GeoBase

National Road Network

Data Product Specifications

Edition 2.0.1

2012-03-31

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REVISION HISTORY

Date	Edition	Description
2003-01-10	1.0	Original version
2005-01-27	1.1	Modifications to 6.1.1 and 6.1.2
2007-05-31	2.0	Upgrade for NRN Edition 2.0 Adaptation to ISO-19131 : 2007 standards
2012-03-31	2.0.1	Modifications to section 2.1, 2.2, 2.4.3, 2.4.4, 2.4.4.2, 3.5, 3.7, and 6.1

These specifications are produced in accordance with *International Standard ISO/TC 211, 19131: 2007 Geographic Information / Geomatics – Data Product Specification*, which refers in particular to standard *ISO 19115: 2003 Geographic information – Metadata.*

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1   OVERVIEW

1.1 Title

National Road Network

1.2 Reference date

Creation date of the data product specifications:

2007-05-31

1.3   Responsible party

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1.4 Language

Languages in which the data product specifications are available in accordance with the ISO 639-2 standard:

eng – english

fra – french

1.5 Terms and definitions

Attribute
Characteristic of a feature. For example, number of lanes or pavement status.

Dataset
Data collection identifiable for a Canadian Province or Territory.

Entity
Digital representation of a real world phenomenon. For example, the digital representation of King Street is an entity.

Object
An object is an instance of a class.

1.6 Abbreviations and acronyms

CRSID   Coordinate Reference System Identifier

CCOG   Canadian Council on Geomatics

GDF   Geographic Data File

GML   Geography Markup Language

GPS   Global Positioning System

IACG   Inter-Agency Committee on Geomatics

ID   Identifier

ISO   International Organization for Standardization

KML   Keyhole Markup Language

NAD83CSRS   North American Datum 1983 (Canadian Spatial Reference System)

NID   National Identifier

NRCan   Natural Resources Canada

NRN   National Road Network

OGC   Open Geospatial Consortium

TC   Technical Committee

XML   Extensible Markup Language

1.7 Informal description of the data product

The National Road Network (NRN) product contains quality geospatial data (current, accurate, consistent and maintained) of Canadian road phenomena. The NRN product is distributed in the form of thirteen provincial or territorial datasets and consists of two linear entities (Road Segment and Ferry Connection Segment) and three punctual entities (Junction, Blocked Passage, Toll Point) with which is associated a series of descriptive attributes such as, among others: First House Number, Last House Number, Street Name Body, Place Name, Functional Road Class, Pavement Status, Number Of Lanes, Structure Type, Route Number, Route Name, Exit Number.

The maintenance of the NRN data is done within the framework of intergovernmental partnership agreements (federal, provincial, territorial and municipal) by interested closest to source governmental bodies capable of offering adequate and current representations of the road phenomena. The frequency of maintenance aimed is of at least one update a year. Data produced form a homogeneous and standardized view of the entire Canadian territory.

The NRN conceptual model was elaborated in collaboration with interested data providers and is adopted by the Canadian Council on Geomatics (CCOG). The standard ISO 14825 — *Intelligent transport systems — Geographic Data Files (GDF) — Overall data specification* served as a guide for the elaboration of the NRN conceptual model and catalogue. The NRN vocabulary used (class names, attribute names and definitions) largely conforms to the ISO 14825.

2   SPECIFICATION SCOPE

This section describes the scope referred to by information provided in subsequent sections which describe the product.

2.1 Scope identification

Global

Note: "Global" means that this scope refers to all parts of this data product specifications.

2.2 Level

This scope refers to the following level according to the ISO 19115 standard and CAN/CGSB - 171.100-2009 standards:

006 - series

2.3 Level name

NRN

2.4 Extent

This section describes the spatial and temporal extent of the scope.

2.4.1   Description

Canadian landmass

NRN data are seamless between datasets and form a continuous network over the Canadian landmass.

2.4.2   Vertical extent

The NRN data are two-dimensional. There is no elevation (z) associated with the data.

2.4.2.1   Minimum value

Not applicable

2.4.2.2   Maximum value

Not applicable

2.4.2.3   Unit of measure

Not applicable

2.4.2.4   Vertical datum

Not applicable

2.4.3   Horizontal extent

The geographic extent is given by the following geographic bounding box:

2.4.3.1   West bound longitude

-141.0

2.4.3.2   East bound longitude

-52.6

2.4.3.3   South bound latitude

+41.7

2.4.3.4   North bound latitude

+76.5

2.4.4   Temporal extent

The temporal extent is given by the following period of time:

2.4.4.1   Beginning date

1979-07

2.4.4.2   Ending date

Today

Note: "Now" means the current date of publication of an instance of the NRN. That is, an instance of the NRN may include the road network that is current at the time of publication.

