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2006 Road Network File Reference Guide

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2006 Road Network File Reference Guide

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Note of appreciation
Canada owes the success of its statistical system to the long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without continued cooperation and goodwill.

What's new?

- The road network file continues to be improved. The release of the 2006 Road Network File contains road network updates up to January 1, 2006.

- Statistics Canada continues to use ongoing partnerships in the generation of the file. The primary opportunities for collaboration involve joint work on the development of datasets facilitating business operations of partnering agencies.

- The attribute "NGD_ID" has been replaced with the attribute "RB_UID" in order to ensure that every arc has a unique identifier.

- The attribute "class" is no longer maintained and has subsequently been removed from the 2006 Road Network File.

Table of contents

1. About this guide

This reference guide is intended for users of the 2006 Road Network File. The guide provides an overview of the file, the general methodology used to create it, and important technical information for users.

Section 4, Data quality gives a detailed description of the various steps in the creation of the Road Network File. This section also provides information to evaluate the suitability of the data for a particular use.

Technical specifications in section 5 include system requirements, installation instructions, record layout, and item descriptions. See Appendix B for file sizes.

Geographic terms found throughout the text are described in Appendix C: Terms and definitions.

This reference guide does not provide details on specific software packages that are available for use with the 2006 Road Network File. Users are advised to contact the appropriate software vendor for information.

This guide, based on the best information available at the time of release, in no way constitutes a warranty of the data. While every effort has been made to ensure that verification of this file has been thorough, there is no guarantee that the data are 100% accurate.

Abbreviations

- CCOG – Canadian Council on Geomatics
- DCW – Digital Chart of the World
- EC – Elections Canada
- GML – Geography Markup Language (OGC)
- NGD – National Geographic Database
- NRCan – Natural Resources Canada
- NRN – National Road Network (NRCan)
- NTDB – National Topographic Database
- OGC – Open Geospatial Consortium
- RNF – Road Network File
- SNF – Street Network File (pre-2001)
- STC – Statistics Canada
- USBC – United States Bureau of Census

2. Overview

This guide covers the content, coverage and quality of the 2006 Road Network File created from the road layer coverage in Statistics Canada's digital geographic database, the National Geographic Database. The file reflects the National Geographic Database road layer content as it existed on January 1, 2006.

The National Geographic Database road layer was constructed as a tool to support data collection and dissemination of the Census of Population. Only road features were selected from this database to create the 2006 Road Network File. This file represents the official road network for the 2006 Census and is the base for 2006 geographic products and services.

The 2006 Road Network File contains roads, road names and address ranges. Address ranges are dwelling-based and occur mainly in large urban centres of Canada.

The 2006 Road Network File provides digital line coverage for Canada. There are 14 standard road network files:

- Canada
- 10 provinces and 3 territories

The 2006 Road Network File's digital co-ordinates are in latitude/longitude and are based on the North American Datum of 1983 (NAD83). The road network file standard products are available in ARC/INFO® format, MapInfo® format and Geography Markup Language format. See Technical specifications (section 5) for more details on record layouts and file formats.

Reference date

The geographic reference date is a date determined by Statistics Canada to finalize the geographic framework for which census data are collected, tabulated and reported. The geographic reference date for the 2006 Census is January 1, 2006.

3. How to use this product

Purpose of the product

The 2006 Road Network File is a geographic reference product and geocoding tool for use with the 2006 Census geographic and data products.

It is recommended that the 2006 Road Network File be used as a basis for the retrieval of 2006 Census data for user-defined areas. Users can define their custom areas based on the roads on the road network file. Boundaries created with the 2006 Road Network File correspond to the 2006 geographic frame and therefore do not require additional boundary reconciliation work, which facilitates the geocoding process. For information on custom area creation and geocoding services, please contact the National Inquiries line at 1 800 263-1136 or infostats@statcan.ca.

Limitations

Statistics Canada maintains road network file information to support the census and other Statistics Canada activities. The relative position of road network features is important in maps created for navigation and reference purposes; therefore, relative positional accuracy takes precedence over absolute positional accuracy. The 2006 Road Network File does not contain street information required for route optimization. For example, data on one-way streets, dead-ends and other street obstacles are not included in the road network file. Consequently, this file is not recommended for engineering applications, emergency dispatching services, surveying or legal applications.

