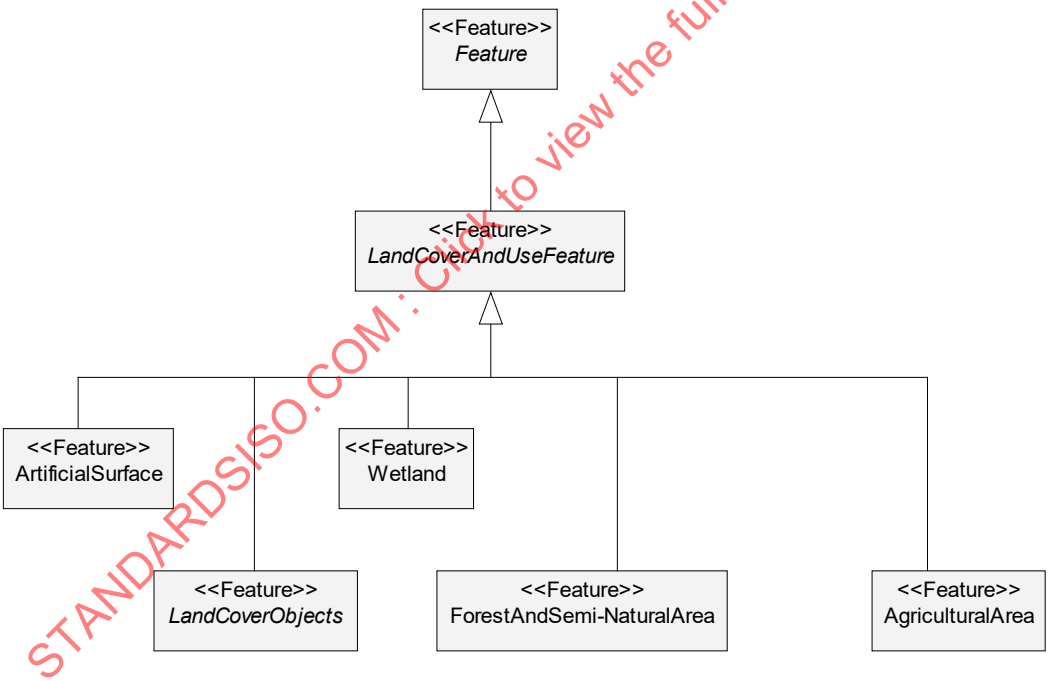
6.5 Land Cover And Use

6.5.1 General overview

Land Cover And Use provide contextual information about the coverage or usage of the earth's surface. Many of the Land Cover And Use types are hierarchical in structure, being further subdivided into subtypes [7]. Land Cover And Use contains on the highest-level the following Features:

- Land Cover Objects (abstract)
- Artificial Surface
- Agricultural Area
- Forest and Semi-Natural Area
- Wetlands
- Island

In the specification below, specification of super-type is given in combination with the data model containing its direct sub-type. See Figure 48 for the highest-level. Specification of a sub-type contains a specification of its direct super-type.



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Figure 48 — Generic Conceptual Data Model for Land Cover And Use

6.5.2 Land Cover Objects (abstract)

6.5.2.1 Definition

Land Cover Objects is abstract class of Building, Building Detail, Building Façade, Building Unit, Schematic Building, Block Detail, Town Block, Island, Sidewalk. Land Cover Objects may be complemented by Road And Rail Network And Associated Land Features to represent the areas covered by road or rail objects such as (elevated) motorways, slip roads, or flyovers.

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6.5.2.2 Description

See Figure 49. As an abstract class, Land Cover Objects may not be instantiated.

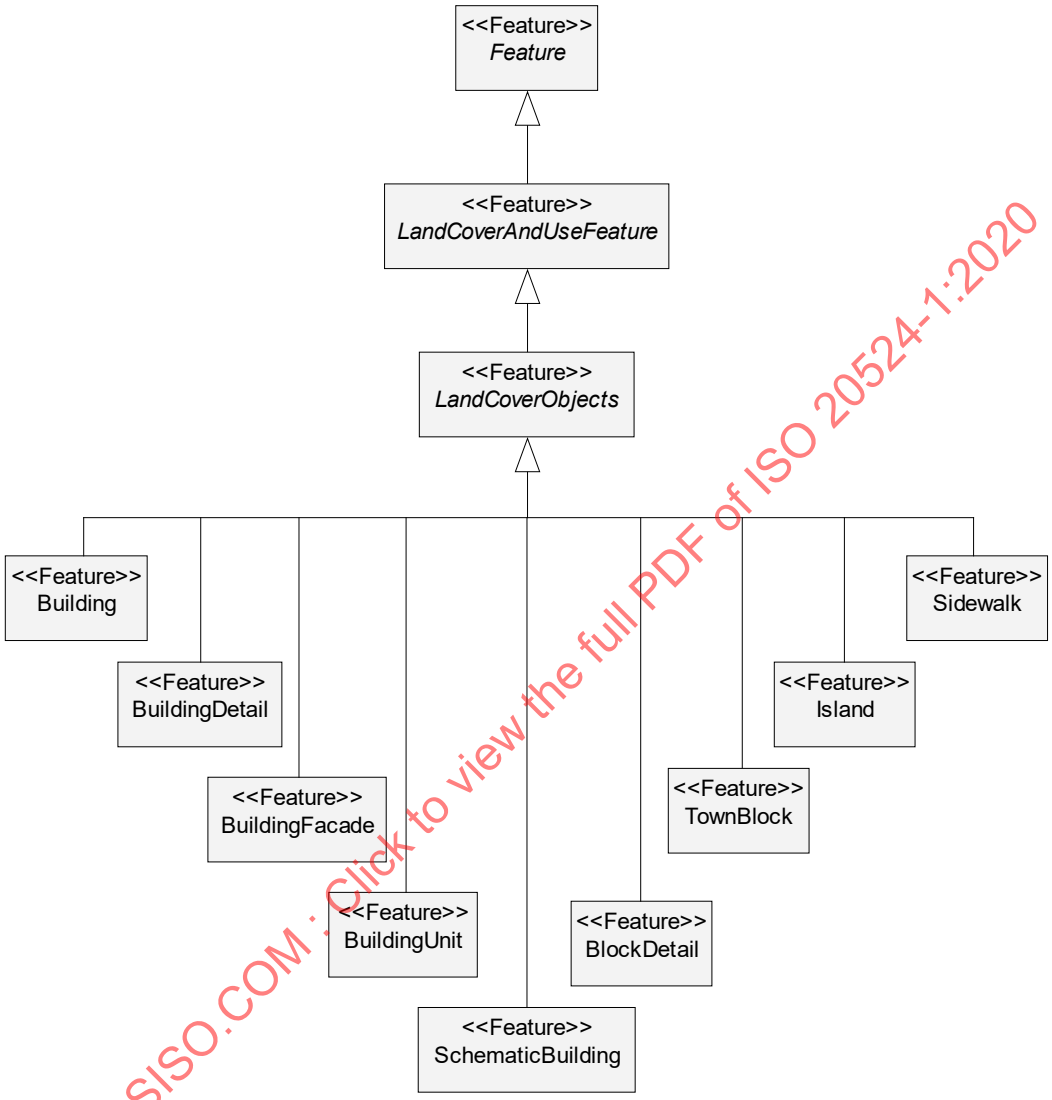


Figure 49 — Conceptual Data Model for Land Cover And Use: Subtype Land Cover Objects

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6.5.3 Building

6.5.3.1 Definition

Manmade structure or structures aboveground occupied by people or goods.

6.5.3.2 Description

Building is included to represent the physical presence of these structures. Neighbouring buildings may be grouped into a single Building Feature.

Different Buildings may be linked to each other by means of the Relationships Building linked to Building.

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6.5.4 Schematic Building

6.5.4.1 Definition

Simplified or representative building footprint for the normalisation of graphical depiction of certain types of Buildings.

6.5.4.2 Description

Stylised representation to aid visual recognition of (re-)occurrences of a certain type of structure. Schematic Buildings may be aboveground or underground, such as underground train stations without a visual footprint.

6.5.5 Building Unit

6.5.5.1 Definition

A single house or other sub-division of a Building or Schematic Building that has unique characteristics compared to neighbouring Building Units in regard to architectural style and/or addressing.

6.5.5.2 Description

Criteria for the determination of individual, identifiable Building Units include

- the embedding of 2- or 3-dimensional object models associated with (landmark) buildings or structures;
- the sub-division of composite buildings into units with each a uniform architectural style;
- the association with a single address unit (such as a particular house number).

For example, two neighbouring houses with different house numbers will always form two Building Units. Likewise, different building structures attached to each other, such as a modern glass office building attached to a medieval brick building, could represent individual Building Units (even if they share the same house number).

6.5.6 Building Detail

6.5.6.1 Definition

The representation of linear shapes that depict prominent construction characteristics of a Building

6.5.6.2 Description

A means to model details of Buildings that are easily recognised as a representative line pattern of the visual (two-dimensional) appearance.

6.5.7 Town Block

6.5.7.1 Definition

The representation of a mesh in the transportation network.

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6.5.7.2 Description

A means to model the areas circumscribed by Transportation Elements or other bounding Features. The outline depicts the casements of roadways, traffic islands, railway tracks, shore lines, to name a few examples.

In the case of the road network, the area covered by sidewalks may be part of a Town Block.

Water systems shall be represented by Water Body Features.

6.5.8 Block Detail

6.5.8.1 Definition

The representation of linear shapes that depict prominent characteristics of a Town Block or Water Body.

6.5.8.2 Description

A means to model supporting details of Town Blocks or Water Bodies that aid recognition of representative line pattern of the visual (two-dimensional) appearance, such as accentuation of elevation differences or structural sub-divisions.

6.5.9 Building Façade

6.5.9.1 Definition

The part of the outer surface of a Building that is facing the same direction.

6.5.9.2 Description

The Building Façade is the projection of a perpendicular side view onto a base line. A simple example is a building with a rectangular footprint; this building would have four Building Façades corresponding to each of the four base lines of the rectangle.

6.5.10 Sidewalk

6.5.10.1 Definition

The representation of an area that is dedicated to pedestrians and is located adjacent to the core roadway.

6.5.10.2 Description

Sidewalks are often elevated relative to the roadway, representing the kerbs as delineation, or otherwise delineated by markings or change in surface fabric. Bicycle lanes may be included in the sidewalk representation if their construction or marking more clearly separates it from the core roadway than from the core sidewalk.

6.5.11 Island

6.5.11.1 Definition

An area surrounded by water, possibly connected to other land by means of a bridge or tunnel or accessible by ferry.

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6.5.12 Artificial Surface

6.5.12.1 Definition

Surface modified by humans, usually resulting from construction activities, and created to serve dedicated purposes.

6.5.12.2 Description

See figure for the conceptual data model.

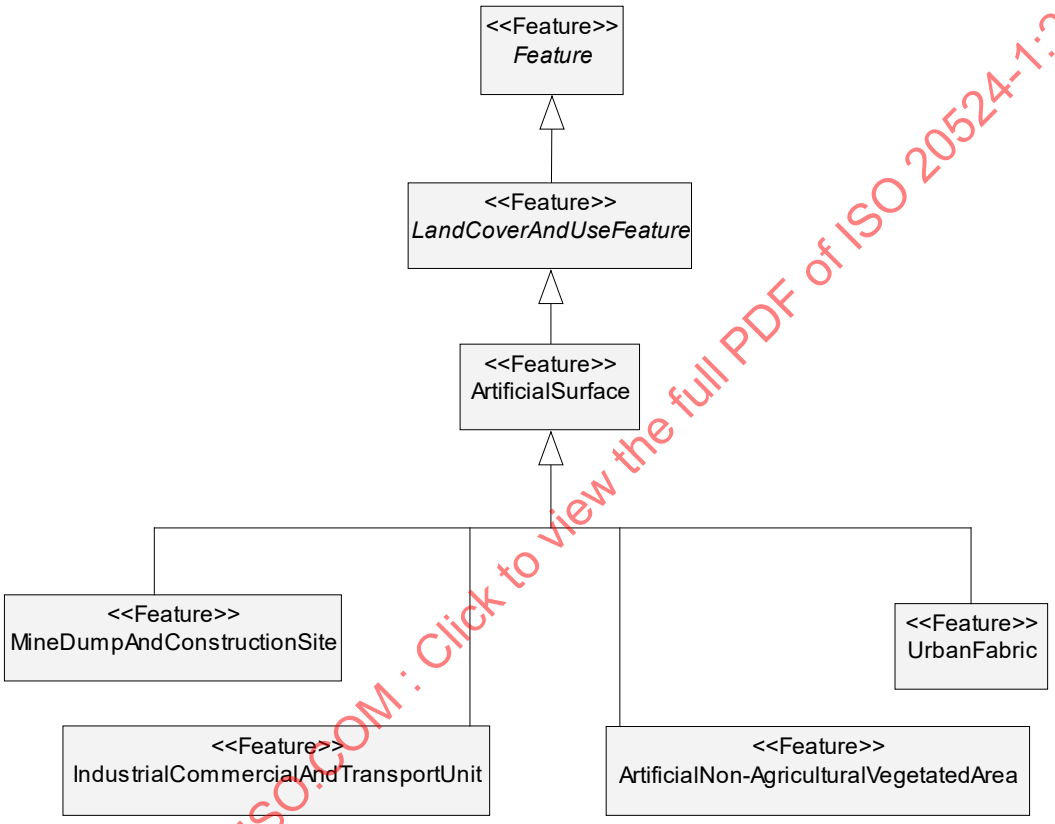


Figure 50 — Conceptual Data Model for Land Cover And Use: Subtype Artificial Surface

6.5.13 Urban Fabric

6.5.13.1 Definition

Area where most of the land is covered by buildings, roads and artificially surfaced areas. See figure for the conceptual data model.

6.5.13.2 Description

Urban Fabric is a subtype of Artificial Surface. See figure for the conceptual data model.

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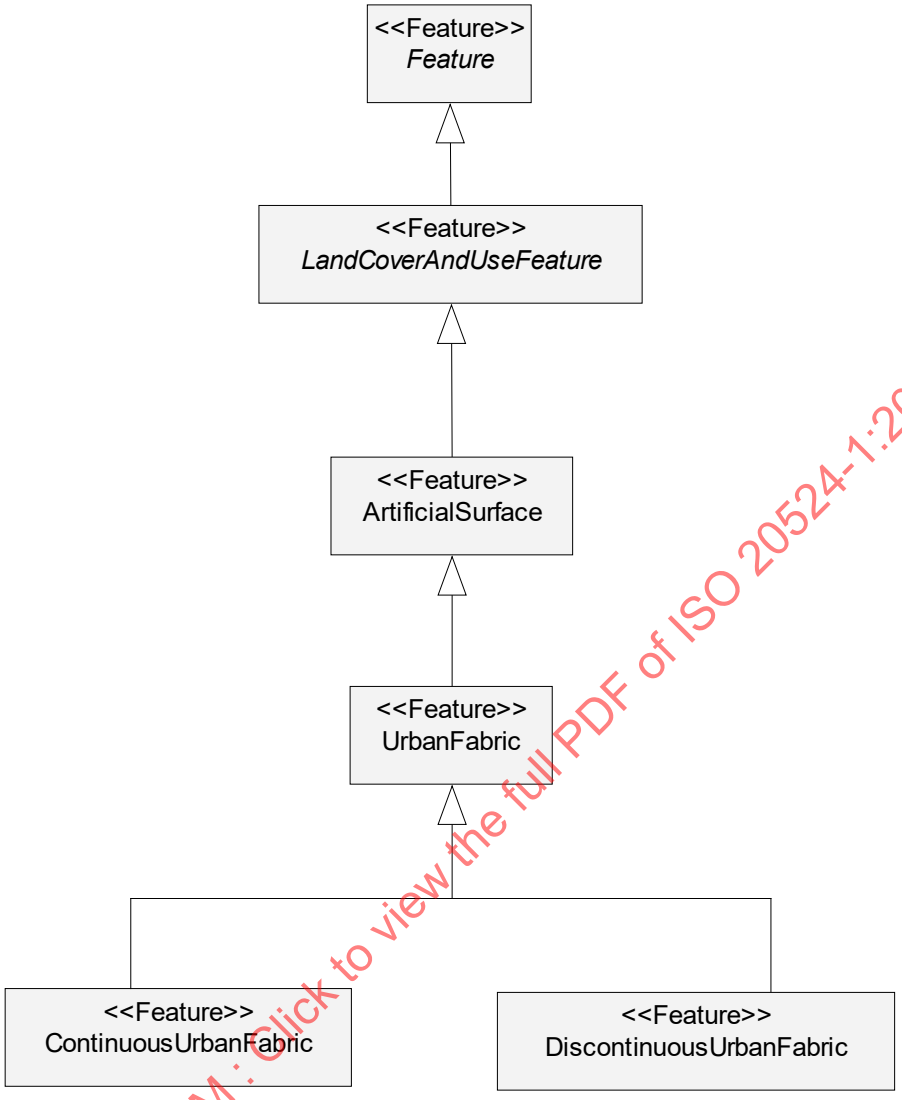


Figure 51 — Conceptual Data Model for Land Cover And Use: Subtype Urban Fabric

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6.5.14 Continuous Urban Fabric

6.5.14.1 Definition

Area where most of the land is covered by structures. Buildings, roads and artificially surfaced areas cover almost all the ground. Non-linear areas of vegetation and bare soil are exceptional.

6.5.14.2 Description

Continuous Urban Fabric is a subtype of Urban Fabric.

6.5.15 Discontinuous Urban Fabric

6.5.15.1 Definition

Area where most of the land is covered by structures. Buildings, roads and artificially surfaced areas associated with vegetated areas and bare soil, which occupy discontinuous but significant surfaces.

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6.5.15.2 Description

Discontinuous Urban Fabric is a subtype of Urban Fabric.

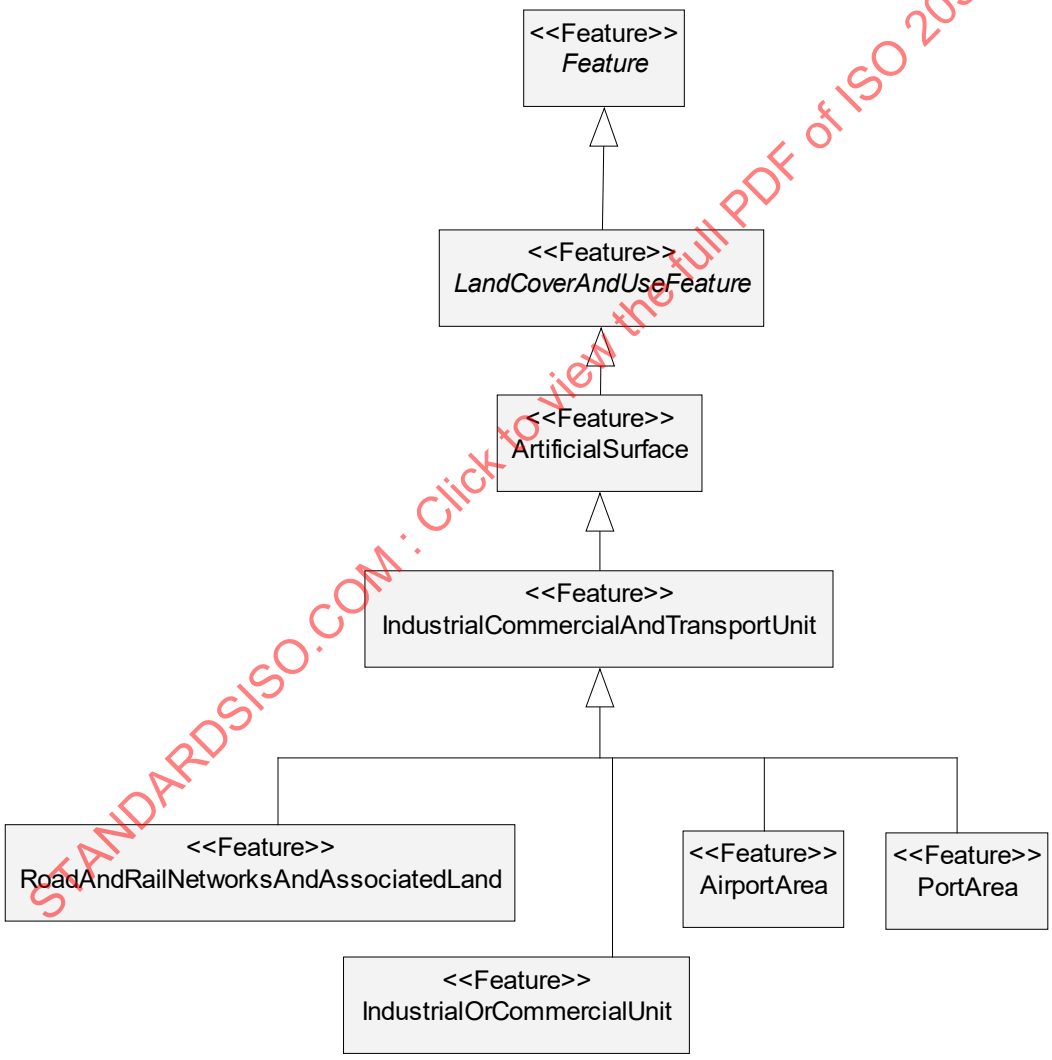
6.5.16 Industrial, Commercial And Transport Unit

6.5.16.1 Definition

Artificial surface and infrastructure associated with transportation and/or an industrial activity.

6.5.16.2 Description

Industrial, Commercial And Transport Unit is a subtype of Artificial Surface. See figure for the conceptual data model.



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Figure 52 — Conceptual Data Model for Land Cover And Use: Subtype Industrial, Commercial And Transport Units

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6.5.17 Industrial Or Commercial Unit

6.5.17.1 Definition

Artificially surfaced areas (with concrete, asphalt, tarmacadam, or stabilised, e.g. beaten earth) devoid of vegetation, occupy most of the area in question, which also contains buildings and/or vegetated areas.

6.5.17.2 Description

Industrial Or Commercial Units is a subtype of Industrial, Commercial And Transport Units.

6.5.18 Road And Rail Network And Associated Land

6.5.18.1 Definition

Areas covered with motorways, railways, including associated installations (stations, platforms, embankments).

6.5.18.2 Description

Road And Rail Network And Associated Land is a subtype of Industrial, Commercial And Transport Units.

6.5.19 Port Area

6.5.19.1 Definition

Area covered with infrastructure of port area, including quays, dockyards and marinas.

6.5.19.2 Description

Port Area is a subtype of Industrial, Commercial And Transport Units.

6.5.20 Airport Area

6.5.20.1 Definition

Areas covered with airport installations: runways, buildings and associated land.

6.5.20.2 Description

Airport Area is a subtype of Industrial, Commercial And Transport Units.

6.5.21 Mine, Dump And Construction Site

6.5.21.1 Definition

Surface resulting from excavation, mine dump or landfill.

6.5.21.2 Description

Mine, Dump And Construction Site is a subtype of Artificial Surface. See figure for the conceptual data model.

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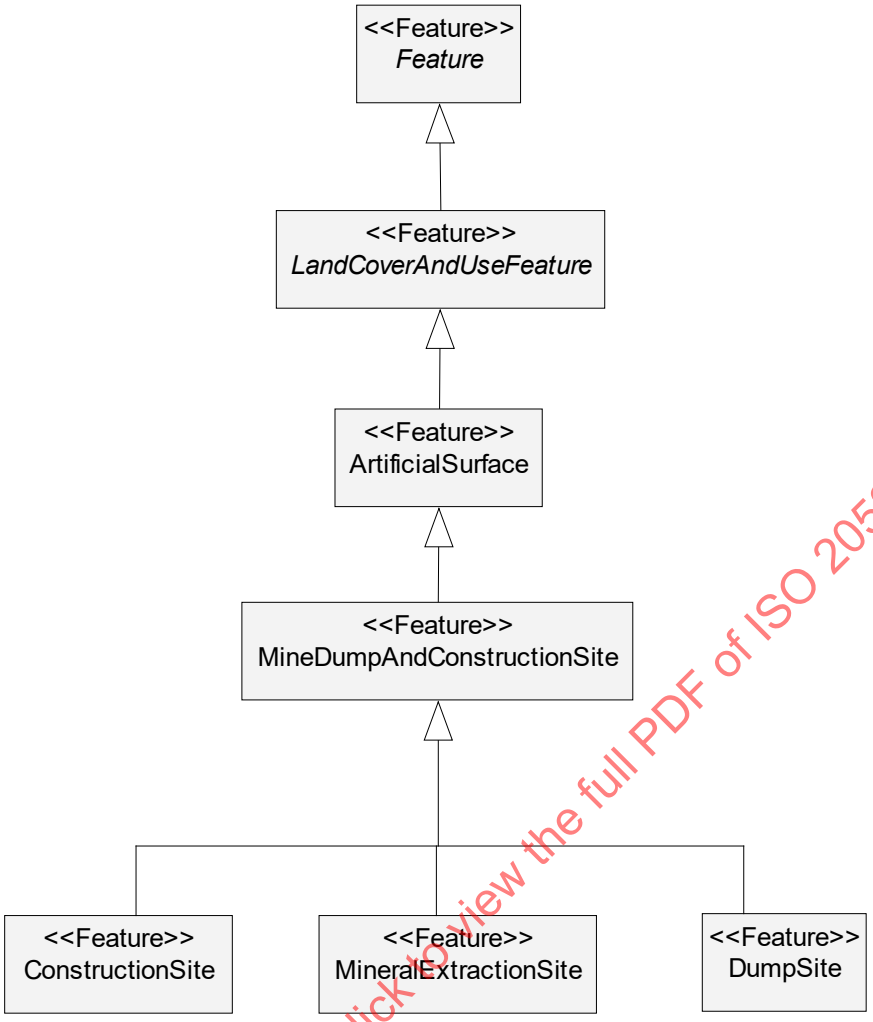


Figure 53 — Conceptual Data Model for Land Cover And Use: Subtype Mine, Dump And Construction Site

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6.5.22 Mineral Extraction Site

6.5.22.1 Definition

Areas with open-pit extraction of industrial minerals (sandpits, quarries) or other minerals (open cast mines). Includes flooded gravel pits, except for river-bed extraction.

6.5.22.2 Description

Mineral Extraction Site is a subtype of Mine, Dump And Construction Site.

6.5.23 Dump Site

6.5.23.1 Definition

Area covered with landfill or mine dump sites, industrial or public.

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6.5.23.2 Description

Dump Site is a subtype of Mine, Dump And Construction Site.

6.5.24 Construction Site

6.5.24.1 Definition

Spaces under construction development, soil or bedrock excavations, earthworks.

6.5.24.2 Description

Construction Site is a subtype of Mine, Dump And Construction Site.

6.5.25 Artificial, Non-Agricultural Vegetated Area

6.5.25.1 Definition

Cultivated area with vegetation dedicated to leisure, sports and recreation activities or used as cemetery.

6.5.25.2 Description

Artificial, Non-Agricultural Vegetated Area is a subtype of Artificial Surface. See figure for the conceptual data model.

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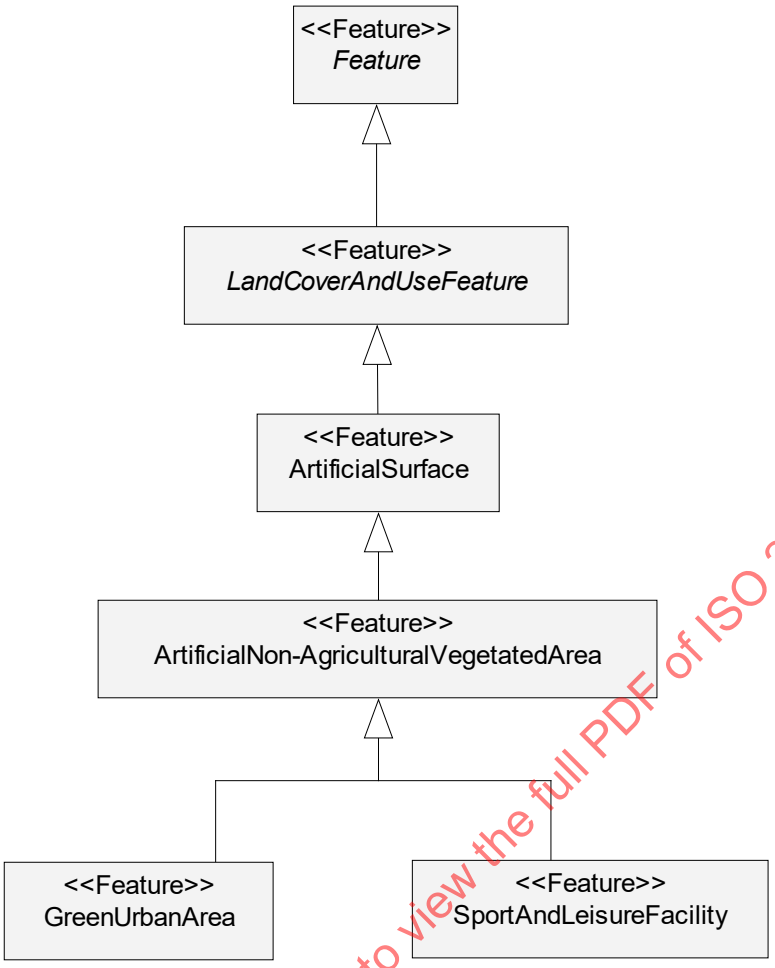


Figure 54 — Conceptual Data Model for Land Cover And Use: Subtype Artificial Non-Agricultural Vegetated Areas

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6.5.26 Green Urban Area

6.5.26.1 Definition

Area with vegetation within urban fabric. Includes parks and cemeteries with vegetation.

6.5.26.2 Description

Green Urban Area is a subtype of Artificial, Non-Agricultural Vegetated Area

6.5.27 Sport And Leisure Facility

6.5.27.1 Definition

Area with camping ground, sports ground, leisure park, golf course, racecourse.

6.5.27.2 Description

Sport And Leisure Facility is a subtype of Artificial, Non-Agricultural Vegetated Area

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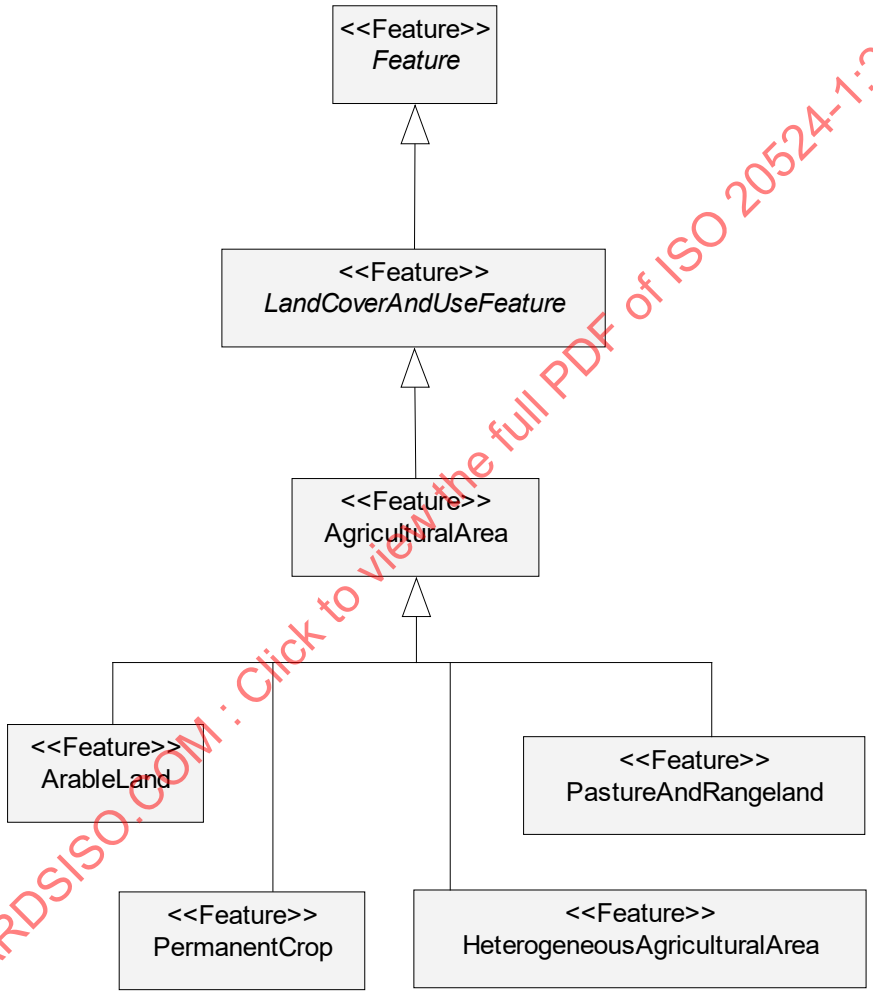
6.5.28 Agricultural Area

6.5.28.1 Definition

Vegetated area that is cultivated to grow crops or fruits, or used for grazing.

6.5.28.2 Description

See figure for the conceptual data model.



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Figure 55 — Conceptual Data Model for Land Cover And Use: Subtype Agricultural Area

6.5.29 Arable Land

6.5.29.1 Definition

Cultivated area regularly ploughed and generally under a rotation system.

6.5.29.2 Description

Arable Land is a subtype of Agricultural Area. See figure for the conceptual data model.

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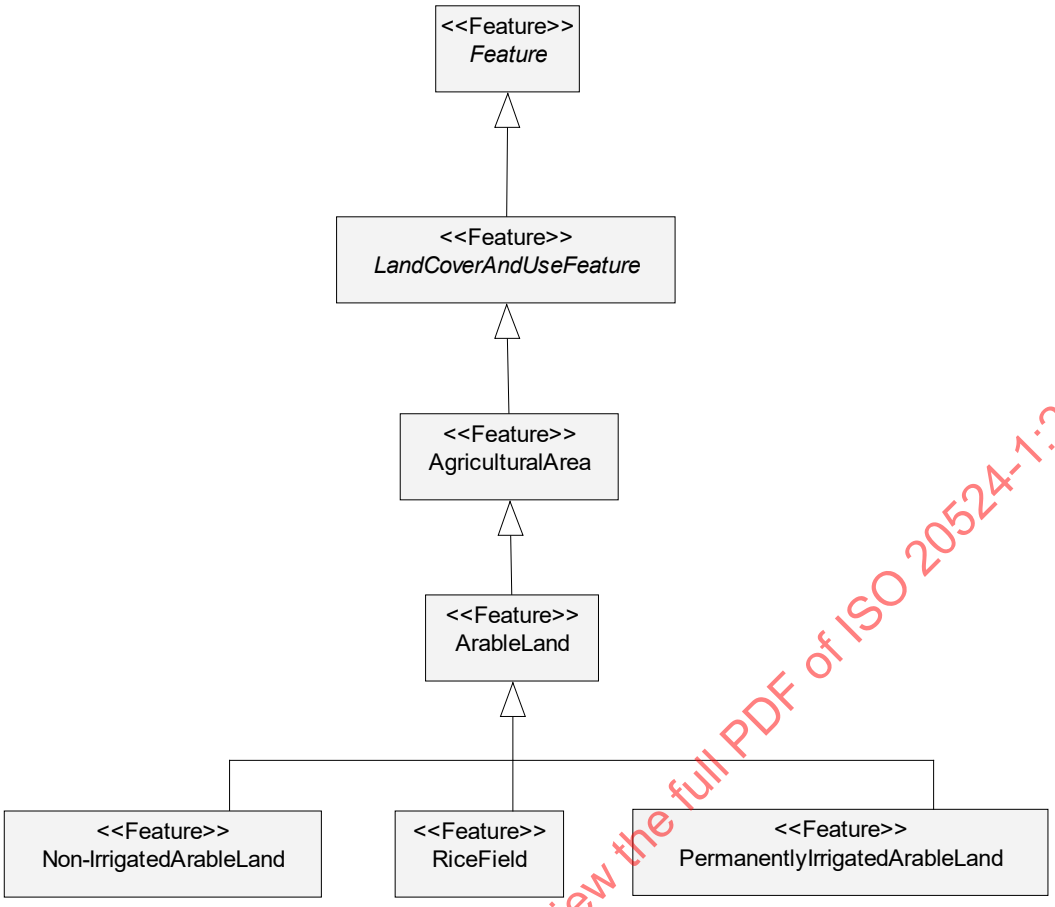


Figure 56 — Conceptual Data Model for Land Cover And Use: Subtype Arable Land

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6.5.30 Non-Irrigated Arable Land

6.5.30.1 Definition

Cereals, legumes, fodder crops, root crops and fallow land. Includes flower and tree (nurseries) cultivation and vegetables, whether open field, under plastic or glass (includes market gardening). Includes aromatic, medicinal and culinary plants. Excludes permanent pastures.

6.5.30.2 Description

Non-Irrigated Arable Land is a subtype of Arable Land.

6.5.31 Permanently Irrigated Land

6.5.31.1 Definition

Crops irrigated permanently and periodically, using a permanent infrastructure (irrigation channels, drainage network). Most of these crops could not be cultivated without an artificial water supply. Does not include sporadically irrigated land.

6.5.31.2 Description

Permanently Irrigated Land is a subtype of Arable Land.

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6.5.32 Rice Field

6.5.32.1 Definition

Land developed for rice cultivation. Flat surfaces with irrigation channels. Surfaces regularly flooded.

6.5.32.2 Description

Rice field is a subtype of Arable land.

6.5.33 Permanent Crop

6.5.33.1 Definition

Crops not under a rotation system which provide repeated harvests and occupy the land for a long period before it is ploughed and replanted: mainly plantations of woody crops. Excludes pastures, grazing lands and forests.

6.5.33.2 Description

Permanent Crop is a subtype of Agricultural Area. See figure for the conceptual data model.

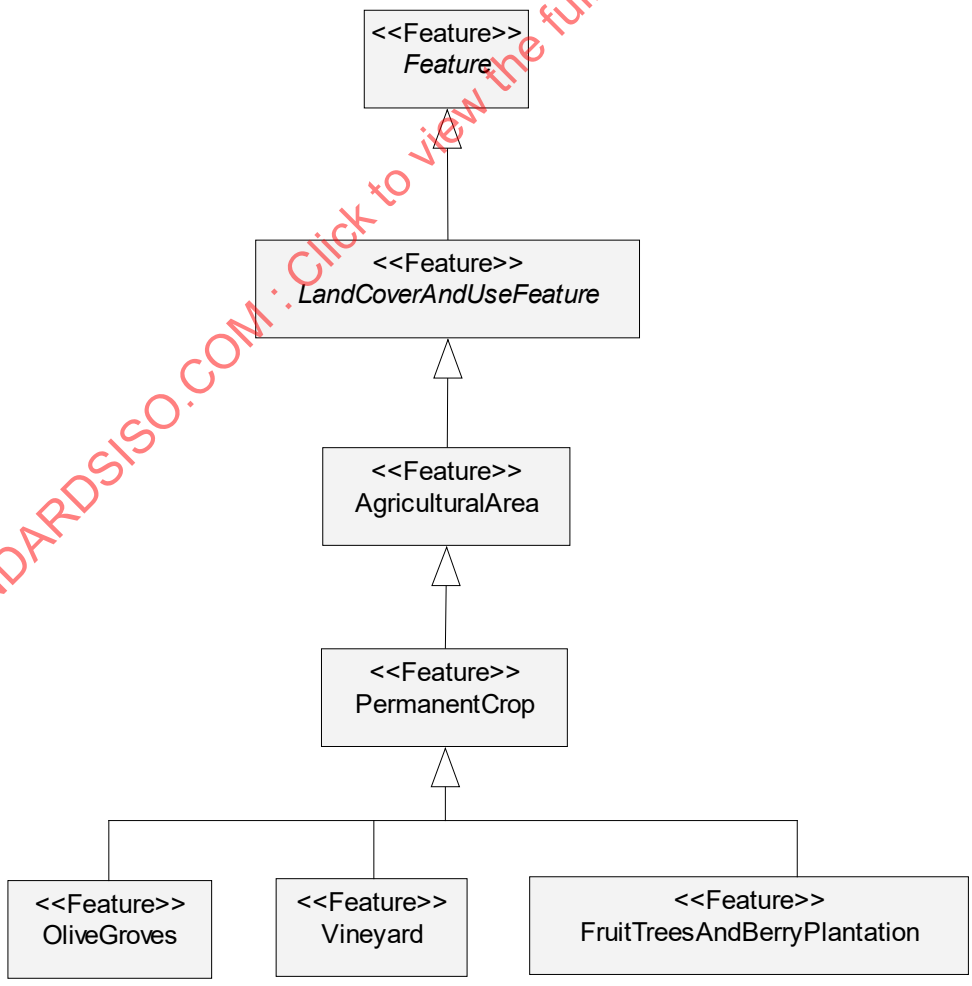


Figure 57 — Conceptual Data Model for Land Cover And Use: Subtype Permanent Crop

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6.5.34 Vineyard

6.5.34.1 Definition

Area planted with vines.

6.5.34.2 Description

Vineyard is a subtype of Permanent Crop.

6.5.35 Fruit Trees And Berry Plantation

6.5.35.1 Definition

Parcels planted with fruit trees or shrubs: single or mixed fruit species, fruit trees associated with permanently grassed surfaces. Includes chestnut and walnut groves.

6.5.35.2 Description

Fruit Trees And Berry Plantations is a subtype of Permanent crops.

6.5.36 Olive Grove

6.5.36.1 Definition

Areas planted with olive trees, including mixed occurrence of olive trees and vines on the same parcel.

6.5.36.2 Description

Olive Grove is a subtype of Permanent Crop.

6.5.37 Pasture And Rangeland

6.5.37.1 Definition

Grassland area, usually used for grazing.

6.5.37.2 Description

Pasture And Rangeland is a subtype of Agricultural Area. See figure for the conceptual data model.

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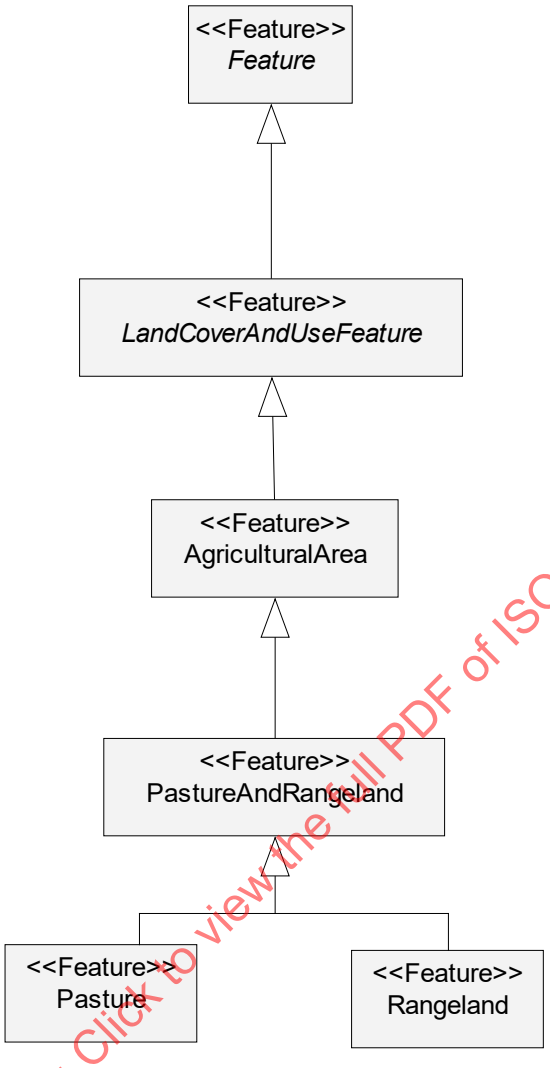


Figure 58 — Conceptual Data Model for Land Cover And Use: Subtype Pasture And Rangeland

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6.5.38 Pasture

6.5.38.1 Definition

Dense, predominantly graminoid grass cover, of floral composition, not under a rotation system. Mainly used for grazing, but the fodder may be harvested mechanically. Includes areas with hedges (bocage).

6.5.38.2 Description

Pasture is a subtype of Pasture And Rangeland.

6.5.39 Rangeland

6.5.39.1 Definition

Spatially extensive area of natural grass cover, usually short grass in semi-arid climates, on which ruminants are allowed to graze freely.

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6.5.39.2 Description

Rangeland is a subtype of Pastures And Rangeland.

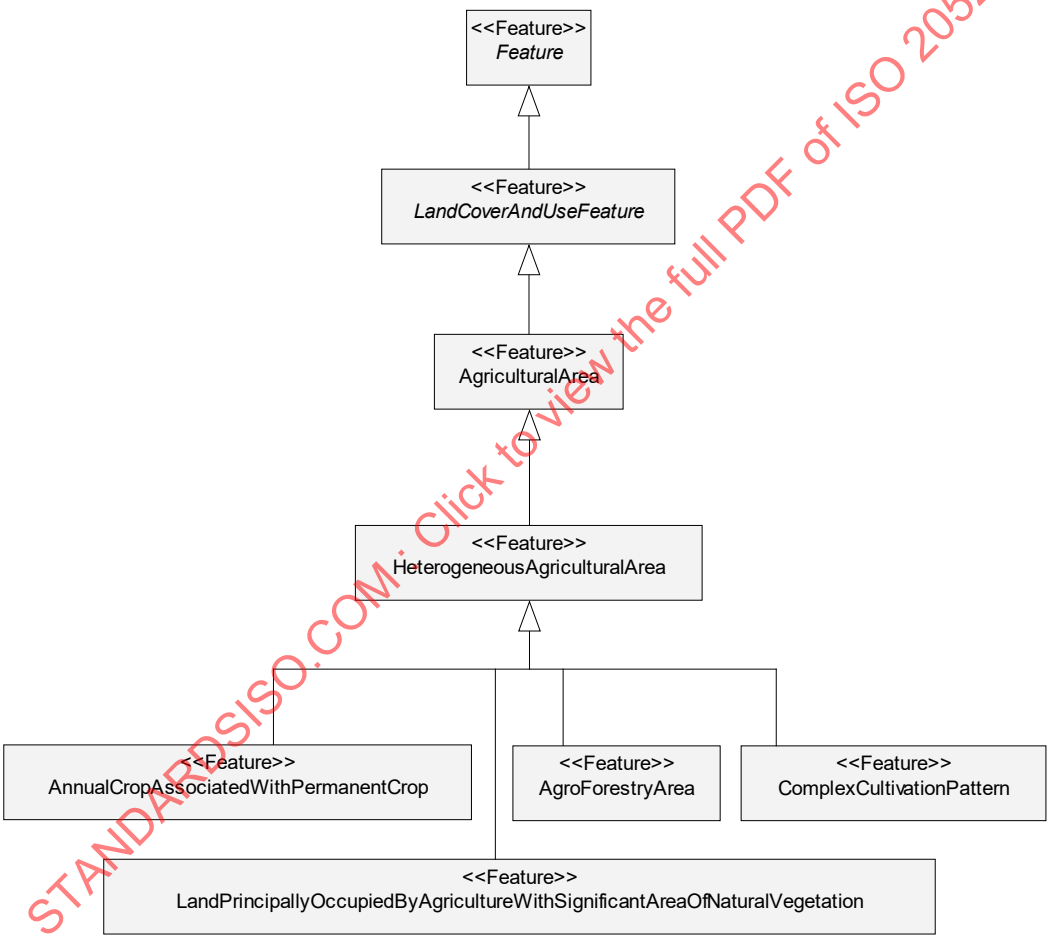
6.5.40 Heterogeneous Agricultural Area

6.5.40.1 Definition

Partly or fully cultivated area with crops or pastures next to other vegetation such as trees.

6.5.40.2 Description

Heterogeneous Agricultural Area is a subtype of Agricultural area. See figure for the conceptual data model.



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Figure 59 — Conceptual Data Model for Land Cover And Use: Subtype Heterogeneous Agricultural Area

6.5.41 Annual Crop Associated With Permanent Crop

6.5.41.1 Definition

Non-Permanent Crop (Arable Land or Pasture) associated with Permanent Crop on the same parcel.

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6.5.41.2 Description

Annual Crop associated with Permanent Crop is a subtype of Heterogeneous Agricultural Area.

6.5.42 Complex Cultivation Pattern

6.5.42.1 Definition

Juxtaposition of small parcels of diverse annual crops, pasture and/or permanent crops.

6.5.42.2 Description

Complex Cultivation Pattern is a subtype of Heterogeneous Agricultural Area.

6.5.43 Land Principally Occupied By Agriculture With Significant Area Of Natural Vegetation

6.5.43.1 Definition

Areas principally occupied by agriculture, interspersed with significant natural areas.

6.5.43.2 Description

Land Principally Occupied By Agriculture With Significant Area Of Natural Vegetation is a subtype of Heterogeneous Agricultural Area.

6.5.44 Agro-Forestry area

6.5.44.1 Definition

Annual crops of grazing land under the wooded cover of forestry species.

6.5.44.2 Description

Agro-Forestry Area is a subtype of Heterogeneous Agricultural Area.

6.5.45 Forest And Semi-Natural Area

6.5.45.1 Definition

Vegetated area covered with trees and/or bushy vegetation.

6.5.45.2 Description

See figure for the conceptual data model.

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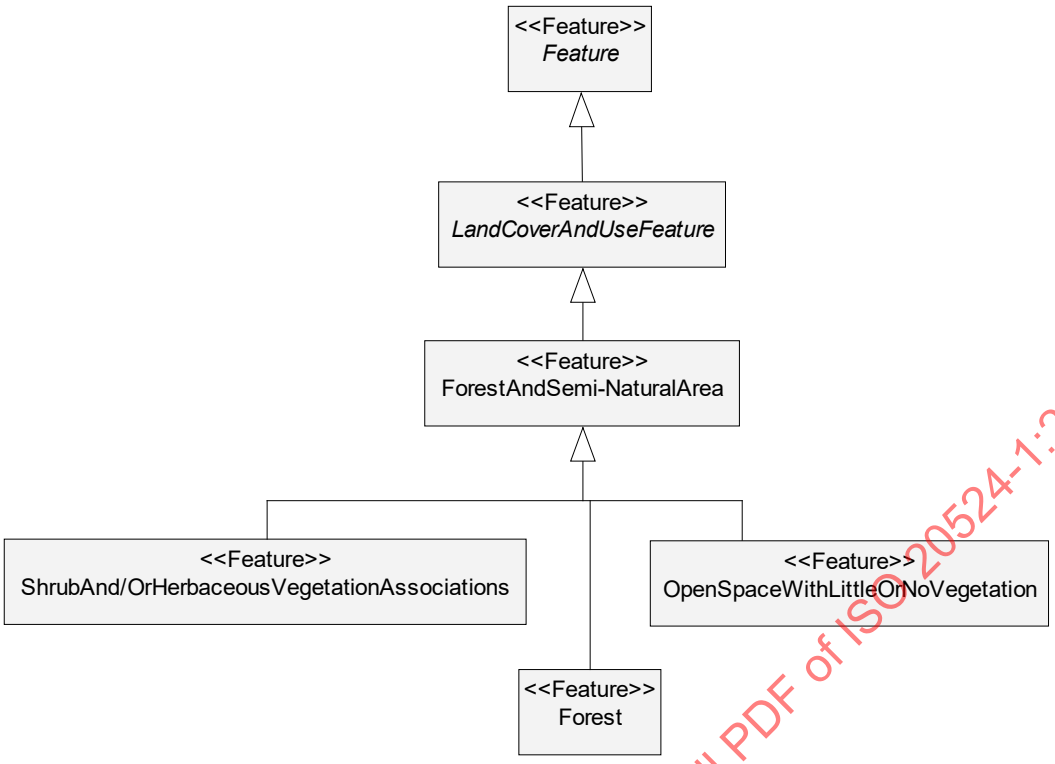


Figure 60 — Conceptual Data Model for Land Cover And Use: Subtype Forest And Semi-Natural Area

6.5.46 Forest

6.5.46.1 Definition

Vegetation formation composed principally of trees, including shrub and bush understories.

6.5.46.2 Description

Forest is a subtype of Forest And Semi-Natural Area. See figure for the conceptual data model.

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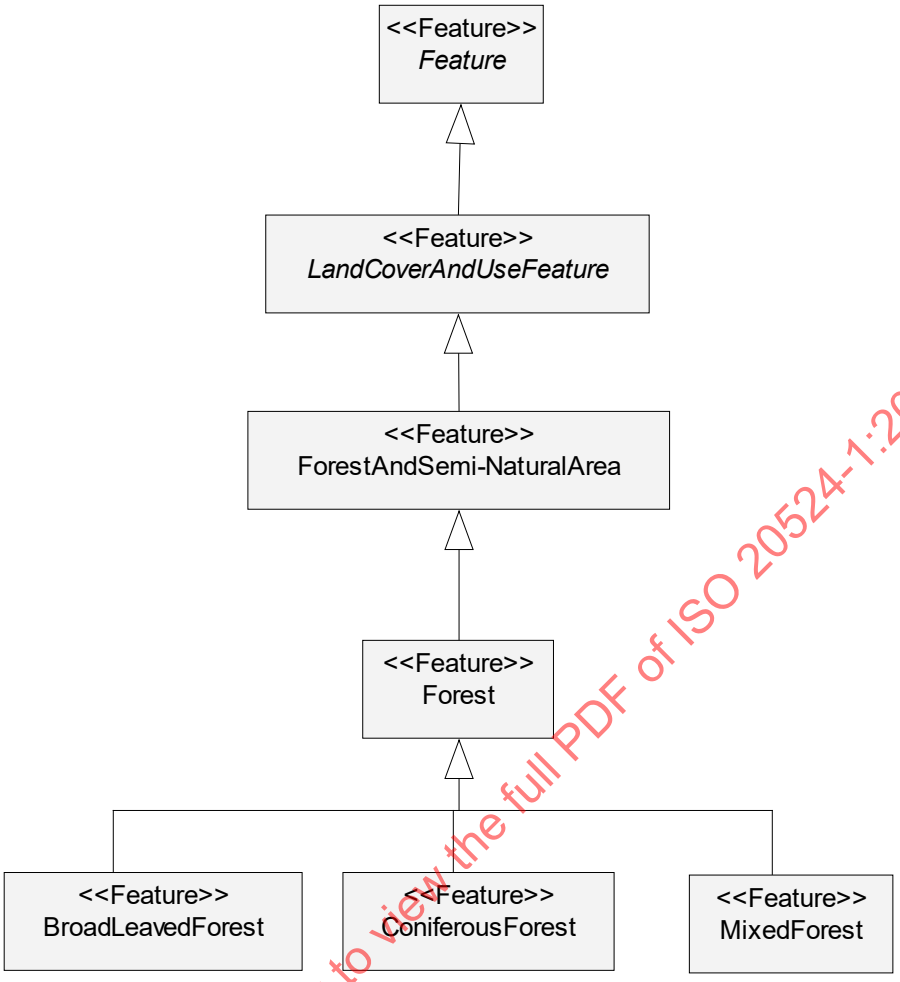


Figure 61 — Conceptual Data Model for Land Cover And Use: Subtype Forest

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6.5.47 Broad-Leaved Forest

6.5.47.1 Definition

Vegetation formation composed principally of trees, including shrub and bush understories, where broad-leaved species predominate.

6.5.47.2 Description

Broad-Leaved Forest is a subtype of Forest.

6.5.48 Coniferous Forest

6.5.48.1 Definition

Vegetation formation composed principally of trees, including shrub and bush understories, where coniferous species predominate.

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6.5.48.2 Description

Coniferous Forest is a subtype of Forest.

6.5.49 Mixed Forest

6.5.49.1 Definition

Vegetation formation composed principally of trees, including shrub and bush understories, where broad-leaved and coniferous species co-dominate.

6.5.49.2 Description

Mixed Forest is a subtype of Forest.

6.5.50 Scrub And/Or Herbaceous Vegetation Association

6.5.50.1 Definition

Bushy vegetation, generally with low cover and with no or scattered trees.

6.5.50.2 Description

Scrub And/Or Herbaceous Vegetation Association is a sub-type of Forest And Semi-Natural Area. See figure for the conceptual data model.

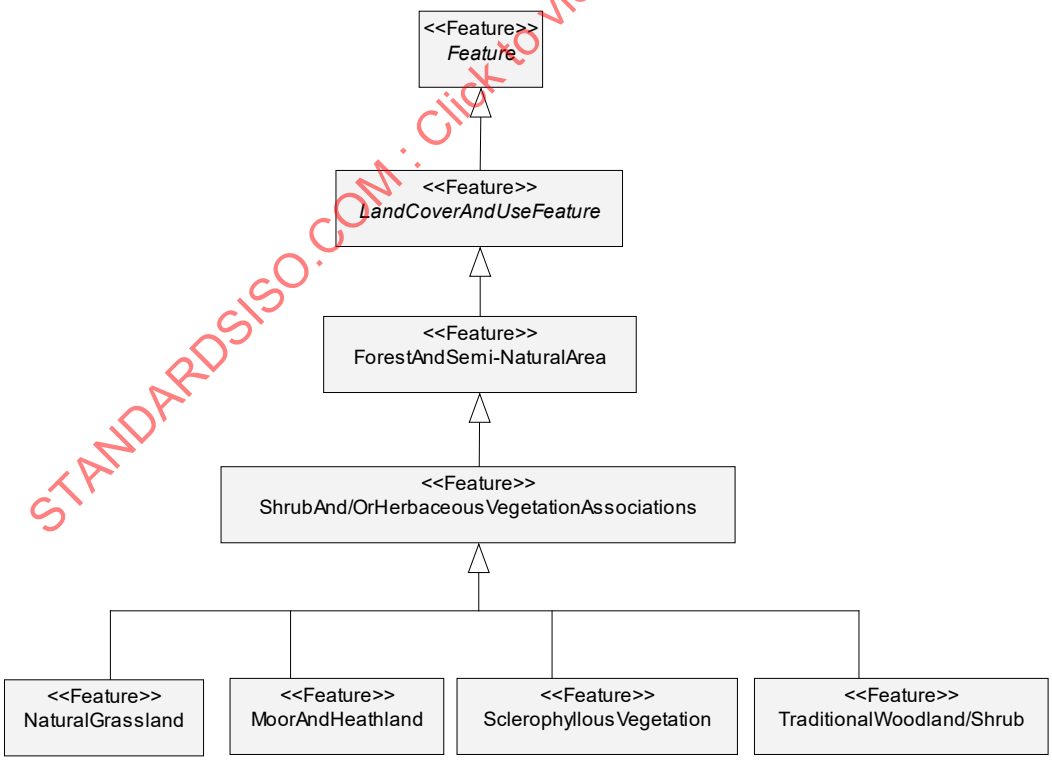


Figure 62 — Conceptual Data Model for Land Cover And Use: Subtype Scrub And/Or Herbaceous Vegetation Association

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6.5.51 Natural Grassland

6.5.51.1 Definition

Low productivity grassland. Often situated in areas of rough uneven ground. Frequently includes rocky areas, briars and heathland.

6.5.51.2 Description

Natural Grassland is a sub-type of Scrub And/Or Herbaceous Vegetation Association.

6.5.52 Moor And Heathland

6.5.52.1 Definition

Vegetation with low and closed cover, dominated by bushes, shrubs and herbaceous plants (heath, briars, broom, gorse, laburnum, etc.).

6.5.52.2 Description

Moor And Heathland is a sub-type of Scrub And/Or Herbaceous Vegetation Association.

6.5.53 Sclerophyllous vegetation

6.5.53.1 Definition

Bushy sclerophyllous vegetation. Includes maquis and garrigue.

Maquis: a dense vegetation composed of numerous shrubs associated with siliceous soils in the Mediterranean environment.

Garrigue: discontinuous bushy associations of Mediterranean calcareous plateaus. Generally composed of kermes oaks, arbutus, lavender, thyme, cistus, etc. May include a few isolated trees.

6.5.53.2 Description

Sclerophyllous Vegetation is a sub-type of Scrub And/Or Herbaceous Vegetation Association.

6.5.54 Transitional Woodland/Scrub

6.5.54.1 Definition

Bushy or herbaceous vegetation with scattered trees. Can represent either woodland degradation or forest regeneration/colonization.

6.5.54.2 Description

Transitional Woodland/Scrub is a sub-type of Scrub And/Or Herbaceous Vegetation Association.

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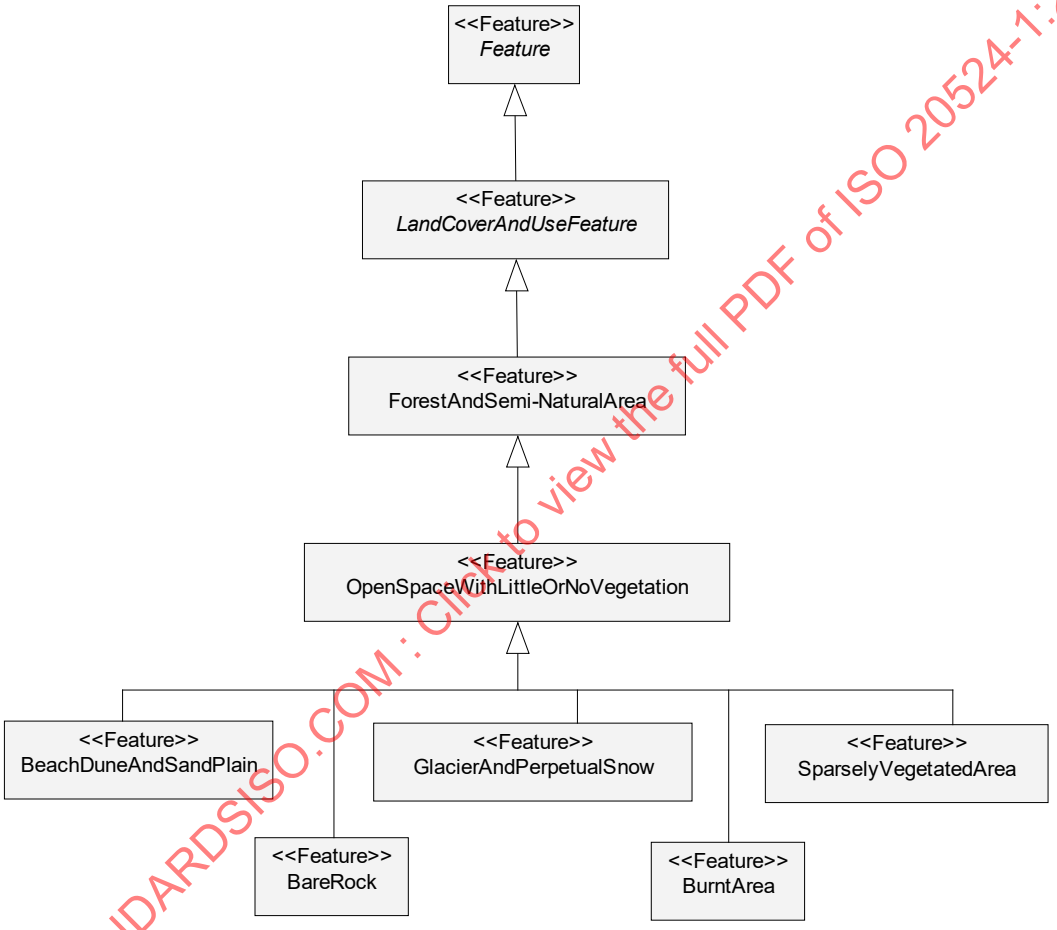
6.5.55 Open Space With Little Or No Vegetation

6.5.55.1 Definition

Area with little or no vegetation, such as sandy or rocky areas, permanent ice or snow, or sparsely vegetated high-altitude areas.

6.5.55.2 Description

Open Space With Little Or No Vegetation is a sub-type of Forest And Semi-Natural Area. See figure for the conceptual data model.



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Figure 63 — Conceptual Data Model for Land Cover And Use: Subtype Open Space With Little Or No Vegetation

6.5.56 Beach, Dune And Sand Plain

6.5.56.1 Definition

Beaches, dunes and expanses of sand or pebbles in coastal or continental locations, including beds of stream channels with torrential regime.

6.5.56.2 Description

Beach, Dune And Sand Plain is a sub-type of Open Space With Little Or No Vegetation.

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6.5.57 Bare Rock

6.5.57.1 Definition

Scree, cliffs, rocks and outcrops.

6.5.57.2 Description

Bare Rock is a sub-type of Open Space With Little Or No Vegetation.

6.5.58 Sparsely Vegetated Area

6.5.58.1 Definition

Includes steppes, tundra and badlands. Scattered high-altitude vegetation.

6.5.58.2 Description

Sparsely Vegetated Area is a sub-type of Open Space With Little Or No Vegetation.

6.5.59 Burnt Area

6.5.59.1 Definition

Areas affected by recent fires, still mainly black.

6.5.59.2 Description

Burnt Area is a sub-type of Open Space With Little Or No Vegetation.

6.5.60 Glacier And Perpetual Snow

6.5.60.1 Definition

Land covered by glaciers or permanent snowfields.

6.5.60.2 Description

Glacier And Perpetual Snow is a sub-type of Open Space With Little Or No Vegetation.

6.5.61 Wetland

6.5.61.1 Definition

Inland or coastal area seasonally, tidally or permanently waterlogged.

6.5.61.2 Description

See figure for the conceptual data model.

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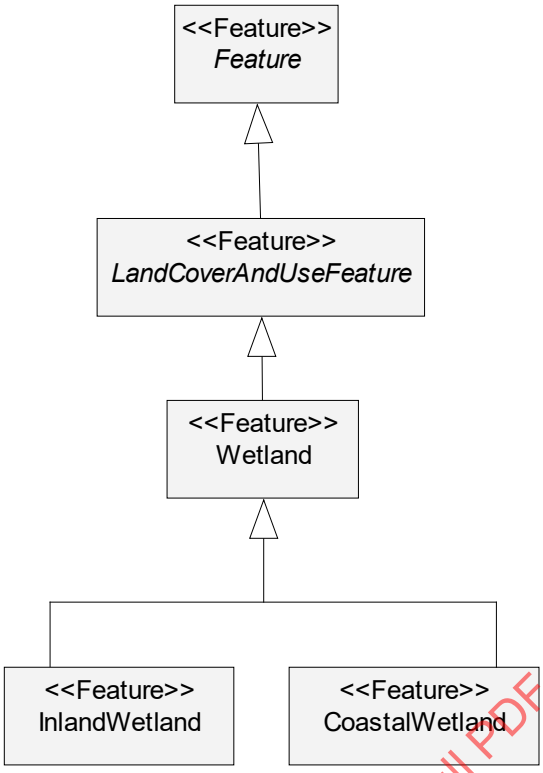


Figure 64 — Conceptual Data Model for Land Cover And Use: Subtype Wetland

6.5.62 Inland Wetland

6.5.62.1 Definition

Forested or non-forested areas either partially, seasonally or permanently waterlogged. The water may be stagnant or circulating.

6.5.62.2 Description

Inland Wetland is a sub-type of Wetland. See figure for the conceptual data model.

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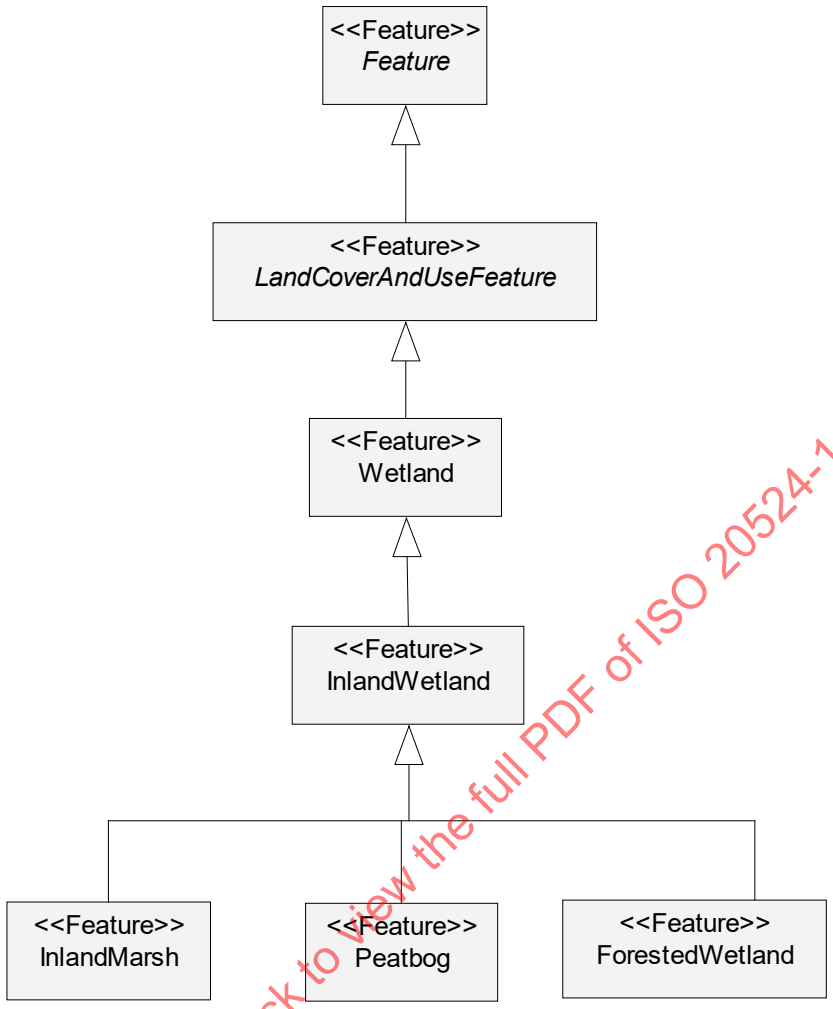


Figure 65 — Conceptual Data Model for Land Cover And Use: Subtype Inland Wetland

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6.5.63 Inland Marsh

6.5.63.1 Definition

Low-lying land usually flooded in winter, and more or less saturated by water all year round.

6.5.63.2 Description

Inland Marsh is a sub-type of Inland Wetland.

6.5.64 Peatbog

6.5.64.1 Definition

Peatland consisting mainly of decomposed moss and vegetable matter. May or may not be exploited.

6.5.64.2 Description

Peatbog is a sub-type of Inland Wetland.

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6.5.65 Forested Wetland

6.5.65.1 Definition

Low-lying forested or partially forested land often flooded, and with stagnant or circulating water most of the year.

6.5.65.2 Description

Forested Wetland is a sub-type of Inland Wetland.

6.5.66 Coastal Wetland

6.5.66.1 Definition

Non-wooded areas either tidally, seasonally or permanently waterlogged with brackish or saline water.

6.5.66.2 Description

Coastal Wetland is a sub-type of Wetlands. See figure for the conceptual data model.

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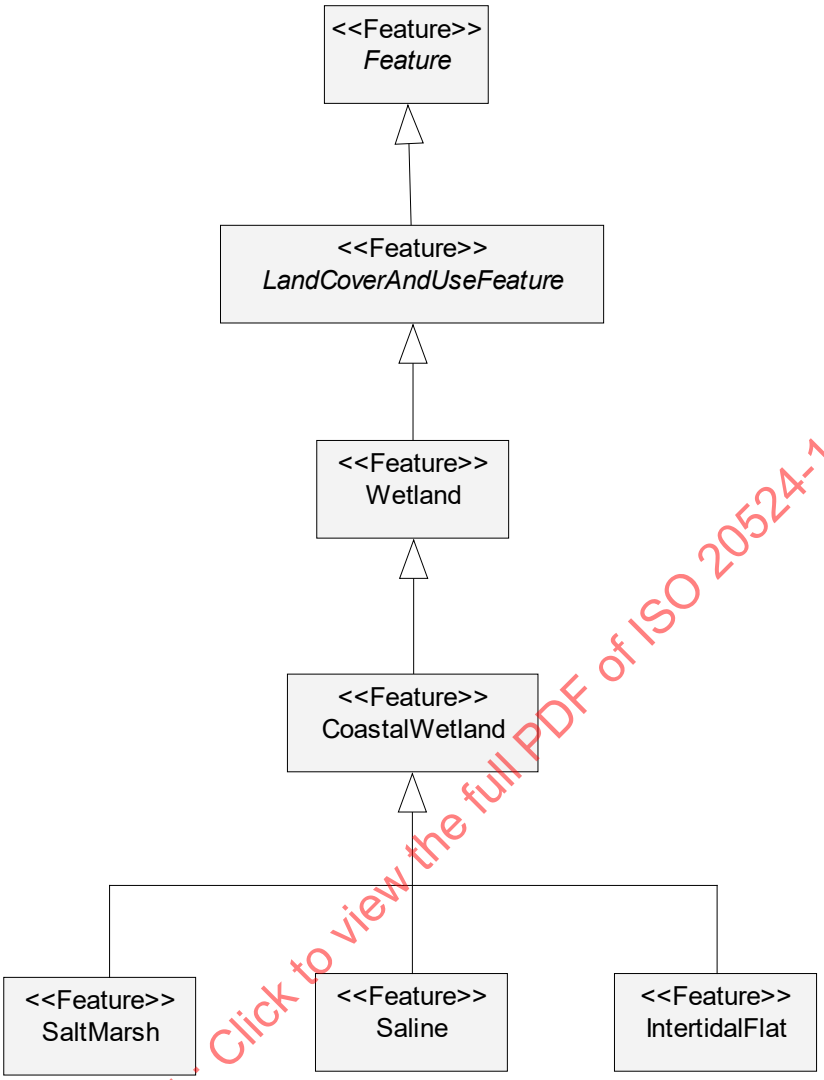


Figure 66 — Conceptual Data Model for Land Cover And Use: Subtype Coastal Wetland

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6.5.67 Salt marsh

6.5.67.1 Definition

Vegetated low-lying areas, above the high-tide line, susceptible to flooding by sea water. Often in the process of filling in, gradually being colonized by halophilic plants.

6.5.67.2 Description

Salt Marsh is a sub-type of Coastal Wetland.

6.5.68 Saline

6.5.68.1 Definition

Salt-plants, active or in process of abandonment. Sections of salt marsh exploited for the production of salt by evaporation. They are clearly distinguishable from the rest of the marsh by their segmentation and embankment system.

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6.5.68.2 Description

Saline is a sub-type of Coastal Wetland.

6.5.69 Intertidal flat

6.5.69.1 Definition

Generally, unvegetated expanses of mud, sand or rock lying between high and low water-marks.

6.5.69.2 Description

Intertidal flat is a sub-type of Coastal Wetland.

6.6 Terrain Elevation

6.6.1 General overview

Terrain elevation is represented by means of discrete terrain height measurements, either measured or calculated, in-between which a whole coverage of terrain heights may be interpolated and approximated in order to model the morphology of the earth's surface.

See Figure 67 for the data model for Terrain Elevation Features.

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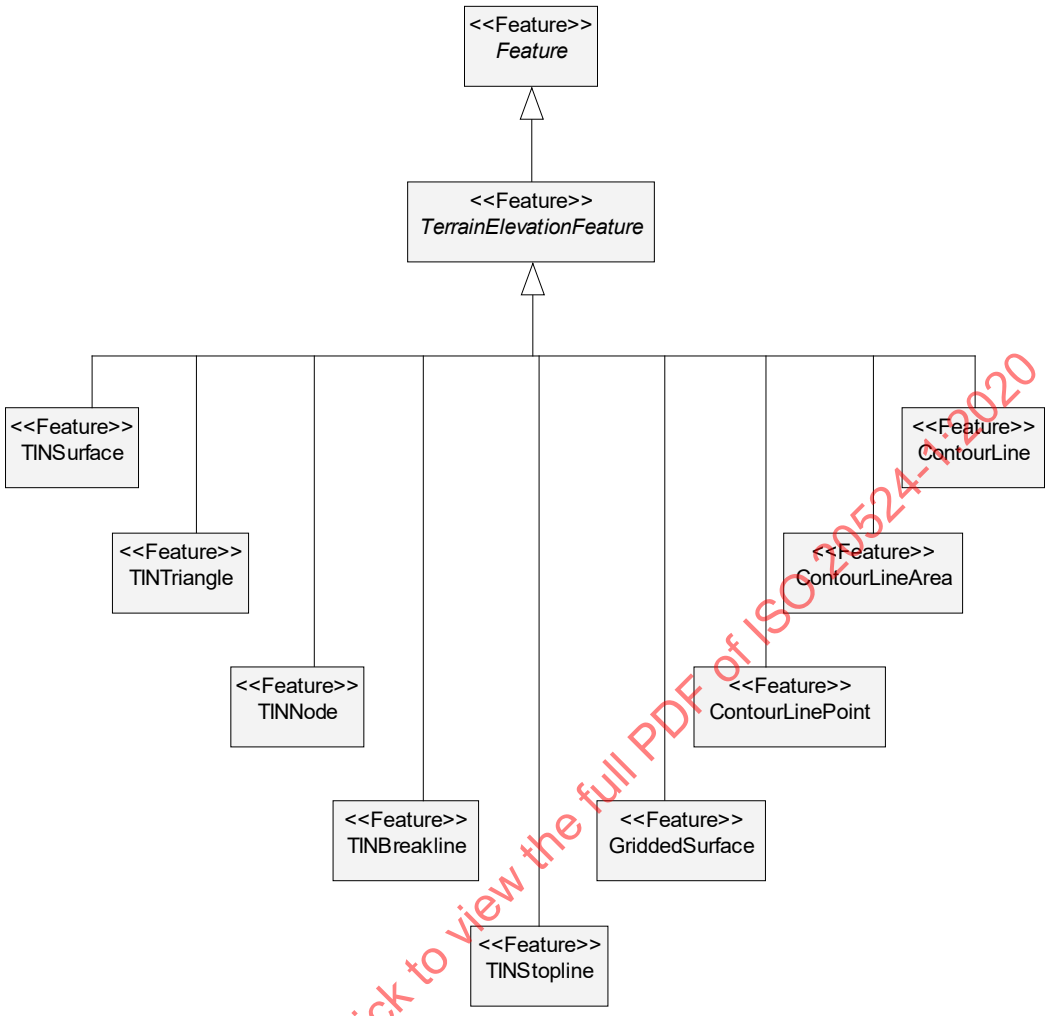


Figure 67 — Conceptual Data Model for Terrain Elevation Features

Alternative modelling approaches are supported (see figures Figure 68, Figure 69, Figure 70 and Figure 71 for examples):

1. (full) TIN (Triangular Irregular Network): tessellation of the terrain's surface into triangular areas, each with constant slope approximating the terrain

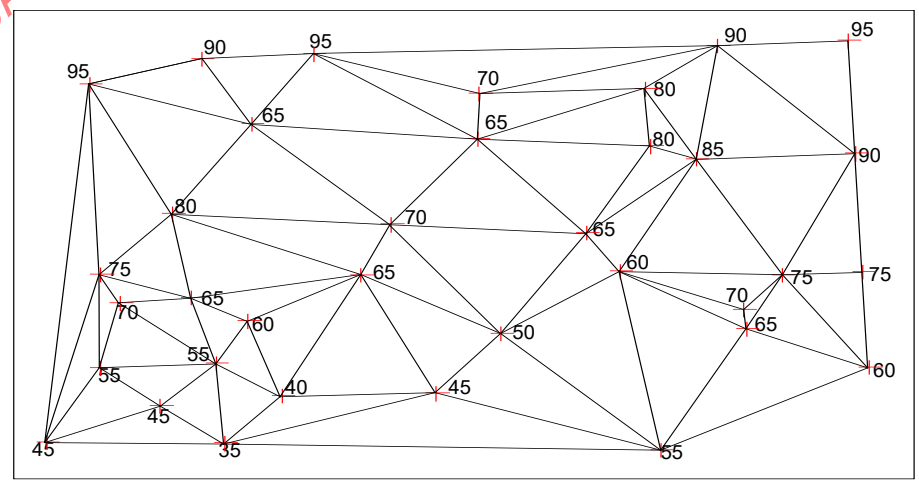


Figure 68 – Example of (full) TIN terrain elevation representation

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2. (reduced) TIN: representation of topographic surface essentials (Nodes/Breaklines/Stoplines)

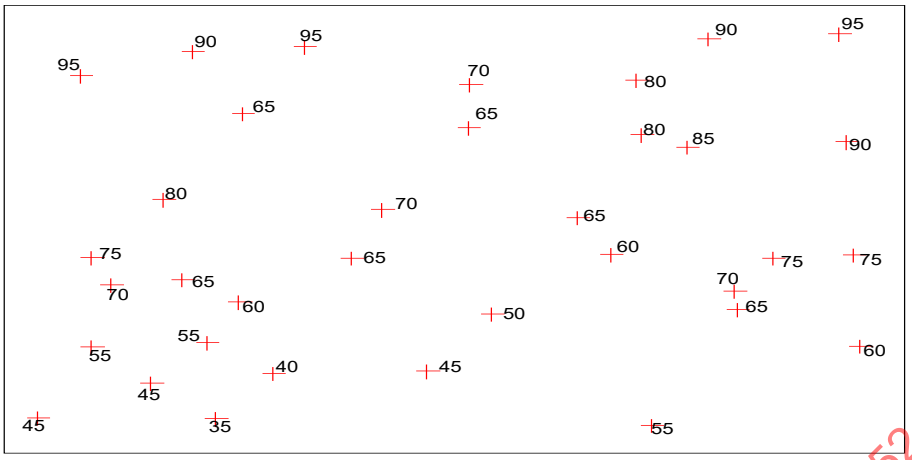


Figure 69 – Example of reduced TIN representation in terms of TIN Nodes

3. Contour lines: a virtual path across the terrain following a constant terrain height

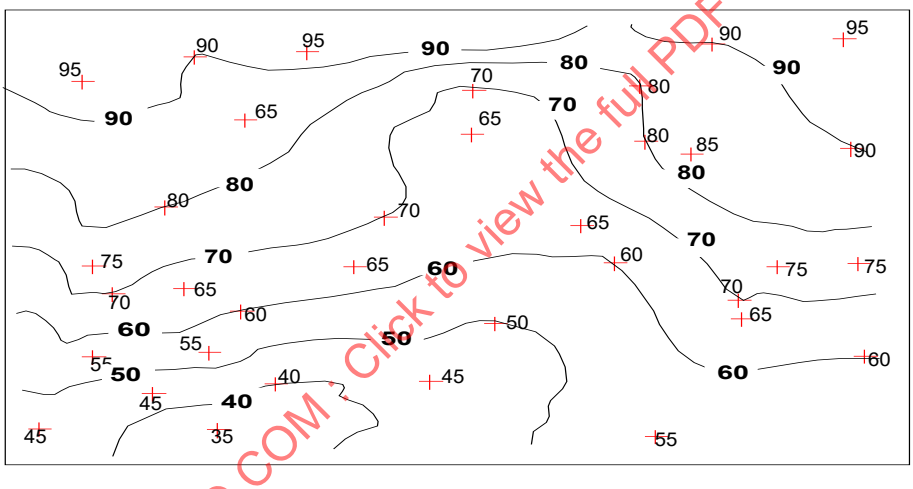


Figure 70 – Example of contour line representation

4. Grid: array of height points (raster data of coordinate triplets)

95	90	95	90	85	82	88	93
90	88	80	70	67	75	84	90
84	82	78	70	65	72	81	85
78	73	70	65	61	64	70	77
69	64	60	58	54	56	66	69
52	50	45	44	48	53	60	59
43	37	37	42	47	52	55	55

Figure 71 – Example of gridded terrain elevation representation

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6.6.2 TIN Surface

6.6.2.1 Definition

Triangular Irregular Network (TIN) representation of the earth's surface which is composed of triangular areas approximating the slope of the terrain.

6.6.2.2 Description

A TIN is derived from TIN Nodes, taking into account TIN Breaklines and TIN Stoplines (using Delauney algorithm or a similar algorithm). TIN Triangles are implicit components of a TIN Surface.

6.6.3 TIN Triangle

6.6.3.1 Definition

A single triangular area with constant slope approximating the terrain.

6.6.3.2 Description

A TIN Triangle is (implicitly) determined by three TIN Nodes. (Part of) the outline of a triangle composing the TIN may coincide with a TIN Breakline.

6.6.4 TIN Node

6.6.4.1 Definition

Representative terrain point associated with a terrain height.

6.6.4.2 Description

A TIN Node represents a location at which the terrain's slope is changing.

6.6.5 TIN Breakline

6.6.5.1 Definition

Representation of a local ridge or depression in the terrain across which interpolation between TIN Nodes is not applicable.

6.6.5.2 Description

A TIN Breakline is included in the TIN composition in terms of triangle borders.

6.6.6 TIN Stopline

6.6.6.1 Definition

A line where the local continuity or regularity of the surface is questionable und across which interpolation between TIN Nodes is not applicable.

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6.6.6.2 Description

A TIN Stopline may lead to holes in a TIN by locally breaking its triangular nature.

6.6.7 Contour Line

6.6.7.1 Definition

A virtual path across the terrain following a constant terrain height.

6.6.7.2 Description

By their nature, Contour Lines do not cross each other.

If they form a loop (such as surrounding a mountain), they are modelled as a Contour Line Area.

6.6.8 Contour Line Area

6.6.8.1 Definition

A Contour Line forming a loop.

6.6.8.2 Description

A Contour Line Area may be represented by a Contour Line Point is its spatial extent is minimal.

6.6.9 Contour Line Point

6.6.9.1 Definition

A point representing the terrain height.

6.6.9.2 Description

A Contour Line Point is a Contour Line (Area) collapsed into a single point.

6.6.10 Gridded Surface

6.6.10.1 Definition

An array of height points organized as a spatial grid.

6.6.10.2 Description

The Gridded Surface Feature represents the quadrangular bounding box of the grid array. The actual height data is attached using the Multi-Media File Attachment Attribute and dedicated file formats, such as GeoTIFF.

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6.7 Structures

6.7.1 General overview

Structures are used to describe significant constructions that are part of a transportation network. Structures may relate to just one Transportation Element, or may form a grade separated crossing between two Transportation Elements. This aspect of a structure is expressed in the Relationship in which it takes part.

EXAMPLE Bridges, viaducts, tunnels, aqueducts, trenches, galleries or retaining walls.

Figure 72 illustrates the Data Model for Structures.

6.7.2 Structure

6.7.2.1 Definition

A Structure is a significant construction that is part of a transportation network, such as a bridge, a tunnel or a retaining wall.

6.7.2.2 Types of Structures

A Structure Feature may be classified with the Structure Type Attribute.

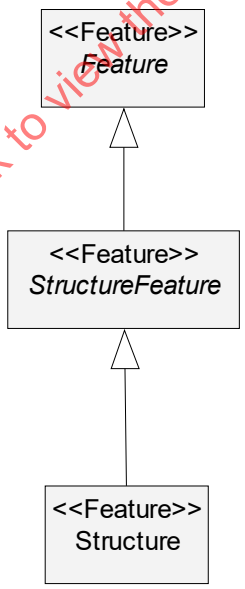


Figure 72 — Conceptual Data Model for Structures

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6.8 Railways

6.8.1 General overview

Railways are similar to roads in that their constituent elements together form a network. A railway network may therefore be considered to be made up of a number of Railway Elements that are connected by means of Railway Element Junctions. Figure 73 illustrates the Data Model for Railways

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6.8.2 Railway Element

6.8.2.1 Definition

A permanent way having one or more tracks that are or may be used for trains.

6.8.2.2 Description

A Railway Element is the smallest independent part of the railway network, and is bounded by two Railway Element Junctions.

6.8.3 Railway Element Junction

6.8.3.1 Definition

The location where three or more Railway Elements meet or where a Railway Element ends.

6.8.3.2 Description

Railway Element Junctions are located where three or more Railway Elements join or where one Railway Element ends.

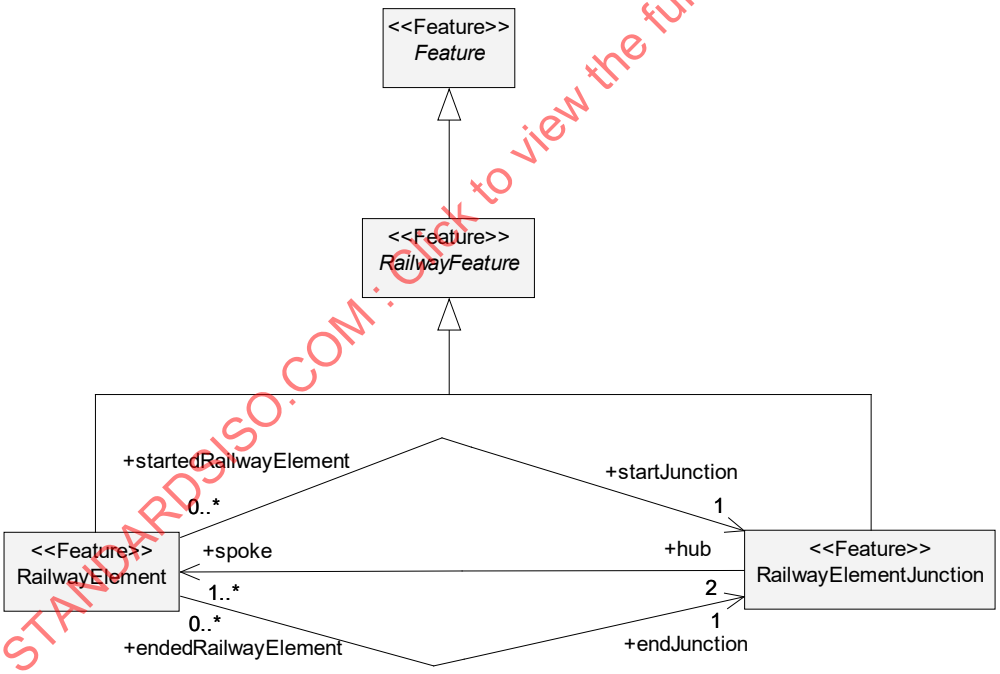


Figure 73 — Conceptual Data Model for Railways

6.9 Waterways

6.9.1 General overview

The Waterway Feature Theme contains the representation of Water Bodies. Waterway Features are composed of Water Bodies and water boundaries. Water Bodies may be connected to other Water Bodies or they may be isolated Water Bodies have a hierarchical structure. Water boundaries are represented

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by Water Boundary Elements and Water Boundary Junctions. A Water Boundary Element describes the outline of the water surface and connects two Water Boundary Junctions.

Figure 74 illustrates the Conceptual Data Model for Waterways.

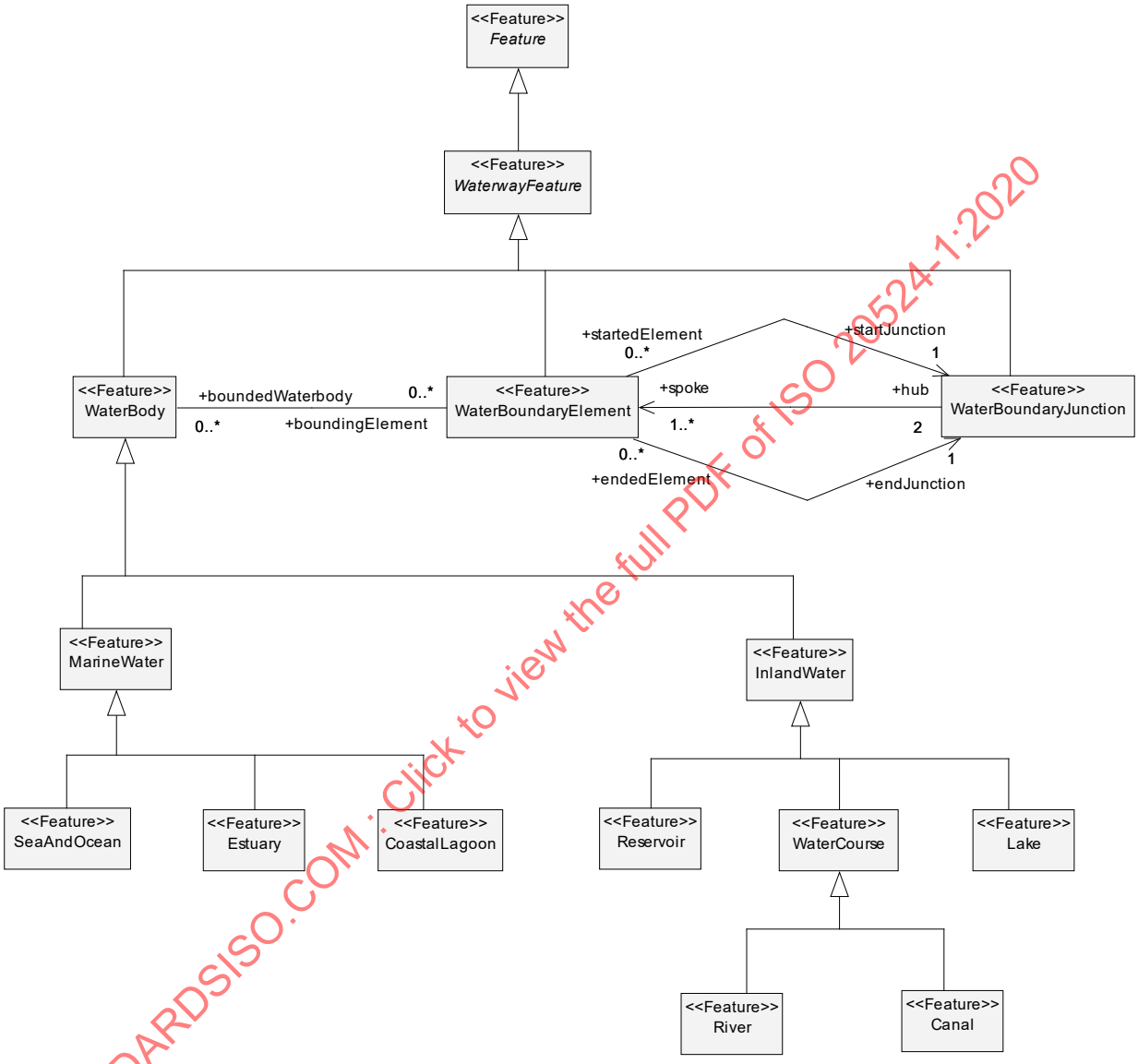


Figure 74 — Conceptual Data Model for Waterways

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6.9.2 Canal

6.9.2.1 Definition

An artificially constructed linear water body.

6.9.2.2 Description

Canal is a sub-type of Water Course.

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6.9.3 Coastal Lagoon

6.9.3.1 Definition

Unvegetated stretch of salt or brackish water separated from the sea by a tongue of land or other similar topography. These water bodies may be connected with the sea at limited points, either permanently or for parts of the year only.

6.9.3.2 Description

Coastal Lagoon is a sub-type of Marine Water.

6.9.4 Estuary

6.9.4.1 Definition

The mouth of a river within which the tide ebbs and flows.

6.9.4.2 Description

Estuary is a sub-type of Marine Water.

6.9.5 Inland Water

6.9.5.1 Definition

Water body with no or only limited connection to the sea or ocean.

6.9.5.2 Description

Inland Water is a sub-type of Water Body

6.9.6 Lake

6.9.6.1 Definition

Natural or artificial stretch of water, excluding reservoirs.

6.9.6.2 Description

Lake is a sub-type of Inland Water.

6.9.7 Marine Water

6.9.7.1 Definition

Sea, ocean or other saline water body connected to them.

6.9.7.2 Description

Marine Water is a sub-type of Water Body

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6.9.8 Reservoir

6.9.8.1 Definition

Constructed stretch of water, or artificially contained natural stretch of water, used primarily as a water source for human populations and for agricultural purposes.

6.9.8.2 Description

Reservoir is a sub-type of Inland Water.

6.9.9 River

6.9.9.1 Definition

A linear body of inland water of natural or semi-natural origin.

6.9.9.2 Description

River is a sub-type of Water Course.

6.9.10 Sea And Ocean

6.9.10.1 Definition

Zone seaward of the lowest tide limit.

6.9.10.2 Description

Sea And Ocean is a sub-type of Marine Water.

6.9.11 Water Body

6.9.11.1 Definition

A way or course through which water flows, or an area covered by water.

6.9.12 Water Boundary Element

6.9.12.1 Definition

The smallest unit of a boundary that describes the edge of a Water Body.

6.9.12.2 Description

A Water Boundary Element is a continuous boundary formed between the edge of a Water Body and the surrounding area.

6.9.12.3 Constraints

A Water Boundary Element is bounded by exactly two or in case of a (Water) island by one (see Figure 75) Water Boundary Junction(s). A Water Boundary Element may never bound the same Waterways Feature twice.

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6.9.13 Water Boundary Junction

6.9.13.1 Definition

The location where Water Boundary Elements join.

6.9.13.2 Constraints

A Water Boundary Junction joins/connects one or more Water Boundary Elements. Figure 75 illustrates the case when it joins one single Water Boundary Element.

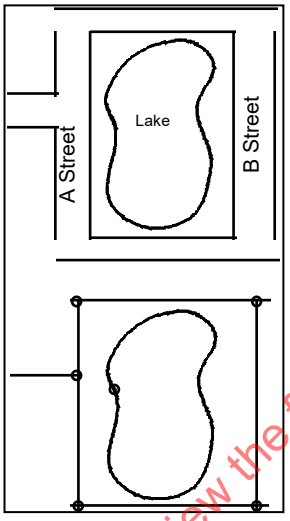


Figure 75 — Example of Water Boundary Element bounded by one Water Boundary Junction

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6.9.14 Water Course

6.9.14.1 Definition

Natural or artificial water-course serving as a water drainage channel. Includes canals.

6.9.14.2 Description

Water Course is a sub-type of Inland Water.

6.10 Road Furniture

6.10.1 General overview

Road Furniture denotes items of road inventory which are categorised by having a fixed location along a Road Element (either on the carriageway or the pavement) or Path.

EXAMPLE Traffic Lights, Traffic Sign or Measurement Device.

Figure 77 illustrates the Data Model for Road Furniture.

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6.10.2 Environmental Equipment

6.10.2.1 Definition

Item for protecting the environment along or adjacent to the road.

6.10.2.2 Description

EXAMPLE Noise protection wall, or a set of hedges.

6.10.3 Signpost

6.10.3.1 Definition

A collection of boards and plates that are physically attached and which contain directional information.

6.10.3.2 Description

An illustration is given in Figure 76. A Signpost may represent a set of signposts referring to the same situation.

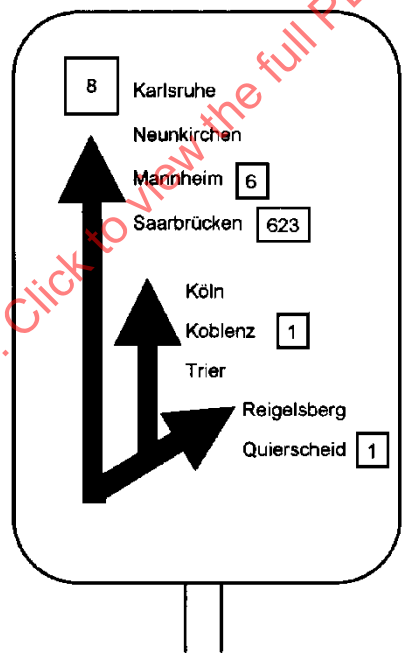


Figure 76 — Example of a Signpost

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6.10.4 Traffic Light

6.10.4.1 Definition

A multi coloured light governing the traffic flow.

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6.10.5 Traffic Sign

6.10.5.1 Definition

A board containing symbols and (possibly) some additional text, expressing a traffic restriction, recommendation or information.

6.10.6 Lighting

6.10.6.1 Definition

Item for lighting a road.

6.10.6.2 Description

EXAMPLE A lamppost.

6.10.7 Measurement Device

6.10.7.1 Definition

Device for measurements or monitoring of traffic.

6.10.7.2 Description

EXAMPLE Video camera, induction loop or radar.

6.10.8 Road Markings

6.10.8.1 Definition

The occurrence of markings on a road.

6.10.8.2 Description

EXAMPLE Solid lines or dashed lines for limiting the driving lanes.

6.10.9 Safety Equipment

6.10.9.1 Definition

Equipment on a road for safety purposes.

6.10.9.2 Description

EXAMPLE Safety barrier.

6.10.10 Pedestrian Crossing

6.10.10.1 Definition

A specially marked location of a Road Element where pedestrians are privileged to cross the street.

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6.10.10.2 Description

A Pedestrian Crossing may have the form of a street level crossing, or be an overpass or underpass. The former may or may not include signalling by means of signs, traffic lights and pavement markings; the latter may or may not have complementary Pedestrian Crossing Entry/Exit locations.

Multiple underpasses, as well as overpasses, may be connected to form a pedestrian crossing network underneath, or above respectively, a road intersection.

6.10.11 Complex Pedestrian Crossing

6.10.11.1 Definition

The collection of Pedestrian Crossings that together form one (logical) unity, possibly including associated Entry Points.

6.10.11.2 Description

A Complex Pedestrian Crossing aggregates distributed Pedestrian Crossing locations (as well as their Entry Point locations), such as the representation of an underpass pedestrian crossing network or a pair of street-level crossings across a dual carriageway.

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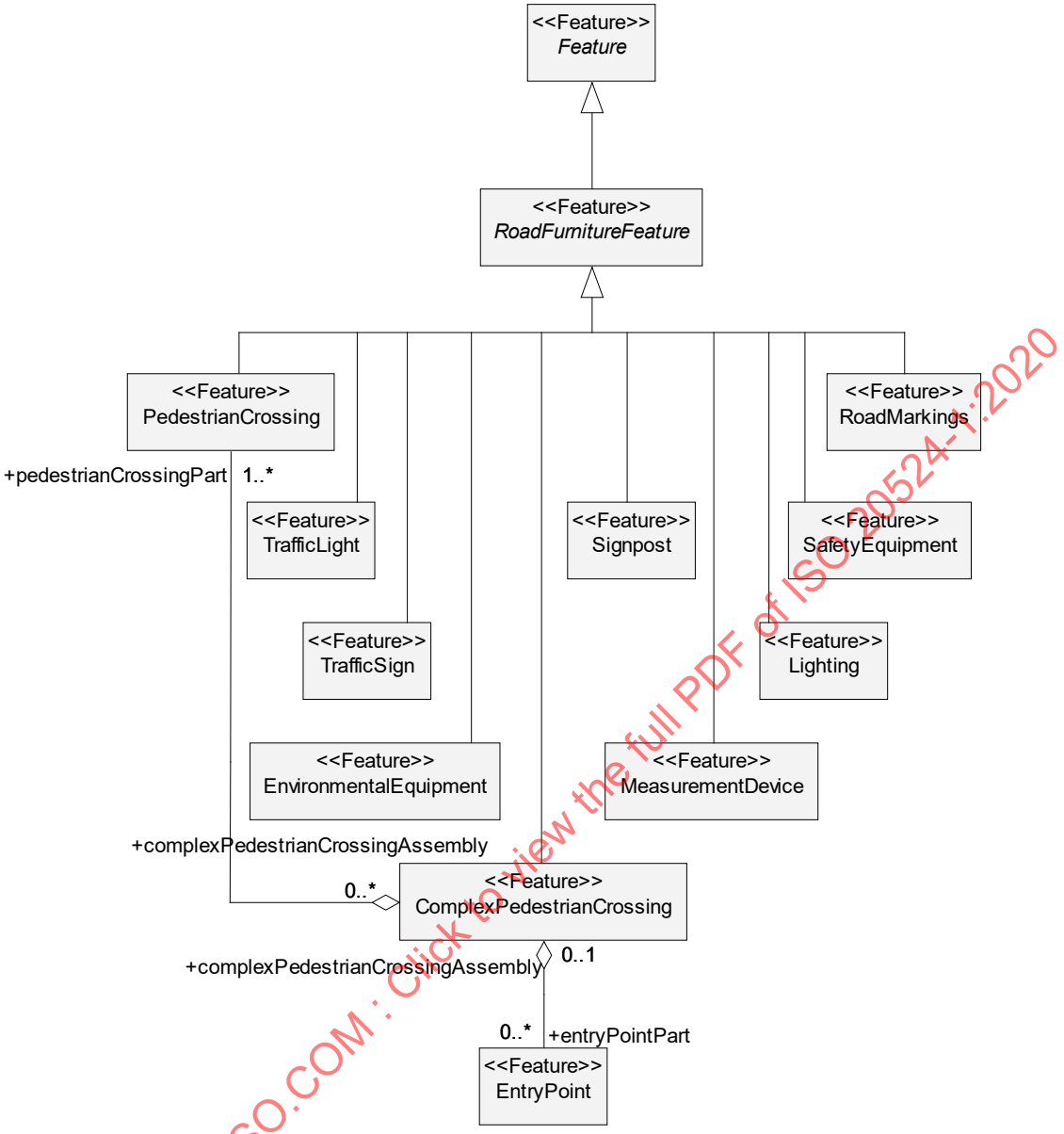


Figure 77 — Conceptual Data Model for Road Furniture

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6.11 Services

6.11.1 General overview

Service is a generic term for an activity at a specific location. It is important to notice that a Service represents an activity and not the building in which this activity (possibly) takes place.

Many services are particularly relevant to the road environment, such as recreation, vehicle maintenance, emergency services or cargo, customs and retail services. Services also may be related to a Road Element or Junction to describe information needed for vehicle access. Services may be further characterised by Attributes. Service definitions and classification of Services tend to be an interpretation of reality rather than a representation thereof. Service definitions are therefore not part of the normative part of this document. For illustrative purpose some definitions have been included in the informative part of this document. They may be found in C.1.

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Figure 78 represents a sample conceptual data model in which some services are contained.

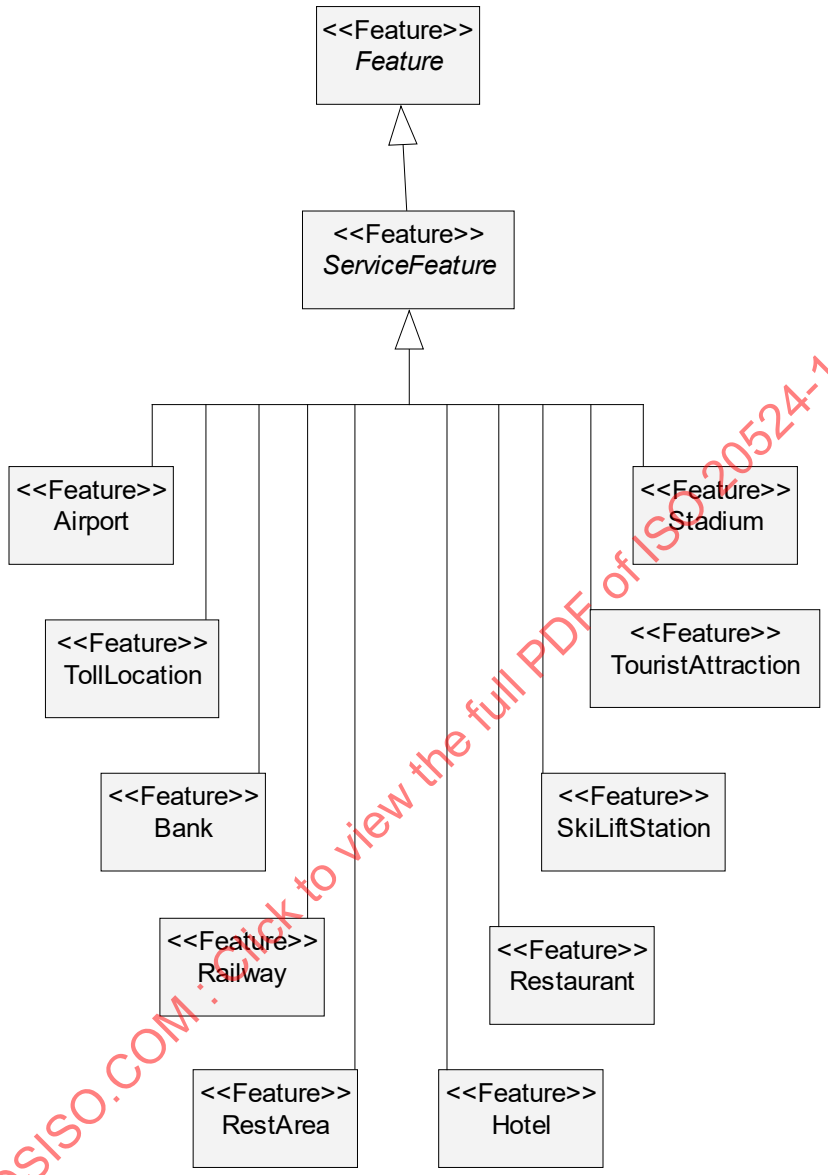


Figure 78 — Sample Conceptual Data Model for Services

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6.12 Public Transport

This section, including Figure 88 and Figure 89, is deprecated. In order to use Public Transport entities, please refer to Part 2.

Figure 79 — Conceptual Data Model for Public Transport

(DEPRECATED)

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Figure 80 — Example of Public Transport Features

(DEPRECATED)

6.13 Linear Referencing Features

6.13.1 General overview

The Features defined in this part of this document have in common that they all shall do with a special view on linear shaped geographical objects such as roads, railways and waterways. This view is different to Roads and Ferries, Railways and Waterways where these object domains are modelled as "networks", i.e. as set of objects that have topological Relationships that together define a "network space".

However, these object domains may also be conceptualised as a set of independent long (linear) entities, called Paths, which do not have explicit mutual topological Relationships. One-dimensional linear referencing methods specify how to measure along a linear entity. Properties of a linear entity are referenced by means of positions along the entity. These positions are expressed by Distance expressions corresponding to curvilinear measurements, in accordance with an applicable linear referencing method. Positions expressed in this manner are referred to as linearly referenced locations [8].

Such a linear-based referencing method is often bench-marked in the Field by a number of "reference points" or Referents. Because these Referents are often used to collect and to represent data, they play a crucial role in the information systems of road, railway and waterway authorities.

Linear Referencing Features and the associated set of linear referencing Attributes adopt the concept of ISO 19148 Linear Referencing [8].

The conceptual data model for Linear Referencing Features is shown in Figure 81.

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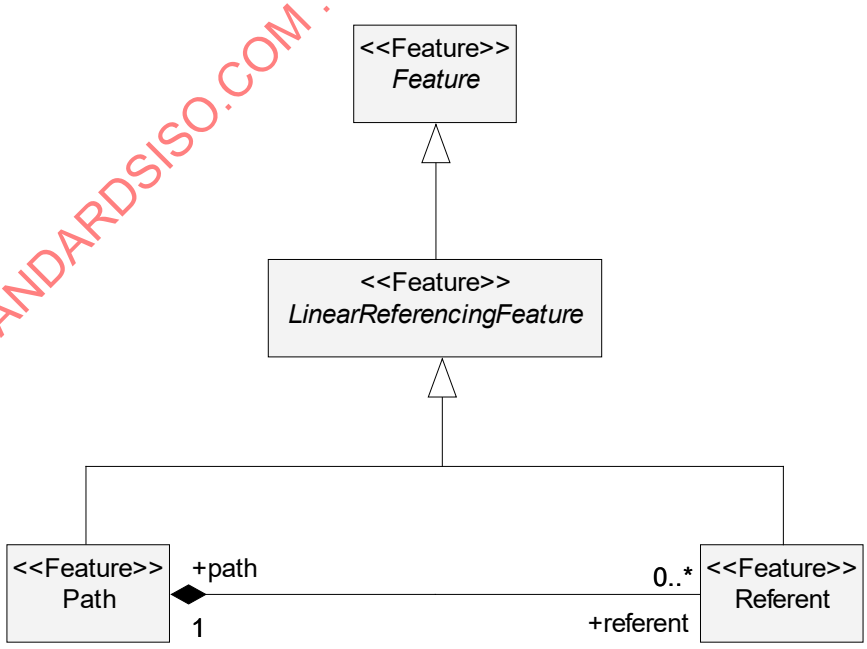


Figure 81 — Conceptual Data Model for Linear Referencing Features

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6.13.2 Path

6.13.2.1 Definition

A piece of the road, railway or waterway network which is considered as one single entity by an appropriate organisation or which is a user-defined designation of a linear extent.

6.13.2.2 Description

A Path represents a linear corridor. For instance, in the case of road entities in road databases of Public Road Authorities, the length may be several hundred kilometres and the width would only exceptionally exceed 100 meters. A Path may have one unique name or number assigned to it which distinguishes it from another Path.

A Path may have its own centre line representation, or it may be associated with the linear shape of (an)other Line Feature(s) and/or of a Linear Datum, to which it is tied by means of Linear Assignment Relationship(s).

A Path may have an associated set of Referents, which are linked to a Path by using the Exclusive Multi-Point Assignment Relationship. Some Linear Referencing Methods require such Referents for rendering actual Distance Expressions along a Path.

6.13.3 Referent

6.13.3.1 Definition

A known position along a Path from which relative measurements may be made.

6.13.3.2 Description

6.13.3.2.1 General

Some Linear Referencing Methods require Referents to be specified for rendering actual Distance Expressions along a Path. The set of Referents associated with a Path are linked to it by using the Exclusive Multi-Point Assignment Relationship.

The physical location of a Referent may relate to an intersection along the path, a boundary crossing the path, a landmark situated along the path, or a reference marker indicated by a benchmark (tally) placed in the verge or axis of the Path.

6.13.3.2.2 Referents embodied by reference markers

The concept of Reference marker corresponds to the physical marker that one will find in the verge or on the shoulders of roads, railways or waterways. It is an abstraction which may be an amalgam of the physical marker itself and the (usually not materialised) theoretical location on the axis of the Path that it embodies.

A Reference marker may be considered as an individual object, but in many other aspects (position, lay-out, value) it is linked with its neighbours, showing that they together form one reference system. For that reason, a Reference marker may exist even when there is no corresponding physical marker. This could be the case when one of the markers incidentally is missing (e.g. no place due to the presence of an exit or due to an accident etc.). Such location is still considered as a Reference marker, because it intentionally should have been there. This intention is indicated by the physical presence of the neighbouring points.

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6.14 Linear Datum Features

6.14.1 General overview

A Linear Datum is a reference network of nodes and links, called Anchor Points and Anchor Sections, established based on locatable phenomena on the roadways. Its purpose is to provide for a common basis for assimilating road related data expressed in terms of different location and referencing methods. See Figure 82 for the conceptual data model for Linear Datum Features.

Translations between locations from different methods, such as a topological network of Roads & Ferries Features or a linear referencing model of Linear Referencing Features, are enabled by a Linear Datum linked to either of the location methods.

The linear datum may also provide a means of linking the GDF map database to the real world. Anchor Points represent locations which, through their description, are easily and unambiguously locatable in the field. Anchor Sections are then connected to these points of recoverable location.

By linking GDF data to the Linear Datum, it will be possible to integrate GDF data with other information which is similarly tied to the datum.

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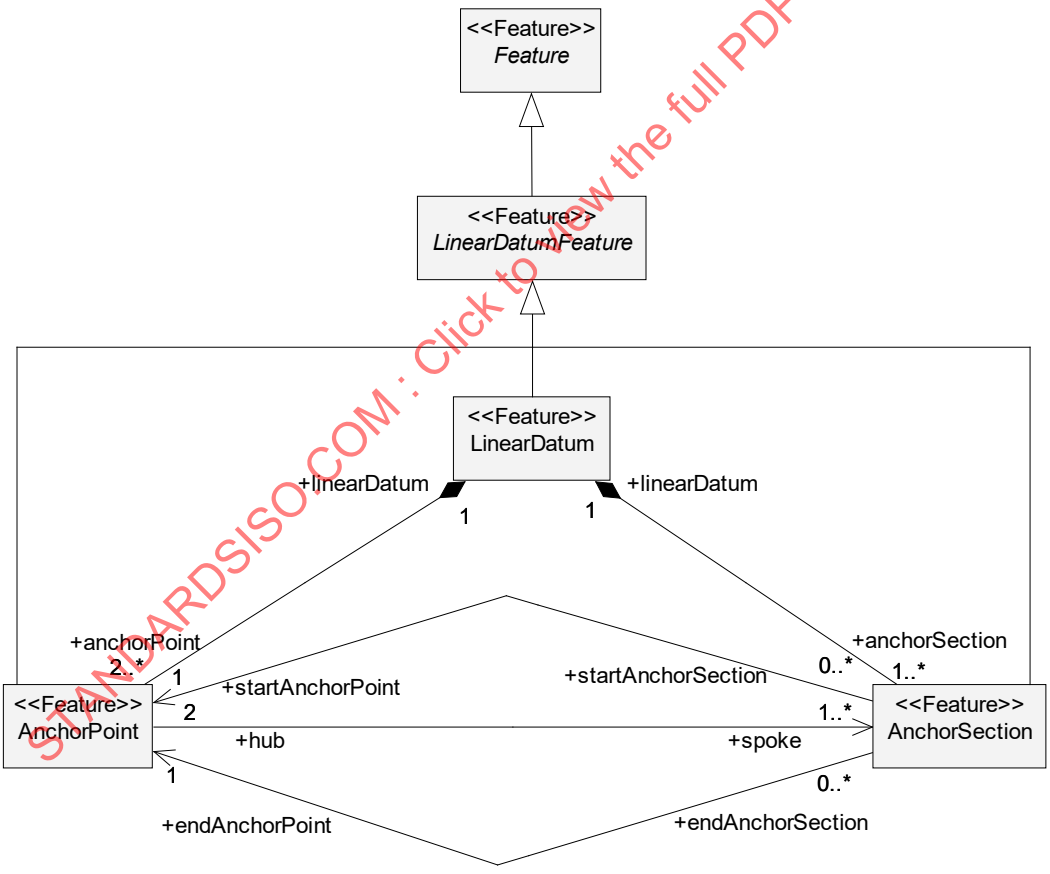


Figure 82 — Conceptual Data Model for Linear Datum Features

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6.14.2 Linear Datum

6.14.2.1 Definition

Linear datum is the reference framework for relating linear elements to each other or to their real-world locations.

6.14.2.2 Description

The collection of connected Anchor Points and Anchor Sections which allow different classes of GDF Line Features to be related to each other or to linear elements outside of GDF.

6.14.3 Anchor Point

6.14.3.1 Definition

Linear Datum point representing a physical location in the field that may be unambiguously described so that it may be clearly located in the real world using its description.

6.14.3.2 Description

An Anchor Point provides a link between the digital model representation of a road system in GDF and the real world.

6.14.4 Anchor Section

6.14.4.1 Definition

Linear Datum linear element representing a section of road between two Anchor Points.

6.14.4.2 Description

Anchor Sections embody the official surface length of a road segment.

Anchor Sections may be used as the reference linear element (target Line Feature) to which other types of linear elements (source Line Features) may be assigned. These include GDF linear elements (e.g., Road Elements) as well as linear elements from other data sources. Linear Assignments may be to one or more, whole or partial Anchor Sections.

6.15 General Features

6.15.1 General overview

General Features are Features that have properties, Attributes or Relationships that may apply to all Feature Themes. These Features are defined separately to ease the representation of the common Attributes and Relationships.

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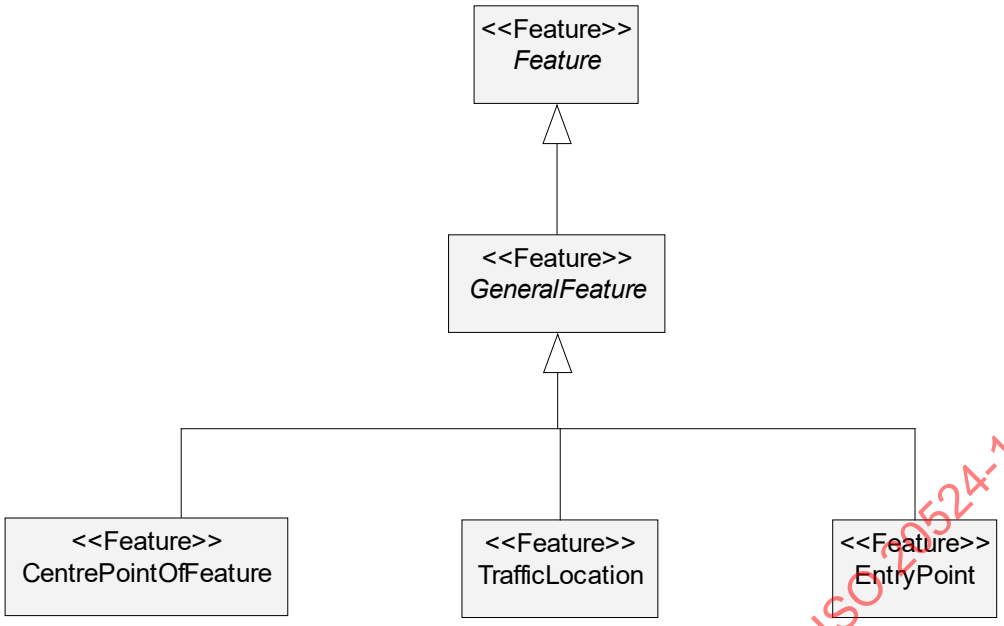


Figure 83 — Conceptual Data Model for General Features

6.15.2 Centre Point of Feature

6.15.2.1 Definition

A point which describes an approximate or exact centre of a Simple or Complex Feature.

6.15.2.2 Description

This Feature forms a geographical reference point of another (Simple or Complex) Feature. The Centre Point of Feature is linked to the corresponding Feature of which it represents the centre by means of the Relationship Type Centre Point of Feature belonging to Feature.

The Centre Point of Feature may refer to an isolated Node or a Node of the Feature to which it belongs.

6.15.3 Traffic Location

6.15.3.1 Definition

A set of one or more Features which as a whole represents a location that is identified for and used in traffic information services.

6.15.3.2 Description

A Feature may belong to more than one Traffic Location. Traffic Locations do not have an implied topology. A Traffic Location Feature may belong to another Traffic Location.

6.15.4 Entry Point

6.15.4.1 Definition

A location representing the entrance of Feature.

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6.15.4.2 Description

An entry point represents an entrance of one or more Features, or a combination of an entrance and an exit of one or more Features. It shall not represent only an exit.

7 Attribute Catalogue

7.1 Generic specifications

7.1.1 Attribute Types

Properties of real world objects are represented as Attributes. Attributes are classified in the form of Attribute Types. Each Attribute Type corresponds to a well-defined Property of a real-world object (e.g. colour).

7.1.2 Attribute Values

To each Attribute Type are assigned one or more Attribute Values, which may be seen as a particular instance of an Attribute Type (e.g. the colour "green"). Some Attribute Types may have an infinite number of different Attribute Values (e.g. the values of the Attribute Type "width"), whereas other Attribute Types may have only a fixed number of values (e.g. gender, "male" and "female"). The list of permissible values that the Attribute may take is called the domain of an Attribute. The paragraph "Domain/Unit of Measurement" in the description of the individual Attributes in the following sub-clauses specifies the domain for each Attribute.

See A.2 for the codes defined for Attribute Values.

7.1.3 Attribute Type Name

Each Attribute Type is referenced in this document by an Attribute Type Name. These names are written with initial capitals in order to distinguish them from the daily life terms from which they have been derived (e.g. "Maximum Height Allowed" versus "maximum height allowed").

See A.2 for the codes defined for Attribute Types.

7.1.4 Simple Attributes, Composite Attributes and Sub-Attributes

7.1.4.1 Introduction

Two kinds of Attributes may be distinguished: simple and composite. A Simple Attribute has only one component, whereas a Composite Attribute has more than one component. The individual components are called Sub-Attributes.

The Sub-Attributes of a Composite Attribute may in their turn be simple or composite. In this way, a Composite Attribute may be viewed as a hierarchical Attribute tree with only Simple Attributes as leaves.

Certain Sub-Attributes of a Composite Attribute may be absent or contain null values. For others this is not allowed. In the description this is indicated by the word "mandatory". Certain Sub-Attributes may appear more than one time within the context of the Composite Attribute. An example may be found in 12.2.5.6.2.

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7.1.4.2 Restrictive Sub-Attributes

Some Attribute Types may be used in combination with more than one Attribute to form a Composite Attribute, each time playing the same role, restricting the validity of the associated Sub-Attribute. Because of this they are called Restrictive Sub-Attributes.

If attached to Features, Restrictive Sub-Attributes always appear in combination with the Sub-Attribute they restrict. They may never appear alone. In case they are attached to Relationships, they may appear alone. In this case they restrict the Relationship itself and as such play conceptually the same role as a normal Attribute attached to a Relationship. The Attribute Validity Direction will never be attached to a Relationship because Relationships are, unlike Attributes, directed.

Restrictive Sub-Attributes may relate to Simple, Composite or Sub-Attributes of Composite Attributes. To allow for this, it is possible to define logical groups of Sub-Attributes that are subject to the Restrictive Sub-Attribute. It is also possible that more than one Restrictive Sub-Attribute restrict an Attribute (simple or composite). In this respect a distinction needs to be made between two different cases:

1. The Restrictive Sub-Attributes simultaneously restrict the logical group.
2. The Restrictive Sub-Attributes sequentially restrict the logical group, each instance forming a separate logical group (in terms of each instance constituting a new scope level), restricted by the next Restrictive Sub-Attribute, etc.

The result of the first situation shall be interpreted as the Attribute Value restricted by the first Restrictive Sub-Attribute extended with the same Attribute Value restricted by the second Restrictive Sub-Attribute extended with the same Attribute Value restricted by the third Restrictive Sub-Attribute etc. In set theory terms this comes down to a Union or application of an OR operator.

The result of the second situation shall be interpreted as the result of a number of subsequent restrictions. The first Restrictive Sub-Attribute restricts the Attribute Value of the logical group, together forming a new logical group, which subsequently is restricted by a second Restrictive Sub-Attribute, together forming a third logical group, which subsequently…. etc. In set theory terms this comes down to an Intersection or application of an AND operator.

Other rules apply for Restrictive Sub-Attributes in the context of Default Attributes than for normal Attributes. For Restrictive Sub-Attributes the default Attribute value does not have to be specified explicitly. It is defined as “No restriction”.

The Restrictive Sub-Attributes defined so far are Lane Dependent Validity, Linear Segmentation, Pedestrian Type, Scope, Side of Line, Validity Direction, Validity Period and Vehicle Type. Because they may in principle be combined with any other Attribute they are dealt with here instead of specifying each different combination under its respective Feature Theme.

7.1.5 Composite Attributes combined with the Restrictive Sub-Attribute Lane Dependent Validity

7.1.5.1 General

The Attribute Lane Dependent Validity may in principle be combined with any other Attribute of a Road Element. The Lane Dependent Validity specifies for which traffic lanes of the associated Road Element the associated Sub-Attribute holds. Combined with any Attribute XXXX this combination forms the Composite Attribute XXXX for lane (where XXXX may be any Simple or Composite Attribute).

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7.1.5.2 Definition

An Attribute which is only valid for a restricted number of traffic lanes of the associated Road Element.

7.1.5.3 Domain/unit of measure

Composite.

7.1.5.4 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Any Attribute Type from Roads and Ferries — Mandatory.
- Lane Dependent Validity.

7.1.6 Composite Attributes combined with the Restrictive Sub-Attribute Linear Segmentation

7.1.6.1 General

The Attribute Linear Segmentation may in principle be combined with any other Attribute. It expresses the linear extent for which the Attribute with which the Linear Segmentation together forms the Composite Attribute is valid. Combined with any arbitrary Attribute XXXX this combination forms the Composite Attribute XXXX with Linear Segmentation -- (where XXXX may be any Simple or Composite Attribute).

7.1.6.2 Definition

An Attribute which is valid for a restricted linear sub-section of a Line Feature.

7.1.6.3 Domain/unit of measure

Composite

7.1.6.4 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Any Attribute Type – Mandatory.
- Linear Segmentation.

7.1.7 Composite Attributes combined with the Restrictive Sub-Attribute Pedestrian Type

7.1.7.1 General

The Pedestrian Type may in principle be combined with any other Attribute. It defines the types of pedestrians to which accessibility restrictions apply and for which the information contained in the associated Attribute is valid. Combined with an arbitrary Attribute XXXX, this combination forms the Composite Attribute XXXX for Pedestrian Type.

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7.1.7.2 Definition

An Attribute which is only valid for a restricted number of accessibility restriction types.

7.1.7.3 Domain/unit of measure

Composite.

7.1.7.4 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Any Attribute Type from Roads and Ferries — Mandatory.
- Pedestrian Type [.]..[.].

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.1.8 Composite Attributes combined with the Restrictive Sub-Attribute Scope

7.1.8.1 General

The Attribute Scope may in principle be combined with any other Attribute. It expresses the fact whether or not the semantic scope of an Attribute value is entirely applicable. Combined with any arbitrary Attribute XXXX this combination forms the Composite Attribute XXXX with Scope (where XXXX may be any Simple or Composite Attribute). However, not all combinations may be meaningful, as the notion of partial Scope may not always be relevant or suitable for an Attribute at hand.

7.1.8.2 Definition

An Attribute whose semantic scope is partially applicable only.

7.1.8.3 Domain/unit of measure

Composite

7.1.8.4 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Any Attribute Type – Mandatory.
- Scope.

7.1.9 Composite Attributes combined with the Restrictive Sub-Attribute Side of Line

7.1.9.1 General

The Attribute Side of Line may in principle be combined with any other Attribute of a Line Feature. The Side of Line specifies for which side of the associated Line Feature the associated Sub-Attribute holds. Combined with any Attribute XX this combination forms the Composite Attribute XX for the Side of the Line Feature (where XX may be any Simple or Composite Attribute applicable to the Line Feature in question).

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7.1.9.2 Definition

An Attribute which is only valid for the indicated side of the associated Line Feature.

7.1.9.3 Domain/unit of measure

Composite.

7.1.9.4 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Any Attribute Type — Mandatory.
- Side of Line.

7.1.10 Composite Attributes combined with the Restrictive Sub-Attribute Validity Direction

7.1.10.1 General

The Attribute Validity Direction may in principle be combined with any other Attribute of a Line Feature. Validity Direction specifies for which direction relative to the direction of the Line Feature the associated Sub-Attribute holds. Combined with any Attribute XX this combination forms the Composite Attribute XX for the positive or negative direction of the Line Feature (where XX may be any Simple or Composite Attribute).

7.1.10.2 Definition

An Attribute which is only valid for (a) specific direction(s) of the associated Line Feature.

7.1.10.3 Domain/unit of measure

Composite.

7.1.10.4 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Any Attribute Type — Mandatory.
- Validity Direction.

7.1.11 Composite Attributes combined with the Restrictive Sub-Attribute Validity Period

7.1.11.1 General

The Attribute Validity Period may in principle be combined with any other Attribute. It expresses the time period for which the Attribute with which the Validity Period together forms the Composite AttributeComposite Attribute is valid. Combined with any arbitrary Attribute XXXX this combination forms the Composite Attribute XXXX with Validity Period (where XXXX may be any Simple or Composite Attribute).

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7.1.11.2 Definition

An Attribute which is valid for a restricted period of time.

7.1.11.3 Domain/unit of measure

Composite.

7.1.11.4 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Any Attribute Type — Mandatory.
- Validity Period [.]..[.].

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.1.12 Composite Attributes combined with the Restrictive Sub-Attribute Vehicle Type

7.1.12.1 General

The Attribute Vehicle Type may in principle be combined with any other Attribute. It defines the kind of vehicle for which the information contained in the associated Attribute is valid. Combined with an arbitrary Attribute XXXX, this combination forms the Composite Attribute XXXX for Vehicle Type.

7.1.12.2 Definition

An Attribute which is only valid for a restricted number of vehicle types.

7.1.12.3 Domain/unit of measure

Composite.

7.1.12.4 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Any Attribute Type from Roads and Ferries — Mandatory.
- Vehicle Type [.]..[.].

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.1.13 Names in combination with a Language Code

The Attributes in which a name is specified are language dependent. To specify this dependency, a Language Code value should be used in combination with the Name. The Language Code specifies in which language the Name has been defined. Language Codes are defined in ISO 639-2.

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7.1.14 Default Attribute Values

In case a certain, appropriate Attribute Type is not related to a particular Feature, this means that that particular Attribute has not been collected for that particular Feature. However, it is also possible to specify that the absence of a certain Attribute Type at a particular Feature indicates that a certain default value of that Attribute holds. If this is the case, the value “not collected” no longer is applicable for that Attribute.

7.1.15 Default Attribute units for measures

For Attributes with units of some form of measure, listed in the table below, units may be specified at either a Dataset level, or for an individual Attribute type. At the Dataset level, a default of Metric or English units may be specified for an entire Dataset via the Attribute Unit System in the Dataset Header (refer to the Metadata Catalogue 10.2.3.5). Unit System specifies which of two code lists apply for all possible default values for the Unit System.

The Dataset-level default may be over-ridden for any Attribute type. Each existing GDF Attribute listed in Figure 88, with the exception of Value On Traffic Sign and Distance Measure, has two defining elements which together declare each Attribute's respective measure: (1) a numerical value and (2) a Union of English, Metric, or user-defined Unit Of Measure (UOM). In the case of Value On Traffic Sign, only the user-defined Unit Of Measure is allowed. In the case of Distance Measure, the Unit Of Measure is designated by the applicable Linear Referencing Method, and the numerical value is supplemented by a unit exponent (scaling factor). If a unit other than the default is to be used, this should be specified at the Attribute level, with a conversion (scaling factor) from Base Units. Base Units are: metre, minute, kilogram, kilometre per hour, or degree.

The Data Model for default Attribute units is given in Figure 88 and Figure 89.

Attribute Type	Metric Default Unit Of Measure	English Default Unit Of Measure
Average Vehicle Speed	Kilometre per hour	Mile per hour
Distance Measure	N/A (Unit Of Measure designated by Linear Reference Method)	
Divider Height	Centimetre	Inch
Divider Width	Centimetre	Inch
Height of Pass	Metre	Foot
Length of a Road Element	Metre	Foot
Lower Building Elevation	Foot	Foot
Maximum Height Allowed	Centimetre	Inch
Maximum Length Allowed	Centimetre	Inch
Maximum Total Weight Allowed	Tenth of a Metric Ton	Pound
Maximum Weight per Axle Allowed	Tenth of a Metric Ton	Pound
Maximum Width Allowed	Centimetre	Inch
Measured Length	Metre	Foot
Positional Accuracy	Metre	Foot
Speed Restrictions	Kilometre per hour	Mile per hour
Summer Time	Minute	Minute
Upper Building Elevation	Metre	Foot
Value on Traffic Sign	N/A (user-defined Unit Of Measure only)	
Width	Centimetre	Inch

7.1.16 Attribute Type Codes

In 7.1.3 it is described how Attributes are referenced by Attribute Type Names. This kind of referencing is applied in this document. In the physical data structure, however, Simple Attributes are referenced by an Attribute Type Code. Composite Attributes are not referenced in the physical structure since they merely form logical constructs. A.2 contains a survey of the defined Attribute Type Codes.

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7.1.17 User-defined Attributes

This document supports the ability for a user to define Attributes which are not already defined. For these, special Attribute Type Codes have been reserved. (See A.2).

7.1.18 Attribute mapping to Feature Themes and Relationships

7.1.18.1 General

Usually, Attributes are associated with one Feature Theme. Some types of Attributes may be applied to more than one Feature Theme. Some are truly general. In order to illustrate which Attributes may apply to which Feature Themes, tables that map Attribute types to Feature Themes are given in 7.1.18.2 through 7.1.18.16.

Check marks (√) indicate that an Attribute type is thought to be applicable, representing the superset of indicative Attribute usages including specific Attribute usages depicted in the conceptual data models for Attributes of the respective Feature Themes (see 7.1.19) and Relationship Types (see 8.1.2).

For information, signalisation of extended Attribute usage is provided by using a plus (+), going beyond the Attribute scope depicted in the respective conceptual data models.

Alias names of table columns in this section are as follows.

- A: Roads & Ferries
- B: Admin Areas
- C: Named Areas
- D: Land Cover & Use
- E: Terrain Elevation
- F: Structures
- G: Railways
- H: Waterways
- I: Road Furniture
- J: Services
- K: Linear Referencing
- L: Linear Datum
- M: General Features
- N: Relationships

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7.1.18.2 Mapping of Attributes generally applied across Feature Themes and specifically for Relationships

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Accessibility	√								√	√			√	√
Accessibility Limitation	√								√	√			√	√
Alternate Name	√	√	√	√		√	√	√		√			√	
Alternate Name Body	√	√	√	√		√	√	√		√			√	
Alternate Name Text	√	√	√	√		√	√	√		√			√	
Alternate Pronunciation	√	√	√	√		√	√	√	√	√	√		√	√
Association Type														√
Composite Alternate Pronunciation	√	√	√	√		√	√	√	√	√	√		√	√
Composite Pronunciation	√	√	√	√		√	√	√	√	√	√		√	√
Continuation Type														√
Currency	√					√					+			√
Display Class	√	√	√	√		√	√	√	√	√			√	
Distance Expression	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Distance Measure	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Distance Measure Referent	√	√	√	√	√	√	√	√	√	√	√	√	√	√
External Identifier	√	√	√	√		√	√	√	√	√	√	√	√	√
Give Way Type														√
Hearing Limitation	√								√	√			√	√
Height Label	√			√	√	√	√	√		√	+			
Infrastructure Accessibility Aids	√								√	√			√	√
Lateral Offset	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Linear Referencing Method	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Linear Segmentation*	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Location Description	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Location Reference	√	√	√	√		√	√	√	√	√	+		√	√
Location Reference Code	√	√	√	√		√	√	√	√	√	+		√	√
Location Reference Type	√	√	√	√		√	√	√	√	√	+		√	√
Multi Media Action	√	√	√	√	√	√	√	√	√	√	√		√	√
Multi Media Description	√	√	√	√	√	√	√	√	√	√	√		√	√
Multi Media File Attachment	√	√	√	√	√	√	√	√	√	√	√		√	√
Multi Media File Attachment Context	√	√	√	√	√	√	√	√	√	√	√		√	√
Multi Media File Attachment Name	√	√	√	√	√	√	√	√	√	√	√		√	√
Multi Media File Attachment Type	√	√	√	√	√	√	√	√	√	√	√		√	√
Multi Media Time Domain	√	√	√	√	√	√	√	√	√	√	√		√	√
Name Component	√	√	√	√		√	√	√		√			√	√
Name Component Length	√	√	√	√		√	√	√		√			√	√
Name Component Offset	√	√	√	√		√	√	√		√			√	√
Name Component Type	√	√	√	√		√	√	√		√			√	√
Name Prefix	√	√	√	√		√	√	√		√			√	
Notation	√	√	√	√		√	√	√	√	√	√		√	√
Notation Alphabet	√	√	√	√		√	√	√	√	√	√		√	√
Notation Anomaly	√	√	√	√		√	√	√	√	√	√		√	√

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Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Notation Variant	√	√	√	√		√	√	√	√	√	√		√	√
Notation Version	√	√	√	√		√	√	√	√	√	√		√	√
Official Code	√	√	√			√	√	√	√	√	√			
Official Name	√	√	√	√		√	√	√		√			√	
Official Name Body	√	√	√	√		√	√	√		√			√	
Official Name Text	√	√	√	√		√	√	√		√			√	
Opening Period	√									√			√	
Pedestrian Type*	√					√			√	√	√		√	√
Phonetic Alphabet	√	√	√	√		√	√	√	√	√	√		√	√
Positional Accuracy	√	√	√	√		√	√	√	√	√				
Postal Code	√	√	√							√				
Pronunciation	√	√	√	√		√	√	√	√	√	√		√	√
Pronunciation Language	√	√	√	√		√	√	√	√	√	√		√	√
Pronunciation Variant	√	√	√	√		√	√	√	√	√	√		√	√
Scope*	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Side of Line*	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Slow Walker Limitation	√								√	√			√	√
Spoken Language	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Suitable for Disabled Or Impaired	√								√	√			√	√
Summer Time	√	√	√				√	√		√				
Time Zone	√	√	√				√	√		√				√
Toll	√					√					+			√
Toll Charge	√					√					+			√
Transcription Description	√	√	√	√		√	√	√	√	√	√		√	√
Validity Direction*	√					√	√	√	√		√		√	√
Validity Period*	√	√	√	√		√	√	√	√	√	√		√	√
Vision Limitation	√								√	√			√	√
Wheelchair Limitation	√								√	√			√	√

NOTE The * symbol indicates that the Attribute is a Restrictive Sub-Attribute which can be applied generically. Restrictive Sub-Attributes are not called out in the UML diagrams since they operate on Attributes, not Features.

7.1.18.3 Attribute mapping for Roads & Ferries Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Accident	√										+			+
Accident Date	√													+
Accident Identifier	√													+
Address Information	√													
Alternate Street Name	√													+
Alternate Street Name Body	√													+
Alternate Street Name Text	√													+
Average Vehicle Speed	√													
Blocked Passage	√													
Blocked Passage Location	√													
Blocked Passage Type	√													
Composite Exit Number	√								√					√
Composite Form of Way	√													
Conditional Traffic Flow	√										√			+

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Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Construction Status	√													+
Direction Category	√								√					√
Directional Prefix	√										+			√
Directional Suffix	√										+			√
Divided Road Element	√													
Divider	√													
Divider Colour	√													
Divider Height	√													
Divider Impact	√													
Divider Marking	√													
Divider Type	√													
Divider Width	√													
Enclosed Traffic Area Type	√													
Exit Number	√								√					√
Ferry Type	√													
First House Number	√													
Form of Way	√													
Motorway	√													
Frequency of a Traffic Connection	√													
Functional Road Class	√													
High Occupancy Vehicle	√													
House Number Range	√													
House Number Structure	√													
Grade-separated Junction Type	√													
Intermediate House Number	√													
Junction Type	√													
Lane Dependent Validity*	√										+			√
Lane Info	√													
Lane Type	√													
Last House Number	√													
Length of a Road Element	√													
Magnetic Anomalies	√													
Maximum Height Allowed	√					√					+			+
Maximum Length Allowed	√					√					+			+
Maximum Number of Lanes	√										+			+
Maximum Total Weight Allowed	√					√					+			+
Maximum Weight per Axle Allowed	√					√					+			+
Maximum Width Allowed	√					√					+			+
Measured Length	√										+	√		+
Minimum Number of Lanes	√													+
Minimum Number of Occupants	√													
Mountain Pass	√													
National Road Class	√													+
Not Crossable by Pedestrians	√													
Number of Lanes	√										+			+
Official Street Name	√													+
Official Street Name Body	√													+
Official Street Name Text	√													+

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Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
One-way	√										√			
Ownership	√										+			
Pass	√													
Passing Restrictions	√										+			
Pathway Safety Indicator	√													
Pathway Type	√													
Paved Road Surface Type	√										+			+
Pavement Status	√										+			+
Percentage of International Traffic	√										+		√	+
Publicly Accessible	√													
Removable Blockage	√													
Road Gradient	√										+			
Road Crossfall	√										+			
Road Surface	√										+			+
Road Surface Condition	√										+			+
Road Under Structure	√													
Road with Bicycle Lane	√													
Road with Parking Lane	√													
Road with Pavement	√													
Route Number	√										+			√
Route Number Body	√										+			√
Route Type Prefix	√										+			√
Route Type Suffix	√										+			√
Routing Identifier	√										+			+
Routing Sequence Number	√										+			+
Routing Type	√										+			+
Scenic Value	√													
Separator	√										+			√
Slip Road Type	√													
Special Routing	√										+			+
Speed Restrictions	√													
Street Lighted	√													
Street Type Prefix	√													
Street Type Suffix	√													
Structure Abutment	√													
Structure Abutment Info	√													
Toll Road	√										+			
Traffic Flow	√										+		√	+
Traffic Flow Measurement	√										+		√	+
Traffic Flow Measurement Type	√										+		√	+
Traffic Flow Measurement Unit	√										+		√	+
Traffic Jam Sensitivity	√													
Trailing Spaces	√													
Transition	√													
Travel Time	√													√
Unpaved Road Surface Type	√										+			+
Vehicle Type*	√										+			+
Width	√										+			+

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NOTE The * symbol indicates that the Attribute is a Restrictive Sub-Attribute which can be applied generically. Restrictive Sub-Attributes are not called out in the UML diagrams since they operate on Attributes, not Features.

7.1.18.4 Attribute mapping for Administrative Areas Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Administrative Boundary Type		√												
Common Language		√	√											
Geopolitical Structure Containment		√	√											
ISO Country Code		√												
Official Language		√	√											
Place within Place Classification														√
Population		√	√							√				
Population Class		√	√							√				
Region Code		√												

7.1.18.5 Attribute mapping for Named Areas Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Boundary Type			√											
Settlement Type			√											

7.1.18.6 Attribute mapping for Land Cover and Use Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Building Class Name				√										
Block Class Name				√										
Block Grouping				√										
Block Tyoe				√										
Building Detail Type				√										
Building Storey				√										
Building Storey Count				√										
Complex Building Elevation				√										
Façade Colour				√										
Façade Component				√										
Façade Component Placement				√										
Façade Fabric				√										
Façade Fabric Type				√										
Façade Information				√										
Lower Building Elevation				√										
Road and Rail Network and Associated Land Type				√										
Sand Area Type				√										
Underground Flag				√			√							
Upper Building Elevation				√										

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7.1.18.7 Attribute mapping for Terrain Elevation Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
No Terrain Elevation-specific Attributes defined														

7.1.18.8 Attribute mapping for Structures Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Structure Category						√								√
Structure Identifier						√								
Structure Type						√								

7.1.18.9 Attribute mapping for Railways Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
No Railway-specific Attributes defined														

7.1.18.10 Attribute mapping for Waterways Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Water Boundary Element Type								√						
Water Body Type								√						

7.1.18.11 Attribute mapping for Road Furniture Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Destination Info on Traffic Sign									√					√
Destination Location									√					√
Equipment Identifier									√					
Other Textual Content on a Traffic Sign									√					
Pedestrian Crossing Level									√					
Pedestrian Crossing Priority									√					
Pedestrian Crossing Signage									√					
Pedestrian Crossing Type									√					
Road Furniture Position									√					√
Route Number on Sign									√					√
Sign Text									√					
Symbol on Traffic Sign									√					
Traffic Signal Info									√					
Traffic Sign Class									√					
Traffic Sign Information									√					
Value on Traffic Sign									√					

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7.1.18.12 Attribute mapping for Services Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Accepted Credit Cards										√				
Airport Code										√				
Brand Name										√				
Breakfast Available										√				
Business Lunch										√				
Car Dealer Type										√				
City Center Administrative Class										√				
Commercial Airline Service										√				
Commuter/Regional Railway Station										√				
Departure/Arrival										√				
Destination of Flight Connection										√				
Domestic/International										√				
Facilities en Suite										√				
Flight Info										√				
General Aviation										√				
Government Type										√				
House Number										√				
ID of Flight Connection										√				
Importance										√				
International Railway Station										√				
Main Railway Station										√				
Military Airport										√				
Number of Rooms										√				
Park and Ride Facility										√				
Park Type				√						√				
Parking Facilities Available										√				
Parking Type Charged										√				
Place Name										√				
Post Office Type										√				
Priceband										√				
Railway Type				√			√			√				
Rating										√				
Restaurant Facilities Available										√				
Service Address										√				
Snack Served										√				
Street Name										√				
Telefax Number										√				
Telephone Number										√				
Time Difference of Flight Connection										√				
Time of Arrival of Flight Connection										√				
Time of Departure of Flight Connection										√				
Toll Point Type										√				
Urban Railway Station										√				

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7.1.18.13 Attribute mapping for Public Transport Feature Theme

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

7.1.18.14 Attribute mapping for Linear Referencing Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Assignment Order														√
Correspondence														√
Correspondence Order														√
Linear Position														√
Point Assignment														√
Start End Flag														√
Value on Referent											√			

7.1.18.15 Attribute mapping for Linear Datum Feature Theme

Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
No Linear Datum-specific Attributes defined														

7.1.18.16 Attribute mapping for Feature Theme for General Features

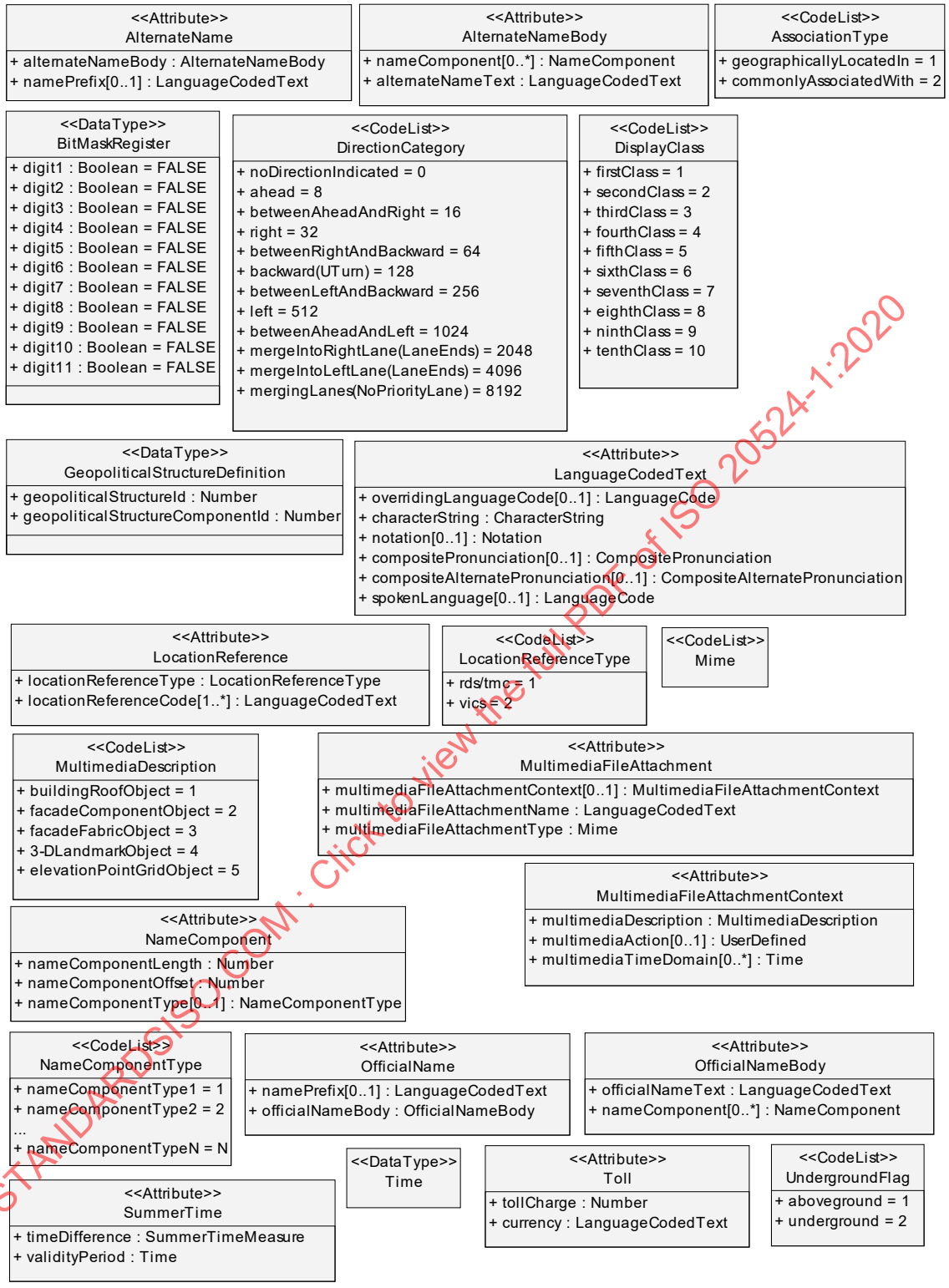
Attribute Name	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Entry Point Type													√	

7.1.19 The data model for Attributes

The conceptual data model for Attributes is shown in Figure 91, Figure , Figure 92, Figure 93, Figure 94, Figure 95, Figure 96, Figure 97, Figure 98, Figure 99, Figure 100, Figure 101, Figure 102, Figure 103, Figure 104, Figure 105, Figure 106, Figure 107, Figure 108, Figure 109, Figure 110, Figure 111, Figure 112, Figure 113 and Figure 114. These Data Models show the applicable Attributes specific for the Feature Theme to which the Feature belongs. General Attributes specific to more than one Feature Theme are shown in Figure 84, Figure 85, Figure 86 and Figure 87. It should furthermore be noted that the use of Restrictive Sub-Attributes is a generic capability, for instance the restriction of any Attribute by a Validity Period. This generic mechanism is reflected in the overall conceptual model for Attributes in Figure 10. Related to linear referencing, the corresponding Feature Theme (see 6.13 and 7.1.18.14) and Linear Segmentation capabilities, a default Linear Referencing Method may be defined for Line Features (see Figure 90).

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Figure 84 — Conceptual Data Model for General Attributes

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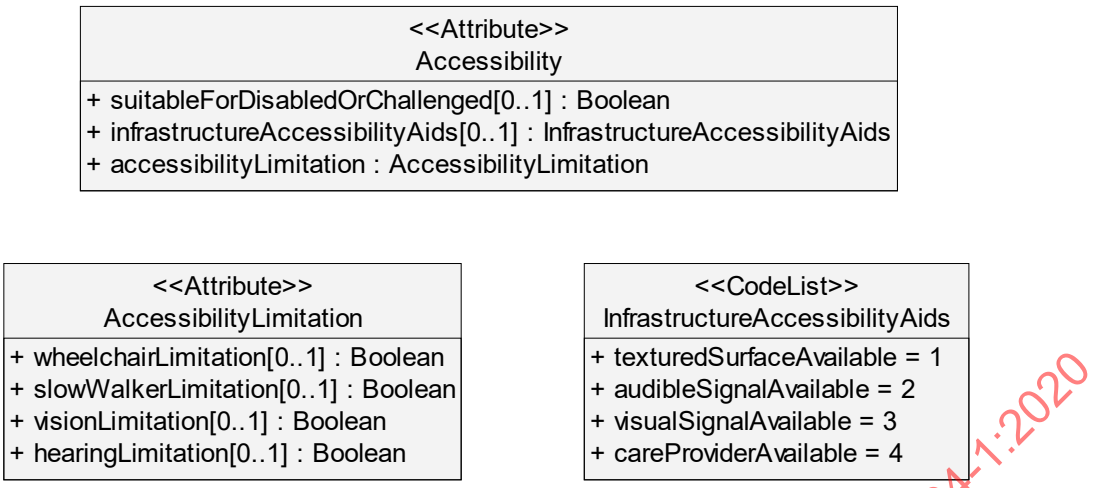


Figure 85 — Conceptual Data Model for General Attributes (Accessibility)

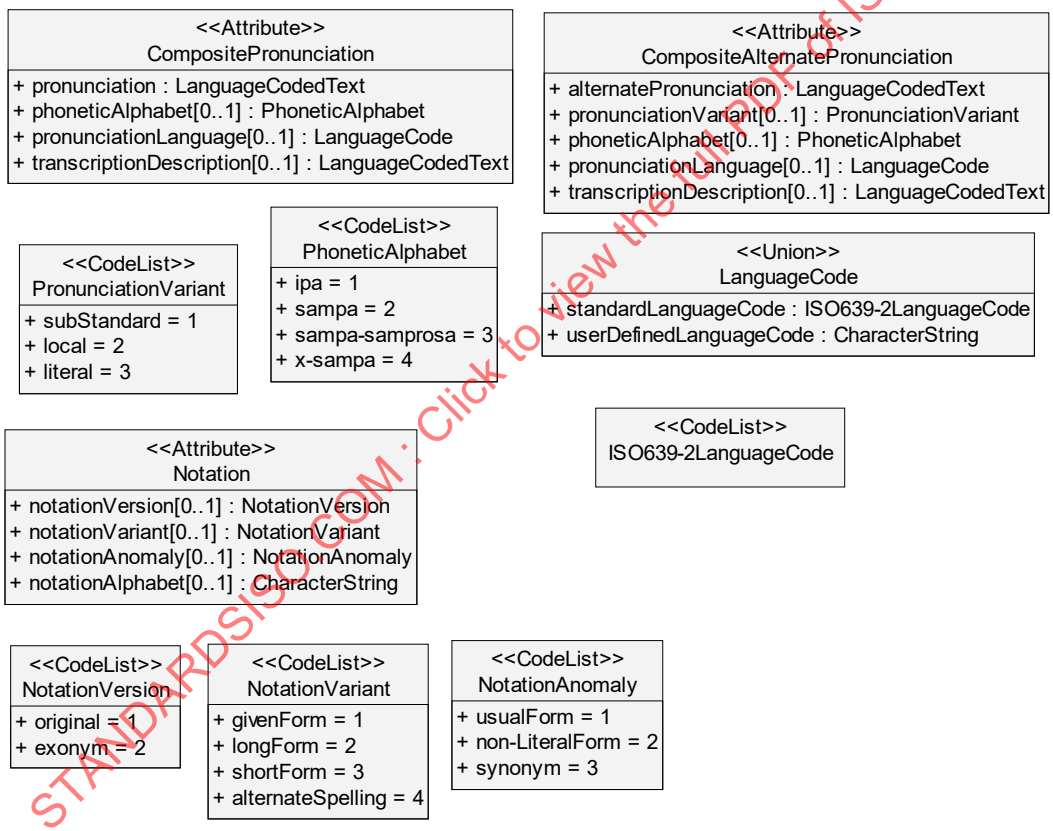


Figure 86 — Conceptual Data Model for General Attributes (Phonetic Attributes)

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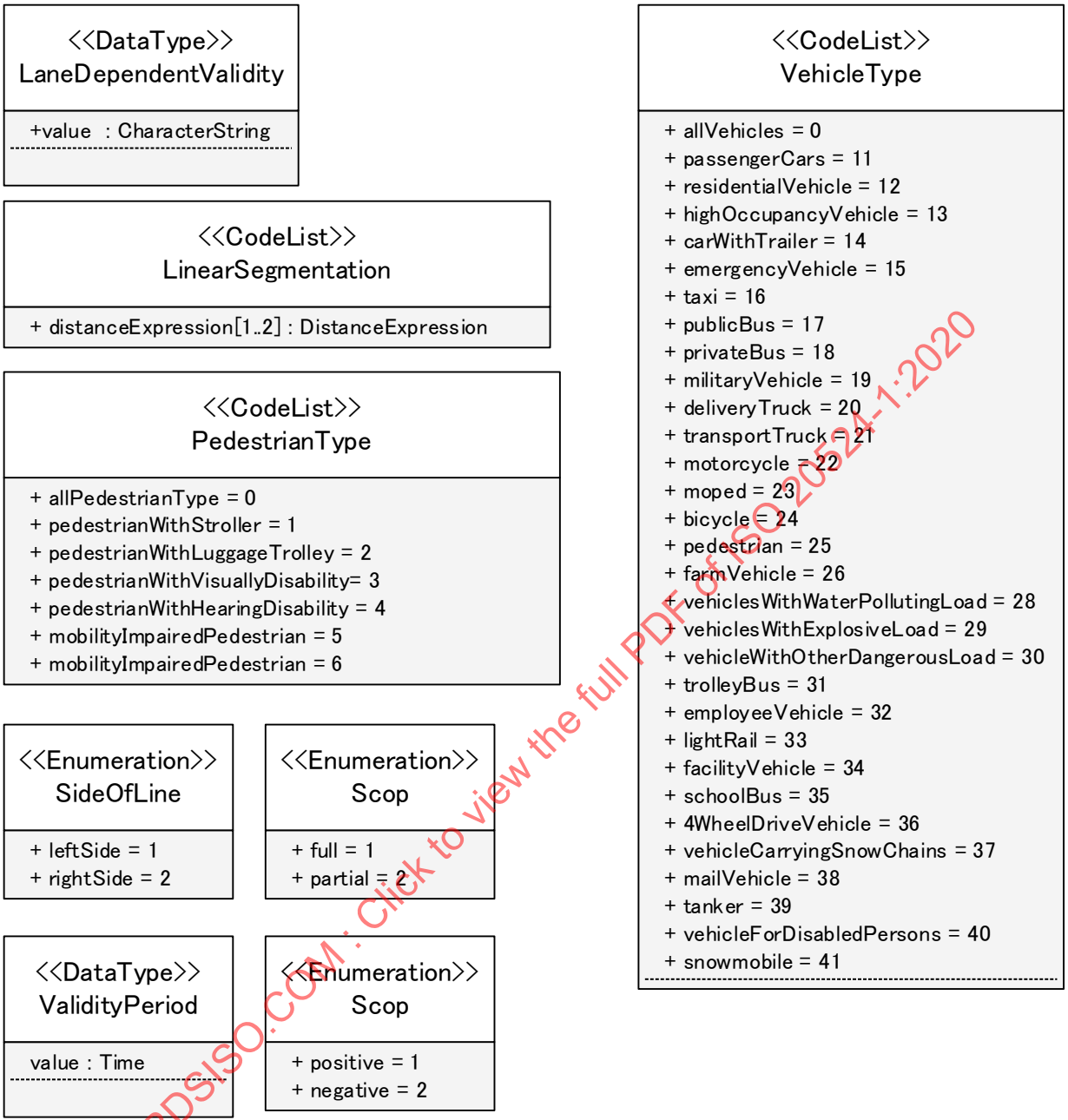
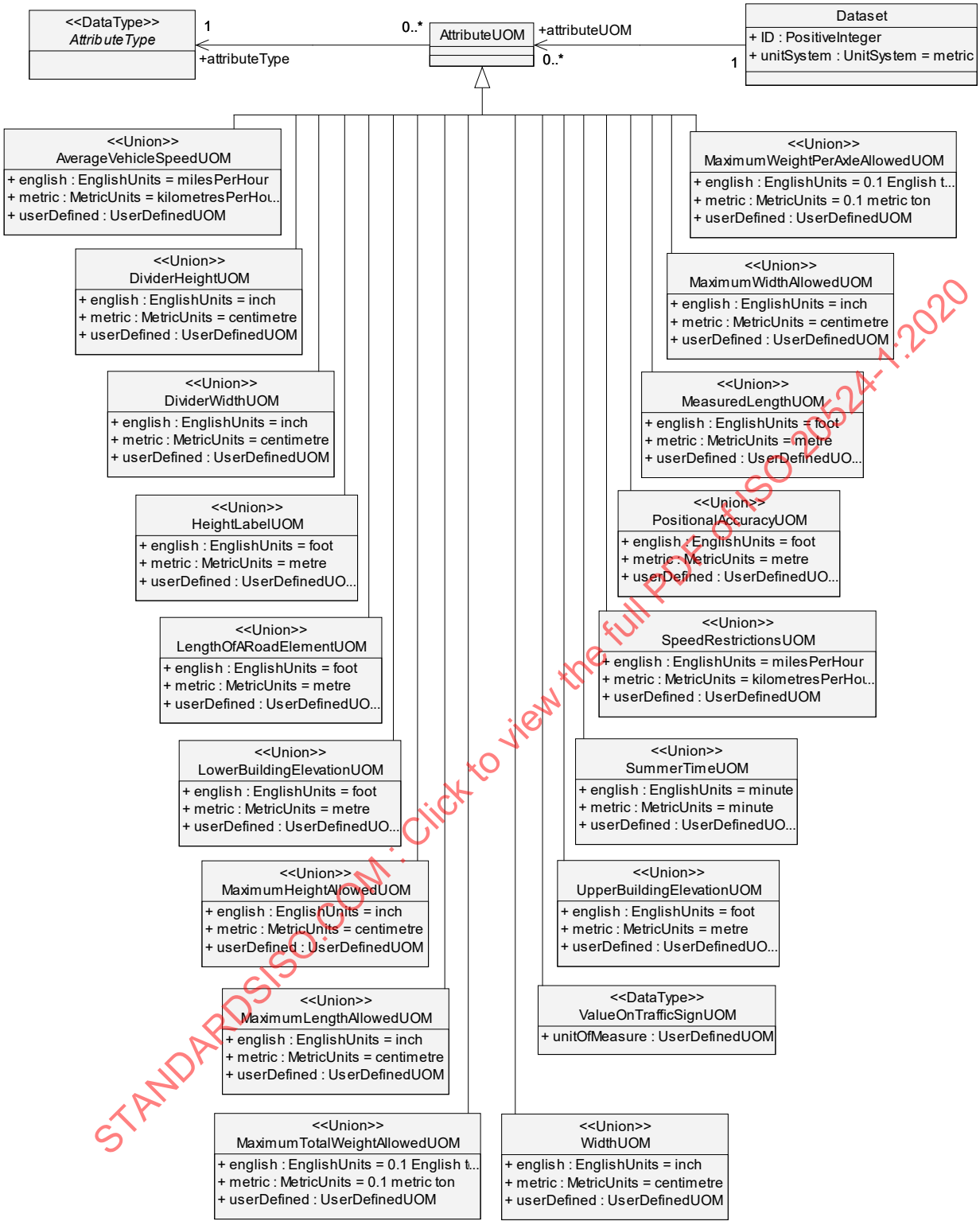


Figure 87 — Conceptual Data Model for General Attributes (Restrictive Sub-Attributes)

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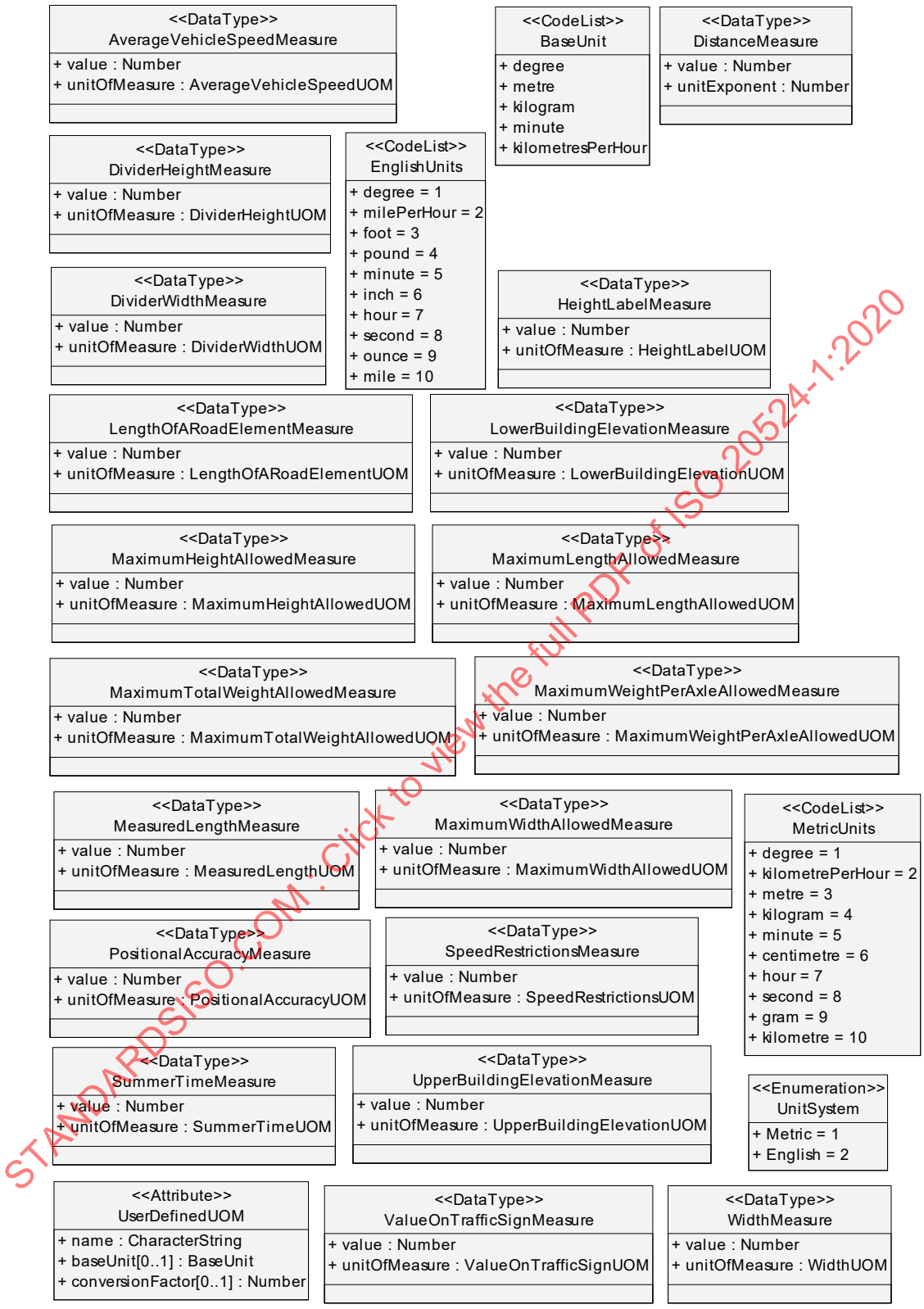
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Figure 88 — Conceptual Data Model for Default Attribute Units

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Figure 89 — Conceptual Data Model for Type Classes for Default Attribute Units

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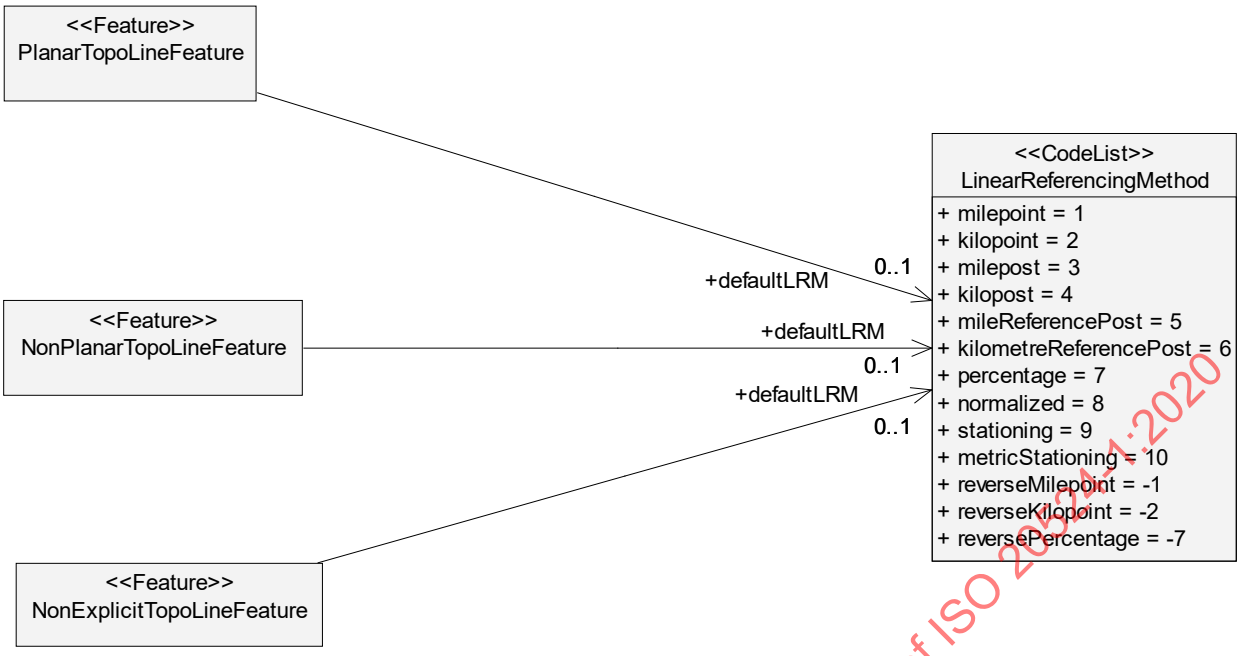


Figure 90 — Conceptual Data Model for Default Linear Referencing Method of Line Features

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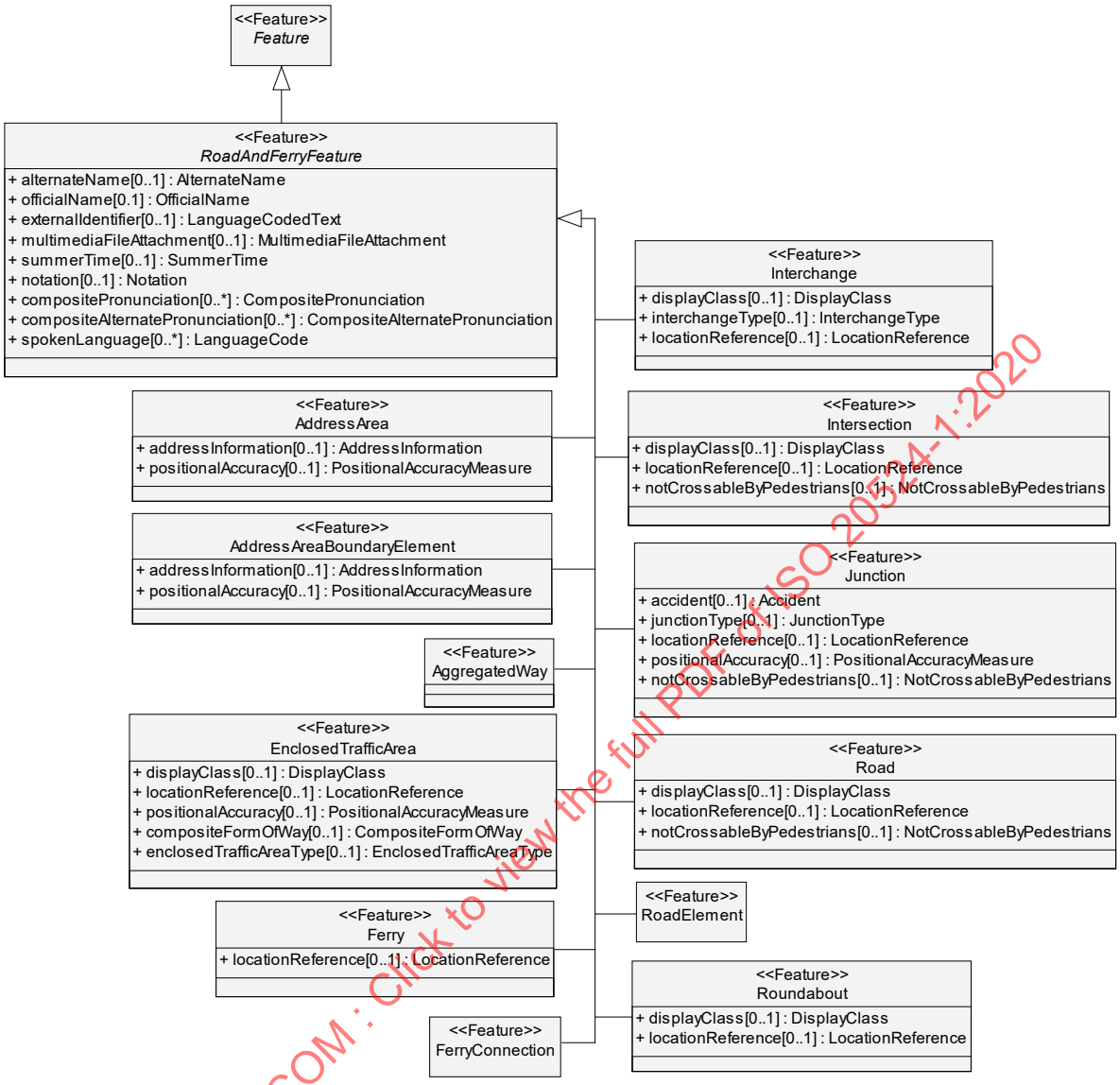
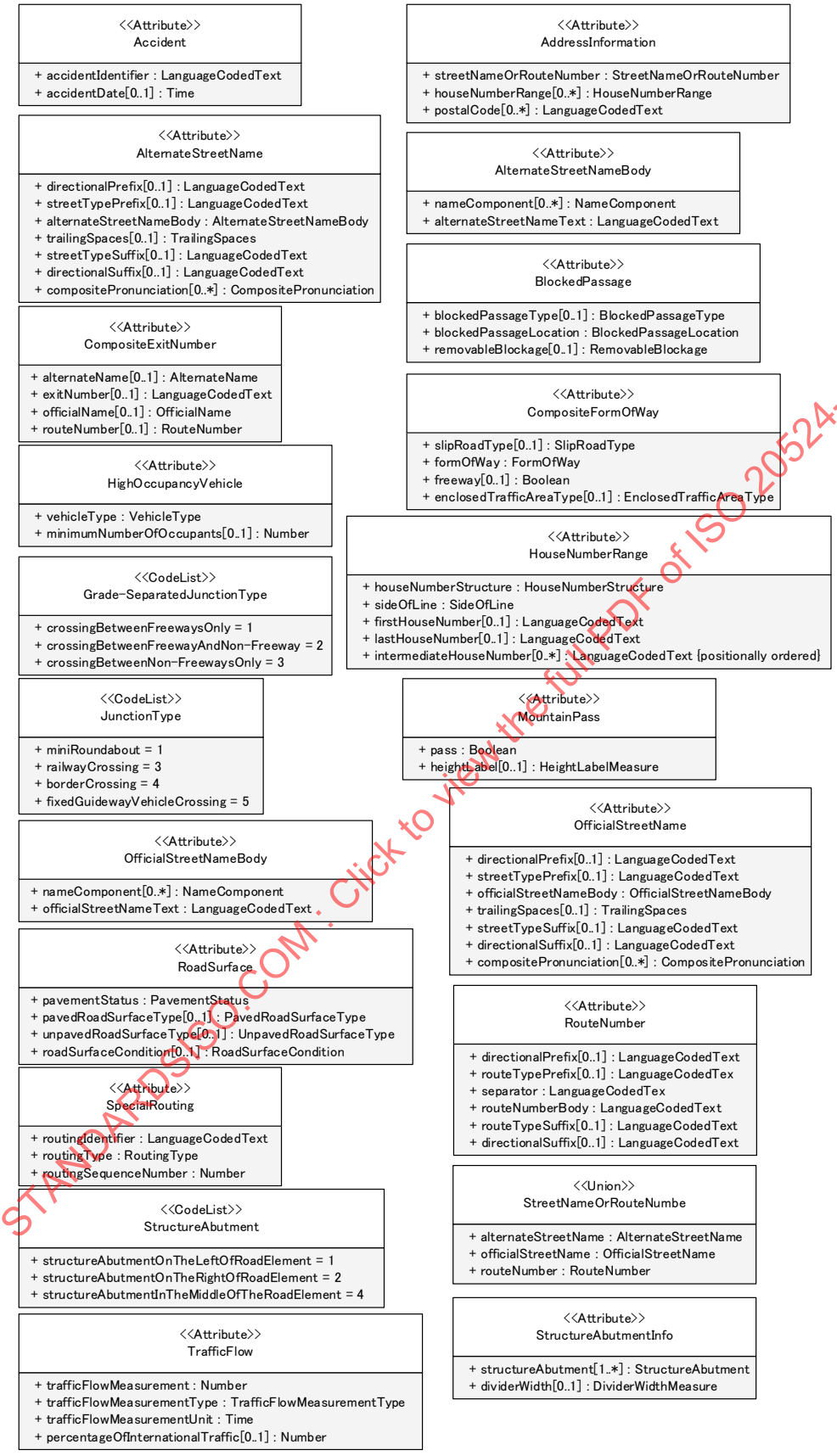


Figure 91-1 — Conceptual Data Model for Attributes of Roads and Ferries

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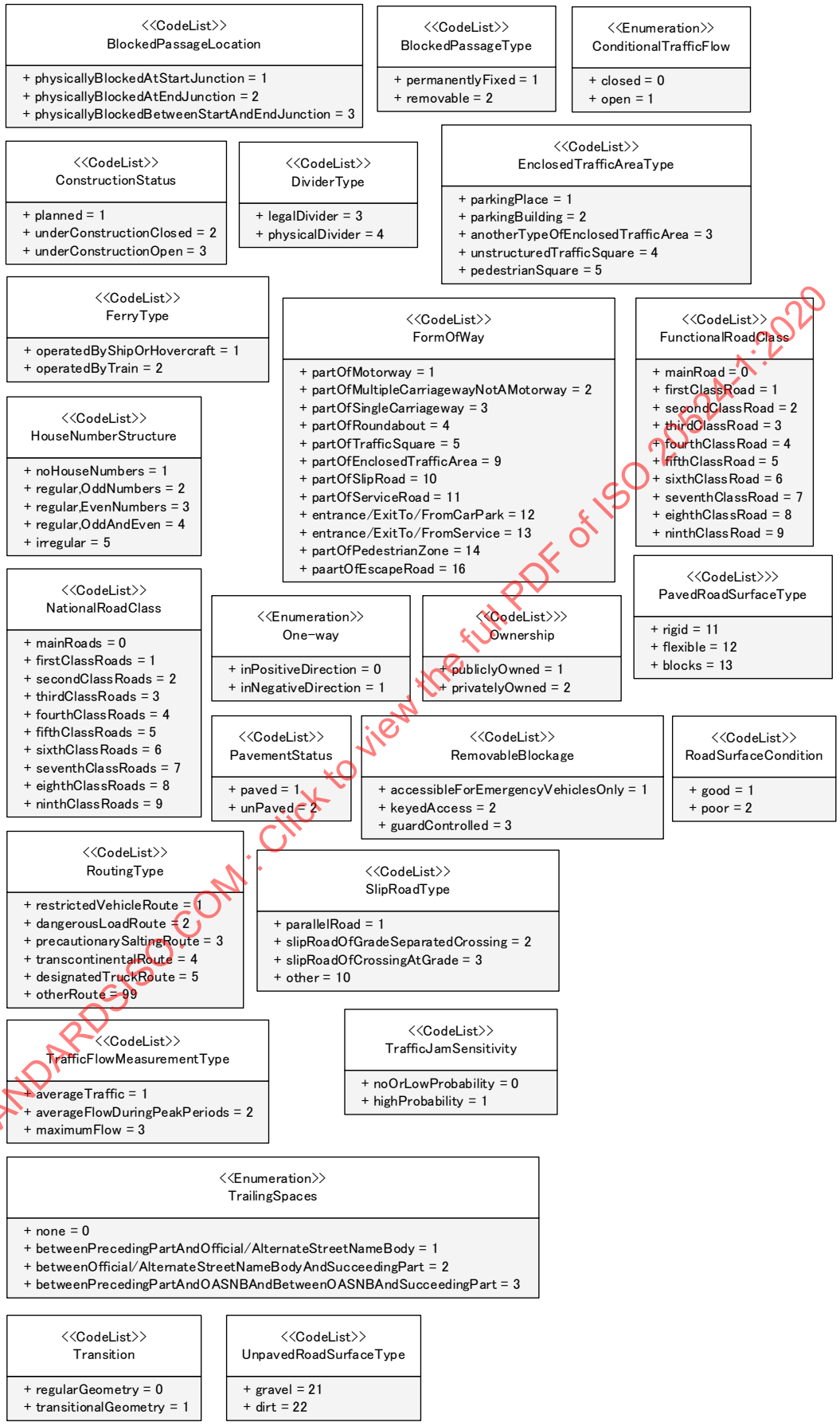
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Figure 91-2 — Conceptual Data Model for Attributes of Road and Ferries

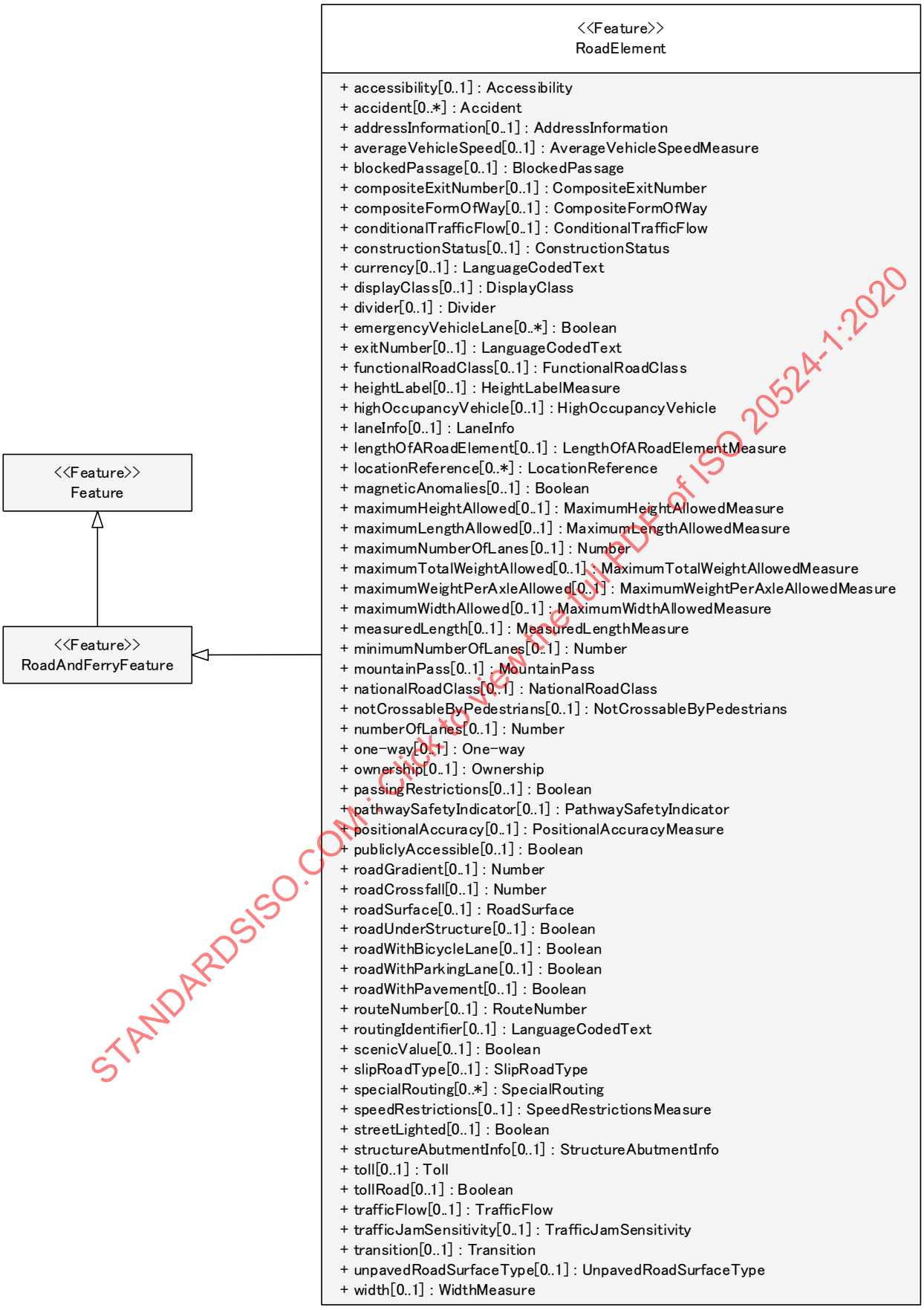
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Figure 91-3 — Conceptual Data Model for Attributes of Road and Ferries

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Figure 92 — Conceptual Data Model for Attributes of Road Element Features

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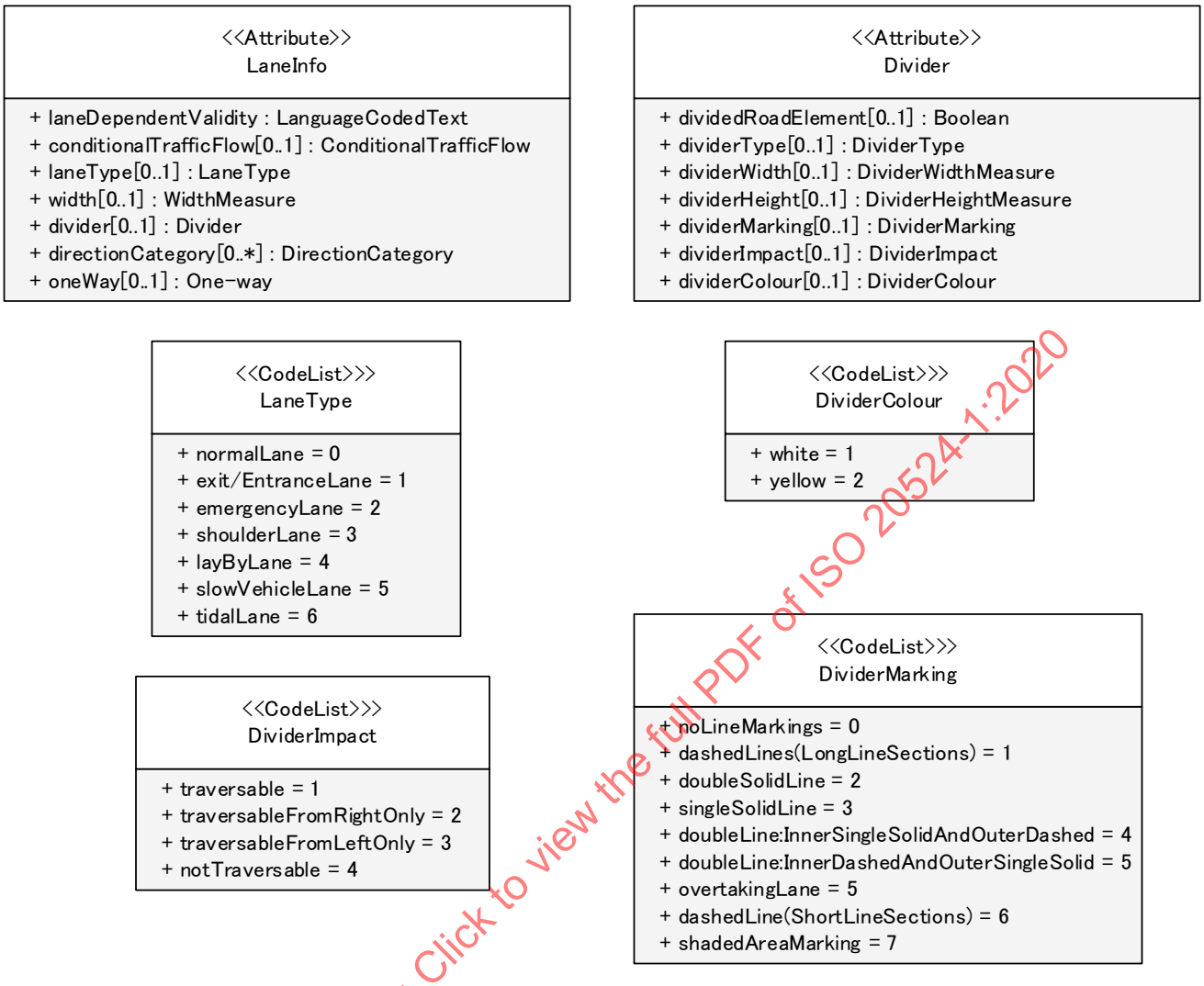


Figure 93 — Conceptual Data Model for Attributes of Road Element Features (Lane Attributes)

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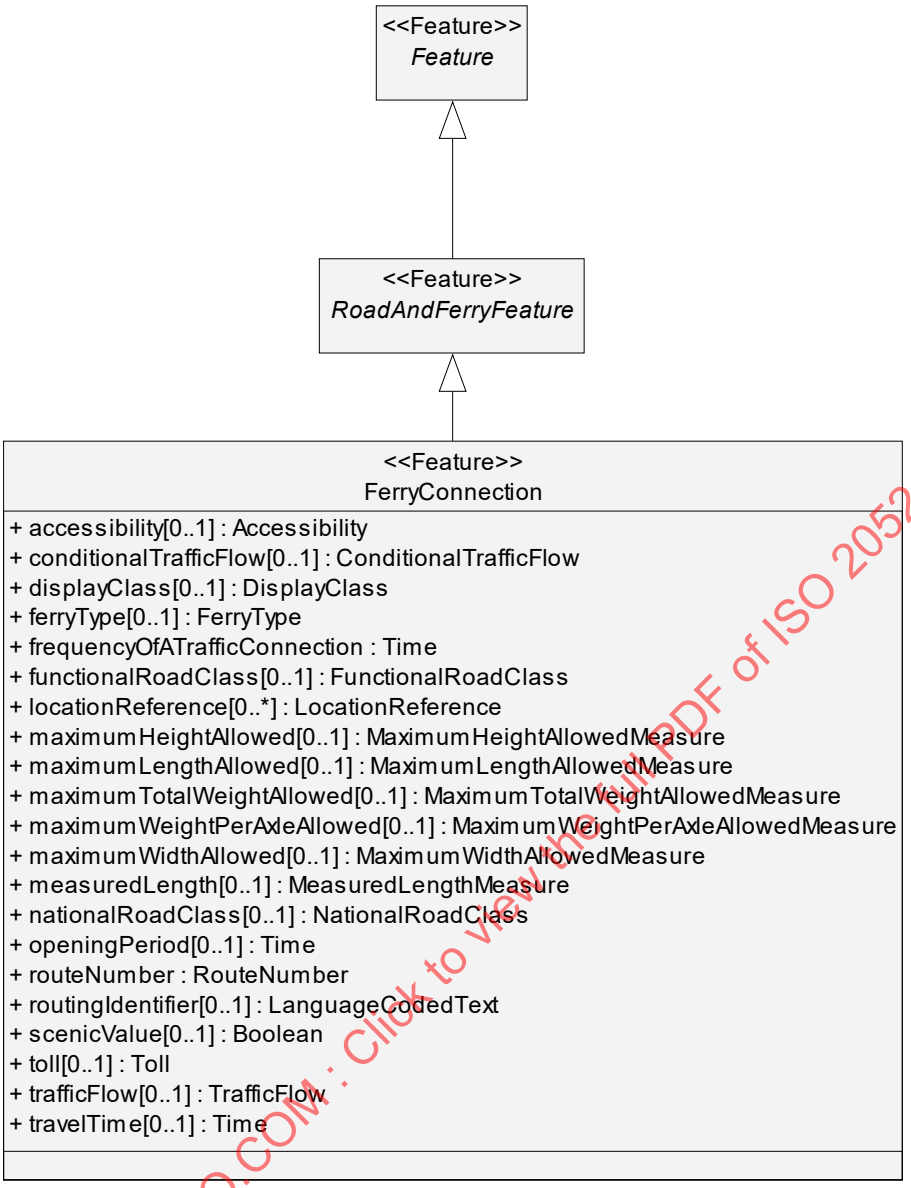


Figure 94 — Conceptual Data Model for Attributes of Ferry Connection Features

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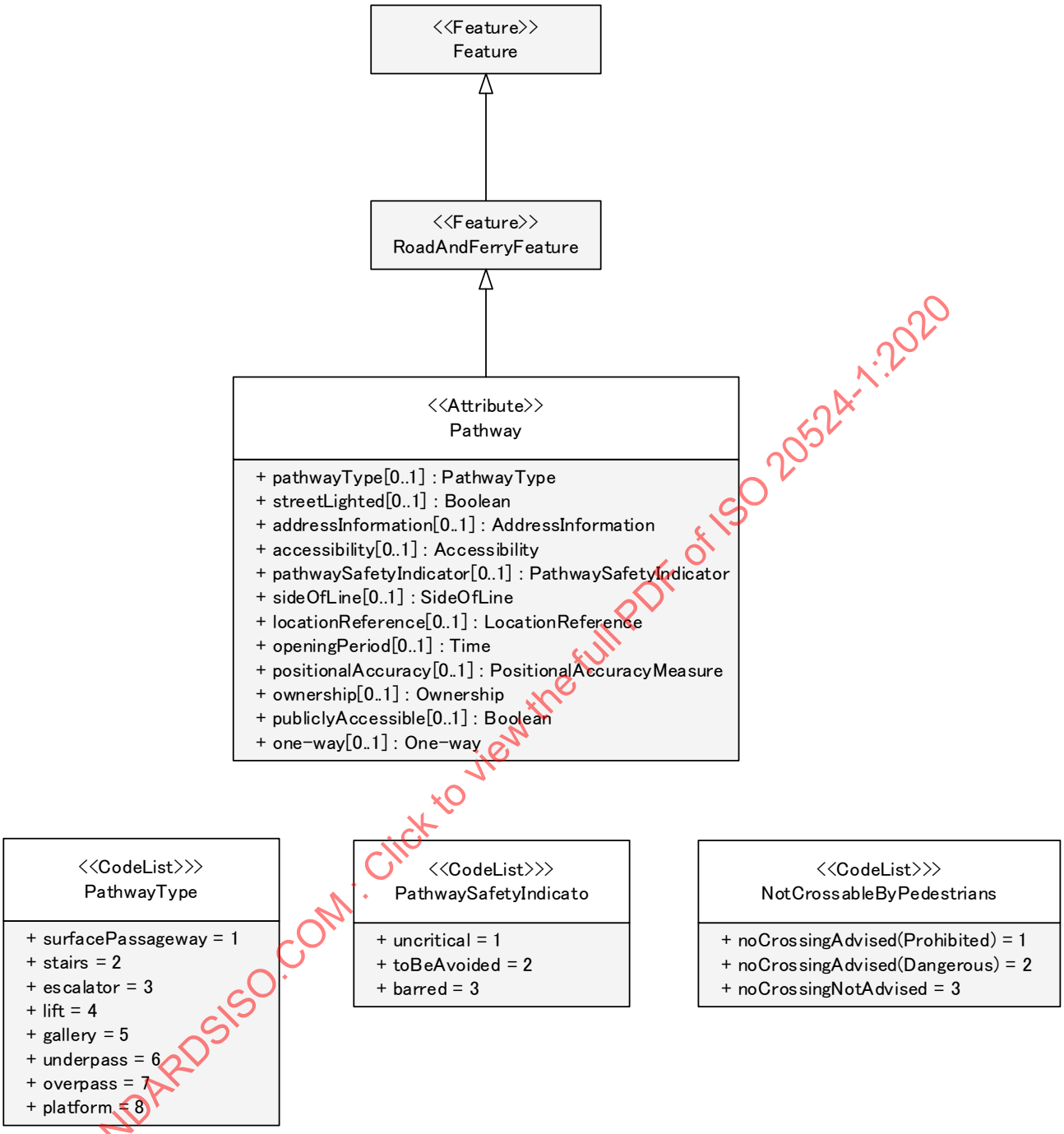
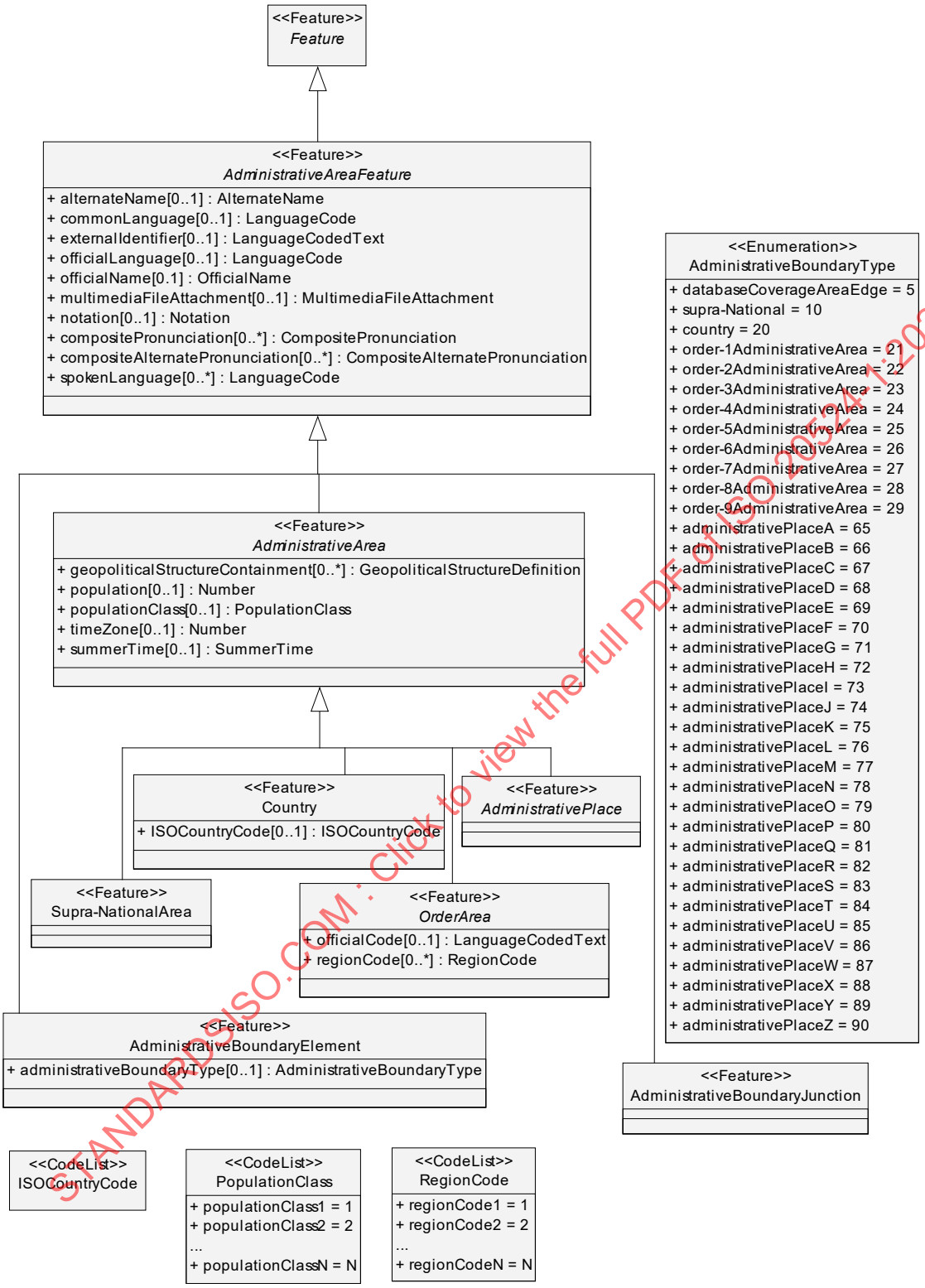


Figure 95 — Conceptual Data Model for Attributes of Pathways

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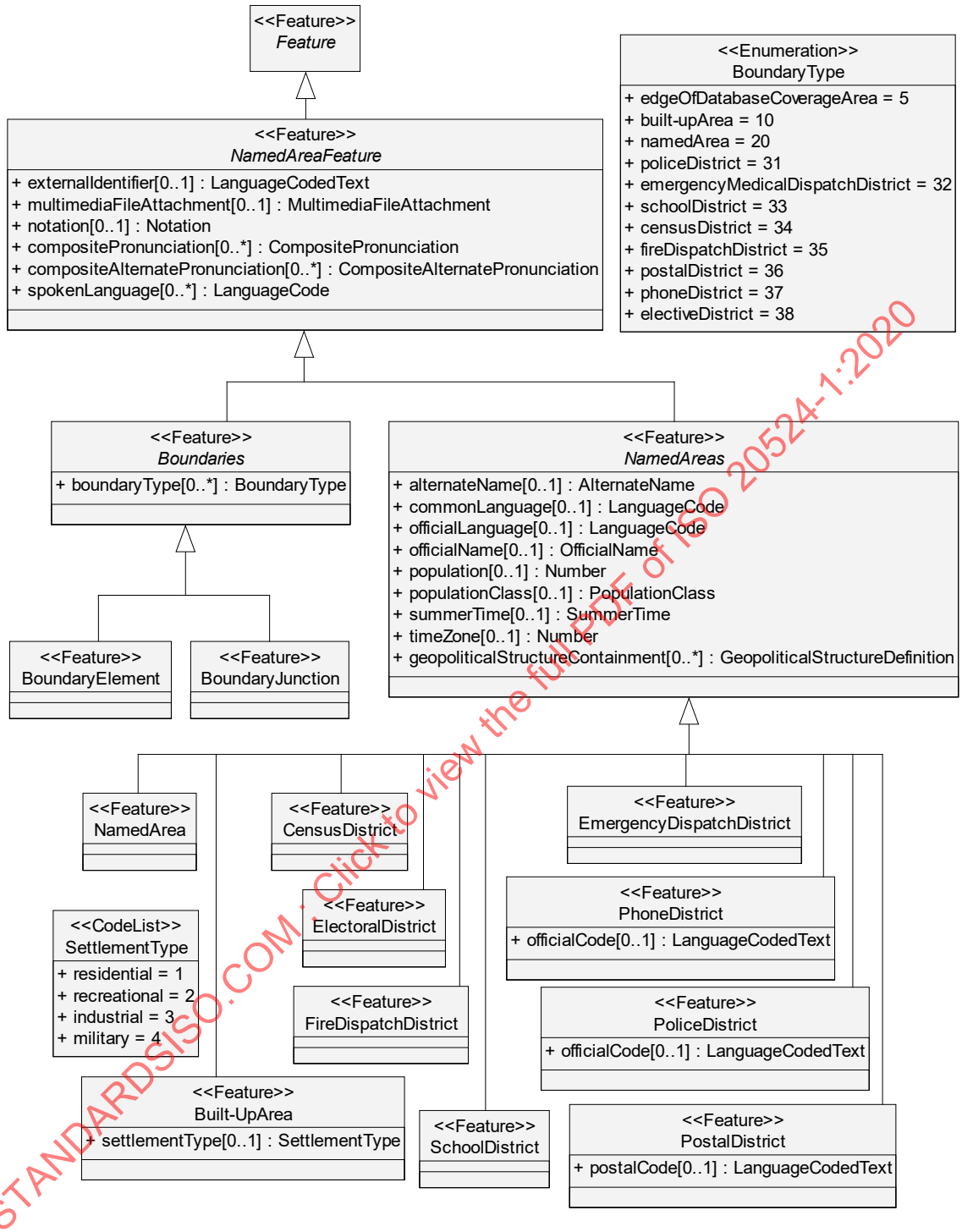
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Figure 96 — Conceptual Data Model for Attributes of Administrative Areas

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Figure 97 — Conceptual Data Model for Attributes of Named Areas