3   DATA PRODUCT IDENTIFICATION

3.1 Title

National Road Network

3.2 Alternate title

NRN

3.3 Abstract

The NRN product is distributed in the form of thirteen provincial or territorial datasets and consists of two linear entities (Road Segment and Ferry Connection Segment) and three punctual entities (Junction, Blocked Passage, Toll Point) with which is associated a series of descriptive attributes such as, among others: First House Number, Last House Number, Street Name Body, Place Name, Functional Road Class, Pavement Status, Number Of Lanes, Structure Type, Route Number, Route Name, Exit Number.

The development of the NRN was realized by means of individual meetings and national workshops with interested data providers from the federal, provincial, territorial and municipal governments.

In 2005, the NRN edition 2.0 was alternately adopted by members from the Inter-Agency Committee on Geomatics (IACG) and the Canadian Council on Geomatics (CCOG). The NRN content largely conforms to the ISO 14825 from ISO/TC 204.

3.4 Purpose

The National Road Network (NRN) provides quality geospatial and attributive data (current, accurate, consistent), homogeneous and normalized of the entire Canadian road network.

The NRN data serve as a foundation for several applications. This common geometric base is maintained on a regular basis by closest to the source organizations selected for their specific interests or for their ease in offering adequate, up-to-date representations of road phenomena, in accordance with the GeoBase initiative (www.geobase.ca). This common infrastructure facilitates data integration of NRN data with supplementary data.

3.5 Topic category

Main topics for the product, as defined by the ISO 19115 standard or CAN/CGSB 171.100-2009:

013 – location

018 – transportation

3.6 Spatial representation type

Type of spatial representation for the product, as defined by the ISO 19115 standard:

001 - vector

3.7 Spatial resolution

Spatial resolution denominator of the data:

10 000

Note: The nominal spatial resolution is only a general estimate since the data originate from multiple sources (GPS, existing federal, provincial or municipal data) but is approximately 1:10 000.

3.8 Geographic description

3.8.1 Authority

International Organization for Standardization (ISO)

3.8.1.1 Title

Standard for codes of geographical regions:

ISO 3166-1:1997 Codes for the representation of names of countries and their subdivisions – Part 1: Country codes

3.8.1.2   Date

Reference date of the ISO 3166-1 standard:

1997-10-01

3.8.1.3   Date type code

Type of date according to ISO 19115 standard:

002 - publication

3.8.2   Code

Code of the geographical region covered by the product according to the ISO 3166-1 standard:

CA – Canada

3.8.3   Extent type code

Extent type code of the delimitation polygon according to the ISO 19115 standard:

1 - inclusive (the delimitation polygon is inclusive)

3.9 Reference to specification scope

Global

4   DATA CONTENT AND STRUCTURE

4.1 Description

The NRN product is distributed in the form of thirteen provincial or territorial datasets and consists of two linear entities (Road Segment and Ferry Connection Segment) and three punctual entities (Junction, Blocked Passage, Toll Point) with which is associated a series of descriptive attributes such as, among others: First House Number, Last House Number, Street Name Body, Place Name, Functional Road Class, Pavement Status, Number Of Lanes, Structure Type, Route Number, Route Name, Exit Number.

Addressing information (address range, street name and place name) linked to Road Segment entities are also distributed in three distinct tables (Address Range, Street and Place Names and Alternate Name Link).

4.2 Data modelling schema used

4.2.1   Application schema

The conceptual model of the NRN data is presented in the document *National Road Network, edition 2.0.1, Conceptual Data Model, Segmented View* accessible on the GeoBase portal (www.geobase.ca).

The physical implementation of the NRN product differs from the conceptual model in what concerned the management of object metadata and the addition of certain attributes to the entity Road Segment.

For the Object Metadata, the conceptual model foresees two distinct series of metadata attributes describing the respective sources used for the creation and the revision of the data. Only the creation and

revision dates were distinctly specified. When a revision date is indicated and a geometric modification was applied on the object (with regard to the previous dataset edition), the series of metadata attributes describes the sources used for revision. Otherwise, Object Metadata attributes describe the sources used for creation.

The street name, place name and address range were also added as attributes on the geometry of the entity Road Segment.