The 2006 Road Network File contains road arcs with either “true” address ranges, imputed address ranges, or no address ranges. Imputed address ranges are not meant to replace true address ranges for any purpose other than address geocoding. Thus, if the files are to be used for computer-aided dispatch or similar purposes (that require an address to be matched to a block or street), it may be necessary to supplement the file with local knowledge by updating existing true addresses and replacing imputed addresses.

The limitations of the 2006 Road Network File should be recognized for uses other than the mapping, analysis and retrieval of census data. See section 4, Data quality, for information related to the effective use of this file.

General methodology

The 2006 Road Network File is based on road network components extracted from the National Geographic Database. The National Geographic Database is maintained by Statistics Canada and Elections Canada for use in their various mapping applications. The National Geographic Database is continuously improved as a result of Statistics Canada's partnership with Elections Canada, and with input from Natural Resources Canada's National Topographic Database. The National Geographic Database is the source for all 2006 Census dissemination geographic units, geography products and geocoding services.

The 2006 Road Network File is not compatible with 2001 Census Geography products. See section 4, Data quality, Consistency with other products, for more details.

Content

This product contains road arcs with name, type, direction, and address ranges.

A large number of addresses are missing in the National Geographic Database (from which the 2006 Road Network File is derived). Some addresses were imputed in order to increase the number of complete address ranges in the final product. Imputed addresses were specifically created to assist users who wish to geocode addresses. See section 4, Data quality, for more information about the completeness of the information. See section 5, Technical specifications, for more details on record layouts and file formats of the 2006 Road Network File. Table 3.1 provides information on number of known addresses (prior to imputation) and the number of missing and imputed addresses in the 2006 Road Network File.

Table 3.1 Number of known and missing/imputed address by province or territory, 2006 Road Network File

Province/territory	Known addresses (prior to imputation)	Missing and imputed addresses
Newfoundland and Labrador	37,327	119,425
Prince Edward Island	30,442	21,942
Nova Scotia	183,334	125,794
New Brunswick	110,024	155,722
Quebec	885,260	785,656
Ontario	1,113,823	771,311
Manitoba	75,846	320,280
Saskatchewan	69,956	652,182
Alberta	618,944	396,774
British Columbia	415,138	531,698
Yukon	3,366	20,410
Northwest Territories	2,873	20,367
Nunavut	957	9,235

Source: National Geographic Database (NGD) Road Network Layer, June 2006.

Comparisons to the 2005 Road Network File

Differences between the 2006 Road Network File and the 2005 Road Network File are:

- The 2006 Road Network File contains additional roads, road names and address ranges.
- RB_UID replaces NGD_ID as the attribute which uniquely identifies road arcs.
- The attribute CLASS is no longer maintained by the National Geographic Database, and therefore is not included in the product.
- Roads in this version of the product are not ranked. Therefore, users are not able to derive a layer equivalent to the 2001 Skeletal Road Network File (SRNF).

4. Data quality

Spatial data quality elements provide information on the fitness-for-use of a spatial database by describing why, when and how the data are created, and how accurate the data are. The elements include an overview describing the purpose and usage, as well as specific quality elements reporting on lineage, positional accuracy, attribute accuracy, logical consistency and completeness. This information is provided to users for all spatial data products disseminated for the census.

Lineage

Describes the history of the spatial data, including descriptions of the source material from which the data were derived, and the methods of derivation. It also contains the dates of the source material, and all transformations involved in producing the final digital files.

Road layer

The data in the road layer were derived from the National Geographic Database. The National Geographic Database is a spatial database that contains the road network in Canada, as well as road attributes (name, type, direction, and address ranges). The National Geographic Database was originally built from four main data sources:

- Statistics Canada Street Network Files (SNFs)
- National Topographic Database (NTDB) 1:50,000 and 1:250,000 maps
- Digital Chart of the World (DCW) 1:1,000,000 maps
- Elections Canada road data

Additional road information was incorporated from a variety of other sources, including municipal maps and road data from private companies. However, the timeliness of the National Geographic Database varies from region to region depending on the source data. Table 4.1 provides details on the distribution of features by source.