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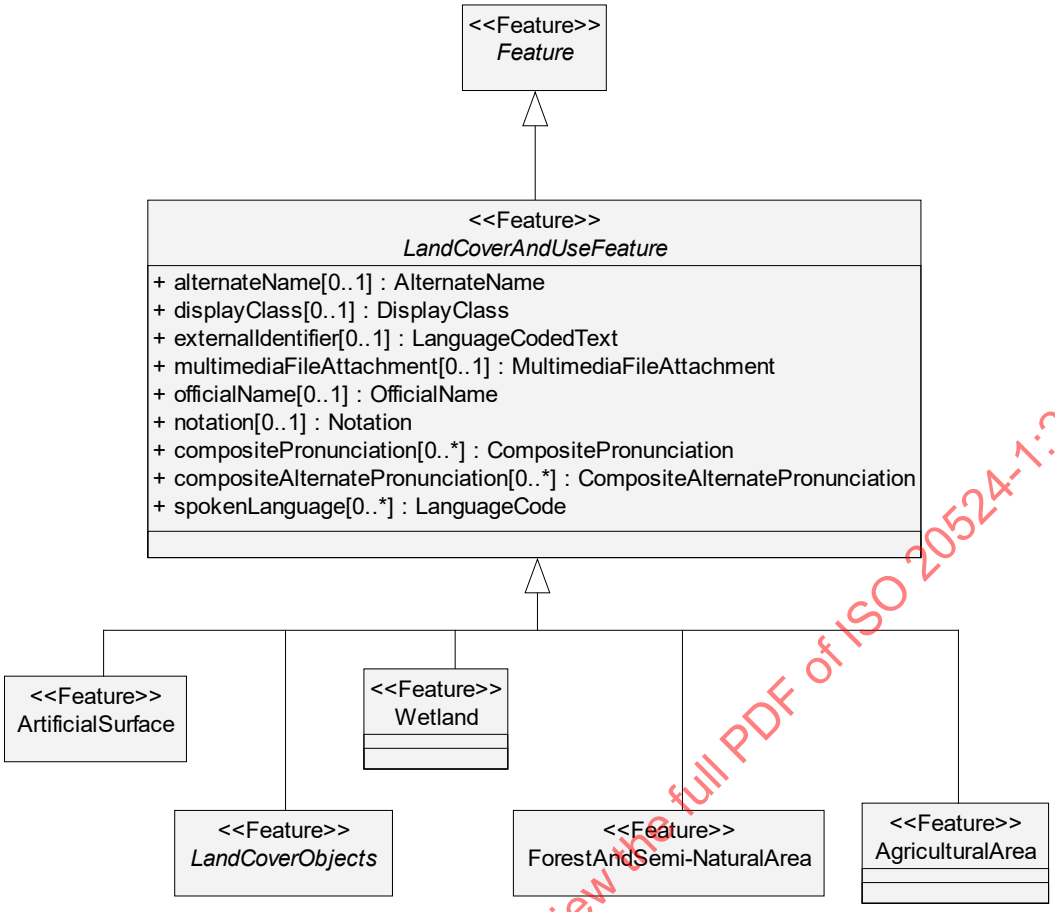
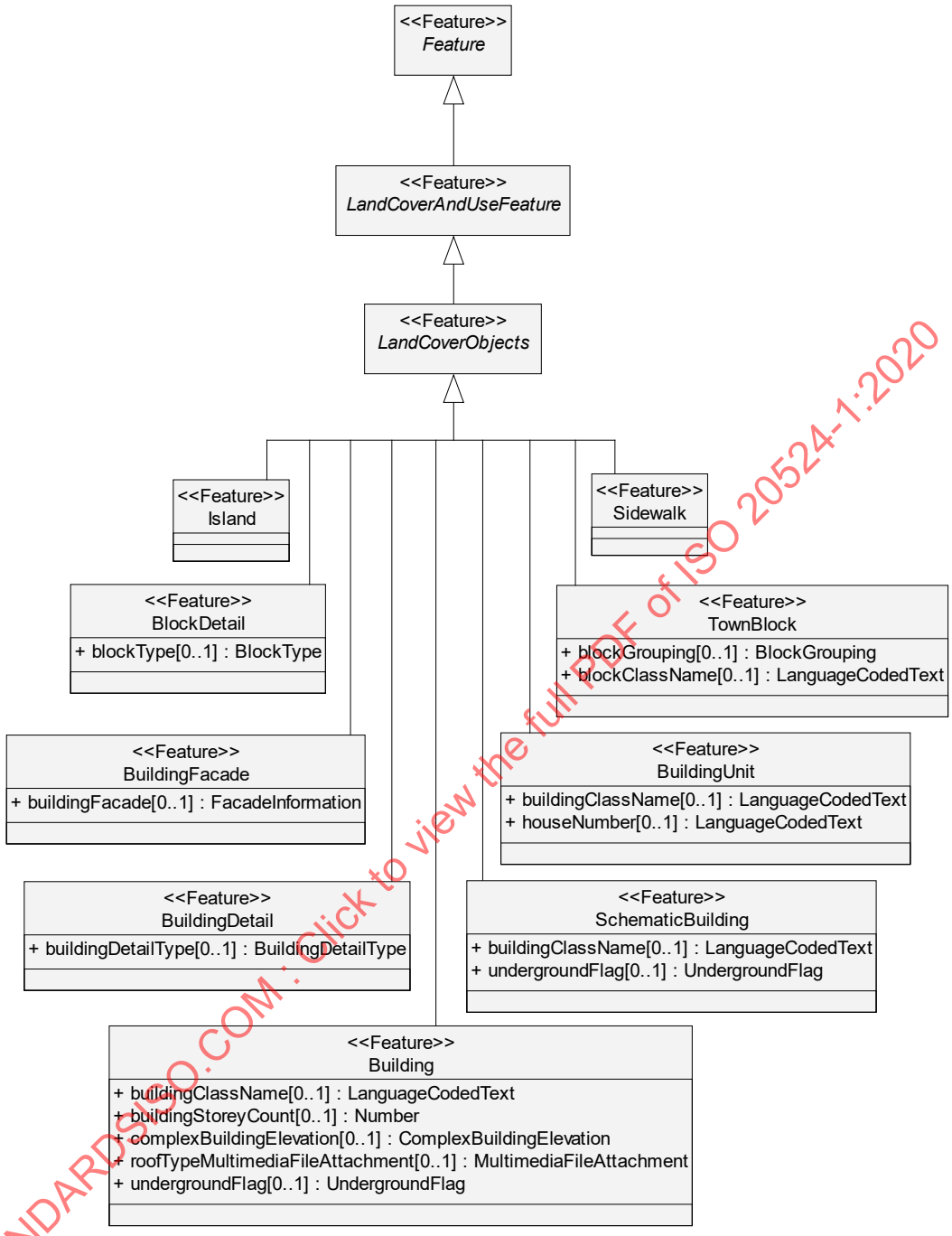


Figure 98 — Conceptual Data Model for Attributes of Land Cover and Use

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Figure 99 — Conceptual Data Model for Attributes of Land Cover and Use: Subtype Land Cover Objects

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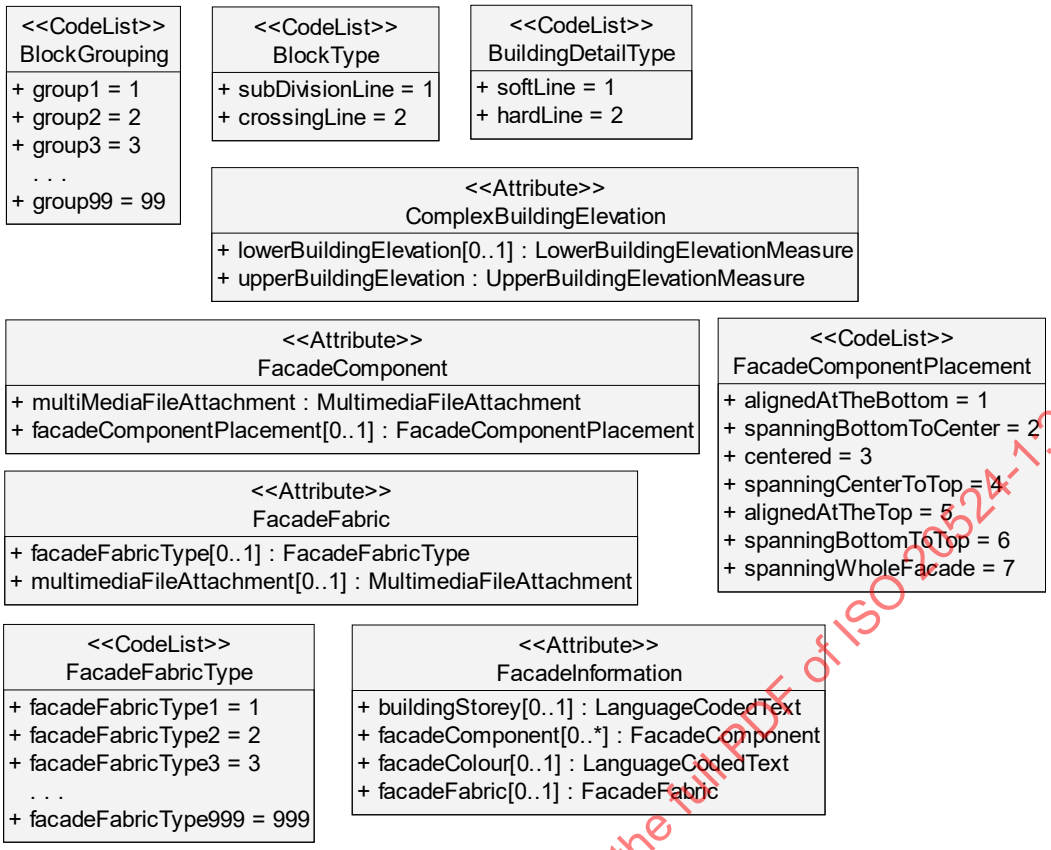


Figure 100 — Conceptual Data Model for Support Classes for Land Cover Object Attributes

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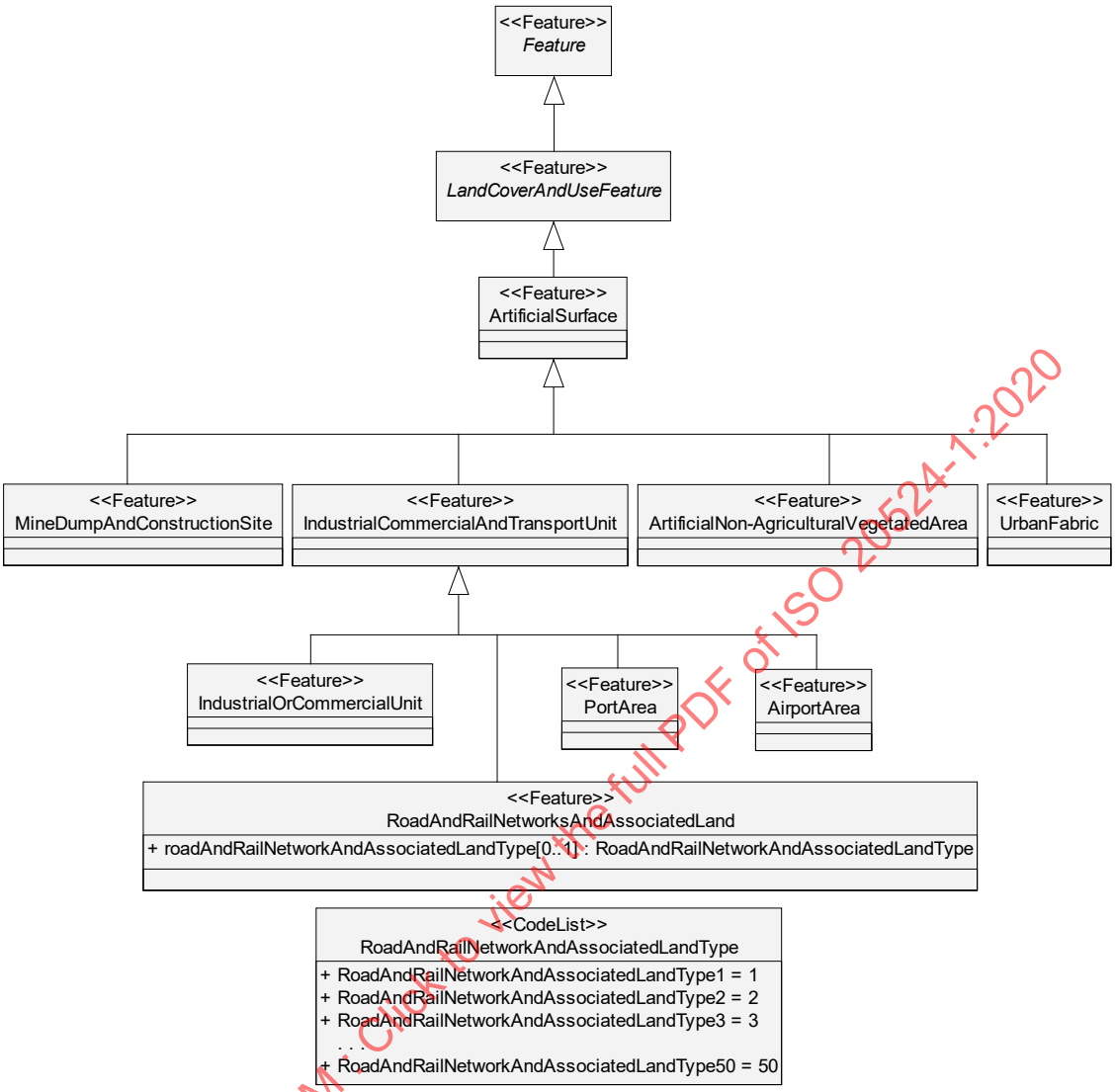


Figure 101 — Conceptual Data Model for Attributes of Land Cover and Use: Subtype Artificial Surfaces

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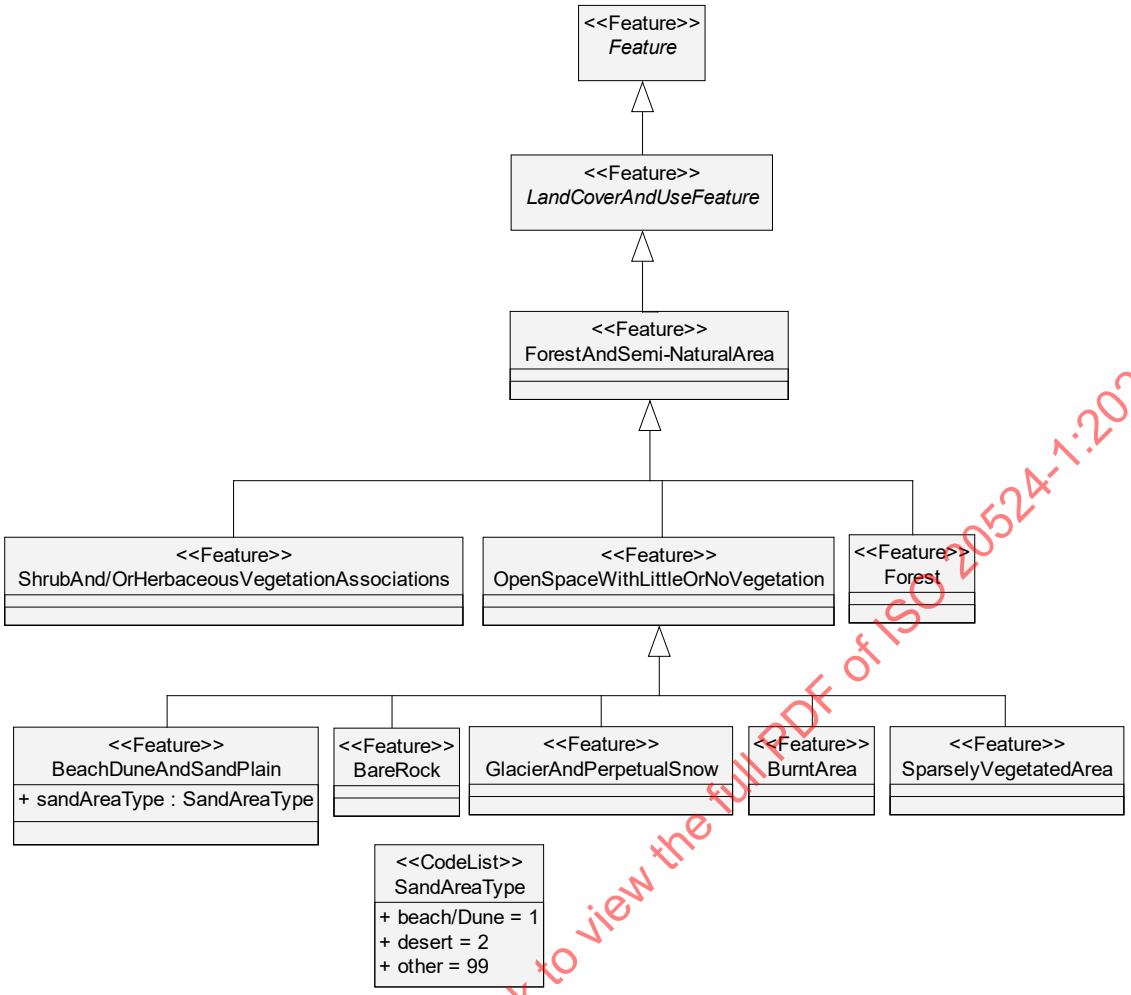


Figure 102 — Conceptual Data Model for Attributes of Land Cover and Use: Subtype Forest And Semi-Natural Areas

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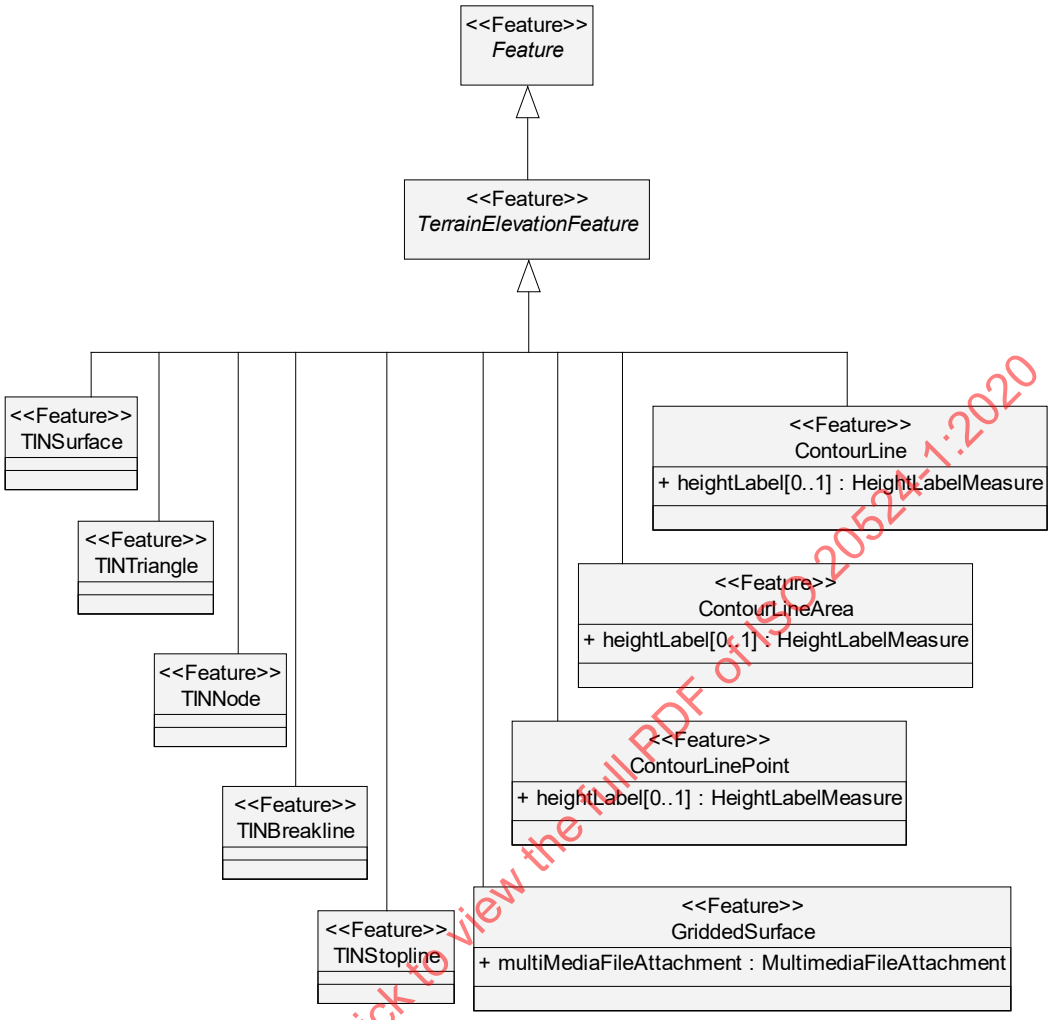


Figure 103 — Conceptual Data Model for Attributes of Terrain Elevation Features

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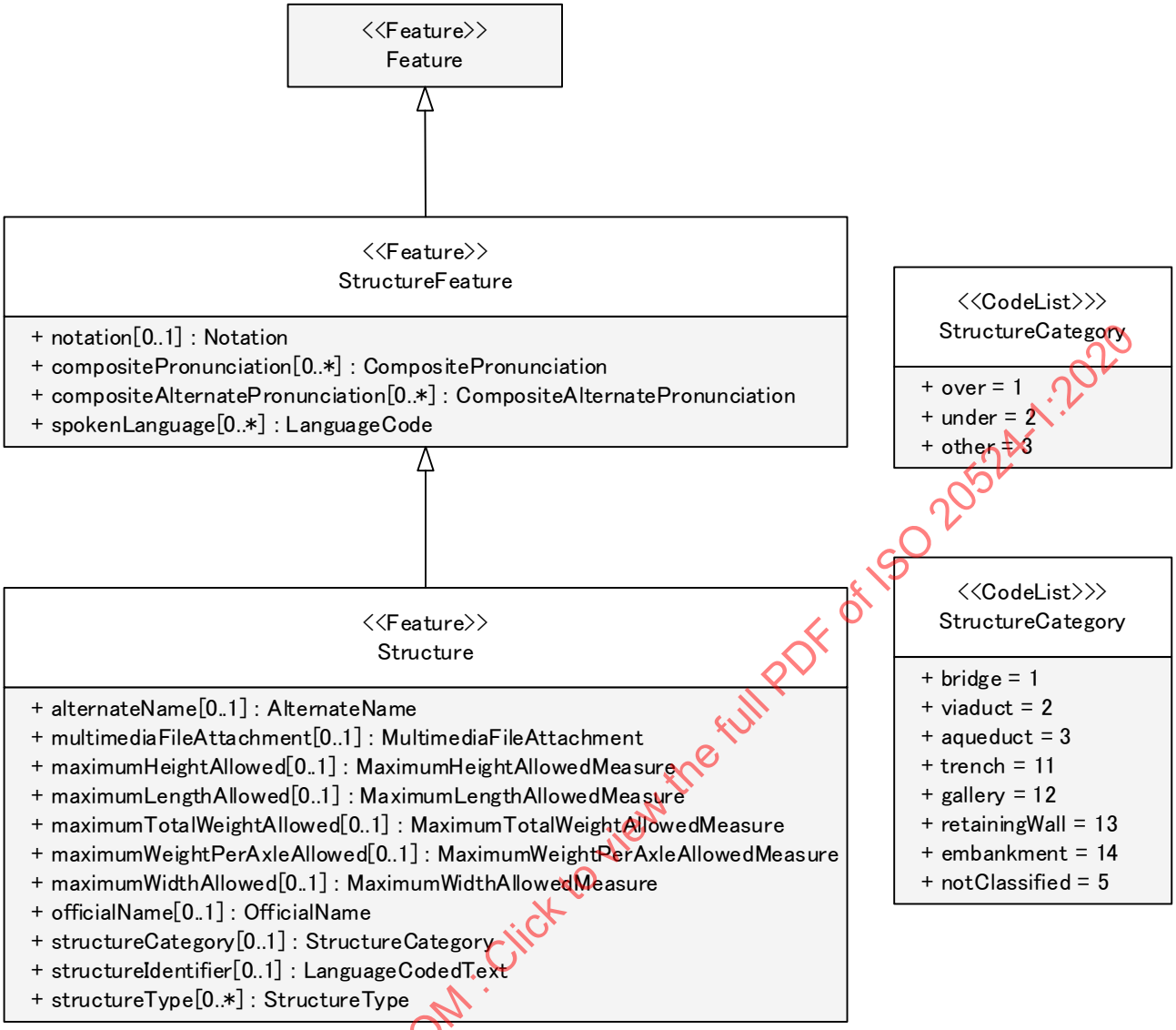


Figure 104 — Conceptual Data Model for Attributes of Structures

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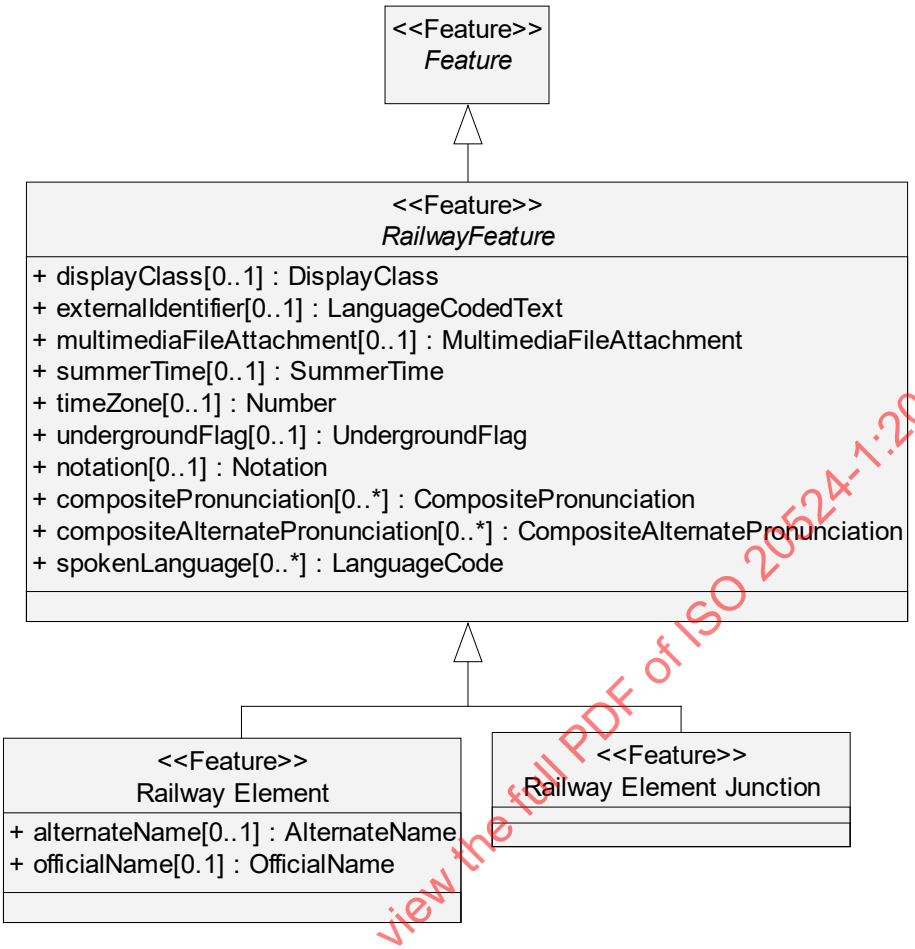


Figure 105 — Conceptual Data Model for Attributes of Railway Features

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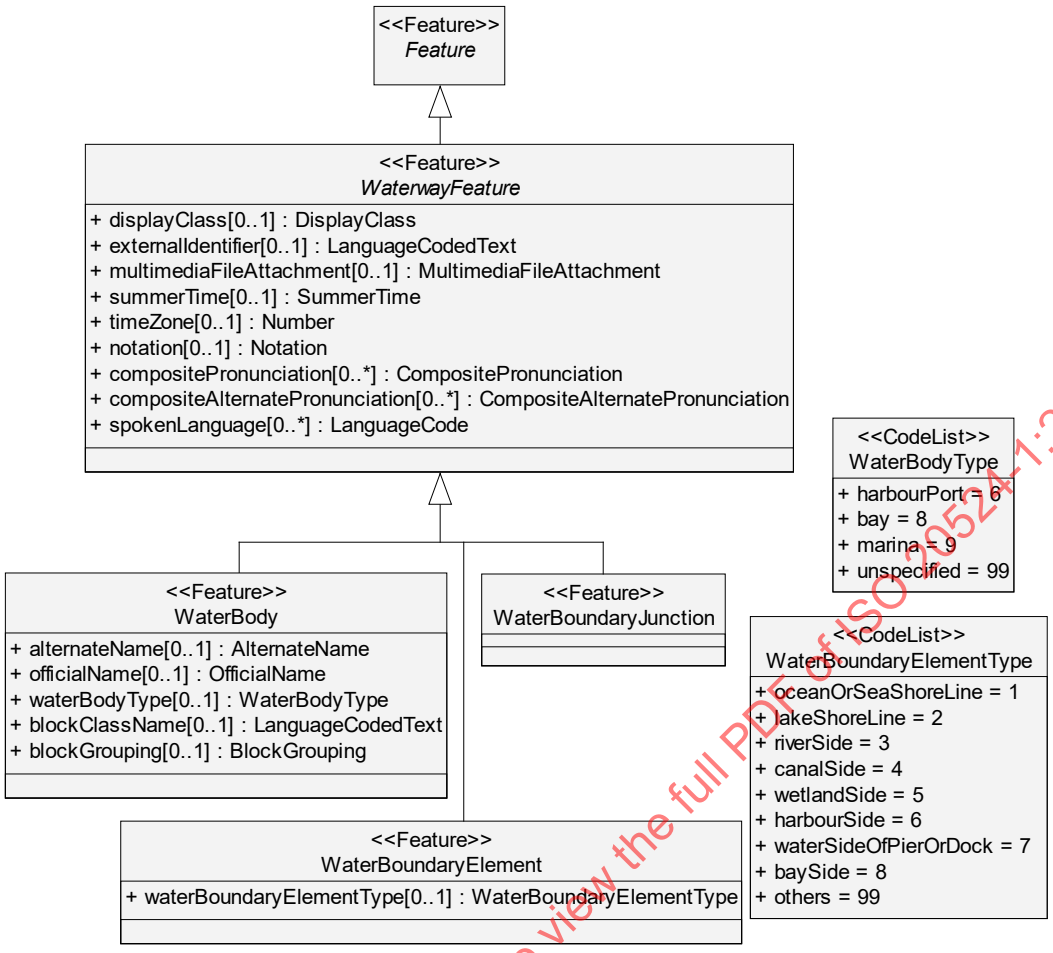
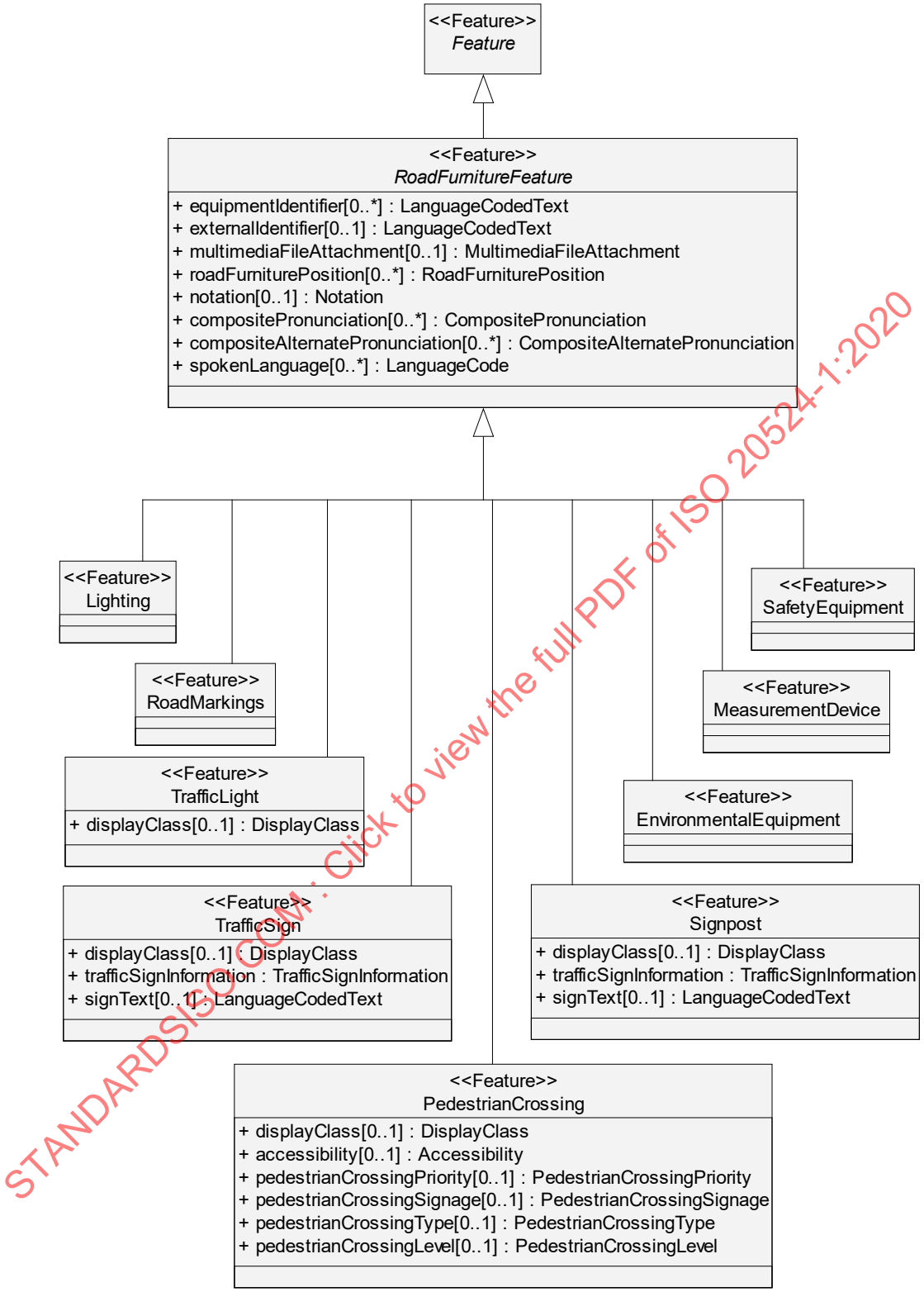


Figure 106 — Conceptual Data Model for Attributes of Waterways

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Figure 107 — Conceptual Data Model for Attributes of Road Furniture

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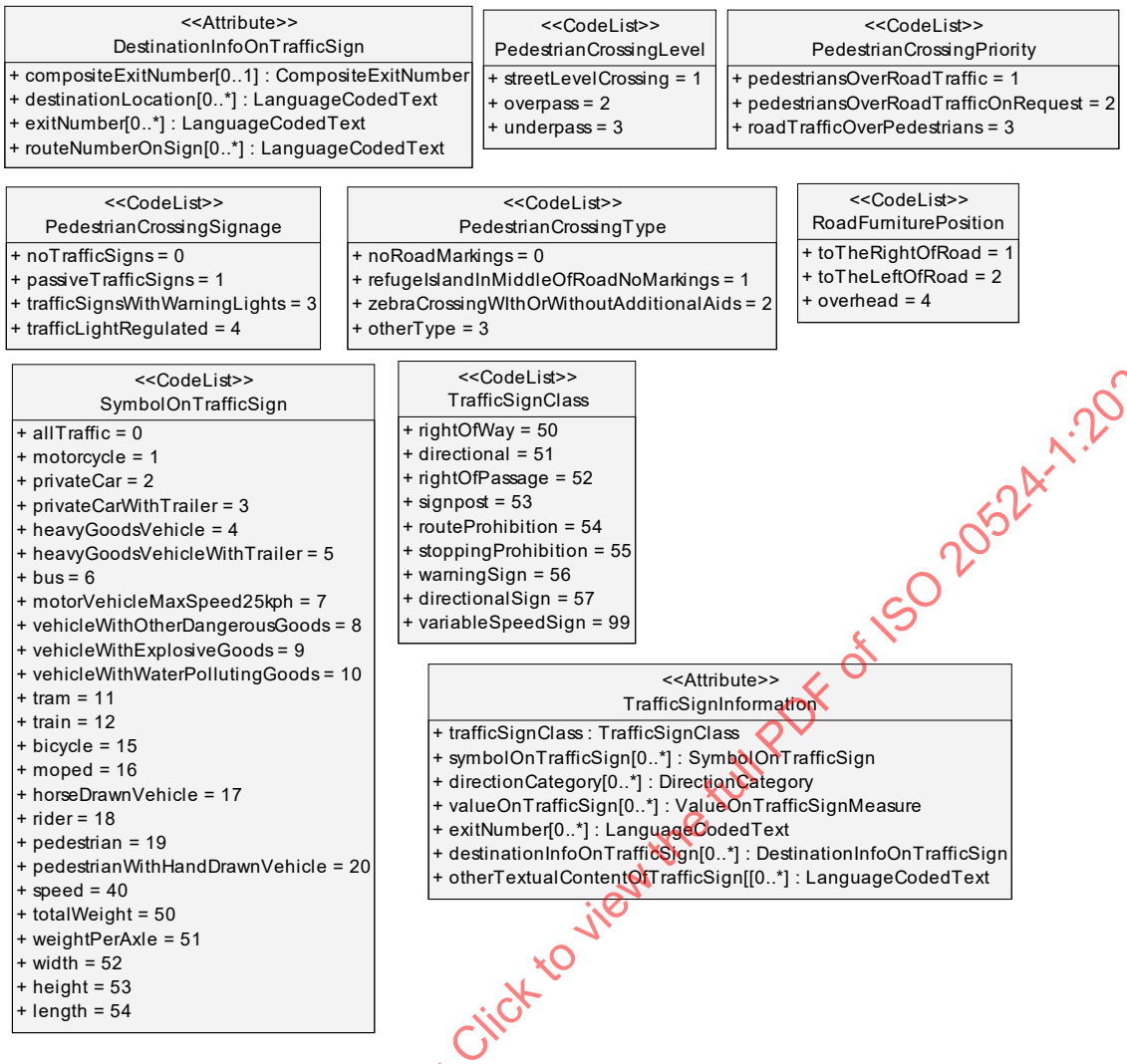
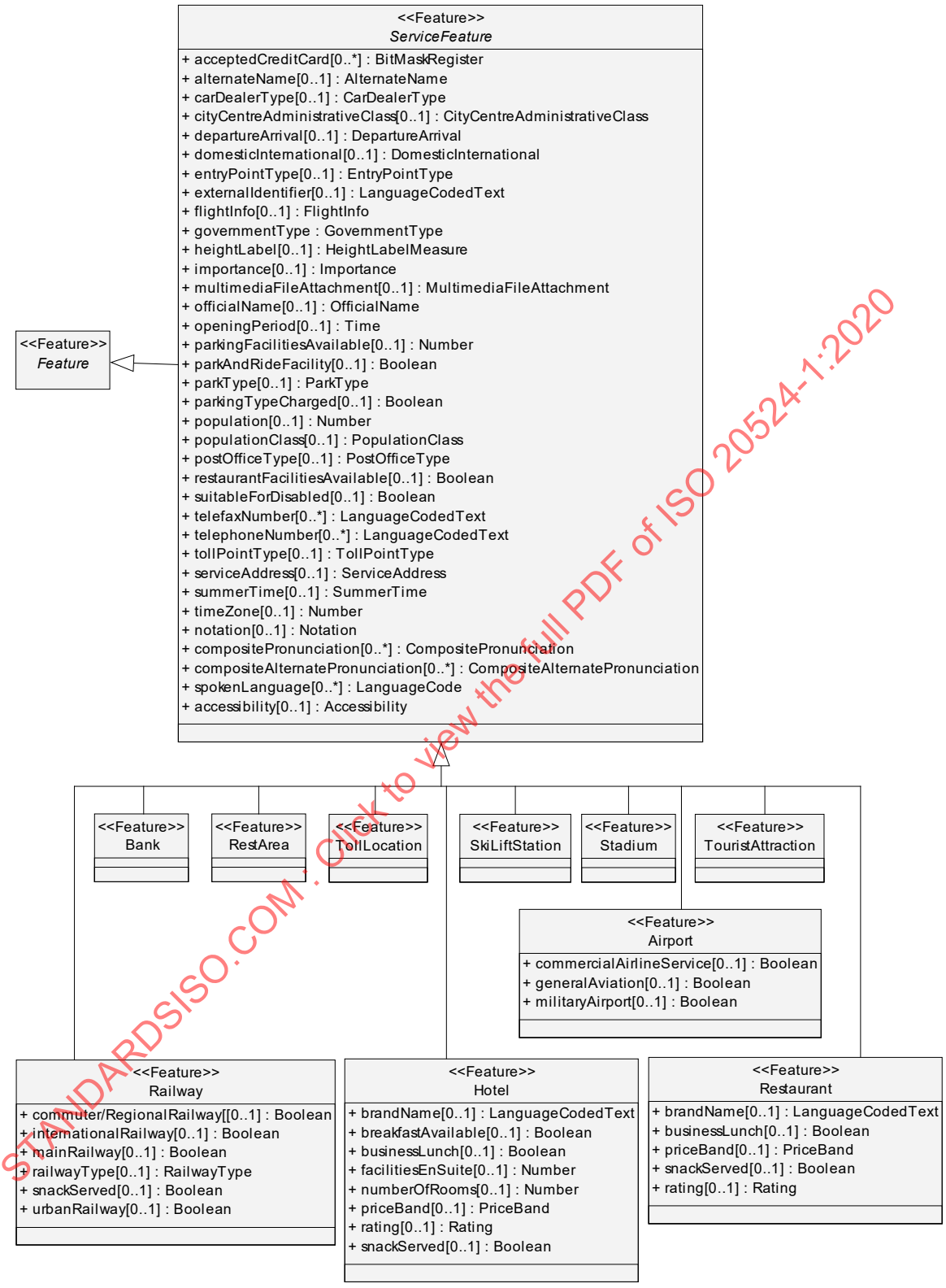


Figure 108 — Conceptual Data Model for Support Classes for Road Furniture Attributes

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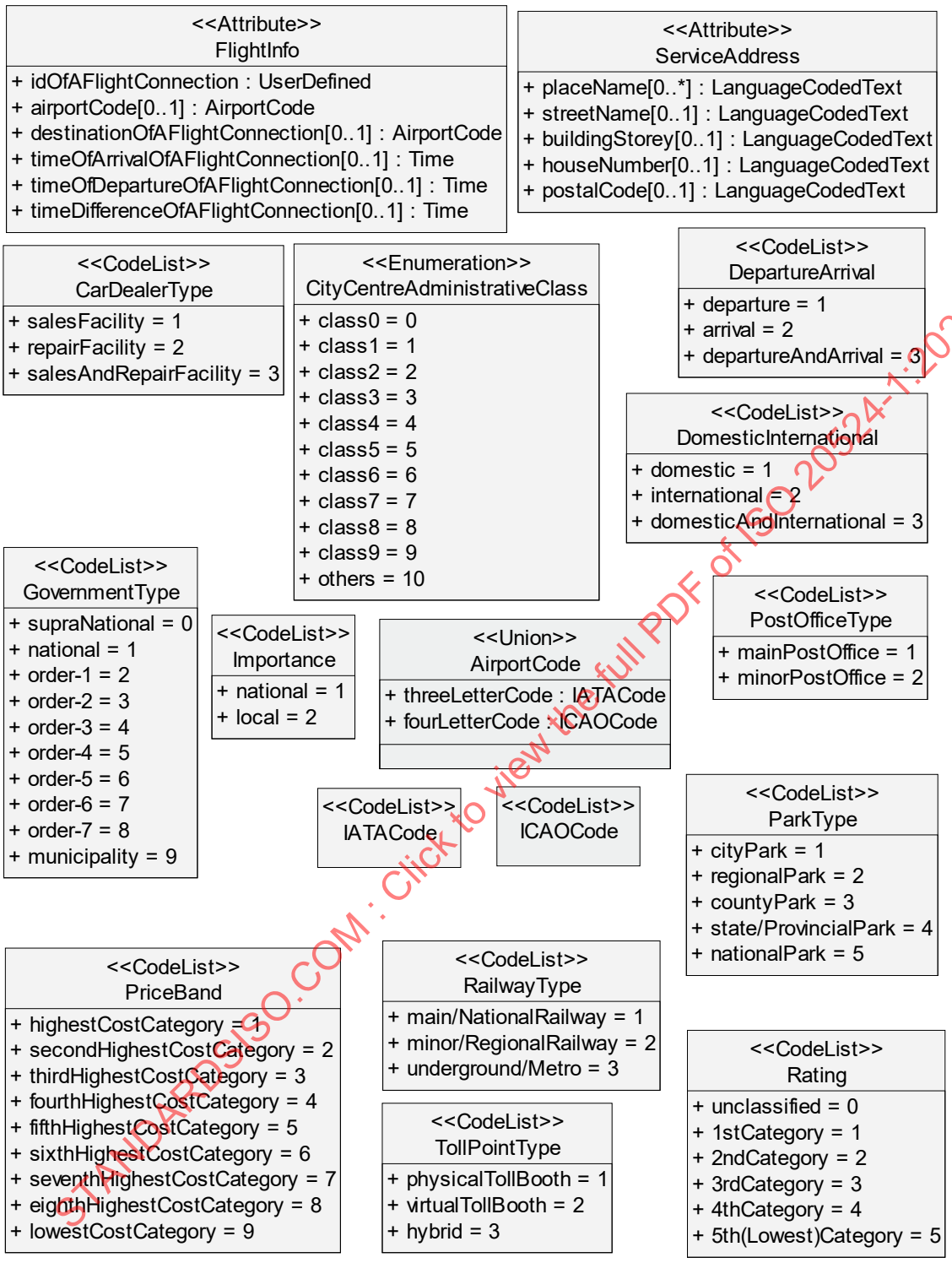
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Figure 109 — Conceptual Data Model for Attributes of Services

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Figure 110 — Conceptual Data Model for Attributes of Services (Continued)

Figure 111 — Conceptual Data Model for Attributes of Public Transport Features

(DEPRECATED)

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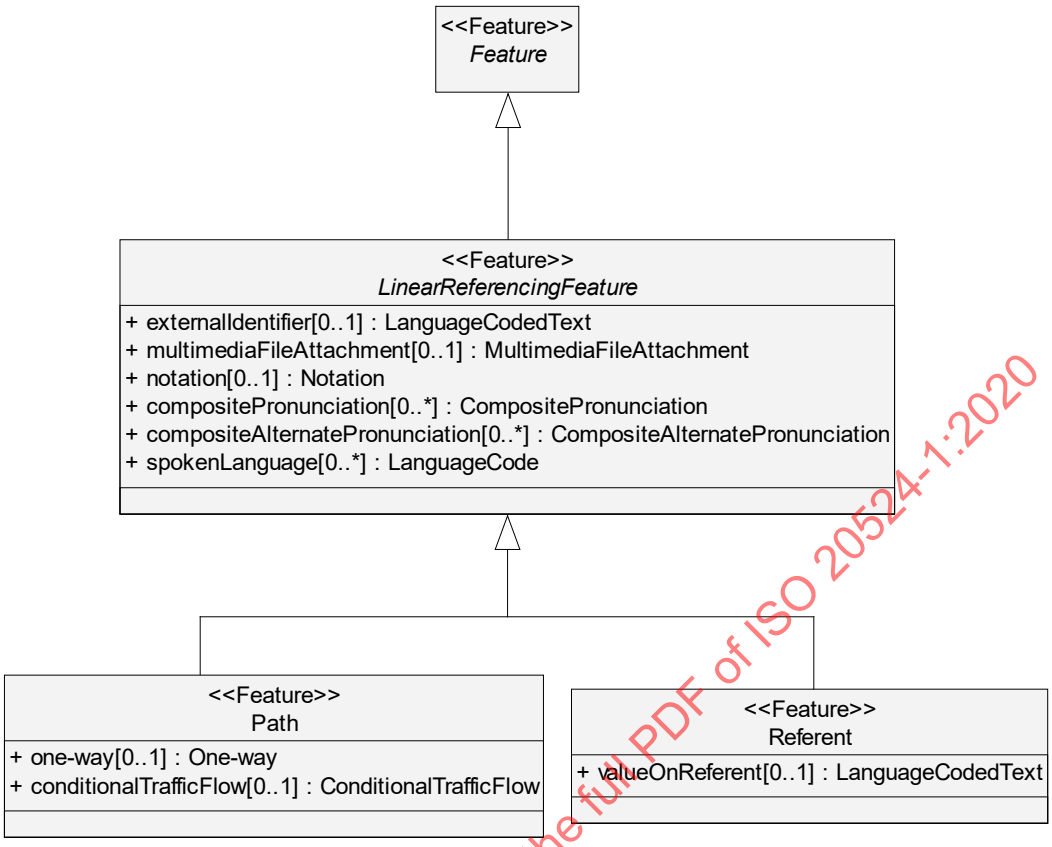


Figure 112 — Conceptual Data Model for Attributes of Linear Referencing Features

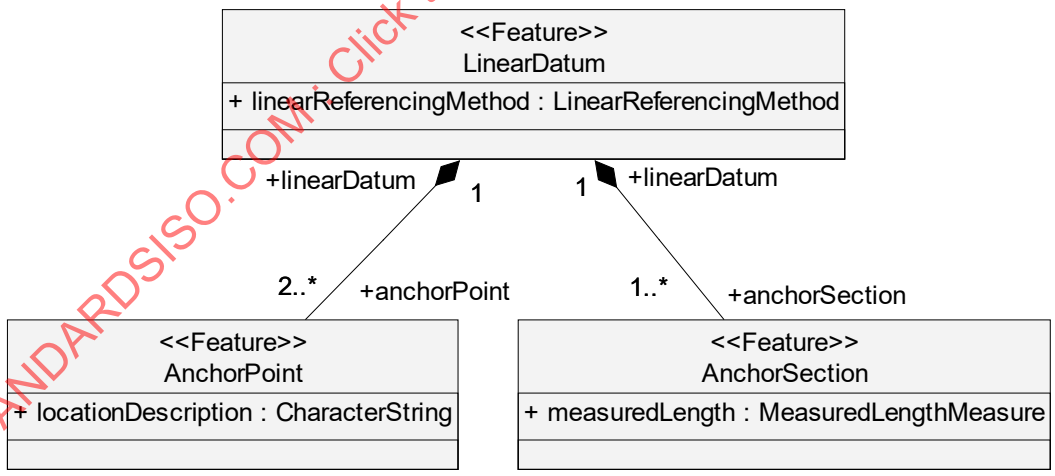


Figure 113 — Conceptual Data Model for Attributes of Linear Datum Features

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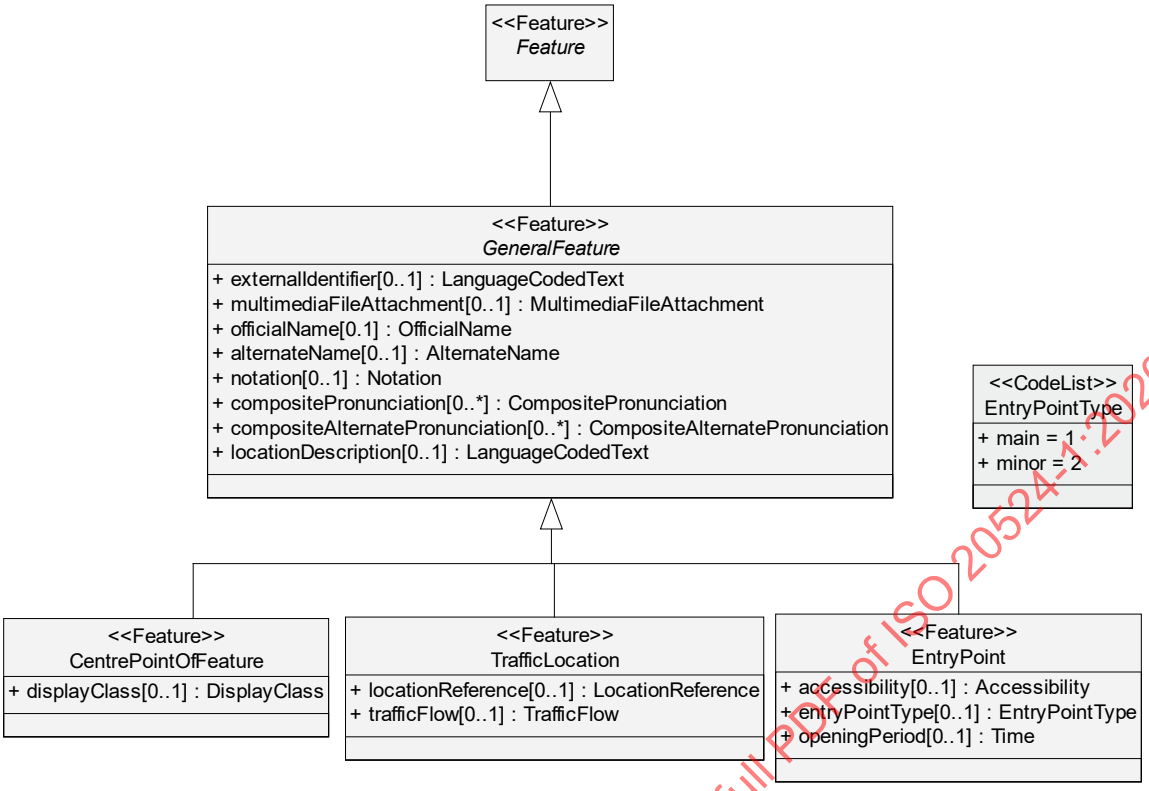


Figure 114 — Conceptual Data Model for Attributes of General Feature

7.2 Attributes

7.2.1 Accepted Credit Cards

7.2.1.1 Definition

A list of recognized credit cards accepted by a Service.

7.2.1.2 Domain/unit of measure

For each of the recognized credit cards a value is given as follows:

- Accepted
- Not Accepted

What is considered as a recognized credit card is not specified by this document.

7.2.2 Accessibility

7.2.2.1 Definition

Accessibility of road elements to people with accessibility limitations.

7.2.2.2 Domain/unit of measure

Composite.

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7.2.2.3 Sub-Attributes

- Suitable for Disabled or Impaired
- Accessibility Limitation
- Infrastructure Accessibility Aids — [.]..[.]

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.2.2.4 Description

Accessibility refers to a Road Element, Ferry Crossings, or a Pathway, or Pedestrian Crossings, or possibly some Services. The Composite Attribute is composed of the Sub-Attribute Suitable for Disabled or Impaired, the composite Sub-Attribute Accessibility Limitation, and the Sub-Attribute Infrastructure Accessibility Aids, which defines classes of aids for accessibility.

7.2.3 Accessibility Limitation

7.2.3.1 Definition

Classes of limitations on accessibility.

7.2.3.2 Domain/unit of measure

Composite.

7.2.3.3 Sub-Attributes

- Wheelchair Limitation
- Slow Walker Limitation
- Vision Limitation
- Hearing Limitation

7.2.3.4 Description

Accessibility Limitation is used in conjunction with the Sub-Attributes Suitable for Disabled or Impaired and Infrastructure Accessibility Aids. Together they form the Composite Attribute Accessibility.

Each limitation class may be restricted by the Restrictive Sub-Attribute Pedestrian Type, which details the kinds of pedestrians to which the restrictions apply, and the Restrictive Sub-Attribute Validity Period, which expresses temporality associated with accessibility limitations.

7.2.4 Accident

7.2.4.1 Definition

Information about an accident registered by an appropriate organization.

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7.2.4.2 Domain/unit of measure

Composite.

7.2.4.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Accident Identifier — Mandatory
- Accident Date

7.2.5 Accident Date

7.2.5.1 Definition

The date of an accident.

7.2.5.2 Domain/unit of measure

The value shall be expressed as a single starting date according to the Time Domain Syntax.

7.2.5.3 Description

This Sub-Attribute is used in conjunction with the Sub-Attribute Accident Identifier.

7.2.6 Accident Identifier

7.2.6.1 Definition

A unique alphanumeric identifier, ascribed to an Accident, which may provide a key to an external database.

7.2.6.2 Domain/unit of measure

As specified by the administrating body.

7.2.6.3 Description

This Sub-Attribute may be used in conjunction with the Sub-Attribute Accident Date.

7.2.7 Address Information

7.2.7.1 Definition

The essential components of a street address.

7.2.7.2 Domain/unit of measure

Composite.

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7.2.7.3 Sub-Attributes

Address Information may refer to official street addresses, to alternate street addresses or to address information in which a route number is used instead of a street name.

When it refers to official street addresses, this Composite Attribute may consist of the following Sub-Attributes:

- Official Street Name — Mandatory
- House Number Range — [.]..[.]
- Postal Code — [.]..[.]

When it refers to alternate street addresses, this Composite Attribute may consist of the following Sub-Attributes:

- Alternate Street Name — Mandatory
- House Number Range — [.]..[.]
- Postal Code — [.]..[.]

When it refers to route numbers, this Composite Attribute may consist of the following Sub-Attributes:

- Route Number — Mandatory
- House Number Range — [.]..[.]
- Postal Code — [.]..[.]

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.2.7.4 Description

Address Information refers to both sides of the Road Element or Pathway. If Attributes are contained which refer to one side only (e.g. House Number Range) the Restrictive Sub-Attribute Side of Line shall be used. This Sub-Attribute shall also be used in case the Address Information refers to an Address Area Boundary Element.

7.2.8 Administrative Boundary Type

7.2.8.1 Definition

An indication of the Administrative Area which is bounded by the Administrative Boundary Element.

7.2.8.2 Domain/unit of measure

- Country
- Order-1-7 Administrative Area
- Order-8 Administrative Area

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- Order-9 Administrative Area
- Supra-National Area
- Administrative Place A-Z (26 entries)
- Edge of the database coverage area

7.2.8.3 Description

For hierarchical Administrative Areas the value shall always indicate the highest-order Administrative Area which is bounded by the Administrative Boundary Element whereby the following order shall be taken into account:

High	• Supra-National Area • Country • Order-1-7 Administrative Area • Order-8 Administrative Area
Low	• Order-9 Administrative Area

A boundary of an Administrative Place shall get the according type:

- Boundary of Administrative Place A
- Boundary of Administrative Place B
- Boundary of Administrative Place C
- .
- .
- Boundary of Administrative Place Y
- Boundary of Administrative Place Z

7.2.9 Airport Code

7.2.9.1 Definition

Designated international airport code of an Airport.

7.2.9.2 Domain/unit of measure

The value should be expressed in the international standard IATA three letter airport code [9] or this document ICAO four letter airport code [10], respectively. Optionally this may be followed by a one position indication for a possible terminal. If the airport only has one terminal the last character should be a zero or left out.

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7.2.10 Alternate Name

7.2.10.1 Definition

The name of a Feature that has no official status but is used or known by the general public.

7.2.10.2 Domain/unit of measure

Composite.

7.2.10.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Name Prefix
- Alternate Name Body – Mandatory

7.2.10.4 Description

Alternate Names may include abbreviations or commonly used nicknames. A single Feature may have more than one Alternate Name, often associated with a bilingual situation. A language code shall be used to specify the applied language.

The use of prefixes is not obligatory, even if they make up part of the alternate names. If prefixes are not applied but are part of the official name, they shall be part of the Alternate Name Body.

Spaces are assumed to exist in between the components of the alternate name. They are not explicitly added.

7.2.11 Alternate Name Body

7.2.11.1 Definition

The part of the alternate name which has, compared to the prefix, most identifying power.

7.2.11.2 Domain/unit of measure

Composite.

7.2.11.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Name Component [.]..[.]
- Alternate Name Text – Mandatory

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attribute Name Prefix. Together these form the Composite Attribute Alternate Name.

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7.2.11.4 Description

In most cases it will be sufficient to sub-divide the official name on name body level. In these cases, Alternate Name Body will consist of one instance of Alternate Name Text and zero instances of Name Component. In certain cases, a need may exist to be able to further sub-divide the Alternate Name Body. In these cases, Alternate Name Body consists of one instance of Alternate Name Text and two or more Name Components.

7.2.12 Alternate Name Text

7.2.12.1 Definition

(A part of) an alternate name.

7.2.12.2 Domain/unit of measure

Any combination of characters and punctuation.

7.2.12.3 Description

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attribute Name Component to form the Composite Attribute Alternate Name Body.

7.2.13 Alternate Pronunciation

7.2.13.1 Definition

The phonetic transcription of an alternative pronunciation of a name.

7.2.13.2 Domain/unit of measure

A phonetic string.

7.2.13.3 Description

The Attribute Alternate Pronunciation is used as a Sub-Attribute in conjunction with the Sub-Attributes Pronunciation Variant, Phonetic Alphabet, Pronunciation System, and Transcription Description. Together these Sub-Attributes form the Composite Attribute Composite Alternate Pronunciation.

7.2.14 Alternate Street Name

7.2.14.1 Definition

The name of a Road Element, Pathway or Address Area which has no official status but is used or known by the general public.

7.2.14.2 Domain/unit of measure

Composite.

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7.2.14.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Directional Prefix
- Street Type Prefix
- Alternate Street Name Body — Mandatory
- Trailing Spaces
- Street Type Suffix
- Directional Suffix
- Composite Pronunciation [.]..[.]

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

This Attribute is used as a Sub-Attribute possibly in conjunction with the Sub-Attribute House Number Range and Postal Code. Together these form the Composite Attribute Address Information.

7.2.14.4 Description

The use of pre- or suffixes is not obligatory, even if they make up part of the street names. If pre- or suffixes are not applied but are part of the street name, they shall be part of the Alternate Street Name Body. Also, combinations are allowed. E.g. a Street Type Prefix might be separately defined in a Street Type Prefix while the Street Type Suffix is defined as part of the Alternate Street Name Body.

Spaces are assumed to exist in between the different components of the street name. They are not explicitly added. One exception exists on this point: spaces preceding and/or succeeding the Alternate Street Name Body are not assumed. These should be explicitly defined. For this, the Sub-Attribute Trailing Spaces has been defined.

A single Road Element or Pathway may have more than one Alternate Street Name. This often is associated with a bilingual situation. A language code shall be used to specify the applied language.

How the application of the different Sub-Attributes in a particular GDF has been done may be specified through meta information.

The fact that Alternate Street Name instead of an Official Street Name has been defined may not be concluded from every Sub-Attribute which make up the Street Name. This conclusion may only be drawn from the Sub-Attribute Alternate Street Name Body or Official Street Name Body. The rest of the Sub-Attributes are identical for both types of Street Names.

7.2.15 Alternate Street Name Body

7.2.15.1 Definition

The part of the alternate street name which has, compared to the other parts the most identifying power.

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7.2.15.2 Domain/unit of measure

Composite.

7.2.15.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attribute:

- Name Component [.]..[.]
- Alternate Street Name Text — Mandatory

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

This Attribute is used as a Sub-Attribute possibly in conjunction with the Sub-Attributes Directional Prefix, Street Type Prefix, Trailing Spaces, Street Type Suffix, Directional Suffix and Composite Pronunciation. Together these form the Composite Attribute Alternate Street Name.

7.2.15.4 Description

In most cases it will be sufficient to sub-divide the Street Name on Street Name Body level. In these cases, Alternate Street Name Body will consist of one instance of Alternate Street Name Text and zero instances of Name Component. In certain cases, a need may exist to be able to further sub-divide the street name body. In these cases, the Alternate Street Name Body consists of one instance of Alternate Street Name Text and two or more Name Components.

7.2.16 Alternate Street Name Text

7.2.16.1 Definition

(A part of) an alternate street name.

7.2.16.2 Domain/unit of measure

Any combination of characters, numbers or punctuation.

7.2.16.3 Description

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attribute Name Component to form the Composite Attribute Alternate Street Name Body.

7.2.17 Assignment Order

7.2.17.1 Definition

The position of the source Point Feature in the list of source Point Features of a Multi-Point Assignment or of an Exclusive Multi-Point Assignment.

7.2.17.2 Domain/unit of measure

A positive integer.

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7.2.17.3 Description

A Multi-Point Assignment or Exclusive Multi-Point Assignment has one or more source Point Features for a target Line Feature in the assignment. The Assignment Order puts them in consecutive order, being assigned in the increasing direction of the target Line Feature.

This Attribute is used as a Sub-Attribute in conjunction with Distance Expression. Together these Sub-Attributes form the Composite Attribute Point Assignment.

7.2.18 Association Type

7.2.18.1 Definition

The type of association between two Features for which an association has been defined.

7.2.18.2 Domain/unit of measure

- Geographically located in
- Commonly associated with

7.2.18.3 Description

Geographically located in refers to the case in which factual information is represented. Commonly associated with refers to the situation whereby the information represented is in contradiction with the geographical information but represents what is believed to be true by the general public.

7.2.19 Average Vehicle Speed

7.2.19.1 Definition

The average speed of vehicles travelling along a Road Element.

7.2.19.2 Domain/unit of measure

7.2.19.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is kilometre per hour; English default unit is mile per hour.

7.2.19.2.2 Measure

A measure of Average Vehicle Speed is composed of a value and a unit of measure.

7.2.19.2.3 Unit of measure

The unit of measure of Average Vehicle Speed is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.20 Block Class Name

7.2.20.1 Definition

The functional or usage description of a Town Block or Water Body.

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7.2.20.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid name.

7.2.20.3 Description

A group of blocks sharing an Attribute value may be displayed in the same colour.

7.2.21 Block Grouping

7.2.21.1 Definition

Grouping of Town Block or Waterways based on the same Attribute value.

7.2.21.2 Domain/unit of measure

- Group 1
- Group 2
- …
- Group 99

7.2.21.3 Description

A group of blocks sharing an Attribute value may be displayed in the same style, such as Town Blocks belonging to one city or suburb, or a campus.

7.2.22 Block Type

7.2.22.1 Definition

Type of characteristic represented by Block Detail.

7.2.22.2 Domain/unit of measure

- Sub-division Line
- Crossing Line

7.2.22.3 Description

7.2.22.3.1 Definition of Sub-division Line

Line to identify adjacent areas divided by a real or virtual border, such as a sluice gate. For visualisation this allows to depict representative sub-structures within areas of the same display colour or texture.

7.2.22.3.2 Definition of Crossing Line

Line to identify a division between different elevation levels.

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7.2.23 Blocked Passage

7.2.23.1 Definition

Indication of a physical barrier on a Road Element.

7.2.23.2 Domain/unit of measure

Composite.

7.2.23.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Blocked Passage Location — Mandatory
- Blocked Passage Type
- Removable Blockage

7.2.24 Blocked Passage Location

7.2.24.1 Definition

Indication of a physical obstruction on a Road Element.

7.2.24.2 Domain/unit of measure

- Physically blocked at Start Junction
- Physically blocked at End Junction
- Physically blocked between Start and End Junction

7.2.24.3 Description

The blockage at the Start or End Junction should be interpreted in such a way that in these situations it is not possible to enter the Road Element at that point. When the blockage is near one of these locations, but it is possible to actually enter the Road Element, the value “Physically blocked between Start and End Junction” should be applied.

The Attribute Blocked Passage Location is used as a Sub-Attribute in conjunction with the Sub-Attributes Removable Blockage and Blocked Passage Type. Together these Sub-Attributes form the Composite Attribute Blocked Passage.

7.2.25 Blocked Passage Type

7.2.25.1 Definition

The type of blocked passage as an indication of the fact whether it is removable.

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7.2.25.2 Domain/unit of measure

- Permanently fixed
- Removable

7.2.25.3 Description

A barrier is considered permanently fixed if the barrier may not be removed without destroying it. It is considered removable if it is designed to free the entrance to the (other side of the) road element that it is blocking.

The Attribute Blocked Passage Type is used as a Sub-Attribute in conjunction with the Sub-Attributes Removable Blockage and Blocked Passage Location. Together these Sub-Attributes form the Composite Attribute Blocked Passage.

7.2.26 Boundary Type

7.2.26.1 Definition

Defines the type of boundary separating Built-up Areas, Named Areas and Districts.

7.2.26.2 Domain/unit of measure

- Edge of Database Coverage Area
- Police District
- Emergency Medical Dispatch District
- School District
- Census District
- Fire Dispatch District
- Postal District
- Phone District
- Elective District
- Named Area
- Built-up Area

7.2.27 Brand Name

7.2.27.1 Definition

The brand name of a Service.

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7.2.27.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid name.

7.2.27.3 Description

EXAMPLE Renault, Texaco, Q8, or Hilton.

7.2.28 Breakfast Available

7.2.28.1 Definition

This Attribute when True indicates whether breakfast is available as part of the Service.

7.2.28.2 Domain/unit of measure

- True
- False

7.2.29 Building Class Name

7.2.29.1 Definition

The functional or architectural description of the Building.

EXAMPLE Church, or Tower.

7.2.29.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid name.

7.2.29.3 Description

Building Class Name only applies to the Feature Building, Schematic Building or Building Unit within the Feature Theme Land Cover And Use.

7.2.30 Building Detail Type

7.2.30.1 Definition

Type of characteristic represented by Building Detail.

7.2.30.2 Domain/unit of measure

- Soft Line
- Hard Line

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7.2.30.3 Description

7.2.30.3.1 Definition of Soft Line

Line depicting prominent decorative characteristics, such as painted or imprinted line patterns of a (landmark) building.

7.2.30.3.2 Definition of Hard Line

Line depicting representative edges of the building, such as sub-shapes of a Building having a different elevation.

7.2.31 Building Storey

7.2.31.1 Definition

One or multiple storey(s) of a Building or Building Façade.

7.2.31.2 Domain/unit of measure

A Building Storey is identified by an alphanumeric character or set of characters, possibly including a minus sign. A range of Building Storeys is separated by a tilde (´~´). The enumeration of Building Storeys or Building Storey ranges are listed comma-separated (´,´).

7.2.31.3 Description

The Attribute Building Storey may be used in conjunction with the Sub-Attributes Façade Component, Façade Colour and Façade Fabric. Together they make up the Composite Attribute Façade Information. In this case the Building Storey numbers shall not be negative.

The Attribute Building Storey may be used in conjunction with the Sub-Attributes Place Name, Street Name, House Number, Postal Code. Together they make up the Composite Attribute Service Address.

Numbering conventions depend on the usage within the context of the respective Composite Attributes.

7.2.32 Building Storey Count

7.2.32.1 Definition

The total number of full storeys of a Building above ground.

7.2.32.2 Domain/unit of measure

An integer number.

7.2.32.3 Description

The lowest storey representing the ground level is numbered 1, regardless whether a Lower Building Elevation is specified or not. In case it is specified, the Building Storey Count represents the number of virtual storeys plus the number of real storeys (as if the building structure would not be elevated).

The roof shall not be taken into account in the count.

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7.2.33 Business Lunch

7.2.33.1 Definition

This Attribute when True indicates whether business lunch is available.

7.2.33.2 Domain/unit of measure

- True
- False

7.2.34 Car Dealer Type

7.2.34.1 Definition

Whether a Car Dealer offers sales facilities, repair facilities or a combination of both.

7.2.34.2 Domain/unit of measure

- Sales Facility
- Repair Facility
- Sales and Repair Facility

7.2.35 City Centre Administrative Class

7.2.35.1 Definition

An indication of the administrative importance of a City Centre.

7.2.35.2 Domain/unit of measure

- Class 0: Capital of Country
- Class 1: Capital of the Order-1 Area
- Class 2: Capital of the Order-2 Area
- Class 3: Capital of the Order-3 Area
- Class 4: Capital of the Order-4 Area
- Class 5: Capital of the Order-5 Area
- Class 6: Capital of the Order-6 Area
- Class 7: Capital of the Order-7 Area
- Class 8: Main settlement of Order-8 Area
- Class 9: Main settlement of Order-9 Area

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- Others: Remaining City Centres (e.g. hamlet, town quarters)

7.2.35.3 Description

Class 1 to 7 are country dependent and may not all be present. However, a general rule is that Class i is always more important than Class i+1.

7.2.36 Commercial Airline Service

7.2.36.1 Definition

This Attribute when True indicates whether an airport offers scheduled flight services.

7.2.36.2 Domain/unit of measure

- True
- False

7.2.37 Common Language

7.2.37.1 Definition

A language in common use in an Administrative or Named Area which is not officially recognized by the government.

7.2.37.2 Domain/unit of measure

An ISO 639-2 language code

7.2.37.3 Description

A given area may have multiple common languages.

7.2.38 Commuter/Regional Railway Station

7.2.38.1 Definition

This Attribute when True indicates a facility established to provide inter-city and commuter rail transportation.

7.2.38.2 Domain/unit of measure

- True
- False

7.2.39 Complex Building Elevation

7.2.39.1 Definition

The description of lower and upper elevation of a Building above the (projected) building footprint.

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7.2.39.2 Domain/unit of measure

Composite

7.2.39.3 Sub-Attributes

This Composite Attribute consists of the following Sub-Attributes:

- Upper Building Elevation - Mandatory
- Lower Building Elevation

7.2.39.4 Description

The use of both, Lower Building Elevation and Upper Building Elevation allows specifying elevated buildings (building parts) such as a skyway between two towers. In such a case, the Building (footprint) associated with the skyway is its projection on the ground.

Most common will be the specification of Upper Building Elevation only.

7.2.40 Composite Alternate Pronunciation

7.2.40.1 Definition

Attribute group for alternate pronunciation(s).

7.2.40.2 Domain/unit of measure

Composite.

7.2.40.3 Sub-Attributes

- Alternate Pronunciation — Mandatory
- Pronunciation Variant
- Phonetic Alphabet
- Pronunciation Language
- Transcription Description

7.2.40.4 Description

The Composite Alternate Pronunciation Attribute is associated with name strings, i.e. with the actual values of name Attributes.

For information about standard pronunciation of names, the Attribute Composite Pronunciation is provided.

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7.2.41 Composite Exit Number

7.2.41.1 Definition

Information about numbers and names of an individual exit along a motorway.

7.2.41.2 Domain/unit of measures

Composite.

7.2.41.3 Sub-Attributes

- Exit Number
- Official Name
- Alternate Name
- Route number

7.2.42 Composite Form of Way

7.2.42.1 Definition

Certain aspects of the physical form that a Road Element takes. It is based on a number of certain physical and traffic properties.

7.2.42.2 Domain/unit of measure

Composite.

7.2.42.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Form of Way — Mandatory
- Slip Road Type
- Motorway
- Enclosed Traffic Area Type

7.2.43 Composite Pronunciation

7.2.43.1 Definition

Attribute group for standard pronunciation.

7.2.43.2 Domain/unit of measure

Composite.

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7.2.43.3 Sub-Attributes

- Pronunciation — Mandatory
- Phonetic Alphabet
- Pronunciation Language
- Transcription Description

7.2.43.4 Description

The Composite Pronunciation Attribute is associated with name strings, i.e. with the actual values of name Attributes.

For information about alternate (non-standard) pronunciation of names, the Attribute Composite Alternate Pronunciation is provided.

7.2.44 Conditional Traffic Flow

7.2.44.1 Definition

Is traffic allowed to flow on a Road Element, lane, Ferry Connection or Path.

7.2.44.2 Domain/unit of measure

- Open: Traffic is allowed.
- Closed: Traffic is not allowed.

7.2.44.3 Description

7.2.44.3.1 Definition of Traffic

The meaning of the term "Traffic" shall be interpreted as one of several values of the associated Sub-Attribute Vehicle Type or as a logical OR combination of these.

7.2.44.3.2 Conditional Traffic Flow as Sub-Attribute for lanes

This Attribute is may be attached to Road Elements as a Simple Attribute or as a Sub-Attribute in conjunction with Lane-Dependent Validity, Lane Type, Width, Divider, and Direction Category. In the latter case, these Sub-Attributes form the Composite Attribute Lane Info.

7.2.45 Construction Status

7.2.45.1 Definition

Whether a Feature such as a Road Element or Path is currently under construction or in the planning stage.

7.2.45.2 Domain/unit of measure

- Under Construction —Open

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- Under Construction — Closed
- Planned

7.2.46 Correspondence

7.2.46.1 Definition

As part of a Linear Assignment, a Correspondence specifies the (simple) mapping between a whole source Line Feature and a target Line Feature.

7.2.46.2 Domain/unit of measure

Composite

7.2.46.3 Sub-Attributes

- Correspondence Order — Mandatory
- Validity Direction — Mandatory

7.2.46.4 Description

A Correspondence's Validity Direction Attribute indicates whether the source Line Feature is in the same or opposite direction as the target Line Feature.

Correspondences are ordered, based on their Correspondence Order Attribute. The Correspondence Order corresponds to the logical Feature number among the set of target Line Features.

7.2.47 Correspondence Order

7.2.47.1 Definition

The position of the Correspondence in the list of Correspondences of a Linear Assignment.

7.2.47.2 Domain/unit of measure

A positive integer.

7.2.47.3 Description

A Linear Assignment has one or more Correspondences, each for a single target Line Feature in the assignment. The Correspondence Order puts all Correspondences in consecutive order from the start of the source Line Feature, being assigned in the increasing direction of the source Line Feature.

This Attribute is used as a Sub-Attribute in conjunction with Validity Direction. Together these Sub-Attributes form the Composite Attribute Correspondence.

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7.2.48 Continuation Type

7.2.48.1 Definition

Classification whether or not the Connectivity Relationship specified between incoming lane(s) and outgoing lane(s) represents natural continuations.

7.2.48.2 Domain/unit of measure

- Natural
- Other type of lane transition

7.2.49 Currency

7.2.49.1 Definition

The national currency in which a certain payment may be made.

7.2.49.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which specifies a currency according to the internationally accepted abbreviation rules [11].

7.2.49.3 Description

This Sub-Attribute is to be used in combination with the Sub-Attribute Toll Charge to specify a certain Toll to be paid.

7.2.50 Departure/Arrival

7.2.50.1 Definition

Whether a traffic Service is only for departures or arrivals, or both.

7.2.50.2 Domain/unit of measure

- Departure
- Arrival
- Departure and Arrival

7.2.51 Destination of Flight Connection

7.2.51.1 Definition

The destination of the Flight Connection.

7.2.51.2 Domain/unit of measure

The value should be expressed in the international standard IATA three letter airport code [9] or the international standard ICAO four letter airport code [10], respectively. Optionally this may be followed

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by a one position indication for a possible terminal. If the airport only has one terminal the last character should be a zero or left out.

7.2.51.3 Description

This Attribute may be used as a Sub-Attribute of the Composite Attribute Flight Info.

7.2.52 Destination Info on Traffic Sign

7.2.52.1 Definition

Information present on Traffic Signs which relates to destinations.

7.2.52.2 Domain/unit of measure

Composite.

7.2.52.3 Sub-Attribute

- Destination Location [.]..[.]
- Route Number On Sign [.]..[.]
- Exit Number [.]..[.]

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.2.53 Destination Location

7.2.53.1 Definition

Information which relates to locations expressed on the traffic sign as destinations.

7.2.53.2 Domain/unit of measure

Any combination of characters and punctuation.

7.2.53.3 Description

EXAMPLE Settlement Name, Industrial Area Name, or Neighbourhood Name.

This Attribute is a Sub-Attribute which together with Route Number On Sign and Exit Number forms the Composite Attribute Destination Info On Traffic Sign.

7.2.54 Direction Category

7.2.54.1 Definition

The directionality meaning of arrows or other symbols on the road (lane) surface or on a sign.

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7.2.54.2 Domain/unit of measure

- No direction indicated
- Ahead
- Between ahead and right
- Right
- Between right and backward
- Backward (U-turn)
- Between backward and left
- Left
- Between Left and Ahead
- Merge into right lane (lane ends)
- Merge into left lane (lane ends)
- Merging lanes (no priority lane)

7.2.54.3 Description

This Attribute is used as a Sub-Attribute for either of the three Composite Attribute Traffic Sign Information, Traffic Signal Info, and Lane Info. In the former case it is only meaningful if it is preceded by a Sub-Attribute Traffic Sign Class.

All references (e.g. Ahead, Right) are made in relation to the driving direction of the driver confronted with the road markings or sign. Figure 115 gives graphical examples for the defined direction values (except for those related to merge cases).

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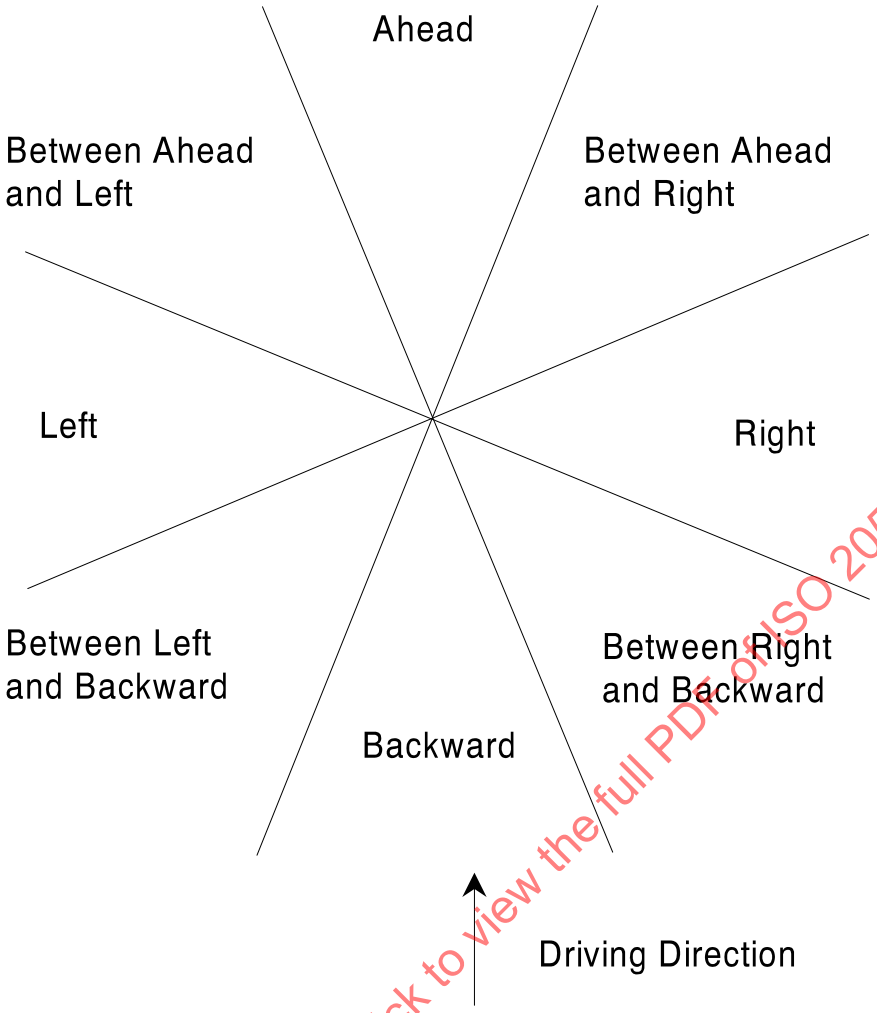


Figure 115 — Graphical representation of the defined direction values

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7.2.55 Directional Prefix

7.2.55.1 Definition

A geographic direction which is part of the official/alternate street name or route number of a Road Element or Address Area Boundary Element and which precedes the

- Official/Alternate Street Name Body
- Route Number Body

or

- Street Type Prefix
- Route Type Prefix.

7.2.55.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid Directional Prefix.

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7.2.55.3 Description

This Attribute is used as a Sub-Attribute to form the Composite Attribute Official/Alternate Street Name or the Composite Attribute Route Number. In the first case it is possibly combined with the Sub-Attributes Official/Alternate Street Name Body, Street Type Prefix, Trailing Spaces, Street Type Suffix, Directional Suffix and Composite Pronunciation. In the second case it is possibly combined with the Sub-Attributes Directional Prefix, Route Type Prefix, Separator, Route Number Body, Route Type Suffix, Directional Suffix, Composite Pronunciation.

7.2.56 Directional Suffix

7.2.56.1 Definition

A geographic direction which is part of the official/alternate street name or route number of a Road Element or Address Area Boundary Element and which succeeds the

- Official/Alternate Street Name Body
- Route Number Body

or

- Street Type Prefix
- Route Type Prefix

7.2.56.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid Directional Suffix.

7.2.56.3 Description

This Attribute is used as a Sub-Attribute to form the Composite Attribute Official/Alternate Street Name or the Composite Attribute Route Number. In the first case it is possibly combined with the Sub-Attributes Official/Alternate Street Name Body, Street Type Prefix, Trailing Spaces, Street Type Suffix, Directional Suffix and Composite Pronunciation. In the second case it is possibly combined with the Sub-Attributes Directional Prefix, Route Type Prefix, Separator, Route Number Body, Route Type Suffix, Directional Suffix.

7.2.57 Display Class

7.2.57.1 Definition

A classification of Features which enables a meaningful display of these Features.

7.2.57.2 Domain/unit of measure

- First Class
- Second Class
- Third Class
- Fourth Class

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- Fifth Class
- Sixth Class
- Seventh Class
- Eighth Class
- Ninth Class
- Tenth Class

7.2.57.3 Description

Although the user is free to apply his own classification scheme, it is recommended that classification is assigned according to the importance of the associated Feature instances in such a way that the most important Feature instances are classified in the first class.

7.2.58 Distance Expression

7.2.58.1 Definition

A composite expression of a linearly referenced location according to the applicable Linear Referencing Method.

7.2.58.2 Domain/unit of measure

Composite

7.2.58.3 Sub-Attributes

- Distance Measure — Mandatory
- Distance Measure Referent
- Lateral Offset

7.2.58.4 Description

The Distance Expression comprises a Distance Measure, being an absolute, relative, or interpolative linear referencing distance, in accordance with the (default or local) Linear Referencing Method of the Line Feature it is measured against.

In case of a relative Linear Referencing Method, the Distance Measure Referent is to be specified for the relative Distance Measure.

The referenced location may have a Lateral Offset from the Line Feature, which is measured right or left of the Line Feature from the point defined by the Distance Measure.

This Attribute may be used as a Sub-Attribute in conjunction with Start End Flag. Together these Sub-Attributes form the Composite Attribute Linear Position.

Alternatively, this Attribute may be used as a Sub-Attribute within the scope of the Composite Attribute Linear Segmentation. In this case, its Sub-Attribute Lateral Offset is not applicable.

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7.2.59 Distance Measure

7.2.59.1 Definition

A measured or calculated distance along a Line Feature as part of a Distance Expression for linear referencing.

7.2.59.2 Domain/unit of measure

7.2.59.3 Value domain

The value should be expressed according to the applicable Linear Referencing Method.

7.2.59.4 Measure

A measure of Distance Measure is composed of a value and a unit of measure.

7.2.59.5 Unit of measure

Deviating from the general unit of measure concept, the unit of measure of Distance Measure is limited to a unit exponent for the applicable Linear Referencing Method. The unit exponent is expressed as 10LOG of the multiplication factor with which the Distance Measure's value, in terms of the base unit of the Linear Referencing Method at hand, shall be multiplied.

EXAMPLE If the applicable Location Referencing Method is Kilopoint and the Unit Exponent is set to -3, a Distance Measure value of 25 actually represents a distance of 25 metres or 0,025 kilometres.

7.2.59.6 Description

It is determined by the applicable (default or local) Linear Referencing Method, whether the measure represents an absolute, relative, or interpolative linear referencing distance.

This Attribute is used as a Sub-Attribute in conjunction with Distance Measure Referent, and Lateral Offset. Together these Sub-Attributes form the Composite Attribute Distance Expression.

Alternatively, this Attribute is used as a Sub-Attribute in conjunction with Assignment Order. Together these Sub-Attributes form the Composite Attribute Point Assignment.

7.2.60 Distance Measure Referent

7.2.60.1 Definition

The Referent associated with a Line Feature, which is used for expressing the linearly referenced location in a relative Linear Referencing Method applicable for the Line Feature.

7.2.60.2 Domain/unit of measure

The number of a Referent as designated as Feature number in the Multi-Point Assignment Relationship or the Exclusive Multi-Point Assignment Relationship between the Referent and the Line Feature along which the Distance Measure is expressed.

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7.2.60.3 Description

This Attribute is used as a Sub-Attribute in conjunction with Distance Measure, and Lateral Offset. Together these Sub-Attributes form the Composite Attribute Distance Expression.

7.2.61 Divided Road Element

7.2.61.1 Definition

An Indication of the presence of a physical or legal divider which separates opposing lanes of traffic.

7.2.61.2 Domain/unit of measure

- True
- False

7.2.61.3 Description

This Attribute when True indicates the existence of a physical or legal divider along the centre line of a single bi-directional Road Element. Depending on the geometrical accuracy requirements of the application, a physical divider or legal divider may either be represented by this Attribute or by the representation of each individual carriageway by a separate centre line.

This Attribute gives no information about the possibility to cross the divider at the start or end Junction.

This Attribute should be used as a Sub-Attribute possibly in conjunction with (one of) the Sub-Attributes Divider Type, Divider Width, Divider Height, Divider Marking, Divider Impact, and Divider Colour. Together they form the Composite Attribute Divider.

7.2.62 Divider

7.2.62.1 Definition

Information about the existence of a physical or legal divider along a Road Element, which is not expressed by individual Features, corresponding to a divider between opposite traffic flow directions of the Road Element as a whole or between individual lanes.

7.2.62.2 Domain/unit of measure

Composite.

7.2.62.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Divided Road Element
- Divider Type
- Divider Width
- Divider Height

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- Divider Marking
- Divider Impact
- Divider Colour

7.2.62.4 Description

The Attribute Divider may be used both for whole Road Elements (in which case it corresponds to the divider between the two opposite carriageways) or for dividers between individual lanes.

In the first case, the Sub-Attribute Divided Road Element is mandatory.

In the second case, divider information relates to the boundary between any given lane (expressed via the Restrictive Sub-Attribute Lane-dependent Validity) and the respective "next lane", either to the left or right. Which neighbouring lane is considered the "next" lane follows from the lane counting convention that is adopted from the Lane-Dependent Validity Attribute. In this context, left and right are related to the "From➔ To" orientation of the Road Element.

7.2.63 Divider Colour

7.2.63.1 Definition

The colour of legal divider markings.

7.2.63.2 Domain/unit of measure

- White
- Yellow

7.2.63.3 Description

This Attribute should be used as a Sub-Attribute in conjunction with the Sub-Attributes Divided Road Element, Divider Type, Diver Width, Divider Height, Divider Marking, and Divider Impact. Together they form the Composite Attribute Divider.

Divider Colour specifically relates to the Divider Type "Legal Divider" and allow for further sub-typing.

7.2.64 Divider Height

7.2.64.1 Definition

The height of the divider along the Road Element or between individual lanes.

7.2.64.2 Domain/unit of measure

7.2.64.2.1 Value domain

The value shall be expressed in either Metric or English default units, or in user-defined units. Metric default unit is centimetre; English default unit is inch.

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7.2.64.2.2 Measure

A measure of Divider Height is composed of a value and a unit of measure.

7.2.64.2.3 Unit of measure

The unit of measure of Divider Height is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.64.3 Description

This Attribute should be used as a Sub-Attribute in conjunction with the Sub-Attributes Divided Road Element, Divider Type, Divider Width, Diver Marking, Divider Impact, and Divider Colour. Together they form the Composite Attribute Divider.

7.2.65 Divider Impact

7.2.65.1 Definition

Identifies whether and under which conditions a divider may be crossed.

7.2.65.2 Domain/unit of measure

- Traversable
- Traversable from the right only
- Traversable from left only
- Not traversable

7.2.65.3 Description

This Attribute should be used as a Sub-Attribute in conjunction with the Sub-Attributes Divided Road Element, Divider Type, Diver Width, Divider Height, Divider Marking, and Divider Colour. Together they form the Composite Attribute Divider.

7.2.66 Divider Marking

7.2.66.1 Definition

The type of marking of a legal divider.

7.2.66.2 Domain/unit of measure

- No line markings
- Dashed Line (long line sections)
- Double solid line
- Single solid line
- Double line: combination of (inner) single solid line and (outer) dashed line

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- Double line: combination of (inner) dashed line and (outer) single solid line
- Dashed line (short line sections)
- Shaded area marking

NOTE The "Outer" line of the double line of the lane boundary under consideration refers to the line which is closer to the "next" lane (in lane counting direction; see description of Composite Attribute Divider), "Inner" refers to the other line of the two. If no counting direction is specified (e.g. in case Divider Type and Divider Marking is not described for lanes but for whole Road Elements, right hand traffic/left hand traffic determines which lane is counted first.

7.2.66.3 Description

This Attribute should be used as a Sub-Attribute in conjunction with the Sub-Attributes Divided Road Element, Divider Type, Diver Width, Divider Height, Divider Impact, and Divider Colour. Together they form the Composite Attribute Divider.

Divider Marking specifically relates to the Divider Type "Legal Divider" and allow for further sub-typing.

7.2.67 Divider Type

7.2.67.1 Definition

Classification of the divider along the Road Element or between individual lanes.

7.2.67.2 Domain/unit of measure

- Legal Divider (not physical)
- Physical Divider

7.2.67.3 Description

This Attribute should be used as a Sub-Attribute in conjunction with the Sub-Attributes Divided Road Element, Divider Width, Divider Height, Diver Marking, Divider Impact, and Divider Colour. Together they form the Composite Attribute Divider.

The fact whether a particular divider is crossable for traffic or not may not be implied from its type or marking. It is for example a permitted to cross a continuous white line in Hong Kong, while this is not the case in Germany. Therefore explicit "crossability" information may be specified in the Sub-Attribute Divider Impact to allow the interpretation of lane divider types and markings with regards to their impact on traversing between lanes.

The Sub-Attributes Divider Marking and Divider Colour specifically relate to the Divider Type "Legal Divider" and allow for further sub-typing.

7.2.68 Divider Width

7.2.68.1 Definition

The width of the divider along the Road Element or between individual lanes.

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7.2.68.2 Domain/unit of measure

7.2.68.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is centimetre; English default unit is inch.

7.2.68.2.2 Measure

A measure of Divider Width is composed of a value and a unit of measure.

7.2.68.2.3 Unit of measure

The unit of measure of Divider Width is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.68.3 Description

This Attribute should be used as a Sub-Attribute in conjunction with the Sub-Attribute Divided Road Element, Divider Type, Divider Height, Divider Marking, Divider impact, and Divider Colour. Together they form the Composite Attribute Divider.

This Attribute may also be used in conjunction with Structure Abutment. In this case they together form the Composite Attribute Structure Abutment Info.

7.2.69 Domestic/International

7.2.69.1 Definition

Whether a traffic Service is for Domestic or International traffic, or both.

7.2.69.2 Domain/unit of measure

- Domestic
- International
- Domestic and International

7.2.70 Enclosed Traffic Area Type

7.2.70.1 Definition

The type of Enclosed Traffic Area.

7.2.70.2 Domain/unit of measure

- Parking Place
- Parking Building
- Unstructured Traffic Square
- Pedestrian Square

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- Another Type of Enclosed Traffic Area

7.2.70.3 Description

7.2.70.3.1 Usage rule

This Attribute may be used for Features other than Enclosed Traffic Areas as a Sub-Attribute in conjunction with the Sub-Attributes Form of Way, Motorway and Slip Road Type. Together these form the Composite Attribute Composite Form of Way.

7.2.70.3.2 Definition of Parking Place

A ground level parking location for passenger cars and/or commercial vehicles.

7.2.70.3.3 Definition of Parking Building

A car park within a building which may be multi-storey and/or (partly) subterranean.

7.2.70.3.4 Definition of Unstructured Traffic Square

An unstructured traffic square is an area on the road network which allows for the confluence of traffic from different roads, for the purpose of moving from one road to another, which has no internal structure of legally defined driving directions.

7.2.70.3.5 Definition of Pedestrian Square

An open area designated for (unstructured) pedestrian movement and sojourn, separate from roadways and sidewalks. Pedestrian squares are usually paved and may be enclosed by buildings, roads, waterfronts, or other land cover; the squares may be furnished with structures such as flower beds, trees, benches, fountains, etc.

7.2.70.3.6 Definition of Other Type Of Enclosed Traffic Area

A form of Enclosed Traffic Area other than Parking Place, Parking Building or Unstructured Traffic Square.

7.2.71 Entry Point Type

7.2.71.1 Definition

The specification of the importance of an Entry Point.

7.2.71.2 Domain/unit of measure

- Main
- Minor

7.2.71.3 Description for Entry Points of a Service

A “Main” entrance is generally characterized by the following:

- It coincides with the address of the selected Service;

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- It is provided with a reception/lobby for visitors;
- It is the entrance which attracts the most attention;
- It is the entrance to which road signs (if present) point.

At least one of the Entry Points (one or more) of a service shall be Attributed as “Main”.

7.2.72 Equipment Identifier

7.2.72.1 Definition

A unique alphanumeric identifier ascribed to a particular Road Furniture Feature, which may provide a key to an external database.

7.2.72.2 Domain/unit of measure

As specified by the administrating body.

7.2.73 Exit Number

7.2.73.1 Definition

The number of an exit along a motorway which has been assigned by an administrating body.

7.2.73.2 Domain/unit of measures

Any valid number, including point, prefixes or suffixes which specify directional or sub-division information.

EXAMPLE Exit 2, Exit 34B, Junction 67, or Exit 48 North.

7.2.73.3 Description

This Attribute may be used as a Sub-Attribute in conjunction with the Sub-Attributes Route Number, Alternate Name and Official Name. Together they form the Composite Attribute Composite Exit Number.

This Attribute is a Sub-Attribute which together with Destination Location and Route Number On Sign forms the Composite Attribute Destination Info On Traffic Sign.

7.2.74 External Identifier

7.2.74.1 Definition

A unique alphanumeric identifier ascribed to a particular Feature.

7.2.74.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid external identifier.

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7.2.75 Façade Colour

7.2.75.1 Definition

The colour of a Building Façade.

7.2.75.2 Domain/unit of measure

A comma-separated list of three RGB (red, green, blue) colour parameters.

7.2.75.3 Description

The Attribute Façade Colour is used in conjunction with the Sub-Attributes Building Storey, Façade Component and Façade Fabric. Together they make up the Composite Attribute Façade Information according to the "CIE 1931 RGB colour space" specification, internationally recognised by specialists.

7.2.76 Façade Component

7.2.76.1 Definition

Characteristics of a Building Façade.

7.2.76.2 Domain/unit of measure

Composite.

7.2.76.3 Sub-Attributes

This Composite Attribute consists of the following Sub-Attributes:

- Multi Media File Attachment - Mandatory
- Façade Component Placement

7.2.76.4 Description

A façade may be composed of a single Façade Component Object (representing the whole façade area), of one Façade Component Object per (set of) building storeys, or of multiple details of a façade such as window and door objects.

The Attribute Façade Component is used in conjunction with the Sub-Attributes Building Storey, Façade Colour and Façade Fabric. Together they make up the Composite Attribute Façade Information.

7.2.77 Façade Component Placement

7.2.77.1 Definition

The relative vertical placement of a Façade Component within (a storey of) the Building Façade.

7.2.77.2 Domain/unit of measure

- Aligned at the Bottom

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- Spanning Bottom to Center
- Centered
- Spanning Center to Top
- Aligned at the Top
- Spanning Bottom to Top
- Spanning whole facade

7.2.77.3 Description

The Attribute Façade Component Placement is used in conjunction with the Attribute Multi Media File Attachment. Together they make up the Composite Attribute Façade Component.

7.2.78 Façade Fabric

7.2.78.1 Definition

Description of the fabric a building façade is made of.

7.2.78.2 Domain/unit of measure

Composite.

7.2.78.3 Sub-Attributes

This Composite Attribute consists of the following Sub-Attributes:

- Façade Fabric Type
- Multi-media Attachment File

7.2.78.4 Description

The Façade Fabric may be specified either as an encoded type within a (user-defined) classification, and/or as a digital image type of Multi-Media File Attachment.

The Attribute Façade Fabric is used in conjunction with the Sub-Attributes Building Storey, Façade Component and Façade Colour. Together they make up the Composite Attribute Façade Information.

7.2.79 Façade Fabric Type

7.2.79.1 Definition

The classification of the physical material and structure of which a Building Façade is made of.

7.2.79.2 Domain/unit of measure

- Facade Fabric type 1
- Facade Fabric type 2

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- ….
- Facade Fabric type 999

7.2.79.3 Description

EXAMPLE Brick walls, concrete, etc.

7.2.80 Façade Information

7.2.80.1 Definition

The description of the constructive composition of one or more storey(s) of a Building Façade.

7.2.80.2 Domain/unit of measure

Composite.

7.2.80.3 Sub-Attributes

This Composite Attribute consists of the following Sub-Attributes:

- Building Storey
- Façade Component […]
- Façade Colour
- Façade Fabric

7.2.80.4 Description

In case of multiple Façade Components, their order is significant. The sequence corresponds to the linear orientation of the Building Façade Feature.

In case a Lower Building Elevation is specified, Façade Information corresponding to 'virtual' Building Storeys below the elevated building structure will not be provided. When specifying Building Storeys, the number of virtual storeys plus the number of real storeys (as if the building structure would not be elevated) is anticipated. This is in accordance with the way the Building Storey Count for the Building in question is determined.

The lowest storey representing the ground level is numbered 1.

7.2.81 Facilities En Suite

7.2.81.1 Definition

The number of rooms with en suite facilities.

7.2.81.2 Domain/unit of measure

Any positive integer within Field limits.

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7.2.82 Ferry Type

7.2.82.1 Definition

The subclass of, or the type of, a Ferry Connection.

7.2.82.2 Domain/unit of measure

- Operated by a ship or a hovercraft
- Operated by a train

7.2.83 First House Number

7.2.83.1 Definition

The first house number along the Road Element or the Address Area Boundary Element.

7.2.83.2 Domain/unit of measure

The domain of values is only limited in a physical sense. The value has a maximum size of 10 characters. The characters may be of any kind or combination: digits, alphabetic characters or graphical characters.

EXAMPLE 223, 456, 57-a, or 435-II.

7.2.83.3 Description

This Attribute shall be left blank when there are no numbered houses along the Road Element or the Address Area Boundary Element.

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes House Number Structure, Last House Number and possibly Intermediate House Number. Together these Attributes form the Composite Attribute House Number Range.

7.2.84 Flight Info

7.2.84.1 Definition

Information concerning a certain flight connection.

7.2.84.2 Domain/unit of measure

Composite.

7.2.84.3 Sub-Attributes

The Composite Attribute Flight Info contains the following Sub-Attributes:

- ID of a Flight Connection — Mandatory
- Airport Code
- Destination of a Flight Connection

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- Time of Departure of a Flight Connection
- Time of Arrival of a Flight Connection
- Time difference of a Flight Connection.

7.2.85 Form of Way

7.2.85.1 Definition

Certain aspects of the physical form that a Road Element takes. It is based on a number of certain physical and traffic properties.

7.2.85.2 Domain/unit of measure

- Part of a Motorway;
- Part of a Multiple Carriageway which is not a motorway;
- Part of a Single Carriageway;
- Part of a Roundabout;
- Part of a Traffic Square;
- Part of an Enclosed Traffic Area;
- Part of a Slip Road;
- Part of a Service Road;
- Entrance to or exit of Car Park;
- Entrance to or exit to Service;
- Part of a Pedestrian Zone;
- Part of an Escape Road

7.2.85.3 Description

7.2.85.3.1 Usage rule

This Attribute is used as a Sub-Attribute possibly in conjunction with the Sub-Attributes Enclosed Traffic Area Type, Motorway and Slip Road Type. Together these Sub-Attributes form the Composite Attribute Composite Form of Way.

7.2.85.3.2 Definition of Motorway

A Motorway is defined as a road permitted for motorized vehicles only in combination with a prescribed minimum speed. It has two or more physically separated carriageways and no single-level crossings.

7.2.85.3.3 Definition of Multiple Carriageway

A multiple carriageway is defined as a road with physically separated carriageways regardless of the number of lanes. If a road is also a motorway, it should be coded as such and not as a multiple carriageway.

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7.2.85.3.4 Definition of Single Carriageway

All roads without separate carriageways are considered as roads with a single carriageway.

7.2.85.3.5 Definition of a Roundabout

A Roundabout is a road which forms a ring on which traffic travelling in only one direction is allowed. A sign like the one shown in Figure 116 is an indication that the Road Element in question is part of a Roundabout Circle.

The Road Elements which make up a Roundabout shall be connected to one another and they shall form exactly one ring. Figure 117 illustrates the formation of a Roundabout from Road Elements.

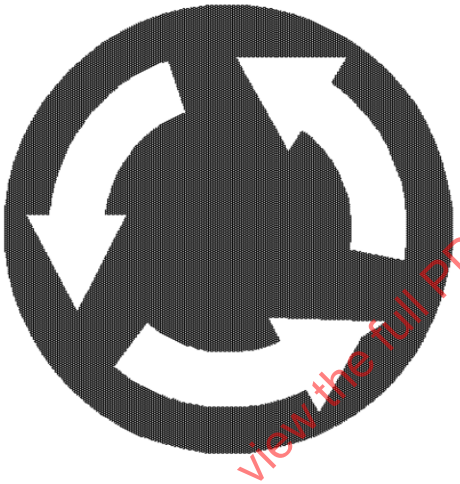


Figure 116 — Example of a roundabout sign used in continental Europe

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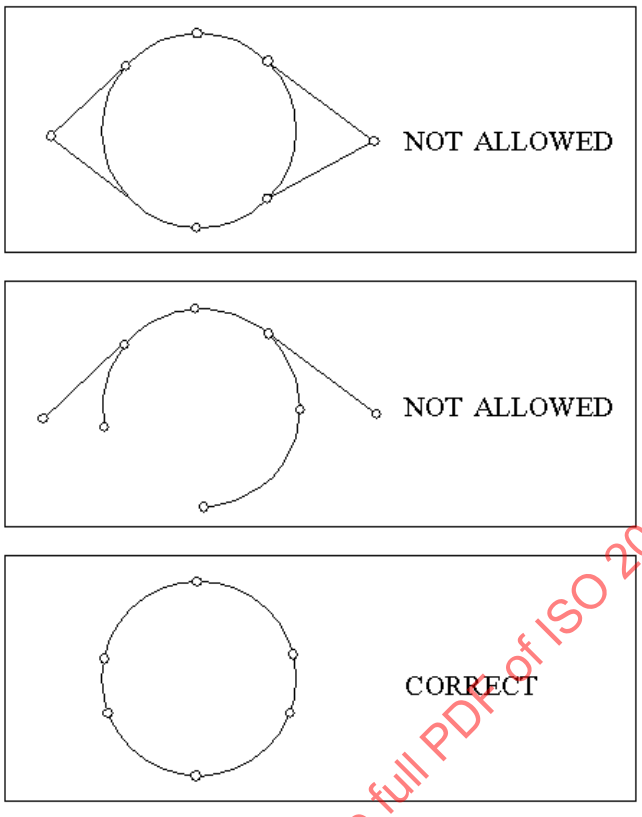


Figure 117 — Examples for the definition of Roundabouts

7.2.85.3.6 Definition of a Traffic Square

A Traffic Square is an open area (partly) enclosed or intersected by roads which is used for non-traffic purposes and which is not a Roundabout.

7.2.85.3.7 Definition of a Slip Road

A Slip Road is a road especially designed to enter or leave a Road Element.

7.2.85.3.8 Definition of a Service Road

A Service Road is a road, running parallel to and connecting to a Road with a relatively high connectivity function, which is especially designed to enable access from the connecting roads to roads with a low connectivity function in its vicinity.

Generally, service roads have the same name as the higher class road they run parallel to and are only divided from it by small constructions like walkways, traffic islands etc.

7.2.85.3.9 Definition of an Enclosed Traffic Area

A confined area within which unstructured traffic movements are allowed.

7.2.85.3.10 Definition of Entrance to or Exit of Car Park

An Entrance or Exit of a Car Park is a road specially designed to enter or to leave a Parking Area.

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7.2.85.3.11 Definition of Entrance to or Exit of Service

An Entrance or Exit of a Service is a road used only to enter or to leave a Service.

7.2.85.3.12 Definition of Pedestrian Zone

A Pedestrian Zone is an area with a road network which is especially designed for use by pedestrians. Pedestrian Zones are usually located in urban areas. Except for emergency vehicles and for delivery vehicles during certain hours no traffic is allowed on the Road Elements which are located inside the Zone.

7.2.85.3.13 Definition of Escape Road

An emergency off-ramp designed to slow down a vehicle that is out of control on a downgrade.

7.2.86 Motorway

7.2.86.1 Definition

This Attribute when True indicates whether a Road Element is part of a Motorway.

7.2.86.2 Domain/unit of measure

- True
- False

7.2.86.3 Description

7.2.86.3.1 Usage rule

This Attribute is used as a Sub-Attribute possibly in conjunction with the Sub-Attributes Form of Way, Slip Road Type and Enclosed Traffic Area Type. Together these form the Composite Attribute Composite Form of Way.

7.2.86.3.2 Definition of a Motorway

A Motorway is defined as a road having no single-level crossings with other roads. This means that connections with other Road Elements only consist of Slip Roads and/or Parallel Roads.

7.2.87 Frequency of a Traffic Connection

7.2.87.1 Definition

The time interval between two departures of a Traffic Connection.

7.2.87.2 Domain/unit of measure

The value shall be expressed as a single time duration using the Time Domain syntax.

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7.2.88 Functional Road Class

7.2.88.1 Definition

A classification based on the importance of the role that the Road Element or Ferry Connection performs in the connectivity of the total road network.

7.2.88.2 Domain/unit of measure

- Main roads: the most important roads in a given network.
- First class roads.
- Second class roads.
- Third class roads.
- Fourth class roads.
- Fifth class roads.
- Sixth class roads.
- Seventh class roads.
- Eighth class roads.
- Ninth class roads: the least important roads in a given network.

7.2.88.3 Description

7.2.88.3.1 Number of road classes

The number may vary from one country to another and depends on the (map) sources which are available.

7.2.88.3.2 Number of road class values

It is allowed in principle that a Road Element has more than one Functional Road Class value, based on different source documents. In such cases it is an absolute requirement that the source document on which a particular value is based is mentioned explicitly.

7.2.88.3.3 Classification of Ferry Connections

The classification of the Feature Ferry Connection shall be homogeneous with the road classification. Consequently, a Ferry Connection joining two Road Elements, each having the same Functional Road Class value, shall also get that Functional Road Class value. A Ferry Connection, joining two Road Elements with different Functional Road Class values, shall get the lowest of these two values.

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7.2.88.3.4 Classification rules

The following rules shall be taken into account for classifications.

- In general, each subset of all Road Elements belonging to a particular Functional Road Class or higher shall always form a connected graph.
- In each of these subsets the number of Road Elements that are dead end shall be kept to a minimum.

7.2.89 General Aviation

7.2.89.1 Definition

This Attribute when True indicates whether an airport offers General Aviation Services.

7.2.89.2 Domain/unit of measure

- True
- False

7.2.90 Give Way Type

7.2.90.1 Definition

The type of Give Way Regulation.

7.2.90.2 Domain/unit of measure

- Give Way (Yield)
- Stop
- All-Way stop (example: 4-Way Stop)
- Caution Sign “Unmarked Intersection Ahead” (i.e. general traffic regulations apply)

7.2.91 Geopolitical Structure Containment

7.2.91.1 Definition

The containing geopolitical structure of an administrative Area Feature or a named Area Feature.

7.2.91.2 Domain/unit of measure

Combined reference to the geopolitical structure ID and the geopolitical structure component ID, separated by a dot (‘.’).

7.2.91.3 Description

Geopolitical structures are composed of administrative areas and named areas, such as Country, Order-8 Area, School District, or Built-up Area, to form a graph of sub-divisions and containment which may be fully or partially hierarchical.

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An instance of a Feature from the Feature Theme Administrative Area or Named Area uses this Attribute to designate which geopolitical structure it is a member of, as well as which specific component within that structure it corresponds to.

EXAMPLE The American town of Lexington plays the role of "CITY" (geopolitical structure component) in the "AMERICAN CCD ADMIN STRUCTURE" (geopolitical structure).
A "CITY" is partially contained in a "COUNTY" (immediate parent) and fully contained in a "STATE" (lowest full parent), both also being geopolitical structure components of the "AMERICAN CCD ADMIN STRUCTURE".

7.2.92 Government Type

7.2.92.1 Definition

The specification of the Government function which is executed in a certain Government Office.

7.2.92.2 Domain/unit of measure

The following types are recognized:

- Supra National
- National
- Order-1
- Order-2
- Order-3
- Order-4
- Order-5
- Order-6
- Order-7
- Municipality

7.2.92.3 Description

Order-1 to 7 represent Administrative Areas on a hierarchical level located between the country and the municipality and are equivalent with the Order-1 to 7 of Administrative Areas.

A Supra-National Government represents a group of more than one country (e.g. Europe, Benelux, UNO).

7.2.93 Hearing Limitation

7.2.93.1 Definition

This Attribute when True indicates accessibility limitation due to a limitation of hearing.

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7.2.93.2 Domain/unit of measure

- True
- False

7.2.93.3 Description

Hearing limitation is a Sub-Attribute that limits access to road elements to people with hearing limitations. Together with Slow Walker Limitation, Vision Limitation, and Wheelchair Limitation, it forms the Composite Attribute Accessibility Limitation.

Hearing Limitation may be restricted by the Restrictive Sub-Attribute Validity Period, which expresses temporality associated with accessibility limitations.

7.2.94 Height Label

7.2.94.1 Definition

The designated altitude of a Feature.

7.2.94.2 Domain/unit of measure

7.2.94.2.1 Value domain

The value shall be expressed in either Metric or English default units, or in user-defined units. Metric default unit is metre; English default unit is foot.

7.2.94.2.2 Measure

A measure of Height Label is composed of a value and a unit of measure.

7.2.94.2.3 Unit of measure

The unit of measure of Height Label is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.94.3 Description

7.2.94.3.1 Usage for Road Elements

The Height Label expresses the maximum altitude along a given Road Element if it has been identified as a mountain pass. The Height Label may flexibly use a local or user-defined unit of measure, in contrast to the Z coordinate of the road geometry, which either is absent, or which is expressed according to the vertical coordinate system defined for the containing GDF Section. Furthermore, the Height Label may by deliberately rounded to represent discrete altitude plateaus and therefore differ from the (possibly more precise) Z coordinate.

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attribute Pass and possibly Opening Period. Together these Sub-Attributes form the Composite Attribute Mountain Pass.

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7.2.94.3.2 Usage for Mountain Pass Summit

The Height Label expresses the terrain height associated with a Mountain Pass Summit. The Height Label may flexibly use a local or user-defined unit of measure, in contrast to the Z coordinate of the mountain pass geometry, which either is absent, or which is expressed according to the vertical coordinate system defined for the containing GDF Section. Furthermore, the Height Label may by deliberately rounded to represent discrete altitude plateaus and therefore differ from the (possibly more precise) Z coordinate.

7.2.94.3.3 Usage for Contour Lines

The Height Label expresses the terrain height associated with Contour Lines (including Contour Line Points or Areas). The Height Label may flexibly use a local or user-defined unit of measure, in contrast to the Z coordinate of the contour line geometry, which either is absent, or which is expressed according to the vertical coordinate system defined for the containing GDF Section. Furthermore, the Height Label may by deliberately rounded to represent discrete altitude plateaus and therefore differ from the (possibly more precise) Z coordinate.

7.2.95 High Occupancy Vehicle

7.2.95.1 Definition

The minimum number of occupants of a passenger car allowed on a certain Road Element or lane.

7.2.95.2 Domain/unit of measure

Composite.

7.2.95.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Vehicle Type — Mandatory
- Minimum Number of Occupants

It may only be applied in the case when the Vehicle Type has the value “High Occupancy Vehicle”.

7.2.96 House Number

7.2.96.1 Definition

Any number or number range that specifies the house number(s) associated to a Service or building Unit.

7.2.96.2 Domain/unit of measure

Any combination of numbers, letters or punctuation which forms a valid house number within an address, e.g. 12, 39B, 2300-2360.

7.2.96.3 Description

This Sub-Attribute is also used in conjunction with the Sub-Attributes Street Name, Place Name and Postal Code. Together they form the Composite Attribute Service Address.

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7.2.97 House Number Range

7.2.97.1 Definition

The set of house numbers that is related to one side of a particular road element or to a particular Address Area Boundary Element.

7.2.97.2 Domain/unit of measure

Composite.

7.2.97.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- House Number Structure — Mandatory
- Side of Line — Mandatory
- First House Number
- Last House Number
- Intermediate House Number [.]..[.]

NOTE 1 [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

The number of Sub-Attributes required to define the house number range completely depends on the value given to the House Number Structure Sub-Attribute.

NOTE 2 House numbers on Address Area Boundary Elements appear, by definition, only on one side.

7.2.97.4 Description

This Sub-Attribute is used in conjunction with the Sub-Attributes Official Street Name or Alternate Street Name or Route Number and Postal Code. Together they form the Composite Attribute Address Information.

7.2.98 House Number Structure

7.2.98.1 Definition

The type of house numbering method that is applied to one side of a particular Road Element or to a particular Address Area Boundary Element.

7.2.98.2 Domain/unit of measure

- No house numbers at all
- Regular with odd numbers
- Regular with even numbers
- Regular with odd and even numbers

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- Irregular

7.2.98.3 Description

7.2.98.3.1 Usage rule

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes First House Number, possibly Intermediate House Number and Last House Number. Together these Attributes form the Composite Attribute House Number Range.

7.2.98.3.2 Definition of different House Number Structures

- No house numbers at all: There are no houses along the road element side/Address Area Boundary Element or the houses along the road element side/Address Area Boundary Element are not numbered.

- Regular with odd and even numbers: Odd and even house numbers appear in a sequential sorted order (ascending or descending) when moving from one end of the Road Element/Address Area Boundary Element to the other. Numeric Completeness of the series is not a requirement. A house number series which has missing numbers, but which is sequentially sorted, is considered to be regular.

EXAMPLE 1 (5,6,7,9,10,13).

EXAMPLE 2 (24,27,30,33,34,36).

EXAMPLE 3 (35,36,48,69,71,74,86).

- Regular with odd numbers: The odd house numbers appear in a sequential sorted order (ascending or descending) when moving from one end of the Road Element/Address Area Boundary Element to the other. Numeric Completeness of the series is not a requirement. A house number series which has missing numbers, but which is sequentially sorted, is considered to be regular.

EXAMPLE 4 (5,7,9,11,13).

EXAMPLE 5 (35,39,43,69,71,73,85).

- Regular with even numbers: The even house numbers appear in a sequential sorted order (ascending or descending) when moving from one end of the Road Element/Address Area Boundary Element to the other. Numeric Completeness of the series is not a requirement. A house number series which has missing numbers, but which is sequentially sorted, is considered to be regular.

EXAMPLE 6 (2,4,8,18,22).

- Irregular: Irregular means that house numbers do not occur in any sorted order).

For examples see Figure 118, Figure 119 and Figure 120.

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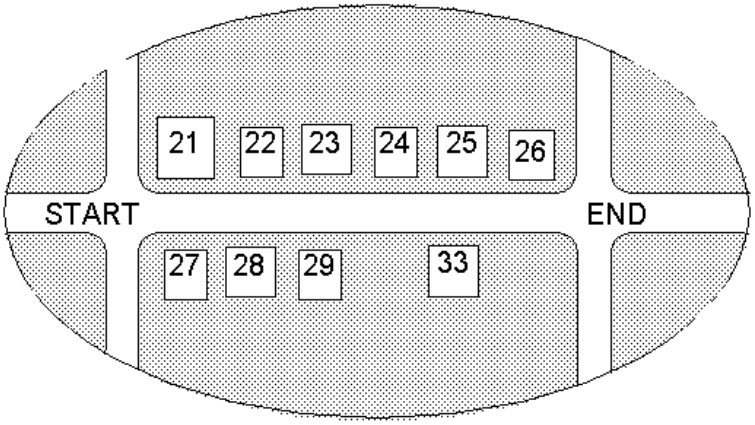


Figure 118 — Example of House numbering regular with odd and even at the same side

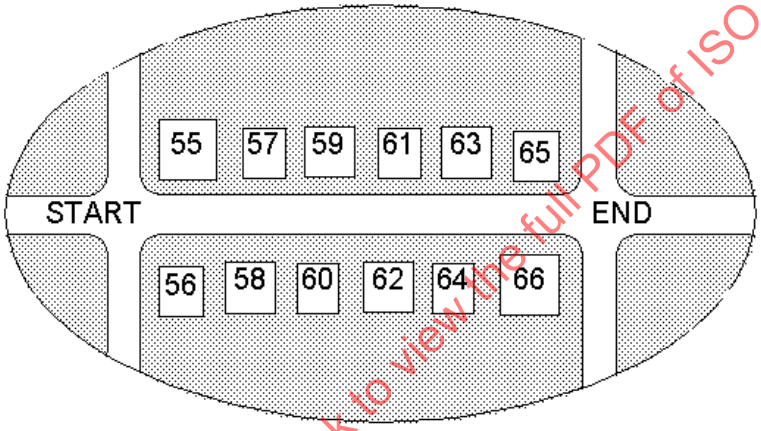


Figure 119 — Example of House numbering regular with odd and even at different sides

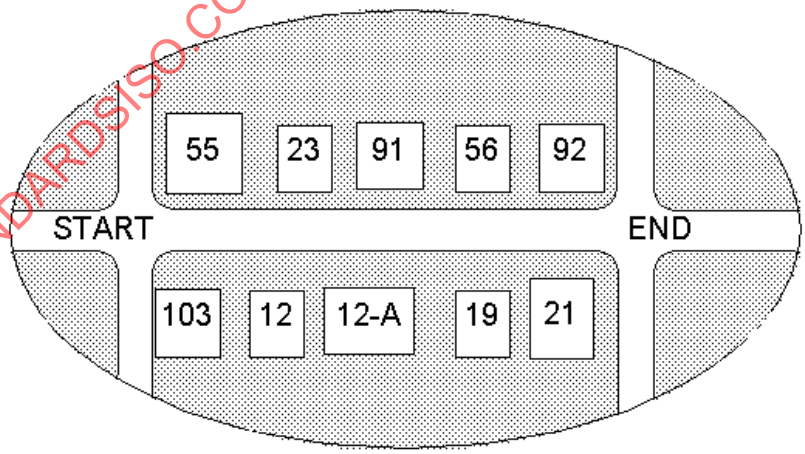


Figure 120 — Example of Irregular house numbering

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7.2.99 ID of Flight Connection

7.2.99.1 Definition

The flight number of the flight connection.

7.2.99.2 Domain/unit of measure

The value should be expressed in the international airline standard format.

7.2.99.3 Description

This Attribute may be used as a Sub-Attribute of the Composite Attribute Flight Info.

7.2.100 Importance

7.2.100.1 Definition

The level of importance of a Service.

7.2.100.2 Domain/unit of measure

- Local
- National

7.2.100.3 Description

“Local” refers to town or municipality. Features of local importance include restaurants, hotels, cinemas, etc. Most towns will have one or more.

“National” refers to national or international importance.

EXAMPLE Stonehenge (monument), or EuroDisney (theme park).

7.2.101 Infrastructure Accessibility Aids

7.2.101.1 Definition

Classes of aids for accessibility.

7.2.101.2 Domain/unit of measure

- Textured surface available
- Audible signal available
- Visual signal available
- Care provider available
- User defined

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7.2.101.3 Description

Infrastructure Accessibility Aids is a Sub-Attribute specifying access aids to handicapped by physical structure and/or by the presence of a care provider. Together with the Sub-Attributes Accessibility Limitation and Suitable for Disabled or Impaired, they form the Composite Attribute Accessibility.

Infrastructure Accessibility Aids may be restricted by the Restrictive Sub-Attribute Pedestrian Type, which details the kinds of pedestrians to which the aids apply, and the Restrictive Sub-Attribute Validity Period, which expresses temporality associated with the aids.

7.2.102 Grade-separated Junction Type

7.2.102.1 Definition

A Classification of a Grade-separated Junction.

7.2.102.2 Domain/unit of measure

- Crossing between Motorways only
- Crossing between a Motorway and a non-Motorway
- Crossing between non-Motorways only

7.2.103 Intermediate House Number

7.2.103.1 Definition

A house number along the Road Element or the Address Area Boundary Element, which is not the first or the last house number along that Road or Address Area Boundary Element.

7.2.103.2 Domain/unit of measure

The domain of values is only limited in a physical sense. The value has a maximum size of 10 characters. The characters may be of any kind: digits, alphabetic characters or graphical characters.

EXAMPLE 223, 456, 57-a, or 435-II.

7.2.103.3 Description

7.2.103.3.1 Usage rules

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes House Number Structure, First House Number, and Last House Number. Together these Attributes form the Composite Attribute House Number Range.

The main intention of Intermediate House Number is to add detail when the Sub-Attribute House Number Structure is irregular. It stores all of the numbers on one side of the Road Element/Address Area Boundary Element between the First and the Last House Number.

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7.2.103.3.2 Sorting order

The house numbers need to be stored in the same order as they occur alongside the Road Element/Address Area Boundary Element from the First to the Last House Number.

7.2.104 International Railway Station

7.2.104.1 Definition

This Attribute when True indicates a facility established to provide international rail transportation.

7.2.104.2 Domain/unit of measure

- True
- False

7.2.105 ISO Country Code

7.2.105.1 Definition

The ISO 3166-1 alpha-3 code of the country in question.

7.2.106 Junction Type

7.2.106.1 Definition

The classification of a Junction

7.2.106.2 Domain/unit of measure

- Mini roundabout
- Railway crossing
- Border crossing
- Fixed Guideway Vehicle Crossing

7.2.106.3 Description

7.2.106.3.1 Definition of a Mini Roundabout

A mini roundabout is a roundabout mainly designed to reduce the speed of the passing vehicles. When continuing in the same direction it only requires a small direction deviation. See Figure 121 for an example.

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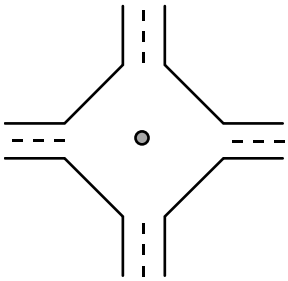


Figure 121 — Example of a mini-roundabout

7.2.106.3.2 Definition of a Railway Crossing

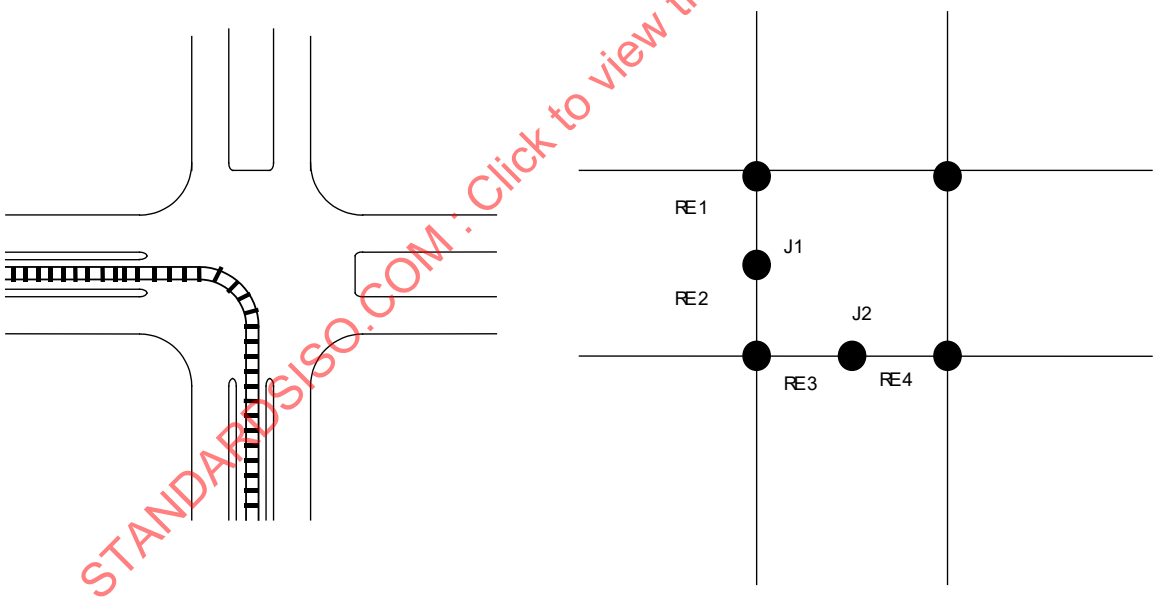
A railway crossing is a crossing at grade between a road and a railway.

7.2.106.3.3 Definition of a Border Crossing

A Border Crossing is the location where a road crosses a Country Border.

7.2.106.3.4 Definition of a Fixed Guideway Vehicle Crossing

A Fixed Guideway Vehicle crossing is a crossing at grade between a road and a dedicated pathway for vehicles such as trams, trains and busses. See Figure 122 for an example.



Tram Crossings: J 1 and J 2

Figure 122 — Example of a tram crossing

7.2.107 Lane Dependent Validity

7.2.107.1 Definition

For which of the lanes of an associated Road Element the associated Sub-Attribute or Relationship holds or does not hold.

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7.2.107.2 Domain/unit of measure

A string with a length which at maximum equals the number of lanes present on the associated Road Element + 1, whereby the character on the $(n+1)^{th}$ position refers to the nth lane. The allowed characters on the first position of the string are:

- L: Indicating that the lanes are counted from the left side of the Road Element.
- R: Indicating that the lanes are counted from the right side of the Road Element.

The allowed characters on the n^{th} $(n > 1)$ position of the string are:

- 0: Indicating that the associated Sub-Attribute is not valid for that lane.
- 1: Indicating that the associated Sub-Attribute is valid for that lane.

7.2.107.3 Description

The left and right side of the Road Element are defined by considering the orientation of the Road Element as defined by the start and end bounding Point Feature.

The number of characters does not necessarily have to equal the number of lanes of the associated Road Element + 1. In this case the not represented lanes should be considered as not collected.

The Attribute should be used in conjunction with another Sub-Attribute which specifies the Property which is valid for the lanes specified by the Lane Validity Attribute.

7.2.108 Lane Info

7.2.108.1 Definition

Information associated with individual lane(s) of a Road Element.

7.2.108.2 Domain/unit of measure

Composite

7.2.108.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Lane-Dependent Validity - Mandatory
- Conditional Traffic Flow
- Lane Type
- Width
- Divider
- Direction Category

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7.2.108.4 Description

Information about lane connectivity along a road element may be derived particularly from the Sub-Attribute Divider Impact (within the Composite Attribute Divider) and the Sub-Attribute Conditional Traffic Flow.

7.2.109 Lane Type

7.2.109.1 Definition

Indicates whether the associated Road Element has a lane of the specified dedicated use.

7.2.109.2 Domain/unit of measure

- Normal Lane
- Exit/Entrance Lane
- Emergency Lane
- Shoulder Lane
- Lay-by Lane
- Slow Vehicle Lane
- Tidal Lane

7.2.109.3 Description

7.2.109.3.1 Definition of Normal Lane

A lane without special characteristics.

7.2.109.3.2 Definition of Exit/Entrance Lane

A lane that merges with or departs from leftmost or rightmost lane, serving as a connection from or to another road.

7.2.109.3.3 Definition of Emergency Lane

A lane, typically the leftmost or rightmost lane, exclusively reserved for emergency vehicles.

7.2.109.3.4 Definition of Shoulder Lane

Leftmost or rightmost lane that may be paved or unpaved and is not part of the designated roadway, serving as safety zone aside a road.

7.2.109.3.5 Definition of Lay-by Lane

A lane dedicated to the parking of vehicles (frequently found in the UK).

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7.2.109.3.6 Definition of Slow Vehicle Lane

A supplementary lane builds besides (uphill) sections of ordinary lane(s) to facilitate safe over-taking (of slow vehicles).

7.2.109.3.7 Definition of Tidal Lane

A lane which may be reserved for different directions of travel according to the needs of traffic flow.

7.2.109.4 Attribute Usage rule

This Attribute is may be attached to Road Elements as a Simple Attribute or as a Sub-Attribute in conjunction with Lane-Dependent Validity, Conditional Traffic Flow, Width, Divider, and Direction Category. In the latter case, these Sub-Attributes form the Composite Attribute Lane Info.

7.2.110 Last House Number

7.2.110.1 Definition

The last house number along the Road Element or the Address Area Boundary Element.

7.2.110.2 Domain/unit of measure

The domain of values is only limited in a physical sense. The value has a maximum size of 10 characters. The characters may be of any kind: digits, alphabetic characters or graphical characters.

EXAMPLE 223, 456, 57-a, or 435-II.

7.2.110.3 Description

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes House Number Structure, First House Number and possibly Intermediate House Number. Together these Attributes form the Composite Attribute House Number Range.

7.2.111 Lateral Offset

7.2.111.1 Definition

An indication of the lateral position of a Line Feature.

7.2.111.2 Domain/unit of measure

Any integer value.

7.2.111.3 Description

Positive values should be used to indicate positions on the right side of the Line Feature, negative values for positions on the left side. The value zero indicates a position on (or above) the Line Feature.

The values should be used in an ordinal sense whereby larger numbers (or in the case of negative numbers, smaller numbers) indicate a lateral position further from the Line Feature.

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This Attribute is used as a Sub-Attribute in conjunction with Distance Measure and Distance Measure Referent. Together these Sub-Attributes form the Composite Attribute Distance Expression.

NOTE This model for Lateral Offsets deviates from ISO 19148 [8] which defines distance-based lateral offsets.

7.2.112 Length of a Road Element

7.2.112.1 Definition

The curvimetric two-dimensional length of a Road Element.

7.2.112.2 Domain/unit of measure

7.2.112.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is metre; English default unit is foot.

7.2.112.2.2 Measure

A measure of Length of a Road Element is composed of a value and a unit of measure.

7.2.112.2.3 Unit of measure

The unit of measure of Length of a Road Element is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.112.3 Description

This Attribute should contain the curvimetric length of the horizontal projection of the Road Element.

7.2.113 Linear Position

7.2.113.1 Definition

The designation of a Distance Expression serving either as the start position or as the end position of a linearly referenced linear extent.

7.2.113.2 Domain/unit of measure

Composite

7.2.113.3 Sub-Attributes

- Start End Flag — Mandatory
- Distance Expression — Mandatory

7.2.113.4 Description

A linear extent along a Line Feature may be specified by two occurrences of the Linear Position Attribute, specifying the Distance Expression applicable to the start position and the Distance Expression applicable to the end position, respectively.

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In the context of the Linear Assignments Relationship, a Linear Position may be specified for a start position only, for an end position only, for both, or not at all.

A single position along a Line Feature is specified by applying the Distance Expression Attribute directly as a Simple Attribute, i.e. without start/end designation.

7.2.114 Linear Referencing Method

7.2.114.1 Definition

The Linear Referencing Method applied for Distance Expressions along Line Feature(s).

7.2.114.2 Domain/unit of measure

- Milepoint
- Kilopoint
- Milepost
- Kilopost
- Mile Reference Post
- Kilometre Reference Post
- Percentage
- Normalized
- Stationing
- Metric Stationing
- Reverse Milepoint
- Reverse Kilopoint
- Reverse Percentage

7.2.114.3 Description

7.2.114.3.1 General

The Attribute may be applied to Line Features in general, to a Line Feature instance, or to an individual Linear Assignment involving a particular (set of) Line Feature(s).

The Attribute specifies how measured locations along Line Features are measured by default, unless overridden by an individually designated Linear Referencing Method.

7.2.114.3.2 Definition of Milepoint

Distances are measured in miles from the start of the Line Feature (absolute Linear Referencing Method).

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7.2.114.3.3 Definition of Kilopoint

Distances are measured in kilometres from the start of the Line Feature (absolute Linear Referencing Method).

7.2.114.3.4 Definition of Milepost

Distances are measured in miles from the specified milepost along the Line Feature (relative Linear Referencing Method).

7.2.114.3.5 Definition of Kilopost

Distances are measured in kilometres from the specified kilopost along the Line Feature (relative Linear Referencing Method).

7.2.114.3.6 Definition of Mile Reference Post

Distances are measured in miles from the specified reference post along the Line Feature (relative Linear Referencing Method).

7.2.114.3.7 Definition of Kilometre Reference Post

Distances are measured in kilometres from the specified reference post along the Line Feature (relative Linear Referencing Method).

7.2.114.3.8 Definition of Percentage

Distances are expressed as a percentage of the total Line Feature length (interpolative Linear Referencing Method).

7.2.114.3.9 Definition of Normalized

Distances are expressed as a decimal ratio of the total Line Feature length (interpolative Linear Referencing Method).

7.2.114.3.10 Definition of Stationing

Distances are measured in feet based on stationing defined for the Line Feature (relative Linear Referencing Method).

7.2.114.3.11 Definition of Metric Stationing

Distances are measured in metres based on metric stationing defined for the Line Feature (relative Linear Referencing Method).

7.2.114.3.12 Definition of Reverse Milepoint

Distances are measured in miles from the end of the Line Feature in reverse direction (absolute Linear Referencing Method).

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7.2.114.3.13 Definition of Reverse Kilopoint

Distances are measured in kilometres from the end of the Line Feature in reverse direction (absolute Linear Referencing Method).

7.2.114.3.14 Definition of Reverse Percentage

Distances are expressed as a percentage of the total Line Feature length, measured from the end towards the start of the Line Feature, i.e. in reverse direction (interpolative Linear Referencing Method).

7.2.115 Linear Segmentation

7.2.115.1 Definition

The linearly referenced position or linear extent along a Line Feature for which an Attribute is valid.

7.2.115.2 Domain/unit of measure

Composite.

7.2.115.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Distance Expression — Mandatory
- Distance Expression

7.2.115.4 Description

This Attribute may be used in combination with any Simple or Composite Attribute Type. The concept of a segmented Attribute is illustrated in Figure 123.

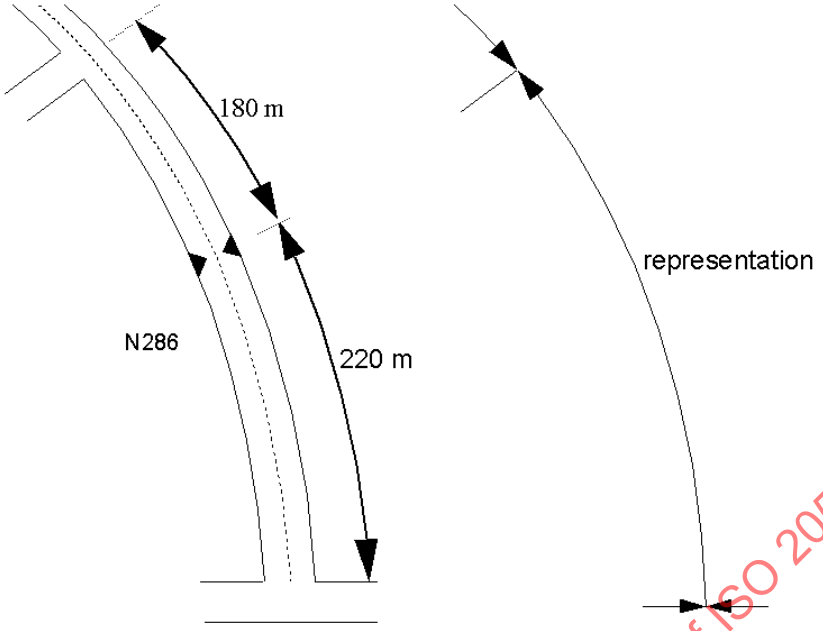
Two Distance Expression Attribute values are used as linearly referenced positions delimiting the segmented Attribute's validity; the orientation sense of the two instances of the Distance Expression Attribute shall coincide with the Line Feature's orientation. This is, the linearly referenced position which is closer to the start of the Line Feature implies the start (or From position) of the linear segment, the linearly referenced position which is closer to the end of the Line Feature implies the end (or To position) of the linear segment. To indicate a single position in lieu of an interval, one Distance Expression Attribute value suffices.

Whether a linearly referenced position is measured from the start of a Line Feature or from the end of a Line Feature is determined by the applicable Location Referencing Method Attribute which is either set as default for said (class of) Line Features or defined individually as Sub-Attribute part of the Distance Expression Attribute, in which case it is overriding the default setting.

If a linearly referenced position equals the end of a Line Feature, or in case of reverse referencing orientation the start of a Line Feature, two possibilities exist to specify this. There is the normal way in which the Distance Expression Attribute in question specifies the total length of the Line Feature. Another way to do this is by storing the special value '-1'.

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A road with a road number N286 and a road width of 15 m which narrows at a certain point to 8 m after which it gets its original width again.

Figure 123 (*continued*)

from pos: 0 to pos: 220 road width: 15	from pos: 220 to pos: 220 road width: 8	from pos: 220 to pos: 400 (or -1) road width: 15	from pos: 0 (or <S>) to pos: 400 (or <S>) road number: N286

Associated segmented Attributes (<S>) indicate blanks.

Figure 123 — Example of the use of Linear Segmentation

7.2.116 Location Description

7.2.116.1 Definition

Textual description of the location of a Feature in the field.

7.2.116.2 Domain/unit of measure

Character string

7.2.116.3 Description

Describes the location of a Feature such that the Feature may be easily and unambiguously located in the field.

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7.2.117 Location Reference

7.2.117.1 Definition

The location reference code of a certain location according to a certain location referencing system.

7.2.117.2 Domain/unit of measure

Composite.

7.2.117.3 Sub-Attributes

The Composite Attribute Location Reference consists of the following Sub-Attributes:

- Location Reference Code [.]..[.] — Mandatory
- Location Reference Type — Mandatory

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.2.118 Location Reference Code

7.2.118.1 Definition

The identification of a location according to a certain location referencing system.

7.2.118.2 Domain/unit of measure

Any value representing a valid location referencing code.

7.2.118.3 Description

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attribute Location Reference Type. Together these Sub-Attributes form the Composite Attribute Location Reference.

A location referencing code is used to identify a specific location or section of the road network for traffic messaging purposes.

7.2.119 Location Reference Type

7.2.119.1 Definition

The type of location referencing system employed for the associated Location Reference Code.

7.2.119.2 Domain/unit of measure

- RDS/TMC
- VICS
- User defined

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7.2.119.3 Description

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attribute Location Reference Code. Together these Sub-Attributes form the Composite Attribute Location Reference.

7.2.120 Lower Building Elevation

7.2.120.1 Definition

The lower elevation of a Building, above which the building structure extends up to the upper building elevation.

7.2.120.2 Domain/unit of measure

7.2.120.2.1 Value domain

The value shall be expressed in either Metric or English default units, or in user-defined units. Metric default unit is metre; English default unit is foot.

7.2.120.2.2 Measure

A measure of Lower Building Elevation is composed of a value and a unit of measure.

7.2.120.2.3 Unit of measure

The unit of measure of Lower Building Elevation is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.120.3 Description

The Attribute Lower Building Elevation is used in conjunction with the Sub-Attribute Upper Building Elevation. Together they make up the Composite Attribute Complex Building Elevation.

7.2.121 Magnetic Anomalies

7.2.121.1 Definition

This Attribute when True indicates an apparent change in the earth's magnetic field due to the presence of a construction and within the local area of that construction.

7.2.121.2 Domain/unit of measure

- True
- False

7.2.121.3 Description

Constructions that may influence the earth's magnetic field include: bridges, tunnels, power lines, electric railways and tramways.

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7.2.122 Main Railway Station

7.2.122.1 Definition

This Attribute when True indicates a facility which has a relatively high level of importance in the transportation network of an urban area. An urban area may have more than one main railway station.

7.2.122.2 Domain/unit of measure

- True
- False

7.2.123 Maximum Height Allowed

7.2.123.1 Definition

The maximum height limit of a vehicle that may use the Road Element, Ferry Connection or Path. The limit is normally set by a physical obstruction such as a bridge or tunnel, or a legal restriction.

7.2.123.2 Domain/unit of measure

7.2.123.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is centimetre; English default unit is inch.

7.2.123.2.2 Measure

A measure of Maximum Height Allowed is composed of a value and a unit of measure.

7.2.123.2.3 Unit of measure

The unit of measure of Maximum Height Allowed is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

The value shall be expressed in centimetres.

7.2.124 Maximum Length Allowed

7.2.124.1 Definition

The legal maximum length of a vehicle that may use the Road Element, Ferry Connection or Path.

7.2.124.2 Domain/unit of measure

7.2.124.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is centimetre; English default unit is inch.

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7.2.124.2.2 Measure

A measure of Maximum Length Allowed is composed of a value and a unit of measure.

7.2.124.2.3 Unit of measure

The unit of measure of Maximum Length Allowed is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.125 Maximum Number of Lanes

7.2.125.1 Definition

The maximum number of lanes existing on a Road Element.

7.2.125.2 Domain/unit of measure

Any integer value.

7.2.125.3 Description

The Maximum Number of Lanes Attribute refers to the total number of lanes associated with one particular driving direction which are at least present on a certain Road Element. If this Attribute appears once with one Road Element without a side indication it indicates that both driving directions have the same maximum number of lanes or, in case there is only one driving direction, the total maximum number of lanes. In case two different driving directions on a Road Element have a different maximum number of lanes, each number may be specified by a different Attribute Value in combination with a side indication.

7.2.126 Maximum Total Weight Allowed

7.2.126.1 Definition

The legal maximum total weight of a vehicle that may use the Road Element, Ferry Connection or Path.

7.2.126.2 Domain/unit of measure

7.2.126.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is tenth of a metric ton; English default unit is tenth of an English ton.

7.2.126.2.2 Measure

A measure of Maximum Total Weight Allowed is composed of a value and a unit of measure.

7.2.126.2.3 Unit of measure

The unit of measure of Maximum Total Weight is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

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7.2.127 Maximum Weight per Axle Allowed

7.2.127.1 Definition

The legal maximum weight per axle of a vehicle that may use the Road Element, Ferry Connection or Path.

7.2.127.2 Domain/unit of measure

7.2.127.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is tenth of a metric ton; English default unit is tenth of an English ton.

7.2.127.2.2 Measure

A measure of Maximum Weight per Axle Allowed is composed of a value and a unit of measure.

7.2.127.2.3 Unit of measure

The unit of measure of Maximum Weight per Axle Allowed is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.128 Maximum Width Allowed

7.2.128.1 Definition

The maximum width limit of a vehicle that may use the Road Element, Ferry Connection or Path. The limit is normally set by a physical obstruction such as a bridge or a legal restriction.

7.2.128.2 Domain/unit of measure

7.2.128.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is centimetre; English default unit is inch.

7.2.128.2.2 Measure

A measure of Maximum Width Allowed is composed of a value and a unit of measure.

7.2.128.2.3 Unit of measure

The unit of measure of Maximum Width Allowed is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.129 Measured Length

7.2.129.1 Definition

The three-dimensional length of a Road Element or path or Anchor Section.

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7.2.129.2 Domain/unit of measure

7.2.129.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is metre; English default unit is foot.

7.2.129.2.2 Measure

A measure of Measured Length is composed of a value and a unit of measure.

7.2.129.2.3 Unit of measure

The unit of measure of Measured Length is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.129.3 Description

The value represents the length as it may be measured in reality.

In the case of an Anchor Section, it defines the official length of the distance between the Anchor Points represented by the Anchor Section.

7.2.130 Military Airport

7.2.130.1 Definition

This Attribute when True indicates whether an airport is structurally used for Military Airport activities.

7.2.130.2 Domain/unit of measure

- True
- False

7.2.131 Minimum Number of Lanes

7.2.131.1 Definition

The minimum number of lanes existing on a Road Element.

7.2.131.2 Domain/unit of measure

Any integer value.

7.2.131.3 Description

The Minimum Number of Lanes Attribute refers to the total number of lanes associated with one particular driving direction which are at least present on a certain Road Element. If this Attribute appears once with one Road Element without a side indication it indicates that both driving directions have the same minimum number of lanes or, in case there is only one driving direction, the total minimum number of lanes. In case two different driving directions on a Road Element have a different minimum number of lanes, each number may be specified by a different Attribute Value in combination with a side indication.

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7.2.132 Minimum Number of Occupants

7.2.132.1 Definition

The minimum number of occupants of a vehicle which are required by traffic restriction.

7.2.132.2 Domain/unit of measure

Any integer value.

7.2.132.3 Description

This Sub-Attribute should be used in conjunction with the Sub-Attribute Vehicle Type. This combination only has meaning if the Vehicle Type has the value “High Occupancy Vehicle”. Together these Sub-Attributes form the Composite Attribute High Occupancy Vehicle.

7.2.133 Mountain Pass

7.2.133.1 Definition

The existence, height and opening period of a Road Element which is considered as a Mountain Pass.

7.2.133.2 Domain/unit of measure

Composite

7.2.133.3 Sub-Attributes

The Composite Attribute Mountain Pass consists of the following Sub-Attributes:

- Pass — Mandatory
- Height Label
- Opening Period [.]..[.]

NOTE [.]..[.] indicates that the Sub-Attribute may have multiple instances in the framework of the Composite Attribute.

7.2.134 Multi Media Action

7.2.134.1 Definition

A Specification of what to do with the Multi Media Object.

7.2.134.2 Domain/unit of measure

User Defined.

7.2.134.3 Description

The action to be performed with Multi Media Object shall be described by referring to a set of user defined descriptions.

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7.2.135 Multi Media Description

7.2.135.1 Definition

A semantic classification of the Multi Media Object.

7.2.135.2 Domain/unit of measure

- Unknown
- Building Roof Object
- Façade Component Object
- Façade Fabric Object
- 3-D Landmark Object
- Elevation Point Grid Object
- User Defined

7.2.135.3 Description

The Multi-Media Object shall be described by referring to a set of predefined or user defined description classes. The predefined description classes each corresponds to the semantic context of a particular (set of) Feature(s) and Composite Attribute(s).

7.2.136 Multi-Media File Attachment

7.2.136.1 Definition

A Multi-Media File containing Multi-Media Objects “decorating” the associated Feature.

7.2.136.2 Domain/unit of measure

Composite.

7.2.136.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Multi-Media File Attachment Context
- Multi-Media File Attachment Name — Mandatory
- Multi-Media File Attachment Type — Mandatory

7.2.136.4 Description

This Attribute does not specify what name a file should have nor any restriction on the format of the name of that file. However, in order to provide such naming flexibility, it is necessary to adhere to well defined means of designating a “file type” of the Multi-Media file. For instance, a JPEG Image, a Wave Audio file, a Quick Time Movie clip, an HTML complex file (which contains within it other more elementary

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components, such as sounds and images), or even a Word Processor document, are examples of Multi-Media files which may be attached to the GDF file as an Attribute to any Feature. It is assumed that the Multi-Media files are separated files, and not an internal part of the GDF file. Since Multi-Media file types come and go, it is deemed not an efficient usage of this document to continually code file types. This document therefore specifies the use of the industry standard MIME (Multipurpose Internet Mail Extensions). MIME is a standard used in mail applications, as well as in web browsers and many other internet applications. New MIME types are regularly published, after they get officially registered [12].

The goal of this Attribute is to designate a Multi-Media file in a standard way without succumbing to a platform dependent way of doing so.

7.2.137 Multi-Media File Attachment Context

7.2.137.1 Definition

The context of the Multi-Media file attached to the Feature.

7.2.137.2 Domain/unit of measure

Composite.

7.2.137.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Multi Media Description — Mandatory
- Multi Media Action
- Multi Media Time Domain [.]..[.]

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.2.137.4 Description

A context for the Multi-Media attachment to the Feature is provided to make it easier for the application to decide what to do when with the Multi-Media attachment.

7.2.138 Multi Media File Attachment Name

7.2.138.1 Definition

Name of the Multi-Media file attached to the Feature.

7.2.138.2 Domain/unit of measure

Any combination of characters and punctuation.

7.2.138.3 Description

No particular constraints regarding file naming have been specified.

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7.2.139 Multi Media File Attachment Type

7.2.139.1 Definition

The type of the Multi-Media file attached to the Feature.

7.2.139.2 Domain/unit of measure

Any combination of characters and punctuation.

7.2.139.3 Description

The goal of this Attribute is to designate a Multi-Media file type in a standard way without succumbing to a platform dependent way of doing so. By choosing an industry standard way of specifying file types, operating system dependency is removed. It is not necessary to guess the type from the filename (and its suffix). Furthermore, the burden of keeping an updated list of recognized file types is proxied out to another organisation whose charter it is to do so. Finally, it is not necessary to update this document, each time a new Multi-Media file type is introduced. By allowing for a dynamic definition to be embedded into this document the equivalent of an hyper-standard mark-up format is created.

This Multi-Media File attachment Type Attribute Value shall be in adherence with the MIME type specifications. These specify that a file type shall be of the format <genus> "I" <species>. For example, the file type "image/jpeg" has the genus image, and species jpeg. The terms, "genus" and "species" are not Mime standard terminology, but are useful for referencing (the actual Mime correct nomenclature is "type" and "subtype". At the time of completion of this document, only the following 8 genera had been defined: application, audio, image, message, model, multipart, text and video. There are hundreds of official species and about as many unofficial ones. Unofficial species are delineated with a leading "x". The following may serve as an example of a commonly used, yet not officially registered species: "audio/x-wav". Recently, there has been an "IP-address" style name sub-grouping at the species level. The VND prefix with any number of levels following stands for vendor specific file types.

EXAMPLE 1 Audio/vnd.xiff.

EXAMPLE 2 Application/vnd.lotus-1-2-3.

EXAMPLE 3 Application/vnd.ibm.modcap.

EXAMPLE 4 Application/vnd.mitsubishi.misty-guard.trustweb.

EXAMPLE 5 Video/vnd.motorola.video.

7.2.140 Multi Media Time Domain

7.2.140.1 Definition

A Specification when to perform the action indicated in the associated Sub-Attribute Multi Media Action.

7.2.140.2 Domain/unit of measure

The value shall be expressed as a (set of) starting date(s) or as a combination of starting date(s) & time duration(s), or starting date(s) / ending date(s), according to the Time Domain syntax.

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7.2.141 Name Component

7.2.141.1 Definition

The specification of a portion of a name which has a specific meaning.

7.2.141.2 Domain/unit of measure

Composite.

7.2.141.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Name Component Offset — Mandatory
- Name Component Length — Mandatory
- Name Component Type — Mandatory

7.2.141.4 Description

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Alternate Street Name Text or Official Street Name Text to form the Composite Attribute Alternate Street Name Body or Official Street Name Body, or with the Sub-Attributes Alternate Name Text or Official Name Text to form the Composite Attribute Alternate Name Body or Official Name Body.

7.2.142 Name Component Length

7.2.142.1 Definition

The length of a Name Component.

7.2.142.2 Domain/unit of measure

Any positive number within the field limits.

7.2.142.3 Description

Name Component Length is specified in the number of characters (and not in number of bytes).

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Name Component Offset and Name Component Type to form the composite Name Component.

7.2.143 Name Component Offset

7.2.143.1 Definition

The offset of a name that represents the beginning of a Name Component.

7.2.143.2 Domain/unit of measure

Any positive number within the field limits.

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7.2.143.3 Description

Name Component Length is specified in the number of characters (and not in number of bytes) at which a Name Component starts. If the Name Component starts at the beginning of the name, the Name Component Offset will equal 1.

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Name Component Length and Name Component Type to form the composite Name Component.

7.2.144 Name Component Type

7.2.144.1 Definition

The type of a name component.

7.2.144.2 Domain/unit of measure

- Name Component Type 1
- Name Component Type 2
- Name Component Type n

7.2.144.3 Description

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Name Component Length and Name Component Offset to form the composite Name Component.

7.2.145 Name Prefix

7.2.145.1 Definition

A part of the official or alternate name not belonging to the Official/Alternate Name Body, usually indicating the type of object the name refers to and which comes prior to the Official/Alternate Name Body.

7.2.145.2 Domain/unit of measure

Any combination of characters and punctuation which forms a valid name.

7.2.145.3 Description

EXAMPLE Hotel American, or Luchthaven (Airport) Schiphol.

7.2.146 National Road Class

7.2.146.1 Definition

The numeric classification equivalencies to the order of the National Road Classification of a Road Element, Ferry Connection or Path, where 1 equals the highest class of road.

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7.2.146.2 Domain/unit of measure

- Main roads: the most important roads.
- First class roads.
- Second class roads.
- Third class roads.
- Fourth class roads.
- Fifth class roads.
- Sixth class roads.
- Seventh class roads.
- Eighth class roads.
- Ninth class roads: The least important roads.

7.2.147 Not Crossable by Pedestrians

7.2.147.1 Definition

Indication that a Road Element, Junction, Road or Intersection is clearly not advised to be crossed by pedestrians, either as being prohibited or too dangerous.

7.2.147.2 Domain/unit of measure

- No crossing advised (prohibited)
- No crossing advised (dangerous)
- No crossing not advised

7.2.147.3 Description

The indication for pedestrians not to cross may take into account physical as well as legal provisions. Physical provisions, such as road markings, fences, barriers, or vegetation, may be placed on one or both sides of a roadway or on the median in case of dual carriageways.

7.2.148 Notation

7.2.148.1 Definition

Classification of the nature of the name notation.

7.2.148.2 Domain/unit of measure

Composite

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7.2.148.3 Sub-Attributes

- Notation Version
- Notation Variant
- Notation Anomaly
- Notation Alphabet

7.2.148.4 Description

The Notation Attribute may be associated with name Attributes or with name strings, i.e. with the actual values of name Attributes.

Notation properties are meaningful for name parsing, matching, transcription, and presentation. Other properties for intelligent name processing are related to languages and to phonetic transcriptions (covered by other Attributes).

7.2.149 Notation Alphabet

7.2.149.1 Definition

The script used to represent a (written) name.

7.2.149.2 Domain/unit of measure

- user-defined

7.2.149.3 Description

This Attribute is used as a Sub-Attribute in conjunction with Notation Variant, Notation Version, and Notation Anomaly. Together they form the Composite Attribute Notation

7.2.150 Notation Anomaly

7.2.150.1 Definition

Representation anomaly of the name notation.

7.2.150.2 Domain/unit of measure

- usual form
- non-literal form
- synonym

7.2.150.3 Description

7.2.150.3.1 Definition of Usual Form

The usual form of a name (not an anomaly).

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7.2.150.3.2 Definition of Non-literal Form

An alternate spelling of a name to represent how it is spoken. Typically used to extend (un-abbreviate) abbreviations or acronyms.

7.2.150.3.3 Definition of Synonym

Other name for an original name in the same (written) language.

7.2.150.3.4 Use as Sub-Attribute

This Attribute is used as a Sub-Attribute in conjunction with Notation Variant, Notation Version, and Notation Alphabet. Together they form the Composite Attribute Notation.

7.2.151 Notation Variant

7.2.151.1 Definition

The spelling form of the name notation.

7.2.151.2 Domain/unit of measure

- Given form
- Long form
- Short form
- Alternate spelling

7.2.151.3 Description

7.2.151.3.1 Definition of Given Form

The normal spelling of a name (e.g. as published in directories or official maps).

7.2.151.3.2 Definition of Long Form

A longer (e.g. fully spelled out) spelling representation of a name.

7.2.151.3.3 Definition of Short Form

A shorter (e.g. abbreviated) spelling representation of a name.

7.2.151.3.4 Definition of Alternate Spelling

An alternate spelling of a name (e.g. traditional/modern or common misspelling).

7.2.151.3.5 Use as Sub-Attribute

This Attribute is used as a Sub-Attribute in conjunction with Notation Version, Notation Anomaly, and Notation Alphabet. Together they form the Composite Attribute Notation.

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7.2.152 Notation Version

7.2.152.1 Definition

The language-specific version of the name notation.

7.2.152.2 Domain/unit of measure

- Original
- Exonym

7.2.152.3 Description

7.2.152.3.1 Definition of Original

A name in the applicable local language.

7.2.152.3.2 Definition of Exonym

Alternate version of an original name in another (written) language.

7.2.152.3.3 Use as Sub-Attribute

This Attribute is used as a Sub-Attribute in conjunction with Notation Variant, Notation Anomaly, and Notation Alphabet. Together they form the Composite Attribute Notation.

7.2.153 Number of Lanes

7.2.153.1 Definition

The number of lanes existing on a Road Element or Path.

7.2.153.2 Domain/unit of measure

Any integer value.

7.2.153.3 Description

The Number of Lanes Attribute refers to the total number of lanes associated with one particular driving direction which are present on a certain Road Element. If this Attribute appears once with one Road Element without a side indication it indicates that both driving directions have the same number of lanes or, in case there is only one driving direction, the total number of lanes. In case two different driving directions on a Road Element have a different number of lanes, each number may be specified by a different Attribute Value in combination with a side indication.

7.2.154 Number of Rooms

7.2.154.1 Definition

The number of rooms available to the public.

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7.2.154.2 Domain/unit of measure

Any positive integer within the Field limits.

7.2.155 Official Code

7.2.155.1 Definition

The official code of the Administrative Area or Named Area or District or Built-up Area employed by the relevant authorities.

7.2.155.2 Domain/unit of measure

Any combination of letters, numbers, punctuation which form a valid code.

7.2.156 Official Language

7.2.156.1 Definition

A language officially recognized by a government or in predominant use in an Administrative or Named Area.

7.2.156.2 Domain/unit of measure

An ISO 639-2 language code.

7.2.156.3 Description

A given area may have multiple official languages.

7.2.157 Official Name

7.2.157.1 Definition

The name assigned to any particular Feature by the official organisation responsible for the existence and the maintenance of the Feature.

7.2.157.2 Domain/unit of measure

Composite.

7.2.157.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Name Prefix
- Official Name Body — Mandatory

7.2.157.4 Description

A single Feature may have more than one Official Name. This often is associated with a bilingual situation. A language code shall be used to specify the applied language.

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The use of prefixes is not obligatory, even if they make up part of the official names. If prefixes are not applied but are part of the official name, they shall be part of the Official Name Body.

Spaces are assumed to exist in between the components of the official name. They are not explicitly added.

7.2.158 Official Name Body

7.2.158.1 Definition

The part of the official name which has, compared to the prefix, most identifying power.

7.2.158.2 Domain/unit of measure

Composite.

7.2.158.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Name Component [.]..[.]
- Official Name Text – Mandatory

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attribute Name Prefix. Together these form the Composite Attribute Official Name.

7.2.158.4 Description

In most cases it will be sufficient to sub-divide the official name on name body level. In these cases, Official Name Body will consist of one instance of Official Name Text and zero instances of Name Component. In certain cases, a need may exist to be able to further sub-divide the Official Name Body. In these cases, Official Name Body consists of one instance of Official Name Text and two or more Name Components.

7.2.159 Official Name Text

7.2.159.1 Definition

(A part of) an official name.

7.2.159.2 Domain/unit of measure

Any combination of characters and punctuation.

7.2.159.3 Description

EXAMPLE Hotel American, or Luchthaven (Airport) Schiphol.

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attribute Name Component to form the Composite Attribute Official Name Body.

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7.2.160 Official Street Name

7.2.160.1 Definition

The official name of Road Element, Pathway or Address Area Boundary Element.

7.2.160.2 Domain/unit of measure

Composite.

7.2.160.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Directional Prefix
- Street Type Prefix
- Official Street Name Body— Mandatory
- Trailing Spaces
- Street Type Suffix
- Directional Suffix
- Composite Pronunciation

This Attribute is used as a Sub-Attribute possibly in conjunction with the Sub-Attribute House Number Range and Postal Code. Together these form the Composite Attribute Address Information.

7.2.160.4 Description

The use of pre- or suffixes is not obligatory, even if they make up part of the street names. If pre- or suffixes are not applied but are part of the street name, they shall be part of the Official Street Name Body. Also, combinations are allowed. E.g. a Street Type Prefix might be separately defined in a Street Type Prefix while the Street Type Suffix is defined as part of the Official Street Name Body.

Spaces are assumed to exist in between the different components of the street name. They are not explicitly added. One exception exists on this point: spaces preceding and/or succeeding the Official Street Name Body are not assumed. These should be explicitly defined. For this, the Sub-Attribute Trailing Spaces has been defined.

A single Road Element or Pathway may have more than one Official Street Name. This often is associated with a bilingual situation. E.g. “Waterloolaan” and “Boulevard de Waterloo” are the official names of the same street in Brussels according to the Dutch and French language. A language code shall be used to specify the applied language.

How the application of the different Sub-Attributes in a particular GDF has been done may be specified through meta information.

The fact that Official Street Name instead of an Alternate Street Name has been defined may not be concluded from every Sub-Attribute which make up the Official Street Name. This conclusion may only be drawn from the Sub-Attribute Official Street Name Body or Alternate Street Name Body. The rest of the Sub-Attributes are identical for both types of Street Names.

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7.2.161 Official Street Name Body

7.2.161.1 Definition

The part of the official street name which has, compared to the other parts, the most identifying power.

7.2.161.2 Domain/unit of measure

Composite.

7.2.161.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

Name Component [.]..[.]
Official Street Name Text – Mandatory

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attributes Directional Prefix, Street Type Prefix, Trailing Spaces, Street Type Suffix, Directional Suffix and Composite Pronunciation. Together these form the Composite Attribute Official Street Name.

7.2.161.4 Description

In most cases it will be sufficient to sub-divide the street name on street name body level. In these cases, Official Street Name Body will consist of one instance of Official Street Name Text and zero instances of Name Component. In certain cases, a need may exist to be able to further sub-divide the Official Street Name Body. In these cases, Official Street Name Body consists of one instance of Official Street Name Text and two or more Name Components.

EXAMPLE 1 Embarcadero with Street Name Body Embarcadero.

EXAMPLE 2 Avenue George V with Street Name Body George V.

EXAMPLE 3 Place du General de Gaulle with Street Name Body General de Gaulle.

EXAMPLE 4 Via Appia with Street Name Body Appia.

7.2.162 Official Street Name Text

7.2.162.1 Definition

(A part of) an official street name.

7.2.162.2 Domain/unit of measure

Any combination of characters, numbers or punctuation.

7.2.162.3 Description

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attribute Name Component to form the Composite Attribute Official Street Name Body.

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7.2.163 One-way

7.2.163.1 Definition

A Transportation Element is a one-way street

7.2.163.2 Domain/unit of measure

- in positive direction
- in negative direction

7.2.163.3 Description

7.2.163.3.1 One-way streets

A Transportation Element for which the movement of motorised vehicles is administratively restricted to a single direction.

7.2.163.3.2 Definition of positive/negative

Positive/negative directions of One-way are expressed relative to a Road Element, Pathway or Path. The positive direction of the Road Element, Pathway or Path, respectively, as seen from the start bounding Point Feature.

7.2.164 Opening Period

7.2.164.1 Definition

The period in which the function of an associated Feature is available to the public.

7.2.164.2 Domain/unit of measure

The value shall be expressed as a combination of both starting date(s) and time duration(s) according to the Time Domain syntax.

7.2.165 Other Textual Content of a Traffic Sign

7.2.165.1 Definition

Information which may not be represented by means of the Attributes Symbol on Traffic Sign and/or Validity Period and which does not represent textual destination information

7.2.165.2 Domain/unit of measure

Any combination of characters and punctuation.

7.2.165.3 Description

This Attribute is used as a Sub-Attribute for the Composite Attribute Traffic Sign Information. The use of this Attribute is only meaningful if it is used in conjunction with the Sub-Attribute Traffic Sign Class.

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7.2.166 Ownership

7.2.166.1 Definition

Whether a Road Element is publicly or privately owned.

7.2.166.2 Domain/unit of measure

- Publicly owned
- Privately owned

7.2.167 Park and Ride Facility

7.2.167.1 Definition

This Attribute when True indicates whether a parking facility is provided with a Park and Ride facility.

7.2.167.2 Domain/unit of measure

- True
- False

7.2.167.3 Description

A parking facility such as Open Parking Area or Parking Garage with Park and Ride facility is a parking facility which offers direct access to the public transport. Usually, Park and Ride facilities are officially recognized as such and are indicated by traffic signs along the road network.

7.2.168 Parking Facilities Available

7.2.168.1 Definition

The number of parking places available.

7.2.168.2 Domain/unit of measure

Any positive integer within Field limits.

7.2.169 Park Type

7.2.169.1 Definition

An indication of the type of Land Cover and Use or Service Feature.

7.2.169.2 Domain/unit of measure

- City Park
- Regional Park
- County Park

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- State/Provincial Park
- National Park

7.2.169.3 Description

There is an essential difference between City Parks and National or Regional Parks. City Parks are located in an urban environment, designed for recreational purposes and accessible free of charge. Regional or National Parks generally have a function as a nature reserve and are not always (completely) accessible by the public.

7.2.170 Parking Type Charged

7.2.170.1 Definition

This Attribute when True indicates whether a parking facility (Open Parking Area, Parking Garage) is charged.

7.2.170.2 Domain/unit of measure

- True
- False

7.2.171 Pass

7.2.171.1 Definition

This Attribute when True indicates a Road Element is regarded as a mountain pass.

7.2.171.2 Domain/unit of measure

- True
- False

7.2.171.3 Description

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Height of a Pass and possibly Opening Period. Together these Sub-Attributes form the Composite Attribute Mountain Pass.

7.2.172 Passing Restrictions

7.2.172.1 Definition

This Attribute when True indicates that other cars is not allowed on the associated Road Element.

7.2.172.2 Domain/unit of measure

- True
- False

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7.2.172.3 Description

This Attribute should be used as a Sub-Attribute in combination with the Attribute Vehicle Type.

7.2.173 Pathway Safety Indicator

7.2.173.1 Definition

The indication of a safety level of a Road Element or Pathway for use by pedestrians and non-motorised vehicles.

7.2.173.2 Domain/unit of measure

- Uncritical
- To be avoided
- Barred

7.2.173.3 Description

7.2.173.3.1 Definition of Uncritical

A Road Element or Pathway generally considered safe for pedestrians and non-motorised vehicles.

7.2.173.3.2 Definition of To be avoided

A Road Element or Pathway may not be safe or secure for pedestrians and non-motorised vehicles, for reasons such as dense motorised traffic or dangerous neighbourhoods.

7.2.173.3.3 Definition of Barred

A Road Element or Pathway declared barred for use by pedestrians and other non-motorists by means of safety risk related regulations.

7.2.174 Pathway Type

7.2.174.1 Definition

The physical type of Pathway.

7.2.174.2 Domain/unit of measure

- Surface Passageway
- Stairs
- Escalator
- Lift
- Gallery

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- Underpass
- Overpass
- Platform

7.2.174.3 Description

7.2.174.3.1 Definition of Surface Passageway

A paved or unpaved out-door passageway having a recognisable course via its physical appearance, markings and/or signage.

7.2.174.3.2 Definition of Stairs

Inclined passageway of steps between different building or surface levels.

7.2.174.3.3 Definition of Escalator

A one-directional Pathway of “moving stairs”, either as an included passageway between different building or surface levels or as a horizontal passageway within one level.

7.2.174.3.4 Definition of Lift

Section of a (vertical) lift connecting two consecutive building or surface levels.

7.2.174.3.5 Definition of Gallery

An in-door passage way through a building, e.g. shopping mall or train station.

7.2.174.3.6 Definition of Underpass

A Pathway constructed as an underground passageway underneath other Transportation Elements (or other Features), such as a Road Element.

7.2.174.3.7 Definition of Overpass

A Pathway constructed as a bridge across other Transportation Elements (or other Features), such as a Road Element.

7.2.174.3.8 Definition of Platform

A designated location dedicated for access to public transportation networks.

7.2.175 Paved Road Surface Type

7.2.175.1 Definition

The type of surface a paved Road Element has.

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7.2.175.2 Domain/unit of measure

- Rigid
- Flexible
- Blocks

7.2.175.3 Description

EXAMPLE 1 Concrete is a rigid surface.

EXAMPLE 2 Asphalt is a flexible surface.

EXAMPLE 3 Cobblestones is a block surface.

This Attribute is a Sub-Attribute which together with the Sub-Attributes Pavement Status, Unpaved Road Surface Type and Road Surface Condition forms the Composite Attribute Road Surface.

7.2.176 Pavement Status

7.2.176.1 Definition

An indication of improvement applied to a Road surface.

7.2.176.2 Domain/unit of measure

- Paved
- Unpaved

7.2.176.3 Description

Gravel covered roads are considered to be unpaved.

This Attribute is a Sub-Attribute which together with the Sub-Attributes Paved Road Surface Type, Unpaved Road Surface Type and Road Surface Condition forms the Composite Attribute Road Surface.

7.2.177 Pedestrian Crossing Level

7.2.177.1 Definition

The indication whether a Pedestrian Crossing is on street level, or above or below street level.

7.2.177.2 Domain/unit of measure

- Street level crossing
- Overpass
- Underpass

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7.2.178 Pedestrian Crossing Priority

7.2.178.1 Definition

The priority of a Pedestrian Crossing in relation to cross traffic.

7.2.178.2 Domain/unit of measure

- Pedestrians over road traffic
- Pedestrians over road traffic on request (at pedestrian crossings with traffic lights)
- Road traffic over pedestrians

7.2.179 Pedestrian Crossing Signage

7.2.179.1 Definition

The signage present at a Pedestrian Crossing.

7.2.179.2 Domain/unit of measure

- No traffic signs
- (Passive) Traffic signs
- Traffic signs with warning lights
- Traffic light regulated

7.2.180 Pedestrian Crossing Type

7.2.180.1 Definition

The type of street-level Pedestrian Crossing with respect to its physical appearance.

7.2.180.2 Domain/unit of measure

- No road markings
- Refuge island in the middle of road, no markings
- Zebra crossing, with or without additional constructive aids
- Other type

7.2.181 Pedestrian Type

7.2.181.1 Definition

The type of pedestrian with accessibility limitations.

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7.2.181.2 Domain/unit of measure

- All pedestrian type
- Pedestrian with Stroller
- Pedestrian with Luggage trolley
- Pedestrian with visually disability
- Pedestrian with hearing disability
- Mobility impaired Pedestrian
- User defined

7.2.181.3 Description

Pedestrian Type is a Restrictive Sub-Attribute for kinds of pedestrians to which accessibility limitations apply. Pedestrian Type may be applied to any Attribute or Relationship as appropriate.

7.2.182 Percentage of International Traffic

7.2.182.1 Definition

The fraction of traffic flow measurements which represents international traffic, i.e. vehicles from other countries.

7.2.182.2 Domain/unit of measure

The value should be specified by a percentage value.

7.2.182.3 Description

This Sub-Attribute is used in conjunction with the Sub-Attributes Traffic Flow Measurement, Traffic Flow Measurement Type and Traffic Flow Measurement Unit. Together these Attributes form the Composite Attribute Traffic Flow.

7.2.183 Phonetic Alphabet

7.2.183.1 Definition

Alphabet used for encoding the phonetic transcription.

7.2.183.2 Domain/unit of measure

- IPA.
- SAMPA
- SAMPA-SAMPROSA
- X-SAMPA

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7.2.183.3 Description

7.2.183.3.1 Definition of IPA

Transcription encoded using the International Phonetic Alphabet [13].

7.2.183.3.2 Definition of SAMPA

Transcription encoded using SAMPA UCL [14].

7.2.183.3.3 Definition of SAMPA SAMPROSA

Transcription encoded using both SAMPA and SAMPROSA [15].

7.2.183.3.4 Definition of X-SAMPA

Transcription encoded using extended SAMPA.

7.2.183.3.5 Use as Sub-Attribute

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Pronunciation, Pronunciation Language, and Transcription Description. Together these Sub-Attributes form the Composite Attribute Composite Pronunciation

7.2.184 Place Name

7.2.184.1 Definition

Name of an Administrative Area, District or other named area that is part of the (hierarchical) address description of a Service and which is required for uniqueness of the Street Name.

7.2.184.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid name.

7.2.184.3 Description

This Sub-Attribute is used in conjunction with the Sub-Attributes Street Name, Postal Code and House Number. Together they form the Composite Attribute Service Address.

7.2.185 Place within Place Classification

7.2.185.1 Definition

The type of Place within Place Relationship.

7.2.185.2 Description

Places (i.e., Named Areas, Administrative Areas, Built-Up Areas or Districts) may be related to each other using Place within Place Relationships. Places may be related in different ways, and application behaviour may differ accordingly. The Place within Place Classification Attribute provides the data necessary for such applications to determine how a Contained Place and a Containing Place are related.

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7.2.185.3 Domain/unit of measure

- Administrative

Specifies that the Contained Place listed in the Relationship is an administrative subdivision of the Containing Place.

- Postal

Specifies that the post office considers the Contained Place listed in the Relationship to be within the Containing Place for the purpose of constructing postal addresses.

- Address-significant

Specifies that end-users commonly consider the Contained Place listed in the Relationship to be within the Containing Place for the purpose of identifying locations such as origins or destinations.

- Useful for reverse-geocoding

Specifies an upward traversal of the Place tree used by the application to provide a commonly-understood description of a Place to end-users.

7.2.186 Point Assignment

7.2.186.1 Definition

A Point Assignment positions a source Point Feature along a target Line Feature.

7.2.186.2 Domain/unit of measure

Composite

7.2.186.3 Sub-Attributes

- Assignment Order — Mandatory
- Distance Expression — Mandatory

7.2.186.4 Description

Point Assignments are ordered, based on their Assignment Order Attribute. The Assignment Order corresponds to the logical Feature number among the set of source Point Features.

7.2.187 Population

7.2.187.1 Definition

The population figure of an Administrative Area or Named Area, District or Built-up Area.

7.2.187.2 Domain/unit of measure

Any integer.

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7.2.188 Population Class

7.2.188.1 Definition

A classified representation of a population figure.

7.2.188.2 Domain/unit of measure

- Population Class 1
- Population Class 2
- …
- Population Class n

7.2.188.3 Description

The classification should be done according to a user defined class division.

This Attribute is applied to either an Administrative Area, a Built-up Area, Named Area or District.

7.2.189 Positional Accuracy

7.2.189.1 Definition

An indication of the accuracy of the associated Feature.

7.2.189.2 Domain/unit of measure

7.2.189.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is metre; English default unit is foot.

7.2.189.2.2 Measure

A measure of Positional Accuracy is composed of a value and a unit of measure.

7.2.189.2.3 Unit of measure

The unit of measure of Positional Accuracy is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.190 Post Office Type

7.2.190.1 Definition

The importance of a Post Office.

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7.2.190.2 Domain/unit of measure

- Main Post Office
- Minor Post Office

7.2.190.3 Description

Typically, there will be one main Post Office in a certain Postal District, generally considered as the head office, and several (0 to n) minor Post Offices.

7.2.191 Postal Code

7.2.191.1 Definition

The official code of a postal area as defined by the national postal organisation.

7.2.191.2 Domain/unit of measure

The domain of values is only limited in a physical sense. The characters making up the Postal Code may be of any kind: blanks, digits, alphabetic characters or graphical characters.

7.2.191.3 Description

This Sub-Attribute may be used in conjunction with the Sub-Attributes Official Street Name or Alternate Street Name or Route Number and House Number Range. Together they form the Composite Attribute Address Information.

This Sub-Attribute may also be used in conjunction with the Sub-Attributes Street Name, Place Name and House Number. Together they form the Composite Attribute Service Address.

7.2.192 Priceband

7.2.192.1 Definition

The cost category of a service.

7.2.192.2 Domain/unit of measure

- highest cost category
- second highest cost category
- third highest cost category
- fourth highest cost category
- fifth highest cost category
- sixth highest cost category
- seventh highest cost category
- eighth highest cost category
- lowest cost category

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7.2.193 Pronunciation

7.2.193.1 Definition

The phonetic transcription of this document pronunciation of a name considered official and/or proffered.

7.2.193.2 Domain/unit of measure

A phonetic string.

7.2.193.3 Description

The Attribute Pronunciation is used as a Sub-Attribute in conjunction with the Sub-Attributes Phonetic Alphabet, Pronunciation System, and Transcription Description. Together these Sub-Attributes form the Composite Attribute Composite Pronunciation.

7.2.194 Pronunciation Language

7.2.194.1 Definition

The spoken language (including dialect when applicable) of the phonetic transcription.

7.2.194.2 Domain/unit of measure

An ISO 639-2 language code

7.2.194.3 Description

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Pronunciation, Phonetic Alphabet, and Transcription Description. Together these Sub-Attributes form the Composite Attribute Composite Pronunciation.

Alternatively, this Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Alternate Pronunciation, Pronunciation Variant, Phonetic Alphabet, and Transcription Description. Together these Sub-Attributes form the Composite Attribute Composite Alternate Pronunciation.

7.2.195 Pronunciation Variant

7.2.195.1 Definition

Classification of Alternate Pronunciation according to its transcription characteristics.

7.2.195.2 Sub-Attributes

- sub-standard
- local
- literal

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7.2.195.3 Description

7.2.195.3.1 Definition of Sub-standard

A recognized pronunciation variant of a name different from standard pronunciation.

7.2.195.3.2 Definition of Local

A local pronunciation variant of a name.

7.2.195.3.3 Definition of Literal

The literal pronunciation of a name. Occurs for names which are subject to pronunciation anomalies or have abbreviations.

7.2.195.3.4 Use as Sub-Attribute

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Alternate Pronunciation, Pronunciation Variant, Phonetic Alphabet, and Pronunciation Language. Together these Sub-Attributes form the Composite Attribute Composite Alternate Pronunciation.

7.2.196 Public Transport Mode

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

7.2.197 Public Transport Operator

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

7.2.198 Publicly Accessible

7.2.198.1 Definition

This Attribute when True indicates that a Road Element is publicly accessible.

7.2.198.2 Domain/unit of measure

- True
- False

7.2.199 Railway Type

7.2.199.1 Definition

A classification reflecting the importance of a railway line or station.

7.2.199.2 Domain/unit of measure

- Main/national Railway
- Minor/regional Railway
- Underground/Metro

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7.2.199.3 Description

The difference between Main/Minor Railway and Underground/Metro is whether

- the line or station represents part of the national (inter-urban) railway network (or of one of the networks making up the national network), or
- the line or station represents part of a (sub)urban network.

Whether it is located underground or on ground level is of no importance. Consequently, a Main/Minor Railway Station may be located underground and an Underground Station on ground level or elevated.

The distinction between main/national railway and minor/regional railway may take into account the existence of dedicated tracks for high-speed trains, or stations serving as hubs for connecting national and regional train connections.

A Railway Station may have only one type:

- if a Railway Station gives access both to the national and to the regional railway network, it should be classified as main/national railway;
- if a Railway Station gives access both to the national/regional and to the urban railway network, it should be represented by two different Railway Stations.

7.2.200 Rating

7.2.200.1 Definition

The quality category of a Service. This may be based on any classification scheme such as the Automobile Association (UK), or Michelin (France) etc.

7.2.200.2 Domain/unit of measure

- Unclassified
- 5th (Lowest) category
- 4th category
- 3rd category
- 2nd category
- 1st (highest) category

7.2.200.3 Description

The number of classes, and therefore also the class which represents the highest quality, will vary from one classification scheme to another.

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7.2.201 Region Code

7.2.201.1 Definition

The Region Code according to some regional coding scheme, chosen by the map publisher.

7.2.202 Removable Blockage

7.2.202.1 Definition

The way in which a removable barrier is to be removed.

7.2.202.2 Domain/unit of measure

- Accessible for Emergency Vehicles only
- Accessible via Keyed Access
- Guarded

7.2.202.3 Description

The Attribute Removable Blockage is used as a Sub-Attribute in conjunction with the Sub-Attributes Blocked Passage Location and Blocked Passage Type. Together these Sub-Attributes form the Composite Attribute Blocked Passage.

7.2.203 Restaurant Facilities Available

7.2.203.1 Definition

This Attribute when True indicates whether restaurant facilities are available.

7.2.203.2 Domain/unit of measure

- True
- False

7.2.204 Road And Rail Network And Associated Land Type

7.2.204.1 Definition

Type of Road And Rail Network And Associated Land

7.2.204.2 Domain/unit of measure

- Road And Rail Network And Associated Land Type 1
- Road And Rail Network And Associated Land Type 2
- ….
- Road And Rail Network And Associated Land Type 50

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7.2.204.3 Description

An example of a Road And Rail Network And Associated Land Type is motorway road block.

7.2.205 Road Furniture Position

7.2.205.1 Definition

The position of a Road Furniture relative to a Road Element.

7.2.205.2 Domain/unit of measure

- To the right of road
- To the left of the road
- Overhead

In case of multiple sets of road furniture together forming one logical group with identical meaning, combinations (e.g. both right and above) may be represented by summing up the respective Attribute value codes into one (cumulated) value.

7.2.205.3 Description

This Attribute may form a Sub-Attribute in conjunction with the Sub-Attributes Direction Category. Together they form the Composite Attribute Traffic Signal Info.

7.2.206 Road Gradient

7.2.206.1 Definition

The road gradient percentage value on the Road Element.

7.2.206.2 Domain/unit of measure

The gradient shall be expressed in the form of a percentage incline. Negative values describe downhill gradients, positive values describe uphill gradients.

Only the maximum gradient value at any position along the Road Element need be stored.

In case the gradient relates to the entire Road Element, only the maximum gradient value at any position along the Road Element need be stored.

7.2.206.3 Description

Uphill and downhill should be defined relative to the orientation of the Road Element when travelling from start to end point.

7.2.207 Road Crossfall

7.2.207.1 Definition

The transverse gradient of a Road Element.

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7.2.207.2 Domain/unit of measure

The inclination shall be expressed in the form of a permille incline. Negative values describe inclinations from the left to the right side of the road, positive values describe inclination in the reverse direction. The inclination is defined relative to the Road Element orientation from start to end Junction.

In case the inclination relates to the entire Road Element, only the maximum inclination value at any position along the Road Element need be stored.

The inclination should be rounded off to the nearest integer. The valid range is from -999 to +999.

7.2.208 Road Surface

7.2.208.1 Definition

The type and condition of the surface of a Road Element.

7.2.208.2 Domain/unit of measure

Composite.

7.2.208.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Pavement Status – Mandatory
- Paved Road Surface Type
- Unpaved Road Surface Type
- Road Surface Condition

7.2.208.4 Description

The Sub-Attributes are independent. This implies that a dirt road may have a good Road Surface Condition while a Road paved with asphalt may have a poor Road Surface Condition.

7.2.209 Road Surface Condition

7.2.209.1 Definition

An indication of the quality for transportation purposes of the surface of a Road Element.

7.2.209.2 Domain/unit of measure

- Good
- Poor

7.2.209.3 Description

What is considered good and what poor shall be defined from the viewpoint of car transportation.

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This Attribute is a Sub-Attribute which together with the Sub-Attributes Pavement Status, Paved Road Surface Type and Unpaved Road Surface Type forms the Composite Attribute Road Surface.

7.2.210 Road Under Structure

7.2.210.1 Definition

This Attribute when True indicates a Road Element that is entirely underneath or within a Structure whose dimensions are not negligible in regard to its coverage of the Road Element.

7.2.210.2 Domain/unit of measure

- True
- False

7.2.210.3 Description

Structure Types relevant to this Attribute include a multi-lane Bridge or Viaduct or a Gallery.

7.2.211 Road with Bicycle Lane

7.2.211.1 Definition

This Attribute when True indicates the existence of a bicycle lane along (both sides of) the core roadway represented by a Road Element.

7.2.211.2 Domain/unit of measure

- True
- False

7.2.211.3 Description

The validity of Road with Bicycle Lane may be specialised by means of the Restrictive Sub-Attribute Side of Line.

7.2.212 Road with Parking Lane

7.2.212.1 Definition

This Attribute when True indicates the existence of a parking lane (lay-by lane) along (both sides of) the core roadway represented by a Road Element.

7.2.212.2 Domain/unit of measure

- True
- False

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7.2.212.3 Description

This Attribute aids map visualisation and orientation purposes.

The validity of Road with Parking Lane may be specialised by means of the Restrictive Sub-Attribute Side of Line.

7.2.213 Road with Pavement

7.2.213.1 Definition

This Attribute when True indicates the existence of a pavement for pedestrians adjacent to (both sides of) the core roadway represented by a Road Element.

7.2.213.2 Domain/unit of measure

- True
- False

7.2.213.3 Description

The validity of Road with Pavement may be specialised by means of the Restrictive Sub-Attribute Side of Line.

7.2.214 Route Direction

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

7.2.215 Route Number

7.2.215.1 Definition

The route number of a Road Element, Ferry Element or Path. The Route Number is the ID-number of a particular route in a given road network as Attributed by a national, sub-national or international organization (e.g. the numbering of the departmental roads in France or the E-roads in Europe).

7.2.215.2 Domain/unit of measure

Composite.

7.2.215.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Directional Prefix
- Route Type Prefix
- Separator

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- Route Number Body — Mandatory
- Route Type Suffix
- Directional Suffix

7.2.215.4 Description

The use of pre- or suffixes is not obligatory, even if they make up part of the route numbers. If pre- or suffixes are not applied but are part of the route number, they shall be part of the Route Number Body. Also, combinations are allowed. E.g. a route type prefix might be separately defined in a Route Type Prefix while the route type suffix is defined as part of the Route Number Body.

Spaces are assumed to exist in between the different components of the street name. They are not explicitly added. One exception exists on this point: spaces in between the Route Type Prefix and Route Number Body are not assumed. These are divided by a separator defined in Separator.

In the Theme Roads and Ferries, Route Number may be used as a Sub-Attribute in conjunction with the Sub-Attributes House Number Range and Postal Code. Together these Sub-Attributes form the Composite Attribute Address Information. Route Number may also be used as a Sub-Attribute in conjunction with the Sub-Attributes Exit Number, Official Name and Alternate Name. Together these Sub-Attributes form the Composite Attribute Composite Exit Number.

7.2.216 Route Number Body

7.2.216.1 Definition

The part of the Route Number which has, compared to the other parts, the most identifying power.

7.2.216.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid route number body.

7.2.216.3 Description

EXAMPLE 1, 25, 66, 101 or A6b.

7.2.217 Route Number On Sign

7.2.217.1 Definition

The route number expressed on a Traffic Sign as destination information. The Route Number On Sign is the ID-number of a particular route in a given road network as Attributed by a national, sub-national or international organization (e.g. the numbering of the departmental roads in France or the E-roads in Europe).

7.2.217.2 Domain/unit of measure

Any combination of characters, punctuation and/or numbers.

7.2.217.3 Description

A particular Destination may belong to more than one numbered route. In such cases a corresponding number of Route Number values may be recorded.

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This Attribute is a Sub-Attribute which together with Destination Location and Exit Number forms the Composite Attribute Destination Info On Traffic Sign.

7.2.218 Route Type Prefix

7.2.218.1 Definition

A part of the route number of a Road Element, Ferry Element or Path identifying its route type. A prefix precedes the Route Number Body of a road.

7.2.218.2 Domain/unit of measure

Any combination of characters and punctuation which form a valid Route Type Prefix.

7.2.218.3 Description

Generally, the Route Type Prefixes which exist are dependent on the country in which the Road Element is located.

EXAMPLE 1 I, US, SR, RTE (USA).

EXAMPLE 2 E, A, M, B, R (Europe).

7.2.219 Route Type Suffix

7.2.219.1 Definition

A part of the route number of a Road Element, Ferry Element or Path identifying its route type. A suffix succeeds the Route Number Body of a road.

7.2.219.2 Domain/unit of measure

Any combination of letters and punctuation which forms a valid Route Type Suffix.

7.2.219.3 Description

The Route Type Suffixes which exist are dependent on the country in which the Road Element is located.

EXAMPLE Alt, Bus, Outer, or Inner (USA).

7.2.220 Routing Identifier

7.2.220.1 Definition

A unique alphanumeric identifier, ascribed to a special route, which may provide a key to an external database.

7.2.220.2 Domain/unit of measure

Any text.

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7.2.220.3 Description

This Sub-Attribute is used in conjunction with the Sub-Attributes Routing Type and Routing Sequence Number. Together these form the Composite Attribute Special Routing.

7.2.221 Routing Sequence Number

7.2.221.1 Definition

The identification of the sequence number of a particular Road Element, Ferry Connection or Path within a special routing.

7.2.221.2 Domain/unit of measure

A positive numerical value.

7.2.221.3 Description

This Sub-Attribute is used in conjunction with the Sub-Attributes Routing Identifier and Routing Type. Together these form the Composite Attribute Special Routing.

7.2.222 Routing Type

7.2.222.1 Definition

The identification of the type of special routing to which a Road Element, Ferry Connection or Path belongs.

7.2.222.2 Domain/unit of measure

- Restricted Vehicle Route
- Dangerous Load Route
- Precautionary Salting Route
- Transcontinental Route
- Designated Truck Route
- Other Route

7.2.222.3 Description

7.2.222.3.1 Usage rules

This Sub-Attribute is used in conjunction with the Sub-Attributes Routing Identifier and Routing Sequence Number. Together these form the Composite Attribute Special Routing.

7.2.222.3.2 Definition of Restricted Vehicle Route

A pre-defined route with restrictions for the load, width or height of vehicles.

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7.2.222.3.3 Definition of Dangerous Load Route

A pre-defined route selected for the transport of dangerous goods through an area.

7.2.222.3.4 Definition of Precautionary Salting Route

A route that is selected for precautionary salting for winter maintenance.

7.2.222.3.5 Definition of Transcontinental Route

A route that is part of a transcontinental route network, e.g. the Trans European Network.

7.2.222.3.6 Definition of Designated Truck Route

A route that is especially, but not exclusively, designated for the passage of trucks through, typically, an urban area.

7.2.222.3.7 Definition of Other Route

Any other special route that may be selected on an ad-hoc basis.

7.2.223 Sand Area Type

7.2.223.1 Definition

The type of Beach, Dune or Sand Plains.

7.2.223.2 Domain/unit of measure

- Beach/Dune
- Desert
- Other

7.2.224 Separator

7.2.224.1 Definition

A part of the route number which separates the Route Type Prefix and the Route Number Body.

7.2.224.2 Domain/unit of measure

A character which forms a valid separator.

7.2.224.3 Description

EXAMPLE “-” in I-280,or “ ” in SR 92.

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7.2.225 Service Address

7.2.225.1 Definition

Address description of a street-related or block-related address of a Service.

7.2.225.2 Domain/unit of measure

Composite.

7.2.225.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Place Name [.]..[.]
- Street Name
- House Number
- Building Storey
- Postal Code

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.2.226 Settlement Type

7.2.226.1 Definition

The type or character of a Built-up Area.

7.2.226.2 Domain/unit of measure

- Residential
- Recreational
- Industrial
- Military

7.2.226.3 Description

The Settlement Type should specify the main activity which takes place in the area inside the Built-up Area. Professional activities should in this respect be classified as industrial.

7.2.227 Scenic Value

7.2.227.1 Definition

This Attribute when True indicates whether a Road Element is regarded as scenic.

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7.2.227.2 Domain/unit of measure

- True
- False

7.2.227.3 Description

Assignment of scenic values is subjective and may be based on a variety of sources.

7.2.228 Scope

7.2.228.1 Definition

The Attribute Scope indicates the validity of associated Attribute value semantics or Relationship semantics.

7.2.228.2 Domain/unit of measure

- Full
- Partial

7.2.229 Side of Line

7.2.229.1 Definition

The side of a Line Feature for which an Attribute applies.

7.2.229.2 Domain/unit of measure

- Left Side
- Right Side

7.2.229.3 Description

7.2.229.3.1 Usage rules

Any Property that may vary for the left or the right side of a Line Feature may be expressed as such by combining the Attribute expressing the Property with the Attribute Side of Line as Sub-Attributes in a Composite Attribute. When this is done the Attribute expressing the Property is only valid at the side as specified in the Side of Line Attribute.

When there are no side restrictions on the Property, the Side of Line Attribute shall not be included.

7.2.229.3.2 Indication of a particular side

The definition of left and right side should take place by applying the direction of the Line Feature as seen from the start bounding Point Feature.

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7.2.230 Sign Text

7.2.230.1 Definition

The text on a sign post representing one logical element.

7.2.230.2 Domain/unit of measure

Any printable characters which form a valid sign text.

7.2.230.3 Description

Usually, Sign Posts contain different independent elements of logical information (e.g. different place names, names of recreation areas etc.). These shall be modelled as different instances of the Attribute Sign Text. Route Numbers and Exit Numbers shall not be represented by the Attribute Sign Text.

7.2.231 Slip Road Type

7.2.231.1 Definition

The type of Slip Road.

7.2.231.2 Domain/unit of measure

- Parallel Road
- Slip Road of a grade separated crossing
- Slip Road of a crossing at grade
- Other

7.2.231.3 Description

7.2.231.3.1 General

This Sub-Attribute is used to further specify the Slip Road which has been specified in the associated Sub-Attribute Form of Way. Together with the Sub-Attributes Enclosed Traffic Area and Motorway, they make up the Composite Attribute Composite Form Of Way.

See Figure 124, Figure 125, Figure 126, Figure 127 and Figure 128 for examples.

7.2.231.3.2 Definition of a Slip Road of a grade separated crossing

A Slip Road of a grade separated crossing represents a part of the road network which is used only to enter or leave a Road Element and will connect two or more roads which have a grade separated crossing.

7.2.231.3.3 Definition of a Slip Road of a crossing at grade

A Slip Road of a crossing at grade is a Slip Road of a single or multiple carriageway but never a Motorway which forms a single-level Intersection with another single or multiple carriageway which is not a Motorway.

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7.2.231.3.4 Definition of a Parallel Road

A Parallel Road is a sub-type of a Slip Road which connects to the same road both at its start and at its end. In between its start and end it runs parallel or nearly parallel to the road it connects to and it only gives access to Slip Roads. A parallel road always will be open in only one direction for motorized traffic.

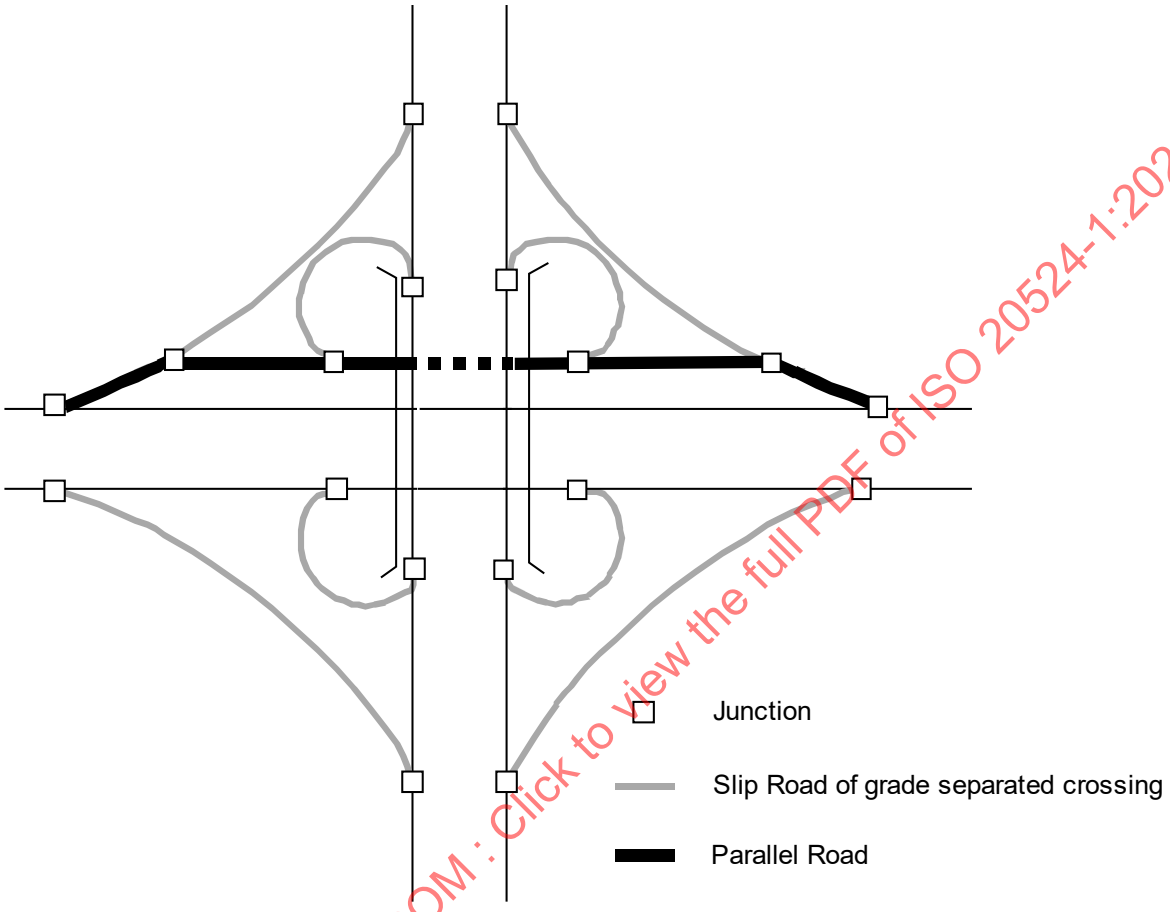


Figure 124 — Example of a Slip Road of type "Slip Road of a Grade Separated Crossing" and of type "Parallel Road"

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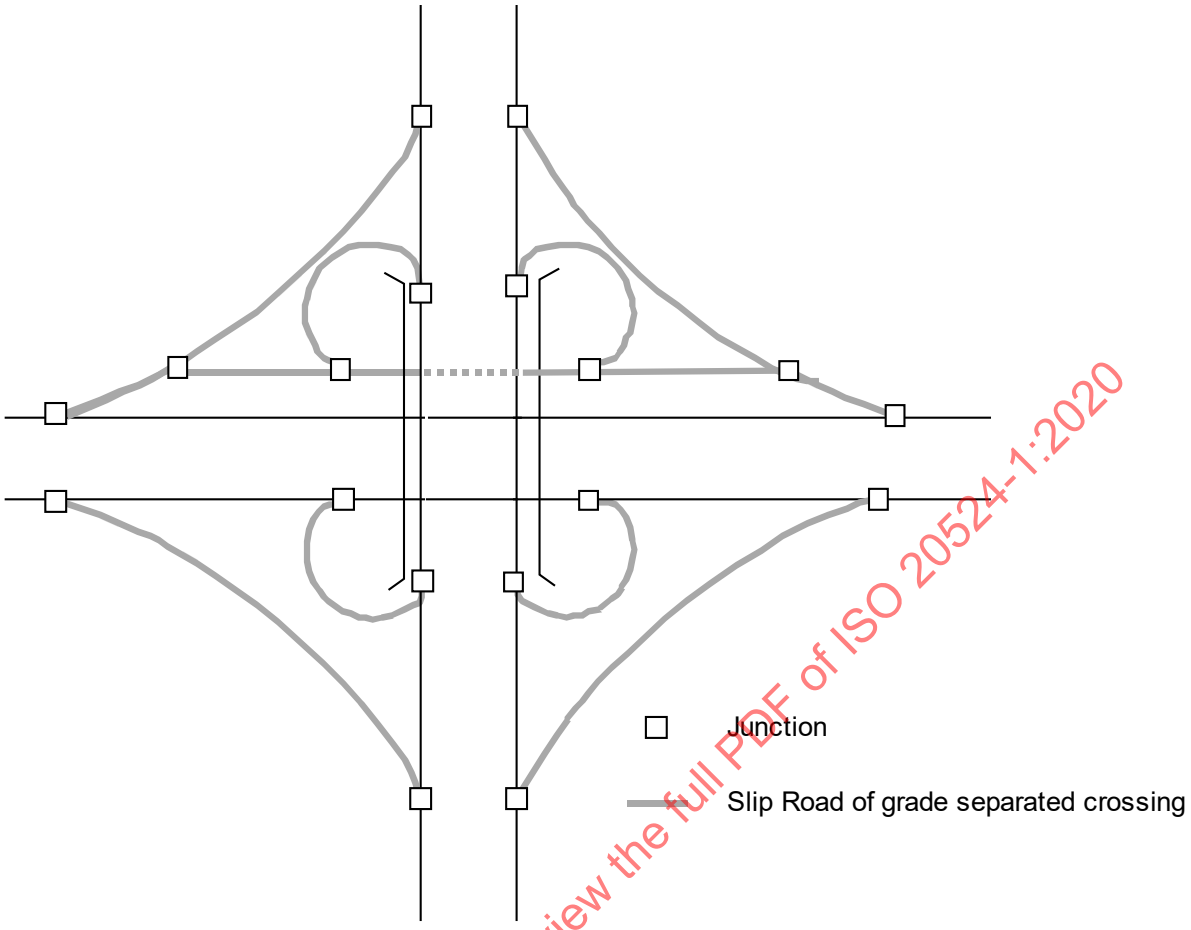


Figure 125 — Example of a Slip Road of type "Slip Road of a Grade Separated Crossing" when Parallel Road is not captured

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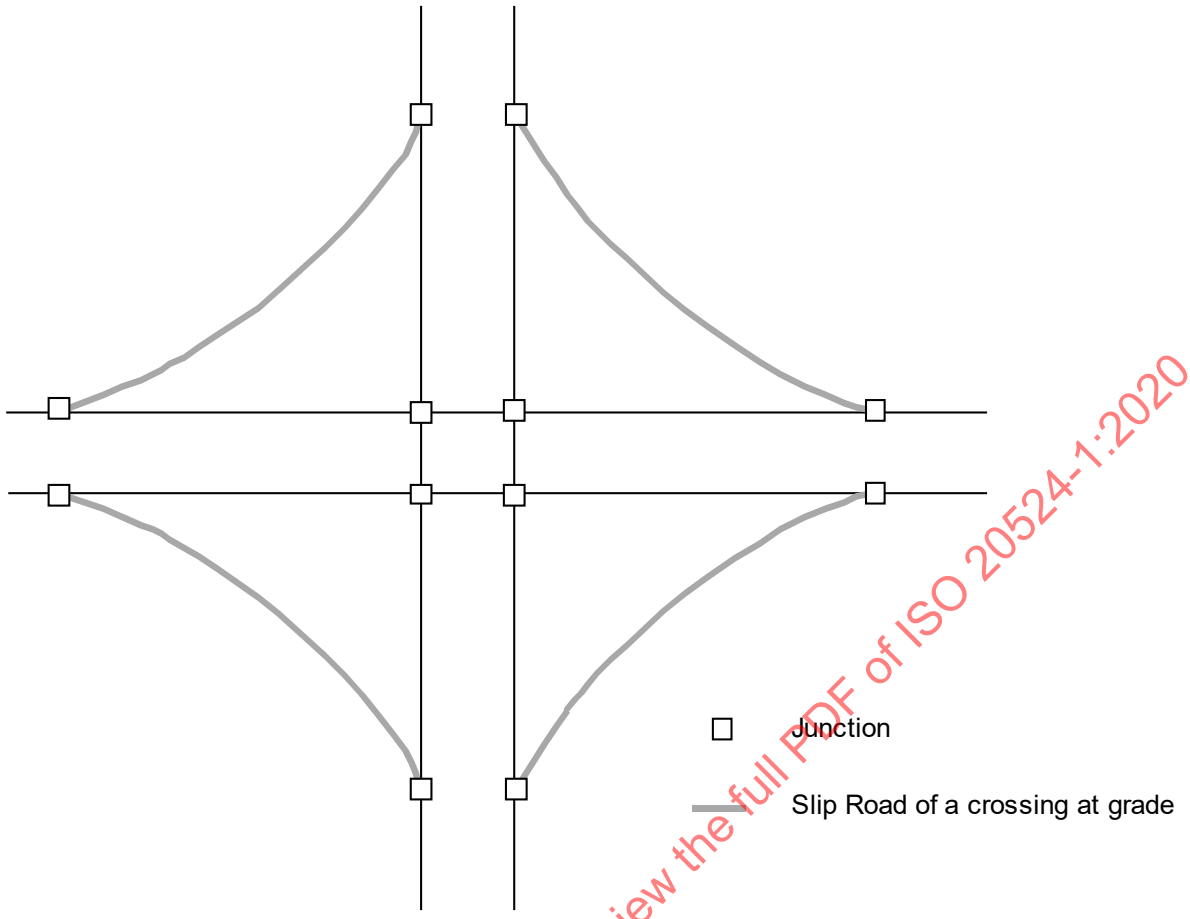


Figure 126 — Example of a Slip Road of type "Slip Road of a Crossing at Grade"

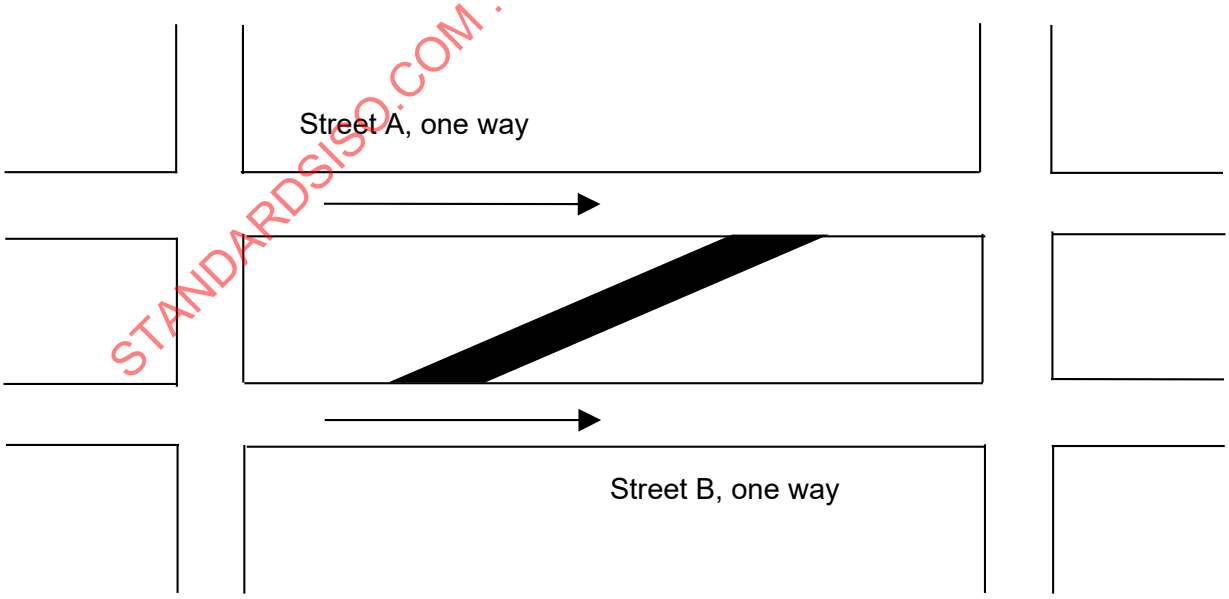


Figure 127 — Example of a Slip Road of type "Other"

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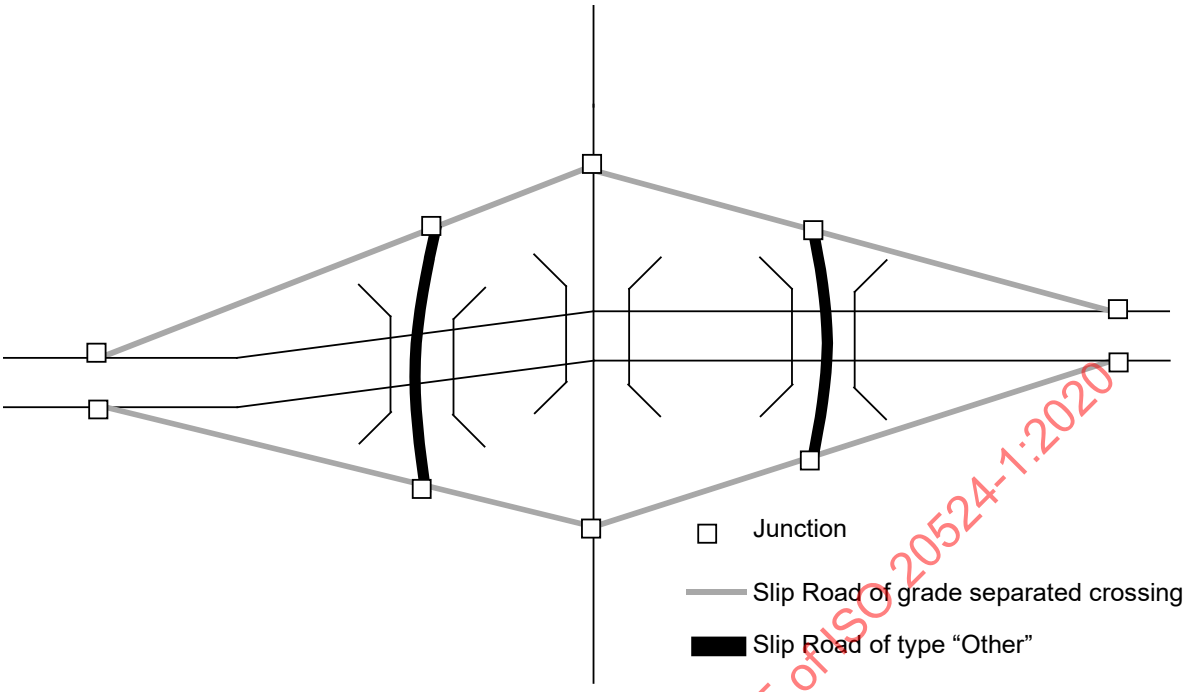


Figure 128 — Example of a Slip Road of type “Slip Road of Grade Separated Crossing” and of type “Other”

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7.2.232 Slow Walker Limitation

7.2.232.1 Definition

This Attribute when True indicates accessibility limitation for people who walk slowly due to use of special devices such as walkers.