The document *National Road Network, edition 2.0.1, Product Distribution Formats* also demonstrates the implementation of the conceptual model into the physical model of the NRN data product according to the distribution formats GML, KML and Shape (www.geobase.ca).

4.2.2   Feature catalogue

The feature catalogue entitled *National Road Network, edition 2.0.1, Feature Catalogue* can be found on the GeoBase portal (www.geobase.ca).

4.3 Reference to specification scope

Global (see 2.1)

5   REFERENCE SYSTEM

5.1 Spatial reference system

Spatial data are expressed in latitude (φ) and longitude (λ) geographic coordinates in reference to the North American Datum 1983 Canadian Spatial Reference System (NAD83CSRS). The longitude is stored as a negative number to represent a position west of the prime meridian (0°). Coordinates measuring unit is the degree expressed as a 7-decimal real value.

5.1.1   Authority

5.1.1.1   Title

Coordinate reference system registry:

EPSG Geodetic Parameter Dataset

5.1.1.2   Date

Reference date:

2007-02-08

5.1.1.3   Date type code

Date type according to ISO 19115 standard:

002 - publication

5.1.1.4   Responsible party

OGP – International Organisation of Oil and Gas Producers
URL: http://www.epsg.org

5.1.2 Code

Coordinate reference system identifier (CRSID):

4617

5.1.3 Code space

EPSG – European Petroleum Survey Group

5.1.4 Version

6.12

5.2 Reference to specification scope

Global (see 2.1)

6 DATA QUALITY

6.1 Completeness

NRN product contains a quality geometric and attributive description (current, accurate, consistent), homogeneous and standardised of the entire Canadian road network.

NRN road representation corresponds to centerline of all non restricted usage roads (5 meters wide or more, drivable and not blocked by an obstacle). Roads isolated from the main road network, alleyways, resource and recreational roads and addressing information may not be included in some NRN datasets.

Note: Ferry connection segments are included in the NRN for the purpose of road network completeness.

6.1.1 Commission

Evaluation methods used for the detection of data in excess is determined by each data provider.

6.1.2 Omission

Evaluation methods used for the detection of missing data is determined by each data provider.

6.2 Logical consistency

6.2.1 Conceptual consistency

The conceptual model of the NRN data can be found in the document *National Road Network, edition 2.0.1, Conceptual Data Model, Segmented View* accessible on the GeoBase portal (www.geobase.ca).

The physical implementation of the NRN product differs from the conceptual model in what concerned the management of object metadata and the addition of certain attributes to the entity Road Segment.

For the Object Metadata, the conceptual model foresees two distinct series of metadata attributes describing the respective sources used for the creation and the revision of the data. Only the creation and revision dates were distinctly specified. When a revision date is indicated and a geometric modification was applied on the object (with regard to the previous dataset edition), the series of metadata attributes

describes the sources used for revision. Otherwise, Object Metadata attributes describe the sources used for creation.

The street name, place name and address range were also added as attributes on the geometry of the entity Road Segment.

6.2.2   Domain consistency

The attributive values are validated by means of an XML schema containing the definition of the authorized domain values defined in the feature catalogue.

Authorized combinations of attribute values are validated by means of in-house software.

6.2.3   Format consistency

The NRN data formats conform to the distribution formats described in the document *National Road Network, edition 2.0.1, Product Distribution Formats* accessible on the GeoBase portal (www.geobase.ca).

6.2.4   Topological consistency

The spatial relations of the entities of NRN datasets are systematically validated by means of in-house software.

The validation performed consists in detecting and correcting within reasonable measures: duplication of entities, connection and valency between the linear and punctual entities, assignment of identifiers (NID), geometrical incoherence ("spikes") and network continuity of route number, route name, street name and address ranges.

6.3 Positional accuracy

6.3.1   Absolute external positional accuracy

The geometric accuracy of objects is given as the difference between objects position in the dataset and their real ground positions measured in reference to the geodetic network. The accuracy may vary from one object to another. It is thus provided in attribute with each feature occurrence and is expressed according to the Circular Map Accuracy Standard (CMAS).

Standard Circular Error: $\sigma_c = 0.7071\ (\sigma_x^2 + \sigma_y^2)^{1/2}$
σ_x : standard deviation in the X-axis
σ_y : standard deviation in the Y-axis

Circular Map Accuracy Standard: CMAS = 2.1460 σ_c

The planimetric accuracy aimed for the product is 10 meters or better. Under the data maintenance phase, no systematic validation of geometric and attributive accuracies is performed on all NRN datasets.