Table 4.1 Feature counts and summed length values by data source

Source	Number of features	Length of features (kilometres)
Elections Canada	889,639	855,209
Statistics Canada	458,732	106,522
Other	203,356	127,641
Municipal	190,044	76,194
National Topographic Database 1:50,000	106,084	96,399
National Topographic Database 1:250,000	21,709	64,130
Total	**1,869,564**	**1,326,095**

Source: National Geographic Database (NGD) Road Network Layer, June 2006.

- The 1996 Street Network File (SNF)

In census metropolitan areas and larger census agglomerations, the 1996 Street Network Files (SNFs) from Statistics Canada were the primary data source. The SNFs were created from various source maps at different scales, and maintained by the Statistics Canada Geography Division over more than twenty-five years. They contained road names, address ranges and a rich set of road arcs. The maps used to build and maintain the SNF had various scales and different vintages. Therefore, the quality of its geometry varies from place to place in terms of absolute positional accuracy.

The SNF information was updated, enhanced, and incorporated into the National Geographic Database during a build phase. Features that were not roads were removed. Streets were geometrically adjusted (i.e. rubber sheeted) to match the superior positional precision of the National Topographic Database. The format of address ranges was not changed, except the type of the values was changed from character to numeric. In most cases, road names in all upper case letters were converted to names in upper and lower case. The length of the field that contains the road names was also increased to accept full names instead of abbreviations.

- National Topographic Database (NTDB)

The National Topographic Database (NTDB), produced by Natural Resources Canada (NRCan), has a stable and precise geometry and a standardized road classification scheme. In the more densely populated parts of Canada, its scale is 1: 50,000, while in the more northern and sparsely populated areas the scale is 1: 250,000. Unlike the SNF, the NTDB contains no civic address range or street name information. The NTDB served as the source of the road network for most of southern Canada, outside of census metropolitan areas and large census agglomerations that were covered by the SNF and Elections Canada (EC) data.

The NTDB geometry is the adopted standard for the NGD: that is, all spatial data used in the creation of the NGD were vertically adjusted (rubber sheeted) and edge matched to approach the largest scale NTDB geometry.

- Digital Chart of the World (DCW)

The Digital Chart of the World (DCW) is a 1: 1,000,000 scale digital map, built primarily for aeronautical charts. It was used in the database to add road geometry to the sparsely populated portion of Canada, mainly in the north. It does not contain road names or address ranges.

- Elections Canada Geographic Database

In 1993, Elections Canada (EC) started to compile the EC Geographic Database, using data from the SNF, NTDB and DCW. Paper maps were created for areas not covered by the SNF and distributed to the EC returning officers who added the road names with information from the field. Elections Canada updated the road network with new roads and added the road names but not address ranges.

Due to the addition of new roads, the resulting geometry does not always match the initial NTDB geometry. Wherever more recent EC data would improve the quality and quantity of road information, it was added to the Statistics Canada SNF to form the National Geographic Database. The content derived from Elections Canada is primarily new roads and road names. These were left in the format used by Elections Canada, with upper and lower case letters, accents, road type and direction, but no civic address ranges.

- Other sources

In addition to digital maps from other federal, provincial, municipal and licensed private sources, portions of the National Geographic Database contain information from EC Returning Officers (maps for the 38th General Election, held in the summer of 2004), Statistics Canada (STC) Regional Offices (1996 Enumeration Area Collection maps), data from the STC 2001 Census, and other materials prepared by private companies. The data also contains data from Statistics Canada's 2004 collection units (CU04), block canvass activities and PLANET, which originates from the New Brunswick real property information system.

Positional accuracy

Refers to the absolute and relative accuracy of the positions of geographic features. Absolute accuracy is the closeness of the coordinate values in a dataset to values accepted as or being true. Relative accuracy is the closeness of the relative positions of features to their respective relative positions accepted as or being true. Descriptions of positional accuracy include the quality of the final file or product after all transformations.