7.2.232.2 Domain/unit of measure

- True
- False

7.2.232.3 Description

Slow Walker limitation is a Sub-Attribute that limits access to road elements to people using walking assistance devices. Together with Hearing Limitation, Vision Limitation, and Wheelchair Limitation, it forms the Composite Attribute Accessibility Limitation.

Slow Walker Limitation may be restricted by the Restrictive Sub-Attribute Validity Period, which expresses temporality associated with accessibility limitations.

7.2.233 Snack Served

7.2.233.1 Definition

This Attribute when True indicates whether snacks or light refreshments are available.

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7.2.233.2 Domain/unit of measure

- True
- False

7.2.234 Special Routing

7.2.234.1 Definition

Information about special routing along a sequence of Road Elements and/or Ferry Connections or along a sequence of Paths.

7.2.234.2 Domain/unit of measure

Composite.

7.2.234.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Routing Identifier — Mandatory
- Routing Type — Mandatory
- Routing Sequence Number — Mandatory

7.2.235 Speed Restrictions

7.2.235.1 Definition

The maximum speed limit allocated to a Road Element.

7.2.235.2 Domain/unit of measure

7.2.235.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is kilometre per hour; English default unit is mile per hour.

7.2.235.2.2 Measure

A measure of Speed Restrictions is composed of a value and a unit of measure.

7.2.235.2.3 Unit of measure

The unit of measure of Speed Restrictions is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.235.3 Description

This Attribute may be used in conjunction with the Sub-Attribute Vehicle Type, Validity Direction and Validity Period to indicate for which vehicles, driving direction and/or time period the restriction holds.

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7.2.236 Spoken Language

7.2.236.1 Definition

A spoken language, or dialect within a spoken language.

7.2.236.2 Domain/unit of measure

An ISO 639-2 language code

7.2.236.3 Description

The Attribute Spoken Language may be associated with Features, with name Attributes, or with name strings, i.e. with the actual values of name Attributes.

7.2.237 Start End Flag

7.2.237.1 Definition

Specification of a start or end designation.

7.2.237.2 Domain/unit of measure

- Start
- End

7.2.237.3 Description

This Attribute is used as a Sub-Attribute in conjunction with Distance Expression. Together these Sub-Attributes form the Composite Attribute Linear Position.

7.2.238 Street Lighted

7.2.238.1 Definition

This Attribute when True indicates street lighting present along a Road Element or Pathway.

7.2.238.2 Domain/unit of measure

- True
- False

7.2.239 Street Name

7.2.239.1 Definition

Name of the street which is part of the address description of a Service.

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7.2.239.2 Domain/unit of measure

Any combination of letters, numbers or punctuation which forms a valid name.

7.2.239.3 Description

This Sub-Attribute is used in conjunction with the Sub-Attributes Place Name, Postal Code and House Number. Together they form the Composite Attribute Service Address.

7.2.240 Street Type Prefix

7.2.240.1 Definition

A part of the official street name or alternate street name of a Road Element or Address Area Boundary Element identifying the street type and including possible articles and prepositions. A prefix precedes the Official/Alternate Street Name Body of a road.

7.2.240.2 Domain/unit of measure

Any combination of characters and punctuation which form a valid Street Type Prefix.

7.2.240.3 Description

Generally, the Street Type Prefixes which exist are dependent on the country or the address system in which the Road Element is located in.

NOTE Street Type Prefixes in the USA are officially defined by the USPS (United States Postal Service).

EXAMPLE 1 “Rue de” in France, Belgium.

EXAMPLE 2 “Piazza della” in Italy.

EXAMPLE 3 “Plaza” in Spain.

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attributes Official/Alternate Street Name Body, Directional Prefix, Trailing Spaces, Street Type Suffix, Directional Suffix and Composite Pronunciation. Together these form the Composite Attribute Official/Alternate Street Name.

7.2.241 Street Type Suffix

7.2.241.1 Definition

A part of the official street name or alternate street name of a Road Element or Address Areas Boundary Element identifying the street type and including a possible leading blank (i.e. a space character) in the case when the Official/Alternate Street Name Body and the Street Type Suffix are separated by a blank. A Street Type Suffix succeeds the Official/Alternate Street Name Body of a road.

7.2.241.2 Domain/unit of measure

Any combination of letters and punctuation which forms a valid Street Type Suffix.

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7.2.241.3 Description

Generally, the Street Type Suffixes which exist are dependent on the country or the address system in which the Road Element is located in.

NOTE Street Type Suffixes in the USA are officially defined by the USPS.

EXAMPLE 1 Seventh Avenue with Street Type Suffix Avenue.

EXAMPLE 2 Rozengracht with Street Type Suffix gracht.

EXAMPLE 3 Friedrichstraße with Street Type Suffix straße.

This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attributes Official/Alternate Street Name Body, Directional Prefix, Street Type Prefix, Trailing Spaces, Directional Suffix and Composite Pronunciation. Together these form the Composite Attribute Official/Alternate Street Name.

7.2.242 Structure Abutment

7.2.242.1 Definition

Identifies constructive parts of a Structure directly alongside a Road Element.

7.2.242.2 Domain/unit of measure

- Structure abutment on the left of Road Element
- Structure abutment on the right of Road Element
- Structure abutment in the middle of the Road Element

7.2.242.3 Description

This Attribute identifies abutments, such as supporting pillars or the buttress of a bridge, located to the left, to the right of a Road Element and/or in the middle of the roadway, i.e. the road is split either side of the abutment.

In case abutments related to a structure correspond to more than one of the Attribute values, combinations (e.g. both left and right) may be represented by summing up the respective Attribute value codes into one (cumulated) value.

This Attribute should be used as a Sub-Attribute in conjunction with the Sub-Attribute Divider Width. Together they form the Composite Attribute Structure Abutment Info.

7.2.243 Structure Abutment Info

7.2.243.1 Definition

Describes constructive parts of a Structure directly alongside a Road Element.

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7.2.243.2 Domain/unit of measure

Composite.

7.2.243.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Structure Abutment - Mandatory
- Divider Width

7.2.243.4 Description

The Sub-Attribute Divider Width may be used in conjunction with the Structure Abutment value "Structure abutment in the middle of the Road Element".

7.2.244 Structure Category

7.2.244.1 Definition

The category of traffic flow for a Structure.

7.2.244.2 Domain/unit of measure

- over
- under
- other

7.2.244.3 Description

This Attribute may be used as an Attribute of the Relationships Multi-Point Assignment, Exclusive Multi-Point Assignment, or Linear Assignment in order to specify whether the traffic flow is over or under the referenced Structure (or different from over or under).

7.2.245 Structure Identifier

7.2.245.1 Definition

A unique alphanumeric identifier, ascribed to a particular Structure Feature, which may provide a key to an external database.

7.2.245.2 Domain/unit of measure

As specified by the administrating body.

7.2.246 Structure Type

7.2.246.1 Definition

The classification of a Structure.

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7.2.246.2 Domain/unit of measure

- Bridge
- Viaduct
- Aqueduct
- Tunnel
- Trench
- Gallery
- Retaining wall
- Embankment

7.2.246.3 Description

7.2.246.3.1 General

The types are not mutually exclusive. (see Figure 129)

7.2.246.3.2 Definition of Bridge

A man-made construction to either carry a Transportation Element over another Feature or to span over a Transportation Element. In the case where one Transportation Element spans over another, the bridge represents a grade separated crossing.

7.2.246.3.3 Definition of Viaduct

A type of bridge, usually characterised by multiple spans. A viaduct often carries a Transportation Element elevated above ground level (such as a fly-over).

7.2.246.3.4 Definition of Aqueduct

A type of bridge, carrying a water Feature.

7.2.246.3.5 Definition of Tunnel

An enclosed man-made construction to carry a Transportation Element through or below a natural Feature or other obstructions.

7.2.246.3.6 Definition of Trench

A non-enclosed, man-made excavation carrying a Transportation Element below the surrounding ground-level.

7.2.246.3.7 Definition of Embankment

A non-enclosed man-made earth construction carrying a Transportation Element above the surrounding ground-level.

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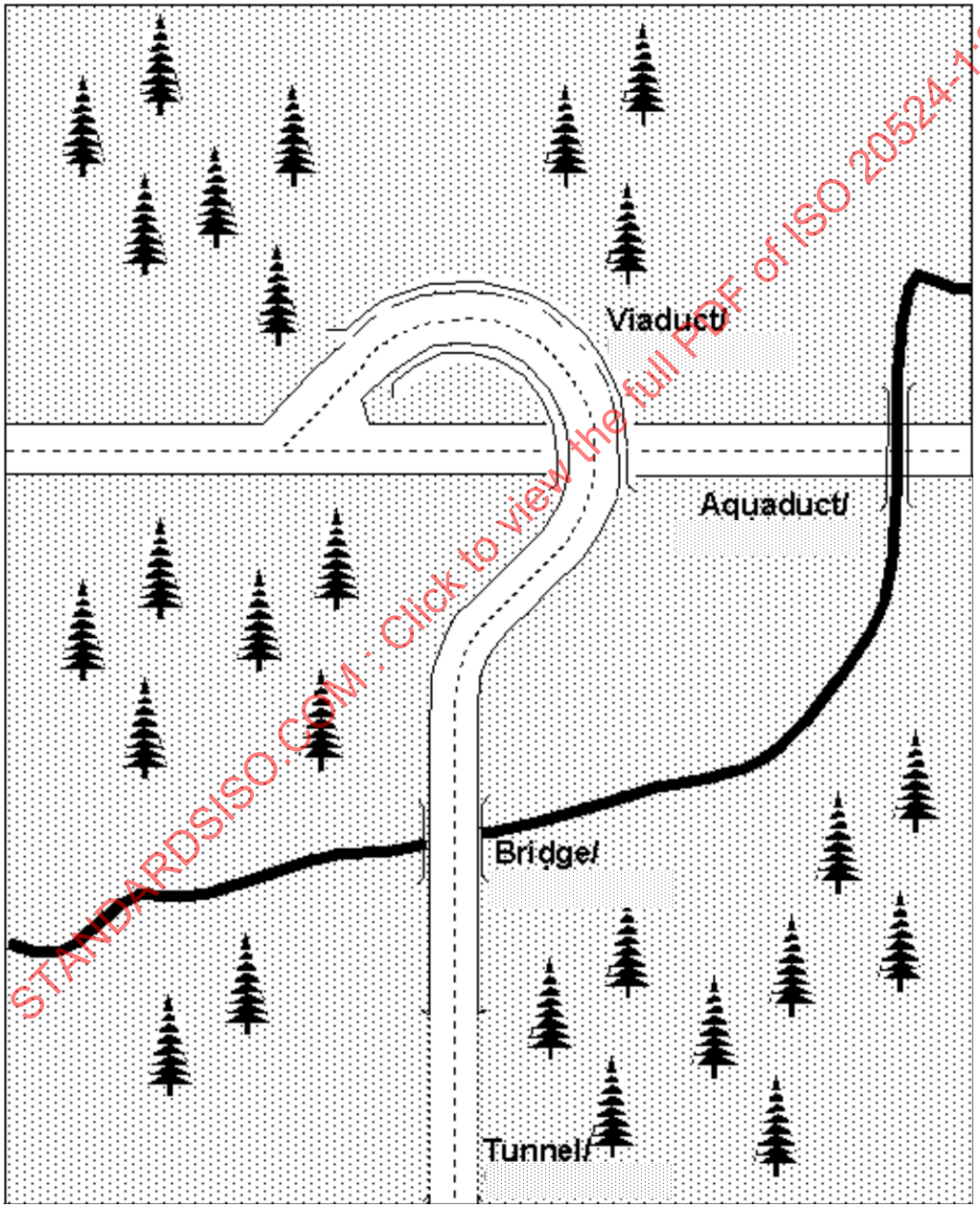
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7.2.246.3.8 Definition of Gallery

A man-made construction that covers a Transportation Element and is usually open on one side. Like a tunnel, it carries a Transportation Element through or under a natural Feature or obstruction.

7.2.246.3.9 Definition of Retaining wall

A man-made construction that either retains natural ground at a higher level than an associated Transportation Element or supports the Transportation Element at a higher level than the surrounding ground.



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Figure 129 — Examples of different Structure Types

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7.2.246.4 Relation between Structure Types and grade-separations

The Structure Types bridge, viaduct, tunnel, gallery and aqueduct may relate to:

- one Transportation Element (non-grade separated, or the fact that a grade separation occurs is not relevant), or
- two Transportation Elements (grade separated).

Trench, embankment and retaining wall do not relate to grade separation.

7.2.247 Suitable for Disabled or Impaired

7.2.247.1 Definition

This Attribute when True indicates whether the Service is suitable for a disabled person, such as people using a wheelchair, or otherwise physically impaired.

7.2.247.2 Domain/unit of measure

- True
- False

7.2.247.3 Description

Suitable for Disabled or Impaired is used in conjunction with the Sub-Attributes Accessibility Limitation and Infrastructure Accessibility Aids. Together they form the Composite Attribute Accessibility.

7.2.248 Summer Time

7.2.248.1 Definition

Summer Time identifies whether an area observes Summer Time and offsets clocks forward to achieve more daylight in the evening (this is Daylight Savings Time in the U.S.).

7.2.248.2 Domain/unit of measure

7.2.248.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is minute; English default unit is minute.

7.2.248.2.2 Measure

A measure of Summer Time is composed of a value and a unit of measure.

7.2.248.2.3 Unit of measure

The unit of measure of Summer Time is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

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7.2.248.3 Description

This Attribute is used with the validity period to describe when Summer Time is in effect. Typically, this is applied to the highest administrative area level for which it applies, and then overridden when necessary by applying a different Summer Time value or Validity Period to a lower level area. For example, most of the United States observes Daylight Savings Time, but Arizona (and other places) does not. In this case the country Feature for the U.S. will receive a Summer Time value of 60 and the State Feature for Arizona will receive a Summer Time value of 0.

7.2.249 Symbol on Traffic Sign

7.2.249.1 Definition

A description of the symbol that occurs on the traffic sign.

7.2.249.2 Domain/unit of measure

- All traffic
- Motor cycle
- Private car
- Private car with trailer
- Heavy Goods Vehicle
- Heavy Goods Vehicle with trailer
- Bus
- Motor vehicle, having a maximum speed of 25 km/h
- Vehicle with explosive goods
- Vehicle with water-polluting goods
- Vehicle with other dangerous goods
- Tram
- Train
- Bicycle
- Moped
- Horse-drawn vehicle
- Rider
- Pedestrian
- Pedestrian with hand-drawn vehicle

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- Speed
- Total weight
- Weight per axle
- Width
- Height
- Length

The values “Speed” to “Length” shall be followed by the Attribute Value on Traffic Sign.

7.2.249.3 Description

This Attribute is used as a Sub-Attribute for the Composite Attribute Traffic Sign Information. Its use is only meaningful if it is preceded by the Attribute Traffic Sign Class.

7.2.250 Telefax Number

7.2.250.1 Definition

The telefax number of the Service.

7.2.250.2 Domain/unit of measure

The number should be specified according to the following standard syntax:

+(country code)-(area code without leading zero)-local telefax number

EXAMPLE +(44)-(171)-1234567.

Any combination of letters, numbers or punctuation which forms a valid Telefax Number.

7.2.251 Telephone Number

7.2.251.1 Definition

The telephone number of the Service.

7.2.251.2 Domain/unit of measure

The number should be specified according to the same syntax as the telefax number. See 7.12.66.2.

Any combination of letters, numbers or punctuation which forms a valid Telephone Number.

7.2.252 Time Difference of Flight Connection

7.2.252.1 Definition

The difference in time between the destination and starting point of a flight connection.

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7.2.252.2 Domain/unit of measure

The value shall be expressed as a single time duration according to the Time Domain syntax. For destinations in a time zone that is behind the time at the starting point, a negative time difference shall be represented by means of a negative time duration expression.

7.2.252.3 Description

This Attribute may be used as a Sub-Attribute of the Composite Attribute Flight Info.

7.2.253 Time of Arrival of Flight Connection

7.2.253.1 Definition

The arrival time at the Destination of Flight Connection of a flight connection.

7.2.253.2 Domain/unit of measure

Any point in time expressed as a single starting date according to the “Syntax for Time Domain” rules.

7.2.253.3 Description

This Attribute may be used as a Sub-Attribute of the Composite Attribute Flight Info.

7.2.254 Time of Departure of Flight Connection

7.2.254.1 Definition

The departure time for a flight connection.

7.2.254.2 Domain/unit of measure

Any point in time expressed as a single starting date according to the “Syntax for Time Domain” rules.

7.2.254.3 Description

This Attribute may be used as a Sub-Attribute of the Composite Attribute Flight Info.

7.2.255 Time Zone

7.2.255.1 Definition

Time Zone identifies the difference between local time offset from UTC for an area.

7.2.255.2 Domain/unit of measure

A number between -12.00 and +12.00, where the number before the decimal point represents the hours offset from UTC and the number after the decimal point represents the number of additional minutes offset from UTC.

EXAMPLE 1 Chicago is -6.00 from UTC.

EXAMPLE 2 Netherlands is +1.00 from UTC.

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7.2.255.3 Description

The Time Zone is typically applied at the highest area level that the time zone covers, and overridden at a lower level area when necessary. For example, since the U.S. crosses many time zones, the state level will generally be the highest-level for applying this information. The state of Indiana crosses the Central and Eastern Time zones. The state of Indiana may receive the time zone of -5.00 since the majority of the state is in the Eastern Time zone. For the administrative areas in the Central Time zone, the time zone of -6.00 may be applied at the next lower administrative level (county). The time represents standard time, not summer time. Summer time is addressed with the Summer Time Attribute

7.2.256 Toll

7.2.256.1 Definition

Fee to be paid in a certain currency to travel on (a section of) a toll road.

7.2.256.2 Domain/unit of measure

Composite.

7.2.256.3 Sub-Attributes

- Toll Charge — Mandatory
- Currency

7.2.256.4 Description

This Attribute is usable in conjunction with the Relationship Toll Route.

7.2.257 Toll Charge

7.2.257.1 Definition

Fee to be paid to travel on (a section of) a toll road.

7.2.257.2 Domain/unit of measure

Amount specified in the smallest unit of a certain currency which is accepted by the associated user defined Feature Toll Location.

7.2.257.3 Description

This Sub-Attribute is to be used in combination with the Sub-Attribute Currency to specify a certain Toll to be paid.

7.2.258 Toll Point Type

7.2.258.1 Definition

The type of Toll Point.

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7.2.258.2 Domain/unit of measure

- Physical Toll Booth
- Virtual Toll Booth
- Hybrid

7.2.258.3 Description

7.2.258.3.1 Definition of a Physical Toll Booth

A Toll Booth is a construction along or across the road where toll may be paid to employees of the organization in charge of collecting the toll, to machines capable of automatically recognizing coins or bills or to machines involving electronic methods of payment like credit cards or bank cards.

7.2.258.3.2 Definition of a Virtual Toll Booth

At a virtual point of toll payment, toll will be charged via automatic registration of the passing vehicle by subscription or invoice.

7.2.258.3.3 Definition of Hybrid

Hybrid signifies a Toll Booth which is both Physical and Virtual.

7.2.259 Toll Road

7.2.259.1 Definition

This Attribute when True indicates whether travelling a Road Element requires payment of toll.

7.2.259.2 Domain/unit of measure

- True
- False

7.2.260 Traffic Flow

7.2.260.1 Definition

Information about the traffic flow on Road Elements or Path.

7.2.260.2 Domain/unit of measure

Composite.

7.2.260.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Traffic Flow Measurement — Mandatory
- Traffic Flow Measurement Type — Mandatory

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- Traffic Flow Measurement Unit — Mandatory
- Percentage of International Traffic

7.2.261 Traffic Flow Measurement

7.2.261.1 Definition

The traffic flow on Road Elements or Path, expressed for instance by number of vehicles per day.

7.2.261.2 Domain/unit of measure

A positive numerical value.

7.2.261.3 Description

The value shall be expressed in the unit specified by the Sub-Attribute Traffic Flow Measurement Unit.

This Sub-Attribute is used in conjunction with the Sub-Attributes Traffic Flow Measurement Type, Traffic Flow Measurement Unit and Percentage of International Traffic.

7.2.262 Traffic Flow Measurement Type

7.2.262.1 Definition

Classification of traffic flow measurement on Road Elements or Path.

7.2.262.2 Domain/unit of measure

- Average Traffic
- Average Flow during Peak Periods
- Maximum Flow

7.2.262.3 Description

This Sub-Attribute is used in conjunction with the Sub-Attributes Traffic Flow Measurement, Traffic Flow Measurement Unit and Percentage of International Traffic.

7.2.263 Traffic Flow Measurement Unit

7.2.263.1 Definition

Time unit over which the traffic flow measurement is recorded.

7.2.263.2 Domain/unit of measure

The value shall be specified by a single time duration expressed according to the Time Domain syntax.

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7.2.263.3 Description

This Sub-Attribute is used in conjunction with the Sub-Attributes Traffic Flow Measurement, Traffic Flow Measurement Type and Percentage of International Traffic.

7.2.264 Traffic Jam Sensitivity

7.2.264.1 Definition

Probability of a traffic jam on a Road Element.

7.2.264.2 Domain/unit of measure

- No or low probability
- High probability

7.2.265 Traffic Signal Info

7.2.265.1 Definition

The Traffic Signal Info specifies the driving direction to which a number of special traffic signals apply and where these signalling units are positioned relative to the road

7.2.265.2 Domain/unit of measure

Composite

7.2.265.3 Sub-Attributes

This Composite Attribute may consist of the following Sub-Attributes:

- Direction Category
- Road Furniture Position

7.2.266 Traffic Sign Class

7.2.266.1 Definition

The classification of the traffic sign.

7.2.266.2 Domain/unit of measure

Traffic signs are classified in the following 9 different categories:

- Right of Way
- Directional
- Right of Passage
- Signpost

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- Route prohibition
- Stopping prohibition
- Warning sign
- Directional Sign
- Variable Speed Sign

Figure 130 provides graphical examples of the first four categories.

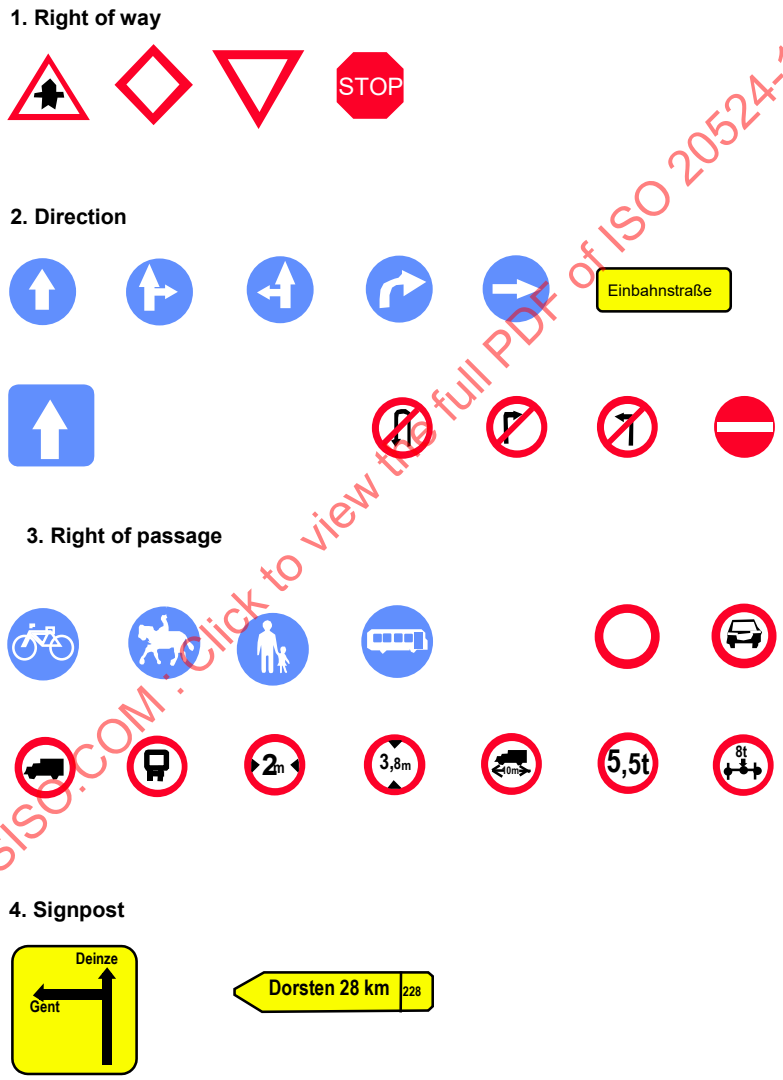


Figure 130 — Traffic Signs according to Traffic Sign Class

7.2.266.3 Description

This Attribute is used as a Sub-Attribute for the Composite Attribute Traffic Sign Information.

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7.2.267 Traffic Sign Information

7.2.267.1 Definition

A description of the information contained in a traffic sign. The information should comprise the information contained in the traffic sign itself, as well as supplementary information present on e.g. additional text plates.

7.2.267.2 Domain/unit of measure

Composite.

7.2.267.3 Sub-Attributes

- Traffic Sign Class — Mandatory
- Symbol on Traffic Sign [.]..[.]
- Direction [.]..[.]
- Value on Traffic Sign [.]..[.]
- Exit Number [.]..[.]
- Destination Info on Traffic Sign [.]..[.]
- Other Textual Content of Traffic Sign [.]..[.]

NOTE [.]..[.] indicates that the Sub-Attribute can have multiple instances in the framework of the Composite Attribute.

7.2.268 Trailing Spaces

7.2.268.1 Definition

An indication of the presence of a space character between the Official /Alternate Street Name Body and the preceding or succeeding part.

7.2.268.2 Domain/unit of measure

- None
- Between preceding part and Official /Alternate Street Name Body.
- Between Official /Alternate Street Name Body and succeeding part.
- Between preceding part and the Official /Alternate Street Name Body and between the Official /Alternate Street Name Body and the succeeding part.

7.2.268.3 Description

In case in the Official or Alternate Street Name, the Official /Alternate Street Name Body and the Street Type Prefix or the Street Type Suffix are divided by a space, this should be indicated by the Sub-Attribute Trailing Spaces.

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This Attribute is used as a Sub-Attribute, possibly in conjunction with the Sub-Attributes Alternate or Official Street Name Body, Directional Prefix, Street Type Prefix, Street Type Suffix, Directional Suffix and Composite Pronunciation. Together these form the Composite Attribute Alternate or Official Street Name.

7.2.269 Transcription Description

7.2.269.1 Definition

Description of the phonetic transcription to aid in understanding.

7.2.269.2 Domain/unit of measure

Any text.

7.2.269.3 Description

This Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Pronunciation, Pronunciation System, and Phonetic Alphabet. Together these Sub-Attributes form the Composite Attribute Composite Pronunciation.

Alternatively, this Attribute is used as a Sub-Attribute in conjunction with the Sub-Attributes Alternate Pronunciation, Pronunciation Variant, Phonetic Alphabet, and Pronunciation Language. Together these Sub-Attributes form the Composite Attribute Composite Alternate Pronunciation.

7.2.270 Transition

7.2.270.1 Definition

Identifies a Road Element whose existence in the Roads and Ferries network serves to topologically connect road centre geometry without reflecting centreline characteristics.

7.2.270.2 Domain/unit of measure

- Regular geometry
- Transitional geometry

7.2.270.3 Description

Generally, Road Elements are modelled to reflect linear road objects. Road Elements also imply network connectivity through topological connections to other Road Elements (via Junctions). In some situations, Road Elements exist in the network only to connect other Road Elements without corresponding to linear characteristics present in the real world. See Figure 131 and Figure 132 for examples. Such special Road Elements play the role of representing the transition (i.e. topological network connection) between sections of regular geometry.

This Attribute gives the possibility of identifying such special Road Elements.

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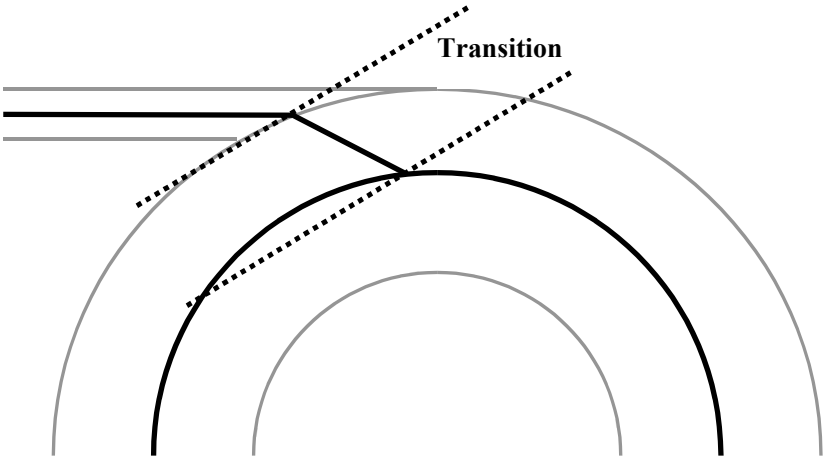


Figure 131 — Schematic example of road centreline transition at a curve/roundabout

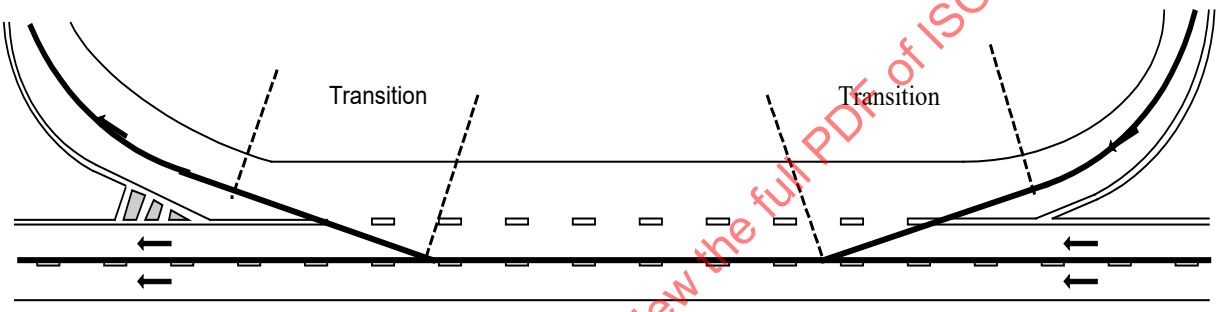


Figure 132 — Schematic example of road centreline transition at an entry/exit lane

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7.2.271 Travel Time

7.2.271.1 Definition

The one-way travel time that a Ferry Connection takes to traverse along the connection.

7.2.271.2 Domain/unit of measure

The value shall be expressed as a single time duration using Time Domain Syntax.

7.2.271.3 Description

The travel time shall represent the average duration of a trip by the transport mode in question.

7.2.272 Type of Public Transport Point

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

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7.2.273 Underground Flag

7.2.273.1 Definition

Indication whether a (Schematic) Building or Railway Line, or a Public Transport Point is aboveground or underground.

7.2.273.2 Domain/unit of measure

- Aboveground
- Underground

7.2.274 Unpaved Road Surface Type

7.2.274.1 Definition

The Type of surface an unpaved Road Element has.

7.2.274.2 Domain/unit of measure

- Gravel
- Dirt

7.2.274.3 Description

Dirt roads are those roads whose surface is formed by the removal of vegetation and/or by the transportation movements over that road which inhibit further growth of any vegetation. Gravel roads are dirt roads whose surface has been improved by grading with gravel.

This Attribute is a Sub-Attribute which together with the Sub-Attributes Pavement Status, Paved Road Surface Type and Road Surface Condition forms the Composite Attribute Road Surface.

7.2.275 Upper Building Elevation

7.2.275.1 Definition

The upper elevation of a Building above ground.

7.2.275.2 Domain/unit of measure

7.2.275.2.1 Value domain

The value shall be expressed in either Metric or English default units, or in user-defined units. Metric default unit is metre; English default unit is foot.

7.2.275.2.2 Measure

A measure of Upper Building Elevation is composed of a value and a unit of measure.

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7.2.275.2.3 Unit of measure

The unit of measure of Upper Building Elevation is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

7.2.275.3 Description

The Attribute Upper Building Elevation is used in conjunction with the Sub-Attribute Lower Building Elevation. Together they make up the Composite Attribute Complex Building Elevation.

7.2.276 Urban Railway Station

7.2.276.1 Definition

This Attribute when True indicates a facility established to provide rail transportation within an urban area.

7.2.276.2 Domain/unit of measure

- True
- False

7.2.277 Validity Direction

7.2.277.1 Definition

The direction sense of a (Sub-)Attribute associated with a Line Feature, or a Relationship involving a Line Feature, defined relative to the given Line Feature's positive direction.

7.2.277.2 Domain/unit of measure

- Same direction
- Opposite direction

7.2.277.3 Description

The Validity Direction Attribute may serve in two ways, either by restricting the validity of an associated (Sub-)Attribute to a single direction, or by setting the direction sense for associating Attribute and/or Relationship properties with a Line Feature.

This Attribute may be used as a Sub-Attribute in conjunction with Correspondence Order. Together these Sub-Attributes form the Composite Attribute Correspondence.

7.2.278 Validity Period

7.2.278.1 Definition

The period, for which a value defined in an associated Sub-Attribute or Relationship is valid.

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7.2.278.2 Domain/unit of measure

The value of the Attribute Validity Period shall be constructed as a combination of both starting date(s) and time duration(s) according to the Syntax for Time Domain rules.

7.2.278.3 Description

Any Property that has a variable character over time may be expressed as such by combining the Attribute expressing the Property with the Attribute Validity Period as Sub-Attributes in a Composite Attribute. When this is done the Attribute expressing the Property is only valid in the period as specified in the Validity Period Attribute.

When there are no time restrictions on the Property, the Validity Period Attribute shall be left out or its value shall be left blank.

7.2.279 Value on Referent

7.2.279.1 Definition

The (alpha-)numeric value that is painted on the marker that physically represents a Referent.

7.2.279.2 Domain/unit of measure

As specified by the administrating body.

7.2.279.3 Description

The values depicted on reference markers are typically miles or kilometres, with possibly one digit behind the decimal point (e.g. 50.7).

7.2.280 Value on Traffic Sign

7.2.280.1 Definition

A value mentioned on a traffic sign.

7.2.280.2 Domain/unit of measure

7.2.280.2.1 Value domain

The value may be any user defined integer value.

7.2.280.2.2 Measure

A measure of Value on Traffic Sign is composed of a user defined unit of measure.

7.2.280.2.3 Unit of measure

The unit of measure of Value on Traffic Sign is composed of a base unit (metre, minute, kilogram, kilometre per hour, or degree), and a conversion (scaling) factor.

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7.2.280.3 Description

This Attribute is used as a Sub-Attribute for the Composite Attribute Traffic Sign Information. It is used in conjunction with Symbol On Traffic Sign and stores the numeric value associated with given traffic signs.

7.2.281 Vehicle Type

7.2.281.1 Definition

The type of vehicle for which the information contained in an associated Sub-Attribute or Relationship holds.

7.2.281.2 Domain/unit of measure

- All Vehicles
- Passenger Cars
- Delivery Truck
- Transport Truck
- Pedestrian
- Bicycle
- Motorcycle
- Moped
- Emergency Vehicle
- Taxi
- Public Bus
- Facility Vehicle
- Residential
- Employee vehicle
- High Occupancy Vehicle
- Military Vehicle
- Car with Trailer
- Private Bus
- Farm Vehicle
- Vehicles with an explosive load

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- Vehicles with a water-polluting load
- Vehicles with other dangerous loads
- Trolley Bus
- Light Rail
- School Bus
- 4 Wheel Drive Vehicle
- Vehicle carrying snow chains
- Mail Vehicle
- Tanker
- Vehicle for disabled persons
- Snowmobile
- User-Defined

7.2.281.3 Description

7.2.281.3.1 Usage rules

This Restrictive Sub-Attribute should be used if the restriction to Vehicle Type is indicated through traffic signs. The negative value of a vehicle would have the semantic of negation, i.e. everything except that vehicle.

7.2.281.3.2 Definition of 4 Wheel Drive Vehicle

Vehicle that is capable of transferring power to all wheels.

7.2.281.3.3 Definition of All Vehicles

Any vehicle, not including Pedestrians.

7.2.281.3.4 Definition of an Employee Vehicle

A vehicle operated by an employee of an organization that is used within that organization's grounds.

7.2.281.3.5 Definition of Bicycle

Pedal-driven two-wheeled vehicle.

7.2.281.3.6 Definition of Car with Trailer

A passenger car with an attached trailer.

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7.2.281.3.7 Definition of Delivery Truck

A truck vehicle of relatively small size, whose principal use is for delivery of good and materials.

7.2.281.3.8 Definition of Emergency Vehicle

A vehicle engaged in emergency response, included but not limited to police, ambulance and fire.

7.2.281.3.9 Definition of Facility Vehicle

A vehicle dedicated to a localized area within a private or restricted estate.

EXAMPLE Facilities roads within an airport or theme park.

7.2.281.3.10 Definition of Farm Vehicle

Vehicle commonly associated with Farming Activities.

7.2.281.3.11 Definition of High Occupancy Vehicle

Vehicle populated with a number of occupants corresponding to (or exceeding) the specified minimum number of passengers.

7.2.281.3.12 Definition of Light Rail

Train-like transport vehicle limited to a rail network within a limited area; does not include heavy rail lines.

7.2.281.3.13 Definition of Mail Vehicle

A vehicle that collects, carries or delivers mail.

7.2.281.3.14 Definition of Military Vehicle

Vehicle authorized by a Military Authority.

7.2.281.3.15 Definition of Moped

Low powered two-wheeled motor vehicle with pedals.

7.2.281.3.16 Definition of Motorcycle

High powered two-wheeled motor vehicle without pedal propulsion.

7.2.281.3.17 Definition of Passenger Car

A small vehicle designed for private transport of people.

7.2.281.3.18 Definition of Pedestrian

A person on foot.

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7.2.281.3.19 Definition of Private Bus

A vehicle designed for transport of large groups of people, privately owned or chartered.

7.2.281.3.20 Definition of Public Bus

A vehicle designed for transport of large groups of people that is generally characterized by published routes and schedules.

7.2.281.3.21 Definition of Residential Vehicle

A vehicle whose owner is resident (or a guest) of particular street or town area.

7.2.281.3.22 Definition of Snowmobile

A motorised vehicle designed for transportation on snow and ice surface.

7.2.281.3.23 Definition of School Bus

Vehicle operated on behalf of a school to transport students.

7.2.281.3.24 Definition of Tanker

A truck with more than two axles used to transport liquid loads in bulk.

7.2.281.3.25 Definition of Taxi

A vehicle licensed for hire usually fitted with a meter.

7.2.281.3.26 Definition of Transport Truck

A truck vehicle for long range transport of goods.

7.2.281.3.27 Definition of Trolley Bus

A Bus-like mass transport vehicle hooked up to an electrical network for power supply.

7.2.281.3.28 Definition of User-Defined

A vehicle of a user-defined type.

7.2.281.3.29 Definition of Vehicle carrying snow chains

Vehicle equipped with snow chains.

7.2.281.3.30 Definition of Vehicle for disabled persons

A vehicle with supporting identification that designates a vehicle for disabled persons.

7.2.281.3.31 Definition of Vehicles with a water-polluting load

Vehicle transporting water-polluting cargo.

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7.2.281.3.32 Definition of Vehicles with an explosive load

Vehicle transporting explosive cargo.

7.2.281.3.33 Definition of Vehicles with other dangerous loads

Vehicle transporting dangerous cargo, other than explosive or water-polluting loads.

7.2.282 Vision Limitation

7.2.282.1 Definition

This Attribute when True indicates accessibility limitation due to a limitation of vision.

7.2.282.2 Domain/unit of measure

- True
- False

7.2.282.3 Description

Vision limitation is a Sub-Attribute that limits access to road elements to people with vision limitations. Together with Slow Walker Limitation, Hearing Limitation, and Wheelchair Limitation, it forms the Composite Attribute Accessibility Limitation.

Vision Limitation may be restricted by the Restrictive Sub-Attribute Validity Period, which expresses temporality associated with accessibility limitations.

7.2.283 Water Boundary Element Type

7.2.283.1 Definition

The type of Water Boundary Element.

7.2.283.2 Domain/unit of measure

- Ocean or Sea shore line
- Bay side
- Lake shore line
- River side
- Canal side
- Wetland side
- Harbour side
- Water side of Pier or Dock
- Others

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7.2.283.3 Description

7.2.283.3.1 Definition of a Shore line

That part of the land in immediate contact with a water body including the areas between high and low water lines.

7.2.283.3.2 Definition of a Pier or Dock

A Pier or Dock is a structure built out into the water to serve as a landing place for ships.

For definitions of other water bodies bounded by Water Boundary Elements of the types mentioned, see 6.8.12.

7.2.283.3.3 Combination rules

The types of Water Boundary Element Type are not mutually excluding. In case of conflicts the following hierarchical order should be applied, in which a higher order type always will be applied instead of a lower order type:

Highest order

- Water side of Pier of Dock
- Harbour side
- River or Canal side

Lowest Order

- Ocean or Sea shore line

7.2.284 Water Body Type

7.2.284.1 Definition

The type of Water Body.

7.2.284.2 Domain/unit of measure

- Harbour/Port
- Marina
- Bay
- Unspecified

7.2.284.3 Description

7.2.284.3.1 Definition of Harbour/Port

An area for mooring, loading and unloading commercial ships.

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7.2.284.3.2 Definition of Marina

An area with docking and service facility for pleasure craft.

7.2.284.3.3 Definition of a Bay

An area largely yet not entirely surrounded by land and open to a larger Water Body.

7.2.285 Wheelchair Limitation

7.2.285.1 Definition

This Attribute when True indicates accessibility limitation for use of wheelchairs.

7.2.285.2 Domain/unit of measure

- True
- False

7.2.285.3 Description

Wheelchair limitation is a Sub-Attribute that limits access to road elements to people using wheelchairs. Together with Slow Walker Limitation, Vision Limitation, and Hearing Limitation, it forms the Composite Attribute Accessibility Limitation.

Wheelchair Limitation may be restricted by the Restrictive Sub-Attribute Validity Period, which expresses temporality associated with accessibility limitations.

7.2.286 Width

7.2.286.1 Definition

The width of a Road Element or Path, a lane or a Road Furniture or Structure Feature.

7.2.286.2 Domain/unit of measure

7.2.286.2.1 Value domain

The value should be expressed in either Metric or English default units, or in user-defined units. Metric default unit is centimetre; English default unit is inch.

7.2.286.2.2 Measure

A measure of Width is composed of a value and a unit of measure.

7.2.286.2.3 Unit of measure

The unit of measure of Width is a Union of three: a Metric default unit, an English default unit, or a user-defined unit. User-defined units allow overriding of the default.

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7.2.286.3 Description

If this Attribute is used to specify the width of a Road Element it should be attached as a normal Attribute to a Road Element or Path. If the width of a lane is specified, it should be attached to a Road Element using the Composite Attribute Lane Info (within which Width is treated as a Sub-Attribute).

8 Relationship Catalogue

8.1 Generic Specifications

8.1.1 Features and their Relationships

Some information related to real world objects needs to be modelled in the form of a Relationship between Features.

EXAMPLE "*Is Capital of*" is the Relationship between "*Paris*" and "*France*".

This clause documents the Relationships included in GDF.

The Conceptual Data Models for the Relationship Catalogue are given in Figure 133, Figure 134, Figure 135, Figure 136, Figure 137, Figure 138, Figure 139, Figure 140, Figure 141, Figure 142, Figure 143, Figure 144, Figure 145, Figure 146, Figure 147, Figure 148, Figure 149, Figure 150, Figure 151, Figure 152, Figure 153, Figure 154, Figure 155, Figure 156, Figure 157, Figure 158, Figure 159 and Figure 160.

The Conceptual Data Models comprise applicable Attribute types per Relationship Type, detailing the Attribute usage provided in 7.1.18 for the Relationship Catalogue as a whole. For information, signalisation of extended Attribute usage is provided by using a plus (+), going beyond the Attribute scope depicted in the respective conceptual data models.

All Relationships are referenced by a particular Relationship name. These names are written with initial capitals in order to distinguish them from the daily life common usage terms from which they have been derived (e.g.: "Service along Road Element" versus "service along road element").

A Feature may be involved in more than one Relationship. Two different Relationships may relate identical Feature instances as with the Relationships "*is seat of government of*" and "*is capital of*" to the Feature instances "Paris" and "France".

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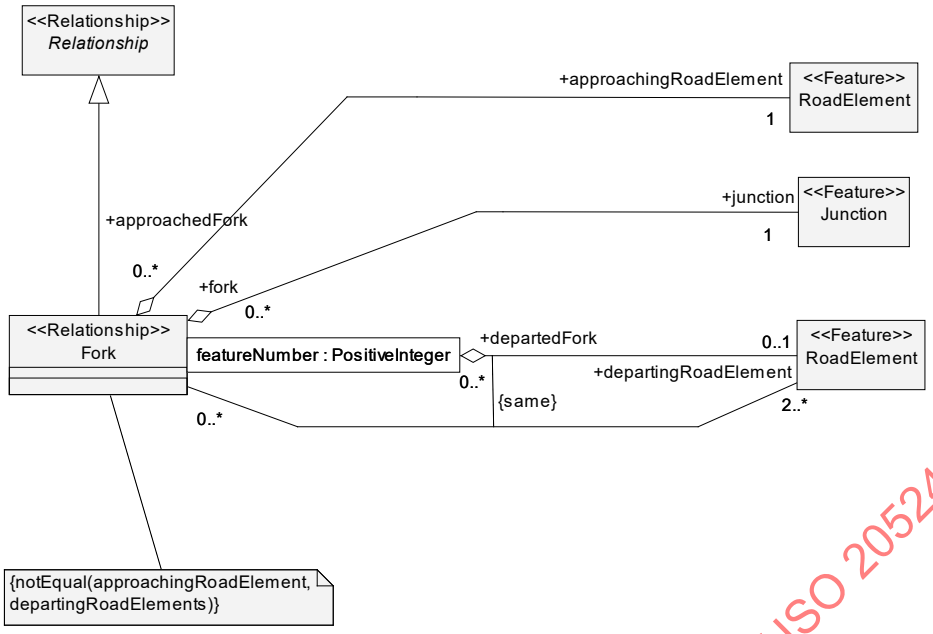


Figure 133 — The Conceptual Data Model for the Fork Relationship

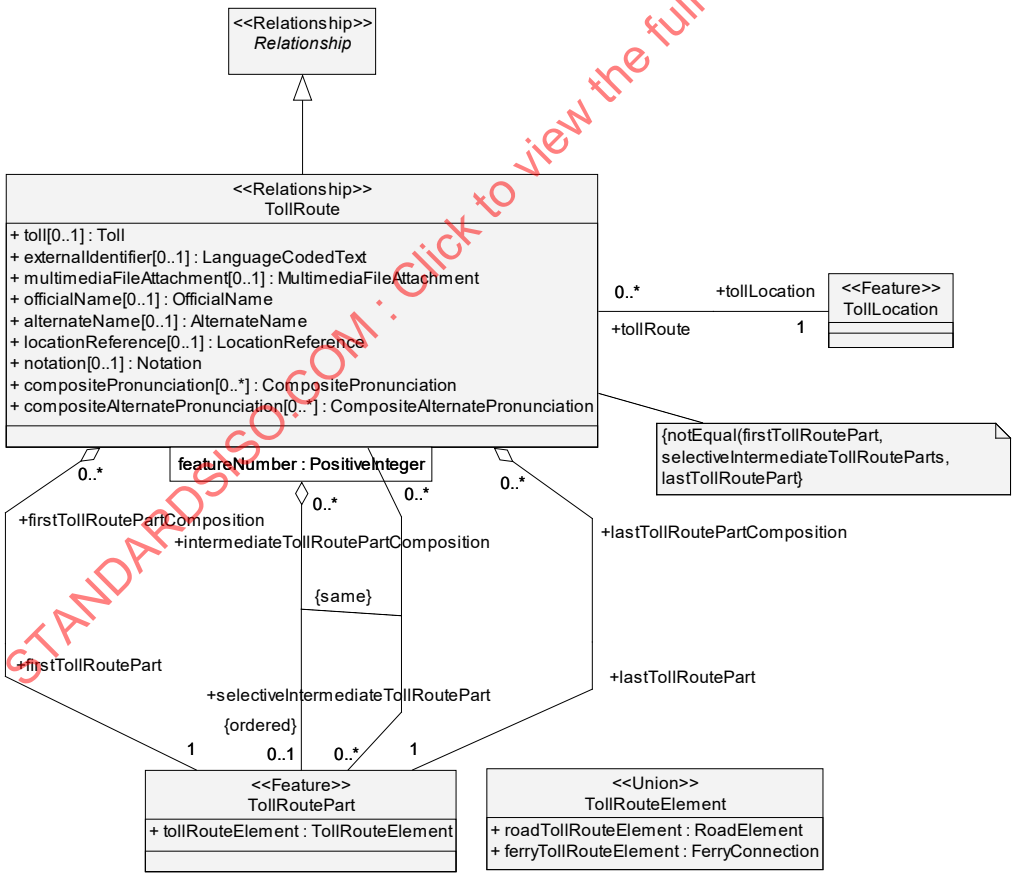


Figure 134 — The Conceptual Data Model for the Toll Route Relationship

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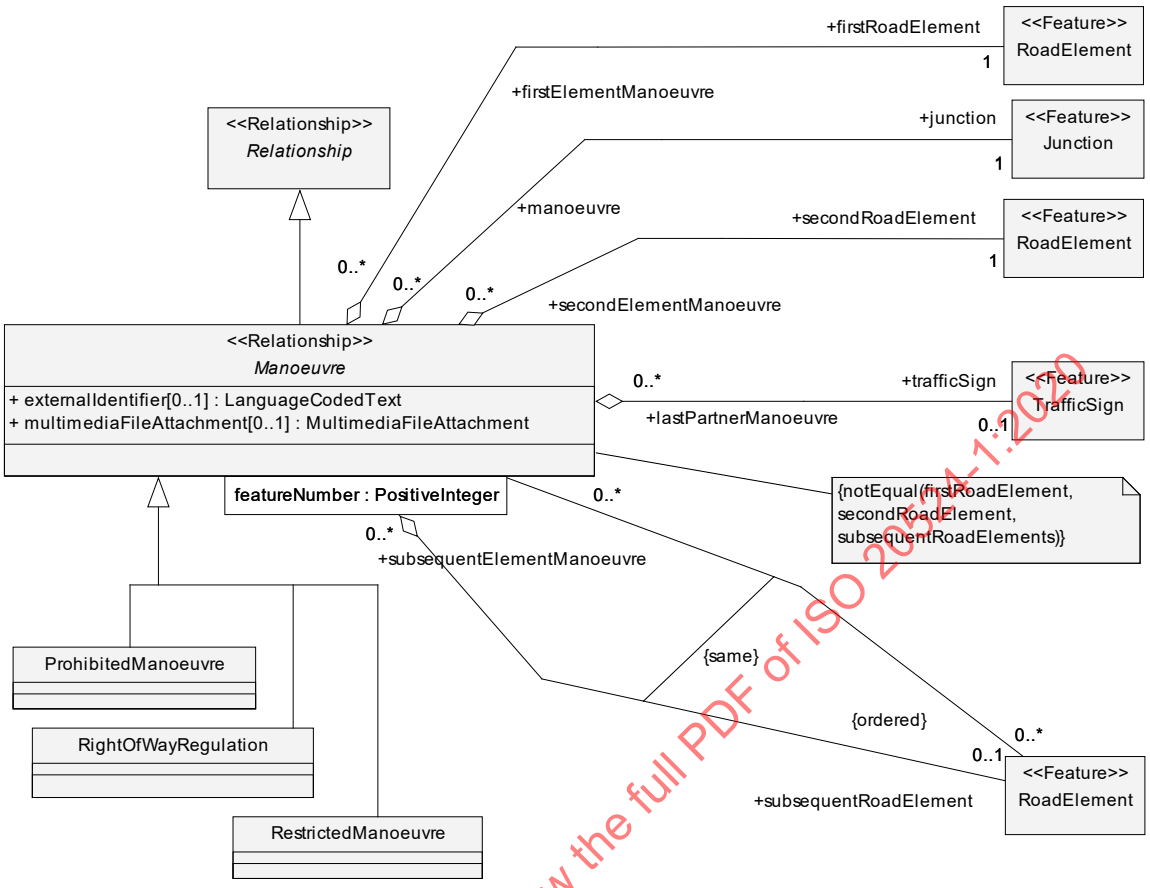


Figure 135 — Conceptual Data Model for Manoeuvre Relationships

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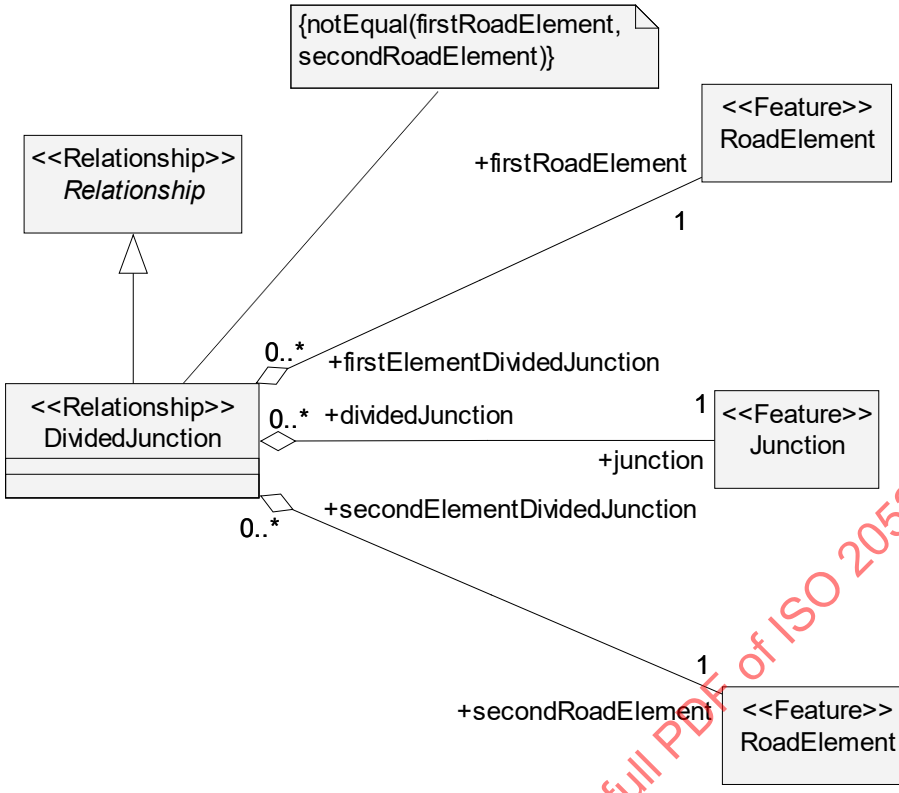


Figure 136 — Conceptual Data Model for the Divided Junction Relationships

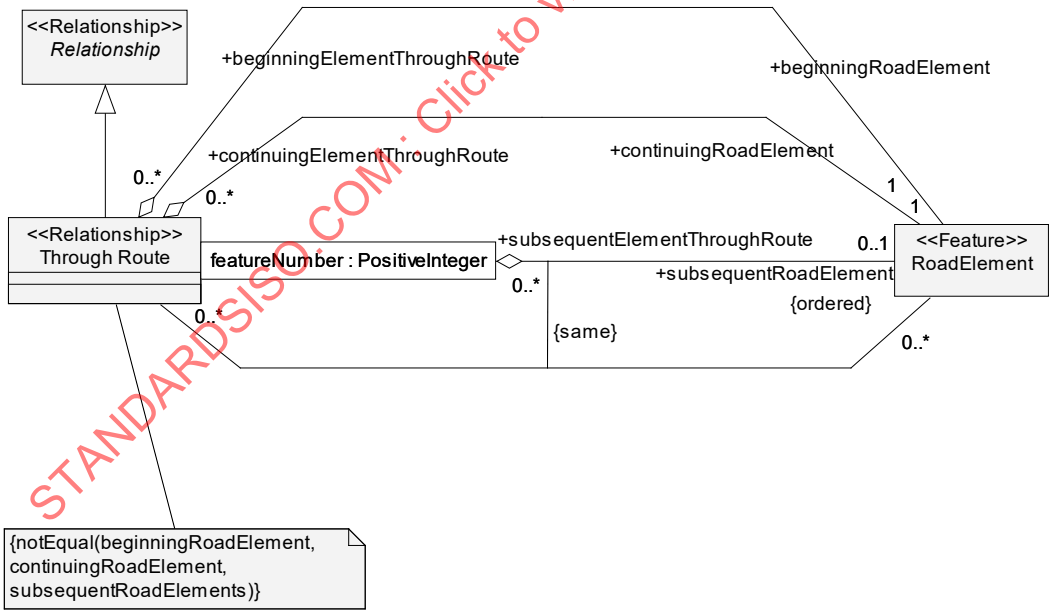


Figure 137 — Conceptual Data Model for the Through Route Relationship

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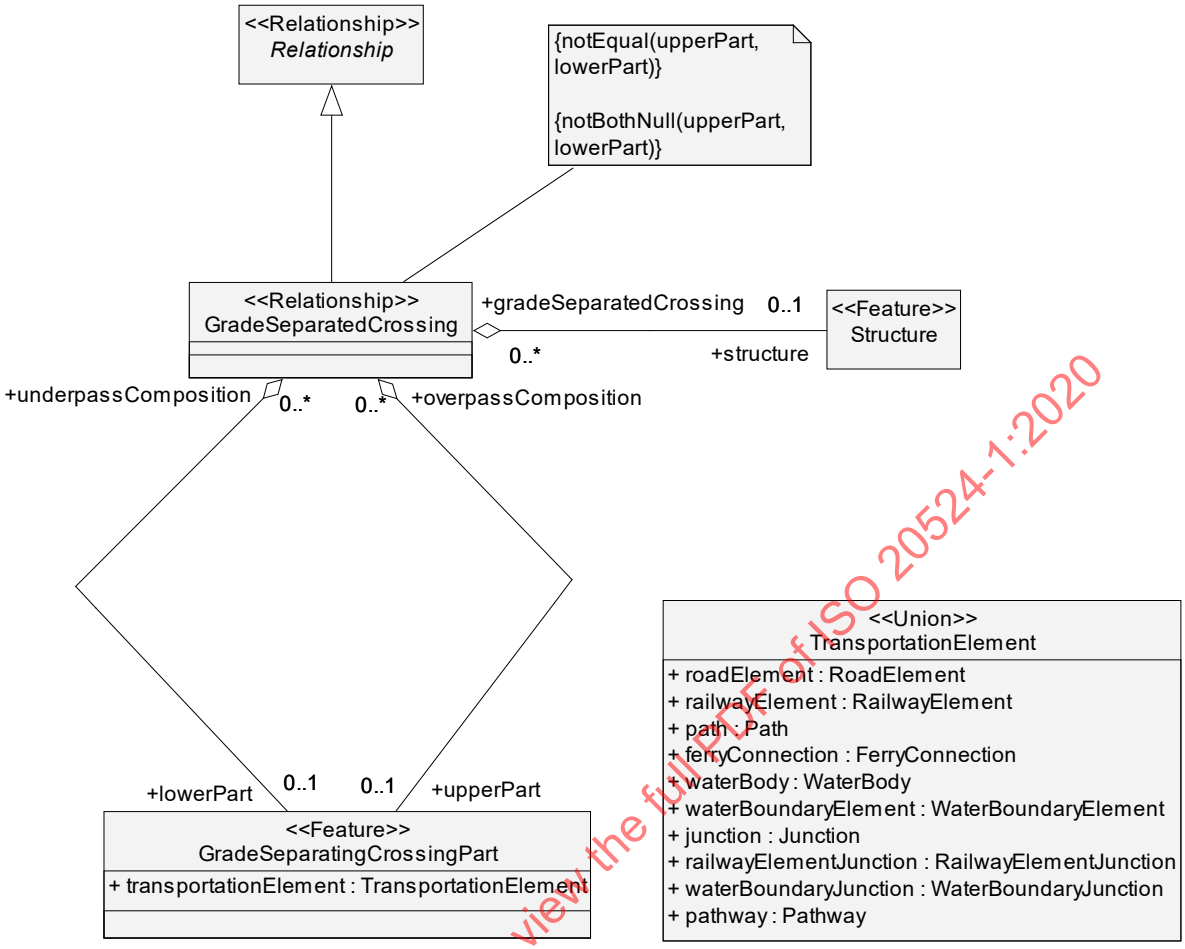


Figure 138 — Conceptual Data Model for the Grade-separated Crossing Relationship

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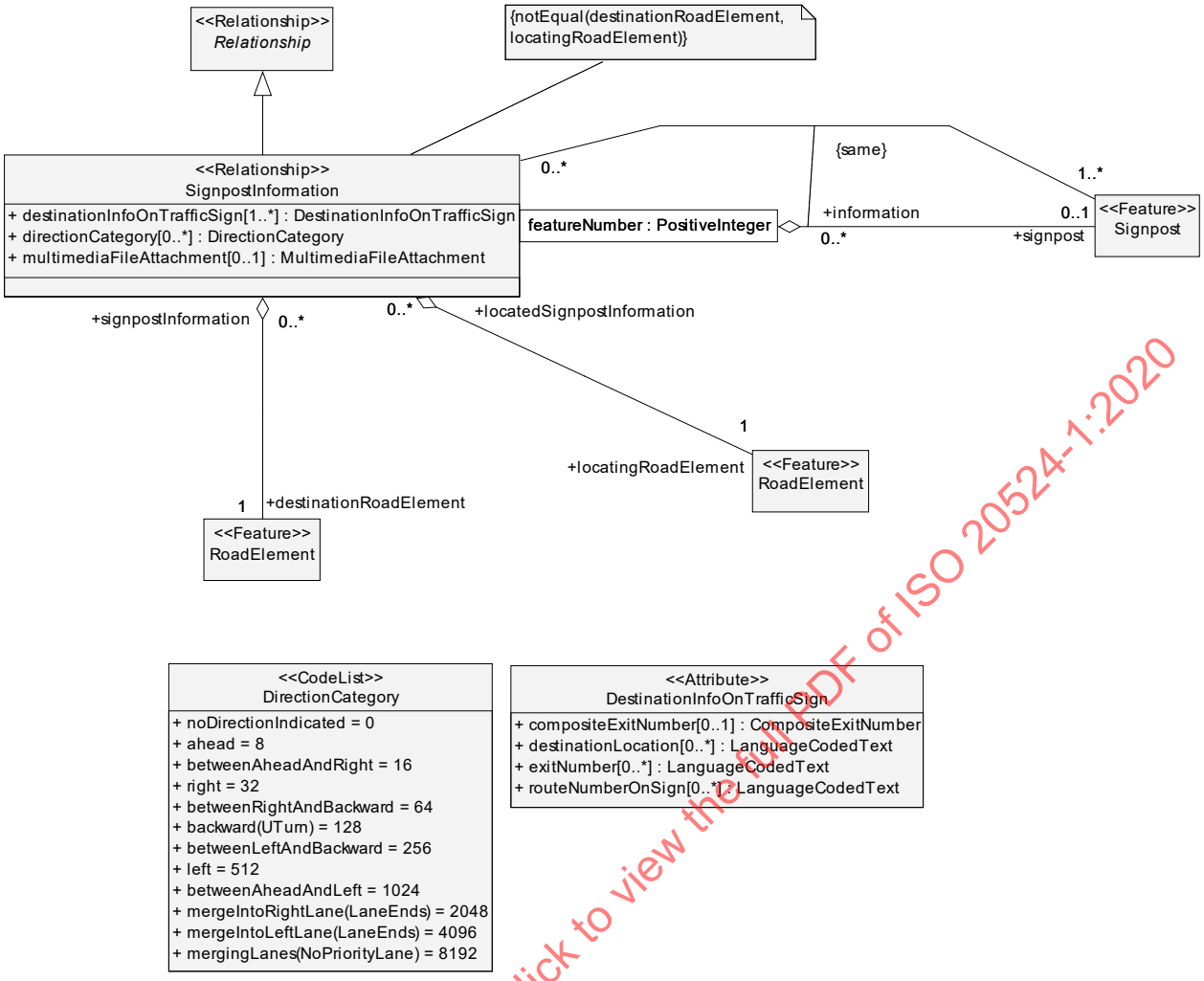


Figure 139 — Conceptual Data Model for the Signpost Information Relationship

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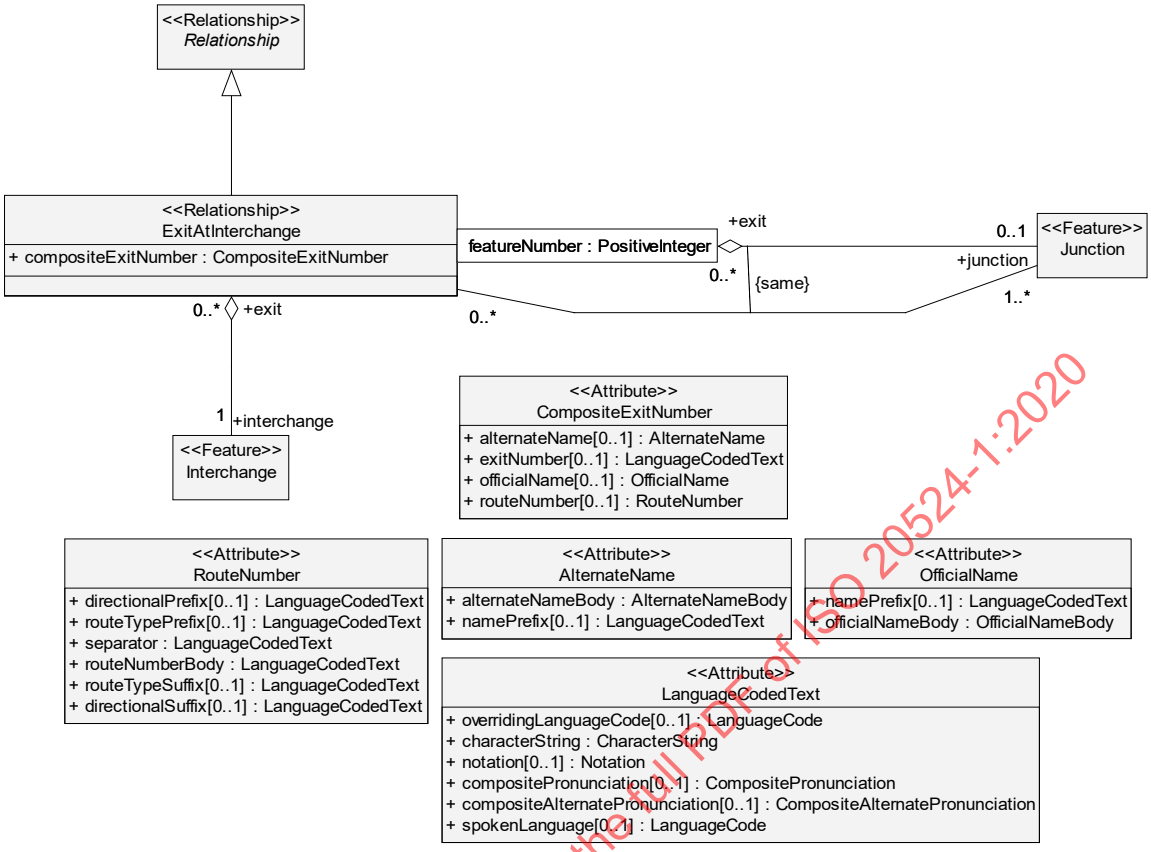


Figure 140 — Conceptual Data Model for the Exit at Interchange Relationship

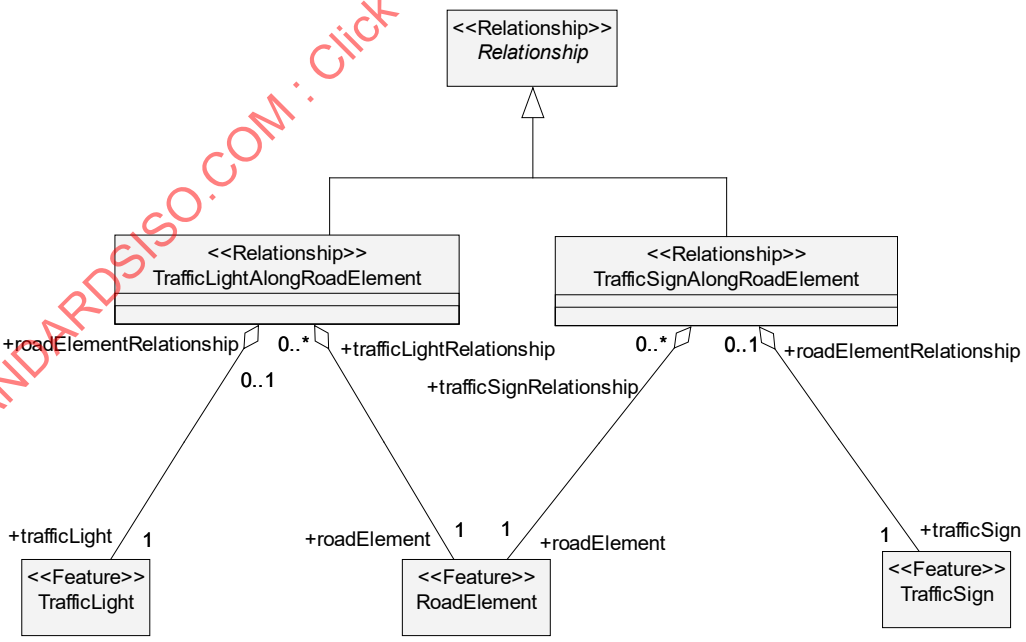
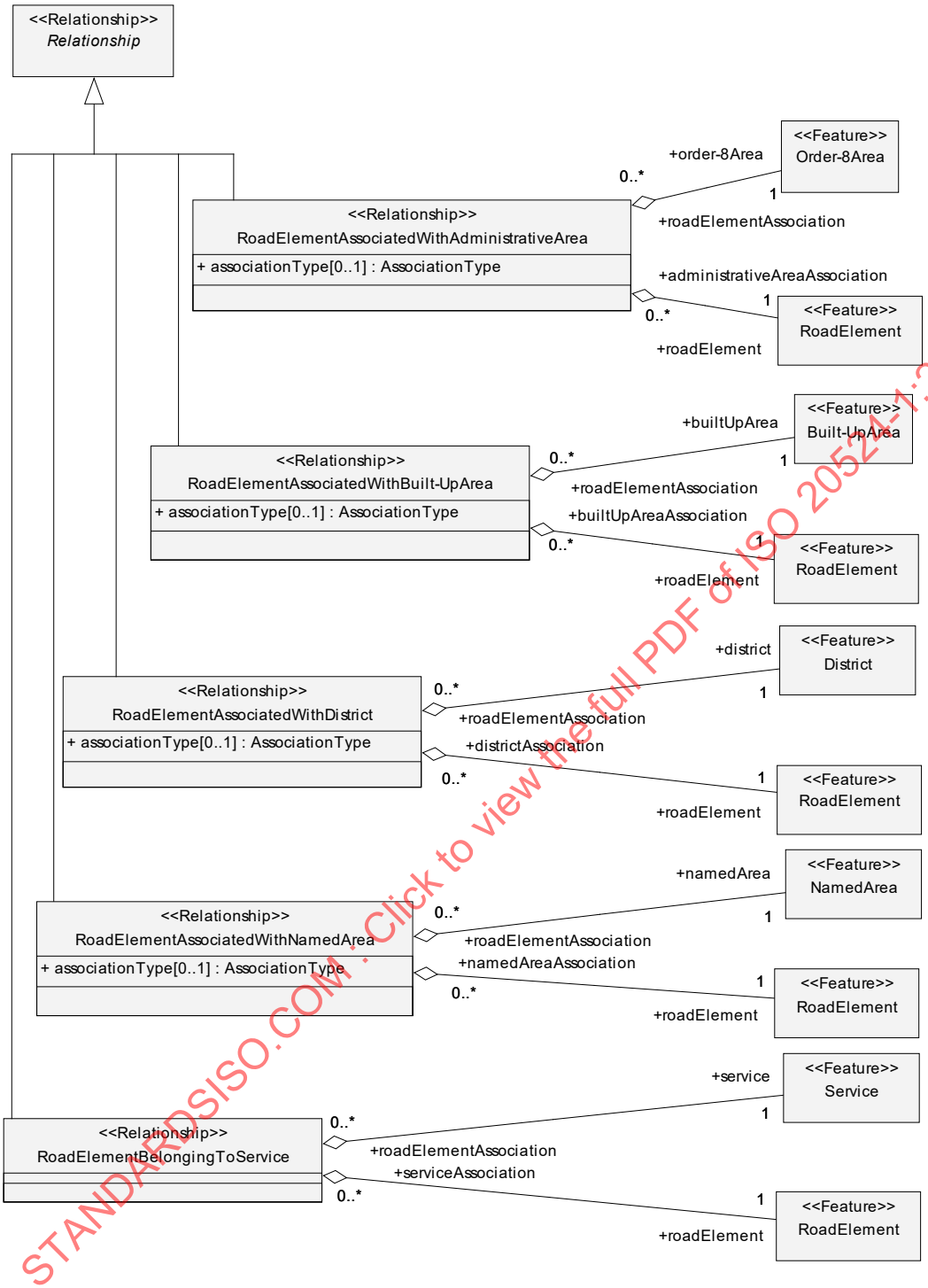


Figure 141 — Conceptual Data Model for the Traffic Sign along Road Element and the Traffic Light along Road Element Relationships

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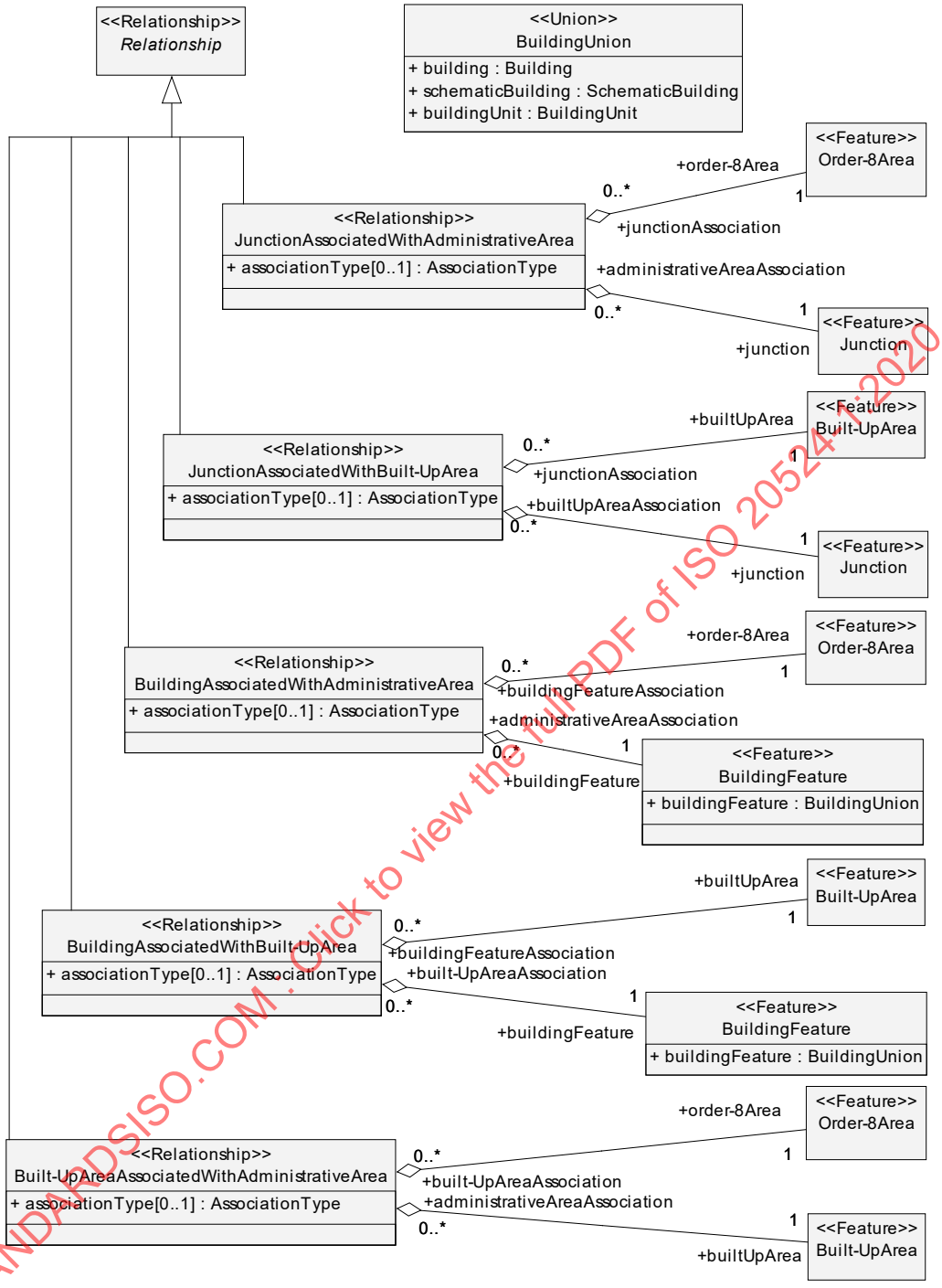
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Figure 142-1 — Conceptual Data Model for Relationships with arity 2, involving the Feature Themes Roads and Ferries, Administrative Areas, Named Areas, Land Cover and Use, and Services

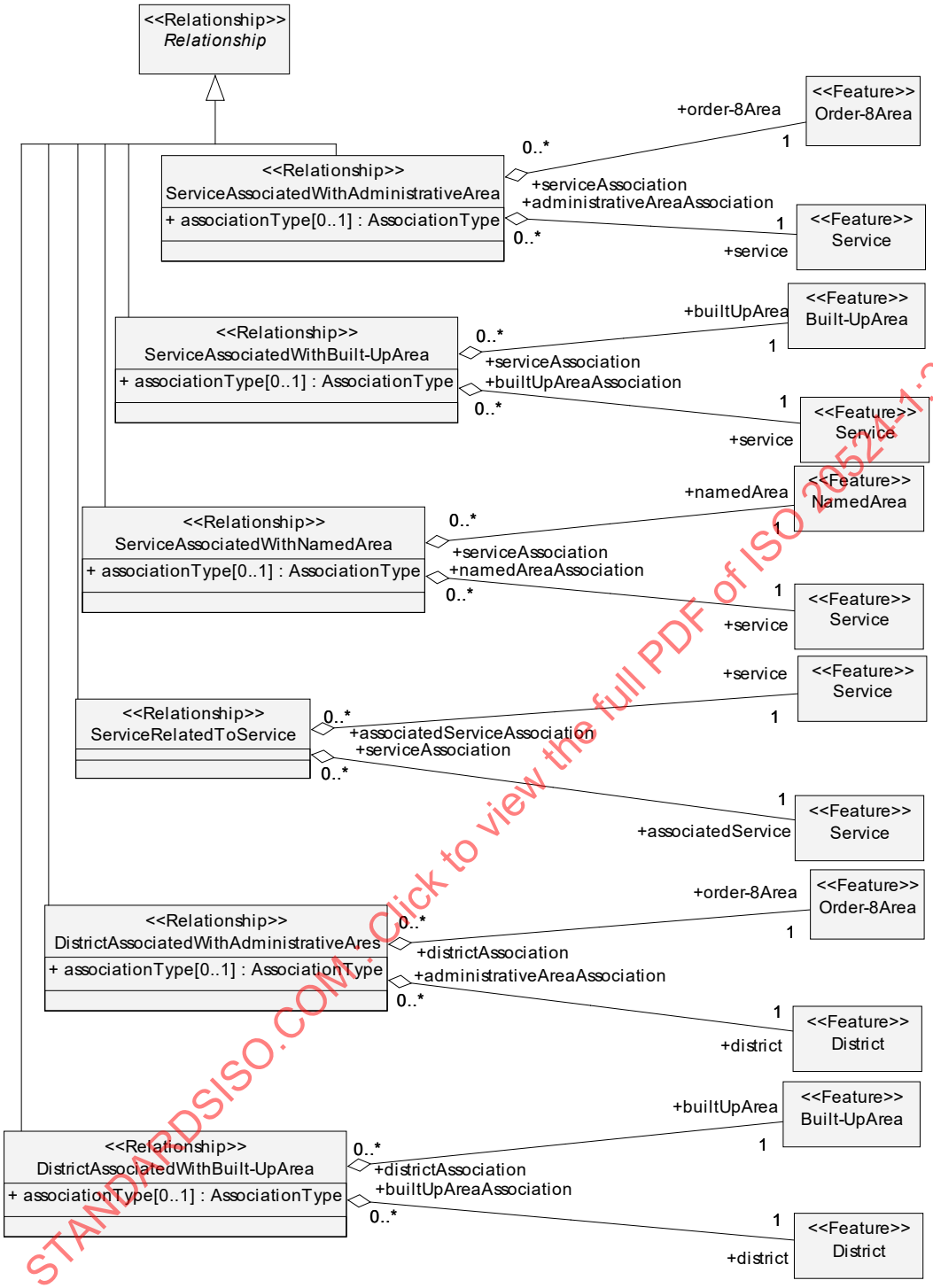
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Figure 142-2 — Conceptual Data Model for Relationships with arity 2, involving the Feature Themes Roads and Ferries, Administrative Areas, Named Areas, Land Cover and Use, and Services

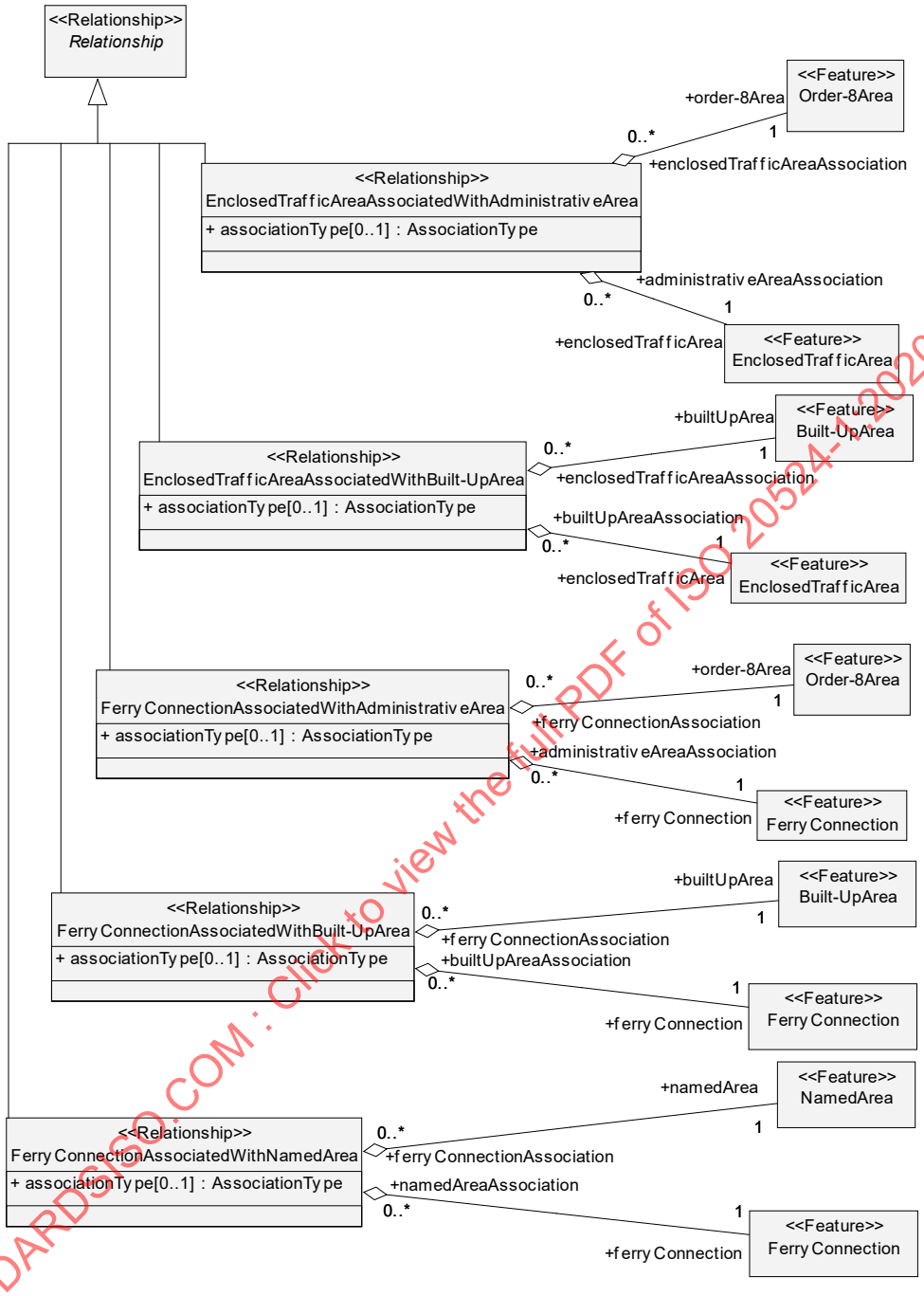
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Figure 142-3 — Conceptual Data Model for Relationships with arity 2, involving the Feature Themes Roads and Ferries, Administrative Areas, Named Areas, Land Cover and Use, and Services

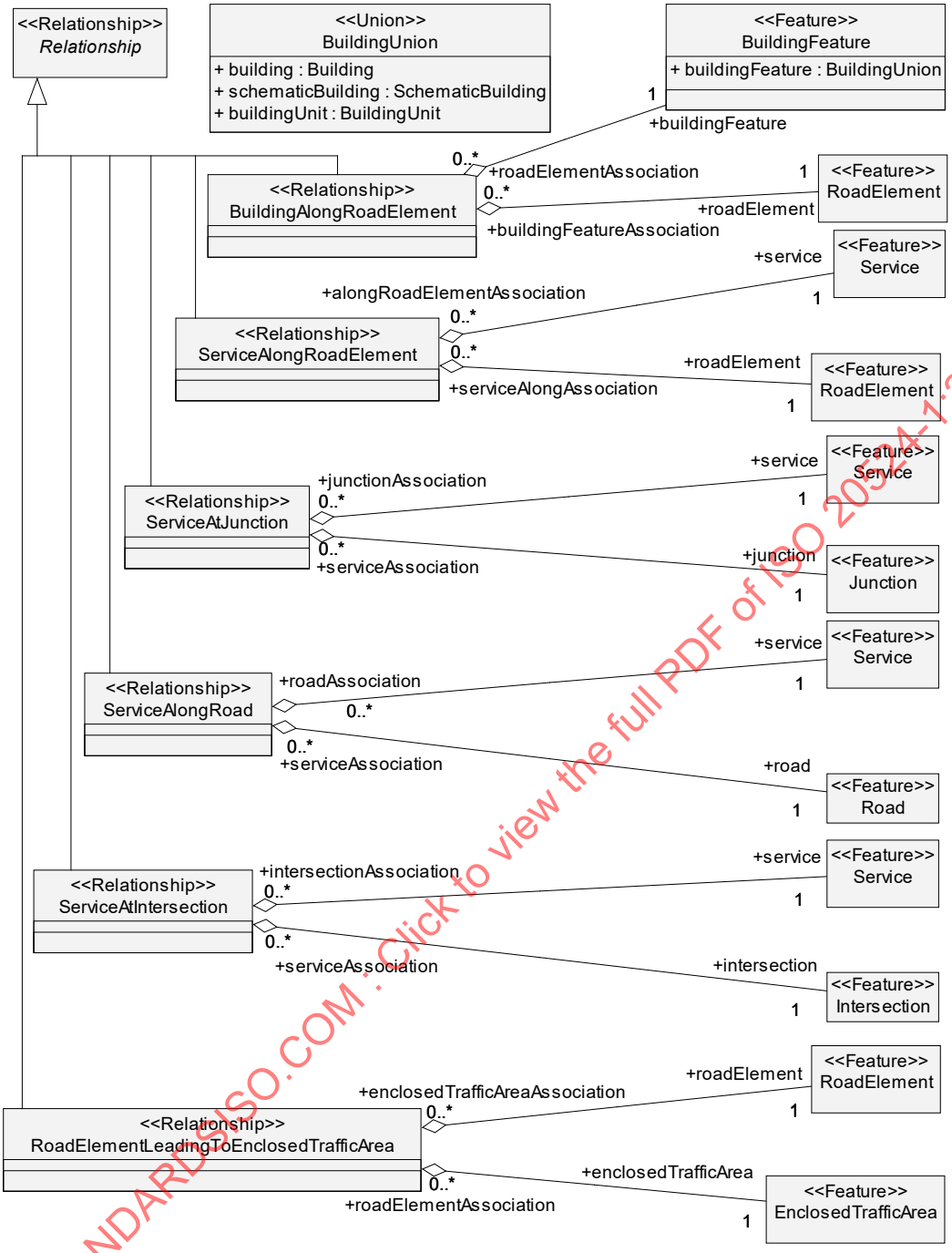
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Figure 142-4 — Conceptual Data Model for Relationships with arity 2 involving the Feature Themes Roads and Ferries, Administrative Areas, Named Areas, Land Cover and Use, and Services

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Figure 142-5 — Conceptual Data Model for Relationships with arity 2, involving the Feature Themes Roads and Ferries, Administrative Areas, Named Areas, Land Cover and Use, and Services

Figure 143 — Conceptual Data Model for the Relationship involving Public Transport Features

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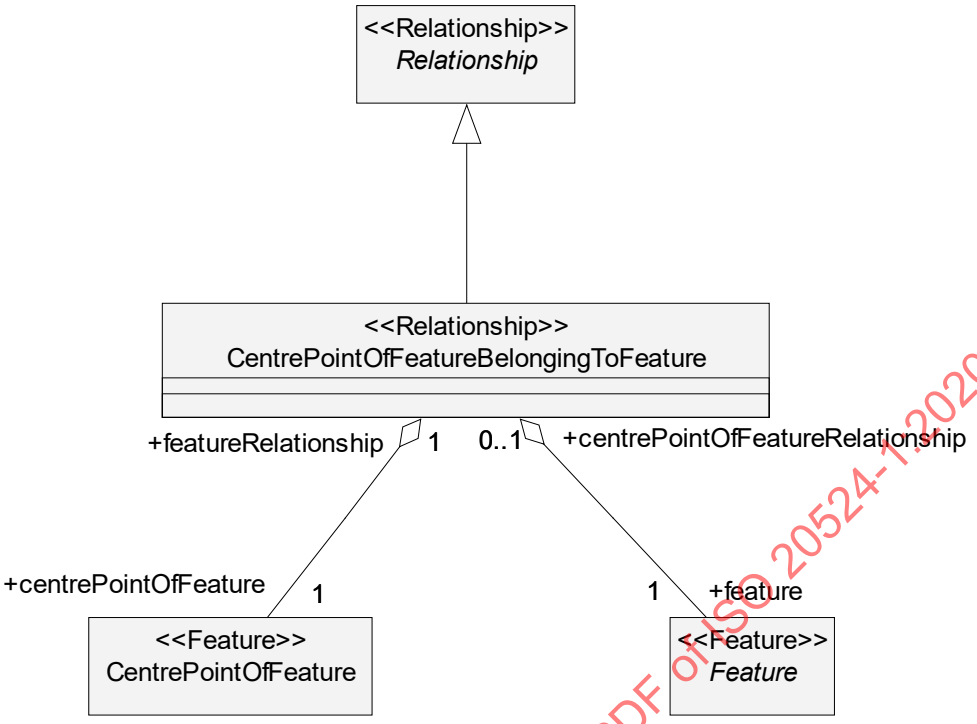


Figure 144 — Conceptual Data Model for the Centre Point of Feature belonging to Feature Relationship

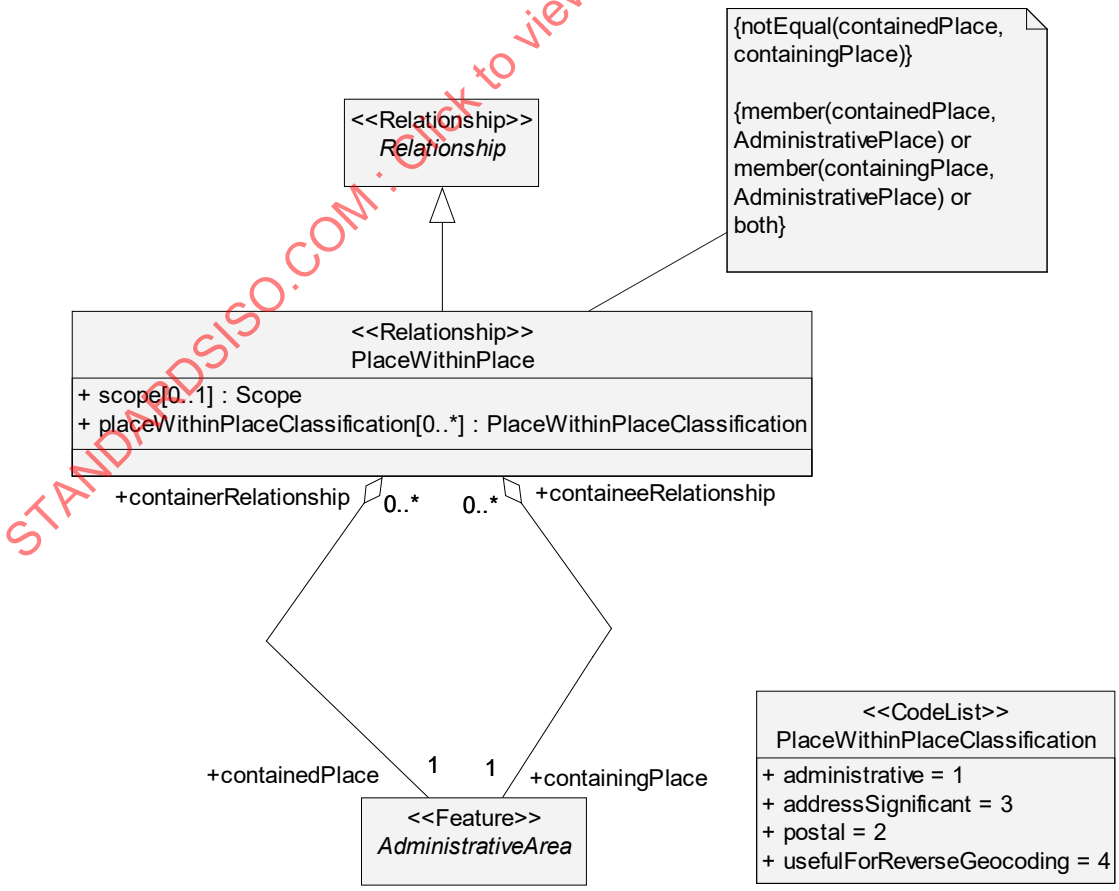


Figure 145 — Conceptual Data Model for the Place within Place Relationship

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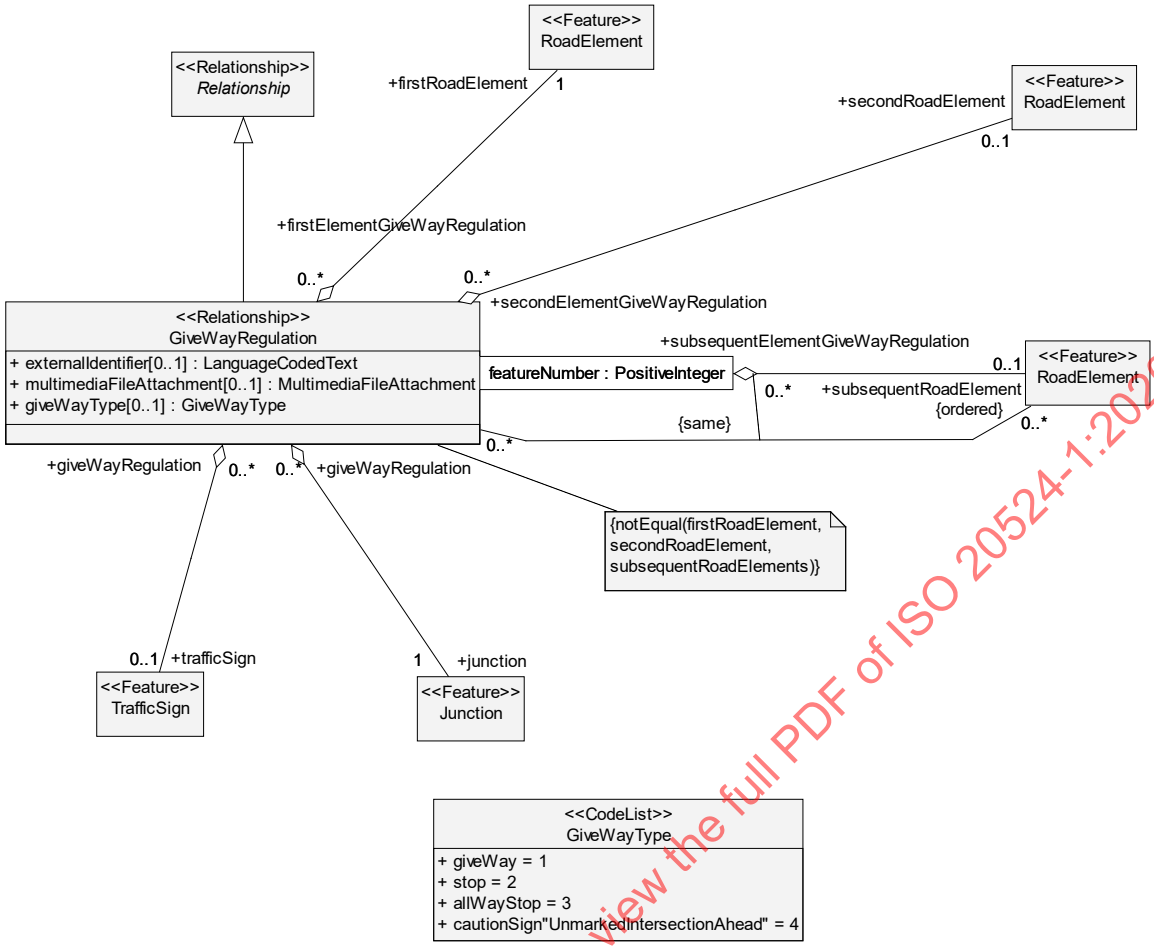


Figure 146 — Conceptual Data Model for the Give Way Regulation Relationship

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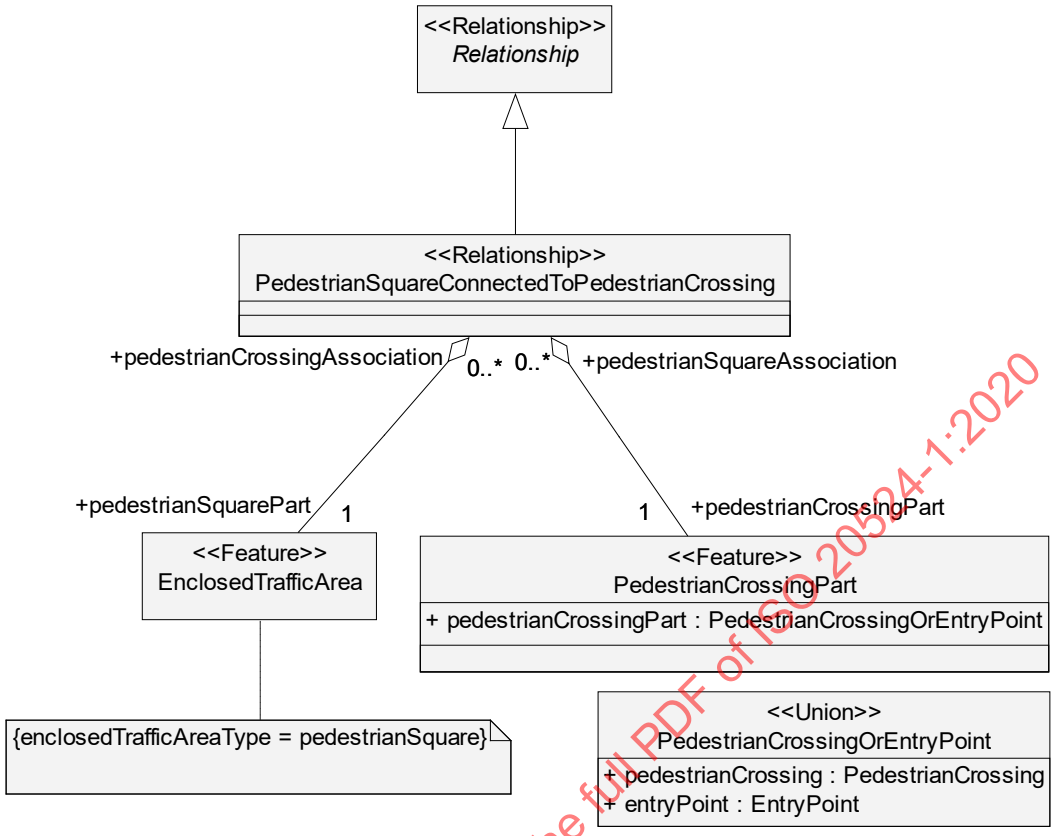


Figure 147 — Conceptual Data Model for the Pedestrian Square Connected To Pedestrian Crossing Relationship

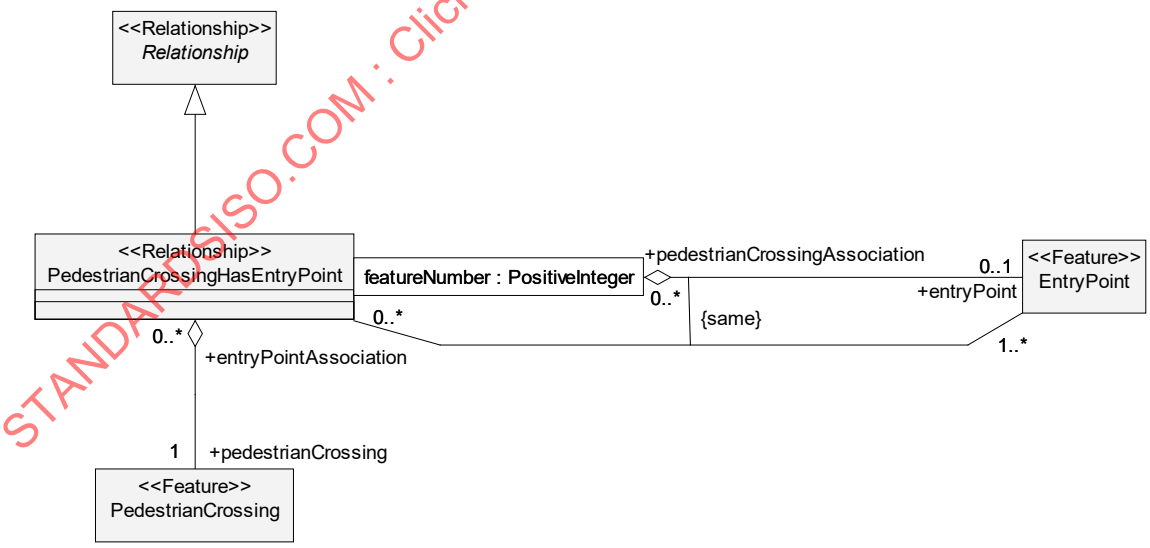


Figure 148 —Conceptual Data Model for the Pedestrian Crossing Has Entry Point Relationship

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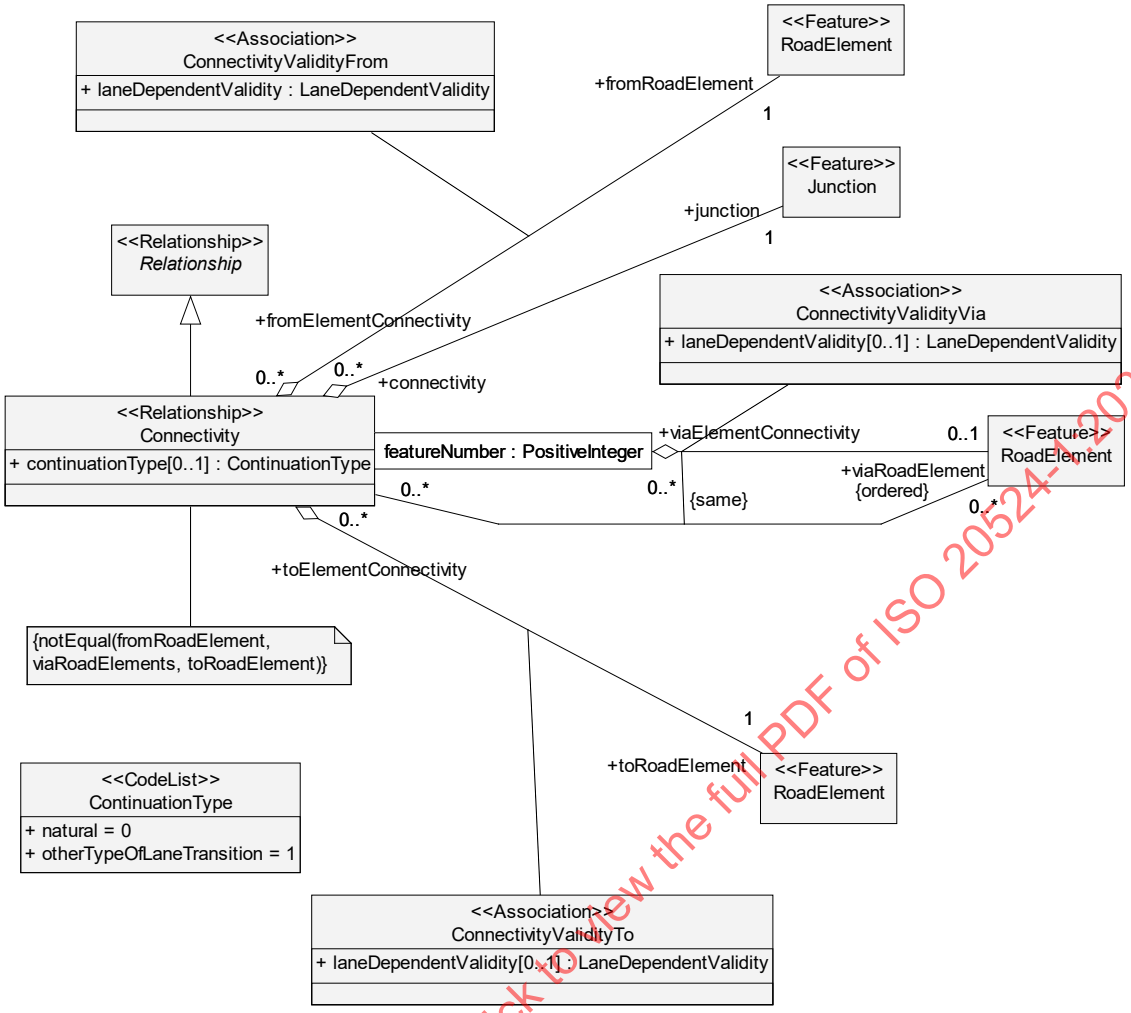


Figure 149 —Conceptual Data Model for the Connectivity Relationship

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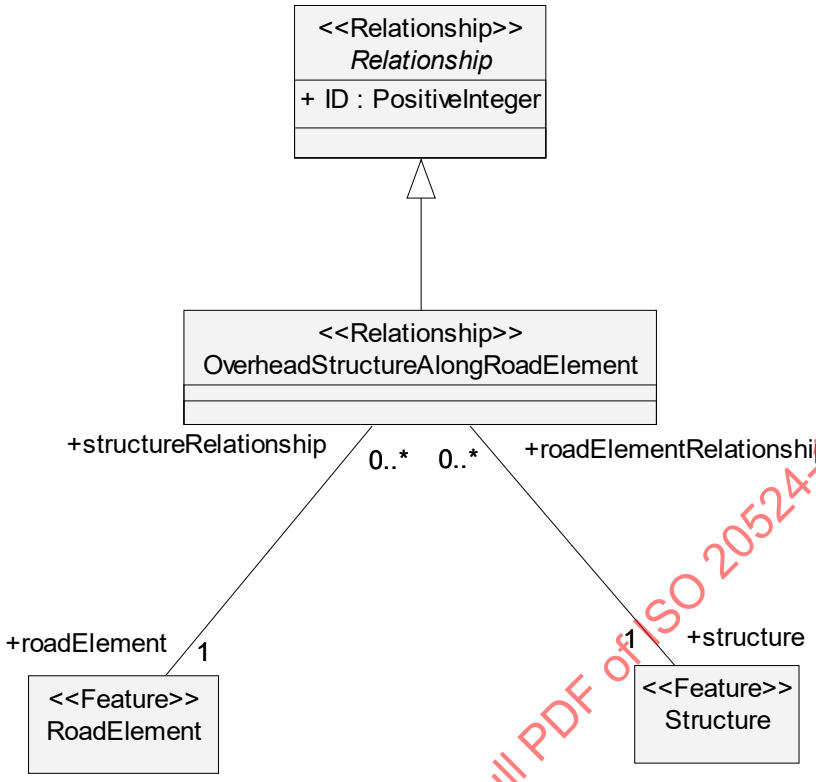


Figure 150 — Conceptual Data Model for the Overhead Structure along Road Element Relationship

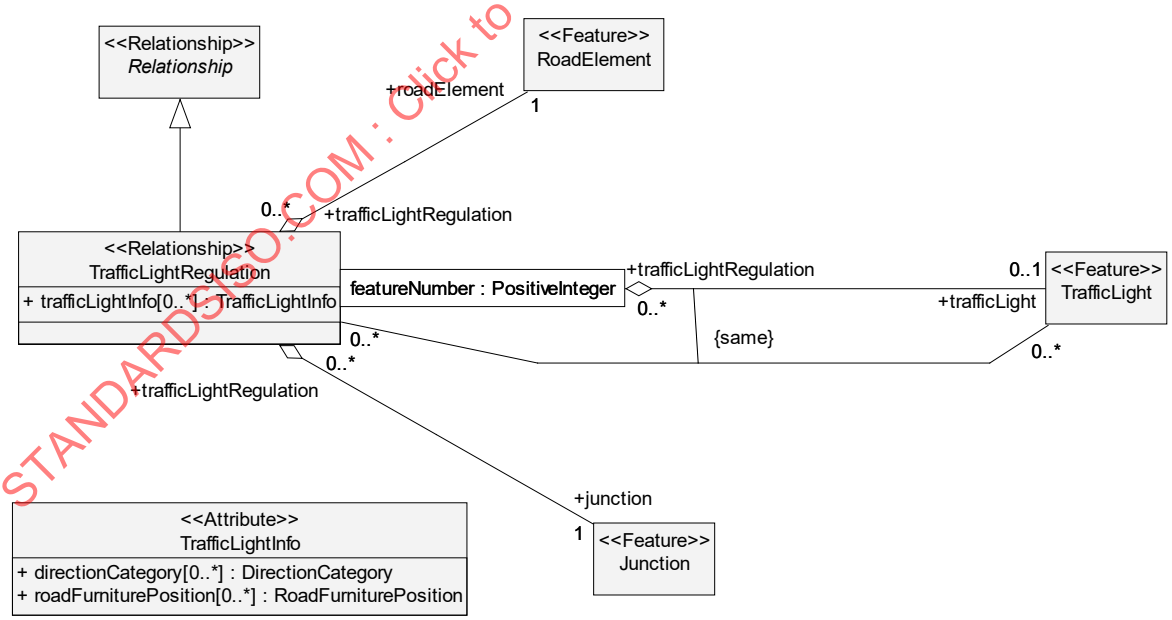


Figure 151 — Conceptual Data Model for the Traffic Light Regulation Relationship

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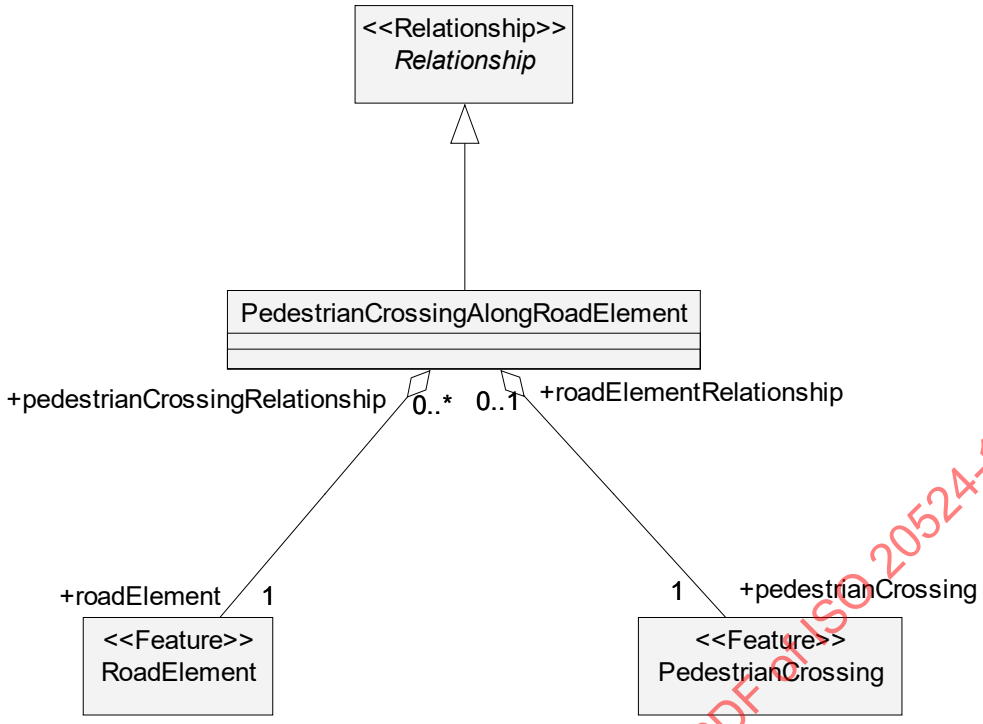


Figure 152 — Conceptual Data Model for Pedestrian Crossing along Road Element Relationship

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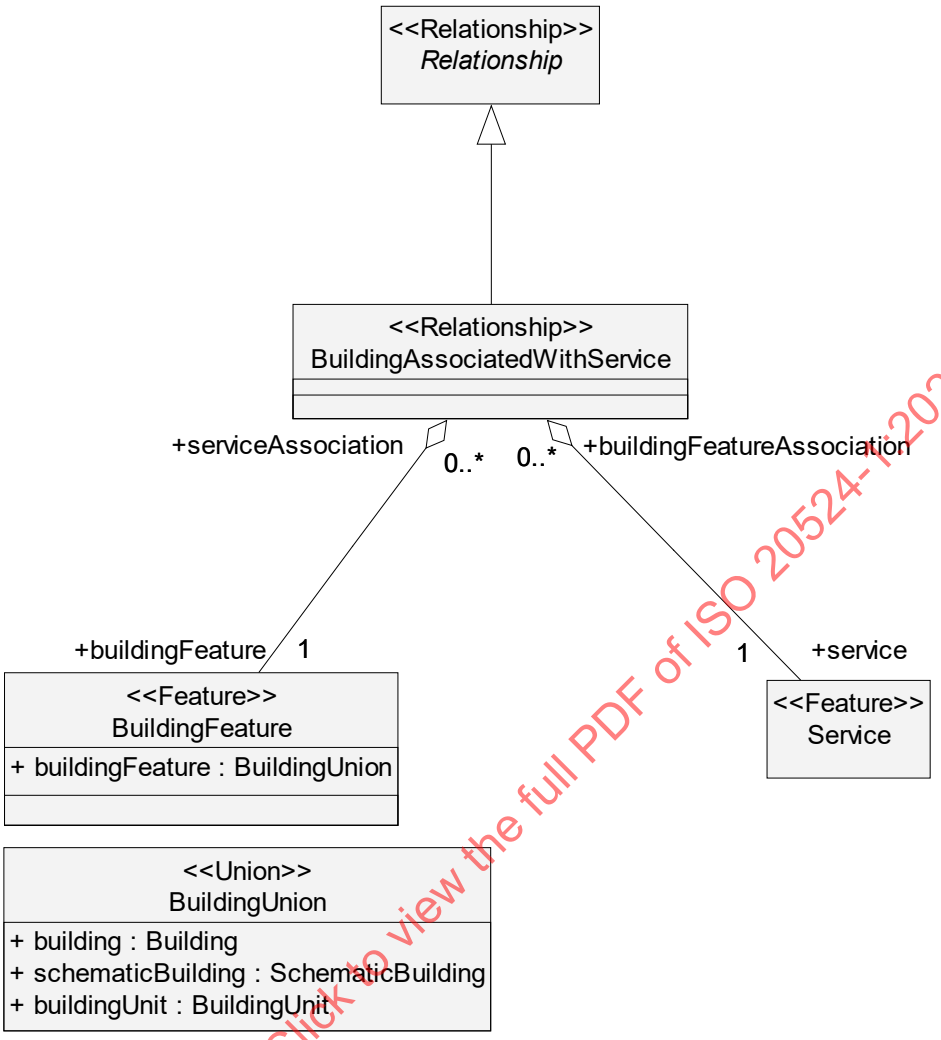


Figure 153 —Conceptual Data Model for the Building Associated With Service Relationship

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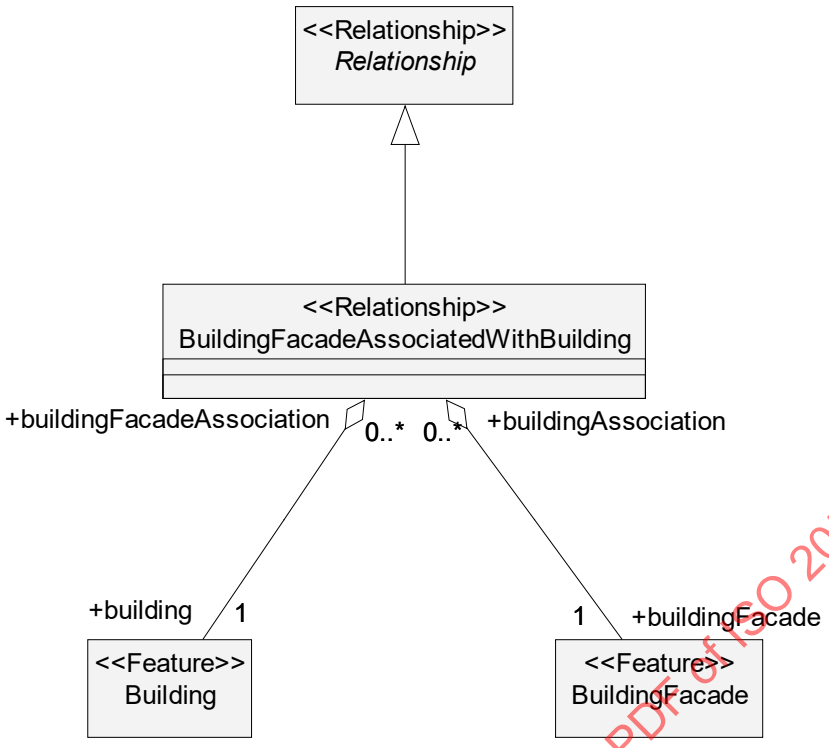


Figure 154 —Conceptual Data Model for the Building Façade Associated With Building Relationship

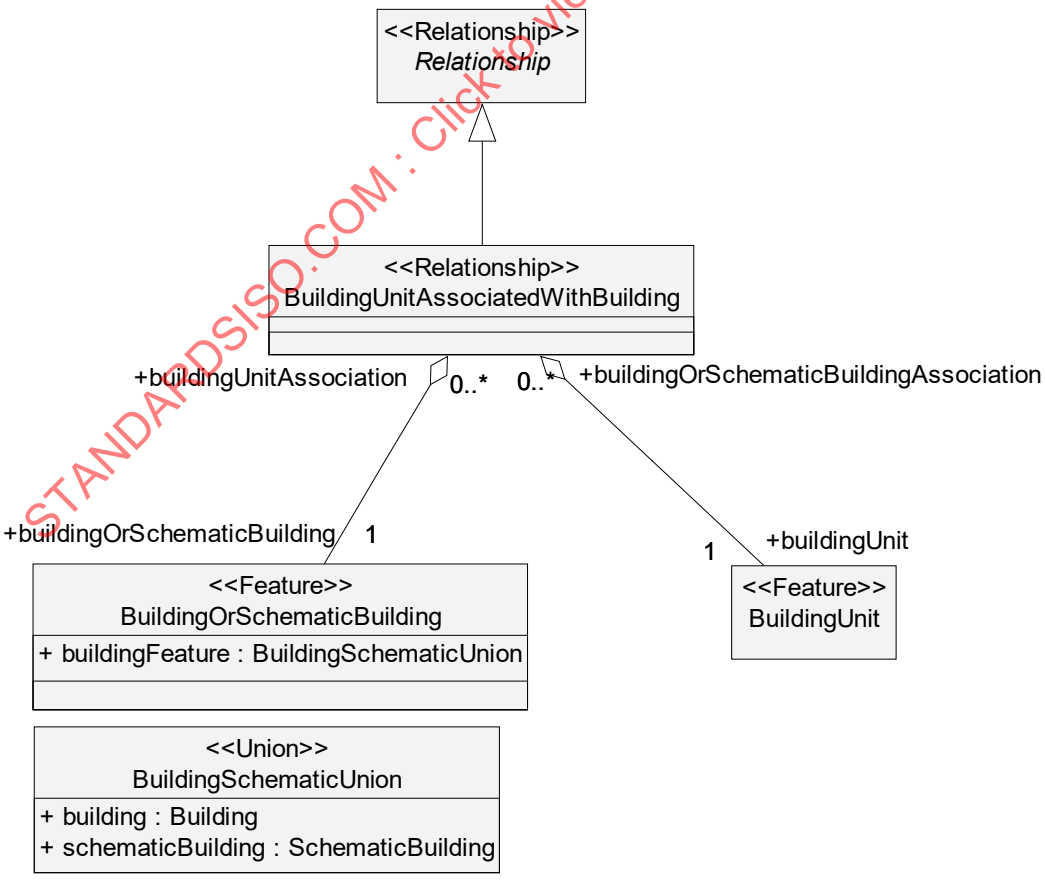


Figure 155 —Conceptual Data Model for the Building Unit Associated With Building Relationship

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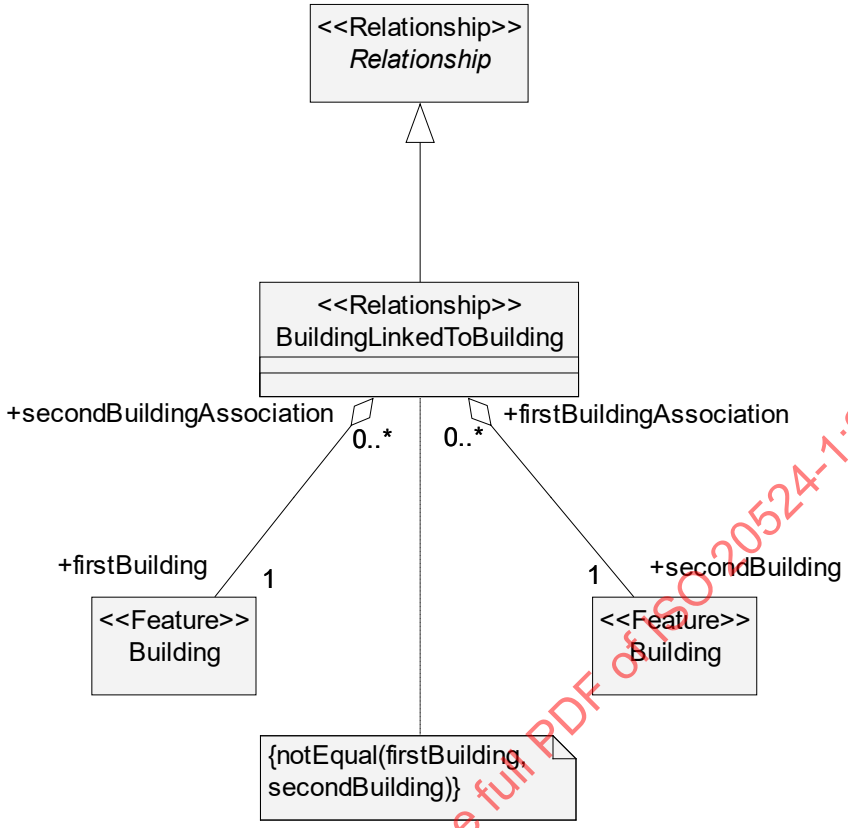


Figure 156 —Conceptual Data Model for the Building Linked To Building Relationship

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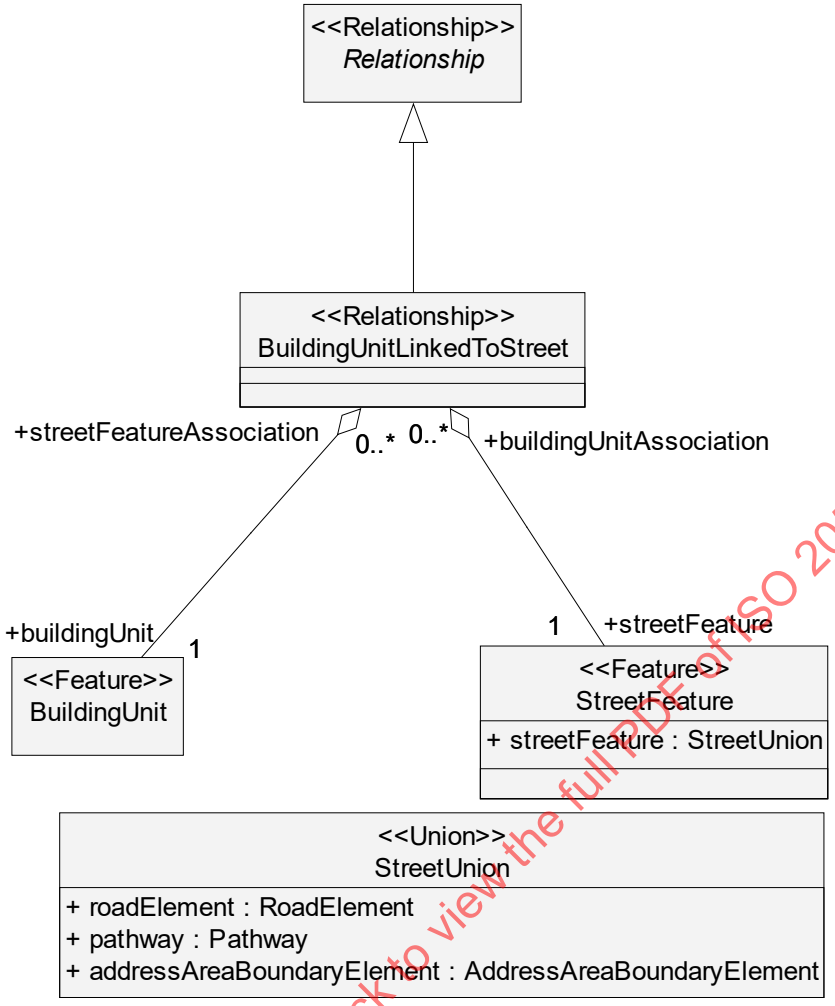


Figure 157 — Conceptual Data Model for the Building Unit Linked To Street Relationship

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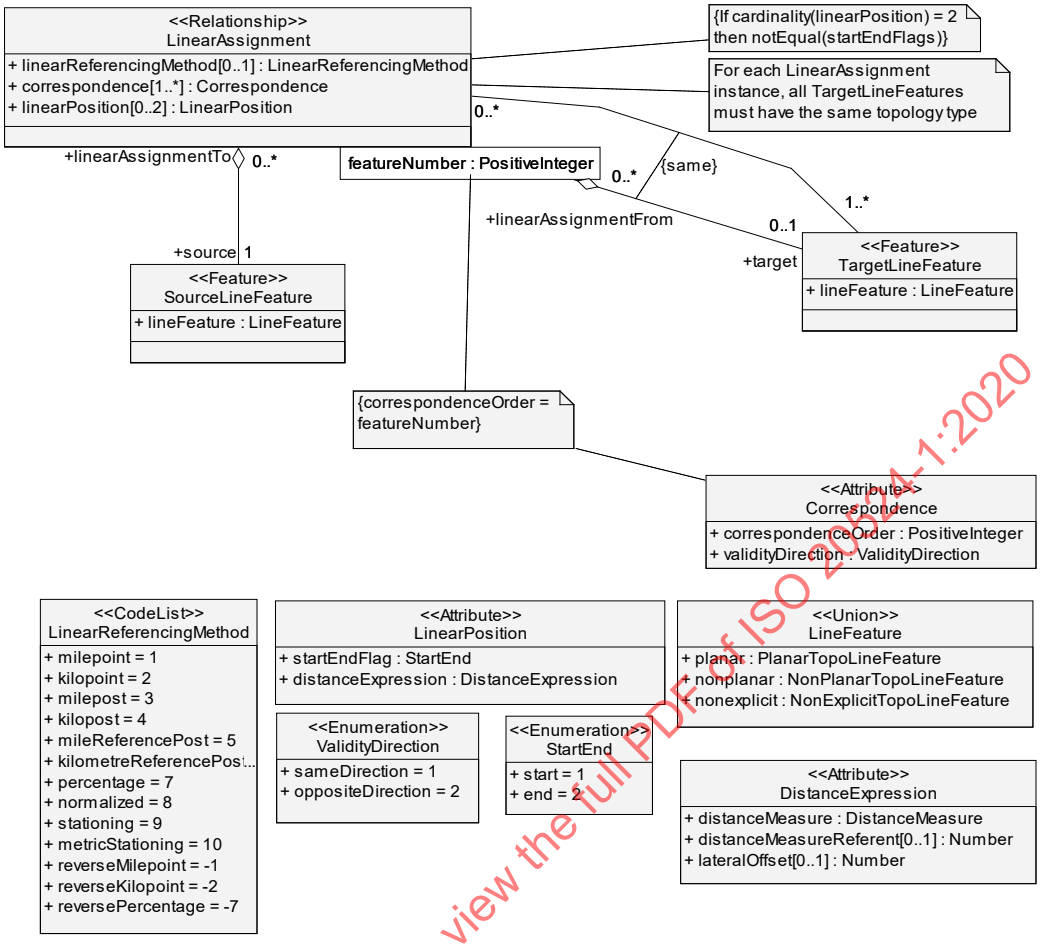


Figure 158 —Conceptual Data Model for the Linear Assignment Relationship

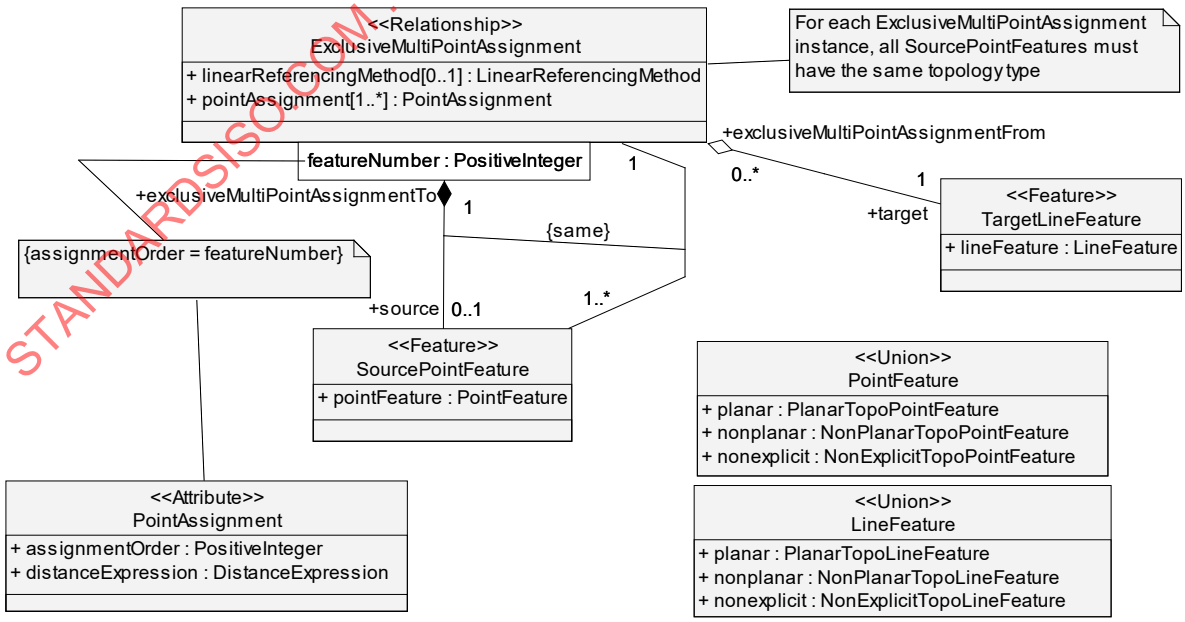


Figure 159 — Conceptual Data Model for the Exclusive Multi-Point Assignment Relationship

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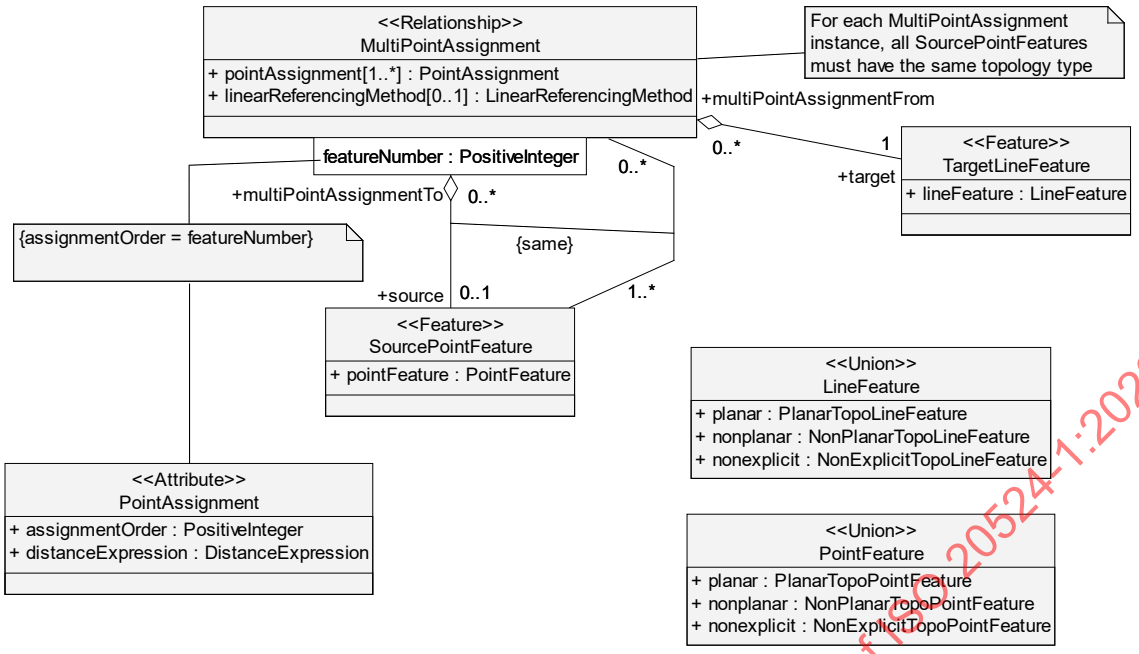


Figure 160 — Conceptual Data Model for the Multi-Point Assignment Relationship

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8.1.2 Relationship Types

All identical relationships between *Features* belonging to the same *Feature Class* are said to belong to the same *Relationship* type. E.g. the facts that Paris is the capital of France and Madrid is the capital of Spain may both be seen as instances of the *Relationship* type "Is capital of" between two instances of the *Feature* class "*Settlement*" and "*Country*" respectively.

8.1.3 Relationship Type Codes

The referencing by *Relationship* Type Names is applied in this document. In the physical data structure, however, Relationships are referenced by a *Relationship* Type Code. Clause A.4 contains an overview of the defined *Relationship* Type Codes.

8.1.4 Arity of a Relationship

Most information may be modelled in the form of binary relationships, i.e. relationships with only two partners, as in the examples of country capitals given above. However, some facts may not be split into binary relationships with impunity. If one wants to express the fact that London Bridge leads High Street over the Thames, this may only be represented correctly by means of a ternary *Relationship* between the three *Features* "Structure", "Road Element" and "Waterway Element". Trying to split this fact into two binaries would cause loss of information.

The number of *Feature* classes in a *Relationship* is called the arity of that *Relationship*.

8.1.5 Roles and partners of a Relationship

The *Feature* classes involved in a particular *Relationship* are called the partners in the *Relationship*. Each partner plays a dedicated role within the Relationship Type in question. In the above-mentioned example "City" and "Country" are the roles in the *Relationship* "Is capital of".

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For each role in a Relationship, its role number and role name is defined (both unique among the Relationship's roles). Also, it is defined if a role is mandatory, meaning that there shall be at least one Feature playing this role. Furthermore, it is defined if a role may repeat, whereby a role may correspond to multiple Features of the same Feature Class (e.g. multiple departing Road Elements of a Fork). In case such multiple Feature instances conceptually reflect a particular order, an explicit ordering constraint is specified.

For a role, commonly a single Feature Class is applicable. However, multiple “candidate” Feature Classes may be allowable in certain cases (e.g. the role of upper Transportation Element may be played by either a Road Element, a Junction, or a Railway Element, to name a few allowable Feature Classes).

Two Features of the same Feature Class may play two different roles in the same Relationship (e.g. Transportation Elements as Underpass and Overpass of a grade-separated crossing, respectively).

8.1.6 Homogeneous Relationships and their constraints

8.1.6.1 Introduction

A *Relationship* is called homogeneous if and only if at least two partners in that *Relationship* are of the same *Feature* class.

EXAMPLE 1 The *Relationship Prohibited Manoeuvre*, where each *Relationship* involves at least two Road Elements.

EXAMPLE 2 The *Relationship* Grade Separated Crossing, where each *Relationship* involves two *Transportation Elements*.

Homogeneous relationships may be characterised according to whether they are reflexive, symmetric, transitive or not. What these constraints mean is explained in the following sub-clauses by mathematical definitions.

8.1.6.2 Reflexivity

A *Relationship* R is called reflexive over A if and only if for all x in A, (x,x) is an element of R. A *Relationship* R is called irreflexive if and only if for all x, (x,x) is not an element of R. *Relationships* that do not meet one of these conditions are called non-reflexive. (Note that this is not the same as irreflexive.)

8.1.6.3 Symmetry

A *Relationship* R is called symmetric over A if and only if for all x in A, (x_i,x_j) is an element of R when (x_j,x_i) is an element of R.

A *Relationship* R is called asymmetric over A if and only if for all x in A, (x_i,x_j) and (x_j,x_i) are not both an element of R.

Relationships that do not satisfy one of these conditions are called non-symmetric. (Note that this is not the same as asymmetric.)

8.1.6.4 Transitivity

A *Relationship* R is called transitive if and only if for all x, y and z, (x,z) is an element of R when both (x,y) and (y,z) are elements of R. A *Relationship* R is called intransitive if and only if for all x, y and z, (x,z) is not an element of R when both (x,y) and (y,z) are elements of R.

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Relationships that do not meet one of these conditions are called non-transitive. Note that this is not the same as intransitive.

8.2 Relationship Types

8.2.1 Building along Road Element

8.2.1.1 Definition

Relationship between a *Building, Schematic Building or Building Unit* and the *Road Element* along which it is located.

8.2.1.2 Feature roles

8.2.1.2.1 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.1.2.2 Building Feature

- This role is mandatory.
- This role is not repeatable.

8.2.1.3 Description

This *Relationship* identifies the *Road Element* along which the entrance of the *Building, Schematic Building or Building Unit* is situated. For the conceptual data model, see Figure 142.

In most cases the *Road Element* to which a *Building, Schematic Building or Building Unit* logically "belongs", will be the closest. However, this will not always be the case. See Figure 161.

One *Building, Schematic Building or Building Unit* may belong to two or more different *Road Elements* if the *Building or Building Unit* has several entrances located at different *Road Elements*. Each is represented as a separate Relationship.

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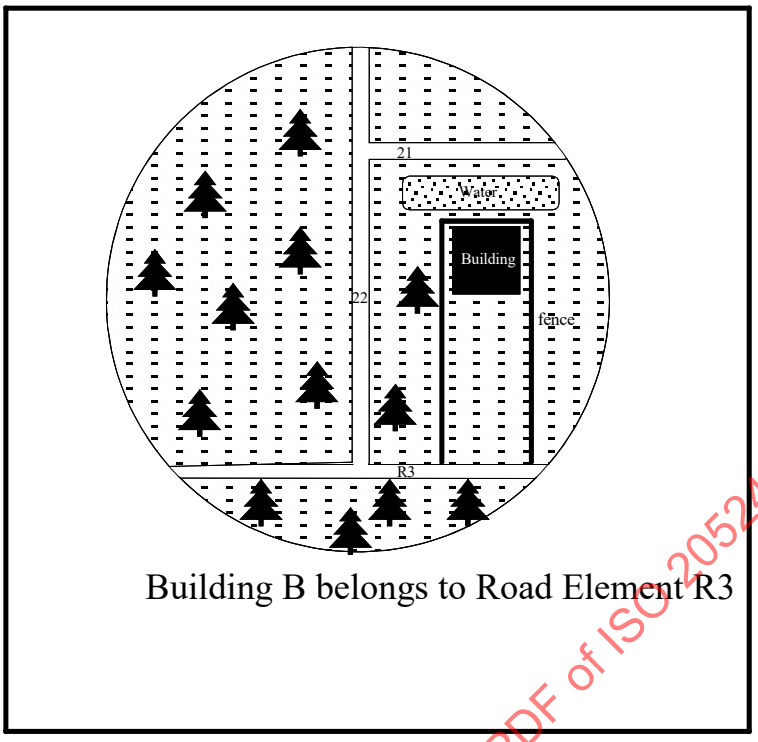


Figure 161 — Example of a Building along Road Element

8.2.2 Building Associated with Administrative Area

8.2.2.1 Definition

Relationship between a Building, Schematic Building or Building Unit and the Administrative Area in which it is located or with which it is commonly associated.

8.2.2.2 Feature Roles

8.2.2.2.1 Order-8 Area

- This role is mandatory.
- This role is not repeatable.

8.2.2.2.2 Building Feature

- This role is mandatory.
- This role is not repeatable.

8.2.2.3 Description

For the conceptual data model, see Figure 142.

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8.2.3 Building Associated with Built-up Area

8.2.3.1 Definition

Relationship between a Building, Schematic Building or Building Unit and the Built-up Area in which it is located or with which it is commonly associated.

8.2.3.2 Feature roles

8.2.3.3 Built-up-Area

- This role is mandatory.
- This role is not repeatable.

8.2.3.3.1 Building Feature

- This role is mandatory.
- This role is not repeatable.

8.2.3.4 Description

For the conceptual data model, see Figure 142.

8.2.4 Building Associated with Service

8.2.4.1 Definition

Relationship between a Building, Schematic Building or Building Unit and the Service with which it is commonly associated.

8.2.4.2 Feature roles

8.2.4.2.1 Service

- This role is mandatory.
- This role is not repeatable.

8.2.4.2.2 Building Feature

- This role is mandatory.
- This role is not repeatable.

8.2.4.3 Description

For the conceptual data model, see Figure 153.

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8.2.5 Building Façade is associated with Building

8.2.5.1 Definition

Relationship between a Building Façade and the footprint of a Building with which it is commonly associated.

8.2.5.2 Feature roles

8.2.5.2.1 Building Façade

- This role is mandatory.
- This role is not repeatable.

8.2.5.2.2 Building

- This role is mandatory.
- This role is not repeatable.

8.2.5.3 Description

For the conceptual data model, see Figure 154.

This Relationship represents the linkage between the façade of a Building with the building object.

8.2.6 Building Unit is associated with Building

8.2.6.1 Definition

Relationship between a Building Unit and the Building or Schematic Building with which it is commonly associated.

8.2.6.2 Feature roles

8.2.6.2.1 Building Unit

- This role is mandatory.
- This role is not repeatable.

8.2.6.2.2 Building or Schematic Building

- This role is mandatory.
- This role is not repeatable.

8.2.6.3 Description

For the conceptual data model, see Figure 155.

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This Relationship represents the linkage between addressable and architectural (visual) information components associated with (schematic) building objects.

8.2.7 Building Unit linked to Street

8.2.7.1 Definition

Relationship between a Road Element, Pathway or Address Area Boundary Element and the Building Unit carrying its street address.

8.2.7.2 Feature roles

8.2.7.2.1 Street Feature

- This role is mandatory.
- This role is not repeatable.

8.2.7.2.2 Building Unit

- This role is mandatory.
- This role is not repeatable.

8.2.7.3 Description

For the conceptual data model, see Figure 157.

This Relationship identifies the Road Element or Address Area Boundary Element that is associated with the street address of a Building Unit. In most cases the closest Road Element or Address Area Boundary Element will be the correct one, possibly the closest Pathway. However, this will not always be the case.

8.2.8 Building linked to Building

8.2.8.1 Definition

Relationship between a Building and other Building(s) it is linked to, representing a group of buildings recognised as one (logical) structure.

8.2.8.2 Feature roles

8.2.8.2.1 First Building

- This role is mandatory.
- This role is not repeatable.

8.2.8.2.2 Second Building

- This role is mandatory.
- This role is not repeatable.

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8.2.8.3 Description

For the conceptual data model, see Figure 156.

Linked Buildings are considered part of one entity. The individual building may be referred to by a common name, potentially supplemented by additional sub-names for the respective parts. Linked buildings may or may not be attached to each other, and may or may not be connected, e.g. via an underground passage.

Examples are twin towers, a hotel building next an annex building, or two buildings connected by an elevated skyway (which may be represented by its own (projected) building footprint).

8.2.9 Built-up Area Associated with Administrative Area

8.2.9.1 Definition

Relationship between a Built-Up Area and the Administrative Area in which it is located or to which it is commonly associated.

8.2.9.2 Feature roles

8.2.9.2.1 Order-8 Area

- This role is mandatory.
- This role is not repeatable.

8.2.9.2.2 Built-up Area

- This role is mandatory.
- This role is not repeatable.

8.2.9.3 Description

The Relationship between Built-up Areas and Administrative Areas is many to many. That means that one Administrative Area may contain many different Built-up Areas and that one Built-up Area may belong to many different Administrative Areas because it may cross more than one boundary. Each pair of Built-up Area and Administrative Area is represented as a separate Relationship. For the conceptual data model, see Figure 142.

8.2.10 Centre Point of Feature belonging to Feature

8.2.10.1 Definition

Relationship between a Centre Point of Feature and the Feature for which it is the centre point.

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8.2.10.2 Feature roles

8.2.10.2.1 Centre Point

- This role is mandatory.
- This role is not repeatable.

8.2.10.2.2 Feature

- This role is mandatory.
- This role is not repeatable.

8.2.10.3 Description

For the conceptual data model, see Figure 144.

8.2.11 Connectivity

8.2.11.1 Definition

Representation of connectivity between lanes across junctions are based on a directed Manoeuvre of the incoming ("From") Road Element, a Junction to indicate the direction, optional intermediate ("via") Road Element(s), and the outgoing ("To") Road Element.

8.2.11.2 Feature roles

8.2.11.2.1 From Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.11.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.11.2.3 Via Road Element

- This role is optional.
- This role is repeatable. Conceptually, Features playing this role shall be ordered.

8.2.11.2.4 To Road Element

- This role is mandatory.
- This role is not repeatable.

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8.2.11.3 Description

For the conceptual data model, see Figure 149.

Lane specific details are supplemented through pair(s) of Restrictive Sub-Attributes Lane-Dependent Validity, corresponding to the concerned lane(s) of the “From” and the “To” Road Elements, respectively.

Multiple pairs of Lane-dependent Validity Attributes may be attached to this relation-ship to map the entire lane connectivity “matrix” between the “From” and “To” Road Element.

In addition, the coded lane connectivity may be classified whether or not it represents natural continuations between incoming lane(s) and outgoing lane(s). This classification is modelled by the Attribute Continuation Type. Consequently, the connectivity matrix is to be broken up in such cases and two Relationship instances are to be specified, containing the naturally continued and not naturally continued lanes, respectively.

In complex situation “via road elements” may be specified as part of the connectivity definition. These via road elements give a path from the incoming Road Element to the outgoing road element. Road elements along this via path do not necessarily carry additional lane information.

8.2.12 District Associated with Administrative Area

8.2.12.1 Definition

Relationship between a Census District, Elective District, Emergency Medical Dispatch District, Fire Dispatch District, Phone District, Police District, Postal District or School District and the Administrative Area in which it is located or to which it is commonly associated.

8.2.12.2 Feature roles

8.2.12.2.1 Order-8 Area

- This role is mandatory.
- This role is not repeatable.

8.2.12.2.2 District

- This role is mandatory.
- This role is not repeatable.

8.2.12.3 Description

The Relationship between Districts and Administrative Areas is many to many. That means that one Administrative Area may contain many different Districts and that one District may belong to many different Administrative Areas because it may cross more than one boundaries. Each pair of District and Administrative Area is represented as a separate Relationship. For the conceptual data model, see Figure 142.

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8.2.13 District Associated with Built-up Area

8.2.13.1 Definition

Relationship between a Census District, Elective District, Emergency Medical Dispatch District, Fire Dispatch District, Phone District, Police District, Postal District or School District and the Built-up Area in which it is located or to which it is commonly associated.

8.2.13.2 Feature roles

8.2.13.2.1 Built-up Area

- This role is mandatory.
- This role is not repeatable.

8.2.13.2.2 District

- This role is mandatory.
- This role is not repeatable.

8.2.13.3 Description

For the conceptual data model, see Figure 142.

8.2.14 Divided Junction

8.2.14.1 Definition

A Divided Junction is a manoeuvre that contains a Junction which has a physical or legal divider that prevents crossing it in a particular direction. The two Road Elements bounded by the Junction indicate along which Road Elements the Junction is divided. This implies that certain Manoeuvres are prevented.

8.2.14.2 Feature roles

8.2.14.2.1 First Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.14.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.14.2.3 Second Road Element

- This role is mandatory.
- This role is not repeatable.

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8.2.14.3 Description

For the conceptual data model, see Figure 136.

8.2.15 Enclosed Traffic Area Associated with Administrative Area

8.2.15.1 Definition

Relationship between an Enclosed Traffic Area and the Administrative Area in which it is located or to which it is commonly associated.

8.2.15.2 Feature roles

8.2.15.2.1 Order-8 Area

- This role is mandatory.
- This role is not repeatable.

8.2.15.2.2 Enclosed Traffic Area

- This role is mandatory.
- This role is not repeatable.

8.2.15.3 Description

For the conceptual data model, see Figure 142.

8.2.16 Enclosed Traffic Area Associated with Built-up Area

8.2.16.1 Definition

Relationship between an Enclosed Traffic Area and the Built-up Area in which it is located or to which it is commonly associated.

8.2.16.2 Feature roles

8.2.16.2.1 Built-up Area

- This role is mandatory.
- This role is not repeatable.

8.2.16.2.2 Enclosed Traffic Area

- This role is mandatory.
- This role is not repeatable.

8.2.16.3 Description

For the conceptual data model, see Figure 142.

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8.2.17 Exclusive Multi-Point Assignment

8.2.17.1 Definition

Relationship used to exclusively link source Point Feature(s) to a target Line Feature.

8.2.17.2 Feature roles

8.2.17.2.1 Source

- This role is mandatory.
- This role is repeatable. Conceptually, no particular order of Features playing this role is implied.

8.2.17.2.2 Target

- This role is mandatory.
- This role is not repeatable.

8.2.17.3 Description

For the conceptual data model, see Figure 159.

Exclusive Multi-Point Assignments are defined as Relationships between one or more source Point Features and the target Line Features. A source Point Feature is exclusively linked to a target Line Features, and thus shall not play a role in other Multi-Point Assignments or Exclusive Multi-Point Assignments.

A Point Assignment indicates that that part of the Exclusive Multi-Point Assignment is between a source Point Feature and the target Line Feature.

Point Assignments are ordered, based on their Assignment Order Attribute.

The corresponding locations are defined in accordance with this document for Linear Referencing contained within ISO 19148, Linear referencing [8]. Locations are described with three mandatory components.

- The first component is the linear element being measured, in this case the target Line Feature.
- The second component is the measurement method, called the Linear Referencing Method (LRM). The LRM used to measure along the target Line Feature is its Default Linear Referencing Method, and in the case of the target Line Feature being an Anchor Section, its Linear Datum's Default Linear Referencing Method; it may be overridden by an individual Linear Referencing Method Attribute specified for the actual Exclusive Multi-Point Assignment.
- The third component is the measured value along the linear element being measured. It is the Distance Expression Sub-Attribute of the Point Assignment Attribute which is measuring along the target Line Feature.

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8.2.18 Exit at Interchange

8.2.18.1 Definition

The Relationship between an Interchange and one or more contained Junctions which correspond to an exit specified by means of one Composite Exit Number.

8.2.18.2 Feature roles

8.2.18.2.1 Interchange

- This role is mandatory
- This role is not repeatable.

8.2.18.2.2 Junction

- This role is mandatory.
- This role is repeatable. Conceptually, no particular order of Features playing this role is implied.

8.2.18.3 Description

For the conceptual data model, see Figure 140. The specified Junction(s) is/are the turning point(s) within the Interchange which is/are associated with the attached Composite Exit Number.

Consider a dual carriageway crossing another dual carriageway. Exit 5a is considered to be a single Exit At Interchange even if it includes both the Northbound and Southbound carriageway exits since both lead to the East bound carriageway. This Exit At Interchange has a single Composite Exit Number (5a) but two Junctions – one where you turn off from Northbound and the other where you turn off from Southbound. Another Exit At Interchange would exist for 5b for the exits to Westbound.

8.2.19 Ferry Connection Associated with Administrative Area

8.2.19.1 Definition

Relationship between a Ferry Connection and the Administrative Area in which it is located or to which it is commonly associated.

8.2.19.2 Feature roles

8.2.19.2.1 Order-8 Area

- This role is mandatory.
- This role is not repeatable.

8.2.19.2.2 Ferry Connection

- This role is mandatory.
- This role is not repeatable.

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8.2.19.3 Description

For the conceptual data model, see Figure 142.

8.2.20 Ferry Connection Associated with Named Area

8.2.20.1 Definition

Relationship between a Ferry Connection and the Named Area in which it is located or to which it is commonly associated.

8.2.20.2 Feature roles

8.2.20.2.1 Named Area

- This role is mandatory.
- This role is not repeatable.

8.2.20.2.2 Ferry Connection

- This role is mandatory.
- This role is not repeatable.

8.2.20.3 Description

For the conceptual data model, see Figure 142.

8.2.21 Ferry Connection Associated with Built-up Area

8.2.21.1 Definition

Relationship between a Ferry Connection and the Built-up Area in which it is located or to which it is commonly associated.

8.2.21.2 Feature roles

8.2.21.2.1 Built-up Area

- This role is mandatory.
- This role is not repeatable.

8.2.21.2.2 Ferry Connection

- This role is mandatory.
- This role is not repeatable.

8.2.21.3 Description

For the conceptual data model, see Figure 142.

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8.2.22 Fork

8.2.22.1 Definition

A fork in the road at which — for an approaching road — more than one departing road could be considered as the natural continuation.

8.2.22.2 Feature roles

8.2.22.2.1 Approaching Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.22.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.22.2.3 Departing Road Element

- This role is mandatory.
- This role is repeatable. Conceptually, no particular order of Features playing this role is implied.

8.2.22.3 Description

For the conceptual data model, see Figure 133. Forks are typically recognized by the fact that

- the continuations have no sharp bends or kinks at/immediately after the fork point and
- the angle between the (most) right and the (most) left continuation is less than 90º.

Note that forks include road forks with more than two natural continuations, e.g. a three-lane carriageway which branches off at one point into three separate roads, each as a continuation of one lane.

The following situations typically do not represent forks:

- Situations in which all but one of the continuations are slip roads of a crossing at grade having a deceleration lane.
- T-like Junctions.

Forks are relevant for route guidance. They allow for the generation of special route guidance instructions. Therefore, the information to be modelled shall reflect the road user's perception of the road continuation(s) at junctions. This might be ambiguous.

8.2.23 Give Way Regulation

8.2.23.1 Definition

A Manoeuvre at the end of which a driver shall give way to other intervening traffic.

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8.2.23.2 Feature roles

8.2.23.2.1 First Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.23.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.23.2.3 Second Road Element

- This role is optional.
- This role is not repeatable.

8.2.23.2.4 Subsequent Road Element

- This role is optional.
- This role is repeatable. Conceptually, Features playing this role shall be ordered.

8.2.23.2.5 Traffic Sign

- This role is optional.
- This role is not repeatable.

8.2.23.3 Description

For the conceptual data model, see Figure 146.

Two different forms of Give Way Regulation exist:

- An implicit form, implied from general traffic rules. For example, “traffic coming from the right (or left) has right of way".
- An explicit form, at a particular Intersection where give way information is indicated by means of traffic signs and which overrule the general traffic rule.

Figure 162 shows some examples of give way traffic signs:



Figure 162 — Examples for Give Way traffic signs

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Regulations may involve only a Road Element from which the driver is approaching the Junction and the junction itself. In such a case the Give Way Regulation is not limited to any particular (sequence of) outbound Road Element(s). In other situations, the give way situation may be effective along a path connecting the road element from which the driver is approaching the Junction to an outbound Road Element, and possibly further subsequent Road Elements, in order to connect to the Road Element that is exclusively related to the Give Way Regulation (however not any subsets of fewer Road Elements).

Note that the Relationship Give Way Regulation is not symmetric.

8.2.24 Grade Separated Crossing

8.2.24.1 Definition

A Relationship between Transportation Elements that cross at different elevations that is comprised of an upper Transportation Element, a lower Transportation Element, and the Structure which grade-separates the two.

8.2.24.2 Feature roles

8.2.24.2.1 Upper Part

- This role is optional.
- This role is not repeatable.

8.2.24.2.2 Lower Part

- This role is optional.
- This role is not repeatable.

8.2.24.2.3 Structure

- This role is optional.
- This role is not repeatable.

8.2.24.3 Description

For the conceptual data model, see Figure 138.

8.2.24.4 Constraint

Either the upper or lower Transportation Element may be absent, but not both.

The Relationship is transitive, when 3 Transportation Elements pass over each other at the same location using the same Structure two Relationships will be created; one describing the separation between the lower and the middle element, and one describing the separation between the upper and middle element. The separation between the upper and lower element shall not be explicitly described.

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8.2.25 Junction Associated with Administrative Area

8.2.25.1 Definition

Relationship between a Junction and the Administrative Area in which it is located or to which it is commonly associated.

8.2.25.2 Feature roles

8.2.25.2.1 Order-8 Area

- This role is mandatory.
- This role is not repeatable.

8.2.25.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.25.3 Description

For the conceptual data model, see Figure 142.

8.2.26 Junction Associated with Built-up Area

8.2.26.1 Definition

Relationship between a Junction and the Built-up Area in which it is located or to which it is commonly associated.

8.2.26.2 Feature roles

8.2.26.2.1 Built-up Area

- This role is mandatory.
- This role is not repeatable.

8.2.26.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.26.3 Description

For the conceptual data model, see Figure 142.

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8.2.27 Linear Assignment

8.2.27.1 Definition

Relationship used to link a source Line Feature to target Line Feature(s).

8.2.27.2 Feature roles

8.2.27.2.1 Source

- This role is mandatory.
- This role is not repeatable.

8.2.27.2.2 Target

- This role is mandatory.
- This role is repeatable. Conceptually, no particular order of Features playing this role is implied.

8.2.27.3 Description

For the conceptual data model, see Figure 158.

Linear Assignments are defined as Relationships between a source Line Feature and one or more, entire or partial target Line Features. Linear Assignments have one or more Correspondences, one per source-target combination.

A Correspondence indicates that that part of the Linear Assignment is between an entire source Line Feature and an entire or partial target Line Feature. Its Validity Direction Attribute indicates whether the source Line Feature is in the same or opposite direction as the target Line Feature.

Correspondences are ordered, based on their Correspondence Order Attribute. Only the first and the last target Line Feature may be subject to a partial Correspondence.

The corresponding locations are defined in accordance with this document for Linear Referencing contained within ISO 19148, Linear referencing. Locations are described with three mandatory components.

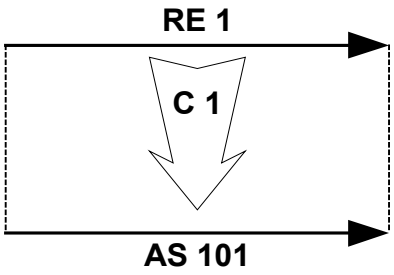
1. The first component is the linear element being measured, in this case the target Line Feature.
2. The second component is the measurement method, called the Linear Referencing Method (LRM). The LRM used to measure along the target Line Feature is its Default Linear Referencing Method, and in the case of the target Line Feature being an Anchor Section, its Linear Datum's Default Linear Referencing Method; it may be overridden by an individual Linear Referencing Method Attribute specified for the actual Linear Assignment.
3. The third component is the measured value along the linear element being measured. It is the Linear Position Attribute of the Linear Assignment which is measuring along the target Line Feature.

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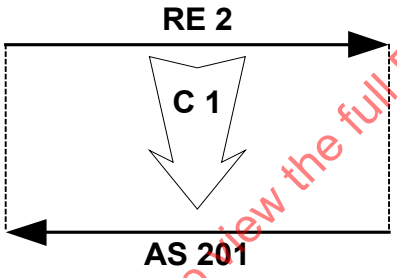
8.2.27.4 Examples

8.2.27.4.1 Simple assignment with single, entire target in same direction



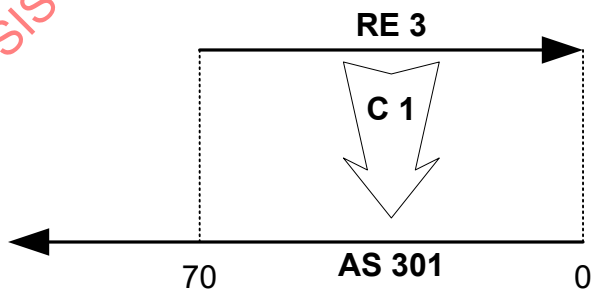
The source Line Feature, Road Element RE1, is assigned to the single, entire target Line Feature, Anchor Section AS101, representing source feature number 1, with a single Correspondence C1 having a Correspondence Order of 1 (one) and a Validity Direction Attribute equal to “same direction”.

8.2.27.4.2 Simple assignment with single, entire target in opposite direction



The source Line Feature, Road Element RE2, is assigned to the single, entire target Line Feature, Anchor Section AS201, representing source feature number 1, with a single Correspondence C1 having a Correspondence Order of 1 (one) and a Validity Direction Attribute equal to “opposite direction”.

8.2.27.4.3 Simple assignment with single, partial target



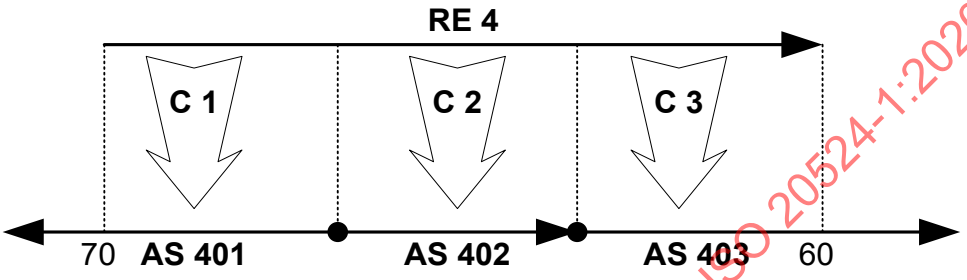
The source Line Feature, Road Element RE3, is assigned to a part of the single target Line Feature, Anchor Section AS301, representing source feature number 1, with a single Correspondence C1 having a Correspondence Order of 1 (one) and a Validity Direction Attribute equal to “opposite direction”.

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A composite Linear Position value of 70 (Distance Expression) and “Start” (Start End Flag) for the Linear Assignment indicates that the beginning of the Source corresponds to a location of 70 along the Target. Along with the Validity Direction value, the absence of a second Linear Position value indicates that the end of the Source corresponds to the beginning of the Target. The presence of another composite Linear Position value (with Start End Flag set to “end”) would specify where along the Target the Source ends. The default Location Referencing Method for the Linear Datum containing Anchor Section AS301 is Percentage.

8.2.27.4.4 Simple assignment with multiple target



A single, simple assignment may be used to assign a Source to multiple Targets, in this case three: The source Line Feature, Road Element RE4, is assigned to three target Line Features, Anchor Sections AS401, AS402 and AS403, in that order, representing source feature numbers 1, 2, and 3, respectively. Three Simple Correspondences are required: C1, C2, and C3, respectively.

A composite Linear Position value of 70 (Distance Expression) and “Start” (Start End Flag) for the Linear Assignment indicates that the beginning of the Source corresponds to a location of 70 along the first Target, AS401. A composite Linear Position value of 60 (Distance Expression) and “End” (Start End Flag) indicates that the end of the Source corresponds to a location of 60 along the last Target, AS403. Correspondence C1 would have Correspondence Order and Validity Direction values of 1 and “opposite direction”, respectively; C2 would have 2 and “same direction”; C3 would have 3 and “same direction”. The default Location Referencing Method for the Linear Datum containing Anchor Sections AS401, AS402 and AS403 is Percentage.

When mapping the Source to the Target parts, the entire length of RE4 is pro-rated across the combined length of the three Target parts.

Any number of Targets may exist, however only the first and last may be partial.

8.2.28 Manoeuvre (abstract)

8.2.28.1 Definition

Relationship between a first and second Road Element, the Junction connecting them, and optionally any number of additional, subsequent Road Elements. A Manoeuvre shall be either a Priority Manoeuvre, a Right of Way Regulation, or a Restrictive Manoeuvre.

8.2.28.2 Feature roles

8.2.28.2.1 First Road Element

- This role is mandatory.
- This role is not repeatable.

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8.2.28.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.28.2.3 Second Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.28.2.4 Subsequent Road Element

- This role is optional.
- This role is repeatable. Conceptually, Features playing this role shall be ordered.

8.2.28.2.5 Traffic Sign

- This role is optional.
- This role is not repeatable.

8.2.28.3 Description

For the conceptual data model, see Figure 135. As an abstract class, Manoeuvre may not be instantiated.

8.2.29 Multi-Point Assignment

8.2.29.1 Definition

Relationship used to non-exclusively link source Point Feature(s) to a target Line Feature.

8.2.29.2 Feature roles

8.2.29.2.1 Source

- This role is mandatory.
- This role is repeatable. Conceptually, no particular order of Features playing this role is implied.

8.2.29.2.2 Target

- This role is mandatory.
- This role is not repeatable.

8.2.29.3 Description

For the conceptual data model, see Figure 160.

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Multi-Point Assignments are defined as Relationships between one or more source Point Features and the target Line Features. A source Point Feature may be linked to multiple target Line Features, and thus play a role in multiple Multi-Point Assignments.

A Point Assignment indicates that that part of the Multi-Point Assignment is between a source Point Feature and the target Line Feature.

Point Assignments are ordered, based on their Assignment Order Attribute.

The corresponding locations are defined in accordance with this document for Linear Referencing contained within ISO 19148, Linear referencing [8]. Locations are described with three mandatory components.

- The first component is the linear element being measured, in this case the target Line Feature.
- The second component is the measurement method, called the Linear Referencing Method (LRM). The LRM used to measure along the target Line Feature is its Default Linear Referencing Method, and in the case of the target Line Feature being an Anchor Section, its Linear Datum's Default Linear Referencing Method; it may be overridden by an individual Linear Referencing Method Attribute specified for the actual Multi-Point Assignment.
- The third component is the measured value along the linear element being measured. It is the Distance Expression Sub-Attribute of the Point Assignment Attribute which is measuring along the target Line Feature.

8.2.30 Overhead Structure along Road Element

8.2.30.1 Definition

The indication of a linear Structure spanning a Road Element or part of it.

8.2.30.2 Feature roles

8.2.30.2.1 Structure

- This role is mandatory.
- This role is not repeatable.

8.2.30.2.2 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.30.3 Description

For the conceptual data model, Figure 150.

Overhead structures subject to this Relationship include road or rail bridges, gantries carrying road signs that cross entirely or partially the road, etc.

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8.2.31 Pedestrian Crossing along Road Element

8.2.31.1 Definition

The presence of a Pedestrian Crossing along a Road Element.

8.2.31.2 Feature roles

8.2.31.2.1 Pedestrian Crossing

- This role is mandatory.
- This role is not repeatable.

8.2.31.2.2 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.31.3 Description

For the conceptual data model, see Figure 152.

8.2.32 Pedestrian Crossing has Entry Point

8.2.32.1 Definition

The relation between a non-street level Pedestrian Crossing and its Entry Point(s).

8.2.32.2 Feature roles

8.2.32.2.1 Pedestrian Crossing

- This role is mandatory.
- This role is not repeatable.

8.2.32.2.2 Entry Point

- This role is mandatory.
- This role is repeatable. Conceptually, no particular order of Features playing this role is implied.

8.2.32.3 Description

For the conceptual data model, see Figure 148.

A Pedestrian Crossing may have zero or more Entry Points which give access via stairs, lifts, etc., situated either out-door or in-door. Entry Points are modelled by the Entry Point Feature Class.

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8.2.33 Pedestrian Square connected to Pedestrian Crossing

8.2.33.1 Definition

The presence of an Enclosed Traffic Area is connected to a Pedestrian Crossing, or Entry Point of a Pedestrian Crossing, as part of a pedestrian transportation network.

8.2.33.2 Feature roles

8.2.33.2.1 Pedestrian Square

- This role is mandatory.
- This role is not repeatable.

8.2.33.2.2 Pedestrian Crossing Part

- This role is mandatory.
- This role is not repeatable.

8.2.33.3 Description

For the conceptual data model, see Figure 147.

This Relationship captures topological links between Pedestrian Squares (sub-type of Enclosed Traffic Area) and Pedestrian Crossings and/or Entry Points of a Pedestrian Crossing. Entry Points of Pedestrian Crossings are modelled by the Entry Point Feature Class, which are related to Pedestrian Crossings by means of the Pedestrian Crossing has Entry Point Relationship.

8.2.34 Place within Place

8.2.34.1 Definition

Relationship between an Administrative Place and another Administrative Place in which it is located.

8.2.34.2 Feature roles

8.2.34.2.1 Contained Place

- This role is mandatory.
- This role is not repeatable.

8.2.34.2.2 Containing Place

- This role is mandatory.
- This role is not repeatable.

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8.2.34.3 Description

For the conceptual data model, see Figure 145. This Relationship specifies the fact that at least part of the contained Place is contained within the containing Place according to a particular classification scheme. The type of classification scheme may be specified by the Attribute Place within Place Classification.

8.2.35 Right of Way Regulation

8.2.35.1 Definition

A Manoeuvre which has the right of way over other intervening traffic.

8.2.35.2 Feature roles

8.2.35.2.1 First Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.35.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.35.2.3 Second Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.35.2.4 Subsequent Road Element

- This role is optional.
- This role is repeatable. Conceptually, Features playing this role shall be ordered.

8.2.35.2.5 Traffic Sign

- This role is optional.
- This role is not repeatable.

8.2.35.3 Description

For the conceptual data model, see Figure 135.

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Two different forms of Right of Way Regulation exist:

- An implicit form, implied from general traffic rules. For example, “Traffic coming from the right (or left) has the right of way”.
- An explicit form, at a particular Intersection where right-of-way is indicated by means of traffic signs which overrule the general traffic rules.

Figure 163 shows some examples of traffic signs granting right of way.



Figure 163 — Examples for Right of Way traffic signs

Regulations granting the right of way always involve a Road Element from which the driver is approaching the junction and a Road Element leaving the junction. In some situations, the right of way situation may also be effective along a path connecting the road element from which the driver is approaching the junction to an outbound road element.

An example of a Right of Way Regulation is given in Figure 164, including Traffic Sign Features (optional). Note that the Relationship Right of Way Regulation is not symmetric.

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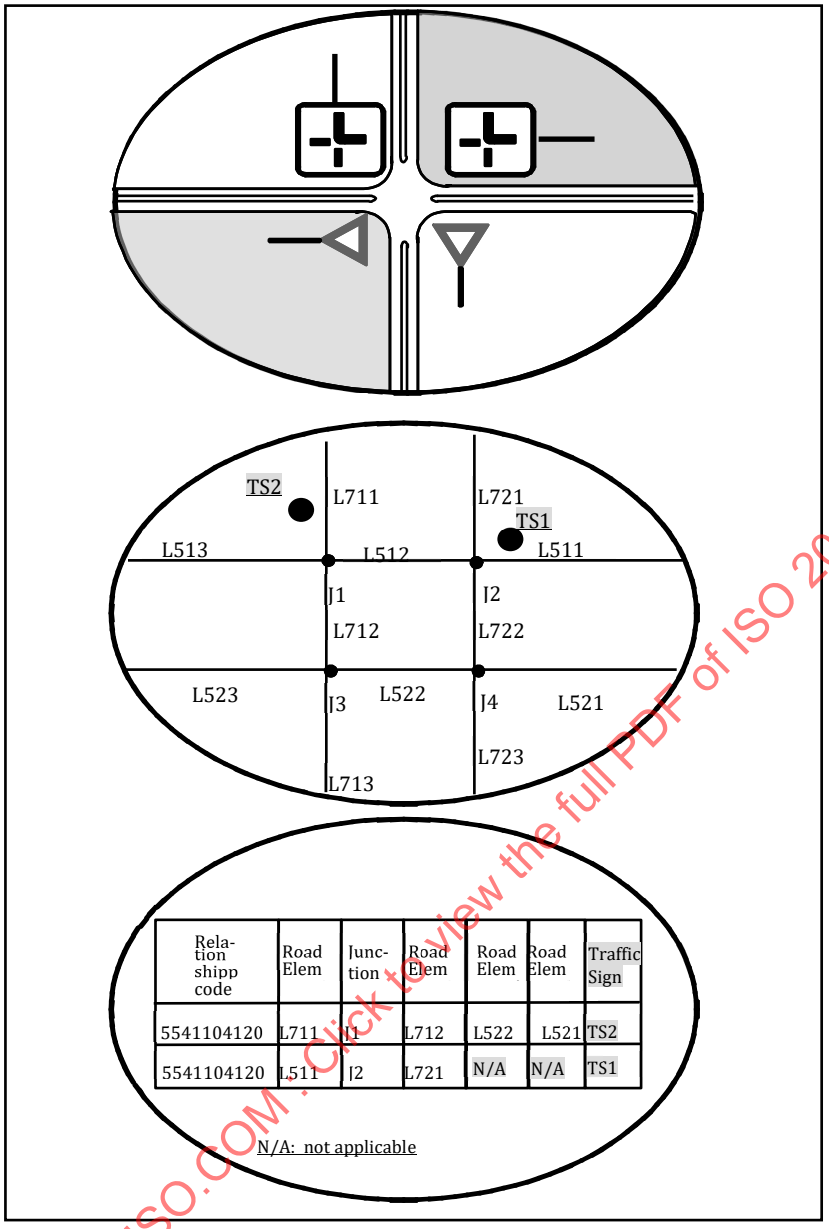


Figure 164 — Example of Right of Way Regulation

8.2.36 Prohibited Manoeuvre

8.2.36.1 Definition

A Manoeuvre which is physically possible, but which is “prohibited” by means of legal measures, as denoted by traffic signs.

8.2.36.2 Feature roles

8.2.36.2.1 First Road Element

- This role is mandatory.
- This role is not repeatable.

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8.2.36.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.36.2.3 Second Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.36.2.4 Subsequent Road Element

- This role is optional.
- This role is repeatable. Conceptually, Features playing this role shall be ordered.

8.2.36.2.5 Traffic Sign

- This role is optional.
- This role is not repeatable.

8.2.36.3 Description

For the conceptual data model, see Figure 135.

Three different forms of prohibited Manoeuvres may be distinguished. Examples are given in Figure 166. These are:

- Prohibited because of one-way traffic flow on one of the Road Elements of the Manoeuvres. These are not required to be modelled as Prohibited Manoeuvres.
- All prohibited Manoeuvres, indicated by traffic signs and not resulting from one-way situations on one of the Road Elements of the Manoeuvres. These are required to be modelled as Prohibited Manoeuvres. Examples for traffic signs indicating these situations are given in Figure 165.
- All prohibited Manoeuvres, neither resulting from one-way situations nor explicitly indicated by traffic signs, but resulting from the road network. These are required to be either modelled as Prohibited Manoeuvres or as Restricted Manoeuvres.

An example of the construction of a Prohibited Manoeuvre is given in Figure 167.

Note that a Prohibited Manoeuvre Relationship is not necessarily symmetrical: i.e. the reverse direction Manoeuvre need not be prohibited.

Attributes may be added to this Relationship for further description. For instance, it may be used in conjunction with the Attribute Validity Period to define changing circumstances through time.

EXAMPLE Prohibited Manoeuvre only during Peak Period.

The Prohibited Manoeuvre may also be used in conjunction with the Attribute Vehicle Type for which the Manoeuvre is prohibited.

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8.2.36.4 Constraints

If a Road Element is the first Road Element in a Prohibited Manoeuvre, then it may not be the first element in a Restricted Manoeuvre with the same Junction.

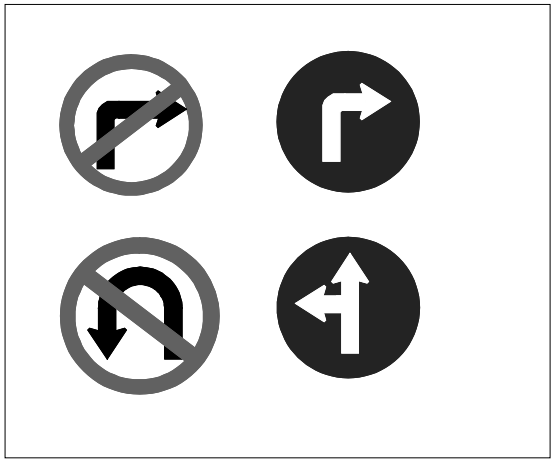


Figure 165 — Traffic Signs for Prohibited Manoeuvre and Restricted Manoeuvre

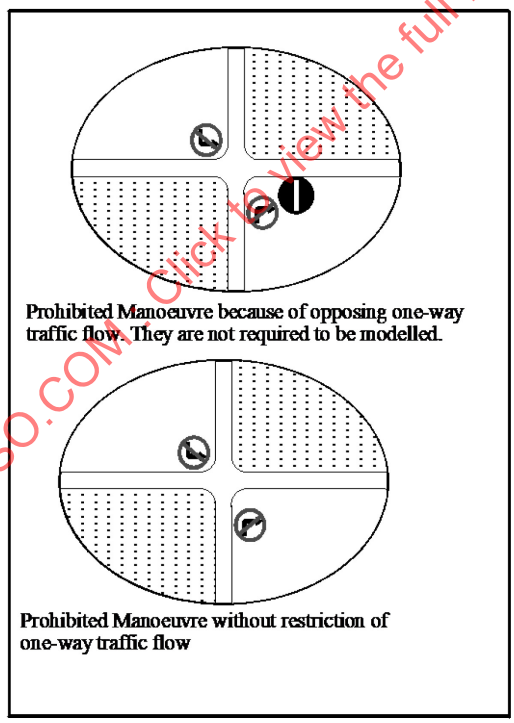
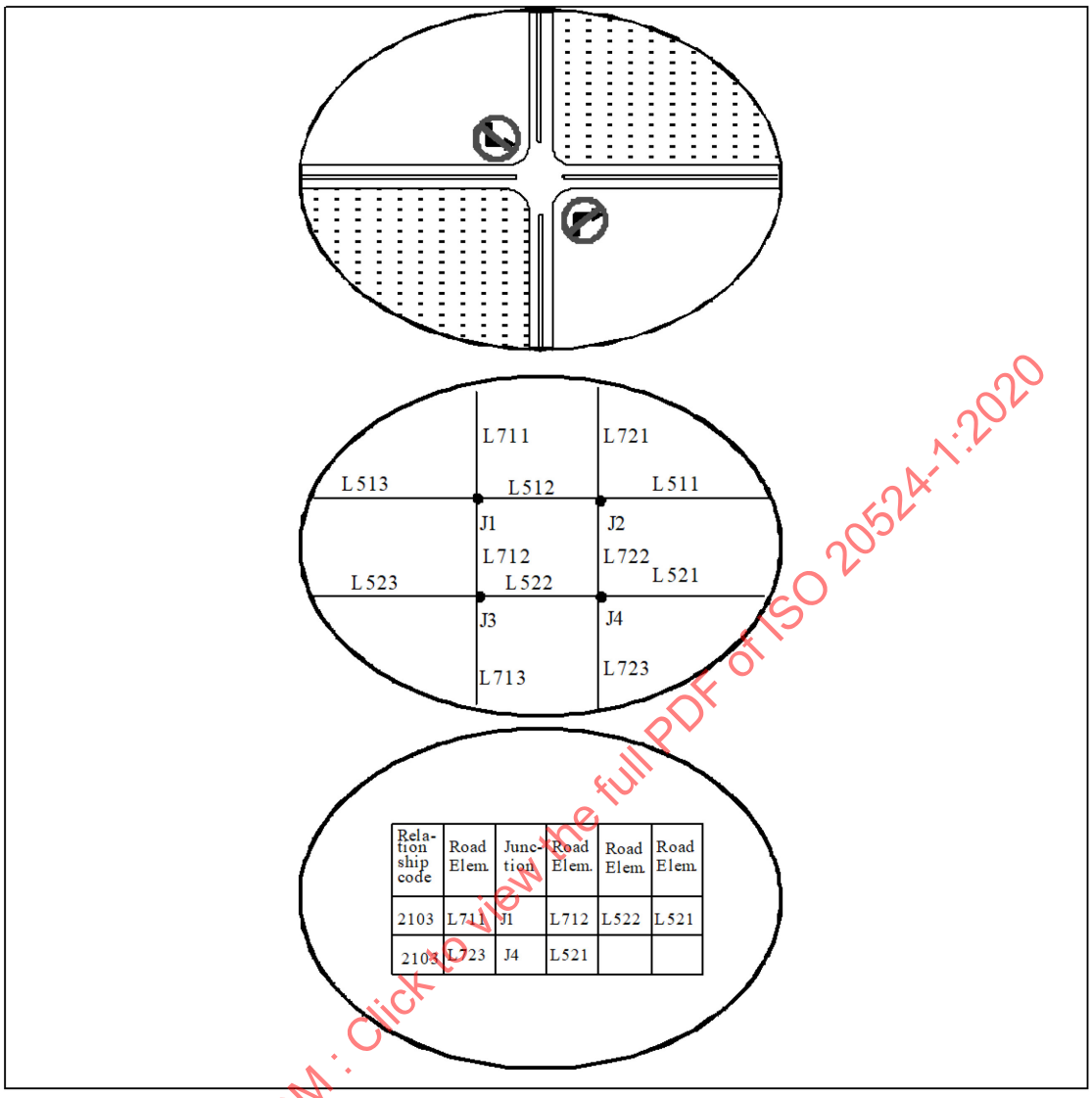


Figure 166 — Examples of Prohibited Manoeuvres

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Relation-ship code	Road Elem.	Junc-tion	Road Elem.	Road Elem.	Road Elem.
2103	L711	J1	L712	L522	L521
2103	L723	J4	L521		

Figure 167 — Representation of a Prohibited Manoeuvre

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8.2.37 Public Transport Connection

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

8.2.38 Public Transport Point along Route Link

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

8.2.39 Restricted Manoeuvre

8.2.39.1 Definition

A Manoeuvre which is explicitly permitted by means of legal measures, as denoted by traffic signs.

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8.2.39.2 Feature roles

8.2.39.2.1 First Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.39.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.39.2.3 Second Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.39.2.4 Subsequent Road Element

- This role is optional.
- This role is repeatable. Conceptually, Features playing this role shall be ordered.

8.2.39.2.5 Traffic Sign

- This role is optional.
- This role is not repeatable.

8.2.39.3 Description

For the conceptual data model, see Figure 135.

Whether the Restricted Manoeuvre is the only possibility to manoeuvre from the specified Road Element via the specified Junction may not be concluded from the Relationship. The full description may be derived by taking all Restricted Manoeuvre Relationships where the first specified Road Element and the Junction play the same role.

Three different forms of restricted Manoeuvre may be distinguished:

- Restricted because of one-way traffic flow on one of the roads not belonging to the restricted Manoeuvre but accessing the junction of this restricted Manoeuvre. These situations are not required to be modelled as Restricted Manoeuvre.
- All restricted Manoeuvres, indicated by traffic signs and not resulting from one-way traffic flow on one of the roads not belonging to the restricted Manoeuvre but accessing the junction of this restricted Manoeuvre. These are required to be modelled as Restricted Manoeuvres. Examples for traffic signs indicating these situations are given in Figure 165.
- All restricted Manoeuvres, neither resulting from one-way situations nor explicitly indicated by traffic signs, but resulting from the road network. These are required to be either modelled as Restricted Manoeuvres or as Prohibited Manoeuvres.

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Note that a Restricted Manoeuvre Relationship is not necessarily symmetrical: i.e. the reverse direction Manoeuvre need not be restricted.

Attributes may be added to this Relationship for further description. For instance, it may be used in conjunction with the Attribute Validity Period to define changing circumstances through time.

EXAMPLE Restricted Manoeuvre only during Peak Period.

The Restricted Manoeuvre may also be used in conjunction with the Attribute Vehicle Type for which the Manoeuvre is restricted.

8.2.39.4 Constraints

If a Road Element is the first Road Element in a Restricted Manoeuvre, then it may not be the first element in a Prohibited Manoeuvre with the same Junction.

8.2.40 Road Element Associated with Administrative Area

8.2.40.1 Definition

Relationship between a Road Element and the Administrative Area in which it is located or with which it is commonly associated.

8.2.40.2 Feature roles

8.2.40.2.1 Order-8 Area

- This role is mandatory.
- This role is not repeatable.

8.2.40.2.2 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.40.3 Description

For the conceptual data model, see Figure 142.

8.2.41 Road Element Associated with Built-up Area

8.2.41.1 Definition

Relationship between a Road Elements and the Built-up Area in which it is located or with which it is commonly associated.

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8.2.41.2 Feature roles

8.2.41.2.1 Built-up Area

- This role is mandatory.
- This role is not repeatable.

8.2.41.2.2 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.41.3 Description

For the conceptual data model, see Figure 142.

8.2.42 Road Element Associated with District

8.2.42.1 Definition

Relationship between a Road Element and the Census District, Elective District, Emergency Medical Dispatch District, Fire Dispatch District, Phone District, Police District, Postal District or School District with which it is commonly associated.

8.2.42.2 Feature roles

8.2.42.2.1 District

- This role is mandatory.
- This role is not repeatable.

8.2.42.2.2 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.42.3 Description

For the conceptual data model, see Figure 142.

8.2.43 Road Element Associated with Named Area

8.2.43.1 Definition

Relationship between a Road Element and the Named Area with which it is commonly associated.

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8.2.43.2 Feature roles

8.2.43.2.1 Named Area

- This role is mandatory.
- This role is not repeatable.

8.2.43.2.2 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.43.3 Description

For the conceptual data model, see Figure 142.

8.2.44 Road Element belonging to Service

8.2.44.1 Definition

Relationship between a Road Element and the Service to which it belongs.

8.2.44.2 Feature roles

8.2.44.2.1 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.44.2.2 Service

- This role is mandatory.
- This role is not repeatable.

8.2.44.3 Description

For the conceptual data model, see Figure 142.

8.2.45 Road Element leading to Enclosed Traffic Area

8.2.45.1 Definition

Relationship between a Road Element and the Enclosed Traffic Area to which it leads.

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8.2.45.2 Feature roles

8.2.45.2.1 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.45.2.2 Enclosed Traffic Area

- This role is mandatory.
- This role is not repeatable.

8.2.45.3 Description

For the conceptual data model, see Figure 142.

8.2.46 Route Link along Road Element

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

8.2.47 Service along Road

8.2.47.1 Definition

Relationship between a Service and the Road along which it is situated.

8.2.47.2 Feature roles

8.2.47.2.1 Road

- This role is mandatory.
- This role is not repeatable.

8.2.47.2.2 Service

- This role is mandatory.
- This role is not repeatable.

8.2.47.3 Description

For the conceptual data model, see Figure 142.

8.2.48 Service along Road Element

8.2.48.1 Definition

Relationship between a Service and the Road Element along which it is situated.

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8.2.48.2 Feature roles

8.2.48.2.1 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.48.2.2 Service

- This role is mandatory.
- This role is not repeatable.

8.2.48.3 Description

For the conceptual data model, see Figure 142.

8.2.49 Service Associated with Administrative Area

8.2.49.1 Definition

Relationship between a Service and the Administrative Area in which it is located or to which it is commonly associated.

8.2.49.2 Feature roles

8.2.49.2.1 Order-8 Area

- This role is mandatory.
- This role is not repeatable.

8.2.49.2.2 Service

- This role is mandatory.
- This role is not repeatable.

8.2.49.3 Description

For the conceptual data model, see Figure 142.

8.2.50 Service Associated with Built-up Area

8.2.50.1 Definition

Relationship between a Service and the Built-up Area in which it is located or to which it is commonly associated.

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8.2.50.2 Feature roles

8.2.50.2.1 Built-up Area

- This role is mandatory.
- This role is not repeatable.

8.2.50.2.2 Service

- This role is mandatory.
- This role is not repeatable.

8.2.50.3 Description

For the conceptual data model, see Figure 142.

8.2.51 Service Associated with Named Area

8.2.51.1 Definition

Relationship between a Service and the Named Area in which it is located or to which it is commonly associated.

8.2.51.2 Feature roles

8.2.51.2.1 Named Area

- This role is mandatory.
- This role is not repeatable.

8.2.51.2.2 Service

- This role is mandatory.
- This role is not repeatable.

8.2.51.3 Description

For the conceptual data model, see Figure 142.

8.2.52 Service at Intersection

8.2.52.1 Definition

Relationship between a Service and the Intersection at which it is situated.

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8.2.52.2 Feature roles

8.2.52.2.1 Intersection

- This role is mandatory.
- This role is not repeatable.

8.2.52.2.2 Service

- This role is mandatory.
- This role is not repeatable.

8.2.52.2.3 Description

For the conceptual data model, see Figure 142.

8.2.53 Service at Junction

8.2.53.1 Definition

Relationship between a Service and the Junction at which it is situated.

8.2.53.2 Feature roles

8.2.53.2.1 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.53.2.2 Service

- This role is mandatory.
- This role is not repeatable.

8.2.53.3 Description

For the conceptual data model, see Figure 142.

8.2.54 Service related to Service

8.2.54.1 Definition

Relationship between one Service and another Service to which it functionally belongs or to which it is related.

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8.2.54.2 Feature roles

8.2.54.2.1 Service

- This role is mandatory.
- This role is not repeatable.

8.2.54.2.2 Associated Service

- This role is mandatory.
- This role is not repeatable.

8.2.54.3 Description

For the conceptual data model, see Figure 142.

8.2.55 Signpost Information

8.2.55.1 Definition

A single Signpost or set of related Signposts situated on a particular Road Element which correspond to a particular Manoeuvre and describe in textual or graphical form the signpost information.

EXAMPLE A Place name or road number.

8.2.55.2 Feature roles

8.2.55.2.1 Signpost

- This role is mandatory.
- This role is repeatable. Conceptually, no particular order of Features playing this role is implied.

8.2.55.2.2 Locating Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.55.2.3 Destination Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.55.3 Description

For the conceptual data model, see Figure 139. The logical information on a (set of) signpost(s) is expressed as a Relationship between:

- the (set of) Signpost(s),

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- the locating Road Element along which the (set of) Signpost(s) is located,
- The destination Road Element which is the first Road Element leading exclusively to the destination indicated on the Signpost.

In practice the number of "physical" signposts referring to the same situation is of no importance. All the information may be considered as one "logical" signpost, belonging to this particular Manoeuvre.

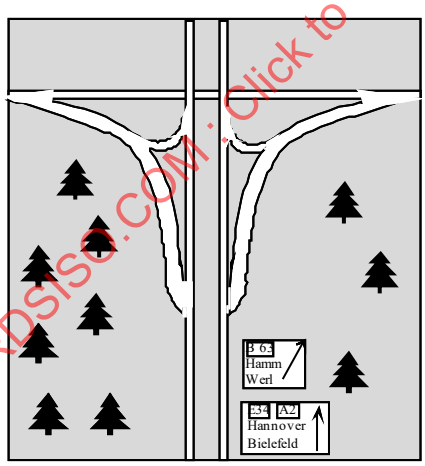
Data items on signposts of interest include:

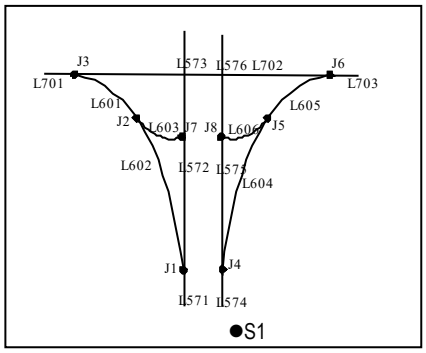
- names of towns, villages or other names (e.g. names of industrial areas, conference centres, tourist attractions) and area numbers (e.g. S109 in Amsterdam),
- route numbers,
- exit numbers,
- directional arrows.

8.2.55.4 Notes

Names and area number information shall be attached to the Relationship via the Destination Location Attribute, Route Numbers via the Route Number on Sign Attribute and exit numbers via the Exit Number Attribute, all of which are contained within the Composite Attribute Destination Info On Traffic Sign. A Directional arrow may be included in the Relationship via the Direction Attribute.

Some examples are given in Figure 168.





Relation-Ship code	Sign post	Road Elem.	Road Elem.	Attribute Value
2128	S1	L574	L604	Hamm
				Werl
				B63

Relation ship code	Sign post	Road Elem	Road Elem.	Attribute Value
2128	S1	L574	L575	Hannover
				Bielefeld
				E 34
				A 2

Figure 168 — Example of Signpost Information

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8.2.56 Stop Point along Road Element

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

8.2.57 Stop Point along Route

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

8.2.58 Stop Point at Junction

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

8.2.59 Stop Point located near Service

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

8.2.60 Through Route

8.2.60.1 Definition

A relation between two or more Road Elements that describes the continuation of the road.

8.2.60.2 Feature roles

8.2.60.2.1 Beginning Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.60.2.2 Continuing Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.60.2.3 Subsequent Road Element

- This role is optional.
- This role is repeatable. Conceptually, Features playing this role shall be ordered.

8.2.60.3 Description

For the conceptual data model, see Figure 137.

The Through Route Relationship is useful for Route Guidance.

The upper part of Figure 169 shows a schematic representation of the road as seen in reality, while the bottom part is the “digital” representation. The digital representation might imply incorrectly that R2 is the natural continuation of R1. To rectify this, the Through Route relation may be used.

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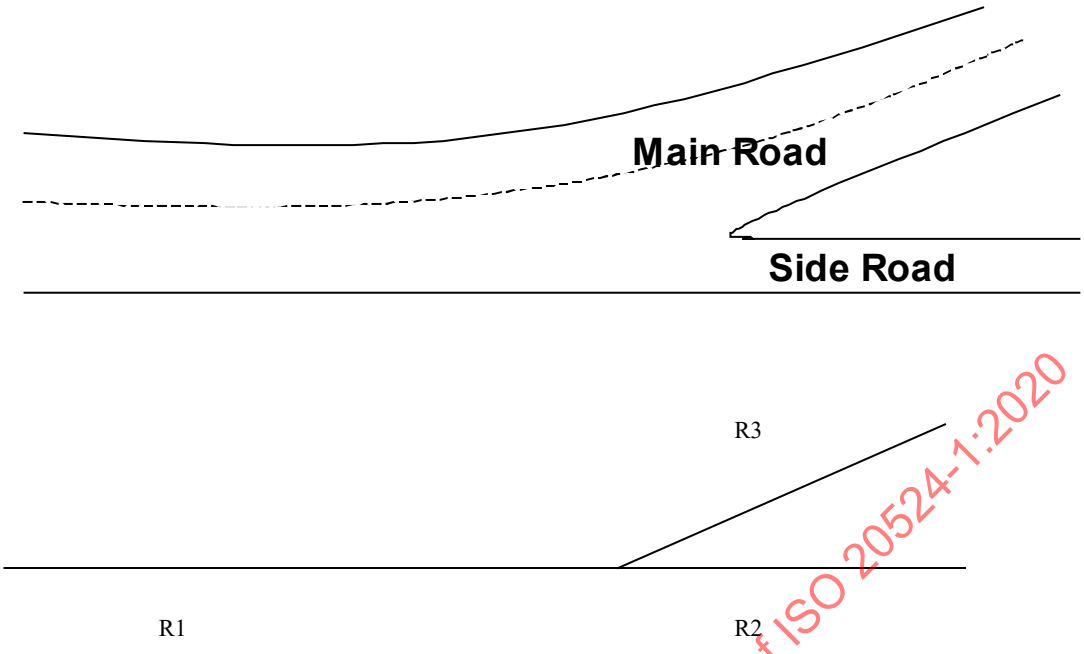


Figure 169 — Example of a Through Route

8.2.61 Toll Route

8.2.61.1 Definition

The relation between the Toll Location, which represents the point of toll payment, the first Road Element or Ferry Connection of the Toll Route, the last Road Element or Ferry Connection of the Toll Route and possible intermediate Road Element or Ferry Connections if these are necessary to uniquely describe the Toll Route. The relation represents (a section of) a Toll Route with a certain fee to be paid.

8.2.61.2 Feature roles

8.2.61.2.1 Toll location

- This role is mandatory.
- This role is not repeatable.

8.2.61.2.2 First Toll Route Part

- This role is mandatory.
- This role is not repeatable.

8.2.61.2.3 Selective Intermediate Toll Route Part

- This role is optional.
- This role is repeatable. Conceptually, Features playing this role shall be ordered.

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8.2.61.2.4 Last Toll Route Part

- This role is mandatory.
- This role is not repeatable.

8.2.61.3 Description

For the conceptual data model, see Figure 134. The Relationship specifies an ordered set of two or more Road Elements or Ferry Connections representing a Toll Route associated with a certain toll payment to be paid when traveling the Toll Route. The reverse combination of two Road Elements may relate to a different toll payment and is to be specified by a separate Relationship. If the Toll Route is not uniquely described by the first and last Road Element of the Toll Route (e.g., in between two Road Elements several Toll Routes exist, each associated with a different toll payment), intermediate Road Elements shall be specified to uniquely describe the Toll Route. The toll payment may be specified by the Toll Attribute.

8.2.62 Traffic Light Along Road Element

8.2.62.1 Definition

The presence of a Traffic Light relevant for traffic moving along a Road Element.

8.2.62.2 Feature roles

8.2.62.2.1 Traffic Light

- This role is mandatory.
- This role is not repeatable.

8.2.62.2.2 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.62.3 Description

For the conceptual data model, see Figure 141.

8.2.63 Traffic Light Regulation

8.2.63.1 Definition

The presence of a Traffic Light at a Road Element entering a Junction.

8.2.63.2 Feature roles

8.2.63.2.1 Road Element

- This role is mandatory.
- This role is not repeatable.

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8.2.63.2.2 Junction

- This role is mandatory.
- This role is not repeatable.

8.2.63.2.3 Traffic Light

- This role is optional.
- This role is repeatable. Conceptually, no particular order of Features playing this role is implied.

8.2.63.3 Description

For the conceptual data model, see Figure 151.

For traffic lights present at Junctions, the traffic light regulation involves an individual Road Element from which the driver is approaching the Junction regulated by the traffic lights in question. Driving direction to which a number of special traffic lights apply and information where these signalling units are positioned relative to the road may be modelled through the Composite Attribute Traffic Signal Info. See Figure 170 for an example.

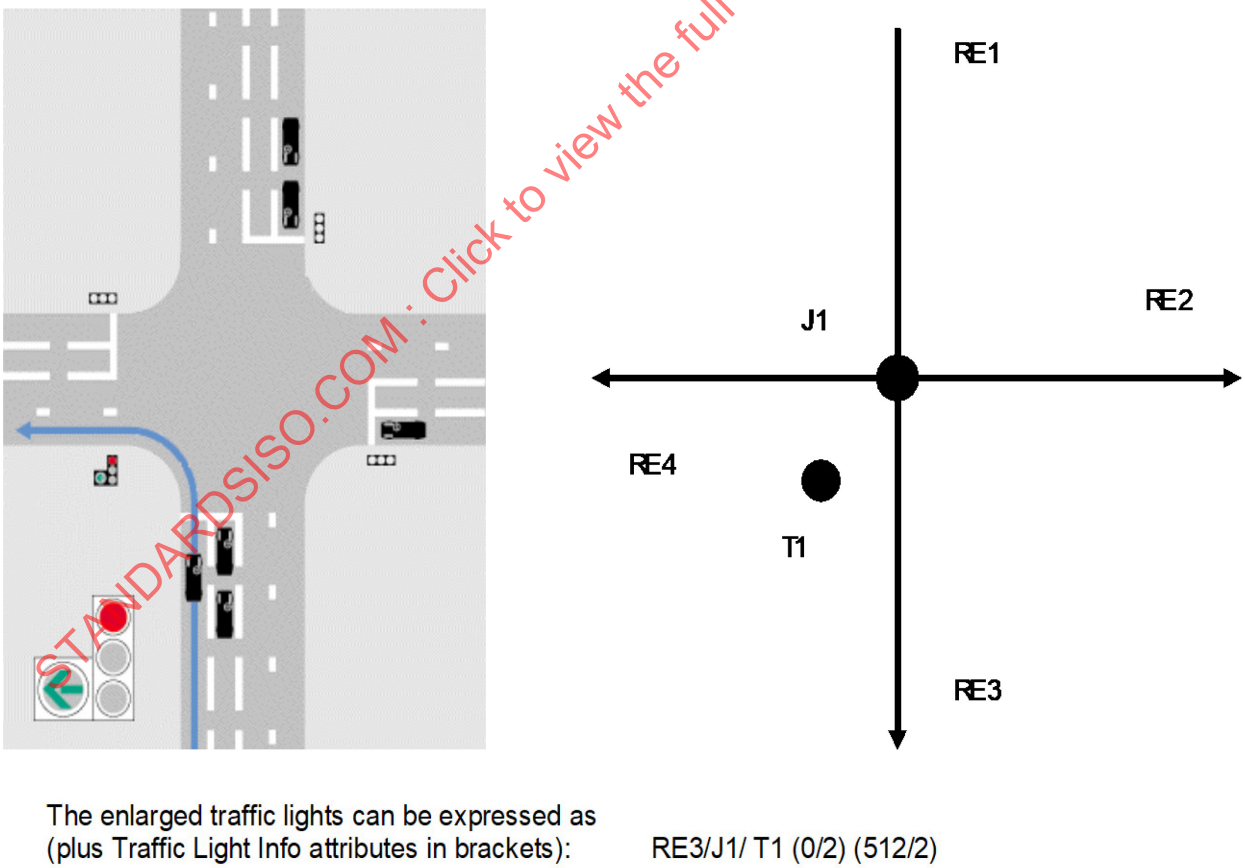


Figure 170 — Example of Traffic Light Regulation

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8.2.64 Traffic Sign Along Road Element

8.2.64.1 Definition

The presence of a Traffic Sign relevant for traffic moving along a Road Element.

8.2.64.2 Feature roles

8.2.64.2.1 Traffic Sign

- This role is mandatory.
- This role is not repeatable.

8.2.64.2.2 Road Element

- This role is mandatory.
- This role is not repeatable.

8.2.64.3 Description

For the conceptual data model, see Figure 141.

9 Feature representation rules

9.1 Generic specifications

9.1.1 Introduction

The objective of the Feature Representation Rules is to specify how individual Features should be represented by the different Feature Categories and how Simple Features shall be represented by the cartographic primitives: Nodes, Edges, Faces, Dots, Polylines and Polygons.

9.1.2 Feature Categories

The Overall Conceptual Data Model (Figure 1) illustrates that in each of the three topology types Features are divided into Complex Features and Simple Features. It also shows that Simple Features may be either zero-dimensional (Point Features), one-dimensional (Line Features), or two-dimensional (Area Features). Depending on the topology type, a Point Feature is represented by one Node or by one Dot, a Line Feature is represented by one or more Edges or by one Polyline and an Area Feature is a Feature represented by one or more Faces, by one or more Edges (representing its boundary) or by one Polygon. The fact that each of these Feature Categories may be represented in more than one way in a GDF relates to the different types of topology that may be represented (see sub-clause 5.2.3). Constraints are defined for the use of these alternative representations (see Figure 1, Figure 2, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, Figure 14, Figure 15, Figure 16, and sub-clause 9.1.5).