Data accuracy is evaluated according to the methods used to control acquisition sources (GPS, imagery, photogrammetry, etc.) and the positioning errors inherent to data extraction. The method for evaluating data accuracy is determined by the data provider.

6.3.2   Relative internal positional accuracy

Unknown

6.4 Temporal accuracy

6.4.1   Accuracy of a time measurement

Not applicable

6.4.2   Temporal consistency

Not applicable

6.4.3   Temporal validity

Not applicable

6.5 Thematic accuracy

6.5.1   Thematic classification correctness

Unknown

6.5.2   Non quantitative attribute accuracy

The method used for evaluating the accuracy of the non quantitative attribute values with respect to reality is determined by each data provider.

6.5.3   Quantitative attribute accuracy

The method used for evaluating the accuracy of the quantitative attribute values with respect to reality is determined by each data provider.

6.6 Reference to specification scope

Global (see 2.1)

7   DATA CAPTURE

7.1 Description

The method used for data acquisition is determined by each data provider. The selected method must allow for the acquisition of quality geospatial data (current, accurate, consistent) for the entire dataset. Many acquisition sources are used: GPS, orthoimages, orthophotos, photogrammetry.

Acquisition technique used by the provider is indicated in the object metadata associated with each entity occurrences.

7.2 Reference to specification scope

Global (see 2.1)

8   DATA MAINTENANCE

8.1 Description

Maintenance of the NRN data is done within the framework of intergovernmental partnership agreements (federal, provincial, territorial and municipal) by interested closest to source governmental bodies capable of offering adequate and current representations of the road phenomena. The minimal frequency of maintenance updates is of at least once a year.

In order to help NRN data users in their management of the various update releases, updates are packaged and distributed by change effects (addition, retirement, modification, confirmation). By proceeding in this fashion, identification rules as well as methods for classifying the modifications are established.

Identification rules on how to unequivocally identify entity occurrences are defined in the document entitled *National Vector Data – Identification Rules* available on the GeoBase portal (www.geobase.ca).

The methods for classifying updates by change effects (addition, retirement, modification and confirmation) are defined in the document *National Vector data – Change Management* available on the GeoBase portal (www.geobase.ca).

8.2 Reference to specification scope

Global

9   DATA PRODUCT DELIVERY

Output file formats available for the product are: GML (*Geography Markup Language*), KML (*Keyhole Markup Language*) and SHAPE (ESRI[TM]).

Note: Data files distributed in KML format only contain the entity Road Segment and a subset of attributes.

9.1 Delivery format information on GML

9.1.1   Format name

GML – Geography Markup Language

9.1.2   Version

2.1.2

9.1.3   Specification

Geography Markup Language – GML – 2.1.2, OpenGIS® Implementation Specifications, 17 September 2002, OGC Document Number 02-069 (http://portal.opengeospatial.org/files/?artifact_id=11339)

9.1.4   Language

Languages used in the dataset according to ISO 639-2 standard:

eng-English

fra-French

9.2 Delivery format information on KML

9.2.1 Format name

KML – Keyhole Markup Language

9.2.2 Version

2.1

9.2.3 Specification

Open Geospatial Consortium Inc., KML 2.1 Reference – An OGC Best Practice, Version 0.0.9, 2007-05-02, Reference number of this OGC® project document: OGC 07-039r1 (http://www.opengeospatial.org/standards/bp)

KML specifications available on Google™ Earth web site (http://www.keyhole.com/kml/kml_doc.html).

9.2.4 Language

Languages used in the dataset according to ISO 639-2 standard:

eng-English

fra-French

9.3 Delivery format information on SHAPE

9.3.1 Format name

Shape – ESRI™

9.3.2 Version

01

9.3.3 Specification

ESRI Shapefile Technical Description, an ESRI White Paper, July 1998 (http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf)

9.3.4 Language

Languages used in the dataset according to ISO 639-2 standard:

eng-English

fra-French

9.4 Delivery medium information

9.4.1   Units of delivery

Canadian Province/Territory

9.4.2   Medium name

Data are available on the GeoBase portal (www.geobase.ca).

9.4.3   Other delivery information

The name of the files, entities and attributes are described in the document *National Road Network, edition 2.0.1, Product Distribution Formats* (www.geobase.ca).

Data are subject to the GeoBase Unrestricted Use Licence Agreement (www.geobase.ca).

9.5 Reference to specification scope

Global

10 METADATA

Not applicable

10.1 Reference to specification scope

Global