Absolute positional accuracy

Absolute positional accuracy describes the degree to which the position of features in a geographic database reflects their true position on the ground (i.e. the closeness of reported coordinate values to values accepted as true).

The information present in the National Geographic Database (NGD) road layer is provided for the purposes of statistical analysis, census operations and electoral operations only. The absolute position of roads on the NGD varies with the source files and documents used to build and maintain the database. Therefore, the NGD is not suitable for high precision measurement applications such as engineering, property transfers, or other uses that might require highly accurate measurements of the earth's surface.

During the build phase, the road layer was rubber sheeted to match the position of those on the NTDB (which was used for reference purposes). After the build, the rubber sheeting process was applied to the materials used to maintain and improve the content of the road network. It is therefore expected that these geometrically matched arcs will have a positional accuracy similar to the corresponding reference data used during development of the database. It should be noted that the reference source selected for different geographic areas depended on a variety of factors such as population size, geographic location (urban or rural) and the availability of NTDB/DCW data. For example, in major urban centres 1:50,000 NTDB data were generally used as the reference data. As a result, in these areas, roads that were geometrically matched have a positional accuracy similar to roads on the NTDB data (i.e. approx. ±10 metres). In areas that used 1:250,000 NTDB and DCW reference data, the positional accuracy of roads that were geometrically matched is approximately ±300 metres (NTDB) and between ±2,100 and ±4,300 metres (DCW), respectively.

The positional accuracy of arcs that could not be matched because they were not present in the reference data is not measured. These arcs were digitized on screen from paper maps annotated by EC returning officers and STC regional officers. Although accurate in

their attribute information and their relative position in relation to other features, the absolute positional accuracy of these roads is unknown.

Absolute positional accuracy is not a requirement for electoral and census processes. An indication of the positional accuracy of features in the NGD can be assessed from the source of the geometry of road features in Table 4.1.

Relative positional accuracy

Relative positional accuracy describes the degree to which the position of features in a geographic database reflects their true ground relationships.

For the NGD, relative positional accuracy is important. A road must appear in the proper position relative to other roads and physical features. For example, a road should not fall on water when the road layer is overlaid on hydrographical layers, unless it is a road classified as a bridge.

During the build phase, the dataset was thoroughly tested for relative positional accuracy. The road network was overlaid onto the hydrographical, power line and railroad layers.

Attribute accuracy

Attribute accuracy refers to the accuracy of quantitative attributes and the correctness of non-quantitative attributes. Two road attributes were tested for accuracy: road name (name) and road address range (‘addr_fm_left’, ‘addr_to_left’, ‘addr_fm_rght’, ‘addr_to_rght’). Road address range considers the completeness of addressing on individual arcs.

Road name:
During the build phase, every effort was made to insure a proper transfer and association of a specific attribute (i.e. name, type, direction, and address range) to a specific geometric feature. This includes the association as well as its accuracy.

Measures on number of road name and address range attributes have been presented in Table 4.2.

Road address range:
Two tests were conducted to determine the attribute accuracy of address features on the base. First, the results from the current version of the NGD were compared to the previous version of the NGD in order to identify any increases or decreases in the number of addressable roads and blockfaces. Secondly, a check was run on the 2001 addresses to determine which 2006 geographic area they fell into, then those same addresses were compared to the 2006 geographic area derived using a 2001/2006 correspondence file.

Logical consistency

Logical consistency refers to the fidelity of relationships between all variables in a dataset. For example, a road arc that does not have a road name should not have a road type.

During the build phase, the National Geographic Database (NGD) dataset was thoroughly tested for logical consistency. Any violations of logical consistency were corrected, and 100% of the data are logically consistent.

Node-line-area relationships satisfy topological requirements as specified in the ARC/INFO® data model.

Consistency with other products

The position of the arcs in the 2006 Road Network File is generally consistent with the 2005 Road Network File and 2006 Cartographic and Digital Boundary Files, but is not necessarily consistent with those of the 2001 Cartographic Boundary Files and the 2001 Road Network and Skeletal Road Network Files.