For the sake of simplicity, the terms “Point Features, Line Features, Area Features and Complex Features” are often abbreviated to “Points, Lines, Areas and Complexes”. These together form the four Feature categories.

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Features belonging to the same Feature Class (for instance Buildings) need not all belong to the same Feature Category. For example, one Building may be seen as a Point Feature, represented by an (isolated) Node, whereas another Building may be an Area Feature, represented by one or more Faces or by one or more Edges.

9.1.3 Types of topology

The following types of topology are defined in GDF:

1 Non-explicit topology:

- Simple Features are based on Dots, Polylines and Polygons.
- Topological relations are only defined via coordinate values of the Dots, Polylines and Polygons.

2 Non-Planar topology:

- Simple Features are based on Nodes and Edges.
- Topological relations between these two cartographic primitives are explicitly defined.
- Area Features are not fully topologically integrated.

3 Planar topology:

- Simple Features are based on Nodes, Edges and Faces.
- Topological relations between all cartographic primitives are explicitly defined.

Non-planar topology and planar topology are collectively referred to as topologically structured representations.

9.1.4 Levels of representation

9.1.4.1 Level 0: the geometry

Level 0 describes the geometry of the map in terms of the cartographic primitives. It breaks the map down into its most basic form for representation. All elements of the map may or may not be represented by a planar graph, i.e. on a single plane.

Curved shapes shall be represented by a series of segmented straight lines. These segments, however, are not represented in an explicit form. Instead, a segmented shape between the first geometry point and the last geometry point of an Edge, Polyline, or Polygon is described by an ordered sequence of Intermediate Points. Each pair of consecutive Intermediate Points bounds exactly one Segment.

For an Edge, the first geometry point is the geometry of the From Node and the last geometry point is the geometry of the To Node. For a Polyline and Polygon, the sequence of the first geometry point, zero or more intermediate points and the last geometry point collectively constitute the vertices of the segmented shape.

In addition to the core positional dimensions X, Y, and Z (optional), 3-dimensional object elevation as well as temporal existence may be specified for the cartographic primitives Dot, Polyline, and Polygon in non-explicit topology.

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9.1.4.2 Level 1: the Simple Features

Level 1 describes the map in terms of Simple Features. These may take the form of either Points, Lines or Areas.

EXAMPLE 1 A Road Element is a Simple Line Feature.

EXAMPLE 2 A Junction is a Simple Point Feature.

On level 1, the level 0 elements receive a “real world” significance. For non-explicit topology Features, the notion of Level 0 is artificial due to the 1:1 relation between a Feature and its representation by a cartographic primitive.

Non-planar situations (e.g. a grade separated crossing between two roads) need to be represented on Level 1 as non-planar.

The following Relationships exist between Level 1 and the associated cartographic primitives (Level 0):

- Each Point on Level 1 shall be represented by one Node on Level 0 or one Dot, except for topologically structured Points with no geometry, in which case the Point does not have a corresponding Node.
- Each Line on Level 1 shall be represented by one or more Edges on Level 0 or one Polyline, except for topologically structured Lines without geometry, in which case the Line does not have any corresponding Edge(s).
- Each Area on level 1 shall be represented by one or more Faces on Level 0, one or more Edges on Level 0 (describing the Area's boundary) or one Polygon, except for topologically structured Areas with no geometry, in which case the Area does not have any corresponding Face(s), or Edge(s), respectively.
- A Node on Level 0 will represent 0, 1 or more Points on Level 1.
- A Dot will represent one and only one Point on Level 1.
- An Edge will represent (part of) one or more Lines on level 1, a boundary of a Face on level 0, a boundary of an Area on level 1 or a combination of these.
- A Polyline will represent one and only one Line on level 1.
- A Face on level 0 will represent (part of) one or more Areas on level 1.
- A Polygon will represent one and only one Area on level 1.

9.1.4.3 Level 2: the Complex Features

Some Features are composed of other Features. These Features are called Complex Features. Complex Features may consist of Simple Features or other Complex Features.

EXAMPLE An Intersection is a group of Road Elements and Junctions forming an aggregation of Simple Features.

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9.1.4.4 Symbolisation

In this clause, a fixed set of symbols is used for the visualisation of Level 2, Level 1 and Level 0 representations. The symbols for topologically-structured representations are shown in Figure 171, Figure 172 and Figure 173.

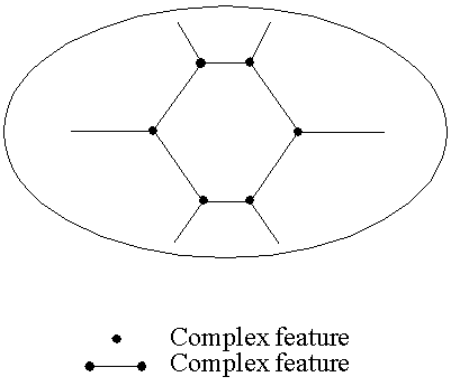


Figure 171 — Symbols in a Level-2 representation

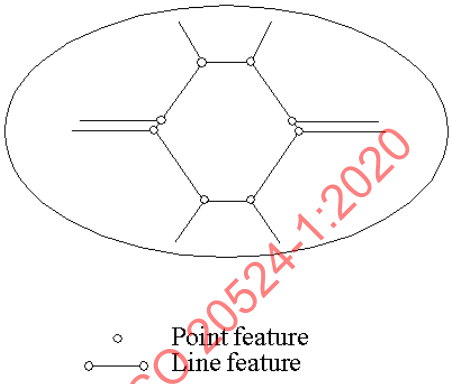


Figure 172 — Symbols in a Level-1 representation

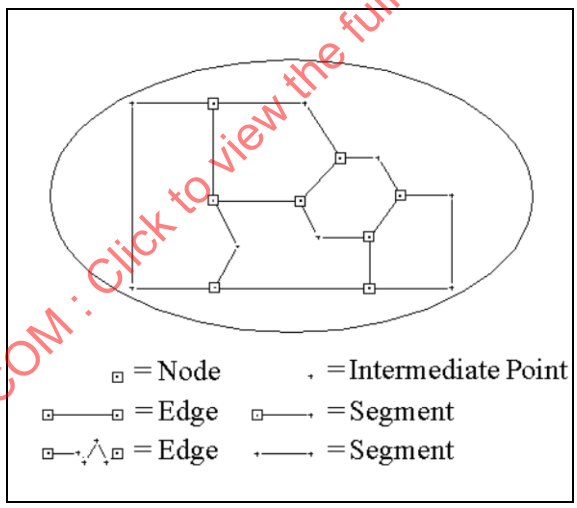


Figure 173 — Symbols in a Level-0 representation

A generic overview of the concept of a topologically-structured representation in three levels is given in Figure 179.

For the representation of non-explicit topological Features, the relation between Level 0 and Level 1 is much simpler. Each element in Level 0 corresponds to exactly one element in Level 1.

9.1.5 Layers on level 0

A Layer contains the set of level-0 elements of a GDF which are either all structured in planar topology, in non-planar topology, or which all represent non-explicit topological Features (see Figure 15). If two level-0 objects are present in two different Layers no topological integration shall take place.

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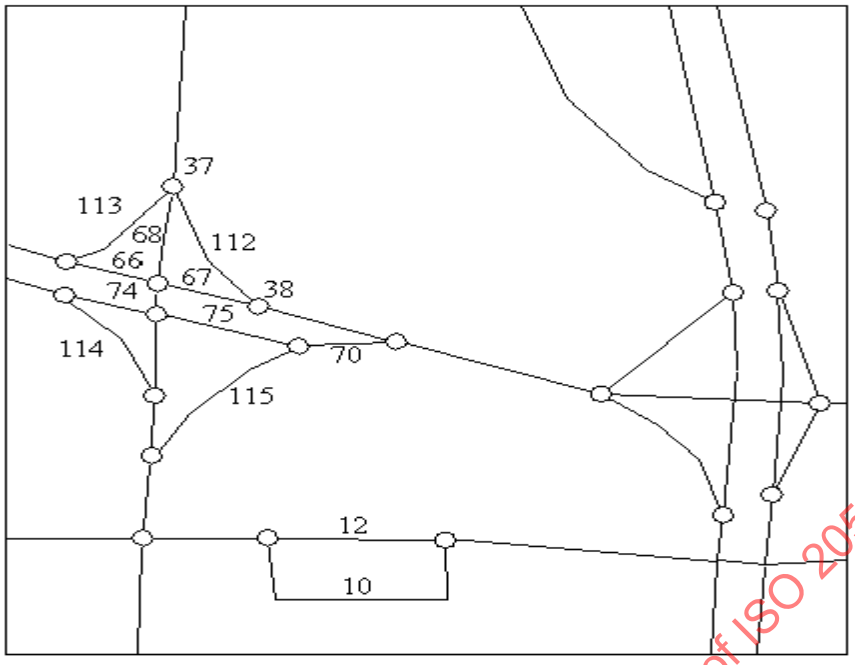


Figure 174 — Example of Level-1 representation of Roads and Ferries

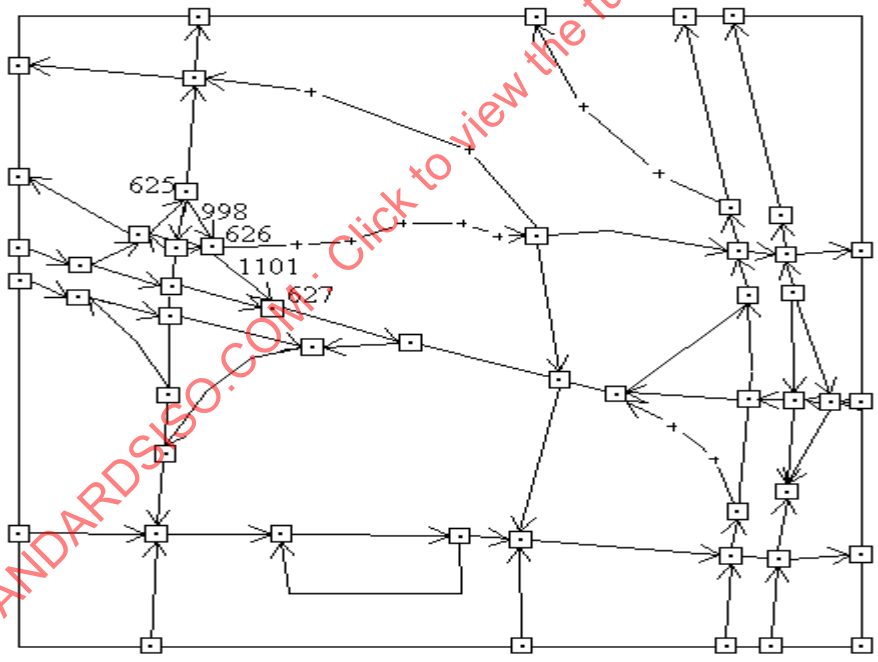


Figure 175 — Example of topological Level-0 representation of Roads and Ferries, Administrative Areas and Waterways in planar or non-planar topology

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9.1.6 Rules for level 0 representation

9.1.6.1 Two-dimensional geometry model

9.1.6.1.1 General rules

For the purpose of these specifications, the geometrical representation in 2-dimensional space is based on the coordinate triplet X, Y, and Z, whereby Z is optional.

- X and Y represent the spatial position on the earth's surface.
- Z represents the altitude of the earth's surface (in terms of a 2.5-dimensional geometry model rather than representing a full 3rd dimension).

The interrelation between Level 0 and Level 1 is illustrated by Figure 174 and Figure 175. Figure 174 shows the representation of a theme (Roads and Ferries) in terms of Points and Lines. Figure 175 shows the corresponding representation in terms of Nodes, Edges, Segments and Intermediate Points.

For the construction of the topologically structured Level 0 from the corresponding Level 1 representation, the following general rules apply:

- Each Level 1 Point Feature shall be represented by a Node at Level 0. If in a planar Level 0 representation two or more different Point Features of the same Feature Theme share the same position, they should be represented by one single Node. Otherwise, multiple Nodes “above” each other are allowed (in a non-planar Level 0 representation).
- Each intersection between a Level 0 Edge and the Section border shall be represented by a Node.
- Level-0 within one Layer may or may not form a planar graph. Intersections of Edges of the same Layer not represented by a Node are allowed in a non-planar Level 0 representation.
- Different themes may be combined in one Layer in which case a Level 0 element shall be shared by Level 1 elements having the same location from different themes.
- Each Line Feature shall be represented by one or more Edges. An Edge may connect vertically aligned Nodes (either connect from and to a single Node in a planar Level 0 representation, or connect from and to two Nodes located “above” each other in a non-planar Level 0 representation).

For the construction of the non-explicit topological geometric primitives, each simple Feature (Point, Line, Area) has a 1:1 relation to its corresponding Dot, Polyline or Polygon representation.

The shape of an Edge or Polyline is described by one or more Segments. The Segments are used only to represent the shape of the Edge/Polyline. Rules for the correct representation of different kinds of object shapes are given below.

9.1.6.1.2 Straight linear objects

A Straight-Line Feature is represented by an Edge/Polyline that contains only one single Segment. The location of this Segment is fixed by means of two pairs of coordinates which either form the bounding Nodes (of the Edge) or the two pairs of coordinates describing the Polyline. Intermediate Points are not needed. An example is given in Figure 176 and Figure 177.

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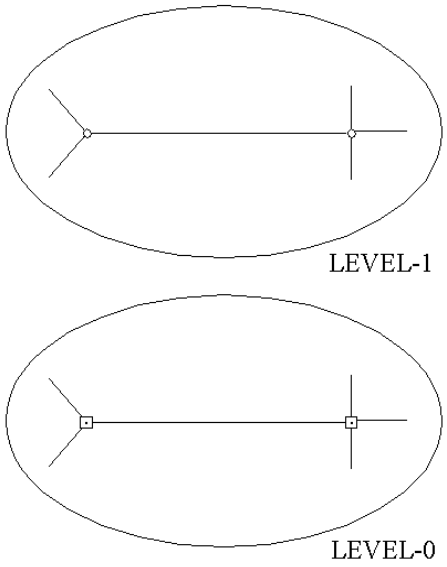


Figure 176 — Representation of straight lines

9.1.6.1.3 Linear objects with kinks

Some Line Features are not straight, but may be split into a distinct number of straight parts. These Lines may be represented by means of one or more Edges or one Polyline containing several Segments where each Segment corresponds exactly to one straight part of the Line Feature. Intermediate Points bounding the Segments represent the Kinks. An example is given in Figure 177.

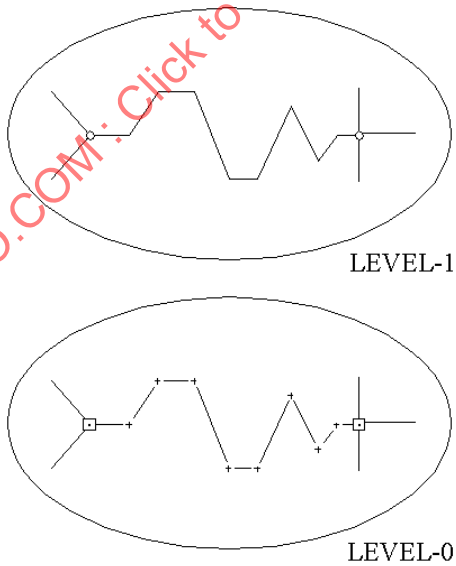


Figure 177 — Representation of a segmented line

9.1.6.1.4 Curved linear objects

An approximated representation of a curved Line Feature also will need to be made using straight Line Segments and Intermediate Points. In this case however, the positions of the intermediate points and thus their density will depend on how close an approximation is needed. An example is given in Figure 178.

The density of intermediate points is determined by the accuracy requirements.

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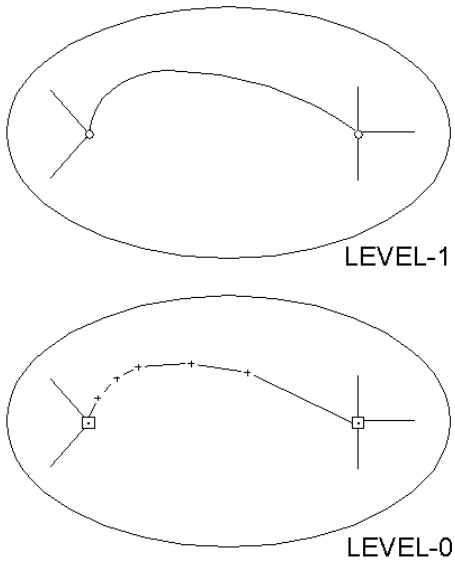


Figure 178 — Representation of curved linear objects

9.1.6.1.5 Angles between curved linear objects

The representation of the angle between two intersecting Line Features may only be approximated using Segments and Intermediate Points.

9.1.6.1.6 Example of topologically structured geo-topo representation

See Figure 179 for a generic overview of the concept of a topologically-structured representation in three levels.

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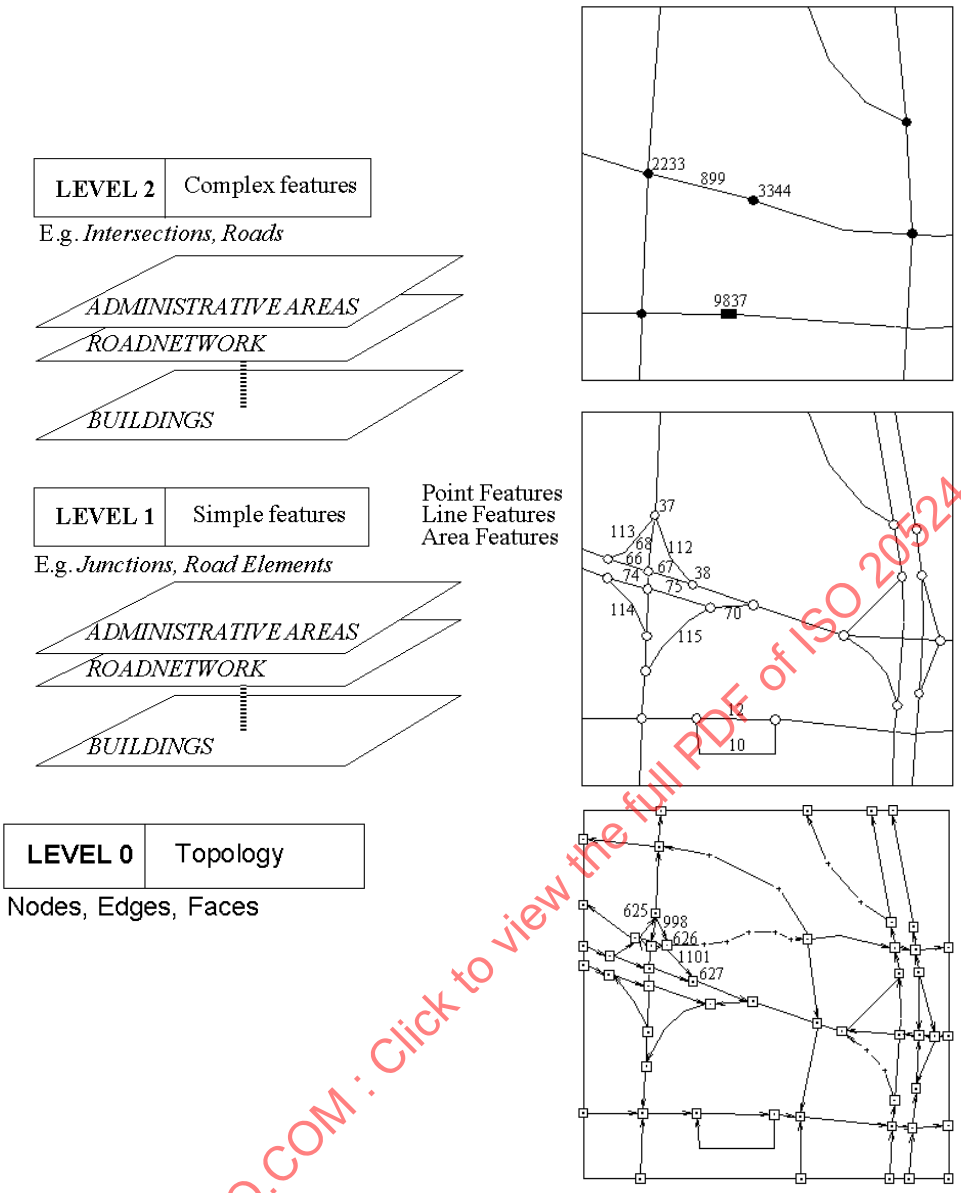


Figure 179 — Building blocks of the three levels of representation (topologically structured)

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9.1.6.2 Three-dimensional geometry model

9.1.6.2.1 General rules

For the purpose of these specifications, the geometrical representation in 3-dimensional space is based on the coordinates X, Y, Z, H1, and H2, whereby Z and H2 are optional.

- X and Y represent the spatial position on the earth's surface.
- Z represents the altitude of the earth's surface.
- H1 and H2 represent the upper and lower object elevation, respectively, above (or below) the earth's surface.

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The 3-dimensional geometry model is applicable to the cartographic primitives Dot, Polyline, and Polygon in non-explicit topology.

The shape of a Polyline or a Polygon (in terms of a closed Polyline) is described by one or more Segments. The same rules for the correct representation of different kinds of object shapes (such as straight lines, curved lines, etc.) as specified in the 2-dimensional geometry model apply for the X and Y dimensions of the 3-dimensional objects.

9.1.6.2.2 Basic model

A geometrical object is modelled in terms of the object's 2-dimensional footprint projected onto the earth's surface and the object's elevation.

- For a Dot, this allows modelling a vertical straight line, or “pole”.
- For a Polyline, this allows modelling a vertical plane, or “wall”, either with a constant height or width individual elevations specified per Intermediate Point.
- For a Polygon, this allows modelling a solid object with vertical walls, or “blocks”, either with a constant height or with individual elevations specified per Intermediate Point.

The upper object elevation (H1) specifies the total vertical height relative to the earth's surface. The optional lower elevation (H2) further modifies the object's geometry by introducing open space between object and the earth's surface (0<H2<H1), or by extending the object's vertical extent below the earth's surface (H2<0). In a special case, both H1 and H2 may be below ground (H2<H1<0). H2 is not applicable to Dots.

9.1.6.2.3 Block modelling with polygons

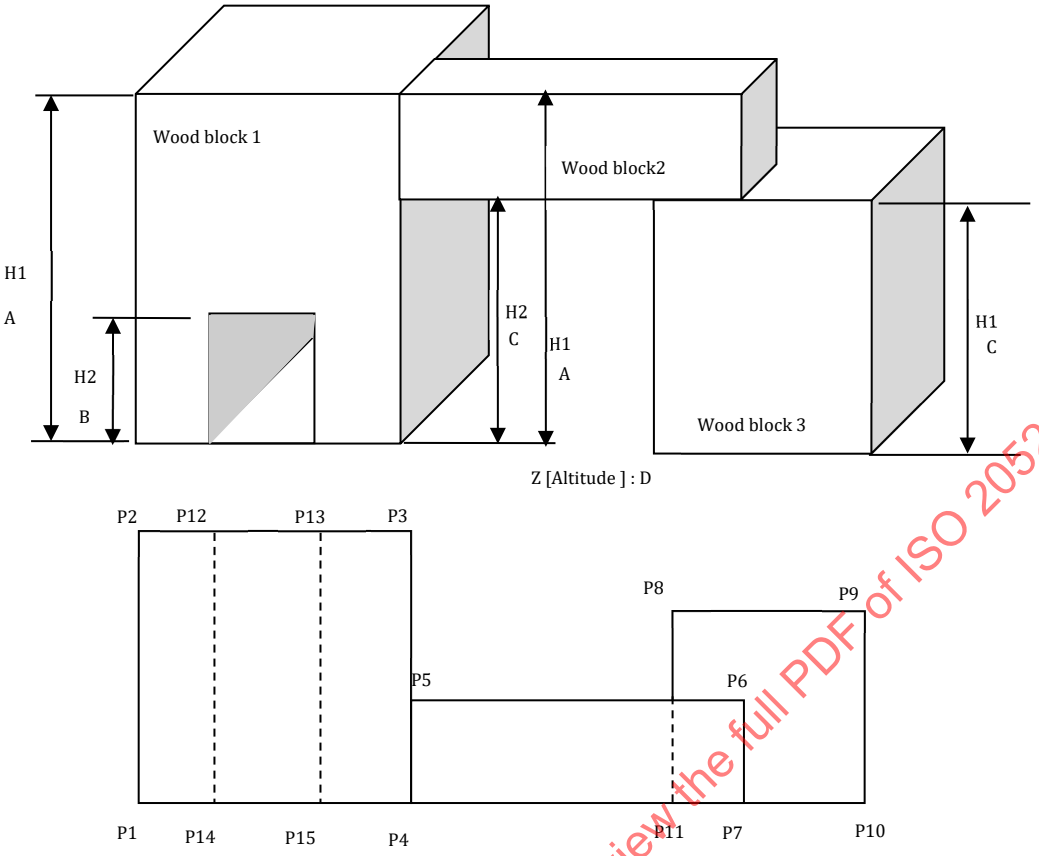
The 3-dimensional polygons support different degrees of sophistication, depending on the occurrence of lower object elevations or individual heights per Intermediate Point.

Complex 3-dimensional geometries may be modelled by breaking them down into basic models, each represented by a Polygon (so-called wood block models).

Figure 180 and Figure 181 give two examples for complex cases.

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Description of extended

Wood block 1

Foot print (X,Y)	P1	P2	P12	P12	P13	P13	P3	P4	P15	P15	P14	P14	P1
Z	D												
H1	A												
H2	0			B		0				B		0	

Wood block 2

Foot print (X,Y)	P4	P5	P6	P7	P4
Z	D				
H1	A				
H2	C				

Wood block 3

Foot print (X,Y)	P8	P9	P10	P11	P8
Z	D				
H1	C				
H2	0				

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Figure 180 — Wood block model example of a complex 3-dimensional geometry

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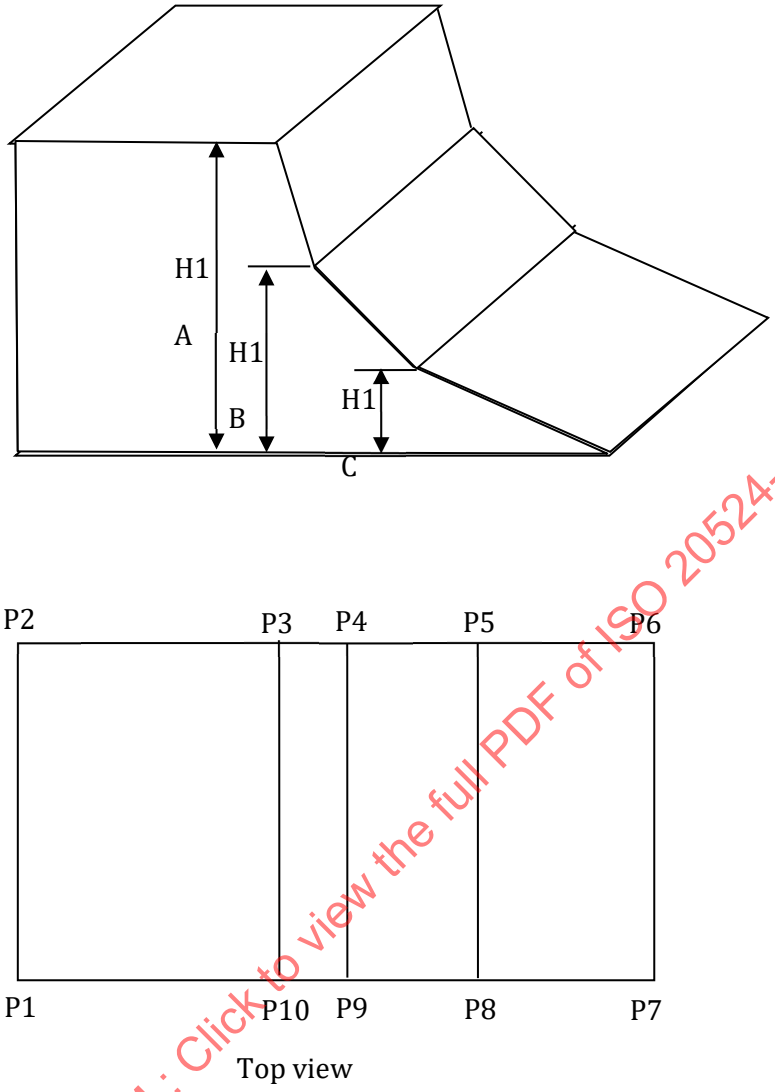


Figure 181 — Basic block model example of a sophisticated 3-dimensional geometry

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9.1.6.3 Four-dimensional geometry model

9.1.6.3.1 General rules

For the purpose of these specifications, the geometrical representation in 4-dimensional space is constituted by extending the 2-dimensional or the 3-dimensional geometry model with temporal coordinates about the object's existence. The 4-dimensional model is based on the coordinates X, Y, Z, H1, H2, SA, EA, SD, and ED, whereby Z, H1, and H2 are optional.

- X and Y represent the spatial position on the earth's surface.
- Z represents the altitude of the earth's surface.
- H1 and H2 represent the upper and lower object elevation, respectively, above (or below) the earth's surface.
- SA (Start Appearance), EA (End Appearance), SD (Start Disappearance), and ED (End Disappearance) represent the start and end of the object's existence in time, including time ramps for the period during which the object came into existence (SA→EA), and during which it ceased to exist (SD→ED) [16].

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The 4-dimensional geometry model is applicable to the cartographic primitives Dot, Polyline, and Polygon in non-explicit topology.

The shape of a Polyline and a Polygon (in terms of a closed Polyline) is described by one or more Segments. The same rules for the correct representation of different kinds of object shapes (such as straight lines, curved lines, etc.) as specified in the 2-dimensional geometry model apply for the X and Y dimensions of the 4-dimensional objects.

9.1.6.3.2 Temporal scenarios

Object geometry may use only some and not all of the temporal coordinates to describe its existence over time, including the transitions [16].

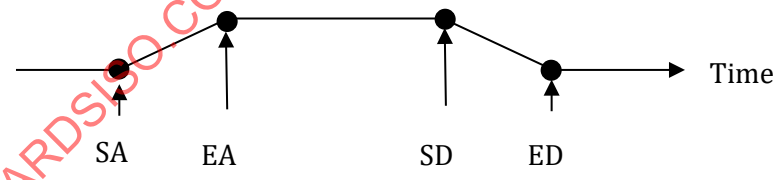
A Feature may be one of the 17 cases

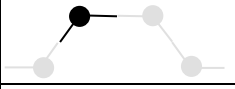
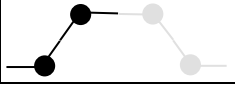
A. The Feature without temporal coordinates reflects that

- The Feature exists at the current time, but
- there is no temporal information associated with it.
- Note that this is not considered a case of 4-dimensional geometry.

B. The Feature with temporal coordinates used presents one of 16 cases listed below whereby

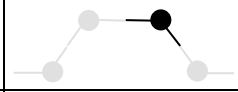
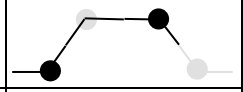
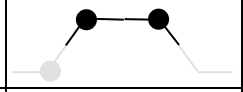
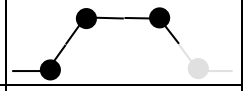
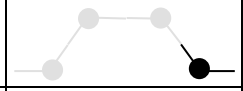
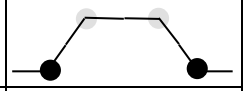
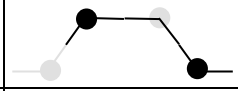
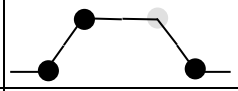
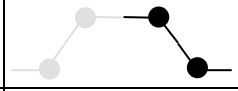
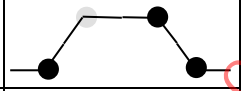
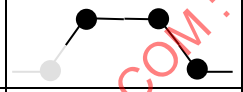
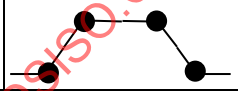
- the Feature has the temporal information even though it disappeared, and
- there could be some missing temporal information for the four-time coordinates.
- If the Feature is associated with temporal information, it is present in the map regardless of its temporal state.



No	Action	SA	EA	SD	ED	Interpretation
0		-	-	-	-	Feature no longer exists w/ incomplete info
1		•	-	-	-	Feature is being built
2		-	•	-	-	Feature exists now w/ incomplete info
3		•	•	-	-	Feature was built and exists now

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No	Action	SA	EA	SD	ED	Interpretation
4		-	-	●	-	Feature is deserted w/ incomplete info
5		●	-	●	-	Feature was built, and deserted
6		-	●	●	-	Feature was built w/ incomplete info, and deserted
7		●	●	●	-	Feature was built, and deserted
8		-	-	-	●	Feature no longer exits w/ incomplete info
9		●	-	-	●	Feature was built, and no longer exists w/ incomplete info
10		-	●	-	●	Feature was built, and no longer exists w/ incomplete info
11		●	●	-	●	Feature was built, and no longer exists
12		-	-	●	●	Feature no longer exists w/ incomplete info
13		●	-	●	●	Feature was built, and no longer exists
14		-	●	●	●	Feature was built, and no longer exists
15		●	●	●	●	Feature was built and no longer exists
●: time info; ●: unknown time info; —: known period; —: unknown period						

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Figure 182 depicts an example of a geometry which ceases to exist. Both Figure 182 and Figure 183 contain an example of geometry that comes into existence. Figure 183 additionally shows the default case of geometry that remains unchanged over time. Figure 184 describes an example of the lifespan of the geometry of a building.

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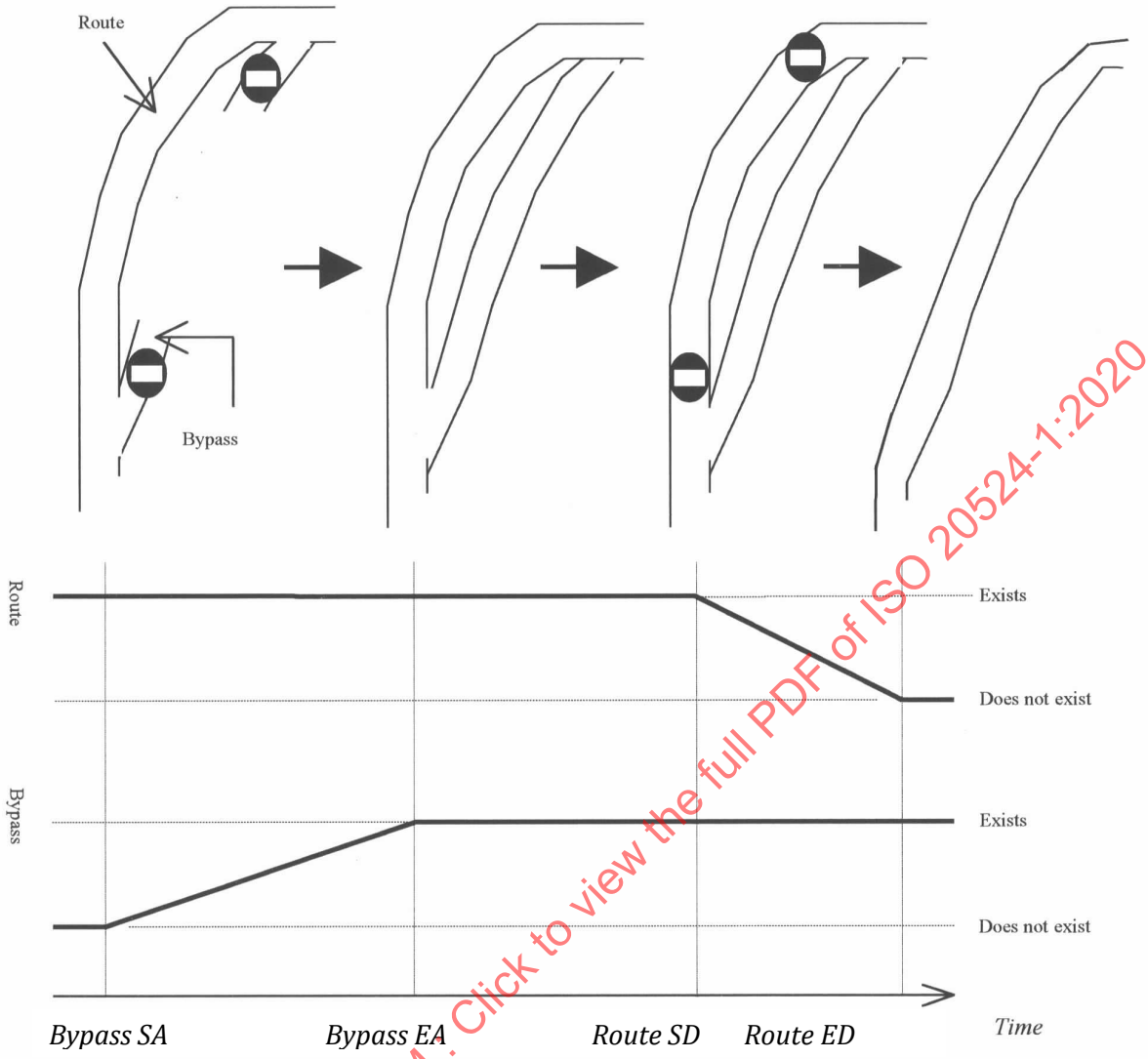


Figure 182 — Transition over time of bypass construction example replacing route

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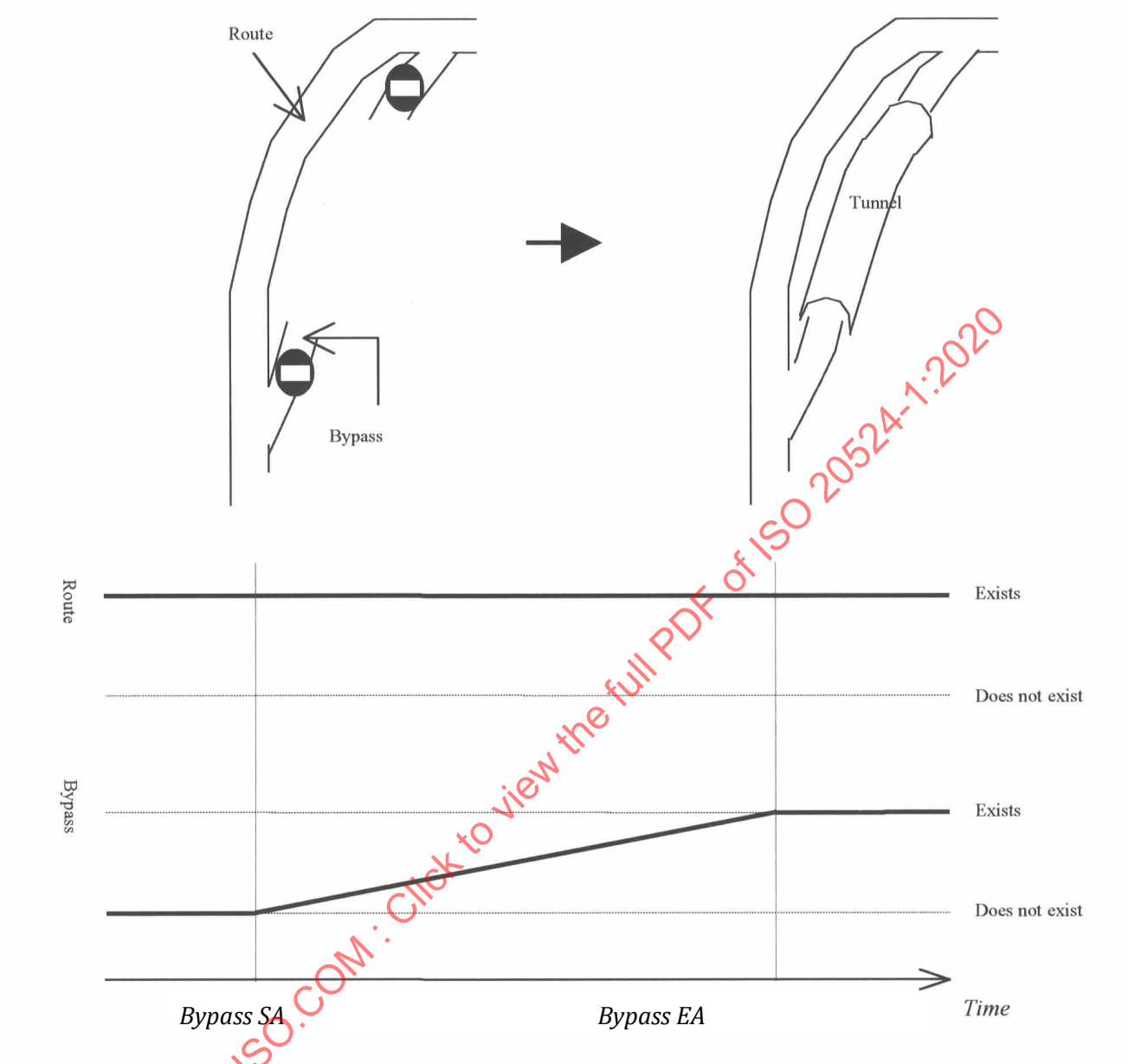


Figure 183 — Transition over time of bypass construction example adding tunnel

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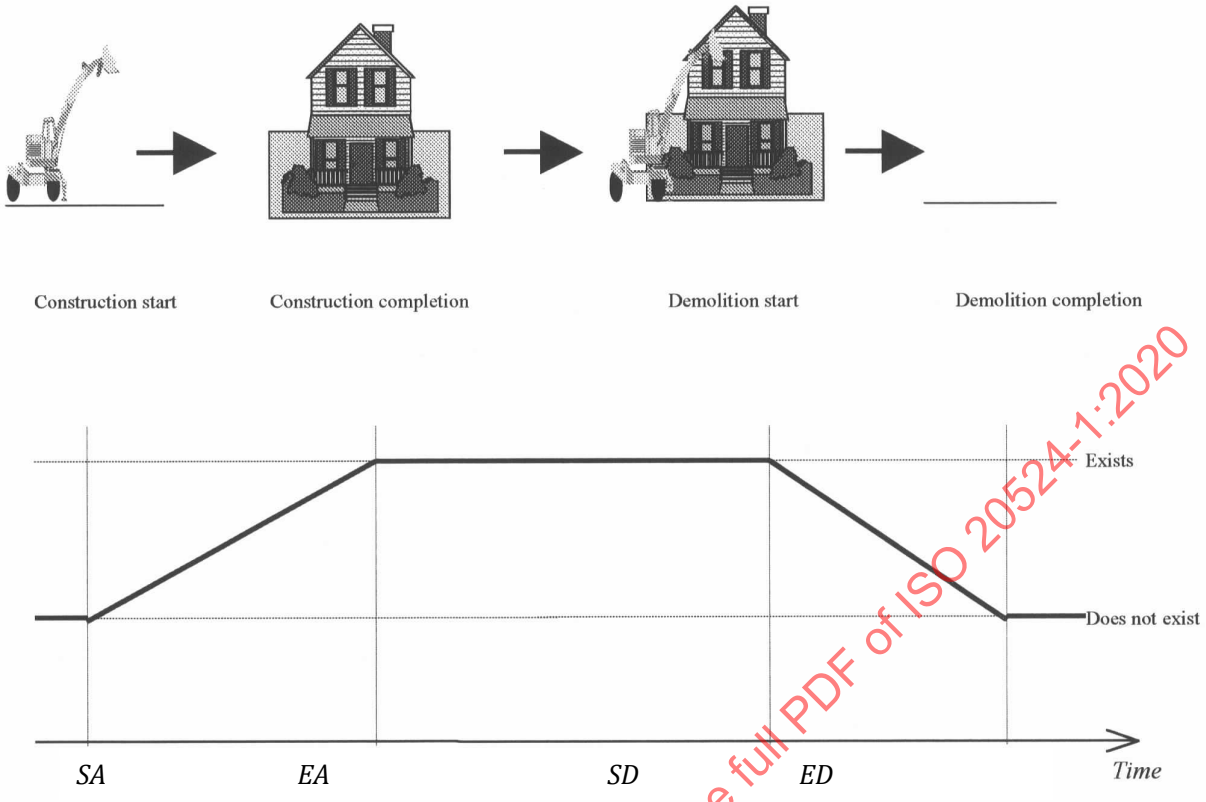


Figure 184 — Transition over time of building construction and demolition example

9.2 Roads and Ferries

9.2.1 Introduction

This clause describes the three different levels of representation (Level 0, Level 1, Level 2) for the Feature Theme Roads and Ferries. Only topologically structured elements shall be used.

9.2.2 Level 2 representation

A Road, a Ferry, an Intersection, an Interchange, a Roundabout and an Aggregated Way are Complex Features.

Guidelines for the formation of Roads, Intersections, Roundabouts and Interchanges may be found in Annex F.

9.2.3 Level 1 representation for planar or non-planar topology

9.2.3.1 General rules

- A Road Element is always a Line Feature, represented by one or more Edges at Level 0.
- A Pathway is always a Line Feature, represented by one or more Edges at Level 0.
- A Ferry Connection is always a Line Feature represented by one or more Edges at Level 0.

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- A Junction is always a Point Feature, represented by one single Node at Level 0.
- An Address Area is always an Area Feature, represented by one or more Faces or Edges at Level 0.
- An Address Area Boundary Element is always a Line Feature, represented by one or more Edges at Level 0.
- An Enclosed Traffic Area is always represented by an Area Feature, represented by one or more Faces or Edges at Level 0.

9.2.3.2 Road Element

Road Elements are Line Features and are represented by one or more Edges at Level 0. They are represented by the centrelines of a road. In case the centreline of the road is ambiguous or discontinuous the general flow of traffic should be used as a guideline for defining the shape of the Road Element.

The Edges should fall within the curb lines.

9.2.3.3 Pathway

Pathways are Line Features and are represented by one or more Edges at Level 0. They are represented by the centrelines of a pedestrian passageway. The Edges should fall within the curb lines (boundary lines) where applicable.

In the case of a vertical Pathway (i.e. lift), the representation is dependent upon the type of topology:

- In planar topology, an Edge of length zero is to form a connection between two instances of the same Node;
- In non-planar topology, a description of the height difference between the two Nodes stacked above each-other to bound the vertical Edge shall appear.

Where a centreline is ambiguous or discontinuous a different representation by means of an Enclosed Traffic Area (type Pedestrian Square) may be more appropriate.

9.2.3.4 Junction

A Junction is always a Point Feature, represented by one single Node at Level 0. The location of the Junction corresponds to:

- the connection point between two or more Road Elements, two or more Pathways, two or more Ferry Connections, or a combination of either of the former;
- or the intersection point between one or more of the former and the outline of an Enclosed Traffic Area;
- or the end of a dead-end Road Element or Pathway.

9.2.3.5 Enclosed Traffic Area

Within Enclosed Traffic Areas, the identification of a road centreline is an unrealistic task. Also, a general flow of traffic is non-existent. These objects are therefore not represented by a Line Feature but by an Area Feature.

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The connectivity of all Road Elements, and/or Pathways leading to one Enclosed Traffic Area may be described in three ways:

- by means of their shared Node(s) or Edge(s);
- by means of a number of bivalent Relationships defined between the Enclosed Traffic Area in question and each Road Element, or Pathway respectively, linked to it;
- by means of (artificial) Road Elements inside the Enclosed Traffic Area connecting the Junctions situated on the outline with an (artificial) centre point Junction somewhere inside the traffic area.

In the latter case, the Attribute Type Form of Way may be attached to the additional Road Elements, or Pathway respectively, in order to indicate their special status.

For Enclosed Traffic Areas where pedestrians or non-motorised vehicles are only allowed along the outer Edges but not inside, the outline of the Enclosed Traffic Area shall be represented either by Pathways or, for those parts of an Enclosed Traffic Area that are bounded by Road Elements, by the Attribute Road with Pavement.

9.2.3.6 Ferry Connection

A Ferry Connection is always a Line Feature represented by one or more Edges at Level 0.

9.2.3.7 Address Area

An Address Area is always an Area Feature, represented by one or more Faces at Level 0 or by one or more Edges on level 0 representing its boundary.

9.2.3.8 Address Area Boundary Element

An Address Area Boundary Element is always a Line Feature, represented by one or more Edges at Level 0.

9.2.4 Level 1 representation for non-explicit topology

A Point, Line, or Area Feature is represented by a single Dot, Polyline, or Polygon, respectively, at any point in time.

Generally, the same representation rules apply as for planar or non-planar topology, except that any of the specified topological relations shall be (implicitly) fulfilled by spatial relations.

9.2.5 Level 0 representation

9.2.5.1 Introduction

The general rules for the construction of a Level 0 representation are described in an earlier sub-clause. This sub-clause contains some worked examples and detailed rules relevant for Roads and Ferries.

9.2.5.2 Enclosed Traffic Area

The Face(s) representing the Enclosed Traffic Area or the Edges or the Polyline describing its boundary shall describe the maximum extent of the permitted area for vehicle use.

Special attention shall be paid to those situations where the (part of the) outline of an Enclosed Traffic Area spatially coincides with the centrelines of a “normal” Road Element.

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Figure 185 describes the situation where a parking area is directly situated along the side of a road. At Level 0 Edge C203 is used for representation of both the centreline of the Road Element and the outline of the parking area.

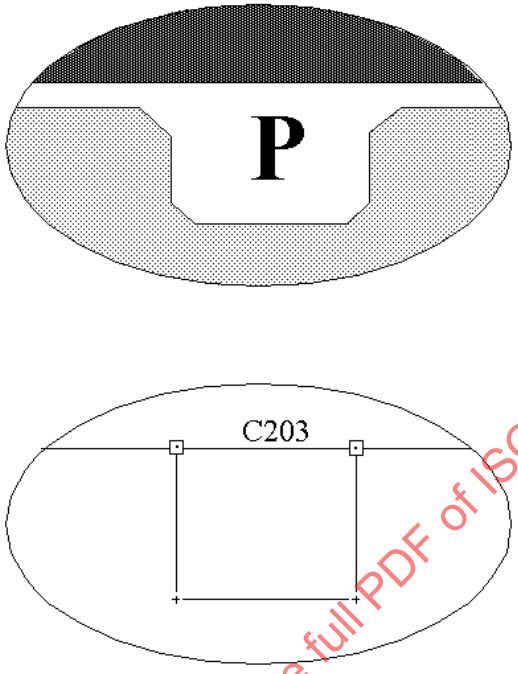


Figure 185 — Level-0 representation of a parking area (in planar or non-planar topology)

9.2.5.3 Ferry Connection

The Edge(s) or the Polyline that represent(s) a Ferry Connection need to mirror the average route of the ferry boats. A detailed representation is not practical as the route may vary by season or by tide.

9.3 Administrative Areas

9.3.1 Level 1 and Level 2 representation for planar or non-planar topology

9.3.1.1 Administrative Boundary Element

An Administrative Boundary Element is always treated as a Line Feature. Every Administrative Boundary Element should be part of a set of Administrative Boundary Elements which together form a closed polygon, which means that “dead ends” or “dangling nodes” are not allowed.

To avoid dead ends at the borders of a particular Section the border shall be represented as an Administrative Boundary Element as well, so that closed polygons may always be formed. See Figure 186 and Figure 187.

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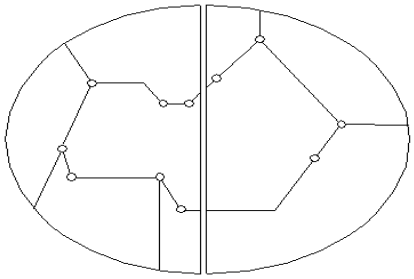


Figure 186 — Administrative Boundary Elements are represented by one or more Edges

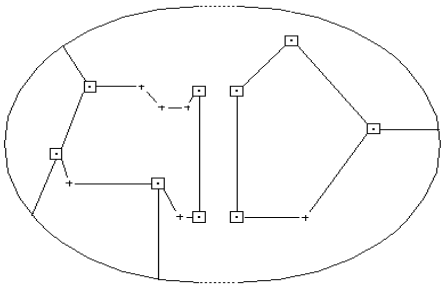
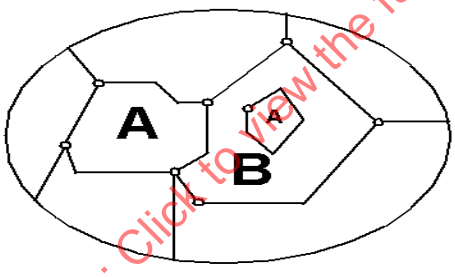


Figure 187 — Section borders have to be represented as Administrative Boundary Elements to avoid dangling nodes

9.3.1.2 Administrative Boundary Junction

An Administrative Boundary Junction is always a Point Feature represented by one single Node.

If a boundary of a particular Administrative Area (or parts of that Area) is not connected with any other boundary (in the case of enclaves or isolated parts), an Administrative Boundary Junction shall be introduced somewhere along its length in order to define at least one Administrative Boundary Element. (See Figure 188).



For an isolated (part of an) Administrative Area, an Administrative Boundary Junction shall be introduced to define one Administrative Boundary Element.

Figure 188 — Administrative Boundary Junction

9.3.1.3 Order-9 Area and higher, Country

A Feature of the lowest occurring order in the hierarchy of Administrative Areas is generally represented as an Area Feature defined by one or more Faces or by one or more Edges describing its boundary. If not, it should be represented as a Point Feature represented by a Node. The above rule assumes that if they are represented in a separate Layer, they may also be represented by Polygons. Hierarchical Administrative Areas of higher order shall be seen as Complex Features. They are composed of lower order Administrative Areas, either Area or Complex Features.

9.3.1.4 Administrative Place n

An Administrative Place n is generally represented as an Area Feature defined by one or more Faces or by one or more Edges describing its boundary. If not, it should be represented as a Point Feature represented by a Node. The above rule assumes that, if they are represented in a separate Layer, they may also be represented by Polygons.

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9.3.1.5 Supra-National Area

A Supra-National Area is represented as a Complex Feature consisting of its member countries.

9.3.2 Level 1 and Level 2 representation for non-explicit topology

A Point, Line, or Area Feature is represented by a single Dot, Polyline, or Polygon, respectively, at any point in time.

Generally, the same representation rules apply as for planar or non-planar topology, except that any of the specified topological relations shall be (implicitly) fulfilled by spatial relations.

9.3.3 Level 0 representation

The general rules for the Level-0 representation apply.

9.4 Named Areas

9.4.1 Level 2 representation

There are no Level 2 Features in the Named Areas theme.

9.4.2 Level 1 representation for planar or non-planar topology

9.4.2.1 General rules

Except in the two cases represented below, Named Areas are generally represented as Area Features. If not, they should be represented as Point Features.

9.4.2.2 Boundary Element

A Boundary Element is always treated as a Line Feature. Every Boundary Element should be part of a set of Boundary Elements which together form a closed polygon, which means that “dead ends” or “dangling nodes” are not allowed.

To avoid dead ends at the borders of a particular Section the border shall be represented as a Boundary Element as well, so that closed polygons may always be formed. See Figure 189 and Figure 190.

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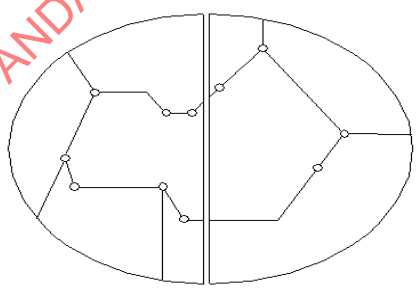


Figure 189 — Boundary Elements are represented by one or more Edges

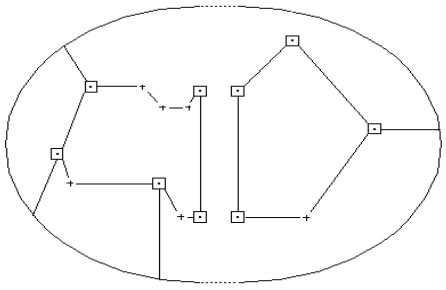


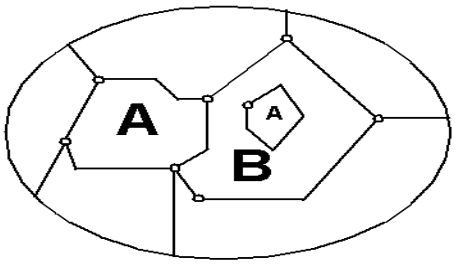
Figure 190 — Section borders have to be represented as Boundary Elements to avoid dangling nodes

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9.4.2.3 Boundary Junction

A Boundary Junction is always a Point Feature represented by one single Node.

If a boundary of a particular Named Area (or parts of that Area) is not connected with any other boundary (in the case of enclaves or isolated parts), a Boundary Junction shall be introduced somewhere along its length in order to define at least one Boundary Element. (See Figure 191).



For an isolated (part of a) Named Area, a Boundary Junction shall be introduced to define one Boundary Element.

Figure 191 — Boundary Junction

9.4.3 Level 1 representation for non-explicit topology

A Point, Line, or Area Feature is represented by a single Dot, Polyline, or Polygon, respectively, at any point in time.

Generally, the same representation rules apply as for planar or non-planar topology, except that any of the specified topological relations shall be (implicitly) fulfilled by spatial relations.

9.4.4 Level 0 representation

The general rules for the Level-0 representation apply.

9.5 Land Cover And Use

9.5.1 Level 2 representation

There are no Level 2 Features in the Land Cover And Use theme.

9.5.2 Level 1 representation

Building Units are always represented as Point Features.

Building Façade, Building Detail and Block Detail are represented as Line Features.

All other Features of Land Cover And Use are generally represented as Area Features. If not, they should be represented as Point Features.

9.5.3 Level 0 representation

The general rules for the Level-0 representation apply.

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9.6 Terrain Elevation

9.6.1 Level 2 representation

There are no Level 2 Features in the Terrain Elevation theme.

9.6.2 Level 1 representation for planar and non-planar topology

These topology types support terrain surface modelling by means of full TINs (planar topology only) and reduced TINs.

- A TIN Node is represented by a Point Feature.
- A TIN Breakline and a TIN Stopline is each represented by a Line Feature.
- A TIN Surface is represented by an Area Feature composed of multiple (triangular) Faces.

9.6.3 Level 1 representation for non-explicit topology

This topology type supports terrain surface modelling by means of full TINs, reduced TINs, contour lines, and grids.

- A TIN Node and Contour Line Point is each represented by a Point Feature in terms of a single Dot.
- A TIN Breakline, a TIN Stopline, and a Contour Line is each represented by a Line Feature in terms of a single Polyline.
- A TIN Triangle is represented by an Area Feature in terms of a single (triangular) Polygon.
- A Gridded Surface is represented by an Area Feature in terms of a single (quadrangular) Polygon outlining the bounding box of the rasterised elevation points.
- A Contour Line Area is represented by an Area Feature in terms of a single Polygon.

9.6.4 Level 0 representation

The general rules for the Level-0 representation apply. Extended Area Geometry Information may be specified for Faces (modelling TIN Surfaces) and Area Features (modelling TIN Triangles and Gridded Surfaces).

9.7 Structures

9.7.1 Level 2 representation

There are no Level 2 Features in the Structures theme.

9.7.2 Level 1 representation

9.7.2.1 General rules

Structures may be treated as Point Features, Line Features, or Area Features.

Normally use may be made of existing geometry created for other Features. New geometry may be created to more accurately represent the physical construction of the Structure. However, in certain cases

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it is required to create Level 0 elements for the representation of a Structure. This applies e.g. to a bridge over a valley, a tunnel through a mountain, and more specifically to Trench, Gallery and Retaining Wall.

Below rules are given for the representation of Structures where they are represented in the same Layer as the associated Transportation Elements. If Structures are represented in a separate Layer, they may also be represented by Dots, Polylines or Polygons.

9.7.2.2 Structures as Point Features

In most cases, Structures will be seen as Point Features, for example grade separated Structures situated on the crossing between two single carriageway Road Elements, as illustrated in Figure 192. The Level 0 representation of such a crossing will have one single Node. The same Node shall also be used to describe the location of the Structure.

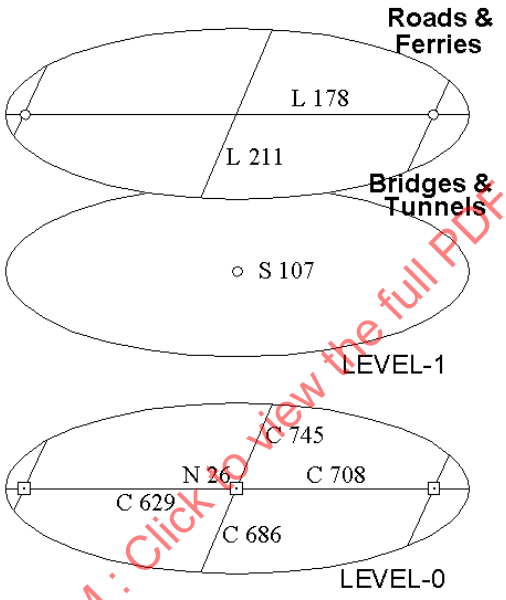


Figure 192 — Structure as a Point Feature

9.7.2.3 Structures as Line Features

Structures related to a crossing between a single and a dual carriageway (see Figure 193 and Figure 194) are treated as Line Features as shown in the example in Figure 194.

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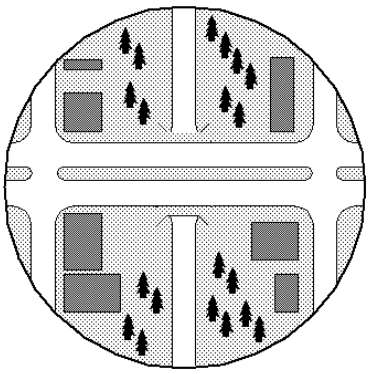


Figure 193 — A Structure at the crossing of a single and dual carriageway road

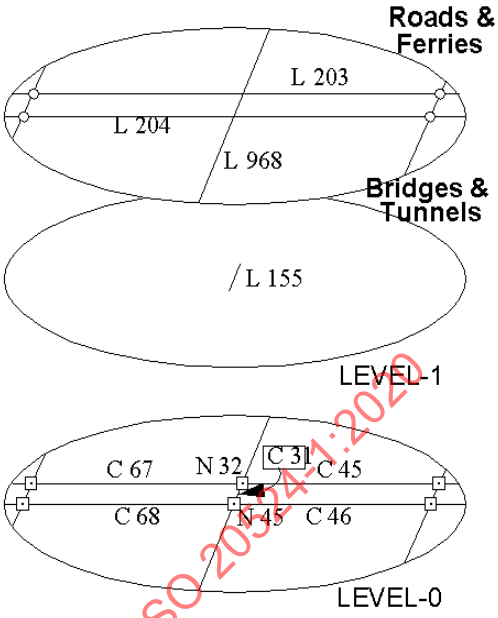


Figure 194 — Structure as a Line Feature

In certain cases, additional geometrical elements may need to be introduced for an accurate representation. This applies e.g. to a tunnel through a mountain (as illustrated in Figure 195 and Figure 196), or a very long viaduct, trench, gallery and retaining wall.

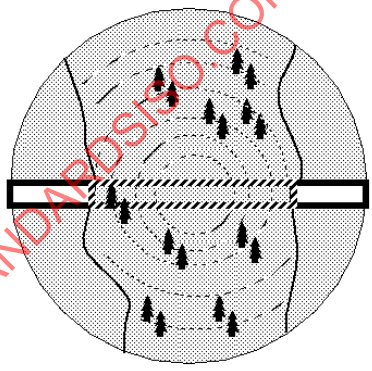


Figure 195 — A Structure as a tunnel through a mountain

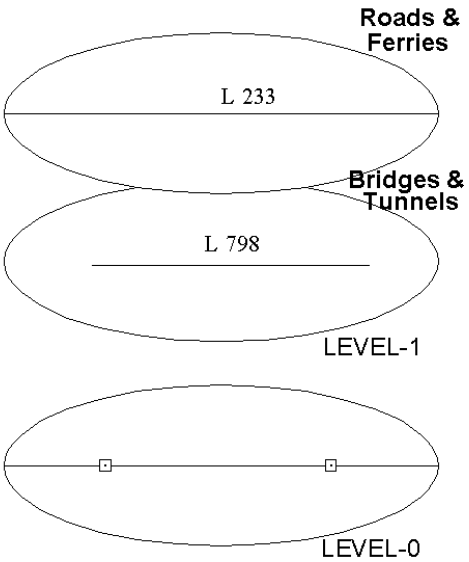


Figure 196 — Representation of the tunnel at Level-0 and Level-1

9.7.2.4 Structures as Area Features

Structures related to a crossing between two dual carriageways (see Figure 197 and Figure 198) may be treated in two ways, depending on whether it should be considered as one or two separate structure constructions:

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- Representation as Area Features, as shown in Figure 198.
- Representation as two (parallel) Line Features. Depending on the construction, either two bridges or two tunnels are created, both represented according to Line Feature Structures (see above).

Trench, embankment and retaining wall shall not be represented as an Area Feature.

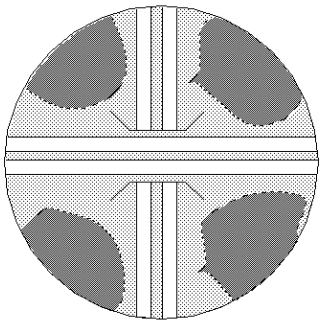


Figure 197 — A structure at the crossing of 2 dual carriageways

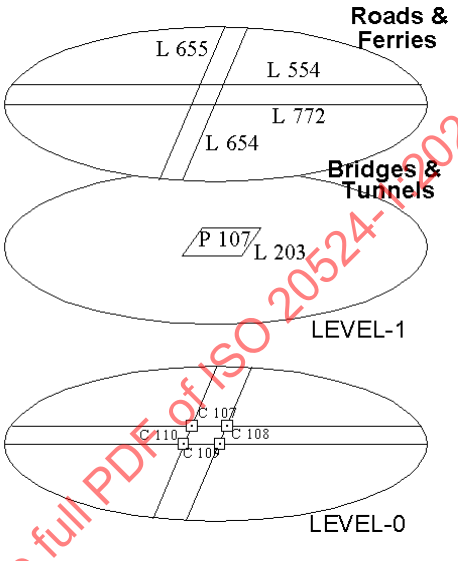


Figure 198 — A Structure represented as an Area Feature

9.7.3 Level 0 representation

The general rules for the Level-0 representation apply.

9.8 Railways

9.8.1 Level 2 representation

There are no Level 2 Features in the Railways theme.

9.8.2 Level 1 representation

9.8.2.1 Railway Element

A Railway Element is always represented as a Line Feature.

9.8.2.2 Railway Element Junction

A Railway Junction is always represented as a Point Feature.

9.8.3 Level 0 representation

The general rules for the Level-0 representation apply.

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9.9 Waterways

9.9.1 Level 2 representation

There are no Level 2 Features in the Waterway theme.

9.9.2 Level 1 representation

9.9.2.1 General rules

Water bodies may be represented in three ways:

- by describing the outline of the water body;
- by describing the water itself, i.e. the area which is covered by water;
- a combination of above methods.

The representation of the second case (i.e. the coverage representation by means of Water Bodies) considers whether the water body is of linear (e.g. rivers) or areal (e.g. lakes, wide rivers) nature or a landmark (spring, pond, etc.).

9.9.2.2 Water Body

A Water Body is either a Point Feature, a Line Feature or an Area Feature depending on its size and the defined accuracy. In the case of Point Features, the centre point of water bodies is represented. With Line Features, the centreline is described. In case of Area Features, the physical extent is represented.

When the width of a Water Body does not exceed xx meters, it should be treated as a Line Feature. Otherwise, it forms an Area Feature. If along a river or canal the width varies around yy meters, so that the representation changes very often between line and area, one of these representations shall be chosen for a longer distance. Transitions between line and area representations should be kept to a minimum.

When the length or diameter of a Water Body does not exceed zz meters, it should be treated as a Point Feature. This Point shall correspond to the centre point of the cartographic representation in the source map.

The values for xx, yy and zz are user and/or application dependent.

9.9.2.3 Water Boundary Element

A Water Boundary Element is always represented as a Line Feature. It is directed to describe to which side of the boundary the water exists (see Feature Catalogue).

9.9.2.4 Water Boundary Junction

A Water Boundary Junction is always represented as a Point Feature.

9.9.3 Level 0 representation

The general rules for the Level-0 representation apply.

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9.10 Road Furniture

9.10.1 Level 2 representation

Complex Pedestrian Crossing is a Complex Feature.

9.10.2 Level 1 representation

9.10.2.1 Pedestrian Crossing

Pedestrian Crossing objects are either a Point Feature, a Line Feature or an Area Feature depending on the size and the defined accuracy. In case of a Point Feature the Centre point of the object is represented. With Line Features, the center line is described. In case of Area Features the physical extent of the object is represented. When the width or diameter of the object does not exceed yy meters it should be treated as a Line Feature, otherwise it forms an Area Feature. When the length or diameter of the object does not exceed zz meters, it should be treated as a Point Feature.

The values for yy, zz are user and/or application dependent.

9.10.2.2 Environmental Equipment, Road Markings, Safety Equipment

Environmental Equipment, Road Markings and Safety Equipment objects are either a Point Feature or a Line Feature depending on the size and the defined accuracy. In case of a Point Feature, the centre point of the object is represented. With Line Features, the centreline is described.

When the length of the object does not exceed zz meters, it should be treated as a Point Feature.

The value for zz is user and/or application dependent.

Lighting, Measurement Device, Traffic Sign, Traffic Light and Signpost objects are always represented as a Point Feature.

9.10.3 Level 0 representation

The general rules for the Level-0 representation apply, except that it is not required to collect the position (i.e. the coordinates) of the Road Furniture Features.

9.11 Services

9.11.1 Level 1 and Level 2 representation

All Service objects are represented as either Point, Line or Area Features.

9.11.2 Level 0 representation

The general rules for the Level-0 representation apply.

9.12 Public Transport

This section is deprecated. In order to use Public Transport entities, please refer to Part 2.

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9.13 Linear Referencing Features

9.13.1 Level 1 and Level 2 representation

9.13.1.1 Path

A Path shall be represented as a Line Feature.

9.13.1.2 Referent

A Referent shall be represented as a Point Feature.

9.13.2 Level 0 representation

The general rules for the Level 0 representation apply.

9.14 Linear Datum Features

9.14.1 Level 2 representation

The Linear Datum is always represented as a Complex Feature.

Each Linear Datum shall have at least two Anchor Points.

Each Linear Datum shall have at least one Anchor Section.

9.14.2 Level 1 representation

An Anchor Point is always represented as a Point Feature.

An Anchor Section is always represented as a Line Feature.

Each Anchor Section shall have one and only one start Anchor Point.

Each Anchor Section shall have one and only one end Anchor Point.

9.14.3 Level 0 representation

When Linear Datums are defined with planar topology or non-planar topology, level 0 representation Nodes and Edges are used for the Anchor Points and Anchor Sections, respectively. The general rules for the Level-0 representation apply. Alternatively, the level 0 representation may be omitted. For non-explicit topology, there is no level 0 representation.

In a planar graph, a single Anchor Section may be composed of multiple Edges. Crossing Anchor Sections shall not intersect each other, i.e. no additional Anchor Points shall artificially be introduced even if crossing Anchor Sections represent roads that cross at the same grade in the real-world.

9.15 General Features

9.15.1 Level 2 representation

A Traffic Location is represented as a Complex Feature.

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9.15.2 Level 1 representation

Centre Point of Feature and Entry Point are always represented as a Point Feature.

9.15.3 Level 0 representation

The general rules for the Level-0 representation apply.

10 Metadata Catalogue

10.1 Generic specification

10.1.1 Introduction

A set of data in GDF format should be as self-descriptive as possible, so that a recipient may interpret the data without the need for copious volumes of documentation. This self-descriptive information is called "metadata" and contains the following main items:

- The identification and description of the different logical and physical units.
- The definition of field and record types.
- The table of contents.
- The description of external data sources that have been used.
- The specification of the spatial reference system that has been used.
- The description of syntactical information used for the publishing of Update Information.

Metadata in GDF Datasets is compliant with ISO 19115-1:2014 [17]. Compliance with ISO 19115-1:2014 is asserted by inclusion of all mandatory data elements from this document. In addition, selected data elements that are optional in ISO 19115-1:2014 are included in GDF where doing so facilitates use of GDF by the Geographic Information community.

NOTE 1 Any GDF Dataset produced in accordance with this document is subject to compliance testing as specified in ISO 19115-1:2014, Annex D (normative), Abstract test suite.

The following table lists the ISO 19115-1:2014 data items (elements and classes) included in GDF. Unless otherwise labelled, all elements are mandatory in ISO 19115-1:2014. New code lists and enumerations added are given in Figure 199.

NOTE 2 ISO 19115-1:2014 is a revision of ISO 19115:2003 and ISO 19115:2003/Cor 1:2006. ISO 19115-1 is fully independent from the previous version with a new name and date. Thus, in Figure 214, element names of previous version are cited for reference.

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ISO 19115:2003 Elements	ISO 19115-1:2014 Elements	GDF Album Applicable	GDF Data-set Applicable	ISO 19115-1:2014 Data Type	Definition	Correspondence Status
Organization Name	Name	√		CI_Responsiblity/CI_Party:name (CharacterString)	name of the responsible organization	Data Supplier Name
Role	Role	√		CI_Responsiblity/role:CI_RoleCode (code list)	function performed by the responsible party	Adopted by and added to GDF Metadata
Metadata Date Stamp	Date Info	√		MD_Metadata/dateInfo:CL_Date	date that the metadata was created and reference date.	Adopted by and added to GDF Metadata
Dataset Title	Title		√	CI_Citation/title (CharacterString)	dataset name	Dataset Title
Dataset Reference Date	Date Info	√		MD_Metadata/dateInfo:CL_Date	date that the metadata was created and reference date.	Adopted by and added to GDF Metadata
Dataset Reference Date Type	Date Type		√	CI_Date/dataType:CI_DateTypeCode (code list)	event used for reference date	Adopted by and added to GDF Metadata
Abstract	Abstract		√	MD_Identification/abstract (Character String)	brief narrative summary of the content of the resource(s)	Adopted by and added to GDF Metadata
Geographic Extent (Optional)	Geographic Extent (Optional)		√	May be geographic extents (EX_GeographicBoundingBox) or by identifier (EX_GeographicDescription).	spatial extent of data	Spatial Domain, in terms of Geographic Bounding Box or Area Name.
Dataset Language	Default Locale		√	MD_DataIdentification/defaultLocale:PT_Locale	language(s) used within a Dataset	Dataset Language
Topic Category	Topic Category			MD_Identification/topicCategory:MD_TopicCategoryCode (code list)	main themes (topics) of the Dataset	Adopted by and added to GDF Metadata

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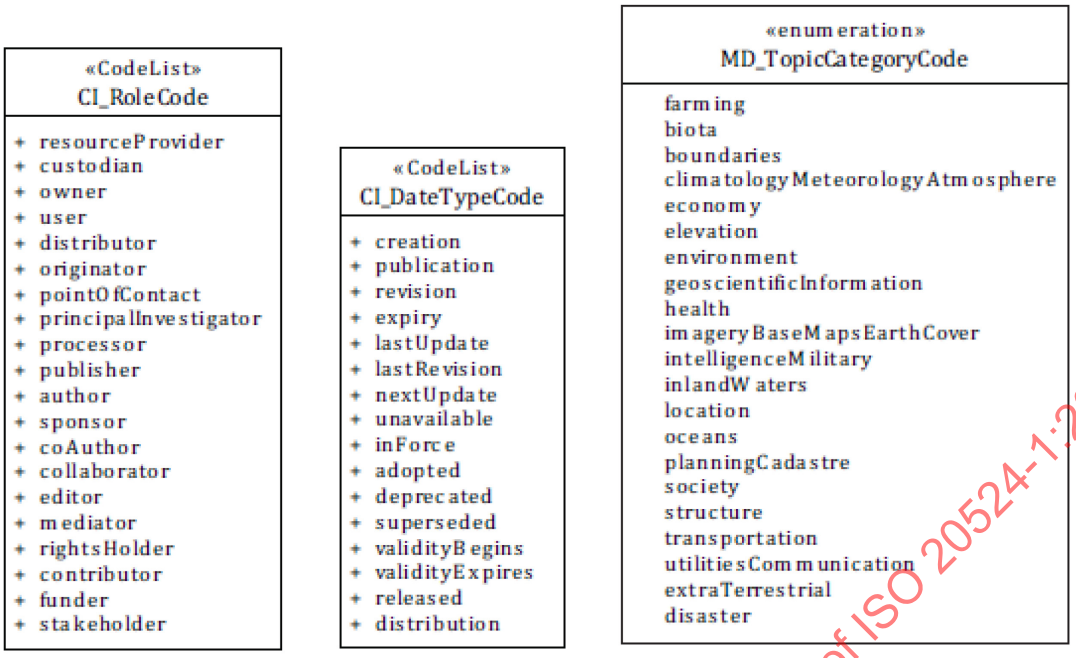


Figure 199 — Code Lists and Enumerations reused from ISO 19115

10.1.2 Syntax of the Metadata description

This is described in detail as part of physical format definitions (such as in Clause 12, Media Record Specifications).

10.1.3 Partitioning of GDF

Each GDF is split up into subparts in order to keep the Dataset manageable. This is called partitioning. A GDF is partitioned into Information Units (generally applicable to the Logical Data Structure and any physical format) and Medium Units (possibly applicable to a physical format in which case Medium Units are further detailed as part of the physical format specification in question).

Information unit partitions describe the characteristics of the data which as a whole is equivalent to the Album. There are three levels of information units within an Album: the Dataset, the Layer, and the Section.

10.1.3.1 Album

A collection of Datasets.

10.1.3.2 Dataset

The highest-level of partitioning into Information Unit. The term designates a large set of data of a particular geographic area, created at a particular moment and delivered by a particular data supplier.

10.1.3.3 Layer

A subset of a Dataset. It comprises either a planar graph composed of Nodes, Edges, and Faces (planar topology), a non-planar graph composed of Nodes and Edges (non-planar topology), or it comprises a non-explicit topological representation of Features and their geometries. A Layer may represent one or more Feature Themes.

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10.1.3.4 Section

A Section is a geographical subset of a Layer.

10.2 Headers and terminators

10.2.1 General

The information and medium units into which a Dataset has been partitioned may be identified by use of headers.

According to the names of the units, these headers are called Album Header, Dataset Headers, Layer Headers and Section Headers.

10.2.2 Album Header

10.2.2.1 General

Each Album starts with an Album Header. This header specifies global Album related characteristics. Furthermore, it specifies the links to the Datasets associated with the Album.

An Album Header contains the following items:

- Short Organisation Name
- Organisation Name
- Role Code
- Standard Name
- Version Number
- Album Size
- Album Identifier
- Default Character Set
- Associated Datasets
- Local Character Set Definition Information
- Creation Date
- Metadata Date Stamp
- Date of Copyright
- Copyright Owner

10.2.2.2 Short Organisation Name

The short name of the main producer and/or deliverer of the Album specified by using the default character set.

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10.2.2.3 Organisation Name

The name of the main producer and/or deliverer of the Album.

The producer is taken to mean the company with the responsibility for the production of the Album, not the company responsible for the source material, if they are different.

Where there is more than one major producer of the Album, a combination of names may be given.

All other producers involved will be described in detail in the Dataset Header.

10.2.2.4 Role Code

The function performed by the main producer and/or deliverer of the Album.

Roles are defined by the Code List Role Code and will be defined at the time of Album publication. B.2.2 provides the TC211-adopted description of Role Code. The following values have been fixed:

1 = Resource provider

2 = Custodian

3 = Owner

4 = User

5 = Distributor

6 = Originator

7 = Point of contact

8 = Principal investigator

9 = Processor

10 = Publisher

11 = Author

12 = Sponsor

13 = CoAuthor

14 = Collaborator

15 = Editor

16 = Mediator

17 = Rights Holder

18 = Contributor

19 = Funder

20 = Stakeholder

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10.2.2.5 Standard Name

The name of this document to which the Album conforms.

10.2.2.6 Version Number

The number of the version or release of this document to which the Album conforms.

10.2.2.7 Album Size

The size of the present Album expressed in bytes.

10.2.2.8 Album Identifier

The unique identification number of the Album.

Each physical occurrence of an Album gets its own identification number, even when the Album is an exact copy of another one.

10.2.2.9 Default Character Set

The character set applicable for the entire Album as a default. This setting may be overridden by Local Character Set definitions.

The following character set designators have been fixed [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33]:

1 = ISO 8859-1 (Latin-1)

2 = ISO 8859-2 (Latin-2)

3 = ISO 8859-3 (Latin-3)

4 = ISO 8859-4 (Latin-4)

5 = ISO 8859-5 (Cyrillic)

6 = ISO 8859-6 (Arabic)

7 = ISO 8859-7 (Greek)

8 = ISO 8859-8 (Hebrew)

9 = ISO 8859-9 (Latin-5)

10 = ISO 8859-10 (Latin-6)

11 = ISO 8859-11 (Thai)

12 = reserved/not used

13 = ISO 8859-13 (Latin-7)

14 = ISO 8859-14 (Latin-8)

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15 = ISO 8859-15 (Latin-9)

16 = ISO 8859-16 (Latin-10)

17 ~ 29 = reserved for future use

30 = ISO/IEC 10646:2017, Annex D (Unicode - UTF-8)

10.2.2.10 Associated Datasets

10.2.2.10.1 Introduction

Specifies which Datasets may be found in the present Album.

It consists of the Number of Datasets in the Album, and a Dataset Identifier.

10.2.2.10.2 Number of Datasets

The number of Datasets that are associated with the Album.

10.2.2.10.3 Dataset Identifier

For each Dataset, the identification number of the Dataset header which is related to the Album.

10.2.2.11 Local Character Set Definition Information

10.2.2.11.1 Introduction

Local Character Set Information used in the Album.

10.2.2.11.2 Local Character Set

Designation of a Local Character Set used in the Album.

The following character set designators have been fixed [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37]:

1 = ISO 8859-1 (Latin-1)

2 = ISO 8859-2 (Latin-2)

3 = ISO 8859-3 (Latin-3)

4 = ISO 8859-4 (Latin-4)

5 = ISO 8859-5 (Cyrillic)

6 = ISO 8859-6 (Arabic)

7 = ISO 8859-7 (Greek)

8 = ISO 8859-8 (Hebrew)

9 = ISO 8859-9 (Latin-5)

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10 = ISO 8859-10 (Latin-6)

11 = ISO 8859-11 (Thai)

12 = reserved/not used

13 = ISO 8859-13 (Latin-7)

14 = ISO 8859-14 (Latin-8)

15 = ISO 8859-15 (Latin-9)

16 = ISO 8859-16 (Latin-10)

17 ~ 29 = reserved for future use

30 = ISO/IEC 10646:2017, Annex D (Unicode - UTF-8)

31 = ISO/IEC 10646 (Unicode - UCS-2)

32 = ISO/IEC 10646 (Unicode - UCS-2, big endian)

33 ~ 49 = reserved for future use

50 = Shift-JIS (Japanese)

51 = KS X 1001 (Korean)

52 ~ 99 = reserved for the User Defined

10.2.2.11.3 Organization Information

Specification of the ISO 3166 alpha-3 country code of the country of the organization maintaining the Local character set.

10.2.2.11.4 Character Set Code Table Name

The Character Set Code Table Name for the character set used in the Album.

10.2.2.11.5 Character Set Code Table Version Number

The version number of the Character Set Code Table.

10.2.2.11.6 Local Character Sub-string Delimiter Codes (Local-In, Local-Out)

10.2.2.11.6.1 Introduction

The Local-In (start) and Local-Out (end) code values to be used to separate a sub-string of local characters from the surrounding one-byte text.

The Local-In code marks the beginning of a sub-string of local characters and Local-Out marks the end.

By not specifying these delimiter codes, the local character set at hand becomes the default character set for Fields of type L (overruling the general default character set). Only one default character set may be declared; for any other local character set Local In and Local Out Codes shall be provided.

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10.2.2.11.6.2 Local-In Code

The value used as the Local-In Code.

10.2.2.11.6.3 Local-Out Code

The value used as the Local-Out Code.

10.2.2.11.7 Language Code

The ISO 639-2 language code(s) of (a) language(s) applying to the specified Character Set Code Table

10.2.2.11.8 Collating Sequence

Designation of the collating sequence, i.e. the order in which character strings should be placed when sorting them, by means of ISO 639-2 language code for each language associated with the specified Character Set Code Table.

10.2.2.12 Creation Date

The date of creation of the physical copy of the Album.

10.2.2.13 Metadata Date Stamp

The date of creation of the metadata for the Album.

Metadata Date Stamp is a string which shall follow the format for date specified by ISO 8601 [38] basic format, i.e. YYYYMMDD, without separators.

10.2.2.14 Date of Copyright

The date that the (possible) copyrights of the present Album, if any, were registered.

10.2.2.15 Copyright Owner

The name of the owner of the (possible) copyrights of the present Album, if any.

10.2.3 Dataset Header

10.2.3.1 Introduction

This marks the beginning of a new Dataset and the end of the previous one.

The Dataset Header contains the following items:

- International Dataset Identification Number
- Supplier Dataset Identification Number
- Edition Date
- Unit System
- Dataset Language

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- Country Involved
- Default Language
- Dataset Title
- Production Info
- Creation Year
- Dataset Reference Date
- Reference Date Type
- Abstract
- Dataset Geographical Coverage
- Thematical Coverage
- Dataset XY Resolution
- Dataset Topic Category

10.2.3.2 International Dataset Identification Number

An identification number that is unique worldwide. To guarantee the uniqueness of these identification numbers, the distribution shall be coordinated by an international organization. This item will be left empty until such agreements are made.

10.2.3.3 Supplier Dataset Identification Number

An identification number that is unique within the system of a data supplier or within the system of a group of suppliers. The same technique may be followed as for the assignment of Album Identifiers.

10.2.3.4 Edition Date

Date and hour that this particular version of the Dataset has been created.

When a Dataset is changed completely or changed on essential points, it will be considered as a new Dataset and receive a new Dataset identification number. When there have been only minor changes (e.g. corrections and additions), the Dataset may keep its former identification number. In such cases the Edition Date is used to denote the version number of the Dataset.

10.2.3.5 Unit System

An enumeration of “English” or “Metric” specifying the default unit system for the entire Dataset.

10.2.3.6 Dataset Language

The ISO 639-2 Language Code of a language which is used in the Dataset Header and Layer Headers or in the data.

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10.2.3.7 Countries Involved

The ISO 3166 alpha-3 code of the countries involved in the production of the Dataset in issue.

10.2.3.8 Default Language

The ISO 639-2 Language Code of a language used as the default language of character strings in this Dataset.

10.2.3.9 Dataset Title

10.2.3.9.1 Introduction

The title and subtitles of a Dataset. The item may have multiple instances in case a Dataset Title is given in more than one language.

It is composed of a Dataset Title Language, a Dataset Main Title, and a Dataset Subtitle.

10.2.3.9.2 Dataset Title Language

The ISO 639-2 Language Code of the language in which the Dataset Title is written.

10.2.3.9.3 Dataset Main Title

The proper title of a Dataset.

10.2.3.9.4 Dataset Subtitle

A possible subtitle of the Dataset.

The language used should be the same as that used in Dataset Main Title.

10.2.3.10 Production Information

10.2.3.10.1 Introduction

Information about the producers and the production places of the Dataset. The item may repeat as many times as needed to list all producers and places of production.

Production Information lists the Production Country, the Production Place, and the Producer Name.

10.2.3.10.2 Production Country

The ISO 3166 alpha-3 country code of the country in which the place of production is situated.

10.2.3.10.3 Production Place

The place name of the location of the producer such as a city, town or village.

Should the producer have more than one office location state only the location of the company's headquarters and/or the location of the real production division.

The name of the location shall be written in the major national language at that location.

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EXAMPLE 1 “London” and not “Londres”.

EXAMPLE 2 “Mons” and not “Bergen”.

EXAMPLE 3 “Antwerpen” and not “Anvers”.

In completely bilingual cases, both names may be specified.

EXAMPLE 4 “Bruxelles”/“Brussel”.

This requires the use of two different Production Information instances.

10.2.3.10.4 Producer Name Language

The ISO 639-2 Language Code of the language used to specify the Producer Name.

10.2.3.10.5 Producer Name

The name of a producer of the Dataset. In case a producer is known by different names (multinationals, in multilingual countries), each of these names shall be specified in a separate Production Information instance.

The producer is the organization which has entirely or partly the intellectual Property of the Dataset.

10.2.3.11 Creation Year

The year of creation of the intellectual and logical content of the Dataset.

10.2.3.12 Dataset Reference Date

The reference date of the intellectual and logical content of the Dataset.

Dataset Reference Date is a string which shall follow the format for date specified by ISO 8601 [38] basic format, i.e. YYYYMMDD.

10.2.3.13 Reference Date Type

Event used for the Dataset Reference Date.

Reference Date Type may be one of three types:

- Creation

  Identifies when the Dataset was brought into existence.

- Publication

  When the Dataset was issued

- Revision

  When the Dataset was examined or re-examined and improved or amended.

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Expiry

When the dataset expires.

- Last Update

  When the dataset was last updated.

- Last Revision

  When the dataset was last reviewed.

- Next Update

  When the dataset will be next updated.

- Unavailable

  When the dataset became not available or obtainable.

- In Force

  When the dataset became in force.

- Adopted

  When the dataset was adopted.

- Deprecated

  When the dataset was deprecated.

- Superseded

  When the dataset was superseded or replaced by another resource.

- Validity Begins

  Time at which the data are considered to become valid.

  NOTE There could be quite a delay between creation and validity begins.

- Validity Expires

  Time at which the data are no longer considered to be valid.

- Released

  The date that the resource shall be released for public access.

- Distribution

  When an instance of the dataset was distributed.

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10.2.3.14 Abstract

Brief narrative summary of the content of the Dataset.

10.2.3.15 Dataset Geographical Coverage

The name of a geographical area that is representative for the area covered by the Dataset.

EXAMPLE A political or economical area, or a landscape unit.

10.2.3.16 Thematic Coverage

10.2.3.16.1 Introduction

This describes a Feature Theme Code and a Feature Theme Name.

10.2.3.16.2 Feature Theme Code

The code of a Feature Theme contained in the present Dataset. Permissible theme codes are described in A.1.

10.2.3.16.3 Feature Theme Name

The name of a Feature Theme contained in the present Dataset. Permissible theme names are described in A.1.

10.2.3.17 Dataset XY Resolution

The worst case planimetric resolution anywhere in the Dataset, expressed in meters.

The worst-case resolution shall be expressed in metres as whole numbers. Non-integer values shall be rounded off upwards: e.g. a resolution of 1,25 m shall be rounded to 2 m.

The determination of this worst case shall be based on the corresponding resolution values in the Layer Headers. The worst-case resolution corresponds with the maximum of the values found in the Layer Headers.

10.2.3.18 Dataset Topic Category

Enumeration of the possible main themes of a Dataset. The value for a particular Dataset is defined at time of publication. B.2.3 provides the ISO 19115-1:2014 description of Dataset Topic Category [17]. The following values have been fixed:

1 = Farming

2 = Biota

3 = Boundaries

4 = Climatology / meteorology / atmosphere

5 = Economy

6 = Elevation

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7 = Environment

8 = Geoscientific information

9 = Health

10 = Imagery base maps earth cover

11 = Intelligence military

12 = Inland waters

13 = Location

14 = Oceans

15 = Planning cadastre

16 = Society

17 = Structure

18 = Transportation

19 = Utilities communication

20 = Extra Terrestrial

21 = Disaster

10.2.4 Layer Header

10.2.4.1 Introduction

The Layer Header indicates the beginning of a new Layer and the end of the previous one.

It contains the following data items:

Layer Identifier

Thematic Coverage

Level-0 Network Topology

Edge Height Level Referencing

Layer XY Resolution

Layer Geometry Accuracy Level

10.2.4.2 Layer Identifier

This number shall be unique within the set of all Layer Identification Numbers for a particular Dataset.

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10.2.4.3 Thematic Coverage

Indication of the Feature Theme(s) that belong to a particular Layer.

10.2.4.4 Level-0 Network Topology

Indication of the topology of the level-0 network in this Layer. The following topology types are allowed:

- Non-explicit Topology

  No topological relations between objects are explicitly defined. That is, topological relations are only defined via coordinate values.

- Non-planar topology

  Topological relations are explicitly defined, Objects may fully or partially coincide, or intersect or overlap each other.

- Planar topology

  Topological relations are explicitly defined, Objects shall not fully or partially coincide, and shall not intersect or overlap each other. Intersecting/overlapping objects lead to fragmentation, whereby common parts are present exactly once.

10.2.4.5 Edge Height Level Referencing

The method of Edge height level referencing applied in this Layer.

- Implied by coordinates

  The Z coordinate of the Nodes referenced by the Edge and the Intermediates of the Edges in this Layer specify the geographic height level according to the coordinate system applied.

- Achieved via Edge levels

  The height of Edges in this Layer is not specified as part of the definition of the Edge itself. Instead, the relative height of the start, the middle and the end of Edges in this Layer is specified in combination with their use in the definition of the Line Feature(s) they represent. The relative height may range from –9 to +99.

- Achieved only via Grade-separated Crossing Relationships

  The height level information in the Layer is not specified via Z coordinates. Instead, the relative height levels are specified via the Relationship Grade-separated Crossing.

- No height level referencing

  No height levels are specified in this Layer.

NOTE 1 Grade-separated Crossings may appear in combination with the values implied by coordinates and achieved via Edge levels.

NOTE 2 The relative height of Edge levels may be greater than 9 (up to 99) when modelling vertical connectivity of Pathway Features connecting floors in high-rise buildings. When modelling road, rail or water transportation networks, the maximum Edge level is set to +9.

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10.2.4.6 Layer XY Resolution

Information about the resolution of the Layer. The values which shall be specified for resolution are worst case values expressed in metres.

10.2.4.7 Layer Geometry Accuracy Level

10.2.4.7.1 General

For all geometry present in a given Layer, accuracy levels may be specified. Use case for this is terrain surface modelling using tessellated surface areas or gridded data.

10.2.4.7.2 Horizontal Accuracy Level

A user-defined horizontal accuracy level measure, such as Root Mean Square Error (RSME) or the like. The actual measure chosen may be textually described.

10.2.4.7.3 Vertical Accuracy Level

A user-defined vertical accuracy level measure, such as Root Mean Square Error (RSME) or the like. The actual measure chosen may be textually described.

10.2.5 Section Header

10.2.5.1 Introduction

The Section Header indicates the start of a new Section and the end of the previous one. It contains information and the parameters which are essential for interpretation and processing of some of the Fields in the data records.

A Section Header contains the following items:

Section Identification Number

Section Geographic Coverage

Section XY Resolution

Lane Counting Direction

Source Document

Geodetic Datum

Reference Ellipsoid

Horizontal Reference Type

Projection Method

National Map Grid

Magnetic Declination

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Height Reference Type

Geoid Undulation

Coordinate Offset

Section Border

Planimetric Control Point

Height Control Point

Network Specification Identifier

Artificial ETA Connectivity

10.2.5.2 Section Identification Number

This number shall be unique within the set of all Section Identification Numbers for a particular Layer.

10.2.5.3 Section Geographic Coverage

The name of a geographical area that is representative for the area covered by the Section. Rules are as for Dataset Geographic Coverage Section.

10.2.5.4 Section XY Resolution

Information about the resolution of the Section. The values which shall be specified for resolution are worst case values expressed in metres.

10.2.5.5 Lane Counting Direction

The convention for default direction of lane counting in a Section.

This field may be used in cases where all instances of the Restrictive Sub-Attribute Lane-Dependent Validity in a given Section deliberately use the same convention for the counting direction.

NOTE The counting direction is repeated within each Attribute value of Lane-Dependent Validity.

10.2.5.6 Source Document

See 10.5.2.

10.2.5.7 Geodetic Datum

See 10.6.2.

10.2.5.8 Reference Ellipsoid

See 10.6.4.

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10.2.5.9 Horizontal Reference Type

An indicator which specifies whether the coordinate values in the Section shall be interpreted as **geographical** coordinates (latitude and longitude), or as X- and Y-values within a **rectangular** plane coordinate system (with linearly divided axes and equal length units along these axes).

The indicator may express two different values:

Geographical coordinates

Rectangular Plane coordinates

10.2.5.10 Projection Method

See 10.6.5.

10.2.5.11 National Map Grid

See 10.6.6.

10.2.5.12 Magnetic Declination

See 10.6.8.

10.2.5.13 Height Reference Type

An indicator which specifies whether the Z-values in this Section shall be interpreted as ellipsoidal heights or as orthometric heights.

The indicator may have one of three values:

Ellipsoidal heights

Orthometric heights

Relative heights

10.2.5.14 Geoid Undulation

See 10.6.7.

10.2.5.15 Coordinate Offset

10.2.5.15.1 Introduction

Contains the following components:

- XY Multiplication Factor
- Z Multiplication Factor
- X Offset
- Y Offset
- Z Offset

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10.2.5.15.2 XY Multiplication Factor

The multiplication factor (M) of the X and Y coordinate values in the data records in this Section, expressed as 10logM. This makes it possible to specify coordinates which have a higher resolution than the length unit, or to delete non-relevant zeros at the end of coordinate values with a coarse resolution.

Only integer values of 10logM are allowed. Positive values shall be preceded by a plus sign (+); negative values by a minus sign (-).

EXAMPLE 1 A value of -2 means a multiplication factor of 0,01.

EXAMPLE 2 A value of -1 means a multiplication factor of 0,1.

EXAMPLE 3 A value of 0 means a multiplication factor of 1.

EXAMPLE 4 A value of 1 means a multiplication factor of 10.

EXAMPLE 5 A value of 2 means a multiplication factor of 100.

10.2.5.15.3 Z Multiplication Factor

A multiplication factor of the Z-values in a particular Section, expressed as 10logM.

10.2.5.15.4 X Offset

The offset value for all the X-coordinates in the data records in this Section. This value shall be added to all the X-coordinate values in the data records to obtain national grid coordinate values.

Use of the X-offset reduces the length of the coordinate values in the individual data records.

10.2.5.15.5 Y Offset

Contains the offset value for all the Y-coordinates in a particular Section. Rules as for X Offset.

10.2.5.15.6 Z Offset

Contains the offset value for all the Z-coordinates in a Section. Rules as for X Offset.

When a Section does not contain Z-values, Z Offset shall remain blank.

10.2.5.16 Section Border

Contains the following components:

- **Maximum X**: The maximum value of any X-coordinate in the Section.
- **Maximum Y**: The maximum value of any Y-coordinate in the Section.
- **Minimum X**: The minimum value of any X-coordinate in the Section.
- **Minimum Y**: The minimum value of any Y-coordinate in the Section.

NOTE In the specification of the maximum and minimum values, X Offset and Y Offset values are not added or included in these Attributes.

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10.2.5.17 Planimetric Control Point

10.2.5.17.1 Introduction

A Point Feature with highly accurate X and Y coordinates. May be used to check the accuracy of coordinates obtained from digitizing. The Planimetric Control Point contains the following components:

10.2.5.17.2 Point Name

An identifier for the Point Feature. This may be the name or number, or a combination of both, by which the Point is known in the catalogue of a local organization for land surveying.

If the uniqueness of the identifier may not be guaranteed within a larger context, it shall be preceded by the name of the town to which it belongs, or by the name of the survey organization responsible for its delivery.

10.2.5.17.3 X Digitized

The value of the X-coordinate, expressed in centimeters, as obtained by digitizing a paper map or by another indirect method of data capture, such as photogrammetry.

10.2.5.17.4 Y Digitized

The value of the Y-coordinate, expressed in centimeters, of the point in issue as obtained by digitizing a paper map or by another method of indirect surveying.

Rules as for X Digitized.

10.2.5.17.5 X Surveyed

The value of the X-coordinate, expressed in centimeters, as delivered by a land survey organization.

10.2.5.17.6 Y Surveyed

The value of the Y-coordinate, expressed in centimeters, as delivered by the land survey organization.

10.2.5.18 Height Control Point

10.2.5.18.1 Introduction

A Point Feature with highly accurate coordinates. May be used to check the accuracy of coordinates obtained from photogrammetry.

A Height Control Point contains the following components:

10.2.5.18.2 Point Name

As for Planimetric Control Point.

10.2.5.18.3 X Reference

The X-coordinate of the point specified in the same length unit as used in the data records in this Section.

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10.2.5.18.4 Y Reference

The Y-coordinate of the point specified in the same length unit as used in the data records in this Section.

10.2.5.18.5 Z Digitized

The value of the Z-coordinate of the point obtained by means of the same technique by which the Z-values in the data records have been determined (e.g. interpolation of contour lines on a paper map or obtained by stereo restitution).

The Z-value shall be expressed in centimeters.

10.2.5.18.6 Z Surveyed

The value of the Z-coordinate, expressed in centimeters, as delivered by a survey organization.

10.2.5.19 Network Specification Identifier

The specification of the kind of (road) networks which are present in the Section.

10.2.5.20 Artificial ETA Connectivity

An indicator which specifies whether artificial connectivity is present for all Enclosed Traffic Areas (ETA) within the Section for representing connectivity within Enclosed Traffic Areas (ETA) between connected Road Elements and/or connected Pathways.

The indicator may express two different values:

Artificial ETA connectivity not present

Artificial ETA connectivity present

10.3 Data Dictionary

10.3.1 General

All Field, record, Feature and Attribute Types that are used in a particular GDF shall be defined explicitly at the beginning of a Dataset.

The definition is split into four parts: Field Definition, Record Definition, Feature Definition and Attribute Definition. These definitions immediately follow the Dataset header in the order stated.

10.3.2 Field Definition

10.3.2.1 Introduction

The Field types which are used in a particular Dataset. Each occurrence of a Field-type will be represented by one occurrence of a Field Definition. Therefore, there should be as many occurrences of Field Definition in the file as there are Field types. For the definition of Fields, records will be used which also consist of Fields. These last Fields also need to be defined in Field Definition.

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Field Definition contains the following items:

Field Name

Field Size

Data Type

Data Unit Type

Data Unit

Unit Exponent

No Data

Field Value Domain

Field Class

Field Description

10.3.2.2 Field Name

The name of a particular Field type. This may be any string of printable characters, excluding the Space character.

The maximum name length of Fields is 10 characters.

10.3.2.3 Field Size

The length of a particular Field expressed as the number of character positions that have been reserved for that Field.

The length of a fixed length Field is specified by a positive integer value which may range from 1 to 99.

A variable length Field is indicated by means of the value = 0.

Field types of Data Type L may contain multi-byte characters and thus shall be no shorter than 4 bytes. Alternatively, such Field types may have a variable Field length.

10.3.2.4 Data Type

The subset of Global/Local Character Set characters allowed in a particular Field type. The Valid Data Type values are:

L : : = {<space>|<printable character>| <local character string> }
G : : = <space>|<printable character> {<printable character>| Space character}
A : : = <space>|<alphabetic character> {<alphabetic character>| Space character}
AN : : = <space>|<alphanumeric character> {<alphanumeric character>| Space character}
N : : = {Space character} {<digit>}
I : : = {Space character} [<sign character> <digit> {digit}]

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where

<printable character> : : = <alphanumeric character> |<graphic character>|<sign character>
<alphanumeric character> : : = <alphabetic character>|<digit>
<alphabetic character> : : = A| B| C| ....Z| a| b| c| .... z| < ISO/IEC 8859-1 character 12/0 - 15/15>
<digit> : : = 0| 1| 2| 3| 4| 5| 6| 7| 8| 9|
<graphic character> : : = ! | "| #| $| %| &| '| (|)| *| ,| /| : | ;| <| =| >| ?| @| [| \|]| ^| _| `| {| || }| ~|
< ISO/IEC 8859-1 character 10/01 - 10/12>|
< ISO/IEC 8859-1 character 10/14 - 11/15>
<sign character> : : = +| -
<space> : : = Space character {Space character}
Space character : : = the ISO/IEC 8859-1 character 2/0

and where

<local character string> : : = <local-in code> {<local character>} <local-out code>
<local character> : : = character from user-defined local character set
<local-in code> : : = <double character>
<local-out code> : : = <double character>
<double character> : : = character from default character set, character from default character set

The symbols used in the above-mentioned production rules have the following meaning:

: : = is replaced by, produces, consists of
| exclusive or
[] term enclosed is optional (used zero, or one times)
{} term enclosed is optional (used zero, one, or more times)
<> term enclosed is non-terminal
, exists together with
.... indicates a repetitive list of similar items

10.3.2.5 Data Unit Type

Specifies the data unit type as either a unit of measure (MSR) or a GDF defined unit.

10.3.2.6 Data Unit

Indication of the unit in which the values in the Field type in question are expressed.

Only units as specified in the list below are allowed. Other units using decimal prefixes (cm, gram etc.) shall be split into a basic unit and an exponent value. The exponent shall be represented by means of Unit Exponent.

The following units of measure and their corresponding codes are applicable:

DEG = Degree
MTR = Metres
KMR = Kilometre
INC = Inch
FET = Feet
MIL = Mile
KGR = Kilogram

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PND = Pound (US pound)
KIP = Kilo Pound
TON = Ton (metric ton)
MIN = Minute (of time)
KPH = Kilometres per hour
MPH = Miles per hour
YMD = Year, month, day
MDH = Month, day, hour
YXH = Year, month, day, hour
OTH = Other SI-unit, to be described in Field Description

The following GDF-defined data units are allowed:

COD = Code list
ENM = Enumeration
CNT = Number
BOL = Boolean
BMR = Bit Mask Register (binary number as binary)
BMI = Bit Mask Integer (binary number as decimal)
TIM = Time
SCS = (Simple) Character String
PRC = Percentage
CMP = Composite
IDN = Identifier
PRS = Signed Percentage

In case the Field type in question does not contain a value that is expressed in a particular unit of measure (e.g. when the Field-type contains a free text comment), Data Unit shall be left empty.

10.3.2.7 Unit Exponent

The multiplication factor to be applied to the values in a particular Field type in order to convert them to the unit of measurement as specified in Data Unit.

The Unit Exponent is expressed as an exponent of 10.

The exponent shall be preceded by a plus (+) or minus (-) sign, and may range from -9 to +9.

In case the values do fit directly with the unit of measurement as specified in Data Unit, Unit Exponent shall contain the value = 0 (which corresponds to a multiplication factor of 1).

Example of the use of Data Unit and Unit Exponent:

Value	Data Unit	Unit Exponent	Value in field
2,65 m	MTR	-2	265
377 mm	MTR	-3	377
75 km/h	KMH	0	75
45 %	PRC	0	45
30 October 1986	YMD	<S>	19861030

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10.3.2.8 No Data

The characters the Field will contain in the case that the Field is “empty”, i.e. has “no data”. There are the following possibilities:

<S> The empty Field will contain Space characters. This is needed in, but not restricted to, Fields of Data Type N and I, where 0 is a meaningful value.

{a valid value} The empty Field will contain any value allowable for the data type in question, and within the valid value range in case of data type N, and for the rest Space characters. This may be needed in Fields of data types other than N or I, where a string of spaces is a meaningful value.

Obl The Field is not allowed to be empty as a correct interpretation of the data would be impossible.

10.3.2.9 Field Value Domain

10.3.2.9.1 Introduction

A logical domain of the values in a particular Field type in terms of its allowable minimum and maximum values. This may be quite different from the physical domain.

10.3.2.9.2 Minimum Value Allowed

The allowable minimum value of a particular Field type.

10.3.2.9.3 Maximum Value Allowed

The allowable maximum value of a particular Field type.

10.3.2.10 Field Class

Indication of the kind of use and purpose of a particular Field type. The following Field classes are specified:

1 = Entity
2 = Foreign Identifier
3 = Field Counter
4 = Other

10.3.2.11 Field Description

Textual description of the content and use of a particular Field type.

10.3.3 Record Definition

10.3.3.1 Introduction

The specification of a record type that is used in the Dataset. Each of the record types in a particular Dataset shall be represented by one Record Definition. There will be as many occurrences of Record Definition in the Dataset as there are record types. For the definition of records, records also will be used. These last records also need to be defined in Record Definition.

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Record Definition contains the following items:

Record Type Code

Record Subtype Code

Record Name

Field Name List

Repeating Field Flag

Record Type Description

10.3.3.2 Record Type Code

The reference code of a particular record type. This code value will be found at the beginning of each occurrence of a record of that particular type.

Only numerical codes containing 2 digits are allowed. The code containing two Space characters shall be assigned to the null record.

10.3.3.3 Record Subtype Code

A possible record subtype code of a record.

It is possible to subdivide a particular record type into 99 different subtypes by building in a Record Subtype Code. It is a digit code the value of which will be found in each occurrence of that record subtype. In case a record type is not subdivided into subrecords, the Record Subtype Code shall remain empty.

10.3.3.4 Record Name

The name by which a record type is referred to in a specification document.

Any string of printable characters up to a maximum length of 10 is allowed.

10.3.3.5 Field Name List

A list of Field names defined by means of Field Name in Field Name Definition. The different instances of Field Name in Field Name List shall occur in the same order as the corresponding data Fields do in any occurrence of the record type itself.

10.3.3.6 Repeating Field Level

Repeating Fields are marked by means of specifying a level that indicates the nesting of a repeating Field within another (lower-level) group of repeated Fields. A Repeating Field Level of 0 means that the Field is not repeated.

In a given sequence of Fields, the Repeating Field Level may be incremented, decremented, or kept constant compared to the Repeating Field Level of the respective previous Field. Increments and decrements larger than 1 level shall not occur.

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10.3.3.7 Record Type Description

Textual description of the record type.

10.3.4 Feature Definition

10.3.4.1 Introduction

The definition of a Feature Class, with corresponding Feature Class Name, Feature Class Code and Feature hierarchy information.

Feature hierarchies may be specified for Features from the Feature Themes Land Cover and Use, Road Furniture, Services, and for user-defined Features. The hierarchy is specified in terms of a list of (optional) sub-types of a particular Feature Class. These sub-types are Features in their own right and are to be defined by separate Feature definitions. This implies that any sub-type may be further sub-typed. Within the definition of the list of Feature Class sub-types, the sub-types are referred to by their Feature Class Codes.

Feature Definition consists of the following items:

- Feature Class Code
- Language Code
- Feature Class Name
- Feature Description
- Feature Hierarchy Information

10.3.4.2 Feature Class Code

A four-digit code of the Feature Class in question.

10.3.4.3 Language Code

The ISO 639-2 Language Code of the language used in Feature Class Name.

10.3.4.4 Feature Class Name

A name for the Feature Class. Feature Class Names shall have an uppercase character at the beginning of the individual words. The other characters shall be lower case.

For each Feature Class, names may be specified in multiple languages.

10.3.4.5 Feature Description

Textual description of the Feature Class.

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10.3.4.6 Feature Hierarchy Information

10.3.4.6.1 Introduction

The Feature hierarchy information consists of the number of hierarchical levels, a list of (optional) sub-types of a particular Feature Class and further textual descriptions of the sub-types.

10.3.4.6.2 Number of Hierarchical Levels

The number of levels in the hierarchical tree to which a particular Feature belongs. In case of the definition of a non-hierarchical Feature, the number shall be set to one.

10.3.4.6.3 Sub-type Feature Class Code

Specification of a direct sub-type of the particular Feature Class in issue by means of a four-digit Feature Class Code from the Feature Themes Land Cover and Use, Road Furniture, Services, and for user-defined Features.

10.3.5 Attribute Definition

10.3.5.1 Introduction

Parameters of the Attribute subfields that belong to a particular Attribute Type.

Attribute Definition contains the following items:

- Attribute Type Code
- Language Code
- Attribute Type Name
- Attribute Value Data Type
- Maximum Attribute Value Width
- Attribute Data Type
- Attribute Data Unit
- Attribute Base Unit and Conversion Factor
- Attribute Value Domain
- Attribute Description

10.3.5.2 Attribute Type Code

The code of a particular Attribute Type. The code consists of two printable characters.

The code value shall correspond to the code value as used in the individual occurrences of the Attribute Field in issue.

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10.3.5.3 Language Code

The ISO 639-2 Language Code of the language used in Attribute Type name.

10.3.5.4 Attribute Type Name

A name for the Attribute Type. Attribute Type names shall have an uppercase character at the beginning of the individual words. The other characters shall be lowercase.

For each Attribute Type, names may be specified in multiple languages.

10.3.5.5 Attribute Value Data Type

See 10.3.2.4.

10.3.5.6 Maximum Attribute Value Width

The maximum Width of an Attribute Value in terms of the number of digits or characters. This Width may range from 1 to 11. Special provisions are made for Time and Language-Coded Text values whose width may be greater than 11.

10.3.5.7 Attribute Data Type

The applicable data type of the Attribute type in question.

COD = Code List

ENM = Enumeration

CNT = Number

BOL = Boolean

BMR = Bit Mask Register (binary number as binary)

BMI = Bit Mask Integer (binary number as decimal)

TMR = Time Domain (GDF Time Domain syntax)

SCS = (Simple) Character String

TXT = (Language-Coded) Text

PRC = Percentage

CMP = Composite

IDN = Identifier

GSD = Geopolitical Structure Definition

PRS = Signed Percentage

MSR = Measure (with the Attribute's Unit of Measure being specified separately; see 10.3.5.8 and 10.3.5.9)

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10.3.5.8 Attribute Data Unit

The following units of measure and their corresponding codes are applicable as either metric or English default attribute units (see 7.1.15). This is a subset of all units of measure applicable to Fields as part of Field definitions (see 10.3.2.6).

DEG = Degree

MTR = Metres

KMR = Kilometre

INC = Inch

FET = Feet

MIL = Mile

KGR = Kilogram

PND = Pound (US pound)

KIP= Kilo Pound

TON = Ton (metric ton)

MIN = Minute (of time)

KPH = Kilometres per hour

MPH = Miles per hour

10.3.5.9 Attribute Base Unit and Conversion Factor

10.3.5.9.1 General

In the event that a unit of measure other than any of the Metric or English default units is applicable, a base unit and a conversion factor expressed in terms of the base unit shall be used.

10.3.5.9.2 Attribute Base unit

The following base units are applicable:

DEG = Degree

MTR = Metres

KGR = Kilogram

MIN = Minute (of time)

KPH = Kilometres per hour

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10.3.5.9.3 Conversion factor

The unit of measure is expressed by multiplying the base unit by a conversion factor. The conversion factor is expressed in terms of a mantissa (positive integer) and an exponent (base 10).

The exponent is the power of 10 by which the mantissa is multiplied. The exponent shall be preceded by a plus (+) or minus (-) sign, and may range from -9 to +9.

Together, mantissa and exponent express the “floating point” conversion factor.

10.3.5.10 Attribute Value Domain

10.3.5.10.1 Introduction

A logical domain of the values in a particular Attribute in terms of its allowable minimum and maximum values.

10.3.5.10.2 Minimum Value Allowed

The allowable minimum value of a particular Attribute.

10.3.5.10.3 Maximum Value Allowed

The allowable maximum value of a particular Attribute.

10.3.5.11 Attribute Description

A textual description of the content and use of the Attribute Type in question.

10.3.6 Attribute Value Definition

10.3.6.1 Introduction

The definition of Attribute Values that represent a set of enumerated coded cases rather than measurements.

Attribute Value Definition consists of the following items:

- Attribute type
- Feature Class Code
- Attribute Value
- Language Code
- Value Description

10.3.6.2 Attribute Type

The Attribute Type Code composed of two printable characters for the Attribute in question.

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Values of an Attribute Type may be Feature Class-sensitive, i.e. only applicable if used in combination with a certain Feature Class, or set of Feature Classes. Examples for this include a different range of values for different Feature Classes, and different value semantics depending on the Feature Class context.

10.3.6.3 Feature Class Code

The Feature Class(es) for which this Attribute Value is applicable.

In the event of no Feature Class Code being specified (i.e. in case of zero occurrences of a Feature Class Code), it does not mean that there is no information available for this metadata Field. It means that this is a “standard” value for this Attribute, one that isn't sensitive to which Feature it is applied to. Only Attribute values which are specifically mentioned with a particular Feature, or set of Features, to which they apply would “over ride” this value.

10.3.6.4 Attribute Value

A particular Attribute Value (allowable value code for attribute type of data type COD or ENM) which corresponds to the meaning described in the Value Code Description.

Note that a “standard” set of attribute values (i.e. non-sensitive to Features) is always to be specified. This is, Feature-sensitive attribute values may be only specified in addition to a standard set of attribute values.

10.3.6.5 Language Code

The ISO 639-2 Language Code of the language used in Value Code Description.

10.3.6.6 Value Code Description

A textual description of the specified value code.

10.3.7 Relationship Definition

10.3.7.1 Introduction

The definition of a Relationship Type with corresponding Relationship Type name and Relationship Type Code.

Relationship Definition contains the following items:

- Relationship Type Name
- Language Code
- Relationship Type Code
- Relationship Partner Information
- Relationship Description

10.3.7.2 Relationship Type Code

The four-digit code of a Relationship Type being defined.

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10.3.7.3 Language Code

The ISO 639-2 Language Code of the language used in Relationship Type name.

10.3.7.4 Relationship Type Name

The name of a Relationship Type. Relationship Type names shall have an upper-case character at the beginning of the individual words. The other characters shall be lower case.

For each Relationship Type, names may be specified in multiple languages.

10.3.7.5 Relationship Partner Information

10.3.7.5.1 Introduction

A specification of the roles, as well as the Features classes candidate(s) allowable per role, which are partners in this Relationship. It shall be specified whether the role may appear repeatedly or only once. Repeatedly in this respect shall be interpreted as repeating with an unfixed number of times. If the number of repetitions is fixed, each appearance shall be indicated by a separate Feature Class specification. It also shall be indicated whether the appearance of the role is mandatory or optional.

10.3.7.5.2 Feature Role

For each partner in a Relationship, its role number is assigned (unique within the Relationship). Numbering starts from 1 up to the total number of roles present.

One role may correspond to multiple Features of the same Feature Class (e.g. multiple outgoing Road Elements of a Fork), or two Features of the same class may play two different roles (e.g. Transportation Elements as Underpass and Overpass of a grade-seperated crossing, respectively).

10.3.7.5.3 Feature Role Name

The name of the role in question.

10.3.7.5.4 Feature Class Code

The four-digit Feature Class Code of the Feature class candidate(s) that appears in the role at hand.

For a role, commonly instantiation by a single Feature Class is allowed. However, multiple “candidate” Feature Classes may be specified as allowable in certain cases (e.g. the role of upper Transportation Element may be played by either a Road Element, a Junction, or a Railway Element, to name a few allowable Feature Classes).

10.3.7.5.5 Repeat Information

Indication whether the presence of this role may repeat.

10.3.7.5.6 Mandatory Information

Indication whether the appearance of this role is mandatory.

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10.3.7.6 Relationship Description

A textual description of the content and intended use of the Relationship Type being defined.

10.4 Table of Contents

10.4.1 General

The Dataset Header and the definitions for Field, Record, Attribute Types, Attribute Value Codes, Feature Classes and Relationship Types are followed by information that briefly describes what may be found in the Dataset. Concise information is also given about the geographic coverage of each particular Section. Furthermore, it contains a specification of transportation network types, default Attribute Values, abbreviations, and the generic Administrative Area structures that are present in the Dataset.

The Table of Contents contains the following items:

- Directory.
- Spatial Domain.
- Network Specification.
- Default Attribute Values.
- Administrative Structure Definition.
- Abbreviations.

10.4.2 Directory

10.4.2.1 Introduction

How many instances of one particular record type (or subtype) occur within a particular Section within a particular Layer.

The Directory contains the following parts:

10.4.2.2 Layer Identifier

The Identification number of a particular Layer. See 10.2.5.2. In the Directory records of Dataset records, the value of Layer Identifier shall be left empty because the Dataset records do not belong to any particular Layer.

10.4.2.3 Section Identification

The identification number of a Section which occurs within the Layer in question.

In the Directory records of Dataset records the value of Section Identification Number shall be left empty. See also 10.2.5.2.

10.4.2.4 Record Type Code

The record type code of a record type which occurs within the Section and Layer in question. See 10.3.3.2. Only codes of logical record types will be mentioned.

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10.4.2.5 Record Subtype Code

See 10.3.3.3.

10.4.2.6 Record Quantity

The number of logical record instances of the record type and subtype in question.

10.4.3 Spatial Domain

10.4.3.1 Introduction

A description of the geographic coverage of a particular Section. It is described both in mathematical terms (latitude and longitude values) and in linguistic terms. The geometry will be described in a coarse form (200 metres ground resolution) so that information of the geodetic datum is not needed.

At the Section level the geographic coverage will be described in a more detailed way, together with all the geodetic parameters belonging to it. The Spatial Domain description shall contain a Section Identification Number, Geographic Bounding Box and an Area Name. Spatial Domain is the equivalent of the ISO 19115-1:2014 data element Geographic Extent.

10.4.3.2 Section Identification Number

The ID-number of a particular Section. See 10.2.5.2.

10.4.3.3 Geographic Bounding Box

10.4.3.3.1 Introduction

The geographic Bounding Box is described by means of bounding Longitudes and Latitudes.

10.4.3.3.2 North Bound Latitude

The geographical latitude of the most northern part of the Section. This value is specified in decimal degrees with a resolution of millidegrees, so the latitude of e.g. the North Pole will be : +90000. The value shall be preceded by a plus sign (+) for latitudes in the Northern hemisphere, and a minus sign (-) for those in the South. See also ISO 6709 [39].

10.4.3.3.3 East Bound Longitude

The geographical longitude of the most eastern part of the Section. This value shall be specified in decimal degrees, referring to the Prime Meridian of Greenwich, with a resolution of millidegrees. Longitudes east of Greenwich shall be designated by use of the plus sign (+), longitudes west of Greenwich shall be designated by use of the minus sign (-). See also ISO 6709 [39].

10.4.3.3.4 South Bound Latitude

The value of the geographical latitude of the most southern part of the Section. Rules are as for North Bound Latitude.

10.4.3.3.5 West Bound Longitude

The geographical longitude of the most western point in the Section. Rules are as for East Bound Latitude.

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10.4.3.4 Area Name

The name of a geographical area. This name shall be representative for the area covered by the Section. Area Name is the equivalent of the mandatory portion of the ISO 19115-1:2014 data element Geographic Identifier, an option for defining geographic extent.

Rules are as for Dataset Geographical Coverage (see 10.2.3.15).

10.4.4 Network Specification

10.4.4.1 Introduction

GDF databases often contain different kinds of road networks.

EXAMPLE Networks containing all the roads, only the more important roads or only Motorways.

The network specification consists of the following parts:

- Network Identifier
- Completeness level of the network
- Network description

10.4.4.2 Network Identifier

An identifier of the network which is unique in the current Dataset.

10.4.4.3 Completeness Level of the network

A specification of the Completeness level of the network in the form of a value between 0 and 9 whereby 0 indicates no network and 9 a full network. The further meaning of the values is data producer defined.

10.4.4.4 Network Description

A verbal description of the specified Completeness level.

10.4.5 Default Attribute Values

10.4.5.1 Introduction

By default, the default Attribute Value in a GDF specifies the not-known/not-collected case. In case it is desired that the default Attribute Value specifies a different value (i.e. an Attribute Value defined for a certain Attribute Type), the Default Attribute Value Record may be used. However, the information that a certain Attribute Value has not been captured or is unknown, may now no longer be defined.

Default values of an Attribute Type may be Feature Class-sensitive, i.e. only applicable if used in combination with a certain Feature Class, or set of Feature Classes.

10.4.5.2 Feature Class Code

The Feature Class(es) for which this Default Attribute Value is applicable.

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In the event of no Feature Class Code being specified (i.e. in case of zero occurrences of a Feature Class Code), it does not mean that there is no information available for this metadata Field. It means that this is a "standard" value for this Attribute, one that isn't sensitive to which Feature it is applied to. Only Attribute values which are specifically mentioned with a particular Feature, or set of Features, to which they apply would "over ride" this value.

10.4.5.3 Attribute Type

The Attribute Type for which the default value is defined.

10.4.5.4 Default Attribute Value

The Attribute Value of the Attribute Type specified which is considered default in a Dataset.

Note that a "standard" value (i.e. non-sensitive to Features) does not have to be specified. This is, default attribute values may be specified for a certain Feature Class, or set of Feature Classes, only.

10.4.6 Geopolitical Structure Definition

10.4.6.1 Introduction

The purpose of the Geopolitical Structure Definition is to provide a mapping between the GDF defined general placeholders for Administrative Areas or Named Areas and actual instances of those in certain areas covered by the GDF. Several different structures may be defined, either for different countries or for different regions within a country which have different geopolitical structures. Geopolitical structures are composed of Administrative Areas and/or Named Areas, such as Country, Order-8 Area, School District, or Built-up Area, to form a directed acyclic graph (DAG) of sub-divisions and containment which may be fully or partially hierarchical.

For each geopolitical structure, all occurring Geopolitical Structure Component (i.e. Administrative Area and Named Areas Feature Classes) are generically labelled with their local name(s).

Administrative Structure Definition consists of the following items:

- Geopolitical Structure Identifier
- Geopolitical Structure Name
- Geopolitical Structure Component Identifier
- Feature Class Code of Administrative Area or Named Area
- Language Code
- Local Name of Administrative Area or Named Area
- Immediate Parent Geopolitical Structure Component
- Lowest Full Predecessor Geopolitical Structure Component
- Geopolitical Structure Component Description

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10.4.6.2 Geopolitical Structure Identifier

A numerical identifier of the Geopolitical Structure in question. This is the identifier of the structure that is being defined. Other Administrative Areas or Named Areas contribute to this Structure. They all share the same Geopolitical Structure ID. Other Geopolitical Structures share a different ID.

10.4.6.3 Geopolitical Structure Name

A name for the Geopolitical Structure in question.

10.4.6.4 Geopolitical Structure Component Identifier

A numerical identifier for the Geopolitical Structure Component in question. Geopolitical Structures are composed of Geopolitical Structure Component, such as Country, Order-8 Area, School District, or Built-up Area, to form a graph of sub-divisions and containment which may be fully or partially hierarchical. By means referring to Geopolitical Structure Identifiers and Geopolitical Structure Component Identifiers, instances of Features from the Feature Themes Administrative Area and Named Area may declare which geopolitical structure they are a member of, as well as which specific component within that structure they correspond to.

10.4.6.5 Feature Class Code of Administrative Area or Named Area

The four-digit Feature Class Code of an Administrative Area Feature Class or Named Area Feature Class that occurs within the particular geopolitical structure in question.

10.4.6.6 Language Code

The ISO 639-2 Language Code language code of the language used to define the Local Name of the Administrative Area or Named Area.

10.4.6.7 Local Name of Administrative Area or Named Area

The Local Name of Administrative Area or Named Area is the Field that records the local name of the generic Administrative Area or Named Area within this particular structure. There may be several languages in which this name is provided.

EXAMPLE State, County, Bundesland, Département, Postleitzahlenbezirk, or Woonplaats.

These might correspond to ”Built-up Area”, “Postal District”, “Order-3 Administrative Area” or “Administrative Place C”. A multilingual release of a GDF may be provided with the multiple language mechanism for local Administrative Area or Named Area names.

10.4.6.8 Immediate Parent Geopolitical Structure Component

One or multiple direct parent Geopolitical Structure Components of the local Geopolitical Structure Component in question. The totality of all parent definitions within a Geopolitical Structure establishes its fully or partially hierarchical graph of sub-divisions and containment.

10.4.6.9 Lowest Full Predecessor Geopolitical Structure Component

The next hierarchical predecessor Geopolitical Structure Component(s) of the local Geopolitical Structure Component in question (‘”the local component”). One or multiple full predecessors are derived by recursively exploring all parents if they are fully containing the local component. The recursion is effected when a parent does not fully contain the local component; then in turn its parent(s) become subject to

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further exploration. The set of all Lowest Full Predecessors is determined upon reaching the final parent that fully contains the local component and no additional explorations are required.

The geopolitical structure is locally hierarchical if the set of Immediate Parents and the set of Lowest Full Predecessors are identical. The totality of all parent definitions within a Geopolitical Structure establishes its fully or partially hierarchical graph of sub-divisions and containment.

10.4.6.10 Geopolitical Structure Component Description

An informative description of the characteristics of the Geopolitical Structure Component in question.

10.4.7 Abbreviation

10.4.7.1 Introduction

Common cartographic practice often leads to the abbreviation of common words on a map to reduce clutter and make the map more visually appealing.

EXAMPLE "Professor van Essenstraat" may be abbreviated "Prof. v. Essenstr.".

Additionally, users may enter addresses using these abbreviations for geocoding. The Abbreviation Record may be used to describe the common abbreviations for a given language.

10.4.7.2 Language Code

The ISO 639-2 Language Code of the language which a particular occurrence of an abbreviation applies to.

10.4.7.3 Abbreviation Short

The abbreviation of an abbreviated term.

10.4.7.4 Abbreviation Long

The full spelling of the abbreviated term.

10.5 Source Material

10.5.1 General

Each instance of a Dataset will be based, to a certain degree, on information which already was available, either in the form of documents and/or in reality. These documents may have the form of a map, a book, report or other monographic document, both in printed and in digitized form. Each Dataset shall contain short descriptions of the sources that have been used for its creation. These references are needed for reasons of copyright, but they are also useful as tools for quality control.

In the description of the source documents, this document rules as formulated by the International Federation of Library Associations (IFLA) shall be followed. These rules are found in this documents ISBD(G) and ISBD(CM) [40].

For the description of reality as a source, so called Field Data Capture of Field Verification information will be specified. This "Field" information is sufficiently characterized by the date on which the survey took place.

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It is possible that both a source document and field information is relevant. Usually this concerns information from a document which afterwards has been verified or updated in the field.

The descriptions of the sources will be situated immediately after the spatial domain descriptions. These descriptions concern all reference documents and field information of the entire Dataset. It is possible to refer on the Section level to those descriptions which are relevant for that particular Section.

10.5.2 Source

10.5.2.1 Introduction

The description of the Sources used in the creation of a Dataset. Each single document will in principle be represented by one Cartographic Source description. Field information will be represented by the date on which the field activity was conducted.

A description of the sources shall contain the following items:

Description Level

Level of Completeness

Source Description Identifier

International Standard Book Number

International Standard Serial Number

Document Language(s)

Country(ies) Involved

Year of Survey

Date of Survey

Map Scale (for Cartographic Documents only)

Author Name

Document Title

Document Title Language

Document Volume Name

Edition Number

Impression Number

Year of Publication

Place of Publication

Name of Publisher

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Year of Distribution

Place of Distribution

Name of Distributor

Host Document Relation

Field Information

10.5.2.2 Description Level

Indicates whether the description is “stand alone” or whether it forms a “description tree” with host documents. The relations to possible host document shall be specified.

It may contain one of four different values which indicates the level of description that applies to the subsequent Source description.

The first level in a multilevel description or an independent (single level) description.

The second level in a multi-level description.

The third level in a multi-level description.

The fourth level in a multi-level description.

Single level descriptions will always have the value 1. Parents in a two-level description will have a value 1, the child 2. Codes 3 and 4 are only used in exceptional cases of descriptions with three and four different levels.

10.5.2.3 Level of Completeness

This code may only have the value 1 indicating the 1st level of Completeness for this document.

10.5.2.4 Source Description Identifier

An identification number of this particular Source description. This number shall be unique for all Source Material descriptions covering all Datasets.

10.5.2.5 International Standard Book Number

The ISBN-number [41] of the source document. In case this document in question has no ISBN-number, this field shall be left empty.

10.5.2.6 International Standard Serial Number

The ISSN-number [42] of the source document. For a non-serial numbered document, or for documents not having an ISSN-number, this field shall be left empty.

10.5.2.7 Document Language(s)

The ISO 639-2 Language Code of the main language(s) used in the source document.

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10.5.2.8 Country(ies) Involved

The ISO 3166 alpha-3 country code of a country or countries which have been involved in the production, publication or distribution of a document.

10.5.2.9 Year of Survey

The year of the primary field survey of the real-world situation as represented in this document. Surveys performed for updating purposes are not considered. When the primary survey may not be fixed on one year (because the survey lasted more than one year), a mean value may be taken.

10.5.2.10 Date of Survey

The actual date of the survey expressed in the form of month, day and hour. This exact information will only be required for documents having a very precise moment of survey, e.g. aerial photographs or satellite images.

10.5.2.11 Map Scale (for Cartographic Document only)

The scale denominator of the cartographic document given without punctuation.

EXAMPLE A scale of 1:25 000 will be treated as 25000.

10.5.2.12 Author Name

The name(s) of the author(s) of a document according to the rules given in ISO 690. The name of the author shall be recorded as given on the source, but with the family name first. If the name of more than one author appears on the source, the name appearing most prominently shall be recorded first. If the names are given equal prominence, the name appearing first shall be recorded first. If not more than three authors share principle responsibility for the work, the names of both or all three shall be included. If four or more authors share responsibility for the work, only the name of the first, or the names of the first two or three need to be recorded; the names of the others may be omitted, the abbreviation “et al.” or its equivalent shall be added following the last name recorded.

10.5.2.13 Document Title

10.5.2.13.1 Introduction

The main title of this document in issue. When the title is specified in more than one language, a corresponding number of repeating Document Title descriptions shall be used. Parts of the title which differ from document volume to document volume are considered as subtitles and shall be described by document volume Name.

In a multilevel description, Document Title will be used to specify the general title. The general title is that part of the title that belongs to a series of documents as a whole and that is present in all (or almost all) the individual titles.

Document Title contains two sub elements:

Document Title Language

Document Title Text

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10.5.2.13.2 Document Title Language

The ISO 639-2 Language Code of the language used in this document Title Text. See ISO 639-2 Language Codes.

10.5.2.13.3 Document Title Text

The main title of a document.

Any string of words which may be used for the identification of a document or a series of documents and which is present on this document itself. If a document has no title in the sense of the definition in the foregoing sentence, a title shall be devised and recorded in square brackets.

In the case of a multilevel description, the main title shall only contain that part of the title which is common to all document volumes. The individual document volume titles and document volume numbers are given in Document Volume Name. In single level descriptions, a document having a long title that consists of two or more clearly distinguishable parts, of which only the first part is required for identification purposes and of which the secondary part(s) give(s) only a more detailed description, may be split into two parts: a main title and a sub-title. The subtitle shall be represented in Document Volume Name.

In case the title is not self-explanatory, a General Comment shall be included, which explains in one or two lines the content of a document. This General Comment shall immediately follow this document Title Text.

10.5.2.14 Document Volume Name

10.5.2.14.1 Introduction

The subtitle elements within a one level description or those parts of a title within a multilevel description that are not common to all document volumes and will differ from one document volume to the other. Also, document volume numbers are considered to be (part of) a subtitle.

If this document contains parallel subtitles in different languages, a corresponding number of repeating Document Volume Name descriptions shall be created. These records repeat independently from Document Title.

Document Volume Name contains two elements:

Document Volume Name Language

Document Volume Name Text

10.5.2.14.2 Document Volume Name Language

The ISO 639-2 Language Code of the language used in Document Volume Name Text. When Document Volume Name Text contains only a document volume number, this document Volume Name Language may remain empty.

10.5.2.14.3 Document Volume Name Text

That part of the title which is not included in the main title. Also, document volume numbers are considered to be a part of the sub title and are handled as such.

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10.5.2.15 Edition Number

The edition number of a particular document. When there is no edition number mentioned on this document, it is assumed to be the first edition.

10.5.2.16 Impression Number

The impression number of this document.

10.5.2.17 Year of Publication

The year (according to the international "Gregorian" calendar) of the publication or distribution of this document.

10.5.2.18 Place of Publication

Contains two sub-items: Country of Publication and Place of Publication.

- **Country of Publication**: The ISO 3166 alpha-3 code of the country to which the place specified in Place Name belongs.
- **Place of Publication**: The name of the place where the publisher is located. For rules, see Production Place (10.2.4.8.3).

10.5.2.19 Name of Publisher

The name of a publisher of this document, or the organisation (legal person) who has been entirely or partly financially responsible for the publication of a document. The name of the publisher is mandatory in every document description.

10.5.2.20 Year of Distribution

The year (according to the international "Gregorian" calendar) of the distribution of this document.

10.5.2.21 Place of Distribution

Contains two items: Country of Distribution and Place of Distribution.

- **Country of Distribution**: The ISO 3166 alpha-3 code of the country to which the place belongs which is described in Place of Distribution.
- **Place of Distribution**: The name of the place where the distributor is located. For rules, see Production Place (10.2.4.8.3).

10.5.2.22 Name of Distributor

The name of a distributor of this document.

As for Name of Publisher.

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10.5.2.23 Host Document Relation

10.5.2.23.1 Introduction

The relations that exist between this document or this document series in issue and the host documents. A Host Document description contains 5 different elements:

Host Description Identifier
Relationship Kind
From Page
To Page
General Comment

10.5.2.23.2 Host Description Identifier

The Description Identifier of the host document.

10.5.2.23.3 Relationship Kind

The type of relation between this document in issue and the host document. The following values have been fixed:

11 = Descended from
12 = Appendix to
13 = Published together with
14 = Additional map to
15 = Inset map to
16 = Is part of

10.5.2.23.4 From Page

The page number within the host document where this document in question starts.

10.5.2.23.5 To Page

The page number within the host document where this document in question ends.

10.5.2.23.6 General Comment

Any free text to represent a short comment.

10.5.2.24 Field Information

10.5.2.24.1 Introduction

The date on which field data capture or verification was conducted. Field Information contains three different elements:

Start Date of Field Data Capture
End Date of Field Data Capture
General Comment

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10.5.2.24.2 Start Date of Field Data Capture

The date of the start of the field activity via which the information was collected, verified or last updated.

10.5.2.24.3 End Date of Field Data Capture

The date of the end of the field activity via which the information was collected, verified or last updated. In case this field is left empty, the field activity took place on the start date of the Field Data Capture.

10.5.2.24.4 General Comment

Any free text for any additional FDC information.

10.6 Geodetic Parameters

10.6.1 General

In a Dataset, all the geodetic parameters needed for the correct interpretation of the X, Y and Z coordinates shall be described explicitly so that the coordinates may be transformed into any other coordinate system.

The descriptions of the geodetic parameters are given at the Dataset level, and are provided with an identification number so that they may be referred to by the Section Headers for which they are relevant.

Geodetic Parameters contain the following parts:

Geodetic Datum
Vertical Datum
Reference Ellipsoid
Projection Method
National Map Grid
Geoid Undulation
Magnetic Declination

10.6.2 Geodetic Datum

10.6.2.1 Introduction

A description of the geodetic (horizontal) datum that underlies a particular national grid. It is needed in order to be able to shift from one geographical coordinate system into another. This description consists of the following items:

Datum Origin
Datum Rotation
Scale Factor
Datum Name
Datum Code

10.6.2.2 Datum Origin

10.6.2.2.1 Introduction

The origin of the datum in question in WGS '84 coordinates. It contains the following elements:

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10.6.2.2.2 X-Origin

The value of the X-coordinate of the origin of the geodetic datum, in WGS '84 and expressed in decimeters.

10.6.2.2.3 Y-Origin

The value of the Y-coordinate of the datum's origin, in WGS '84 and expressed in decimeters.

10.6.2.2.4 Z-Origin

The value of the Z-coordinate of the datum's origin, in WGS '84 and expressed in decimeters.

10.6.2.3 Datum Z Rotation

The rotation parameters of the datum in relation to WGS '84.

The angle of the rotation around the Z-axis in WGS '84, expressed in hundredths of milligons (gon E-5). This rotation is defined as the angle between the direction of the X-axis of the datum in question minus the direction of the X-axis of the WGS-datum.

10.6.2.4 Scale Factor

The quotient between a distance between two points expressed in the length unit of the local datum divided by the same distance expressed in the length unit of WGS '84.

Assuming that the length units in both systems are based on meters, this factor always will have values of almost 1.

EXAMPLE Values of 0,9999995 or 1,0000005.

In Scale Factor not the value of Mo itself, but the value of (1 - Mo)* 10 E+9 will be stored. These values shall be rounded at an integer and preceded by their sign.

In the examples mentioned above, this will lead to values of +500 and -500 respectively.

10.6.2.5 Datum Name

Name of the geodetic (horizontal) datum.

A list of horizontal datum names is given in B.1.

10.6.2.6 Datum Code

Code of the geodetic (horizontal) datum.

A list of horizontal datum codes is given in B.1.

10.6.3 Vertical Datum

10.6.3.1 Introduction

A description of the orthometric reference system used in a certain country, together with adjacent orthometric reference systems. This is needed in order to be able to translate height data either side of the interface between adjacent height levels. This description consists of the following items:

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Relevant Country
Height Level Name
Height Level Code
Adjacent Orthometric Reference System(s)

10.6.3.2 Relevant Country

ISO 3166 country code of the country in which the orthometric reference system in issue is used.

10.6.3.3 Height Level Name

Name of the vertical datum in use.

A list of vertical datum names is given in B.1.

10.6.3.4 Height Level Code

Code of the vertical datum in use.

A list of vertical datum codes is given in B.1.

10.6.3.5 Adjacent Orthometric Reference Systems

10.6.3.5.1 Introduction

Specification of zero or more orthometric reference systems that are adjacent to the vertical datum in use. Each adjacent orthometric reference system is described by the following items:

Relevant Country
Height Level Name
Height Level Code
Height Difference

10.6.3.5.2 Relevant Country

ISO 3166 country code of the country in which the adjacent orthometric reference system is used.

10.6.3.5.3 Height Level Name

Name of an adjacent vertical datum.

A list of vertical datum names is given in B.1.

10.6.3.5.4 Height Level Code

Code of an adjacent vertical datum.

A list of vertical datum codes is given in B.1.

10.6.3.5.5 Height Difference

The orthometric height of the origin of the adjacent system, relative to the system in issue.

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10.6.4 Reference Ellipsoid

10.6.4.1 Introduction

The reference ellipsoid is described by the following elements:

Semi Major Axis
Semi Minor Axis
Ellipsoid Code
Ellipsoid Description

10.6.4.2 Semi Major Axis

The length of the semi-major axis of the reference ellipsoid expressed in metres.

10.6.4.3 Semi Minor Axis

The length of the semi-minor axis of the reference ellipsoid expressed in metres.

10.6.4.4 Ellipsoid Code

The reference code of the ellipsoid. A list of ellipsoid codes is given in B.1.

10.6.4.5 Ellipsoid Description

Textual description of the Ellipsoid used. This information is mandatory if no ellipsoid code is specified.

10.6.5 Projection Method

10.6.5.1 Introduction

Information about the projection used in a particular national grid is needed to be able to transform XY- coordinates into geographical coordinates. In case all the coordinates in the Sections are directly given in the form of geographical coordinates, Projection Method may be left empty.

Each description of the projection shall contain the following items:

Projection Type Code
Projection Parameter
Projection Type Description

10.6.5.2 Projection Type Code

A reference code of the projection used by a Dataset.

A list of projection type codes is given in B.1.

10.6.5.3 Projection Parameter

10.6.5.3.1 Introduction

The longitude and/or latitude value(s) of the base line(s), together with a point scale factor, which define the projection.

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10.6.5.3.2 Latitude Longitude

This item may repeat up to 3 times. The value of the geographical latitude and longitude values shall refer to the same datum and reference ellipsoid described in Geodetic Datum and Reference Ellipsoid.

Latitude

The value of the latitude depending on the projection type.

The latitude shall be expressed in microdegrees (degrees E-6). It shall be preceded by a plus sign (+) for latitudes on the Northern hemisphere and a minus sign (-) for latitudes on the Southern hemisphere.

The latitude of the equator shall be expressed as +0000000. The latitude of the North Pole will be +90000000. See also ISO 6709 [39].

Longitude

The value of the longitude depending on the projection type.

Longitudes shall be expressed in microdegrees. The longitudes shall refer to the Prime meridian of Greenwich. Longitudes east of Greenwich shall be designated by use of the plus sign (+), longitudes west of Greenwich shall be designated by use of the minus sign (-). The prime Meridian shall be designated by use of the plus sign (+). The 180th meridian shall be designated by use of the minus sign (-). See also ISO 6709 [39].

10.6.5.3.3 Point Scale Factor

The scale factor in a defined point or along a defined parameter line depending on the projection type.

The scale factor (Mo) is defined as the quotient between the value of a distance between two infinitesimal adjacent points calculated from the XY-coordinates of the projection system and the other value calculated from the geographical latitude and longitude and the corresponding reference ellipsoid.

In Point Scale Factor not the value of Mo itself, but the value of (1 - Mo)* 10 E+7 will be specified. These values shall be rounded at an integer and preceded by a plus (+) or minus (-) sign.

The longitude of the central meridian is specified in the first Latitude Longitude group which is directly followed by Point Scale Factor.

EXAMPLE 1 For a projection of the type “Transverse Mercator”, the geographical longitude of the central meridian and the point scale factor along the central meridian shall be known.

EXAMPLE 2 For a projection of the type “Lambert Conformal Conic with two standard parallels”, the following parameters are required:

latitude of the Northern standard parallel,

latitude of the Southern standard parallel,

latitude of the central parallel at which the point scale factor is specified,

the point scale factor.

The latitude of the Northern parallel shall be given in the first Latitude Longitude group, the latitude of the Southern parallel in the second and the latitude to which the point scale factor belongs in the third one, followed by a Point Scale Factor.

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The geographical latitude and longitude values shall refer to the same datum and reference ellipsoid described in Geodetic Datum and Reference Ellipsoid.

10.6.5.4 Projection Type Description

Textual description of the Projection Type used. This information is mandatory if no projection type code is specified.

10.6.6 National Map Grid

10.6.6.1 Introduction

The characteristics of the national grid to which the coordinates of a particular Section refer are needed to interpret correctly the X- and Y-coordinate values, and to be able to transform from XY-coordinates into geographical coordinates.

The description contains three items:

Indication whether the grid axes are left- or right-turning.

Description of the origin of a "help" grid in terms of latitude and longitude.

Description of the origin of the national grid relative to the help grid.

The help grid shall be normal Cartesian and have its +Y-axis northwards and tangential to the projection of the meridian in the origin. The length unit used in the help grid shall be the metre.

In case the real grid is rotated with respect to the help grid, this shall be specified by means of Grid Rotation.

A description of the national grid shall contain the following items:

Grid Axes Orientation

Help Grid Latitude

Help Grid Longitude

X Origin

Y Origin

Grid Rotation

Grid Name

Grid Code

10.6.6.2 Grid Axes Orientation

An indicator of whether the grid in issue (the national grid) is normal Cartesian or reverse Cartesian.

0 normal Cartesian

1 reverse Cartesian

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For the rest, grids shall be rectangular and have orthogonal coordinate axes, both using the same length unit.

Normal Cartesian means that the clockwise counted angle between the +Y-axis and the +X-axis (Yr - Xr) is 300 gon. Reverse Cartesian means that this angle is 100 gon.

10.6.6.3 Help Grid Latitude

The latitude of the origin of the "help" grid.

This value shall be expressed in microdegrees (degrees E-6).

Rules as for Latitude.

10.6.6.4 Help Grid Longitude

This field shall contain the value of the longitude of the origin of the "help" grid.

Rules as for Longitude.

10.6.6.5 X Origin

The X-coordinate of the origin of the national grid expressed in the "help" grid. This value shall be expressed in decimeters. Positive coordinate values shall be preceded by a plus sign (+) and negative values by a minus sign (-). In case the origin of the national grid coincides with the origin of the "help" grid (which will often be the case), this field shall contain the value: +00.

10.6.6.6 Y Origin

The Y-coordinate of the origin of the national grid expressed in the "help" grid. Rules as for X Origin.

10.6.6.7 Grid Rotation

The clockwise counted angle between the + Y-axis of the national grid and the + Y-axis of the "help" grid, expressed in microgons (gon E-6).

Expressed in symbols: Rot = Yn - Yh

where Yn is the direction of the +Y-axis of the national grid and Yh is the direction of the +Y-axis of the help grid.

If the Y-axes of both grids coincide (or are parallel to each other), which will often be the case, this field shall contain: +0000000.

10.6.6.8 Grid Name

Name of the national grid.

A list of National Grids is given in B.1.

10.6.6.9 Grid Code

Code of the national grid.

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A list of National Grids is given in B.1.

10.6.7 Geoid Undulation

10.6.7.1 Introduction

The height of the geoid above the reference ellipsoid in some particular reference points shall be described.

A description of Geoid Undulation is needed when Z-values are used in the data records.

Each Section shall refer to 4 different geoid undulation reference points which surround the Section, so that the local geoid height in the Section may be calculated by means of interpolation.

Each description of a geoid undulation reference point shall contain the following items:

Reference Point Latitude

Reference Point Longitude

Ellipsoidal Height

10.6.7.2 Reference Point Latitude

The value of the latitude of the point in question.

Rules as for Latitude.

10.6.7.3 Reference Point Longitude

The value of the longitude of the point in question.

Rules as for Longitude.

10.6.7.4 Ellipsoidal Height

The ellipsoidal height of the local geoid.

The height above the reference ellipsoid (the same as that described in Reference Ellipsoid) shall be expressed in decimeters. Positive values shall be preceded by a plus sign (+), negative values by a minus sign (-).

10.6.8 Magnetic Declination

10.6.8.1 Introduction

Information about the magnetic declination and the annual deviation is needed to be able to correct for this declination in the heading of a navigation compass.

The magnetic declination shall be specified in the centre point of a Section or in 4 different points that surround the Section so that the local value may be calculated by means of interpolation.

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Each description of a magnetic declination reference point shall contain the following items:

Reference Point Latitude

Reference Point Longitude

Validity Date

Magnetic Variation

Annual Change

Horizontal Magnetic Field Intensity

Vertical Magnetic Field Intensity

10.6.8.2 Reference Point Latitude

See 10.6.7.2.

10.6.8.3 Reference Point Longitude

See 10.6.7.3.

10.6.8.4 Validity Date

The year, month and day which correspond to the value of the magnetic declination which is specified in Magnetic Variation.

10.6.8.5 Magnetic Variation

The angle between the direction of the Magnetic North (Nm) and the Geographic North (Ng), in symbols: Dec = Nm - Ng.

The angle shall be expressed in milligons (gon E-3) and shall be preceded by a plus sign for eastward declinations and by a minus sign for westward declinations.

10.6.8.6 Annual Change

The annual change in the magnetic declination. This change is defined as: the clockwise counted angle between the direction of the Magnetic North in year i (Nm(i)) and the direction of Nm in the preceding year i-1 (Nm(i-1)).

In symbols: Dev(An) = Nm(i) - Nm(i-1).

The angle shall be expressed in milligons (gon E-3).

Eastward annual changes are preceded by a plus (+) sign. Westward annual changes are preceded by a minus sign (-).

10.6.8.7 Horizontal Magnetic Field Intensity

Horizontal Magnetic Field Intensity expressed in nanoteslas.

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10.6.8.8 Vertical Magnetic Field Intensity

Vertical Magnetic Field Intensity expressed in nanoteslas.

10.7 Update Information

10.7.1 General

For publishing update information, certain syntactical structures shall be specified. These are described in the following.

10.7.2 Time Stamp Format

Formatting string for the time stamps used within the given Section:

The time unit symbols correspond to those used for Time Domain expressions. The Logical Data Structures specifies further Time Stamp Format composition rules and constraints (see 11.6.3.9).

d = day

M = month

y = year

h = hour (0…23)

m = minutes

s = seconds

: = separator

For instance, “dd:MM:yyyy:hh:mm” means that a time stamp is stored in a day/month/year system followed by the hour and the minutes.

10.8 General Comment

A free text allowing any necessary comment to other items.

11 Logical Data Structures

11.1 Introduction

This document specifies the logical GDF data structures that help understand the semantics of the GDF data and thereby help with the transfer and exchange of data. These data structures may be considered as independent of any specific realization method in which they are implemented. This data structures may be used to build the basis of in-memory data structures that would be used by a reader (parser) program on a computer to ingest (accept / store) the GDF content from any realization.

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11.1.1 Data description language: ESN

To describe the data structures, use is made of a Data Description Language, called ESN. This language enables data types to be constructed of any complexity from a set of elementary types. This may be illustrated by means of the following example:

PROJECTION TYPE =

```
[
  Projection Identifier          : PROJECTION ID              11.8.7.33
  Projection Type Code           : PROJECTION TYPE CODE       11.8.3.8
  Projection Parameters Sequence : PROJECTION PARAMETERS      11.3.15.9
]
```

The name written entirely in uppercase letters ("PROJECTION TYPE" in the example) is the proper name of the data type. This name is used to identify just this particular data structure so that it may be referenced in the definition of data types of higher complexity. The name may not be used for any other data type. Furthermore, it is recommended that one particular data type (i.e. with exactly that particular specification, constraints included) carries just one name.

Each data type definition begins with the symbol "[" and ends with the symbol"]". Each line between these square brackets describes a particular component of the data type in question. At the right-hand side, the data type of that particular component is mentioned. In the example above, the datatype of the first component is "PROJECTION ID". This name is followed by the number of the section where that data type is described (11.8.7.33 in the example).

The example shows that the data type "PROJECTION ID" has the role of a Projection Identifier. Therefore "Projection Identifier" is called the "role name". Role names are always found in the left column and are always written in lowercase with initial caps. Role names correspond (for the most part) to the names used in the Metadata Catalogue and the Media Record Specifications. It often occurs that the role name and the data type name are identical (apart from the different use of uppercase letters). This indicates that the data type has been especially constructed for the role in question. If the data type is used for more than one role, the names will be different. The order in which the individual components are listed is significant. When the same components are listed in another order, this implies that the data type defined is different. See the diagram of 11.1.5. for a graphical illustration of what is written in this section.

11.1.2 Sets, elements and ranges

A particular data type used in ESN is the Set. A Set is simply an un-ordered collection of one or more elements (instances) of the same data type and is specified in the following form:

L = [T]+, where the + indicates that in the Set L there may be multiple elements of type T.

The elements of type T in a particular instance of the Set L are not order significant. However, if the order is meaningful, then a constraint to note that shall be specified: as in the example of the order of X,Y Coordinate Sequence in [COORDINATE PAIR]+ (i.e. the ordered SET of COORDINATE PAIRs) in NON-EXPLICIT TOPO LINE GEO RENDERING, as further explained in constraint C2; see 11.5.4.4.14. A datatype may be constrained by saying that its domain shall be a subset of the elements of a particular list. This is done by means of the constructs ELEMENT(L) or RANGE(L). ELEMENT(L) means that the component refers to not more than one element of the Set L. RANGE(L) means that the component refers to zero, one or more elements of the Set L. The order in which these elements are referred to is not relevant, unless otherwise specified. Such use of ELEMENT and RANGE operators are often used in the constraints – but there, they play an important role. This technique is known as “denotational semantics”. It is a branch of computer science which formalizes “meaning” of computer (synthetic) languages.

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11.1.3 Summary of the syntax notation

(0) literals in this language are either numbers (like 17) or strings in quotes (like ‘a’ or ‘November’);

(0a)NULL denotes an absence of a value;

(1) e : T — component with role e is of data type T;

(2) T = [A|B] — an instance of data type T is either expressed as an A type or as a B;
where A and B are simple data types, which may be further turned into some values;

(2a)T = [17|’a’] — an instance of data type T is either the value 17 or the value a;
where both 17 and a are literal values;

(3) T = an instance of data type T contains 2 components:

```
[
   e1: T1        - a component of data type T1 playing role e1
   e2: T2        - a component of data type T2 playing role e2
]
```

(3a)T = an instance of data type T contains exactly 1 of the following 2 components:

```
[
   e1: T1        - a component of data type T1 playing role e1
   |             - or
   e2: T2        - a component of data type T2 playing role e2
]
```

(4) L = [T]* — an instance of data type L is a Set of zero or more instances of data type T;

(4a)L = [T]+ — an instance of data type L is a Set of one or more instances of data type T;

(5) T = (i..j) — an instance of data type T is an integer in the range i <= t <= j;

(5a)T = (i..j, k..l) — an instance of data type T is an integer in the range i <= t <= j or k <= t <= l;

(5b) T = (i, j, k, l) — an instance of data type T is an integer whose value is either i, j, k, or l;

where in these examples i, j, k, and l are some integers;

(6) ELEMENT(L) — denotes a reference to one instance of the Set L;
if L isn't the empty Set, ELEMENT(L) shall return exactly one value;

(6a)RANGE(L) — denotes a reference to zero, one, or more instances of the Set L.

11.1.4 Useful consequences of the syntax notation

Putting "together" (0), (0a), (2), and (2a) yields:

(7) T = [‘a’ | NULL] — an instance of data type T may have either the value of ‘a’ or the absence of a value, that is no value at all;

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Putting together (2), (2a), (3), and (7) above yields:

(8) T =
[
e1: T1
| NULL - an optional component of data type T1 playing role e1

e2: T2 - a mandatory component of data type T2 playing role e2
]

Putting together (3), (4a), and (7) yields:

(9) T =
[
e1: [T1]+
| NULL - an optional component (or a Set of such components) of data type T1 playing (together) role e1

e2: T2 - a mandatory component of data type T2 playing role e2
]

and also

(9a)T =
[
e1: [T1]+ - at least one component (or a Set of such components) of data type T1 playing (together) role e1

e2: T2 - a mandatory component of data type T2 playing role e2
]

If we take the or '|' symbol out of (2) and (2a), we are left with

(10) T = [A]

and

(10a) T = ['a']

which may be more "naturally" rendered as

(11) T = A

and

(11a) T = 'a'

Putting together (0), (5b), and (11a) allows us the convenient way to render something like this:

(12) T = (Sunday=1, Monday=2, Tuesday=3, Wednesday=4, Thursday=5, Friday=6, Saturday=7)

which is a very pleasant way to render "meaningful" value lists.

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(13) T = (Car=12, Bus, Taxi, Truck=51)

takes this notation a step further, where arguments without explicit value assume to continue the former element. So, in this example Bus and Taxi would have the values 13 and 14 respectively.

If a Set like this doesn't specify any value (or at least not the first value), that value is assumed to be 1. For all other situations, an explicit value shall be presented.

11.1.5 Diagrammatic Overview of the overall structure

At the highest-level observation, a GDF-Album is made up of the following components:

- GDF Album		{11.2}
+ Album Metadata		{11.2.3}
- Dataset SET		{11.3}
+ Dataset Metadata		{11.3.3}
+ Dataset Data		{11.3.16}
- Layer SET	{11.4}	
+ Layer Metadata	{11.4.3}	
+ Layer Data		{11.4.4}
+ Section SET		{11.5}

In the above rendition the highest-level view is provided. It only shows Album, Dataset, Layer, and Section, as well as their respective Metadata components. The '-' sign shows that the object to its right has been "opened" of "laid out to see" its 1st level components. A '+' shows that the object to its right has not yet been "opened".

At the next level of presentation, the 2nd level view of the above diagram (after having "opened" Album Metadata and Dataset Metadata) appears as follows:

- GDF Album		{11.2}
- Album Metadata		{11.2.3}
+ Local Char Set Defn.	<optional>	{11.2.5}
+ Global Album Info	{11.2.6}	
- Dataset SET		{11.3}
- Dataset Metadata		{11.3.3}
+ Dataset Header	{11.3.4}	
+ Media Record Set Constructs	<opt>	{11.3.5}
+ Data Dictionary	{11.3.6}	
+ Directory	<opt>{11.3.7}	
+ Spatial Domain SET	<opt>{11.3.8}	
+ Sources	<opt>	{11.3.9}
+ Network Specifications	<opt>{11.3.10}	
+ Abbreviations	<opt>{11.3.11}	
+ Admin. Structure Definitions	<opt>	{11.3.13}
+ Geodetical Parameters	<opt>	{11.3.15}
- Dataset Data		{11.3.16}
+ Update Info SET	<opt>{11.7}	
+ Relationship SET	<opt>	{11.5.4.5}
+ Attribute SET	<opt>{11.5.4.6}	
+ Text Record SET	<opt>	{11.5.4.7}
+ Time Domain Record SET	<opt>{11.6.2}	
+ Object Reference SET	<opt>{11.5.4.9}	

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- Layer SET {11.4}
  + Layer Metadata {11.4.3}
  + Layer Data {11.4.4}
  + Section SET {11.5}

For the 3rd "level" of exposition, Layer Metadata as well as Section Metadata and Data is "opened":

- GDF Album {11.2}
  - Album Metadata {11.2.3}
    + Local Char Set Defn. <optional> {11.2.5}
    + Global Album Info {11.2.6}
  - Dataset SET {11.3}
    - Dataset Metadata {11.3.3}
      + Dataset Header {11.3.4}
      + Media Record Set Constructs <opt> {11.3.5}
      + Data Dictionary {11.3.6}
      + Directory <opt> {11.3.7}
      + Spatial Domain SET <opt> {11.3.8}
      + Sources <opt> {11.3.9}
      + Network Specifications <opt> {11.3.10}
      + Abbreviations <opt> {11.3.11}
      + Admin. Structure Definitions <opt> {11.3.13}
      + Geodetical Parameters <opt> {11.3.15}
    - Dataset Data {11.3.16}
      + Update Info SET <opt> {11.7}
      + Relationship SET <opt> {11.5.4.5}
      + Attribute SET <opt> {11.5.4.6}
      + Text Record SET <opt> {11.5.4.7}
      + Time Domain Record SET <opt> {11.6.2}
      + Object Reference SET <opt> {11.5.4.9}
    - Layer SET {11.4}
      + Layer Metadata {11.4.3}
        + Layer Topology {11.4.5.2}
        + Height Level Method {11.4.5.3}
        + X,Y Resolution {inside 11.4.3}
        + Layer Theme SET <opt> {11.8.2.6}
      + Layer Data {11.4.4}
        + Update Info SET <opt> {11.7}
        + Relationship SET <opt> {11.5.4.5}
        + Attribute SET <opt> {11.5.4.6}
        + Text Record SET <opt> {11.5.4.7}
        + Time Domain Record SET <opt> {11.6.2}
        + Object Reference SET <opt> {11.5.4.9}
      + Section SET {11.5}
        - Section Metadata {11.5.3.2}
          + Section Identification {11.5.3.3}
          + X,Y Resolution <opt> {inside 11.5.3.2}
          + Network Identification <opt> {11.3.10}
          + Datasource References <opt> {11.3.9.2}
          + Datum & Magnetism Use <opt> {11.5.3.5}
          + Orthometric Ref. Use <opt> {11.5.3.7}
          + Section Borders {11.5.3.9}
          + XY Control Point <opt> {11.5.3.10}
          + Z Control Point <opt> {11.5.3.11}

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+ Upd. Time Stamp Format		<opt>	{11.6.3.9}
- Section Data		{11.5.4}	
+ Update Info SET	<opt>	{11.7}	
- Topo/Geo Data	<opt>	{11.5.4.3}	
+ Node SET		{11.5.4.3.3}	
+ Edge SET		{11.5.4.3.4}	
+ Face SET		{11.5.4.3.5}	
- Feature Data		{11.5.4.4}	
- Simple Feature Data			{11.5.4.4}
+ Point Feature SET			{11.5.4.4.4}
+ Line Feature SET			{11.5.4.4.9}
+ Area Feature SET			{11.5.4.4.17}
+ Complex Feature Data			{11.5.4.4.24}
+ Relationship SET	<opt>	{11.5.4.5}	
+ Attribute SET	<opt>	{11.5.4.6}	
+ Text Record SET	<opt>	{11.5.4.7}	
+ Time Domain Record SET		<opt>	{11.6.2}
+ Conversion Record SET		<opt>	{11.5.4.8}
+ Object Reference SET	<opt>	{11.5.4.9}	

11.2 Logical GDF Album

11.2.1 Overview

The aggregation of all the information pertaining to a particular geographical area, created at a particular moment by a certain supplier, is called an Album. An Album contains one or more Datasets.

The relations between Album, Datasets, Layers and Sections are illustrated in the diagram of section 11.1.5 as well as UML data model Figure 14 and Figure 15.

11.2.2 Album

[

Album Identifier	: ALBUM ID	11.8.7.9
Album Metadata	: ALBUM HEADER	11.2.3
Datasets	: [DATASET]+	11.3.2

]

Constraints

C1: An Album Identifier is an identifier of an Album and shall be unique within the set of Albums supplied by a certain supplier.

C2: Each Dataset shall belong to exactly one Album.

11.2.3 ALBUM HEADER

[

Album Introduction	ALBUM HEADER INTRO	11.2.4
Local Character Set Definition List	: [LOCAL CHARACTER SET DEFINITION]+ | NULL	11.2.5
Global Album Information	: GLOBAL ALBUM INFORMATION	11.2.6

]

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Constraints
C1: An Album shall contain at least one Dataset
C2: A Dataset shall belong to exactly one Album

11.2.4 ALBUM HEADER INTRO

[		
Short Organization Name	: STRING	11.5.4.7.4
Standard Name	: STRING	11.5.4.7.4
Standard Version	: STRING	11.5.4.7.4
Default Character Set Identifier	: (1..30)	
Album Size	: (0..99999999999999999999)	
]		

Constraints
C1: The Short Organization Name may not exceed 18 characters (nor 18 bytes, whichever comes first).
C2: The Standard Name for this document is “GDF”.
C3: The Standard Version for this document is “5.1”.
C4: Default Character Set Identifier is limited to a narrower subset of possible character sets from the bigger available set. See 10.2.2.9 for the full list.
C5: Album Size is specified in bytes.
C6: An Album Identifier is an identifier of an Album and shall be unique within the set of Albums supplied by a certain supplier.

Comments:
K1: Corresponds to 12.6.1.1 ALBUM HEADER INTRO in MRS (Rec01.01)

11.2.5 LOCAL CHARACTER SET DEFINITION

[		
Local In Code	: TWO CHARACTERS	11.5.4.7.6
Local Out Code	: TWO CHARACTERS	11.5.4.7.6
Character Set Identifier	: CHARACTER SET ID	11.8.7.42
Organization Code	: ISO COUNTRY CODE	11.8.6.2
Character set Code Table Name	: STRING	11.5.4.7.4
Character set Code Table Version Number	: STRING	11.5.4.7.4
Character set Languages	: [LANGUAGE CODE]+	11.5.4.7.7
	| NULL	
Collating Sequence	: LANGUAGE CODE	11.5.4.7.7
	| NULL	
]		

Constraints
C1: A Character Set Identifier is an identifier of a local character set and shall be unique within the Album in issue.
C2: This Character Set Identifier shall be different than the Default Character Set in ALBUM HEADER INFO.
C3: The Local In Code shall be from the Album default character set and shall be unique within the Album in issue.
C4: The Local Out Code shall be from the Album default character set.

Comments:
K1: Corresponds to 12.6.1.2LOCAL CHARACTER SET DEFINITION in MRS (Rec01.02)

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11.2.6 GLOBAL ALBUM INFORMATION

[		
Organization Name	: STRING	11.5.4.7.4
Organization Role	: ORGANIZATION ROLE CODE	11.2.7.2
Album Creation Date	: DATE STAMP	11.6.3.2
	| NULL	
Metadata Creation Date	: DATE STAMP	11.6.3.2
Date of Copyright	: DATE STAMP	11.6.3.2
	| NULL	
Copyright Owner	: STRING	11.5.4.7.4
	| NULL	
]		

Comments:
K1: Corresponds to 12.6.1.3 GLOBAL ALBUM INFORMATION in MRS (Rec01.03)

11.2.7 Basic Data Types used by Album

11.2.7.1 Overview

Simple types used by Album

11.2.7.2 ORGANIZATION ROLE CODE

= (Resource Provider=1, Custodian=2, Owner=3, User=4, Distributor=5, Originator=6, Point of Contact=7, Principal, Investigator=8, Processor=9, Publisher=10, Author=11)

11.3 Datasets

11.3.1 Overview

The Datasets partition the Album geographically. Of course, an Album may consist of just a single Dataset, or it may consist of several Datasets.

A Dataset may contain one or more Layers.

11.3.2 DATASET

[		
Dataset Identifier	: DATASET ID	11.8.7.10
Dataset Metadata	: DATASET METADATA	11.3.3.2
Dataset Data	: DATASET DATA	11.3.16
Layer Set	: [LAYER]+	11.4.2
]		

Constraints
C1: The Supplier Dataset Identifier is an identifier of the Dataset which is unique within the set of Datasets supplied by a particular supplier.

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11.3.3 Dataset Metadata

11.3.3.1 Overview

Each Dataset starts with Dataset Metadata: data about the data needed to interpret these data in the right context.

11.3.3.2 DATASET METADATA

[

Dataset Header	: DATASET HEADER	11.3.4.2
MRS Realization Constructs	: MRS GENOME	11.3.5
Data Dictionary	: DATA DICTIONARY	11.3.6.2
Directory	: [DIRECTORY ENTRY]+	11.3.7.2
	| NULL	
Spatial Domain	: [SPATIAL DOMAIN ENTRY]+	11.3.8.2
	| NULL	
Sources	: [SOURCE DEFINITION]+	11.3.9.2
	| NULL	
Network Specifications	: [NETWORK SPECIFICATION]+	11.3.10
	| NULL	
Abbreviations	: [ABBREVIATION]+	11.3.11
	| NULL	
Admin Structure Definitions	: [ADMINISTRATIVE STRUCTURE DEFINITION]+	11.3.13
	| NULL	
Geodetical Parameters	: GEODETICAL PARAMETERS	11.3.15.2
	| NULL	

]

Constraints
C1: MRS GENOME is only useful for the MRS realization.

11.3.4 Dataset Header

11.3.4.1 Overview

The Dataset Header is the first component of the Dataset Metadata.

11.3.4.2 DATASET HEADER

[

Dataset Identification	: DATASET IDENTIFICATION	11.3.4.3
Dataset Titles	: DATASET TITLES	11.3.4.4
	| NULL	
Dataset Producer	:DATASET PRODUCER	11.3.4.5
	| NULL	
Dataset Extensiveness	:GEOGRAPHIC COVERAGE NAME	11.5.3.3
	| NULL	
Dataset Currency	: CREATION YEAR	11.3.4.6
	| NULL	
Dataset Geographical Coverage	: DATASET CONTENTS	11.3.4.7
	| NULL	
Dataset XY Resolution	: (0..999)	
	| NULL	

]

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Comments:
K1: Corresponds to 12.6.2 DATASET HEADER in MRS

11.3.4.3 DATASET IDENTIFICATION

[

IDSI Number	: STRING	11.5.4.7.4
	| NULL	
Edition Date	: DATE/HOUR STAMP	11.6.3.3
Reference Date	: DATE STAMP	11.6.3.2
Reference Type	: DATASET REFERENCE TYPE	11.3.4.9.2
Dataset Topic	: DATASET TOPIC	11.3.4.9.3
Unit System	: DATASET UNIT SYSTEM	11.3.4.9.4
	| NULL	
Dataset Languages	: [LANGUAGE CODE]+	11.5.4.7.7
	| NULL	
Default Language	: LANGUAGE CODE	11.5.4.7.7
	| NULL	
Countries Involved	: [ISO COUNTRY CODE]+	11.8.6.2
	| NULL	
Abstract	: STRING	11.5.4.7.4

]

Constraints:
C1: IDSI Number (International DataSet Identification Number) is 13 characters wide.
C2: If Unit System is not specified, the default value is 'Metric' (1).

Comments:
K1: Corresponds to 12.6.2.1 and 12.6.2.2 DATASET IDENTIFICATION in MRS (Rec02.01)

11.3.4.4 DATASET TITLES

[

Dataset Main Title	: LANGUAGE TEXT PAIR	11.5.4.7.3
	| NULL	
Dataset Subtitle	: STRING	11.5.4.7.4
	| NULL	

]

Constraints
C1: If DATASET TITLES is specified, at least one of its elements should be present.

Comments:
K1: Corresponds to 12.6.2.3 DATASET TITLES in MRS (Rec02.02 and Rec02.03)

11.3.4.5 DATASET PRODUCER

[

Production Place	: PLACE	11.8.6.1
	| NULL	
Producer Name	: LANGUAGE TEXT PAIR	11.5.4.7.3
	| NULL	

]

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Constraints
C1: It should not be the case that all fields are NULL

Comments:
K1: Corresponds to 12.6.2.4 DATASET PRODUCER in MRS (Rec02.04)

11.3.4.6 CREATION YEAR

= YEAR CODE 11.6.3.5

Comments:
K1: Corresponds to 12.6.2.5 CREATION YEAR in MRS (Rec02.05)

11.3.4.7 DATASET CONTENTS

[
Thematic Coverage : [THEME]+ 11.3.4.8
| NULL
]

Comments:
K1: Corresponds to 12.6.2.6 DATASET CONTENTS in MRS (Rec02.06)

11.3.4.8 THEME

[
Feature Theme Code : FEATURE THEME CODE 11.8.2.6
Feature Theme Name : FEATURE THEME NAME 11.8.2.7
]

11.3.4.9 Basic Data Types used by Dataset Header

11.3.4.9.1 Overview

Simple types used by Dataset Header

11.3.4.9.2 DATASET REFERENCE TYPE

= (Creation=1, Publication=2, Revision=3)

11.3.4.9.3 DATASET TOPIC

= (Farming=1, Biota=2, Boundaries=3, Climatology / Meteorology / Atmosphere=4, Economy=5, Elevation=6, Environment=7, Geoscientific Information=8, Health=9, Imagery / Base Maps / Earth Cover=10, Intelligence / Military=11, Inland Water=12, Location=13, Oceans=14, Planning Cadastre=15, Society=16, Structure=17, Transportation=18, Utilities / Communications=19)

11.3.4.9.4 DATASET UNIT SYSTEM

= (Metric=1, English=2)

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11.3.5 MRS GENOME

11.3.5.1 Overview

MRS Genome are the building blocks used to self-define the layout of the MRS realization.

11.3.5.2 MRS GENOME

[

Field Definitions	: [FIELD DEFINITION]+ | NULL	11.3.5.3
Record Definitions	: [RECORD DEFINITION]+ | NULL	11.3.5.4

]

11.3.5.3 FIELD DEFINITION

[

Field Name	: SHORT STRING	11.5.4.7.5
Field Size	: (1..99)	
Data Type	: DATA TYPE CODE	11.8.4.1
Data Unit Type	: DATA UNIT TYPE	11.8.4.3
Data Unit Code	: DATA UNIT CODE | NULL	11.8.4.2
Unit Exponent	: (-9..9)	
No Data	: NO DATA MARK	11.3.5.7.3
Value Domain	: VALUE DOMAIN	11.3.5.7.2
Data Use	: DATA USE	11.3.5.7.7
Field Description	: STRING	11.5.4.7.4

]

Constraints
C1: The Field Name is an identifier of a Field which is unique within the field definitions of GDF.

11.3.5.4 RECORD DEFINITION

[

Record Type/Subtype Code	: RECORD TYPE IDENTIFIER	11.3.5.5
Record Name	: RECORD NAME	11.3.5.7.6
Field Sequence	: [FIELD]+	11.3.5.6
Record Comment	: STRING	11.5.4.7.4

]

Constraints
C1: The Record Type Code is an identifier of a record type which shall be unique within a particular Dataset. However legal, it is uncommon for Field Type Codes to vary from one Dataset to another.
C2: The Record Name is an identifier of a record type or record subtype which shall be unique within a particular Dataset. However legal, it is uncommon for Field Type Codes to vary from one Dataset to another.
C3: The number of fields in the Field Sequence may not exceed 99.

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11.3.5.5 RECORD TYPE IDENTIFIER

[

Record Type Code	: RECORD TYPE CODE	11.3.5.7.4
Record Sub-Type Code	: RECORD SUB-TYPE CODE	11.3.5.7.5
	| NULL	

]

Constraints
C1: Not all combinations from the respective sets of Record Type Code and Record Sub-type Code are meaningful.

11.3.5.6 FIELD

[

Field Name	: SHORT STRING	11.5.4.7.5
Repeat Flag	: (0..9)	

]

Constraints
C1: Field Name shall be an ELEMENT(FIELD DEFINITION SET)->Field Name

11.3.5.7 Basic Data Types used by MRS Genome

11.3.5.7.1 Overview

Simple and compound types used by MRS Genome

11.3.5.7.2 VALUE DOMAIN

[

Minimum Value Allowed	: (-999999999999999999..999999999999999999)
Maximum Value Allowed	: (-999999999999999999..999999999999999999)

]

11.3.5.7.3 NO DATA MARK

[

No Data Mark	: 'Obl'	
	| '<S>'	
	| STRING	11.5.4.7.4

]

Constraints
C1: The '<S>' mark may be of length 1 or of some field width n of some length, but shall not exceed the allowable width of the field that it decorates.
C2: The STRING instance for a particular FIELD DEFINITION shall be an allowable field value for the given Data Type and, in case of DATA TYPE CODE 'N', be from the allowable numeric value range.

11.3.5.7.4 RECORD TYPE CODE

= (0..11, 13..19, 24, 25, 29, 41, 44..46, 50..54, 61..66, 83, 89, 90)

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11.3.5.7.5 RECORD SUB-TYPE CODE

= (0..10)

11.3.5.7.6 RECORD NAME

= ('ALHDREC.01', 'ALHDREC.02', 'ALHDREC.03', 'DSHDREC.01', 'DSHDREC.02', 'DSHDREC.03', 'DSHDREC.04', 'DSHDREC.05', 'DSHDREC.06', 'DSHDREC.07', 'ATDEFREC', 'DIREC', 'FEATDEFREC', 'SPADOREC', 'RELDEFREC', 'GPLSTRDREC', 'GPLCOMDREC', 'SRCEREC.01', 'SRCEREC.02', 'SRCEREC.03', 'SRCEREC.04', 'SRCEREC.05', 'SRCEREC.06', 'SRCEREC.07', 'SRCEREC.08', 'SRCEREC.09', 'SRCEREC.10', 'DATTVALREC', 'SECHREC.01', 'SECHREC.02', 'SECHREC.03', 'SECHREC.04', 'SECHREC.05', 'SECHREC.06', 'SECHREC.07', 'SECHREC.08', 'SECHREC.09', 'LAYHREC', 'ATTVALREC', 'NWSPECSREC', 'DATELREC', 'VERDATREC', 'PROJECREC', 'NATGRIDREC', 'GEOIDREC', 'MAGNETREC', 'EDGEREC', 'NODEREC', 'FACEREC', 'TEXTREC', 'ATTREC', 'TIMEREC', 'CONVERTREC', 'RELATREC', 'POFEREC', 'LIFEREC', 'ARFEREC', 'COFEREC', 'OBJREFREC', 'UPDIREC.01', 'UPDIREC.02','UPDIREC.01')

11.3.5.7.7 DATA USE

= (Entity=1, Foreign ID=2, Field Counter=3, Other=4)

11.3.6 Data Dictionary

11.3.6.1 Overview

The Data Dictionary contains the explicit description of the definitions of Features, Attributes, and Relationships components used in a particular Dataset.

11.3.6.2 DATA DICTIONARY

[		
Feature Component	: [FEATURE DEFINITION]+ | NULL	11.3.6.4
Attribute Component	: ATTRIBUTE COMPONENT	11.3.6.3
Relationship Component	: [RELATIONSHIP DEFINITION]+ | NULL	11.3.6.19
]		

11.3.6.3 ATTRIBUTE COMPONENT

[		
Attribute Definitions	: [ATTRIBUTE DEFINITION]+ | NULL	11.3.6.11
Attribute Value Definitions	: [ATTRIBUTE VALUE DEFINITION]+ | NULL	11.3.6.27
Default Attributes	: [DEFAULT ATTRIBUTE]+ | NULL	11.3.6.28.2
]		

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11.3.6.4 FEATURE DEFINITION

[

Maximum Level	: (1..99)	
Feature Type Translation Name Set	: FEATURE TYPE TRANSLATION NAME SET	11.3.6.5
Feature Subtype Set	: [(7100..9999)]+	
Feature Description	: STRING	11.5.4.7.4
	| NULL	

]

Constraints
C1: There may be at most 99 Feature Class Names in the Translation Name Set.
C2: There may be at most 999 Feature Subtypes.
C3: Each member of the Feature Subtype Set shall exist.

Comments:
K1: Corresponds to 12.6.5FEATURE DEFINITION in MRS (Rec**07**)

11.3.6.5 FEATURE TYPE TRANSLATION NAME SET

[

Translation Name Set	: FEATURE TYPE TRANSLATION NAME SET PRE-DEFINED	11.3.6.6
	| FEATURE TYPE TRANSLATION NAME SET USER-DEFINED	11.3.6.7

]

Constraints
C1: Inside each of the members of the Set inside the Translation Name Set, there may only be one mention of any Language Code. If there are more Names in the Set, they shall be in another language. They shall all share the same Class Code and mean the same thing, just in different languages: a translated set.

11.3.6.6 FEATURE TYPE TRANSLATION NAME SET PRE-DEFINED

[

Feature Class Code	: FEATURE CLASS CODE	11.8.2.4
Translation Name Set	: [FEATURE CLASS NAME PRE-DEFINED]+	11.3.6.8

]

11.3.6.7 FEATURE TYPE TRANSLATION NAME SET USER-DEFINED

[

Feature Class Code	: (8100..9999)	
Translation Name Set	: [FEATURE CLASS NAME USER-DEFINED]+	11.3.6.9

]

Constraints
C1: The Feature Class Codes are “newly-defined” (i.e. user-defined) from the range (8100..9999), which is exactly reserved for that. Once newly-defined user-defined class code is defined, it “joins” the FEATURE CLASS CODE set and may no longer be used again to define a new Feature Class Code. For example, if the code 9007 has been used to define some user-defined Feature, the next time a user-defined Feature is defined, that value: 9007, is no longer available, and “recuses itself” from the (8100..9999) range available for the remaining values.

Denotation semantics: each time a new definition of a Feature is made, its Feature Class Code is added to the already existing set of previously defined codes.

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If D is set of so far defined Class Codes, and
d = newly defined Feature Class Code
then D ← D U d (where U stands for Union)

and furthermore, symbolically, d is only allowed the new value if and only if
d isn't already ELEMENT(D), before the union

11.3.6.8 FEATURE CLASS NAME PRE-DEFINED

[

Feature Class Language	: LANGUAGE CODE | NULL	11.5.4.7.7
Feature Class Name	: FEATURE CLASS NAME	11.8.2.5

]

11.3.6.9 FEATURE CLASS NAME USER-DEFINED

[

Feature Class Language	: LANGUAGE CODE | NULL	11.5.4.7.7
Feature Class Name	: STRING	11.5.4.7.4

]

11.3.6.10 ANY FEATURE CLASS CODE

[

Feature Class Code	: FEATURE CLASS CODE | (8100..9999)	11.8.2.4

]

Constraints

C1: {In order to be used, a Feature Class Code shall exist. That is, it is either from the pre-defined set FEATURE CLASS CODE or from the user-defined set (namely, the [8100..9999] range). If it is from the latter, it shall have been previously 'created' in a FEATURE DEFINITION. If so, it may be named here.

11.3.6.11 ATTRIBUTE DEFINITION

[

Attribute Type Translation Name Set	: ATTRIBUTE TYPE TRANSLATION NAME SET	11.3.6.12
Attribute Value Type	: DATA TYPE CODE	11.8.4.1
Maximum Attribute Value Width	: (1..11) | NULL	
Attribute Data Type	: ATTRIBUTE DATA TYPE	11.8.4.2
Attribute Data Unit	: DATA UNIT TYPE | NULL	11.8.4.3
Conversion Mantissa	(1..99999999999) | NULL	
Conversion Exponent	: (-9..9) | NULL	
Attribute Value Domain	: ATTRIBUTE VALUE DOMAIN | NULL	11.3.6.17
Attribute Description	: STRING | NULL	11.5.4.7.4

]

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Constraints
C1: There may be at most 99 Attribute Type Names.
C2: Attribute Data Unit is only specified if the value of Attribute Data Type is MSR (Measure).
C3: Semantically, here may not be more than one Attribute Type Name, however, it may be delivered in several different languages

Comments:
K1: Corresponds to 12.6.6 ATTRIBUTE DEFINITION in MRS (Rec**05**)

11.3.6.12 ATTRIBUTE TYPE TRANSLATION NAME SET

[
Translation Name Set : ATTRIBUTE TYPE TRANSLATION NAME SET PRE-DEFINED 11.3.6.13
| ATTRIBUTE TYPE TRANSLATION NAME SET USER-DEFINED 11.3.6.14
]

Constraints
C1: Inside each of the members of the Set inside the Translation Name Set, there may only be one mention of any Language Code. If there are more Names in the Set, they shall be in another language. They shall all share the same Type Code and mean the same thing, just in different languages: a translated set.

11.3.6.13 ATTRIBUTE TYPE TRANSLATION NAME SET PRE-DEFINED

[
Attribute Type Code : ATTRIBUTE TYPE CODE 11.8.2.1
Translation Name Set : [ATTRIBUTE TYPE NAME PRE-DEFINED]+
]

11.3.6.14 ATTRIBUTE TYPE TRANSLATION NAME SET USER-DEFINED

[
Attribute Type Code : TWO CHARCTERS 11.5.4.7.6
Translation Name Set : [ATTRIBUTE TYPE NAME USER-DEFINED]+
]

Constraints
C1: The Attribute Type Codes are “newly-defined” (i.e. user-defined) designated by two characters. Those two-character companions may not be the same as any such combination from the Pre-defined Attribute Type Code Set . Once newly-defined user-defined code is defined, it “joins” the ATTRIBUTE TYPE CODE set and may no longer be used again to define a new Attribute Type Code. For example, if the code: 7G has been used to define some user-defined Attribute, the next time a user-defined Attribute is defined, that value: 7G, is no longer available, and “recuses itself” from the available two-character combinations for the remaining values.

Denotation semantics: each time a new definition of an Attribute is made, its Attribute Type Code is added to the already existing set of previously defined codes.

If D is set of so far defined Type Codes, and
d = newly defined Attribute Type Code
then D ← D U d (where U stands for Union)

and furthermore, symbolically, d is only allowed the new value if and only if
d isn't already ELEMENT(D), before the union

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11.3.6.15 ATTRIBUTE TYPE NAME PRE-DEFINED

[

Attribute Type Language	: LANGUAGE CODE | NULL	11.5.4.7.7
Attribute Type Name	: ATTRIBUTE TYPE NAME	11.8.2.2

]

11.3.6.16 ATTRIBUTE TYPE NAME USER-DEFINED

[

Attribute Type Language	: LANGUAGE CODE | NULL	11.5.4.7.7
Attribute Type Name	: STRING	11.5.4.7.4

]

11.3.6.17 ATTRIBUTE VALUE DOMAIN

[

Minimum Value Allowed	: (-9999999999..9999999999)
Maximum Value Allowed	: (-9999999999..9999999999)

]

Constraint:
C1: Minimum Value Allowed < Maximum Value Allowed

11.3.6.18 ANY ATTRIBUTE TYPE CODE

[

Attribute Type Code	: ATTRIBUTE TYPE CODE | TWO CHARCTERS	11.8.2.1 11.5.4.7.6

]

Constraints
C1: In order to be used, an Attribute Type Code shall exist. That is, it is either from the pre-defined set ATTRIBUTE TYPE CODE or from the user-defined set. If it is from the latter, it shall have been previously 'created' in an ATTRIBUTE DEFINITION. If so, it may be named here.

11.3.6.19 RELATIONSHIP DEFINITION

[

Relationship Type Translation Name Set	: RELATIONSHIP TYPE TRANSLATION NAME SET	11.3.6.20
Role Sequence	: [ROLE DEFINITION]+	11.3.6.25
Relationship Description	: STRING | NULL	11.5.4.7.4

]

Constraints
C1: Semantically, here may not be more than one Relationship Type Name, however, it may be delivered in several different languages

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Comments:
K1: The unique 'key' or identifier of each such new Relationship Defined here is to be found deep inside the Relationship Type Translation Name Set, namely, it is the Relationship Type Code.
K2: Corresponds to12.6.9 RELATIONSHIP DEFINITION in MRS (Rec**09**)

11.3.6.20 RELATIONSHIP TYPE TRANSLATION NAME SET

[
Translation Name Set : RELATIONSHIP TYPE TRANSLATION NAME SET PRE-DEFINED 11.3.6.21
| RELATIONSHIP TYPE TRANSLATION NAME SET USER-DEFINED 11.3.6.24
]

Constraints
C1: Inside each of the members of the Set inside the Translation Name Set, there may only be one mention of any Language Code. If there are more Names in the Set, they shall be in another language. They shall all share the same Type Code and mean the same thing, just in different languages: a translated set.

11.3.6.21 RELATIONSHIP TYPE TRANSLATION NAME SET PRE-DEFINED

[
Relationship Type Code : RELATIONSHIP TYPE CODE 11.8.2.8
Translation Name Set : [RELATIONSHIP TYPE NAME PRE-DEFINED]+ 11.3.6.23
]

11.3.6.22 RELATIONSHIP TYPE TRANSLATION NAME SET USER-DEFINED

[
Relationship Type Code : (9000..9999)
Translation Name Set : [RELATIONSHIP TYPE NAME USER-DEFINED]+ 11.3.6.24
]

Constraints
C1: The Relationship Type Codes are "newly-defined" (i.e. user-defined) from the range (9000..9999), which is exactly reserved for that. Once newly-defined user-defined code is defined, it "joins" the RELATIONSHIP TYPE CODE set and may no longer be used again to define a new Relationship Type Code. For example, if the code 9007 has been used to define some user-defined Relationship, the next time a user-defined Relationship is defined, that value: 9007, is no longer available, and "recuses itself" from the (9000..9999) range available for the remaining values.

Denotation semantics: each time a new definition of a Relationship is made, its Relationship Type Code is added to the already existing set of previously defined codes.

If D is set of so far defined Type Codes, and
d = newly defined Relationship Type Code
then D ← D U d (where U stands for Union)

and furthermore, symbolically, d is only allowed the new value if and only if
d isn't already ELEMENT(D), before the union

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11.3.6.23 RELATIONSHIP TYPE NAME PRE-DEFINED

[

Relationship Type Language	: LANGUAGE CODE | NULL	11.5.4.7.7
Relationship Type Name	: RELATIONSHIP TYPE NAME	11.8.2.9

]

11.3.6.24 RELATIONSHIP TYPE NAME USER-DEFINED

[

Relationship Type Language	: LANGUAGE CODE | NULL	11.5.4.7.7
Relationship Type Name	: STRING	11.5.4.7.4

]

11.3.6.25 ROLE DEFINITION

[

Feature Role Number	: (1..99)	
Feature Role Name	: STRING	11.5.4.7.4
Role Feature Class Code Set	: [ANY FEATURE CLASS CODE]+	11.3.6.10
Repeat Flag	: BOOLEAN	11.8.8.1
Mandatoriness Flag	: BOOLEAN	11.8.8.1

]

Constraints

C1: The Feature Role Name shall not exceed 40 characters width.

C2: There may be no more than 99 elements in the Role Feature Class Code Set.

C3: Each of the elements in the Role Feature Class Code Set shall exist in order to be named.

11.3.6.26 ANY RELATIONSHIP CLASS CODE

[

Relationship Type Code	: RELATIONSHIP TYPE CODE | (9000..9999)	11.8.2.8

]

Constraints

C1: {In order to be used, a Relationship Type Code shall exist. That is, it is either from the pre-defined set RELATIONSHIP TYPE CODE or from the user-defined set (namely, the [8100..9999] range). If it is from the latter, it shall have been previously 'created' in a RELATIONSHIP DEFINITION. If so, it may be named here.

11.3.6.27 ATTRIBUTE VALUE DEFINITION

[

Attribute Type Code	: ANY ATTRIBUTE TYPE CODE	11.3.6.18
Feature Class Code Set	: [ANY FEATURE CLASS CODE]+ | NULL	11.3.6.10
Attribute Value Code	: ATTRIBUTE VALUE CODE	11.8.2.3
Attribute Code Description	: LANGUAGE TEXT PAIR | NULL	11.5.4.7.3

]

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Constraints
C1: The possible values of Attribute Value Code is either taken from the set of pre-defined code list values or from any of the user-defined Attributes, whose codes list values are 'added' to the ATTRIBUTE VALUE CODE set. This is a value code from a set of tables which are either pre-defined, or a set of tables added by user definition of new tables of code lists.
C2: Attribute Type Code and Attribute Value Code together form a composite key, which means that in any given Dataset there may not be more than one such definition.

Comments:
K1: Corresponds to 12.6.7 ATTRIBUTE VALUE DEFINITION in MRS (Rec18)

11.3.6.28 Default Attributes

11.3.6.28.1 Overview

A Default Attribute provides a method to assign a particular attribute value to a set of Features instead of a single Feature. Declaring a particular value as the default value of an attribute indicates that the absence of that attribute for a particular Feature instance means that the default attribute value should be applied to that Feature.

The use of Default Attribute is only allowed under the following conditions:

- The Attribute shall be applicable for all instances of the Features for a given class.
- The Attribute shall have been collected for 100 percent of the relevant Features.

11.3.6.28.2 DEFAULT ATTRIBUTE

[

Attribute Type Code	: ANY ATTRIBUTE TYPE CODE	11.3.6.18
Feature Class Code Set	: [ANY FEATURE CLASS CODE]+	11.3.6.10
	| NULL	
Attribute Value	: SHORT STRING	11.5.4.7.5
	| TEXT ID	11.8.7.23
	| TIME ID	11.8.7.24

]

Comments:
K1: Corresponds to 12.6.8 DEFAULT ATTRIBUTE in MRS (Rec15)

11.3.7 Directory

11.3.7.1 Overview

The Directory lists the number of records stored in each Section, inside all Layers, inside all Datasets, of a particular record type (and subtype when appropriate). Each directory "entry" gives one such count. There are as many directory "entries" as there are record types in each of the Sections (in their respective scopes).

11.3.7.2 DIRECTORY ENTRY

[

Directory Entry Identifier	: DIRECTORY ID	11.8.7.38
Layer Identification	: LAYER ID	11.8.7.11
Section Identification	: SECTION ID	11.8.7.12

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Record Type/Subtype Code	: RECORD TYPE IDENTIFIER	11.3.5.5
Record Quantity	: (0..99999999)	

]

Constraints

C1: The Directory Entry Identifier is an identifier of the Directory Entry which shall be unique within the Dataset.

C2: The Layer referred to by Layer Identifier shall be an element of the set of Layers within the Dataset which this Directory belongs to or symbolically:

Layer Identifier : ELEMENT(LAYER SET)
need to specify scope of LAYER SET to be in this Dataset, somehow

where LAYER SET is inside 11.3.2 (DATASET)

C3: The Section referred to by Section Identifier shall be an element of the set of Sections within the Layer as referred to by the preceding Layer Identifier or symbolically:

Section Identifier: ELEMENT(SECTION SET)
need to specify scope of SECTION SET to be in the Layer of comment C2, somehow

where SECTION SET is inside 11.4.2 (LAYER)

C4: The Record Type/Subtype referred to by Record Type/Subtype Code shall be an element of the set of record types/subtypes _defined_ within the same Dataset as this Directory is in or symbolically:

Record Type/Subtype Code : ELEMENT(RECORD DEFINITION SET)

where RECORD DEFINITION SET is inside 11.3.5 (MRS GENOME)

C5: The Record Type/Subtype referred to by Record Type/Subtype Code shall be an element of the set of record types/subtypes _used_ within the same Section as referred to by the Section Identifier of comment C3 or symbolically:

Record Type/Subtype Code : ELEMENT(RECORD SET)
need to specify scope of RECORD SET to be in the Section of comment C3, somehow

where RECORD SET is implicitly present within the Section of comment C3

Comments:

K1: Corresponds to 12.6.13 DIRECTORY ENTRY in MRS (Rec06) [**DIREC**].

K2: Corresponds to 11.3.7.2 in the Metadata Catalogue.

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11.3.8 Spatial Domain

11.3.8.1 Overview

The Spatial Domain describes the geographical coverage of a Dataset. It does so by “duplicating” the Section boundary information of each Section (in each Layer) in the Dataset.

11.3.8.2 SPATIAL DOMAIN ENTRY

[

Spatial Domain Entry Identifier	: SPATDOM ID	11.8.7.37
Layer Identifier	: LAYER ID	11.8.7.11
Section Identifier	: SECTION ID	11.8.7.12

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Geo Coverage Boundaries	: SPATIAL DOMAIN BOUNDARY | NULL	11.3.8.3
Area Name	: STRING | NULL	11.5.4.7.4

]

Constraints
C1: The Spatial Domain Entry Identifier is an identifier of a Spatial Domain Entry which shall be unique within the Dataset.
C2: The Layer referred to by Layer Identifier shall be an element of the set of Layers within the Dataset which this Spatial Domain element belongs to or symbolically:

Layer Identifier : ELEMENT(LAYER SET)
need to specify scope of LAYER SET to be in this Dataset, somehow

where LAYER SET is inside 11.3.2 (DATASET)
C3: The Section referred to by Section Identifier shall be an element of the set of Sections within the Layer as referred to by the preceding Layer Identifier or symbolically:

Section Identifier: ELEMENT(SECTION SET)
need to specify scope of SECTION SET to be in the Layer of comment C2, somehow

where SECTION SET is inside 11.4.2 (LAYER)
C4: At least one of the Geo Coverage Boundaries or Area Name shall be specified.

Comments:
K1: Corresponds to 12.6.12 SPATIAL DOMAIN ENTRY in MRS (Rec08)
K2: Corresponds to 11.3.8.2 in the Metadata Catalogue

11.3.8.3 SPATIAL DOMAIN BOUNDARY

[

North-most Latitude	: (-90000..90000)
South-most Latitude	: (-90000..90000)
West-most Longitude	: (-180000..180000)
East-most Longitude	: (-180000..180000)

]

Comments:
K1: The latitude and longitude fields are measured in milli-degrees.

11.3.9 Sources

11.3.9.1 Overview

"Source" is the general term for this documents (books, reports, maps, aerial photos, etc.) that are used in the establishment of the Dataset.

See the Metadata Catalogue for more details (10.5.2).

11.3.9.2 SOURCE DEFINITION

[

Source Definition Identifier	: SOURCE ID	11.8.7.30
Source Description Info	: SOURCE DESCRIPTION INFO	11.3.9.3

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	| NULL	
ISBN & Survey	: ISBN AND SURVEY	11.3.9.4
	| NULL	
Author Names	: STRING	11.5.4.7.4
	| NULL	
Map Scale	: (1..9999999)	
	| NULL	
Title	:TITLE	11.3.9.5
	| NULL	
Volume/Map Sheet Name	: VOLUME/MAP SHEET NAME	11.3.9.6
	| NULL	
Edition & Impression	: EDITION AND IMPRESSION	11.3.9.7
	| NULL	
Publisher	: PUBLISHER	11.3.9.8
	| NULL	
Distribution	: DISTRIBUTION	11.3.9.9
	| NULL	
Host Document	: HOST DOCUMENT	11.3.9.10
	| NULL	
Field Data Capturing	: FIELD DATA CAPTURING	11.3.9.11
	| NULL	

]

Constraints

C1: The Source Definition Identifier is an identifier of the Source which shall be unique within the Dataset.

C2: Besides the mandatory SOURCE ID the rest of the other members may not all be NULL. That is, one of the other ones (at least) shall have a value.

11.3.9.3 SOURCE DESCRIPTION INFO

[

Description Level	: (1..4)	
	| NULL	
Level of Completeness	: 1	
	| NULL	
Parent Source	: SOURCE ID	11.8.7.30
	| NULL	

]

Constraints

C1: The Source Identifier referred to by the Parent Source shall be an element of the set of Source Definition Set, which is *defined* within the Dataset, or symbolically:

Parent source Identifier : ELEMENT(SOURCE DEFINITION SET)
need to specify scope of SOURCE DEFINITION SET to be in the Dataset of this Source Description Info, somehow

where SOURCE DEFINITION SET is inside 11.3.3.2 (DATASET METADATA)

C2: The Source referred to by Parent Source Identifier shall belong to the same Dataset as this Source Description Info.

C3: The members of this structure may not all be NULL. That is, one of them (at least) shall have a value.

Comments:

K1: Corresponds to 12.6.16.1 SOURCE DESCRIPTION INFO in MRS (Rec14.01).

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11.3.9.4 ISBN AND SURVEY

[

International Standard Book Number	: STRING | NULL	11.5.4.7.4
International Standard Serial Number	: SHORT STRING | NULL	11.5.4.7.5
Document Languages	: [LANGUAGE CODE]+ | NULL	11.5.4.7.7
Countries Involved	: [ISO COUNTRY CODE]+ | NULL	11.8.6.2
Year of Survey	: YEAR CODE | NULL	11.6.3.5
Date of Survey	: MONTH/HOUR STAMP | NULL	11.6.3.4

]

Constraints
C1: The International Standard Book Number may not exceed 13 characters wide
C2 : The members of this structure may not all be NULL. That is, at least one of them shall have a value

Comments:
K1: Corresponds to 12.6.16.2 ISBN AND SURVEY in MRS (Rec14.02).

11.3.9.5 TITLE

[

Language Code	: LANGUAGE CODE | NULL	11.5.4.7.7
Document Title	: STRING	11.5.4.7.4

]

11.3.9.6 VOLUME/MAP SHEET NAME

[

Language Code	: LANGUAGE CODE | NULL	11.5.4.7.7
Volume/Map Sheet Name	: STRING | NULL	11.5.4.7.4

]

Constraints
C1: The members of this structure may not all be NULL. That is, at least one of them shall have a value.

11.3.9.7 EDITION AND IMPRESSION

[

Edition Number	: STRING | NULL	11.5.4.7.4
Impression Number	: STRING | NULL	11.5.4.7.4

]

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Constraints
C1: The members of this structure may not all be NULL. That is, at least one of them shall have a value.

11.3.9.8 PUBLISHER

[

Year of Publication	: YEAR CODE | NULL	11.6.3.5
Place of Publication	: PLACE | NULL	11.8.6.1
Name of Publisher	: STRING | NULL	11.5.4.7.4

]

Constraints
C1: The members of this structure may not all be NULL. That is, at least one of them shall have a value.

Comments:
K1: Corresponds to 12.6.16.7PUBLISHERin MRS (Rec14.07)

11.3.9.9 DISTRIBUTION

[

Year of Distribution	: YEAR CODE | NULL	11.6.3.5
Place of Distribution	: PLACE | NULL	11.8.6.1
Name of Distributor	: STRING | NULL	11.5.4.7.4

]

Constraints
C1: The members of this structure may not all be NULL. That is, at least one of them shall have a value.

11.3.9.10 HOST DOCUMENT

[

Host Source Identifier	: SOURCE ID	11.8.7.30
Kind of Relationship	: RELATIONSHIP KIND CODE | NULL	11.3.9.10.1.2
From Page	: (1 ... 999) | NULL	
To Page	: (1 ... 999) | NULL	
General Comments	: STRING | NULL	11.5.4.7.4

]

Constraints
C1: The Source Identifier referred to by the host Source Identifier shall be an element of the set of Source Definition Set, which is *defined* within the Dataset, or symbolically:

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Host source Identifier : ELEMENT(SOURCE DEFINITION SET)
need to specify scope of SOURCE DEFINITION SET to be in the Dataset of this Host Document, somehow
where SOURCE DEFINITION SET is inside 11.3.3.2 (DATASET METADATA)

C2: The Source referred to by Parent Source Identifier shall belong to the same Dataset as this Host Document.

11.3.9.10.1 Basic Data Types used by Host Documents

11.3.9.10.1.1 Overview

Simple types used by Host Documents

11.3.9.10.1.2 RELATIONSHIP KIND CODE

= (Descended from=11, Appendix to=12, Published together with=13, Additional map to=14, Inset map to=15, Is part of=16)

11.3.9.11 FIELD DATA CAPTURING

[

Start Data Field Data Capture Activity	: DATE STAMP	11.6.3.2
End Date Field Data Capture Activity	: DATE STAMP | NULL	11.6.3.2
General Comment	: STRING | NULL	11.5.4.7.4

]

11.3.10 NETWORK SPECIFICATION

[

Road Network Identifier	: NETWORK ID	11.8.7.40
Completeness Level	: (0..9)	
Completeness Description	: STRING | NULL	11.5.4.7.4
Section BP Set	: [SECTION ID]+ | NULL	11.8.7.12
Features BP Set	: [ANY FEATURE IN DATASET]+ | NULL	11.8.7.2

]

Constraints:

C1: The Road Network Identifier is an identifier of a Road Network which shall be unique within the Dataset.

Comments:

K1: Corresponds to 12.6.15 NETWORK SPECIFICATION in MRS (Rec19).

11.3.11 ABBREVIATION

[

Language Code	: LANGUAGE CODE	11.5.4.7.7
Abbreviation Short	: STRING	11.5.4.7.4
Abbreviation Long	: STRING	11.5.4.7.4

]

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Constraints
C1: Abbreviation Short may not exceed 20 characters wide and Abbreviation Long may not exceed 50 characters wide.

Comments:
K1: Corresponds to 12.6.14 ABBREVIATION in MRS (Rec13).

11.3.12 GEOPOLITICAL STRUCTURE DEFINITION

[

Geopolitical Structure Identifier	: GPL STR ID	11.8.7.41
Geopolitical Structure Name	: STRING	11.5.4.7.4
	| NULL	
Geopolitical Structure Component Set	: [GPL STR CMP ID]+	11.8.7.39
Attribute BP Set	: [ANY ATTRIBUTE IN DATASET]+	11.5.4.6.8
	| NULL	

]

Constraints:
C1: The Geopolitical Structure Identifier is an identifier of a Geopolitical Structure which shall be unique within the Dataset
C2: Geopolitical Structure Name should not exceed 40 characters width.

Comments:
K1: Corresponds to 12.6.10 GEOPOLITICAL STRUCTURE DEFINITION in MRS (Rec10).

11.3.13 GEOPOLITICAL STRUCTURE COMPONENT DEFINITION

[

Geopolitical Structure Component Identifier	: GPL STR CMP ID	11.8.7.39
Feature Class Code	: ANY FEATURE CLASS CODE	11.3.6.10
Local Area Type Name Set	: [LANGUAGE TEXT PAIR]+	11.5.4.7.3
Immediate Parent Set	: [GPL STR CMP ID]+	11.8.7.39
	| NULL	
Full Predecessor Set	: [GPL STR CMP ID]+	11.8.7.39
	| NULL	
Geopolitical Structure Component Description	: STRING	11.5.4.7.4
	| NULL	
Attribute BP Set	: [ANY ATTRIBUTE IN DATASET]+	11.5.4.6.8
	| NULL	

]

Constraints:
C1: The Geopolitical Structure Component Identifier is an identifier of a Geopolitical Structure Component which shall be unique within the Dataset
C2: The Feature Class Code shall be in the range (1100..3199)

Comments:
K1: Corresponds to 12.6.11 GEOPOLITICAL STRUCTURE COMPONENT DEFINITION in MRS (Rec11).

11.3.14 GEOPOLITICAL STRUCTURE REFERENCE

[

Geopolitical Structure ID	: GPL STR ID	11.8.7.41
Geopolitical Structure Component ID	: GPL STR CMP ID	11.8.7.39

]

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Constraints:
C1: The Geopolitical Structure ID and the Geopolitical Structure Component ID shall belong to the same Geopolitical Structure Definition scheme.

11.3.15 Geodetical Parameters

11.3.15.1 Overview

The Geodetical Parameters group contains general information about Geodetical items, such as datums, ellipsoids, Geoid undulation, projection methods and grid systems. It includes data which is needed in order to interpret the metric data in a correct way.

See the Metadata Catalogue for more details (see 10.6).

11.3.15.2 GEODETICAL PARAMETERS

[

Geodetical Datum & Ellipsoid Set	: [HORIZONTAL DATUM]+ | NULL	11.3.15.3
Orthometric Height References	: [VERTICAL DATUM]+ | NULL	11.3.15.6
Projection Methods	: [PROJECTION TYPE]+ | NULL	11.3.15.8
National Map Grids	: [NATIONAL GRID]+ | NULL	11.3.15.10
Geoid Undulations	: [GEOID UNDULATION]+ | NULL	11.3.15.12
Earth Magnetic Field Set	: [MAGNETIC FIELD DECLINATION]+ | NULL	11.3.15.13

]

Comments:
K1: Corresponds to GEODETICAL PARAMETERS in MRS

11.3.15.3 HORIZONTAL DATUM

[

Horizontal Datum Identifier	: HORIZONTAL DATUM ID	11.8.7.31
Datum Origin Translation	: DATUM ORIGIN | NULL	11.3.15.4
Datum Z Rotation	: (0..40000000) | NULL	
Scale Factor	: (-9999..9999) | NULL	
Datum Name	: DATUM NAME | NULL	11.8.3.2
Datum Code	: DATUM CODE	11.8.3.1
Reference Ellipsoid	: ELLIPSOID | NULL	11.3.15.5

]

Constraints:
C1: The Horizontal Datum Identifier is an identifier of the Horizontal Datum which shall be unique within the Dataset.
C2: The optional members of this structure may not all be NULL. That is, at least one of them shall have a value.

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Comments:
K1: Corresponds to 12.6.17.1 HORIZONTAL DATUM in MRS (Rec61).

11.3.15.4 DATUM ORIGIN

[

X-Origin	: (-9999..9999)	
	| NULL	
Y-Origin	: (-9999..9999)	
	| NULL	
Z-Origin	: (-9999..9999)	
	| NULL	

]

Constraints:
C1: All elements are specified in decimetres.

11.3.15.5 ELLIPSOID

[

Semi Major Axis	: (1..99999999)	
	| NULL	
Semi Minor Axis	: (1..99999999)	
	| NULL	
Ellipsoid Code	: ELLIPSOID CODE	11.8.3.3
Ellipsoid Description	: STRING	11.5.4.7.4
	| NULL	

]

11.3.15.6 VERTICAL DATUM

[

Vertical Datum Identifier.	: VERTICAL DATUM ID	11.8.7.32
Relevant Country	: ISO COUNTRY CODE	11.8.6.2
Height Level Name	: HEIGHT LEVEL NAME	11.8.3.7
	| NULL	
Height Level Code	: HEIGHT LEVEL CODE	11.8.3.6
Adjacent Levels	: [ADJACENT LEVEL]+	11.3.15.7
	| NULL	

]

Constraints
C1: The Vertical Datum Description Identifier is an identifier of the vertical datum which shall be unique within a Dataset.
C2: The combination of Relevant Country and Height Level Name is an identifier of a vertical datum which shall be unique within a particular Dataset.

Comments:
K1: Corresponds to 12.6.17.2 VERTICAL DATUM in MRS (Rec62)

11.3.15.7 ADJACENT LEVEL

[

Used in Country	: ISO COUNTRY CODE	11.8.6.2
Height Level Name	: HEIGHT LEVEL NAME	11.8.3.7
	| NULL	

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Height Level Code	: HEIGHT LEVEL CODE	11.8.3.6
Height Difference	: (-9999..9999)	

]

Constraints

C1: The combination of Used in Country and Height Level Name shall be a unique Adjacent Level within a particular Dataset.

C2: Height Difference is specified in centimeters.

11.3.15.8 PROJECTION TYPE

[

Projection Identifier	: PROJECTION ID	11.8.7.33
Projection Type Code	: PROJECTION TYPE CODE	11.8.3.8
Projection Parameters Sequence	: PROJECTION PARAMETERS	11.3.15.9
Projection Description	: STRING	11.5.4.7.4
	| NULL	

]

Constraints

C1: The Projection Identifier is an identifier of the Projection Type which shall be unique within the Dataset.

Comments:

K1: Corresponds to 12.6.17.3 PROJECTION TYPE in MRS (Rec63).

11.3.15.9 PROJECTION PARAMETERS

[

First Latitude Parameter	: (-900000000..900000000)
	| NULL
First Longitude Parameter	: (-1800000000..1800000000)
	| NULL
Second Latitude Parameter	: (-900000000..900000000)
	| NULL
Second Longitude Parameter	: (-1800000000..1800000000)
	| NULL
Third Latitude Parameter	: (-900000000..900000000)
	| NULL
Third Longitude Parameter	: (-1800000000..1800000000)
	| NULL
Point Scale Factor	: (-9999..9999)
	| NULL

]

11.3.15.10 NATIONAL GRID

[

National Grid Identifier	: NATIONAL GRID ID	11.8.7.34
Grid Axis Orientation	: GRID AXIS ORIENTATION	11.8.8.1
Help Grid Origin	: LAT/LONG PAIR	11.3.15.11
	| NULL	
National Grid Origin	: OPTIONAL COORDINATE PAIR	11.8.5.5
	| NULL	
Grid Rotation	: (0..400000000)	
	| NULL	

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Grid Name	: GRID NAME	11.8.3.5
	| NULL	
Grid Code	: GRID CODE	11.8.3.4

]

Constraints

C1: The National Grid Identifier is an identifier of the National Grid which shall be unique within the Dataset.

C2: At least one optional field shall be present.

C3: National Grid Origin is expressed in decimetres.

Comments:

K1 Corresponds to 12.6.17.4 NATIONAL GRID in MRS (Rec64).

11.3.15.11 LAT/LONG PAIR

[

Latitude	: (-900000000..900000000)
	| NULL
Longitude	: (-1800000000..1800000000)
	| NULL

]

Constraints

C1: At least one optional field shall be present.

11.3.15.12 GEOID UNDULATION

[

Geoid Description Identifier	: GEOID UNDULATION ID	11.8.7.35
Reference Point Position	: LAT/LONG PAIR	11.3.15.11
Ellipsoidal Height	: (-9999..9999)	

]

Constraints

C1: The Geoid Undulation Identifier is an identifier of the of a Geoid Undulation which shall be unique within the Dataset.

C2: Ellipsoidal Height is expressed in decimetres.

Comments:

K1: Corresponds to 12.6.17.5 GEOID UNDULATION in MRS (Rec65)

11.3.15.13 MAGNETIC FIELD DECLINATION

[

Magnetic Field Description Identifier	: MAGNETIC FIELD DECLINATION ID	11.8.7.36
Reference Point Position	: LAT/LONG PAIR	11.3.15.11
Declination Validity Date	: DATE STAMP	11.6.3.2
	| NULL	
Magnetic Variation Value	: (-400000..400000)	
	| NULL	
Annual Change	: (-400000..400000)	
	| NULL	
Horizontal Magnetic Field Intensity	: (0..99999)	
	| NULL	

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Vertical Magnetic Field Intensity	: (0..99999) | NULL	

]

Constraints
C1: The Magnetic Field Declination Identifier is an identifier of the Magnetic Field Declination, which shall be unique within the Dataset.
C2: At least one optional field shall be non-NULL.
C3: Horizontal and Vertical Magnetic Field Intensities are specified in nano Tesla.

Comments:
K1: Corresponds to 12.6.17.6 MAGNETIC FIELD DECLINATION in MRS (Rec66).

11.3.15.14 Basic Data Types used by Geodetical Parameters

11.3.15.14.1 Overview

Simple types used by Geodetical Parameters

11.3.15.14.2 GRID AXIS ORIENTATION

= (Normal Cartesian=0, Reverse Cartesian=1)

11.3.16 DATASET DATA

[

Update Information Records	: [UPDATE INFORMATION]+ | NULL	11.7.2
Relationships	: [RELATIONSHIP]+ | NULL	11.5.4.5.2
Attributes	: [ATTRIBUTE GROUP]+ | NULL	11.5.4.6.2
Text Records	: [TEXT RECORD]+ | NULL	11.5.4.7.2
Time Domain Syntax Records	: [TIME DOMAIN]+ | NULL	11.6.2.2
Object Reference Records	: [OBJECT REFERENCE]+ | NULL	11.5.4.9.2

]

Constraints
C1: Update Information Records and Object Reference Records may only exist if at least one of the other 4 elements is present and they need to decorate any subset of those other elements.

11.4 Layers

11.4.1 Overview

A Dataset is subdivided into one or more Layers, which are in turn subdivided into Sections. Typically, Datasets division to Layers is based upon content criteria, while Layers division to Section is based upon geographical criteria.

Relations between Section, Layers and Primitives are illustrated in the diagram of section 11.1.5 and in UML data model Figure 14, Figure 15 and Figure 16.

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11.4.2 LAYER

[

Layer Identifier	: LAYER ID	11.8.7.11
Layer Metadata	: LAYER HEADER	11.4.3
Section Set	: [SECTION]+	11.5.2

]

Constraints
C1: The Layer Identifier is an identifier of a Layer which shall be unique within a particular Dataset.

11.4.3 LAYER HEADER

[

Layer Topology	: LAYER TOPOLOGY	11.4.5.2
Height Level Referencing	: HEIGHT LEVEL METHOD	11.4.5.3
XY Resolution	: (0..999)	
Layer Theme SET	: [FEATURE THEME CODE]+	11.8.2.6
	| NULL	

]

11.4.4 LAYER DATA

[

Update Information Records	: [UPDATE INFORMATION]+	11.7.2
	| NULL	
Relationships	: [RELATIONSHIP]+	11.5.4.5.2
	| NULL	
Attributes	: [ATTRIBUTE GROUP]+	11.5.4.6.2
	| NULL	
Text Records	: [TEXT RECORD]+	11.5.4.7.2
	| NULL	
Time Domain Syntax Records	: [TIME DOMAIN]+	11.6.2.2
	| NULL	
Object Reference Records	: [OBJECT REFERENCE]+	11.5.4.9.2
	| NULL	

]

Constraints
C1: Update Information Records and Object Reference Records may only exist if at least one of the other 4 elements is present and they need to decorate any subset of those other elements.

11.4.5 Basic Data Types used by Layers

11.4.5.1 Overview

Simple and compound types used by Layers

11.4.5.2 LAYER TOPOLOGY

= (Non-Explicit Topology=1, Non-Planar-Connectivity Topology=2, Planar-Full Topology=3)

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11.4.5.3 HEIGHT LEVEL METHOD

= (Implied by Coordinates=0, Via Edge Levels=1, Via Grade Separated Crossing Relationship=2, None=3)

11.5 Sections

11.5.1 Overview

A Layer is subdivided into one or more Sections, typically, based upon geographical criteria. See UML data model figures Figure 15, Figure 16 and Figure 18 for topology type-specific composition primitives of Sections and for Feature conversion across Sections.

11.5.2 SECTION

[

Section Identifier	: SECTION ID	11.8.7.12
Section Metadata	: SECTION HEADER	11.5.3.2
Section Data	: SECTION DATA	11.5.4.2

]

11.5.3 Section Metadata

11.5.3.1 Overview

This clause describes the Section Metadata.

11.5.3.2 SECTION HEADER

[

Section Identification	: GEOGRAPHIC COVERAGE NAME | NULL	11.5.3.3
XY Resolution	: (0..999) | NULL	
Lane Counting Default Direction Convention	: LANE COUNTING DIRECTION | NULL	11.5.3.4
Network	: NETWORK ID | NULL	11.8.7.40
Datasource References	: [SOURCE ID]+ | NULL	11.8.7.30
Section Datum & Magnetism Use	: DATUM AND MAGNETISM USE | NULL	11.5.3.5
Section Orthometric Reference Use	: ORTHOMETRIC REFERENCE USE | NULL	11.5.3.7
Section Borders	: SECTION BORDERS	11.5.3.9
XY Control Point	: XY CONTROL POINT | NULL	11.5.3.10
Z Control Point	: Z CONTROL POINT | NULL	11.5.3.11
Update Information Time Stamp Format	: TIME STAMP FORMAT | NULL	11.6.3.9

]

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Constraints

C1: The Sources referred to by Datasource Reference Identifiers shall belong to the same Dataset as the Section in question (inside Layer). Furthermore, the Sources shall have been previously defined in order to be used here.

C2: The Geoid height values referred to by Geoid Description Identifier shall belong to the same Dataset as the Section in question.

11.5.3.3 GEOGRAPHIC COVERAGE NAME

= STRING 11.5.4.7.4

11.5.3.4 LANE COUNTING DIRECTION

= (RIGHT=0, LEFT=1)

11.5.3.5 DATUM AND MAGNETISM USE

[

Horizontal Datum Used	: HORIZONTAL DATUM ID	11.8.7.31
Horizontal Reference Coordinate Type	: COORDINATE TYPE	11.5.3.6
Projection Used	: PROJECTION ID	11.8.7.33
	| NULL	
National Grid Used	: NATIONAL GRID ID	11.8.7.34
	| NULL	
Magnetic Field Declinations Set Used	: [MAGNETIC FIELD DECLINATION ID]+	11.8.7.36
	| NULL	

]

Constraints

C1: The Horizontal Datum referred to by the Horizontal Datum Used Identifier shall belong to the same Dataset as the Section in question (inside Layer). Furthermore, the Horizontal Datums shall have been previously defined in order to be used here.

C2: The Projection referred to by Projection Used Identifier shall belong to the same Dataset as the Section in question (inside Layer). Furthermore, the Projections shall have been previously defined in order to be used here.

C3: The National Grid referred to by National Grid Used Identifier shall belong to the same Dataset as the Section in question (inside Layer). Furthermore, the National Grids' Identifiers shall have been previously defined in order to be used here.

C4: The Magnetic Field Declinations referred to by Magnetic Field Declination Used Identifiers shall belong to the same Dataset as the Section in question (inside Layer). Furthermore, the Magnetic Field Declinations shall have been previously defined in order to be used here.

C5: In this structure Datum and Magnetism may not both be NULL.

Comments:

K1: Corresponds to 12.6.19.5 DATUM AND MAGNETISM USE in MRS (Rec16.05)

11.5.3.6 COORDINATE TYPE

= (LAT/LONG=0, X/Y=1)

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11.5.3.7 ORTHOMETRIC REFERENCE USE

[

Height Reference Type	: HEIGHT REFERENCE TYPE	11.5.3.8
Vertical Datum Used	: VERTICAL DATUM ID	11.8.7.32
	| NULL	
Geoid Undulation Set	: [GEOID UNDULATION ID]+	11.8.7.35
	| NULL	

]

Constraints

C1: The Vertical Datum referred to by Vertical Datum Used shall belong to the same Dataset as the Section in question (inside Layer). Furthermore, the Vertical Datums shall have been previously defined in order to be used here.

C2: {The Geoid Undulations referred to by Geoid Undulation Set shall belong to the same Dataset as the Section in question (inside Layer). Furthermore, the Geoid Undulations shall have been previously defined in order to be used here.

11.5.3.8 HEIGHT REFERENCE TYPE

= (Ellipsoidal=0, Orthometric=1, Relative=2)

11.5.3.9 SECTION BORDERS

[

XY Multiplication Factor	: (-9..9)	
Z Multiplication Factor	: (-9..9)	
	| NULL	
XYZ Offset	: COORDINATE TRIPLET	11.8.5.3
	| NULL	
Maximum XY	: COORDINATE PAIR	11.8.5.4
	| NULL	
Minimum XY	: COORDINATE PAIR	11.8.5.4
	| NULL	

]

Comments:

K1: Corresponds to 12.6.19.7 SECTION BORDERS in MRS (Rec16.07)

11.5.3.10 XY CONTROL POINT

[

Point Name	: STRING	11.5.4.7.4
	| NULL	
X Digitized	: (-99999999999..99999999999)	
	| NULL	
Y Digitized	: (-99999999999..99999999999)	
	| NULL	
X Surveyed	: (-99999999999..99999999999)	
	| NULL	
Y Surveyed	: (-99999999999..99999999999)	
	| NULL	

]

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Constraints
C1: The members of this structure may not all be NULL. That is, at least one of them shall have a value
C2: The Point Name is an "identifier" of a control point which shall be unique within the particular Section.
C3: All the X,Y values are specified in centimetres.

11.5.3.11 Z CONTROL POINT

[		
Point Name	: STRING | NULL	11.5.4.7.4
XY Reference	: COORDINATE PAIR | NULL	11.8.5.4
Z Digitized	: COORDINATE VALUE | NULL	11.8.5.7
Z Surveyed	: COORDINATE VALUE | NULL	11.8.5.7
]		

Constraints
C1: The members of this structure may not all be NULL. That is, at least one of them shall have a value
C2: The Point Name is an "identifier" of a control point which shall be unique within the particular Section.

11.5.4 Section Data

11.5.4.1 Overview

This clause describes the Section Data.

11.5.4.2 SECTION DATA

[		
Update Information Records	: [UPDATE INFORMATION]+ | NULL	11.7.2
Topological Geometric Data	: TOPO/GEO DATA | NULL	11.5.4.3.2
Feature Data	: FEATURE DATA | NULL	11.5.4.4.2
Relationships	: [RELATIONSHIP]+ | NULL	11.5.4.5.2
Attributes	: [ATTRIBUTE GROUP]+ | NULL	11.5.4.6.2
Text Records	: [TEXT RECORD]+ | NULL	11.5.4.7.2
Time Domain Syntax Records	: [TIME DOMAIN]+ | NULL	11.6.2.2
Conversion Records	: [CONVERSION]+ | NULL	11.5.4.8.2
Object Reference Records	: [OBJECT REFERENCE]+ | NULL	11.5.4.9.2
]		

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11.5.4.3 Topological Geometric Data

11.5.4.3.1 Overview

Topology, Geometry, and their constructs are described here.

11.5.4.3.2 TOPO/GEO DATA

[

Nodes	: [NODE]+ | NULL	11.5.4.3.3
Edges	: [EDGE]+ | NULL	11.5.4.3.4
Faces	: [FACE]+ | NULL	11.5.4.3.5

]

11.5.4.3.3 NODE

[

Node Identifier	: NODE ID	11.8.7.14
Source	: SOURCE ID | NULL	11.8.7.30
Node in Face	: FACE ID | NULL	11.5.4.3.5
Node Status	: NODE STATUS | NULL	11.5.4.3.8.2
Coordinate Record	: COORDINATE ID	11.8.7.13
Edge BP Set	: [EDGE ID]+ | NULL	11.8.7.15
Point Feature BP Set	: [POINT FEATURE ID]+ | NULL	11.8.7.17

]

Constraints
C1: The Node Identifier is an identifier of a Node which shall be unique within a particular Section.
C2: Source Description Identifier shall exist.
C3: The Face referred by Node in Face shall belong to the same Section as the Node in question.
C4: The Edges and Point Features shall belong to the same Section as the Node in question.

11.5.4.3.4 EDGE

[

Edge Identifier	: EDGE ID	11.8.7.15
Source	: SOURCE ID | NULL	11.8.7.30
From Node	: NODE ID	11.8.7.14
To Node	: NODE ID	11.8.7.14
Left Face	: FACE ID | NULL	11.8.7.16
Right Face	: FACE ID | NULL	11.8.7.16
Edge Status	: EDGE STATUS | NULL	11.5.4.3.8.3
Coordinate Record	: COORDINATE ID	11.8.7.13

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Line Feature BP Set	: [LINE FEATURE ID]+ | NULL	11.8.7.18
Area Feature BP Set	: [AREA FEATURE ID]+ | NULL	11.8.7.19

]

Constraints

C1: The Edge Identifier is an identifier of an Edge which shall be unique within a particular Section.
C2: Source Description Identifier shall exist.
C3: The Nodes referred to by From Node Identifier and To Node Identifier shall belong to the same Section as the Edge in question.
C4: The Faces referred to by Left Face Identifier and Right Face Identifier shall belong to the same Section as the Edge in question.
C5: The order of the Coordinate values referred to via the Coordinate ID is meaningful. The order represents the topological order and orientation of the point sequence of the Edge (as rendered inside the Coordinate Record).
C6: The Line BP and Area BP Feature Sets shall belong to the same Section as the Edge.

11.5.4.3.5 FACE

[

Face Identifier	: FACE ID	11.8.7.16
Source	: SOURCE ID | NULL	11.8.7.30
Bounding Edges	: [BOUNDING EDGE]+	11.5.4.3.6
Area Feature BP Set	: [AREA FEATURE ID]+ | NULL	11.8.7.19
Extended Area Geometry	: EXTENDED AREA GEOMETRY | NULL	11.5.4.3.7

]

Constraints:

C1: The Face Identifier is an identifier of a Face which shall be unique within a particular Section
C2: Source Description Identifier shall exist.
C3: The Edge(s) referred to by Edge Identifiers (inside BOUNDING EDGE) shall belong to the same Section as this Face.

11.5.4.3.6 BOUNDING EDGE

[

Edge Identifier	: EDGE ID	11.8.7.15
Edge Orientation	: EDGE ORIENTATION	11.5.4.3.8.4

]

Constraints

C1: ELEMENT(EDGE ID) should exist in this scope.

11.5.4.3.7 EXTENDED AREA GEOMETRY

[

Geometrical Type	: GEOMETRICAL TYPE	11.5.4.3.8.5
Outline Length of Bounded Area	(0..9999999999) | NULL	

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Size of Bounded Area	(0..9999999999) | NULL	
Slope of Bounded Area	: (0..999) | NULL	
Aspect of Bounded Area	: (0..3599) | NULL	
Light Value of Bounded Area	: (0..255) | NULL	

]

Constraints:
C1: Outline Length is specified in decimeters.
C2: Size is specified in square meters.
C3: Slope is specified in percentage.

11.5.4.3.8 Basic Data Types used by Topological Geometric Data

11.5.4.3.8.1 Overview

Simple and compound types used by Topological Geometric Data

11.5.4.3.8.2 NODE STATUS

= (Section Border Node=1, Normal Node=2, Dataset Border Node=3, End of Stubble=4, Normal Node on a Section and/or Dataset border=5)

11.5.4.3.8.3 EDGE STATUS

= (Section Border Edge=1, Normal Edge=2, Dataset Border Edge=3, Normal Edge on a Section and/or Dataset border=5)

11.5.4.3.8.4 EDGE ORIENTATION

= (Clockwise=0, Counter-clockwise=1)

11.5.4.3.8.5 GEOMETRICAL TYPE

= (Triangular=3, Quadrangular=4, Other=0)

11.5.4.4 Feature Data

11.5.4.4.1 Overview

Feature Data is described here.

11.5.4.4.2 FEATURE DATA

[

Simple Feature Data	: SIMPLE FEATURE DATA | NULL	11.5.4.4.3
Complex Feature Data	: [COMPLEX FEATURE]+ | NULL	11.5.4.4.24

]

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11.5.4.4.3 SIMPLE FEATURE DATA

[

Point Feature	: [POINT FEATURE]+ | NULL	11.5.4.4.4
Line Feature	: [LINE FEATURE]+ | NULL	11.5.4.4.9
Area Feature	: [AREA FEATURE]+ | NULL	11.5.4.4.17

]

11.5.4.4.4 POINT FEATURE

[

Point Feature Identifier	: POINT FEATURE ID	11.8.7.17
Source	: SOURCE ID | NULL	11.8.7.30
Network	: NETWORK ID | NULL	11.8.7.40
Feature Class Code	: ANY FEATURE CLASS CODE	11.3.6.10
Topo/Geo Rendering	: EXPLICIT TOPOLOGY POINT RENDERING | NON-EXPLICIT TOPOLOGY POINT RENDERING	11.5.4.4.5 11.5.4.4.6
Attribute Group Set	: [SCOPED ATTRIBUTE]+ | NULL	11.5.4.6.6
Complex Feature Set	: [COMPLEX FEATURE ID]+ | NULL	11.8.7.20
Relationship Set	: [RELATIONSHIP ID]+ | NULL	11.8.7.22
Conversion Record Set	: [CONVERSION ID]+ | NULL	11.8.7.25

]

Constraints

C1: The Point Feature Identifier is an identifier of a Point Feature which shall be unique within a particular Section.

C2: The data source referred to by Source Description Identifier shall belong to the same Dataset as the Point Feature in question.

C3: NETWORK ID shall exist as ELEMENT(NETWORK ID).

C4: The Node below "shall exist" as ELEMENT(NODE ID).

C5: The Node referred to by Node Identifier (inside EXPLICIT TOPO POINT GEO RENDERING, inside EXPLICIT TOPOLOGY POINT RENDERING) shall belong to the same Section as the Point Feature in question. In the Non-Explicit Topology case no Nodes are used.

C6: The Topo Rendering choice for this Point Feature should be the same for all Features in the Layer.

11.5.4.4.5 EXPLICIT TOPOLOGY POINT RENDERING

[

Geometry	: EXPLICIT TOPO POINT GEO RENDERING | NULL	11.5.4.4.7
Line BP Set	: [LINE FEATURE ID]+ | NULL	11.8.7.18

]

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11.5.4.4.6 NON-EXPLICIT TOPOLOGY POINT RENDERING

[
Geometry : NON-EXPLICIT TOPO POINT GEO RENDERING 11.5.4.4.8
]

11.5.4.4.7 EXPLICIT TOPO POINT GEO RENDERING

[
Node Identifier : NODE ID 11.8.7.14
]

Constraints
C1: ELEMENT(NODE ID) should exist in the scope that it is used from.

11.5.4.4.8 NON-EXPLICIT TOPO POINT GEO RENDERING

[

Coordinate Mask	: (0..3331)	
Time Mask	: (1..16)	
	| NULL	
X,Y Coordinates	: COORDINATE PAIR	11.8.5.4
Z Coord	: COORDINATE VALUE	11.8.5.7
	| NULL	
H1 Coordinate	: COORDINATE VALUE	11.8.5.7
	| NULL	
Temporal Coordinate Tuple	: TEMPORAL COORDINATE TUPLE	11.8.5.6
	| NULL	

]

11.5.4.4.9 LINE FEATURE

[

Line Feature Identifier	: LINE FEATURE ID	11.8.7.18
Source	: SOURCE ID	11.8.7.30
	| NULL	
Network	: NETWORK ID	11.8.7.40
	| NULL	
Feature Class Code	: ANY FEATURE CLASS CODE	11.3.6.10
Split Indicator	: SPLIT INDICATOR	11.5.4.4.27.2
Topo/Geo Rendering	: EXPLICIT TOPOLOGY LINE RENDERING	11.5.4.4.10
	| NON-EXPLICIT TOPOLOGY LINE RENDERING	11.5.4.4.14
Attribute Group Set	: [SCOPED ATTRIBUTE]+	11.5.4.6.6
	| NULL	
Complex Feature Set	: [COMPLEX FEATURE ID]+	11.8.7.20
	| NULL	
Relationship Set	: [RELATIONSHIP ID]+	11.8.7.22
	| NULL	
Conversion Record Set	: [CONVERSION ID]+	11.8.7.25
	| NULL	

]

Constraints
C1: The Line Feature Identifier is an identifier of a Line Feature which shall be unique within a particular Section.
C2: The data source referred to by Source Description Identifier shall belong to the same Dataset as the Point Feature in question.

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C3: The Points referred to by From Point Identifier and To Point Identifier shall belong to the same Section as the Line Feature in question.
C4: The Edge referred to by Edge Identifier (deep inside EDGE REFERENCE) shall belong to the same Section as this Line Feature. Only used in "explicit" mode.
C5: ELEMENT(source, network) shall exist.
C6: The Topo Rendering choice for this Line Feature should be the same for all the Features in this Layer.

11.5.4.4.10 EXPLICIT TOPOLOGY LINE RENDERING

[

Topology	: EXPLICIT TOPO LINE TOPOLOGY	11.5.4.4.12
Geometry	: EXPLICIT TOPO LINE GEO RENDERING	11.5.4.4.13
	| NULL	

]

11.5.4.4.11 NON-EXPLICIT TOPOLOGY LINE RENDERING

[

Geometry	: NON-EXPLICIT TOPO LINE GEO RENDERING	11.5.4.4.14

]

11.5.4.4.12 EXPLICIT TOPO LINE TOPOLOGY

[

From Point Feature	: POINT FEATURE ID	11.8.7.17
	| NULL	
To Point Feature	: POINT FEATURE ID	11.8.7.17
	| NULL	

]

11.5.4.4.13 EXPLICIT TOPO LINE GEO RENDERING

[

Edge Reference Sequence	: [EDGE REFERENCE]+	11.5.4.4.15
	| NULL	
Ending Height	: (-9..9)	
	| NULL	

]

11.5.4.4.14 NON-EXPLICIT TOPO LINE GEO RENDERING

[

Coordinate Mask	: (0..3331)	
Time Mask	: (1..16)	
	| NULL	
X,Y Coordinate Sequence	: [COORDINATE PAIR]+	11.8.5.4
From Interval Position Sequence	: [(0..99999)]+	
	| NULL	
Discrete Dynamic Counter of Zs	(0..99999)	
Z Coordinate Sequence	: [COORDINATE VALUE]+	11.8.5.7
	| NULL	
Discrete Dynamic Counter of H1s	(0..99999)	
H1 Coordinate Sequence	: [COORDINATE VALUE]+	11.8.5.7
	| NULL	
Discrete Dynamic Counter of H2s	(0..99999)	

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H2 Coordinate Sequence	: [COORDINATE VALUE]+ | NULL	11.8.5.7
Temporal Coordinate Tuple	: TEMPORAL COORDINATE TUPLE | NULL	11.8.5.6

]

Constraints

C1: There shall be at least 2 points in the X,Y Coordinate Sequence.

C2: The order of the Coordinate Pairs in the X,Y Coordinate Sequence is significant and is to be maintained.

11.5.4.4.15 EDGE REFERENCE

[

Starting Height	: (-9..9) | NULL	
Intermediate Height	: (-9..9) | NULL	
Composing Edge	: COMPOSING EDGE	11.5.4.4.16

]

11.5.4.4.16 COMPOSING EDGE

[

Edge Identifier	: EDGE ID	11.8.7.15
Line Direction	: LINE DIRECTION	11.5.4.4.27.4

]

Constraints

C1: ELEMENT(EDGE ID) should exist in this scope.

11.5.4.4.17 AREA FEATURE

[

Area Feature Identifier	: AREA FEATURE ID	11.8.7.19
Source	: SOURCE ID | NULL	11.8.7.30
Network	: NETWORK ID | NULL	11.8.7.40
Feature Class Code	: ANY FEATURE CLASS CODE	11.3.6.10
Split Indicator	: SPLIT INDICATOR	11.5.4.4.27.2
Topo/Geo Rendering	: FULL TOPOLOGY AREA RENDERING | CONNECTIVITY TOPOLOGY AREA RENDERING | NON-EXPLICIT TOPOLOGY AREA RENDERING	11.5.4.4.18 11.5.4.4.19 11.5.4.4.23
Attribute Group Set	: [SCOPED ATTRIBUTE]+ | NULL	11.5.4.6.6
Complex Feature Set	: [COMPLEX FEATURE ID]+ | NULL	11.8.7.20
Relationship Set	: [RELATIONSHIP ID]+ | NULL	11.8.7.22
Conversion Record Set	: [CONVERSION ID]+ | NULL	11.8.7.25

]

Constraints

C1: The Area Feature Identifier is an identifier of an Area Feature that shall be unique within a particular Section.

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C2: The Face(s) referred to by Face Identifier shall belong to the same Section as the Area Feature in question.
C3: The Face referred to by Face Identifier inside the full topology rendering shall belong to the same Section as the Area Feature that refers to that Face. Furthermore, the Face shall have been previously defined in order to be used here.
C4: The Edge referred to by Edge Identifier inside the connectivity rendering shall belong to the same Section as the Area Feature that refers to that Edge. Furthermore, the Edge shall have been previously defined in order to be used here.
C5: The Source shall have been previously defined in order to be used here.
C6: The Network shall have been previously defined in order to be used here.
C7: The Topological Rendering choice for this Area Feature should be the same for all Features in this Layer.

11.5.4.4.18 FULL TOPOLOGY AREA RENDERING

[
Geometry : FULL TOPO AREA GEO RENDERING 11.5.4.4.21
| NULL
]

11.5.4.4.19 CONNECTIVITY TOPOLOGY AREA RENDERING

[
Geometry : CONNECTIVITY TOPO AREA GEO RENDERING 11.5.4.4.22
| NULL
]

11.5.4.4.20 NON-EXPLICIT TOPOLOGY AREA RENDERING

[
Geometry : NON-EXPLICIT TOPO AREA GEO RENDERING 11.5.4.4.23
]

11.5.4.4.21 FULL TOPO AREA GEO RENDERING

[
Face Identifiers : [FACE ID]+ 11.8.7.16

]

11.5.4.4.22 CONNECTIVITY TOPO AREA GEO RENDERING

[
Bounding Edge Sequence : [BOUNDING EDGE]+ 11.5.4.3.6

]

Constraints
C1: There Shall be at least 3 Edges in the Sequence.

11.5.4.4.23 NON-EXPLICIT TOPO AREA GEO RENDERING

[
Coordinate Mask : (0..3331)

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Time Mask	: (1..16) | NULL	
X,Y Coordinate Sequence	: [COORDINATE PAIR]+	11.8.5.4
From Interval Position Sequence	: [(0..99999)]+ | NULL	
Discrete Dynamic Counter of Zs	(0..99999)	
Z Coordinate Sequence	: [COORDINATE VALUE]+ | NULL	11.8.5.7
Discrete Dynamic Counter of H1s	(0..99999)	
H1 Coordinate Sequence	: [COORDINATE VALUE]+ | NULL	11.8.5.7
Discrete Dynamic Counter of H2s	(0..99999)	
H2 Coordinate Sequence	: [COORDINATE VALUE]+ | NULL	11.8.5.7
Temporal Coordinate Tuple	: TEMPORAL COORDINATE TUPLE | NULL	11.8.5.6
Extended Area Geometry	: EXTENDED AREA GEOMETRY | NULL	11.5.4.3.7

]

Constraints

C1: There shall be at least 3 points in the X,Y Coordinate Sequence.

C2: The order of the Coordinate Pairs in the X,Y Coordinate Sequence is significant and is to be maintained.

C3: If the final X,Y COORDINATE PAIR does not match (equal) the first X,Y COORDINATE PAIR then it should be "inferred" that there is an additional 'segment' which connects the final COORDINATE PAIR to the first, to close the 'polygon'.

11.5.4.4.24 COMPLEX FEATURE

[

Complex Feature Identifier	: COMPLEX FEATURE ID	11.8.7.20
Source	: SOURCE ID | NULL	11.8.7.30
Network	: NETWORK ID | NULL	11.8.7.40
Feature Class Code	: ANY FEATURE CLASS CODE	11.3.6.10
Complex Split Indicator	: COMPLEX SPLIT INDICATOR	11.5.4.4.27.3
Topology	: EXPLICIT COMPLEX FEATURE TOPOLOGY | NULL	11.5.4.4.25
Complex Feature Part Sequence	: [COMPOSING FEATURE]+ | NULL	11.5.4.4.26
Attribute Group Set	: [SCOPED ATTRIBUTE]+ | NULL	11.5.4.6.6
Parent Complex Feature BP Set	: [COMPLEX FEATURE ID]+ | NULL	11.8.7.20
Relationship Set	: [RELATIONSHIP ID]+ | NULL	11.8.7.22
Conversion Record Set	: [CONVERSION ID]+ | NULL	11.8.7.25

]

Constraints

C1: The Complex Feature Identifier is an identifier of a Complex Feature which shall be unique within a particular Section.

C2: source ID and network ID "shall exist" in this Dataset.

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C3: The Complex Features referred to by From Complex Feature and To Complex Feature (inside EXPLICIT COMPLEX FEATURE TOPOLOGY) shall belong to the same Section as this Complex Feature.
C4: The Features referred to by Feature Identifier (inside – even nested – the COMPOSING FEATURE) shall belong to the same Section as this Complex Feature.

11.5.4.4.25 EXPLICIT COMPLEX FEATURE TOPOLOGY

[

From Complex Feature	: COMPLEX FEATURE ID | NULL	11.8.7.20
To Complex Feature	: COMPLEX FEATURE ID | NULL	11.8.7.20
Complex Feature From/To BP Spoke Set	: [COMPLEX FEATURE ID]+ | NULL	11.8.7.20

]

Constraints:
C1: From/To topological information is only attached to “line-ish” Complex Features.

11.5.4.4.26 COMPOSING FEATURE

[

Feature Identifier	: ANY FEATURE	11.8.7.1
Feature Part Attribute Group Set	: [SCOPED ATTRIBUTE]+ | NULL	11.5.4.6.6

]

Constraints
C1: The Features referred to by Feature Identifier (inside ANY FEATURE) shall exist in their declared scope.

11.5.4.4.27 Basic Data Types used by Feature Data

11.5.4.4.27.1 Overview

Simple and compound types used by Feature Data

11.5.4.4.27.2 SPLIT INDICATOR

= (Entire Feature=0, Part of a Split Feature=1)

11.5.4.4.27.3 COMPLEX SPLIT INDICATOR

= (Entire Feature=0, Part of a Split Feature=1, Repeated in another Section=2)

11.5.4.4.27.4 LINE DIRECTION

= (Same as Edge=0, Opposite=1)

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11.5.4.5 Relationships

11.5.4.5.1 Overview

The data structures defined in this section are meant to represent Relationships between features and Attributes.

11.5.4.5.2 RELATIONSHIP

[

Relationship Identifier	: RELATIONSHIP ID	11.8.7.22
Source	: SOURCE ID	11.8.7.30
	| NULL	
Relationship Code	: ANY RELATIONSHIP CLASS CODE	11.3.6.26
Relationship Feature Partner Sequence	: [PARTNER]+	11.5.4.5.3
Relationship Attribute Group Set	: [EXPLICITLY SCOPED ATTRIBUTE]+	11.5.4.6.7
	| NULL	

]

Constraints

C1: The Relationship Identifier is an identifier of a Relationship instance which shall be unique within a particular Section.

C2: The source document referred to by Source Description Identifier shall belong to the same Dataset as the Relationship in question. It also needs to exist i.e. ELEMENT( ).

C3: ELEMENT(ATTRIBUTE ID SET LIST)} that is we shall make sure that the ATTRIBUTE ID exists as an ELEMENT(Attributes in the section of this Relationship, i.e. in scope).
Any elements of the Attribute Group Set which are *not* contained in the same <DLS> as the Relationship shall have the sufficient set of <DLS> in its Scoped Attribute to be located.
*]

C4: ELEMENT([rel. def.]->rel code set) i.e. the code used shall be in the set defined by the structure in rel. def record set.

11.5.4.5.3 PARTNER

[

Partner Feature	: ANY FEATURE	11.8.7.1
Feature Role Number	: (1..99)	
Relationship Partner Attributes Record Set	: [SCOPED ATTRIBUTE]+	11.5.4.6.6
	| NULL	

]

Constraints

C1 Partner Feature shall exist as well as within its scope and all of its components.

11.5.4.6 Attributes

11.5.4.6.1 Overview

Attributes travel in 'groups'. The top-level entity (that is, the Attribute Group) is a sequence (in which order is significant) of Attributes (either simple or composite).

11.5.4.6.2 ATTRIBUTE GROUP

[

Attribute Group Identifier	: ATTRIBUTE ID	11.8.7.21

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Attribute Sequence	: [ATTRIBUTE]+	11.5.4.6.3

]

Constraints

C1: The Attribute Set Identifier is an identifier of a particular Attribute Set which is unique within a particular Section.

C2: The [ATTRIBUTE]+ is not a "usual" Set, but actually a Sequence, that is order matters.

11.5.4.6.3 ATTRIBUTE

[

Attribute Sequence Element	: SIMPLE ATTRIBUTE	11.5.4.6.4
	| COMPOSITE ATTRIBUTE	11.5.4.6.5

]

11.5.4.6.4 SIMPLE ATTRIBUTE

[

Attribute Type Code	: ANY ATTRIBUTE TYPE CODE	11.3.6.18
Source	: SOURCE ID	11.8.7.30
	| NULL	
Value Scope	: DATA SCOPE	11.5.4.6.9.2
	| NULL	
Attribute Value	: SHORT STRING	11.5.4.7.5
	| TEXT ID	11.8.7.23
	| TIME ID	11.8.7.24
	| GEOPOLITICAL STRUCTURE REFERENCE	11.3.14
Feature BP Set	: [ANY FEATURE IN DATASET]+	11.8.7.2
	| NULL	
Text Record BP Set	: [TEXT RECORD IN DATASET]+	11.8.7.3
	| NULL	
Relationship BP Set	: [RELATIONSHIP IN DATASET]+	11.8.7.4
	| NULL	

]

Constraints:

C1: The data source referred to by Description Identifier shall belong to the same Dataset as the Attribute in question.

C2: ELEMENT(ATTRIBUTE DEFINITION LIST) or type codes defined in {ATTRIBUTE TYPE CODE} set.

C3: The Source shall have been previously defined in order to be used here .

C4: The Source Description Id shall be in the {Dataset}. The data source referred to by Description Identifier shall belong to the same Dataset as the Attribute in question.

C5: The Text shall have been previously defined in order to be used here.

C6: The Time Domain shall have been previously defined in order to be used here.

C7: If Attribute Value is of type SHORT STRING then Value Scope is NULL.

C8: The Feature referred to by Feature BP (back pointer) shall have been previously defined in order to be used here.

C9: The Text referred to by Text BP (back pointer) shall have been previously defined in order to be used here.

C10: The Relationship referred to by Relationship BP (back pointer) shall have been previously defined in order to be used here.

11.5.4.6.5 COMPOSITE ATTRIBUTE

[

Sub-Attributes	: [ATTRIBUTE]+	11.5.4.6.3

]

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Constraints

C1: The Sub-Attributes in the [ATTRIBUTE]+ are ordered, that is it is a Sequence, even if not in all case there is a strict semantic ordering intended by the specific Composite Attribute.

C2: Each *Sub-Attribute* of a *Composite Attribute* is either a *Simple Attribute*, a *Composite Attribute*, or a *Restrictive Sub-Attribute*. Any *Sub-Attribute* being a *Composite Attribute* recursively builds a hierarchical tree of *Sub-Attribute* sets at different hierarchical level. In case a *Restrictive Sub-Attribute* operates on a *(Simple or Composite) Attribute*, it implies representing a different (hierarchical) level than said *Attribute.*

11.5.4.6.6 SCOPED ATTRIBUTE

[		
Attribute Partition Level Scope	: DATA SCOPE	11.5.4.6.9.2
Attribute Identifier	: ATTRIBUTE ID	11.8.7.21
]		

Comments

K1: See Figure 17 for a UML data model view of Attribute and Relationship partition scope.

11.5.4.6.7 EXPLICITLY SCOPED ATTRIBUTE

[		
Dataset Identifier	: DATASET ID	11.8.7.10
	| NULL	
Layer Identifier	: LAYER ID	11.8.7.11
	| NULL	
Section Identifier	: SECTION ID	11.8.7.12
	| NULL	
Attribute Identifier	: ATTRIBUTE ID	11.8.7.21
]		

Constraints

C1: All items in the EXPLICITLY SCOPED ATTRIBUTE structure shall exists and they shall form together a partitioning scope which exists in the actual data representation.

Comments

K1: The EXPLICITLY SCOPED ATTRIBUTE structure equals the notion of ANY ATTRIBUTE, in the spirit of related definitions (ANY ATTRIBUTE IN DATASET) and of similar definitions (ANY FEATURE), it just does so more explicitly.

11.5.4.6.8 ANY ATTRIBUTE IN DATASET

[		
Layer Identifier	: LAYER ID	11.8.7.11
	| NULL	
Section Identifier	: SECTION ID	11.8.7.12
	| NULL	
Attribute Identifier	: ATTRIBUTE ID	11.8.7.21
]		

Constraints

C1: All items in the ANY ATTRIBUTE IN DATASET structure shall exists and they shall form together a scope which exists in the actual data representation.

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11.5.4.6.9 Basic Data Types used by Attributes

11.5.4.6.9.1 Overview

Simple and compound types used by Attributes

11.5.4.6.9.2 DATA SCOPE

= (Section='S', Layer='L', Dataset='D')

Comments

K1: The partition level scope of Section is considered local scope, Layer is considered semi-global scope, and Dataset is considered global scope.

11.5.4.7 Text Records

11.5.4.7.1 Overview

All text needs addressed here.

11.5.4.7.2 TEXT RECORD

[		
Text Identifier	: TEXT ID	11.8.7.23
Source	: SOURCE ID	11.8.7.30
	| NULL	
Text	: LANGUAGE TEXT PAIR	11.5.4.7.3
Text Attribute Group Set	: [SCOPED ATTRIBUTE]+	11.5.4.6.6
	| NULL	
Attribute BP Set	: [EXPLICITLY SCOPED ATTRIBUTE]+	11.5.4.6.6
	| NULL	
]		

Constraints:

C1: The Text Identifier is an identifier of a Text Record which is unique within a particular Section.

C2: The data source referred to by SOURCE ID shall belong to the same Dataset as this Text Record.

C3: SOURCE ID shall exist i.e. ELEMENT(sources in the Dataset?)

11.5.4.7.3 LANGUAGE TEXT PAIR

[		
Language	: LANGUAGE CODE	11.5.4.7.7
	| NULL	
Text	: STRING	11.5.4.7.4
]		

11.5.4.7.4 STRING

= [CHARACTER]* 11.5.4.7.9

11.5.4.7.5 SHORT STRING

= [CHARACTER]* 11.5.4.7.9

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Constraints
C1: Spaces are not allowed.
C2: The length of SHORT STRING may not exceed 11 characters.

11.5.4.7.6 TWO CHARACTERS

[		
First Character	: CHARACTER	11.5.4.7.9
Second Character	: CHARACTER	11.5.4.7.9
]		

Constraints
C1: The 2 characters are concatenated together.

11.5.4.7.7 LANGUAGE CODE

= A value from the set of ISO Language Codes, which in some cases, may be extended by other language entries as appropriate

11.5.4.7.8 ALPHABETIC CHARACTER

= ('A'..'Z', 'a'..'z')

11.5.4.7.9 CHARACTER

A printable character from an "appropriate" character set.

11.5.4.8 Conversion Records

11.5.4.8.1 Overview

The data structures described in this sub-clause are meant to enable cross-reference between Features that belong to different Sections.

11.5.4.8.2 CONVERSION

[		
Conversion Identifier	: CONVERSION ID	11.8.7.25
Local Feature Category	: FEATURE CATEGORY	11.8.7.8
Local Feature Identifier	: ANY FEATURE ID	11.8.7.5
Foreign Features	: [ANY FEATURE]+	11.8.7.1
]		

Constraints
C1: CONVERSION ID shall be unique in the Section that it "resides" in.
C2: The Foreign Features [in the set of ANY FEATUREs] shall have *all* of the Dataset, Layer, *and* Section Identifiers specified.

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11.5.4.9 Object References

11.5.4.9.1 Overview

The object reference is a mechanism which allows the creation of a “permanent-complex-long” ID which usually doesn't fit into a 10-wide integer identifier.

11.5.4.9.2 OBJECT REFERENCE

[

Object Reference Identifier	: OBJECT REF ID	11.8.7.27
Record Type/Subtype Code	: RECORD TYPE IDENTIFIER	11.3.5.5
Object Record Identifier	: ANY GEOMETRICAL ID	11.8.7.6
	| ANY OBJECT ID	11.8.7.7
Object Reference Type	: ALPHABETIC CHARACTER	11.5.4.7.8
	| NULL	
Object Reference Data Type	: DATA TYPE CODE	11.8.4.1
Object Reference Length	: (1..99999)	
Object Reference	: STRING	11.5.4.7.4

]

Constraints

C1: The Object Reference Identifier is an identifier of Object Reference Information which shall be unique within a particular Section.

C2: The Object Record identifier has a “special” meaning in the MRS realization which is specifically different than in the other realizations which don't part take in the MRS Genome.

C3: The Object Record Identifier shall belong to the same scope as the Object Reference in question.

C4: ELEMENT(rec type) shall exist, i.e. in rec def set.

11.6 Time Domain Syntax

11.6.1 Overview

All temporal needs of GDF taken care of here.

11.6.2 Time Domain Syntax Records

11.6.2.1 Overview

The data structures described in this sub-clause provide the means to express a time period of any complexity. Also, clause 12 for Time Domain Record (rec45).

11.6.2.2 TIME DOMAIN

[

Time Domain Identifier	: TIME ID	11.8.7.24
Source	: SOURCE ID	11.8.7.30
	| NULL	
Time Domain Description	: TIME DOMAIN DESCRIPTION	11.6.2.3

]

Constraints

C1: The Time Domain Identifier is an identifier of a Time Domain which shall be unique within a particular Section.

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C2: The data source referred to by Source Description Identifier shall belong to the same Dataset as the Time Domain in question.

11.6.2.3 TIME DOMAIN DESCRIPTION

```
[
  Time Domain Description        : COMPOSITE TIME DOMAIN        11.6.2.4
                                 | BASIC TIME DOMAIN            11.6.2.8
]
```

11.6.2.4 COMPOSITE TIME DOMAIN

```
[
  Open Bracket                   : '['
  Time Domain Description        : TIME DOMAIN DESCRIPTION      11.6.2.3
  Set Operator                   : SET OPERATOR                 11.6.2.6
  Time Domain Description        : TIME DOMAIN DESCRIPTION      11.6.2.3
  Additional Terms               : COMPOSITE TIME DOMAIN ELEMENT
                                 | NULL
  Close Bracket                  : ']'
]
```

11.6.2.5 COMPOSITE TIME DOMAIN ELEMENT

```
[
  Set Operator                   : REPEATABLE_SET OPERATOR      11.6.2.7
  Time Domain Description        : TIME DOMAIN DESCRIPTION      11.6.2.3
]
```

11.6.2.6 SET OPERATOR

= ('+', '*', '-')

The Set Operator symbols have the following meaning:

A+B: the union of A and B

A*B: the intersection of A and B

A-B: the difference of A and B

11.6.2.7 REPEATABLE SET OPERATOR

= ('+', '*')

11.6.2.8 BASIC TIME DOMAIN

```
[
  Open Bracket                   : '['
  Basic Time Domain Expression   : START-DURATION METHOD        11.6.2.9
                                 | START-END METHOD            11.6.2.10
  Close Bracket                  : ']'
]
```

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11.6.2.9 START-DURATION METHOD

[

Starting Date Clause	: STARTING OR ENDING DATE CLAUSE | NULL	11.6.2.11
Duration Clause	: DURATION CLAUSE | NULL	11.6.2.31

]

Constraints
C1: Starting Date and Duration may not both be NULL.

11.6.2.10 START-END METHOD

[

Starting Date Clause	: STARTING OR ENDING DATE CLAUSE | NULL	11.6.2.11
Ending Date Clause	: STARTING OR ENDING DATE CLAUSE | NULL	11.6.2.11

]

Constraints
C1: Starting Date and Ending Date may not both be NULL.

11.6.2.11 STARTING OR ENDING DATE CLAUSE

[

Open Parenthesis	: '('	
Starting Or Ending Date	: STARTING DATE	11.6.2.12
Close Parenthesis	: ')'	

]

Comments:
K1: Note that both, starting dates and ending dates are meant to be covered by the STARTING DATE data type and any sub-structures simply referring to START, or STARTING.

11.6.2.12 STARTING DATE

[

Year	: YEAR TAG | NULL	11.6.2.13
Sub-year	: SUB YEAR STARTING DATE | NULL	11.6.2.14
Time	: TIME START DATE | NULL	11.6.2.22
Fuzzy Start Date Sequence	: [FUZZY START DATE]+ | NULL	11.6.2.28

]

Constraints
C1: The elements may not all be NULL.

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11.6.2.13 YEAR TAG

[
Year Designator Code : 'y'
Year : YEAR CODE 11.6.3.5
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.14 SUB YEAR STARTING DATE

[
Sub-year Date : MONTH IN YEAR START DATE 11.6.2.15
| WEEK IN YEAR START DATE 11.6.2.26
]

11.6.2.15 MONTH IN YEAR START DATE

[
Month in Year : MONTH IN YEAR TAG 11.6.2.16
| NULL
Day : DAY START DATE 11.6.2.17
| NULL
]

Constraints
C1: The elements may not all be NULL.

11.6.2.16 MONTH IN YEAR TAG

[
Month in Year Designator Code : 'M'
Month in Year : (1..12)

]

Constraints
C1: The fields in this type are concatenated.

11.6.2.17 DAY START DATE

[
Day : DAY IN MONTH TAG 11.6.2.18
| [DAY IN WEEK TAG]+ 11.6.2.19
| FORWARD DAY IN WEEK IN MONTH TAG 11.6.2.20
| REVERSE DAY IN WEEK IN MONTH TAG 11.6.2.21
]

Constraints
C1: No blank space between the literals and the numbers following them.

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11.6.2.18 DAY IN MONTH TAG

[
Minus Sign : '-'
| NULL
Day in Month Designator Code : 'd'
Day in Month : (1..31)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.19 DAY IN WEEK TAG

[
Day in Week Designator Code : 't'
Day in Week : DAY IN WEEK EXTENDED 11.6.2.30
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.20 FORWARD DAY IN WEEK IN MONTH TAG

[
Forward Day in Week in Month Designator Code : 'f'
Week in Month : (1..5)
Day in Week : DAY IN WEEK 11.6.2.29
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.21 REVERSE DAY IN WEEK IN MONTH TAG

[
Reverse Day in Week in Month Designator Code : 'l'
Week in Month : (1..5)
Day in Week : DAY IN WEEK 11.6.2.29
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.22 TIME START DATE

[
Hour in Day : HOUR IN DAY TAG 11.6.2.23
| NULL
Minute in Hour : MINUTE IN HOUR TAG 11.6.2.24
| NULL
Second in Minute : SECOND IN MINUTE TAG 11.6.2.25
| NULL
]

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Constraints
C1: The fields in this type are concatenated.

11.6.2.23 HOUR IN DAY TAG

[
Minus Sign : '-'
| NULL
Hour in Day Designator Code : 'h'
Hour in Day : (0..23)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.24 MINUTE IN HOUR TAG

[
Minus Sign : '-'
| NULL
Minute in Hour Designator Code : 'm'
Minute in Hour : (0..59)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.25 SECOND IN MINUTE TAG

[
Minus Sign : '-'
| NULL
Second in Minute Designator Code : 's'
Second in Minute : (0..59)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.26 WEEK IN YEAR START DATE

[
Week in Year : WEEK IN YEAR TAG 11.6.2.27
| NULL
Day in Week : DAY IN WEEK TAG 11.6.2.19
| NULL
]

11.6.2.27 WEEK IN YEAR TAG

[
Minus Sign : '-'
| NULL
Week in Year Designator Code : 'W'
Week in Year : (1..52)
]

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Constraints
C1: The fields in this type are concatenated.

11.6.2.28 FUZZY START DATE

[
Minus Sign : '-'
| NULL
Fuzzy Designator Code : 'z'
Start Fuzzy Values : (0..100)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.29 DAY IN WEEK

= (Sunday=1, Monday=2, Tuesday=3, Wednesday=4, Thursday=5, Friday=6, Saturday=7)

11.6.2.30 DAY IN WEEK EXTENDED

= (Sunday=1, Monday=2, Tuesday=3, Wednesday=4, Thursday=5, Friday=6, Saturday=7, Holiday=8)

11.6.2.31 DURATION CLAUSE

[
Open Braces : '{'
Duration : DURATION 11.6.2.32
Close Braces : '}'
]

11.6.2.32 DURATION

[
Number of Years : YEARS NUMBER TAG 11.6.2.33
| NULL
Number of Months : MONTHS NUMBER TAG 11.6.2.34
| NULL
Number of Weeks : WEEKS NUMBER TAG 11.6.2.35
| NULL
Number of Days : DAYS NUMBER TAG 11.6.2.36
| NULL
Number of Hours : HOURS NUMBER TAG 11.6.2.37
| NULL
Number of Minutes : MINUTES NUMBER TAG 11.6.2.39
| NULL
Number of Seconds : SECONDS NUMBER TAG 11.6.2.39
| NULL
Fuzzy Duration Sequence : [FUZZY DURATION]+ 11.6.2.40
| NULL
]

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Constraints
C1: The present fields in this type are concatenated.
C2: The fields in this structure may not all be absent.

11.6.2.33 YEARS NUMBER TAG

[
Minus Sign : '-'
| NULL
Years Number Designator Code : 'y'
Years : (0..99)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.34 MONTHS NUMBER TAG

[
Minus Sign : '-'
| NULL
Months Number Designator Code : 'M'
Months : (0..99)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.35 WEEKS NUMBER TAG

[
Minus Sign : '-'
| NULL
Weeks Number Designator Code : 'w'
Weeks : (0..99)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.36 DAYS NUMBER TAG

[
Minus Sign : '-'
| NULL
Days Number Designator Code : 'd'
Days : (0..99)
]

Constraints
C1: The fields in this type are concatenated.

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11.6.2.37 HOURS NUMBER TAG

[
Minus Sign : '-'
| NULL
Hours Number Designator Code : 'h'
Hours : (0..99)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.38 MINUTES NUMBER TAG

[
Minus Sign : '-'
| NULL
Minutes Number Designator Code : 'm'
Minutes : (0..99)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.39 SECONDS NUMBER TAG

[
Minus Sign : '-'
| NULL
Seconds Number Designator Code : 's'
Seconds : (0..99)
]

Constraints
C1: The fields in this type are concatenated.

11.6.2.40 FUZZY DURATION

[
Minus Sign : '-'
| NULL
Fuzzy Designator Code : 'z'
Duration Fuzzy Values : (50..100)
]

Constraints
C1: The fields in this type are concatenated.

11.6.3 Direct Time Expressions Usage

11.6.3.1 Overview

The following time structures are used "directly" by other higher-level structures and do not go via the intermediation of an actual Time Record. Both direct usage as well as format of time stamps for usage (as in time stamp format, which is not, strictly speaking, a time expression but rather metadata about how a time stamp shall look like) are described in this 'direct-usage' sub-clause.

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11.6.3.2 DATE STAMP

[
Year : YEAR CODE 11.6.3.5
Month : MONTH CODE 11.6.3.6
Day : DAY CODE 11.6.3.7
]

11.6.3.3 DATE/HOUR STAMP

[
Date : DATE STAMP 11.6.3.2
Hour : HOUR CODE 11.6.3.8
]

11.6.3.4 MONTH/HOUR STAMP

[
Month : MONTH CODE 11.6.3.6
Day : DAY CODE 11.6.3.7
Hour : HOUR CODE 11.6.3.8
]

11.6.3.5 YEAR CODE

= (1000..9999)

11.6.3.6 MONTH CODE

= ('01', '02', '03', '04', '05', '06', '07', '08', '09', 10..12)

11.6.3.7 DAY CODE

= ('01', '02', '03', '04', '05', '06', '07', '08', '09', 10..31)

11.6.3.8 HOUR CODE

= ('01', '02', '03', '04', '05', '06', '07', '08', '09', 10..23)

11.6.3.9 TIME STAMP FORMAT

[
Day Component : DAY COMPONENT 11.6.3.10
| NULL
Month Component : MONTH COMPONENT 11.6.3.11
| NULL
Year Component : YEAR COMPONENT 11.6.3.12
| NULL
Hour Component : HOUR COMPONENT 11.6.3.13
| NULL
Minute Component : MINUTE COMPONENT 11.6.3.14
| NULL
Second Component : SECOND COMPONENT 11.6.3.15
| NULL
]

Constraints
C1: At least one of the time components shall be different from NULL.

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C2: The TIME STAMP FORMAT isn't allowed to end with a Separator
C3: The total length of the TIME STAMP FORMAT shall not exceed 20 characters width.

11.6.3.10 DAY COMPONENT

[
Day Placeholder Code Set : [DAY PLACEHOLDER CODE]+ 11.6.3.16
Separator : ':'
| NULL
]

Constraints
C1: The Separator is only used if this component isn't the last one in the TIME STAMP FORMAT.

11.6.3.11 MONTH COMPONENT

[
Month Placeholder Code Set : [MONTH PLACEHOLDER CODE]+ 11.6.3.17
Separator : ':'
| NULL
]

Constraints
C1: The Separator is only used if this component isn't the last one in the TIME STAMP FORMAT.

11.6.3.12 YEAR COMPONENT

[
Year Placeholder Code : [YEAR PLACEHOLDER CODE]+ 11.6.3.18
Separator : ':'
| NULL
]

Constraints
C1: The Separator is only used if this component isn't the last one in the TIME STAMP FORMAT.

11.6.3.13 HOUR COMPONENT

[
Hour Placeholder Code : [HOUR PLACEHOLDER CODE]+ 11.6.3.19
Separator : ':'
| NULL
]

Constraints
C1: The Separator is only used if this component isn't the last one in the TIME STAMP FORMAT.

11.6.3.14 MINUTE COMPONENT

[
Minute Placeholder Code : [MINUTE PLACEHOLDER CODE]+ 11.6.3.20
Separator : ':'
| NULL
]

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Constraints
C1: The Separator is only used if this component isn't the last one in the TIME STAMP FORMAT.

11.6.3.15 SECOND COMPONENT

[
Second Placeholder Code : [SECOND PLACEHOLDER CODE]+ 11.6.3.21

]

11.6.3.16 DAY PLACEHOLDER CODE

= 'd'

11.6.3.17 MONTH PLACEHOLDER CODE

= 'M'

11.6.3.18 YEAR PLACEHOLDER CODE

= 'y'

11.6.3.19 HOUR PLACEHOLDER CODE

= 'h'

11.6.3.20 MINUTE PLACEHOLDER CODE

= 'm'

11.6.3.21 SECOND PLACEHOLDER CODE

= 's'

11.7 Update Information

11.7.1 Overview

The Update Information Records are used to register changes in a particularly published GDF Album vis-à-vis former such publishing.

11.7.2 UPDATE INFORMATION

[
Update Information : GEO TOPO UPDATE INFORMATION 11.7.3
| OBJECT UPDATE INFORMATION 11.7.4
| ATTRIBUTE UPDATE INFORMATION 11.7.5
]

Constraints
C1: UPDATE ID shall be unique within the applicable scope.

Comments:
K1: Corresponds to 12.8.1 UPDATE INFORMATION in MRS

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11.7.3 GEO TOPO UPDATE INFORMATION

[		
Update Identifier	UPDATE GEO TOPO ID	11.8.7.26
Product Cycle	: (0..99)	
	| NULL	
Geo Topo Category	: GEO TOPO CATEGORY	11.7.6.2
Geo Topo Object Identifier	: ANY GEOMETRICAL ID	11.8.7.6
Action Class	: ACTION CLASS	11.7.6.4
Action Time Stamp	: STRING	11.5.4.7.4
]		

Constraints
C1: The Geo Topo Category and Geo Topo Object Identifier shall form a unique composite "key" in the Dataset.
C2: ELEMENT(any geo id) shall exist.

11.7.4 OBJECT UPDATE INFORMATION

[		
Update Identifier	UPDATE OBJECT ID	11.8.7.27
Product Cycle	: (0..99)	
	| NULL	
Object Category	: OBJECT CATEGORY	11.7.6.3
Object Record Identifier	| ANY OBJECT ID	11.8.7.7
Object Code	: ANY FEATURE CLASS CODE	11.3.6.10
	| SPECIAL OBJECT CODE	11.7.6.5
Action Class	: ACTION CLASS	11.7.6.4
Action Time Stamp	: STRING	11.5.4.7.4
]		

Constraints
C1: ELEMENT(any obj id) shall exist.
C2: ELEMENT(Feature Class Code) shall actually exist.

11.7.5 ATTRIBUTE UPDATE INFORMATION

[		
Update Identifier	UPDATE ATTRIBUTE ID	11.8.7.28
Product Cycle	: (0..99)	
	| NULL	
Object Category	: OBJECT CATEGORY	11.7.6.3
Object Record Identifier	| ANY OBJECT ID	11.8.7.7
Object Code	: ANY FEATURE CLASS CODE	11.3.6.10
	| SPECIAL OBJECT CODE	11.7.6.5
Action Class	: ACTION CLASS	11.7.6.4
Action Time Stamp	: STRING	11.5.4.7.4
Attribute Update Sequence	: [ATTRIBUTE]+	11.5.4.6.3
]		

Constraints
C1: All constraints that apply to each of the original Attributes apply to the updated Attributes.

Comments:
K1: For Attribute Update Sequence, order matters.

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11.7.6 Basic Data Types used by Update Information

11.7.6.1 Overview

Simple and compound types used by Update Information Records

11.7.6.2 GEO TOPO CATEGORY

= (Node=1, Edge=2, Face=3, Dot=4, Polyline=5, Polygon=6, Coordinate tuple=7)

11.7.6.3 OBJECT CATEGORY

= (Point Feature=1, Line Feature=2, Area Feature=3, Complex Feature=4, Relationship=5, Name=6, Time Domain=7, Other Text=8, Geopolitical Structure=9, Geopolitical Structure Component=10)

11.7.6.4 ACTION CLASS

= (Update of source only=0, New=1, Delete=2, Modify=3)

11.7.6.5 SPECIAL OBJECT CODE

= (Relationship='0001', Name='0002', Time Domain='0003', Other Text='0004', Geopolitical Structure='0005', Geopolitical Structure Component='0006')

11.8 Common Data Types

11.8.1 Overview

Data Types which are used in more than one particular sub-clause are better defined here.

11.8.2 Pre-defined code lists and value lists

11.8.2.1 ATTRIBUTE TYPE CODE

= A value from the set of Attribute Type Codes.

See Attribute Catalogue Annex A.2for a list of Attribute Type Codes.

11.8.2.2 ATTRIBUTE TYPE NAME

= A value from the set of Attribute Type Names.

See Attribute Catalogue Annex A.2 for a list of Attribute Type Codes.

The Attribute Type Codes and the Attribute Type Names "travel" in pairs. They shouldn't be assigned out of such order.

11.8.2.3 ATTRIBUTE VALUE CODE

= A value from the set of sets of Attribute Value Codes. There are actually many code lists that this value may come from. They are {list them all} with individual x-reference.

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See Annex A.1. {times n.}

11.8.2.4 FEATURE CLASS CODE

= A value from the set of Feature Class Codes, in the range of (1000..8099)

See Annex A.1 for a list of Feature Class Codes

11.8.2.5 FEATURE CLASS NAME

= A value from the set of Feature Class Names.

See Annex A.1 for a list of Feature Class Names

11.8.2.6 FEATURE THEME CODE

= A value from the set of Feature Theme Codes.

See Annex A.1 for a list of Feature Theme Codes

11.8.2.7 FEATURE THEME NAME

= A value from the set of Feature Theme Names.

See Annex A.1 for a list of Feature Theme Names

11.8.2.8 RELATIONSHIP TYPE CODE

= A value from the set of Relationship Type Codes, in the range of (1000..8999).

See Relationship Catalogue Annex A.3.1 for a list of Relationship Type Codes.

11.8.2.9 RELATIONSHIP TYPE NAME

= A value from the set of Relationship Type name.

See Relationship Catalogue Annex A.3.1 for a list of Relationship Type names.

11.8.3 Geodeticals

11.8.3.1 DATUM CODE

= A code value from the Horizontal Datum List

See Metadata Catalogue Annex B.1 for a list of Horizontal Datums

11.8.3.2 DATUM NAME

= A name value from the Horizontal Datum List

See Metadata Catalogue Annex B.1 for a list of Horizontal Datums

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11.8.3.3 ELLIPSOID CODE

= A value from the list of ellipsoid codes

See Annex B.1 for a list of ellipsoid codes

11.8.3.4 GRID CODE

= A code from the list of National Grid codes

See Annex B.1 for a list of National Grids in use.

11.8.3.5 GRID NAME

= A name from the list of National Grids

See Annex B.1 for a list of National Grids in use.

11.8.3.6 HEIGHT LEVEL CODE

= A code from the list of Vertical Datum codes

See Annex B.1 for a list of Vertical Datums in use.

11.8.3.7 HEIGHT LEVEL NAME

= A name from the list of Vertical Datums

See Annex B.1 for a list of Vertical Datums in use.

11.8.3.8 PROJECTION TYPE CODE

= A value from the list of Projection Codes

See Annex B.1 for a list of Projection Codes

11.8.4 Units & measures

11.8.4.1 DATA TYPE CODE

= ('G', 'A', 'N', 'AN', 'I', 'L')

See the Metadata Catalogue for a more detailed description (see 10.3.2.4).

11.8.4.2 ATTRIBUTE DATA TYPE

= (Code list=**COD**, Enumeration=**ENM**, Number=**CNT**, Boolean=**BOL**, Bitmask Register=**BMR**, Bitmask Integer=**BMI**, Time Domain=**TMR**, Simple Character String=**SCS**, Language Coded Text=**TXT**, Percentage=**PRC**, Composite=**CMP**, Identifier=**IDN**, Geopolitical Structure Definition=**GSD**, Signed Percentage=**PRS,** Measure=**MSR**)

See the Metadata Catalogue for a list of assigned Data Unit Codes and further descriptions (see 10.3.2.6).

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11.8.4.3 DATA UNIT TYPE

= (Degree=**DEG**, Meters=**MTR**, Kilometers=**KMR**, Inch=**INC**, Feet=**FET**, Mile=**MIL**, Kilogram=**KGR**, US Pound=**PND**, Kilo Pound=**KIP**, Metric Ton=**TON**, Minute of Time=**MIN**, Kilometer Per Hour=**KPH**, Miles Per Hour=**MPH**)

11.8.5 Coordinates

11.8.5.1 COORDINATE RECORD

[		
Coordinate Identifier	: COORDINATE ID	11.8.7.13
Source	: SOURCE ID	11.8.7.30
	| NULL	
Coordinate Sequence	: [COORDINATE TUPLE]+	11.8.5.2
Node BP Set	: [NODE ID]+	11.8.7.14
	| NULL	
Edge BP Set	: [EDGE ID]+	11.8.7.15
	| NULL	
]		

Constraints:
C1: The Coordinate Identifier is the unique key in some Section.
C2: Only one Coordinate Tuple should appear if the Coordinate Record is referenced from a Node or an explicit topology Point Feature.
C3: The order of the Coordinate Sequence is significant and is to be maintained.

11.8.5.2 COORDINATE TUPLE

[		
Coordinate	: COORDINATE TRIPLET	11.8.5.3
	| COORDINATE PAIR	11.8.5.4
]		

11.8.5.3 COORDINATE TRIPLET

[		
Coordinate Pair	: COORDINATE PAIR	11.8.5.4
Third Coordinate	: COORDINATE VALUE	11.8.5.7
	| NULL	
]		

11.8.5.4 COORDINATE PAIR

[		
First Coordinate	: COORDINATE VALUE	11.8.5.7
Second Coordinate	: COORDINATE VALUE	11.8.5.7
]		

11.8.5.5 OPTIONAL COORDINATE PAIR

[		
First Coordinate	: COORDINATE VALUE	11.8.5.7
	| NULL	

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Second Coordinate	: COORDINATE VALUE | NULL	11.8.5.7

]

Constraints:
C1: May not both be NULL.

11.8.5.6 TEMPORAL COORDINATE TUPLE

[

Start Appearance	: TEMPORAL COORDINATE VALUE	11.8.5.8
End Appearance	: TEMPORAL COORDINATE VALUE	11.8.5.8
Start Disappearance	: TEMPORAL COORDINATE VALUE	11.8.5.8
End Disappearance	: TEMPORAL COORDINATE VALUE	11.8.5.8

]

11.8.5.7 COORDINATE VALUE

= (-9999999999..9999999999)

11.8.5.8 TEMPORAL COORDINATE VALUE

= (1000010100..9999123123)

11.8.6 Geographics

11.8.6.1 PLACE

[

Country	: ISO COUNTRY CODE | NULL	11.8.6.2
Place Name	: STRING | NULL	11.5.4.7.4

]

Constraints:
C1: In a Place, both may not be NULL.

11.8.6.2 ISO COUNTRY CODE

= A value from the set of ISO 3166 Alpha-3 Country Codes

11.8.7 Identifier types

11.8.7.1 ANY FEATURE

[

Dataset Identifier	: DATASET ID | NULL	11.8.7.10
Layer Identifier	: LAYER ID | NULL	11.8.7.11
Section Identifier	: SECTION ID | NULL	11.8.7.12
Feature Category	: FEATURE CATEGORY	11.8.7.8
Feature Identifier	: ANY FEATURE ID	11.8.7.5

]

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Constraints

C1: All items in the ANY FEATURE structure shall exist and they shall form together a scope which exists in the actual data representation.

C2: When an ANY FEATURE is referenced from a CONVERSION (11.5.4.8.2), the Dataset, Layer, *and* Section Identifiers shall all be specified.

C3: When an ANY FEATURE is referenced from a COMPOSING FEATURE, PARTNER, or a CONVERSION, then only those <DLS> required to reference this Feature from the scope of the <caller,user> record shall be specified. The others are optional.

11.8.7.2 ANY FEATURE IN DATASET

[		
Layer Identifier	: LAYER ID | NULL	11.8.7.11
Section Identifier	: SECTION ID | NULL	11.8.7.12
Feature Category	: FEATURE CATAGORY	11.8.7.8
Feature Identifier	: ANY FEATURE ID	11.8.7.5
]		

Comments

K1: Same as above, but without Dataset Identifier and without Feature Category.

K2: A Feature ID sufficiently scoped to Section, and Layer as necessary to make it accessible across Sections or Layers from the <calling/accessing> Feature.

11.8.7.3 TEXT RECORD IN DATASET

[		
Layer Identifier	: LAYER ID | NULL	11.8.7.11
Section Identifier	: SECTION ID | NULL	11.8.7.12
Text Identifier	: TEXT ID	11.8.7.23
]		

Comments

K1: Same as above, but instead of Feature a Text Record reference.

11.8.7.4 RELATIONSHIP IN DATASET

[		
Layer Identifier	: LAYER ID | NULL	11.8.7.11
Section Identifier	: SECTION ID | NULL	11.8.7.12
Relationship Identifier	: RELATIONSHIP ID	11.8.7.22
]		

Comments

K1: Same as above, but instead of Text Record a Relationship reference.

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11.8.7.5 ANY FEATURE ID

[

Any Feature Identifier	: POINT FEATURE ID	11.8.7.17
	| LINE FEATURE ID	11.8.7.18
	| AREA FEATURE ID	11.8.7.19
	| COMPLEX FEATURE ID	11.8.7.20

]

11.8.7.6 ANY GEOMETRICAL ID

[

Any Geo Identifier	: NODE ID	11.8.7.14
	| EDGE ID	11.8.7.15
	| FACE ID	11.8.7.16
	| COORDINATE ID	11.8.7.13

]

11.8.7.7 ANY OBJECT ID

[

Any Object Identifier	: ANY FEATURE ID	11.8.7.5
	| RELATIONSHIP ID	11.8.7.22
	| TEXT ID	11.8.7.23
	| TIME ID	11.8.7.24
	| GPL STR ID	11.8.7.41
	| GPL STR CMP ID	11.8.7.39

]

11.8.7.8 FEATURE CATEGORY

= (Point=1, Line=2, Area=3, Complex=4)

11.8.7.9 ALBUM ID

= RECORD ID 11.8.7.43

11.8.7.10 DATASET ID

= RECORD ID 11.8.7.43

11.8.7.11 LAYER ID

= RECORD ID 11.8.7.43

11.8.7.12 SECTION ID

= RECORD ID 11.8.7.43

11.8.7.13 COORDINATE ID

= RECORD ID 11.8.7.43

11.8.7.14 NODE ID

= RECORD ID 11.8.7.43

11.8.7.15 EDGE ID

= RECORD ID 11.8.7.43

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11.8.7.16 FACE ID

= RECORD ID 11.8.7.43

11.8.7.17 POINT FEATURE ID

= RECORD ID 11.8.7.43

11.8.7.18 LINE FEATURE ID

= RECORD ID 11.8.7.43

11.8.7.19 AREA FEATURE ID

= RECORD ID 11.8.7.43

11.8.7.20 COMPLEX FEATURE ID

= RECORD ID 11.8.7.43

11.8.7.21 ATTRIBUTE ID

= RECORD ID 11.8.7.43

11.8.7.22 RELATIONSHIP ID

= RECORD ID 11.8.7.43

11.8.7.23 TEXT ID

= RECORD ID 11.8.7.43

11.8.7.24 TIME ID

= RECORD ID 11.8.7.43

11.8.7.25 CONVERSION ID

= RECORD ID 11.8.7.43

11.8.7.26 UPDATE GEO TOPO ID

= RECORD ID 11.8.7.43

11.8.7.27 UPDATE OBJECT ID

= RECORD ID 11.8.7.43

11.8.7.28 UPDATE ATTRIBUTE ID

= RECORD ID 11.8.7.43

11.8.7.29 OBJECT REF ID

= RECORD ID 11.8.7.43

11.8.7.30 SOURCE ID

= RECORD ID 11.8.7.43

11.8.7.31 HORIZONTAL DATUM ID

= RECORD ID 11.8.7.43

11.8.7.32 VERTICAL DATUM ID

= RECORD ID 11.8.7.43

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11.8.7.33 PROJECTION ID

= RECORD ID 11.8.7.43

11.8.7.34 NATIONAL GRID ID

= RECORD ID 11.8.7.43

11.8.7.35 GEOID UNDULATION ID

= RECORD ID 11.8.7.43

11.8.7.36 MAGNETIC FIELD DECLINATION ID

= RECORD ID 11.8.7.43

11.8.7.37 SPATDOM ID

= RECORD ID 11.8.7.43

11.8.7.38 DIRECTORY ID

= RECORD ID 11.8.7.43

11.8.7.39 GPL STR CMP ID

= 6 DIGIT RECORD ID 11.8.7.44

11.8.7.40 NETWORK ID

= 5 DIGIT RECORD ID 11.8.7.45

11.8.7.41 GPL STR ID

= 4 DIGIT RECORD ID 11.8.7.46

11.8.7.42 CHARACTER SET ID

= 2 DIGIT RECORD ID 11.8.7.47

11.8.7.43 RECORD ID

= (1..9999999999)

11.8.7.44 6 DIGIT RECORD ID

= (1..999999)

11.8.7.45 5 DIGIT RECORD ID

= (1..99999)

11.8.7.46 4 DIGIT RECORD ID

= (1..9999)

11.8.7.47 2 DIGIT RECORD ID

= (1..99)

11.8.8 Basic types

11.8.8.1 Boolean

= (0..1)

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12 Media Record Specifications

12.1 General specifications

12.1.1 Introduction

This sub-clause explains basic concepts of the exchange format specifications using Media Records.

12.1.2 Partitioning

12.1.2.1 General

Each GDF is split up into subparts in order to keep the Dataset manageable. This is called partitioning. A GDF is partitioned into Information Units and Medium Units.

12.1.2.2 Information units

Information Units are the generally applicable scheme for partitioning GDF, independent from a particular physical format, and describe the partitioning characteristics of the data which as a whole is equivalent to the Album. There are three levels of partitioning into information units: the Dataset, the Layer, and the Section.

See the Metadata Catalogue for detailed specifications (clause 10.1.3)

12.1.2.3 Medium units

The physical medium upon which the GDF is stored.

12.1.2.3.1 Volume

The smallest physical unit of medium.

EXAMPLE A floppy disk, a CD-ROM, or a DVD.

A single Volume may contain one, more than one, or a part of a Dataset depending on Dataset size. The collection of related Volumes physically constitute the Album.

A Volume is terminated by a Volume Terminator.

12.1.2.3.2 Volume Header

The Album Header is supplemented with Volume related characteristics. Furthermore, it specifies the links to the Dataset(s) associated with the Volume in issue.

12.1.3 Logical Record

A group of sequential data Fields which belong together, and which may be considered as a logical unit. A logical record has no fixed length. It may contain one or more media records. The start and end of a logical record is governed by the record type code and the Continuation Mark.

12.1.4 Media Record

The name of a group of sequential data Fields which belong together.

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All characters controlling the behaviour of Media Records utilize a single-byte character set (as per the default character set defined in the Album Header; see 10.2.2.9.

A GDF media record has a length of 81 or 82 characters, depending on whether one or two control characters are used to terminate the record.

Each media record starts with a record type code and ends with a Carriage Return character (CR), a Line Feed (LF) or a combination of these two control characters, as agreed by the data supplier and the customer.

(In terms of ISO/IEC 8859-1 [18], the character code for <CR> and <LF> characters is 0/13 and 0/10, respectively).

12.1.5 Continuation Record

A media record that is used for the representation of that part of a particular logical record which exceeds 80 characters. A continuation record has two Zero characters in the Field which is used for the record type code.

12.1.6 Null Record

Media records which may be used to fill a block. The first two positions of this record (reserved for the record type code) shall contain two Space characters (code 2/0).

12.1.7 Fields of variable and fixed length

Most of the data Fields will have a pre-specified fixed length. Only text Fields may have a variable length. The actual Field length for a given text content is determined by the last position that is only followed by trailing space characters (code 2/0).

The Field size of all fixed-length Fields is specified as the number of characters. A Field size of " * " is used in this documentation to indicate a field of variable length. The size of Field size itself in the field definition record (12.6.3) is an integer of size 2. In this case, the value of " 0 " is used to indicate a field of variable size, but the printed layout in this document will actually contain “*”.

A fixed length Field should not be split. When a particular Field does not fit in media record X, this Field shall be moved to the next media record (which is then, by definition, a Continuation Record, see 12.1.4). Conversely, a variable length Field may be split across more than one media record when the actual text content exceeds the number of positions present in the (remainder of the) media record.

12.1.8 Repeating Fields

A repeating Field is a Field that may have more than one successive instance in a particular record.

The number of occurrences of a repeating Field in the record is variable.

Each repeating Field is preceded by a Field Counter which specifies how many times the subsequent Field repeats within the logical record in issue.

In the specification of the format of the individual record types (sub-clauses 12.6, 12.7, 12.8), a repeating Field is indicated by means of a vertical line (|) preceding the Field.

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12.1.9 Repeating Field Groups

A sequence of two or more Fields which may repeat, together with the other Fields belonging to that group.

A repeating group is also preceded by a Field Counter. This counter belongs to the group as a whole. It specifies how many times the repeating group repeats within the logical record in issue.

In the specification of the format of the record (sub-clauses 12.6, 12.7, 12.8), the presence of a repeating Field group is indicated by means of a vertical line (|) preceding the repeating Fields.

12.1.10 Nesting Of Repeating Fields

Within a repeating field group, one or more sub-sets of Fields may again be repeated, i.e. nested within another repeating field group. Each sub-set, either a single Field or a sequence of two or more Fields, shall be preceded by a field counter as specified above, which itself is embedded in the lower-level repeating field group.

Up to 9 nesting levels may be defined.

In the specification of the format of the record (sub-clauses 12.6, 12.7, 12.8), the presence of multiple repeat levels is indicated by means of multiple vertical lines (|) preceding the repeating Fields. The number of vertical lines corresponds to the number of nesting levels.

12.1.11 Packing

Any character positions unused between the last complete Field and position 80 shall be packed with Space characters (code 2/0). The Continuation Mark and the agreed control character(s) are then written.

12.1.12 Data Types

The characters that may be contained in a Field are of different data types. The constraints for the individual Fields regarding the data type of the characters they may contain is specified in the Record Specification (see sub-clauses 12.6, 12.7, 12.8). Data type definitions are specified in the Metadata Catalogue and are consistent throughout the GDF, with the exception of the data type L, which allows for the use of local character sets not included in the default character set specified for the GDF Album (see sub-clause 12.1.13).

12.1.13 Character sets

This document supports the exclusive use of a single character set for all Fields except for the Fields of data type L. This general default character set is defined in the Album Header Record and may be any of the ISO 8859 variants [8]-[22], or ISO/IEC 10646:2017, Annex D (UNICODE – UTF8) [24].

The data type L contains one-byte or multi-byte characters from a character set defined externally and specified in the Local Character Set Definition Record (ALHDREC.02). Such a character set is referred to as a “Local Character Set”. The use of characters from a Local Character Set, and the use of characters from the default character set of the GDF Album after the use of characters from a Local Character Set is indicated by the presence of characters from the default character set specially defined for this use and referred to as Local-In and Local-Out. This is done in the Local Character Set Definition Record.

The use of the Local-In code supposes that the first character of this code is not used for any other purpose within the default character set used in the GDF. The use of the Local-Out code supposes that the code is not used for any other purpose within the Local Character Set.

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As special case is the choice to not specify Local-In and Local-Out; in this case the local character set at hand becomes the default character set for Fields of type L (overruling the general default character set). Only one default character set may be declared; for any other local character set Local In and Local Out Codes shall be provided.

12.1.14 Justification

Numeric values (Fields of data type I or N) are right or left justified. Alphanumeric values (Fields of data type A, G, L and AN) are left justified. In Fields of type I or N, unused leading characters will be Space characters.

12.1.15 Order of Records

Figure 144 shows that every Album shall start with a Volume Header Subrecord from the Album Header Record. Each Volume ends with a Volume Termination Record.

The Album Header Record is followed immediately by the Dataset Header Record which is the first of a group of records which are called Dataset records (because they contain general information that applies to the whole Dataset). The group occurs only once in a Dataset. If a Dataset is distributed over more than one Volume, these records appear only in the first Volume.

The occurrence of a Dataset Header Record indicates the beginning of a Dataset. The Dataset ends with the next Dataset Header Record or with a Volume Termination Record with a Volume Termination Mark = 0 (last Volume in an Album).

The order of the Dataset records, apart from the Dataset Header Record, is not essential. However, it is recommended to arrange them in a standardized order, e.g. in the order as proposed in Figure 144.

The Dataset records are immediately followed by a Layer Header Record. Its first appearance means the beginning of the first Layer. The Layer logically ends at the occurrence of another Layer Header Record with a different Layer ID or with the presence of a Volume Termination Record having a Volume Termination Mark = 0 (last Volume of an Album).

If a Layer logically continues on the next Volume, the corresponding Layer Header Record shall be repeated.

The Layer Header Record is followed by a Section Header Record. This record indicates the beginning of a new Section. A Section ends at the occurrence of another Section Header Record.

The last Section of a Layer ends at the occurrence of a Layer Header Record, a Volume Termination Record or a Dataset Header Record.

When Update Information is contained in a GDF, the Section Header Record is followed by one of more Update Information Records, each possibly together with a Text Record or Time Domain Record. These Update Information Record combinations are in their turn followed by the so-called “data records”. In case Update Information is not contained, the Section Header Record is directly followed by the “data records”. The order of the records within this group is not essential, but it is strongly recommended to arrange them in some standardized and logical way, e.g. as proposed in Figure 144: first all Node Records, next all Edge Records, etc.

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12.1.16 Order of subrecords

12.1.16.1 General

Some records are subdivided into a number of subrecords. This concerns the Album Header Record, the Dataset Header Record, the Source Record, and the Section Header Record.

The subrecord instances shall occur in a particular order within the record they belong to. This is specified in the following.

NOTE An asterisk (*) indicates that a record or record group may repeat within one group.

12.1.16.2 Album Header Record

[
Album Header Intro Subrecord
Local Character Set Definition Subrecord*
Global Album Information Subrecord
Volume Header Subrecord*
]

The Global Album Information Sub-Record shall be repeated in each Volume.

12.1.16.3 Dataset Header Record

[
Dataset Identification Subrecord
[
Dataset Main Title Subrecord
Dataset Subtitle Subrecord
]*
Dataset Producer Subrecord*
Dataset Extensiveness & Currency Subrecord
Dataset Contents Subrecord*
Dataset XY Resolution Subrecord
]

12.1.16.4 Source Record

[
Description Info Subrecord
ISBN & Survey Subrecord
Author Name Subrecord
Scale and Title Subrecord*
Volume Name Subrecord*
Edition and Impression Subrecord
Publisher Subrecord*
Distribution Subrecord*

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Host Document Subrecord
Field Data Capturing Subrecord
]

12.1.16.5 Section Header Record

[
Section Identification Subrecord
Section Settings Subrecord
Network Identification Subrecord
Datasource Reference Subrecord
Datum & Magnetism Subrecord
Orthometric Reference Subrecord
Section Border Subrecord
XY Control Point Subrecord*
Z Control Point Subrecord*
Update Information Format Subrecord
]

12.1.16.6 Point Feature Record

Depending on the declared topology type for the Layer containing the Point Feature(s) at hand, either of the subrecords shall be applicable.

[

Explicit Point Topology Subrecord

]*

XOR:

[

Non-explicit Point Topology Subrecord

]*

12.1.16.7 Line Feature Record

Depending on the declared topology type for the Layer containing the Line Feature(s) at hand, either of the subrecords shall be applicable.

[

Explicit Line Topology Subrecord

]*

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XOR:

Non-explicit Line Topology Subrecord

]*

12.1.16.8 Area Feature Record

Depending on the declared topology type for the Layer containing the Area Feature(s) at hand, either of the subrecords shall be applicable.

[

Full Rendering Area Topology Subrecord

]*

XOR:

[

Connectivity Rendering Area Topology Subrecord

]*

XOR:

[

Non-explicit Area Topology Subrecord

]*

12.1.16.9 Complex Feature Record

Depending on the declared topology type for the Layer containing the Complex Feature(s) at hand, either of the subrecords shall be applicable.

[

Explicit Complex Topology Subrecord

]*

XOR:

[

Non-explicit Complex Topology Subrecord

]*

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12.1.16.10 Update Information Record

[
Geo-topo Update information Subrecord
Object Update Information Subrecord
Object Attribute Update Information Subrecord
]

12.1.17 Links between data records

The relations between the entities of the Overall Conceptual Data Model (see Clause 5) have been implemented with some exceptions in the form of pointers between the data records. Each record type has therefore been provided with a Field where a unique identifier for a record occurrence may be stored.

The Coordinate Record identifiers for 2D and 3D coordinates, respectively, share the same ID space and shall be unique across all Coordinate Records in a given Section.

Each record type has furthermore one or more Fields in which a reference pointer to another record may be stored. Non-explicit topological Features do not have relations with Nodes, Edges and Faces. In this case there are no Node, Edge or Face records, because the Feature geometry is stored within the Feature records. Pointer arrangement related to Feature records differs according to the type of topology.

Figure 201, Figure 202 and Figure 203 show how these record types are inter-linked for the different topological models. Figure 204 and Figure 205 show the other pointer relations related to Feature records. For simplicity, pointer relations are only shown in one direction. Pointer relations in the reverse direction (optional pointers) are not shown.

Figure 206, Figure 207 and Figure 208 show the pointer Fields and their role in the records. An open dot indicates a Field where the identifier is assigned. A full black dot indicates a Field that is used to refer to another record.

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Album Level	Dataset Level	Layer Level	Section Level
Album Header Rc			
	[		
	Dataset Header Rc		
	Field Definition Rc*		
	Record Definition Rc*		
	Feature Definition Rc*		
	Attribute Definition Rc*		
	Attribute Value Def Rc*		
	Default Attribute Rc*		
	Relationship Definition Rc*		
	Geopol. Structure Def. Rc*		
	Geopol. Struc. Comp. Def. Rc*		
	Spatial Domain Rc*		
	Directory Rc*		
	Abbreviation Rc*		
	Network Specification Rc*		
	Source Rc*		
	Datum & Ellipsoid Rc*		
	Vertical Datum Rc*		
	Projection Rc*		
	National Grid Rc*		
	Geoid Undulation Rc*		
	Earth Magn. Field Rc*		
	Update Info Rc*		
	Relationship Rc*		
	Attribute Rc*		
	Text Rc*		
	Time Domain Rc*		
	Object Reference Rc*		
		[	
		Layer Header Rc	
		Update Info Rc*	
		Relationship Rc*	
		Attribute Rc*	
		Text Rc*	
		Time Domain Rc*	
		Object Reference Rc*	
			[
			Section Header Rc
			Update Info Rc*
			2D Coordinate Rc*
			3D Coordinate Rc*
			Node Rc*
			Edge Rc*
			Face Rc*
			Point Feature Rc*
			Line Feature Rc*
			Area Feature Rc*
			Complex Feature Rc*
			Conversion Rc*
			Attribute Rc*
			Relationship Rc*
			Text Rc*
			Time Domain Rc*
			Object Reference Rc*
			]*
		]*	
	]*		

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NOTE An asterisk (*) indicates that a record can repeat within one group. “Rc” means “Record”.

A special case are Comments Rc* and Volume Termination Rc, which can occur in-between any 2 records. Regardless of the above, Volume Termination Rc shall occur as the last record of an Album.

Figure 200 — Order of Records

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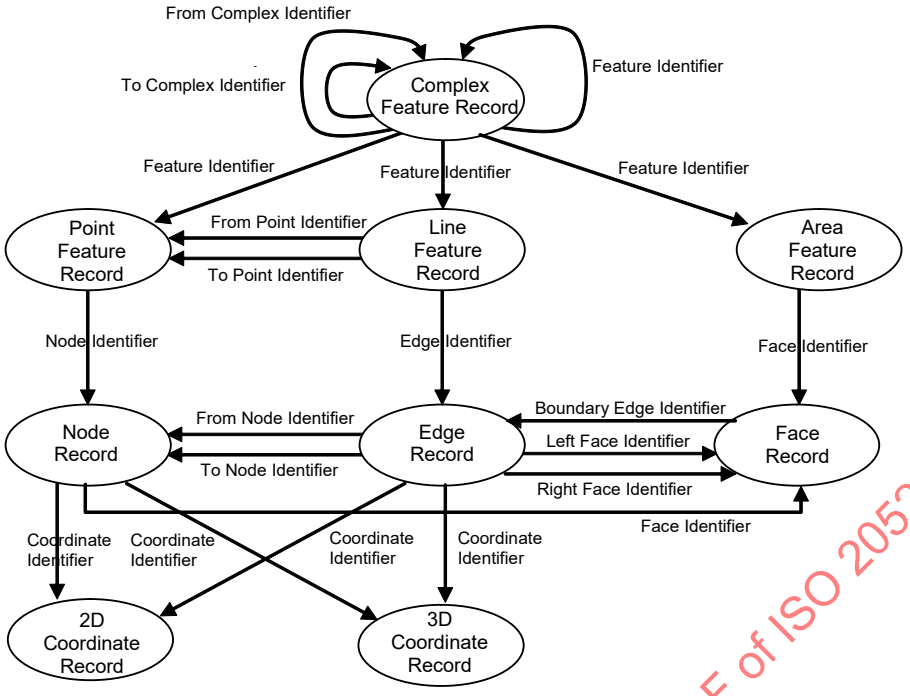


Figure 201 — Pointer relations among feature and topological primitive records in the full integration rendering model of planar topology (the reverse direction for each pointer relation is not shown)

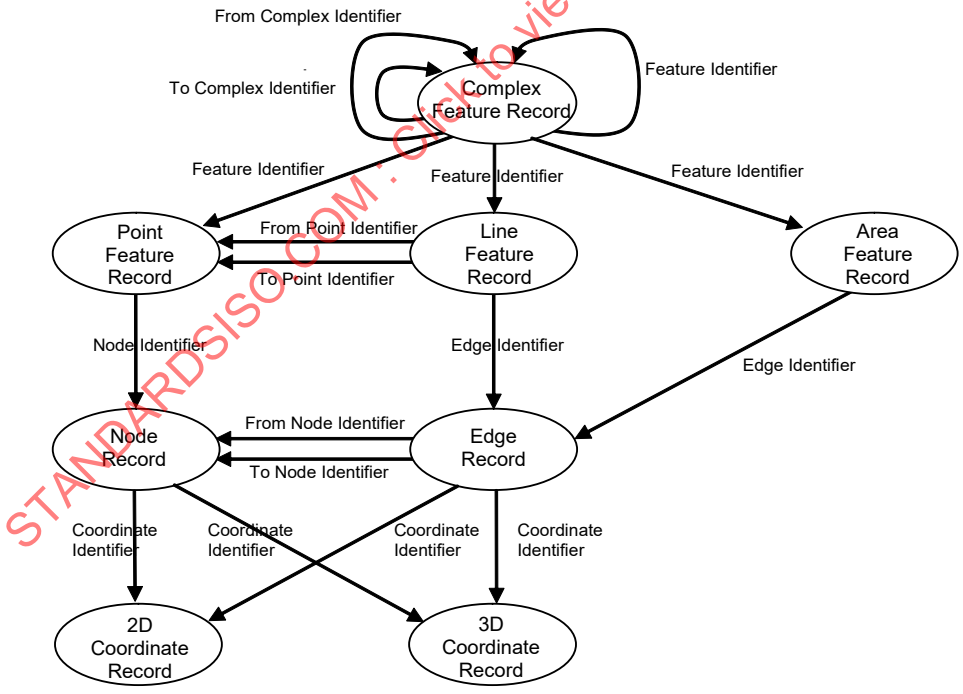


Figure 202 — Pointer relations among feature and topological primitive records in the connectivity rendering model of non-planar topology (the reverse direction for each pointer relation is not shown)

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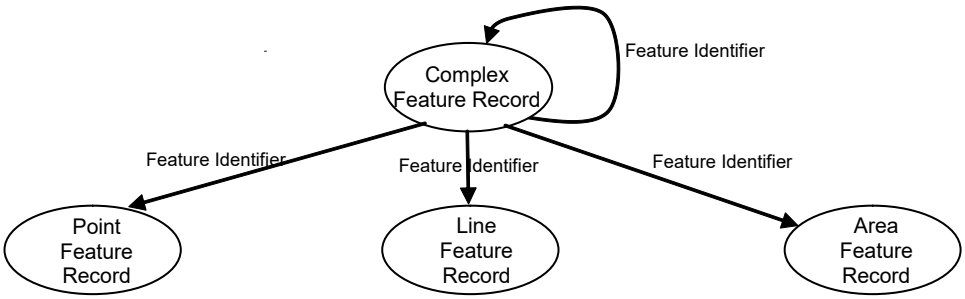


Figure 203 — Pointer relations among features in the non-explicit topology model (the reverse direction for each pointer relation is not shown)

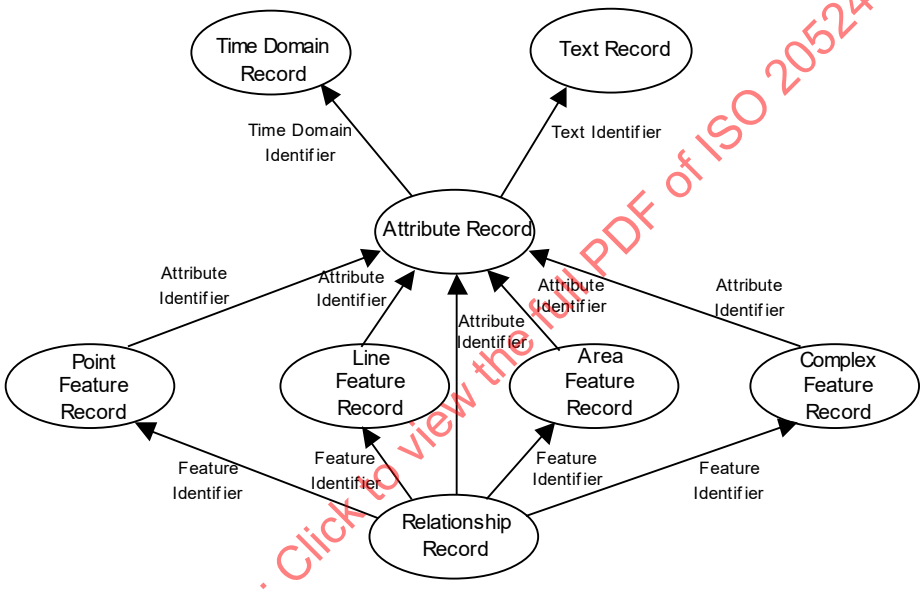


Figure 204 — Other pointer relations between data records (topological features) (the reverse direction for each pointer relation is not shown)

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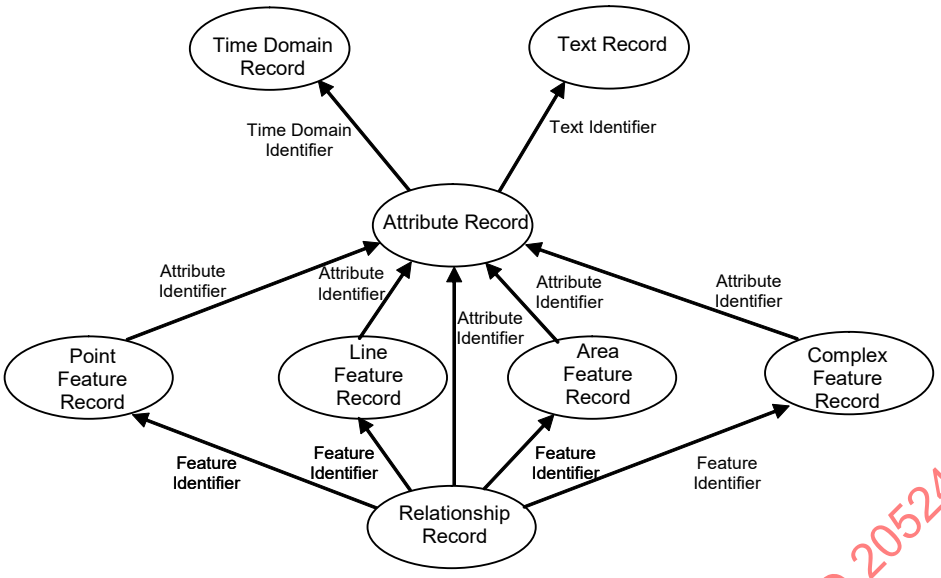
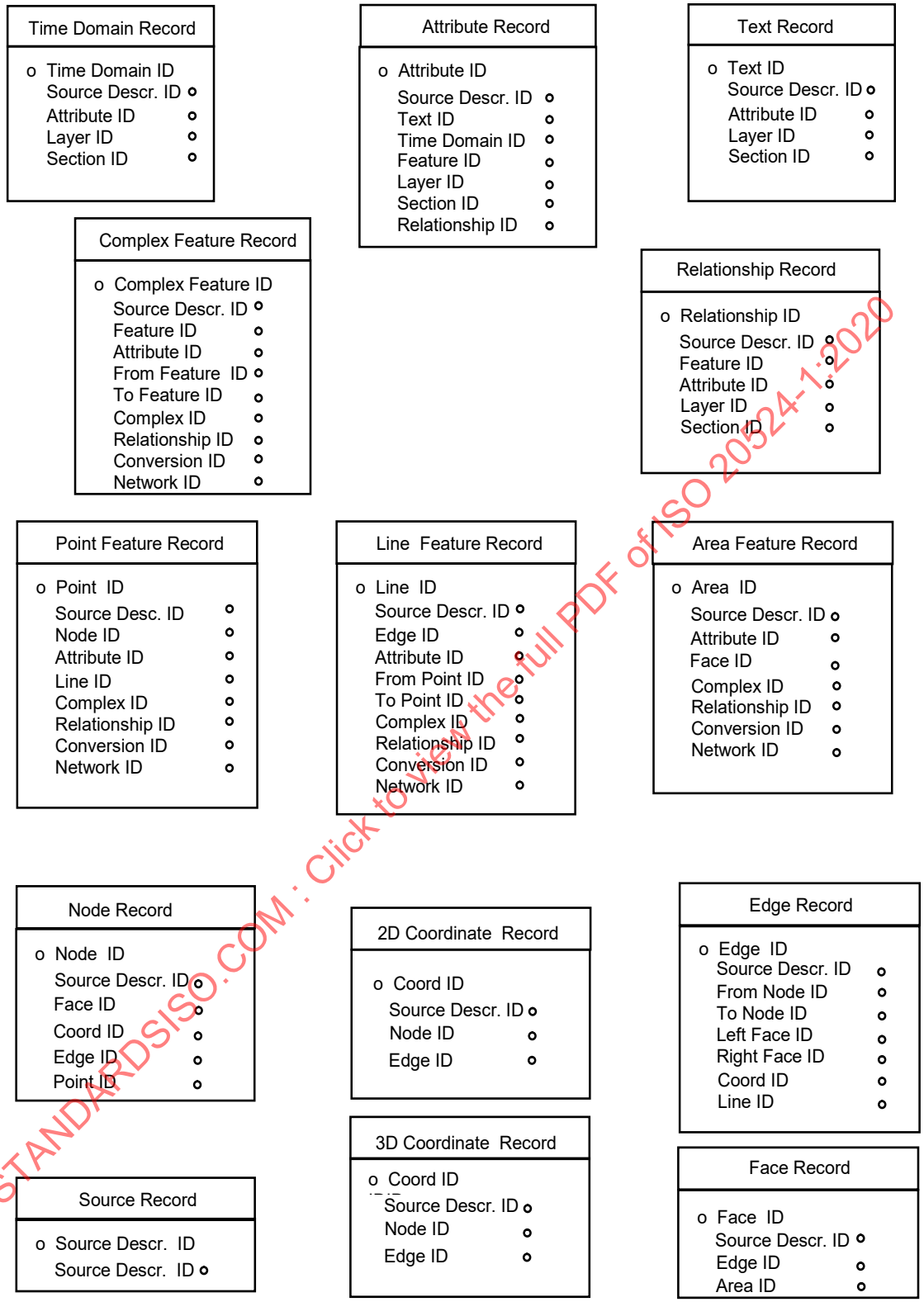


Figure 205 — Other pointer relations between data records (non-explicit topological features) (the reverse direction for each pointer relation is not shown)

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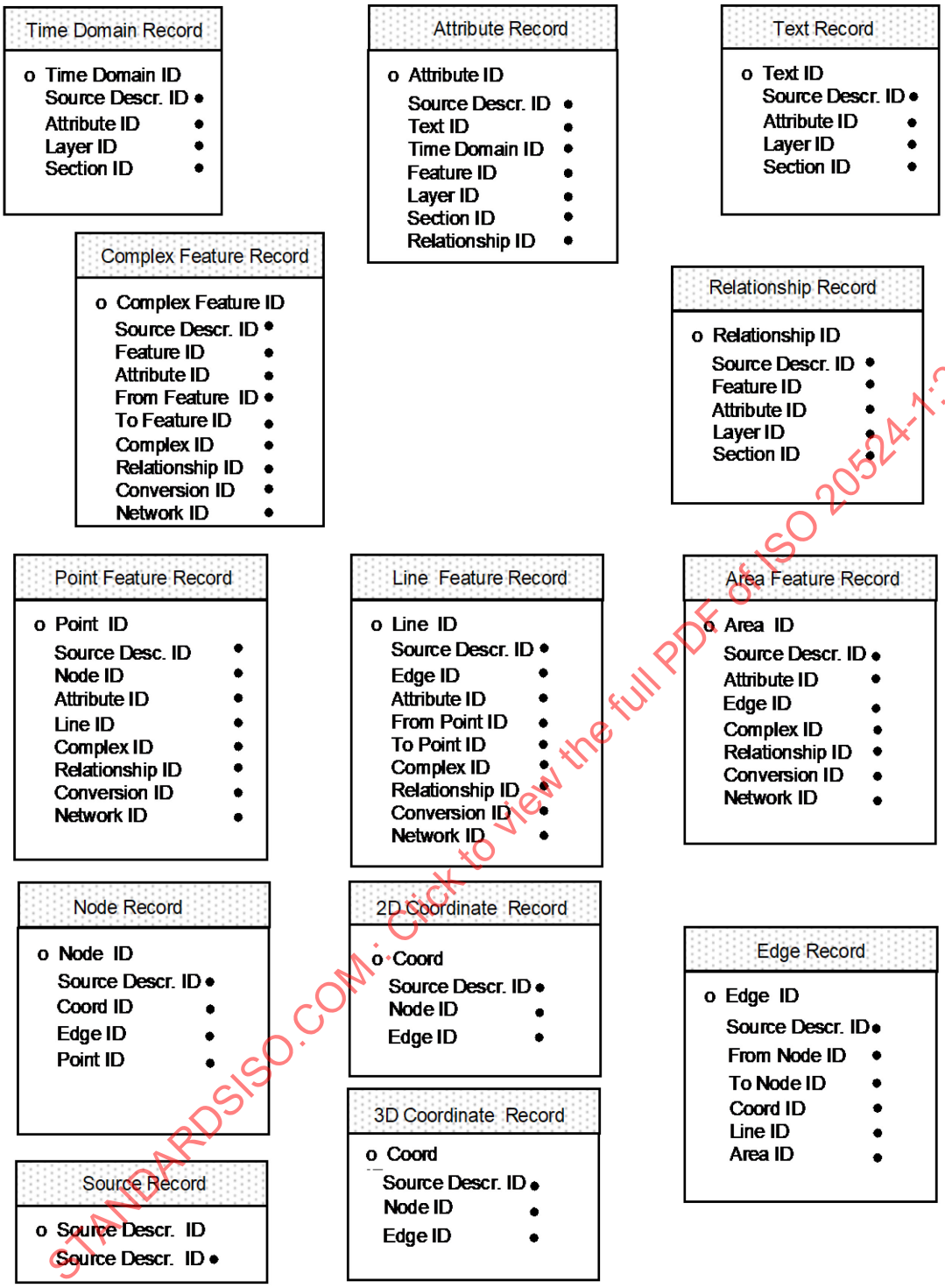
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Figure 206 — Pointer fields and their role in the records (full integration rendering of planar topology)

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Figure 207 — Pointer fields and their role in the records (connectivity rendering of non-planar topology)

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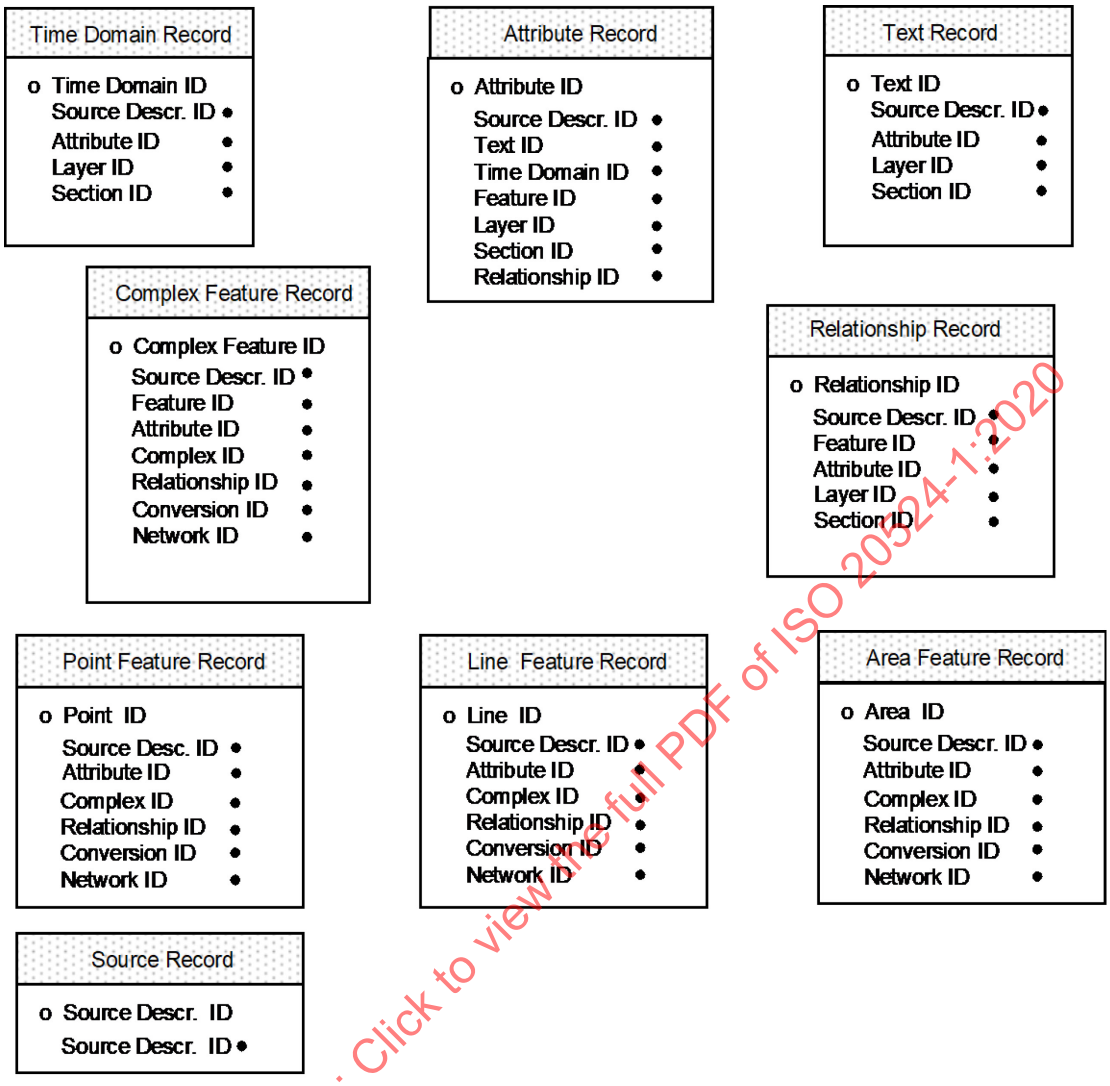


Figure 208 — Pointer fields and their role in the records (non-explicit topology)

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12.2 Field specifications

12.2.1 Field Name

The Field Name is an identifier of a Field which is unique within the Field definitions of GDF.

12.2.2 Record Control Fields

12.2.2.1 General

Some fields are used for record control. These include the Record Type Code, the Record Subtype Code, the Continuation Mark and the Field Counter. The following sub-clauses describe these Fields which are used for record control.

12.2.2.2 Record Type Code

This is a two-character Field which occurs at the beginning of each logical and media record. It is used to indicate the record type of a particular record, and contains a numeric code.

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The following codes have been fixed:

Code	Mnemonic Name	Full Record Name
All-purpose media records		
<SS>	[NULLREC]	Null Record
00	[CONTREC]	Continuation Record
	<SS> means two successive Space characters	
Global records		
01	[ALHDREC]	Album Header Record
02	[DSHDREC]	Dataset Header Record
03	[FIELDEFREC]	Field Definition Record
04	[RECDEFREC]	Record Definition Record
05	[ATDEFREC]	Attribute Definition Record
06	[DIREC]	Directory Record
07	[FEATDEFREC]	Feature Definition Record
08	[SPADOREC]	Spatial Domain Record
09	[RELDEFREC]	Relationship Definition Record
10	[GPLSTRDREC]	Geopolitical Structure Definition Record
11	[GPLCOMDREC]	Geopolitical Structure Component Definition Record
13	[ABBRREC]	Abbreviation Record
14	[SRCEREC]	Source Record
15	[DATTVALREC]	Default Attribute Value Record
16	[SECHREC]	Section Header Record
17	[LAYHREC]	Layer Header Record
18	[ATTVALREC]	Attribute Value Definition Record
19	[NWSPECSREC]	Network Specification Record
61	[DATELREC]	Datum & Ellipsoid Record
62	[VERDATREC]	Vertical Datum Record
63	[PROJECREC]	Projection Record
64	[NATGRIDREC]	National Grid Record
65	[GEOIDREC]	Geoid Undulation Record
66	[MAGNETREC]	Earth Magnetic Field Record
90	[COMMENTREC]	Comment Record
99	[VOLTERMREC]	Volume Termination Record

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Data records

22	[XYREC]	2D Coordinate Record
23	[XYZREC]	3D Coordinate Record
24	[EDGEREC]	Edge Record
25	[NODEREC]	Node Record
29	[FACEREC]	Face Record
41	[TEXTREC]	Text Record
44	[ATTREC]	Attribute Record
45	[TIMEREC]	Time Domain Record
46	[CONVERTREC]	Conversion Record
50	[RELATREC]	Relationship Record
51	[POFEREC]	Point Feature Record
52	[LIFEREC]	Line Feature Record
53	[ARFEREC]	Area Feature Record
54	[COFEREC]	Complex Feature Record
83	[OBJREFREC]	Object Reference Record

Update Information records

89	[UPDIREC]	Update Information Record

12.2.2.3 Record Subtype Code

A record type may be subdivided up to a hundred different subtypes by means of a subtype code. This Field has a length of 2 positions and may be filled with numbers ranging from 00 to 99.

The following record subtypes have been defined. This concerns subdivisions of the Album Header Record, the Dataset Header Record, the Source Record, the Section Header Record, the Point Feature Record, the Line Feature Record, the Area Feature Record, the Complex Feature Record and the Update Information Record.

Rec. Code	Subt. Code	Mnemonic Name	Full Record Name
Album Header Record			
01	01	[ALHDREC.01]	Album Header Intro Subrecord
01	02	[ALHDREC.02]	Local Character Set Definition Subrecord
01	03	[ALHDREC.03]	Global Album Information Subrecord
01	04	[ALHDREC.04]	Volume Header Subrecord
Dataset Header Record			
02	01	[DSHDREC.01]	Dataset Identification Subrecord
02	02	[DSHDREC.02]	Dataset Main Title Subrecord
02	03	[DSHDREC.03]	Dataset Subtitle Subrecord
02	04	[DSHDREC.04]	Dataset Producer Subrecord
02	05	[DSHDREC.05]	Dataset Extensiveness & Currency Subrecord
02	06	[DSHDREC.06]	Dataset Contents Subrecord
02	07	[DSHDREC.07]	Dataset XY Resolution Subrecord

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Source Record

14	01	[SRCEREC.01]	Description Info Subrecord
14	02	[SRCEREC.02]	ISBN & Survey Subrecord
14	03	[SRCEREC.03]	Author Name Subrecord
14	04	[SRCEREC.04]	Scale and Title Subrecord
14	05	[SRCEREC.05]	Volume Name Subrecord
14	06	[SRCEREC.06]	Edition & Impression Subrecord
14	07	[SRCEREC.07]	Publisher Subrecord
14	08	[SRCEREC.08]	Distribution Subrecord
14	09	[SRCEREC.09]	Host Document Subrecord
14	10	[SRCEREC.10]	Field Data Capturing Subrecord

Section Header Record

16	01	[SECHREC.01]	Section Identification Subrecord
16	02	[SECHREC.02]	Section Settings Subrecord
16	03	[SECHREC.03]	Network Identification Subrecord
16	04	[SECHREC.04]	Datasource Reference Subrecord
16	05	[SECHREC.05]	Datum & Magnetism Subrecord
16	06	[SECHREC.06]	Orthometric Reference Subrecord
16	07	[SECHREC.07]	Section Border Subrecord
16	08	[SECHREC.08]	XY Control Point Subrecord
16	09	[SECHREC.09]	Z Control Point Subrecord

Point Feature Record

51	01	[POFEREC.01]	Explicit Point Topology Subrecord
51	02		Not defined in its own right (identical to 51.01)
51	03	[POFEREC.03]	Non-explicit Point Topology Subrecord

Line Feature Record

52	01	[LIFEREC.01]	Explicit Line Topology Subrecord
52	02		Not defined in its own right (identical to 52.01)
52	03	[LIFEREC.03]	Non-explicit Line Topology Subrecord

Area Feature Record

53	01	[ARFEREC.01]	Full Rendering Area Topology Subrecord
53	02	[ARFEREC.02]	Connectivity Rendering Area Topology Subrecord
53	03	[ARFEREC.03]	Non-explicit Area Topology Subrecord

Complex Feature Record

54	01	[COFEREC.01]	Explicit Complex Topology Subrecord
54	02		Not defined in its own right (identical to 54.01)
54	03	[COFEREC.03]	Non-explicit Complex Topology Subrecord

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Update Information Record

89	01	[UPDIREC.01]	Geo-topo Update Information Subrecord
89	02	[UPDIREC.02]	Object Update Information Subrecord
89	03	[UPDIREC.03]	Object Attribute Update Information Subrecord

12.2.2.4 Continuation Mark

The Continuation Mark is a one-character Field which occurs at the end of each media record (at the 80th position). It occurs in all record types except the Volume Termination Record (which instead has an explicit Volume Continuation Mark field, CONT_VOL, at the 80th position). The regular Continuation Mark's function is to indicate the end of media and/or logical records.

The Continuation Mark may have two values: 0 or 1.

0: means that the logical record ends together with the media record.
1: means that the logical record continues in the subsequent Continuation Record.

12.2.2.5 Field counter

12.2.2.5.1 NUM Counters

In many record types data Fields or Field groups occur which may repeat within the overall structure of the logical record. This means that within a particular instance of a logical record, there may be 0, 1 or more occurrences of that Field. This number may vary from one logical record instance to the other.

When there are more than 1 of these repeating Field types in a record, or when the repeating Field is followed by other (non-repeating) Fields, it will be necessary to specify the number of occurrences in advance, because otherwise the Fields may not be interpreted in a correct manner.

The number of repetitions is indicated by means of a Field Counter. This is a small Field that immediately precedes a repeating Field or Field group. The mnemonic names of these Fields all have the generic form: {NUM_ * }, where * shall be substituted by a letter string.

The following regular Field Counters have been defined:

Mnemonic Field Name	Description
NUM_FIELD	Number of fields
NUM_PARTS	Number of Feature parts
NUM_DASET	Number of Datasets
NUM_COMP	Number of components to Geopolitical Structure
NUM_CNTRY	Number of countries
NUM_FUL	Number of full predecessor Geopolitical Structure Component
NUM_IMM	Number of Immediate Parent Geopolitical Structure Components
NUM_SUBT	Number of Subtypes
NUM_LAN	Number of languages
NUM_LEV	Number of adjacent orthometric levels
NUM_PAR	Number of parameter sets
NUM_DOC	Number of Sources

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Mnemonic Field Name	Description
NUM_THEM	Number of themes
NUM_COORD	Number of coordinates tuples
NUM_TIME	Number of T coordinates tuples
NUM_EDGE	Number of Edges
NUM_NODE	Number of Nodes
NUM_FACE	Number of Faces
NUM_ATT	Number of Attribute Sets or Number of Attributes in an Attribute Record or Number of Attributes in an Update Information Record
NUM_NAME	Number of Feature Class Names or Number of Attribute Type names or Number of Relationship Type names or Number of Administrative Area or Named Area names
NUM_FEAT	Number of Features
NUM_FEAT_C	Number of Feature Class candidates
NUM_ATT_BP	Number of Attribute back pointers
NUM_ATT_P	Number of Attribute sets per part(net)
NUM_COMPLX	Number of Complex Features
NUM_EDG_BP	Number of Edge backpointers
NUM_CONV	Number of conversion records
NUM_H1	Number of H1 coordinates
NUM_INTVAL	Number of coordinate intervals
NUM_AREA	Number of Area Features
NUM_LINE	Number of Line Features
NUM_POINT	Number of Point Features
NUM_REC	Number of Records
NUM_REL	Number of Relationships
NUM_BP_FT	Number of reverse pointer Features
NUM_ROLE	Number of Roles
NUM_SECT	Number of Sections
NUM_TEXT	Number of Text Records
NUM_Z	Number of Z coordinates
NUM_EXTGEO	Number flagging the presence of Extended area geometry information

12.2.2.5.2 DD_NUM Counters

Contrary to a NUM Counter, a DD_NUM Counter may dynamically assume a discrete number of allowable values from within the specified min/max range. These values may or may not be conditional to other NUM or DD_NUM fields. An example would be a Discrete Dynamic Counter that may be set to either '0', '1', or 'all' ('all' being specified in terms of a value specified in another field, such as a NUM field).

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The following DD_NUM Counters have been defined:

Mnemonic Field Name	Description
DD_NUM_Z	Discrete Dynamic Counter of Number of Z coordinates
DD_NUM_H1	Discrete Dynamic Counter of Number of H1 coordinates
DD_NUM_H2	Discrete Dynamic Counter of Number of H2 coordinates

12.2.3 Common fields

12.2.3.1 Introduction

This sub-clause describes Fields which occur in many different record types.

12.2.3.2 Language Code

Some free text Fields may be preceded by a Field named Language Code. This Field shall contain the ISO 639-2 language code of the language which is used in the text Field that follows.

12.2.3.3 ISO 3166 Country Code

This Field shall contain the alpha-3 country code as specified in ISO 3166-1.

12.2.3.4 Theme Code

This Field is 2 characters long and contains numerical values and shall be used to specify the Feature Theme Code. The Feature Theme Code values may be found in A.1.

12.2.3.5 Feature Code

A Field that may be found in all Feature records. This Field shall contain a four-digit code of the Feature Class to which the Feature in issue belongs.

The Feature Code values may be found in A.1.

12.2.3.6 Identifiers

Many record types have Fields where an ID-number of a particular entity is declared or that refer to the ID-number of an entity declared in another record. These ID-numbers shall be unique within a given context (Section, Layer, Dataset, Supplier) and for a particular entity type (Feature Category, Edge Name, Source Description, etc.). This means that no two entity instances of the same type within the same context may have the same ID-number.

For a set of sub-records belonging together, the ID-number shall be the same one designated to the "master" sub-record. As an example, the designated DESC_ID in the Description Info Sub-record 14.01 shall be the same for all associated source document sub-records 14.x. Additionally, for any sub-record which may occur multiple times, a supplementary sub-identifier is introduced, unless uniqueness among multiples is achieved by means of a composite key involving other fields.

Relationship Records, Attribute Records, Text Records, and Time Domain Records may be stored

- Locally within a Section,

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- Semi-globally on Layer level (outside of a particular Section), or

- On Dataset level (outside of a particular Layer).

Data records referring to these records (Point/Line/Area/Complex Feature Record → Attribute Record; Relationship Record → Attribute Record; Attribute Record → Text Record/Time Domain Record; Text Record → Attribute Record) will flag the respective ID scope which determines the respective context for ID uniqueness. Attributes shall be published at the same or a higher scope level as the Relationships in question (e.g. a Relationship on Layer level shall not refer to an Attribute specified within a particular Section). Text Records and Time Domain Records shall be published at the same or a higher scope level as the Attribute in question (e.g. an Attribute on Layer level shall not refer to a text record specified within a particular Section). Attributes shall be published at the same or a higher scope level as the Text Record in question (e.g. a text record on Layer level shall not refer to an Attribute specified within a particular Section).

The Fields for ID-numbers have a length of 2, 4, 5, or 10 characters. The maximum value that may be stored in a 10-character ID-Field is 2^{32}-1. As a convention, the minimum value for any ID-number is 1, regardless of the Field length. However, the value 0 (zero) may be used with a special meaning in certain cases.

As a rule, the ID-number Fields have mnemonic Field names which have the generic form: {*_ID}, where * may be substituted by a string of letters.

There are exceptions to this rule, specifically:

Field Definition Record	FLD_NAME is used as an Identifier
Attribute Definition Record	ATT_TYPE is used as an Identifier
Feature Definition Record	FEAT_CODE is used as an Identifier
Relationship Definition Record	REL_CODE is used as an Identifier

In select cases, multiple fields are used together as a composite key:

Record Definition Record: use REC_TYPE + REC_CODE as a composite key

Abbreviation Record: use LAN_CODE + ABBR_SHORT as a composite key.

Default Attribute Record: use ATT_TYPE + ATT_VAL as a composite key

Attribute Value Definition Record: use ATT_TYPE + ATT_VAL as a composite key

The following ID-Fields have been defined (without listing sub identifiers {*_SUBID} and derived ID-fields such as VOL_ID_S):

Global records

Mnemonic Name	Description
ALBUM_ID	Album Identifier
VOL_ID	Volume Identifier
DASET_ID	Dataset Identification Number
LAY_ID	Layer Identifier
SECT_ID	Section Identification Number
NW_ID	Network Specification Type Identifier
GPL_STR_ID	Geopolitical Structure Identifier

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GPL_S_C_ID	Geopolitical Structure Component Identifier
DESC_ID	Source Description Identifier
PAR_ID	Parent Description Identifier
HOST_ID	Host Description Identifier
DATEL_ID	Datum Description Identifier
VERDAT_ID	Vertical Datum Description Identifier
PROJEC_ID	Projection Description Identifier
NATGRID_ID	Grid Description Identifier
GEOID_ID	Geoid Description Identifier
MAGN_ID	Declination Description Identifier
GEOREC_ID	Geodetic Parameter Record Identifier
DIR_ID	Directory Record Identifier

Data records

Mnemonic Name	**Description**
TEXT_ID	Text Identifier
ATT_ID	Attribute Identifier
ATT_ID_P	Attribute Identifier of Feature part(ner)
NODE_ID	Node Identifier
FNODE_ID	From Node Identifier
TNODE_ID	To Node Identifier
EDGE_ID	Edge Identifier
FACE_ID	Face Identifier
L_FACE_ID	Left Face Identifier
R_FACE_ID	Right Face Identifier
POINT_ID	Point Feature Identifier
LINE_ID	Line Feature Identifier
AREA_ID	Area Feature Identifier
COMPLEX_ID	Complex Feature Identifier
FROM_ID	From Feature Identifier
TO_ID	To Feature Identifier
CONV_ID	Conversion Record Identifier
FEAT_ID	Feature Identifier
EXT_ID	Foreign Section Feature Identifier
INT_ID	Internal Section Feature Identifier
REL_ID	Relationship Identifier
TIME_ID	Time Domain Identifier
OBJREF_ID	Object Reference Identifier
REC_REF_ID	Record Identifier of record referenced by Object Reference Record
COORD_ID	Coordinate identifier
PAR_IMM_ID	Immediate parent identification
PRE_FUL_ID	Lowest full predecessor identification
REC_ID	Record identifier
SPATDOM_ID	Spatial domain identifier

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Update Information records

Mnemonic Name	Description
GEO_ID	Geometry/Topology Object Identifier
OBJ_ID	Object Identifier
UPD_GEO_ID	Geo-topo Update Information Record Identifier
UPD_OBJ_ID	Object Update Information Record Identifier
UPD_ATT_ID	Object Attribute Update Information Record Identifier

12.2.4 Fields in Global Records

12.2.4.1 General

Detailed descriptions of the Fields that occur in the Global Records may be found in the Metadata Catalogue. The Field names used in the column "Description" of the record syntax definitions (sub-clauses 12.6 to12.8) correspond to sub-clause headings in the Metadata Catalogue and may be found by means of the index.

12.2.4.2 Volume related fields

12.2.4.2.1 Volume Identifier

The sequence number of the present Volume within the context of an Album. It starts with 1 for the first volume and is incremented for each subsequent volume up to a maximum of 9999. The Volume Identifier of the last Volume of an Album is by definition identical to the number of volumes.

In combination with the Album Identifier it serves as a unique identification number of the Volume in issue.

12.2.4.2.2 Volumes Size

The size of the present Volumes expressed in bytes.

12.2.4.2.3 Number of Volumes

The total number of Volumes in the Album. The maximum number of Volumes in an Album is 9999.

12.2.4.2.4 Associated Datasets

12.2.4.2.4.1 Introduction

Specifies which Datasets may be found in the present Volume.

It consists of the Number of Datasets associated with the Volume in issue, and a Dataset Identifier and a Start Volume Identifier where the Dataset Header is stored for each Dataset or part of a Dataset in the present Volume.

12.2.4.2.4.2 Number of Datasets

The number of Datasets or parts of Datasets that are associated with the Volume.

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12.2.4.2.4.3 Dataset Identifier

For each Dataset or part of a Dataset, the identification number of the Dataset header which is related to the Volume.

12.2.4.2.4.4 Start Volume Identifier

The identification number of the Volume where the Dataset Header for the Dataset specified in the Dataset Identifier may be found. This number may be the local Volume number

12.2.4.2.5 Volume Terminator

12.2.4.2.5.1 Introduction

Indicates that the present Volume is terminated and specifies whether it is followed by another Volume or not. It consists of Volume Termination Comments and a Volume Continuation Mark.

12.2.4.2.5.2 Volume Termination Comments

Any kind of relevant information concerning the present Volume.

12.2.4.2.5.3 Volume Continuation Mark

A mark expressing one of the two following values:

- The present Volume is the last one of the Album.
- The present Volume is not the last and will be followed by another one.

12.2.5 Fields in Data Records

12.2.5.1 XYZ Coordinates

12.2.5.1.1 X-coordinate

This Field contains the value of the X-coordinate of a point.

The coordinate value shall refer to the (national) grid as mentioned in the Section Header, taking into account the offset value as specified in the same header.

The coordinate value shall be expressed in the length unit of the (national) grid as mentioned in the Section Header, taking into account the multiplication factor as specified in the same header.

12.2.5.1.2 Y-coordinate

This Field contains the value of the corresponding Y-coordinate of the point in question. See "X-coordinate" for further specifications.

12.2.5.1.3 Z-coordinate

This Field contains the value of the corresponding Z-coordinate of the point in question. The Z-value shall be expressed in the length unit and relative to the vertical datum as mentioned in the Section Header, taking into account the multiplication factor as specified in the same header.

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Together with above-specified XY coordinates, a 2.5-dimensional object model for the geometrical representing of both, topological and non-explicit topological Features is provided (see also sub-clause 9.1.6.1).

12.2.5.2 Extended geometry

12.2.5.2.1 H1 and H2 Coordinates

These Fields contain the upper object elevation H1 and lower object elevation H2, respectively, above (or below) the earth's surface. Together with before-mentioned XYZ coordinates, a three-dimensional object model for representing Dot, Polyline, and Polygon geometry of non-explicit topological Features is provided (see also 9.1.6.2).

H1 and H2 are measured in metres. Negative values designate elevations below the earth's surface.

The upper object elevation specifies the total vertical height relative to the earth's surface. The lower elevation further modifies the object's geometry by introducing open space between object and the earth's surface (0<H2<H1), or by extending the object's vertical extent below the earth's surface (H2<0). In a special case, both H1 and H2 may be below ground (H2<H1<0).

As part of Dot geometry, H1 may be absent or not absent. H2 is not applicable to Dots.

As part of Polyline and Polygon geometry, H1 may be absent, may be set to a constant value for the entire Polyline/Polygon, may be specified for 2 or more intervals of sequences of Polyline/Polygon vertices, or may be specified individually for each Polyline/Polygon vertex. Equally, H2 may be absent, may be set to a constant value for the entire Polyline/Polygon, may be specified for 2 or more intervals of sequences of Polyline/Polygon vertices, or may be specified individually for each Polyline/Polygon vertex.

If H1 is absent, H2 shall be absent, too. If H1 is present without H2, H2 assumes default value 0.

Use of intervals requires repetition of XY coordinates at interval borders. If more than one coordinate is intervallic, intervals may have to be made smaller to represent the least common denominator of two, or three, levels of intervallic coordinates. See 12.2.5.3.4 for basic examples of intervals.

12.2.5.2.2 T Coordinates

These Fields contain the set of temporal coordinates SA (Start Appearance), EA (End Appearance), SD (Start Disappearance), and ED (End Disappearance) about the object's existence. Together with before-mentioned XYZ coordinates and H1/H2 coordinates, a four-dimensional object model for representing Dot, Polyline, and Polygon geometry of non-explicit topological Features is provided (see also sub-clause 9.1.6.3).

SA, EA, SD, and ED are stored as a time stamp with format YYYYMMDDHH. Specification of year (YYYY), month (MM) and day (DD) is mandatory. Hours (HH) shall be set to '00' if not applicable.

SA, EA, SD, and ED represent the start and end of the object's existence in time, including time ramps for the period during which the object came into existence (SA→EA), and during which it ceased to exist (SD→ED) [16]. Temporal coordinates describe the object's existence as a whole; individualized temporality per Polyline/Polygon vertex or interval is not applicable. Multiple geometrical representations of an object (each valid at a different time period) shall not mutually overlap.

Object geometry may use only some and not all of the temporal coordinates to describe its existence over time, including the transitions, with a total of 16 valid combinations. Note that two- or three-dimensional

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object geometry without temporal coordinates is treated separate from four-dimensional geometry with T coordinates all being absent (see also 9.1.6.3.2).

12.2.5.3 Coordinate Mask, Time Mask and Examples

12.2.5.3.1 General

Whether or not the Z, H1, H2, and T coordinates are present, and if so (where applicable) with an individual, intervallic, or constant scheme, is signalled by the coordinate mask field. Additionally, the presence of each of the four temporal coordinates is signalled by the time mask field.

12.2.5.3.2 Coordinate Mask

This Field contains four one-digit mask positions for Z, H1, H2, and T (or in short ZHHT).

Four different mask values are defined for Z, H1, and H2, respectively:

0 : no occurrence of coordinate

1 : constant coordinate for whole Polyline/Polygon (not applicable to Dots)

2 : constant coordinate per interval (not applicable to Dots)

3 : individual coordinate per XY position

Two different mask values are defined for T:

0 : no occurrence of coordinates, and as a consequence time mask is not applicable

1 : constant set or coordinates, applicable to entire Dot, Polyline, or Polygon

Valid ZHHT mask settings for Dot geometry allow for a total 2*2*2, or 8, cases:

Z = 0 | 3

HH = 00 | 30

T = 0 | 1

Valid ZHHT mask settings for Polyline/Polygon geometry allow for a total 4*13*2, or 104, cases:

Z = 0 | 1 | 2 | 3

HH = 00 | 10 | 20 | 30 | 11 | 21 | 31 | 12 | 22 | 32 | 13 | 23 | 33

T = 0 | 1

12.2.5.3.3 Time Mask

This Field contains four one-digit mask positions for SA, EA, SD, and ED. Two binary states are defined for each coordinate:

0 : no occurrence of coordinate

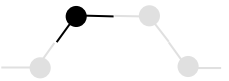
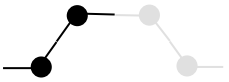
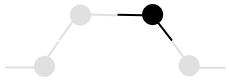
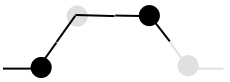
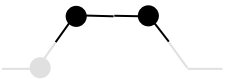
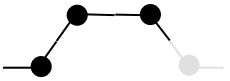
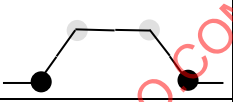
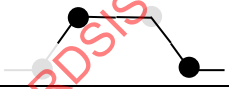
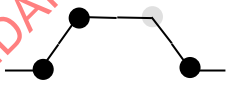
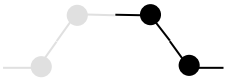
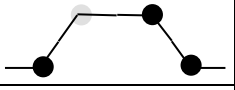
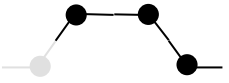
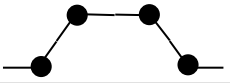
1 : coordinate occurs

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The mask renders the composite binary states of the four temporal coordinates as a decimal value as follows:

Table 1 — Time Mask

Mask	Action	SA	EA	SD	ED	Interpretation
0		-	-	-	-	Feature no longer exists w/ incomplete info
1		●	-	-	-	Feature is being built
2		-	●	-	-	Feature exists now w/ incomplete info
3		●	●	-	-	Feature was built and exists now
4		-	-	●	-	Feature is deserted w/ incomplete info
5		●	-	●	-	Feature was built, and deserted
6		-	●	●	-	Feature was built w/ incomplete info, and deserted
7		●	●	●	-	Feature was built, and deserted
8		-	-	-	●	Feature no longer exits w/ incomplete info
9		●	-	-	●	Feature was built, and no longer exists w/ incomplete info
10		-	●	-	●	Feature was built, and no longer exists w/ incomplete info
11		●	●	-	●	Feature was built, and no longer exists
12		-	-	●	●	Feature no longer exists w/ incomplete info
13		●	-	●	●	Feature was built, and no longer exists
14		-	●	●	●	Feature was built, and no longer exists
15		●	●	●	●	Feature was built and no longer exists

●: time info; ● : unknown time info; —: known period; —: unknown period

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12.2.5.3.4 Examples

To illustrate the capabilities of the four-dimensional geometry model for non-explicit topological Features, a number of examples are provided. These examples focus in the usage options for Z, H1, and H2. The aspect of temporal existence is deliberately left out. For temporal examples, see 9.1.6.3.2.

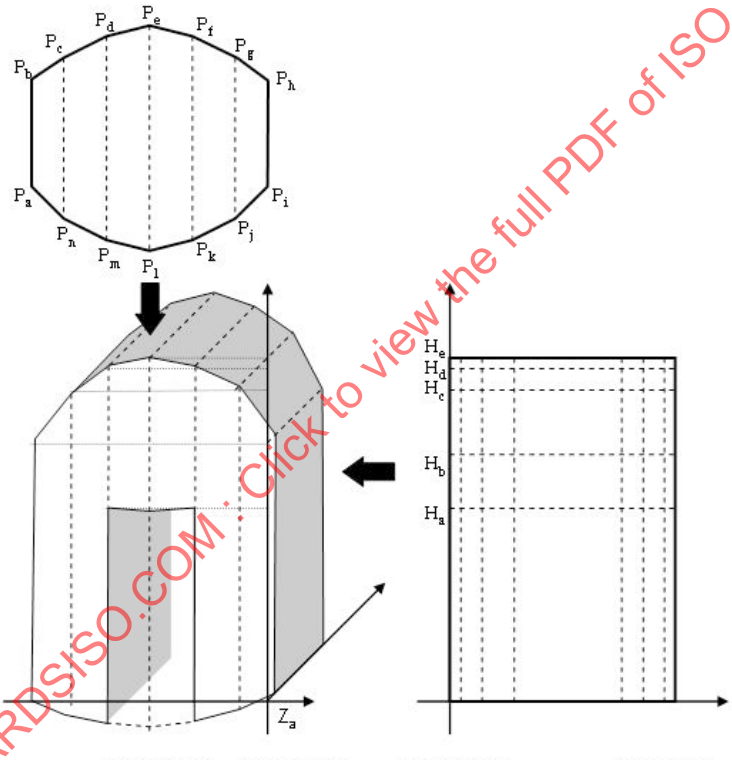
Figure 209 gives an example with the ZHHT mask set to 132*:

- Z is constant;

- H1 is individually specified per vertex; and

- H2 is constant for a number of intervals.

Note that XY coordinates are to be repeated at interval borders (here H2 intervals).



	INT_FROM				INT_FROM				INT_FROM				INT_FROM				INT_FROM			
Foot print (X,Y)	P_a	P_b	P_c	P_d	P_d	P_e	P_f	P_f	P_g	P_h	P_i	P_j	P_k	P_k	P_l	P_m	P_m	P_n	P_a	
Z	Z_a																			
H1	H_b	H_b	H_c	H_d	H_d	H_e	H_d	H_d	H_c	H_b	H_b	H_c	H_d	H_d	H_e	H_d	H_d	H_c	H_b	
H2	0				H_a				0				H_a				0			

Figure 209 — Example for 132* coordinate mask

Figure 210 gives an example with the ZHHT mask set to 213*.

- Z is constant for a number of intervals;

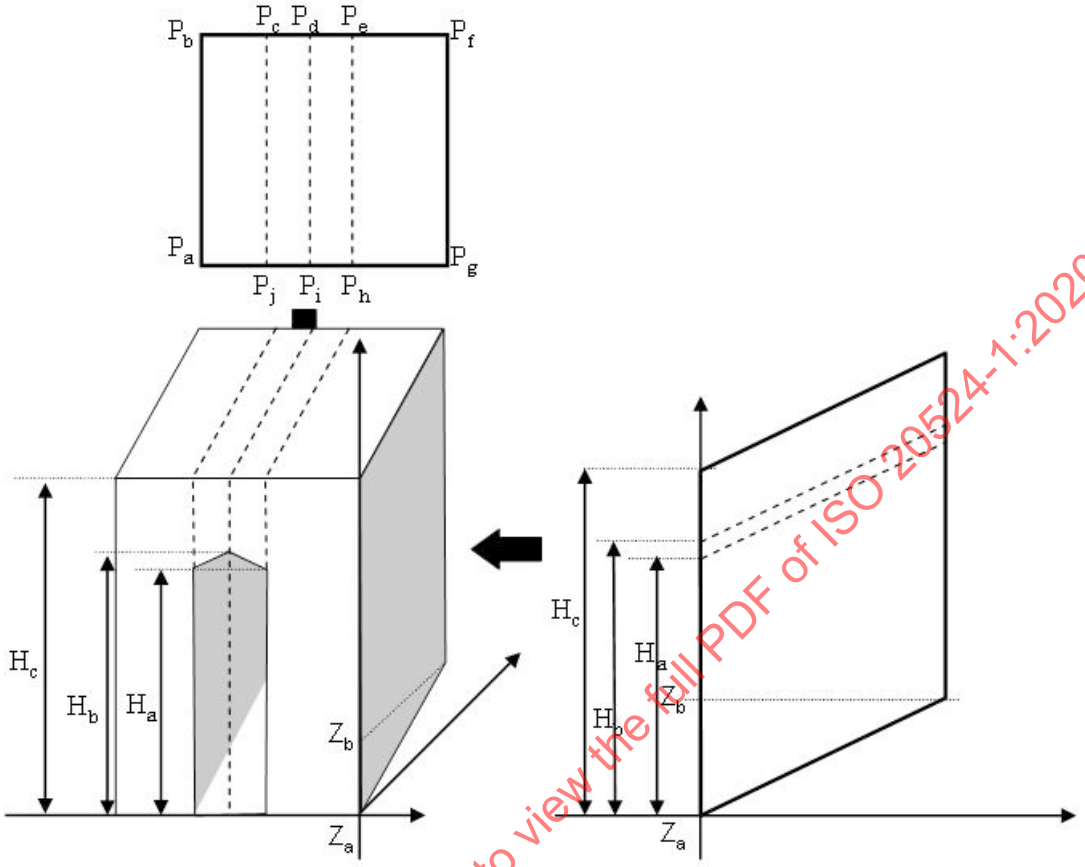
- H1 is constant for the entire object; and

- H2 is individually specified per vertex.

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Note that XY coordinates are to be repeated at interval borders (here Z intervals).



INT_FROM INT_FROM INT_FROM

Footprint (X,Y)	P_a	P_b	P_c	P_c	P_d	P_e	P_e	P_f	P_g	P_h	P_h	P_i	P_j	P_j	P_a
Z	Z_a				Z_b							Z_a			
H1	H_c														
H2	0	0	0	H_a	H_b	H_a	0	0	0	0	H_a	H_b	H_a	0	0

Figure 210 — Example for 213* coordinate mask

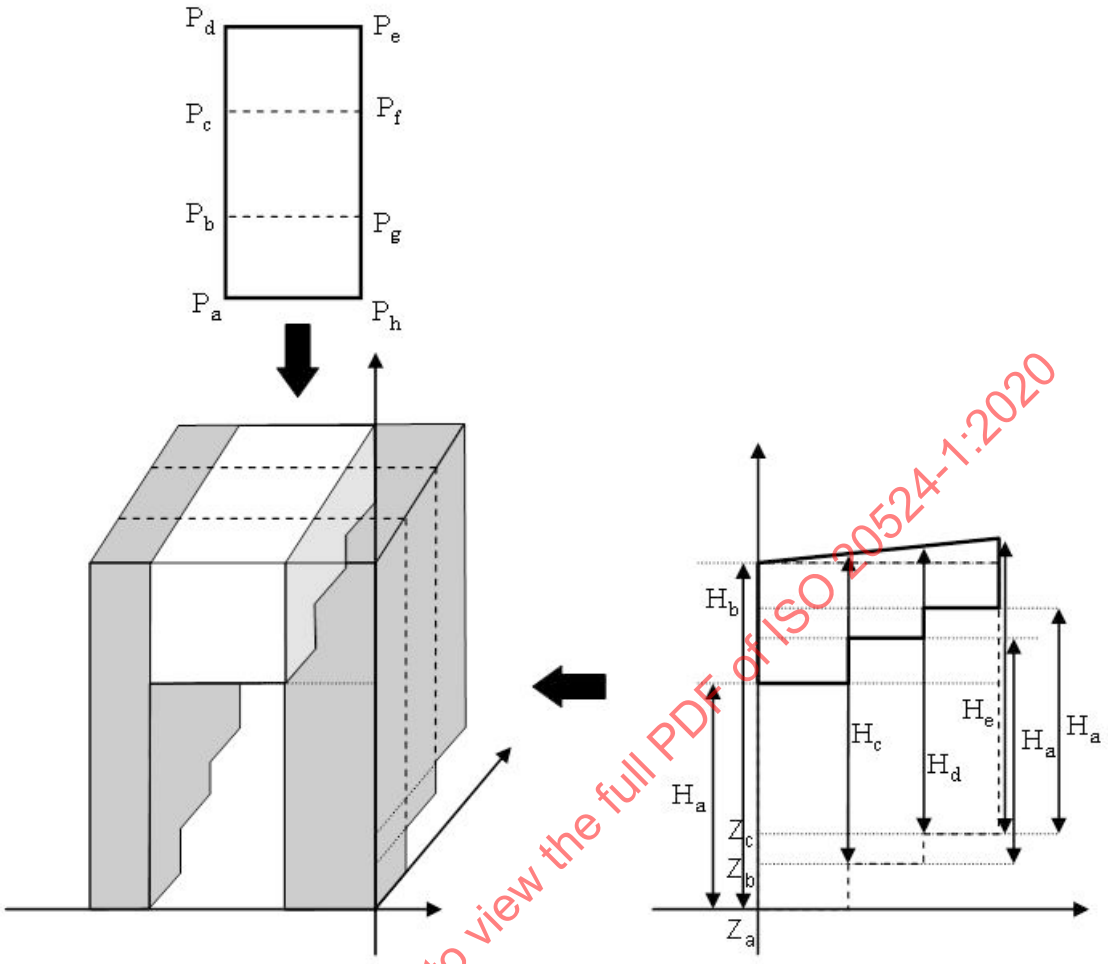
Figure 211 gives an example with the ZHHT mask set to 231*:

- Z is constant for a number of intervals;
- H1 is individually specified per vertex; and
- H2 is constant for the entire object.

Note that XY coordinates are to be repeated at interval borders (here Z intervals).

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INT_FROM	INT_FROM	INT_FROM	INT_FROM	INT_FROM
Foot print (X,Y)	P_a P_b	P_b P_c	P_c P_d P_e P_f	P_f P_g	P_g P_h P_a
Z	Z_a	Z_b	Z_c	Z_b	Z_a
H1	H_b H_c	H_c H_d	H_d H_e H_e H_d	H_d H_c	H_c H_b H_b
H2	H_a				

Figure 211 — Example for 231* coordinate mask

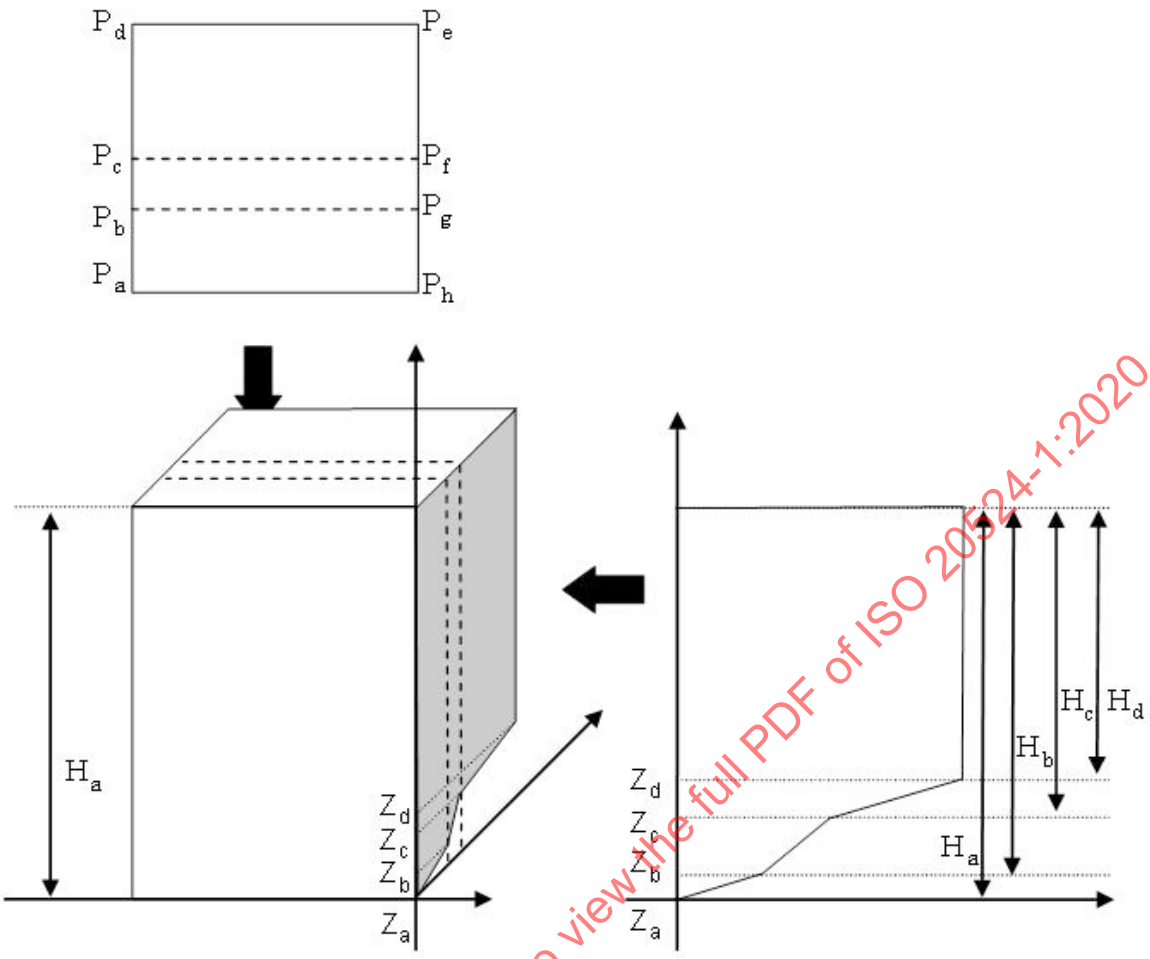
Figure 212 gives an example with a ZHHT mask set to 330*:

- Z and H1 are specified individually per vertex; and

- H2 is absent (with default value 0).

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Foot print (X,Y)	P_a	P_b	P_c	P_d	P_e	P_f	P_g	P_h	P_a
Z	Z_a	Z_b	Z_c	Z_d	Z_d	Z_c	Z_b	Z_a	Z_a
H1	H_a	H_b	H_c	H_d	H_d	H_e	H_b	H_a	H_a
H2	0								

Figure 212 — Example for 330* coordinate mask

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12.2.5.4 Status

This Field contains an indicator which specifies whether the Node or Edge is located exactly at the Section Border (and thus corresponds with a Node or an Edge in the adjacent Section) or whether it is located inside the Section.

The fact that a Node or an Edge is located on a Section border is either caused because it simply is located there (already before the sectioning) or because it was introduced in order to terminate the Edges continuing in the other Section. When two neighbouring Sections, or to terminate the Face continuing in the other Section, respectively. are merged again into one, a pair of Nodes of the first type will have to be combined into one and a pair of Nodes of the second type will have to be deleted completely. Similarly, when two neighbouring Sections are merged again into one, a pair of Edges of the first type will have to be combined into one and a pair of Edges of the second type will have to be deleted completely.

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When two Sections are merged into one new one, appropriate Nodes or Edges will be deleted or combined into one. In order to distinguish the different types of Nodes, they may be flagged with a Status indicator.

Status may have the values 1-5:

1: means that the Node or Edge is situated at the Section border for sectioning purposes only.

2: means that the Node or Edge is "normal", i.e. not situated at the Section Border.

3: means that the Node or Edge is situated at the Section Border which is also the Dataset Border (please note that this status value is implicitly including the status value of "1").

4: means that the Node is at the end of a so-called "stub", i.e. a Line at the interior of a Section or Dataset that has been truncated and only represents a part of a Feature because further information was not available or required.

5: means that the Node or Edge is situated at the Section Border and/or Dataset border for reasons other than sectioning.

12.2.5.5 Edge Orientation

This Field indicates the direction of an Edge relative to the boundary of the Face or Area Feature that it bounds.

0: means that the Edge is clockwise oriented.
1: means that the Edge is counterclockwise oriented.

The direction of an Edge is determined by its start and end Nodes. In the case of circular Edges (i.e. with identical start and end Node) two possibilities exists to define the direction:

1: the Edge may be split into two Edges (Non-circular).
2: the order of the vertices of the Edge.

12.2.5.6 NUM_ATT

12.2.5.6.1 General

Usually, a Feature has more than one Attribute Value attached to it. Several ways exist to specify these. The Feature records contain the Fields NUM_ATT and ATT_ID through which NUM_ATT Attribute records may be referred. These Attribute records themselves contain the Fields NUM_ATT, ATT_TYPE and ATT_VAL, which may be used to specify a set of NUM_ATT Attribute Values.

12.2.5.6.2 Specification of Composite Attributes

Composite Attributes do not occur as an Attribute Type Code on an Attribute Record. Rather, the existence of a Composite Attribute is inferred by the presence of one (or more) of the Simple Attributes that participate in the Composite Attribute.

A Composite Attribute may consist of Composite Attributes itself. In order to identify the bounds of a Composite Attribute, parentheses may be used. Additionally, parentheses may be used to group Simple Attributes with Restrictive Attributes, or Composite Attributes with Restrictive Attributes. Generally speaking, the parentheses may be used to define logical groups of Sub-Attributes and Sub-

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Attribute/Restrictive Sub- combinations. For consistency reasons it is advised that all Attributes are encased between at least one set of parentheses.

Restrictive Attributes at a given scope level are accumulated and then further restricted by Restrictive Attributes at the next higher level, and so on. In other words, using the language of set theory, Restrictive Attributes within an Attribute scope level are unioned and then intersected with the Restrictive Attribute at the next higher level and so on.

The actual parentheses do not appear in the GDF File. Rather a count of left and right parentheses is embedded around each occurrence of an ATT_TYPE/ATT_VAL field combination in the Composite Attribute Record.

As a consequence, the use of the NUM_ATT field in the Feature Record in relation to the use of NUM_ATT field in the Composite Attribute Record is restricted in the case of Composite Attributes or Attributes restricted by one or more Restrictive Sub-Attributes. These last two cases shall be completely specified within a Composite Attribute Record. In all other cases it is left to the user how the respective fields are used in combination.

EXAMPLE A situation where a Road Element is Closed for trucks all the time, on Sunday closed for all vehicles and the rightmost lane is closed for all vehicles all the time:

("CLOSED IN BOTH DIRECTIONS" "TRUCKS" "SUNDAY" "RIGHTMOST LANE").

All Restrictive Sub-Attributes operate on the same scope level (the Attribute Direction of Traffic Flow with the value Closed in Both Directions). Consequently, the description represents the situation where all Restrictive Sub-Attributes operate individually on the logical group Closed in both Directions, the result of which subsequently are combined via an OR operator (i.e. unioned):

- Closed for trucks (all the time)
- ALSO closed (for all vehicles) on Sunday
- ALSO the rightmost lane is closed for all vehicles all the time

A situation as above where the rightmost lane is not closed for all vehicles but open for emergency vehicles in the positive direction could look like:

(("CLOSED IN BOTH DIRECTIONS" "TRUCKS" "SUNDAY" "RIGHTMOST LANE") "ALL BUT EMERGENCY VEHICLES").

And

("OPEN IN POSITIVE DIRECTION" "RIGHTMOST LANE" "EMERGENCY VEHICLES".)

This situation needs to be specified via two Attribute Records because it contains two logical groups: Closed in Both Directions and Open in Positive Direction. Within this first group the Restrictive Sub-Attribute Values "Trucks", "Sunday" and "Rightmost Lane" all operate on the same scope level. The resulting statement is true for all vehicles except emergency vehicles.

- Closed for trucks (all the time) (for all lanes) except for emergency vehicles
- ALSO closed on Sunday (for all lanes) except for emergency vehicles
- ALSO the rightmost lane is closed (all the time) except for emergency vehicles

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Because this does not describe yet what is true for emergency vehicles, the second logical group (i.e. what is true for emergency vehicles) needs also to be specified.

- The rightmost lane is open in positive direction for emergency vehicles

A situation where a Road Element is closed for Trucks on Sunday and the rightmost lane is closed for all vehicles on Sunday may be described as:

(("CLOSED" "TRUCKS" "RIGHTMOST LANE") SUNDAY), meaning

- Closed for trucks on Sunday
- ALSO the rightmost lane closed on Sunday for all vehicles

A situation where the rightmost lane of a Road Element is closed for Trucks all the time and the rightmost lane is closed for all vehicles on Sunday may be described as:

(("CLOSED" "TRUCKS" "SUNDAY") "RIGHTMOST LANE"), meaning

- The rightmost lane closed for trucks (all the time)
- ALSO the rightmost lane closed on Sunday for all vehicles

(("CLOSED" "TRUCKS") "RIGHTMOST LANE") "SUNDAY"), meaning

- Rightmost lane is closed for trucks on Sunday

Note that Restrictive Sub-Attributes operating on the same scope level may be exchanged. Exchanging Restrictive Sub-Attributes for different scope levels may lead to essentially different specifications.

12.2.5.7 Attribute Type Code

This Field contains the code of the Attribute Type in issue. This code governs the type, range and interpretation of the subsequent Attribute Value Field.

The Attribute Type Code consists of 2 letters. These may be found in Clause A.2.

12.2.5.8 Attribute Value

This Field contains an Attribute Value of the object in question, within the range of the Attribute Type. The data type of this Field is always "G". The domain of a particular Attribute Type may be found in Clause 7 – Attribute Catalogue. The designated Attribute data type and, if applicable, codes for corresponding values, may be found in Clause A.2.

12.2.5.9 Text or Time Domain as Attribute Value

Most Attribute Values are stored in the Field Attribute Value. This is however not possible if the Attribute Value has or may have a length exceeding ten characters. In this case a different mechanism is offered. For all Attributes of Attribute data type TXT (Language-coded Text), the mechanism makes use of a special record type, the Text Record which shall be used to store the Attribute Value. In order to link the value to the Feature, the Attribute Value Field of the Attribute Record linked to the Feature Record shall contain a Text Identifier (TEXT_ID) which serves as a pointer towards the Text Record. It shall be noted that Attributes of Attribute data type SCS (Short Character String) do not use this mechanism, but store any Attribute Values directly in the Field Attribute Value.

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The specification of time domains also may exceed the length of ten characters. Therefore, for all Attributes of Attribute data type TIM (Time), the Attribute Value Field shall contain a Time Record Identifier (TIME_ID) which serves as a pointer to a Time Domain Record.

12.2.5.10 Feature Category Code

This Field indicates the Category to which a Feature belongs (see A.1 for an explanation).

1 = Point Feature

2 = Line Feature

3 = Area Feature

4 = Complex Feature

12.2.5.11 Relationship Code

This Field contains a 4-digit code specifying the Relationship Type represented in a particular Relationship Record. Clause A.4 lists the Relationship Type names and their associated codes.

12.2.5.12 Time Domain Description

Time domains are represented by a particular record type, the Time Domain Record, which has its own particular syntax (See D.1). Each Attribute that refers to a Time Domain (e.g. Opening Period, Validity Period) contains in the Attribute Value Field a pointer to a Time Domain Record.

12.2.5.13 Split Indicator

When a Layer is split into Sections, Features may be split across Sections. In such a case a Feature will be represented by two or more Lines (or Areas or Complexes), one in each Section and each only representing a part of the Feature.

When the Split Indicator has a value = 0, this means that the Line, Area or Complex represents the entire Feature. When it has a value = 1, this means that the Line, Area or Complex only represents a part of the Feature and that the other parts are to be found in the adjacent Section(s). In the case of a Complex Feature it is also possible that the complete Feature is defined in both Sections completely. This is indicated by the value 2. Value 2 refers to Complex Features only. It indicates that a definition of the Feature is repeated in another Section.

12.2.5.14 Line Direction

Indicator whether a Line has the same direction or the opposite direction as the underlying Edge.

0 = in direction of Edge

1 = in opposite direction

12.2.5.15 Network Identifier

The specification of the kind of network a particular Feature is part of. The use of this network identifier applies to transportation networks and refers to network types defined and described by metadata.

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12.2.5.16 Extended Area Geometry Information

12.2.5.16.1 General

For areas, extended geometrical properties may be provided representing generated (i.e. redundant) information which facilitates data processing, such as graphical rendering. Use case for this is terrain surface modelling using either a Face in planar rendering of Full Topology, or an Area Feature in Non-Explicit Topology rendering.

12.2.5.16.2 Geometrical Type

Classification of the Geometrical Type of bounded area at hand. The geometrical type may be:

3 = Triangular

4 = Quadrangular

0 = Other.

12.2.5.16.3 Outline Length

Outline Length of bounded area at hand, expressed in decimetres.

12.2.5.16.4 Area Size

Size of bounded area at hand, expressed in square metres.

12.2.5.16.5 Area Slope

Slope of bounded area at hand, representing the (maximum) inclination, expressed as positive percentage.

12.2.5.16.6 Aspect

Aspect of bounded area at hand, representing the horizontal bearing of slope vector (maximum inclination), expressed as clockwise angle against North measured in 1/10 of a degree.

12.2.5.16.7 Light Value

Light Value of bounded area at hand, representing an artificial hill shade, expressed as a grey scale. No standardized provisions are made as to the position of the (virtual) illumination source, i.e. distance, azimuth, and altitude are user-defined.

12.2.5.17 Object Referencing

In order to facilitate effective Object ID management, this document provides for Object Referencing. In the context of the Media Record Specifications, Object Referencing describes the possibility to publish user-defined references for a range of data entities, including:

- Node
- Edge
- Face

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- Point Feature
- Line Feature
- Area Feature
- Complex Feature
- Relationship
- Attribute (single or composite), including Restrictive Sub-Attributes
- Text (name) of an Attribute of a Feature or Relationship
- Time Domain

An Object Reference is specified like a cross-reference in a look-up table. For a specific data record, identified through Record Type Code and Record Identifier, a user-defined Object Reference is published. Each single Object Reference is further described by

- the data Type of the Object Reference
- the length of the Object Reference
- an Object Reference Type from a user-defined set of types

The Object Reference Record needs to be published at the same scope level as the referenced record. In other words, the Object Reference Records needs to reside in the same Section, Layer, or Dataset, respectively, as the data record it references.

12.2.6 Fields in Update Information Records

12.2.6.1 General

Descriptions of fields uniquely used for publishing update information. Other fields that are adopted from Data records are not described, except if their use differs from their usual purpose.

12.2.6.2 Product Cycle

User-defined reference number to update cycles.

12.2.6.3 GEO Category

This field indicates the category of geometrical objects affected by an update.

1 = Node

2 = Edge

3 = Face

4 = Dot

5 = Polyline

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6 = Polygon

12.2.6.4 Object Category

This field indicates the category to which a Feature belongs. In the context of classifying update information, Relationships are treated as another category.

1 = Point Feature

2 = Line Feature

3 = Area Feature

4 = Complex Feature

5 = Relationship

6 = Name

7 = Time Domain

8 = Other Text

12.2.6.5 Object Class Code

A unique identification of the object updated. If the object is a Feature, the Feature Class Code shall be used. If the object is not a Feature, the following codes shall be used:

Object type	Code
Relationship	0001
Name	0002
Time Domain	0003
Other Text	0004

12.2.6.6 Action Class

Indicator of the type of update action.

0 = Update of source only (i.e. no action in relation to actual Object or Geometry)

1 = New (i.e. added information)

2 = Delete (i.e. information no longer valid)

3 = Modify (i.e. information superseding present information)

Note that Modify is non-applicable for Objects of Object Category Point Feature, Line Feature, Area Feature, or Complex Feature.

12.2.6.7 Action Time Stamp

Time of the GDF alteration specified by means of the other update fields. The format of the time stamp is specified through Metadata.

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12.2.7 Fields Catalogue

The following table is a central repository of all the Fields that occur in all the Record Types. They are listed alphabetically and cross referenced by the Record Types where the Fields are used.

If a Field type occurs more than once in a particular record type, or in two or more different record types, the minimum and maximum values may vary for each individual occurrence due to the semantic context within the particular record type. In such cases, the Field catalogue specifies the outer minimum-maximum range that is syntactically possible. The respective values are marked with a " * " to identify that some occurrences of the affected Field type may have a higher minimum value or a lower maximum value respectively.

No.	Field name	Description	Records	Size	Type	Minimum	Maximum
1	ABBR_SHORT	Abbreviation short	13	20	L		
2	ABBR_LONG	Abbreviation long	13	50	L		
3	ABSTRACT	Content summary	02.01	*	L		
4	ACTION	Action Class	89.01, 89.02, 89.03	2	N	0	3
5	ACT_DATE	Action Time Stamp	89.01, 89.02, 89.03	20	G		
6	ALBUM_ID	Album identifier	01.01, 01.03	10	N	1	2^{32}-1
7	ALB_SIZE	Album size	01.01	20	N	640	10^{20}-1
8	AREA_ID	Area Feature ID	24, 29, 53.01, 53.02, 53.03	10	N	1	2^{32}-1
9	ASPECT	Aspect of bounded area	29, 53.03	4	N	0	3599
10	AT_MAX_VAL	Maximum Attribute Value	05	11	I	-2^{31}	2^{31}-1
11	AT_MIN_VAL	Minimum Attribute Value	05	11	I	-2^{31}	2^{31}-1
12	ATT_DESC	Attribute description	05	*	L		
13	ATT_DIR	Segmentation direction	44	1	G		
14	ATT_D_TYPE	Attribute data type	05	3	A		

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
15	ATT_ID	Attribute ID	10, 11, 41, 44, 45, 50, 51.01, 51.03,52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03	10	N	1	2^{32}-1
16	ATT_ID_BP	Attribute identifier pointing back to Attribute of text record	41	10	N	1	2^{32}-1
17	ATT_ID_ P	Attribute Identifier of Feature part(ner)	50, 54.01, 54.03	10	N	1	2^{32}-1
18	ATT_NAME	Attribute Type Name	05	40	L		
19	ATT_TYPE	Attribute Type Code	05, 15, 18, 44, 89.03	2	G		
20	ATT_VAL	Attribute value code	15, 18, 44, 89.03	11	G		
21	AUTHOR	Author name	14.03	*	L		
22	CHAR_SET	Character set designation	01.01, 01.02	2	N	1	99*
23	CHAR_TBL	Character Code Table Name	01.02	20	G		
24	CHAR_VER	Character Code Table Version No.	01.02	10	G		
25	CMPSPLTIND	Complex Split Indicator	54, 54.01, 54.03	1	N	0	2
26	CNT_CODE	Country involved	02.01, 02.04, 14.02, 14.07, 14.08	3	A		
27	CNT_CODE_A	Adjacent country involved	62	3	A		
28	COLL_SEQ	Collating Sequence	01.02	3	A		
29	COMPLEX_ID	Complex Feature ID	50, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	10	N	1	2^{32}

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
30	COMMENT	Comment	04, 14.09, 14.10, 61, 63, 90	*	L		
31	COMPL_LEV	Level of completeness	14.01	1	N	1	1
32	CONT_VOL	Volume continuation mark	99	1	N	0	1
33	CONV_EXP	Conversion unit exponent	05	2	I	-9	9
34	CONV_ID	Conversion Record Identifier	44, 46, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03	10	N	1	2^{32}-1
35	CONV_MAN	Conversion unit Mantissa	05	11	I	1	2^{32}-1
36	COORD_ID	Coordinate identifier	22, 23, 24, 25	10	N	1	2^{32}-1
37	COORD_MASK	Coordinate mask	51.03, 52.03, 53.03	4	N	0	3331
38	COORD_TYPE	Horizontal ref. Type	16.05	1	N	0	1
39	CORI_DATE	Copyright date	01.03	8	N	10000101	99991231
40	CORI_OWNER	Copyright owner	01.03	*	L		
41	COUNT_LF_(	Number of logical left parenthesis	44, 89.03	1	N	0	9
42	COUNT_RT_)	Number of logical right parenthesis	44, 89.03	1	N	0	9
43	CREA_DATE	Creation date	01.03	8	N	10000101	99991231
44	CREA_YEAR	Creation year	02.05	4	N	1000	9999
45	DASET_ID	Dataset identifier	01.01, 02.01, 02.02, 02.03, 02.04, 02.05, 02.06, 02.07, 01.03, 01.04, 02.01, 46, 50	10	N	1	2^{32}-1

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
46	DAST_SUBID	Sub Identifier of Dataset ID	02.02, 02.03, 02.04, 02.06	3	N	1	999
47	DASET_NAME	Dataset main title	02.02	*	L		
48	DATA_TYPE	Data type	03, 83	2	A		
49	DATA_UNIT	Data unit	03, 05	3	A		
50	DATA_USE	Field class	03	2	N	1	4
51	DATEL_ID	Datum description ID	16.05, 61	10	N	1	2^{32}-1
52	DATE_FMT	Time Stamp Format	16.10	20	G		
53	DAT_CODE	Horizontal Datum Code	61	4	A		
54	DAT_NAME	Horizontal Datum name	61	50	L		
55	DD_NUM_H1	Discrete dynamic counter of number of H1 coordinates	52.03, 53.03	5	N	0	99999
56	DD_NUM_H2	Discrete dynamic counter of number of H2 coordinates	52.03, 53.03	5	N	0	99999
57	DD_NUM_Z	Discrete dynamic counter of number of Z coordinates	52.03, 53.03	5	N	0	99999
58	DEC_DATE	Validity date	66	8	N	10000101	99991231
59	DEC_VALUE	Magnetic variation	66	7	I	-400000	400000
60	DESCR_LEV	Description level	14.01	1	N	1	4
61	DESC_ID	Source description ID	14.01, 14.02, 14.03, 14.04, 14.05, 14.06, 14.07, 14.08, 14.09, 14.10, 16.04, 22, 23, 24, 25, 29, 41, 44, 45, 50, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	5	N	1	99999

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
62	DESC_SUBID	Sub Identifier of source description ID	14.04, 14.05, 14.07, 14.08	3	N	1	999
63	DEFAULTLAN	Default language	02.01	3	A		
64	DEV_ANNUAL	Annual change	66	7	I	-400000	400000
65	DIR_ID	Directory identifier	06	10	N	1	2^{32}-1
66	DIST_NAME	Name of distributor	14.08	*	L		
67	DIST_PLACE	Place of distribution	14.08	20	L		
68	DIST_YEAR	Year of distribution	14.08	4	N	1000	9999
69	DOC_TITLE	Document title	14.04	*	L		
70	DSET_TOPIC	Main Theme	02.01	2	N	1	19
71	EAST_LONG	East bound longitude	08	7	I	-180000	180000
72	EDGELEVE	Edge height level at end Node	52.01	2	I	-9	99
73	EDGELEVI	Intermediate Edge height level	52.01	2	I	-9	99
74	EDGELEVS	Edge height level at start Node	52.01	2	I	-9	99
75	EDGE_ID	Edge ID	22, 23, 25, 24, 29, 52.01, 53.02	10	N	1	2^{32}-1
76	EDIT_NR	Edition number	14.06	20	G		
77	ED_DATE	Edition date	02.01	10	N	1000010100	9999123123
78	EL_CODE	Ellipsoid code	61	2	A		
79	END_FDC	End date FDC	14.10	8	N	10000101	99991231
80	ETA_CONN	Artificial ETA Connectivity	16.03	1	N	0	1
81	EXT_F_CAT	External Feature category	46	2	N	1	4
82	EXT_ID	Foreign Section Feature identifier	46	10	N	1	2^{32}-1
83	FACE_ID	Face identifier	25, 29, 53.01	10	N	1	2^{32}-1
84	FEAT_CAT	Feature Category	19, 44, 50, 54	2	N	1	4
85	FEAT_CAT_I	Internal Feature Category	46	2	N	1	4
86	FEAT_CAT_F	Foreign Feature Category	46	2	N	1	4

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
87	FEAT_CODE	Feature Class Code	07, 09, 11, 15, 18, 51.01, 51.03,52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	4	N	1000*	9999*
88	FEAT_COD_S	Subtype Feature code	07	4	N	7100	9999
89	FEAT_DESC	Feature description	07	*	L		
90	FEAT_ID	Feature ID	19, 44, 50, 54.01	10	N	1	2^{32}-1
91	FEAT_ID_FT	Feature ID for from/to backpointers	54.03	10	N	1	2^{32}-1
92	FEAT_NAME	Feature name	07	40	L		
93	FIELD_DESC	Field description	03	*	L		
94	FIELD_SIZE	Field length	03	2	N	0	99
95	FNODE_ID	From Node ID	24	10	N	1	2^{32}-1
96	FLD_NAME	Field name	03, 04	10	G		
97	FROLE_NAME	Feature role name	09	40	L		
98	FROLE_NUM	Feature role	09, 50	2	N	1	99
99	FROM_ID	From ID	52.01, 54.01	10	N	1	2^{32}-1
100	FST_PAGE	From page	14.09	5	N	1	99999
101	GEOID_ID	Geoid description ID	16.06, 65	10	N	1	2^{32}-1
102	GEOID_UND	Ellipsoid height	65	5	I	-9999	9999
103	GEO_AREA	Area name	02.05, 08, 16.01	*	L		
104	GEO_CAT	Geometry/Topology Object Category	89.01	2	N	1	7
105	GEO_ID	Geometry/Topology Object Identifier	89.01	10	N	1	2^{32}-1
106	GEO_TYPE	Geometrical type	29, 53.03	1	N	0	4
107	GPL_STR_ID	Geopolitical structure ID	10	4	N	1	9999
108	GPL_STR_NM	Geopolitical structure name	10	40	L		

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
109	GPL_S_C_DC	Geopolitical structure component description	11	*	L		
110	GPL_S_C_ID	Geopolitical structure component identifier	10, 11	6	N	1	999999
111	GRID_CODE	Grid Code	64	2	A		
112	GRID_NAME	Grid Name	64	50	L		
113	GRID_ORT	Grid axes orientation	64	1	N	0	1
114	HELP_LAT	Help grid latitude	64	10	I	-90000000	90000000
115	HELP_LONG	Help grid longitude	64	10	I	-180000000	180000000
116	HMAG_INT	Horizontal magnetic intensity	66	5	I	0	99999
117	HOST_ID	Host identifier	14.09	5	N	1	99999
118	H_TYPE	Height ref. type	16.06	1	N	0	2
119	H1_COORD	Upper height	51.03, 52.03, 53.03	11	I	-2^{31}	$2^{31}-1$
120	H2_COORD	Upper height	51.03, 52.03, 53.03	11	I	-2^{31}	$2^{31}-1$
121	IDSI_NR	Intern'l Dataset ID	02.01	13	G		
122	ID_SCOPE	ID scope level	41, 44, 50, 51.01, 51.03,52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	1	A		
123	ID_SCOPE_P	ID scope level Attribute of Feature part(ner)	44, 50, 54.01 , 54.03	1	A		
124	IMP_NR	Impression number	14.06	20	G		
125	INT_ID	Internal Section Feature identifier	46	10	N	1	$2^{32}-1$
126	INT_FROM	From position of polyline interval	52.03, 53.03	5	N	1	99999
127	INT_F_CAT	Internal Feature type	46	2	N	1	4
128	ISBN	ISBN of document	14.02	13	G		
129	ISSN	ISSN of document	14.02	10	G		

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
130	LAN_CODE	language code	01.02, 02.01, 02.02, 02.04, 05, 07, 09, 11, 13, 14.02, 14.04, 14.05, 18; 41	3	A		
131	LAY_ID	Layer ID	06, 08, 10, 11, 17, 41, 44, 45, 46, 50	10	N	0*	2^{32}-1
132	LAY_TOPOL	Layer Topology	17	1	N	1	3
133	LCL_IN_COD	Local In Code	01.02	2	L		
134	LCL_OT_COD	Local Out Code	01.02	2	L		
135	LEV_CODE	Height level code	62	2	A		
136	LEV_CODE_A	Adjacent Height level code	62	2	A		
137	LEV_NAME	Height level name	62	50	L		
138	LEV_NAME_A	Adjacent Height level name	62	50	L		
139	LIGHT_VAL	Light value of bounded area	29, 53.03	3	N	0	255
140	LINE_ID	Line Feature ID	24, 51.01, 52.01, 52.03	10	N	1	2^{32}-1
141	LN_CNT_DIR	Direction for the counting of lanes	16.02	1	N	0	1
142	LST_PAGE	To page	14.09	5	N	1	99999
143	L_FACE_ID	Left Face identifier	24	10	N	1	2^{32}-1
144	LOCAL_NM	Local administrative area name	11	40	L		
145	MAGN_ID	Declination desc. ID	16.05, 66	10	N	1	2^{32}-1
146	MANDATRY	Mandatory indicator	09	1	N	0	1
147	MAP_SCALE	Map scale	14.04	7	N	1	9999999
148	MAX_LEVEL	Maximum no. of hierarchical Feature levels	07	2	N	1	99
150	MAX_VAL	Max. allowed value	03	20	I	-2^{63}	2^{63}-1
151	MDAT_DATE	Album metadata creation date	01.03	8	N	10000101	99991231

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
154	MIN_VAL	Min. allowed value	03	20	I	-2^{63}	$2^{63}-1$
155	NATGRID_ID	Grid description ID	16.05, 64	10	N	1	$2^{32}-1$
156	NODE_ID	Node identifier	22, 23, 25, 51.01	10	N	1	$2^{32}-1$
157	NORTH_LAT	North bound latitude	08	7	I	-90000	90000
158	NO_DATA	No data value	03	3	G		
159	NUM_AREA	Number of Area Features	24, 29	10	N	0	$2^{32}-1$
160	NUM_ATT	Number of Attributes or Attribute sets	41, 44, 50, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03, 89.03	5	N	0*	99999
161	NUM_ATT_BP	Number of Attribute back pointers	10, 11, 41, 45	10	N	0	$2^{32}-1$
162	NUM_ATT_P	Number of Attribute sets per part(ner)	50, 54.01, 54.03	5	N	0	99999
163	NUM_BP_FT	Number of reverse pointer Features	54.01	10	N	0	$2^{32}-1$
164	NUM_CNTRY	Number of countries	02.01, 14.02	3	N	0	999
165	NUM_COMP	Number of components	10	2	N	1	99
166	NUM_COMPLX	Number of Complex Features	51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	10	N	0	$2^{32}-1$
167	NUM_CONV	Number of conversion records	51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	10	N	0	$2^{32}-1$

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
168	NUM_COORD	Number of coordinates tuples	22, 23, 52.03, 53.03	5	N	1*	99999
169	NUM_DASET	Number of Datasets	01.01, 01.03, 01.04	2	N	1	99
170	NUM_DOC	Number of sources	16.04	2	N	0	99
171	NUM_EDGE	Number of Edges	29, 52.01, 53.02	10	N	0*	2^{32}-1
172	NUM_EDG_BP	Number of Edge backpointers	22, 23, 25	10	N	0	2^{32}-1
173	NUM_EXTGEO	Number flagging the presence of Extended area geometry information	29, 53.03	1	N	0	1
174	NUM_FACE	Number of Faces	53.01	10	N	0	2^{32}-1
175	NUM_FEAT	Number of Features	15, 18, 19, 44, 46, 50	5	N	0*	99999
176	NUM_FEAT_C	Number of Feature Class candidates	09	2	N	1	99
177	NUM_FIELD	Number of fields	04, 16.05, 16.06	2	N	0*	99
178	NUM_FUL	Number of full predecessors	11	2	N	0	99
179	NUM_H1	Number of H1 coordinates	51.03	1	N	0	1
180	NUM_IMM	Number of immediate parents	11	2	N	1	99
181	NUM_INTVAL	Number of coordinate intervals	52.03, 53.03	5	N	0	99999
182	NUM_LAN	Number of languages	01.02, 02.01, 14.02	3	N	0	999
183	NUM_LEV	Number of adjacent orthometric levels	62	2	N	0	99
184	NUM_LINE	Number of Line Features	24, 51.01	10	N	0	2^{32}-1
185	NUM_NAME	Number of names	05, 07, 09, 11	2	N	1	99
186	NUM_NODE	Number of Nodes	22, 23	10	N	0	2^{32}-1
187	NUM_PAR	Number of parameter sets	63	2	N	1	3
188	NUM_PARTS	Number of Feature parts	54.01, 54.03	5	N	0	99999

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
189	NUM_POINT	Number of Point Features	25	10	N	0	2^{32}-1
190	NUM_REC	Number of records	14.01	5	N	0	99999
191	NUM_REL	Number of Relationships	44, 50, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	10	N	0	2^{32}-1
192	NUM_ROLE	Number of Roles	09	2	N	2	99
193	NUM_SECT	Number of Sections	19	5	N	0	99999
194	NUM_SUBT	Number of subtypes	07	3	N	0	999
195	NUM_TEXT	Number of Text Records	44	10	N	0	2^{32}-1
196	NUM_THEM	Number of themes	17	2	N	1	99
197	NUM_TIME	Number of T coordinate tuples	51.03, 52.03, 53.03	1	N	0	1
198	NUM_Z	Number of Z coordinates	51.03	1	N	0	1
199	NW_COMPL	Network completeness level	19	1	N	0	9
200	NW_DESC	Network complete-ness description	19	*	L		
201	NW_ID	Network Identifier	16.03, 19, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	5	N	1	99999
202	OBJ_CAT	Object Category	89.02, 89.03	2	N	1	10
203	OBJ_CODE	Object Class Code	89.02, 89.03	4	N	1	9999
204	OBJ_ID	Object Identifier	89.02, 89.03	10	N	1	2^{32}-1
205	OBJREF	Object Reference Value	83	*	*		
206	OBJREF_ID	Object Reference Identifier	83	10	N	1	2^{32}-1

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
207	OBJREF_LEN	Object Reference Length	83	5	N	1	99999
208	OBJREF_TYP	Object Reference Type	83	1	A		
209	ORG_CODE	Country Code	01.02	3	A		
210	ORG_NAME	Organisation name	01.03	40	L		
211	ORG_NAM_SH	Short Organisation name	01.01	18	L		
212	ORIENT	Orientation	29, 53.02	1	N	0	1
213	OUT_LENGTH	Outline length of bounded area	29, 53.03	10	N	0	2^{32}-1
214	P_CYCLE	Product Cycle	89.01, 89.02, 89.03	2	N	0	99
215	PAR_ID	Parent description ID	14.01	5	N	1	99999
216	PAR_IMM_ID	Immediate parent identification	11	6	N	1	999999
217	PAR_LAT	Latitude parameter	63	10	I	-90000000	90000000
218	PAR_LONG	Longitude parameter	63	10	I	-180000000	180000000
219	POINT_ID	Point ID	25, 51.01, 51.03	10	N	1	2^{32}-1
220	POINT_NAME	Point name	16.08, 16.09	20	L		
221	POS_NEG	Orientation	52.01	2	N	0	1
222	PRE_FUL_ID	Lowest full predecessor identification	11	6	N	1	999999
223	PROD_NAME	Producer name	02.04	*	L		
224	PROD_PLACE	Production place	02.04	50	L		
225	PROJEC_ID	Projection ID	16.05, 63	10	N	1	2^{32}-1
226	PROJ_CODE	Projection type code	63	2	A		
227	PUB_NAME	Name of publisher	14.07	*	L		
228	PUB_PLACE	Place of publication	14.07	50	L		
229	PUB_YEAR	Year of publication	14.07	4	N	1000	9999

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
230	REC_CODE	Record subtype code	01.01, 01.02, 01.03, 01.04, 02.01, 02.02, 02.03, 02.04 02.05, 02.06, 02.07, 04, 06, 14.01, 14.02, 14.03, 14.04, 14.05, 14.06, 14.07, 14.08, 14.09, 14.10, 16.01, 16.02, 16.03, 16.04, 16.05, 16.06, 16.07, 16.08, 16.09, 16.10, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03, 89.01, 89.02, 89.03	2	N	1*	99*

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
231	REC_DESCR	Record type code	01.01, 01.02, 01.03, 01.04, 02.01, 02.02, 02.03, 02.04, 02.05, 02.06, 02.07, 03, 04, 05, 06, 07, 08, 09, 10, 11, 13, 14.01, 14.02, 14.03, 14.04, 14.05, 14.06, 14.07, 14.08, 14.09, 14.10, 15, 16.01, 16.02, 16.03, 16.04, 16.05, 16.06, 16.07, 16.08, 16.09, 16.10, 17, 18, 19, 22, 23, 24, 25, 29, 41, 44, 45, 46, 50, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03, 61, 62, 63, 64, 65, 66, 83, 89.01, 89.02, 89.03, 90, 99	2	N	0*	99*

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
232	REC_ID	Record identifier	14.01	10	N	1	2^{32}-1
233	REC_NAME	Record name	04	10	G		
234	REC_QTY	Number of records	06	8	N	0	99999999
235	REC_SUBTYPE	Record subtype	14.01	2	N	1	99
236	REC_TYPE	Record type code	04, 06, 14.01, 83	2	N	1	99
237	REF_DATE	Reference date	02.01	8	N	10000101	99991231
238	REF_LAT	Reference point, latitude	65, 66	10	I	-90000000	90000000
239	REF_LONG	Reference point, longitude	65, 66	10	I	-180000000	180000000
240	REF_REC_ID	Record ID of referenced Record	83	10	N	1	2^{32}-1
241	REF_TYPE	Reference Type	02.01	1	N	1	3
242	REL_CODE	Relationship Type Code	09, 50	4	N	1000	9999
243	REL_DESC	Relationship Type description	09	*	L		
244	REL_ID	Relationship ID	44, 50, 51.01, 51.03, 52.01, 52.03, 53.01, 53,02, 53.03, 54.01, 54.03,	10	N	1	2^{32}-1
245	REL_KIND	Kind of Relationship	14.09	2	N	11	16
246	REL_NAME	Name of Relationship	09	40	L		
247	REPEAT	Repeat indicator	04, 09	1	N	0	9
248	ROLE_CODE	Function of the Album	01.03	2	N	1	11
249	ROT_GRID	Grid rotation	64	10	I	0	400000000
250	ROT_Z	Z-rotation	61	9	I	0	40000000
251	R_FACE_ID	Right Face identifier	24	10	N	1	2^{32}-1
252	SCALE_FAC	Point scale factor	61, 63	5	I	-9999	9999

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
253	SECT_ID	Section ID	06, 08, 10, 11, 16.01, 16.02, 16.03, 16.04, 16.05, 16.06, 16.07, 16.08, 16.09, 16.10, 19, 41, 44, 45, 46, 50	10	N	0*	2^{32}-1
254	SECT_ID_F	Section ID of referenced Feature	19	10	N	0*	2^{32}-1
255	SECT_SUBID	Sub Identifier of Section ID	16.08, 16.09	3	N	1	999
256	SEC_NAME	Dataset subtitle	02.03	*	L		
257	SEM_MAJOR	Semi-major axis	61	8	N	0	99999999
258	SEM_MINOR	Semi-minor axis	61	8	N	0	99999999
259	SIZE	Size of bounded area	29, 53.03	10	N	0	2^{32}-1
260	SLOPE	Slope of bounded area	29, ,53.03	3	N	0	999
261	SOUTH_LAT	South bound latitude	08	7	I	-90000	90000
262	SPATDOM_ID	Spatial domain identifier	08	10	N	1	2^{32}-1
263	SPLIT_IND	Split indicator	52.01, 52.03, 53.01, 53.02, 53.03	1	N	0	1
264	STAN_NAME	Data standard	01.01	10	G		
265	START_FDC	Start date FDC	14.10	8	N	10000101	99991231
266	STATUS	Status code	24, 25	2	N	1	5
267	SURV_DATE	Survey date	14.02	6	N	1	123123
268	SURV_YEAR	Survey year	14.02	4	N	1000	9999
269	TEXT_ID	Text ID	41, 44	10	N	1	2^{32}-1
270	TEXT	Text	41	*	L		
271	THEM_COD	Feature Theme Code	02.06, 17	2	N	10	99
272	THEM_NAME	Feature Theme Name	02.06	*	G		

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
273	TIME_DOM	Time domain desc.	45	*	G		
274	TIME_ID	Time domain rec. ID	45	10	N	1	2^{32}-1
275	TIME_MASK	Time mask	51.03, 52.03, 53.03	2	N	1	16
276	TNODE_ID	To Node ID	24	10	N	1	2^{32}-1
277	TOT_VOL	Number of volumes	01.01, 01.04,	4	N	1	9999
278	TO_ID	To ID	52.01, 54.01	10	N	1	2^{32}-1
279	TRANS_H	Height difference	62	5	I	-9999	9999
280	TRANS_X	X-origin	61	5	I	-9999	9999
281	TRANS_Y	Y-origin	61	5	I	-9999	9999
282	TRANS_Z	Z-origin	61	5	I	-9999	9999
283	T_SA_COORD	Start appearance coordinate	51.03, 52.03, 53.03	10	N	1000010100	9999123123
284	T_EA_COORD	End appearance coordinate	51.03, 52.03, 53.03	10	N	1000010100	9999123123
285	T_SD_COORD	Start disappearance coordinate	51.03, 52.03, 53.03	10	N	1000010100	9999123123
286	T_ED_COORD	End disappearance coordinate	51.03, 52.03, 53.03	10	N	1000010100	9999123123
287	UNIT_EXP	Exponent multiplier	03	2	I	-9	9
288	UNIT_SYSTEM	Default Unit System	02.01, 02.01	1	N	1	2
289	UNIT_TYPE	Data unit type	03	1	N	0	1
290	UPD_ATT_ID	Object Attribute update identification	89.03	10	N	1	2^{32}-1
291	UPD_GEO_ID	Geo-topo update identification	89.01	10	N	1	2^{32}-1
292	UPD_OBJ_ID	Object update identification	89.02	10	N	1	2^{32}-1
293	VAL_DESC	Value Code description	18	*	L		
294	VAL_SIZE	Maximum Attribute Value Width	05	2	N	1	11

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
295	VAL_TYPE	Attribute Value Data Type	05	2	A		
296	VERDAT_ID	Vertical datum desc.	16.06, 62	10	N	1	2^{32}-1
297	VERSION	Version number	01.01	4	G		
298	VMAG_INT	Vert. Magn. Intensity	66	5	I	0	99999
299	VOLENDTEXT	Volume termination comments	99	77	L		
300	VOL_ID	Volume identifier	01.04, 06	4	N	1	9999
301	VOL_ID_S	Start volume identifier	01.03, 01.04, 06	4	N	1	9999
302	VOL_NAME	Volume name	14.05	*	L		
303	VOL_SIZE	Volume size	01.04	20	N	640	10^{20}-1
304	WEST_LONG	West bound longitude	08	7	I	-180000	180000
305	XY_ACC_LEV	Horizontal accuracy level	17	5	N	0	99999
307	XY_AL_DESC	Horizontal accuracy level description	17	40	L		
308	XY_CONFAC	XY mult. Factor	16.07	2	I	-9	9
309	XY_RES	XY resolution	02.07, 16.02, 17	3	N	0	999
310	X_COORD	X coordinate	16.09, 22, 23, 51.03, 52.03, 53.03	11	I	-2^{31}	2^{31}-1
311	X_DIG	Digitized X coord.	16.08	12	I	-(10^{11}-1)	10^{11}-1
312	X_MAX	Maximum X value	16.07	11	I	-2^{31}	2^{31}-1
313	X_MIN	Minimum X value	16.07	11	I	-2^{31}	2^{31}-1
314	X_OFFSET	X offset	16.07	11	I	-2^{31}	2^{31}-1
315	X_ORIG	X origin	64	10	I	-(10^{9}-1)	10^{9}-1
316	X_SURV	Surveyed X coord.	16.08	12	I	-(10^{11}-1)	10^{11}-1
317	Y_COORD	Y coordinate	16.09, 22, 23, 51.03, 52.03, 52.03 53.03	11	I	-2^{31}	2^{31}-1
318	Y_DIG	Digitized Y coord.	16.08	12	I	-(10^{11}-1)	10^{11}-1
319	Y_MAX	Maximum Y value	16.07	11	I	-2^{31}	2^{31}-1

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No.	Field name	Description	Records	Size	Type	Minimum	Maximum
320	Y_MIN	Minimum Y value	16.07	11	I	-2^{31}	$2^{31}-1$
321	Y_OFFSET	Y offset	16.07	11	I	-2^{31}	$2^{31}-1$
322	Y_ORIG	Y origin	64	10	I	$-(10^{9}-1)$	$10^{9}-1$
323	Y_SURV	Surveyed Y coord.	16.08	12	I	$-(10^{11}-1)$	$10^{11}-1$
324	Z_ACC_LEV	Vertical accuracy level	17	5	N	0	99999
325	Z_AL_DESC	Vertical accuracy level description	17	40	L		
326	Z_CONFAC	Z mult. Factor	16.07	2	I	-9	9
327	Z_COORD	Z coordinate	23, 51.03, 53.03	11	I	-2^{31}	$2^{31}-1$
328	Z_DIG	Digitized Z coord.	16.09	11	I	-2^{31}	$2^{31}-1$
329	Z_OFFSET	Z offset	16.07	11	I	-2^{31}	$2^{31}-1$
330	Z_REF	Z referencing method	17	1	N	0	3
331	Z_SURV	Surveyed Z coord.	16.09	11	I	-2^{31}	$2^{31}-1$

12.3 Additional Constraints for Topological Features

12.3.1 Order of multiple Coordinate tuples in Coordinate Records

The coordinate tuples stored in Coordinate records (either 2D coordinates records or 3D coordinate records) together form a List. This means that the order in which they are stored is significant, i.e. representing the direction of the corresponding Edge. The coordinate list shall be ordered in such a way that within the Edge definition the first vertex is preceded by the coordinate tuple of the start Node (exclusive to the coordinate list at hand) and the last vertex succeeded by the coordinate tuple of the end Node (exclusive to the coordinate list at hand).

12.3.2 Order of Edges in Line Features, Area Features and Faces

Within a Line Feature, Edges shall be listed in consecutive order. Edges describing the boundary of an Area Feature or a Face, respectively, shall be (consecutively) ordered in clockwise orientation (i.e. the Area Feature/Face is situated on the right side of the boundary line). Consequently, enclaves shall be described counterclockwise.

12.3.3 Order of Features in Relationship Records

The physical order of Features in a Relationship shall reflect the specified sequence (numbering) of roles, and (if applicable and specified for a given Relationship Type) the conceptual ordering of Features per role. For the Relationship Types defined in GDF, see A.3.1 for the role numbers.

12.3.4 Order of Features in Relationship Records

The physical order of Features in a Complex Feature assembly shall reflect (if applicable and specified for a given Complex Feature class) the conceptual ordering of Features.

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12.4 Additional Constraints for Non-Explicit Topological Features: Order of Coordinate triplets in Feature Records

When Features are defined in a non-explicit topological way, their geometrical definition has the form of coordinate tuples defined in the Feature record, comprising X and Y, and possibly Z, H1, H2, and T coordinates. In the case of Line and Area Features the order with which these tuples appear in the Feature Record is significant. In the case of Line Features only the fact that the tuples appear ordered is significant. The direction of the order is not significant. In the case of Area Features also the direction of the ordering is significant. The Area Feature (and thus the underlying polygon) is defined to be on the right side of the directed set of coordinate tuples (clockwise orientation). In this way it becomes possible to not only define simple areas but also areas containing enclaves (and exclaves).

12.5 Mandatory Records

Of all the Records of GDF, eight shall appear at least once in each GDF file. These Records are:

Album header record		[01.01]
Album header record		[01.03]
Dataset header record	[02.01]	
Dataset header record	[02.02]	
Layer header		[17]
Section header record	[16.01]	
Section header record	[16.07]	
Volume termination record		[99]

Each Dataset, declared by a set of Dataset header records, shall include at least one Layer (header). Each Layer, declared by a Layer header record, shall include at least one Section (header).

12.6 Record Format Specifications: Global Records

NOTE 1 A vertical bar to the left of a field name indicates that the field is part of a repeating group of fields.

NOTE 2 The character '"*" is used in this documentation of field size to indicate a field of variable length. Electronically, fields of variable length are indicated by a numeric value of "0", but printed record layouts in this document will show "*".

12.6.1 Album Header Record [ALHDREC]

12.6.1.1 Album Header Intro Subrecord [ALHDREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**01**)
REC_CODE	2	N	Obl			Record Subtype Code (**01**)
ORG_NAM_SH	18	L[4]	<S>			Short Organisation Name: Name of the producer or deliverer of this album
STAN_NAME	10	G	Obl			Standard Name to which this[5] album conforms

4) Note that the (local) character set applicable to this field is declared by a different sub-record of the Album Header and may differ from the general default character.

5) The name of this document is "GDF"

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VERSION	4	G	Obl			Version Number of this document to which this album conforms [6]
CHAR_SET	2	N	1	1	30	Default Character Set applicable to whole GDF 1 = ISO 8859-1 (Latin-1) 2 = ISO 8859-2 (Latin-2) 3 = ISO 8859-3 (Latin-3) 4 = ISO 8859-4 (Latin-4) 5 = ISO 8859-5 (Cyrillic) 6 = ISO 8859-6 (Arabic) 7 = ISO 8859-7 (Greek) 8 = ISO 8859-8 (Hebrew) 9 = ISO 8859-9 (Latin-5) 10 = ISO 8859-10 (Latin-6) 11 = ISO 8859-11 (Thai) 12 = reserved/not used 13 = ISO 8859-13 (Latin-7) 14 = ISO 8859-14 (Latin-8) 15 = ISO 8859-15 (Latin-9) 16 = ISO 8859-16 (Latin-10) 17 ~ 29 = reserved for future use 30 = ISO/IEC 10646 Annex D (Unicode - UTF-8)
ALB_SIZE	20	N	<S>	640	10^{20}-1	Album Size in bytes
ALBUM_ID	10	N	Obl	1	2^{32}-1	A unique Album Identifier

NOTE The exact meaning of the data types (N, A, G, etc.) may be found in the Metadata Catalogue. (see 10.3.2.4)

12.6.1.2 Local Character Set Definition Subrecord [ALHDREC.02]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**01**)
REC_CODE	2	N	Obl			Record Subtype Code (**02**)
LCL_IN_COD [7]	2	L	<S>			Local In Code. By not specifying this field, the local character set at hand becomes the default character set for Fields of type L (overruling the general default character set). Only one default character set may be declared; for any other local character set a Local In Code shall be provided.
LCL_OT_COD [8]	2	L	<S>			Local Out Code. By not specifying this field, the local character set at hand becomes the default character set for Fields of type L (overruling the general default character set). Only one default character set may be declared; for any other local character set a Local In Code shall be provided.

6) The version number is “5.0”

7) The Local In Code is to be composed using the general default character set. The use of the Local In Code supposes that the first character of this code is not used for any other purpose in regular text.

8) The Local Out Code is to be composed using the general default character set. The use of the Local Out Code supposes that the code is not used for any other purpose within the Local Character Set.

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CHAR_SET	2	N	Obl	1	99	Local Character Set applicable to Fields of Type L. 1 = ISO 8859-1 (Latin-1) 2 = ISO 8859-2 (Latin-2) 3 = ISO 8859-3 (Latin-3) 4 = ISO 8859-4 (Latin-4) 5 = ISO 8859-5 (Cyrillic) 6 = ISO 8859-6 (Arabic) 7 = ISO 8859-7 (Greek) 8 = ISO 8859-8 (Hebrew) 9 = ISO 8859-9 (Latin-5) 10 = ISO 8859-10 (Latin-6) 11 = ISO 8859-11 (Thai) 12 = reserved/not used 13 = ISO 8859-13 (Latin-7) 14 = ISO 8859-14 (Latin-8) 15 = ISO 8859-15 (Latin-9) 16 = ISO 8859-16 (Latin-10) 17 ~ 29 = reserved for future use 30 = ISO/IEC 10646 Annex D (Unicode - UTF-8) 31 = ISO/IEC 10646 (Unicode - UCS-2) 32 = ISO/IEC 10646 (Unicode - UCS-2, big endian) 33 ~ 49 = reserved for future use 50 = Shift-JIS (Japanese) 51 = KS X 1001 (Korean) 52 ~ 99 = reserved for the User Defined
ORG_CODE	3	A	<S>			Organisation Information (ISO 3166 alpha-3 country code)
CHAR_TBL	20	G	<S>			Character Set Code Table name
CHAR_VER	10	G	<S>			Character Set Code Table Version Number
NUM_LAN	3	N	Obl	0	999	Number of languages
LAN_CODE	3	A	Obl			Character Set Language: The ISO 639-2 language code of a language applying to the specified Character Set Code Table
COLL_SEQ	3	A	<S>			Collating Sequence: Designation of collating sequence by means of ISO 639-2 language code.

12.6.1.3 Global Album Information Subrecord [ALHDREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**01**)
REC_CODE	2	N	Obl			Record Subtype Code (**03**)
ALBUM_ID	10	N	Obl	1	2^{32}-1	A unique Album Identifier [9]
ORG_NAME	40	L	Obl			Organization Name: Name of the producer or deliverer of this album

9) For a set of sub-records associated with the same album header, the ID has to be the same as the designated ALBUM_ID in "master" sub-record 01.01.

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ROLE_CODE	2	N	Obl	1	11	Function performed by the main producer and/or deliverer of this album. 1 : resource provider 2 : custodian 3 : owner 4 : user 5 : distributor 6 : originator 7 : point of contact 8 : principal investigator 9 : processor 10 : publisher 11 : author
CREA_DATE	8	N	<S>	10000101	99991231	Creation Date of this album(YYYYMMDD)
MDAT_DATE	8	N	Obl	10000101	99991231	Date of creation of the metadata for this album (YYYYMMDD).
NUM_DASET	2	N	Obl	1	99	Number of Datasets
DASET_ID	10	N	Obl	1	2^{32}-1	Dataset Identifier of a Dataset which is associated with this album
VOL_ID_S	4	N	Obl	1	9999	Start Volume Identifier of the volume which contains the Dataset Header.
CORI_DATE	8	N	<S>	10000101	99991231	Date of Copyright (YYYYMMDD)
CORI_OWNER	*	L	<S>			Copyright Owner: Name of the legal Person having the copyrights of album

12.6.1.4 Volume Information Subrecord [ALHDREC.04]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (01)
REC_CODE	2	N	Obl			Record Subtype Code (04)
VOL_ID	4	N	Obl	1	9999	The sequence number of the present Volume serving as a unique Volume Identifier
VOL_SIZE	20	N	<S>	640	10^{20}-1	Volume Size in bytes
TOT_VOL	4	N	<S>	1	9999	Number of Volumes in the album
NUM_DASET	2	N	Obl	1	99	Number of Datasets
DASET_ID	10	N	Obl	1	2^{32} -1	Dataset Identifier of a Dataset which is associated with this volume
VOL_ID_S	4	N	Obl	1	9999	Start Volume Identifier of the volume which contains the Dataset Header. This number may be the local Volume number

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12.6.2 Dataset Header Record [DSHDREC]

12.6.2.1 Dataset Identification Subrecord [DSHDREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**02**)
REC_CODE	2	N	Obl			Record Subtype Code (**01**)
DASET_ID	10	N	Obl	1	$2^{32}-1$	Supplier Dataset Identification Number, which is unique within the system of the producer (supplier) of this Dataset
IDSI_NR	13	G	<S>			International Dataset Identification Number
ED_DATE	10	N	Obl	1000010100	9999123123	Edition Date and hour of this particular version of the Dataset which constitutes also a unique version number of the present version (YYYYMMDDHH)
REF_DATE	8	N	Obl	10000101	99991231	Reference date of the intellectual and logical content of this Dataset (YYYYMMDD)
REF_TYPE	1	N	Obl	1	3	Event used for the Dataset reference date 1 : Creation 2 : Publication 3 : Revision
DSET_TOPIC	2	N	Obl	1	19	Main theme of this Dataset [10)] 1 : farming 2 : biota 3 : boundaries 4 : climatology/meteorology/atmosphere 5 : economy 6 : elevation 7 : environment 8 : geoscientific information 9 : health 10 : imagery base maps earth cover 11 : intelligenceMilitary 12 : inlandWaters 13 : location 14 : oceans 15 : planning cadastre 16 : society 17 : structure 18 : transportation 19 : utilities communication

10) Most commonly the main theme applicable is 18 : transportation.