Completeness

Completeness refers to the presence or absence of features, their attributes and relationships. Many new road features that were not previously found on earlier digital files at Elections Canada and Statistics Canada have been added to the National Geographic Database (NGD) in order to create a more complete NGD road layer for all of Canada.

Roads

Many features not found in previous road network file products were added to the 2006 Road Network File in order to improve our nation-wide road coverage. Table 4.2 shows the number of road features on the 2006 Road Network File.

Table 4.2 Number of road features in the 2006 Road Network File

National level	Number of arcs	Arc length (kilometres)	Number of arcs with full address range on at least one side
With road name	1,462,249	688,753	1,054,937
Without road name	407,315	637,342	11
Canada	**1,869,564**	**1,326,095**	**1,054,948**

Source: National Geographic Database (NGD) Road Network Layer, June 2006.

5. Technical specifications

Software formats

The 2006 Road Network File (RNF) is available for download from the Statistics Canada website in the following formats:

- ARC/INFO® shapefile format version 9.0
  File extension: **.shp**

- MapInfo® format version 7.0
  File extension: **.tab**

- Geography Markup Language (GML) version 2.1.2
  File extension: **.gml**

Installation instructions

The ARC/INFO®, MapInfo® and GML files are compressed into WinZip® files (file extension .zip).

An additional template (.tem) file is included with the GML files for use with the Java Unified Mapping Platform (JUMP) free GIS data viewer.

The road names in the 2006 Road Network File contain accented characters. These characters can be seen in UNIX and Windows® versions of ARC/INFO® and MapInfo®. (They were tested on desktop versions of ArcGIS 8.3 & 9.0 and MapInfo 7.0 & 7.8. The accents were also visible in ARC/INFO 8.01 in UNIX.) To preserve accents, ArcToolbox™ is recommended for importing files into the desktop version of ArcGIS 9.0.

Data descriptions and record layouts

Geographic representation

The 2006 Road Network File is available free on the Statistics Canada website in the following geographic representation:

Datum:	NAD 83
Projection:	Geographic
Co-ordinates:	Latitude / Longitude

Record layouts and item/field descriptions

Table 5.1 Record layouts position — ARC/INFO® (.shp) files

Attribute name	Data type	Definition	Attribute source - National Geographic Database
FID*	Object ID (4)	Maintained by ARC/INFO®	…
Shape*	Geometry	Maintained by ARC/INFO®	…
RB_UID	char (15)	Unique identifier of the arc.	RB_UID
NAME	char (50)	Street name associated with the arc.	ST_NME
TYPE	char (6)	Street type associated with the arc.	ST_TYP_CDE
DIRECTION	char (2)	Street direction associated with the arc.	ST_DRCTN_CDE
ADDR_FM_LE	number (11)	The civic address found on the left-hand side of the arc at the FROM node	ADDR_FM_LEFT
ADDR_TO_LE	number (11)	The civic address found on the left-hand side of the arc at the TO node	ADDR_TO_LEFT
ADDR_FM_RG	number (11)	The civic address found on the right-hand side of the arc at the FROM node	ADDR_FM_RGHT
ADDR_TO_RG	number (11)	The civic address found on the right-hand side of the arc at the TO node	ADDR_TO_RGHT

Table 5.2 Record layouts position — MapInfo® Line (.tab) files

Attribute name	Data type	Definition	Attribute source - National Geographic Database
rb_uid	char (15)	Unique identifier of the arc.	RB_UID
name	char (50)	Street name associated with the arc.	ST_NME
type	char (6)	Street type associated with the arc.	ST_TYP_CDE
direction	char (2)	Street direction associated with the arc.	ST_DRCTN_CDE
addr_fm_left	number (9)	The civic address found on the left-hand side of the arc at the FROM node	ADDR_FM_LEFT
addr_to_left	number (9)	The civic address found on the left-hand side of the arc at the TO node	ADDR_TO_LEFT
addr_fm_rght	number (9)	The civic address found on the right-hand side of the arc at the FROM node	ADDR_FM_RGHT
addr_to_rght	number (9)	The civic address found on the right-hand side of the arc at the TO node	ADDR_TO_RGHT