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UNIT_SYSTEM	1	N	1	1	2	Default unit system for a Dataset 1 : Metric 2 : English
NUM_LAN	3	N	Obl	0	999	Number of languages
LAN_CODE	3	A	Obl			Dataset Language: The ISO 639-2 language code of a language used in this Dataset
DEFAULTLAN	3	A	<S>			Default Language: The ISO 639-2 language code of a language used as the default language of character strings in this Dataset
NUM_CNTRY	3	N	Obl	0	999	Number of countries
CNT_CODE	3	A	Obl			The ISO 3166 alpha-3 code of a country involved in the production of this Dataset
ABSTRACT	*	L	Obl			Narrative summary of the content of the Dataset

12.6.2.2 Dataset Main Title Subrecord [DSHDREC.02]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**02**)
REC_CODE	2	N	Obl			Record Subtype Code (**02**)
DASET_ID	10	N	Obl	1	$2^{32}-1$	Supplier Dataset Identification Number, which is unique within the system of the producer (supplier) of this Dataset[11)]
DAST_SUBID	3	N	Obl	1	999	Sub Identifier of Supplier Dataset Identification Number which is unique among multiple occurrences of this subrecord in a given Dataset
LAN_CODE	3	A	<S>			Dataset Title Language: The ISO 639-2 language specified in the next field
DASET_NAME	*	L	Obl			Dataset Main Title

12.6.2.3 Dataset Subtitle Subrecord [DSHDREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**02**)
REC_CODE	2	N	Obl			Record Subtype Code (**03**)
DASET_ID	10	N	Obl	1	$2^{32}-1$	Supplier Dataset Identification Number, which is unique within the system of the producer (supplier) of this Dataset[12)]

11) For a set of sub-records associated with the same dataset header, the ID has to be the same as the designated DASET_ID in "master" sub-record 02.01.

12) For a set of sub-records associated with the same dataset header, the ID has to be the same as the designated DASET_ID in "master" sub-record 02.01.

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DAST_SUBID	3	N	Obl	1	999	Sub Identifier of Supplier Dataset Identification Number which is unique among multiple occurrences of this subrecord in a given Dataset
SEC_NAME	*	L	Obl			Dataset Subtitle in the same language as in Dataset Main Title

12.6.2.4 Dataset Producer Subrecord [DSHDREC.04]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**02**)
REC_CODE	2	N	Obl			Record Subtype Code (**04**)
DASET_ID	10	N	Obl	1	$2^{32}-1$	Supplier Dataset Identification Number, which is unique within the system of the producer (supplier) of this Dataset[13)]
DAST_SUBID	3	N	Obl	1	999	Sub Identifier of Supplier Dataset Identification Number which is unique among multiple occurrences of this subrecord in a given Dataset
CNT_CODE	3	A	<S>			Production Country: The ISO 3166 alpha-3 country code of the country to which Production Place belongs
PROD_PLACE	50	L	<S>			Production Place
LAN_CODE	3	A	<S>			Producer Name Language: The ISO 639-2 language code of the Producer Name
PROD_NAME	*	L	<S>			Producer Name

NOTE The layout of this record assumes that at least one optional field will be specified.

12.6.2.5 Dataset Extensiveness & Currency Subrecord [DSHDREC.05]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**02**)
REC_CODE	2	N	Obl			Record Subtype Code (**05**)
DASET_ID	10	N	Obl	1	$2^{32}-1$	Supplier Dataset Identification Number, which is unique within the system of the producer (supplier) of this Dataset[14)]
CREA_YEAR	4	N	<S>	1000	9999	Creation Year (YYYY)
GEO_AREA	*	L	<S>			Dataset Geographical coverage: An area name that is representative for the Dataset

NOTE The layout of this record assumes that at least one optional field will be specified.

13) For a set of sub-records associated with the same dataset header, the ID has to be the same as the designated DASET_ID in "master" sub-record 02.01.

14) For a set of sub-records associated with the same dataset header, the ID has to be the same as the designated DASET_ID in "master" sub-record 02.01.

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12.6.2.6 Dataset Contents Subrecord [DSHDREC.06]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**02**)
REC_CODE	2	N	Obl			Record Subtype Code (**06**)
DASET_ID	10	N	Obl	1	2^{32}-1	Supplier Dataset Identification Number, which is unique within the system of the producer (supplier) of this Dataset [15)]
DAST_SUBID	3	N	Obl	1	999	Sub Identifier of Supplier Dataset Identification Number which is unique among multiple occurrences of this subrecord in a given Dataset
THEM_COD	2	N	<S>	10	99	Feature Theme Code
THEM_NAME	*	G	<S>			Feature Theme Name: The name of a Feature Theme which is present in this Dataset

NOTE The layout of this record assumes that at least one optional field will be specified.

12.6.2.7 Dataset XY Resolution Subrecord [DSHDREC.07]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**02**)
REC_CODE	2	N	Obl			Record Subtype Code (**07**)
DASET_ID	10	N	Obl	1	2^{32}-1	Supplier Dataset Identification Number, which is unique within the system of the producer (supplier) of this Dataset [16)]
XY_RES	3	N	Obl	0	999	Dataset XY Resolution: Worst case value in any part of the Dataset, expressed in meters

12.6.3 Field Definition Record [FIELDEFREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**03**)
FLD_NAME	10	G	Obl			Field Name: The name of the field which is specified in this record
FIELD_SIZE	2	N	Obl	0	99	Field Size: Length of the field which is specified The value 0 signifies a variable field length
DATA_TYPE	2	A	Obl			Data Type: The subset of the field may contain G = printable characters L = Local Characters A = alphabetic characters N = digits I = digits and + or - AN = alphabetic and numeric

15) For a set of sub-records associated with the same dataset header, the ID has to be the same as the designated DASET_ID in "master" sub-record 02.01.

16) For a set of sub-records associated with the same dataset header, the ID has to be the same as the designated DASET_ID in "master" sub-record 02.01.

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UNIT_TYPE	1	N	Obl	0	1	Data Unit Type: Specifies either unit of measurement or GDF defined unit 0 = general unit of measurement 1 = GDF defined unit
DATA_UNIT	3	A	<S>			Data Unit: Code of the unit of measurement or GDF defined unit in which the data values are expressed. GDF defined units may include COD = Code list ENM = Enumeration CNT = Number BOL = Boolean BMR = Bit Mask Register (binary number as binary) BMI = Bit Mask Integer (binary number as decimal) TIM = Time PRC = Percentage CMP = Composite IDN = Identifier PRS = Signed Percentage
UNIT_EXP	2	I	<S>	-9	9	Unit Exponent: 10LOG of the multiplication factor with which the data values, expressed in the unit specified in DATA_UNIT, shall be multiplied.
NO_DATA	3	G	Obl			No Data: Value if no data is being provided Obl = Obligatory <S> = Space(s) *{a valid value}* = any value allowable for the data type assigned for the field in question, and within the valid value range in case of being data type N
MIN_VAL	20	I	<S>	-2^{63}	$2^{63}-1$	Minimum Value Allowed
MAX_VAL	20	I	<S>	-2^{63}	$2^{63}-1$	Maximum Value Allowed
DATA_USE	2	N	<S>	1	4	Field Class: Indication to which Field Class the field belongs: 1 = Entity 2 = Foreign Identifier 3 = Field Counter 4 = Other
FIELD_DESC	*	L	<S>			Field Description: Short explanation of the field which is specified

NOTE The character '"*" is used in the Size column to indicate a field of variable length, for example FIELD_DESC. In this record, a numeric value of "0" for FIELD_SIZE indicates that the field is of variable length, but a printed record layout in this document will show "*".

12.6.4 Record Definition Record [RECDEFREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**04**)
REC_TYPE	2	N	Obl	01	99	Record Type Code: Code of the record type which is specified
REC_CODE	2	N	<S>	01	99	Record Subtype Code: A possible subtype code of the record type which is specified
REC_NAME	10	G	<S>			Record Name: Name of the record type which is specified in this record
NUM_FIELD	2	N	Obl	2	99	Number of fields

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FLD_NAME	10	G	Obl			Field Name: A list of field names, for the record type in issue, in order
REPEAT	1	N	Obl	0	9	Repeating Field Level indicating how the field (field group) is nested. 0 = non-repeating 1…9 = repeated field (group) nested within previous repeating field level
COMMENT	*	L	<S>			Record Type Description: Short indication of the content of the record type in issue

12.6.5 Feature Definition Record [FEATDEFREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**07**)
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Four-digit code of the Feature Class
MAX_LEVEL	2	N	Obl	1	99	The maximum number of levels in the hierarchical tree according to which the hierarchical Features in the current Dataset are defined. In case of non-hierarchical Features this field shall contain the value 1.
NUM_NAME	2	N	Obl	1	99	Number of names associated with the Feature Class
LAN_CODE	3	A	<S>			Language Code: ISO 639-2 language code of the language used in the Feature Class Name
FEAT_NAME	40	L	Obl			Feature Class Name: name for the Feature Class
NUM_SUBT	3	N	Obl	0	999	The number of subtypes which have been defined for the current Feature Class. In case of non-hierarchical Features this number shall be zero.
FEAT_COD_S	4	N	Obl	7100	9999	Subtype Feature Class Code: Four-digit code of the child Feature Class (only applicable for hierarchical Feature definitions)
FEAT_DESC	*	L	<S>			Feature Description: Textual description of the current (parent) Feature Class which is specified

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12.6.6 Attribute Definition Record [ATDEFREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**05**)
ATT_TYPE	2	G	Obl			Attribute Type Code: The code of the Attribute type which is specified in this record
NUM_NAME	2	N	Obl	1	99	Number of names associated with the Attribute Type
LAN_CODE	3	A	<S>			Language Code: ISO 639-2 language code of the language used in the Attribute Type Name
ATT_NAME	40	L	Obl			Attribute Type Name: name for the Attribute type
VAL_TYPE	2	A	Obl			Attribute Value Data Type G = Printable characters A = Alphabetic characters N = Digits I = Digits and + or - AN = Alphabetic and numeric L = Local characters
VAL_SIZE	2	N	<S>	1	11	Maximum Attribute Value Width
ATT_D_TYPE	3	A	Obl			Attribute Data Type: Specifies applicable Data type of the Attribute type COD = Code List ENM = Enumeration CNT = Number BOL = Boolean BMR = Bit Mask Register (binary number as binary) BMI = Bit Mask Integer (binary number as decimal) TMR = Time Domain SCS = (Simple) Character String TXT = (Language-Coded) Text) PRC = Percentage CMP = Composite IDN = Identifier GSD = Geopolitical Structure Definition PRS = Signed Percentage MSR =Measure

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DATA_UNIT	3	A	<S>			Attribute Data Unit: Code of the unit of measure in which the data values are expressed. (only specified if ATT_D_TYPE is set to MSR). DEG = Degree* MTR = Metre* KMR = Kilometre INC = Inch FET = Feet MIL = Mile KGR = Kilogram* PND = Pound (US pound) KIP= Kilo Pound TON = Ton (metric ton) MIN = Minute (of time)* KPH = Kilometres per hour* MPH = Miles per hour In case Conversion Factor and conversion exponent are defined, DATA_UNIT shall be from allowable set of Base Units (marked by *)
CONV_MAN	11	I	<S>	1	2^{31}-1	Base Unit Conversion Mantissa
CONV_EXP	2	I	<S>	-9	9	Exponent: 10LOG of the conversion factor with which the conversion mantissa, expressed in the base unit specified in DATA_UNIT, shall be multiplied.
AT_MIN_VAL	11	I	<S>	-2^{31}	2^{31}-1	Minimum Value Allowed
AT_MAX_VAL	11	I	<S>	-2^{31}	2^{31}-1	Maximum Value Allowed
ATT_DESC	*	L	<S>			Attribute Description: Textual description of the Attribute type which is specified

12.6.7 Attribute Value Definition Record [ATTVALREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**18**)
ATT_TYPE	2	G	Obl			Attribute Type Code: The code of the Attribute which is specified in this record
NUM_FEAT	5	N	Obl	0	99999	Number of Features
FEAT_CODE	4	N	<S>	1000	9999	Feature Class Code: Four-digit code of the Feature Class
ATT_VAL	11	G	Obl			Value of an Attribute (allowable value code for Attribute type of data type COD or ENM)
LAN_CODE	3	A	<S>			ISO 639-2 Language Code of the Value Code Description
VAL_DESC	*	L	<S>			Value Code Description: Textual description of the specified value code

NOTE A usage of this record without mention of the FEAT_CODE field is the general mode, i.e. Feature Class independent and compatible with the previous version of this document(apart from the additional NUM_FEAT field specifying a count of zero). See 10.3.6 for further descriptions.

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12.6.8 Default Attribute Record [DATTVALREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**15**)
ATT_TYPE	2	G	Obl			Attribute Type Code
NUM_FEAT	5	N	Obl	0	99999	Number of Features
FEAT_CODE	4	N	<S>	1000	9999	Feature Class Code: Four-digit code of the Feature Class
ATT_VAL	11	G	Obl			Default Attribute Value

NOTE 1 Although the SPACE character <S> is a legal value in the ATT_VAL *Field*, it does not mean that there is no information available for this metadata *Field*. It means that in the *Attribute* data of the given type, "not-collected / unknown" shall be considered as the default case.

NOTE 2 A usage of this record without mention of the FEAT_CODE field is the general mode, i.e. Feature Class independent and compatible with the previous version of this document(apart from the additional NUM_FEAT field specifying a count of zero). See 10.4.5.4 for further descriptions.

12.6.9 Relationship Definition Record [RELDEFREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**09**)
REL_CODE	4	N	Obl	1000	9999	Relationship Type Code: four-digit Relationship Type Code
NUM_NAME	2	N	Obl	1	99	Number of names associated with the Relationship Type
LAN_CODE	3	A	<S>			Language Code: ISO 639-2 language code of the language used in the Relationship Type Name
REL_NAME	40	L	Obl			Relationship Type name: name of the Relationship Type
NUM_ROLE	2	N	Obl	2	99	Number of roles that are defined in this Relationship Type
FROLE_NUM	2	N	Obl	1	99	Declaration of the role, in terms of a role number (unique within the Relationship), that this Relationship partner (Feature) plays
FROLE_NAME	40	L	<S>			Name of the Feature role
NUM_FEAT_C	2	N	Obl	1	99	Number of Feature class candidates that may appear in the role at hand
FEAT_CODE	4	N	Obl	1000	9999	Feature class candidate(s) that may appear in the role at hand in this Relationship Type
REPEAT	1	N	Obl	0	1	Indication whether the presence of this role may repeat 0 = non-repeating 1 = repeating

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MANDATRY	1	N	Obl	0	1	Indication whether the appearance of this role is mandatory 0 = non-mandatory 1 = mandatory
REL_DESC	*	L	<S>			A textual description of the Relationship Type specified

12.6.10 Geopolitical Structure Definition Record [GPLSTRDREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**10**)
GPL_STR_ID	4	N	Obl	1	9999	Geopolitical Structure ID
GPL_STR_NM	40	L	<S>			Geopolitical Structure Name: A name for the Geopolitical Structure
NUM_COMP	2	N	Obl	1	99	Number of components participating in this Geopolitical Structure
GPL_S_C_ID	6	N	Obl	1	999999	Geopolitical Structure Component ID [17]
NUM_ATT_BP	10	N	Obl	0	2^{32}-1	Number of Attribute back pointers
LAY_ID	10	N	Obl [18]	0	2^{32}-1	Layer Identifier: ID number of the Layer within which the Attribute referred to by the geopolitical structure definition resides.
SECT_ID	10	N	Obl [19]	0	2^{32}-1	Section Identifier: ID number of the Section within which the Attribute referred to by the geopolitical structure definition resides.
ATT_ID	10	N	Obl	1	2^{32}-1	ATT_ID: Attribute which uses this Geopolitical Structure Definition

12.6.11 Geopolitical Structure Component Definition Record [GPLCOMDREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**11**)
GPL_S_C_ID	6	N	Obl	1	999999	Geopolitical Structure Component ID
FEAT_CODE	4	N	Obl	1100	3199	Feature Class Code: Four-digit Feature ClassClass Code of the Administrative Area Feature or Named Area which is part of the specified Geopolitical Structure [20]

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17) No order is implied by this repeating field; instead graph relations between Geopolitical Structure Components are established by means of Immediate Parent and Lowest Full Predecessor definitions in Geopolitical Structure Component Definition Record (Record Type Code 11).

18) If the referred-to attribute resides on Dataset level, the Layer ID is not applicable and rendered as 'zero'.

19) If the referred-to attribute resides on Dataset or Layer level, the Section ID is not applicable and rendered as 'zero'.

20) Min/max boundary of allowable ranges is targeting feature codes from the Admin Area and Named Area Feature Themes (11xx, 31xx), excluding 1200.....3099.

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NUM_NAME	2	N	Obl	1	99	Number of names associated with the Administrative Area or Named Area in the structure
LAN_CODE	3	A	<S>			Language Code: ISO 639-2 language code of the language used to name the Administrative Area or Named Area
LOCAL_NM	40	L	Obl			Administrative Area or Named Area Name: The local name of the Administrative Area or Named Area in the specified language
NUM_IMM	2	N	Obl	0	99	Number of Immediate Parent Geopolitical Structure Components [21)]
PAR_IMM_ID	6	N	<S>	1	999999	Immediate parent Geopolitical Structure Component
NUM_FUL	2	N	Obl	0	99	Number of full predecessor Geopolitical Structure Component [22]
PRE_FUL_ID	6	N	<S>	1	999999	Lowest full predecessor Geopolitical Structure Component
GPL_S_C_DC	*	L	<S>			Geopolitical Structure Component Description: An informative description of the characteristics of this component
NUM_ATT_BP	10	N	Obl	0	2^{32}-1	Number of Attribute back pointers
LAY_ID	10	N	Obl [23)]	0	2^{32}-1	Layer Identifier: ID number of the Layer within which the Attribute referred to by the geopolitical structure component definition resides.
SECT_ID	10	N	Obl [24)]	0	2^{32}-1	Section Identifier: ID number of the Section within which the Attribute referred to by the geopolitical structure component definition resides.
ATT_ID	10	N	Obl	1	2^{32}-1	ATT_ID: Attribute which uses this Geopolitical Structure Component Definition

12.6.12 Spatial Domain Record [SPADOREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**08**)
SPATDOM_ID	10	N	Obl	1	2^{32}-1	Spatial Domain Identifier, which is unique within the Dataset
LAY_ID	10	N	Obl	1	2^{32}-1	Layer Identifier: ID-number of the Layer that contains the Section specified in the next field

21) NUM_IMM is only allowed to be zero if the actual Geopolitical Structure Component is the root of the Geopolitical Structure Definition and thus does not have a parent.

22) If the set of immediate parents and the set of full predecessors is identical, the counter for the full predecessors can be set to zero (i.e. repetition of the component IDs is not necessary).

23) If the referred-to attribute resides on Dataset level, the Layer ID is not applicable and rendered as 'zero'.

24) If the referred-to attribute resides on Dataset or Layer level, the Section ID is not applicable and rendered as 'zero'.

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SECT_ID	10	N	Obl	1	2^{32}-1	Section Identification Number: The ID-number of the Section of which the spatial domain is specified in this record
NORTH_LAT	7	I	<S>	-90000	90000	North Bound Latitude: Most northern latitude value of the Section, in millidegrees
SOUTH_LAT	7	I	<S>	-90000	90000	South Bound Latitude: Most southern latitude value in the Section, in millidegrees
WEST_LONG	7	I	<S>	-180000	180000	West Bound Longitude: Most western longitude value of the Section in millidegrees
EAST_LONG	7	I	<S>	-180000	180000	East Bound Longitude: Most eastern longitude value of the Section in millidegrees
GEO_AREA	*	L	<S>			Area Name: A characteristic topographical name of the Section

NOTE The layout of this record assumes that at least one optional field will be specified.

12.6.13 Directory Record [DIREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**06**)
DIR_ID	10	N	Obl	1	2^{32}-1	Directory Identifier, which is unique within the Dataset
VOL_ID	4	N	Obl	1	9999	Volume Identifier: The identification number of the volume that contains the Layer specified in Layer Identifier
LAY_ID	10	N	<S>	1	2^{32}-1	Layer Identifier: Identification number of the Layer that contains the Sections specified in the next field
SECT_ID	10	N	<S>	1	2^{32}-1	Section Identification Number: The identification number of the Section containing the records which are specified in the next fields
REC_TYPE	2	N	Obl	1	99	Record Type Code: Code of the record type of which the amount is specified in Record Quantity
REC_CODE	2	N	<S>	1	99	Record Subtype Code: Code of the record sub-type of which the amount is specified in Record Quantity
REC_QTY	8	N	<S>	0	99999999	Record Quantity: Number of occurrences of the logical record type mentioned in Record Type Code

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12.6.14 Abbreviation Record [ABBRREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**13**)
LAN_CODE	3	A	Obl			Language Code: ISO 639-2 language code for which the abbreviation applies
ABBR_SHORT	20	L	Obl			Abbreviation Short: the abbreviation of the abbreviated term
ABBR_LONG	50	L	Obl			Abbreviation Long: the full version of the abbreviated term

12.6.15 Network Specification Record [NWSPECSREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**19**)
NW_ID	5	N	Obl	1	99999	Road Network Identifier which is unique in the current Dataset
NW_COMPL	1	N	Obl	0	9	Level of completeness whereby 0 indicates no Road Network and 9 a full Road Network
NUM_SECT	5	N	Obl	0	99999	Number of Sections
SECT_ID	10	N	Obl	1	2^{32}-1	SECT_ID: Section which uses this network
NUM_FEAT	5	N	Obl	0	99999	Number of Features
FEAT_CAT	2	N	Obl	1	4	Feature Category Code: Feature Category of the Feature referred to in the next field 1 = Point 2 = Line 3 = Area 4 = Complex
LAY_ID	10	N	Obl	0	2^{32}-1	Layer Identifier: ID number of the Layer within which the Feature referred to by the network specification resides.
SECT_ID_F	10	N	Obl	0	2^{32}-1	Section Identifier: ID number of the Section within which the Feature referred to by the network specification resides.
FEAT_ID	10	N	Obl	1	2^{32}-1	Feature Identifier: ID-number of a Point, Line, Area or Complex Feature which uses this network
NW_DESC	*	L	<S>			Description of the meaning of the specified completeness level

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12.6.16 Source Record [SRCEREC]

12.6.16.1 Description Info Subrecord [SRCEREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**01**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [25].
PAR_ID	5	N	<S>	1	99999	Parent Description Identifier: The specification number of the "parent"" of the source description in issue
DESCR_LEV	1	N	<S>	1	4	Description Level
COMPL_LEV	1	N	<S>	1	1	Level of Completeness: Always = 1 in the current version of this document
NUM_REC	5	N	Obl	0	99999	Number of records
REC_TYPE	2	N	Obl	1	99	REC_TYPE: Type of the record referred to in the REC_ID field 16 = Section Header (Data Source Reference Subrecord) 45 = Time Domain 44 = Attribute 41 = Text 51 = Point 52 = Line 53 = Area 54 = Complex 25 = Node 24 = Edge 29 = Face 50 = Relationship
REC_SUBTYPE	2	N	<S>	1	99	REC_SUBTYPE: Subtype of the record referred to in the REC_ID field Where the record subtype doesn't exist, <space> should be used.
REC_ID	10	N	Obl	1	$2^{32}-1$	Record Identifier: ID-number of record which uses this network

NOTE This record is published even with all optional fields left empty, if at least one other associated sub-record 14.x is published.

25) For the published set of grouped Source records (sub-records SRCEREC.01 – SRCEREC.10), they make reference to the same DESC_ID. On the contrary, PAR_ID (SRCEREC.01) and HOST_ID (SRCEREC.09), if applicable, make reference to a Source Description Identifier different from DESC_ID.

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12.6.16.2 ISBN & Survey Subrecord [SRCEREC.02]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**02**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [26)]
ISBN	13	G	<S>			International Standard Book Number of this document in issue
ISSN	10	G	<S>			International Standard Serial Number of this document
NUM_LAN	3	N	Obl	0	999	Number of languages used in this document
LAN_CODE	3	A	Obl			Document Language: ISO 639-2 language code of a language used in this document
NUM_CNTRY	3	N	Obl	0	999	Number of countries involved in the production of this document in issue
CNT_CODE	3	A	Obl			Country Involved: The ISO 3166 alpha-3 code of a country involved in the production of this document
SURV_YEAR	4	N	<S>	1000	9999	Year of Survey of the situation as represented in this document (YYYY)
SURV_DATE	6	N	<S>	1	123123	Date of Survey: Month and (if relevant) day and hour of survey of the situation as represented in this document (MMDDHH)

NOTE The layout of this record assumes that at least one optional field will be specified, or one counter is greater than zero.

12.6.16.3 Author Name Subrecord [SRCEREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**03**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [27)]
AUTHOR	*	L	Obl			Author Name: Name(s) of the author(s) of this document according to ISO 690 specifications

26) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in “master” sub-record 14.01.

27) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in “master” sub-record 14.01.

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12.6.16.4 Scale and Title Subrecord [SRCEREC.04]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**04**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [28)]
DESC_SUBID	3	N	Obl	1	999	Sub Identifier of Source Description Identification which is unique among multiple occurrences of this subrecord in a given source description
MAP_SCALE	7	N	Obl	1	9999999	Map Scale (cartographic documents only): The value with which all distances on the map shall multiplied to obtain real world distances
LAN_CODE	3	A	<S>			Document Title Language: ISO 639-2 language code of the title as specified
DOC_TITLE	*	L	Obl			Document Title Text: Title of this document in issue

12.6.16.5 Volume Name Subrecord [SRCEREC.05]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**05**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [29)]
DESC_SUBID	3	N	Obl	1	999	Sub Identifier of Source Description Identification which is unique among multiple occurrences of this subrecord in a given source description
LAN_CODE	3	A	<S>			Document Volume Name Language: ISO 639-2 language code of this document Volume Name as specified in the next field
VOL_NAME	*	L	<S>			Document Volume Name: Short name and/or number of a document volume or map sheet

NOTE The layout of this record assumes that at least one optional field will be specified.

28) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in "master" sub-record 14.01.

29) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in "master" sub-record 14.01.

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12.6.16.6 Edition & Impression Subrecord [SRCEREC.06]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**06**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [30)]
EDIT_NR	20	G	<S>			Edition Number of this document
IMP_NR	20	G	<S>			Impression Number of this document

NOTE The layout of this record assumes that at least one optional field will be specified.

12.6.16.7 Publisher Subrecord [SRCEREC.07]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**07**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [31)]
DESC_SUBID	3	N	Obl	1	999	Sub Identifier of Source Description Identification which is unique among multiple occurrences of this subrecord in a given source description
PUB_YEAR	4	N	<S>	1000	9999	Year of Publication
CNT_CODE	3	A	<S>			Country of Publication: ISO 3166 alpha-3 code of the country to which the place belongs that is specified in Place of Publication
PUB_PLACE	50	L	<S>			Place of Publication
PUB_NAME	*	L	<S>			Name of Publisher

NOTE The layout of this record assumes that at least one optional field will be specified.

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30) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in “master” sub-record 14.01.

31) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in “master” sub-record 14.01.

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12.6.16.8 Distribution Subrecord [SRCEREC.08]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**08**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [32)]
DESC_SUBID	3	N	Obl	1	999	Sub Identifier of Source Description Identification which is unique among multiple occurrences of this subrecord in a given source description
DIST_YEAR	4	N	<S>	1000	9999	Year of Distribution
CNT_CODE	3	A	<S>			Country of Distribution: ISO 3166 alpha-3 code of the country to which the place belongs that is specified in Place of Distribution
DIST_PLACE	20	L	<S>			Place of Distribution
DIST_NAME	*	L	<S>			Name of Distributor

NOTE The layout of this record assumes that at least one optional field will be specified.

12.6.16.9 Host Document Subrecord [SRCEREC.09]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**09**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [33)]
HOST_ID	5	N	Obl	1	99999	Host Description Identifier: Identification number of a host document
REL_KIND	2	N	<S>	11	16	Kind of Relationship: Code for the kind of relation with the host document 11 = Descended from 12 = Appendix to 13 = Published together with 14 = Additional map to 15 = Inset map to 16 = Is part of

32) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in "master" sub-record 14.01.

33) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in "master" sub-record 14.01.

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FST_PAGE	5	N	<S>	1	99999	From Page
LST_PAGE	5	N	<S>	1	99999	To Page
COMMENT	*	L	<S>			General Comment

12.6.16.10 Field Data Capturing Subrecord [SRCEREC.10]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**14**)
REC_CODE	2	N	Obl			Record Subtype Code (**10**)
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: An identification number of this Cartographic Source Description which is unique within the set of all Source Material Descriptions [34)]
START_FDC	8	N	Obl	10000101	99991231	Start date FDC activities (YYYYMMDD)
END_FDC	8	N	<S>	10000101	99991231	End date FDC activities (YYYYMMDD) In case this field is left empty START_FDC contains the FDC date
COMMENT	*	L	<S>			General Comment: Free text field for additional FDC information

12.6.17 Geodetical Parameter Records

12.6.17.1 Datum & Ellipsoid Record [DATELREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**61**)
DATEL_ID	10	N	Obl	1	$2^{32}-1$	Datum Description Identifier: Identification number of this datum description which is unique within the set of all Datum & Ellipsoid Records in the Dataset
TRANS_X	5	I	<S>	-9999	9999	X-Origin: X-coordinate of the origin of the datum, expressed in decimeters, relative to the origin of WGS ‘84
TRANS_Y	5	I	<S>	-9999	9999	Y-Origin: Y-coordinate of the origin of the datum, expressed in decimeters, relative to the origin of WGS ‘84
TRANS_Z	5	I	<S>	-9999	9999	Z-Origin: Z-coordinate of the origin of the datum, expressed in decimeters, relative to the origin of WGS ‘84
ROT_Z	9	I	<S>	0	40000000	Z-Rotation: Rotation around the Z-axis, expressed in gon $\times 10^{-5}$ (hundredths of a milligon)

34) For a set of sub-records associated with the same source description, the ID has to be the same as the designated DESC_ID in “master” sub-record 14.01.

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SCALE_FAC	5	I	<S>	-9999	9999	Scale Factor: Scale factor Mo, expressed in the form (1 - Mo) * 1 000 000 000
DAT_NAME	50	L	<S>			Datum Name: The name of the geodetic datum in issue
DAT_CODE	4	A	<S>			Datum Code: The code of the geodetic datum in issue
SEM_MAJOR	8	N	<S>	0	99999999	Semi Major Axis: The length of the semi-major axis of the reference ellipsoid expressed in meters
SEM_MINOR	8	N	<S>	0	99999999	Semi Minor Axis: The length of the semi-minor axis of the reference ellipsoid expressed in meters
EL_CODE	2	A	<S>			Ellipsoid Code: code of the reference ellipsoid
COMMENT	*	L	<S>			Description of the Ellipsoid

NOTE The layout of this record assumes that at least one optional field will be specified.

12.6.17.2 Vertical Datum Record [VERDATREC]

Field name	Size	Type	No data	MIn.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**62**)
VERDAT_ID	10	N	Obl	1	$2^{32}-1$	Vertical Datum Description Identifier: An identification number of the record that is unique within the set of all Vertical Datum Records in the Dataset
CNT_CODE	3	A	Obl			Relevant Country: ISO 3166 country code of the country in which the orthometric reference system, as mentioned in the next field Height Level Name, is used
LEV_NAME	50	L	<S>			Height Level Name: Name of the orthometric reference system in issue
LEV_CODE	2	A	Obl			Height Level Code: Code of the orthometric reference system in issue
NUM_LEV	2	N	Obl	0	99	Number of adjacent orthometric levels
CNT_CODE_A	3	A	Obl			Used in Country: ISO 3166 alpha-3 country code of the country in which the adjacent system, as specified in the next field Height Level Name, is used
LEV_NAME_A	50	L	<S>			Adjacent Height Level Name: Name of an adjacent orthometric reference system
LEV_CODE_A	2	A	Obl			Adjacent Height Level Code: Code of the adjacent orthometric reference system
TRANS_H	5	I	Obl	-9999	9999	Height Difference: The orthometric height of the origin of the adjacent system, relative to system in issue, expressed in centimeters

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12.6.17.3 Projection Record [PROJECREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**63**)
PROJEC_ID	10	N	Obl	1	2^{32}-1	Projection Description Identifier: An identification number of this record that is unique within the set of all Projection Records in the Dataset
PROJ_CODE	2	A	Obl			Projection Type Code
NUM_PAR	2	N	Obl	1	3	Number of parameter sets
PAR_LAT	10	I	<S>	-90000000	90000000	Parameter Latitude: Latitude of a projection parameter, expressed in microdegrees
PAR_LONG	10	I	<S> [35]	-180000000	180000000	Parameter Longitude: Longitude of a projection parameter, expressed in microdegrees
SCALE_FAC	5	I	0	-9999	9999	Point Scale Factor: Point scale factor Mo, expressed in the form (1 - Mo) * 10 000 000
COMMENT	*	L	<S>			Description of the Projection Type

12.6.17.4 National Grid Record [NATGRIDREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**64**)
NATGRID_ID	10	N	Obl	1	2^{32}-1	Grid Description Identifier: An identification number of this record that is unique within the set of all National Grid Records in the Dataset
GRID_ORT	1	N	Obl	0	1	Grid Axes Orientation: Indicates whether the orientation of the national grid is 0 : normal Cartesian or 1 : reverse Cartesian
HELP_LAT	10	I	<S>	-90000000	90000000	Help Grid Latitude: Latitude of the origin of the help grid, expressed in microdegrees
HELP_LONG	10	I	<S>	-180000000	180000000	Help Grid Longitude: Longitude of the origin of the help grid, expressed in micro-degrees
X_ORIG	10	I	<S>	$-(10^9-1)$	10^9-1	X Origin: X-coordinate of the origin of the national grid, relative to the origin of the help grid and expressed in decimeters

35) Within a given repeat cycle, not both fields PAR_LAT and PAR_LONG can be left empty.

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Y_ORIG	10	I	<S>	$-(10^9-1)$	10^9-1	Y Origin: Y-coordinate of the origin of the national grid, relative to the origin of the help grid, expressed in decimeters
ROT_GRID	10	I	<S>	0	400000000	Grid Rotation: Clockwise counted angle between the positive Y-axis of the national grid and the positive Y-axis of the help grid, expressed in gon $\times 10^{-6}$
GRID_NAME	50	L	<S>			Grid Name: Name of the national grid in issue
GRID_CODE	2	A	<S>			Grid Code: Code of the national grid in issue

NOTE The layout of this record assumes that at least one optional field will be specified.

12.6.17.5 Geoid Undulation Record [GEOIDREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**65**)
GEOID_ID	10	N	Obl	1	$2^{32}-1$	Geoid Description Identifier: An identification number of the record that is unique within the set of all Geoid Undulation Records in the Dataset
REF_LAT	10	I	<S>	-90000000	90000000	Reference Point Latitude: Latitude of the point at which the geoid undulation is specified, expressed in microdegrees
REF_LONG	10	I	<S>	-180000000	180000000	Reference Point Longitude: Longitude of the point at which the geoid undulation is specified, expressed in microdegrees
GEOID_UND	5	I	<S>	-9999	9999	Ellipsoidal Height: Height of the national orthometric reference level (geoid) above the reference ellipsoid, expressed in decimeters

NOTE The layout of this record assumes that at least one optional field will be specified.

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12.6.17.6 Earth Magnetic Field Record [MAGNETREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**66**)
MAGN_ID	10	N	Obl	1	$2^{32}-1$	Declination Description Identifier: An identification number of this record that is unique within the set of all Earth Magnetic Field Records in the Dataset
REF_LAT	10	I	<S>	-90000000	90000000	Reference Point Latitude: Latitude of the point at which the magnetic declination is specified, expressed in microdegrees
REF_LONG	10	I	<S>	-180000000	180000000	Reference Point Longitude: Longitude of the point at which the magnetic declination is specified, expressed in micro-degrees
DEC_DATE	8	N	<S>	10000101	99991231	Validity Date: Date of the declination value. Declination value is specified in the field Magnetic Variation (DEC_VALUE). (YYYYMMDD)
DEC_VALUE	7	I	<S>	-400000	400000	Magnetic Variation: Value of the clockwise counted angle between the direction of the Geographic North and the direction of the Magnetic North, expressed in milligons
DEV_ANNUAL	7	I	<S>	-400000	400000	Annual Change: Value of the clockwise counted angle of the annual deviation of the magnetic declination, expressed in milligons
HMAG_INT	5	I	<S>	0	99999	Horizontal Magnetic Field Intensity: in nanoteslas
VMAG_INT	5	I	<S>	0	99999	Vertical Magnetic Field Intensity: in nanoteslas

NOTE The layout of this record assumes that at least one optional field will be specified.

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12.6.18 Layer Header Record [LAYHREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**17**)
LAY_ID	10	N	Obl	1	$2^{32}-1$	Layer Identifier: Unique ID number for this Layer (within the Dataset to which it belongs)
LAY_TOPOL	1	N	Obl	1	3	Level-0 network topology of this Layer. 1: Non-explicit topology 2: Connectivity rendering of non-planar topology 3: Full integration rendering of planar topology
Z_REF	1	N	Obl	0	3	Method of Edge height level referencing applied in this Layer: 0: implied by coordinates 1: achieved via Edge levels 2: achieved via Relationship Grade-separated Crossing 3: no height level referencing
XY_RES	3	N	<S>	0	999	Layer XY Resolution
NUM_THEM	2	N	Obl	0	99	Number of Feature Themes
THEM_COD	2	N	<S>			Feature Theme Code: Code of Feature Theme that occurs in this Layer
XY_ACC_LEV	5	N	<S>	0	99999	Horizontal accuracy level measure (user-defined)
XY_AL_DESC	40	L	<S>			Description of Horizontal accuracy level measure
Z_ACC_LEV	5	N	<S>	0	99999	Vertical accuracy level measure (user-defined)
Z_AL_DESC	40	L	<S>			Description of Vertical accuracy level measure

12.6.19 Section Header Record [SECHREC]

12.6.19.1 Section Identification Subrecord [SECHREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**01**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer
GEO_AREA	*	L	<S>			Section Geographic Coverage: A characteristic topographical name of the Section

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12.6.19.2 Section Settings Subrecord [SECHREC.02]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**02**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[36)]
XY_RES	3	N	<S>	0	999	Section XY Resolution: Worst case value in any part of the Section, expressed in meters
LN_CNT_DIR	1	N	<S>	0	1	Convention for default direction for the counting of lanes 0 = right 1 = left

NOTE The layout of this record assumes at least one optional field will be specified.

12.6.19.3 Network Identification Subrecord [SECHREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**03**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[37)]
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network present in the Section
ETA_CONN	1	N	<S>	0	1	Artificial Connectivity indicator for Enclosed Traffic Areas. 0: Artificial ETA connectivity not present 1: Artificial ETA connectivity present

NOTE The layout of this record assumes that at least one optional field will be specified.

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36) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

37) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

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12.6.19.4 Datasource Reference Subrecord [SECHREC.04]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**04**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[38)]
NUM_DOC	2	N	Obl	0	99	Number of Sources
DESC_ID	5	N	Obl	1	99999	Source Description Identifier: Identification number of a [SRCEREC] record which is related to this Section

12.6.19.5 Datum & Magnetism Subrecord [SECHREC.05]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**05**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[39)]
DATEL_ID	10	N	Obl	1	$2^{32}-1$	Datum Description Identifier: The identification number of the Datum & Ellipsoid Record which contains information about the geodetic datum and reference ellipsoid which is relevant for the Section in issue
COORD_TYPE	1	N	Obl	0	1	Horizontal Reference Type: Indicates whether the coordinate values in the present Section are given in the form of geographical latitude and longitude (= 0) or as X- and Y-values within a rectangular Cartesian coordinate system (= 1)
PROJEC_ID	10	N	<S>	1	$2^{32}-1$	Projection Description Identifier: Identification number of the Projection Record that contains the information about the projection
NATGRID_ID	10	N	<S>	1	$2^{32}-1$	Grid Description Identifier: Identification number of the National Grid Record that contains information about the national grid
NUM_FIELD	2	N	Obl	0	99	Number of fields
MAGN_ID	10	N	Obl	1	$2^{32}-1$	Declination Description Identifier: Identification number of an Earth Magnetic Field Record that contains information about the magnetic declination

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38) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

39) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

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NOTE The layout of this record assumes that at least one optional field will be specified or the counter is greater than zero.

12.6.19.6 Orthometric Reference Subrecord [SECHREC.06]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**06**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[40)]
H_TYPE	1	N	Obl	0	2	Height Reference Type: Indicates whether the height values in the present Section are given in the form of ellipsoidal heights (= 0), as orthometric heights (= 1) or as relative heights (= 2)
VERDAT_ID	10	N	<S>	1	$2^{32}-1$	Vertical Datum Description Identifier: Identification number of the Vertical Datum Record that contains information about the orthometric height reference system, which is relevant for the Section in issue
NUM_FIELD	2	N	Obl	0	99	Number of fields
GEOID_ID	10	N	Obl	1	$2^{32}-1$	Geoid Description Identifier: Identification number of a Geoid Undulation Record that contains information about the geoid height at a particular point

12.6.19.7 Section Border Subrecord [SECHREC.07]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**07**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[41)]
XY_CONFAC	2	I	Obl	-9	9	XY Multiplication Factor: 10 LOG of the multiplication factor for the X- and Y-values in the present Section
Z_CONFAC	2	I	<S>	-9	9	Z Multiplication Factor: 10 LOG of the multiplication factor for the Z-values in this Section
X_OFFSET	11	I	<S>	-2^{31}	$2^{31}-1$	X Offset: An additive constant for all the X coordinates in this Section

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40) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

41) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

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Y_OFFSET	11	I	<S>	-2^{31}	$2^{31}-1$	Y Offset: An additive constant for all the Y coordinates in this Section
Z_OFFSET	11	I	<S>	-2^{31}	$2^{31}-1$	Z Offset: An additive constant for all the Z coordinates in this Section
X_MAX	11	I	<S>	-2^{31}	$2^{31}-1$	Maximum X: The maximum logical X-value which may occur in this Section
Y_MAX	11	I	<S>	-2^{31}	$2^{31}-1$	Maximum Y: The maximum logical Y-value which may occur
X_MIN	11	I	<S>	-2^{31}	$2^{31}-1$	Minimum X: The minimum logical X-value which may occur
Y_MIN	11	I	<S>	-2^{31}	$2^{31}-1$	Minimum Y: The minimum logical Y-value which may occur

12.6.19.8 XY Control Point Subrecord [SECHREC.08]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**08**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[42)]
SECT_SUBID	3	N	Obl	1	999	Sub Identifier of Section Identification Number which is unique among multiple occurrences of this subrecord in a given Section
POINT_NAME	20	L	<S>			Point Name: A unique external identification number or name of the control point
X_DIG	12	I	<S>	$-(10^{11}-1)$	$10^{11}-1$	X Digitized: The digitized X-coordinate of the control point, expressed in centimeters
Y_DIG	12	I	<S>	$-(10^{11}-1)$	$10^{11}-1$	Y Digitized: The digitized Y-coordinate of the control point, expressed in centimeters
X_SURV	12	I	<S>	$-(10^{11}-1)$	$10^{11}-1$	X Surveyed: The surveyed X-coordinate of the control point, expressed in centimeters
Y_SURV	12	I	<S>	$-(10^{11}-1)$	$10^{11}-1$	Y Surveyed: The surveyed Y-coordinate of the bench mark, expressed in centimeters

NOTE The layout of this record assumes that at least one optional field will be specified.

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42) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

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12.6.19.9 Z Control Point Subrecord [SECHREC.09]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**09**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[43)]
SECT_SUBID	3	N	Obl	1	999	Sub Identifier of Section Identification Number which is unique among multiple occurrences of this subrecord in a given Section
POINT_NAME	20	L	<S>			Point Name: A unique external identification number or name of the control point
X_COORD	11	I	<S>	-2^{31}	$2^{31}-1$	X Reference: X-coordinate of the control point expressed in the same unit as in the data records
Y_COORD	11	I	<S>	-2^{31}	$2^{31}-1$	Y Reference: Y-coordinate of the control point, expressed in the same unit as in the data records
Z_DIG	11	I	<S>	-2^{31}	$2^{31}-1$	Z Digitized: Digitized Z-coordinate of the control point, expressed in centimeters
Z_SURV	11	I	<S>	-2^{31}	$2^{31}-1$	Z Surveyed: Surveyed Z-coordinate of the control point, expressed in centimeters

NOTE The layout of this record assumes that at least one optional field will be specified.

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43) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

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12.6.19.10 Update Information Subrecord [SECHREC.10]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**16**)
REC_CODE	2	N	Obl			Record Subtype Code (**10**)
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identification Number: An identification number of the Section in issue, which is unique within the Layer[44)]
DATE_FMT	20	G	Obl			Time Stamp Format: Formatting string for the time stamps used within the given Section composed of: d = day M = month y = year h = hour (0…23) m = minute s = second : = separator

12.6.20 Comment Record [COMMENTREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**90**)
COMMENT	*	L	<S>			General Comment

12.6.21 Volume Termination Record [VOLTERMREC]

Field name	Size	Type	No data	Min.	Max	Description
REC_DESCR	2	N	Obl			Record Type Code (**99**)
VOLENDTEXT	77	L	<S>			Volume Termination Comments
CONT_VOL	1	N	Obl	0	1	Volume Continuation Mark: 0 : if the present volume is the last volume in the Dataset 1 : if another volume follows

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44) For a set of sub-records associated with the same section header, the ID has to be the same as the designated SECT_ID in "master" sub-record 16.01.

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12.7 Record Format Specifications: Data Records

12.7.1 2D Coordinate Record [XYREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**22**)
COORD_ID	10	N	Obl	1	$2^{32}-1$	Coordinate Identifier: The ID-number of the Coordinate which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NUM_COORD	5	N	Obl	1	99999	Number of coordinate tuples of intermediate points
X_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	X-coordinate
Y_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	Y-coordinate
NUM_NODE	10	N	Obl	0	$2^{32}-1$	Number of Nodes
NODE_ID	10	N	Obl	1	$2^{32}-1$	NODE_ID: Node which uses this coord record as geometry
NUM_EDG_BP	10	N	Obl	0	$2^{32}-1$	Number of Edge backpointers
EDGE_ID	10	N	Obl	1	$2^{32}-1$	EDGE_ID: Edge which uses this coord rec as geometry

12.7.2 3D Coordinate Record [XYZREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**23**)
COORD_ID	10	N	Obl	1	$2^{32}-1$	Coordinate Identifier: The ID-number of the Coordinate which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NUM_COORD	5	N	Obl	1	99999	Number of coordinate tuples of intermediate points
X_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	X-coordinate
Y_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	Y-coordinate
Z_COORD	11	I	<S>	-2^{31}	$2^{31}-1$	Z-coordinate
NUM_NODE	10	N	Obl	0	$2^{32}-1$	Number of Nodes
NODE_ID	10	N	Obl	1	$2^{32}-1$	NODE_ID: Node which uses this coord record as geometry
NUM_EDG_BP	10	N	Obl	0	$2^{32}-1$	Number of Edge backpointers
EDGE_ID	10	N	Obl	1	$2^{32}-1$	EDGE_ID: Edge which uses this coord rec as geometry

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12.7.3 Node Record [NODEREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**25**)
NODE_ID	10	N	Obl	1	2^{32}-1	Node Identifier: The ID-number of the Node which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
FACE_ID	10	N	<S>	1	2^{32}-1	Face Identifier: The ID-number of the Face containing this Node. This field is always empty for explicit connectivity rendering topology.
STATUS	2	N	Obl	1	5	Status Code: 1 = Section border Node 2 = normal Node 3 = Dataset border Node 4 = End of Stub 5 = Normal Node on a Section and/or Dataset border
COORD_ID	10	N	Obl	1	2^{32}-1	ID-number of a Coordinate record (2D or 3D)
NUM_EDG_BP	10	N	Obl	0	2^{32}-1	Number of Edge backpointers
EDGE_ID	10	N	Obl	1	2^{32}-1	EDGE_ID: Edge which uses this Node as a boundary
NUM_POINT	10	N	Obl	0	2^{32}-1	Number of Point Features
POINT_ID	10	N	Obl	1	2^{32}-1	POINT_ID: Point Feature which uses this Node as geo-topo representation. [45)]

12.7.4 Edge Record [EDGEREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**24**)
EDGE_ID	10	N	Obl	1	2^{32}-1	Edge Identifier: ID-number of the Edge, which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
FNODE_ID	10	N	Obl	1	2^{32}-1	From Node Identifier: ID-number of the From Node of this Edge
TNODE_ID	10	N	Obl	1	2^{32}-1	To Node Identifier: ID-number of the To Node of this Edge
L_FACE_ID	10	N	<S>	1	2^{32}-1	Left Face Identifier: ID-number of the Left Face of this Edge. This field is always empty for explicit connectivity rendering topology.

45) This pointer identifies Point Features rendered by the Point Feature Record for explicit topology (Rec51.01).

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R_FACE_ID	10	N	<S>	1	2^{32}-1	Right Face Identifier: ID-number of the Right Face. This field is always empty for explicit connectivity rendering topology.
STATUS	2	N	Obl	1	5	Status Code: 1 = Section border Edge 2 = Normal Edge 3 = Dataset Border Edge 4 = (Not applicable) 5 = Normal Edge on a Section and/or Dataset border
COORD_ID	10	N	<S>	1	2^{32}-1	ID-number of a Coordinate record (2D or 3D)
NUM_LINE	10	N	Obl	0	2^{32}-1	Number of Line Features
LINE_ID	10	N	Obl	1	2^{32}-1	LINE_ID: Line Feature which uses this Edge as geo-topo representation. 46)
NUM_AREA	10	N	Obl	0	2^{32}-1	Number of Area Features
AREA_ID	10	N	Obl	1	2^{32}-1	AREA_ID: Area Feature which uses this Edge as geo-topo representation. 47)

12.7.5 Face Record [FACEREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**29**)
FACE_ID	10	N	Obl	1	2^{32}-1	Face Identifier: ID-number of this Face, which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NUM_EDGE	10	N	Obl	1	2^{32}-1	Number of Edges
EDGE_ID	10	N	Obl	1	2^{32}-1	Edge Identifier: ID-number of an Edge that forms the boundary of this Face
ORIENT	1	N	Obl	0	1	Edge Orientation: Indication of the orientation of the Edge on the Face border 0 = Clockwise 1 = Counterclockwise
NUM_AREA	10	N	Obl	0	2^{32}-1	Number of Area Features
AREA_ID	10	N	Obl	1	2^{32}-1	AREA_ID: Area Feature which uses this Face as geo-topo representation. 48)

46) This pointer identifies Line Features rendered by the Line Feature Record for explicit topology (Rec52.01).

47) This pointer identifies Area Features rendered by the Area Feature Record for explicit connectivity rendering topology (Rec53.02).

48) This pointer identifies Area Features rendered by the Area Feature Record for explicit full integration rendering topology (Rec53.01).

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NUM_EXTGEO	1	N	Obl	0	1	Number flagging the presence of Extended area geometry information
GEO_TYPE	1	N	<S>	0	4	Geometrical Type of bounded area 3 = Triangular 4 = Quadrangular 0 = Other
OUT_LENGTH	10	N	<S>	0	$2^{32}-1$	Outline Length of bounded area, expressed in decimetres
SIZE	10	N	<S>	0	$2^{32}-1$	Size of bounded area, expressed in square metres
SLOPE	3	N	<S>	0	999	Slope of bounded area, representing the (maximum) inclination, expressed as positive percentage
ASPECT	4	N	<S>	0	3599	Aspect of bounded area, representing the horizontal bearing of slope vector (maximum inclination), expressed as clockwise angle against North measured in 1/10 of a degree
LIGHT_VAL	3	N	<S>	0	255	Light Value of bounded area, representing an artificial hill shade, expressed as a grey scale

12.7.6 Point Feature Record (Explicit Point Topology sub-record) [POFEREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (51)
REC_CODE	2	N	Obl			Record Subtype Code (01)
POINT_ID	10	N	Obl	1	$2^{32}-1$	Point Feature Identifier: ID-number of the Point Feature which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
NODE_ID	10	N	<S>	1	$2^{32}-1$	Node Identifier: The ID-number of the Node which contains the geometry of the Point Feature. It is allowable to have a Node-less Point Feature.
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets
ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to

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ATT_ID	10	N	Obl	1	2^{32}-1	Attribute Identifier: ID-number of an [ATTREC] record which contains relevant Attribute values for this Feature
NUM_LINE	10	N	Obl	0	2^{32}-1	Number of Line Features
LINE_ID	10	N	Obl	1	2^{32}-1	LINE_ID: Line Feature which uses this point as a boundary.[49)]
NUM_COMPLX	10	N	Obl	0	2^{32}-1	Number of Complex Features
COMPLEX_ID	10	N	Obl	1	2^{32}-1	COMPLEX_ID: Complex Feature which uses this point as a component[50)]
NUM_REL	10	N	Obl	0	2^{32}-1	Number of Relationships
REL_ID	10	N	Obl	1	2^{32}-1	REL_ID: Relationship which uses this point as a component
NUM_CONV	10	N	Obl	0	2^{32}-1	Number of conversion records
CONV_ID	10	N	Obl	1	2^{32}-1	CONV_ID: Conversion record which converts this point

12.7.7 Point Feature Record (Non-explicit Point Topology sub-record) [POFEREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**51**)
REC_CODE	2	N	Obl			Record Subtype Code (03)
POINT_ID	10	N	Obl	1	2^{32}-1	Point Feature Identifier: ID-number of the Point Feature which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
COORD_MASK	4	N	Obl	0	3331	Coordinate Mask: ZHHT value, whereby Z=0 | 3; HH= 00 | 30; T=0 | 1.
TIME_MASK	2	N	<S>	1	16	Time Mask: decimal value representing SA/EA/SD/ED occurence of 16 cases (2*2*2*2 combinations). If the fourth position of the COORD_MASK is set to '0', the TIME_MASK shall not be specified (leave field empty).
X_COORD	11	I	Obl	-2^{31}	2^{31}-1	X Coordinate

49) This pointer identifies Line Features rendered by the Line Feature Record for explicit topology (Rec52.01).

50) This pointer identifies Complex Features rendered by the Complex Feature Record for explicit topology (Rec54.01).

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Y_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	Y Coordinate
NUM_Z	1	N	Obl	0	1	Number of Z coordinates of the geometry of this Point Feature, specifying whether Z coordinates are present or not.
Z_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	Z Coordinate
NUM_H1	1	N	Obl	0	1	Number of H1 coordinates of the geometry of this Point Feature, specifying whether H1 coordinates are present or not.
H1_COORD	11	I	<S>	-2^{31}	$2^{31}-1$	Upper Object Elevation
NUM_TIME	1	N	Obl	0	1	Number of T coordinate tuples of the geometry of this Point Feature, specifying whether T coordinates are present or not.
T_SA_COORD	10	N	<S>	1000010100	9999123123	T Coordinate SA (Start Appearance) (YYYYMMDDHH)
T_EA_COORD	10	N	<S>	1000010100	9999123123	T Coordinate EA (End Appearance) (YYYYMMDDHH)
T_SD_COORD	10	N	<S>	1000010100	9999123123	T Coordinate SD (Start Disappearance) (YYYYMMDDHH)
T_ED_COORD	10	N	<S>	1000010100	9999123123	T Coordinate ED (End Disappearance) (YYYYMMDDHH)
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets
ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	$2^{32}-1$	Attribute Identifier: ID-number of a [ATTREC] record which contains relevant Attribute values for this Feature
NUM_COMPLX	10	N	Obl	0	$2^{32}-1$	Number of Complex Features
COMPLEX_ID	10	N	Obl	1	$2^{32}-1$	COMPLEX_ID: Complex Feature which uses this point as a component[51)]
NUM_REL	10	N	Obl	0	$2^{32}-1$	Number of Relationships
REL_ID	10	N	Obl	1	$2^{32}-1$	REL_ID: Relationship which uses this point as a component
NUM_CONV	10	N	Obl	0	$2^{32}-1$	Number of conversion records
CONV_ID	10	N	Obl	1	$2^{32}-1$	CONV_ID: Conversion record which converts this point

51) This pointer identifies Complex Features rendered by the Complex Feature Record for non-explicit topology (Rec54.03).

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12.7.8 Line Feature Record (Explicit Line Topology sub-record) [LIFEREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**52**)
REC_CODE	2	N	Obl			Record Subtype Code (**01**)
LINE_ID	10	N	Obl	1	$2^{32}-1$	Line Feature Identifier: ID-number of the Line Feature which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
SPLIT_IND	1	N	Obl	0	1	Split Indicator: 0 = Line represents an entire Feature 1 = Line represents part of a split Feature
FROM_ID	10	N	<S>	1	$2^{32}-1$	From Point Identifier: The ID-number of the first bounding Point Feature of a Line Feature
TO_ID	10	N	<S>	1	$2^{32}-1$	To Point Identifier: The ID-number of the second bounding Point Feature of this Line Feature
NUM_EDGE	10	N	Obl	0	$2^{32}-1$	Number of Edges. It is allowable to have an edge-less Line Feature.
EDGELEVS	2	I	<S>	-9	99	Relative height level of Line Feature at starting Node of the current Edge
EDGELEVI	2	I	<S>	-9	99	Intermediate height level of the current Edge
EDGE_ID	10	N	Obl	1	$2^{32}-1$	ID-number of an Edge representing the Line Feature
POS_NEG	2	N	Obl	0	1	Line Direction: Indication of the direction of the Line in relation to the direction of the Edge 0 = in the direction of Edge 1 = in opposite direction
EDGELEVE	2	I	<S>	-9	99	Relative height level of end Node of the last Edge defining the Line Feature; field shall be left empty when NUM_EDGE is zero
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets
ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	$2^{32}-1$	Attribute Identifier: ID-number of an [ATTREC] record which contains relevant Attribute values for this Feature
NUM_COMPLX	10	N	Obl	0	$2^{32}-1$	Number of Complex Feature

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COMPLEX_ID	10	N	Obl	1	2^{32}-1	COMPLEX_ID: Complex Feature which uses this line as a component[52)]
NUM_REL	10	N	Obl	0	2^{32}-1	Number of Relationships
REL_ID	10	N	Obl	1	2^{32}-1	REL_ID: Relationship which uses this line as a component
NUM_CONV	10	N	Obl	0	2^{32}-1	Number of conversion records
CONV_ID	10	N	Obl	1	2^{32}-1	CONV_ID: Conversion record which converts this line

NOTE The relative height of Edge levels may be greater than 9 (up to 99) when modelling vertical connectivity of Pathway Features connecting floors in high-rise buildings. When modelling road, rail or water transportation networks, the maximum Edge level is set to +9.

12.7.9 Line Feature Record (Non-Explicit Line Topology sub-record) [LIFEREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**52**)
REC_CODE	2	N	Obl			Record Subtype Code (**03**)
LINE_ID	10	N	Obl	1	2^{32}-1	Line Feature Identifier: ID-number of the Line Feature which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
SPLIT_IND	1	N	Obl	0	1	Split Indicator: 0 = Line represents an entire Feature 1 = Line represents part of a split Feature
COORD_MASK	4	N	Obl	0	3331	Coordinate Mask: ZHHT value, whereby Z=0 | 1 | 2 | 3; HH= 00 | 10 | 20 | 30 | 11 | 21 | 31 | 12 | 22 | 32 | 13 | 23 | 33; T=0 | 1.
TIME_MASK	2	N	<S>	1	16	Time Mask: decimal value representing SA/EA/SD/ED occurence of 16 cases (2*2*2*2 combinations). If the fourth position of the COORD_MASK is set to '0', the TIME_MASK shall not be specified (leave field empty).

52) This pointer identifies Complex Features rendered by the Complex Feature Record for explicit topology (Rec54.01).

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NUM_COORD	5	N	Obl	2	99999	Number of coordinate tuples of the XY polyline geometry of this Line Feature.
X_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	X Coordinate
Y_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	Y Coordinate
NUM_INTVAL	5	N	0	0	99999	Number of Coordinate Intervals for which Z and/or H1 and/or H2 are constant.
INT_FROM	5	N	Obl	1	99999	From position of begin of polyline interval within range of NUM_COORD shape points.
DD_NUM_Z	5	N	Obl	0	99999	Discrete Dynamic Counter of number of Z coordinates of the polyline geometry of this Line Feature. This counter may assume the following states: 0 = no occurrence of Z coordinates 1 = constant Z coordinate for whole polyline NUM_INTVAL* = constant Z coordinate per interval NUM_COORD* = individual Z coordinate per XY position (* NUM_INTVAL and NUM_COORD as instantiated in the record at hand)
Z_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	Z Coordinate
DD_NUM_H1	5	N	Obl	0	99999	Discrete Dynamic Counter of number of H1 coordinates of the polyline geometry of this Line Feature. This counter may assume the following states: 0 = no occurrence of H1 coordinates 1 = constant H1 coordinate for whole polyline NUM_INTVAL = constant H1 coordinate per interval NUM_COORD = individual H1 coordinate per XY position (* NUM_INTVAL and NUM_COORD as instantiated in the record at hand)
H1_COORD	11	I	<S>	-2^{31}	$2^{31}-1$	Upper Object Elevation

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DD_NUM_H2	5	N	Obl	0	99999	Discrete Dynamic Counter of number of H2 coordinates of the polyline geometry of this Line Feature. This counter may assume the following states: 0 = no occurrence of H2 coordinates 1 = constant H2 coordinate for whole polyline NUM_INTVAL = constant H2 coordinate per interval NUM_COORD = individual H2 coordinate per XY position This counter shall be '0' in case the counter for H1 coordinates is set to '0'. (* NUM_INTVAL and NUM_COORD as instantiated in the record at hand)
H2_COORD	11	I	<S>	-2^{31}	$2^{31}-1$	Lower Object Elevation
NUM_TIME	1	N	Obl	0	1	Number of T coordinate tuples of the polyline geometry of this Line Feature, specifying whether T coordinates are present or not.
T_SA_COORD	10	N	<S>	1000010100	9999123123	T Coordinate SA (Start Appearance) (YYYYMMDDHH)
T_EA_COORD	10	N	<S>	1000010100	9999123123	T Coordinate EA (End Appearance) (YYYYMMDDHH)
T_SD_COORD	10	N	<S>	1000010100	9999123123	T Coordinate SD (Start Disappearance) (YYYYMMDDHH)
T_ED_COORD	10	N	<S>	1000010100	9999123123	T Coordinate ED (End Disappearance) (YYYYMMDDHH)
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets
ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	$2^{32}-1$	Attribute Identifier: ID-number of a [ATTREC] record which contains relevant Attribute values for this Feature

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NUM_COMPLX	10	N	Obl	0	2^{32}-1	Number of Complex Features
COMPLEX_ID	10	N	Obl	1	2^{32}-1	COMPLEX_ID: Complex Feature which uses this point as a component[53)]
NUM_REL	10	N	Obl	0	2^{32}-1	Number of Relationships
REL_ID	10	N	Obl	1	2^{32}-1	REL_ID: Relationship which uses this line as a component
NUM_CONV	10	N	Obl	0	2^{32}-1	Number of conversion records
CONV_ID	10	N	Obl	1	2^{32}-1	CONV_ID: Conversion record which converts this line

12.7.10 Area Feature Record (Full Rendering Area Topology sub-record) [ARFEREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**53**)
REC_CODE	2	N	Obl			Record Subtype Code (**01**)
AREA_ID	10	N	Obl	1	2^{32}-1	Area Feature Identifier: ID-number of the Area Feature which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
SPLIT_IND	1	N	Obl	0	1	Split Indicator: 0 = Area represents an entire Feature 1 = Area represents part of a split Feature
NUM_FACE	10	N	Obl	0	2^{32}-1	Number of Faces. It is allowable to have a Face-less Area Feature.
FACE_ID	10	N	Obl	1	2^{32}-1	Face Identifier: ID-number of a Face which is a component of the Area Feature
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets
ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to

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53) This pointer identifies Complex Features rendered by the Complex Feature Record for non-explicit topology (Rec54.03).

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ATT_ID	10	N	Obl	1	$2^{32}-1$	Attribute Identifier: ID-number of a [ATTREC] record which contains Attribute values for this Area Feature
NUM_COMPLX	10	N	Obl	0	$2^{32}-1$	Number of Complex Features
COMPLEX_ID	10	N	Obl	1	$2^{32}-1$	COMPLEX_ID: Complex Feature which uses this area as a component [54)]
NUM_REL	10	N	Obl	0	$2^{32}-1$	Number of Relationships
REL_ID	10	N	Obl	1	$2^{32}-1$	REL_ID: Relationship which uses this area as a component
NUM_CONV	10	N	Obl	0	$2^{32}-1$	Number of conversion records
CONV_ID	10	N	Obl	1	$2^{32}-1$	CONV_ID: Conversion record which converts this area

12.7.11 Area Feature (Connectivity Rendering Area Topology sub-record) [ARFEREC.02]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (53)
REC_CODE	2	N	Obl			Record Subtype Code (02)
AREA_ID	10	N	Obl	1	$2^{32}-1$	Area Feature Identifier: ID-number of the Area Feature which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
SPLIT_IND	1	N	Obl	0	1	Split Indicator: 0 = Area represents an entire Feature 1 = Area represents part of a split Feature
NUM_EDGE	10	N	Obl	0	$2^{32}-1$	Number of Edges. It is allowable to have a edge-less Area Feature.
EDGE_ID	10	N	Obl	1	$2^{32}-1$	ID-number of an Edge bounding the Area Feature
ORIENT	1	N	Obl	0	1	Edge Orientation: Indication of the orientation of the Edge on the Area border 0 = Clockwise 1 = Counterclockwise
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets

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54) This pointer identifies Complex Features rendered by the Complex Feature Record for explicit topology (Rec54.01).

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ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	2^{32}-1	Attribute Identifier: ID-number of an [ATTREC] record which contains Attribute values for this Area Feature
NUM_COMPLX	10	N	Obl	0	2^{32}-1	Number of Complex Features
COMPLEX_ID	10	N	Obl	1	2^{32}-1	COMPLEX_ID: Complex Feature which uses this point as a component [55)]
NUM_REL	10	N	Obl	0	2^{32}-1	Number of Relationships
REL_ID	10	N	Obl	1	2^{32}-1	REL_ID: Relationship which uses this area as a component
NUM_CONV	10	N	Obl	0	2^{32}-1	Number of conversion records
CONV_ID	10	N	Obl	1	2^{32}-1	CONV_ID: Conversion record which converts this area

12.7.12 Area Feature (Non-explicit Area Topology sub-record) [ARFEREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**53**)
REC_CODE	2	N	Obl			Record Subtype Code (**03**)
AREA_ID	10	N	Obl	1	2^{32}-1	Area Feature Identifier: ID-number of the Area Feature which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
SPLIT_IND	1	N	Obl	0	1	Split Indicator: 0 = Area represents an entire Feature 1 = Area represents part of a split Feature

55) This pointer identifies Complex Features rendered by the Complex Feature Record for explicit topology (Rec54.01).

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COORD_MASK	4	N	Obl	0	3331	Coordinate Mask: ZHHT value, whereby Z=0 | 1 | 2 | 3; HH= 00 | 10 | 20 | 30 | 11 | 21 | 31 | 12 | 22 | 32 | 13 | 23 | 33; T=0 | 1.
TIME_MASK	2	N	<S>	1	16	Time Mask: decimal value representing SA/EA/SD/ED occurence of 16 cases (2*2*2*2 combinations). If the fourth position of the COORD_MASK is set to '0', the TIME_MASK shall not be specified (leave field empty).
NUM_COORD	5	N	Obl	3	99999	Number of coordinate tuples of the XY geometry of the Polygon.
X_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	X Coordinate
Y_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	Y Coordinate
NUM_INTVAL	5	N	0	0	99999	Number of Coordinate Intervals for which Z and/or H1 and/or H2 are constant.
INT_FROM	5	N	Obl	1	99999	From position of begin of polygon interval within range of NUM_COORD shape points.
DD_NUM_Z	5	N	Obl	0	99999	Discrete Dynamic Counter of number of Z coordinates of the polygon geometry of this Area Feature. This counter may assume the following states: 0 = no occurrence of Z coordinates 1 = constant Z coordinate for whole polyline NUM_INTVAL* = constant Z coordinate per interval NUM_COORD* = individual Z coordinate per XY position (* NUM_INTVAL and NUM_COORD as instantiated in the record at hand)
Z_COORD	11	I	Obl	-2^{31}	$2^{31}-1$	Z Coordinate

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DD_NUM_H1	5	N	Obl	0	99999	Discrete Dynamic Counter of number of H1 coordinates of the polygon geometry of this Area Feature. This counter may assume the following states: 0 = no occurrence of H1 coordinates 1 = constant H1 coordinate for whole polyline NUM_INTVAL = constant H1 coordinate per interval NUM_COORD = individual H1 coordinate per XY position (* NUM_INTVAL and NUM_COORD as instantiated in the record at hand)
H1_COORD	11	I	<S>	-2^{31}	$2^{31}-1$	Upper Object Elevation
DD_NUM_H2	5	N	Obl	0	99999	Discrete Dynamic Counter of number of H2 coordinates of the polygon geometry of this Area Feature. This counter may assume the following states: 0 = no occurrence of H2 coordinates 1 = constant H2 coordinate for whole polyline NUM_INTVAL = constant H2 coordinate per interval NUM_COORD = individual H2 coordinate per XY position This counter shall be '0' in case the counter for H1 coordinates is set to '0'. (* NUM_INTVAL and NUM_COORD as instantiated in the record at hand)
H2_COORD	11	I	<S>	-2^{31}	$2^{31}-1$	Lower Object Elevation
NUM_TIME	1	N	Obl	0	1	Number of T coordinate tuples of the polygon geometry of this Area Feature, specifying whether T coordinates are present or not.
T_SA_COORD	10	N	<S>	1000010100	9999123123	T Coordinate SA (Start Appearance) (YYYYMMDDHH)
T_EA_COORD	10	N	<S>	1000010100	9999123123	T Coordinate EA (End Appearance) (YYYYMMDDHH)
T_SD_COORD	10	N	<S>	1000010100	9999123123	T Coordinate SD (Start Disappearance) (YYYYMMDDHH)

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T_ED_COORD	10	N	<S>	1000010100	9999123123	T Coordinate ED (End Disappearance) (YYYYMMDDHH)
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets
ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	2^{32}-1	Attribute Identifier, ID-number of a [ATTREC] record which contains Attribute values for this Area Feature
NUM_EXTGEO	1	N	Obl	0	1	Number flagging the presence of Extended area geometry information
GEO_TYPE	1	N	<S>	0	4	Geometrical Type of bounded area 3 = Triangular 4 = Quadrangular 0 = Other
OUT_LENGTH	10	N	<S>	0	2^{32}-1	Outline Length of bounded area, expressed in decimetres
SIZE	10	N	<S>	0	2^{32}-1	Size of bounded area, expressed in square metres
SLOPE	3	N	<S>	0	999	Slope of bounded area, representing the (maximum) inclination, expressed as positive percentage
ASPECT	4	N	<S>	0	3599	Aspect of bounded area, representing the horizontal bearing of slope vector (maximum inclination), expressed as clockwise angle against North measured in 1/10 of a degree
LIGHT_VAL	3	N	<S>	0	255	Light Value of bounded area, representing an artificial hill shade, expressed as a grey scale
NUM_COMPLX	10	N	Obl	0	2^{32}-1	Number of Complex Feature
COMPLEX_ID	10	N	Obl	1	2^{32}-1	COMPLEX_ID: Complex Feature which uses this point as a component[56)]
NUM_REL	10	N	Obl	0	2^{32}-1	Number of Relationships

56) This pointer identifies Complex Features rendered by the Complex Feature Record for non-explicit topology (Rec54.03).

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REL_ID	10	N	Obl	1	2^{32}-1	REL_ID: Relationship which uses this area as a component
NUM_CONV	10	N	Obl	0	2^{32}-1	Number of conversion records
CONV_ID	10	N	Obl	1	2^{32}-1	CONV_ID: Conversion record which converts this area

12.7.13 Complex Feature Record (Explicit Complex Topology sub-record) [COFEREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**54**)
REC_CODE	2	N	Obl			Record Subtype Code (01)
COMPLEX_ID	10	N	Obl	1	2^{32}-1	Complex Feature Identifier: ID-number of this Complex Feature
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
CMPSPLTIND	1	N	Obl	0	2	Split Indicator: 0 = Complex represents an entire Feature 1 = Complex represents part of a split Feature 2 = The definition is repeated in another Section
NUM_PARTS	5	N	Obl	0	99999	Number of Feature parts
FEAT_CAT	2	N	Obl	1	4	Feature Category Code: Feature Category of the Feature referred to in the next field 1 = Point 2 = Line 3 = Area 4 = Complex
FEAT_ID	10	N	Obl	1	2^{32}-1	Feature Identifier: ID-number of a Point, Line, Area or other Complex Feature which is an element of the Complex Feature in issue.
NUM_ATT_P	5	N	Obl	0	99999	Number of Attribute sets per part
ID_SCOPE_P	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to

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ATT_ID_P	10	N	Obl	1	2^{32}-1	Attribute Identifier of Feature part: ID-number of an [ATTREC] record which contains relevant Attribute values for this Feature part at hand within this Complex Feature
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets
ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	2^{32}-1	Attribute Identifier: ID-number of an [ATTREC] record which contains relevant Attribute values for this Feature
FROM_ID	10	N	<S>	1	2^{32}-1	From Complex Feature Identifier: The ID-number of the first bounding Complex Feature of this Complex Feature
TO_ID	10	N	<S>	1	2^{32}-1	To Complex Feature Identifier: The ID-number of the last bounding Complex Feature
NUM_COMPLX	10	N	Obl	0	2^{32}-1	Number of Complex Features
COMPLEX_ID	10	N	Obl	1	2^{32}-1	COMPLEX_ID: Complex Feature which uses this Complex Feature as a component[57)]
NUM_BP_FT	10	N	Obl	0	2^{32}-1	Number of reverse pointer Features
FEAT_ID_FT	10	N	Obl	1	2^{32}-1	Feature ID number of a Complex Feature (spoke) which uses this point as a boundary (hub), acting as reversed from/to pointer
NUM_REL	10	N	Obl	0	2^{32}-1	Number of Relationships
REL_ID	10	N	Obl	1	2^{32}-1	REL_ID: Relationship which uses this complex record is a component
NUM_CONV	10	N	Obl	0	2^{32}-1	Number of conversion records
CONV_ID	10	N	Obl	1	2^{32}-1	CONV_ID: Conversion record which converts this Complex Feature

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57) This pointer identifies Complex Features rendered by the Complex Feature Record for explicit topology (Rec54.01).

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12.7.14 Complex Feature Record (Non-explicit Complex Topology sub-record) [COFEREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**54**)
REC_CODE	2	N	Obl			Record Subtype Code (**03**)
COMPLEX_ID	10	N	Obl	1	$2^{32}-1$	Complex Feature Identifier: ID-number of this Complex Feature
DESC_ID	5	N	<S>	1	99999	Source Description Identifier
NW_ID	5	N	<S>	1	99999	Network Specification Identifier for the kind of (road) network the Feature is part of
FEAT_CODE	4	N	Obl	1000	9999	Feature Class Code: Code of the Feature Class to which the Feature belongs
CMPSPLTIND	1	N	Obl	0	2	Split Indicator: 0 = Complex represents an entire Feature 1 = Complex represents part of a split Feature 2 = The definition is repeated in another Section
NUM_PARTS	5	N	Obl	0	99999	Number of Feature parts
FEAT_CAT	2	N	Obl	1	4	Feature Category Code: Feature Category of the Feature referred to in the next field 1 = Point 2 = Line 3 = Area 4 = Complex
FEAT_ID	10	N	Obl	1	$2^{32}-1$	Feature Identifier: ID-number of a Point, Line, Area or other Complex Feature which is an element of the Complex Feature in issue.
NUM_ATT_P	5	N	Obl	0	99999	Number of Attribute sets per part
ID_SCOPE_P	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID_P	10	N	Obl	1	$2^{32}-1$	Attribute Identifier of Feature part: ID-number of an [ATTREC] record which contains relevant Attribute values for this Feature part at hand within this Complex Feature
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets

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ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	2^{32}-1	Attribute Identifier: ID-number of an [ATTREC] record which contains relevant Attribute values for this Feature
NUM_COMPLX	10	N	Obl	0	2^{32}-1	Number of Complex Feature
COMPLEX_ID	10	N	Obl	1	2^{32}-1	COMPLEX_ID: Complex Feature which uses this Complex Feature as a component [58)]
NUM_REL	10	N	Obl	0	2^{32}-1	Number of Relationships
REL_ID	10	N	Obl	1	2^{32}-1	REL_ID: Relationship which uses this complex record is a component
NUM_CONV	10	N	Obl	0	2^{32}-1	Number of conversion records
CONV_ID	10	N	Obl	1	2^{32}-1	CONV_ID: Conversion record which converts this Complex Feature

12.7.15 Conversion Record [CONVERTREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**46**)
CONV_ID	10	N	Obl	1	2^{32}-1	Conversion Record Identifier: Identification number of this conversion record which is unique within the set of all Conversion Records in the Dataset
FEAT_CAT_I	2	N	Obl	1	4	Internal Feature Category Code: Feature Category of the Feature referred to by Internal Feature Identifier 1 = Point 2 = Line 3 = Area 4 = Complex
INT_ID	10	N	Obl	1	2^{32}-1	Internal Feature Identifier: ID-number of the Point, Line, Area or Complex Feature converted into the ID reference system of the present Section
NUM_FEAT	5	N	Obl	1	99999	Number of Features
DASET_ID	10	N	Obl	1	2^{32}-1	Dataset Identifier: ID-number of a foreign Dataset

58) This pointer identifies Complex Features rendered by the Complex Feature Record for non-explicit topology (Rec54.03).

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LAY_ID	10	N	Obl	1	$2^{32}-1$	Layer Identifier: ID number of the foreign Layer
SECT_ID	10	N	Obl	1	$2^{32}-1$	Section Identifier: number of a foreign Section
FEAT_CAT_F	2	N	Obl	1	4	Foreign Feature Category Code: Feature Category of the Feature referred to by Foreign Feature Identifier 1 = Point 2 = Line 3 = Area 4 = Complex
EXT_ID	10	N	Obl	1	$2^{32}-1$	Foreign Feature Identifier: ID-number of a Point, Line, Area or Complex Feature within the system of the foreign Section

12.7.16 Attribute Record [ATTREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record type code (**44**)
ATT_ID	10	N	Obl	1	$2^{32}-1$	Attribute Identifier: ID-number of this Attribute record which is unique within the Section
NUM_ATT	5	I	Obl	1	99999	Number of Attributes
COUNT_LF_(	1	N	Obl	0	9	Count of left parentheses that logically would be needed to contain an Attribute or Composite Attribute, and all of their Restrictive Attributes
ATT_TYPE	2	G	Obl			Attribute Type Code
DESC_ID	5	N	<S>	1	99999	Source Description Identifier: ID-number of a source document
ID_SCOPE	1	A	<S> [59]			Scope switch: whether the Record [60] referred to by the subsequent field is published locally, semi-globally, or globally [61]. S = locally within same Section, when appropriate L = semi-globally within the Layer this Record belongs to, when appropriate D = globally within Dataset this Record belongs to
ATT_VAL	11	G	<S>			Attribute Value
COUNT_RT_)	1	N	Obl	0	9	Count of right parentheses that logically would be needed to contain an Attribute or Composite Attribute, and all of their Restrictive Attributes

59) ID_SCOPE is not applicable (and not to be specified) in case that ATT_VAL contains an actual attribute value and not a pointer

60) Pointer to Text Record or Time Domain Record

61) Text Record and Time Domain Record have to be published at the same or a higher scope level as the attribute in question (e.g. an attribute on layer level shall not refer to an text record specified within a particular section)

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NUM_FEAT	5	N	Obl	0	99999	Number of Features
FEAT_CAT	2	N	Obl	1	4	Feature Category Code: Feature Category of the Feature referred to in the next field 1 = Point 2 = Line 3 = Area 4 = Complex
LAY_ID	10	N	<S> 62)	1	2^{32}-1	Layer Identifier: ID number of the Layer within which the Section containing the Feature resides. The Layer ID shall be provided if the Attribute referring to the Feature resides at a scope level higher than the Layer.
SECT_ID	10	N	<S> 63)	1	2^{32}-1	Section Identifier: ID number of the Section within which the Feature resides. The Section ID shall be provided if the Attribute referring to the Feature resides at a scope level higher than the Section.
FEAT_ID	10	N	Obl	1	2^{32}-1	Feature Identifier: ID-number of a Point, Line, Area or Complex Feature which uses this Attribute
NUM_TEXT	10	N	Obl	0	2^{32}-1	Number of text records
LAY_ID	10	N	<S> 64)	0	2^{32}-1	Layer Identifier: ID number of the Layer within which the text record referred to by the Attribute resides. The Layer ID shall be provided if the Attribute referring to the text record resides at a scope level higher than the text record, and this Attribute record resides at a scope level higher then the Layer (i.e. the Dataset level).
SECT_ID	10	N	<S> 65)	0	2^{32}-1	Section Identifier: ID number of the Section within which the text record referred to by the Attribute resides. The Section ID shall be provided if the Attribute referring to the text record resides at a scope level higher than the text record, and this Attribute record resides at a scope level higher then the Section (i.e. the Dataset level or the Layer level).

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62) Depending on the scope level of the attribute, the Layer Identifier is either specified if applicable (global attribute on Dataset level), or left empty if not applicable (local or semi-global attribute on Layer or Section level), respectively. In the latter case the Layer ID of the referring attribute and the referred-to feature are the same.

63) Depending on the scope level of the attribute, the Section Identifier is either specified if applicable (global or semi-global attribute on Layer or Section level), or left empty if not applicable (local attribute on Section level), respectively. In the latter case the Section ID of the referring attribute and the referred-to feature are the same.

64) Depending on the scope levels of the attribute and the text records which it back points to, the Layer Identifier is either specified (global attribute on Dataset level and a text record at a lower scope level), rendered as a 'zero' (attribute record and the referred-to text record residing on the Dataset level), or left empty if not applicable (local or semi-global attribute as well as text records on Layer or Section level, whereby the attribute scope level is higher or equal to the text record), respectively.

65) Depending on the scope levels of the attribute and the text records which it back points to, the Section Identifier is either specified (global or semi-global attribute on Layer or Section level and a text record at the local scope level of the section level), rendered as a 'zero' (attribute record on and the referred-to text record residing on the Dataset or Layer level, whereby the attribute scope level is higher or equal to the text record), or left empty if not applicable (local attribute as well as text records on Section level), respectively.

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TEXT_ID	10	N	Obl	1	$2^{32}-1$	TEXT_ID: Text Record which uses this Attribute
NUM_REL	10	N	Obl	0	$2^{32}-1$	Number of Relationships
LAY_ID	10	N	<S> 66)	0	$2^{32}-1$	Layer Identifier: ID number of the Layer within which the Relationship referred to by the Attribute resides. The Layer ID shall be provided if the Attribute referring to the Relationship resides at a scope level higher than the Relationship, and this Attribute record resides at a scope level higher then the Layer (i.e. the Dataset level).
SECT_ID	10	N	<S> 67)	0	$2^{32}-1$	Section Identifier: ID number of the Section within which the Relationship referred to by the Attribute resides. The Section ID shall be provided if the Attribute referring to the Relationship resides at a scope level higher than the Relationship, and this Attribute record resides at a scope level higher then the Section (i.e. the Dataset level or the Layer level).
REL_ID	10	N	Obl	1	$2^{32}-1$	REL_ID: Relationship which uses this Attribute

12.7.17 Relationship Record [RELATREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**50**)
REL_ID	10	N	Obl	1	$2^{32}-1$	Relationship Identifier: ID-number of this Relationship which is unique within the Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier: ID-number of a source document
REL_CODE	4	N	Obl	1000	9999	Relationship Code: Code of the Relationship Type to which the Relationship belongs
NUM_FEAT	5	N	Obl	2	99999	Number of Features
FEAT_CAT	2	N	<S>	1	4	Feature Category Code: Feature Category of the Feature referred to by the next field 1 = Point 2 = Line 3 = Area 4 = Complex

66) Depending on the scope levels of the attribute and the relationship which it back points to, the Layer Identifier is either specified (global attribute on Dataset level and a relationship at a lower scope level), rendered as a 'zero' (attribute record and the referred-to relationship residing on the Dataset level), or left empty if not applicable (local or semi-global attribute as well as relationship on Layer or Section level, whereby the attribute scope level is higher or equal to the relationship), respectively.

67) Depending on the scope levels of the attribute and the relationship which it back points to, the Section Identifier is either specified (global or semi-global attribute on Layer or Section level and a relationship at the local scope level of the section level), rendered as a 'zero' (attribute record on and the referred-to relationship residing on the Dataset or Layer level, whereby the attribute scope level is higher or equal to the relationship), or left empty if not applicable (local attribute as well as relationship on Section level), respectively.

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DASET_ID	10	N	<S>	1	2^{32}-1	Dataset Identifier: ID-number of the Dataset of the partner Feature. If Dataset ID is not provided the Feature resides in the current Dataset
LAY_ID	10	N	<S>	1	2^{32}-1	Layer Identifier: ID-number of the Layer of the partner Feature. If Layer ID is not provided the Feature resides in the current Layer. The Layer ID shall be provided if the Relationship at hand resides at a scope level higher than the Layer.
SECT_ID	10	N	<S>	1	2^{32}-1	Section Identifier: ID-number of the Section of the partner Feature. If Section ID is not provided the Feature resides in the current Section. The Section ID shall be provided if the Relationship at hand resides at a scope level higher than the Section.
FEAT_ID	10	N	<S>	1	2^{32}-1	Feature Identifier: ID-number of a Point, Line, Area or Complex Feature which is a partner in the Relationship in issue
FROLE_NUM	2	N	Obl	1	99	Declaration of the role that this Relationship partner (Feature) plays
NUM_ATT_P	5	N	Obl	0	99999	Number of Attribute sets per partner
ID_SCOPE_P	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally[68]. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID_P	10	N	Obl	1	2^{32}-1	Attribute Identifier of Feature partner: ID-number of an [ATTREC] record which contains relevant Attribute values for Feature partner(s) in the role at hand within this Relationship
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets

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68) Attributes for a partner in the relationship have to be published at the same or a higher scope level as the relationship in question. Partner attributes are inseparable from the relationship itself and only meaningful to features as partners in said relationship within its appropriate scope level.

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ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally[69]. S = locally within same Section, when appropriate L = semi-globally within the Layer this Section belongs to, when appropriate D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	2^{32}-1	Attribute Identifier: ID-number of an [ATTREC] record which contains relevant Attribute values for this Relationship

12.7.18 Text Record [TEXTREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**41**)
TEXT_ID	10	N	Obl	1	2^{32}-1	Text Identifier: An identification number of this text record which is unique within a Section
DESC_ID	5	N	<S>	1	99999	Source Description Identifier: ID-number of a source document
NUM_ATT	5	N	Obl	0	99999	Number of Attribute sets
ID_SCOPE	1	A	Obl			Scope switch: whether the Attribute Record referred to by the subsequent field is published locally, semi-globally, or globally[70]. S = locally within same Section L = semi-globally within the Layer this Section belongs to D = globally within Dataset this Section belongs to
ATT_ID	10	N	Obl	1	2^{32}-1	Attribute ID ; ID number of an [ATTREC].record which contains relevant Attribute values for this text record
NUM_ATT_BP	10	N	Obl	0	2^{32}-1	Number of Attribute back pointers

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69) Attributes for the entire relationship have to be published at the same or a higher scope level as the relationships in question (e.g. a relationship on layer level shall not refer to an attribute specified within a particular section)

70) Attributes have to be published at the same or a higher scope level as the text record in question (e.g. a text record on layer level shall not refer to an attribute specified within a particular section)

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LAY_ID	10	N	<S> 71)	0	2^{32}-1	Layer Identifier: ID number of the Layer within which the Attribute referred to by the text record resides. The Layer ID shall be provided if the text record referring to the Attribute resides at a scope level higher than the Attribute record, and this text record resides at a scope level higher then the Layer (i.e. the Dataset level).
SECT_ID	10	N	<S> 72)	0	2^{32}-1	Section Identifier: ID number of the Section within which the Attribute referred to by the text record resides. The Section ID shall be provided if the text record referring to the Attribute resides at a scope level higher than the Attribute record, and this text record resides at a scope level higher then the Section (i.e. the Dataset level or the Layer level).
ATT_ID_BP	10	N	Obl	1	2^{32}-1	ATT_ID: Attribute Identifier which points to an Attribute which uses this text record as a value
LAN_CODE	3	A	<S>			Language Code: ISO 639-2 language code of the text specified in the next field
TEXT	*	L	<S>			Text

12.7.19 Time Domain Record [TIMEREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**45**)
TIME_ID	10	N	Obl	1	2^{32}-1	Time Domain Identifier: An identification number of this time domain record which is unique within a Section
DESC_ID	5	N	<S>	1	99999	Description Identifier: ID-number of a source document
NUM_ATT_BP	10	N	Obl	0	2^{32}-1	Number of Attribute back pointers

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71) Depending on the scope levels of the text record and the attribute records which it back points to, the Layer Identifier is either specified (global text record on Dataset level and an attribute record at a lower scope level), rendered as a 'zero' (text record and the referred-to attribute record both residing on the Dataset level), or left empty if not applicable (local or semi-global text record as well as attribute records on Layer or Section level, whereby the text record level is higher or equal to the attribute record), respectively.

72) Depending on the scope level of the text record and the attribute records which it back points to, the Section Identifier is either specified (global or semi-global text record on Layer or Section level and an attribute record at the local scope level of the Section level), rendered as a 'zero' (text record on and the referred-to attribute record residing on the Dataset or Layer scope levels, whereby the text record scope level is higher or equal to the attribute record), or left empty if not applicable (local text as well as attribute records on Section level), respectively.

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LAY_ID	10	N	<S> 73)	0	2^{32}-1	Layer Identifier: ID number of the Layer within which the Attribute referred to by the time domain resides. The Layer ID shall be provided if the time domain referring to the Attribute resides at a scope level higher than the Attribute record, and this time domain record resides at a scope level higher then the Layer (i.e. the Dataset level).
SECT_ID	10	N	<S> 74)	0	2^{32}-1	Section Identifier: ID number of the Section within which the Attribute referred to by the time domain resides. The Section ID shall be provided if the time domain referring to the Attribute resides at a scope level higher than the Attribute record, and this time domain record resides at a scope level higher then the Section (i.e. the Dataset level or the Layer level).
ATT_ID	10	N	Obl	1	2^{32}-1	ATT_ID: Attribute which uses this time domain record
TIME_DOM	*	G	<S>			Time Domain Description

12.7.20 Object Reference Record [OBJREFREC]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**83**)
OBJREF_ID	10	N	Obl	1	2^{32}-1	Object Reference Identifier: ID number of this Object Reference Record which is unique within this Section
REC_TYPE	2	N	Obl	1	99	Record Type of referenced record
REF_REC_ID	10	N	Obl	1	2^{32}-1	Record ID of referenced record 75)
OBJREF_TYP	1	A	<S>			User defined type of Object Reference
DATA_TYPE	2	A	Obl			Data Type of the Object Reference Allowed values are N, A, G, L, I and AN
OBJREF_LEN	5	N	Obl	1	99999	Field length of OBJREF
OBJREF	*	*	Obl			Object Reference value

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73) Depending on the scope levels of the time domain record and the attribute records which it back points to, the Layer Identifier is either specified (global time domain record on Dataset level and an attribute record at a lower scope level), rendered as a 'zero' (time domain record and the referred-to attribute record residing on the Dataset scope level), or left empty if not applicable (local or semi-global time domain as well as attribute records on Layer or Section level, whereby the time domain record level is higher or equal to the attribute record), respectively.

74) Depending on the scope level of the time domain record and the attribute records which it back points to, the Section Identifier is either specified (global or semi-global time domain record on Layer or Section level and an attribute record at the local scope level of the section level), rendered as a 'zero' (time domain record and the referred-to attribute record residing on the Dataset or Layer level, whereby the time domain scope level is higher or equal to the attribute record), or left empty if not applicable (local time domain as well as attribute records on Section level), respectively.

75) The Object Reference Record inherits the scope and scope level of the referenced record. In other words, the Object Reference Records resides in the same Section, Layer, or Dataset, respectively, as the object record it references.

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12.8 Record Format Specifications: Update Information Records

12.8.1 Geo-topo Update Information Record [UPDIREC.01]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**89**)
REC_CODE	2	N	Obl			Record Subtype Code (**01**)
UPD_GEO_ID	10	N	Obl	1	$2^{32}-1$	Geo-topo Update Identification Number, which is unique within the system of the producer (supplier) of this Dataset
P_CYCLE	2	N	<S>	0	99	Product Cycle
GEO_CAT	2	N	Obl	1	7	Geometry/Topology Object category: 1 = Node 2 = Edge 3 = Face 4 = Dot 5 = Polyline 6 = Polygon 7 = Coordinate tuple(s)
GEO_ID	10	N	Obl	1	$2^{32}-1$	Geometry/Topology Object Identifier
ACTION	2	N	Obl	0	3	Action Class: 0 = update of source only 1 = New 2 = Delete 3 = Modify
ACT_DATE	20	G	Obl			Action Time Stamp

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12.8.2 Object Update Information Record [UPDIREC.02]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**89**)
REC_CODE	2	N	Obl			Record Subtype Code (**02**)
UPD_OBJ_ID	10	N	Obl	1	$2^{32}-1$	Object Update Identification Number, which is unique within the system of the producer (supplier) of this Dataset
P_CYCLE	2	N	<S>	0	99	Product Cycle
OBJ_CAT	2	N	Obl	1	10	Object category: 1 = Point 2 = Line 3 = Area 4 = Complex 5 = Relationship 6 = Name 7 = Time Domain 8 = Other Text 9 = Geopolitical Structure 10 = Geopolitical Structure Component
OBJ_ID	10	N	Obl	1	$2^{32}-1$	Object Identifier
OBJ_CODE	4	N	<S>	1	9999	Object Class Code Where the object is a Feature the Feature Class Code shall be used. If not, use the following codes: Relationship: 0001 Name: 0002 Time Domain: 0003 Other Text: 0004 Geopolitical Structure: 0005 Geopolitical Structure Component: 0006
ACTION	2	N	Obl	0	3	Action Class: 0 = Update of source only 1 = New 2 = Delete 3 = Modify
ACT_DATE	20	G	Obl			Action Time Stamp

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12.8.3 Object Attribute Update Information Record [UPDIREC.03]

Field name	Size	Type	No data	Min.	Max.	Description
REC_DESCR	2	N	Obl			Record Type Code (**89**)
REC_CODE	2	N	Obl			Record Subtype Code (**03**)
UPD_ATT_ID	10	N	Obl	1	$2^{32}-1$	Object Attribute Update Identification Number, which is unique within the system of the producer (supplier) of this Dataset
P_CYCLE	2	N	<S>	0	99	Product Cycle
OBJ_CAT	2	N	Obl	1	10	Object category: 1 = Point 2 = Line 3 = Area 4 = Complex 5 = Relationship 6 = Name 7 = Time Domain 8 = Other Text 9 = Geopolitical Structure 10 = Geopolitical Structure Component
OBJ_ID	10	N	Obl	1	$2^{32}-1$	Object Identifier
OBJ_CODE	4	N	<S>	1	9999	Object Class Code Where the object is a Feature the Feature Class Code shall be used. If not, use the following codes: Relationship: 0001 Name: 0002 Time Domain: 0003 Other Text: 0004 Geopolitical Structure: 0005 Geopolitical Structure Component: 0006
ACTION	2	N	Obl	0	3	Action Class: 0 = update of source only 1 = New 2 = Delete 3 = Modify
ACT_DATE	20	G	Obl			Action Time Stamp
NUM_ATT	5	N	Obl	1	99999	Number of Attributes
COUNT_LF_(	1	N	Obl	0	9	Count of left parentheses that logically would be needed to contain an Attribute or Composite Attribute, and all of their restrictive Attributes
ATT_TYPE	2	G	Obl			Attribute Type Code
ATT_VAL	11	G	<S>			Attribute Value
COUNT_RT_)	1	N	Obl	0	9	Count of right parentheses that logically would be needed to contain an Attribute or Composite Attribute, and all of their restrictive Attributes

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13 XML schema specifications

13.1 Introduction

This clause defines an XML schema for GDF. The schema supports the communication of complete GDF databases in XML form. Technically, the XML schema may be considered a translation of the Media Record Specifications (MRS; see Clause 12); the MRS notion of records and fields is therefore reoccurring hereafter. The schema uses the applicable W3C XML references [43] [44] [45] [46] [47].

13.1.1 Background

XML (eXtensible Markup Language) is a relatively unstructured method of communicating data based on explicit 'tags' (names) of data elements. XML is an application profile of SGML, the Standard Generalized Markup Language [43]. XML is self-documenting via element tags; this document is expressed in character form. Both sender and receiver have the XML schema defining the tags and the data structures they describe. It is currently very popular and extensive for internet-based communications, and is growing quickly in popularity for both data communication and data structure definition, including within standards.

XML schemas define the structure, content and semantics of XML 'documents' (in this case GDF). Given a schema, data may be communicated automatically, without loss of semantic information. XML also has the very desirable property of being extensible, and hence may be standardized when desired by a user community. Since it was developed for internet use, it supports multiple platforms and languages, and is supported by multiple vendors of tools.

13.1.2 Schema design principles

13.1.2.1 Non-proliferation of global variables (Data Elements)

There is only one global Data Element, specifically a GDF (*gdf*). The primary benefit of this principle is that it ensures that a partial GDF may not be published, only a complete GDF. It also makes the file easier to read and the root element (*gdf*) easier to find by inspection.

13.1.2.2 Lexical convention

A Lexical Convention was established for the schema, with the following principles:

- Data Elements begin with a lowercase letter;
- Data Types, both simple and complex, begin with an uppercase letter;
- Common abbreviations are used, defined in Table 2;
- Standard prefixes are used for records, defined in Table 3.

Table 2 — Common Abbreviations for GDF XML schema

Word	Abbreviation
album	alb
attribute	attr
border	brdr
category	cat
character	chr

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Word	Abbreviation
character set	chrset
code	cod
complex	cmplx
control	cntrl
conversion	conv
coordinate	coord
country	cntry
dataset	dset
definition	def
descriptor	desc
directory	direc
domain	dom
feature	feat
field	fld
field data capture	fdc
global	glb
header	hdr
international	intl
latitude	lat
level	lvl
list	lst
local	lcl
longitude	long
magnetism	mag
name	nam
national	nat
network	netwk
object	obj
orientation	orient
projection	proj
record	rec
relationship	rel
section	sect
source	src
spatial	spat
structure	struct
survey	surv
text	txt
time	tim
type	typ
update	upd
value	val
vertical	vert
volume	vol

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Table 3 — Standard Record Prefixes

Record Type	Prefix
Metadata records	MET_
Metadata Album subrecords	MET_ALB_
Metadata Dataset subrecords	MET_DSET_
Metadata Source subrecords	MET_SRC_
Metadata Section Header subrecords	MET_SHR_
Update records	UPD_
Data records are not prefixed	

13.1.2.3 Non-hierarchical structuring of Dataset, Layer, and Section

Elements *dataset_ID*, *layer_ID*, and *section_ID* are included in one mandatory, reusable structure (*DLS*) in order to avoid repetition of the same element in the various data records which use it. Source description identifier (*source_ID*) is a separate, optional element in all data records except for the *Conversion* record and *Attribute* record. This gives flexibility of the components of a GDF file for different uses and users.

13.1.2.4 Rich type-hierarchy

The GDF schema contains many new simple types in order to provide flexibility of design change (through isolation of changes to types), and in order to improve comprehension when reading the code. For example, all record identifiers have types explicit to the record name, but all of those types are of base type *Record_ID*, which is itself of base type *Ten_digit_ID*, an integer of minimum value 1. Future changes, e.g. to the size of identifiers, would entail changing *Record_ID* type only. An example of strong typing is that of the various record identifiers, which all have the base type *Rec_Id*, which is itself of type *Ten_digit_Id*.

13.1.2.5 Record types and sub-types (descriptors and codes) as Attributes

The field record descriptor (record type) is present for all records, and code (subtype) for all sub-records. They are specified as Attributes with fixed, assigned values, rather than as data elements, in order to achieve access efficiency.

13.1.2.6 All 'count' fields optional

In the Media Record Specification (Clause 12), explicit counters are used to specify the number of elements in a variable length list, for example, NUM_EDGE for the number (count) of Edges to follow in a *Face* record. Explicit counters are not necessary for XML, however, since the fields are self-describing via tags and may be easily counted. Therefore all counters were made optional.

13.1.2.7 Name/value pairs for enumerations

Enumerations in an XML schema are basic one-column vectors. A string type may be enumerated as a list of character strings, and an integer may be enumerated as a list of integers. There is no explicit two-column XML schema structure to link a vector of names with a vector of numbers, so that a particular code (value) shall always occur with a particular enumerated name. Since such structures are common in GDF, the XML schema convention is to indicate that names and values belong together throughout an enumeration, and should be treated as linked by application software. The convention is that a complex data type is defined for the enumeration element, composed of a local *value.n* element and a *name.n* element, each of which is of defined type. For example, the element *feat_theme* is of type *Feat_theme*, which is composed of two local elements, *value.n* and *name.n*, which are of types *Feat_theme_val* and *Feat_theme_nam*, which are integer and string enumerations.

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13.1.2.8 Comments

Within the schema, comments are not treated as records but as indigenous comments, that is, as XML comments.

13.1.2.9 Inclusion of back pointers

Back pointers are included in the schema to allow file content validation before the file is used and to speed up file compilation into another format.

13.1.2.10 Flexible tag ordering

In order to allow tagged elements to be processed in any order, the root gdf element is expressed as a CHOICE of optional and repeatable elements rather than as a SEQUENCE.

13.1.2.11 Attribute Grouping

A repeatable, recursive reference was introduced for grouping Attributes in the XML schema. Attribute information contains a choice of either Attribute codes of defined or user-defined types and an actual value, or an Attribute group structure, which is itself composed of Attribute information and Attribute group information, recursively. This approach necessitated the creation of one global element (*AttributeDescriptor*) in addition to the *gdf* global element.

13.1.2.12 Definition Choice Groups

User-defined codes are provided in the schema for Feature codes, Relationship Codes, and Attribute (and Attribute group) codes, in a separate file called GDF_userDefined.xsd. Within the schema, Feature, Relationship, and attributes are a choice between defined and user-defined types.

13.1.2.13 Volumes

Since the XML realization is not volumed unlike the Media Record Specification (clause 12), there is no volume information in the schema realization.

13.1.3 LDS Departures

Two departures from the Logical Data Structures (LDS) are found in the XML schema realization:

1. All count (num) fields are optional in the schema, even though they are mandatory in the Logical Data Structures. (13.1.2.6)
2. The concept of data volumes was dropped.

13.1.4 Schema subdivision

The GDF XML realization schema is split into three parts (files):

- GDF_Main.xsd – main GDF record structures
- GDF_data_dict.xsd – underlying data types and structures
- GDF_userDefined.xsd – user-defined enumerations

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GDF_Main.xsd includes GDF_userDefined.xsd and GDF_data_dict.xsd. GDF_userDefined.xsd includes GDF_data_dict.xsd. In XML syntax "includes" means: reads definitions from, before continuing to make its own definitions, that is a file depends on the other files it includes.

13.2 Data content

13.2.1 General

The data contained in GDF may be either of two types: pre-defined content or map data. Pre-defined content is prescribed in this document and applies to all GDF instances. Map data is the actual geographic data for a particular coverage area.

13.2.2 Pre-defined content

For pre-defined content, much of the data content appears in GDF Annexes. In certain situations, this content may be expanded by individual GDF suppliers as user-defined data.

Pre-defined content is cross-referenced to other sections in this document by Table 4. Definitions and graphical descriptions of pre-defined content may be found in sub-clause 13.5, GDF_data_dict.xsd. Definitions and graphical descriptions of user-defined content may be found in sub-clause 13.6, GDF_userDefined.xsd.

Table 4 — Pre-Defined Content references

Entity	Definition Clause	Name	Value	Content
Action	13.5.16	13.5.135	13.5.136	
Attribute Data Type	13.5.15	13.5.133	13.5.134	
Attribute Data Unit	13.5.21	13.5.130	13.5.131	
Attribute Type Code	13.5.17	13.5.137	13.5.138	Annex A.2
Attribute Value Code	13.5.236	13.5.236	13.5.236	Annex A.2
Attribute Value Name	13.5.236	13.5.236	13.5.236	Annex A.2
Character Set	13.5.217	13.5.219	13.5.220	
Coordinate Type	13.5.18	13.5.143	xsd:boolean	
Country Code	13.5.19	13.5.144	13.5.145	
Data Use	13.5.20	13.5.146	13.5.147	
Datum	13.5.2	13.5.148	13.5.149	Annex B.1.1
Direction	13.5.22	13.5.150	xsd:boolean	
Ellipsoid Code	13.5.23	13.5.151	13.5.152	Annex B.1.5
ETA Connectivity	13.5.24	13.5.153	xsd:boolean	
Extended Character Set	13.5.218	13.5.221	13.5.222	
Feature Category	13.5.25	13.5.154	13.5.155	
Feature Code	13.5.26	13.5.215	13.5.216	Annex A.1
Feature Theme	13.5.25	13.5.156	13.5.157	Annex A.1
Geometry Object Category	13.5.28	13.5.158	13.5.159	
Geometry Type	13.5.7	13.5.9	13.5.8	
Grid	13.5.29	13.5.160	13.5.161	Annex B.1.2
Grid Orientation	13.5.44	13.5.191	xsd:boolean	
Height Reference Type	13.5.30	13.5.162	13.5.163	
Language Code	13.5.32	13.5.166	13.5.167	
Layer Topology	13.5.31	13.5.164	13.5.165	
Line Direction	13.5.35	13.5.171	xsd:boolean	
Object Category	13.5.33	13.5.168	13.5.169	
Orientation	13.5.34	13.5.170	xsd:boolean	

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Entity	Definition Clause	Name	Value	Content
Projection Code	13.5.36	13.5.172	13.5.173	Annex B.1.6
Record Type	13.5.37	13.5.174	13.5.175	
Reference Type	13.5.229	13.5.227	13.5.228	Annex B.2.1
Relationship Code D	13.5.54	13.5.182	13.5.183	Annex A.3.1
Role Code	13.5.226	13.5.224	13.5.225	Annex B.2.2
Three Split Indicator	13.5.40	13.5.184	13.5.185	
Two Split Indicator	13.5.41	13.5.186	xsd:boolean	
Topic	13.5.232	13.5.230	13.5.231	Annex B.2.3
Unit System	13.5.235	13.5.233	13.5.234	
User-defined Attribute Type Code	13.6.4	13.6.9	13.6.10	
User-defined Feature Code	13.6.2	13.6.5	13.6.6	
User-defined Relationship Code	13.6.3	13.6.7	13.6.8	
Vertical Datum	13.5.42	13.5.187	13.5.188	Annex B.1.3
Z Reference	13.5.43	13.5.189	13.5.190	
Relationship Role Code Lists	13.5.237	13.5.237	13.5.237	Annex A.3.1

13.2.3 Map data

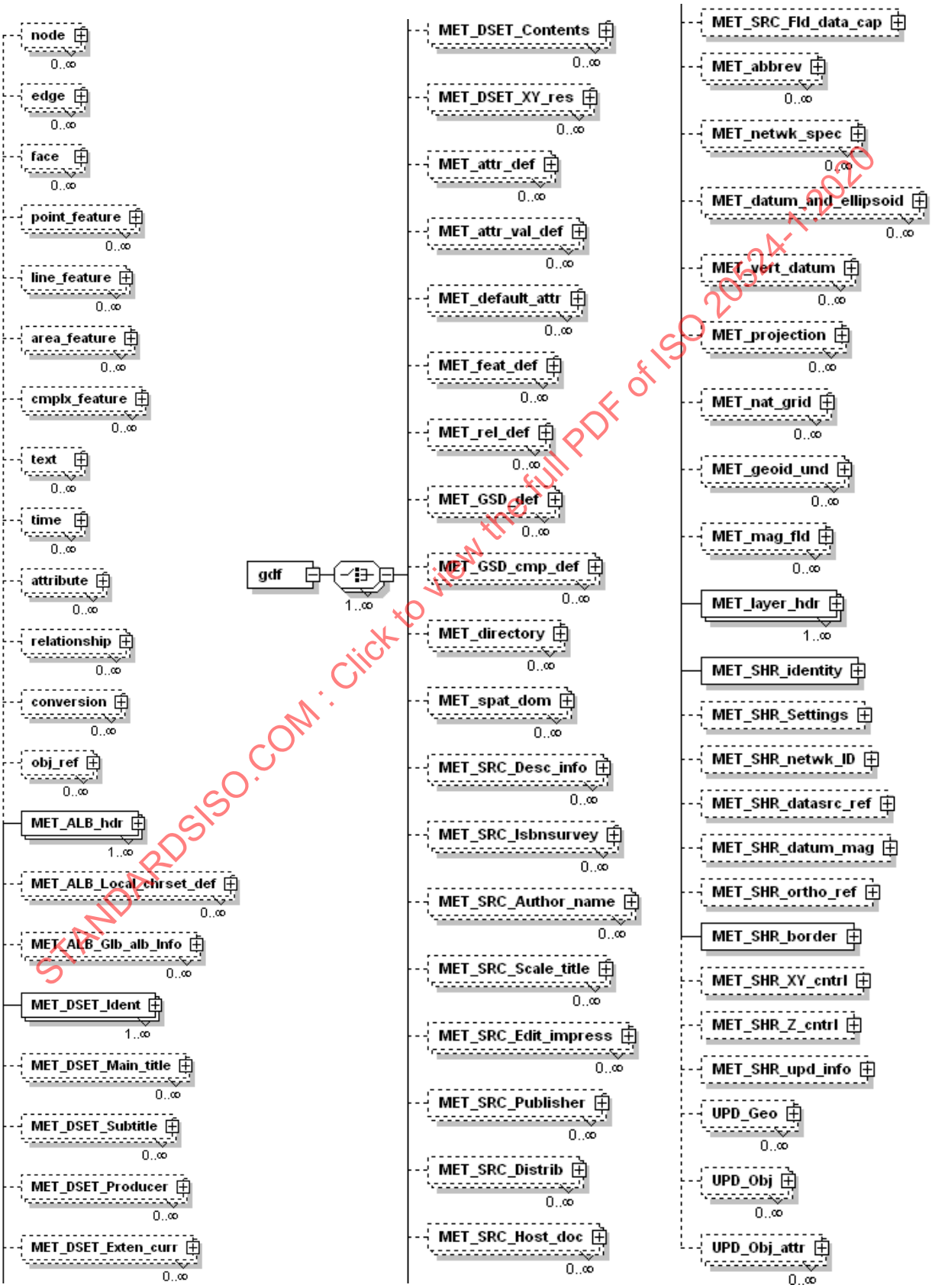
Only XML data structures are specified. Individual suppliers of the GDF map data will provide the content of these data structures, unlike the pre-defined data for which structures are actually filled.

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13.3 GDF XML schema

The GDF XML schema contains one root element: *gdf* (13.1.2.1). The *gdf* element has the following child elements:



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In the schema listings in 13.4, 13.5, and 13.6, diagrams are included for the complex types for the *gdf* child elements in GDF_Main and for other complex elements in the included GDF_data_dict and GDF_userDefined files. Diagrams preceed the complex element names.

13.4 Schema GDF_Main.xsd

13.4.1 Header

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns="http://www.ukusa.org" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gdf="http://www.ukusa.org"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" targetNamespace="http://www.ukusa.org" elementFormDefault="qualified">
	<xsd:include schemaLocation="GDF_data_dict.xsd"/>
	<xsd:include schemaLocation="GDF_userDefined.xsd"/>
	<xsd:element name="gdf">
		<xsd:complexType>
			<xsd:choice maxOccurs="unbounded">
				<xsd:element name="node" type="Node" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="edge" type="Edge" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="face" type="Face" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="point_feature" minOccurs="0" maxOccurs="unbounded">
					<xsd:complexType>
						<xsd:choice>
							<xsd:element name="explicit_point_feat" type="Point_feat_explicit"/>
							<xsd:element name="non-explicit_point_feat" type="Point_feat_non-explicit"/>
						</xsd:choice>
					</xsd:complexType>
				</xsd:element>
				<xsd:element name="line_feature" minOccurs="0" maxOccurs="unbounded">
					<xsd:complexType>
						<xsd:choice>
							<xsd:element name="explicit_line_feat" type="Line_feat_explicit"/>
							<xsd:element name="non-explicit_line_feat" type="Line_feat_non-explicit"/>
						</xsd:choice>
					</xsd:complexType>
				</xsd:element>
				<xsd:element name="area_feature" minOccurs="0" maxOccurs="unbounded">
					<xsd:complexType>
						<xsd:choice>
							<xsd:element name="full_area_feat" type="Area_feat_full"/>
							<xsd:element name="connectivity_area_feat" type="Area_feat_connectivity"/>
							<xsd:element name="non-explicit_area_feat" type="Area_feat_non-explicit"/>
						</xsd:choice>
					</xsd:complexType>
				</xsd:element>
				<xsd:element name="cmplx_feature" minOccurs="0" maxOccurs="unbounded">
					<xsd:complexType>
						<xsd:choice>
							<xsd:element name="explicit_cmplx_feat" type="Cmplx_feat_explicit"/>
							<xsd:element name="non-explicit_cmplx_feat" type="Cmplx_feat_non-
explicit"/>
						</xsd:choice>
					</xsd:complexType>
				</xsd:element>
				<xsd:element name="text" type="Text" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="time" type="Time_domain" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="attribute" type="Attribute" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="relationship" type="Relationship" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="conversion" type="Conversion" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="obj_ref" type="Obj_ref" minOccurs="0" maxOccurs="unbounded"/>
				<xsd:element name="MET_ALB_hdr" type="ALB_hdr" maxOccurs="unbounded"/>
				<xsd:element name="MET_ALB_Local_chrset_def" type="ALB_Local_chrset_def" minOccurs="0"
                                                maxOccurs="unbounded"/>
				<xsd:element name="MET_ALB_Glb_alb_Info" type="ALB_Glb_alb_info" minOccurs="0"
                                                maxOccurs="unbounded"/>
				<xsd:element name="MET_DSET_Ident" type="DSET_Ident" maxOccurs="unbounded"/>
				<xsd:element name="MET_DSET_Main_title" type="DSET_Main_title" minOccurs="0"
                                                maxOccurs="unbounded"/>
				<xsd:element name="MET_DSET_Subtitle" type="DSET_Subtitle" minOccurs="0"
                                                maxOccurs="unbounded"/>
				<xsd:element name="MET_DSET_Producer" type="DSET_Producer" minOccurs="0"
                                                maxOccurs="unbounded"/>
```

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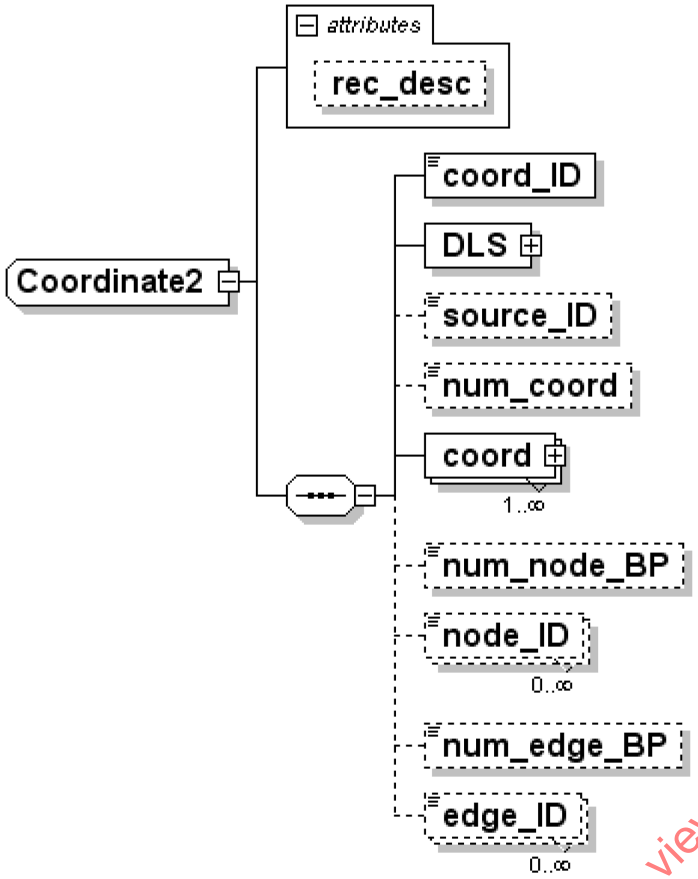
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```
                <xsd:element name="MET_DSET_Exten_curr" type="DSET_Exten_curr" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_DSET_Contents" type="DSET_Contents" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_DSET_XY_res" type="DSET_XY_res" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_attr_def" type="Attr_def" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_attr_val_def" type="Attr_val_def" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_default_attr" type="Default_attr" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_feat_def" type="Feat_def" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_rel_def" type="Rel_def" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_GSD_def" type="GeoPol_str_def" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_GSD_cmp_def" type="GeoPol_str_cmp_def" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_directory" type="Direc" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_spat_dom" type="Spat_dom" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Desc_info" type="SRC_Desc_info" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Isbnsurvey" type="SRC_Isbnsurvey" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Author_name" type="SRC_Author_name" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Scale_title" type="SRC_Scale_title" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Edit_impress" type="SRC_Edit_impress" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Publisher" type="SRC_Publisher" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Distrib" type="SRC_Distrib" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Host_doc" type="SRC_Host_doc" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_SRC_Fld_data_cap" type="SRC_Fld_data_cap" minOccurs="0"/>
                <xsd:element name="MET_abbrev" type="Abbrev" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_netwk_spec" type="Netwk_spec" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_datum_and_ellipsoid" type="Datum_and_ellipsoid" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_vert_datum" type="Vertical_datum" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_projection" type="Projection" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_nat_grid" type="National_grid" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_geoid_und" type="Geoid_undulation" minOccurs="0"
                                                maxOccurs="unbounded"/>
                <xsd:element name="MET_mag_fld" type="Magnetic_fld" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="MET_layer_hdr" type="Layer_hdr" maxOccurs="unbounded"/>
                <xsd:element name="MET_SHR_identity" type="SHR_identity"/>
                <xsd:element name="MET_SHR_Settings" type="SHR_settings" minOccurs="0"/>
                <xsd:element name="MET_SHR_netwk_ID" type="SHR_netwk_ID" minOccurs="0"/>
                <xsd:element name="MET_SHR_datasrc_ref" type="SHR_datasrc_ref" minOccurs="0"/>
                <xsd:element name="MET_SHR_datum_mag" type="SHR_datum_and_mag" minOccurs="0"/>
                <xsd:element name="MET_SHR_ortho_ref" type="SHR_ortho_ref" minOccurs="0"/>
                <xsd:element name="MET_SHR_border" type="SHR_border"/>
                <xsd:element name="MET_SHR_XY_cntrl" type="SHR_XY_cntrl" minOccurs="0"/>
                <xsd:element name="MET_SHR_Z_cntrl" type="SHR_Z_cntrl" minOccurs="0"/>
                <xsd:element name="MET_SHR_upd_info" type="SHR_upd_info" minOccurs="0"/>
                <xsd:element name="UPD_Geo" type="UPD_Geo" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="UPD_Obj" type="UPD_Obj" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="UPD_Obj_attr" type="UPD_Obj_attr" minOccurs="0" maxOccurs="unbounded"/>
            </xsd:choice>
        </xsd:complexType>
    </xsd:element>
```

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13.4.2 2-D Coordinates

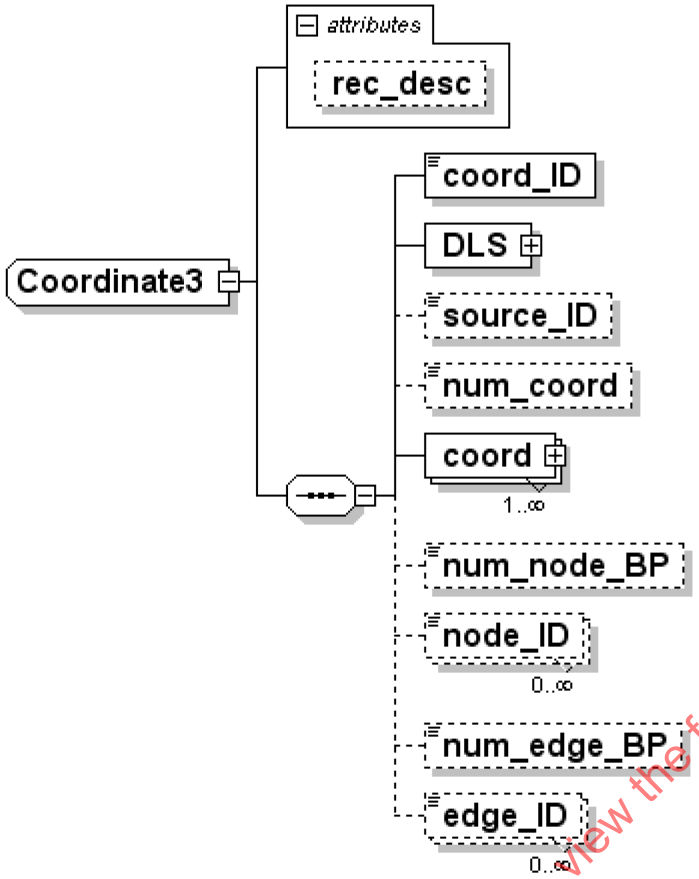



```
<xsd:complexType name="Coordinate2">
    <xsd:sequence>
            <xsd:element name="coord_ID" type="Coord_ID"/>
            <xsd:element name="DLS" type="DLS_ID"/>
            <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
            <xsd:element name="num_coord" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="coord" type="Coord2" maxOccurs="unbounded"/>
            <xsd:element name="num_node_BP" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="node_ID" type="Node_ID" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="num_edge_BP" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="edge_ID" type="Edge_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="22"/>
</xsd:complexType>
```

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13.4.3 3-D Coordinates

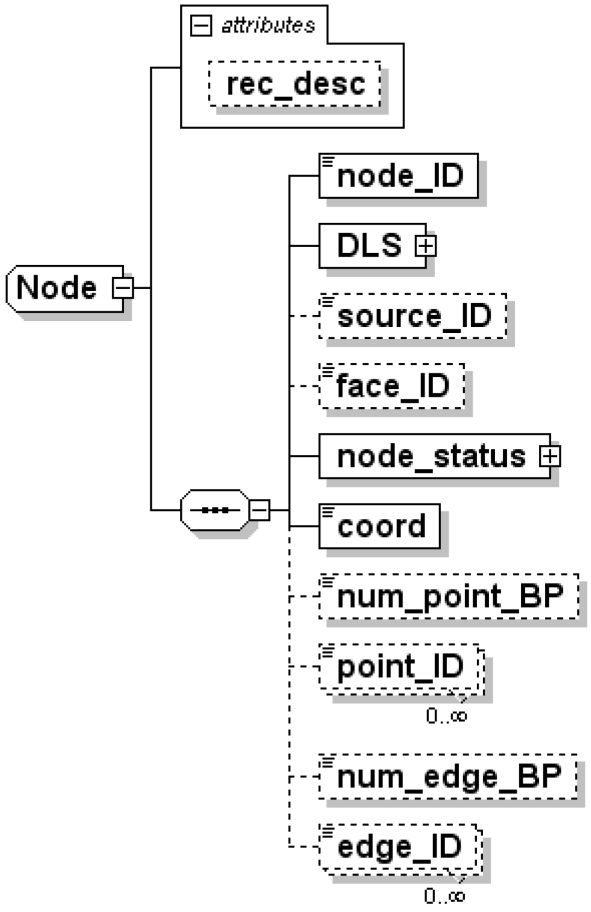



```
<xsd:complexType name="Coordinate3">
    <xsd:sequence>
            <xsd:element name="coord_ID" type="Coord_ID"/>
            <xsd:element name="DLS" type="DLS_ID"/>
            <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
            <xsd:element name="num_coord" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="coord" type="Coord" maxOccurs="unbounded"/>
            <xsd:element name="num_node_BP" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="node_ID" type="Node_ID" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="num_edge_BP" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="edge_ID" type="Edge_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="23"/>
</xsd:complexType>
```

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13.4.4 Node

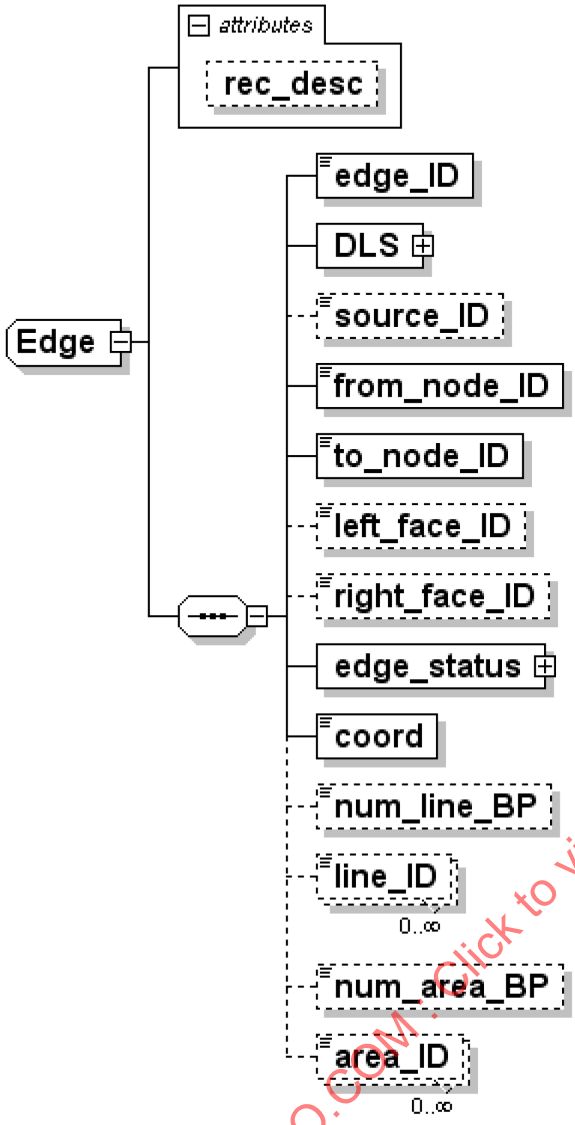



```
<xsd:complexType name="Node">
    <xsd:sequence>
            <xsd:element name="node_ID" type="Node_ID"/>
            <xsd:element name="DLS" type="DLS_ID"/>
            <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
            <xsd:element name="face_ID" type="Face_ID" minOccurs="0"/>
            <xsd:element name="node_status" type="Node_status"/>
            <xsd:element name="coord" type="Coord_ID"/>
            <xsd:element name="num_point_BP" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="point_ID" type="Point_feat_ID" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="num_edge_BP" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="edge_ID" type="Edge_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="25"/>
</xsd:complexType>
```

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13.4.5 Edge

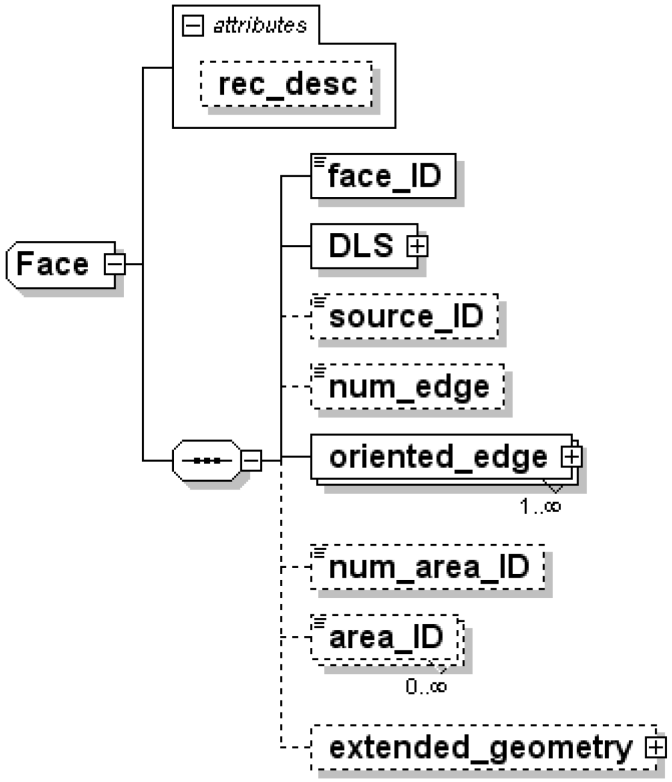



```
<xsd:complexType name="Edge">
    <xsd:sequence>
            <xsd:element name="edge_ID" type="Edge_ID"/>
            <xsd:element name="DLS" type="DLS_ID"/>
            <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
            <xsd:element name="from_node_ID" type="Node_ID"/>
            <xsd:element name="to_node_ID" type="Node_ID"/>
            <xsd:element name="left_face_ID" type="Face_ID" minOccurs="0"/>
            <xsd:element name="right_face_ID" type="Face_ID" minOccurs="0"/>
            <xsd:element name="edge_status" type="Edge_status"/>
            <xsd:element name="coord" type="Coord_ID"/>
            <xsd:element name="num_line_BP" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="line_ID" type="Line_feature_ID" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="num_area_BP" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="area_ID" type="Area_feature_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="24"/>
</xsd:complexType>
```

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13.4.6 Face

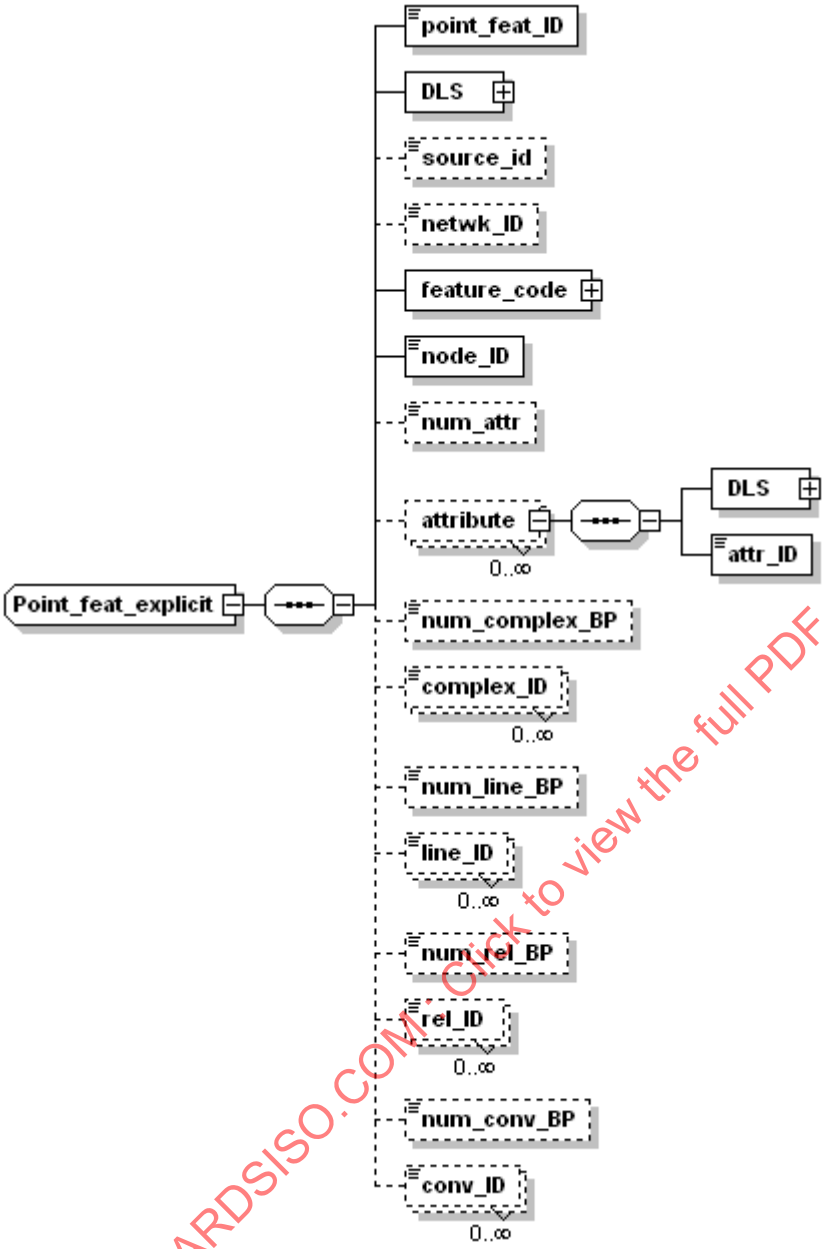



```
<xsd:complexType name="Face">
    <xsd:sequence>
            <xsd:element name="face_ID" type="Face_ID"/>
            <xsd:element name="DLS" type="DLS_ID"/>
            <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
            <xsd:element name="num_edge" type="Ten_digit_int" minOccurs="0"/>
            <xsd:element name="oriented_edge" type="Oriented_edge" maxOccurs="unbounded"/>
            <xsd:element name="num_area_ID" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="area_ID" type="Area_feature_ID" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="extended_geometry" type="Ext_geometry" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="29"/>
</xsd:complexType>
```

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13.4.7 Explicit Point Feature



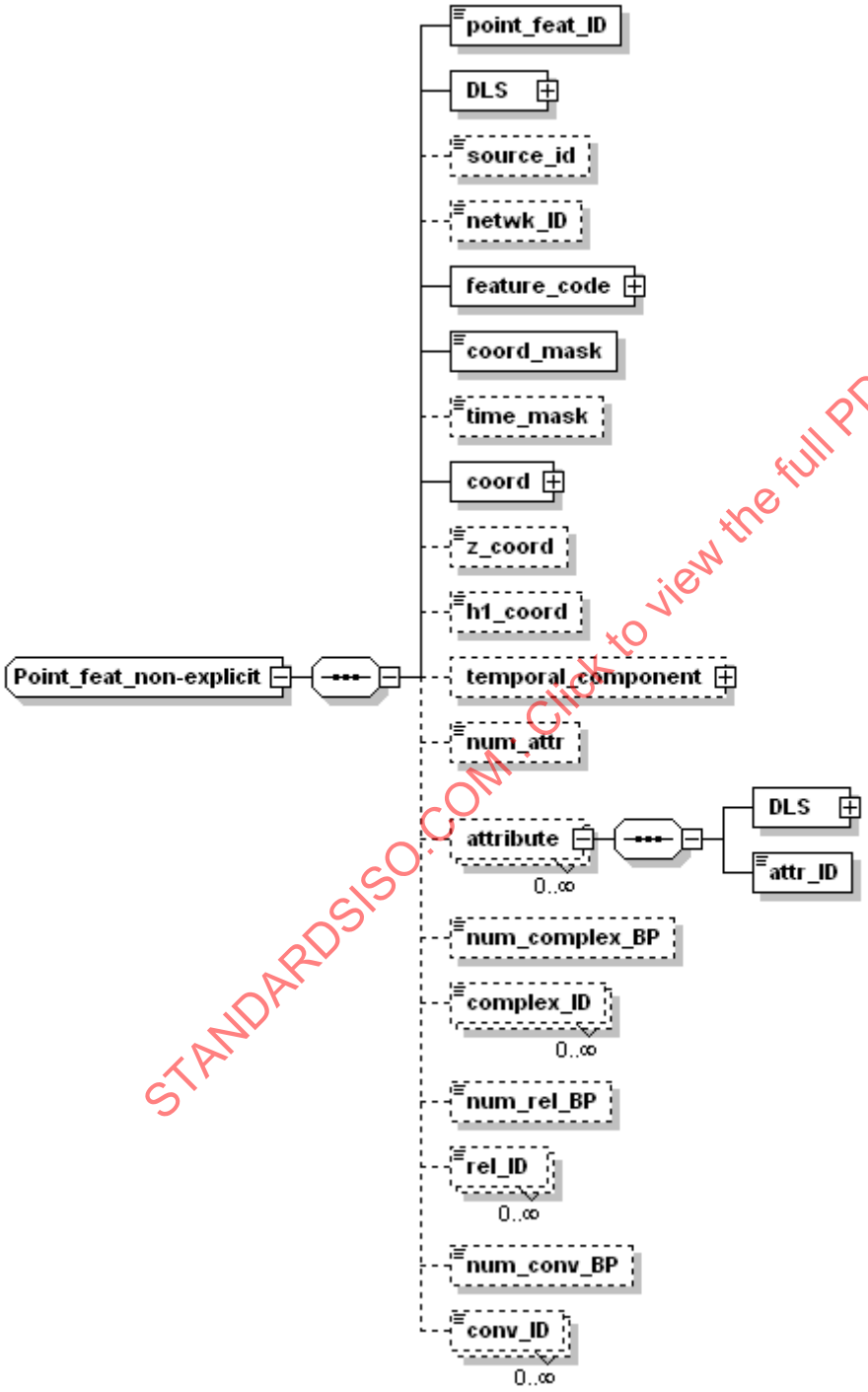

```
<xsd:complexType name="Point_feat_explicit">
    <xsd:sequence>
        <xsd:element name="point_feat_ID" type="Point_feat_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_id" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="netwk_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="node_ID" type="Node_ID"/>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="DLS" type="Optional_DLS_ID"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_complex_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="complex_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_line_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="line_ID" type="Line_feature_ID" minOccurs="0" maxOccurs="unbounded"/>
```

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```
                <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
                <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="num_conv_BP" type="Five_digit_int" minOccurs="0"/>
                <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="51"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
    </xsd:complexType>
```

13.4.8 Non-explicit Point Feature



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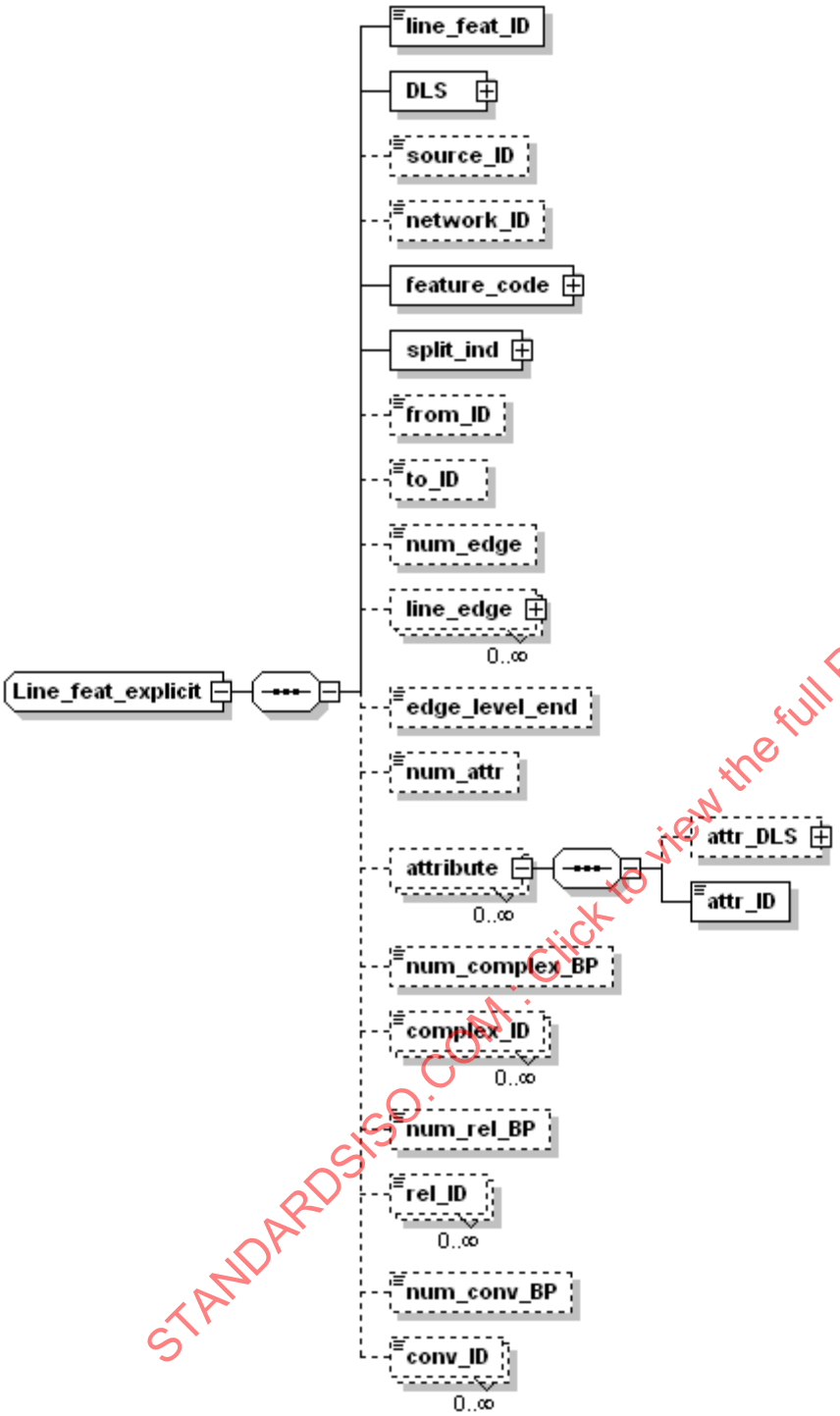
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```
<xsd:complexType name="Point_feat_non-explicit">
    <xsd:sequence>
        <xsd:element name="point_feat_ID" type="Point_feat_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_id" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="netwk_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="coord_mask">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:minInclusive value="0"/>
                    <xsd:maxInclusive value="15"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="time_mask" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:minInclusive value="0"/>
                    <xsd:maxInclusive value="7"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="coord" type="Coord2"/>
        <xsd:element name="z_coord" type="Eleven_digit_int" minOccurs="0"/>
        <xsd:element name="h1_coord" type="Eleven_digit_int" minOccurs="0"/>
        <xsd:element name="temporal_component" type="Time_coord" minOccurs="0"/>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="DLS" type="Optional_DLS_ID"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_complex_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="complex_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_conv_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="51"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
</xsd:complexType>
```

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13.4.9 Explicit Line Feature



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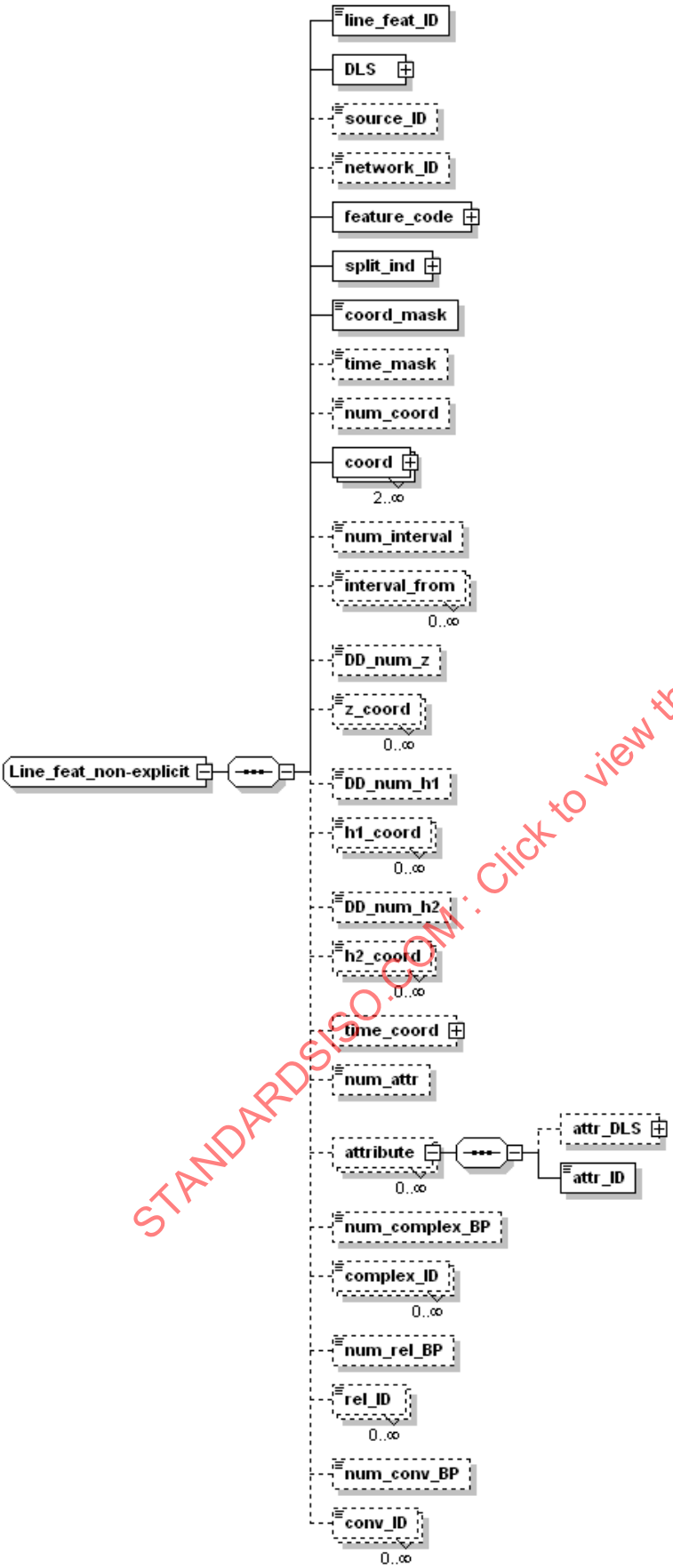
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```
<xsd:complexType name="Line_feat_explicit">
    <xsd:sequence>
        <xsd:element name="line_feat_ID" type="Line_feature_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="network_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="split_ind" type="Two_split_ind"/>
        <xsd:element name="from_ID" type="Point_feat_ID" minOccurs="0"/>
        <xsd:element name="to_ID" type="Point_feat_ID" minOccurs="0"/>
        <xsd:element name="num_edge" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="line_edge" type="Line_edge" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="edge_level_end" type="Edge_level" minOccurs="0"/>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_complex_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="complex_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_conv_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="52"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
</xsd:complexType>
```

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13.4.10 Non-explicit Line Feature



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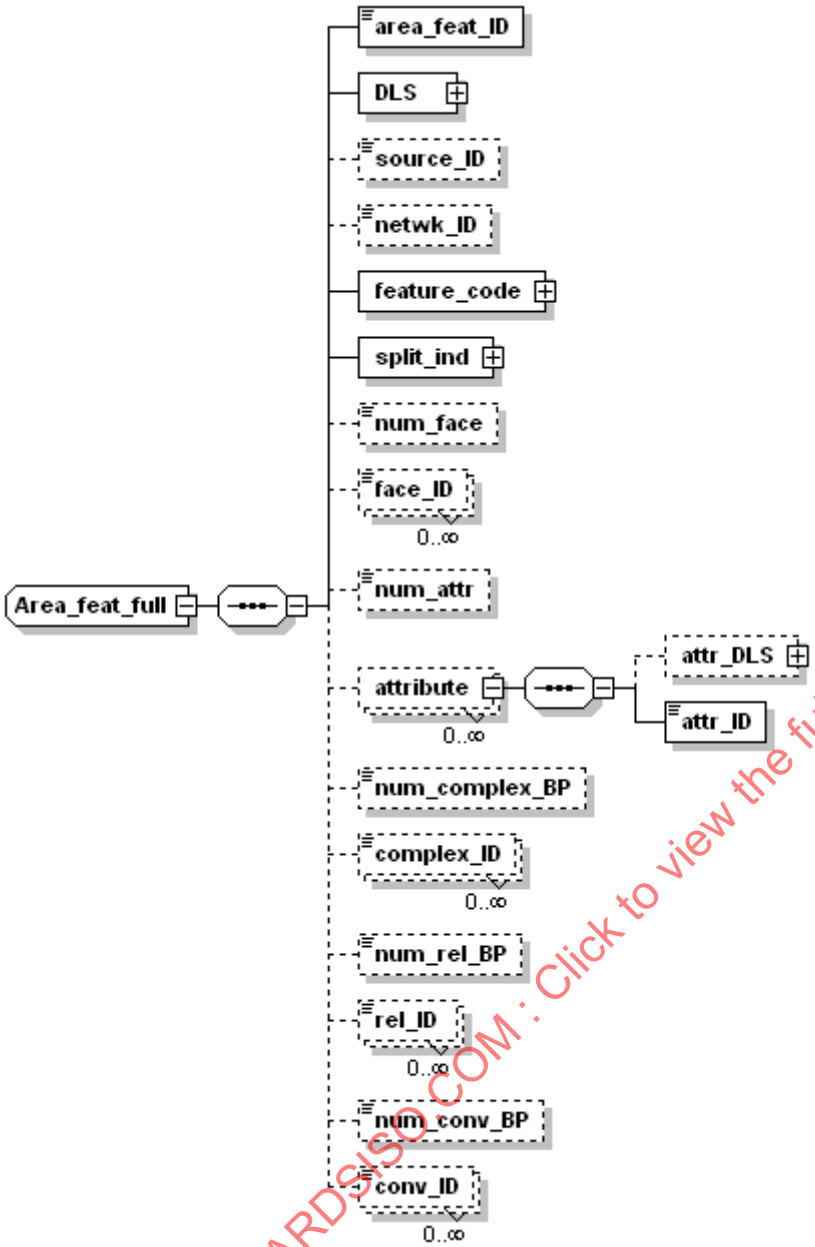
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```
<xsd:complexType name="Line_feat_non-explicit">
    <xsd:sequence>
        <xsd:element name="line_feat_ID" type="Line_feature_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="network_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="split_ind" type="Two_split_ind"/>
        <xsd:element name="coord_mask" type="Coord_mask"/>
        <xsd:element name="time_mask" type="Time_mask" minOccurs="0"/>
        <xsd:element name="num_coord" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="Five_digit_int">
                    <xsd:minInclusive value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="coord" type="Coord2" minOccurs="2" maxOccurs="unbounded"/>
        <xsd:element name="num_interval" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="interval_from" minOccurs="0" maxOccurs="unbounded">
            <xsd:simpleType>
                <xsd:restriction base="Five_digit_int">
                    <xsd:minInclusive value="1"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="DD_num_z" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="z_coord" type="Eleven_digit_coord" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="DD_num_h1" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="h1_coord" type="Eleven_digit_coord" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="DD_num_h2" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="h2_coord" type="Eleven_digit_coord" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="time_coord" type="Time_coord" minOccurs="0"/>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_complex_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="complex_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_conv_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="52"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
</xsd:complexType>
```

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13.4.11 Full Topology Area Feature



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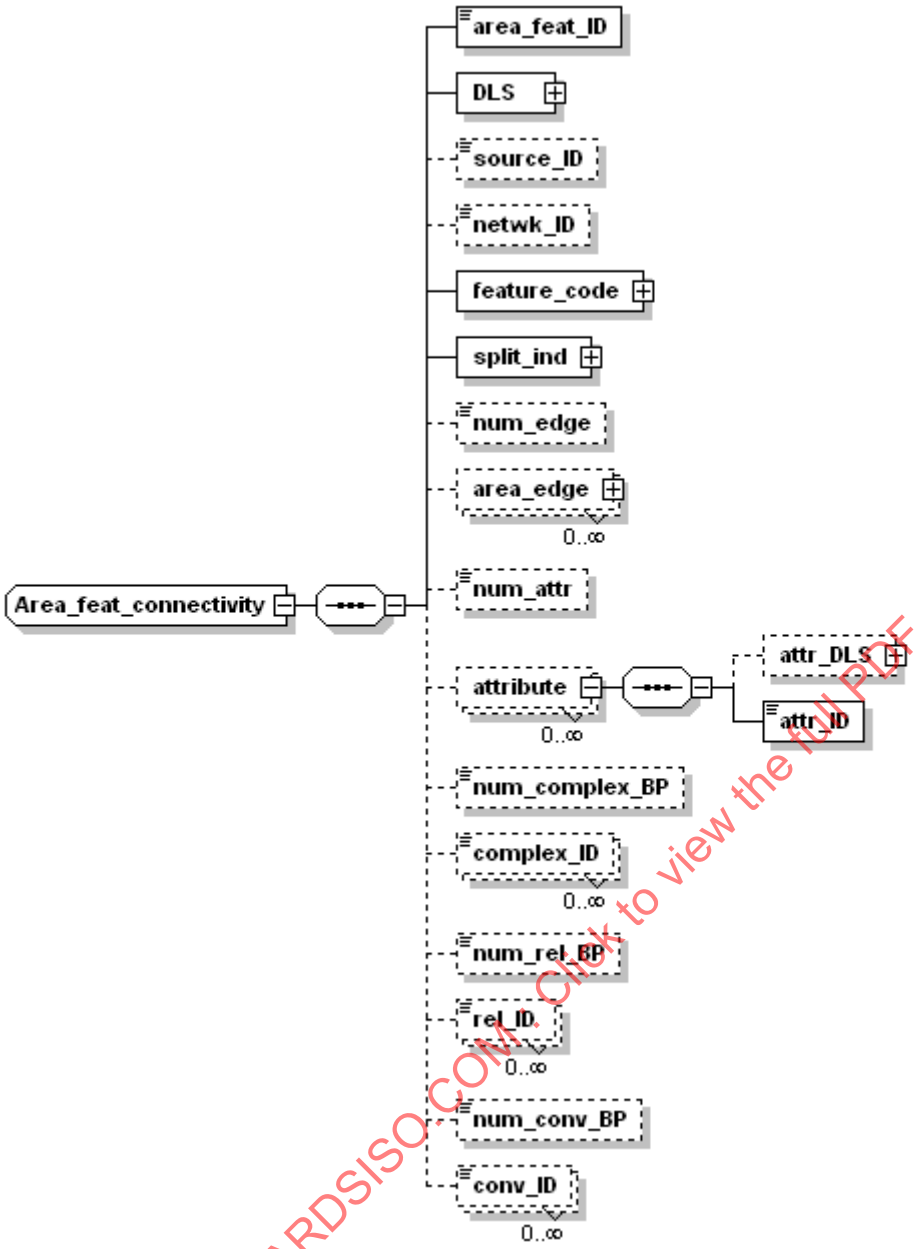
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```
<xsd:complexType name="Area_feat_full">
    <xsd:sequence>
        <xsd:element name="area_feat_ID" type="Area_feature_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="netwk_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="split_ind" type="Two_split_ind"/>
        <xsd:element name="num_face" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="face_ID" type="Face_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_complex_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="complex_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_conv_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="53"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
</xsd:complexType>
```

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13.4.12 Connectivity Topology Area Feature



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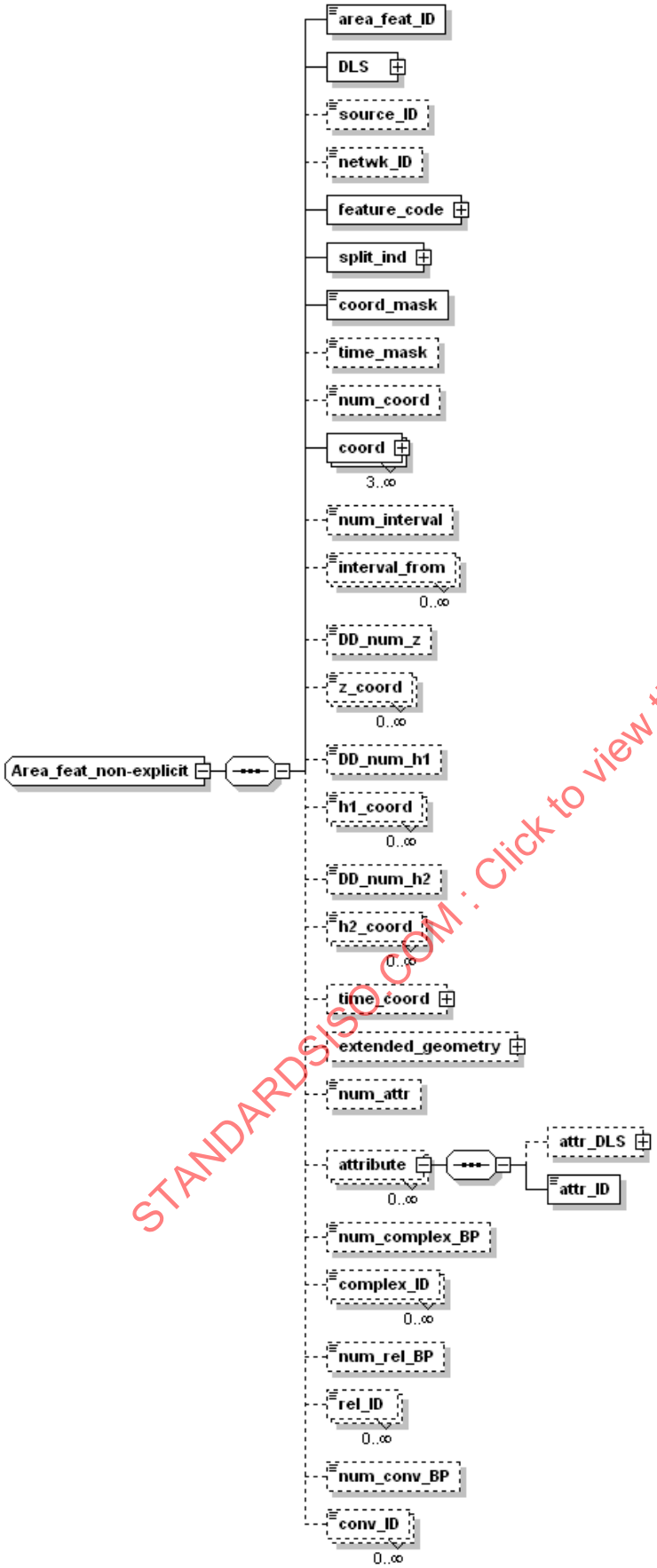
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```
<xsd:complexType name="Area_feat_connectivity">
    <xsd:sequence>
        <xsd:element name="area_feat_ID" type="Area_feature_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="netwk_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="split_ind" type="Two_split_ind"/>
        <xsd:element name="num_edge" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="area_edge" type="Area_edge" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_complex_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="complex_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_conv_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="53"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="2"/>
</xsd:complexType>
```

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13.4.13 Non-explicit Topology Area Feature



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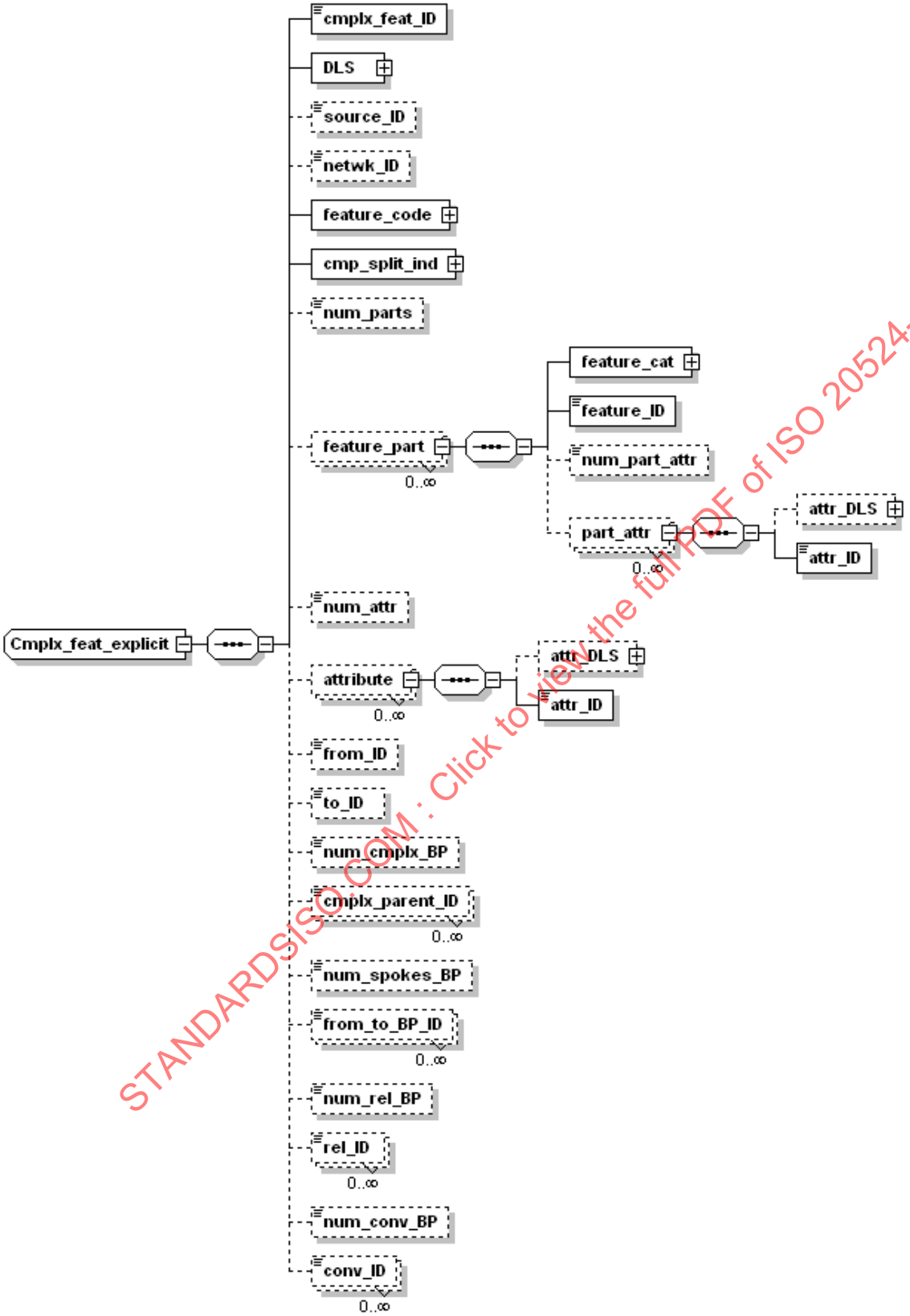
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```
<xsd:complexType name="Area_feat_non-explicit">
    <xsd:sequence>
        <xsd:element name="area_feat_ID" type="Area_feature_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="netwk_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="split_ind" type="Two_split_ind"/>
        <xsd:element name="coord_mask" type="Coord_mask"/>
        <xsd:element name="time_mask" type="Time_mask" minOccurs="0"/>
        <xsd:element name="num_coord" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="Five_digit_int">
                    <xsd:minInclusive value="3"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="coord" type="Coord2" minOccurs="3" maxOccurs="unbounded"/>
        <xsd:element name="num_interval" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="interval_from" minOccurs="0" maxOccurs="unbounded">
            <xsd:simpleType>
                <xsd:restriction base="Five_digit_int">
                    <xsd:minInclusive value="1"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="DD_num_z" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="z_coord" type="Eleven_digit_coord" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="DD_num_h1" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="h1_coord" type="Eleven_digit_coord" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="DD_num_h2" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="h2_coord" type="Eleven_digit_coord" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="time_coord" type="Time_coord" minOccurs="0"/>
        <xsd:element name="extended_geometry" type="Ext_geometry" minOccurs="0"/>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_complex_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="complex_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_conv_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="53"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
</xsd:complexType>
```

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13.4.14 Explicit Topology Complex Feature



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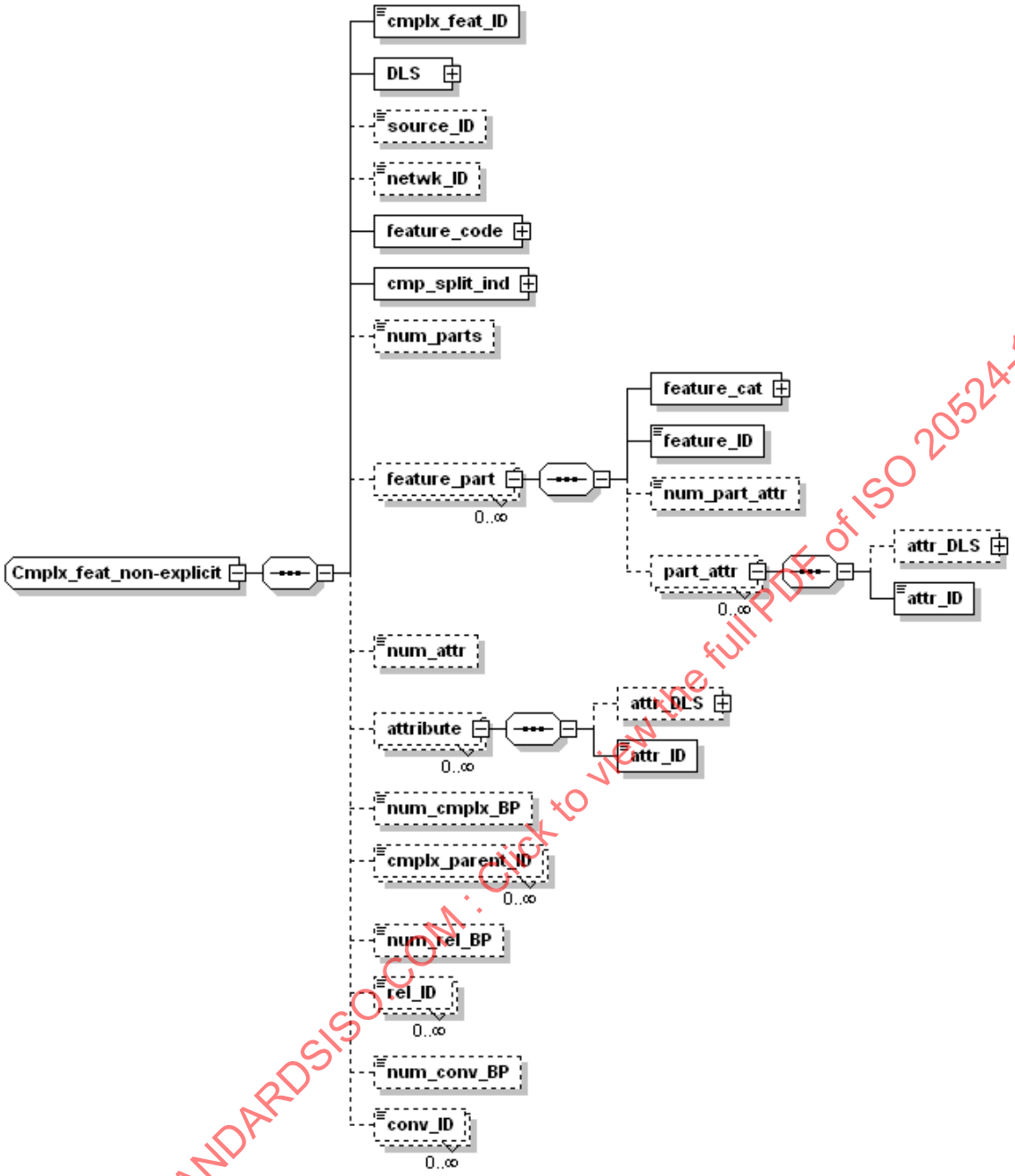
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```
<xsd:complexType name="Cmplx_feat_explicit">
    <xsd:sequence>
        <xsd:element name="cmplx_feat_ID" type="Complex_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="netwk_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="cmp_split_ind" type="Three_split_ind"/>
        <xsd:element name="num_parts" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="feature_part" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="feature_cat" type="Feat_cat"/>
                    <xsd:element name="feature_ID" type="Rec_ID"/>
                    <xsd:element name="num_part_attr" type="Five_digit_int" minOccurs="0"/>
                    <xsd:element name="part_attr" minOccurs="0" maxOccurs="unbounded">
                        <xsd:complexType>
                            <xsd:sequence>
                                <xsd:element name="attr_DLS" type="Optional_DLS_ID"
minOccurs="0"/>
                                <xsd:element name="attr_ID" type="Attr_ID"/>
                            </xsd:sequence>
                        </xsd:complexType>
                    </xsd:element>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="from_ID" type="Complex_ID" minOccurs="0"/>
        <xsd:element name="to_ID" type="Complex_ID" minOccurs="0"/>
        <xsd:element name="num_cmplx_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="cmplx_parent_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_spokes_BP" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="from_to_BP_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_conv_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="54"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
</xsd:complexType>
```

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13.4.15 Non-explicit Topology Complex Feature



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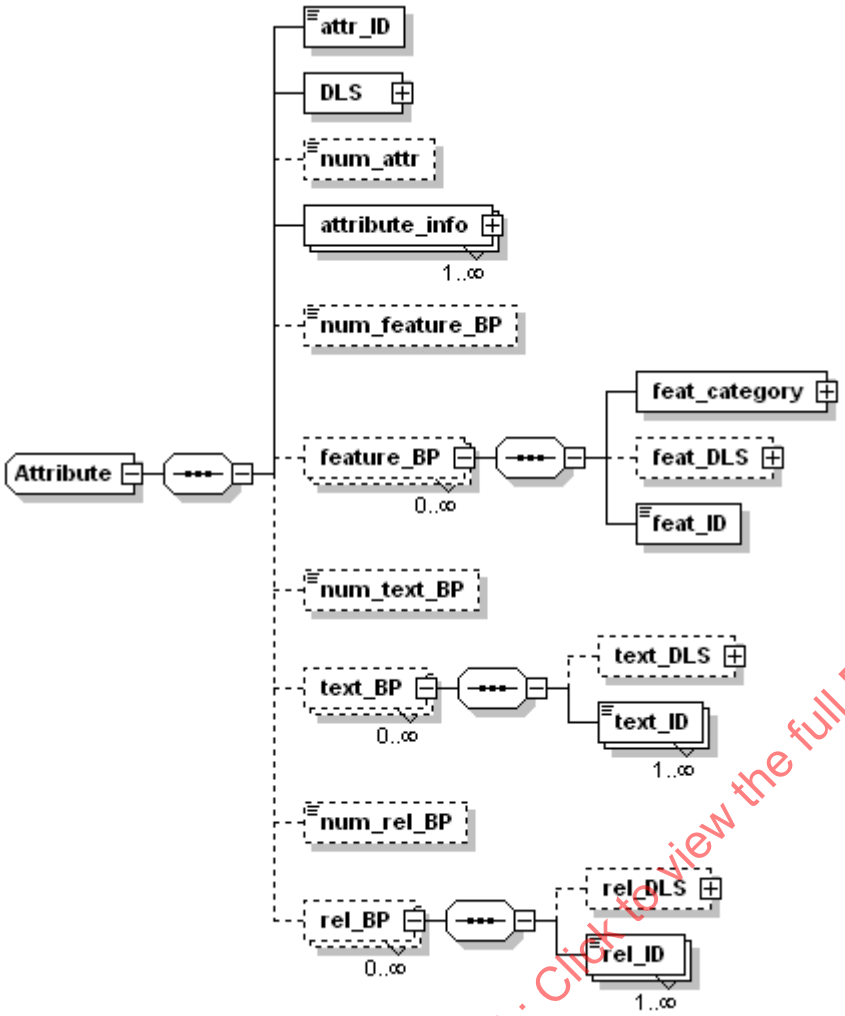
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```
<xsd:complexType name="Cmplx_feat_non-explicit">
    <xsd:sequence>
        <xsd:element name="cmplx_feat_ID" type="Complex_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="netwk_ID" type="Five_digit_ID" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code"/>
        <xsd:element name="cmp_split_ind" type="Three_split_ind"/>
        <xsd:element name="num_parts" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="feature_part" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="feature_cat" type="Feat_cat"/>
                    <xsd:element name="feature_ID" type="Rec_ID"/>
                    <xsd:element name="num_part_attr" type="Five_digit_int" minOccurs="0"/>
                    <xsd:element name="part_attr" minOccurs="0" maxOccurs="unbounded">
                        <xsd:complexType>
                            <xsd:sequence>
                                <xsd:element name="attr_DLS" type="Optional_DLS_ID"
minOccurs="0"/>
                                <xsd:element name="attr_ID" type="Attr_ID"/>
                            </xsd:sequence>
                        </xsd:complexType>
                    </xsd:element>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_cmplx_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="cmplx_parent_ID" type="Complex_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="rel_ID" type="Relationship_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_conv_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="conv_ID" type="Conversion_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="54"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
</xsd:complexType>
```

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13.4.16 Attribute



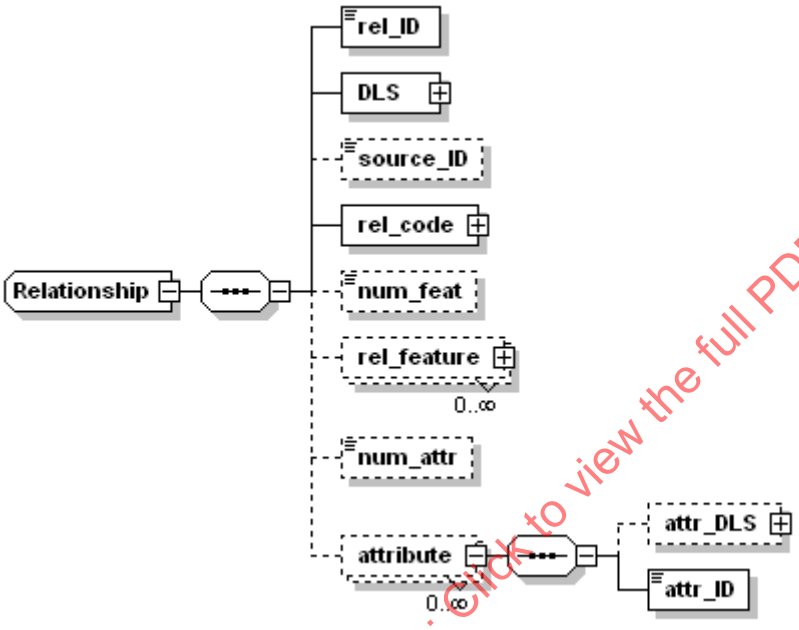

```
<xsd:complexType name="Attribute">
    <xsd:sequence>
        <xsd:element name="attr_ID" type="Attr_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute_info" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element ref="AttributeDescriptor"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_feature_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="feature_BP" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="feat_category" type="Feat_cat"/>
                    <xsd:element name="feat_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="feat_ID" type="Rec_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_text_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="text_BP" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="text_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="text_ID" type="Text_ID" maxOccurs="unbounded"/>
                </xsd:sequence>
            </xsd:complexType>
```

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```
            </xsd:element>
            <xsd:element name="num_rel_BP" type="Ten_digit_int" minOccurs="0"/>
            <xsd:element name="rel_BP" minOccurs="0" maxOccurs="unbounded">
                  <xsd:complexType>
                        <xsd:sequence>
                              <xsd:element name="rel_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                              <xsd:element name="rel_ID" type="Relationship_ID" maxOccurs="unbounded"/>
                        </xsd:sequence>
                  </xsd:complexType>
            </xsd:element>
      </xsd:sequence>
      <xsd:attribute name="rec_desc" type="Rec_typ" fixed="44"/>
</xsd:complexType>
```

13.4.17 Relationship

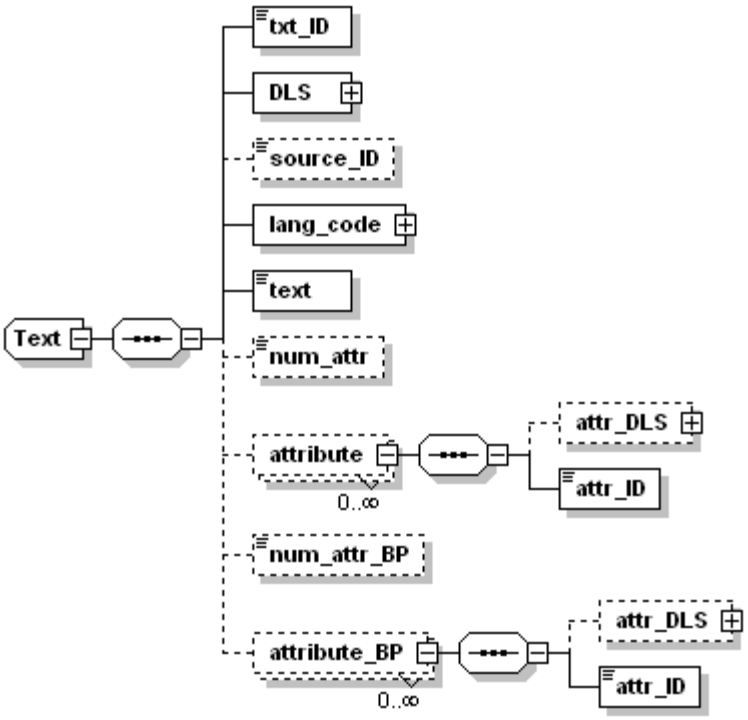



```
<xsd:complexType name="Relationship">
      <xsd:sequence>
            <xsd:element name="rel_ID" type="Relationship_ID"/>
            <xsd:element name="DLS" type="DLS_ID"/>
            <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
            <xsd:element name="rel_code" type="Rel_cod"/>
            <xsd:element name="num_feat" minOccurs="0">
                  <xsd:simpleType>
                        <xsd:restriction base="xsd:integer">
                              <xsd:minInclusive value="1"/>
                              <xsd:maxInclusive value="99999"/>
                        </xsd:restriction>
                  </xsd:simpleType>
            </xsd:element>
            <xsd:element name="rel_feature" type="Rel_feature" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="num_attr" type="Ten_digit_int" minOccurs="0"/>
            <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
                  <xsd:complexType>
                        <xsd:sequence>
                              <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                              <xsd:element name="attr_ID" type="Attr_ID"/>
                        </xsd:sequence>
                  </xsd:complexType>
            </xsd:element>
      </xsd:sequence>
      <xsd:attribute name="rec_desc" type="Rec_typ" fixed="50"/>
</xsd:complexType>
```

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13.4.18 Text

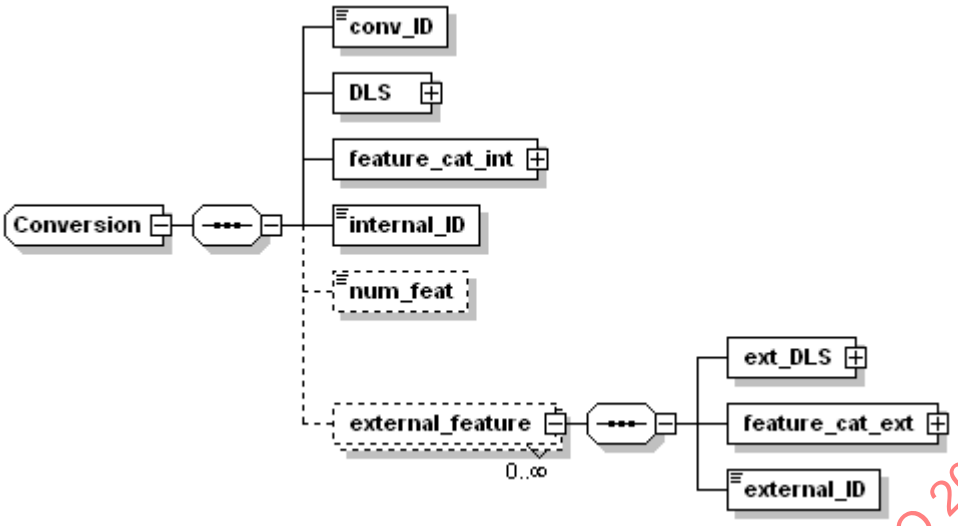



```
<xsd:complexType name="Text">
    <xsd:sequence>
        <xsd:element name="txt_ID" type="Text_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="lang_code" type="Lan_cod"/>
        <xsd:element name="text" type="xsd:string"/>
        <xsd:element name="num_attr" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_attr_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="attribute_BP" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="41"/>
</xsd:complexType>
```

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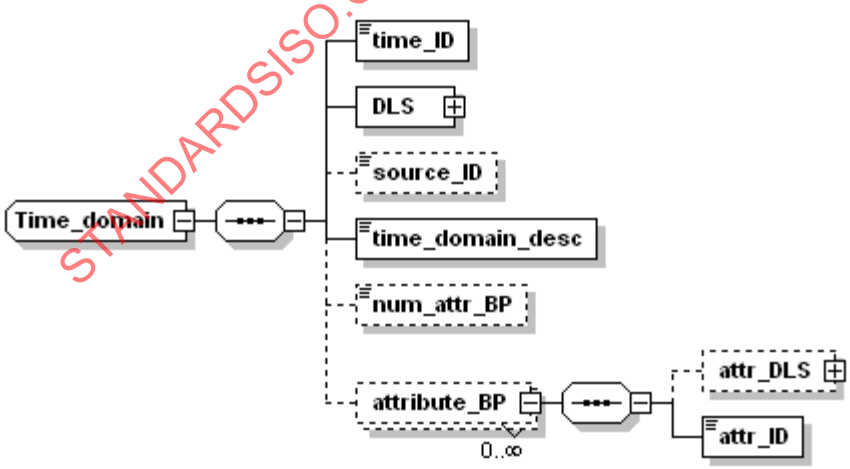
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13.4.19 Conversion




```
<xsd:complexType name="Conversion">
    <xsd:sequence>
            <xsd:element name="conv_ID" type="Conversion_ID"/>
            <xsd:element name="DLS" type="DLS_ID"/>
            <xsd:element name="feature_cat_int" type="Feat_cat"/>
            <xsd:element name="internal_ID" type="Feature_ID"/>
            <xsd:element name="num_feat" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="external_feature" minOccurs="0" maxOccurs="unbounded">
                    <xsd:complexType>
                            <xsd:sequence>
                                    <xsd:element name="ext_DLS" type="DLS_ID"/>
                                    <xsd:element name="feature_cat_ext" type="Feat_cat"/>
                                    <xsd:element name="external_ID" type="Feature_ID"/>
                            </xsd:sequence>
                    </xsd:complexType>
            </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="46"/>
</xsd:complexType>
```

13.4.20 Time Domain

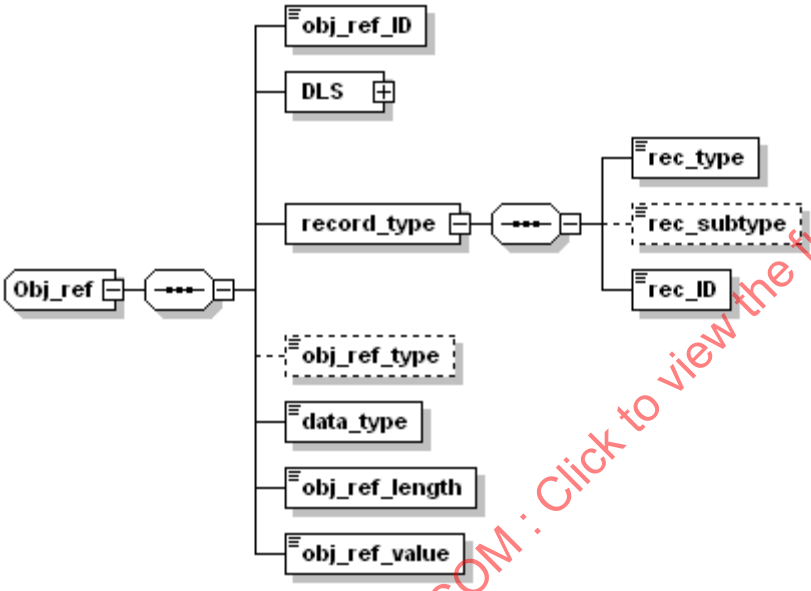


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```
<xsd:complexType name="Time_domain">
    <xsd:sequence>
        <xsd:element name="time_ID" type="Time_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="time_domain_desc" type="xsd:string"/>
        <xsd:element name="num_attr_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="attribute_BP" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="45"/>
</xsd:complexType>
```

13.4.21 Object Reference

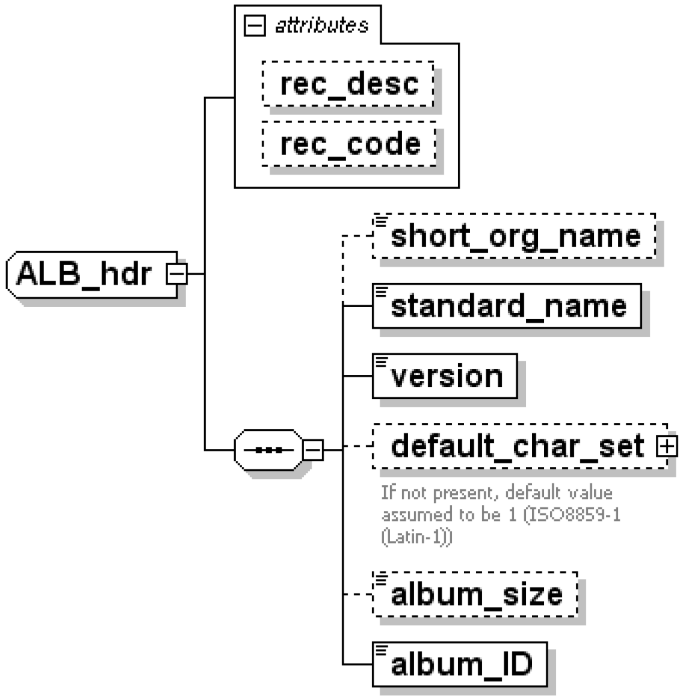



```
<xsd:complexType name="Obj_ref">
    <xsd:sequence>
        <xsd:element name="obj_ref_ID" type="Obj_ref_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="record_type">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="rec_type" type="Record_type_val_reduced"/>
                    <xsd:element name="rec_subtype" type="Rec_subtyp" minOccurs="0"/>
                    <xsd:element name="rec_ID" type="Rec_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="obj_ref_type" type="Obj_ref_typ" minOccurs="0"/>
        <xsd:element name="data_type" type="Data_typ"/>
        <xsd:element name="obj_ref_length" type="Five_digit_ID"/>
        <xsd:element name="obj_ref_value" type="xsd:string"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="83"/>
</xsd:complexType>
```

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13.4.22 Album Header

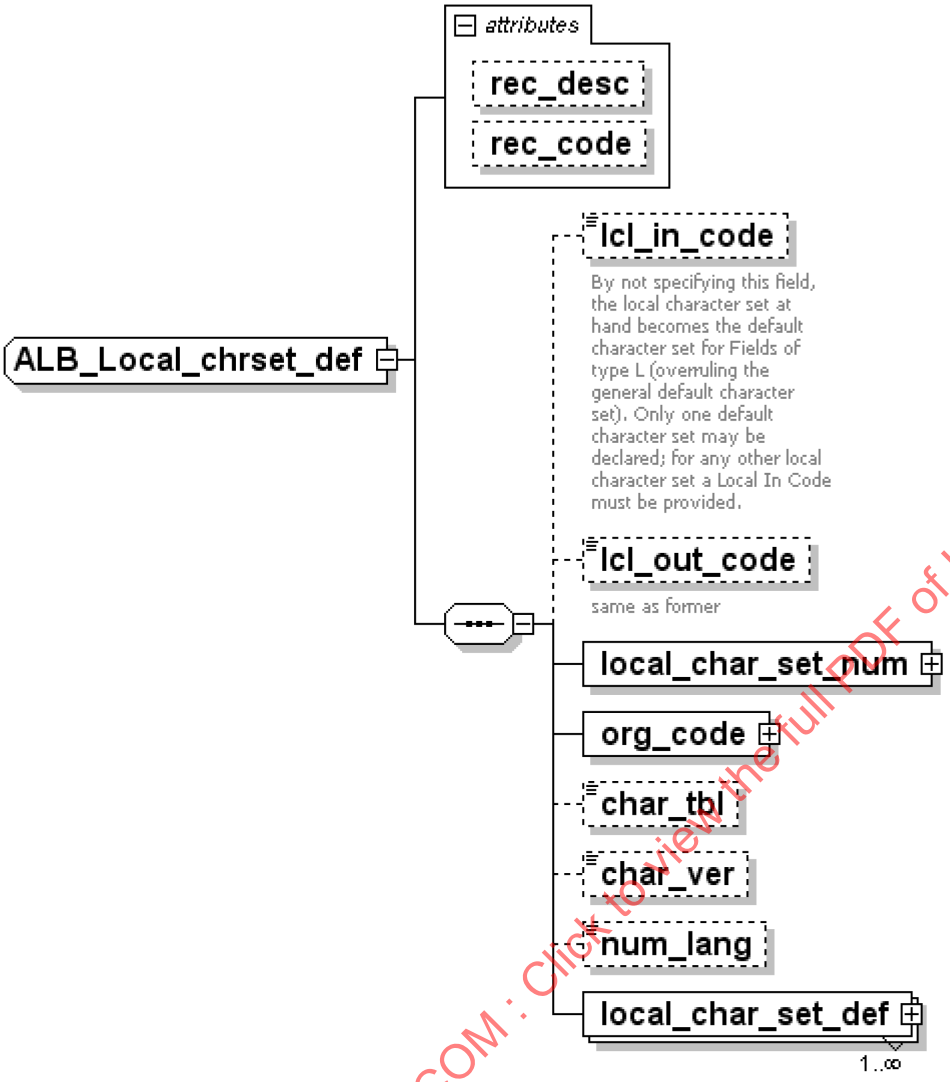



```
<xsd:complexType name="ALB_hdr">
    <xsd:sequence>
        <xsd:element name="short_org_name" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="18"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="standard_name">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="10"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="version">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="4"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="default_char_set" type="Char_set" minOccurs="0">
            <xsd:annotation>
                <xsd:documentation>If not present, default value assumed to be 1 (ISO8859-1
                    (Latin-1))</xsd:documentation>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="album_size" type="xsd:int" minOccurs="0"/>
        <xsd:element name="album_ID" type="Alb_ID"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="1"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
</xsd:complexType>
```

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13.4.23 Local Character Set Definition



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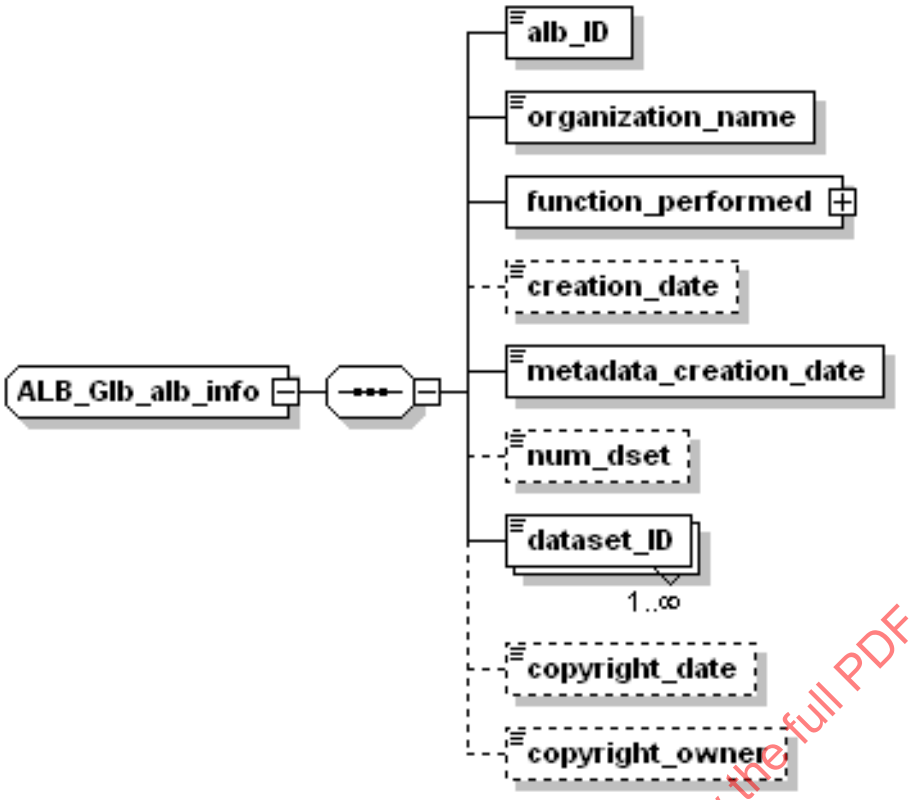
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```
<xsd:complexType name="ALB_Local_chrset_def">
    <xsd:sequence>
        <xsd:element name="lcl_in_code" minOccurs="0">
            <xsd:annotation>
                <xsd:documentation>By not specifying this field, the local character set at hand becomes the
                                    default character set for Fields of type L (overruling the general
default character
                                    set). Only one default character set may be declared; for any other
local character set
                                    a Local In Code shall be provided.</xsd:documentation>
            </xsd:annotation>
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:maxLength value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="lcl_out_code" minOccurs="0">
            <xsd:annotation>
                <xsd:documentation>same as former</xsd:documentation>
            </xsd:annotation>
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:maxLength value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="local_char_set_num" type="Extended_char_set"/>
        <xsd:element name="org_code" type="Cntry_cod"/>
        <xsd:element name="char_tbl" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="char_ver" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="10"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="num_lang" type="Three_digit_int" minOccurs="0"/>
        <xsd:element name="local_char_set_def" type="LC_pair" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="1"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="2"/>
</xsd:complexType>
```

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13.4.24 Global Album Information

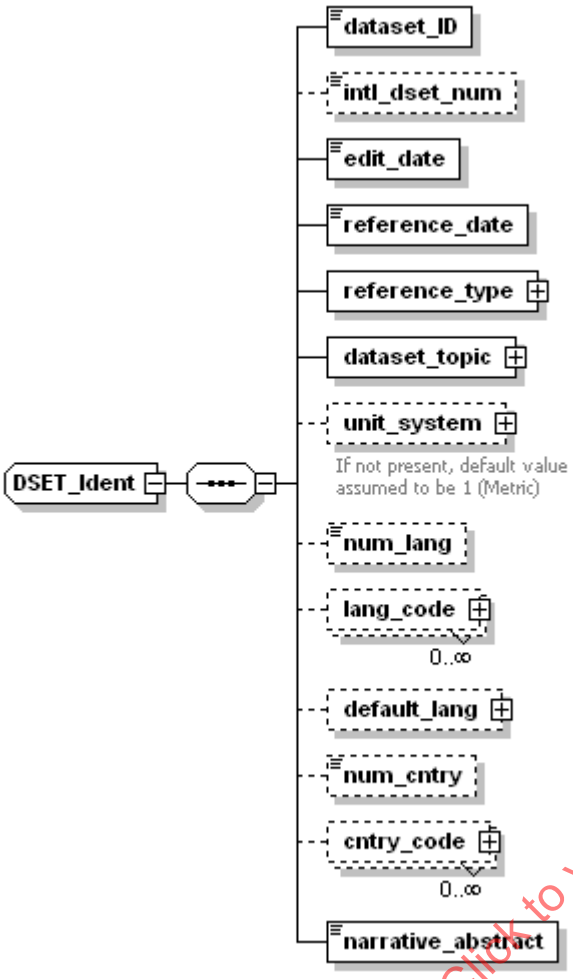



```
<xsd:complexType name="ALB_Glb_alb_info">
    <xsd:sequence>
        <xsd:element name="alb_ID" type="Alb_ID"/>
        <xsd:element name="organization_name">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:maxLength value="40"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="function_performed" type="Role_code"/>
        <xsd:element name="creation_date" type="Eight_digit_t_coord" minOccurs="0"/>
        <xsd:element name="metadata_creation_date" type="Eight_digit_t_coord"/>
        <xsd:element name="num_dset" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="Two_digit_int">
                    <xsd:minInclusive value="1"/>
                    <xsd:maxInclusive value="99"/>
                    <xsd:totalDigits value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="dataset_ID" type="Dset_ID" maxOccurs="unbounded"/>
        <xsd:element name="copyright_date" type="Eight_digit_t_coord" minOccurs="0"/>
        <xsd:element name="copyright_owner" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="1"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
</xsd:complexType>
```

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13.4.25 Dataset Identification



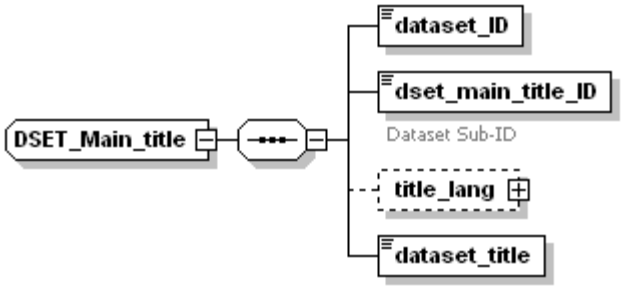

```
<xsd:complexType name="DSET_Ident">
    <xsd:sequence>
        <xsd:element name="dataset_ID" type="Dset_ID"/>
        <xsd:element name="intl_dset_num" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="13"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="edit_date">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="10"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="reference_date">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="10"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="reference_type" type="Ref_type"/>
        <xsd:element name="dataset_topic" type="Topic"/>
        <xsd:element name="unit_system" type="Unit_system" minOccurs="0">
            <xsd:annotation>
                <xsd:documentation>If not present, default value assumed to be 1
                    (Metric)</xsd:documentation>
            </xsd:annotation>
        </xsd:element>
```

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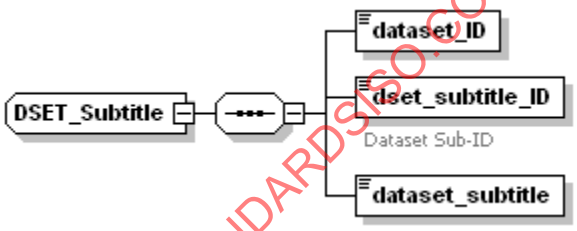
```
            <xsd:element name="num_lang" type="Three_digit_int" minOccurs="0"/>
            <xsd:element name="lang_code" type="Lan_cod" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="default_lang" type="Lan_cod" minOccurs="0"/>
            <xsd:element name="num_cntry" type="xsd:string" minOccurs="0"/>
            <xsd:element name="cntry_code" type="Cntry_cod" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="narrative_abstract" type="xsd:time"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="2"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
    </xsd:complexType>
```

13.4.26 Dataset Main Title




```
    <xsd:complexType name="DSET_Main_title">
        <xsd:sequence>
            <xsd:element name="dataset_ID" type="Dset_ID"/>
            <xsd:element name="dset_main_title_ID" type="Main_title_ID">
                <xsd:annotation>
                    <xsd:documentation>Dataset Sub-ID</xsd:documentation>
                </xsd:annotation>
            </xsd:element>
            <xsd:element name="title_lang" type="Lan_cod" minOccurs="0"/>
            <xsd:element name="dataset_title" type="xsd:string"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="2"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="2"/>
    </xsd:complexType>
```

13.4.27 Dataset Subtitle

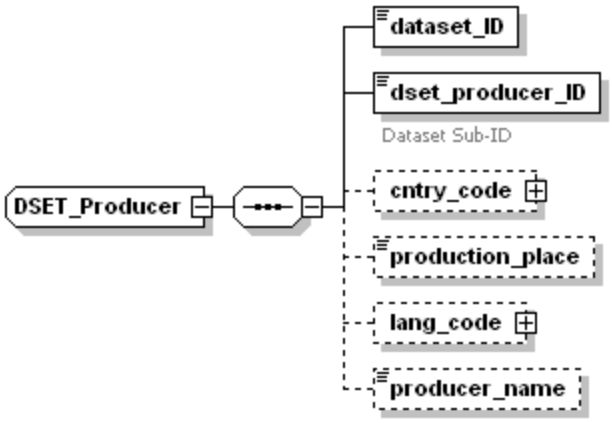



```
    <xsd:complexType name="DSET_Subtitle">
        <xsd:sequence>
            <xsd:element name="dataset_ID" type="Dset_ID"/>
            <xsd:element name="dset_subtitle_ID" type="Dset_subtitle_ID">
                <xsd:annotation>
                    <xsd:documentation>Dataset Sub-ID</xsd:documentation>
                </xsd:annotation>
            </xsd:element>
            <xsd:element name="dataset_subtitle" type="xsd:string"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="2"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
    </xsd:complexType>
```

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13.4.28 Dataset Producer

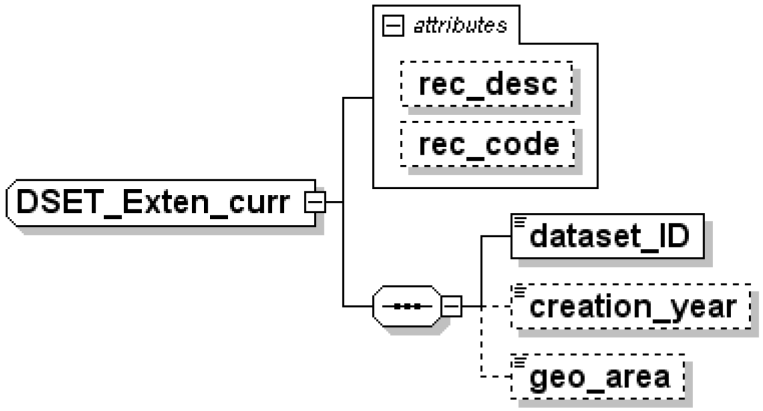



```
<xsd:complexType name="DSET_Producer">
    <xsd:sequence>
        <xsd:element name="dataset_ID" type="Dset_ID"/>
        <xsd:element name="dset_producer_ID" type="Dset_producer_ID">
            <xsd:annotation>
                <xsd:documentation>Dataset Sub-ID</xsd:documentation>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="cntry_code" type="Cntry_cod" minOccurs="0"/>
        <xsd:element name="production_place" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:maxLength value="50"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="lang_code" type="Lan_cod" minOccurs="0"/>
        <xsd:element name="producer_name" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="2"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="4"/>
</xsd:complexType>
```

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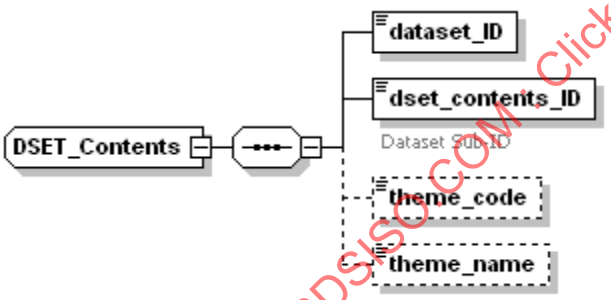
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13.4.29 Dataset Extension Currency




```
<xsd:complexType name="DSET_Exten_curr">
    <xsd:sequence>
        <xsd:element name="dataset_ID" type="Dset_ID"/>
        <xsd:element name="creation_year" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="4"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="geo_area" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="2"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="5"/>
</xsd:complexType>
```

13.4.30 Dataset Contents

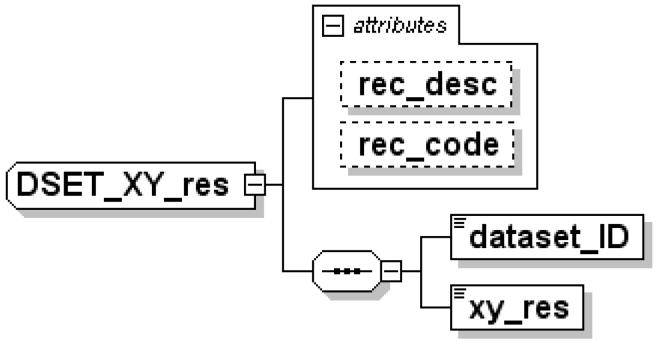



```
<xsd:complexType name="DSET_Contents">
    <xsd:sequence>
        <xsd:element name="dataset_ID" type="Dset_ID"/>
        <xsd:element name="dset_contents_ID" type="Dset_contents_ID">
            <xsd:annotation>
                <xsd:documentation>Dataset Sub-ID</xsd:documentation>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="theme_code" type="Feat_theme_val" minOccurs="0"/>
        <xsd:element name="theme_name" type="Feat_theme_nam" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="2"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="6"/>
</xsd:complexType>
```

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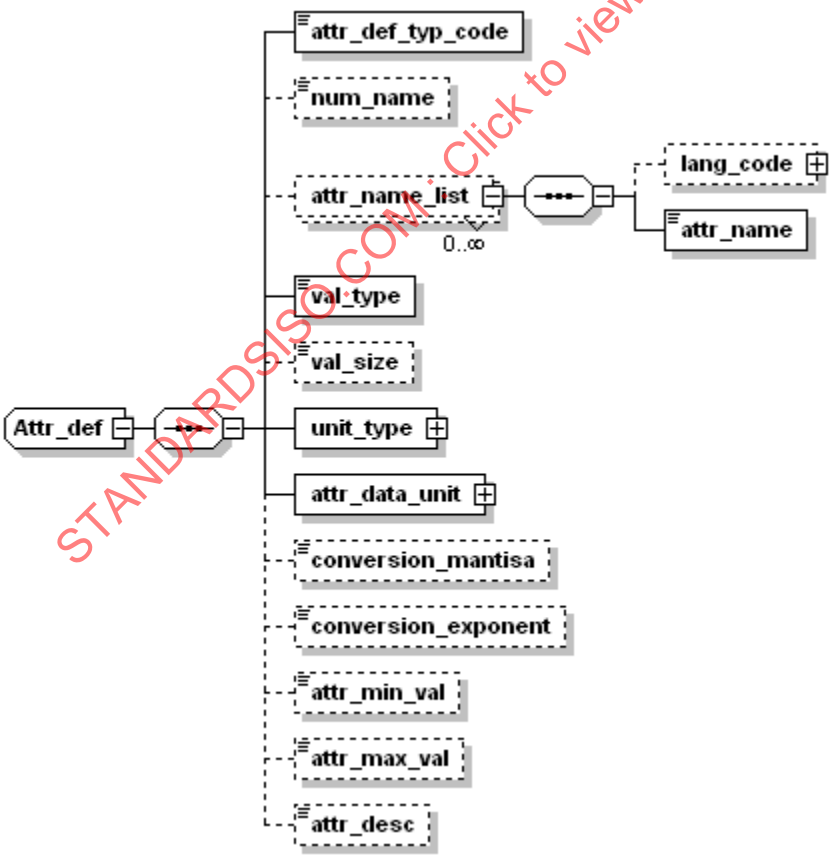
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13.4.31 Dataset XY Resolution




```
<xsd:complexType name="DSET_XY_res">
    <xsd:sequence>
        <xsd:element name="dataset_ID" type="Dset_ID"/>
        <xsd:element name="xy_res">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="3"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="2"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="7"/>
</xsd:complexType>
```

13.4.32 Attribute Definition



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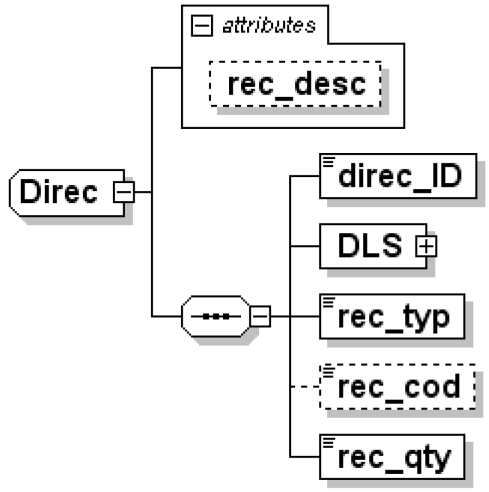
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```
<xsd:complexType name="Attr_def">
    <xsd:sequence>
        <xsd:element name="attr_def_typ_code">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="num_name" type="Field_counter_2dig" minOccurs="0"/>
        <xsd:element name="attr_name_list" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="lang_code" type="Lan_cod" minOccurs="0"/>
                    <xsd:element name="attr_name" type="Name" minOccurs="0"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="val_type">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:enumeration value="G"/>
                    <xsd:enumeration value="A"/>
                    <xsd:enumeration value="N"/>
                    <xsd:enumeration value="I"/>
                    <xsd:enumeration value="AN"/>
                    <xsd:enumeration value="L"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="val_size" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:minInclusive value="1"/>
                    <xsd:maxInclusive value="11"/>
                    <xsd:totalDigits value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="unit_type" type="Attr_data_type"/>
        <xsd:element name="attr_data_unit" type="Attr_data_unit"/>
        <xsd:element name="conversion_mantisa" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="Eleven_digit_int">
                    <xsd:minInclusive value="1"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="conversion_exponent" type="One_digit_signed_int" minOccurs="0"/>
        <xsd:element name="attr_min_val" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="11"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="attr_max_val" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="11"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="attr_desc" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="5"/>
</xsd:complexType>
```

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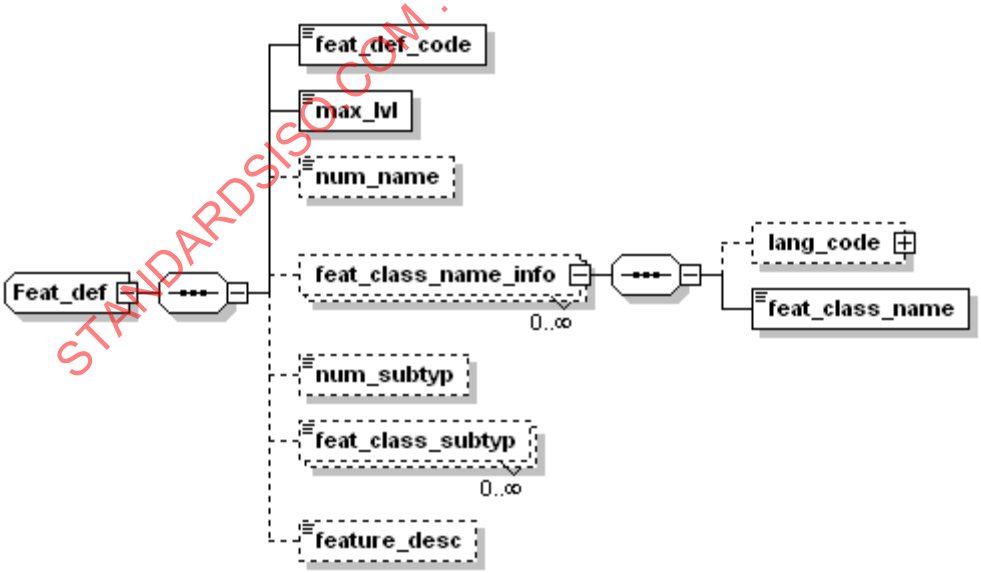
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13.4.33 Directory




```
<xsd:complexType name="Direc">
    <xsd:sequence>
        <xsd:element name="direc_ID" type="Direc_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="rec_type" type="Record_type_value"/>
        <xsd:element name="rec_code" type="Rec_subtyp" minOccurs="0"/>
        <xsd:element name="rec_qty">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="8"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="6"/>
</xsd:complexType>
```

13.4.34 Feature Definition

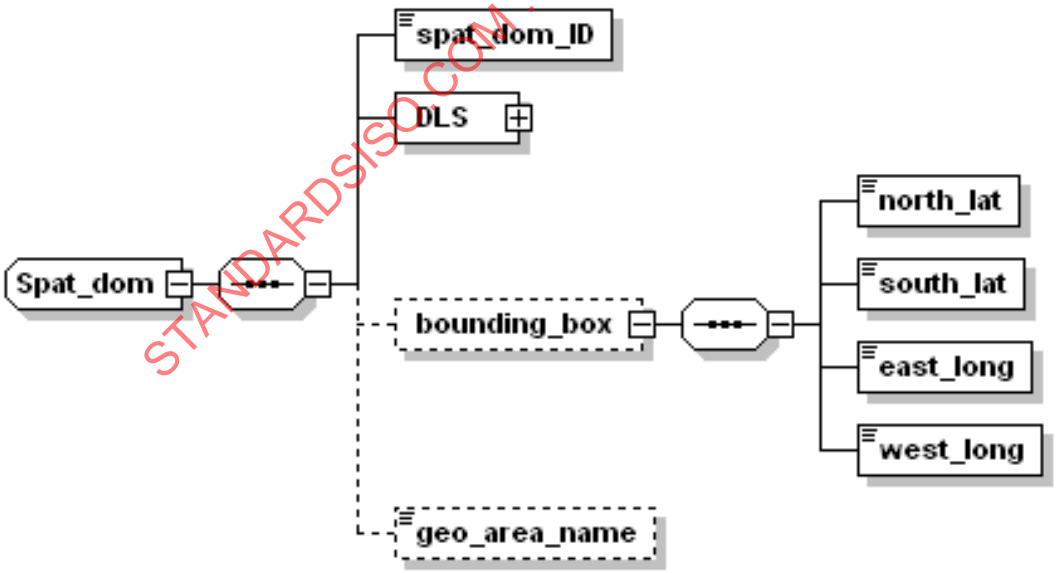


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```
<xsd:complexType name="Feat_def">
    <xsd:sequence>
        <xsd:element name="feat_def_code">
            <xsd:simpleType>
                <xsd:restriction base="Four_digit_code">
                    <xsd:minInclusive value="1100"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="max_lvl">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:minInclusive value="1"/>
                    <xsd:maxInclusive value="99"/>
                    <xsd:totalDigits value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="num_name" type="Field_counter_2dig" minOccurs="0"/>
        <xsd:element name="feat_class_name_info" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="lang_code" type="Lan_cod" minOccurs="0"/>
                    <xsd:element name="feat_class_name" type="Name"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_subtyp" type="Three_digit_int" minOccurs="0"/>
        <xsd:element name="feat_class_subtyp" minOccurs="0" maxOccurs="unbounded">
            <xsd:simpleType>
                <xsd:restriction base="Four_digit_code">
                    <xsd:minInclusive value="7100"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="feature_desc" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="7"/>
</xsd:complexType>
```

13.4.35 Spatial Domain



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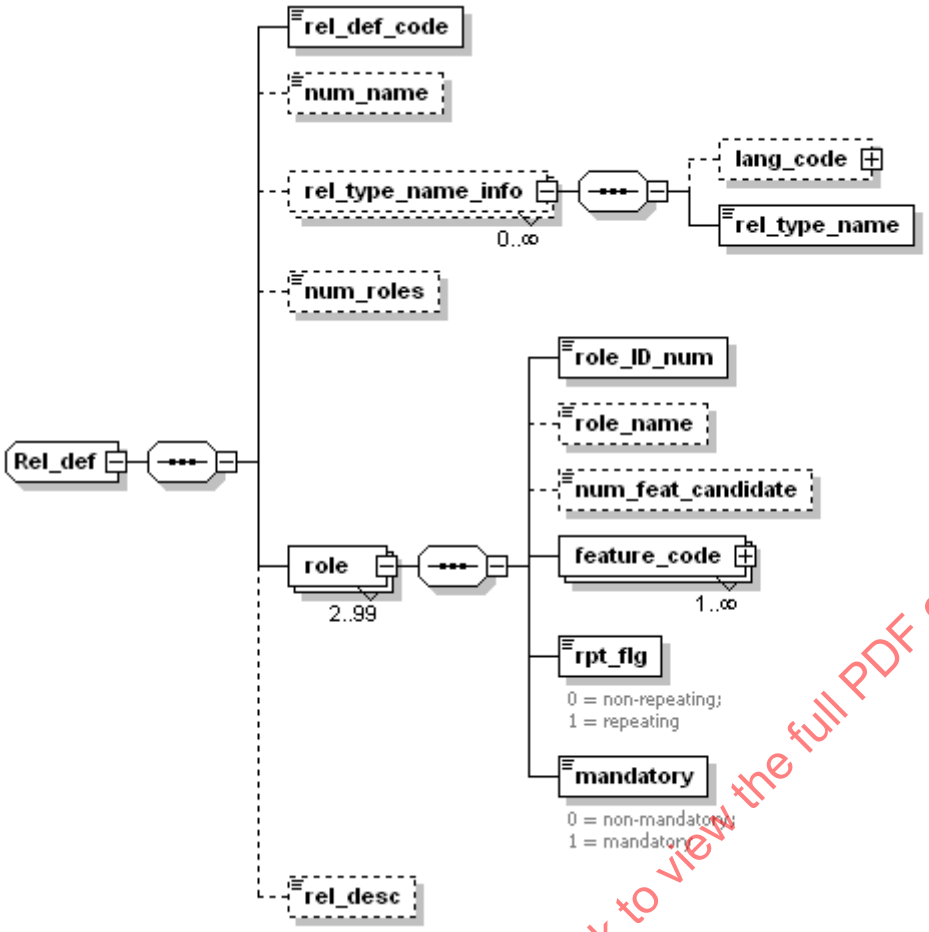
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```
<xsd:complexType name="Spat_dom">
    <xsd:sequence>
        <xsd:element name="spat_dom_ID" type="Spat_dom_ID"/>
        <xsd:element name="DLS" type="DLS_ID"/>
        <xsd:element name="bounding_box" minOccurs="0">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="north_lat">
                        <xsd:simpleType>
                            <xsd:restriction base="xsd:integer">
                                <xsd:minInclusive value="-90000"/>
                                <xsd:maxInclusive value="+90000"/>
                                <xsd:totalDigits value="7"/>
                            </xsd:restriction>
                        </xsd:simpleType>
                    </xsd:element>
                    <xsd:element name="south_lat">
                        <xsd:simpleType>
                            <xsd:restriction base="xsd:integer">
                                <xsd:minInclusive value="-90000"/>
                                <xsd:maxInclusive value="+90000"/>
                                <xsd:totalDigits value="7"/>
                            </xsd:restriction>
                        </xsd:simpleType>
                    </xsd:element>
                    <xsd:element name="east_long">
                        <xsd:simpleType>
                            <xsd:restriction base="xsd:integer">
                                <xsd:minInclusive value="-180000"/>
                                <xsd:maxInclusive value="+180000"/>
                                <xsd:totalDigits value="7"/>
                            </xsd:restriction>
                        </xsd:simpleType>
                    </xsd:element>
                    <xsd:element name="west_long">
                        <xsd:simpleType>
                            <xsd:restriction base="xsd:integer">
                                <xsd:minInclusive value="-180000"/>
                                <xsd:maxInclusive value="+180000"/>
                                <xsd:totalDigits value="7"/>
                            </xsd:restriction>
                        </xsd:simpleType>
                    </xsd:element>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="geo_area_name" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="8"/>
</xsd:complexType>
```

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13.4.36 Relationship Definition



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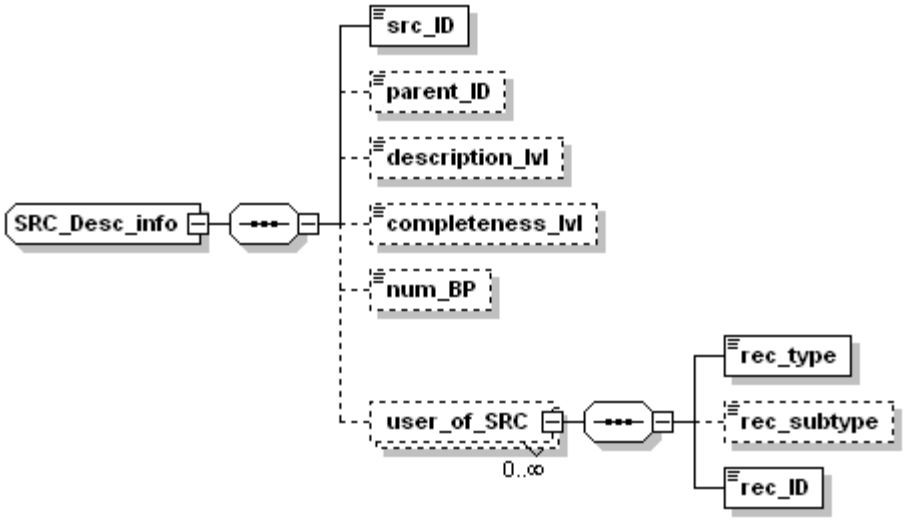
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```
<xsd:complexType name="Rel_def">
    <xsd:sequence>
        <xsd:element name="rel_def_code">
            <xsd:simpleType>
                <xsd:restriction base="Four_digit_code">
                    <xsd:minInclusive value="1000"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="num_name" type="Field_counter_2dig" minOccurs="0"/>
        <xsd:element name="rel_type_name_info" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="lang_code" type="Lan_cod" minOccurs="0"/>
                    <xsd:element name="rel_type_name" type="Name"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="num_roles" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="Two_digit_int">
                    <xsd:minInclusive value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="role" minOccurs="2" maxOccurs="99">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="role_ID_num">
                        <xsd:simpleType>
                            <xsd:restriction base="Two_digit_int">
                                <xsd:minInclusive value="1"/>
                            </xsd:restriction>
                        </xsd:simpleType>
                    </xsd:element>
                    <xsd:element name="role_name" type="Name" minOccurs="0"/>
                    <xsd:element name="num_feat_candidate" minOccurs="0">
                        <xsd:simpleType>
                            <xsd:restriction base="xsd:integer">
                                <xsd:minInclusive value="1"/>
                                <xsd:maxInclusive value="99"/>
                            </xsd:restriction>
                        </xsd:simpleType>
                    </xsd:element>
                    <xsd:element name="feature_code" type="Feat_code" maxOccurs="unbounded"/>
                    <xsd:element name="rpt_flg" type="xsd:boolean">
                        <xsd:annotation>
                            <xsd:documentation>0 = non-repeating;          1 =
repeating</xsd:documentation>
                        </xsd:annotation>
                    </xsd:element>
                    <xsd:element name="mandatory" type="xsd:boolean">
                        <xsd:annotation>
                            <xsd:documentation>0 = non-mandatory;          1 =
mandatory</xsd:documentation>
                        </xsd:annotation>
                    </xsd:element>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="rel_desc" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="9"/>
</xsd:complexType>
```

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13.4.37 Description Info

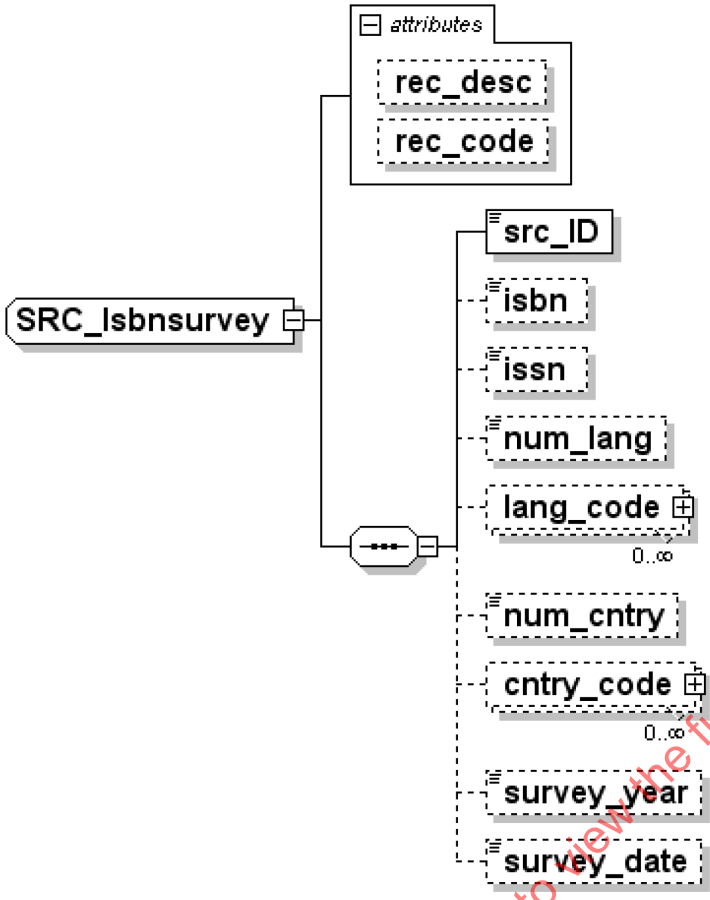



```
<xsd:complexType name="SRC_Desc_info">
    <xsd:sequence>
        <xsd:element name="src_ID" type="Src_desc_ID"/>
        <xsd:element name="parent_ID" type="Src_desc_ID" minOccurs="0"/>
        <xsd:element name="description_lvl" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:minInclusive value="1"/>
                    <xsd:maxInclusive value="4"/>
                    <xsd:totalDigits value="1"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="completeness_lvl" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:minInclusive value="1"/>
                    <xsd:maxInclusive value="1"/>
                    <xsd:totalDigits value="1"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="num_BP" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="user_of_SRC" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="rec_type" type="Record_type_val_reduced"/>
                    <xsd:element name="rec_subtype" type="Rec_subtyp" minOccurs="0"/>
                    <xsd:element name="rec_ID" type="Rec_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
</xsd:complexType>
```

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13.4.38 ISBN & Survey



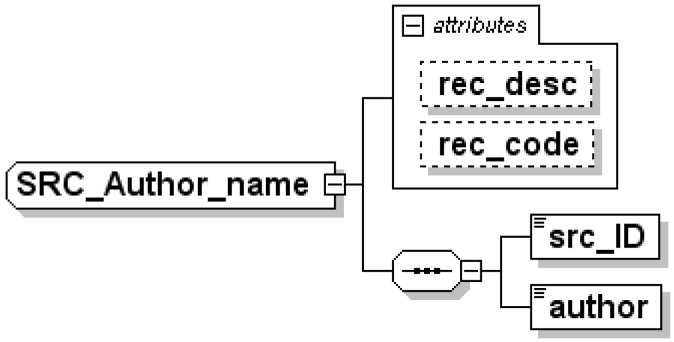

```
<xsd:complexType name="SRC_Isbnsurvey">
    <xsd:sequence>
        <xsd:element name="src_ID" type="Src_desc_ID"/>
        <xsd:element name="isbn" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="13"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="issn" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="10"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="num_lang" type="Three_digit_int" minOccurs="0"/>
        <xsd:element name="lang_code" type="Lan_cod" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_cntry" type="Three_digit_int" minOccurs="0"/>
        <xsd:element name="cntry_code" type="Cntry_cod" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="survey_year" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="4"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="survey_date" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="6"/>
                </xsd:restriction>
            </xsd:simpleType>
```

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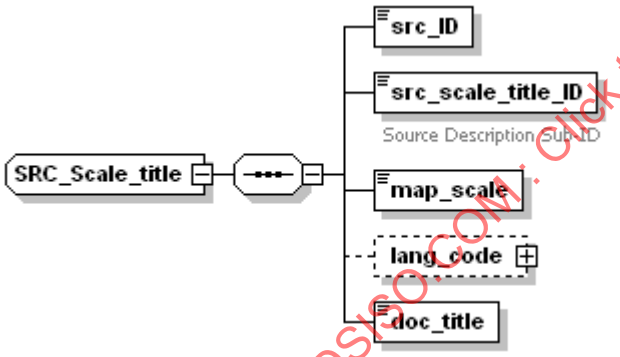
```
            </xsd:element>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="2"/>
    </xsd:complexType>
```

13.4.39 Author Name




```
    <xsd:complexType name="SRC_Author_name">
        <xsd:sequence>
            <xsd:element name="src_ID" type="Src_desc_ID"/>
            <xsd:element name="author" type="xsd:string"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
    </xsd:complexType>
```

13.4.40 Scale & Title

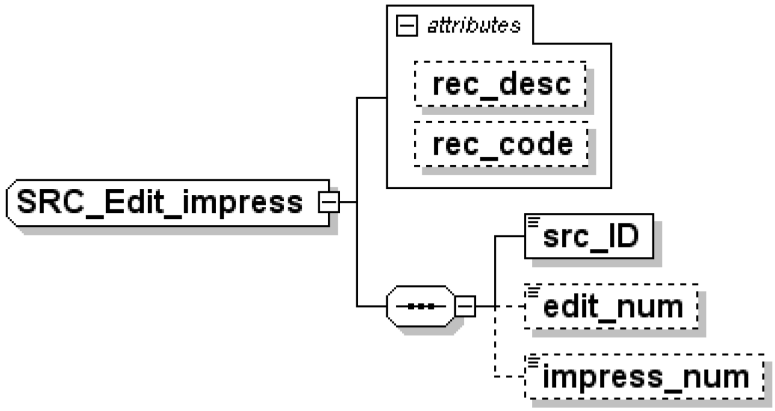



```
    <xsd:complexType name="SRC_Scale_title">
        <xsd:sequence>
            <xsd:element name="src_ID" type="Src_desc_ID"/>
            <xsd:element name="src_scale_title_ID" type="Src_scale_title_ID">
                <xsd:annotation>
                    <xsd:documentation>Source Description Sub-ID</xsd:documentation>
                </xsd:annotation>
            </xsd:element>
            <xsd:element name="map_scale">
                <xsd:simpleType>
                    <xsd:restriction base="xsd:integer">
                        <xsd:minInclusive value="1"/>
                        <xsd:maxInclusive value="9999999"/>
                    </xsd:restriction>
                </xsd:simpleType>
            </xsd:element>
            <xsd:element name="lang_code" type="Lan_cod" minOccurs="0"/>
            <xsd:element name="doc_title" type="xsd:string"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="4"/>
    </xsd:complexType>
```

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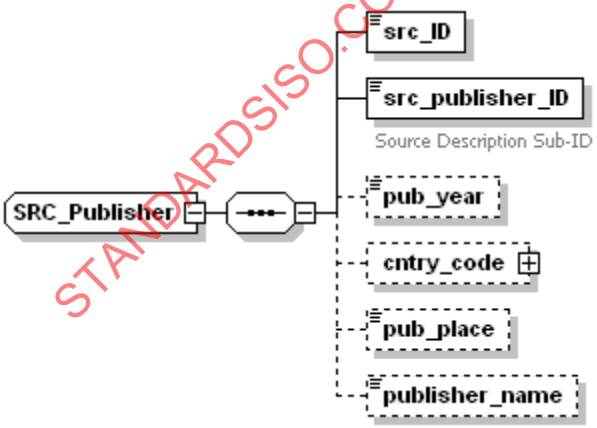
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13.4.41 Edit & Impression




```
<xsd:complexType name="SRC_Edit_impress">
    <xsd:sequence>
        <xsd:element name="src_ID" type="Src_desc_ID"/>
        <xsd:element name="edit_num" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="impress_num" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="6"/>
</xsd:complexType>
```

13.4.42 Publisher



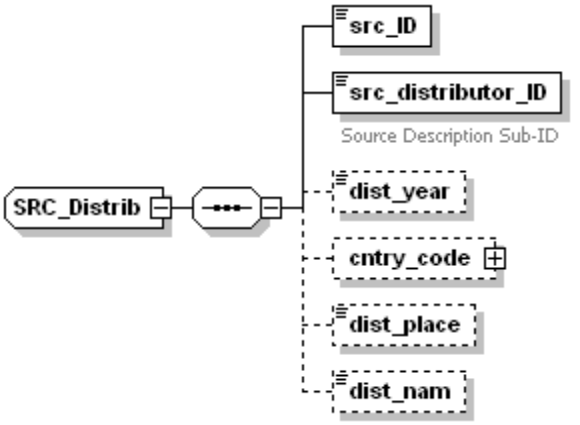

```
<xsd:complexType name="SRC_Publisher">
    <xsd:sequence>
        <xsd:element name="src_ID" type="Src_desc_ID"/>
        <xsd:element name="src_publisher_ID" type="Src_publisher_ID">
            <xsd:annotation>
                <xsd:documentation>Source Description Sub-ID</xsd:documentation>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="pub_year" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
```

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```
                                        <xsd:totalDigits value="4"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:element>
                <xsd:element name="cntry_code" type="Cntry_cod" minOccurs="0"/>
                <xsd:element name="pub_place" minOccurs="0">
                        <xsd:simpleType>
                                <xsd:restriction base="xsd:string">
                                        <xsd:maxLength value="50"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:element>
                <xsd:element name="publisher_name" type="xsd:string" minOccurs="0"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="7"/>
</xsd:complexType>
```

13.4.43 Distribution

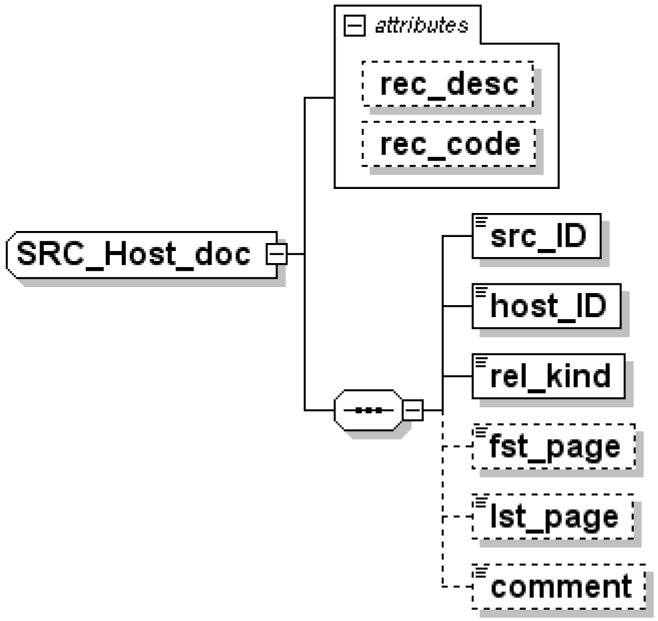



```
<xsd:complexType name="SRC_Distrib">
        <xsd:sequence>
                <xsd:element name="src_ID" type="Src_desc_ID"/>
                <xsd:element name="src_distributor_ID" type="Src_distributor_ID">
                        <xsd:annotation>
                                <xsd:documentation>Source Description Sub-ID</xsd:documentation>
                        </xsd:annotation>
                </xsd:element>
                <xsd:element name="dist_year" minOccurs="0">
                        <xsd:simpleType>
                                <xsd:restriction base="xsd:integer">
                                        <xsd:totalDigits value="4"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:element>
                <xsd:element name="cntry_code" type="Cntry_cod" minOccurs="0"/>
                <xsd:element name="dist_place" minOccurs="0">
                        <xsd:simpleType>
                                <xsd:restriction base="xsd:string">
                                        <xsd:length value="20"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:element>
                <xsd:element name="dist_nam" type="xsd:string" minOccurs="0"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
        <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="8"/>
</xsd:complexType>
```

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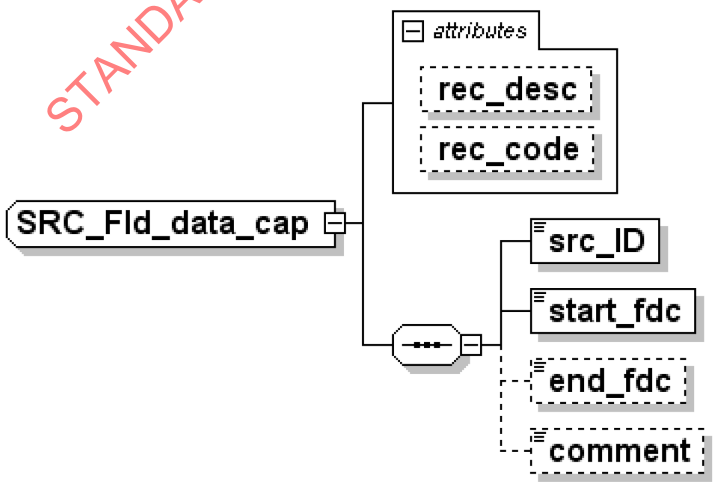
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13.4.44 Host Document




```
<xsd:complexType name="SRC_Host_doc">
    <xsd:sequence>
        <xsd:element name="src_ID" type="Src_desc_ID"/>
        <xsd:element name="host_ID" type="Five_digit_ID"/>
        <xsd:element name="rel_kind" type="Rel_kind"/>
        <xsd:element name="fst_page" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer"/>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="lst_page" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer"/>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="comment" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="9"/>
</xsd:complexType>
```

13.4.45 Field Data Capturing

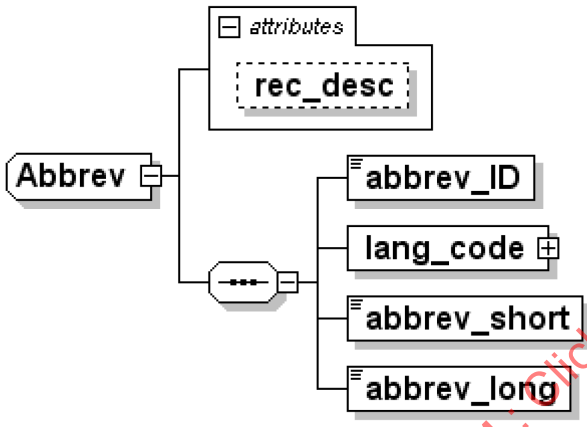


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```
<xsd:complexType name="SRC_Fld_data_cap">
    <xsd:sequence>
        <xsd:element name="src_ID" type="Src_desc_ID"/>
        <xsd:element name="start_fdc">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="8"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="end_fdc" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="8"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="comment" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="14"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="10"/>
</xsd:complexType>
```

13.4.46 Abbreviation

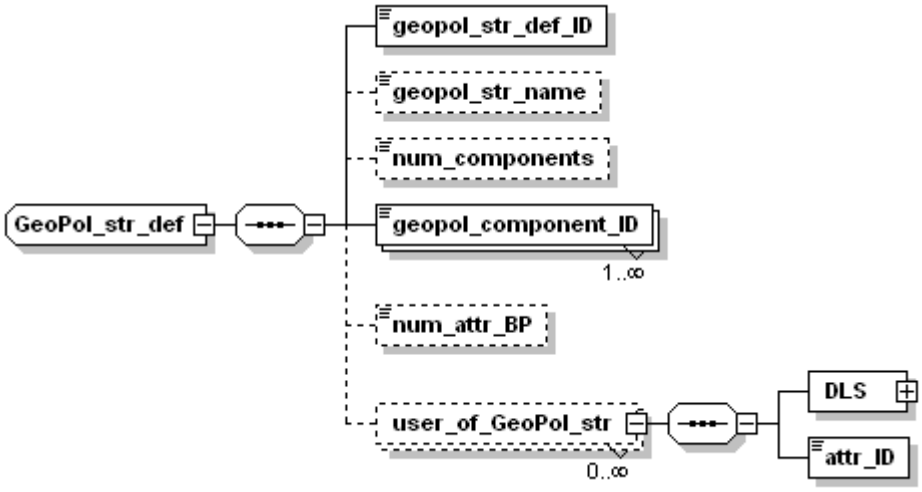



```
<xsd:complexType name="Abbrev">
    <xsd:sequence>
        <xsd:element name="abbrev_ID" type="Abbrev_ID"/>
        <xsd:element name="lang_code" type="Lan_cod"/>
        <xsd:element name="abbrev_short">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:maxLength value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="abbrev_long">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:maxLength value="50"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="13"/>
</xsd:complexType>
```

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13.4.47 Geopolitical Structure Definition

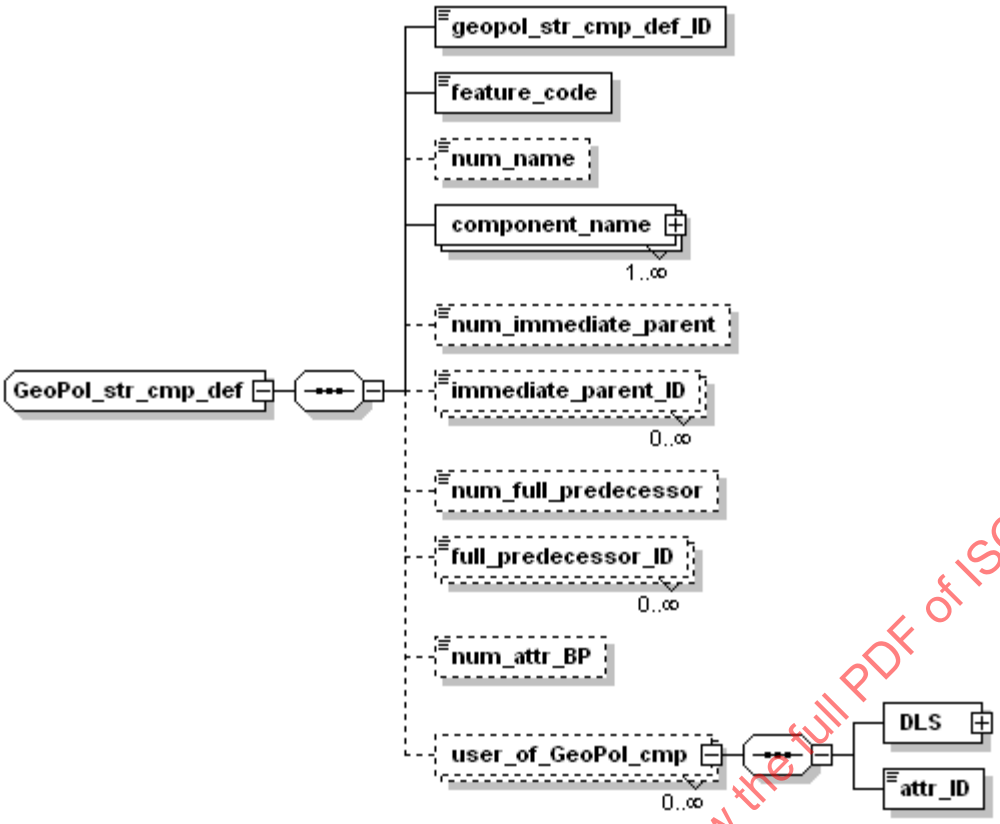



```
<xsd:complexType name="GeoPol_str_def">
    <xsd:sequence>
        <xsd:element name="geopol_str_def_ID" type="GeoPol_str_def_ID"/>
        <xsd:element name="geopol_str_name" type="Name" minOccurs="0"/>
        <xsd:element name="num_components" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="Field_counter_2dig">
                    <xsd:minInclusive value="1"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="geopol_component_ID" type="GeoPol_str_cmp_def_ID" maxOccurs="unbounded"/>
        <xsd:element name="num_attr_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="user_of_GeoPol_str" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="DLS" type="Optional_DLS_ID"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="10"/>
</xsd:complexType>
```

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13.4.48 Geopolitical Structure Component Definition

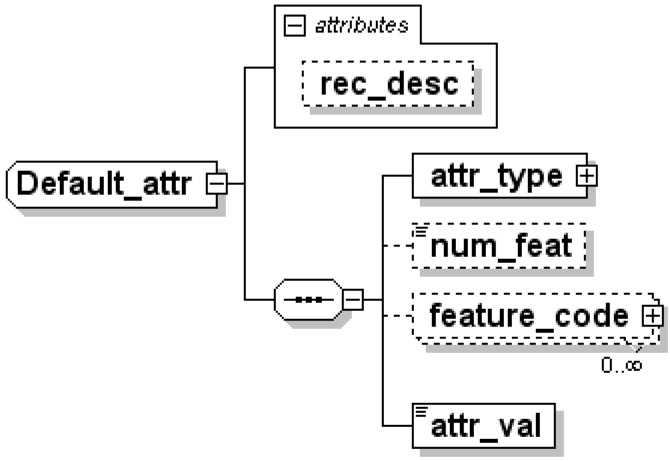



```
<xsd:complexType name="GeoPol_str_cmp_def">
    <xsd:sequence>
        <xsd:element name="geopol_str_cmp_def_ID" type="GeoPol_str_cmp_def_ID"/>
        <xsd:element name="feature_code">
            <xsd:simpleType>
                <xsd:restriction base="Feature_code_value">
                    <xsd:minInclusive value="1100"/>
                    <xsd:maxInclusive value="3199"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="num_name" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="Field_counter_2dig">
                    <xsd:minInclusive value="1"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="component_name" type="Lang_Name_pair" maxOccurs="unbounded"/>
        <xsd:element name="num_immediate_parent" type="Field_counter_2dig" minOccurs="0"/>
        <xsd:element name="immediate_parent_ID" type="GeoPol_str_cmp_def_ID" minOccurs="0"
                                                    maxOccurs="unbounded"/>
        <xsd:element name="num_full_predecessor" type="Field_counter_2dig" minOccurs="0"/>
        <xsd:element name="full_predecessor_ID" type="GeoPol_str_cmp_def_ID" minOccurs="0"
                                                    maxOccurs="unbounded"/>
        <xsd:element name="num_attr_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="user_of_GeoPol_cmp" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="DLS" type="Optional_DLS_ID"/>
                    <xsd:element name="attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="11"/>
</xsd:complexType>
```

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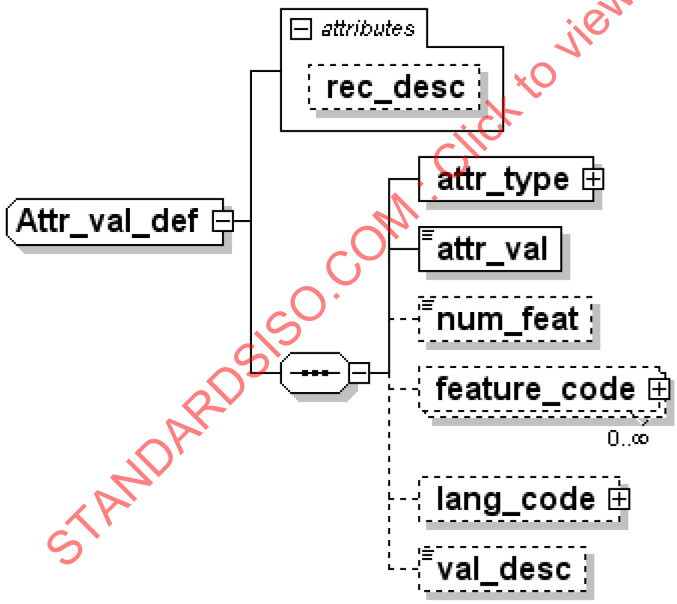
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13.4.49 Default Attribute




```
<xsd:complexType name="Default_attr">
    <xsd:sequence>
        <xsd:element name="attr_type" type="Attr_type_code"/>
        <xsd:element name="num_feat" type="Field_counter_5dig" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="attr_val" type="Attr_val_string"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="15"/>
</xsd:complexType>
```

13.4.50 Attribute Value Definition

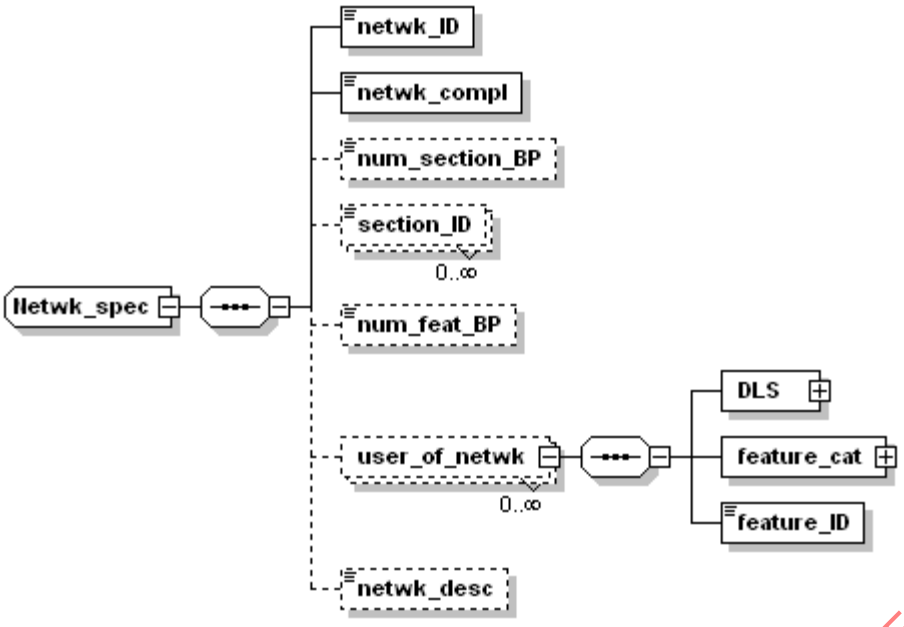



```
<xsd:complexType name="Attr_val_def">
    <xsd:sequence>
        <xsd:element name="attr_type" type="Attr_type_code"/>
        <xsd:element name="attr_val" type="Attr_val_string"/>
        <xsd:element name="num_feat" type="Field_counter_5dig" minOccurs="0"/>
        <xsd:element name="feature_code" type="Feat_code" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="lang_code" type="Lan_cod" minOccurs="0"/>
        <xsd:element name="val_desc" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="18"/>
</xsd:complexType>
```

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13.4.51 Network Specification

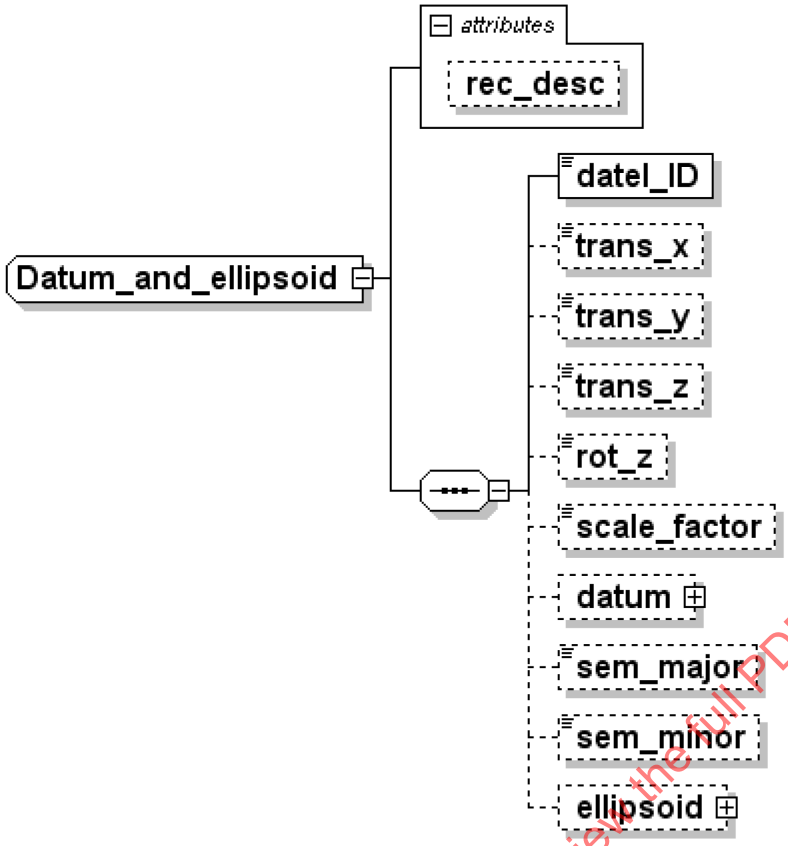



```
<xsd:complexType name="Netwk_spec">
    <xsd:sequence>
        <xsd:element name="netwk_ID" type="Five_digit_ID"/>
        <xsd:element name="netwk_compl" type="One_digit_int"/>
        <xsd:element name="num_section_BP" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="section_ID" type="Sect_ID" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="num_feat_BP" type="Ten_digit_int" minOccurs="0"/>
        <xsd:element name="user_of_netwk" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="DLS" type="DLS_ID"/>
                    <xsd:element name="feature_cat" type="Feat_cat"/>
                    <xsd:element name="feature_ID" type="Feature_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="netwk_desc" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="19"/>
</xsd:complexType>
```

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13.4.52 Datum & Ellipsoid

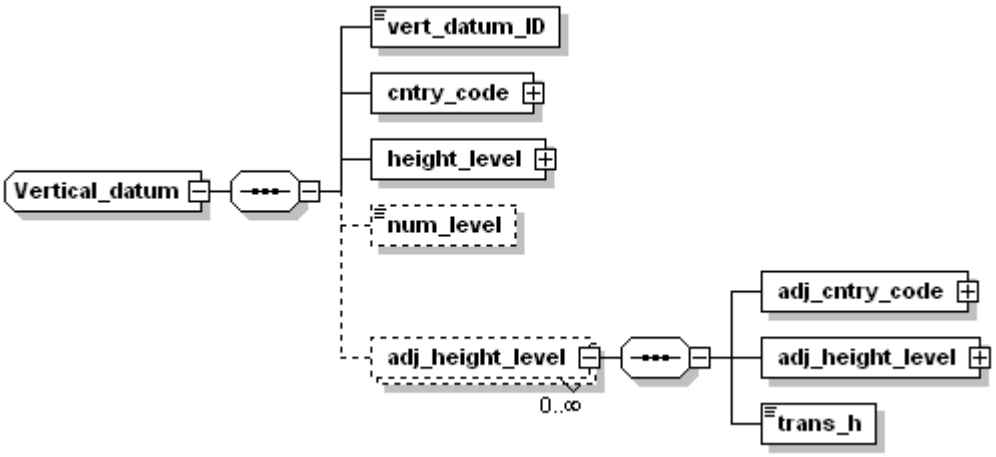



```
<xsd:complexType name="Datum_and_ellipsoid">
    <xsd:sequence>
            <xsd:element name="datel_ID" type="Datel_ID"/>
            <xsd:element name="trans_x" type="Four_digit_signed_int" minOccurs="0"/>
            <xsd:element name="trans_y" type="Four_digit_signed_int" minOccurs="0"/>
            <xsd:element name="trans_z" type="Four_digit_signed_int" minOccurs="0"/>
            <xsd:element name="rot_z" minOccurs="0">
                <xsd:simpleType>
                    <xsd:restriction base="xsd:integer">
                        <xsd:minInclusive value="0"/>
                        <xsd:maxInclusive value="+40000000"/>
                        <xsd:totalDigits value="9"/>
                    </xsd:restriction>
                </xsd:simpleType>
            </xsd:element>
            <xsd:element name="scale_factor" type="Four_digit_signed_int" minOccurs="0"/>
            <xsd:element name="datum" type="Datum" minOccurs="0"/>
            <xsd:element name="sem_major" type="Eight_digit_int" minOccurs="0"/>
            <xsd:element name="sem_minor" type="Eight_digit_int" minOccurs="0"/>
            <xsd:element name="ellipsoid" type="Ellips_code" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="61"/>
</xsd:complexType>
```

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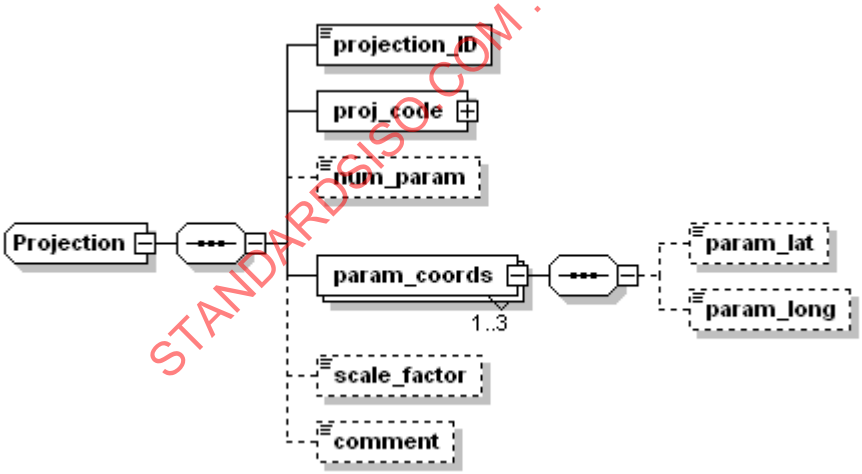
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13.4.53 Vertical Datum




```
<xsd:complexType name="Vertical_datum">
    <xsd:sequence>
        <xsd:element name="vert_datum_ID" type="Vert_datum_ID"/>
        <xsd:element name="cntry_code" type="Cntry_cod"/>
        <xsd:element name="height_level" type="Vert_datum"/>
        <xsd:element name="num_level" type="Two_digit_ID" minOccurs="0"/>
        <xsd:element name="adj_height_level" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="adj_cntry_code" type="Cntry_cod"/>
                    <xsd:element name="adj_height_level" type="Vert_datum"/>
                    <xsd:element name="trans_h" type="Four_digit_signed_int"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="62"/>
</xsd:complexType>
```

13.4.54 Projection



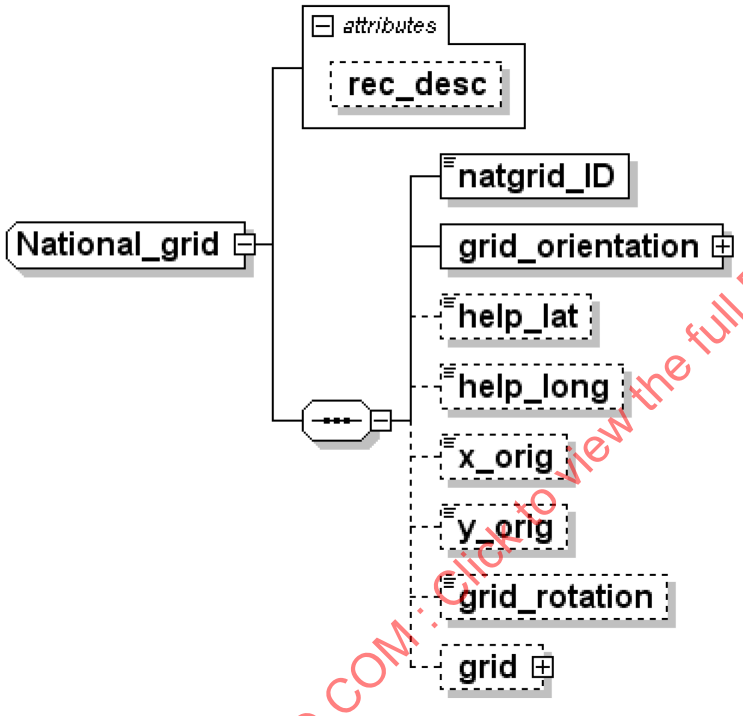

```
<xsd:complexType name="Projection">
    <xsd:sequence>
        <xsd:element name="projection_ID" type="Projection_ID"/>
        <xsd:element name="proj_code" type="Proj_code"/>
        <xsd:element name="num_param" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:minInclusive value="1"/>
                    <xsd:maxInclusive value="3"/>
                    <xsd:totalDigits value="2"/>
                </xsd:restriction>
            </xsd:simpleType>
```

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```
            </xsd:element>
            <xsd:element name="param_coords" maxOccurs="3">
                <xsd:complexType>
                    <xsd:sequence>
                        <xsd:element name="param_lat" type="Ten_digit_lat" minOccurs="0"/>
                        <xsd:element name="param_long" type="Ten_digit_long" minOccurs="0"/>
                    </xsd:sequence>
                </xsd:complexType>
            </xsd:element>
            <xsd:element name="scale_factor" type="Four_digit_signed_int" default="0" minOccurs="0"/>
            <xsd:element name="comment" type="xsd:string" minOccurs="0"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="63"/>
    </xsd:complexType>
```

13.4.55 National Grid

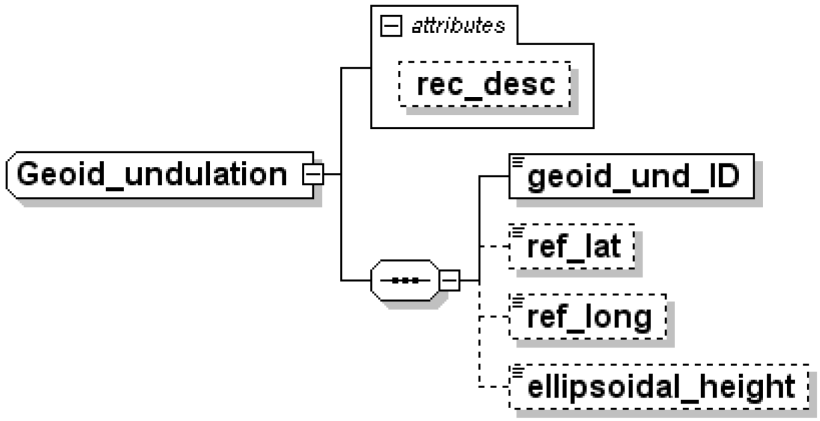



```
    <xsd:complexType name="National_grid">
        <xsd:sequence>
            <xsd:element name="natgrid_ID" type="Natgrid_ID"/>
            <xsd:element name="grid_orientation" type="Grid_ort"/>
            <xsd:element name="help_lat" type="Ten_digit_lat" minOccurs="0"/>
            <xsd:element name="help_long" type="Ten_digit_long" minOccurs="0"/>
            <xsd:element name="x_orig" type="Nine_digit_signed_int" minOccurs="0"/>
            <xsd:element name="y_orig" type="Nine_digit_signed_int" minOccurs="0"/>
            <xsd:element name="grid_rotation" minOccurs="0">
                <xsd:simpleType>
                    <xsd:restriction base="xsd:integer">
                        <xsd:minInclusive value="0"/>
                        <xsd:maxInclusive value="+400000000"/>
                        <xsd:totalDigits value="10"/>
                    </xsd:restriction>
                </xsd:simpleType>
            </xsd:element>
            <xsd:element name="grid" type="Grid" minOccurs="0"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="64"/>
    </xsd:complexType>
```

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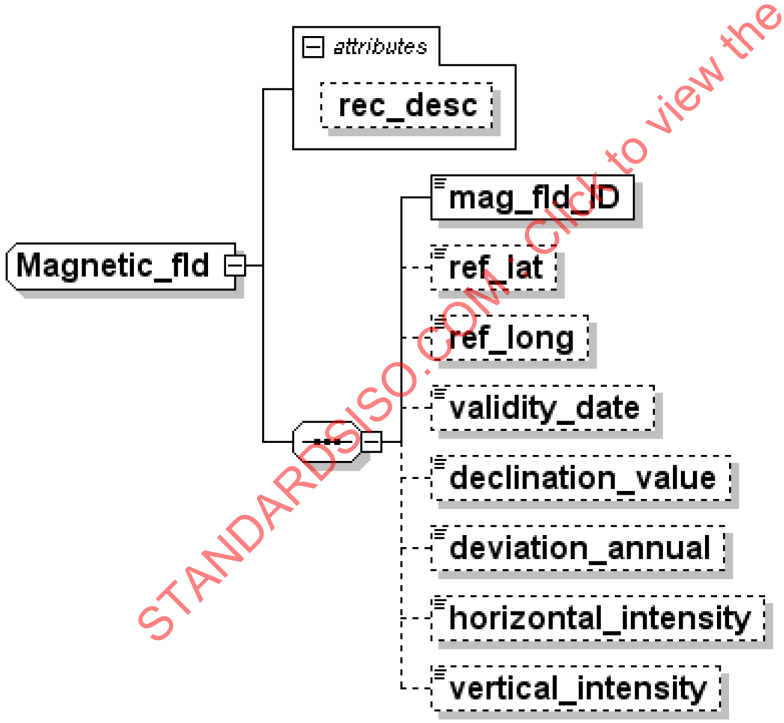
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13.4.56 Geoid Undulation




```
<xsd:complexType name="Geoid_undulation">
    <xsd:sequence>
        <xsd:element name="geoid_und_ID" type="Geoid_und_ID"/>
        <xsd:element name="ref_lat" type="Ten_digit_lat" minOccurs="0"/>
        <xsd:element name="ref_long" type="Ten_digit_long" minOccurs="0"/>
        <xsd:element name="ellipsoidal_height" type="Four_digit_signed_int" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="65"/>
</xsd:complexType>
```

13.4.57 Earth Magnetic Field



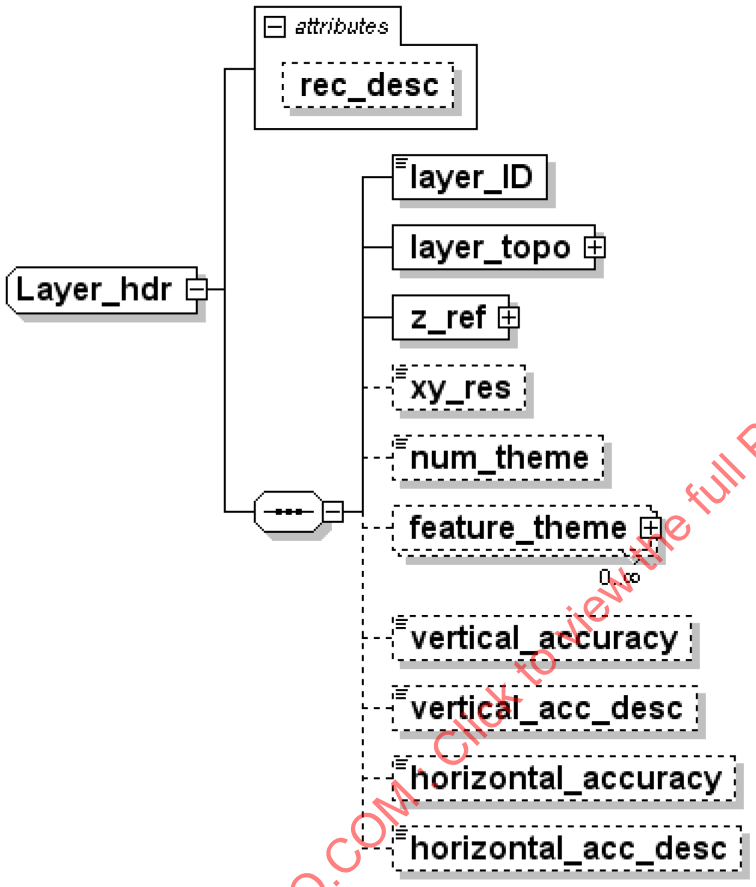

```
<xsd:complexType name="Magnetic_fld">
    <xsd:sequence>
        <xsd:element name="mag_fld_ID" type="Mag_fld_ID"/>
        <xsd:element name="ref_lat" type="Ten_digit_lat" minOccurs="0"/>
        <xsd:element name="ref_long" type="Ten_digit_long" minOccurs="0"/>
        <xsd:element name="validity_date" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:integer">
                    <xsd:totalDigits value="8"/>
                    <xsd:minInclusive value="10000101"/>
                    <xsd:maxInclusive value="99991231"/>
                </xsd:restriction>
            </xsd:simpleType>
```

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```
            </xsd:element>
            <xsd:element name="declination_value" type="Declination" minOccurs="0"/>
            <xsd:element name="deviation_annual" type="Declination" minOccurs="0"/>
            <xsd:element name="horizontal_intensity" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="vertical_intensity" type="Five_digit_int" minOccurs="0"/>
        </xsd:sequence>
        <xsd:attribute name="rec_desc" type="Rec_typ" fixed="66"/>
    </xsd:complexType>
```

13.4.58 Layer Header

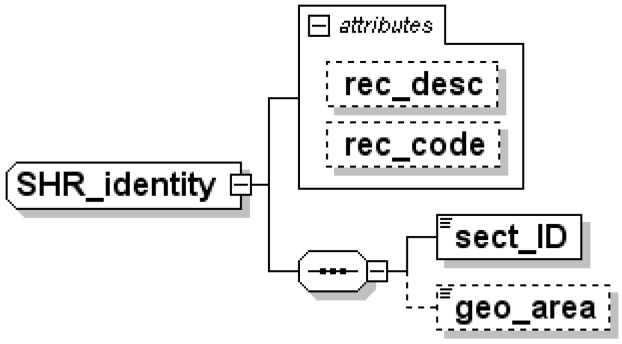



```
<xsd:complexType name="Layer_hdr">
    <xsd:sequence>
            <xsd:element name="layer_ID" type="Layer_ID"/>
            <xsd:element name="layer_topo" type="Layer_topo"/>
            <xsd:element name="z_ref" type="Z_ref"/>
            <xsd:element name="xy_res" type="Three_digit_int" minOccurs="0"/>
            <xsd:element name="num_theme" type="Field_counter_2dig" minOccurs="0"/>
            <xsd:element name="feature_theme" type="Feat_theme" minOccurs="0" maxOccurs="unbounded"/>
            <xsd:element name="vertical_accuracy" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="vertical_acc_desc" minOccurs="0">
                    <xsd:simpleType>
                            <xsd:restriction base="xsd:string">
                                    <xsd:maxLength value="40"/>
                            </xsd:restriction>
                    </xsd:simpleType>
            </xsd:element>
            <xsd:element name="horizontal_accuracy" type="Five_digit_int" minOccurs="0"/>
            <xsd:element name="horizontal_acc_desc" minOccurs="0">
                    <xsd:simpleType>
                            <xsd:restriction base="xsd:string">
                                    <xsd:maxLength value="40"/>
                            </xsd:restriction>
                    </xsd:simpleType>
            </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="17"/>
</xsd:complexType>
```

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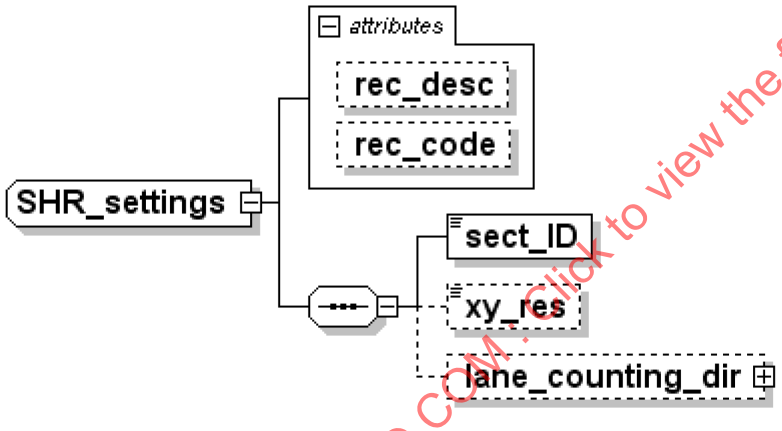
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13.4.59 Section Identity




```
<xsd:complexType name="SHR_identity">
    <xsd:sequence>
        <xsd:element name="sect_ID" type="Sect_ID"/>
        <xsd:element name="geo_area" type="xsd:string" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
</xsd:complexType>
```

13.4.60 Section Settings

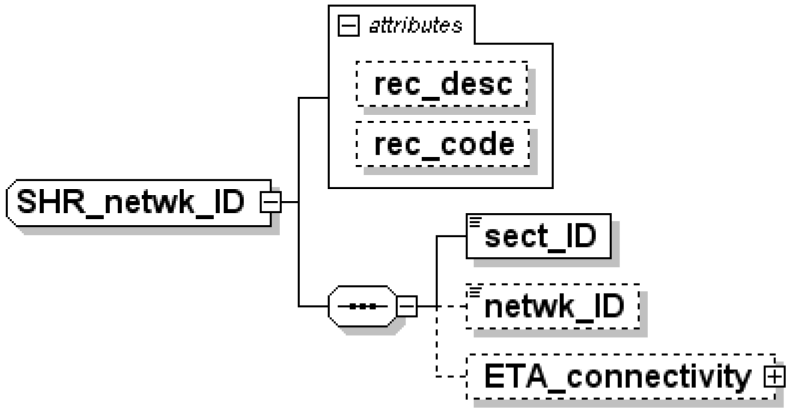



```
<xsd:complexType name="SHR_settings">
    <xsd:sequence>
        <xsd:element name="sect_ID" type="Sect_ID"/>
        <xsd:element name="xy_res" type="Three_digit_int" minOccurs="0"/>
        <xsd:element name="lane_counting_dir" type="Direction" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="2"/>
</xsd:complexType>
```

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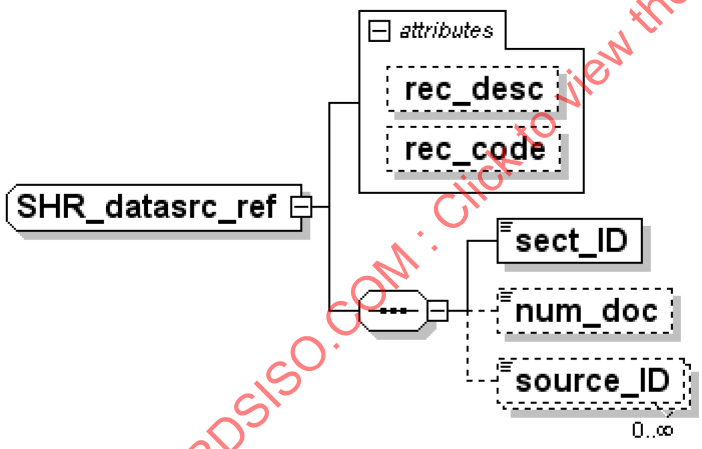
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13.4.61 Network Identification




```
<xsd:complexType name="SHR_netwk_ID">
    <xsd:sequence>
        <xsd:element name="sect_ID" type="Sect_ID"/>
        <xsd:element name="netwk_ID" type="Netwk_ID" minOccurs="0"/>
        <xsd:element name="ETA_connectivity" type="ETA_conn" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
</xsd:complexType>
```

13.4.62 Datasource Reference

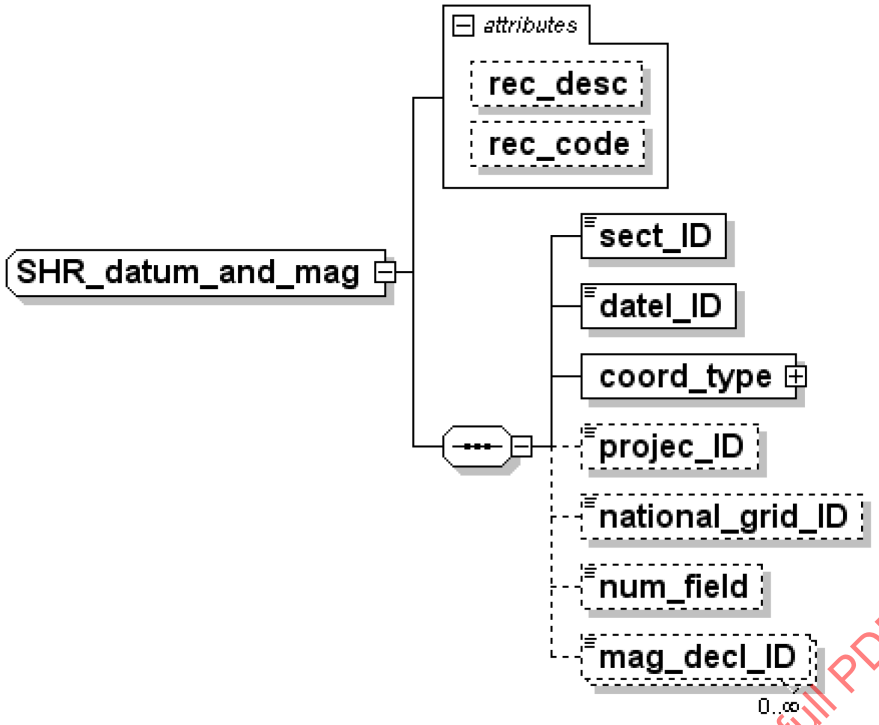



```
<xsd:complexType name="SHR_datasrc_ref">
    <xsd:sequence>
        <xsd:element name="sect_ID" type="Sect_ID"/>
        <xsd:element name="num_doc" type="Field_counter_2dig" minOccurs="0"/>
        <xsd:element name="source_ID" type="Src_desc_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="4"/>
</xsd:complexType>
```

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13.4.63 Datum & Magnetism

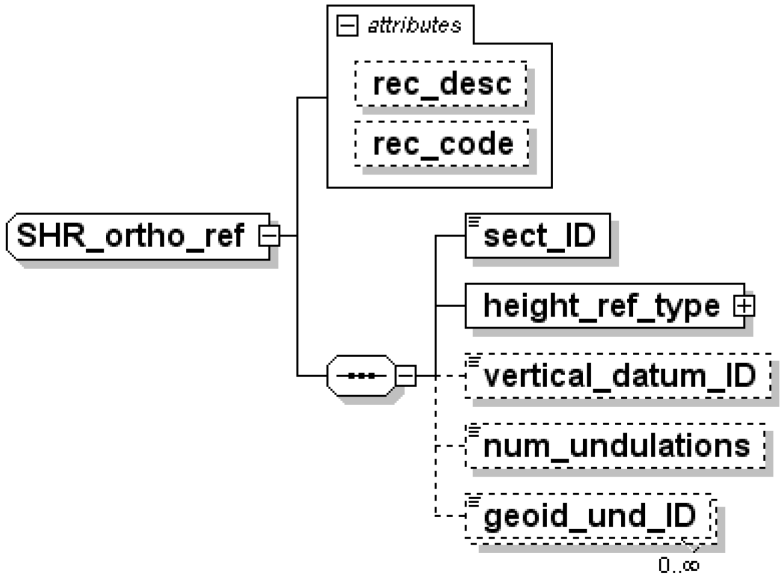



```
<xsd:complexType name="SHR_datum_and_mag">
    <xsd:sequence>
            <xsd:element name="sect_ID" type="Sect_ID"/>
            <xsd:element name="datel_ID" type="Datel_ID"/>
            <xsd:element name="coord_type" type="Coord_type"/>
            <xsd:element name="projec_ID" type="Projection_ID" minOccurs="0"/>
            <xsd:element name="national_grid_ID" type="Natgrid_ID" minOccurs="0"/>
            <xsd:element name="num_field" type="Field_counter_2dig" minOccurs="0"/>
            <xsd:element name="mag_decl_ID" type="Mag_fld_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="5"/>
</xsd:complexType>
```

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13.4.64 Orthometric Reference

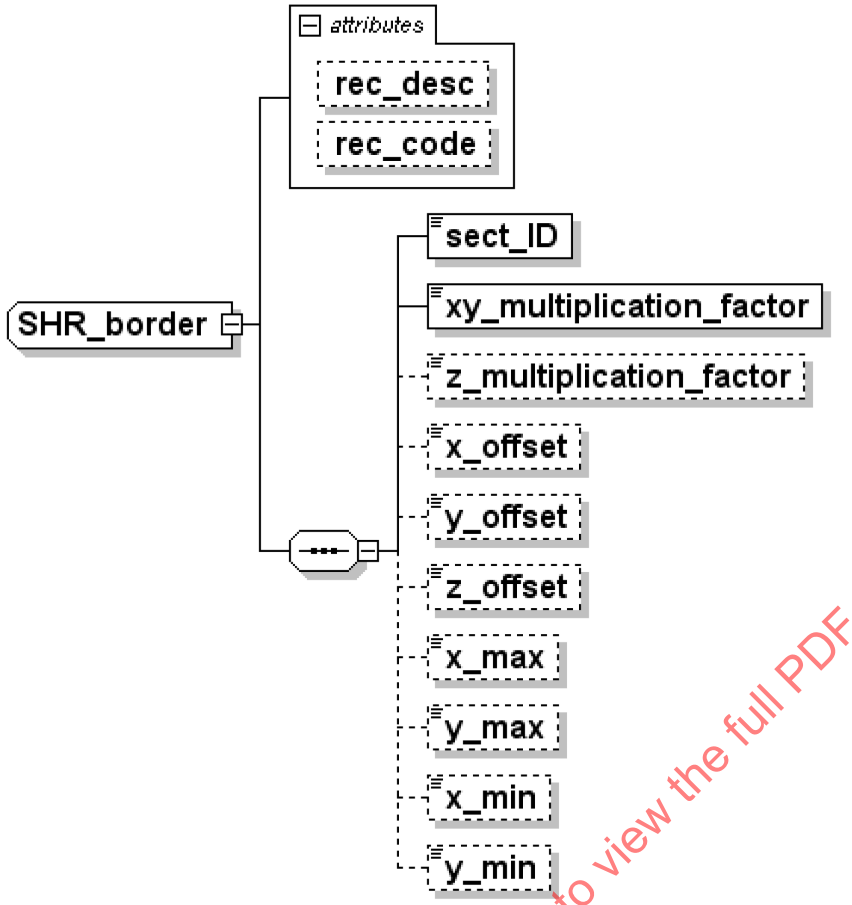



```
<xsd:complexType name="SHR_ortho_ref">
    <xsd:sequence>
            <xsd:element name="sect_ID" type="Sect_ID"/>
            <xsd:element name="height_ref_type" type="Height_ref_type"/>
            <xsd:element name="vertical_datum_ID" type="Rec_ID" minOccurs="0"/>
            <xsd:element name="num_undulations" type="Field_counter_2dig" minOccurs="0"/>
            <xsd:element name="geoid_und_ID" type="Rec_ID" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="6"/>
</xsd:complexType>
```

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13.4.65 Section Border

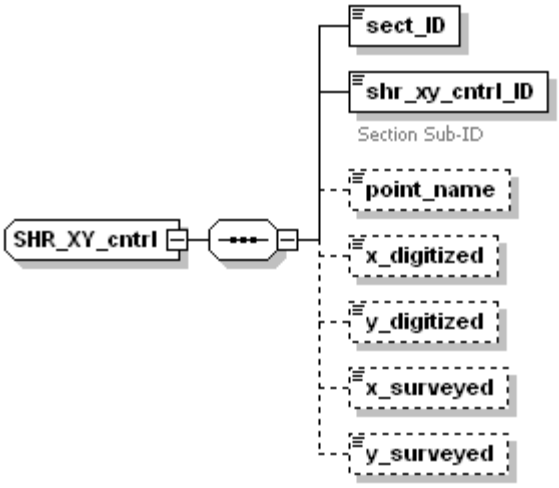



```
<xsd:complexType name="SHR_border">
    <xsd:sequence>
            <xsd:element name="sect_ID" type="Sect_ID"/>
            <xsd:element name="xy_multiplication_factor" type="Mult_factor"/>
            <xsd:element name="z_multiplication_factor" type="Mult_factor" minOccurs="0"/>
            <xsd:element name="x_offset" type="Eleven_digit_coord" minOccurs="0"/>
            <xsd:element name="y_offset" type="Eleven_digit_coord" minOccurs="0"/>
            <xsd:element name="z_offset" type="Eleven_digit_coord" minOccurs="0"/>
            <xsd:element name="x_max" type="Eleven_digit_coord" minOccurs="0"/>
            <xsd:element name="y_max" type="Eleven_digit_coord" minOccurs="0"/>
            <xsd:element name="x_min" type="Eleven_digit_coord" minOccurs="0"/>
            <xsd:element name="y_min" type="Eleven_digit_coord" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="7"/>
</xsd:complexType>
```

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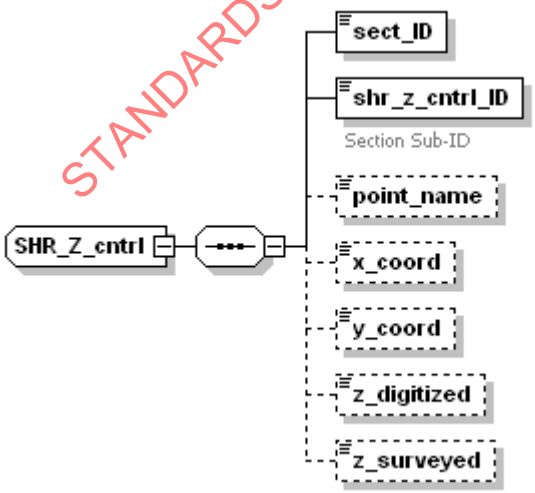
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13.4.66 XY Control Point




```
<xsd:complexType name="SHR_XY_cntrl">
    <xsd:sequence>
        <xsd:element name="sect_ID" type="Sect_ID"/>
        <xsd:element name="shr_xy_cntrl_ID" type="SHR_XY_cntrl_ID">
            <xsd:annotation>
                <xsd:documentation>Section Sub-ID</xsd:documentation>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="point_name" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:maxLength value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="x_digitized" type="Eleven_digit_coord" minOccurs="0"/>
        <xsd:element name="y_digitized" type="Eleven_digit_coord" minOccurs="0"/>
        <xsd:element name="x_surveyed" type="Eleven_digit_coord" minOccurs="0"/>
        <xsd:element name="y_surveyed" type="Eleven_digit_coord" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="8"/>
</xsd:complexType>
```

13.4.67 Z Control Point

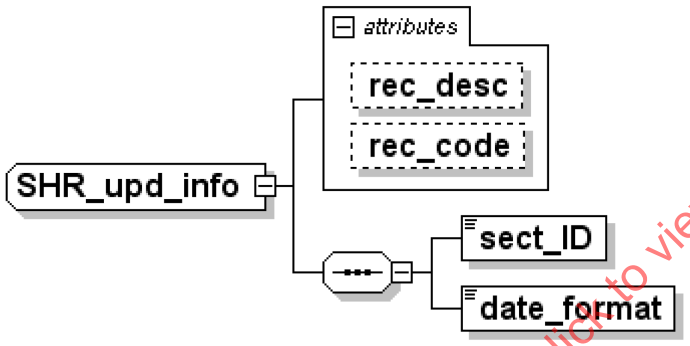


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```
<xsd:complexType name="SHR_Z_cntrl">
    <xsd:sequence>
        <xsd:element name="sect_ID" type="Sect_ID"/>
        <xsd:element name="shr_z_cntrl_ID" type="SHR_Z_cntrl_ID">
            <xsd:annotation>
                <xsd:documentation>Section Sub-ID</xsd:documentation>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="point_name" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:maxLength value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="x_coord" type="Ten_digit_signed_int" minOccurs="0"/>
        <xsd:element name="y_coord" type="Ten_digit_signed_int" minOccurs="0"/>
        <xsd:element name="z_digitized" type="Ten_digit_signed_int" minOccurs="0"/>
        <xsd:element name="z_surveyed" type="Ten_digit_signed_int" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="9"/>
</xsd:complexType>
```

13.4.68 Update Information

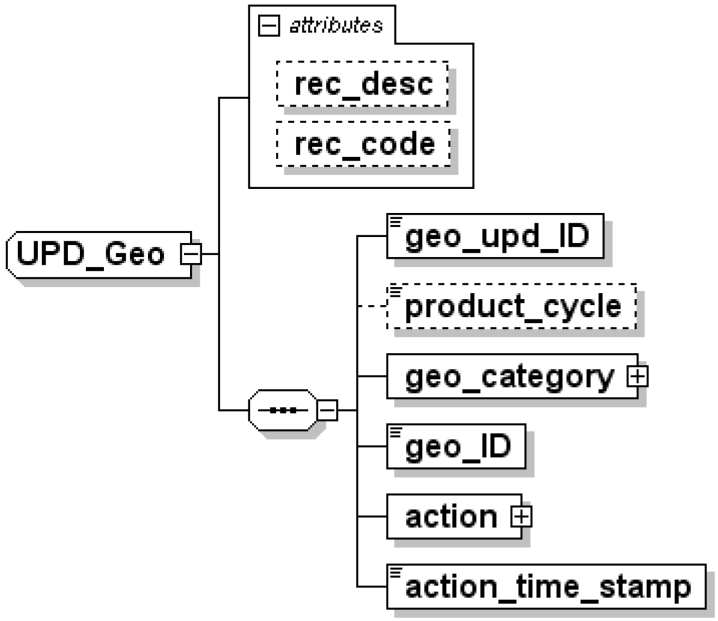



```
<xsd:complexType name="SHR_upd_info">
    <xsd:sequence>
        <xsd:element name="sect_ID" type="Sect_ID"/>
        <xsd:element name="date_format">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="16"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="10"/>
</xsd:complexType>
```

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13.4.69 Geo Update Information

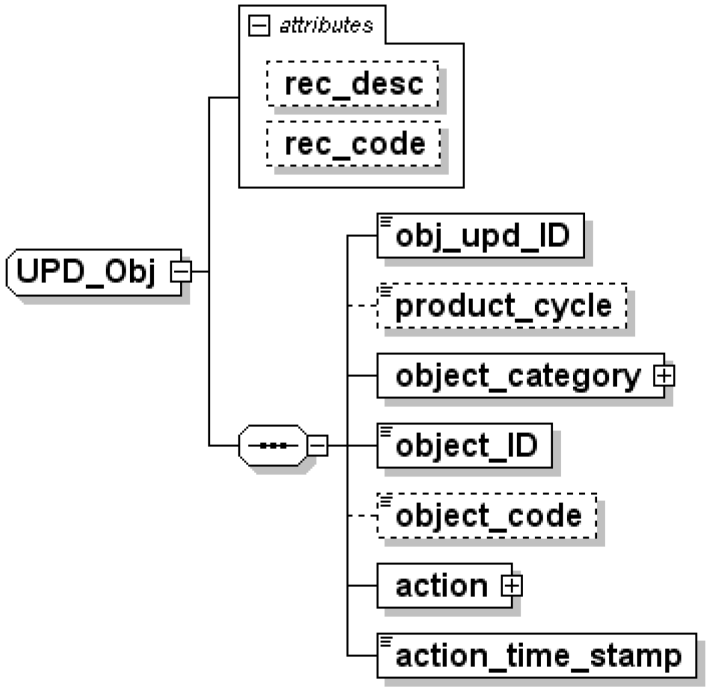



```
<xsd:complexType name="UPD_Geo">
    <xsd:sequence>
        <xsd:element name="geo_upd_ID" type="Geo_upd_ID"/>
        <xsd:element name="product_cycle" type="Two_digit_ID" minOccurs="0"/>
        <xsd:element name="geo_category" type="Geo_cat"/>
        <xsd:element name="geo_ID" type="Geo_ID"/>
        <xsd:element name="action" type="Action"/>
        <xsd:element name="action_time_stamp">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="89"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="1"/>
</xsd:complexType>
```

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13.4.70 Object Update Information

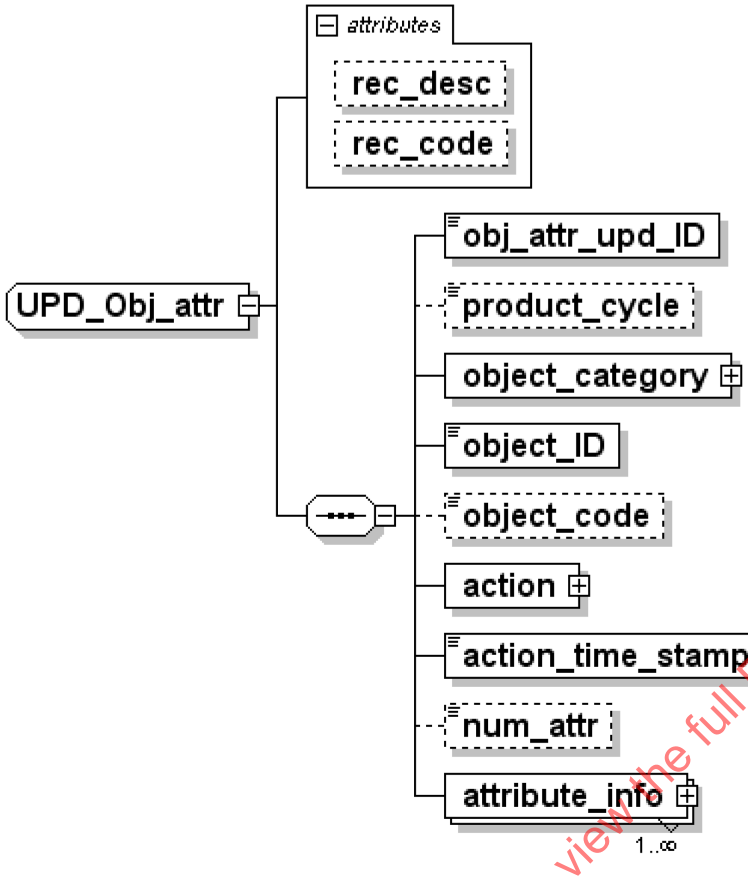



```
<xsd:complexType name="UPD_Obj">
    <xsd:sequence>
        <xsd:element name="obj_upd_ID" type="Obj_upd_ID"/>
        <xsd:element name="product_cycle" type="Two_digit_ID" minOccurs="0"/>
        <xsd:element name="object_category" type="Obj_cat"/>
        <xsd:element name="object_ID" type="Rec_ID"/>
        <xsd:element name="object_code" type="Obj_class_code" minOccurs="0"/>
        <xsd:element name="action" type="Action"/>
        <xsd:element name="action_time_stamp">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="89"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="2"/>
</xsd:complexType>
```

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13.4.71 Object Attribute Update Information




```
<xsd:complexType name="UPD_Obj_attr">
    <xsd:sequence>
        <xsd:element name="obj_attr_upd_ID" type="Obj_attr_upd_ID"/>
        <xsd:element name="product_cycle" type="Two_digit_ID" minOccurs="0"/>
        <xsd:element name="object_category" type="Obj_cat"/>
        <xsd:element name="object_ID" type="Rec_ID"/>
        <xsd:element name="object_code" type="Obj_class_code" minOccurs="0"/>
        <xsd:element name="action" type="Action"/>
        <xsd:element name="action_time_stamp">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                    <xsd:length value="20"/>
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="num_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="attribute_info" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element ref="AttributeDescriptor"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:sequence>
    <xsd:attribute name="rec_desc" type="Rec_typ" fixed="89"/>
    <xsd:attribute name="rec_code" type="Rec_subtyp" fixed="3"/>
</xsd:complexType>
</xsd:schema>
```

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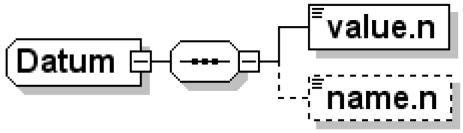
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13.5 Schema GDF_data_dict.xsd

13.5.1 Header

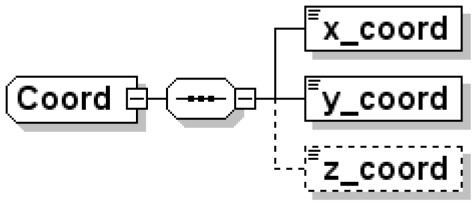
<xsd:schema xmlns="http://www.ukusa.org" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gdf="http://www.ukusa.org"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" targetNamespace="http://www.ukusa.org" elementFormDefault="qualified">

13.5.2 Datum



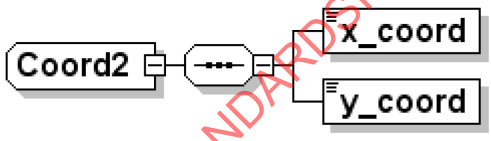

```
<xsd:complexType name="Datum">
    <xsd:sequence>
        <xsd:element name="value.n" type="Datum_value"/>
        <xsd:element name="name.n" type="Datum_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.3 3-D Coordinate




```
<xsd:complexType name="Coord">
    <xsd:sequence>
        <xsd:element name="x_coord" type="Eleven_digit_coord"/>
        <xsd:element name="y_coord" type="Eleven_digit_coord"/>
        <xsd:element name="z_coord" type="Eleven_digit_coord" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.4 2-D Coordinate

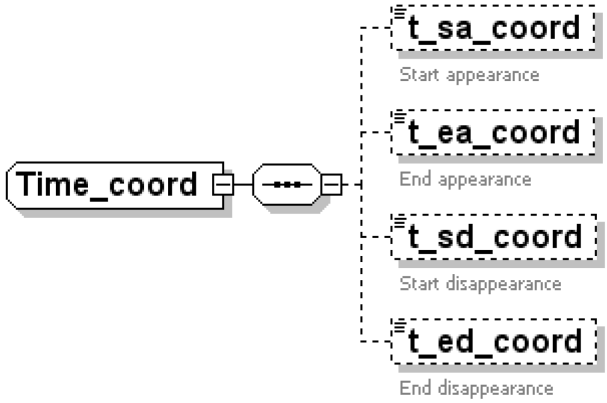



```
<xsd:complexType name="Coord2">
    <xsd:sequence>
        <xsd:element name="x_coord" type="Eleven_digit_coord"/>
        <xsd:element name="y_coord" type="Eleven_digit_coord"/>
    </xsd:sequence>
</xsd:complexType>
```

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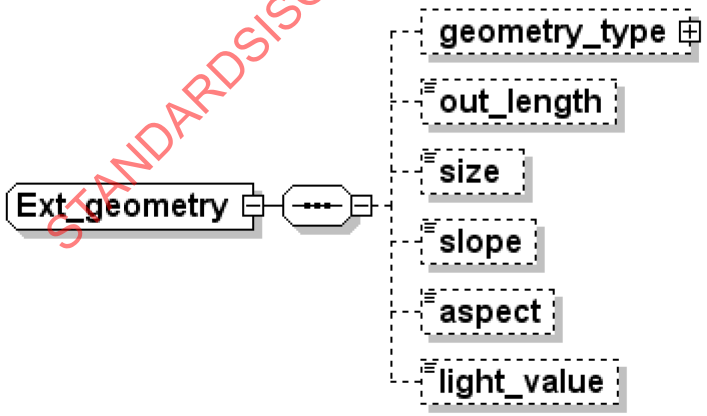
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13.5.5 Time Coordinate




```
<xsd:complexType name="Time_coord">
	<xsd:sequence>
		<xsd:element name="t_sa_coord" type="Ten_digit_t_coord" minOccurs="0">
			<xsd:annotation>
				<xsd:documentation>Start appearance</xsd:documentation>
			</xsd:annotation>
		</xsd:element>
		<xsd:element name="t_ea_coord" type="Ten_digit_t_coord" minOccurs="0">
			<xsd:annotation>
				<xsd:documentation>End appearance</xsd:documentation>
			</xsd:annotation>
		</xsd:element>
		<xsd:element name="t_sd_coord" type="Ten_digit_t_coord" minOccurs="0">
			<xsd:annotation>
				<xsd:documentation>Start disappearance</xsd:documentation>
			</xsd:annotation>
		</xsd:element>
		<xsd:element name="t_ed_coord" type="Ten_digit_t_coord" minOccurs="0">
			<xsd:annotation>
				<xsd:documentation>End disappearance</xsd:documentation>
			</xsd:annotation>
		</xsd:element>
	</xsd:sequence>
</xsd:complexType>
```

13.5.6 Extended Geometry



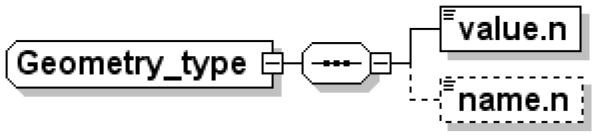

```
<xsd:complexType name="Ext_geometry">
	<xsd:sequence>
		<xsd:element name="geometry_type" type="Geometry_type" minOccurs="0"/>
		<xsd:element name="out_length" type="Ten_digit_int" minOccurs="0"/>
		<xsd:element name="size" type="Ten_digit_int" minOccurs="0"/>
		<xsd:element name="slope" type="Three_digit_int" minOccurs="0"/>
		<xsd:element name="aspect" minOccurs="0">
			<xsd:simpleType>
				<xsd:restriction base="Four_digit_int">
```

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```
                                        <xsd:maxInclusive value="3599"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:element>
                <xsd:element name="light_value" minOccurs="0">
                        <xsd:simpleType>
                                <xsd:restriction base="Three_digit_int">
                                        <xsd:maxInclusive value="255"/>
                                </xsd:restriction>
                        </xsd:simpleType>
                </xsd:element>
        </xsd:sequence>
</xsd:complexType>
```

13.5.7 Geometry Type




```
<xsd:complexType name="Geometry_type">
        <xsd:sequence>
                <xsd:element name="value.n" type="Geo_type_value"/>
                <xsd:element name="name.n" type="Geo_type_name" minOccurs="0"/>
        </xsd:sequence>
</xsd:complexType>
```

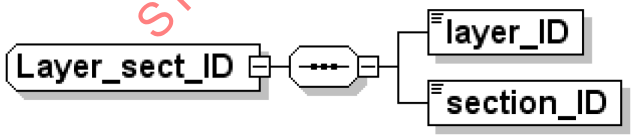
13.5.8 Geometry Type Value (Simple)

```
<xsd:simpleType name="Geo_type_value">
        <xsd:restriction base="xsd:integer">
                <xsd:enumeration value="0"/>
                <xsd:enumeration value="3"/>
                <xsd:enumeration value="4"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.9 Geometry Type Name (Simple)

```
<xsd:simpleType name="Geo_type_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="other"/>
                <xsd:enumeration value="Triangular"/>
                <xsd:enumeration value="Quadrangular"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.10 Layer Section ID

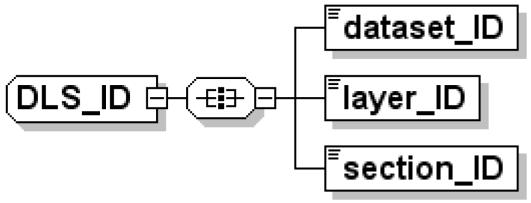



```
<xsd:complexType name="Layer_sect_ID">
        <xsd:sequence>
                <xsd:element name="layer_ID" type="Layer_ID"/>
                <xsd:element name="section_ID" type="Sect_ID"/>
        </xsd:sequence>
</xsd:complexType>
```

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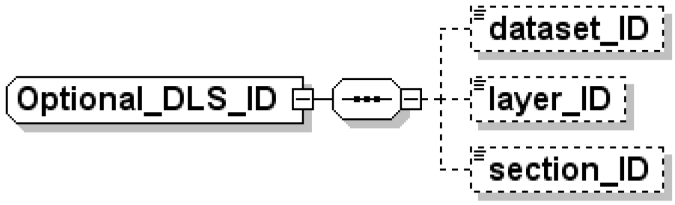
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13.5.11 Dataset Layer Section ID



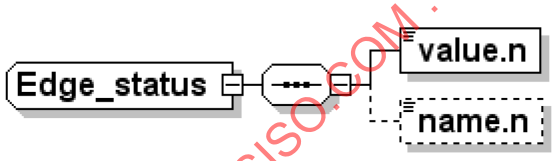

```
<xsd:complexType name="DLS_ID">
    <xsd:all>
            <xsd:element name="dataset_ID" type="Rec_ID"/>
            <xsd:element name="layer_ID" type="Layer_ID"/>
            <xsd:element name="section_ID" type="Rec_ID"/>
    </xsd:all>
</xsd:complexType>
```

13.5.12 Optional Dataset Layer Section ID



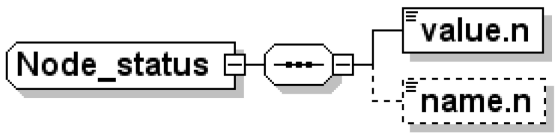

```
<xsd:complexType name="Optional_DLS_ID">
    <xsd:sequence>
            <xsd:element name="dataset_ID" type="Ten_digit_int" minOccurs="0"/>
            <xsd:element name="layer_ID" type="Ten_digit_int" minOccurs="0"/>
            <xsd:element name="section_ID" type="Ten_digit_int" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.13 Edge Status




```
<xsd:complexType name="Edge_status">
    <xsd:sequence>
            <xsd:element name="value.n" type="Five_status_value"/>
            <xsd:element name="name.n" type="Edge_status_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.14 Node Status

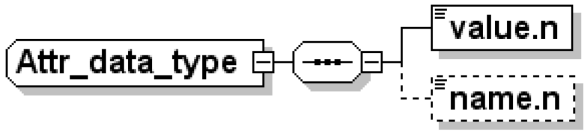



```
<xsd:complexType name="Node_status">
    <xsd:sequence>
            <xsd:element name="value.n" type="Five_status_value"/>
            <xsd:element name="name.n" type="Node_status_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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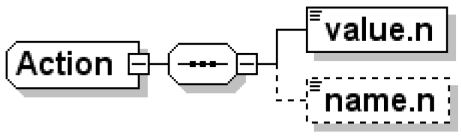
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13.5.15 Attribute Data Type



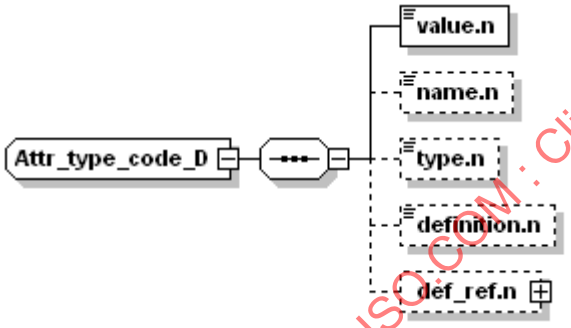

```
<xsd:complexType name="Attr_data_type">
    <xsd:sequence>
        <xsd:element name="value.n" type="Attr_data_type_value"/>
        <xsd:element name="name.n" type="Attr_data_type_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.16 Action




```
<xsd:complexType name="Action">
    <xsd:sequence>
        <xsd:element name="value.n" type="Action_value"/>
        <xsd:element name="name.n" type="Action_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.17 Attribute Type Code

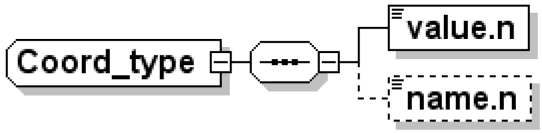



```
<xsd:complexType name="Attr_type_code_D">
    <xsd:sequence>
        <xsd:element name="value.n" type="Attr_type_code_val"/>
        <xsd:element name="name.n" type="Attr_type_code_name" minOccurs="0"/>
        <xsd:element name="type.n" type="Attr_type_code_type" minOccurs="0"/>
        <xsd:element name="definition.n" type="Attr_type_code_def" minOccurs="0"/>
        <xsd:element name="def_ref.n" type="Attr_typ_cod_def_ref" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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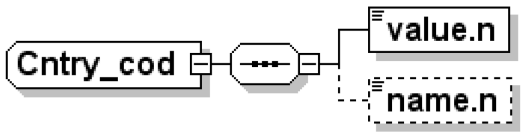
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13.5.18 Coordinate Type



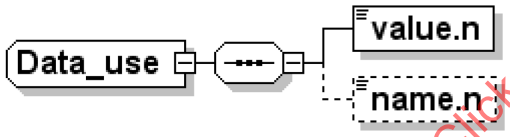

```
<xsd:complexType name="Coord_type">
    <xsd:sequence>
        <xsd:element name="value.n" type="xsd:boolean"/>
        <xsd:element name="name.n" type="Coord_type_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.19 Country Code



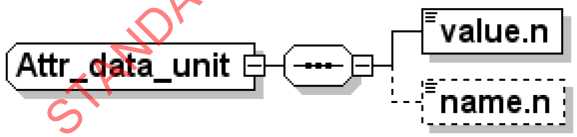

```
<xsd:complexType name="Cntry_cod">
    <xsd:sequence>
        <xsd:element name="value.n" type="Cntry_code_val"/>
        <xsd:element name="name.n" type="Cntry_code_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.20 Data Use




```
<xsd:complexType name="Data_use">
    <xsd:sequence>
        <xsd:element name="value.n" type="Data_use_value"/>
        <xsd:element name="name.n" type="Data_use_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.21 Attribute Data Unit

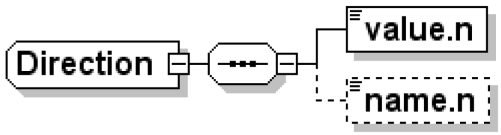



```
<xsd:complexType name="Attr_data_unit">
    <xsd:sequence>
        <xsd:element name="value.n" type="Attr_data_unit_code"/>
        <xsd:element name="name.n" type="Attr_data_unit_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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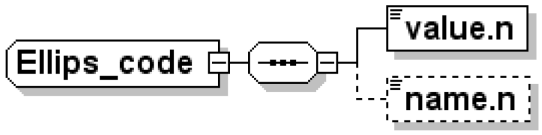
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13.5.22 Direction



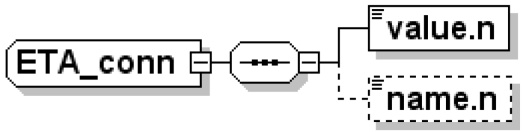

```
<xsd:complexType name="Direction">
    <xsd:sequence>
        <xsd:element name="value.n" type="xsd:boolean"/>
        <xsd:element name="name.n" type="Direction_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.23 Ellipsoid Code



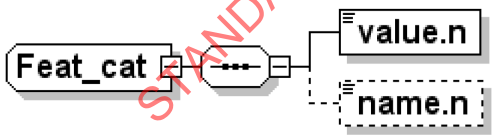

```
<xsd:complexType name="Ellips_code">
    <xsd:sequence>
        <xsd:element name="value.n" type="Ellipsoid_value"/>
        <xsd:element name="name.n" type="Ellipsoid_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.24 ETA Connectivity




```
<xsd:complexType name="ETA_conn">
    <xsd:sequence>
        <xsd:element name="value.n" type="xsd:boolean"/>
        <xsd:element name="name.n" type="ETA_conn_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.25 Feature Category

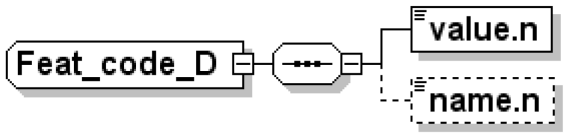



```
<xsd:complexType name="Feat_cat">
    <xsd:sequence>
        <xsd:element name="value.n" type="Feature_category_value"/>
        <xsd:element name="name.n" type="Feature_category_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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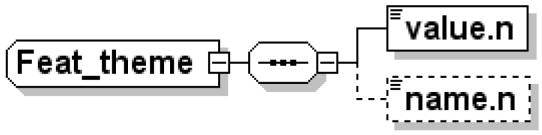
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13.5.26 Feature Code



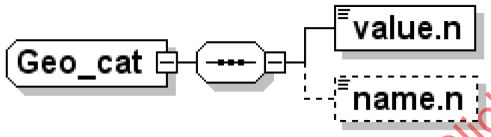

```
<xsd:complexType name="Feat_code_D">
    <xsd:sequence>
        <xsd:element name="value.n" type="Feature_code_value"/>
        <xsd:element name="name.n" type="Feature_code_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.27 Feature Theme



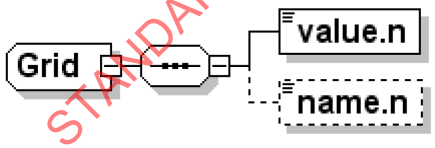

```
<xsd:complexType name="Feat_theme">
    <xsd:sequence>
        <xsd:element name="value.n" type="Feat_theme_val"/>
        <xsd:element name="name.n" type="Feat_theme_nam" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.28 Geometry Object Category




```
<xsd:complexType name="Geo_cat">
    <xsd:sequence>
        <xsd:element name="value.n" type="Geo_cat_value"/>
        <xsd:element name="name.n" type="Geo_cat_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.29 Grid

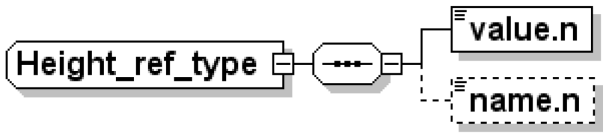



```
<xsd:complexType name="Grid">
    <xsd:sequence>
        <xsd:element name="value.n" type="Grid_value"/>
        <xsd:element name="name.n" type="Grid_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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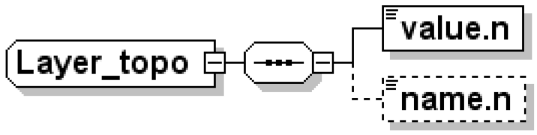
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13.5.30 Height Reference Type



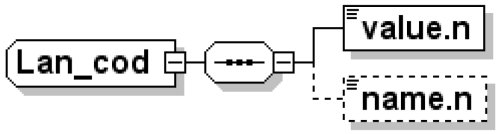

```
<xsd:complexType name="Height_ref_type">
    <xsd:sequence>
        <xsd:element name="value.n" type="Height_ref_type_value"/>
        <xsd:element name="name.n" type="Height_ref_type_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.31 Layer Topology



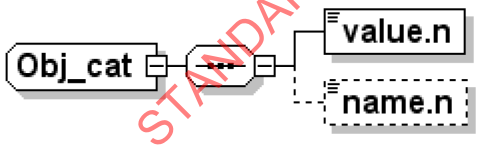

```
<xsd:complexType name="Layer_topo">
    <xsd:sequence>
        <xsd:element name="value.n" type="Layer_topo_value"/>
        <xsd:element name="name.n" type="Layer_topo_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.32 Language Code




```
<xsd:complexType name="Lan_cod">
    <xsd:sequence>
        <xsd:element name="value.n" type="Lang_code_value"/>
        <xsd:element name="name.n" type="Lang_code_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.33 Object Category

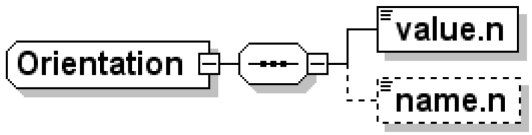



```
<xsd:complexType name="Obj_cat">
    <xsd:sequence>
        <xsd:element name="value.n" type="Obj_cat_val"/>
        <xsd:element name="name.n" type="Obj_cat_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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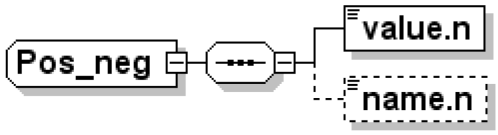
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13.5.34 Orientation



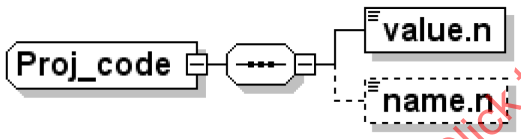

```
<xsd:complexType name="Orientation">
    <xsd:sequence>
        <xsd:element name="value.n" type="xsd:boolean"/>
        <xsd:element name="name.n" type="Orientation_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.35 Line Direction



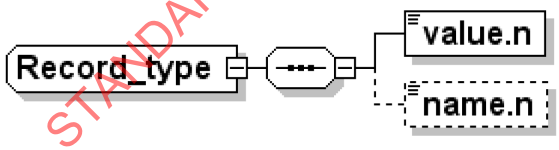

```
<xsd:complexType name="Pos_neg">
    <xsd:sequence>
        <xsd:element name="value.n" type="xsd:boolean"/>
        <xsd:element name="name.n" type="Pos_neg_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.36 Projection Code




```
<xsd:complexType name="Proj_code">
    <xsd:sequence>
        <xsd:element name="value.n" type="Projection_value"/>
        <xsd:element name="name.n" type="Projection_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.37 Record Type

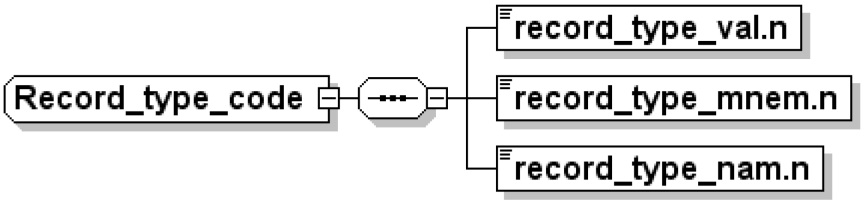



```
<xsd:complexType name="Record_type">
    <xsd:sequence>
        <xsd:element name="value.n" type="Record_type_value"/>
        <xsd:element name="name.n" type="Record_type_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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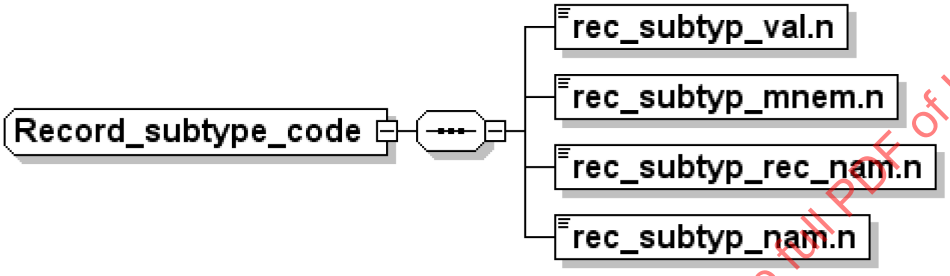
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13.5.38 Record Type Code



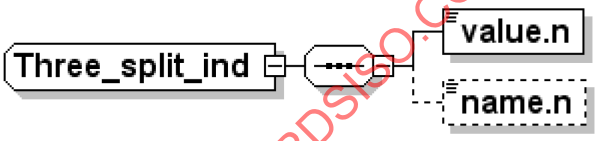

```
<xsd:complexType name="Record_type_code">
    <xsd:sequence>
        <xsd:element name="record_type_val.n" type="Record_type_value"/>
        <xsd:element name="record_type_mnem.n" type="Record_type_mnemonic"/>
        <xsd:element name="record_type_nam.n" type="Record_type_name"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.39 Record Subtype Code



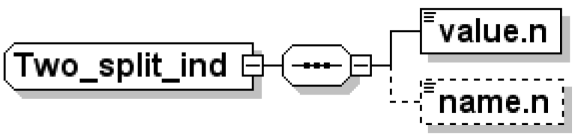

```
<xsd:complexType name="Record_subtype_code">
    <xsd:sequence>
        <xsd:element name="rec_subtyp_val.n" type="Record_subtype_value"/>
        <xsd:element name="rec_subtyp_mnem.n" type="Record_subtype_mnemonic"/>
        <xsd:element name="rec_subtyp_rec_nam.n" type="Record_subtype_rec_name"/>
        <xsd:element name="rec_subtyp_nam.n" type="Record_subtype_name"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.40 Three Split Indicator




```
<xsd:complexType name="Three_split_ind">
    <xsd:sequence>
        <xsd:element name="value.n" type="Three_split_ind_value"/>
        <xsd:element name="name.n" type="Three_split_ind_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.41 Two Split Indicator

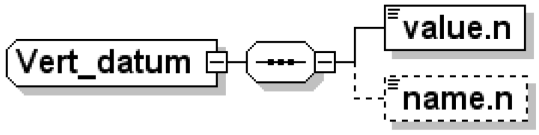



```
<xsd:complexType name="Two_split_ind">
    <xsd:sequence>
        <xsd:element name="value.n" type="xsd:boolean"/>
        <xsd:element name="name.n" type="Two_split_ind_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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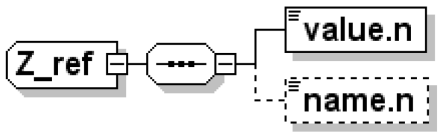
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13.5.42 Vertical Datum



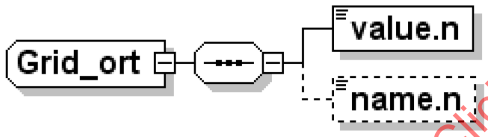

```
<xsd:complexType name="Vert_datum">
    <xsd:sequence>
        <xsd:element name="value.n" type="Vert_datum_value"/>
        <xsd:element name="name.n" type="Vert_datum_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.43 Z Reference



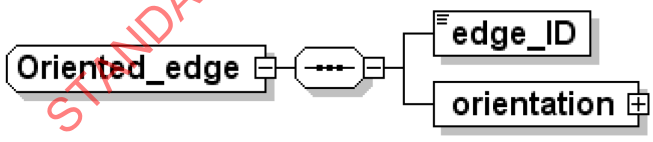

```
<xsd:complexType name="Z_ref">
    <xsd:sequence>
        <xsd:element name="value.n" type="Zref_value"/>
        <xsd:element name="name.n" type="Zref_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.44 Grid Orientation




```
<xsd:complexType name="Grid_ort">
    <xsd:sequence>
        <xsd:element name="value.n" type="xsd:boolean"/>
        <xsd:element name="name.n" type="Grid_ort_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.45 Oriented Edge

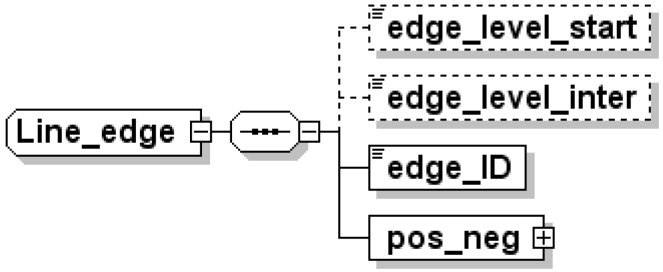



```
<xsd:complexType name="Oriented_edge">
    <xsd:sequence>
        <xsd:element name="edge_ID" type="Edge_ID"/>
        <xsd:element name="orientation" type="Orientation"/>
    </xsd:sequence>
</xsd:complexType>
```

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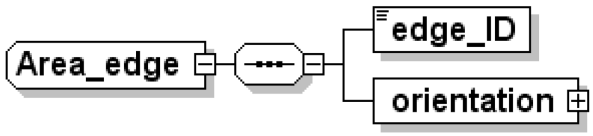
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13.5.46 Line Edge



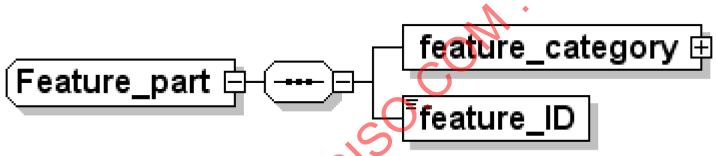

```
<xsd:complexType name="Line_edge">
    <xsd:sequence>
        <xsd:element name="edge_level_start" type="Edge_level" minOccurs="0"/>
        <xsd:element name="edge_level_inter" type="Edge_level" minOccurs="0"/>
        <xsd:element name="edge_ID" type="Edge_ID"/>
        <xsd:element name="pos_neg" type="Pos_neg"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.47 Area Edge




```
<xsd:complexType name="Area_edge">
    <xsd:sequence>
        <xsd:element name="edge_ID" type="Edge_ID"/>
        <xsd:element name="orientation" type="Orientation"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.48 Feature Part

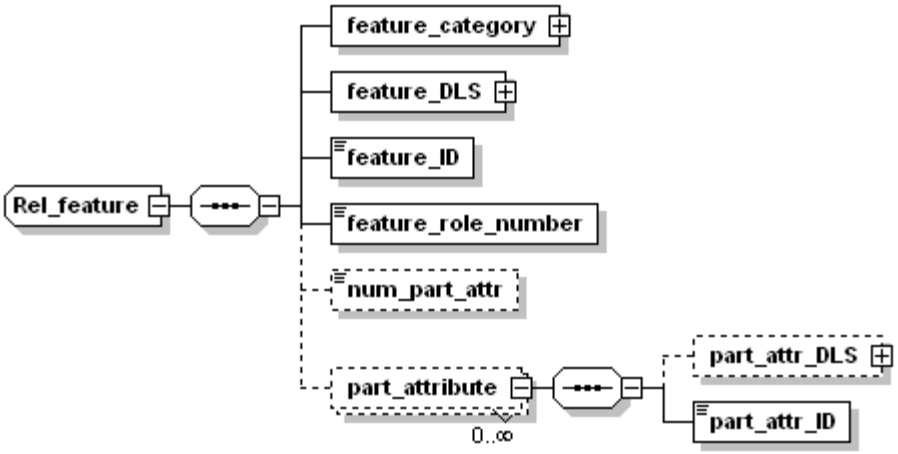



```
<xsd:complexType name="Feature_part">
    <xsd:sequence>
        <xsd:element name="feature_category" type="Feat_cat"/>
        <xsd:element name="feature_ID" type="Feature_ID"/>
    </xsd:sequence>
</xsd:complexType>
```

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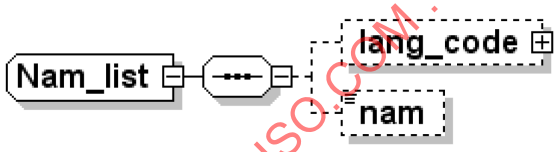
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13.5.49 Relationship Feature



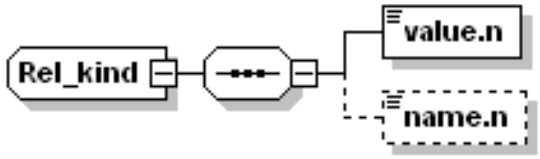

```
<xsd:complexType name="Rel_feature">
    <xsd:sequence>
        <xsd:element name="feature_category" type="Feat_cat"/>
        <xsd:element name="feature_DLS" type="DLS_ID"/>
        <xsd:element name="feature_ID" type="Feature_ID"/>
        <xsd:element name="feature_role_number" type="Two_digit_ID"/>
        <xsd:element name="num_part_attr" type="Five_digit_int" minOccurs="0"/>
        <xsd:element name="part_attribute" minOccurs="0" maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="part_attr_DLS" type="Optional_DLS_ID" minOccurs="0"/>
                    <xsd:element name="part_attr_ID" type="Attr_ID"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:sequence>
</xsd:complexType>
```

13.5.50 Name List




```
<xsd:complexType name="Nam_list">
    <xsd:sequence>
        <xsd:element name="lang_code" type="Lan_cod" minOccurs="0"/>
        <xsd:element name="nam" type="Name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.51 Relationship kind




```
<xsd:complexType name="Rel_kind">
    <xsd:sequence>
        <xsd:element name="value.n" type="Rel_kind_value"/>
        <xsd:element name="name.n" type="Rel_kind_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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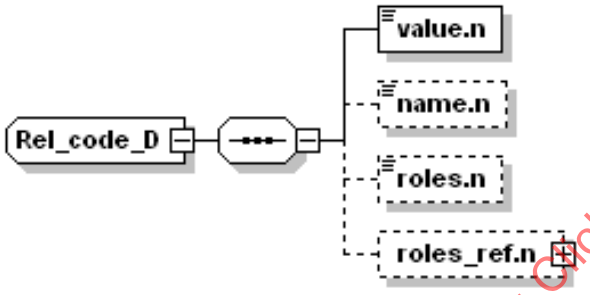
13.5.52 Relationship kind name

```
<xsd:simpleType name="Rel_kind_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Descended from"/>
            <xsd:enumeration value="Appendix to"/>
            <xsd:enumeration value="Published together with"/>
            <xsd:enumeration value="Additional map to"/>
            <xsd:enumeration value="Inset map to"/>
            <xsd:enumeration value="Is part of"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.53 Relationship kind value

```
<xsd:simpleType name="Rel_kind_value">
    <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="11"/>
            <xsd:enumeration value="12"/>
            <xsd:enumeration value="13"/>
            <xsd:enumeration value="14"/>
            <xsd:enumeration value="15"/>
            <xsd:enumeration value="16"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.54 Relationship Code D




```
<xsd:complexType name="Rel_code_D">
    <xsd:sequence>
            <xsd:element name="value.n" type="Rel_code_value"/>
            <xsd:element name="name.n" type="Rel_code_name" minOccurs="0"/>
            <xsd:element name="roles.n" type="Rel_code_roles_def" minOccurs="0"/>
            <xsd:element name="roles_ref.n" type="Rel_code_roles_def_ref" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.55 Relationship Code Roles Definition (Simple)

```
<xsd:simpleType name="Rel_code_roles_def">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Rel_1001_ROLE"/>
            <xsd:enumeration value="Rel_1002_ROLE"/>
            <xsd:enumeration value="Rel_1003_ROLE"/>
            <xsd:enumeration value="Rel_1005_ROLE"/>
            <xsd:enumeration value="Rel_1006_ROLE"/>
            <xsd:enumeration value="Rel_1007_ROLE"/>
            <xsd:enumeration value="Rel_1008_ROLE"/>
            <xsd:enumeration value="Rel_1009_ROLE"/>
            <xsd:enumeration value="Rel_1010_ROLE"/>
            <xsd:enumeration value="Rel_1011_ROLE"/>
            <xsd:enumeration value="Rel_1012_ROLE"/>
            <xsd:enumeration value="Rel_1013_ROLE"/>
            <xsd:enumeration value="Rel_1014_ROLE"/>
            <xsd:enumeration value="Rel_1015_ROLE"/>
            <xsd:enumeration value="Rel_1016_ROLE"/>
            <xsd:enumeration value="Rel_1017_ROLE"/>
```

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```
                <xsd:enumeration value="Rel_1018_ROLE"/>
                <xsd:enumeration value="Rel_1019_ROLE"/>
                <xsd:enumeration value="Rel_1020_ROLE"/>
                <xsd:enumeration value="Rel_1021_ROLE"/>
                <xsd:enumeration value="Rel_1022_ROLE"/>
                <xsd:enumeration value="Rel_1023_ROLE"/>
                <xsd:enumeration value="Rel_1024_ROLE"/>
                <xsd:enumeration value="Rel_1025_ROLE"/>
                <xsd:enumeration value="Rel_1026_ROLE"/>
                <xsd:enumeration value="Rel_1027_ROLE"/>
                <xsd:enumeration value="Rel_1028_ROLE"/>
                <xsd:enumeration value="Rel_1029_ROLE"/>
                <xsd:enumeration value="Rel_1030_ROLE"/>
                <xsd:enumeration value="Rel_1040_ROLE"/>
                <xsd:enumeration value="Rel_1041_ROLE"/>
                <xsd:enumeration value="Rel_1042_ROLE"/>
                <xsd:enumeration value="Rel_1043_ROLE"/>
                <xsd:enumeration value="Rel_1044_ROLE"/>
                <xsd:enumeration value="Rel_2102_ROLE"/>
                <xsd:enumeration value="Rel_2103_ROLE"/>
                <xsd:enumeration value="Rel_2104_ROLE"/>
                <xsd:enumeration value="Rel_2105_ROLE"/>
                <xsd:enumeration value="Rel_2106_ROLE"/>
                <xsd:enumeration value="Rel_2108_ROLE"/>
                <xsd:enumeration value="Rel_2109_ROLE"/>
                <xsd:enumeration value="Rel_2110_ROLE"/>
                <xsd:enumeration value="Rel_2128_ROLE"/>
                <xsd:enumeration value="Rel_2129_ROLE"/>
                <xsd:enumeration value="Rel_2140_ROLE"/>
                <xsd:enumeration value="Rel_2200_ROLE"/>
                <xsd:enumeration value="Rel_2300_ROLE"/>
                <xsd:enumeration value="Rel_2305_ROLE"/>
                <xsd:enumeration value="Rel_2310_ROLE"/>
                <xsd:enumeration value="Rel_2315_ROLE"/>
                <xsd:enumeration value="Rel_2400_ROLE"/>
                <xsd:enumeration value="Rel_4800_ROLE"/>
                <xsd:enumeration value="Rel_4801_ROLE"/>
                <xsd:enumeration value="Rel_4802_ROLE"/>
                <xsd:enumeration value="Rel_6010_ROLE"/>
                <xsd:enumeration value="Rel_6020_ROLE"/>
                <xsd:enumeration value="Rel_7001_ROLE"/>
                <xsd:enumeration value="Rel_7002_ROLE"/>
                <xsd:enumeration value="Rel_7003_ROLE"/>
                <xsd:enumeration value="Rel_7004_ROLE"/>
                <xsd:enumeration value="Rel_7005_ROLE"/>
                <xsd:enumeration value="Rel_7006_ROLE"/>
                <xsd:enumeration value="Rel_7007_ROLE"/>
        </xsd:restriction>
    </xsd:simpleType>
```

13.5.56 Declination

```
    <xsd:complexType name="Rel_code_roles_def_ref">
        <xsd:choice>
                <xsd:element name="Rel_1001_ROLE" type="Rel_1001_ROLE"/>
                <xsd:element name="Rel_1002_ROLE" type="Rel_1002_ROLE"/>
                <xsd:element name="Rel_1003_ROLE" type="Rel_1003_ROLE"/>
                <xsd:element name="Rel_1005_ROLE" type="Rel_1005_ROLE"/>
                <xsd:element name="Rel_1006_ROLE" type="Rel_1006_ROLE"/>
                <xsd:element name="Rel_1007_ROLE" type="Rel_1007_ROLE"/>
                <xsd:element name="Rel_1008_ROLE" type="Rel_1008_ROLE"/>
                <xsd:element name="Rel_1009_ROLE" type="Rel_1009_ROLE"/>
                <xsd:element name="Rel_1010_ROLE" type="Rel_1010_ROLE"/>
                <xsd:element name="Rel_1011_ROLE" type="Rel_1011_ROLE"/>
                <xsd:element name="Rel_1012_ROLE" type="Rel_1012_ROLE"/>
                <xsd:element name="Rel_1013_ROLE" type="Rel_1013_ROLE"/>
                <xsd:element name="Rel_1014_ROLE" type="Rel_1014_ROLE"/>
                <xsd:element name="Rel_1015_ROLE" type="Rel_1015_ROLE"/>
                <xsd:element name="Rel_1016_ROLE" type="Rel_1016_ROLE"/>
                <xsd:element name="Rel_1017_ROLE" type="Rel_1017_ROLE"/>
                <xsd:element name="Rel_1018_ROLE" type="Rel_1018_ROLE"/>
                <xsd:element name="Rel_1019_ROLE" type="Rel_1019_ROLE"/>
```

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```
                <xsd:element name="Rel_1020_ROLE" type="Rel_1020_ROLE"/>
                <xsd:element name="Rel_1021_ROLE" type="Rel_1021_ROLE"/>
                <xsd:element name="Rel_1022_ROLE" type="Rel_1022_ROLE"/>
                <xsd:element name="Rel_1023_ROLE" type="Rel_1023_ROLE"/>
                <xsd:element name="Rel_1024_ROLE" type="Rel_1024_ROLE"/>
                <xsd:element name="Rel_1025_ROLE" type="Rel_1025_ROLE"/>
                <xsd:element name="Rel_1026_ROLE" type="Rel_1026_ROLE"/>
                <xsd:element name="Rel_1027_ROLE" type="Rel_1027_ROLE"/>
                <xsd:element name="Rel_1028_ROLE" type="Rel_1028_ROLE"/>
                <xsd:element name="Rel_1029_ROLE" type="Rel_1029_ROLE"/>
                <xsd:element name="Rel_1030_ROLE" type="Rel_1030_ROLE"/>
                <xsd:element name="Rel_1040_ROLE" type="Rel_1040_ROLE"/>
                <xsd:element name="Rel_1041_ROLE" type="Rel_1041_ROLE"/>
                <xsd:element name="Rel_1042_ROLE" type="Rel_1042_ROLE"/>
                <xsd:element name="Rel_1043_ROLE" type="Rel_1043_ROLE"/>
                <xsd:element name="Rel_1044_ROLE" type="Rel_1044_ROLE"/>
                <xsd:element name="Rel_2102_ROLE" type="Rel_2102_ROLE"/>
                <xsd:element name="Rel_2103_ROLE" type="Rel_2103_ROLE"/>
                <xsd:element name="Rel_2104_ROLE" type="Rel_2104_ROLE"/>
                <xsd:element name="Rel_2105_ROLE" type="Rel_2105_ROLE"/>
                <xsd:element name="Rel_2106_ROLE" type="Rel_2106_ROLE"/>
                <xsd:element name="Rel_2108_ROLE" type="Rel_2108_ROLE"/>
                <xsd:element name="Rel_2109_ROLE" type="Rel_2109_ROLE"/>
                <xsd:element name="Rel_2110_ROLE" type="Rel_2110_ROLE"/>
                <xsd:element name="Rel_2128_ROLE" type="Rel_2128_ROLE"/>
                <xsd:element name="Rel_2129_ROLE" type="Rel_2129_ROLE"/>
                <xsd:element name="Rel_2140_ROLE" type="Rel_2140_ROLE"/>
                <xsd:element name="Rel_2200_ROLE" type="Rel_2200_ROLE"/>
                <xsd:element name="Rel_2300_ROLE" type="Rel_2300_ROLE"/>
                <xsd:element name="Rel_2305_ROLE" type="Rel_2305_ROLE"/>
                <xsd:element name="Rel_2310_ROLE" type="Rel_2310_ROLE"/>
                <xsd:element name="Rel_2315_ROLE" type="Rel_2315_ROLE"/>
                <xsd:element name="Rel_2400_ROLE" type="Rel_2400_ROLE"/>
                <xsd:element name="Rel_4800_ROLE" type="Rel_4800_ROLE"/>
                <xsd:element name="Rel_4801_ROLE" type="Rel_4801_ROLE"/>
                <xsd:element name="Rel_4802_ROLE" type="Rel_4802_ROLE"/>
                <xsd:element name="Rel_6010_ROLE" type="Rel_6010_ROLE"/>
                <xsd:element name="Rel_6020_ROLE" type="Rel_6020_ROLE"/>
                <xsd:element name="Rel_7001_ROLE" type="Rel_7001_ROLE"/>
                <xsd:element name="Rel_7002_ROLE" type="Rel_7002_ROLE"/>
                <xsd:element name="Rel_7003_ROLE" type="Rel_7003_ROLE"/>
                <xsd:element name="Rel_7004_ROLE" type="Rel_7004_ROLE"/>
                <xsd:element name="Rel_7005_ROLE" type="Rel_7005_ROLE"/>
                <xsd:element name="Rel_7006_ROLE" type="Rel_7006_ROLE"/>
                <xsd:element name="Rel_7007_ROLE" type="Rel_7007_ROLE"/>
        </xsd:choice>
</xsd:complexType>
```

13.5.57 Declination (Simple)

```
<xsd:simpleType name="Declination">
        <xsd:restriction base="xsd:integer">
                <xsd:minInclusive value="-400000"/>
                <xsd:maxInclusive value="400000"/>
                <xsd:totalDigits value="7"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.58 Edge Level (Simple)

```
<xsd:simpleType name="Edge_level">
        <xsd:restriction base="xsd:integer">
                <xsd:minInclusive value="-9"/>
                <xsd:maxInclusive value="99"/>
        </xsd:restriction>
</xsd:simpleType>
```

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13.5.59 Coordinate Mask (Simple)

```
<xsd:simpleType name="Coord_mask">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="3331"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.60 Time Mask (Simple)

```
<xsd:simpleType name="Time_mask">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1"/>
            <xsd:maxInclusive value="16"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.61 Two Digit Field Counter (Simple)

```
<xsd:simpleType name="Field_counter_2dig">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="99"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.62 Three Digit Field Counter (Simple)

```
<xsd:simpleType name="Field_counter_3dig">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.63 Five Digit Field Counter (Simple)

```
<xsd:simpleType name="Field_counter_5dig">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="99999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.64 Multiplier Factor (Simple)

```
<xsd:simpleType name="Mult_factor">
    <xsd:restriction base="One_digit_signed_int"/>
</xsd:simpleType>
```

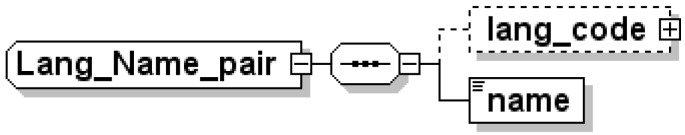
13.5.65 Name (Simple)

```
<xsd:simpleType name="Name">
    <xsd:restriction base="xsd:string">
            <xsd:maxLength value="40"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.66 Language Name Pair




```
<xsd:complexType name="Lang_Name_pair">
    <xsd:sequence>
        <xsd:element name="lang_code" type="Lan_cod" minOccurs="0"/>
        <xsd:element name="name" type="Name"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.67 Five Digit Integer (Simple)

```
<xsd:simpleType name="Five_digit_int">
    <xsd:restriction base="xsd:integer">
        <xsd:minInclusive value="0"/>
        <xsd:maxInclusive value="99999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.68 Six Digit Integer (Simple)

```
<xsd:simpleType name="Six_digit_int">
    <xsd:restriction base="xsd:integer">
        <xsd:minInclusive value="0"/>
        <xsd:maxInclusive value="999999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.69 Object Class Code (Simple)

```
<xsd:simpleType name="Obj_class_code">
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="0001"/>
        <xsd:enumeration value="0002"/>
        <xsd:enumeration value="0003"/>
        <xsd:enumeration value="0004"/>
        <xsd:enumeration value="0005"/>
        <xsd:enumeration value="0006"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.70 Two Digit ID (Simple)

```
<xsd:simpleType name="Two_digit_ID">
    <xsd:restriction base="Two_digit_int">
        <xsd:minInclusive value="1"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.71 Three Digit ID (Simple)

```
<xsd:simpleType name="Three_digit_ID">
    <xsd:restriction base="Three_digit_int">
        <xsd:minInclusive value="1"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.72 Four Digit ID (Simple)

```
<xsd:simpleType name="Four_digit_ID">
    <xsd:restriction base="Four_digit_int">
            <xsd:minInclusive value="1"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.73 Five Digit ID (Simple)

```
<xsd:simpleType name="Five_digit_ID">
    <xsd:restriction base="Five_digit_int">
            <xsd:minInclusive value="1"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.74 Six Digit ID (Simple)

```
<xsd:simpleType name="Six_digit_ID">
    <xsd:restriction base="Six_digit_int">
            <xsd:minInclusive value="1"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.75 Ten Digit ID (Simple)

```
<xsd:simpleType name="Ten_digit_ID">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1"/>
            <xsd:totalDigits value="10"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.76 SUBID (Simple)

```
<xsd:simpleType name="SUBID">
    <xsd:restriction base="Three_digit_ID"/>
</xsd:simpleType>
```

13.5.77 Record ID (Simple)

```
<xsd:simpleType name="Rec_ID">
    <xsd:restriction base="Ten_digit_ID"/>
</xsd:simpleType>
```

13.5.78 Geopolitical Structure Definition ID (Simple)

```
<xsd:simpleType name="GeoPol_str_def_ID">
    <xsd:restriction base="Four_digit_ID"/>
</xsd:simpleType>
```

13.5.79 Geopolitical Structure Definition Component ID (Simple)

```
<xsd:simpleType name="GeoPol_str_cmp_def_ID">
    <xsd:restriction base="Six_digit_ID"/>
</xsd:simpleType>
```

13.5.80 Album ID (Simple)

```
<xsd:simpleType name="Alb_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

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13.5.81 Abbreviation ID (Simple)

```
<xsd:simpleType name="Abbrev_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.82 Area Feature ID (Simple)

```
<xsd:simpleType name="Area_feature_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.83 Attribute ID (Simple)

```
<xsd:simpleType name="Attr_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.84 Complex ID (Simple)

```
<xsd:simpleType name="Complex_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.85 Conversion ID (Simple)

```
<xsd:simpleType name="Conversion_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.86 Datum & Ellipsoid ID (Simple)

```
<xsd:simpleType name="Datel_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.87 Directory ID (Simple)

```
<xsd:simpleType name="Direc_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.88 Dataset ID (Simple)

```
<xsd:simpleType name="Dset_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.89 Dataset Subtitle ID (Simple)

```
<xsd:simpleType name="Dset_subtitle_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

13.5.90 Dataset Producer ID (Simple)

```
<xsd:simpleType name="Dset_producer_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

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13.5.91 Dataset Contents ID (Simple)

```
<xsd:simpleType name="Dset_contents_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

13.5.92 Edge ID (Simple)

```
<xsd:simpleType name="Edge_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.93 Face ID (Simple)

```
<xsd:simpleType name="Face_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.94 Feature ID (Simple)

```
<xsd:simpleType name="Feature_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.95 Field Definition ID (Simple)

```
<xsd:simpleType name="Field_def_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.96 Geoid Undulation ID (Simple)

```
<xsd:simpleType name="Geoid_und_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.97 Geopolitical Update ID (Simple)

```
<xsd:simpleType name="Geo_upd_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.98 Line Feature ID (Simple)

```
<xsd:simpleType name="Line_feature_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.99 Main Title ID (Simple)

```
<xsd:simpleType name="Main_title_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

13.5.100 Magnetic Field ID (Simple)

```
<xsd:simpleType name="Mag_fld_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

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13.5.101 National Grid ID (Simple)

```
<xsd:simpleType name="Natgrid_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.102 Network ID (Simple)

```
<xsd:simpleType name="Netwk_ID">
    <xsd:restriction base="Five_digit_ID"/>
</xsd:simpleType>
```

13.5.103 Coordinate ID (Simple)

```
<xsd:simpleType name="Coord_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.104 Node ID (Simple)

```
<xsd:simpleType name="Node_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.105 Object Attribute Update ID (Simple)

```
<xsd:simpleType name="Obj_attr_upd_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.106 Object Reference ID (Simple)

```
<xsd:simpleType name="Obj_ref_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.107 Object Update ID (Simple)

```
<xsd:simpleType name="Obj_upd_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.108 Point Feature ID (Simple)

```
<xsd:simpleType name="Point_feat_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.109 Projection ID (Simple)

```
<xsd:simpleType name="Projection_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.110 Relationship ID (Simple)

```
<xsd:simpleType name="Relationship_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

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13.5.111 Section ID (Simple)

```
<xsd:simpleType name="Sect_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.112 XY Control ID (Simple)

```
<xsd:simpleType name="SHR_XY_cntrl_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

13.5.113 Z Control ID (Simple)

```
<xsd:simpleType name="SHR_Z_cntrl_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

13.5.114 Spatial Domain ID (Simple)

```
<xsd:simpleType name="Spat_dom_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.115 Source Description ID (Simple)

```
<xsd:simpleType name="Src_desc_ID">
    <xsd:restriction base="Five_digit_ID"/>
</xsd:simpleType>
```

13.5.116 Source Scale & Title ID (Simple)

```
<xsd:simpleType name="Src_scale_title_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

13.5.117 Source Publisher ID (Simple)

```
<xsd:simpleType name="Src_publisher_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

13.5.118 Source Distributor ID (Simple)

```
<xsd:simpleType name="Src_distributor_ID">
    <xsd:restriction base="SUBID"/>
</xsd:simpleType>
```

13.5.119 Text ID (Simple)

```
<xsd:simpleType name="Text_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.120 Time ID (Simple)

```
<xsd:simpleType name="Time_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

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13.5.121 Record Definition ID (Simple)

```
<xsd:simpleType name="Rec_def_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.122 Vertical Datum ID (Simple)

```
<xsd:simpleType name="Vert_datum_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.123 Record Type (Simple)

```
<xsd:simpleType name="Rec_typ">
    <xsd:restriction base="Record_type_value"/>
</xsd:simpleType>
```

13.5.124 Record Subtype (Simple)

```
<xsd:simpleType name="Rec_subtyp">
    <xsd:restriction base="Two_digit_ID"/>
</xsd:simpleType>
```

13.5.125 Geo ID (Simple)

```
<xsd:simpleType name="Geo_ID">
    <xsd:restriction base="Rec_ID"/>
</xsd:simpleType>
```

13.5.126 Layer ID (Simple)

```
<xsd:simpleType name="Layer_ID">
    <xsd:restriction base="Ten_digit_ID"/>
</xsd:simpleType>
```

13.5.127 Data Type (Simple)

```
<xsd:simpleType name="Data_typ">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="N"/>
            <xsd:enumeration value="A"/>
            <xsd:enumeration value="G"/>
            <xsd:enumeration value="L"/>
            <xsd:enumeration value="I"/>
            <xsd:enumeration value="AN"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.128 Extended Data Type (Simple)

```
<xsd:simpleType name="Data_type_extended">
    <xsd:restriction base="xsd:string">
            <xsd:length value="2"/>
            <xsd:enumeration value="N"/>
            <xsd:enumeration value="A"/>
            <xsd:enumeration value="G"/>
            <xsd:enumeration value="L"/>
            <xsd:enumeration value="I"/>
            <xsd:enumeration value="AN"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.129 Attribute Data Unit Code (Simple)

```
<xsd:simpleType name="Attr_data_unit_code">
    <xsd:restriction base="xsd:string">
            <xsd:length value="3"/>
            <xsd:enumeration value="DEG"/>
            <xsd:enumeration value="MTR"/>
            <xsd:enumeration value="KMR"/>
            <xsd:enumeration value="INC"/>
            <xsd:enumeration value="FET"/>
            <xsd:enumeration value="MIL"/>
            <xsd:enumeration value="KGR"/>
            <xsd:enumeration value="PND"/>
            <xsd:enumeration value="KIP"/>
            <xsd:enumeration value="TON"/>
            <xsd:enumeration value="MIN"/>
            <xsd:enumeration value="KPH"/>
            <xsd:enumeration value="MPH"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.130 Attribute Data Unit Name (Simple)

```
<xsd:simpleType name="Attr_data_unit_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Degree"/>
            <xsd:enumeration value="Metres"/>
            <xsd:enumeration value="Kilometre"/>
            <xsd:enumeration value="Inch"/>
            <xsd:enumeration value="Feet"/>
            <xsd:enumeration value="Mile"/>
            <xsd:enumeration value="Kilogram"/>
            <xsd:enumeration value="Pound (US pound)"/>
            <xsd:enumeration value="Kilo Pound"/>
            <xsd:enumeration value="Ton (metric ton)"/>
            <xsd:enumeration value="Minute (of time)"/>
            <xsd:enumeration value="Kilometres per hour"/>
            <xsd:enumeration value="Miles per hour"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.131 Edge Status Name (Simple)

```
<xsd:simpleType name="Edge_status_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="not available 1"/>
            <xsd:enumeration value="normal edge"/>
            <xsd:enumeration value="dataset border edge"/>
            <xsd:enumeration value="not available 2"/>
            <xsd:enumeration value="non-section border edge"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.132 Node Status Name (Simple)

```
<xsd:simpleType name="Node_status_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="section border node"/>
            <xsd:enumeration value="normal node"/>
            <xsd:enumeration value="dataset border node"/>
            <xsd:enumeration value="end of stubble"/>
            <xsd:enumeration value="non-section border node"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.133 Attribute Data Type Name (Simple)

```
<xsd:simpleType name="Attr_data_type_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Code List"/>
            <xsd:enumeration value="Enumeration"/>
            <xsd:enumeration value="Number"/>
            <xsd:enumeration value="Boolean"/>
            <xsd:enumeration value="Bit Mask Register (binary number as binary)"/>
            <xsd:enumeration value="Bit Mask Integer (binary number as decimal)"/>
            <xsd:enumeration value="Time Domain"/>
            <xsd:enumeration value="(Simple) Character String"/>
            <xsd:enumeration value="(Language-Coded) Text)"/>
            <xsd:enumeration value="Percentage"/>
            <xsd:enumeration value="Composite"/>
            <xsd:enumeration value="Identifier"/>
            <xsd:enumeration value="Geopolitical Structure Definition"/>
            <xsd:enumeration value="Signed Percentage"/>
            <xsd:enumeration value="Measure"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.134 Attribute Data Type Value (Simple)

```
<xsd:simpleType name="Attr_data_type_value">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="ENM"/>
            <xsd:enumeration value="CNT"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="BMR"/>
            <xsd:enumeration value="BMI"/>
            <xsd:enumeration value="TMR"/>
            <xsd:enumeration value="SCS"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="PRC"/>
            <xsd:enumeration value="CMP"/>
            <xsd:enumeration value="IDN"/>
            <xsd:enumeration value="GSD"/>
            <xsd:enumeration value="PRS"/>
            <xsd:enumeration value="MSR"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.135 Action Name (Simple)

```
<xsd:simpleType name="Action_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="update of source only"/>
            <xsd:enumeration value="new"/>
            <xsd:enumeration value="delete"/>
            <xsd:enumeration value="modify"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.136 Action Value (Simple)

```
<xsd:simpleType name="Action_value">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="3"/>
            <xsd:enumeration value="0"/>
            <xsd:enumeration value="1"/>
            <xsd:enumeration value="2"/>
            <xsd:enumeration value="3"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.137 Attribute Type Code Name (Simple)

```
<xsd:simpleType name="Attr_type_code_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Infrastructure Accessibility Aids"/>
            <xsd:enumeration value="Structure Abutment"/>
            <xsd:enumeration value="Accident Identifier"/>
            <xsd:enumeration value="Departure/Arrival"/>
            <xsd:enumeration value="Wheelchair Limitation"/>
            <xsd:enumeration value="Hearing Limitation"/>
            <xsd:enumeration value="Airport Code"/>
            <xsd:enumeration value="Alternate Street Name Text"/>
            <xsd:enumeration value="Alternate Name Text"/>
            <xsd:enumeration value="Positional Accuracy"/>
            <xsd:enumeration value="International Railway Station"/>
            <xsd:enumeration value="Average Vehicle Speed"/>
            <xsd:enumeration value="Accident Date"/>
            <xsd:enumeration value="Vision Limitation"/>
            <xsd:enumeration value="Maximum Weight per Axle Allowed"/>
            <xsd:enumeration value="Association Type"/>
            <xsd:enumeration value="Breakfast Available"/>
            <xsd:enumeration value="Building Class Name"/>
            <xsd:enumeration value="Building Detail Type"/>
            <xsd:enumeration value="Blocked Passage Type"/>
            <xsd:enumeration value="Building Storey"/>
            <xsd:enumeration value="Block Grouping"/>
            <xsd:enumeration value="Upper Building Elevation"/>
            <xsd:enumeration value="Lower Building Elevation"/>
            <xsd:enumeration value="Block Class Name"/>
            <xsd:enumeration value="Business Lunch"/>
            <xsd:enumeration value="Brand Name"/>
            <xsd:enumeration value="Block Type"/>
            <xsd:enumeration value="Blocked Passage Location"/>
            <xsd:enumeration value="Urban Railway Station"/>
            <xsd:enumeration value="Building Storey Count"/>
            <xsd:enumeration value="Structure Type"/>
            <xsd:enumeration value="Administrative Boundary Type"/>
            <xsd:enumeration value="Boundary Type"/>
            <xsd:enumeration value="Accepted Credit Cards"/>
            <xsd:enumeration value="City Centre Administrative Class"/>
            <xsd:enumeration value="Car Dealer Type"/>
            <xsd:enumeration value="Start End Flag"/>
            <xsd:enumeration value="Conditional Traffic Flow"/>
            <xsd:enumeration value="Distance Measure"/>
            <xsd:enumeration value="Distance Measure Referent"/>
            <xsd:enumeration value="Assignment Order"/>
            <xsd:enumeration value="Commercial Airline Service"/>
            <xsd:enumeration value="Continuation Type"/>
            <xsd:enumeration value="Correspondence Order"/>
            <xsd:enumeration value="Commuter/Regional Railway Station"/>
            <xsd:enumeration value="Construction Status"/>
            <xsd:enumeration value="Other Textual Content on a Traffic Sign"/>
            <xsd:enumeration value="Currency"/>
            <xsd:enumeration value="Scope"/>
            <xsd:enumeration value="Destination of Flight Connection"/>
            <xsd:enumeration value="Divider Height"/>
            <xsd:enumeration value="Direction Category"/>
            <xsd:enumeration value="Destination Location"/>
            <xsd:enumeration value="Divider Marking"/>
            <xsd:enumeration value="Directional Prefix"/>
            <xsd:enumeration value="Divided Road Element"/>
            <xsd:enumeration value="Directional Suffix"/>
            <xsd:enumeration value="Divider Type"/>
            <xsd:enumeration value="Divider Width"/>
            <xsd:enumeration value="Divider Impact"/>
            <xsd:enumeration value="Display Class"/>
            <xsd:enumeration value="Divider Colour"/>
            <xsd:enumeration value="Enclosed Traffic Area Type"/>
            <xsd:enumeration value="External Identifier"/>
            <xsd:enumeration value="Exit Number"/>
            <xsd:enumeration value="Equipment Identifier"/>
            <xsd:enumeration value="Entry Point Type"/>
            <xsd:enumeration value="Lane Type"/>
            <xsd:enumeration value="Functional Road Class"/>
            <xsd:enumeration value="Façade Fabric Type"/>
            <xsd:enumeration value="Façade Colour"/>
```

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```
<xsd:enumeration value="Road Furniture Position"/>
<xsd:enumeration value="Façade Component Placement"/>
<xsd:enumeration value="Frequency of a Traffic Connection"/>
<xsd:enumeration value="Facilities en Suite"/>
<xsd:enumeration value="Ferry Type"/>
<xsd:enumeration value="Form of Way"/>
<xsd:enumeration value="Motorway"/>
<xsd:enumeration value="General Aviation"/>
<xsd:enumeration value="Government Type"/>
<xsd:enumeration value="Give Way Type"/>
<xsd:enumeration value="Intermediate House Number"/>
<xsd:enumeration value="Last House Number"/>
<xsd:enumeration value="House Number"/>
<xsd:enumeration value="Height Label"/>
<xsd:enumeration value="House Number Structure"/>
<xsd:enumeration value="Pedestrian Type"/>
<xsd:enumeration value="ID of Flight Connection"/>
<xsd:enumeration value="Grade-separated Junction Type"/>
<xsd:enumeration value="Importance"/>
<xsd:enumeration value="Road Crossfall"/>
<xsd:enumeration value="Junction Type"/>
<xsd:enumeration value="Phonetic Alphabet"/>
<xsd:enumeration value="Location Reference Code"/>
<xsd:enumeration value="Lane Dependent Validity"/>
<xsd:enumeration value="Measured Length"/>
<xsd:enumeration value="Lateral Offset"/>
<xsd:enumeration value="Pronunciation Language"/>
<xsd:enumeration value="Length of a Road Element"/>
<xsd:enumeration value="Linear Referencing Method"/>
<xsd:enumeration value="Location Reference Type"/>
<xsd:enumeration value="Location Description"/>
<xsd:enumeration value="Pronunciation Variant"/>
<xsd:enumeration value="Magnetic Anomalies"/>
<xsd:enumeration value="Multi-Media Action"/>
<xsd:enumeration value="Multi-Media Description"/>
<xsd:enumeration value="Maximum Height Allowed"/>
<xsd:enumeration value="Minimum Number of Lanes"/>
<xsd:enumeration value="Maximum Length Allowed"/>
<xsd:enumeration value="Multi-Media Time Domain"/>
<xsd:enumeration value="Multi-Media File Attachment Name"/>
<xsd:enumeration value="Minimum Number of Occupants"/>
<xsd:enumeration value="Military Airport"/>
<xsd:enumeration value="Multi-Media File Attachment Type"/>
<xsd:enumeration value="Main Railway Station"/>
<xsd:enumeration value="Maximum Total Weight Allowed"/>
<xsd:enumeration value="Maximum Width Allowed"/>
<xsd:enumeration value="Notation Anomaly"/>
<xsd:enumeration value="Name Component Length"/>
<xsd:enumeration value="Notation Alphabet"/>
<xsd:enumeration value="Domestic/International"/>
<xsd:enumeration value="Name Component Offset"/>
<xsd:enumeration value="Name Prefix"/>
<xsd:enumeration value="National Road Class"/>
<xsd:enumeration value="Name Component Type"/>
<xsd:enumeration value="Notation Variant"/>
<xsd:enumeration value="Notation Version"/>
<xsd:enumeration value="Paved Road Surface Type"/>
<xsd:enumeration value="Official Code"/>
<xsd:enumeration value="Official Street Name Type Text"/>
<xsd:enumeration value="Official Name Text"/>
<xsd:enumeration value="Opening Period"/>
<xsd:enumeration value="Ownership"/>
<xsd:enumeration value="One-way"/>
<xsd:enumeration value="Pass"/>
<xsd:enumeration value="Pronunciation"/>
<xsd:enumeration value="Population Class"/>
<xsd:enumeration value="Place Name"/>
<xsd:enumeration value="Parking Facilities Available"/>
<xsd:enumeration value="Pathway Type"/>
<xsd:enumeration value="Percentage of International Traffic"/>
<xsd:enumeration value="Pathway Safety Indicator"/>
<xsd:enumeration value="Park and Ride Facility"/>
<xsd:enumeration value="Place within Place Classification"/>
<xsd:enumeration value="Population"/>
<xsd:enumeration value="Post Office Type"/>
<xsd:enumeration value="Price band"/>
<xsd:enumeration value="Postal Code"/>
```

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```
            <xsd:enumeration value="Park Type"/>
            <xsd:enumeration value="Pavement Status"/>
            <xsd:enumeration value="Not Crossable by Pedestrians"/>
            <xsd:enumeration value="Parking Type Charged"/>
            <xsd:enumeration value="Rating"/>
            <xsd:enumeration value="Removable Blockage"/>
            <xsd:enumeration value="Region Code"/>
            <xsd:enumeration value="Route Type Prefix"/>
            <xsd:enumeration value="Restaurant Facilities Available"/>
            <xsd:enumeration value="Road Gradient"/>
            <xsd:enumeration value="Route Type Suffix"/>
            <xsd:enumeration value="Road with Parking Lane"/>
            <xsd:enumeration value="Road with Bicycle Lane"/>
            <xsd:enumeration value="Road with Pavement"/>
            <xsd:enumeration value="Route Number Body"/>
            <xsd:enumeration value="Number of Rooms"/>
            <xsd:enumeration value="Passing Restrictions"/>
            <xsd:enumeration value="Road Surface Condition"/>
            <xsd:enumeration value="Routing Identifier"/>
            <xsd:enumeration value="Routing Type"/>
            <xsd:enumeration value="Routing Sequence Number"/>
            <xsd:enumeration value="Route Number on Sign"/>
            <xsd:enumeration value="Railway Type"/>
            <xsd:enumeration value="Road and Rail Network and Associated Land Type"/>
            <xsd:enumeration value="Sand Area Type"/>
            <xsd:enumeration value="Structure Category"/>
            <xsd:enumeration value="Suitable for Disabled or Impaired"/>
            <xsd:enumeration value="Separator"/>
            <xsd:enumeration value="Structure Identifier"/>
            <xsd:enumeration value="Street Lighted"/>
            <xsd:enumeration value="Side of Line"/>
            <xsd:enumeration value="Sign Text"/>
            <xsd:enumeration value="Slip Road Type"/>
            <xsd:enumeration value="Settlement Type"/>
            <xsd:enumeration value="Street Name"/>
            <xsd:enumeration value="Speed Restrictions"/>
            <xsd:enumeration value="Publicly Accessible"/>
            <xsd:enumeration value="Snack Served"/>
            <xsd:enumeration value="Street Type Suffix"/>
            <xsd:enumeration value="Summer Time"/>
            <xsd:enumeration value="Scenic Value"/>
            <xsd:enumeration value="Street Type Prefix"/>
            <xsd:enumeration value="Symbol on Traffic Sign"/>
            <xsd:enumeration value="Time of Arrival of Flight Connection"/>
            <xsd:enumeration value="Toll Point Type"/>
            <xsd:enumeration value="Toll Charge"/>
            <xsd:enumeration value="Time of Departure of Flight Connection"/>
            <xsd:enumeration value="Time Difference of Flight Connection"/>
            <xsd:enumeration value="Trailing Spaces"/>
            <xsd:enumeration value="Traffic Jam Sensitivity"/>
            <xsd:enumeration value="Telephone Number"/>
            <xsd:enumeration value="Traffic Flow Measurement"/>
            <xsd:enumeration value="Transition"/>
            <xsd:enumeration value="Toll Road"/>
            <xsd:enumeration value="Traffic Sign Class"/>
            <xsd:enumeration value="Travel Time"/>
            <xsd:enumeration value="Traffic Flow Measurement Unit"/>
            <xsd:enumeration value="Telefax Number"/>
            <xsd:enumeration value="Traffic Flow Measurement Type"/>
            <xsd:enumeration value="Time Zone"/>
            <xsd:enumeration value="Underground Flag"/>
            <xsd:enumeration value="Unpaved Road Surface Type"/>
            <xsd:enumeration value="Value on traffic Sign"/>
            <xsd:enumeration value="Validity Direction"/>
            <xsd:enumeration value="Validity Period"/>
            <xsd:enumeration value="Value on Referent"/>
            <xsd:enumeration value="Vehicle Type"/>
            <xsd:enumeration value="Water Boundary Element Type"/>
            <xsd:enumeration value="Width"/>
            <xsd:enumeration value="Water Body Type"/>
        </xsd:restriction>
    </xsd:simpleType>
```

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13.5.138 Attribute Type Code Value (Simple)

```
<xsd:simpleType name="Attr_type_code_val">
    <xsd:restriction base="Attr_type_code_string">
            <xsd:enumeration value="AA"/>
            <xsd:enumeration value="AB"/>
            <xsd:enumeration value="AC"/>
            <xsd:enumeration value="AD"/>
            <xsd:enumeration value="AE"/>
            <xsd:enumeration value="AH"/>
            <xsd:enumeration value="AI"/>
            <xsd:enumeration value="AL"/>
            <xsd:enumeration value="AN"/>
            <xsd:enumeration value="AP"/>
            <xsd:enumeration value="AR"/>
            <xsd:enumeration value="AS"/>
            <xsd:enumeration value="AT"/>
            <xsd:enumeration value="AV"/>
            <xsd:enumeration value="AW"/>
            <xsd:enumeration value="AY"/>
            <xsd:enumeration value="BA"/>
            <xsd:enumeration value="BC"/>
            <xsd:enumeration value="BD"/>
            <xsd:enumeration value="BE"/>
            <xsd:enumeration value="BF"/>
            <xsd:enumeration value="BG"/>
            <xsd:enumeration value="BH"/>
            <xsd:enumeration value="BI"/>
            <xsd:enumeration value="BK"/>
            <xsd:enumeration value="BL"/>
            <xsd:enumeration value="BN"/>
            <xsd:enumeration value="BO"/>
            <xsd:enumeration value="BP"/>
            <xsd:enumeration value="BR"/>
            <xsd:enumeration value="BS"/>
            <xsd:enumeration value="BT"/>
            <xsd:enumeration value="BX"/>
            <xsd:enumeration value="BY"/>
            <xsd:enumeration value="CA"/>
            <xsd:enumeration value="CC"/>
            <xsd:enumeration value="CD"/>
            <xsd:enumeration value="CE"/>
            <xsd:enumeration value="CF"/>
            <xsd:enumeration value="CH"/>
            <xsd:enumeration value="CI"/>
            <xsd:enumeration value="CK"/>
            <xsd:enumeration value="CM"/>
            <xsd:enumeration value="CP"/>
            <xsd:enumeration value="CQ"/>
            <xsd:enumeration value="CR"/>
            <xsd:enumeration value="CS"/>
            <xsd:enumeration value="CT"/>
            <xsd:enumeration value="CU"/>
            <xsd:enumeration value="CY"/>
            <xsd:enumeration value="DC"/>
            <xsd:enumeration value="DH"/>
            <xsd:enumeration value="DI"/>
            <xsd:enumeration value="DL"/>
            <xsd:enumeration value="DM"/>
            <xsd:enumeration value="DP"/>
            <xsd:enumeration value="DR"/>
            <xsd:enumeration value="DS"/>
            <xsd:enumeration value="DT"/>
            <xsd:enumeration value="DW"/>
            <xsd:enumeration value="DX"/>
            <xsd:enumeration value="DY"/>
            <xsd:enumeration value="DZ"/>
            <xsd:enumeration value="EA"/>
            <xsd:enumeration value="EI"/>
            <xsd:enumeration value="EN"/>
            <xsd:enumeration value="EQ"/>
            <xsd:enumeration value="ET"/>
            <xsd:enumeration value="EV"/>
            <xsd:enumeration value="FC"/>
            <xsd:enumeration value="FF"/>
```

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```
<xsd:enumeration value="FL"/>
<xsd:enumeration value="FP"/>
<xsd:enumeration value="FQ"/>
<xsd:enumeration value="FR"/>
<xsd:enumeration value="FS"/>
<xsd:enumeration value="FT"/>
<xsd:enumeration value="FW"/>
<xsd:enumeration value="FY"/>
<xsd:enumeration value="GA"/>
<xsd:enumeration value="GT"/>
<xsd:enumeration value="GW"/>
<xsd:enumeration value="HI"/>
<xsd:enumeration value="HL"/>
<xsd:enumeration value="HN"/>
<xsd:enumeration value="HP"/>
<xsd:enumeration value="HS"/>
<xsd:enumeration value="HT"/>
<xsd:enumeration value="ID"/>
<xsd:enumeration value="IF"/>
<xsd:enumeration value="IM"/>
<xsd:enumeration value="IR"/>
<xsd:enumeration value="JT"/>
<xsd:enumeration value="LA"/>
<xsd:enumeration value="LC"/>
<xsd:enumeration value="LD"/>
<xsd:enumeration value="LM"/>
<xsd:enumeration value="LO"/>
<xsd:enumeration value="LP"/>
<xsd:enumeration value="LR"/>
<xsd:enumeration value="LS"/>
<xsd:enumeration value="LT"/>
<xsd:enumeration value="LU"/>
<xsd:enumeration value="LV"/>
<xsd:enumeration value="MA"/>
<xsd:enumeration value="MC"/>
<xsd:enumeration value="MD"/>
<xsd:enumeration value="MH"/>
<xsd:enumeration value="MI"/>
<xsd:enumeration value="ML"/>
<xsd:enumeration value="MM"/>
<xsd:enumeration value="MN"/>
<xsd:enumeration value="MO"/>
<xsd:enumeration value="MP"/>
<xsd:enumeration value="MQ"/>
<xsd:enumeration value="MR"/>
<xsd:enumeration value="MT"/>
<xsd:enumeration value="MW"/>
<xsd:enumeration value="NA"/>
<xsd:enumeration value="NC"/>
<xsd:enumeration value="NE"/>
<xsd:enumeration value="NI"/>
<xsd:enumeration value="NO"/>
<xsd:enumeration value="NP"/>
<xsd:enumeration value="NR"/>
<xsd:enumeration value="NT"/>
<xsd:enumeration value="NV"/>
<xsd:enumeration value="NW"/>
<xsd:enumeration value="OA"/>
<xsd:enumeration value="OC"/>
<xsd:enumeration value="OF"/>
<xsd:enumeration value="ON"/>
<xsd:enumeration value="OP"/>
<xsd:enumeration value="OW"/>
<xsd:enumeration value="OY"/>
<xsd:enumeration value="PA"/>
<xsd:enumeration value="PB"/>
<xsd:enumeration value="PC"/>
<xsd:enumeration value="PE"/>
<xsd:enumeration value="PF"/>
<xsd:enumeration value="PH"/>
<xsd:enumeration value="PI"/>
<xsd:enumeration value="PJ"/>
<xsd:enumeration value="PK"/>
<xsd:enumeration value="PL"/>
<xsd:enumeration value="PO"/>
```

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```
                <xsd:enumeration value="PP"/>
                <xsd:enumeration value="PR"/>
                <xsd:enumeration value="PS"/>
                <xsd:enumeration value="PV"/>
                <xsd:enumeration value="PX"/>
                <xsd:enumeration value="PY"/>
                <xsd:enumeration value="RA"/>
                <xsd:enumeration value="RB"/>
                <xsd:enumeration value="RC"/>
                <xsd:enumeration value="RE"/>
                <xsd:enumeration value="RF"/>
                <xsd:enumeration value="RG"/>
                <xsd:enumeration value="RI"/>
                <xsd:enumeration value="RK"/>
                <xsd:enumeration value="RL"/>
                <xsd:enumeration value="RM"/>
                <xsd:enumeration value="RN"/>
                <xsd:enumeration value="RO"/>
                <xsd:enumeration value="RP"/>
                <xsd:enumeration value="RR"/>
                <xsd:enumeration value="RS"/>
                <xsd:enumeration value="RT"/>
                <xsd:enumeration value="RU"/>
                <xsd:enumeration value="RX"/>
                <xsd:enumeration value="RY"/>
                <xsd:enumeration value="RZ"/>
                <xsd:enumeration value="SA"/>
                <xsd:enumeration value="SC"/>
                <xsd:enumeration value="SD"/>
                <xsd:enumeration value="SE"/>
                <xsd:enumeration value="SF"/>
                <xsd:enumeration value="SG"/>
                <xsd:enumeration value="SI"/>
                <xsd:enumeration value="SJ"/>
                <xsd:enumeration value="SL"/>
                <xsd:enumeration value="SM"/>
                <xsd:enumeration value="SN"/>
                <xsd:enumeration value="SP"/>
                <xsd:enumeration value="SR"/>
                <xsd:enumeration value="SS"/>
                <xsd:enumeration value="ST"/>
                <xsd:enumeration value="SU"/>
                <xsd:enumeration value="SV"/>
                <xsd:enumeration value="SX"/>
                <xsd:enumeration value="SY"/>
                <xsd:enumeration value="TA"/>
                <xsd:enumeration value="TB"/>
                <xsd:enumeration value="TC"/>
                <xsd:enumeration value="TD"/>
                <xsd:enumeration value="TF"/>
                <xsd:enumeration value="TI"/>
                <xsd:enumeration value="TJ"/>
                <xsd:enumeration value="TL"/>
                <xsd:enumeration value="TM"/>
                <xsd:enumeration value="TN"/>
                <xsd:enumeration value="TR"/>
                <xsd:enumeration value="TS"/>
                <xsd:enumeration value="TT"/>
                <xsd:enumeration value="TU"/>
                <xsd:enumeration value="TX"/>
                <xsd:enumeration value="TY"/>
                <xsd:enumeration value="TZ"/>
                <xsd:enumeration value="UF"/>
                <xsd:enumeration value="UR"/>
                <xsd:enumeration value="VA"/>
                <xsd:enumeration value="VD"/>
                <xsd:enumeration value="VP"/>
                <xsd:enumeration value="VR"/>
                <xsd:enumeration value="VT"/>
                <xsd:enumeration value="WB"/>
                <xsd:enumeration value="WI"/>
                <xsd:enumeration value="WT"/>
        </xsd:restriction>
    </xsd:simpleType>
```

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13.5.139 Attribute Type Data Type Code (Simple)

```
<xsd:simpleType name="Attr_type_code_type">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="BMI"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="COD_external"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="MSR"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="MSR"/>
            <xsd:enumeration value="TMR"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="MSR"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="MSR"/>
            <xsd:enumeration value="MSR"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="CNT"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="ENM"/>
            <xsd:enumeration value="ENM"/>
            <xsd:enumeration value="BMR"/>
            <xsd:enumeration value="ENM"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="ENM"/>
            <xsd:enumeration value="ENM"/>
            <xsd:enumeration value="MSR"/>
            <xsd:enumeration value="CNT"/>
            <xsd:enumeration value="CNT"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="CNT"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="ENM"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="MSR"/>
            <xsd:enumeration value="BMI"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="BOL"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="MSR"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="SCS"/>
            <xsd:enumeration value="TXT"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="COD"/>
            <xsd:enumeration value="SCS"/>
```

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```
<xsd:enumeration value="BMI"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="TMR"/>
<xsd:enumeration value="CNT"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="BOL"/>
<xsd:enumeration value="BOL"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="SCS"/>
<xsd:enumeration value="SCS"/>
<xsd:enumeration value="SCS"/>
<xsd:enumeration value="MSR"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="SCS"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="PRS"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="SCS"/>
<xsd:enumeration value="MSR"/>
<xsd:enumeration value="CNT"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="MSR"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="BOL"/>
<xsd:enumeration value="COD_user_defined"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="MSR"/>
<xsd:enumeration value="CNT"/>
<xsd:enumeration value="MSR"/>
<xsd:enumeration value="TMR"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="CNT"/>
<xsd:enumeration value="BOL"/>
<xsd:enumeration value="COD_external"/>
<xsd:enumeration value="BOL"/>
<xsd:enumeration value="MSR"/>
<xsd:enumeration value="MSR"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="CNT"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="CNT"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="SCS"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="TMR"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="ENM"/>
<xsd:enumeration value="BOL"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="ENM"/>
<xsd:enumeration value="TXT"/>
<xsd:enumeration value="CNT"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="PRC"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="BOL"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="CNT"/>
<xsd:enumeration value="COD"/>
```

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```
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="SCS"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="PRS"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="CNT"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="CNT"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="SCS"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="ENM"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="MSR"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="MSR"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="TMR"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="CNT"/>
                <xsd:enumeration value="TMR"/>
                <xsd:enumeration value="TMR"/>
                <xsd:enumeration value="ENM"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="SCS"/>
                <xsd:enumeration value="CNT"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="BOL"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="TMR"/>
                <xsd:enumeration value="TMR"/>
                <xsd:enumeration value="SCS"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="CNT"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="MSR"/>
                <xsd:enumeration value="ENM"/>
                <xsd:enumeration value="TMR"/>
                <xsd:enumeration value="TXT"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="COD"/>
                <xsd:enumeration value="MSR"/>
                <xsd:enumeration value="COD"/>
        </xsd:restriction>
    </xsd:simpleType>
```

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13.5.140 Attribute Type Code Definition (Simple)

```
<xsd:simpleType name="Attr_type_code_def">
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Attr_AA_CODE"/>
        <xsd:enumeration value="Attr_AB_BMI"/>
        <xsd:enumeration value="03"/>
        <xsd:enumeration value="Attr_AD_CODE"/>
        <xsd:enumeration value="05"/>
        <xsd:enumeration value="06"/>
        <xsd:enumeration value="07"/>
        <xsd:enumeration value="08"/>
        <xsd:enumeration value="09"/>
        <xsd:enumeration value="10"/>
        <xsd:enumeration value="11"/>
        <xsd:enumeration value="12"/>
        <xsd:enumeration value="13"/>
        <xsd:enumeration value="14"/>
        <xsd:enumeration value="15"/>
        <xsd:enumeration value="Attr_AY_CODE"/>
        <xsd:enumeration value="17"/>
        <xsd:enumeration value="18"/>
        <xsd:enumeration value="Attr_BD_CODE"/>
        <xsd:enumeration value="Attr_BE_CODE"/>
        <xsd:enumeration value="21"/>
        <xsd:enumeration value="Attr_BG_CODE"/>
        <xsd:enumeration value="23"/>
        <xsd:enumeration value="24"/>
        <xsd:enumeration value="25"/>
        <xsd:enumeration value="26"/>
        <xsd:enumeration value="27"/>
        <xsd:enumeration value="Attr_BO_CODE"/>
        <xsd:enumeration value="Attr_BP_CODE"/>
        <xsd:enumeration value="30"/>
        <xsd:enumeration value="31"/>
        <xsd:enumeration value="Attr_BT_CODE"/>
        <xsd:enumeration value="Attr_BX_ENUM"/>
        <xsd:enumeration value="Attr_BY_ENUM"/>
        <xsd:enumeration value="35"/>
        <xsd:enumeration value="Attr_CC_ENUM"/>
        <xsd:enumeration value="Attr_CD_CODE"/>
        <xsd:enumeration value="Attr_CE_ENUM"/>
        <xsd:enumeration value="Attr_CF_ENUM"/>
        <xsd:enumeration value="40"/>
        <xsd:enumeration value="41"/>
        <xsd:enumeration value="42"/>
        <xsd:enumeration value="43"/>
        <xsd:enumeration value="Attr_CP_CODE"/>
        <xsd:enumeration value="45"/>
        <xsd:enumeration value="46"/>
        <xsd:enumeration value="Attr_CS_CODE"/>
        <xsd:enumeration value="48"/>
        <xsd:enumeration value="49"/>
        <xsd:enumeration value="Attr_CY_ENUM"/>
        <xsd:enumeration value="51"/>
        <xsd:enumeration value="52"/>
        <xsd:enumeration value="Attr_DI_BMI"/>
        <xsd:enumeration value="54"/>
        <xsd:enumeration value="Attr_DM_CODE"/>
        <xsd:enumeration value="56"/>
        <xsd:enumeration value="57"/>
        <xsd:enumeration value="58"/>
        <xsd:enumeration value="Attr_DT_CODE"/>
        <xsd:enumeration value="60"/>
        <xsd:enumeration value="Attr_DX_CODE"/>
        <xsd:enumeration value="Attr_DY_CODE"/>
        <xsd:enumeration value="Attr_DZ_CODE"/>
        <xsd:enumeration value="Attr_EA_CODE"/>
        <xsd:enumeration value="65"/>
        <xsd:enumeration value="66"/>
        <xsd:enumeration value="67"/>
        <xsd:enumeration value="Attr_ET_CODE"/>
        <xsd:enumeration value="Attr_EV_CODE"/>
        <xsd:enumeration value="Attr_FC_CODE"/>
        <xsd:enumeration value="Attr_FF_CODE"/>
        <xsd:enumeration value="72"/>
```

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```
<xsd:enumeration value="Attr_FP_BMI"/>
<xsd:enumeration value="Attr_FQ_CODE"/>
<xsd:enumeration value="75"/>
<xsd:enumeration value="76"/>
<xsd:enumeration value="Attr_FT_CODE"/>
<xsd:enumeration value="Attr_FW_CODE"/>
<xsd:enumeration value="79"/>
<xsd:enumeration value="80"/>
<xsd:enumeration value="Attr_GT_CODE"/>
<xsd:enumeration value="Attr_GW_CODE"/>
<xsd:enumeration value="83"/>
<xsd:enumeration value="84"/>
<xsd:enumeration value="85"/>
<xsd:enumeration value="86"/>
<xsd:enumeration value="Attr_HS_CODE"/>
<xsd:enumeration value="Attr_HT_CODE"/>
<xsd:enumeration value="89"/>
<xsd:enumeration value="Attr_IF_CODE"/>
<xsd:enumeration value="Attr_IM_CODE"/>
<xsd:enumeration value="92"/>
<xsd:enumeration value="Attr_JT_CODE"/>
<xsd:enumeration value="Attr_LA_CODE"/>
<xsd:enumeration value="95"/>
<xsd:enumeration value="96"/>
<xsd:enumeration value="97"/>
<xsd:enumeration value="98"/>
<xsd:enumeration value="Lang_code_value"/>
<xsd:enumeration value="100"/>
<xsd:enumeration value="Attr_LS_CODE"/>
<xsd:enumeration value="Attr_LT_CODE"/>
<xsd:enumeration value="103"/>
<xsd:enumeration value="Attr_LV_CODE"/>
<xsd:enumeration value="105"/>
<xsd:enumeration value="106"/>
<xsd:enumeration value="Attr_MD_CODE"/>
<xsd:enumeration value="108"/>
<xsd:enumeration value="109"/>
<xsd:enumeration value="110"/>
<xsd:enumeration value="111"/>
<xsd:enumeration value="112"/>
<xsd:enumeration value="113"/>
<xsd:enumeration value="114"/>
<xsd:enumeration value="115"/>
<xsd:enumeration value="116"/>
<xsd:enumeration value="117"/>
<xsd:enumeration value="118"/>
<xsd:enumeration value="Attr_NA_CODE"/>
<xsd:enumeration value="120"/>
<xsd:enumeration value="121"/>
<xsd:enumeration value="Attr_NI_CODE"/>
<xsd:enumeration value="123"/>
<xsd:enumeration value="124"/>
<xsd:enumeration value="Attr_NR_CODE"/>
<xsd:enumeration value="Attr_NT_CODE"/>
<xsd:enumeration value="Attr_NV_CODE"/>
<xsd:enumeration value="Attr_NW_CODE"/>
<xsd:enumeration value="Attr_OA_CODE"/>
<xsd:enumeration value="130"/>
<xsd:enumeration value="131"/>
<xsd:enumeration value="132"/>
<xsd:enumeration value="133"/>
<xsd:enumeration value="Attr_OW_CODE"/>
<xsd:enumeration value="Attr_OY_ENUM"/>
<xsd:enumeration value="136"/>
<xsd:enumeration value="137"/>
<xsd:enumeration value="Attr_PC_CODE"/>
<xsd:enumeration value="Attr_PD_ENUM"/>
<xsd:enumeration value="140"/>
<xsd:enumeration value="141"/>
<xsd:enumeration value="Attr_PH_CODE"/>
<xsd:enumeration value="143"/>
<xsd:enumeration value="Attr_PJ_CODE"/>
<xsd:enumeration value="145"/>
<xsd:enumeration value="Attr_PL_CODE"/>
<xsd:enumeration value="Attr_PM_CODE"/>
<xsd:enumeration value="148"/>
<xsd:enumeration value="Attr_PP_CODE"/>
```

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```
                <xsd:enumeration value="150"/>
                <xsd:enumeration value="Attr_PR_CODE"/>
                <xsd:enumeration value="152"/>
                <xsd:enumeration value="Attr_PT_CODE"/>
                <xsd:enumeration value="Attr_PV_CODE"/>
                <xsd:enumeration value="Attr_PX_CODE"/>
                <xsd:enumeration value="156"/>
                <xsd:enumeration value="Attr_RA_CODE"/>
                <xsd:enumeration value="Attr_RB_CODE"/>
                <xsd:enumeration value="Attr_RC_CODE"/>
                <xsd:enumeration value="160"/>
                <xsd:enumeration value="161"/>
                <xsd:enumeration value="162"/>
                <xsd:enumeration value="163"/>
                <xsd:enumeration value="164"/>
                <xsd:enumeration value="165"/>
                <xsd:enumeration value="166"/>
                <xsd:enumeration value="167"/>
                <xsd:enumeration value="168"/>
                <xsd:enumeration value="169"/>
                <xsd:enumeration value="Attr_RR_CODE"/>
                <xsd:enumeration value="171"/>
                <xsd:enumeration value="Attr_RT_CODE"/>
                <xsd:enumeration value="173"/>
                <xsd:enumeration value="174"/>
                <xsd:enumeration value="Attr_RY_CODE"/>
                <xsd:enumeration value="Attr_RZ_CODE"/>
                <xsd:enumeration value="Attr_SA_CODE"/>
                <xsd:enumeration value="Attr_SC_CODE"/>
                <xsd:enumeration value="179"/>
                <xsd:enumeration value="180"/>
                <xsd:enumeration value="181"/>
                <xsd:enumeration value="182"/>
                <xsd:enumeration value="Attr_SI_ENUM"/>
                <xsd:enumeration value="184"/>
                <xsd:enumeration value="Attr_SL_CODE"/>
                <xsd:enumeration value="Attr_SM_CODE"/>
                <xsd:enumeration value="187"/>
                <xsd:enumeration value="188"/>
                <xsd:enumeration value="189"/>
                <xsd:enumeration value="190"/>
                <xsd:enumeration value="191"/>
                <xsd:enumeration value="192"/>
                <xsd:enumeration value="193"/>
                <xsd:enumeration value="194"/>
                <xsd:enumeration value="Attr_SY_CODE"/>
                <xsd:enumeration value="196"/>
                <xsd:enumeration value="Attr_TB_CODE"/>
                <xsd:enumeration value="198"/>
                <xsd:enumeration value="199"/>
                <xsd:enumeration value="200"/>
                <xsd:enumeration value="Attr_TI_ENUM"/>
                <xsd:enumeration value="Attr_TJ_CODE"/>
                <xsd:enumeration value="203"/>
                <xsd:enumeration value="204"/>
                <xsd:enumeration value="Attr_TN_CODE"/>
                <xsd:enumeration value="Attr_TP_CODE"/>
                <xsd:enumeration value="207"/>
                <xsd:enumeration value="Attr_TP_CODE"/>
                <xsd:enumeration value="209"/>
                <xsd:enumeration value="210"/>
                <xsd:enumeration value="211"/>
                <xsd:enumeration value="Attr_TY_CODE"/>
                <xsd:enumeration value="213"/>
                <xsd:enumeration value="Attr_UF_CODE"/>
                <xsd:enumeration value="Attr_UR_CODE"/>
                <xsd:enumeration value="216"/>
                <xsd:enumeration value="Attr_VD_ENUM"/>
                <xsd:enumeration value="218"/>
                <xsd:enumeration value="219"/>
                <xsd:enumeration value="Attr_VT_CODE"/>
                <xsd:enumeration value="Attr_WB_CODE"/>
                <xsd:enumeration value="222"/>
                <xsd:enumeration value="Attr_WT_CODE"/>
        </xsd:restriction>
    </xsd:simpleType>
```

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13.5.141 Attribute Type Code Definition Reference

```
<xsd:complexType name="Attr_typ_cod_def_ref">
    <xsd:choice>
        <xsd:element name="Attr_AA_CODE" type="Attr_AA_CODE"/>
        <xsd:element name="Attr_AB_BMI" type="Attr_AB_BMI"/>
        <xsd:element name="AC_TXT"/>
        <xsd:element name="Attr_AD_CODE" type="Attr_AD_CODE"/>
        <xsd:element name="AE_BOL"/>
        <xsd:element name="AH_BOL"/>
        <xsd:element name="AI_CODE_external"/>
        <xsd:element name="AL_TXT"/>
        <xsd:element name="AN_TXT"/>
        <xsd:element name="AP_MSR"/>
        <xsd:element name="AR_BOL"/>
        <xsd:element name="AS_MSR"/>
        <xsd:element name="AT_TMR"/>
        <xsd:element name="AV_BOL"/>
        <xsd:element name="AW_MSR"/>
        <xsd:element name="Attr_AY_CODE" type="Attr_AY_CODE"/>
        <xsd:element name="BA_BOL"/>
        <xsd:element name="BC_TXT"/>
        <xsd:element name="Attr_BD_CODE" type="Attr_BD_CODE"/>
        <xsd:element name="Attr_BE_CODE" type="Attr_BE_CODE"/>
        <xsd:element name="BF_TXT"/>
        <xsd:element name="Attr_BG_CODE" type="Attr_BG_CODE"/>
        <xsd:element name="BH_MSR"/>
        <xsd:element name="BI_MSR"/>
        <xsd:element name="BK_TXT"/>
        <xsd:element name="BL_BOL"/>
        <xsd:element name="BN_TXT"/>
        <xsd:element name="Attr_BO_CODE" type="Attr_BO_CODE"/>
        <xsd:element name="Attr_BP_CODE" type="Attr_BP_CODE"/>
        <xsd:element name="BR_BOL"/>
        <xsd:element name="BS_CNT"/>
        <xsd:element name="Attr_BT_CODE" type="Attr_BT_CODE"/>
        <xsd:element name="Attr_BX_ENUM" type="Attr_BX_ENUM"/>
        <xsd:element name="Attr_BY_ENUM" type="Attr_BY_ENUM"/>
        <xsd:element name="CA_BMR"/>
        <xsd:element name="Attr_CC_ENUM" type="Attr_CC_ENUM"/>
        <xsd:element name="Attr_CD_CODE" type="Attr_CD_CODE"/>
        <xsd:element name="Attr_CE_ENUM" type="Attr_CE_ENUM"/>
        <xsd:element name="Attr_CF_ENUM" type="Attr_CF_ENUM"/>
        <xsd:element name="CH_MSR"/>
        <xsd:element name="CI_CNT"/>
        <xsd:element name="CK_CNT"/>
        <xsd:element name="CM_BOL"/>
        <xsd:element name="Attr_CP_CODE" type="Attr_CP_CODE"/>
        <xsd:element name="CQ_CNT"/>
        <xsd:element name="CR_BOL"/>
        <xsd:element name="Attr_CS_CODE" type="Attr_CS_CODE"/>
        <xsd:element name="CT_TXT"/>
        <xsd:element name="CU_TXT"/>
        <xsd:element name="Attr_CY_ENUM" type="Attr_CY_ENUM"/>
        <xsd:element name="DC_TXT"/>
        <xsd:element name="DH_MSR"/>
        <xsd:element name="Attr_DI_BMI" type="Attr_DI_BMI"/>
        <xsd:element name="DL_TXT"/>
        <xsd:element name="Attr_DM_CODE" type="Attr_DM_CODE"/>
        <xsd:element name="DP_TXT"/>
        <xsd:element name="DR_BOL"/>
        <xsd:element name="DS_TXT"/>
        <xsd:element name="Attr_DT_CODE" type="Attr_DT_CODE"/>
        <xsd:element name="DW_MSR"/>
        <xsd:element name="Attr_DX_CODE" type="Attr_DX_CODE"/>
        <xsd:element name="Attr_DY_CODE" type="Attr_DY_CODE"/>
        <xsd:element name="Attr_DZ_CODE" type="Attr_DZ_CODE"/>
        <xsd:element name="Attr_EA_CODE" type="Attr_EA_CODE"/>
        <xsd:element name="EI_TXT"/>
        <xsd:element name="EN_SCS"/>
        <xsd:element name="EQ_TXT"/>
        <xsd:element name="Attr_ET_CODE" type="Attr_ET_CODE"/>
        <xsd:element name="Attr_EV_CODE" type="Attr_EV_CODE"/>
        <xsd:element name="Attr_FC_CODE" type="Attr_FC_CODE"/>
```

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```
<xsd:element name="Attr_FF_CODE" type="Attr_FF_CODE"/>
<xsd:element name="FL_SCS"/>
<xsd:element name="Attr_FP_BMI" type="Attr_FP_BMI"/>
<xsd:element name="Attr_FQ_CODE" type="Attr_FQ_CODE"/>
<xsd:element name="FR_TMR"/>
<xsd:element name="FS_CNT"/>
<xsd:element name="Attr_FT_CODE" type="Attr_FT_CODE"/>
<xsd:element name="Attr_FW_CODE" type="Attr_FW_CODE"/>
<xsd:element name="FY_BOL"/>
<xsd:element name="GA_BOL"/>
<xsd:element name="Attr_GT_CODE" type="Attr_GT_CODE"/>
<xsd:element name="Attr_GW_CODE" type="Attr_GW_CODE"/>
<xsd:element name="HI_SCS"/>
<xsd:element name="HL_SCS"/>
<xsd:element name="HN_SCS"/>
<xsd:element name="HP_MSR"/>
<xsd:element name="Attr_HS_CODE" type="Attr_HS_CODE"/>
<xsd:element name="Attr_HT_CODE" type="Attr_HT_CODE"/>
<xsd:element name="ID_SCS"/>
<xsd:element name="Attr_IF_CODE" type="Attr_IF_CODE"/>
<xsd:element name="Attr_IM_CODE" type="Attr_IM_CODE"/>
<xsd:element name="IR_PRS"/>
<xsd:element name="Attr_JT_CODE" type="Attr_JT_CODE"/>
<xsd:element name="Attr_LA_CODE" type="Attr_LA_CODE"/>
<xsd:element name="LC_TXT"/>
<xsd:element name="LD_SCS"/>
<xsd:element name="LM_MSR"/>
<xsd:element name="LO_CNT"/>
<xsd:element name="LP_Lang_code_value" type="Lan_cod"/>
<xsd:element name="LR_MSR"/>
<xsd:element name="Attr_LS_CODE" type="Attr_LS_CODE"/>
<xsd:element name="Attr_LT_CODE" type="Attr_LT_CODE"/>
<xsd:element name="LU_TXT"/>
<xsd:element name="Attr_LV_CODE" type="Attr_LV_CODE"/>
<xsd:element name="MA_BOL"/>
<xsd:element name="MC_CODE_external"/>
<xsd:element name="Attr_MD_CODE" type="Attr_MD_CODE"/>
<xsd:element name="MH_MSR"/>
<xsd:element name="MI_CNT"/>
<xsd:element name="ML_MSR"/>
<xsd:element name="MM_TMR"/>
<xsd:element name="MN_TXT"/>
<xsd:element name="MO_CNT"/>
<xsd:element name="MP_BOL"/>
<xsd:element name="MQ_CODE_external"/>
<xsd:element name="MR_BOL"/>
<xsd:element name="MT_MSR"/>
<xsd:element name="MW_MSR"/>
<xsd:element name="Attr_NA_CODE" type="Attr_NA_CODE"/>
<xsd:element name="NC_CNT"/>
<xsd:element name="NE_TXT"/>
<xsd:element name="Attr_NI_CODE" type="Attr_NI_CODE"/>
<xsd:element name="NO_CNT"/>
<xsd:element name="NP_TXT"/>
<xsd:element name="Attr_NR_CODE" type="Attr_NR_CODE"/>
<xsd:element name="Attr_NT_CODE" type="Attr_NT_CODE"/>
<xsd:element name="Attr_NV_CODE" type="Attr_NV_CODE"/>
<xsd:element name="Attr_NW_CODE" type="Attr_NW_CODE"/>
<xsd:element name="Attr_OA_CODE" type="Attr_OA_CODE"/>
<xsd:element name="OC_SCS"/>
<xsd:element name="OF_TXT"/>
<xsd:element name="ON_TXT"/>
<xsd:element name="OP_TMR"/>
<xsd:element name="Attr_OW_CODE" type="Attr_OW_CODE"/>
<xsd:element name="Attr_OY_ENUM" type="Attr_OY_ENUM"/>
<xsd:element name="PA_BOL"/>
<xsd:element name="PB_TXT"/>
<xsd:element name="Attr_PC_CODE" type="Attr_PC_CODE"/>
<xsd:element name="Attr_PD_ENUM" type="Attr_PD_ENUM"/>
<xsd:element name="PE_TXT"/>
<xsd:element name="PF_CNT"/>
<xsd:element name="Attr_PH_CODE" type="Attr_PH_CODE"/>
<xsd:element name="PF_PRC"/>
<xsd:element name="Attr_PJ_CODE" type="Attr_PJ_CODE"/>
<xsd:element name="PK_BOL"/>
<xsd:element name="Attr_PL_CODE" type="Attr_PL_CODE"/>
<xsd:element name="Attr_PM_CODE" type="Attr_PM_CODE"/>
<xsd:element name="PO_CNT"/>
```

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```
            <xsd:element name="Attr_PP_CODE" type="Attr_PP_CODE"/>
            <xsd:element name="PQ_TXT"/>
            <xsd:element name="Attr_PR_CODE" type="Attr_PR_CODE"/>
            <xsd:element name="PS_SCS"/>
            <xsd:element name="Attr_PT_CODE" type="Attr_PT_CODE"/>
            <xsd:element name="Attr_PV_CODE" type="Attr_PV_CODE"/>
            <xsd:element name="Attr_PX_CODE" type="Attr_PX_CODE"/>
            <xsd:element name="PY_BOL"/>
            <xsd:element name="Attr_RA_CODE" type="Attr_RA_CODE"/>
            <xsd:element name="Attr_RB_CODE" type="Attr_RB_CODE"/>
            <xsd:element name="Attr_RC_CODE" type="Attr_RC_CODE"/>
            <xsd:element name="RE_TXT"/>
            <xsd:element name="RF_BOL"/>
            <xsd:element name="RG_PRS"/>
            <xsd:element name="RI_TXT"/>
            <xsd:element name="RK_BOL"/>
            <xsd:element name="RL_BOL"/>
            <xsd:element name="RM_BOL"/>
            <xsd:element name="RN_TXT"/>
            <xsd:element name="RO_CNT"/>
            <xsd:element name="RP_BOL"/>
            <xsd:element name="Attr_RR_CODE" type="Attr_RR_CODE"/>
            <xsd:element name="RS_TXT"/>
            <xsd:element name="Attr_RT_CODE" type="Attr_RT_CODE"/>
            <xsd:element name="RU_CNT"/>
            <xsd:element name="RX_TXT"/>
            <xsd:element name="Attr_RY_CODE" type="Attr_RY_CODE"/>
            <xsd:element name="Attr_RZ_CODE" type="Attr_RZ_CODE"/>
            <xsd:element name="Attr_SA_CODE" type="Attr_SA_CODE"/>
            <xsd:element name="Attr_SC_CODE" type="Attr_SC_CODE"/>
            <xsd:element name="SD_BOL"/>
            <xsd:element name="SE_SCS"/>
            <xsd:element name="SF_TXT"/>
            <xsd:element name="SG_BOL"/>
            <xsd:element name="Attr_SI_ENUM" type="Attr_SI_ENUM"/>
            <xsd:element name="SJ_TXT"/>
            <xsd:element name="Attr_SL_CODE" type="Attr_SL_CODE"/>
            <xsd:element name="Attr_SM_CODE" type="Attr_SM_CODE"/>
            <xsd:element name="SN_TXT"/>
            <xsd:element name="SN_MSR"/>
            <xsd:element name="SP_BOL"/>
            <xsd:element name="SR_BOL"/>
            <xsd:element name="SS_TXT"/>
            <xsd:element name="ST_MSR"/>
            <xsd:element name="SU_BOL"/>
            <xsd:element name="SV_BOL"/>
            <xsd:element name="SX_TXT"/>
            <xsd:element name="Attr_SY_CODE" type="Attr_SY_CODE"/>
            <xsd:element name="TA_TMR"/>
            <xsd:element name="Attr_TB_CODE" type="Attr_TB_CODE"/>
            <xsd:element name="TC_CNT"/>
            <xsd:element name="TD_TMR"/>
            <xsd:element name="TF_TMR"/>
            <xsd:element name="Attr_TI_ENUM" type="Attr_TI_ENUM"/>
            <xsd:element name="Attr_TJ_CODE" type="Attr_TJ_CODE"/>
            <xsd:element name="TL_SCS"/>
            <xsd:element name="TM_CNT"/>
            <xsd:element name="Attr_TN_CODE" type="Attr_TN_CODE"/>
            <xsd:element name="Attr_TP_CODE" type="Attr_TP_CODE"/>
            <xsd:element name="TR_BOL"/>
            <xsd:element name="Attr_TS_CODE" type="Attr_TS_CODE"/>
            <xsd:element name="TT_TMR"/>
            <xsd:element name="TU_TMR"/>
            <xsd:element name="TX_SCS"/>
            <xsd:element name="Attr_TY_CODE" type="Attr_TY_CODE"/>
            <xsd:element name="TZ_CNT"/>
            <xsd:element name="Attr_UF_CODE" type="Attr_UF_CODE"/>
            <xsd:element name="Attr_UR_CODE" type="Attr_UR_CODE"/>
            <xsd:element name="VA_MSR"/>
            <xsd:element name="Attr_VD_ENUM" type="Attr_VD_ENUM"/>
            <xsd:element name="VP_TMR"/>
            <xsd:element name="VR_TXT"/>
            <xsd:element name="Attr_VT_CODE" type="Attr_VT_CODE"/>
            <xsd:element name="Attr_WB_CODE" type="Attr_WB_CODE"/>
            <xsd:element name="WI_MSR"/>
            <xsd:element name="Attr_WT_CODE" type="Attr_WT_CODE"/>
        </xsd:choice>
    </xsd:complexType>
```

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13.5.142 Boolean Name (Simple)

```
<xsd:simpleType name="Bool_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="false"/>
            <xsd:enumeration value="true"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.143 Coordinate Type Name (Simple)

```
<xsd:simpleType name="Coord_type_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="lat/long"/>
            <xsd:enumeration value="x/y"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.144 Country Code Name (Simple)

NOTE Since provided XML schemas are coded with reference to ISO 3166-1:2013, Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes, the user is referred to the source organization for the latest information.

```
<xsd:simpleType name="Cntry_code_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Afghanistan"/>
            <xsd:enumeration value="Aaland Islands/>
            <xsd:enumeration value="Albania"/>
            <xsd:enumeration value="Algeria"/>
            <xsd:enumeration value="American Samoa"/>
            <xsd:enumeration value="Andorra"/>
            <xsd:enumeration value="Angola"/>
            <xsd:enumeration value="Anguilla"/>
            <xsd:enumeration value="Antarctica"/>
            <xsd:enumeration value="Antigua and Barbuda"/>
            <xsd:enumeration value="Argentina"/>
            <xsd:enumeration value="Armenia"/>
            <xsd:enumeration value="Aruba"/>
            <xsd:enumeration value="Australia"/>
            <xsd:enumeration value="Austria"/>
            <xsd:enumeration value="Azerbaijan"/>
            <xsd:enumeration value="Bahamas"/>
            <xsd:enumeration value="Bahrain"/>
            <xsd:enumeration value="Bangladesh"/>
            <xsd:enumeration value="Barbados"/>
            <xsd:enumeration value="Belarus"/>
            <xsd:enumeration value="Belgium"/>
            <xsd:enumeration value="Belize"/>
            <xsd:enumeration value="Benin"/>
            <xsd:enumeration value="Bermuda"/>
            <xsd:enumeration value="Bhutan"/>
            <xsd:enumeration value="Bolivia, Plurinational State of"/>
            <xsd:enumeration value="Bonaire, Sint Eustatius and Saba"/>
            <xsd:enumeration value="Bosnia and Herzegovina"/>
            <xsd:enumeration value="Botswana"/>
            <xsd:enumeration value="Bouvet Island"/>
            <xsd:enumeration value="Brazil"/>
            <xsd:enumeration value="British Indian Ocean Territory"/>
            <xsd:enumeration value="Brunei Darussalam"/>
            <xsd:enumeration value="Bulgaria"/>
            <xsd:enumeration value="Burkina Faso"/>
            <xsd:enumeration value="Burundi"/>
            <xsd:enumeration value="Cambodia"/>
            <xsd:enumeration value="Cameroon"/>
            <xsd:enumeration value="Canada"/>
            <xsd:enumeration value="Cape Verde"/>
            <xsd:enumeration value="Cayman Islands"/>
            <xsd:enumeration value="Central African Republic"/>
            <xsd:enumeration value="Chad"/>
            <xsd:enumeration value="Chile"/>
```

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```
<xsd:enumeration value="China"/>
<xsd:enumeration value="Christmas Island"/>
<xsd:enumeration value="Cocos"/>
<xsd:enumeration value="Colombia"/>
<xsd:enumeration value="Comoros"/>
<xsd:enumeration value="Congo"/>
<xsd:enumeration value="Congo(the Democratic Republic of the)"/>
<xsd:enumeration value="Cook Islands"/>
<xsd:enumeration value="Costa Rica"/>
<xsd:enumeration value="Cote d'Ivoire"/>
<xsd:enumeration value="Croatia"/>
<xsd:enumeration value="Cuba"/>
<xsd:enumeration value="Curacao"/>
<xsd:enumeration value="Cyprus"/>
<xsd:enumeration value="Czech Republic"/>
<xsd:enumeration value="Denmark"/>
<xsd:enumeration value="Djibouti"/>
<xsd:enumeration value="Dominica"/>
<xsd:enumeration value="Dominican Republic"/>
<xsd:enumeration value="Ecuador"/>
<xsd:enumeration value="Egypt"/>
<xsd:enumeration value="El Salvador"/>
<xsd:enumeration value="Equatorial Guinea"/>
<xsd:enumeration value="Eritrea"/>
<xsd:enumeration value="Estonia"/>
<xsd:enumeration value="Ethiopia"/>
<xsd:enumeration value="Falkland Islands (Malvinas)"/>
<xsd:enumeration value="Faroe Islands"/>
<xsd:enumeration value="Fiji"/>
<xsd:enumeration value="Finland"/>
<xsd:enumeration value="France"/>
<xsd:enumeration value="French Guiana"/>
<xsd:enumeration value="French Polynesia"/>
<xsd:enumeration value="French Southern Trritories"/>
<xsd:enumeration value="Gabon"/>
<xsd:enumeration value="Gambia"/>
<xsd:enumeration value="Georgia"/>
<xsd:enumeration value="Germany"/>
<xsd:enumeration value="Ghana"/>
<xsd:enumeration value="Gibraltar"/>
<xsd:enumeration value="Greece"/>
<xsd:enumeration value="Greenland"/>
<xsd:enumeration value="Grenada"/>
<xsd:enumeration value="Guadeloupe"/>
<xsd:enumeration value="Guam"/>
<xsd:enumeration value="Guatemala"/>
<xsd:enumeration value="Guernsey"/>
<xsd:enumeration value="Guinea"/>
<xsd:enumeration value="Guinea-Bissau"/>
<xsd:enumeration value="Guyana"/>
<xsd:enumeration value="Haiti"/>
<xsd:enumeration value="Heard Island and McDonald Island"/>
<xsd:enumeration value="Holy See (Vatican City State)"/>
<xsd:enumeration value="Honduras"/>
<xsd:enumeration value="Hong Kong"/>
<xsd:enumeration value="Hungary"/>
<xsd:enumeration value="Iceland"/>
<xsd:enumeration value="India"/>
<xsd:enumeration value="Indonesia"/>
<xsd:enumeration value="Iran (Islamic Republic of)"/>
<xsd:enumeration value="Iraq"/>
<xsd:enumeration value="Ireland"/>
<xsd:enumeration value="Isle of Man"/>
<xsd:enumeration value="Israel"/>
<xsd:enumeration value="Italy"/>
<xsd:enumeration value="Jamaica"/>
<xsd:enumeration value="Japan"/>
<xsd:enumeration value="Jersey"/>
<xsd:enumeration value="Jordan"/>
<xsd:enumeration value="Kazakhstan"/>
<xsd:enumeration value="Kenya"/>
<xsd:enumeration value="Kiribati"/>
<xsd:enumeration value="Korea (Democratic People's Republic of"/>
<xsd:enumeration value="Korea (Republic of)"/>
<xsd:enumeration value="Kuwait"/>
```

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```
<xsd:enumeration value="Kyrgyzstan"/>
<xsd:enumeration value="Lao People's Democratic Republic"/>
<xsd:enumeration value="Latvia"/>
<xsd:enumeration value="Lebanon"/>
<xsd:enumeration value="Lesotho"/>
<xsd:enumeration value="Liberia"/>
<xsd:enumeration value="Libya"/>
<xsd:enumeration value="Liechtenstein"/>
<xsd:enumeration value="Lithuania"/>
<xsd:enumeration value="Luxembourg"/>
<xsd:enumeration value="Macao"/>
<xsd:enumeration value="Macedonia (the former Yugoslav Republic of)"/>
<xsd:enumeration value="Madagascar"/>
<xsd:enumeration value="Malawi"/>
<xsd:enumeration value="Malaysia"/>
<xsd:enumeration value="Maldives"/>
<xsd:enumeration value="Mali"/>
<xsd:enumeration value="Malta"/>
<xsd:enumeration value="Marshall Islands"/>
<xsd:enumeration value="Martinique"/>
<xsd:enumeration value="Mauritania"/>
<xsd:enumeration value="Mauritius"/>
<xsd:enumeration value="Mayotte"/>
<xsd:enumeration value="Mexico"/>
<xsd:enumeration value="Micronesia, Federated States of"/>
<xsd:enumeration value="Monaco"/>
<xsd:enumeration value="Mongolia"/>
<xsd:enumeration value="Montserrat"/>
<xsd:enumeration value="Morocco"/>
<xsd:enumeration value="Mozambique"/>
<xsd:enumeration value="Myanmar"/>
<xsd:enumeration value="Namibia"/>
<xsd:enumeration value="Nauru"/>
<xsd:enumeration value="Nepal"/>
<xsd:enumeration value="Netherlands"/>
<xsd:enumeration value="New Caledonia"/>
<xsd:enumeration value="New Zealand"/>
<xsd:enumeration value="Nicaragua"/>
<xsd:enumeration value="Niger"/>
<xsd:enumeration value="Nigeria"/>
<xsd:enumeration value="Niue"/>
<xsd:enumeration value="Norfolk Island"/>
<xsd:enumeration value="Northern Mariana Islands"/>
<xsd:enumeration value="Norway"/>
<xsd:enumeration value="Oman"/>
<xsd:enumeration value="Pakistan"/>
<xsd:enumeration value="Palau"/>
<xsd:enumeration value="Palestine, State of"/>
<xsd:enumeration value="Panama"/>
<xsd:enumeration value="Papua New Guinea"/>
<xsd:enumeration value="Paraguay"/>
<xsd:enumeration value="Peru"/>
<xsd:enumeration value="Philippines"/>
<xsd:enumeration value="Pitcairn"/>
<xsd:enumeration value="Poland"/>
<xsd:enumeration value="Portugal"/>
<xsd:enumeration value="Puerto Rico"/>
<xsd:enumeration value="Qatar"/>
<xsd:enumeration value="Reunion"/>
<xsd:enumeration value="Romania"/>
<xsd:enumeration value="Russian Federation"/>
<xsd:enumeration value="Rwanda"/>
<xsd:enumeration value="Saint Barthelemy"/>
<xsd:enumeration value="Saint Helena, Ascension and Tristan da Cunha"/>
<xsd:enumeration value="Saint Kitts and Nevis"/>
<xsd:enumeration value="Saint Lucia"/>
<xsd:enumeration value="Saint Martin (French part)"/>
<xsd:enumeration value="Saint Pierre and Miquelon"/>
<xsd:enumeration value="Saint Vincent and the Grenadines"/>
<xsd:enumeration value="Samoa"/>
<xsd:enumeration value="San Marino"/>
<xsd:enumeration value="Sao Tome and Principe"/>
<xsd:enumeration value="Saudi Arabia"/>
<xsd:enumeration value="Senegal"/>
<xsd:enumeration value="Serbia"/>
```

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```
                <xsd:enumeration value="Seychelles"/>
                <xsd:enumeration value="Sierra Leone"/>
                <xsd:enumeration value="Singapore"/>
                <xsd:enumeration value="Sint Maarten (Dutch part)"/>
                <xsd:enumeration value="Slovakia"/>
                <xsd:enumeration value="Slovenia"/>
                <xsd:enumeration value="Solomon Islands"/>
                <xsd:enumeration value="Somalia"/>
                <xsd:enumeration value="South Africa"/>
                <xsd:enumeration value="South Georgia and the south Sandwich Islands"/>
                <xsd:enumeration value="South Sudan"/>
                <xsd:enumeration value="Spain"/>
                <xsd:enumeration value="Sri Lanka"/>
                <xsd:enumeration value="Sudan"/>
                <xsd:enumeration value="Suriname"/>
                <xsd:enumeration value="Svalbard and Jan Mayen"/>
                <xsd:enumeration value="Swaziland"/>
                <xsd:enumeration value="Sweden"/>
                <xsd:enumeration value="Switzerland"/>
                <xsd:enumeration value="Syrian Arab Republic"/>
                <xsd:enumeration value="Taiwan (Province of China)"/>
                <xsd:enumeration value="Tajikistan"/>
                <xsd:enumeration value="Thailand"/>
                <xsd:enumeration value="Timor-Leste"/>
                <xsd:enumeration value="Togo"/>
                <xsd:enumeration value="Tokelau"/>
                <xsd:enumeration value="Tonga"/>
                <xsd:enumeration value="Trinidad and Tobago"/>
                <xsd:enumeration value="Tunisia"/>
                <xsd:enumeration value="Turkey"/>
                <xsd:enumeration value="Turkmenistan"/>
                <xsd:enumeration value="Turks and Caicos Islands"/>
                <xsd:enumeration value="Tuvalu"/>
                <xsd:enumeration value="Uganda"/>
                <xsd:enumeration value="Ukraine"/>
                <xsd:enumeration value="United Arab Emirates"/>
                <xsd:enumeration value="United Kingdom"/>
                <xsd:enumeration value="United States"/>
                <xsd:enumeration value="United States Minor Outlying Islands"/>
                <xsd:enumeration value="Uruguay"/>
                <xsd:enumeration value="Uzbekistan"/>
                <xsd:enumeration value="Vanuatu"/>
                <xsd:enumeration value="Venezuela, Bolivarian Republic of"/>
                <xsd:enumeration value="Viet Nam"/>
                <xsd:enumeration value="Virgin Islands (British)"/>
                <xsd:enumeration value="Virgin Islands (U.S)"/>
                <xsd:enumeration value="Wallis and Futuna Islands"/>
                <xsd:enumeration value="Western Sahara"/>
                <xsd:enumeration value="Yemen"/>
                <xsd:enumeration value="Zambia"/>
                <xsd:enumeration value="Zimbabwe"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.145 Country Code Value (Simple)

NOTE Since provided XML schemas are coded with reference to ISO 3166-1:2013, Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes, the user is referred to the source organization for the latest information.

```
<xsd:simpleType name="Cntry_code_val">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="AFG"/>
                <xsd:enumeration value="ALA"/>
                <xsd:enumeration value="ALB"/>
                <xsd:enumeration value="DZA"/>
                <xsd:enumeration value="ASM"/>
                <xsd:enumeration value="AND"/>
                <xsd:enumeration value="AGO"/>
                <xsd:enumeration value="AIA"/>
                <xsd:enumeration value="ATA"/>
                <xsd:enumeration value="ATG"/>
```

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```
<xsd:enumeration value="ARG"/>
<xsd:enumeration value="ARM"/>
<xsd:enumeration value="ABW"/>
<xsd:enumeration value="AUS"/>
<xsd:enumeration value="AUT"/>
<xsd:enumeration value="AZE"/>
<xsd:enumeration value="BHS"/>
<xsd:enumeration value="BHR"/>
<xsd:enumeration value="BGD"/>
<xsd:enumeration value="BRB"/>
<xsd:enumeration value="BLR"/>
<xsd:enumeration value="BEL"/>
<xsd:enumeration value="BLZ"/>
<xsd:enumeration value="BEN"/>
<xsd:enumeration value="BMU"/>
<xsd:enumeration value="BTN"/>
<xsd:enumeration value="BOL"/>
<xsd:enumeration value="BES"/>
<xsd:enumeration value="BIH"/>
<xsd:enumeration value="BWA"/>
<xsd:enumeration value="BRA"/>
<xsd:enumeration value="IOT"/>
<xsd:enumeration value="BRN"/>
<xsd:enumeration value="BGR"/>
<xsd:enumeration value="BFA"/>
<xsd:enumeration value="BDI"/>
<xsd:enumeration value="KHM"/>
<xsd:enumeration value="CMR"/>
<xsd:enumeration value="CAN"/>
<xsd:enumeration value="CPV"/>
<xsd:enumeration value="CYM"/>
<xsd:enumeration value="CAF"/>
<xsd:enumeration value="TCD"/>
<xsd:enumeration value="CHL"/>
<xsd:enumeration value="CHN"/>
<xsd:enumeration value="CXR"/>
<xsd:enumeration value="CCK"/>
<xsd:enumeration value="COL"/>
<xsd:enumeration value="COM"/>
<xsd:enumeration value="COG"/>
<xsd:enumeration value="COD"/>
<xsd:enumeration value="COK"/>
<xsd:enumeration value="CRI"/>
<xsd:enumeration value="CIV"/>
<xsd:enumeration value="HRV"/>
<xsd:enumeration value="CUB"/>
<xsd:enumeration value="CUW"/>
<xsd:enumeration value="CYP"/>
<xsd:enumeration value="CZE"/>
<xsd:enumeration value="DNK"/>
<xsd:enumeration value="DJI"/>
<xsd:enumeration value="DMA"/>
<xsd:enumeration value="DOM"/>
<xsd:enumeration value="ECU"/>
<xsd:enumeration value="EGY"/>
<xsd:enumeration value="SLV"/>
<xsd:enumeration value="GNQ"/>
<xsd:enumeration value="ERI"/>
<xsd:enumeration value="EST"/>
<xsd:enumeration value="ETH"/>
<xsd:enumeration value="FLK"/>
<xsd:enumeration value="FRO"/>
<xsd:enumeration value="FJI"/>
<xsd:enumeration value="FIN"/>
<xsd:enumeration value="FRA"/>
<xsd:enumeration value="GUF"/>
<xsd:enumeration value="PYF"/>
<xsd:enumeration value="ATF"/>
<xsd:enumeration value="GAB"/>
<xsd:enumeration value="GMB"/>
<xsd:enumeration value="GEO"/>
<xsd:enumeration value="DEU"/>
<xsd:enumeration value="GHA"/>
<xsd:enumeration value="GIB"/>
<xsd:enumeration value="GRC"/>
```

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```
<xsd:enumeration value="GRL"/>
<xsd:enumeration value="GRD"/>
<xsd:enumeration value="GLP"/>
<xsd:enumeration value="GUM"/>
<xsd:enumeration value="GTM"/>
<xsd:enumeration value="GGY"/>
<xsd:enumeration value="GIN"/>
<xsd:enumeration value="GNB"/>
<xsd:enumeration value="GUY"/>
<xsd:enumeration value="HTI"/>
<xsd:enumeration value="HMD"/>
<xsd:enumeration value="VAT"/>
<xsd:enumeration value="HND"/>
<xsd:enumeration value="HKG"/>
<xsd:enumeration value="HUN"/>
<xsd:enumeration value="ISL"/>
<xsd:enumeration value="IND"/>
<xsd:enumeration value="IDN"/>
<xsd:enumeration value="IRN"/>
<xsd:enumeration value="IRQ"/>
<xsd:enumeration value="IRL"/>
<xsd:enumeration value="IMN"/>
<xsd:enumeration value="ISR"/>
<xsd:enumeration value="ITA"/>
<xsd:enumeration value="JAM"/>
<xsd:enumeration value="JPN"/>
<xsd:enumeration value="JEY"/>
<xsd:enumeration value="JOR"/>
<xsd:enumeration value="KAZ"/>
<xsd:enumeration value="KEN"/>
<xsd:enumeration value="KIR"/>
<xsd:enumeration value="PRK"/>
<xsd:enumeration value="KOR"/>
<xsd:enumeration value="KWT"/>
<xsd:enumeration value="KGZ"/>
<xsd:enumeration value="LAO"/>
<xsd:enumeration value="LVA"/>
<xsd:enumeration value="LBN"/>
<xsd:enumeration value="LSO"/>
<xsd:enumeration value="LBR"/>
<xsd:enumeration value="LBY"/>
<xsd:enumeration value="LIE"/>
<xsd:enumeration value="LTU"/>
<xsd:enumeration value="LUX"/>
<xsd:enumeration value="MAC"/>
<xsd:enumeration value="MKD"/>
<xsd:enumeration value="MDG"/>
<xsd:enumeration value="MWI"/>
<xsd:enumeration value="MYS"/>
<xsd:enumeration value="MDV"/>
<xsd:enumeration value="MLI"/>
<xsd:enumeration value="MLT"/>
<xsd:enumeration value="MHL"/>
<xsd:enumeration value="MTQ"/>
<xsd:enumeration value="MRT"/>
<xsd:enumeration value="MUS"/>
<xsd:enumeration value="MYT"/>
<xsd:enumeration value="MEX"/>
<xsd:enumeration value="FSM"/>
<xsd:enumeration value="MDA"/>
<xsd:enumeration value="MCO"/>
<xsd:enumeration value="MNG"/>
<xsd:enumeration value="MNE"/>
<xsd:enumeration value="MSR"/>
<xsd:enumeration value="MAR"/>
<xsd:enumeration value="MOZ"/>
<xsd:enumeration value="MMR"/>
<xsd:enumeration value="NAM"/>
<xsd:enumeration value="NRU"/>
<xsd:enumeration value="NPL"/>
<xsd:enumeration value="NLD"/>
<xsd:enumeration value="NCL"/>
<xsd:enumeration value="NZL"/>
<xsd:enumeration value="NIC"/>
<xsd:enumeration value="NER"/>
```

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```
<xsd:enumeration value="NGA"/>
<xsd:enumeration value="NIU"/>
<xsd:enumeration value="NFK"/>
<xsd:enumeration value="MNP"/>
<xsd:enumeration value="NOR"/>
<xsd:enumeration value="OMN"/>
<xsd:enumeration value="PAK"/>
<xsd:enumeration value="PLW"/>
<xsd:enumeration value="PSE"/>
<xsd:enumeration value="PAN"/>
<xsd:enumeration value="PNG"/>
<xsd:enumeration value="PRY"/>
<xsd:enumeration value="PER"/>
<xsd:enumeration value="PHL"/>
<xsd:enumeration value="PCN"/>
<xsd:enumeration value="POL"/>
<xsd:enumeration value="PRT"/>
<xsd:enumeration value="PRI"/>
<xsd:enumeration value="QAT"/>
<xsd:enumeration value="REU"/>
<xsd:enumeration value="ROU"/>
<xsd:enumeration value="RUS"/>
<xsd:enumeration value="RWA"/>
<xsd:enumeration value="BLM"/>
<xsd:enumeration value="SHN"/>
<xsd:enumeration value="KNA"/>
<xsd:enumeration value="LCA"/>
<xsd:enumeration value="MAF"/>
<xsd:enumeration value="SPM"/>
<xsd:enumeration value="VCT"/>
<xsd:enumeration value="WSM"/>
<xsd:enumeration value="SMR"/>
<xsd:enumeration value="STP"/>
<xsd:enumeration value="SAU"/>
<xsd:enumeration value="SEN"/>
<xsd:enumeration value="SRB"/>
<xsd:enumeration value="SYC"/>
<xsd:enumeration value="SLE"/>
<xsd:enumeration value="SGP"/>
<xsd:enumeration value="SXM"/>
<xsd:enumeration value="SVK"/>
<xsd:enumeration value="SVN"/>
<xsd:enumeration value="SLB"/>
<xsd:enumeration value="SOM"/>
<xsd:enumeration value="ZAF"/>
<xsd:enumeration value="SGS"/>
<xsd:enumeration value="SSD"/>
<xsd:enumeration value="ESP"/>
<xsd:enumeration value="LKA"/>
<xsd:enumeration value="SDN"/>
<xsd:enumeration value="SUR"/>
<xsd:enumeration value="SJM"/>
<xsd:enumeration value="SWZ"/>
<xsd:enumeration value="SWE"/>
<xsd:enumeration value="CHE"/>
<xsd:enumeration value="SYR"/>
<xsd:enumeration value="TWN"/>
<xsd:enumeration value="TJK"/>
<xsd:enumeration value="TZA"/>
<xsd:enumeration value="THA"/>
<xsd:enumeration value="TLS"/>
<xsd:enumeration value="TGO"/>
<xsd:enumeration value="TKL"/>
<xsd:enumeration value="TON"/>
<xsd:enumeration value="TTO"/>
<xsd:enumeration value="TUN"/>
<xsd:enumeration value="TUR"/>
<xsd:enumeration value="TKM"/>
<xsd:enumeration value="TCA"/>
<xsd:enumeration value="TUV"/>
<xsd:enumeration value="UGA"/>
<xsd:enumeration value="UKR"/>
<xsd:enumeration value="ARE"/>
<xsd:enumeration value="GBR"/>
<xsd:enumeration value="USA"/>
```

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```
                <xsd:enumeration value="UMI"/>
                <xsd:enumeration value="URY"/>
                <xsd:enumeration value="UZB"/>
                <xsd:enumeration value="VUT"/>
                <xsd:enumeration value="VEN"/>
                <xsd:enumeration value="VNM"/>
                <xsd:enumeration value="VGB"/>
                <xsd:enumeration value="VIR"/>
                <xsd:enumeration value="WLF"/>
                <xsd:enumeration value="ESH"/>
                <xsd:enumeration value="YEM"/>
                <xsd:enumeration value="ZMB"/>
                <xsd:enumeration value="ZWE"/>
        </xsd:restriction>
```

13.5.146 Data Use Name (Simple)

```
<xsd:simpleType name="Data_use_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="Entity"/>
                <xsd:enumeration value="Foreign Identifier"/>
                <xsd:enumeration value="Field Counter"/>
                <xsd:enumeration value="Other"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.147 Data Use Value (Simple)

```
<xsd:simpleType name="Data_use_value">
        <xsd:restriction base="xsd:integer">
                <xsd:minInclusive value="1"/>
                <xsd:maxInclusive value="4"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.148 Datum Name (Simple)

NOTE Since provided XML schemas are coded with reference to ISO/TS 19127: 2005, Geographic information — Geodetic codes and parameters, the user is referred to the source organization for the latest information.

```
<xsd:simpleType name="Datum_name">
        <xsd:restriction base="xsd:string">
                <xsd:maxLength value="50"/>
                <xsd:enumeration value="Adindan"/>
                <xsd:enumeration value="Adindan (Ethiopia)"/>
                <xsd:enumeration value="Adindan (Sudan)"/>
                <xsd:enumeration value="Adindan (Mali)"/>
                <xsd:enumeration value="Adindan (Senegal)"/>
                <xsd:enumeration value="Adindan (Burkina Faso)"/>
                <xsd:enumeration value="Adindan (Cameroon)"/>
                <xsd:enumeration value="Adindan (Mean value: Ethiopia and Sudan)"/>
                <xsd:enumeration value="Afgooye (Somalia)"/>
                <xsd:enumeration value="Antigua Island Astro 1943"/>
                <xsd:enumeration value="Ain el Abd 1970"/>
                <xsd:enumeration value="Ain el Abd 1970 (Bahrain Island)"/>
                <xsd:enumeration value="Ain el Abd 1970 (Saudi Arabia)"/>
                <xsd:enumeration value="American Samoa Datum 1962"/>
                <xsd:enumeration value="Amersfoort 1885/1903 (Netherlands)"/>
                <xsd:enumeration value="Anna 1 Astro 1965 (Cocos Islands)"/>
                <xsd:enumeration value="Approximate Luzon Datum (Philippines)"/>
                <xsd:enumeration value="Arc 1950"/>
                <xsd:enumeration value="Arc 1950 (Botswana)"/>
                <xsd:enumeration value="Arc 1950 (Lesotho)"/>
                <xsd:enumeration value="Arc 1950 (Malawi)"/>
                <xsd:enumeration value="Arc 1950 (Swaziland)"/>
                <xsd:enumeration value="Arc 1950 (Zaire)"/>
                <xsd:enumeration value="Arc 1950 (Zambia)"/>
                <xsd:enumeration value="Arc 1950 (Zimbabwe)"/>
                <xsd:enumeration value="Arc 1950 (Burundi)"/>
```

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```
<xsd:enumeration value="Arc 1950 (Mean value: Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, and Zimbabwe)"/>
<xsd:enumeration value="Arc 1960"/>
<xsd:enumeration value="Arc 1960 (Kenya)"/>
<xsd:enumeration value="Arc 1960 (Tanzania)"/>
<xsd:enumeration value="Arc 1960 (Mean value: Kenya, Tanzania)"/>
<xsd:enumeration value="Arc 1935 (Africa)"/>
<xsd:enumeration value="Ascension Island 1958 (Ascension Island)"/>
<xsd:enumeration value="Montserrat Island Astro 1958"/>
<xsd:enumeration value="Astro Station 1952 (Marcus Island)"/>
<xsd:enumeration value="Astro Beacon &amp;quot;E&amp;quot; (Iwo Jima Island)"/>
<xsd:enumeration value="Average Terrestrial System 1977, New Brunswick"/>
<xsd:enumeration value="Australian Geod. 1966 (Australia and Tasmania Is.)"/>
<xsd:enumeration value="Australian Geod. 1984 (Australia and Tasmania Is.)"/>
<xsd:enumeration value="Djakarta (Batavia) (Sumatra Island, Indonesia)"/>
<xsd:enumeration value="Djakarta (Batavia) (Sumatra Island, Indonesia) with Zero Meridian Djakarta"/>
<xsd:enumeration value="Bekaa Base South End (Lebanon)"/>
<xsd:enumeration value="Belgium 1950 System (Lommel Signal, Belgium)"/>
<xsd:enumeration value="Bermuda 1957 (Bermuda Islands)"/>
<xsd:enumeration value="Bissau (Guinea-Bissau)"/>
<xsd:enumeration value="Modified BJZ54 (China)"/>
<xsd:enumeration value="BJZ54 (A954 Beijing Coordinates) (China)"/>
<xsd:enumeration value="Bogota Observatory (Colombia)"/>
<xsd:enumeration value="Bogota Observatory (Colombia) with Zero Meridian Bogota"/>
<xsd:enumeration value="Bern 1898 (Switzerland)"/>
<xsd:enumeration value="Bern 1898 (Switzerland) with Zero Meridian Bern"/>
<xsd:enumeration value="Bukit Rimpah (Bangka &amp;amp; Belitung Islands, Indonesia)"/>
<xsd:enumeration value="Cape Canaveral (Mean value: Florida and Bahama Islands)"/>
<xsd:enumeration value="Campo Inchauspe (Argentina)"/>
<xsd:enumeration value="Camacupa Base SW End (Campo De Aviacao, Angola)"/>
<xsd:enumeration value="Canton Astro 1966 (Phoenix Islands)"/>
<xsd:enumeration value="Cape (South Africa)"/>
<xsd:enumeration value="Camp Area Astro (Camp McMurdo Area, Antarctica)"/>
<xsd:enumeration value="S-JTSK, Czechoslavakia (prior to 1 Jan 1993)"/>
<xsd:enumeration value="Carthage (Tunisia)"/>
<xsd:enumeration value="Compensation Géodétique du Québec 1977"/>
<xsd:enumeration value="Chatham 1971 (Chatham Island, New Zealand)"/>
<xsd:enumeration value="Chua Astro (Paraguay)"/>
<xsd:enumeration value="Corrego Alegre (Brazil)"/>
<xsd:enumeration value="Conakry Pyramid of the Service Geographique (Guinea)"/>
<xsd:enumeration value="Guyana CSG67"/>
<xsd:enumeration value="Dabola (Guinea)"/>
<xsd:enumeration value="DCS-3 Lighthouse, Saint Lucia, Lesser Antilles"/>
<xsd:enumeration value="Deception Island, Antarctica"/>
<xsd:enumeration value="GUX 1 Astro (Guadacanal Island)"/>
<xsd:enumeration value="Dominica Astro M-12, Dominica, Lesser Antilles"/>
<xsd:enumeration value="Easter Island 1967 (Easter Island)"/>
<xsd:enumeration value="Wake-Eniwetok 1960 (Marshall Islands)"/>
<xsd:enumeration value="European 1950"/>
<xsd:enumeration value="European 1950 (Western Europe: Austria, Denmark, France, Federal Republic of Germany, Netherlands, and Switzerland)"/>
<xsd:enumeration value="European 1950 (Greece)"/>
<xsd:enumeration value="European 1950 (Norway and Finland)"/>
<xsd:enumeration value="European 1950 (Portugal and Spain)"/>
<xsd:enumeration value="European 1950 (Cyprus)"/>
<xsd:enumeration value="European 1950 (Egypt)"/>
<xsd:enumeration value="European 1950 (England, Channel Islands, Scotland, and Shetland Islands)"/>
<xsd:enumeration value="European 1950 (Iran)"/>
<xsd:enumeration value="European 1950 (Sardinia)"/>
<xsd:enumeration value="European 1950 (Sicily)"/>
<xsd:enumeration value="European 1950 (England, Channel Islands, Ireland, Northern Ireland, Scotland, Shetland Islands, and Wales)"/>
<xsd:enumeration value="European 1950 (Malta)"/>
<xsd:enumeration value="European 1950 (Mean value: Austria, Belgium, Denmark, Finland, France, Federal Republic of Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, &amp;amp; Switzerland)"/>
<xsd:enumeration value="European 1950 (Iraq, Israel, Jordan, Kuwait, Lebanon, Saudi Arabia, and Syria)"/>
<xsd:enumeration value="European 1950 (Tunisia)"/>
<xsd:enumeration value="European 1979 (Mean value: Austria, Finland, Netherlands, Norway, Spain, Sweden, and Switzerland)"/>
<xsd:enumeration value="European Terrestrial Reference System 1989 (ETRS89)"/>
<xsd:enumeration value="Oman (Oman)"/>
<xsd:enumeration value="Observatorio Meteorologico 1939 (Corvo and Flores Islands, Azores)"/>
<xsd:enumeration value="Fort Thomas 1955 (Nevis, St Kitts, Leeward Islands)"/>
<xsd:enumeration value="Gan 1970 (Addu Atoll, Republic of Maldives)"/>
<xsd:enumeration value="Gandajika Base (Zaire)"/>
```


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```
<xsd:enumeration value="Geocentric Datum of Australia (GDA)"/>
<xsd:enumeration value="GDZ80 (China)"/>
<xsd:enumeration value="Geodetic Datum 1949 (New Zealand)"/>
<xsd:enumeration value="DOS 1968 (Gizo Island, New Georgia Islands)"/>
<xsd:enumeration value="Graciosa Base SW (Faial, Graciosa, Pico, Sao Jorge, and Terceira Island, Azores)"/>
<xsd:enumeration value="Greek Datum, Greece"/>
<xsd:enumeration value="Greek Geodetic Reference System 1987 (GGRS 87)"/>
<xsd:enumeration value="Gunong Segara (Kalimantan Island, Indonesia)"/>
<xsd:enumeration value="Gunong Serindung"/>
<xsd:enumeration value="Guam 1963"/>
<xsd:enumeration value="Herat North (Afganistan)"/>
<xsd:enumeration value="Hermannskogel"/>
<xsd:enumeration value="Provisional South Chilean 1963 (or Hito XVIII 1963)  (S. Chile, 53Â°S)"/>
<xsd:enumeration value="Hjörsey 1955 (Iceland)"/>
<xsd:enumeration value="Hong Kong 1963 (Hong Kong)"/>
<xsd:enumeration value="Hong Kong 1929"/>
<xsd:enumeration value="Hu-Tzu-Shan"/>
<xsd:enumeration value="Hungarian 1972"/>
<xsd:enumeration value="Bellevue (IGN) (Efate and Erromango Islands)"/>
<xsd:enumeration value="Indonesian 1974"/>
<xsd:enumeration value="Indian"/>
<xsd:enumeration value="Indian (Thailand and Vietnam)"/>
<xsd:enumeration value="Indian (Bangladesh)"/>
<xsd:enumeration value="Indian (India and Nepal)"/>
<xsd:enumeration value="Indian (Pakistan)"/>
<xsd:enumeration value="Indian (1954)"/>
<xsd:enumeration value="Indian 1954 (Thailand)"/>
<xsd:enumeration value="Indian 1960"/>
<xsd:enumeration value="Indian 1960 (Vietnam: near 16°N)"/>
<xsd:enumeration value="Indian 1960 (Con Son Island (Vietnam))"/>
<xsd:enumeration value="Indian 1975"/>
<xsd:enumeration value="Indian 1975 (Thailand)"/>
<xsd:enumeration value="Ireland 1965 (Ireland and Northern Ireland)"/>
<xsd:enumeration value="ISTS 061 Astro 1968 (South Georgia Islands)"/>
<xsd:enumeration value="ISTS 073 Astro 1969 (Diego Garcia)"/>
<xsd:enumeration value="Johnston Island 1961 (Johnston Island)"/>
<xsd:enumeration value="Kalianpur (India)"/>
<xsd:enumeration value="Kandawala (Sri Lanka)"/>
<xsd:enumeration value="Kertau 1948 (or Revised Kertau) (West Malaysia and Singapore)"/>
<xsd:enumeration value="KCS 2, Sierra Leone"/>
<xsd:enumeration value="Kerguelen Island 1949 (Kerguelen Island)"/>
<xsd:enumeration value="Korean Geodetic System 1995 (South Korea)"/>
<xsd:enumeration value="KKJ (or Kartastokoordinaattijarjestelma), Finland"/>
<xsd:enumeration value="Kusaie Astro 1951"/>
<xsd:enumeration value="Kuwait Oil Company (K28)"/>
<xsd:enumeration value="L.C. 5 Astro 1961 (Cayman Brac Island)"/>
<xsd:enumeration value="Leigon (Ghana)"/>
<xsd:enumeration value="Liberia 1964 (Liberia)"/>
<xsd:enumeration value="Lisbon (Castelo di São Jorge), Portugal"/>
<xsd:enumeration value="Local Astro."/>
<xsd:enumeration value="Loma Quintana (Venezuela)"/>
<xsd:enumeration value="Luzon"/>
<xsd:enumeration value="Luzon (Philipines except Mindanao Island)"/>
<xsd:enumeration value="Luzon (Mindanao Island)"/>
<xsd:enumeration value="Marco Astro (Salvage Islands)"/>
<xsd:enumeration value="Martinique Fort-Desaix"/>
<xsd:enumeration value="Massawa (Eritrea, Ethiopia)"/>
<xsd:enumeration value="Manokwari (West Irian)"/>
<xsd:enumeration value="Mayotte Combani"/>
<xsd:enumeration value="Mount Dillon, Tobago"/>
<xsd:enumeration value="Merchich (Morocco)"/>
<xsd:enumeration value="Midway Astro 1961 (Midway Island)"/>
<xsd:enumeration value="Mahe 1971 (Mahe Island)"/>
<xsd:enumeration value="Minna"/>
<xsd:enumeration value="Minna (Cameroon)"/>
<xsd:enumeration value="Minna (Nigeria)"/>
<xsd:enumeration value="Rome 1940 (or Monte Mario 1940), Italy"/>
<xsd:enumeration value="Rome 1940 (or Monte Mario 1940), Italy, with Zero Meridian Rome"/>
<xsd:enumeration value="Montjong Lowe"/>
<xsd:enumeration value="M'Poraloko (Gabon)"/>
<xsd:enumeration value="Viti Levu 1916 (Viti Levu Island, Fiji Islands)"/>
<xsd:enumeration value="Nahrwan"/>
<xsd:enumeration value="Nahrwan (Masirah Island, Oman)"/>
<xsd:enumeration value="Nahrwan (United Arab Emirates)"/>
<xsd:enumeration value="Nahrwan (Saudi Arabia)"/>
```

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```
                <xsd:enumeration value="Naparima (BWI, Trinidad and Tobago)"/>
                <xsd:enumeration value="North American 1983"/>
                <xsd:enumeration value="North American 1983 (Alaska, excluding Aleutian Islands)"/>
                <xsd:enumeration value="North American 1983 (Canada)"/>
                <xsd:enumeration value="North American 1983 (CONUS)"/>
                <xsd:enumeration value="North American 1983 (Mexico and Central America))"/>
                <xsd:enumeration value="North American 1983 (Aleutian Islands)"/>
                <xsd:enumeration value="North American 1983 (Hawaii)"/>
                <xsd:enumeration value="North American 1927"/>
                <xsd:enumeration value="North American 1927 (Eastern US)"/>
                <xsd:enumeration value="North American 1927 (Western US)"/>
                <xsd:enumeration value="North American 1927 (Mean value: CONUS)"/>
                <xsd:enumeration value="North American 1927 (Alaska)"/>
                <xsd:enumeration value="North American 1927 (Mean value: Canada)"/>
                <xsd:enumeration value="North American 1927 (Alberta and British Columbia)"/>
                <xsd:enumeration value="North American 1927 (Newfoundland, New Brunswick, Nova Scotia and Quebec)"/>
                <xsd:enumeration value="North American 1927 (Manitoba and Ontario)"/>
                <xsd:enumeration value="North American 1927 (Northwest Territories and Saskatchewan)"/>
                <xsd:enumeration value="North American 1927 (Yukon)"/>
                <xsd:enumeration value="North American 1927 (Mexico)"/>
                <xsd:enumeration value="North American 1927 (Central America - Belize, Costa Rica, El Salvador, Guatemala, Honduras,
and Nicaragua)"/>
                <xsd:enumeration value="North American 1927 (Canal Zone)"/>
                <xsd:enumeration value="North American 1927 (Caribbean, Barbados, Caicos Islands, Cuba, Dominican Republic, Grand
Cayman, Jamaica, Leeward Islands, and Turks Islands)"/>
                <xsd:enumeration value="North American 1927 (Bahamas, except San Salvador Island)"/>
                <xsd:enumeration value="North American 1927 (San Salvador Island)"/>
                <xsd:enumeration value="North American 1927 (Cuba)"/>
                <xsd:enumeration value="North American 1927 (Hayes Peninsula, Greenland)"/>
                <xsd:enumeration value="North American 1927 (Aleutian Islands East of 180°W)"/>
                <xsd:enumeration value="North American 1927 (Aleutian Islands West of 180°W)"/>
                <xsd:enumeration value="Revised Nahrwan"/>
                <xsd:enumeration value="New French or Nouvelle Triangulation Française (NTF) with Zero Meridian Paris"/>
                <xsd:enumeration value="North Sahara 1959"/>
                <xsd:enumeration value="Ocotopeque, Guatemala"/>
                <xsd:enumeration value="Belgium 1972 (Observatoire d'Uccle)"/>
                <xsd:enumeration value="Old Egyptian (Egypt)"/>
                <xsd:enumeration value="Ordnance Survey of Great Britain 1936"/>
                <xsd:enumeration value="Ordnance Survey G.B. 1936 (England)"/>
                <xsd:enumeration value="Ordnance Survey G.B. 1936 (England, Isle of Man, and Wales)"/>
                <xsd:enumeration value="Ordnance Survey G.B. 1936 (Scotland and Shetland Islands)"/>
                <xsd:enumeration value="Ordnance Survey G.B. 1936 (Wales)"/>
                <xsd:enumeration value="Ordnance Survey G.B. 1936 (Mean value: England, Isle of Man, Scotland, Shetland, and
Wales)"/>
                <xsd:enumeration value="Old Hawaiian"/>
                <xsd:enumeration value="Old Hawaiian (Hawaii)"/>
                <xsd:enumeration value="Old Hawaiian (Kauai)"/>
                <xsd:enumeration value="Old Hawaiian (Maui)"/>
                <xsd:enumeration value="Old Hawaiian (Oahu)"/>
                <xsd:enumeration value="Old Hawaiian (Mean value)"/>
                <xsd:enumeration value="Oslo Observatory (Old), Norway"/>
                <xsd:enumeration value="Padang Base West End (Sumatra, Indonesia)"/>
                <xsd:enumeration value="Padang Base West End (Sumatra, Indonesia) with Zero Meridian Djakarta"/>
                <xsd:enumeration value="Palestine 1928 (Israel, Jordan)"/>
                <xsd:enumeration value="Potsdam or Helmertturm (Germany)"/>
                <xsd:enumeration value="Ayabelle Lighthouse (Djibouti)"/>
                <xsd:enumeration value="Pitcairn Astro 1967 (Pitcairn Island)"/>
                <xsd:enumeration value="Pico de las Nieves (Canary Islands)"/>
                <xsd:enumeration value="SE Base (Porto Santo) (Porto Santo &amp;amp; Madeira Islands)"/>
                <xsd:enumeration value="Provisional South American 1956"/>
                <xsd:enumeration value="Prov. S. American 1956 (Bolivia)"/>
                <xsd:enumeration value="Prov. S. American 1956 (Northern Chile near 19°S)"/>
                <xsd:enumeration value="Prov. S. American 1956 (Southern Chile near 43°S)"/>
                <xsd:enumeration value="Prov. S. American 1956 (Columbia)"/>
                <xsd:enumeration value="Prov. S. American 1956 (Ecuador)"/>
                <xsd:enumeration value="Prov. S. American 1956 (Guyana)"/>
                <xsd:enumeration value="Prov. S. American 1956 (Peru)"/>
                <xsd:enumeration value="Prov. S. American 1956 (Venezuela)"/>
                <xsd:enumeration value="Prov. S. American 1956 (Mean value: Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, &amp;amp;
Venezuela)"/>
                <xsd:enumeration value="Point 58 Mean Solution (Burkina Faso and Niger)"/>
                <xsd:enumeration value="Pointe Noire 1948"/>
                <xsd:enumeration value="Pulkovo 1942 (Russia)"/>
                <xsd:enumeration value="Puerto Rico (Puerto Rico and Virgin Islands)"/>
                <xsd:enumeration value="Qatar National (Qatar)"/>
```


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```
                <xsd:enumeration value="Qornoq (South Greenland)"/>
                <xsd:enumeration value="Rauenberg (Berlin, Germany)"/>
                <xsd:enumeration value="Reconnaissance Triangulation, Morocco"/>
                <xsd:enumeration value="Reunion 1947"/>
                <xsd:enumeration value="RT90, Stockholm, Sweden"/>
                <xsd:enumeration value="Santo (DOS) 1965 (Espirito Santo Island)"/>
                <xsd:enumeration value="South African (South Africa)"/>
                <xsd:enumeration value="Sainte Anne I 1984 (Guadeloupe)"/>
                <xsd:enumeration value="South American 1969"/>
                <xsd:enumeration value="South American 1969 (Argentina)"/>
                <xsd:enumeration value="South American 1969 (Bolivia)"/>
                <xsd:enumeration value="South American 1969 (Brazil)"/>
                <xsd:enumeration value="South American 1969 (Chile)"/>
                <xsd:enumeration value="South American 1969 (Columbia)"/>
                <xsd:enumeration value="South American 1969 (Ecuador)"/>
                <xsd:enumeration value="South American 1969 (Guyana)"/>
                <xsd:enumeration value="South American 1969 (Paraguay)"/>
                <xsd:enumeration value="South American 1969 (Peru)"/>
                <xsd:enumeration value="South American 1969 (Baltra, Galapagos Islands)"/>
                <xsd:enumeration value="South American 1969 (Trinidad and Tobago)"/>
                <xsd:enumeration value="South American 1969 (Venezuela)"/>
                <xsd:enumeration value="South American 1969 (Mean value: Argentina, Bolivia, Brazil, Chile, Columbia, Ecuador, Guyana,
Paraguay, Peru, Trinidad and Tobago, and Venezuela)"/>
                <xsd:enumeration value="Sao Braz (Sao Miguel, Santa Maria Islands, Azores)"/>
                <xsd:enumeration value="Sapper Hill 1943 (East Falkland Islands)"/>
                <xsd:enumeration value="Schwarzeck (Namibia)"/>
                <xsd:enumeration value="Soviet Geodetic System 1985"/>
                <xsd:enumeration value="Soviet Geodetic System 1990"/>
                <xsd:enumeration value="Selvagem Grande 1938 (Salvage Islands)"/>
                <xsd:enumeration value="Astro Dos 71/4 (St. Helena Island)"/>
                <xsd:enumeration value="Sierra Leone 1960"/>
                <xsd:enumeration value="South Asia (Southeast Asia, Singapore)"/>
                <xsd:enumeration value="S-42 (Pulkovo 1942)"/>
                <xsd:enumeration value="St. Pierre et Miquelon 1950"/>
                <xsd:enumeration value="Stockholm 1938 (Sweden)"/>
                <xsd:enumeration value="Sydney Observatory, New South Wales, Australia"/>
                <xsd:enumeration value="Tananarive Observatory 1925"/>
                <xsd:enumeration value="Tananarive Observatory 1925, with Zero Meridian Paris"/>
                <xsd:enumeration value="Tristan Astro 1968 (Tristan da Cunha)"/>
                <xsd:enumeration value="Timbalai 1948 (Brunei and East Malaysia - Sarawak and Sabah)"/>
                <xsd:enumeration value="Timbali 1968"/>
                <xsd:enumeration value="Tokyo"/>
                <xsd:enumeration value="Tokyo (Japan)"/>
                <xsd:enumeration value="Tokyo (Korea)"/>
                <xsd:enumeration value="Tokyo (Okinawa)"/>
                <xsd:enumeration value="Tokyo (Mean value: Japan, Korea, and Okinawa)"/>
                <xsd:enumeration value="Trinidad 1903"/>
                <xsd:enumeration value="Astro Tern Is. 1961 (Tern Island, Hawaii)"/>
                <xsd:enumeration value="Undetermined or Unknown"/>
                <xsd:enumeration value="Voirol 1875"/>
                <xsd:enumeration value="Voirol 1875 with Zero Meridian Paris"/>
                <xsd:enumeration value="Voirol 1960, Algeria"/>
                <xsd:enumeration value="Voirol 1960, Algeria, with Zero Meridian Paris"/>
                <xsd:enumeration value="Wake Island Astro 1952"/>
                <xsd:enumeration value="World Geodetic System 1960"/>
                <xsd:enumeration value="World Geodetic System 1966"/>
                <xsd:enumeration value="World Geodetic System 1972"/>
                <xsd:enumeration value="World Geodetic System 1984"/>
                <xsd:enumeration value="Yacare (Uruguay)"/>
                <xsd:enumeration value="Zanderij (Surinam)"/>
                <xsd:enumeration value="RGF93 (France)"/>
                <xsd:enumeration value="RGAF09 (France, French Antillas)"/>
                <xsd:enumeration value="RRAF 1991 (France, French Antillas)"/>
                <xsd:enumeration value="RGFG95 (France, French Guyana)"/>
                <xsd:enumeration value="RGR92 (France, Reunion)"/>
                <xsd:enumeration value="RGM04 (France, Mayotte)"/>
                <xsd:enumeration value="RGSPM06 (France, Saint-Pierre et Miquelon)"/>
                <xsd:enumeration value="International Terrestrial Reference System(ITRS)"/>
                <xsd:enumeration value="Other Known Datum"/>
                <xsd:enumeration value="Other Known Datum"/>
        </xsd:restriction>
    </xsd:simpleType>
```

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13.5.149 Datum Value (Simple)

NOTE Since provided XML schemas are coded with reference to ISO/TS 19127: 2005, Geographic information — Geodetic codes and parameters, the user is referred to the source organization for the latest information.

```
<xsd:simpleType name="Datum_value">
    <xsd:restriction base="xsd:string">
            <xsd:maxLength value="4"/>
            <xsd:enumeration value="ADI"/>
            <xsd:enumeration value="ADIA"/>
            <xsd:enumeration value="ADIB"/>
            <xsd:enumeration value="ADIC"/>
            <xsd:enumeration value="ADID"/>
            <xsd:enumeration value="ADIE"/>
            <xsd:enumeration value="ADIF"/>
            <xsd:enumeration value="ADIM"/>
            <xsd:enumeration value="AFG"/>
            <xsd:enumeration value="AIA"/>
            <xsd:enumeration value="AIN"/>
            <xsd:enumeration value="AINA"/>
            <xsd:enumeration value="AINB"/>
            <xsd:enumeration value="AMA"/>
            <xsd:enumeration value="AME"/>
            <xsd:enumeration value="ANO"/>
            <xsd:enumeration value="APL"/>
            <xsd:enumeration value="ARF"/>
            <xsd:enumeration value="ARFA"/>
            <xsd:enumeration value="ARFB"/>
            <xsd:enumeration value="ARFC"/>
            <xsd:enumeration value="ARFD"/>
            <xsd:enumeration value="ARFE"/>
            <xsd:enumeration value="ARFF"/>
            <xsd:enumeration value="ARFG"/>
            <xsd:enumeration value="ARFH"/>
            <xsd:enumeration value="ARFM"/>
            <xsd:enumeration value="ARS"/>
            <xsd:enumeration value="ARSA"/>
            <xsd:enumeration value="ARSB"/>
            <xsd:enumeration value="ARSM"/>
            <xsd:enumeration value="ART"/>
            <xsd:enumeration value="ASC"/>
            <xsd:enumeration value="ASM"/>
            <xsd:enumeration value="ASQ"/>
            <xsd:enumeration value="ATF"/>
            <xsd:enumeration value="ATX"/>
            <xsd:enumeration value="AUA"/>
            <xsd:enumeration value="AUG"/>
            <xsd:enumeration value="BAT"/>
            <xsd:enumeration value="BAT1"/>
            <xsd:enumeration value="BEK"/>
            <xsd:enumeration value="BEL"/>
            <xsd:enumeration value="BER"/>
            <xsd:enumeration value="BID"/>
            <xsd:enumeration value="BJM"/>
            <xsd:enumeration value="BJZ"/>
            <xsd:enumeration value="BOO"/>
            <xsd:enumeration value="BOO1"/>
            <xsd:enumeration value="BRE"/>
            <xsd:enumeration value="BRE1"/>
            <xsd:enumeration value="BUR"/>
            <xsd:enumeration value="CAC"/>
            <xsd:enumeration value="CAI"/>
            <xsd:enumeration value="CAM"/>
            <xsd:enumeration value="CAO"/>
            <xsd:enumeration value="CAP"/>
            <xsd:enumeration value="CAZ"/>
            <xsd:enumeration value="CCD"/>
            <xsd:enumeration value="CGE"/>
            <xsd:enumeration value="CGX"/>
            <xsd:enumeration value="CHI"/>
            <xsd:enumeration value="CHU"/>
            <xsd:enumeration value="COA"/>
            <xsd:enumeration value="COV"/>
```

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```
<xsd:enumeration value="CSG"/>
<xsd:enumeration value="DAL"/>
<xsd:enumeration value="DCS"/>
<xsd:enumeration value="DID"/>
<xsd:enumeration value="DOB"/>
<xsd:enumeration value="DOM"/>
<xsd:enumeration value="EAS"/>
<xsd:enumeration value="ENW"/>
<xsd:enumeration value="EUR"/>
<xsd:enumeration value="EURA"/>
<xsd:enumeration value="EURB"/>
<xsd:enumeration value="EURC"/>
<xsd:enumeration value="EURD"/>
<xsd:enumeration value="EURE"/>
<xsd:enumeration value="EURF"/>
<xsd:enumeration value="EURG"/>
<xsd:enumeration value="EURH"/>
<xsd:enumeration value="EURI"/>
<xsd:enumeration value="EURJ"/>
<xsd:enumeration value="EURK"/>
<xsd:enumeration value="EURL"/>
<xsd:enumeration value="EURM"/>
<xsd:enumeration value="EURS"/>
<xsd:enumeration value="EURT"/>
<xsd:enumeration value="EUS"/>
<xsd:enumeration value="EUT"/>
<xsd:enumeration value="FAH"/>
<xsd:enumeration value="FLO"/>
<xsd:enumeration value="FOT"/>
<xsd:enumeration value="GAA"/>
<xsd:enumeration value="GAN"/>
<xsd:enumeration value="GDS"/>
<xsd:enumeration value="GDZ"/>
<xsd:enumeration value="GEO"/>
<xsd:enumeration value="GIZ"/>
<xsd:enumeration value="GRA"/>
<xsd:enumeration value="GRK"/>
<xsd:enumeration value="GRX"/>
<xsd:enumeration value="GSE"/>
<xsd:enumeration value="GSF"/>
<xsd:enumeration value="GUA"/>
<xsd:enumeration value="HEN"/>
<xsd:enumeration value="HER"/>
<xsd:enumeration value="HIT"/>
<xsd:enumeration value="HJO"/>
<xsd:enumeration value="HKD"/>
<xsd:enumeration value="HKO"/>
<xsd:enumeration value="HTN"/>
<xsd:enumeration value="HUY"/>
<xsd:enumeration value="IBE"/>
<xsd:enumeration value="IDN"/>
<xsd:enumeration value="IND"/>
<xsd:enumeration value="INDA"/>
<xsd:enumeration value="INDB"/>
<xsd:enumeration value="INDI"/>
<xsd:enumeration value="INDP"/>
<xsd:enumeration value="INF"/>
<xsd:enumeration value="INFA"/>
<xsd:enumeration value="ING"/>
<xsd:enumeration value="INGA"/>
<xsd:enumeration value="INGB"/>
<xsd:enumeration value="INH"/>
<xsd:enumeration value="INHA"/>
<xsd:enumeration value="IRL"/>
<xsd:enumeration value="ISG"/>
<xsd:enumeration value="IST"/>
<xsd:enumeration value="JOH"/>
<xsd:enumeration value="KAB"/>
<xsd:enumeration value="KAN"/>
<xsd:enumeration value="KEA"/>
<xsd:enumeration value="KCS"/>
<xsd:enumeration value="KEG"/>
<xsd:enumeration value="KGS"/>
<xsd:enumeration value="KKX"/>
<xsd:enumeration value="KUS"/>
```

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```
<xsd:enumeration value="KUW"/>
<xsd:enumeration value="LCF"/>
<xsd:enumeration value="LEH"/>
<xsd:enumeration value="LIB"/>
<xsd:enumeration value="LIS"/>
<xsd:enumeration value="LOC"/>
<xsd:enumeration value="LOM"/>
<xsd:enumeration value="LUZ"/>
<xsd:enumeration value="LUZA"/>
<xsd:enumeration value="LUZB"/>
<xsd:enumeration value="MAA"/>
<xsd:enumeration value="MAR"/>
<xsd:enumeration value="MAS"/>
<xsd:enumeration value="MAW"/>
<xsd:enumeration value="MCX"/>
<xsd:enumeration value="MDT"/>
<xsd:enumeration value="MER"/>
<xsd:enumeration value="MID"/>
<xsd:enumeration value="MIK"/>
<xsd:enumeration value="MIN"/>
<xsd:enumeration value="MINA"/>
<xsd:enumeration value="MINB"/>
<xsd:enumeration value="MOD"/>
<xsd:enumeration value="MOD1"/>
<xsd:enumeration value="MOL"/>
<xsd:enumeration value="MPO"/>
<xsd:enumeration value="MVS"/>
<xsd:enumeration value="NAH"/>
<xsd:enumeration value="NAHA"/>
<xsd:enumeration value="NAHB"/>
<xsd:enumeration value="NAHC"/>
<xsd:enumeration value="NAP"/>
<xsd:enumeration value="NAR"/>
<xsd:enumeration value="NARA"/>
<xsd:enumeration value="NARB"/>
<xsd:enumeration value="NARC"/>
<xsd:enumeration value="NARD"/>
<xsd:enumeration value="NARE"/>
<xsd:enumeration value="NARH"/>
<xsd:enumeration value="NAS"/>
<xsd:enumeration value="NASA"/>
<xsd:enumeration value="NASB"/>
<xsd:enumeration value="NASC"/>
<xsd:enumeration value="NASD"/>
<xsd:enumeration value="NASE"/>
<xsd:enumeration value="NASF"/>
<xsd:enumeration value="NASG"/>
<xsd:enumeration value="NASH"/>
<xsd:enumeration value="NASI"/>
<xsd:enumeration value="NASJ"/>
<xsd:enumeration value="NASL"/>
<xsd:enumeration value="NASN"/>
<xsd:enumeration value="NASO"/>
<xsd:enumeration value="NASP"/>
<xsd:enumeration value="NASQ"/>
<xsd:enumeration value="NASR"/>
<xsd:enumeration value="NAST"/>
<xsd:enumeration value="NASU"/>
<xsd:enumeration value="NASV"/>
<xsd:enumeration value="NASW"/>
<xsd:enumeration value="NAX"/>
<xsd:enumeration value="NFR1"/>
<xsd:enumeration value="Alt: FDA"/>
<xsd:enumeration value="NSD"/>
<xsd:enumeration value="OCO"/>
<xsd:enumeration value="ODU"/>
<xsd:enumeration value="OEG"/>
<xsd:enumeration value="OGB"/>
<xsd:enumeration value="OGBA"/>
<xsd:enumeration value="OGBB"/>
<xsd:enumeration value="OGBC"/>
<xsd:enumeration value="OGBD"/>
<xsd:enumeration value="OGBM"/>
<xsd:enumeration value="OHA"/>
<xsd:enumeration value="OHAA"/>
```

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```
<xsd:enumeration value="OHAB"/>
<xsd:enumeration value="OHAC"/>
<xsd:enumeration value="OHAD"/>
<xsd:enumeration value="OHAM"/>
<xsd:enumeration value="OSL"/>
<xsd:enumeration value="PAD"/>
<xsd:enumeration value="PAD1"/>
<xsd:enumeration value="PAL"/>
<xsd:enumeration value="PDM"/>
<xsd:enumeration value="PHA"/>
<xsd:enumeration value="PIT"/>
<xsd:enumeration value="PLN"/>
<xsd:enumeration value="POS"/>
<xsd:enumeration value="PRP"/>
<xsd:enumeration value="PRPA"/>
<xsd:enumeration value="PRPB"/>
<xsd:enumeration value="PRPC"/>
<xsd:enumeration value="PRPD"/>
<xsd:enumeration value="PRPE"/>
<xsd:enumeration value="PRPF"/>
<xsd:enumeration value="PRPG"/>
<xsd:enumeration value="PRPH"/>
<xsd:enumeration value="PRPM"/>
<xsd:enumeration value="PTB"/>
<xsd:enumeration value="PTN"/>
<xsd:enumeration value="PUK"/>
<xsd:enumeration value="PUR"/>
<xsd:enumeration value="QAT"/>
<xsd:enumeration value="QUO"/>
<xsd:enumeration value="RAU"/>
<xsd:enumeration value="REC"/>
<xsd:enumeration value="REU"/>
<xsd:enumeration value="RTS"/>
<xsd:enumeration value="SAE"/>
<xsd:enumeration value="SAF"/>
<xsd:enumeration value="SAG"/>
<xsd:enumeration value="SAN"/>
<xsd:enumeration value="SANA"/>
<xsd:enumeration value="SANB"/>
<xsd:enumeration value="SANC"/>
<xsd:enumeration value="SAND"/>
<xsd:enumeration value="SANE"/>
<xsd:enumeration value="SANF"/>
<xsd:enumeration value="SANG"/>
<xsd:enumeration value="SANH"/>
<xsd:enumeration value="SANI"/>
<xsd:enumeration value="SANJ"/>
<xsd:enumeration value="SANK"/>
<xsd:enumeration value="SANL"/>
<xsd:enumeration value="SANM"/>
<xsd:enumeration value="SAO"/>
<xsd:enumeration value="SAP"/>
<xsd:enumeration value="SCK"/>
<xsd:enumeration value="SGA"/>
<xsd:enumeration value="SGB"/>
<xsd:enumeration value="SGM"/>
<xsd:enumeration value="SHB"/>
<xsd:enumeration value="SIB"/>
<xsd:enumeration value="SOA"/>
<xsd:enumeration value="SPK"/>
<xsd:enumeration value="SPX"/>
<xsd:enumeration value="STO"/>
<xsd:enumeration value="SYO"/>
<xsd:enumeration value="TAN"/>
<xsd:enumeration value="TAN1"/>
<xsd:enumeration value="TDC"/>
<xsd:enumeration value="TIL"/>
<xsd:enumeration value="TIN"/>
<xsd:enumeration value="TOY"/>
<xsd:enumeration value="TOYA"/>
<xsd:enumeration value="TOYB"/>
<xsd:enumeration value="TOYC"/>
<xsd:enumeration value="TOYM"/>
<xsd:enumeration value="TRI"/>
<xsd:enumeration value="TRN"/>
```

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```
                <xsd:enumeration value="UND"/>
                <xsd:enumeration value="VOI"/>
                <xsd:enumeration value="VOI1"/>
                <xsd:enumeration value="VOR"/>
                <xsd:enumeration value="VOR1"/>
                <xsd:enumeration value="WAK"/>
                <xsd:enumeration value="WGA"/>
                <xsd:enumeration value="WGB"/>
                <xsd:enumeration value="WGC"/>
                <xsd:enumeration value="WGE"/>
                <xsd:enumeration value="YAC"/>
                <xsd:enumeration value="ZAN"/>
                <xsd:enumeration value="RGF"/>
                <xsd:enumeration value="RGAF"/>
                <xsd:enumeration value="RRAF"/>
                <xsd:enumeration value="RGFG"/>
                <xsd:enumeration value="RGR"/>
                <xsd:enumeration value="RGM"/>
                <xsd:enumeration value="RGSP"/>
                <xsd:enumeration value="ITRS"/>
                <xsd:enumeration value="ZYX"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.150 Direction Name (Simple)

```
<xsd:simpleType name="Direction_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="right"/>
                <xsd:enumeration value="left"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.151 Ellipsoid Name (Simple)

NOTE Since provided XML schemas are coded with reference to Digital Geographic Information Exchange Standard (DIGEST) 2.1, Part 3 Codes and Parameters; Digital Geographic Information Working Group; 2008, the user is referred to the source organization for the latest information. See http://www.dgiwg.org/dgiwg/htm/documents/historical_documents.htm.

```
<xsd:simpleType name="Ellipsoid_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="Airy (1830)"/>
                <xsd:enumeration value="US- Modified Airy or UK- Airy Modified"/>
                <xsd:enumeration value="Australian National (1966)"/>
                <xsd:enumeration value="APL 4.5 (1968)"/>
                <xsd:enumeration value="Average Terrestrial System 1977"/>
                <xsd:enumeration value="Airy (War Office)"/>
                <xsd:enumeration value="Bessel (Modified)"/>
                <xsd:enumeration value="Bessel 1841 (Namibia)"/>
                <xsd:enumeration value="US - Bessel 1841 (Ethiopia, Indonesia, Japan, Korea); UK - Bessel (1841) Revised)"/>
                <xsd:enumeration value="Clarke 1858"/>
                <xsd:enumeration value="Clarke 1858 (Modified)"/>
                <xsd:enumeration value="Clarke 1866"/>
                <xsd:enumeration value="US - Clarke 1880; UK - Clarke 1880 Modified"/>
                <xsd:enumeration value="Clarke 1880 (Cape)"/>
                <xsd:enumeration value="Clarke 1880 (Palestine)"/>
                <xsd:enumeration value="Clarke 1880 (IGN)"/>
                <xsd:enumeration value="Clarke 1880 (Syria)"/>
                <xsd:enumeration value="Clarke 1880 (Fiji)"/>
                <xsd:enumeration value="Clarke 1880 (Unspecified)"/>
                <xsd:enumeration value="Danish (1876) or Andrae"/>
                <xsd:enumeration value="Delambre 1810"/>
                <xsd:enumeration value="Delambre (Carte de France)"/>
                <xsd:enumeration value="US - Everest (India 1830); UK - Everest (1830)"/>
                <xsd:enumeration value="US - Everest (Brunei and E. Malaysia (Sabah and Sarawak)); UK - Everest
                                                                (Borneo)"/>
                <xsd:enumeration value="US - Everest (India 1956); UK - Everest (India)"/>
                <xsd:enumeration value="US - Everest (W. Malaysia 1969); UK - Everest (Malaya RSO)"/>
                <xsd:enumeration value="US - Everest (W. Malaysia and Singapore 1948); UK - Everest (Malaya
                                                                RKT)"/>
```

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```
            <xsd:enumeration value="Everest (Pakistan))"/>
            <xsd:enumeration value="Everest (Unspecified)"/>
            <xsd:enumeration value="US - Modified Fischer 1960 (South Asia); UK - Fischer 1960 (South
                                                                    Asia)"/>
            <xsd:enumeration value="Fischer 1968"/>
            <xsd:enumeration value="Fischer 1960 (Mercury)"/>
            <xsd:enumeration value="Germaine (Djibouti)"/>
            <xsd:enumeration value="Hayford 1909"/>
            <xsd:enumeration value="Helmert 1906"/>
            <xsd:enumeration value="Hough 1960"/>
            <xsd:enumeration value="IAG Best Estimate 1975"/>
            <xsd:enumeration value="Indonesian National (1974)"/>
            <xsd:enumeration value="US - International 1924"/>
            <xsd:enumeration value="Krassovsky (1940)"/>
            <xsd:enumeration value="Krayenhoff 1827"/>
            <xsd:enumeration value="No ellipsoid"/>
            <xsd:enumeration value="NWL-8E"/>
            <xsd:enumeration value="Plessis Modified"/>
            <xsd:enumeration value="Plessis Reconstituted"/>
            <xsd:enumeration value="Geodetic Reference System 1967"/>
            <xsd:enumeration value="Geodetic Reference System 1980"/>
            <xsd:enumeration value="South American"/>
            <xsd:enumeration value="Soviet Geodetic System 1985"/>
            <xsd:enumeration value="Ellipsoid Junction"/>
            <xsd:enumeration value="Soviet Geodetic System 1990"/>
            <xsd:enumeration value="Struve 1860"/>
            <xsd:enumeration value="Svanberg"/>
            <xsd:enumeration value="Walbeck 1819 (Planheft 1942)"/>
            <xsd:enumeration value="Walbeck 1819 (AMS 1963)"/>
            <xsd:enumeration value="World Geodetic System 1966"/>
            <xsd:enumeration value="World Geodetic System 1972"/>
            <xsd:enumeration value="World Geodetic System 1984"/>
            <xsd:enumeration value="World Geodetic System (Unspecified)"/>
            <xsd:enumeration value="US - War Office 1924 (McCaw); UK - War Office 1924"/>
            <xsd:enumeration value="World Geodetic System 1960"/>
            <xsd:enumeration value="Other Known Ellipsoid"/>
            <xsd:enumeration value="Unknown Ellipsoid"/>
        </xsd:restriction>
    </xsd:simpleType>
```

13.5.152 Ellipsoid Value (Simple)

NOTE Since provided XML schemas are coded with reference to Digital Geographic Information Exchange Standard (DIGEST) 2.1, Part 3 Codes and Parameters; Digital Geographic Information Working Group; 2008, the user is referred to the source organization for the latest information. See http://www.dgiwg.org/dgiwg/htm/documents/historical_documents.htm.

```
    <xsd:simpleType name="Ellipsoid_value">
        <xsd:restriction base="xsd:string">
            <xsd:enumeration value="AA"/>
            <xsd:enumeration value="AM"/>
            <xsd:enumeration value="AN"/>
            <xsd:enumeration value="AP"/>
            <xsd:enumeration value="AT"/>
            <xsd:enumeration value="AW"/>
            <xsd:enumeration value="BM"/>
            <xsd:enumeration value="BN"/>
            <xsd:enumeration value="BR"/>
            <xsd:enumeration value="CA"/>
            <xsd:enumeration value="CB"/>
            <xsd:enumeration value="CC"/>
            <xsd:enumeration value="CD"/>
            <xsd:enumeration value="CE"/>
            <xsd:enumeration value="CF"/>
            <xsd:enumeration value="CG"/>
            <xsd:enumeration value="CI"/>
            <xsd:enumeration value="CJ"/>
            <xsd:enumeration value="CL"/>
            <xsd:enumeration value="DA"/>
            <xsd:enumeration value="DB"/>
            <xsd:enumeration value="DC"/>
            <xsd:enumeration value="EA"/>
            <xsd:enumeration value="EB"/>
```

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```
                <xsd:enumeration value="EC"/>
                <xsd:enumeration value="ED"/>
                <xsd:enumeration value="EE"/>
                <xsd:enumeration value="EF"/>
                <xsd:enumeration value="EV"/>
                <xsd:enumeration value="FA"/>
                <xsd:enumeration value="FC"/>
                <xsd:enumeration value="FM"/>
                <xsd:enumeration value="GE"/>
                <xsd:enumeration value="HA"/>
                <xsd:enumeration value="HE"/>
                <xsd:enumeration value="HO"/>
                <xsd:enumeration value="IA"/>
                <xsd:enumeration value="ID"/>
                <xsd:enumeration value="IN"/>
                <xsd:enumeration value="KA"/>
                <xsd:enumeration value="KB"/>
                <xsd:enumeration value="NO"/>
                <xsd:enumeration value="NW"/>
                <xsd:enumeration value="PM"/>
                <xsd:enumeration value="PR"/>
                <xsd:enumeration value="RE"/>
                <xsd:enumeration value="RF"/>
                <xsd:enumeration value="SA"/>
                <xsd:enumeration value="SG"/>
                <xsd:enumeration value="SJ"/>
                <xsd:enumeration value="SN"/>
                <xsd:enumeration value="ST"/>
                <xsd:enumeration value="SV"/>
                <xsd:enumeration value="WA"/>
                <xsd:enumeration value="WB"/>
                <xsd:enumeration value="WC"/>
                <xsd:enumeration value="WD"/>
                <xsd:enumeration value="WE"/>
                <xsd:enumeration value="WF"/>
                <xsd:enumeration value="WO"/>
                <xsd:enumeration value="WS"/>
                <xsd:enumeration value="ZY"/>
                <xsd:enumeration value="ZZ"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.153 ETA Connectivity Name (Simple)

```
<xsd:simpleType name="ETA_conn_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="Artificial ETA connectivity not present"/>
                <xsd:enumeration value="Artificial ETA connectivity present"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.154 Feature Category Name (Simple)

```
<xsd:simpleType name="Feature_category_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="missing"/>
                <xsd:enumeration value="point"/>
                <xsd:enumeration value="line"/>
                <xsd:enumeration value="area"/>
                <xsd:enumeration value="complex"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.155 Feature Category Value (Simple)

```
<xsd:simpleType name="Feature_category_value">
        <xsd:restriction base="xsd:integer">
                <xsd:minInclusive value="0"/>
                <xsd:maxInclusive value="4"/>
        </xsd:restriction>
</xsd:simpleType>
```

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13.5.156 Feature Theme Name (Simple)

```
<xsd:simpleType name="Feat_theme_nam">
    <xsd:restriction base="xsd:string">
            <xsd:maxLength value="50"/>
            <xsd:enumeration value="Administrative Areas"/>
            <xsd:enumeration value="Named Areas"/>
            <xsd:enumeration value="Roads and Ferries"/>
            <xsd:enumeration value="Railways"/>
            <xsd:enumeration value="Waterways"/>
            <xsd:enumeration value="Linear Datum Features"/>
            <xsd:enumeration value="Linear Referencing Features"/>
            <xsd:enumeration value="Public Transport"/>
            <xsd:enumeration value="Terrain Elevation"/>
            <xsd:enumeration value="Land Cover and Use"/>
            <xsd:enumeration value="Road Furniture"/>
            <xsd:enumeration value="Services"/>
            <xsd:enumeration value="Structures"/>
            <xsd:enumeration value="General Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
            <xsd:enumeration value="User-defined Features"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.157 Feature Theme Value (Simple)

```
<xsd:simpleType name="Feat_theme_val">
    <xsd:restriction base="xsd:integer">
            <xsd:totalDigits value="2"/>
            <xsd:enumeration value="11"/>
            <xsd:enumeration value="31"/>
            <xsd:enumeration value="41"/>
            <xsd:enumeration value="42"/>
            <xsd:enumeration value="43"/>
            <xsd:enumeration value="48"/>
            <xsd:enumeration value="49"/>
            <xsd:enumeration value="50"/>
            <xsd:enumeration value="60"/>
            <xsd:enumeration value="71"/>
            <xsd:enumeration value="72"/>
            <xsd:enumeration value="73"/>
            <xsd:enumeration value="75"/>
            <xsd:enumeration value="80"/>
            <xsd:enumeration value="81"/>
            <xsd:enumeration value="82"/>
            <xsd:enumeration value="83"/>
            <xsd:enumeration value="84"/>
            <xsd:enumeration value="85"/>
            <xsd:enumeration value="86"/>
            <xsd:enumeration value="87"/>
            <xsd:enumeration value="88"/>
            <xsd:enumeration value="89"/>
            <xsd:enumeration value="90"/>
            <xsd:enumeration value="91"/>
            <xsd:enumeration value="92"/>
            <xsd:enumeration value="93"/>
```

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```
                <xsd:enumeration value="94"/>
                <xsd:enumeration value="95"/>
                <xsd:enumeration value="96"/>
                <xsd:enumeration value="97"/>
                <xsd:enumeration value="98"/>
                <xsd:enumeration value="99"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.158 Geometry Category Name (Simple)

```
<xsd:simpleType name="Geo_cat_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="node"/>
                <xsd:enumeration value="edge"/>
                <xsd:enumeration value="face"/>
                <xsd:enumeration value="dot"/>
                <xsd:enumeration value="polyline"/>
                <xsd:enumeration value="polygon"/>
                <xsd:enumeration value="coordinate tuple{s}"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.159 Geometry Category Value (Simple)

```
<xsd:simpleType name="Geo_cat_value">
        <xsd:restriction base="xsd:integer">
                <xsd:minInclusive value="1"/>
                <xsd:maxInclusive value="7"/>
                <xsd:enumeration value="1"/>
                <xsd:enumeration value="2"/>
                <xsd:enumeration value="3"/>
                <xsd:enumeration value="4"/>
                <xsd:enumeration value="5"/>
                <xsd:enumeration value="6"/>
                <xsd:enumeration value="7"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.160 Grid Name (Simple)

NOTE Since provided XML schemas are coded with reference to ISO/TS 19127: 2005, Geographic information — Geodetic codes and parameters, the user is referred to the source organization for the latest information.

```
<xsd:simpleType name="Grid_name">
        <xsd:restriction base="xsd:string">
                <xsd:maxLength value="50"/>
                <xsd:enumeration value="Aden Zone"/>
                <xsd:enumeration value="Afghanistan Gauss-Krüger Grid"/>
                <xsd:enumeration value="Air Defense Grid"/>
                <xsd:enumeration value="Air Support Grid"/>
                <xsd:enumeration value="Alabama Coordinate System"/>
                <xsd:enumeration value="Alaska Coordinate System"/>
                <xsd:enumeration value="Algeria Zone"/>
                <xsd:enumeration value="Albania Bonne Grid"/>
                <xsd:enumeration value="Alpha-Numeric (Atlas) Grid"/>
                <xsd:enumeration value="Arbitrary Grid"/>
                <xsd:enumeration value="American Samoa Coordinate System"/>
                <xsd:enumeration value="Argentine Gauss-Krüger Conformal Grid"/>
                <xsd:enumeration value="Artillery Referencing System"/>
                <xsd:enumeration value="Arizona Coordinate System"/>
                <xsd:enumeration value="Map Grid of Australia 1994 (MGA94)"/>
                <xsd:enumeration value="Australia Belt"/>
                <xsd:enumeration value="Arkansas Coordinate System"/>
                <xsd:enumeration value="Australian Map Grid"/>
                <xsd:enumeration value="Azores Gauss Conformal Grid"/>
                <xsd:enumeration value="Azores Zone"/>
                <xsd:enumeration value="Baku 1927 Coordinate System"/>
                <xsd:enumeration value="Bavaria Soldner Coordinate System"/>
                <xsd:enumeration value="Belgium Lambert Grid"/>
```

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```
<xsd:enumeration value="Baltic Region Transverse Mercator Grid"/>
<xsd:enumeration value="Belgium Bonne Grid"/>
<xsd:enumeration value="Brazil Gauss Conformal Grid"/>
<xsd:enumeration value="Soldner-Berlin (Müggelberg) Grid"/>
<xsd:enumeration value="Borneo Rectified Skew Orthomorphic Grid"/>
<xsd:enumeration value="British West Indies Grid"/>
<xsd:enumeration value="California Coordinate System"/>
<xsd:enumeration value="Canada British Modified Grid"/>
<xsd:enumeration value="Ceylon Belt (Transverse Mercator)"/>
<xsd:enumeration value="Canary Islands (Spanish Lambert Grid)"/>
<xsd:enumeration value="Chile Gauss Conformal Grid"/>
<xsd:enumeration value="China Belt"/>
<xsd:enumeration value="Canary Islands Zone"/>
<xsd:enumeration value="China Lambert Zone"/>
<xsd:enumeration value="Colorado Coordinate Zone"/>
<xsd:enumeration value="Connecticut Coordinate System"/>
<xsd:enumeration value="Caspian Zone"/>
<xsd:enumeration value="Costa Rica Lambert Grid"/>
<xsd:enumeration value="Crimea Grid"/>
<xsd:enumeration value="Crete Zone"/>
<xsd:enumeration value="Cuba Lambert Grid"/>
<xsd:enumeration value="Caucasus Zone"/>
<xsd:enumeration value="Cape Verde Islands Zone"/>
<xsd:enumeration value="British Cassini Grid"/>
<xsd:enumeration value="Czechoslovak Uniform Cadastral Coordinate System"/>
<xsd:enumeration value="Cyprus Grid"/>
<xsd:enumeration value="Czechoslovak Military Grid"/>
<xsd:enumeration value="Danube Zone"/>
<xsd:enumeration value="Dahomey Belt"/>
<xsd:enumeration value="Denmark General Staff Grid"/>
<xsd:enumeration value="Delaware Coordinate System"/>
<xsd:enumeration value="Dominican Lambert Grid"/>
<xsd:enumeration value="Denmark Geodetic Institute System 1934"/>
<xsd:enumeration value="Cape Verde Peninsula Grid"/>
<xsd:enumeration value="East Africa Belt"/>
<xsd:enumeration value="English Belt"/>
<xsd:enumeration value="Egypt Gauss Conformal Grid"/>
<xsd:enumeration value="El Salvador Lambert Grid"/>
<xsd:enumeration value="Estonian Grid"/>
<xsd:enumeration value="Estonial lambert Conformal Grid"/>
<xsd:enumeration value="Hungarian Unified National Mapping System (EOTR)"/>
<xsd:enumeration value="Egypt Purple Belt"/>
<xsd:enumeration value="Egypt Red Belt"/>
<xsd:enumeration value="Egypt 35 Degree Belt"/>
<xsd:enumeration value="Fernando Poo Gauss Grid"/>
<xsd:enumeration value="Fiji Grid"/>
<xsd:enumeration value="Florida Coordinate System"/>
<xsd:enumeration value="French Bonne Grid"/>
<xsd:enumeration value="French Guiana Gauss Grid"/>
<xsd:enumeration value="French Somaliland Gauss-Laborde Grid"/>
<xsd:enumeration value="French Indochina Grid"/>
<xsd:enumeration value="Franz Josef Land Zone"/>
<xsd:enumeration value="French Lambert Grid"/>
<xsd:enumeration value="Formosa (Taiwan) Gauss-Schreiber Coordinate System"/>
<xsd:enumeration value="French Equatorial Africa Grid"/>
<xsd:enumeration value="Gabon Belt"/>
<xsd:enumeration value="Gauss-Boaga Grid (Transverse Mercator)"/>
<xsd:enumeration value="Gabon Gauss Conformal Grid"/>
<xsd:enumeration value="Geographic Reference System (GEOREF)"/>
<xsd:enumeration value="Guadeloupe Gauss-Laborde Grid"/>
<xsd:enumeration value="Colombia Gauss Conformal Grid"/>
<xsd:enumeration value="Sweden Gauss-Hannover Grid"/>
<xsd:enumeration value="Georgia Coordinate System"/>
<xsd:enumeration value="Gauss-KrÃüer Grid (Transverse Mercator)"/>
<xsd:enumeration value="Greece Azimuthal Grid"/>
<xsd:enumeration value="German Army Grid (DHG)"/>
<xsd:enumeration value="Ghana National Grid"/>
<xsd:enumeration value="Greece Bonne Grid"/>
<xsd:enumeration value="Greece Conical Mecklenburg Coordinates"/>
<xsd:enumeration value="Greece Conical Mecklenburg Coordinate (New Numbering)"/>
<xsd:enumeration value="Greenland Lambert Grid"/>
<xsd:enumeration value="Guinea Zone"/>
<xsd:enumeration value="Guam Coordinate System"/>
<xsd:enumeration value="Guatemala Lambert Grid"/>
<xsd:enumeration value="Guyana Transverse Mercator Grid"/>
```

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```
<xsd:enumeration value="Haiti Lambert Grid"/>
<xsd:enumeration value="Hawaii Coordinate System"/>
<xsd:enumeration value="Hawaii Grid"/>
<xsd:enumeration value="Honduras Lambert Grid"/>
<xsd:enumeration value="Hong Kong New System Cassini Grid"/>
<xsd:enumeration value="Hungary Stereographic Grid"/>
<xsd:enumeration value="Hong Kong Colony Grid"/>
<xsd:enumeration value="Idaho Coordinate System"/>
<xsd:enumeration value="Illinois Coordinate System"/>
<xsd:enumeration value="Indiana Coordinate System"/>
<xsd:enumeration value="Indonesia Mercator Grid"/>
<xsd:enumeration value="Indonesia Polyhedric Grid"/>
<xsd:enumeration value="Iowa Coordinate System"/>
<xsd:enumeration value="Ivory Coast Azimuthal Grid"/>
<xsd:enumeration value="Irish Cassini Grid"/>
<xsd:enumeration value="Ivory Coast Belt"/>
<xsd:enumeration value="Irish Transverse Mercator Grid"/>
<xsd:enumeration value="Iceland New Lambert Zone"/>
<xsd:enumeration value="India Zone"/>
<xsd:enumeration value="Iberian Peninsula Zone"/>
<xsd:enumeration value="Iraq Zone"/>
<xsd:enumeration value="Iraq National Grid"/>
<xsd:enumeration value="Italy Zone"/>
<xsd:enumeration value="Ivy - Found on an HA in Marshall Islands"/>
<xsd:enumeration value="Iceland Zone"/>
<xsd:enumeration value="Jamaica Foot Grid"/>
<xsd:enumeration value="Japan Plane-Rectangular Coordinate System"/>
<xsd:enumeration value="Japan Gauss-Schreiber Grid"/>
<xsd:enumeration value="Jamaica National Grid (metric)"/>
<xsd:enumeration value="Johore Grid"/>
<xsd:enumeration value="Austria Gauss-Krüger Grid"/>
<xsd:enumeration value="Bulgaria Gauss-Krüger Grid"/>
<xsd:enumeration value="Katanga Grid"/>
<xsd:enumeration value="Kansas Coordinate System"/>
<xsd:enumeration value="Kentucky Coordinate System"/>
<xsd:enumeration value="Finland Gauss-Krüger Grid"/>
<xsd:enumeration value="German Gauss-Krüger Grid"/>
<xsd:enumeration value="Kenya Colony Grid"/>
<xsd:enumeration value="Korea Gauss-Schreiber Coordinate System"/>
<xsd:enumeration value="Louisiana Coordinate System"/>
<xsd:enumeration value="Lithuania Gauss-Krüger Grid"/>
<xsd:enumeration value="Kwantung Province Grid"/>
<xsd:enumeration value="Turkey Gauss-Krüger Grid"/>
<xsd:enumeration value="Kwangsi Province Grid"/>
<xsd:enumeration value="Luxembourg Gauss-Krüger Grid"/>
<xsd:enumeration value="Lambert Conformal Conic Grid"/>
<xsd:enumeration value="Latvia Coordinate System"/>
<xsd:enumeration value="Levant Zone"/>
<xsd:enumeration value="Levant Stereographic Grid"/>
<xsd:enumeration value="Liberia Rectified Skew Orthomorphic Grid"/>
<xsd:enumeration value="Libya Zone"/>
<xsd:enumeration value="Lithuanian LKS-94 Grid"/>
<xsd:enumeration value="Sirte (Libya) Lambert Grid"/>
<xsd:enumeration value="Malaya Grid"/>
<xsd:enumeration value="Malta Belt"/>
<xsd:enumeration value="Maldive-Chagos Belt"/>
<xsd:enumeration value="Madiera Zone"/>
<xsd:enumeration value="Mediterranean Zone"/>
<xsd:enumeration value="Maine Coordinate System"/>
<xsd:enumeration value="Malaya Rectified Skew Orthomorphic (Yard) Grid"/>
<xsd:enumeration value="Martinique Gauss Grid"/>
<xsd:enumeration value="Maryland Coordinate System"/>
<xsd:enumeration value="Massachusetts Coordinate System"/>
<xsd:enumeration value="Mexican Lambert Grid"/>
<xsd:enumeration value="Michigan Coordinate System"/>
<xsd:enumeration value="Mecca-Muscat Zone"/>
<xsd:enumeration value="Minnesota Coordinate System"/>
<xsd:enumeration value="Madagascar Grid (Laborde)"/>
<xsd:enumeration value="Mississippi Coordinate System"/>
<xsd:enumeration value="Morocco Zone"/>
<xsd:enumeration value="Other Known Grid"/>
<xsd:enumeration value="Missouri Coordinate System"/>
<xsd:enumeration value="Mauritius Zone"/>
<xsd:enumeration value="Montana Coordinate System"/>
<xsd:enumeration value="Mozambique Lambert Grid"/>
```

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```
<xsd:enumeration value="Mozambique Polyconic Grid"/>
<xsd:enumeration value="Northwest Africa Zone"/>
<xsd:enumeration value="New Jersey Coordinate System"/>
<xsd:enumeration value="Nigeria Colony Belt"/>
<xsd:enumeration value="National Grid of Great Britain"/>
<xsd:enumeration value="Northern European Zone"/>
<xsd:enumeration value="Nebraska Coordinate System"/>
<xsd:enumeration value="Numeric Grid"/>
<xsd:enumeration value="New Hampshire Coordinate System"/>
<xsd:enumeration value="Niger Zone"/>
<xsd:enumeration value="Netherlands Stereographic Grid (Old Numbering)"/>
<xsd:enumeration value="North Korea Gauss-Krüger Grid"/>
<xsd:enumeration value="Netherlands Stereographic Grid (New Numbering)"/>
<xsd:enumeration value="Netherlands East Indies Equatorial Zone British Metric Grid (Lambert)"/>
<xsd:enumeration value="Nord de Guerre Zone"/>
<xsd:enumeration value="New Mexico Coordinate System"/>
<xsd:enumeration value="Nevada Coordinate System"/>
<xsd:enumeration value="New Sierra Leone Colony Grid"/>
<xsd:enumeration value="New York Coordinate System"/>
<xsd:enumeration value="Netherlands East Indies Southern Zone"/>
<xsd:enumeration value="New Zealand Map Grid (NZMG)"/>
<xsd:enumeration value="Nicaragua Lambert Grid"/>
<xsd:enumeration value="Niger Belt"/>
<xsd:enumeration value="North Carolina Coordinate System"/>
<xsd:enumeration value="North Dakota Coordinate System"/>
<xsd:enumeration value="Netherlands East Indies Equatorial Zone U.S. Yard Grid"/>
<xsd:enumeration value="New Zealand Belt"/>
<xsd:enumeration value="Northern Malaya Grid"/>
<xsd:enumeration value="Norway Gauss-Krüger Grid"/>
<xsd:enumeration value="Ohio Coordinate System"/>
<xsd:enumeration value="Oklahoma Coordinate System"/>
<xsd:enumeration value="Orange Report Net"/>
<xsd:enumeration value="Oregon Coordinate System"/>
<xsd:enumeration value="Palestine Belt"/>
<xsd:enumeration value="Panama Lambert Grid"/>
<xsd:enumeration value="Palestine Civil Grid (Cassini)"/>
<xsd:enumeration value="Paraguay Gauss-Krüger Grid"/>
<xsd:enumeration value="Peiping Coordinate System of 1954"/>
<xsd:enumeration value="Pennsylvania Coordinate System"/>
<xsd:enumeration value="Polish PSWG 1992 Grid"/>
<xsd:enumeration value="Peru Polyconic Grid"/>
<xsd:enumeration value="Philippine Plane Coordinate System"/>
<xsd:enumeration value="Poland Gauss-Krüger Grid"/>
<xsd:enumeration value="Poland Quasi-Stereographic Grid"/>
<xsd:enumeration value="Philippine Polyconic Grid"/>
<xsd:enumeration value="Portugal Bonne Grid, Old"/>
<xsd:enumeration value="Portugal Bonne Grid, New"/>
<xsd:enumeration value="Portugal Gauss Grid"/>
<xsd:enumeration value="Puerto Rico &amp;amp; Virgin Islands Coordinate System"/>
<xsd:enumeration value="Puerto Rico Lambert Grid"/>
<xsd:enumeration value="Qatar Cassini Grid"/>
<xsd:enumeration value="Qatar Peninsula Grid (or Qatar National Grid (TM))"/>
<xsd:enumeration value="Russian Belt"/>
<xsd:enumeration value="Reunion Gauss Grid"/>
<xsd:enumeration value="Rhode Island Coordinate System"/>
<xsd:enumeration value="Romania Bonne Grid"/>
<xsd:enumeration value="Soviet Coordinate System of 1942"/>
<xsd:enumeration value="Romania Lambert-Cholesky Grid"/>
<xsd:enumeration value="Rikets National Grid"/>
<xsd:enumeration value="Romania Stereographic Grid"/>
<xsd:enumeration value="Pulkovo Coordinate System of 1932"/>
<xsd:enumeration value="South Africa Belt (yards)"/>
<xsd:enumeration value="Senegal Gauss Conformal Grid (Belt)"/>
<xsd:enumeration value="South Africa Coordinate System (South Africa Belt (English feet))"/>
<xsd:enumeration value="Senegal Belt"/>
<xsd:enumeration value="South Carolina Coordinate System"/>
<xsd:enumeration value="Sahara Zone"/>
<xsd:enumeration value="South Dakota Coordinate System"/>
<xsd:enumeration value="South Libya Zone"/>
<xsd:enumeration value="Sarawak Grid"/>
<xsd:enumeration value="Spain Lambert Grid"/>
<xsd:enumeration value="Southern New Guinea Grid"/>
<xsd:enumeration value="South Georgia Lambert Grid"/>
<xsd:enumeration value="South Syria Lambert Grid"/>
<xsd:enumeration value="Spanish North-Morocco Lambert Grid"/>
```


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```
                <xsd:enumeration value="Svalbard Gauss-Krüger Grid"/>
                <xsd:enumeration value="Svobodny 1935 Coordinate System"/>
                <xsd:enumeration value="Seychelles Belt"/>
                <xsd:enumeration value="Spitzbergen Zone"/>
                <xsd:enumeration value="Tanganyika Territorial Grid"/>
                <xsd:enumeration value="Tashkent 1875 Coordinate System"/>
                <xsd:enumeration value="Tennessee Coordinate System"/>
                <xsd:enumeration value="Texas Coordinate System"/>
                <xsd:enumeration value="Tobago Grid"/>
                <xsd:enumeration value="Trinidad Grid"/>
                <xsd:enumeration value="Trucial Coast Cassini Grid"/>
                <xsd:enumeration value="Trucial Coast Transverse Mercator Grid"/>
                <xsd:enumeration value="Turkey Bonne Grid"/>
                <xsd:enumeration value="Tunisia Zone"/>
                <xsd:enumeration value="Uganda Cassini Coordinate System"/>
                <xsd:enumeration value="Unidentified Grid"/>
                <xsd:enumeration value="Uruguay Gauss-Krüger Grid"/>
                <xsd:enumeration value="Utah Coordinate System"/>
                <xsd:enumeration value="Universal Polar Stereographic System"/>
                <xsd:enumeration value="U.S. Polyconic Grid System"/>
                <xsd:enumeration value="Universal Transverse Mercator"/>
                <xsd:enumeration value="Vermont Coordinate System"/>
                <xsd:enumeration value="Virginia Coordinate System"/>
                <xsd:enumeration value="Venezuela Modified Lambert Grid"/>
                <xsd:enumeration value="Vietnam Azimuthal Grid"/>
                <xsd:enumeration value="West Malaysia Rectified Skew Orthomorphic (Metric) Grid"/>
                <xsd:enumeration value="Switzerland Bonne Grid"/>
                <xsd:enumeration value="Switzerland Conformal Oblique Cylindrical Grid"/>
                <xsd:enumeration value="West Virginia Coordinate System"/>
                <xsd:enumeration value="Wisconsin Coordinate System"/>
                <xsd:enumeration value="Wyoming Coordinate System"/>
                <xsd:enumeration value="Washington Coordinate System"/>
                <xsd:enumeration value="World Polyconic System"/>
                <xsd:enumeration value="Yugoslavia Gauss-Krüger Grid (Not Reduced)"/>
                <xsd:enumeration value="Yugoslavia Reduced Gauss-Krüger Grid"/>
                <xsd:enumeration value="Yunnan Province Grid"/>
        </xsd:restriction>
    </xsd:simpleType>
```

13.5.161 Grid Value (Simple)

NOTE Since provided XML schemas are coded with reference to ISO/TS 19127: 2005, Geographic information — Geodetic codes and parameters, the user is referred to the source organization for the latest information.

```
    <xsd:simpleType name="Grid_value">
        <xsd:restriction base="xsd:string">
                <xsd:length value="2"/>
                <xsd:enumeration value="AD"/>
                <xsd:enumeration value="AF"/>
                <xsd:enumeration value="AG"/>
                <xsd:enumeration value="AI"/>
                <xsd:enumeration value="AJ"/>
                <xsd:enumeration value="AK"/>
                <xsd:enumeration value="AL"/>
                <xsd:enumeration value="AM"/>
                <xsd:enumeration value="AN"/>
                <xsd:enumeration value="AO"/>
                <xsd:enumeration value="AP"/>
                <xsd:enumeration value="AQ"/>
                <xsd:enumeration value="AR"/>
                <xsd:enumeration value="AS"/>
                <xsd:enumeration value="AT"/>
                <xsd:enumeration value="AU"/>
                <xsd:enumeration value="AV"/>
                <xsd:enumeration value="AW"/>
                <xsd:enumeration value="AX"/>
                <xsd:enumeration value="AZ"/>
                <xsd:enumeration value="BA"/>
                <xsd:enumeration value="BB"/>
                <xsd:enumeration value="BC"/>
                <xsd:enumeration value="BD"/>
                <xsd:enumeration value="BE"/>
                <xsd:enumeration value="BF"/>
```

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```
<xsd:enumeration value="BL"/>
<xsd:enumeration value="BO"/>
<xsd:enumeration value="BW"/>
<xsd:enumeration value="CB"/>
<xsd:enumeration value="CD"/>
<xsd:enumeration value="CE"/>
<xsd:enumeration value="CF"/>
<xsd:enumeration value="CG"/>
<xsd:enumeration value="CH"/>
<xsd:enumeration value="CI"/>
<xsd:enumeration value="CJ"/>
<xsd:enumeration value="CK"/>
<xsd:enumeration value="CM"/>
<xsd:enumeration value="CN"/>
<xsd:enumeration value="CO"/>
<xsd:enumeration value="CQ"/>
<xsd:enumeration value="CR"/>
<xsd:enumeration value="CT"/>
<xsd:enumeration value="CU"/>
<xsd:enumeration value="CV"/>
<xsd:enumeration value="CW"/>
<xsd:enumeration value="CX"/>
<xsd:enumeration value="CY"/>
<xsd:enumeration value="CZ"/>
<xsd:enumeration value="DA"/>
<xsd:enumeration value="DB"/>
<xsd:enumeration value="DC"/>
<xsd:enumeration value="DD"/>
<xsd:enumeration value="DE"/>
<xsd:enumeration value="DJ"/>
<xsd:enumeration value="DK"/>
<xsd:enumeration value="EA"/>
<xsd:enumeration value="EB"/>
<xsd:enumeration value="ED"/>
<xsd:enumeration value="EE"/>
<xsd:enumeration value="EF"/>
<xsd:enumeration value="EL"/>
<xsd:enumeration value="EO"/>
<xsd:enumeration value="EP"/>
<xsd:enumeration value="ER"/>
<xsd:enumeration value="ET"/>
<xsd:enumeration value="FA"/>
<xsd:enumeration value="FB"/>
<xsd:enumeration value="FC"/>
<xsd:enumeration value="FD"/>
<xsd:enumeration value="FE"/>
<xsd:enumeration value="FF"/>
<xsd:enumeration value="FI"/>
<xsd:enumeration value="FJ"/>
<xsd:enumeration value="FL"/>
<xsd:enumeration value="FO"/>
<xsd:enumeration value="FS"/>
<xsd:enumeration value="GA"/>
<xsd:enumeration value="GB"/>
<xsd:enumeration value="GC"/>
<xsd:enumeration value="GE"/>
<xsd:enumeration value="GF"/>
<xsd:enumeration value="GG"/>
<xsd:enumeration value="GH"/>
<xsd:enumeration value="GI"/>
<xsd:enumeration value="GK"/>
<xsd:enumeration value="GL"/>
<xsd:enumeration value="GN"/>
<xsd:enumeration value="GO"/>
<xsd:enumeration value="GP"/>
<xsd:enumeration value="GQ"/>
<xsd:enumeration value="GR"/>
<xsd:enumeration value="GT"/>
<xsd:enumeration value="GU"/>
<xsd:enumeration value="GV"/>
<xsd:enumeration value="GW"/>
<xsd:enumeration value="GY"/>
<xsd:enumeration value="HB"/>
<xsd:enumeration value="HC"/>
<xsd:enumeration value="HD"/>
```

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```
<xsd:enumeration value="HE"/>
<xsd:enumeration value="HF"/>
<xsd:enumeration value="HG"/>
<xsd:enumeration value="HR"/>
<xsd:enumeration value="IA"/>
<xsd:enumeration value="IB"/>
<xsd:enumeration value="IC"/>
<xsd:enumeration value="ID"/>
<xsd:enumeration value="IE"/>
<xsd:enumeration value="IF"/>
<xsd:enumeration value="IG"/>
<xsd:enumeration value="IH"/>
<xsd:enumeration value="IJ"/>
<xsd:enumeration value="IK"/>
<xsd:enumeration value="IL"/>
<xsd:enumeration value="IN"/>
<xsd:enumeration value="IP"/>
<xsd:enumeration value="IQ"/>
<xsd:enumeration value="IR"/>
<xsd:enumeration value="IT"/>
<xsd:enumeration value="IY"/>
<xsd:enumeration value="IZ"/>
<xsd:enumeration value="JA"/>
<xsd:enumeration value="JB"/>
<xsd:enumeration value="JC"/>
<xsd:enumeration value="JM"/>
<xsd:enumeration value="JO"/>
<xsd:enumeration value="KA"/>
<xsd:enumeration value="KB"/>
<xsd:enumeration value="KC"/>
<xsd:enumeration value="KD"/>
<xsd:enumeration value="KE"/>
<xsd:enumeration value="KF"/>
<xsd:enumeration value="KG"/>
<xsd:enumeration value="KH"/>
<xsd:enumeration value="KJ"/>
<xsd:enumeration value="KK"/>
<xsd:enumeration value="KL"/>
<xsd:enumeration value="KN"/>
<xsd:enumeration value="KT"/>
<xsd:enumeration value="KW"/>
<xsd:enumeration value="KX"/>
<xsd:enumeration value="LC"/>
<xsd:enumeration value="LD"/>
<xsd:enumeration value="LE"/>
<xsd:enumeration value="LF"/>
<xsd:enumeration value="LG"/>
<xsd:enumeration value="LI"/>
<xsd:enumeration value="LK"/>
<xsd:enumeration value="LL"/>
<xsd:enumeration value="MA"/>
<xsd:enumeration value="MB"/>
<xsd:enumeration value="MC"/>
<xsd:enumeration value="MD"/>
<xsd:enumeration value="ME"/>
<xsd:enumeration value="MF"/>
<xsd:enumeration value="MG"/>
<xsd:enumeration value="MH"/>
<xsd:enumeration value="MI"/>
<xsd:enumeration value="MJ"/>
<xsd:enumeration value="MK"/>
<xsd:enumeration value="ML"/>
<xsd:enumeration value="MM"/>
<xsd:enumeration value="MN"/>
<xsd:enumeration value="MO"/>
<xsd:enumeration value="MP"/>
<xsd:enumeration value="MQ"/>
<xsd:enumeration value="MS"/>
<xsd:enumeration value="MT"/>
<xsd:enumeration value="MU"/>
<xsd:enumeration value="MV"/>
<xsd:enumeration value="MW"/>
<xsd:enumeration value="MX"/>
<xsd:enumeration value="NA"/>
<xsd:enumeration value="NB"/>
```

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```
<xsd:enumeration value="NC"/>
<xsd:enumeration value="ND"/>
<xsd:enumeration value="NE"/>
<xsd:enumeration value="NF"/>
<xsd:enumeration value="NG"/>
<xsd:enumeration value="NH"/>
<xsd:enumeration value="NI"/>
<xsd:enumeration value="NJ"/>
<xsd:enumeration value="NK"/>
<xsd:enumeration value="NL"/>
<xsd:enumeration value="NM"/>
<xsd:enumeration value="NO"/>
<xsd:enumeration value="NN"/>
<xsd:enumeration value="NP"/>
<xsd:enumeration value="NQ"/>
<xsd:enumeration value="NR"/>
<xsd:enumeration value="NS"/>
<xsd:enumeration value="NT"/>
<xsd:enumeration value="NU"/>
<xsd:enumeration value="NV"/>
<xsd:enumeration value="NW"/>
<xsd:enumeration value="NX"/>
<xsd:enumeration value="NY"/>
<xsd:enumeration value="NZ"/>
<xsd:enumeration value="OA"/>
<xsd:enumeration value="OB"/>
<xsd:enumeration value="OD"/>
<xsd:enumeration value="OE"/>
<xsd:enumeration value="OR"/>
<xsd:enumeration value="OS"/>
<xsd:enumeration value="PA"/>
<xsd:enumeration value="PB"/>
<xsd:enumeration value="PC"/>
<xsd:enumeration value="PD"/>
<xsd:enumeration value="PE"/>
<xsd:enumeration value="PF"/>
<xsd:enumeration value="PG"/>
<xsd:enumeration value="PI"/>
<xsd:enumeration value="PJ"/>
<xsd:enumeration value="PK"/>
<xsd:enumeration value="PL"/>
<xsd:enumeration value="PP"/>
<xsd:enumeration value="PQ"/>
<xsd:enumeration value="PR"/>
<xsd:enumeration value="PS"/>
<xsd:enumeration value="PT"/>
<xsd:enumeration value="PU"/>
<xsd:enumeration value="QA"/>
<xsd:enumeration value="QU"/>
<xsd:enumeration value="RB"/>
<xsd:enumeration value="RC"/>
<xsd:enumeration value="RD"/>
<xsd:enumeration value="RE"/>
<xsd:enumeration value="RF"/>
<xsd:enumeration value="RH"/>
<xsd:enumeration value="RK"/>
<xsd:enumeration value="RI"/>
<xsd:enumeration value="RT"/>
<xsd:enumeration value="SA"/>
<xsd:enumeration value="SB"/>
<xsd:enumeration value="SD"/>
<xsd:enumeration value="SE"/>
<xsd:enumeration value="SF"/>
<xsd:enumeration value="SH"/>
<xsd:enumeration value="SI"/>
<xsd:enumeration value="SJ"/>
<xsd:enumeration value="SK"/>
<xsd:enumeration value="SL"/>
<xsd:enumeration value="SN"/>
<xsd:enumeration value="SQ"/>
<xsd:enumeration value="SR"/>
<xsd:enumeration value="SS"/>
<xsd:enumeration value="SV"/>
<xsd:enumeration value="SX"/>
<xsd:enumeration value="SY"/>
```

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```
                <xsd:enumeration value="SZ"/>
                <xsd:enumeration value="TA"/>
                <xsd:enumeration value="TB"/>
                <xsd:enumeration value="TC"/>
                <xsd:enumeration value="TD"/>
                <xsd:enumeration value="TE"/>
                <xsd:enumeration value="TF"/>
                <xsd:enumeration value="TG"/>
                <xsd:enumeration value="TH"/>
                <xsd:enumeration value="TI"/>
                <xsd:enumeration value="TN"/>
                <xsd:enumeration value="UA"/>
                <xsd:enumeration value="UB"/>
                <xsd:enumeration value="UC"/>
                <xsd:enumeration value="UD"/>
                <xsd:enumeration value="UP"/>
                <xsd:enumeration value="US"/>
                <xsd:enumeration value="UT"/>
                <xsd:enumeration value="VA"/>
                <xsd:enumeration value="VB"/>
                <xsd:enumeration value="VE"/>
                <xsd:enumeration value="VI"/>
                <xsd:enumeration value="WA"/>
                <xsd:enumeration value="WB"/>
                <xsd:enumeration value="WC"/>
                <xsd:enumeration value="WD"/>
                <xsd:enumeration value="WE"/>
                <xsd:enumeration value="WF"/>
                <xsd:enumeration value="WH"/>
                <xsd:enumeration value="WP"/>
                <xsd:enumeration value="YA"/>
                <xsd:enumeration value="YG"/>
                <xsd:enumeration value="YU"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.162 Height Reference Type Name (Simple)

```
<xsd:simpleType name="Height_ref_type_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="ellipsoidal"/>
                <xsd:enumeration value="orthometric"/>
                <xsd:enumeration value="relative"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.163 Height Reference Type Value (Simple)

```
<xsd:simpleType name="Height_ref_type_value">
        <xsd:restriction base="xsd:integer">
                <xsd:minInclusive value="0"/>
                <xsd:maxInclusive value="2"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.164 Layer Topology Name (Simple)

```
<xsd:simpleType name="Layer_topo_name">
        <xsd:restriction base="xsd:string">
                <xsd:maxLength value="40"/>
                <xsd:enumeration value="non-explicit"/>
                <xsd:enumeration value="connectivity"/>
                <xsd:enumeration value="full"/>
        </xsd:restriction>
</xsd:simpleType>
```

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13.5.165 Layer Topology Value (Simple)

```
<xsd:simpleType name="Layer_topo_value">
    <xsd:restriction base="xsd:int">
            <xsd:minInclusive value="1"/>
            <xsd:maxInclusive value="3"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.166 Language Code Name (Simple)

NOTE Since provided XML schemas are coded with reference to ISO 639-2: 1998, the user is referred to the source organization for the latest information.

```
<xsd:simpleType name="Lang_code_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Afar"/>
            <xsd:enumeration value="Abkhaz"/>
            <xsd:enumeration value="Achinese"/>
            <xsd:enumeration value="Acoli"/>
            <xsd:enumeration value="Adangme"/>
            <xsd:enumeration value="Adygei"/>
            <xsd:enumeration value="Afroasiatic (Other)"/>
            <xsd:enumeration value="Afrihili (Artificial language)"/>
            <xsd:enumeration value="Afrikaans"/>
            <xsd:enumeration value="Akan"/>
            <xsd:enumeration value="Akkadian"/>
            <xsd:enumeration value="Albanian"/>
            <xsd:enumeration value="Aleut"/>
            <xsd:enumeration value="Algonquian (Other)"/>
            <xsd:enumeration value="Amharic"/>
            <xsd:enumeration value="English, Old (ca. 450-1100)"/>
            <xsd:enumeration value="Apache languages"/>
            <xsd:enumeration value="Arabic"/>
            <xsd:enumeration value="Aramaic"/>
            <xsd:enumeration value="Aragonese Spanish"/>
            <xsd:enumeration value="Armenian"/>
            <xsd:enumeration value="Mapuche"/>
            <xsd:enumeration value="Arapaho"/>
            <xsd:enumeration value="Artificial (Other)"/>
            <xsd:enumeration value="Arawak"/>
            <xsd:enumeration value="Assamese"/>
            <xsd:enumeration value="Bable"/>
            <xsd:enumeration value="Athapascan (Other)"/>
            <xsd:enumeration value="Australian languages"/>
            <xsd:enumeration value="Avaric"/>
            <xsd:enumeration value="Avestan"/>
            <xsd:enumeration value="Awadhi"/>
            <xsd:enumeration value="Aymara"/>
            <xsd:enumeration value="Azerbaijani"/>
            <xsd:enumeration value="Banda"/>
            <xsd:enumeration value="Bamileke languages"/>
            <xsd:enumeration value="Bashkir"/>
            <xsd:enumeration value="Baluchi"/>
            <xsd:enumeration value="Bambara"/>
            <xsd:enumeration value="Balinese"/>
            <xsd:enumeration value="Basque"/>
            <xsd:enumeration value="Basa"/>
            <xsd:enumeration value="Baltic (Other)"/>
            <xsd:enumeration value="Beja"/>
            <xsd:enumeration value="Belarusian"/>
            <xsd:enumeration value="Bemba"/>
            <xsd:enumeration value="Bengali"/>
            <xsd:enumeration value="Berber (Other)"/>
            <xsd:enumeration value="Bhojpuri"/>
            <xsd:enumeration value="Bihari"/>
            <xsd:enumeration value="Bikol"/>
            <xsd:enumeration value="Edo"/>
            <xsd:enumeration value="Bislama"/>
            <xsd:enumeration value="Siksika"/>
            <xsd:enumeration value="Bantu (Other)"/>
            <xsd:enumeration value="Bosnian"/>
```

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```
<xsd:enumeration value="Braj"/>
<xsd:enumeration value="Breton"/>
<xsd:enumeration value="Batak"/>
<xsd:enumeration value="Buriat"/>
<xsd:enumeration value="Bugis"/>
<xsd:enumeration value="Bulgarian"/>
<xsd:enumeration value="Burmese"/>
<xsd:enumeration value="Caddo"/>
<xsd:enumeration value="Central American Indian (Other)"/>
<xsd:enumeration value="Carib"/>
<xsd:enumeration value="Catalan"/>
<xsd:enumeration value="Caucasian (Other)"/>
<xsd:enumeration value="Cebuano"/>
<xsd:enumeration value="Celtic (Other)"/>
<xsd:enumeration value="Chamorro"/>
<xsd:enumeration value="Chibcha"/>
<xsd:enumeration value="Chechen"/>
<xsd:enumeration value="Chagatai"/>
<xsd:enumeration value="Chinese"/>
<xsd:enumeration value="Truk"/>
<xsd:enumeration value="Mari"/>
<xsd:enumeration value="Chinook jargon"/>
<xsd:enumeration value="Choctaw"/>
<xsd:enumeration value="Chipewyan"/>
<xsd:enumeration value="Cherokee"/>
<xsd:enumeration value="Church Slavic"/>
<xsd:enumeration value="Chuvash"/>
<xsd:enumeration value="Cheyenne"/>
<xsd:enumeration value="Chamic languages"/>
<xsd:enumeration value="Coptic"/>
<xsd:enumeration value="Cornish"/>
<xsd:enumeration value="Corsican"/>
<xsd:enumeration value="Creoles and Pidgins, English-based (Other)"/>
<xsd:enumeration value="Creoles and Pidgins, French-based (Other)"/>
<xsd:enumeration value="Creoles and Pidgins, Portuguese-based (Other)"/>
<xsd:enumeration value="Cree"/>
<xsd:enumeration value="Crimean Tatar"/>
<xsd:enumeration value="Creoles and Pidgins (Other)"/>
<xsd:enumeration value="Cushitic (Other)"/>
<xsd:enumeration value="Czech"/>
<xsd:enumeration value="Dakota"/>
<xsd:enumeration value="Danish"/>
<xsd:enumeration value="Dargwa"/>
<xsd:enumeration value="Dayak"/>
<xsd:enumeration value="Delaware"/>
<xsd:enumeration value="Slave"/>
<xsd:enumeration value="Dogrib"/>
<xsd:enumeration value="Dinka"/>
<xsd:enumeration value="Divehi"/>
<xsd:enumeration value="Dogri"/>
<xsd:enumeration value="Dravidian (Other)"/>
<xsd:enumeration value="Duala"/>
<xsd:enumeration value="Dutch, Middle (ca. 1050-1350)"/>
<xsd:enumeration value="Dutch"/>
<xsd:enumeration value="Dyula"/>
<xsd:enumeration value="Dzongkha"/>
<xsd:enumeration value="Efik"/>
<xsd:enumeration value="Egyptian"/>
<xsd:enumeration value="Ekajuk"/>
<xsd:enumeration value="Elamite"/>
<xsd:enumeration value="English"/>
<xsd:enumeration value="English, Middle (1100-1500)"/>
<xsd:enumeration value="Esperanto"/>
<xsd:enumeration value="Estonian"/>
<xsd:enumeration value="Ewe"/>
<xsd:enumeration value="Ewondo"/>
<xsd:enumeration value="Fang"/>
<xsd:enumeration value="Faroese"/>
<xsd:enumeration value="Fanti"/>
<xsd:enumeration value="Fijian"/>
<xsd:enumeration value="Finnish"/>
<xsd:enumeration value="Finno-Ugrian (Other)"/>
<xsd:enumeration value="Fon"/>
<xsd:enumeration value="French"/>
<xsd:enumeration value="French, Middle (ca. 1400-1600)"/>
```

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```
<xsd:enumeration value="French, Old (ca. 842-1400)"/>
<xsd:enumeration value="Frisian"/>
<xsd:enumeration value="Fula"/>
<xsd:enumeration value="Friulian"/>
<xsd:enumeration value="Gã"/>
<xsd:enumeration value="Gayo"/>
<xsd:enumeration value="Gbaya"/>
<xsd:enumeration value="Germanic (Other)"/>
<xsd:enumeration value="Georgian"/>
<xsd:enumeration value="German"/>
<xsd:enumeration value="Ethiopic"/>
<xsd:enumeration value="Gilbertese"/>
<xsd:enumeration value="Scottish Gaelic"/>
<xsd:enumeration value="Irish"/>
<xsd:enumeration value="Galician"/>
<xsd:enumeration value="Manx"/>
<xsd:enumeration value="German, Middle High (ca. 1050-1500)"/>
<xsd:enumeration value="German, Old High (ca. 750-1050)"/>
<xsd:enumeration value="Gondi"/>
<xsd:enumeration value="Gorontalo"/>
<xsd:enumeration value="Gothic"/>
<xsd:enumeration value="Grebo"/>
<xsd:enumeration value="Greek, Ancient (to 1453)"/>
<xsd:enumeration value="Greek, Modern (1453- )"/>
<xsd:enumeration value="Guarani"/>
<xsd:enumeration value="Gujarati"/>
<xsd:enumeration value="Gwich'in"/>
<xsd:enumeration value="Haida"/>
<xsd:enumeration value="Haitian French Creole"/>
<xsd:enumeration value="Hausa"/>
<xsd:enumeration value="Hawaiian"/>
<xsd:enumeration value="Hebrew"/>
<xsd:enumeration value="Herero"/>
<xsd:enumeration value="Hiligaynon"/>
<xsd:enumeration value="Himachali"/>
<xsd:enumeration value="Hindi"/>
<xsd:enumeration value="Hittite"/>
<xsd:enumeration value="Hmong"/>
<xsd:enumeration value="Hiri Motu"/>
<xsd:enumeration value="Hungarian"/>
<xsd:enumeration value="Hupa"/>
<xsd:enumeration value="Iban"/>
<xsd:enumeration value="Igbo"/>
<xsd:enumeration value="Icelandic"/>
<xsd:enumeration value="Ido"/>
<xsd:enumeration value="Sichuan Yi"/>
<xsd:enumeration value="Ijo"/>
<xsd:enumeration value="Inuktitut"/>
<xsd:enumeration value="Interlingue"/>
<xsd:enumeration value="Iloko"/>
<xsd:enumeration value="Interlingua (International Auxiliary Language Association)"/>
<xsd:enumeration value="Indic (Other)"/>
<xsd:enumeration value="Indonesian"/>
<xsd:enumeration value="Indo-European (Other)"/>
<xsd:enumeration value="Ingush"/>
<xsd:enumeration value="Inupiaq"/>
<xsd:enumeration value="Iranian (Other)"/>
<xsd:enumeration value="Iroquoian (Other)"/>
<xsd:enumeration value="Italian"/>
<xsd:enumeration value="Javanese"/>
<xsd:enumeration value="Japanese"/>
<xsd:enumeration value="Judeo-Persian"/>
<xsd:enumeration value="Judeo-Arabic"/>
<xsd:enumeration value="Kara-Kalpak"/>
<xsd:enumeration value="Kabyle"/>
<xsd:enumeration value="Kachin"/>
<xsd:enumeration value="Kalâtdlisut"/>
<xsd:enumeration value="Kamba"/>
<xsd:enumeration value="Kannada"/>
<xsd:enumeration value="Karen"/>
<xsd:enumeration value="Kashmiri"/>
<xsd:enumeration value="Kanuri"/>
<xsd:enumeration value="Kawi"/>
<xsd:enumeration value="Kazakh"/>
<xsd:enumeration value="Kabardian"/>
```


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```
<xsd:enumeration value="Khasi"/>
<xsd:enumeration value="Khoisan (Other)"/>
<xsd:enumeration value="Khmer"/>
<xsd:enumeration value="Khotanese"/>
<xsd:enumeration value="Kikuyu"/>
<xsd:enumeration value="Kinyarwanda"/>
<xsd:enumeration value="Kyrgyz"/>
<xsd:enumeration value="Kimbundu"/>
<xsd:enumeration value="Konkani"/>
<xsd:enumeration value="Komi"/>
<xsd:enumeration value="Kongo"/>
<xsd:enumeration value="Korean"/>
<xsd:enumeration value="Kusaie"/>
<xsd:enumeration value="Kpelle"/>
<xsd:enumeration value="Kru"/>
<xsd:enumeration value="Kurukh"/>
<xsd:enumeration value="Kuanyama"/>
<xsd:enumeration value="Kumyk"/>
<xsd:enumeration value="Kurdish"/>
<xsd:enumeration value="Kutenai"/>
<xsd:enumeration value="Ladino"/>
<xsd:enumeration value="Lahnda"/>
<xsd:enumeration value="Lamba"/>
<xsd:enumeration value="Lao"/>
<xsd:enumeration value="Latin"/>
<xsd:enumeration value="Latvian"/>
<xsd:enumeration value="Lezgian"/>
<xsd:enumeration value="Limburgish"/>
<xsd:enumeration value="Lingala"/>
<xsd:enumeration value="Lithuanian"/>
<xsd:enumeration value="Mongo-Nkundu"/>
<xsd:enumeration value="Lozi"/>
<xsd:enumeration value="Letzeburgesch"/>
<xsd:enumeration value="Luba-Lulua"/>
<xsd:enumeration value="Luba-Katanga"/>
<xsd:enumeration value="Ganda"/>
<xsd:enumeration value="Luiseño"/>
<xsd:enumeration value="Lunda"/>
<xsd:enumeration value="Luo (Kenya and Tanzania)"/>
<xsd:enumeration value="Lushai"/>
<xsd:enumeration value="Macedonian"/>
<xsd:enumeration value="Madurese"/>
<xsd:enumeration value="Magahi"/>
<xsd:enumeration value="Marshallese"/>
<xsd:enumeration value="Maithili"/>
<xsd:enumeration value="Makasar"/>
<xsd:enumeration value="Malayalam"/>
<xsd:enumeration value="Mandingo"/>
<xsd:enumeration value="Maori"/>
<xsd:enumeration value="Austronesian (Other)"/>
<xsd:enumeration value="Marathi"/>
<xsd:enumeration value="Masai"/>
<xsd:enumeration value="Malay"/>
<xsd:enumeration value="Mandar"/>
<xsd:enumeration value="Mende"/>
<xsd:enumeration value="Irish, Middle (ca. 1100-1550)"/>
<xsd:enumeration value="Micmac"/>
<xsd:enumeration value="Minangkabau"/>
<xsd:enumeration value="Miscellaneous languages"/>
<xsd:enumeration value="Mon-Khmer (Other)"/>
<xsd:enumeration value="Malagasy"/>
<xsd:enumeration value="Maltese"/>
<xsd:enumeration value="Manchu"/>
<xsd:enumeration value="Manipuri"/>
<xsd:enumeration value="Manobo languages"/>
<xsd:enumeration value="Mohawk"/>
<xsd:enumeration value="Moldavian"/>
<xsd:enumeration value="Mongolian"/>
<xsd:enumeration value="Mooré"/>
<xsd:enumeration value="Multiple languages"/>
<xsd:enumeration value="Munda (Other)"/>
<xsd:enumeration value="Creek"/>
<xsd:enumeration value="Marwari"/>
<xsd:enumeration value="Mayan languages"/>
<xsd:enumeration value="Nahuatl"/>
```

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```
<xsd:enumeration value="North American Indian (Other)"/>
<xsd:enumeration value="Neapolitan Italian"/>
<xsd:enumeration value="Nauru"/>
<xsd:enumeration value="Navajo"/>
<xsd:enumeration value="Ndebele (South Africa)"/>
<xsd:enumeration value="Ndebele (Zimbabwe)"/>
<xsd:enumeration value="Ndonga"/>
<xsd:enumeration value="Low German"/>
<xsd:enumeration value="Nepali"/>
<xsd:enumeration value="Newari"/>
<xsd:enumeration value="Nias"/>
<xsd:enumeration value="Niger-Kordofanian (Other)"/>
<xsd:enumeration value="Niuean"/>
<xsd:enumeration value="Norwegian (Nynorsk)"/>
<xsd:enumeration value="Norwegian (Bokmål)"/>
<xsd:enumeration value="Nogai"/>
<xsd:enumeration value="Old Norse"/>
<xsd:enumeration value="Norwegian"/>
<xsd:enumeration value="Northern Sotho"/>
<xsd:enumeration value="Nubian languages"/>
<xsd:enumeration value="Nyanja"/>
<xsd:enumeration value="Nyamwezi"/>
<xsd:enumeration value="Nyankole"/>
<xsd:enumeration value="Nyoro"/>
<xsd:enumeration value="Nzima"/>
<xsd:enumeration value="Occitan (post-1500)"/>
<xsd:enumeration value="Ojibwa"/>
<xsd:enumeration value="Oriya"/>
<xsd:enumeration value="Oromo"/>
<xsd:enumeration value="Osage"/>
<xsd:enumeration value="Ossetic"/>
<xsd:enumeration value="Turkish, Ottoman"/>
<xsd:enumeration value="Otomian languages"/>
<xsd:enumeration value="Papuan (Other)"/>
<xsd:enumeration value="Pangasinan"/>
<xsd:enumeration value="Pahlavi"/>
<xsd:enumeration value="Pampanga"/>
<xsd:enumeration value="Panjabi"/>
<xsd:enumeration value="Papiamento"/>
<xsd:enumeration value="Palauan"/>
<xsd:enumeration value="Old Persian (ca. 600-400 B.C.)"/>
<xsd:enumeration value="Persian"/>
<xsd:enumeration value="Philippine (Other)"/>
<xsd:enumeration value="Phoenician"/>
<xsd:enumeration value="Pali"/>
<xsd:enumeration value="Polish"/>
<xsd:enumeration value="Ponape"/>
<xsd:enumeration value="Portuguese"/>
<xsd:enumeration value="Prakrit languages"/>
<xsd:enumeration value="Provençal (to 1500)"/>
<xsd:enumeration value="Pushto"/>
<xsd:enumeration value="Quechua"/>
<xsd:enumeration value="Rajasthani"/>
<xsd:enumeration value="Rapanui"/>
<xsd:enumeration value="Rarotongan"/>
<xsd:enumeration value="Romance (Other)"/>
<xsd:enumeration value="Raeto-Romance"/>
<xsd:enumeration value="Romani"/>
<xsd:enumeration value="Romanian"/>
<xsd:enumeration value="Rundi"/>
<xsd:enumeration value="Russian"/>
<xsd:enumeration value="Sandawe"/>
<xsd:enumeration value="Sango (Ubangi Creole)"/>
<xsd:enumeration value="Yakut"/>
<xsd:enumeration value="South American Indian (Other)"/>
<xsd:enumeration value="Salishan languages"/>
<xsd:enumeration value="Samaritan Aramaic"/>
<xsd:enumeration value="Sanskrit"/>
<xsd:enumeration value="Sasak"/>
<xsd:enumeration value="Santali"/>
<xsd:enumeration value="Serbian"/>
<xsd:enumeration value="Scots"/>
<xsd:enumeration value="Croatian"/>
<xsd:enumeration value="Selkup"/>
<xsd:enumeration value="Semitic (Other)"/>
```

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```
<xsd:enumeration value="Irish, Old (to 1100)"/>
<xsd:enumeration value="Sign languages"/>
<xsd:enumeration value="Shan"/>
<xsd:enumeration value="Sidamo"/>
<xsd:enumeration value="Sinhalese"/>
<xsd:enumeration value="Siouan (Other)"/>
<xsd:enumeration value="Sino-Tibetan (Other)"/>
<xsd:enumeration value="Slavic (Other)"/>
<xsd:enumeration value="Slovak"/>
<xsd:enumeration value="Slovenian"/>
<xsd:enumeration value="Southern Sami"/>
<xsd:enumeration value="Northern Sami"/>
<xsd:enumeration value="Sami"/>
<xsd:enumeration value="Lule Sami"/>
<xsd:enumeration value="Inari Sami"/>
<xsd:enumeration value="Samoan"/>
<xsd:enumeration value="Skolt Sami"/>
<xsd:enumeration value="Shona"/>
<xsd:enumeration value="Sindhi"/>
<xsd:enumeration value="Soninke"/>
<xsd:enumeration value="Sogdian"/>
<xsd:enumeration value="Somali"/>
<xsd:enumeration value="Songhai"/>
<xsd:enumeration value="Sotho"/>
<xsd:enumeration value="Spanish"/>
<xsd:enumeration value="Sardinian"/>
<xsd:enumeration value="Serer"/>
<xsd:enumeration value="Nilo-Saharan (Other)"/>
<xsd:enumeration value="Swazi"/>
<xsd:enumeration value="Sukuma"/>
<xsd:enumeration value="Sundanese"/>
<xsd:enumeration value="Susu"/>
<xsd:enumeration value="Sumerian"/>
<xsd:enumeration value="Swahili"/>
<xsd:enumeration value="Swedish"/>
<xsd:enumeration value="Syriac"/>
<xsd:enumeration value="Tahitian"/>
<xsd:enumeration value="Tai (Other)"/>
<xsd:enumeration value="Tamil"/>
<xsd:enumeration value="Tatar"/>
<xsd:enumeration value="Telugu"/>
<xsd:enumeration value="Temne"/>
<xsd:enumeration value="Terena"/>
<xsd:enumeration value="Tetum"/>
<xsd:enumeration value="Tajik"/>
<xsd:enumeration value="Tagalog"/>
<xsd:enumeration value="Thai"/>
<xsd:enumeration value="Tibetan"/>
<xsd:enumeration value="Tigré"/>
<xsd:enumeration value="Tigrinya"/>
<xsd:enumeration value="Tiv"/>
<xsd:enumeration value="Tokelauan"/>
<xsd:enumeration value="Tlingit"/>
<xsd:enumeration value="Tamashek"/>
<xsd:enumeration value="Tonga (Nyasa)"/>
<xsd:enumeration value="Tongan"/>
<xsd:enumeration value="Tok Pisin"/>
<xsd:enumeration value="Tsimshian"/>
<xsd:enumeration value="Tswana"/>
<xsd:enumeration value="Tsonga"/>
<xsd:enumeration value="Turkmen"/>
<xsd:enumeration value="Tumbuka"/>
<xsd:enumeration value="Tupi languages"/>
<xsd:enumeration value="Turkish"/>
<xsd:enumeration value="Altaic (Other)"/>
<xsd:enumeration value="Tuvaluan"/>
<xsd:enumeration value="Twi"/>
<xsd:enumeration value="Tuvinian"/>
<xsd:enumeration value="Udmurt"/>
<xsd:enumeration value="Ugaritic"/>
<xsd:enumeration value="Uighur"/>
<xsd:enumeration value="Ukrainian"/>
<xsd:enumeration value="Umbundu"/>
<xsd:enumeration value="Undetermined"/>
<xsd:enumeration value="Urdu"/>
```

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```
                <xsd:enumeration value="Uzbek"/>
                <xsd:enumeration value="Vai"/>
                <xsd:enumeration value="Venda"/>
                <xsd:enumeration value="Vietnamese"/>
                <xsd:enumeration value="Volapük"/>
                <xsd:enumeration value="Votic"/>
                <xsd:enumeration value="Wakashan languages"/>
                <xsd:enumeration value="Walamo"/>
                <xsd:enumeration value="Waray"/>
                <xsd:enumeration value="Washo"/>
                <xsd:enumeration value="Welsh"/>
                <xsd:enumeration value="Sorbian languages"/>
                <xsd:enumeration value="Walloon"/>
                <xsd:enumeration value="Wolof"/>
                <xsd:enumeration value="Kalmyk"/>
                <xsd:enumeration value="Xhosa"/>
                <xsd:enumeration value="Yao (Africa)"/>
                <xsd:enumeration value="Yapese"/>
                <xsd:enumeration value="Yiddish"/>
                <xsd:enumeration value="Yoruba"/>
                <xsd:enumeration value="Yupik languages"/>
                <xsd:enumeration value="Zapotec"/>
                <xsd:enumeration value="Zenaga"/>
                <xsd:enumeration value="Zhuang"/>
                <xsd:enumeration value="Zande"/>
                <xsd:enumeration value="Zulu"/>
                <xsd:enumeration value="Zuni"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.167 Language Code Value (Simple)

NOTE Since provided XML schemas are coded with reference to ISO 639-2: 1998, the user is referred to the source organization for the latest information.

```
<xsd:simpleType name="Lang_code_value">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="AAR"/>
                <xsd:enumeration value="ABK"/>
                <xsd:enumeration value="ACE"/>
                <xsd:enumeration value="ACH"/>
                <xsd:enumeration value="ADA"/>
                <xsd:enumeration value="ADY"/>
                <xsd:enumeration value="AFA"/>
                <xsd:enumeration value="AFH"/>
                <xsd:enumeration value="AFR"/>
                <xsd:enumeration value="AKA"/>
                <xsd:enumeration value="AKK"/>
                <xsd:enumeration value="ALB"/>
                <xsd:enumeration value="ALE"/>
                <xsd:enumeration value="ALG"/>
                <xsd:enumeration value="AMH"/>
                <xsd:enumeration value="ANG"/>
                <xsd:enumeration value="APA"/>
                <xsd:enumeration value="ARA"/>
                <xsd:enumeration value="ARC"/>
                <xsd:enumeration value="ARG"/>
                <xsd:enumeration value="ARM"/>
                <xsd:enumeration value="ARN"/>
                <xsd:enumeration value="ARP"/>
                <xsd:enumeration value="ART"/>
                <xsd:enumeration value="ARW"/>
                <xsd:enumeration value="ASM"/>
                <xsd:enumeration value="AST"/>
                <xsd:enumeration value="ATH"/>
                <xsd:enumeration value="AUS"/>
                <xsd:enumeration value="AVA"/>
                <xsd:enumeration value="AVE"/>
                <xsd:enumeration value="AWA"/>
                <xsd:enumeration value="AYM"/>
                <xsd:enumeration value="AZE"/>
                <xsd:enumeration value="BAD"/>
                <xsd:enumeration value="BAI"/>
```

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```
<xsd:enumeration value="BAK"/>
<xsd:enumeration value="BAL"/>
<xsd:enumeration value="BAM"/>
<xsd:enumeration value="BAN"/>
<xsd:enumeration value="BAQ"/>
<xsd:enumeration value="BAS"/>
<xsd:enumeration value="BAT"/>
<xsd:enumeration value="BEJ"/>
<xsd:enumeration value="BEL"/>
<xsd:enumeration value="BEM"/>
<xsd:enumeration value="BEN"/>
<xsd:enumeration value="BER"/>
<xsd:enumeration value="BHO"/>
<xsd:enumeration value="BIH"/>
<xsd:enumeration value="BIK"/>
<xsd:enumeration value="BIN"/>
<xsd:enumeration value="BIS"/>
<xsd:enumeration value="BLA"/>
<xsd:enumeration value="BNT"/>
<xsd:enumeration value="BOS"/>
<xsd:enumeration value="BRA"/>
<xsd:enumeration value="BRE"/>
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<xsd:enumeration value="BUA"/>
<xsd:enumeration value="BUG"/>
<xsd:enumeration value="BUL"/>
<xsd:enumeration value="BUR"/>
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<xsd:enumeration value="CAU"/>
<xsd:enumeration value="CEB"/>
<xsd:enumeration value="CEL"/>
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<xsd:enumeration value="CHB"/>
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<xsd:enumeration value="CHG"/>
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<xsd:enumeration value="CHM"/>
<xsd:enumeration value="CHN"/>
<xsd:enumeration value="CHO"/>
<xsd:enumeration value="CHP"/>
<xsd:enumeration value="CHR"/>
<xsd:enumeration value="CHU"/>
<xsd:enumeration value="CHV"/>
<xsd:enumeration value="CHY"/>
<xsd:enumeration value="CMC"/>
<xsd:enumeration value="COP"/>
<xsd:enumeration value="COR"/>
<xsd:enumeration value="COS"/>
<xsd:enumeration value="CPE"/>
<xsd:enumeration value="CPF"/>
<xsd:enumeration value="CPP"/>
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<xsd:enumeration value="CRH"/>
<xsd:enumeration value="CRP"/>
<xsd:enumeration value="CUS"/>
<xsd:enumeration value="CZE"/>
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<xsd:enumeration value="DAR"/>
<xsd:enumeration value="DAY"/>
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<xsd:enumeration value="DEN"/>
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<xsd:enumeration value="DIN"/>
<xsd:enumeration value="DIV"/>
<xsd:enumeration value="DOI"/>
<xsd:enumeration value="DRA"/>
<xsd:enumeration value="DUA"/>
<xsd:enumeration value="DUM"/>
<xsd:enumeration value="DUT"/>
<xsd:enumeration value="DYU"/>
```

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```
<xsd:enumeration value="DZO"/>
<xsd:enumeration value="EFI"/>
<xsd:enumeration value="EGY"/>
<xsd:enumeration value="EKA"/>
<xsd:enumeration value="ELX"/>
<xsd:enumeration value="ENG"/>
<xsd:enumeration value="ENM"/>
<xsd:enumeration value="EPO"/>
<xsd:enumeration value="EST"/>
<xsd:enumeration value="EWE"/>
<xsd:enumeration value="EWO"/>
<xsd:enumeration value="FAN"/>
<xsd:enumeration value="FAO"/>
<xsd:enumeration value="FAT"/>
<xsd:enumeration value="FIJ"/>
<xsd:enumeration value="FIN"/>
<xsd:enumeration value="FIU"/>
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<xsd:enumeration value="FUR"/>
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<xsd:enumeration value="GLA"/>
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<xsd:enumeration value="GMH"/>
<xsd:enumeration value="GOH"/>
<xsd:enumeration value="GON"/>
<xsd:enumeration value="GOR"/>
<xsd:enumeration value="GOT"/>
<xsd:enumeration value="GRB"/>
<xsd:enumeration value="GRC"/>
<xsd:enumeration value="GRE"/>
<xsd:enumeration value="GRN"/>
<xsd:enumeration value="GUJ"/>
<xsd:enumeration value="GWI"/>
<xsd:enumeration value="HAI"/>
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<xsd:enumeration value="HIT"/>
<xsd:enumeration value="HMN"/>
<xsd:enumeration value="HMO"/>
<xsd:enumeration value="HUN"/>
<xsd:enumeration value="HUP"/>
<xsd:enumeration value="IBA"/>
<xsd:enumeration value="IBO"/>
<xsd:enumeration value="ICE"/>
<xsd:enumeration value="IDO"/>
<xsd:enumeration value="III"/>
<xsd:enumeration value="IJO"/>
<xsd:enumeration value="IKU"/>
<xsd:enumeration value="ILE"/>
<xsd:enumeration value="ILO"/>
<xsd:enumeration value="INA"/>
<xsd:enumeration value="INC"/>
<xsd:enumeration value="IND"/>
<xsd:enumeration value="INE"/>
<xsd:enumeration value="INH"/>
```

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```
<xsd:enumeration value="IPK"/>
<xsd:enumeration value="IRA"/>
<xsd:enumeration value="IRO"/>
<xsd:enumeration value="ITA"/>
<xsd:enumeration value="JAV"/>
<xsd:enumeration value="JPN"/>
<xsd:enumeration value="JPR"/>
<xsd:enumeration value="JRB"/>
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<xsd:enumeration value="KAC"/>
<xsd:enumeration value="KAL"/>
<xsd:enumeration value="KAM"/>
<xsd:enumeration value="KAN"/>
<xsd:enumeration value="KAR"/>
<xsd:enumeration value="KAS"/>
<xsd:enumeration value="KAU"/>
<xsd:enumeration value="KAW"/>
<xsd:enumeration value="KAZ"/>
<xsd:enumeration value="KBD"/>
<xsd:enumeration value="KHA"/>
<xsd:enumeration value="KHI"/>
<xsd:enumeration value="KHM"/>
<xsd:enumeration value="KHO"/>
<xsd:enumeration value="KIK"/>
<xsd:enumeration value="KIN"/>
<xsd:enumeration value="KIR"/>
<xsd:enumeration value="KMB"/>
<xsd:enumeration value="KOK"/>
<xsd:enumeration value="KOM"/>
<xsd:enumeration value="KON"/>
<xsd:enumeration value="KOR"/>
<xsd:enumeration value="KOS"/>
<xsd:enumeration value="KPE"/>
<xsd:enumeration value="KRO"/>
<xsd:enumeration value="KRU"/>
<xsd:enumeration value="KUA"/>
<xsd:enumeration value="KUM"/>
<xsd:enumeration value="KUR"/>
<xsd:enumeration value="KUT"/>
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<xsd:enumeration value="LAH"/>
<xsd:enumeration value="LAM"/>
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<xsd:enumeration value="LOZ"/>
<xsd:enumeration value="LTZ"/>
<xsd:enumeration value="LUA"/>
<xsd:enumeration value="LUB"/>
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<xsd:enumeration value="MAD"/>
<xsd:enumeration value="MAG"/>
<xsd:enumeration value="MAH"/>
<xsd:enumeration value="MAI"/>
<xsd:enumeration value="MAK"/>
<xsd:enumeration value="MAL"/>
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<xsd:enumeration value="MAO"/>
<xsd:enumeration value="MAP"/>
<xsd:enumeration value="MAR"/>
<xsd:enumeration value="MAS"/>
<xsd:enumeration value="MAY"/>
<xsd:enumeration value="MDR"/>
<xsd:enumeration value="MEN"/>
```

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```
<xsd:enumeration value="MGA"/>
<xsd:enumeration value="MIC"/>
<xsd:enumeration value="MIN"/>
<xsd:enumeration value="MIS"/>
<xsd:enumeration value="MKH"/>
<xsd:enumeration value="MLG"/>
<xsd:enumeration value="MLT"/>
<xsd:enumeration value="MNC"/>
<xsd:enumeration value="MNI"/>
<xsd:enumeration value="MNO"/>
<xsd:enumeration value="MOH"/>
<xsd:enumeration value="MOL"/>
<xsd:enumeration value="MON"/>
<xsd:enumeration value="MOS"/>
<xsd:enumeration value="MUL"/>
<xsd:enumeration value="MUN"/>
<xsd:enumeration value="MUS"/>
<xsd:enumeration value="MWR"/>
<xsd:enumeration value="MYN"/>
<xsd:enumeration value="NAH"/>
<xsd:enumeration value="NAI"/>
<xsd:enumeration value="NAP"/>
<xsd:enumeration value="NAU"/>
<xsd:enumeration value="NAV"/>
<xsd:enumeration value="NBL"/>
<xsd:enumeration value="NDE"/>
<xsd:enumeration value="NDO"/>
<xsd:enumeration value="NDS"/>
<xsd:enumeration value="NEP"/>
<xsd:enumeration value="NEW"/>
<xsd:enumeration value="NIA"/>
<xsd:enumeration value="NIC"/>
<xsd:enumeration value="NIU"/>
<xsd:enumeration value="NNO"/>
<xsd:enumeration value="NOB"/>
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<xsd:enumeration value="NSO"/>
<xsd:enumeration value="NUB"/>
<xsd:enumeration value="NYA"/>
<xsd:enumeration value="NYM"/>
<xsd:enumeration value="NYN"/>
<xsd:enumeration value="NYO"/>
<xsd:enumeration value="NZI"/>
<xsd:enumeration value="OCI"/>
<xsd:enumeration value="OJI"/>
<xsd:enumeration value="ORI"/>
<xsd:enumeration value="ORM"/>
<xsd:enumeration value="OSA"/>
<xsd:enumeration value="OSS"/>
<xsd:enumeration value="OTA"/>
<xsd:enumeration value="OTO"/>
<xsd:enumeration value="PAA"/>
<xsd:enumeration value="PAG"/>
<xsd:enumeration value="PAL"/>
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<xsd:enumeration value="PAP"/>
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<xsd:enumeration value="PON"/>
<xsd:enumeration value="POR"/>
<xsd:enumeration value="PRA"/>
<xsd:enumeration value="PRO"/>
<xsd:enumeration value="PUS"/>
<xsd:enumeration value="QUE"/>
<xsd:enumeration value="RAJ"/>
<xsd:enumeration value="RAP"/>
<xsd:enumeration value="RAR"/>
```

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```
<xsd:enumeration value="ROA"/>
<xsd:enumeration value="ROH"/>
<xsd:enumeration value="ROM"/>
<xsd:enumeration value="RUM"/>
<xsd:enumeration value="RUN"/>
<xsd:enumeration value="RUS"/>
<xsd:enumeration value="SAD"/>
<xsd:enumeration value="SAG"/>
<xsd:enumeration value="SAH"/>
<xsd:enumeration value="SAI"/>
<xsd:enumeration value="SAL"/>
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<xsd:enumeration value="SCC"/>
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<xsd:enumeration value="SNA"/>
<xsd:enumeration value="SND"/>
<xsd:enumeration value="SNK"/>
<xsd:enumeration value="SOG"/>
<xsd:enumeration value="SOM"/>
<xsd:enumeration value="SON"/>
<xsd:enumeration value="SOT"/>
<xsd:enumeration value="SPA"/>
<xsd:enumeration value="SRD"/>
<xsd:enumeration value="SRR"/>
<xsd:enumeration value="SSA"/>
<xsd:enumeration value="SSW"/>
<xsd:enumeration value="SUK"/>
<xsd:enumeration value="SUN"/>
<xsd:enumeration value="SUS"/>
<xsd:enumeration value="SUX"/>
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<xsd:enumeration value="TGL"/>
<xsd:enumeration value="THA"/>
<xsd:enumeration value="TIB"/>
<xsd:enumeration value="TIG"/>
<xsd:enumeration value="TIR"/>
<xsd:enumeration value="TIV"/>
<xsd:enumeration value="TKL"/>
<xsd:enumeration value="TLI"/>
<xsd:enumeration value="TMH"/>
<xsd:enumeration value="TOG"/>
```

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```
            <xsd:enumeration value="TON"/>
            <xsd:enumeration value="TPI"/>
            <xsd:enumeration value="TSI"/>
            <xsd:enumeration value="TSN"/>
            <xsd:enumeration value="TSO"/>
            <xsd:enumeration value="TUK"/>
            <xsd:enumeration value="TUM"/>
            <xsd:enumeration value="TUP"/>
            <xsd:enumeration value="TUR"/>
            <xsd:enumeration value="TUT"/>
            <xsd:enumeration value="TVL"/>
            <xsd:enumeration value="TWI"/>
            <xsd:enumeration value="TYV"/>
            <xsd:enumeration value="UDM"/>
            <xsd:enumeration value="UGA"/>
            <xsd:enumeration value="UIG"/>
            <xsd:enumeration value="UKR"/>
            <xsd:enumeration value="UMB"/>
            <xsd:enumeration value="UND"/>
            <xsd:enumeration value="URD"/>
            <xsd:enumeration value="UZB"/>
            <xsd:enumeration value="VAI"/>
            <xsd:enumeration value="VEN"/>
            <xsd:enumeration value="VIE"/>
            <xsd:enumeration value="VOL"/>
            <xsd:enumeration value="VOT"/>
            <xsd:enumeration value="WAK"/>
            <xsd:enumeration value="WAL"/>
            <xsd:enumeration value="WAR"/>
            <xsd:enumeration value="WAS"/>
            <xsd:enumeration value="WEL"/>
            <xsd:enumeration value="WEN"/>
            <xsd:enumeration value="WLN"/>
            <xsd:enumeration value="WOL"/>
            <xsd:enumeration value="XAL"/>
            <xsd:enumeration value="XHO"/>
            <xsd:enumeration value="YAO"/>
            <xsd:enumeration value="YAP"/>
            <xsd:enumeration value="YID"/>
            <xsd:enumeration value="YOR"/>
            <xsd:enumeration value="YPK"/>
            <xsd:enumeration value="ZAP"/>
            <xsd:enumeration value="ZEN"/>
            <xsd:enumeration value="ZHA"/>
            <xsd:enumeration value="ZND"/>
            <xsd:enumeration value="ZUL"/>
            <xsd:enumeration value="ZUN"/>
        </xsd:restriction>
    </xsd:simpleType>
```

13.5.168 Object Category Name (Simple)

```
    <xsd:simpleType name="Obj_cat_name">
        <xsd:restriction base="xsd:string">
            <xsd:enumeration value="point"/>
            <xsd:enumeration value="line"/>
            <xsd:enumeration value="area"/>
            <xsd:enumeration value="complex"/>
            <xsd:enumeration value="relationship"/>
            <xsd:enumeration value="name"/>
            <xsd:enumeration value="time domain"/>
            <xsd:enumeration value="other text"/>
            <xsd:enumeration value="geopolitical structure"/>
            <xsd:enumeration value="geopolitical structure component"/>
        </xsd:restriction>
    </xsd:simpleType>
```

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13.5.169 Object Category Value (Simple)

```
<xsd:simpleType name="Obj_cat_val">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1"/>
            <xsd:maxInclusive value="10"/>
            <xsd:enumeration value="1"/>
            <xsd:enumeration value="2"/>
            <xsd:enumeration value="3"/>
            <xsd:enumeration value="4"/>
            <xsd:enumeration value="5"/>
            <xsd:enumeration value="6"/>
            <xsd:enumeration value="7"/>
            <xsd:enumeration value="8"/>
            <xsd:enumeration value="9"/>
            <xsd:enumeration value="10"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.170 Orientation Name (Simple)

```
<xsd:simpleType name="Orientation_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="clockwise"/>
            <xsd:enumeration value="counterclockwise"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.171 Positive Negative Name (Simple)

```
<xsd:simpleType name="Pos_neg_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="positive"/>
            <xsd:enumeration value="negative"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.172 Projection Name (Simple)

```
<xsd:simpleType name="Projection_name">
    <xsd:restriction base="xsd:string">
            <xsd:maxLength value="50"/>
            <xsd:enumeration value="Albers Equal-Area Conic"/>
            <xsd:enumeration value="(Lambert) Azimuthal Equal-Area"/>
            <xsd:enumeration value="Azimuthal Equidistant"/>
            <xsd:enumeration value="Bonne"/>
            <xsd:enumeration value="Equidistant Conic with 1 Standard Parallel"/>
            <xsd:enumeration value="Equirectangular (La Carte Parallélogramatique)"/>
            <xsd:enumeration value="Cassini-Soldner"/>
            <xsd:enumeration value="Gnomonic"/>
            <xsd:enumeration value="Hotine Oblique Mercator based on 2 Points"/>
            <xsd:enumeration value="Equidistant Conic with 2 Standard Parallels"/>
            <xsd:enumeration value="Laborde"/>
            <xsd:enumeration value="Lambert Conformal Conic"/>
            <xsd:enumeration value="Lambert Equal-Area Meridional"/>
            <xsd:enumeration value="Mercator"/>
            <xsd:enumeration value="Miller Cylindrical"/>
            <xsd:enumeration value="French Lambert"/>
            <xsd:enumeration value="New Zealand Map Grid"/>
            <xsd:enumeration value="Oblique Mercator"/>
            <xsd:enumeration value="Orthographic"/>
            <xsd:enumeration value="Polar Stereographic"/>
            <xsd:enumeration value="Polyconic"/>
            <xsd:enumeration value="Relative Coordinates"/>
            <xsd:enumeration value="Hotine Oblique Mercator (Rectified Skew Orthomorphic)"/>
            <xsd:enumeration value="Robinson"/>
            <xsd:enumeration value="Sinusoidal"/>
            <xsd:enumeration value="Oblique Stereographic"/>
            <xsd:enumeration value="Space Oblique Mercator"/>
```

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```
                <xsd:enumeration value="Transverse Mercator"/>
                <xsd:enumeration value="Van der Grinten"/>
                <xsd:enumeration value="General Vertical Near-Side Perspective"/>
                <xsd:enumeration value="Other Known Projection"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.173 Projection Value (Simple)

```
<xsd:simpleType name="Projection_value">
        <xsd:restriction base="xsd:string">
                <xsd:length value="2"/>
                <xsd:enumeration value="AC"/>
                <xsd:enumeration value="AK"/>
                <xsd:enumeration value="AL"/>
                <xsd:enumeration value="BF"/>
                <xsd:enumeration value="CC"/>
                <xsd:enumeration value="CP"/>
                <xsd:enumeration value="CS"/>
                <xsd:enumeration value="GN"/>
                <xsd:enumeration value="HX"/>
                <xsd:enumeration value="KA"/>
                <xsd:enumeration value="LA"/>
                <xsd:enumeration value="LE"/>
                <xsd:enumeration value="LJ"/>
                <xsd:enumeration value="MC"/>
                <xsd:enumeration value="MH"/>
                <xsd:enumeration value="MJ"/>
                <xsd:enumeration value="NT"/>
                <xsd:enumeration value="OC"/>
                <xsd:enumeration value="OD"/>
                <xsd:enumeration value="PG"/>
                <xsd:enumeration value="PH"/>
                <xsd:enumeration value="RC"/>
                <xsd:enumeration value="RS"/>
                <xsd:enumeration value="RX"/>
                <xsd:enumeration value="SA"/>
                <xsd:enumeration value="SD"/>
                <xsd:enumeration value="SX"/>
                <xsd:enumeration value="TC"/>
                <xsd:enumeration value="VA"/>
                <xsd:enumeration value="VX"/>
                <xsd:enumeration value="ZY"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.174 Record Type Name (Simple)

```
<xsd:simpleType name="Record_type_name">
        <xsd:restriction base="xsd:string">
                <xsd:enumeration value="Continuation Record"/>
                <xsd:enumeration value="Album Header Record"/>
                <xsd:enumeration value="Dataset Header Record"/>
                <xsd:enumeration value="Field Definition Record"/>
                <xsd:enumeration value="Record Definition Record"/>
                <xsd:enumeration value="Attribute Definition Record"/>
                <xsd:enumeration value="Directory Record"/>
                <xsd:enumeration value="Feature Definition Record"/>
                <xsd:enumeration value="Spatial Domain Record"/>
                <xsd:enumeration value="Relationship Definition Record"/>
                <xsd:enumeration value="GeoPolitical Structure Definition Record"/>
                <xsd:enumeration value="GeoPolitical Component Structure Definition Record"/>
                <xsd:enumeration value="Abbreviation Record"/>
                <xsd:enumeration value="Source Record"/>
                <xsd:enumeration value="Default Attribute Value Record"/>
                <xsd:enumeration value="Section Header Record"/>
                <xsd:enumeration value="Layer Header Record"/>
                <xsd:enumeration value="Attribute Value Definition Record"/>
                <xsd:enumeration value="Network Specification Record"/>
                <xsd:enumeration value="Datum &amp;amp; Ellipsoid Record"/>
                <xsd:enumeration value="Vertical Datum Record"/>
```

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```
                <xsd:enumeration value="Projection Record"/>
                <xsd:enumeration value="National Grid Record"/>
                <xsd:enumeration value="Geoid Undulation Record"/>
                <xsd:enumeration value="Earth Magnetic Field Record"/>
                <xsd:enumeration value="Comment Record"/>
                <xsd:enumeration value="2D Coordinate Record "/>
                <xsd:enumeration value="3D Coordinate Record "/>
                <xsd:enumeration value="Edge Record"/>
                <xsd:enumeration value="Node Record"/>
                <xsd:enumeration value="Face Record"/>
                <xsd:enumeration value="Text Record"/>
                <xsd:enumeration value="Attribute Record"/>
                <xsd:enumeration value="Time Domain Record"/>
                <xsd:enumeration value="Conversion Record"/>
                <xsd:enumeration value="Relationship Record"/>
                <xsd:enumeration value="Point Feature Record"/>
                <xsd:enumeration value="Line Feature Record"/>
                <xsd:enumeration value="Area Feature Record"/>
                <xsd:enumeration value="Complex Feature Record"/>
                <xsd:enumeration value="Object Reference Record"/>
                <xsd:enumeration value="Update Information Record"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.175 Record Type Value (Simple)

```
<xsd:simpleType name="Record_type_value">
        <xsd:restriction base="xsd:integer">
                <xsd:enumeration value="0"/>
                <xsd:enumeration value="1"/>
                <xsd:enumeration value="2"/>
                <xsd:enumeration value="3"/>
                <xsd:enumeration value="4"/>
                <xsd:enumeration value="5"/>
                <xsd:enumeration value="6"/>
                <xsd:enumeration value="7"/>
                <xsd:enumeration value="8"/>
                <xsd:enumeration value="9"/>
                <xsd:enumeration value="10"/>
                <xsd:enumeration value="11"/>
                <xsd:enumeration value="13"/>
                <xsd:enumeration value="14"/>
                <xsd:enumeration value="15"/>
                <xsd:enumeration value="16"/>
                <xsd:enumeration value="17"/>
                <xsd:enumeration value="18"/>
                <xsd:enumeration value="19"/>
                <xsd:enumeration value="61"/>
                <xsd:enumeration value="62"/>
                <xsd:enumeration value="63"/>
                <xsd:enumeration value="64"/>
                <xsd:enumeration value="65"/>
                <xsd:enumeration value="66"/>
                <xsd:enumeration value="90"/>
                <xsd:enumeration value="22"/>
                <xsd:enumeration value="23"/>
                <xsd:enumeration value="24"/>
                <xsd:enumeration value="25"/>
                <xsd:enumeration value="29"/>
                <xsd:enumeration value="41"/>
                <xsd:enumeration value="44"/>
                <xsd:enumeration value="45"/>
                <xsd:enumeration value="46"/>
                <xsd:enumeration value="50"/>
                <xsd:enumeration value="51"/>
                <xsd:enumeration value="52"/>
                <xsd:enumeration value="53"/>
                <xsd:enumeration value="54"/>
                <xsd:enumeration value="83"/>
                <xsd:enumeration value="89"/>
        </xsd:restriction>
</xsd:simpleType>
```

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13.5.176 Reduced Record Type Value (Simple)

```
<xsd:simpleType name="Record_type_val_reduced">
    <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="24"/>
            <xsd:enumeration value="25"/>
            <xsd:enumeration value="29"/>
            <xsd:enumeration value="41"/>
            <xsd:enumeration value="44"/>
            <xsd:enumeration value="45"/>
            <xsd:enumeration value="50"/>
            <xsd:enumeration value="51"/>
            <xsd:enumeration value="52"/>
            <xsd:enumeration value="53"/>
            <xsd:enumeration value="54"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.177 Record Type Mnemonic (Simple)

```
<xsd:simpleType name="Record_type_mnemonic">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="[CONTREC]"/>
            <xsd:enumeration value="[ALHDREC]"/>
            <xsd:enumeration value="[DSHDREC]"/>
            <xsd:enumeration value="[FIELDEFREC]"/>
            <xsd:enumeration value="[RECDEFREC]"/>
            <xsd:enumeration value="[ATDEFREC]"/>
            <xsd:enumeration value="[DIREC]"/>
            <xsd:enumeration value="[FEATDEFREC]"/>
            <xsd:enumeration value="[SPADOREC]"/>
            <xsd:enumeration value="[RELDEFREC]"/>
            <xsd:enumeration value="[GPLSTRDREC]"/>
            <xsd:enumeration value="[GPLCOMDREC]"/>
            <xsd:enumeration value="[ABBRREC]"/>
            <xsd:enumeration value="[SRCEREC]"/>
            <xsd:enumeration value="[DATTVALREC]"/>
            <xsd:enumeration value="[SECHREC]"/>
            <xsd:enumeration value="[LAYHREC]"/>
            <xsd:enumeration value="[ATTVALREC]"/>
            <xsd:enumeration value="[NWSPECSREC]"/>
            <xsd:enumeration value="[DATELREC]"/>
            <xsd:enumeration value="[VERDATREC]"/>
            <xsd:enumeration value="[PROJECREC]"/>
            <xsd:enumeration value="[NATGRIDREC]"/>
            <xsd:enumeration value="[GEOIDREC]"/>
            <xsd:enumeration value="[MAGNETREC]"/>
            <xsd:enumeration value="[COMMENTREC]"/>
            <xsd:enumeration value="[VOLTERMREC]"/>
            <xsd:enumeration value="[XYREC]"/>
            <xsd:enumeration value="[XYZREC]"/>
            <xsd:enumeration value="[EDGEREC]"/>
            <xsd:enumeration value="[NODEREC]"/>
            <xsd:enumeration value="[FACEREC]"/>
            <xsd:enumeration value="[TEXTREC]"/>
            <xsd:enumeration value="[ATTREC]"/>
            <xsd:enumeration value="[TIMEREC]"/>
            <xsd:enumeration value="[CONVERTREC]"/>
            <xsd:enumeration value="[RELATREC]"/>
            <xsd:enumeration value="[POFEREC]"/>
            <xsd:enumeration value="[LIFEREC]"/>
            <xsd:enumeration value="[ARFEREC]"/>
            <xsd:enumeration value="[COFEREC]"/>
            <xsd:enumeration value="[OBJREFREC]"/>
            <xsd:enumeration value="[UPDIREC]"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.178 Record Subtype Name (Simple)

```
<xsd:simpleType name="Record_subtype_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Album Header Subrecord"/>
            <xsd:enumeration value="Local Character Set Definition Subrecord"/>
            <xsd:enumeration value="Global Album Information Subrecord"/>
            <xsd:enumeration value="Dataset Identification Subrecord"/>
            <xsd:enumeration value="Dataset Main Title Subrecord"/>
            <xsd:enumeration value="Dataset Subtitle Subrecord"/>
            <xsd:enumeration value="Dataset Producer Subrecord"/>
            <xsd:enumeration value="Dataset Extensiveness &amp;amp; Currency Subrecord"/>
            <xsd:enumeration value="Dataset Contents Subrecord"/>
            <xsd:enumeration value="Dataset XY Resolution Subrecord"/>
            <xsd:enumeration value="Description Info Subrecord"/>
            <xsd:enumeration value="ISBN &amp;amp; Survey Subrecord"/>
            <xsd:enumeration value="Author Name Subrecord"/>
            <xsd:enumeration value="Scale and Title Subrecord"/>
            <xsd:enumeration value="Edition &amp;amp; Impression Subrecord"/>
            <xsd:enumeration value="Publisher Subrecord"/>
            <xsd:enumeration value="Distribution Subrecord"/>
            <xsd:enumeration value="Host Document Subrecord"/>
            <xsd:enumeration value="Field Data Capturing Subrecord"/>
            <xsd:enumeration value="Section Identification Subrecord"/>
            <xsd:enumeration value="Section XY Resolution Subrecord"/>
            <xsd:enumeration value="Network Identification Subrecord"/>
            <xsd:enumeration value="Datasource Reference Subrecord"/>
            <xsd:enumeration value="Datum &amp;amp; Magnetism Subrecord"/>
            <xsd:enumeration value="Orthometric Reference Subrecord"/>
            <xsd:enumeration value="Section Border Subrecord"/>
            <xsd:enumeration value="XY Control Point Subrecord"/>
            <xsd:enumeration value="Z Control Point Subrecord"/>
            <xsd:enumeration value="GEO Update Information Subrecord"/>
            <xsd:enumeration value="Object Update Information Subrecord"/>
            <xsd:enumeration value="Object Attribute Update Information Subrecord"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.179 Record Subtype Value (Simple)

```
<xsd:simpleType name="Record_subtype_value">
    <xsd:restriction base="xsd:decimal">
            <xsd:enumeration value="01.01"/>
            <xsd:enumeration value="01.02"/>
            <xsd:enumeration value="01.03"/>
            <xsd:enumeration value="02.01"/>
            <xsd:enumeration value="02.02"/>
            <xsd:enumeration value="02.03"/>
            <xsd:enumeration value="02.04"/>
            <xsd:enumeration value="02.05"/>
            <xsd:enumeration value="02.06"/>
            <xsd:enumeration value="02.07"/>
            <xsd:enumeration value="14.01"/>
            <xsd:enumeration value="14.02"/>
            <xsd:enumeration value="14.03"/>
            <xsd:enumeration value="14.04"/>
            <xsd:enumeration value="14.06"/>
            <xsd:enumeration value="14.07"/>
            <xsd:enumeration value="14.08"/>
            <xsd:enumeration value="14.09"/>
            <xsd:enumeration value="14.10"/>
            <xsd:enumeration value="16.01"/>
            <xsd:enumeration value="16.02"/>
            <xsd:enumeration value="16.03"/>
            <xsd:enumeration value="16.04"/>
            <xsd:enumeration value="16.05"/>
            <xsd:enumeration value="16.06"/>
            <xsd:enumeration value="16.07"/>
            <xsd:enumeration value="16.08"/>
            <xsd:enumeration value="16.09"/>
            <xsd:enumeration value="89.01"/>
            <xsd:enumeration value="89.02"/>
            <xsd:enumeration value="89.03"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.180 Record Subtype Mnemonic (Simple)

```
<xsd:simpleType name="Record_subtype_mnemonic">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="[ALHDREC.01]"/>
            <xsd:enumeration value="[ALHDREC.02]"/>
            <xsd:enumeration value="[ALHDREC.03]"/>
            <xsd:enumeration value="[DSHDREC.01]"/>
            <xsd:enumeration value="[DSHDREC.02]"/>
            <xsd:enumeration value="[DSHDREC.03]"/>
            <xsd:enumeration value="[DSHDREC.04]"/>
            <xsd:enumeration value="[DSHDREC.05]"/>
            <xsd:enumeration value="[DSHDREC.06]"/>
            <xsd:enumeration value="[DSHDREC.07]"/>
            <xsd:enumeration value="[SRCEREC.01]"/>
            <xsd:enumeration value="[SRCEREC.02]"/>
            <xsd:enumeration value="[SRCEREC.03]"/>
            <xsd:enumeration value="[SRCEREC.04]"/>
            <xsd:enumeration value="[SRCEREC.06]"/>
            <xsd:enumeration value="[SRCEREC.07]"/>
            <xsd:enumeration value="[SRCEREC.08]"/>
            <xsd:enumeration value="[SRCEREC.09]"/>
            <xsd:enumeration value="[SRCEREC.10]"/>
            <xsd:enumeration value="[SECHREC.01]"/>
            <xsd:enumeration value="[SECHREC.02]"/>
            <xsd:enumeration value="[SECHREC.03]"/>
            <xsd:enumeration value="[SECHREC.04]"/>
            <xsd:enumeration value="[SECHREC.05]"/>
            <xsd:enumeration value="[SECHREC.06]"/>
            <xsd:enumeration value="[SECHREC.07]"/>
            <xsd:enumeration value="[SECHREC.08]"/>
            <xsd:enumeration value="[SECHREC.09]"/>
            <xsd:enumeration value="[UPDIREC.01]"/>
            <xsd:enumeration value="[UPDIREC.02]"/>
            <xsd:enumeration value="[UPDIREC.03]"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.181 Record Subtype Record Name (Simple)

```
<xsd:simpleType name="Record_subtype_rec_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Album Header Record"/>
            <xsd:enumeration value="Album Header Record"/>
            <xsd:enumeration value="Album Header Record"/>
            <xsd:enumeration value="Dataset Header Record"/>
            <xsd:enumeration value="Dataset Header Record"/>
            <xsd:enumeration value="Dataset Header Record"/>
            <xsd:enumeration value="Dataset Header Record"/>
            <xsd:enumeration value="Dataset Header Record"/>
            <xsd:enumeration value="Dataset Header Record"/>
            <xsd:enumeration value="Dataset Header Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Source Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Section Header Record"/>
            <xsd:enumeration value="Update Information Record"/>
            <xsd:enumeration value="Update Information Record"/>
            <xsd:enumeration value="Update Information Record"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.182 Relationship Code Name (Simple)

```
<xsd:simpleType name="Rel_code_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Road Element Associated with Administrative Area"/>
            <xsd:enumeration value="Junction Associated with Administrative Area"/>
            <xsd:enumeration value="Road Element Associated with Named Area"/>
            <xsd:enumeration value="Building Associated with Administrative Area"/>
            <xsd:enumeration value="Service Associated with Administrative Area"/>
            <xsd:enumeration value="Built-up Area Associated with Administrative Area"/>
            <xsd:enumeration value="Ferry Connection Associated with Administrative Area"/>
            <xsd:enumeration value="District Associated with Administrative Area"/>
            <xsd:enumeration value="Enclosed Traffic Area Associated with Administrative Area"/>
            <xsd:enumeration value="Road Element Associated with Built-up Area"/>
            <xsd:enumeration value="Junction Associated with Built-up Area"/>
            <xsd:enumeration value="Ferry Connection Associated with Named Area"/>
            <xsd:enumeration value="Service Associated with Named Area"/>
            <xsd:enumeration value="Building Associated with Built-up Area"/>
            <xsd:enumeration value="Service Associated with Built-up Area"/>
            <xsd:enumeration value="Enclosed Traffic Area Associated with Built-up Area"/>
            <xsd:enumeration value="District Associated with Built-up Area"/>
            <xsd:enumeration value="Road Element Associated with District"/>
            <xsd:enumeration value="Ferry Connection Associated with Built-up Area"/>
            <xsd:enumeration value="Building along Road Element"/>
            <xsd:enumeration value="Service along Road Element"/>
            <xsd:enumeration value="Service along Road"/>
            <xsd:enumeration value="Service at Junction"/>
            <xsd:enumeration value="Service at Intersection"/>
            <xsd:enumeration value="Service related to Service"/>
            <xsd:enumeration value="Road Element leading to Enclosed Traffic Area"/>
            <xsd:enumeration value="Road Element belonging to Service"/>
            <xsd:enumeration value="Centre Point of Feature belonging to Feature"/>
            <xsd:enumeration value="Divided Junction"/>
            <xsd:enumeration value="Building associated with Service"/>
            <xsd:enumeration value="Building Façade associated with Building"/>
            <xsd:enumeration value="Building Unit associated with Building"/>
            <xsd:enumeration value="Building Unit linked to Street"/>
            <xsd:enumeration value="Building related to building"/>
            <xsd:enumeration value="Restricted Manoeuvre"/>
            <xsd:enumeration value="Prohibited Manoeuvre"/>
            <xsd:enumeration value="Priority Manoeuvre"/>
            <xsd:enumeration value="Right of Way Regulation"/>
            <xsd:enumeration value="Through Route"/>
            <xsd:enumeration value="Fork"/>
            <xsd:enumeration value="Give Way Regulation"/>
            <xsd:enumeration value="Traffic Light Regulation"/>
            <xsd:enumeration value="Connectivity"/>
            <xsd:enumeration value="Signpost Information"/>
            <xsd:enumeration value="Exit at Interchange"/>
            <xsd:enumeration value="Toll Route"/>
            <xsd:enumeration value="Grade Separated Crossing"/>
            <xsd:enumeration value="Traffic Sign along Road Element"/>
            <xsd:enumeration value="Traffic Light along Road Element"/>
            <xsd:enumeration value="Overhead Structure along Road Element"/>
            <xsd:enumeration value="Pedestrian Crossing along Road Element"/>
            <xsd:enumeration value="Place within Place"/>
            <xsd:enumeration value="Linear Assignment"/>
            <xsd:enumeration value="Multi-Point Assignment"/>
            <xsd:enumeration value="Exclusive Multi-Pont Assignment"/>
            <xsd:enumeration value="Pedestrian Square Connected to Pedestrian Crossing"/>
            <xsd:enumeration value="Pedestrian Crossing Has Entry Point"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.183 Relationship Code Value (Simple)

```
<xsd:simpleType name="Rel_code_value">
    <xsd:restriction base="Four_digit_int">
            <xsd:minInclusive value="1000"/>
            <xsd:maxInclusive value="8999"/>
            <xsd:enumeration value="1001"/>
            <xsd:enumeration value="1002"/>
            <xsd:enumeration value="1003"/>
            <xsd:enumeration value="1005"/>
            <xsd:enumeration value="1006"/>
            <xsd:enumeration value="1007"/>
            <xsd:enumeration value="1008"/>
            <xsd:enumeration value="1009"/>
            <xsd:enumeration value="1010"/>
            <xsd:enumeration value="1011"/>
            <xsd:enumeration value="1012"/>
            <xsd:enumeration value="1013"/>
            <xsd:enumeration value="1014"/>
            <xsd:enumeration value="1015"/>
            <xsd:enumeration value="1016"/>
            <xsd:enumeration value="1017"/>
            <xsd:enumeration value="1018"/>
            <xsd:enumeration value="1019"/>
            <xsd:enumeration value="1020"/>
            <xsd:enumeration value="1021"/>
            <xsd:enumeration value="1022"/>
            <xsd:enumeration value="1023"/>
            <xsd:enumeration value="1024"/>
            <xsd:enumeration value="1025"/>
            <xsd:enumeration value="1026"/>
            <xsd:enumeration value="1027"/>
            <xsd:enumeration value="1028"/>
            <xsd:enumeration value="1029"/>
            <xsd:enumeration value="1030"/>
            <xsd:enumeration value="1040"/>
            <xsd:enumeration value="1041"/>
            <xsd:enumeration value="1042"/>
            <xsd:enumeration value="1043"/>
            <xsd:enumeration value="1044"/>
            <xsd:enumeration value="2102"/>
            <xsd:enumeration value="2103"/>
            <xsd:enumeration value="2104"/>
            <xsd:enumeration value="2105"/>
            <xsd:enumeration value="2106"/>
            <xsd:enumeration value="2108"/>
            <xsd:enumeration value="2109"/>
            <xsd:enumeration value="2110"/>
            <xsd:enumeration value="2128"/>
            <xsd:enumeration value="2129"/>
            <xsd:enumeration value="2140"/>
            <xsd:enumeration value="2200"/>
            <xsd:enumeration value="2300"/>
            <xsd:enumeration value="2305"/>
            <xsd:enumeration value="2310"/>
            <xsd:enumeration value="2315"/>
            <xsd:enumeration value="2400"/>
            <xsd:enumeration value="4800"/>
            <xsd:enumeration value="4801"/>
            <xsd:enumeration value="4802"/>
            <xsd:enumeration value="6010"/>
            <xsd:enumeration value="6020"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.184 Three Split Indicator Name (Simple)

```
<xsd:simpleType name="Three_split_ind_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="entire feature"/>
            <xsd:enumeration value="part of split feature"/>
            <xsd:enumeration value="repeated definition"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.185 Three Split Indicator Value (Simple)

```
<xsd:simpleType name="Three_split_ind_value">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="2"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.186 Two Split Indicator Name (Simple)

```
<xsd:simpleType name="Two_split_ind_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="entire feature"/>
            <xsd:enumeration value="part of split feature"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.187 Vertical Datum Name (Simple)

```
<xsd:simpleType name="Vert_datum_name">
    <xsd:restriction base="xsd:string">
            <xsd:maxLength value="50"/>
            <xsd:enumeration value="Adjusted MSL 1891, Denmark"/>
            <xsd:enumeration value="Alicante, 187072, Spain"/>
            <xsd:enumeration value="Belfast, Ireland"/>
            <xsd:enumeration value="Berlin, Germany"/>
            <xsd:enumeration value="Brussels, Belgium"/>
            <xsd:enumeration value="Cagliari 1956, Sardinia"/>
            <xsd:enumeration value="Cascais 18811938, Portugal"/>
            <xsd:enumeration value="Constanta, Rumania"/>
            <xsd:enumeration value="Dansk N.N., Denmark"/>
            <xsd:enumeration value="Dublin Bay, Ireland"/>
            <xsd:enumeration value="Durres, Albania"/>
            <xsd:enumeration value="Errits, Denmark"/>
            <xsd:enumeration value="Genoa 1942, Italy"/>
            <xsd:enumeration value="Helsinki, Finland"/>
            <xsd:enumeration value="Irish Ordnance Datum (Poolbeg), Ireland"/>
            <xsd:enumeration value="Isle of Man Ordnance Datum, Great Britain"/>
            <xsd:enumeration value="Kavala, Greece"/>
            <xsd:enumeration value="Klaipeda (Memel), Lithuania"/>
            <xsd:enumeration value="Malin Head, Ireland"/>
            <xsd:enumeration value="Marseille 188596, France"/>
            <xsd:enumeration value="Jeddah 1972, Saudi Arabia"/>
            <xsd:enumeration value="Mediterranean, Italy (oldnet)"/>
            <xsd:enumeration value="NADAP I, Hungary"/>
            <xsd:enumeration value="NADAP II, Hungary"/>
            <xsd:enumeration value="Narvik, Norway"/>
            <xsd:enumeration value="Nord Norges Normal Null (NNN), Norway"/>
            <xsd:enumeration value="Norges Normal Null, Norway"/>
            <xsd:enumeration value="Normaal Amsterdams Peil (NAP), Netherlands"/>
            <xsd:enumeration value="Normal Null (NN), Germany"/>
            <xsd:enumeration value="Normalh*hen (NH) System 1960, East Germany"/>
            <xsd:enumeration value="Ordnance Datum (Lerwick), Shetland Islands, Gr. Britain"/>
            <xsd:enumeration value="Ordnance Datum (Liverpool), Great Britain"/>
            <xsd:enumeration value="Ordnance Datum (Newlyn), 1921 Great Britain"/>
            <xsd:enumeration value="Ordnance Datum (Stornoway), Outer Herbrides, GR. Britain"/>
            <xsd:enumeration value="Ostende, Belgium"/>
            <xsd:enumeration value="Pierre du Niton, geneva, Switzerland"/>
            <xsd:enumeration value="Reykjavik, Iceland"/>
            <xsd:enumeration value="Split, Yugoslavia"/>
            <xsd:enumeration value="Stockholm, Sweden"/>
            <xsd:enumeration value="Tallin (Reval), Estonia"/>
            <xsd:enumeration value="Thessaloniki, Greece"/>
            <xsd:enumeration value="Torun, Poland"/>
            <xsd:enumeration value="Tregde, Norway"/>
            <xsd:enumeration value="Trieste 1875 (Italy), Austria, Czechosl., Hung., Yugosl."/>
            <xsd:enumeration value="Varna, Bulgaria"/>
            <xsd:enumeration value="General levelling, France"/>
            <xsd:enumeration value="Relative Ordinal"/>
            <xsd:enumeration value="Relative Metric"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.188 Vertical Datum Value (Simple)

```
<xsd:simpleType name="Vert_datum_value">
    <xsd:restriction base="xsd:string">
            <xsd:length value="2"/>
            <xsd:enumeration value="AE"/>
            <xsd:enumeration value="AK"/>
            <xsd:enumeration value="BK"/>
            <xsd:enumeration value="BO"/>
            <xsd:enumeration value="CA"/>
            <xsd:enumeration value="CE"/>
            <xsd:enumeration value="CM"/>
            <xsd:enumeration value="DD"/>
            <xsd:enumeration value="DI"/>
            <xsd:enumeration value="DS"/>
            <xsd:enumeration value="EA"/>
            <xsd:enumeration value="ED"/>
            <xsd:enumeration value="EI"/>
            <xsd:enumeration value="EP"/>
            <xsd:enumeration value="FN"/>
            <xsd:enumeration value="FP"/>
            <xsd:enumeration value="GA"/>
            <xsd:enumeration value="GF"/>
            <xsd:enumeration value="HQ"/>
            <xsd:enumeration value="HT"/>
            <xsd:enumeration value="JD"/>
            <xsd:enumeration value="JG"/>
            <xsd:enumeration value="KI"/>
            <xsd:enumeration value="KJ"/>
            <xsd:enumeration value="KL"/>
            <xsd:enumeration value="KP"/>
            <xsd:enumeration value="KQ"/>
            <xsd:enumeration value="KR"/>
            <xsd:enumeration value="KS"/>
            <xsd:enumeration value="KT"/>
            <xsd:enumeration value="LE"/>
            <xsd:enumeration value="LF"/>
            <xsd:enumeration value="LG"/>
            <xsd:enumeration value="LH"/>
            <xsd:enumeration value="LI"/>
            <xsd:enumeration value="LL"/>
            <xsd:enumeration value="NC"/>
            <xsd:enumeration value="PB"/>
            <xsd:enumeration value="PF"/>
            <xsd:enumeration value="PO"/>
            <xsd:enumeration value="QA"/>
            <xsd:enumeration value="QG"/>
            <xsd:enumeration value="QI"/>
            <xsd:enumeration value="QJ"/>
            <xsd:enumeration value="QO"/>
            <xsd:enumeration value="RG"/>
            <xsd:enumeration value="RO"/>
            <xsd:enumeration value="RM"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.189 Z Reference Name (Simple)

```
<xsd:simpleType name="Zref_name">
    <xsd:restriction base="xsd:string">
            <xsd:maxLength value="50"/>
            <xsd:enumeration value="implied by coordinates"/>
            <xsd:enumeration value="achieved via edge levels"/>
            <xsd:enumeration value="achieved via relationship Grade-separated crossing"/>
            <xsd:enumeration value="no height level referencing"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.190 Z Reference Value (Simple)

```
<xsd:simpleType name="Zref_value">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="3"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.191 Grid Orientation Name ID (Simple)

```
<xsd:simpleType name="Grid_ort_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="normal Cartesian"/>
            <xsd:enumeration value="reverse Cartesian"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.192 One Digit Integer (Simple)

```
<xsd:simpleType name="One_digit_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="9"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.193 One Digit Signed Integer (Simple)

```
<xsd:simpleType name="One_digit_signed_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="-9"/>
            <xsd:maxInclusive value="9"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.194 Two Digit Integer (Simple)

```
<xsd:simpleType name="Two_digit_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="99"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.195 Three Digit Integer (Simple)

```
<xsd:simpleType name="Three_digit_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.196 Four Digit Integer (Simple)

```
<xsd:simpleType name="Four_digit_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="9999"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.197 Four Digit Signed Integer (Simple)

```
<xsd:simpleType name="Four_digit_signed_int">
    <xsd:restriction base="xsd:integer">
        <xsd:minInclusive value="-9999"/>
        <xsd:maxInclusive value="9999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.198 Four Digit Code (Simple)

```
<xsd:simpleType name="Four_digit_code">
    <xsd:restriction base="Four_digit_int">
        <xsd:totalDigits value="4"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.199 Five Status Value (Simple)

```
<xsd:simpleType name="Five_status_value">
    <xsd:restriction base="xsd:integer">
        <xsd:minInclusive value="1"/>
        <xsd:maxInclusive value="5"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.200 Eight Digit Integer (Simple)

```
<xsd:simpleType name="Eight_digit_int">
    <xsd:restriction base="xsd:integer">
        <xsd:minInclusive value="0"/>
        <xsd:maxInclusive value="99999999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.201 Nine Digit Signed Integer (Simple)

```
<xsd:simpleType name="Nine_digit_signed_int">
    <xsd:restriction base="xsd:integer">
        <xsd:minInclusive value="-9999999999"/>
        <xsd:maxInclusive value="9999999999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.202 Ten Digit Latitude (Simple)

```
<xsd:simpleType name="Ten_digit_lat">
    <xsd:restriction base="xsd:integer">
        <xsd:minInclusive value="-90000000"/>
        <xsd:maxInclusive value="+90000000"/>
        <xsd:totalDigits value="10"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.203 Ten Digit Longitude (Simple)

```
<xsd:simpleType name="Ten_digit_long">
    <xsd:restriction base="xsd:integer">
        <xsd:minInclusive value="-180000000"/>
        <xsd:maxInclusive value="+180000000"/>
        <xsd:totalDigits value="10"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.204 Ten Digit Integer (Simple)

```
<xsd:simpleType name="Ten_digit_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="9999999999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.205 Ten Digit Signed Integer (Simple)

```
<xsd:simpleType name="Ten_digit_signed_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="-9999999999"/>
            <xsd:maxInclusive value="9999999999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.206 Ten Digit Time Coordinate (Simple)

```
<xsd:simpleType name="Ten_digit_t_coord">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1000010100"/>
            <xsd:maxInclusive value="9999123123"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.207 Eight Digit Time Coordinate (Simple)

```
<xsd:simpleType name="Eight_digit_t_coord">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="10000101"/>
            <xsd:maxInclusive value="99991231"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.208 Eleven Digit Integer (Simple)

```
<xsd:simpleType name="Eleven_digit_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="99999999999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.209 Eleven Digit Coordinate (Simple)

```
<xsd:simpleType name="Eleven_digit_coord">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="-9999999999"/>
            <xsd:maxInclusive value="9999999999"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.210 Twelve Digit Integer (Simple)

```
<xsd:simpleType name="Twelve_digit_int">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="0"/>
            <xsd:maxInclusive value="999999999999"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.211 Object Reference Type (Simple)

```
<xsd:simpleType name="Obj_ref_typ">
    <xsd:restriction base="xsd:string">
        <xsd:length value="1"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.212 Relationship Code (Simple)

```
<xsd:simpleType name="Rel_code">
    <xsd:restriction base="Four_digit_int">
        <xsd:minInclusive value="1000"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.213 Attribute Type Code String (Simple)

```
<xsd:simpleType name="Attr_type_code_string">
    <xsd:restriction base="xsd:string">
        <xsd:length value="2"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.214 Attribute Value String (Simple)

```
<xsd:simpleType name="Attr_val_string">
    <xsd:restriction base="xsd:string">
        <xsd:length value="11"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.215 Feature Code Name (Simple)

```
<xsd:simpleType name="Feature_code_name">
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Supra-National Area"/>
        <xsd:enumeration value="Country"/>
        <xsd:enumeration value="Order-1 Area"/>
        <xsd:enumeration value="Order-2 Area"/>
        <xsd:enumeration value="Order-3 Area"/>
        <xsd:enumeration value="Order-4 Area"/>
        <xsd:enumeration value="Order-5 Area"/>
        <xsd:enumeration value="Order-6 Area"/>
        <xsd:enumeration value="Order-7 Area"/>
        <xsd:enumeration value="Order-8 Area"/>
        <xsd:enumeration value="Order-9 Area"/>
        <xsd:enumeration value="Administrative Place A"/>
        <xsd:enumeration value="Administrative Place B"/>
        <xsd:enumeration value="Administrative Place C"/>
        <xsd:enumeration value="Administrative Place D"/>
        <xsd:enumeration value="Administrative Place E"/>
        <xsd:enumeration value="Administrative Place F"/>
        <xsd:enumeration value="Administrative Place G"/>
        <xsd:enumeration value="Administrative Place H"/>
        <xsd:enumeration value="Administrative Place I"/>
        <xsd:enumeration value="Administrative Place J"/>
        <xsd:enumeration value="Administrative Place K"/>
        <xsd:enumeration value="Administrative Place L"/>
        <xsd:enumeration value="Administrative Place M"/>
        <xsd:enumeration value="Administrative Place N"/>
        <xsd:enumeration value="Administrative Place O"/>
        <xsd:enumeration value="Administrative Place P"/>
        <xsd:enumeration value="Administrative Place Q"/>
        <xsd:enumeration value="Administrative Place R"/>
        <xsd:enumeration value="Administrative Place S"/>
        <xsd:enumeration value="Administrative Place T"/>
        <xsd:enumeration value="Administrative Place U"/>
        <xsd:enumeration value="Administrative Place V"/>
        <xsd:enumeration value="Administrative Place W"/>
```

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```
<xsd:enumeration value="Administrative Place X"/>
<xsd:enumeration value="Administrative Place Y"/>
<xsd:enumeration value="Administrative Place Z"/>
<xsd:enumeration value="Administrative Boundary Junction"/>
<xsd:enumeration value="Administrative Boundary Element"/>
<xsd:enumeration value="Built-up Area"/>
<xsd:enumeration value="Named Area"/>
<xsd:enumeration value="Police District"/>
<xsd:enumeration value="Emergency Medical Dispatch District"/>
<xsd:enumeration value="School District"/>
<xsd:enumeration value="Census District"/>
<xsd:enumeration value="Fire Dispatch District"/>
<xsd:enumeration value="Postal District"/>
<xsd:enumeration value="Phone District"/>
<xsd:enumeration value="Electoral District"/>
<xsd:enumeration value="Boundary Junction"/>
<xsd:enumeration value="Boundary Element"/>
<xsd:enumeration value="Road Element"/>
<xsd:enumeration value="Pathway"/>
<xsd:enumeration value="Junction"/>
<xsd:enumeration value="Ferry Connection"/>
<xsd:enumeration value="Enclosed Traffic Area"/>
<xsd:enumeration value="Road"/>
<xsd:enumeration value="Intersection"/>
<xsd:enumeration value="Ferry"/>
<xsd:enumeration value="Address Area"/>
<xsd:enumeration value="Address Area Boundary Element"/>
<xsd:enumeration value="Aggregated Way"/>
<xsd:enumeration value="Interchange"/>
<xsd:enumeration value="Roundabout"/>
<xsd:enumeration value="Railway Element"/>
<xsd:enumeration value="Railway Element Junction"/>
<xsd:enumeration value="Water Body"/>
<xsd:enumeration value="Water Boundary Element"/>
<xsd:enumeration value="Water Boundary Junction"/>
<xsd:enumeration value="Inland Water"/>
<xsd:enumeration value="Reservoir"/>
<xsd:enumeration value="Lake"/>
<xsd:enumeration value="Water Course"/>
<xsd:enumeration value="Canal"/>
<xsd:enumeration value="River"/>
<xsd:enumeration value="Marine Water"/>
<xsd:enumeration value="Coastal Lagoon"/>
<xsd:enumeration value="Estuary"/>
<xsd:enumeration value="Sea and Ocean"/>
<xsd:enumeration value="Linear Datum"/>
<xsd:enumeration value="Anchor Point"/>
<xsd:enumeration value="Anchor Section"/>
<xsd:enumeration value="Path"/>
<xsd:enumeration value="Referent"/>
<xsd:enumeration value="TIN Surface"/>
<xsd:enumeration value="TIN Triangle"/>
<xsd:enumeration value="TIN Node"/>
<xsd:enumeration value="TIN Breakline"/>
<xsd:enumeration value="TIN Stopline"/>
<xsd:enumeration value="Contour Line"/>
<xsd:enumeration value="Contour Line Area"/>
<xsd:enumeration value="Contour Line Point"/>
<xsd:enumeration value="Gridded Surface"/>
<xsd:enumeration value="Sidewalk"/>
<xsd:enumeration value="Building Façade"/>
<xsd:enumeration value="Town Block"/>
<xsd:enumeration value="Block Detail"/>
<xsd:enumeration value="Building Unit"/>
<xsd:enumeration value="Building Detail"/>
<xsd:enumeration value="Schematic Building"/>
<xsd:enumeration value="Building"/>
<xsd:enumeration value="Artificial Surface"/>
<xsd:enumeration value="Urban Fabric"/>
<xsd:enumeration value="Industrial, Commercial and Transport Unit"/>
<xsd:enumeration value="Mine, Dump and Construction Site"/>
<xsd:enumeration value="Artificial, Non-Agricultural Vegetation Area"/>
<xsd:enumeration value="Continuous Urban Fabric"/>
<xsd:enumeration value="Discontinuous Urban Fabric"/>
<xsd:enumeration value="Industrial or Commercial Unit"/>
```

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```
            <xsd:enumeration value="Road and Rail Network and Associated Land"/>
            <xsd:enumeration value="Wetland"/>
            <xsd:enumeration value="Inland Wetland"/>
            <xsd:enumeration value="Inland Marsh"/>
            <xsd:enumeration value="Peatbog"/>
            <xsd:enumeration value="Forested Wetland"/>
            <xsd:enumeration value="Coastal Wetland"/>
            <xsd:enumeration value="Salt Marsh"/>
            <xsd:enumeration value="Saline"/>
            <xsd:enumeration value="Intertidal Flat"/>
            <xsd:enumeration value="Pasture and Rangeland"/>
            <xsd:enumeration value="Port Area"/>
            <xsd:enumeration value="Airport Area"/>
            <xsd:enumeration value="Mineral Extraction Site"/>
            <xsd:enumeration value="Dump Site"/>
            <xsd:enumeration value="Construction Site"/>
            <xsd:enumeration value="Green Urban Area"/>
            <xsd:enumeration value="Sport And Leisure Facility"/>
            <xsd:enumeration value="Agricultural Area"/>
            <xsd:enumeration value="Arable Land"/>
            <xsd:enumeration value="Permanent Crop"/>
            <xsd:enumeration value="Pasture"/>
            <xsd:enumeration value="Rangeland"/>
            <xsd:enumeration value="Heterogeneous Agricultural Area"/>
            <xsd:enumeration value="Non-irrigated Arable Land"/>
            <xsd:enumeration value="Permanently Irrigated Land"/>
            <xsd:enumeration value="Rice Field"/>
            <xsd:enumeration value="Vineyard"/>
            <xsd:enumeration value="Forest"/>
            <xsd:enumeration value="Fruit Tree And Berry Plantation"/>
            <xsd:enumeration value="Olive Grove"/>
            <xsd:enumeration value="Annual Crop Associated With Permanent Crop"/>
            <xsd:enumeration value="Complex Cultivation Pattern"/>
            <xsd:enumeration value="Land Principally Occupied By Agriculture, With Significant Area Of
                                    Natural Vegetation"/>
            <xsd:enumeration value="Agro-Forestry Area"/>
            <xsd:enumeration value="Forest And Semi-Natural Area"/>
            <xsd:enumeration value="Forest"/>
            <xsd:enumeration value="Scrub And/Or Herbaceous Vegetation Association"/>
            <xsd:enumeration value="Open Space With Little Or No Vegetation"/>
            <xsd:enumeration value="Broad-Leaved Forest"/>
            <xsd:enumeration value="Coniferous Forest"/>
            <xsd:enumeration value="Mixed Forest"/>
            <xsd:enumeration value="Natural Grassland"/>
            <xsd:enumeration value="Moor And Heathland"/>
            <xsd:enumeration value="Sclerophyllous Vegetation"/>
            <xsd:enumeration value="Transitional Woodland Scrub"/>
            <xsd:enumeration value="Beach, Dune And Sand Plain"/>
            <xsd:enumeration value="Bare Rock"/>
            <xsd:enumeration value="Sparsely Vegetated Area"/>
            <xsd:enumeration value="Burnt Area"/>
            <xsd:enumeration value="Glaciers And Perpetual Snow"/>
            <xsd:enumeration value="Park/Garden"/>
            <xsd:enumeration value="Island"/>
            <xsd:enumeration value="Signpost"/>
            <xsd:enumeration value="Traffic Sign"/>
            <xsd:enumeration value="Traffic Light"/>
            <xsd:enumeration value="Pedestrian Crossing"/>
            <xsd:enumeration value="Complex Pedestrian Crossing"/>
            <xsd:enumeration value="Environmental Equipment"/>
            <xsd:enumeration value="Lighting"/>
            <xsd:enumeration value="Measurement Device"/>
            <xsd:enumeration value="Road Markings"/>
            <xsd:enumeration value="Safety Equipment"/>
            <xsd:enumeration value="Entry Point of Service"/>
            <xsd:enumeration value="Structure"/>
            <xsd:enumeration value="Centre Point of Feature"/>
            <xsd:enumeration value="Traffic Location"/>
            <xsd:enumeration value="Entry Point"/>
        </xsd:restriction>
    </xsd:simpleType>
```

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13.5.216 Feature Code Value (Simple)

```
<xsd:simpleType name="Feature_code_value">
    <xsd:restriction base="Four_digit_code">
            <xsd:minInclusive value="1000"/>
            <xsd:maxExclusive value="8100"/>
            <xsd:enumeration value="1110"/>
            <xsd:enumeration value="1111"/>
            <xsd:enumeration value="1112"/>
            <xsd:enumeration value="1113"/>
            <xsd:enumeration value="1114"/>
            <xsd:enumeration value="1115"/>
            <xsd:enumeration value="1116"/>
            <xsd:enumeration value="1117"/>
            <xsd:enumeration value="1118"/>
            <xsd:enumeration value="1119"/>
            <xsd:enumeration value="1120"/>
            <xsd:enumeration value="1165"/>
            <xsd:enumeration value="1166"/>
            <xsd:enumeration value="1167"/>
            <xsd:enumeration value="1168"/>
            <xsd:enumeration value="1169"/>
            <xsd:enumeration value="1170"/>
            <xsd:enumeration value="1171"/>
            <xsd:enumeration value="1172"/>
            <xsd:enumeration value="1173"/>
            <xsd:enumeration value="1174"/>
            <xsd:enumeration value="1175"/>
            <xsd:enumeration value="1176"/>
            <xsd:enumeration value="1177"/>
            <xsd:enumeration value="1178"/>
            <xsd:enumeration value="1179"/>
            <xsd:enumeration value="1180"/>
            <xsd:enumeration value="1181"/>
            <xsd:enumeration value="1182"/>
            <xsd:enumeration value="1183"/>
            <xsd:enumeration value="1184"/>
            <xsd:enumeration value="1185"/>
            <xsd:enumeration value="1186"/>
            <xsd:enumeration value="1187"/>
            <xsd:enumeration value="1188"/>
            <xsd:enumeration value="1189"/>
            <xsd:enumeration value="1190"/>
            <xsd:enumeration value="1198"/>
            <xsd:enumeration value="1199"/>
            <xsd:enumeration value="3110"/>
            <xsd:enumeration value="3120"/>
            <xsd:enumeration value="3131"/>
            <xsd:enumeration value="3132"/>
            <xsd:enumeration value="3133"/>
            <xsd:enumeration value="3134"/>
            <xsd:enumeration value="3135"/>
            <xsd:enumeration value="3136"/>
            <xsd:enumeration value="3137"/>
            <xsd:enumeration value="3138"/>
            <xsd:enumeration value="3198"/>
            <xsd:enumeration value="3199"/>
            <xsd:enumeration value="4110"/>
            <xsd:enumeration value="4115"/>
            <xsd:enumeration value="4120"/>
            <xsd:enumeration value="4130"/>
            <xsd:enumeration value="4135"/>
            <xsd:enumeration value="4140"/>
            <xsd:enumeration value="4145"/>
            <xsd:enumeration value="4150"/>
            <xsd:enumeration value="4160"/>
            <xsd:enumeration value="4165"/>
            <xsd:enumeration value="4170"/>
            <xsd:enumeration value="4180"/>
            <xsd:enumeration value="4190"/>
            <xsd:enumeration value="4210"/>
            <xsd:enumeration value="4220"/>
            <xsd:enumeration value="4310"/>
            <xsd:enumeration value="4330"/>
```

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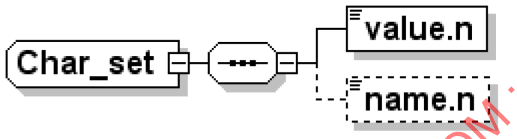
```
<xsd:enumeration value="4335"/>
<xsd:enumeration value="4350"/>
<xsd:enumeration value="4351"/>
<xsd:enumeration value="4352"/>
<xsd:enumeration value="4353"/>
<xsd:enumeration value="4354"/>
<xsd:enumeration value="4355"/>
<xsd:enumeration value="4370"/>
<xsd:enumeration value="4371"/>
<xsd:enumeration value="4372"/>
<xsd:enumeration value="4373"/>
<xsd:enumeration value="4810"/>
<xsd:enumeration value="4820"/>
<xsd:enumeration value="4830"/>
<xsd:enumeration value="4910"/>
<xsd:enumeration value="4920"/>
<xsd:enumeration value="6010"/>
<xsd:enumeration value="6020"/>
<xsd:enumeration value="6030"/>
<xsd:enumeration value="6040"/>
<xsd:enumeration value="6050"/>
<xsd:enumeration value="6060"/>
<xsd:enumeration value="6070"/>
<xsd:enumeration value="6075"/>
<xsd:enumeration value="6080"/>
<xsd:enumeration value="7103"/>
<xsd:enumeration value="7104"/>
<xsd:enumeration value="7105"/>
<xsd:enumeration value="7106"/>
<xsd:enumeration value="7107"/>
<xsd:enumeration value="7108"/>
<xsd:enumeration value="7109"/>
<xsd:enumeration value="7110"/>
<xsd:enumeration value="7111"/>
<xsd:enumeration value="7112"/>
<xsd:enumeration value="7113"/>
<xsd:enumeration value="7114"/>
<xsd:enumeration value="7115"/>
<xsd:enumeration value="7116"/>
<xsd:enumeration value="7117"/>
<xsd:enumeration value="7118"/>
<xsd:enumeration value="7119"/>
<xsd:enumeration value="7120"/>
<xsd:enumeration value="7121"/>
<xsd:enumeration value="7122"/>
<xsd:enumeration value="7123"/>
<xsd:enumeration value="7124"/>
<xsd:enumeration value="7125"/>
<xsd:enumeration value="7126"/>
<xsd:enumeration value="7127"/>
<xsd:enumeration value="7128"/>
<xsd:enumeration value="7129"/>
<xsd:enumeration value="7130"/>
<xsd:enumeration value="7131"/>
<xsd:enumeration value="7132"/>
<xsd:enumeration value="7133"/>
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<xsd:enumeration value="7135"/>
<xsd:enumeration value="7136"/>
<xsd:enumeration value="7137"/>
<xsd:enumeration value="7138"/>
<xsd:enumeration value="7139"/>
<xsd:enumeration value="7140"/>
<xsd:enumeration value="7141"/>
<xsd:enumeration value="7142"/>
<xsd:enumeration value="7143"/>
<xsd:enumeration value="7144"/>
<xsd:enumeration value="7145"/>
<xsd:enumeration value="7146"/>
<xsd:enumeration value="7147"/>
<xsd:enumeration value="7148"/>
<xsd:enumeration value="7149"/>
<xsd:enumeration value="7150"/>
<xsd:enumeration value="7152"/>
<xsd:enumeration value="7153"/>
```

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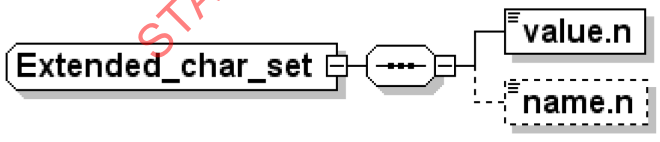
```
                <xsd:enumeration value="7154"/>
                <xsd:enumeration value="7155"/>
                <xsd:enumeration value="7156"/>
                <xsd:enumeration value="7157"/>
                <xsd:enumeration value="7158"/>
                <xsd:enumeration value="7159"/>
                <xsd:enumeration value="7160"/>
                <xsd:enumeration value="7161"/>
                <xsd:enumeration value="7162"/>
                <xsd:enumeration value="7163"/>
                <xsd:enumeration value="7164"/>
                <xsd:enumeration value="7165"/>
                <xsd:enumeration value="7166"/>
                <xsd:enumeration value="7167"/>
                <xsd:enumeration value="7168"/>
                <xsd:enumeration value="7169"/>
                <xsd:enumeration value="7170"/>
                <xsd:enumeration value="7180"/>
                <xsd:enumeration value="7210"/>
                <xsd:enumeration value="7220"/>
                <xsd:enumeration value="7230"/>
                <xsd:enumeration value="7240"/>
                <xsd:enumeration value="7245"/>
                <xsd:enumeration value="7251"/>
                <xsd:enumeration value="7252"/>
                <xsd:enumeration value="7253"/>
                <xsd:enumeration value="7254"/>
                <xsd:enumeration value="7255"/>
                <xsd:enumeration value="7300"/>
                <xsd:enumeration value="7500"/>
                <xsd:enumeration value="8000"/>
                <xsd:enumeration value="8001"/>
                <xsd:enumeration value="8002"/>
        </xsd:restriction>
</xsd:simpleType>
```

13.5.217 Character Set




```
<xsd:complexType name="Char_set">
        <xsd:sequence>
                <xsd:element name="value.n" type="Char_set_value"/>
                <xsd:element name="name.n" type="Char_set_name" minOccurs="0"/>
        </xsd:sequence>
</xsd:complexType>
```

13.5.218 Extended Character Set




```
<xsd:complexType name="Extended_char_set">
        <xsd:sequence>
                <xsd:element name="value.n" type="Ext_char_set_value"/>
                <xsd:element name="name.n" type="Ext_char_set_name" minOccurs="0"/>
        </xsd:sequence>
</xsd:complexType>
```

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13.5.219 Character Set Name (Simple)

```
<xsd:simpleType name="Char_set_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="ISO8859-1 (Latin-1: Western European)"/>
            <xsd:enumeration value="ISO8859-2 (Latin-2: Central European)"/>
            <xsd:enumeration value="ISO8859-3 (Latin-3: South European)"/>
            <xsd:enumeration value="ISO8859-4 (Latin-4: North European)"/>
            <xsd:enumeration value="ISO8859-5 (Cyrillic)"/>
            <xsd:enumeration value="ISO8859-6 (Arabic)"/>
            <xsd:enumeration value="ISO8859-7 (Greek)"/>
            <xsd:enumeration value="ISO8859-8 (Hebrew)"/>
            <xsd:enumeration value="ISO8859-9 (Latin-5: Turkish"/>
            <xsd:enumeration value="ISO8859-10 (Latin-6: Nordic)"/>
            <xsd:enumeration value="ISO8859-11 (Thai)"/>
            <xsd:enumeration value="ISO8859-13 (Latin-7: Baltic Rim)"/>
            <xsd:enumeration value="ISO8859-14 (Latin-8: Celtic)"/>
            <xsd:enumeration value="ISO8859-15 (Latin-9: later rework of Latin-1)"/>
            <xsd:enumeration value="ISO8859-16 (Latin-10: South-Eastern European)"/>
            <xsd:enumeration value="ISO/IEC10646 Annex D (Unicode - UTF-8)"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.220 Character Set Value (Simple)

```
<xsd:simpleType name="Char_set_value">
    <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1"/>
            <xsd:enumeration value="2"/>
            <xsd:enumeration value="3"/>
            <xsd:enumeration value="4"/>
            <xsd:enumeration value="5"/>
            <xsd:enumeration value="6"/>
            <xsd:enumeration value="7"/>
            <xsd:enumeration value="8"/>
            <xsd:enumeration value="9"/>
            <xsd:enumeration value="10"/>
            <xsd:enumeration value="11"/>
            <xsd:enumeration value="12"/>
            <xsd:enumeration value="13"/>
            <xsd:enumeration value="14"/>
            <xsd:enumeration value="15"/>
            <xsd:enumeration value="16"/>
            <xsd:enumeration value="30"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.221 Extended Character Set Name (Simple)

```
<xsd:simpleType name="Ext_char_set_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="ISO8859-1 (Latin-1: Western European)"/>
            <xsd:enumeration value="ISO8859-2 (Latin-2: Central European)"/>
            <xsd:enumeration value="ISO8859-3 (Latin-3: South European)"/>
            <xsd:enumeration value="ISO8859-4 (Latin-4: North European)"/>
            <xsd:enumeration value="ISO8859-5 (Cyrillic)"/>
            <xsd:enumeration value="ISO8859-6 (Arabic)"/>
            <xsd:enumeration value="ISO8859-7 (Greek)"/>
            <xsd:enumeration value="ISO8859-8 (Hebrew)"/>
            <xsd:enumeration value="ISO8859-9 (Latin-5: Turkish"/>
            <xsd:enumeration value="ISO8859-10 (Latin-6: Nordic)"/>
            <xsd:enumeration value="ISO8859-11 (Thai)"/>
            <xsd:enumeration value="ISO8859-13 (Latin-7: Baltic Rim)"/>
            <xsd:enumeration value="ISO8859-14 (Latin-8: Celtic)"/>
            <xsd:enumeration value="ISO8859-15 (Latin-9: later rework of Latin-1)"/>
            <xsd:enumeration value="ISO8859-16 (Latin-10: South-Eastern European)"/>
            <xsd:enumeration value="ISO/IEC10646 Annex D (Unicode - UTF-8)"/>
            <xsd:enumeration value="ISO/IEC10646 (Unicode - UCS-2"/>
            <xsd:enumeration value="ISO/IEC10646 (Unicode - UCS-2, big endian)"/>
            <xsd:enumeration value="Shift-JIS (Japanese)"/>
            <xsd:enumeration value="KSC-5601 (Korean)"/>
    </xsd:restriction>
</xsd:simpleType>
```

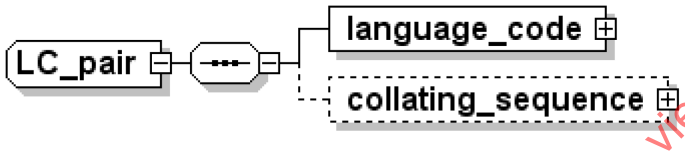
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13.5.222 Extended Character Set Value (Simple)

```
<xsd:simpleType name="Ext_char_set_value">
    <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1"/>
            <xsd:enumeration value="2"/>
            <xsd:enumeration value="3"/>
            <xsd:enumeration value="4"/>
            <xsd:enumeration value="5"/>
            <xsd:enumeration value="6"/>
            <xsd:enumeration value="7"/>
            <xsd:enumeration value="8"/>
            <xsd:enumeration value="9"/>
            <xsd:enumeration value="10"/>
            <xsd:enumeration value="11"/>
            <xsd:enumeration value="12"/>
            <xsd:enumeration value="13"/>
            <xsd:enumeration value="14"/>
            <xsd:enumeration value="15"/>
            <xsd:enumeration value="16"/>
            <xsd:enumeration value="30"/>
            <xsd:enumeration value="31"/>
            <xsd:enumeration value="32"/>
            <xsd:enumeration value="50"/>
            <xsd:enumeration value="51"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.223 Language Code Pair




```
<xsd:complexType name="LC_pair">
    <xsd:sequence>
            <xsd:element name="language_code" type="Lan_cod"/>
            <xsd:element name="collating_sequence" type="Lan_cod" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.224 Role Code Name (Simple)

```
<xsd:simpleType name="Role_code_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="resource provider"/>
            <xsd:enumeration value="custodian"/>
            <xsd:enumeration value="owner"/>
            <xsd:enumeration value="user"/>
            <xsd:enumeration value="distributor"/>
            <xsd:enumeration value="originator"/>
            <xsd:enumeration value="point of contact"/>
            <xsd:enumeration value="principal investigator"/>
            <xsd:enumeration value="processor"/>
            <xsd:enumeration value="publisher"/>
            <xsd:enumeration value="author"/>
    </xsd:restriction>
</xsd:simpleType>
```

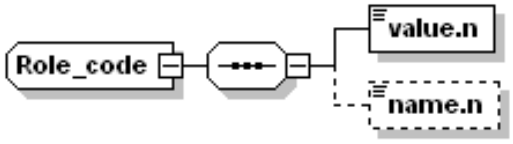
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13.5.225 Role Code Value (Simple)

```
<xsd:simpleType name="Role_code_value">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1"/>
            <xsd:maxInclusive value="11"/>
            <xsd:enumeration value="1"/>
            <xsd:enumeration value="2"/>
            <xsd:enumeration value="3"/>
            <xsd:enumeration value="4"/>
            <xsd:enumeration value="5"/>
            <xsd:enumeration value="6"/>
            <xsd:enumeration value="7"/>
            <xsd:enumeration value="8"/>
            <xsd:enumeration value="9"/>
            <xsd:enumeration value="10"/>
            <xsd:enumeration value="11"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.226 Role Code




```
<xsd:complexType name="Role_code">
    <xsd:sequence>
            <xsd:element name="value.n" type="Role_code_value"/>
            <xsd:element name="name.n" type="Role_code_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

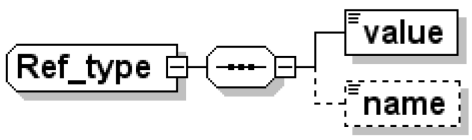
13.5.227 Reference Type Name (Simple)

```
<xsd:simpleType name="Ref_type_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Creation"/>
            <xsd:enumeration value="Publication"/>
            <xsd:enumeration value="Revision"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.228 Reference Type Value (Simple)

```
<xsd:simpleType name="Ref_type_value">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1"/>
            <xsd:maxInclusive value="3"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.229 Reference Type




```
<xsd:complexType name="Ref_type">
    <xsd:sequence>
            <xsd:element name="value" type="Ref_type_value"/>
            <xsd:element name="name" type="Ref_type_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

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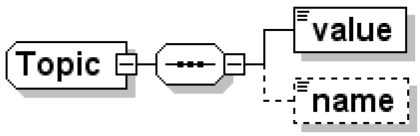
13.5.230 Topic Name (Simple)

```
<xsd:simpleType name="Topic_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="farming"/>
            <xsd:enumeration value="biota"/>
            <xsd:enumeration value="boundaries"/>
            <xsd:enumeration value="climatology/meteorology/atmosphere"/>
            <xsd:enumeration value="economy"/>
            <xsd:enumeration value="elevation"/>
            <xsd:enumeration value="environment"/>
            <xsd:enumeration value="geoscientific information"/>
            <xsd:enumeration value="health"/>
            <xsd:enumeration value="imagery base maps earth cover"/>
            <xsd:enumeration value="intelligenceMilitary"/>
            <xsd:enumeration value="inlandWaters"/>
            <xsd:enumeration value="location"/>
            <xsd:enumeration value="oceans"/>
            <xsd:enumeration value="planning cadastre"/>
            <xsd:enumeration value="society"/>
            <xsd:enumeration value="structure"/>
            <xsd:enumeration value="transportation"/>
            <xsd:enumeration value="utilities communication"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.231 Topic Value (Simple)

```
<xsd:simpleType name="Topic_value">
    <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1"/>
            <xsd:maxInclusive value="19"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.232 Topic




```
<xsd:complexType name="Topic">
    <xsd:sequence>
            <xsd:element name="value" type="Topic_value"/>
            <xsd:element name="name" type="Topic_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.233 Unit System Name (Simple)

```
<xsd:simpleType name="Unit_system_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Metric"/>
            <xsd:enumeration value="English"/>
    </xsd:restriction>
</xsd:simpleType>
```

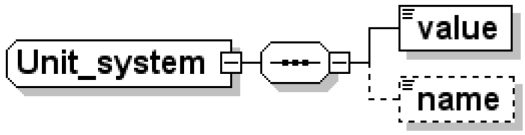
13.5.234 Unit System Value (Simple)

```
<xsd:simpleType name="Unit_system_value">
    <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1"/>
            <xsd:enumeration value="2"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.235 Unit System




```
<xsd:complexType name="Unit_system">
    <xsd:sequence>
        <xsd:element name="value" type="Unit_system_value"/>
        <xsd:element name="name" type="Unit_system_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.236 Attribute Code Lists

13.5.236.1 Administrative Boundary Type

13.5.236.1.1 Administrative Boundary Type Structure

```
<xsd:complexType name="Attr_BX_ENUM">
<!-- Administrative Boundary Type -->
    <xsd:sequence>
        <xsd:element name="value" type="Attr_BX_ENM_value"/>
        <xsd:element name="name" type="Attr_BX_ENM_name" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>
```

13.5.236.1.2 Administrative Boundary Type Name

```
<xsd:simpleType name="Attr_BX_ENM_name">
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Database Coverage Area Edge"/>
        <xsd:enumeration value="Supra-National"/>
        <xsd:enumeration value="Country"/>
        <xsd:enumeration value="Order-1 Administrative Area"/>
        <xsd:enumeration value="Order-2 Administrative Area"/>
        <xsd:enumeration value="Order-3 Administrative Area"/>
        <xsd:enumeration value="Order-4 Administrative Area"/>
        <xsd:enumeration value="Order-5 Administrative Area"/>
        <xsd:enumeration value="Order-6 Administrative Area"/>
        <xsd:enumeration value="Order-7 Administrative Area"/>
        <xsd:enumeration value="Order-8 Administrative Area"/>
        <xsd:enumeration value="Order-9 Administrative Area"/>
        <xsd:enumeration value="Administrative Place A"/>
        <xsd:enumeration value="Administrative Place B"/>
        <xsd:enumeration value="Administrative Place C"/>
        <xsd:enumeration value="Administrative Place D"/>
        <xsd:enumeration value="Administrative Place E"/>
        <xsd:enumeration value="Administrative Place F"/>
        <xsd:enumeration value="Administrative Place G"/>
        <xsd:enumeration value="Administrative Place H"/>
        <xsd:enumeration value="Administrative Place I"/>
        <xsd:enumeration value="Administrative Place J"/>
        <xsd:enumeration value="Administrative Place K"/>
        <xsd:enumeration value="Administrative Place L"/>
        <xsd:enumeration value="Administrative Place M"/>
        <xsd:enumeration value="Administrative Place N"/>
        <xsd:enumeration value="Administrative Place O"/>
        <xsd:enumeration value="Administrative Place P"/>
        <xsd:enumeration value="Administrative Place Q"/>
        <xsd:enumeration value="Administrative Place R"/>
        <xsd:enumeration value="Administrative Place S"/>
        <xsd:enumeration value="Administrative Place T"/>
        <xsd:enumeration value="Administrative Place U"/>
        <xsd:enumeration value="Administrative Place V"/>
        <xsd:enumeration value="Administrative Place W"/>
        <xsd:enumeration value="Administrative Place X"/>
        <xsd:enumeration value="Administrative Place Y"/>
        <xsd:enumeration value="Administrative Place Z"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.236.1.3 Administrative Boundary Type Value

```
<xsd:simpleType name="Attr_BX_ENM_value">
    <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="5"/>
            <xsd:enumeration value="10"/>
            <xsd:enumeration value="20"/>
            <xsd:enumeration value="21"/>
            <xsd:enumeration value="22"/>
            <xsd:enumeration value="23"/>
            <xsd:enumeration value="24"/>
            <xsd:enumeration value="25"/>
            <xsd:enumeration value="26"/>
            <xsd:enumeration value="27"/>
            <xsd:enumeration value="28"/>
            <xsd:enumeration value="29"/>
            <xsd:enumeration value="65"/>
            <xsd:enumeration value="66"/>
            <xsd:enumeration value="67"/>
            <xsd:enumeration value="68"/>
            <xsd:enumeration value="69"/>
            <xsd:enumeration value="70"/>
            <xsd:enumeration value="71"/>
            <xsd:enumeration value="72"/>
            <xsd:enumeration value="73"/>
            <xsd:enumeration value="74"/>
            <xsd:enumeration value="75"/>
            <xsd:enumeration value="76"/>
            <xsd:enumeration value="77"/>
            <xsd:enumeration value="78"/>
            <xsd:enumeration value="79"/>
            <xsd:enumeration value="80"/>
            <xsd:enumeration value="81"/>
            <xsd:enumeration value="82"/>
            <xsd:enumeration value="83"/>
            <xsd:enumeration value="84"/>
            <xsd:enumeration value="85"/>
            <xsd:enumeration value="86"/>
            <xsd:enumeration value="87"/>
            <xsd:enumeration value="88"/>
            <xsd:enumeration value="89"/>
            <xsd:enumeration value="90"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.236.2 Association Type

13.5.236.2.1 Association Type Structure

```
    <xsd:complexType name="Attr_AY_CODE">
<!-- Association Type -->
        <xsd:sequence>
            <xsd:element name="value" type="Attr_AY_COD_value"/>
            <xsd:element name="name" type="Attr_AY_COD_name" minOccurs="0"/>
        </xsd:sequence>
    </xsd:complexType>
```

13.5.236.2.2 Association Type Name

```
<xsd:simpleType name="Attr_AY_COD_name">
    <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Geographically Located In"/>
            <xsd:enumeration value="Commonly Associated With"/>
    </xsd:restriction>
</xsd:simpleType>
```

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13.5.236.2.3 Association Type Value

```
<xsd:simpleType name="Attr_AY_COD_value">
    <xsd:restriction base="xsd:integer">
        <xsd:enumeration value="1"/>
        <xsd:enumeration value="2"/>
    </xsd:restriction>
</xsd:simpleType>
```

13.5.236.3 Block Grouping

13.5.236.3.1 Block Grouping Structure

```
    <xsd:complexType name="Attr_BG_CODE">
<!-- Block Grouping -->
        <xsd:sequence>
            <xsd:element name="value" type="Attr_BG_COD_value"/>
            <xsd:element name="name" type="Attr_BG_COD_name" minOccurs="0"/>
        </xsd:sequence>
    </xsd:complexType>
```

13.5.236.3.2 Block Grouping Name

```
    <xsd:simpleType name="Attr_BG_COD_name">
        <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Group 1"/>
            <xsd:enumeration value="Group 2"/>
            <xsd:enumeration value="Group 3"/>
            <xsd:enumeration value="Group 4"/>
            <xsd:enumeration value="Group 5"/>
            <xsd:enumeration value="Group 6"/>
            <xsd:enumeration value="Group 7"/>
            <xsd:enumeration value="Group 8"/>
            <xsd:enumeration value="Group 9"/>
            <xsd:enumeration value="Group 10"/>
<!-- a break in the sequence occurs in the middle... -->
            <xsd:enumeration value="Group 90"/>
            <xsd:enumeration value="Group 91"/>
            <xsd:enumeration value="Group 92"/>
            <xsd:enumeration value="Group 93"/>
            <xsd:enumeration value="Group 94"/>
            <xsd:enumeration value="Group 95"/>
            <xsd:enumeration value="Group 96"/>
            <xsd:enumeration value="Group 97"/>
            <xsd:enumeration value="Group 98"/>
            <xsd:enumeration value="Group 99"/>
        </xsd:restriction>
    </xsd:simpleType>
```

13.5.236.3.3 Block Grouping Value

```
    <xsd:simpleType name="Attr_BG_COD_value">
        <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1"/>
            <xsd:enumeration value="2"/>
            <xsd:enumeration value="3"/>
            <xsd:enumeration value="4"/>
            <xsd:enumeration value="5"/>
            <xsd:enumeration value="6"/>
            <xsd:enumeration value="7"/>
            <xsd:enumeration value="8"/>
            <xsd:enumeration value="9"/>
            <xsd:enumeration value="10"/>
<!-- a break in the sequence occurs in the middle... -->
            <xsd:enumeration value="90"/>
            <xsd:enumeration value="91"/>
            <xsd:enumeration value="92"/>
            <xsd:enumeration value="93"/>
            <xsd:enumeration value="94"/>
            <xsd:enumeration value="95"/>
            <xsd:enumeration value="96"/>
            <xsd:enumeration value="97"/>
```

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```
                <xsd:enumeration value="98"/>
                <xsd:enumeration value="99"/>
            </xsd:restriction>
        </xsd:simpleType>
```

13.5.236.4 Block Type

13.5.236.4.1 Block Type Structure

```
        <xsd:complexType name="Attr_BO_CODE">
<!-- Block Type -->
            <xsd:sequence>
                <xsd:element name="value" type="Attr_BO_COD_value"/>
                <xsd:element name="name" type="Attr_BO_COD_name" minOccurs="0"/>
            </xsd:sequence>
        </xsd:complexType>
```

13.5.236.4.2 Block Type Name

```
        <xsd:simpleType name="Attr_BO_COD_name">
            <xsd:restriction base="xsd:string">
                <xsd:enumeration value="Sub-divisions Line"/>
                <xsd:enumeration value="Crossing Line"/>
            </xsd:restriction>
        </xsd:simpleType>
```

13.5.236.4.3 Block Type Value

```
        <xsd:simpleType name="Attr_BO_COD_value">
            <xsd:restriction base="xsd:integer">
                <xsd:enumeration value="1"/>
                <xsd:enumeration value="2"/>
            </xsd:restriction>
        </xsd:simpleType>
```

13.5.236.5 Blocked Passage Location

13.5.236.5.1 Blocked Passage Location Structure

```
        <xsd:complexType name="Attr_BP_CODE">
<!-- Blocked Passage Location -->
            <xsd:sequence>
                <xsd:element name="value" type="Attr_BP_COD_value"/>
                <xsd:element name="name" type="Attr_BP_COD_name" minOccurs="0"/>
            </xsd:sequence>
        </xsd:complexType>
```

13.5.236.5.2 Blocked Passage Location Name

```
        <xsd:simpleType name="Attr_BP_COD_name">
            <xsd:restriction base="xsd:string">
                <xsd:enumeration value="Physically Blocked at Start Junction"/>
                <xsd:enumeration value="Physically Blocked at End Junction"/>
                <xsd:enumeration value="Physically Blocked between Start and End Junction"/>
            </xsd:restriction>
        </xsd:simpleType>
```

13.5.236.5.3 Blocked Passage Location Value

```
        <xsd:simpleType name="Attr_BP_COD_value">
            <xsd:restriction base="xsd:integer">
                <xsd:enumeration value="1"/>
                <xsd:enumeration value="2"/>
                <xsd:enumeration value="3"/>
            </xsd:restriction>
        </xsd:simpleType>
```

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