Table 5.3 Record layouts position — Geography Markup Language (.gml) files

Attribute name	Data type	Definition	Attribute source - National Geographic Database
rbUid	char (15)	Unique identifier of the arc.	RB_UID
name	char (50)	Street name associated with the arc.	ST_NME
type	char (6)	Street type associated with the arc.	ST_TYP_CDE
direction	char (2)	Street direction associated with the arc.	ST_DRCTN_CDE
addrFmLeft	number (9)	The civic address found on the left-hand side of the arc at the FROM node	ADDR_FM_LEFT
addrToLeft	number (9)	The civic address found on the left-hand side of the arc at the TO node	ADDR_TO_LEFT
addrFmRght	number (9)	The civic address found on the right-hand side of the arc at the FROM node	ADDR_FM_RGHT
addrToRght	number (9)	The civic address found on the right-hand side of the arc at the TO node	ADDR_TO_RGHT

Attribute domain values

Representation of unknown or no value

The null value is used to represent values of the road's name, type and direction that are either missing or non-existent. The zero "0" is used when an address does not exist or is not known.

Table 5.4 Road type

Type	Description	Type	Description	Type	Description
< Null >	no type	EXTEN	Extension (E)	PINES	Pines (E)
ABBEY	Abbey (E)	FARM	Farm (E)	PLACE	Place (F)
ACCESS	Access (E)	FIELD	Field (E)	PL	Place (E)
ACRES	Acres (E)	FOREST	Forest (E)	PLAT	Plateau (E)
ALLÉE	Allée (F)	FWY	Freeway (E)	PLAZA	Plaza (E)
ALLEY	Alley (E)	FRONT	Front (E)	PT	Point (E)
AUT	Autoroute (F)	GDNS	Gardens (E)	PVT	Private (E)
AV	Avenue (F)	GATE	Gate (E)	PROM	Promenade (F)
AVE	Avenue (E)	GLADE	Glade (E)	QUAY	Quay (E)
BAY	Bay (E)	GLEN	Glen (E)	RANG	Rang (F)
BEACH	Beach (E)	GREEN	Green (E)	RG	Range (E)
BEND	Bend (E)	GRNDS	Grounds (E)	REACH	Reach (E)
BLVD	Boulevard (E)	GROVE	Grove (E)	RIDGE	Ridge (E)
BOUL	Boulevard (F)	HARBR	Harbour (E)	RTOFWY	Right of Way (E)
BROOK	Brook (E)	HAVEN	Haven (E)	RISE	Rise (E)
BYPASS	By-pass (E)	HEATH	Heath (E)	RD	Road (E)
BYWAY	Byway (E)	HTS	Heights (E)	RDPT	Rond Point (F)
CAMPUS	Campus (E)	HGHLDS	Highlands (E)	ROUTE	Route (F)
CAPE	Cape (E)	HWY	Highway (E)	RTE	Route (E)
CAR	Carre (F)	HILL	Hill (E)	ROW	Row (E)
CERCLE	Cercle (F)	HOLLOW	Hollow (E)	RUE	Rue (F)
CHASE	Chase (E)	IMP	Impasse (F)	RLE	Ruelle (F)
CH	Chemin (F)	ISLAND	Island (E)	RUIS	Ruisseau (F)
CIR	Circle (E)	KEY	Key (E)	RUN	Run (E)
CIRCT	Circuit (F)	KNOLL	Knoll (E)	SECTN	Section (E)
CLOSE	Close (E)	LANDING	Landing (E)	SENT	Sentier (F)
COMMON	Common (E)	LANE	Lane (E)	SIDERD	Sideroad (E)
CONC	Concession (E)	LANEWY	Laneway (E)	SQ	Square (E)
CRNRS	Corners (E)	LMTS	Limits (E)	ST	Street (E)
CÔTE	Côte (F)	LINE	Line (E)	STROLL	Stroll (E)
COUR	Cour (F)	LINK	Link (E)	SUBDIV	Subdivision (E)
CRT	Court (E)	LKOUT	Lookout (E)	TERR	Terrace (E)
COVE	Cove (E)	LOOP	Loop (E)	TSSE	Terrasse (F)
CRES	Crescent (E)	MALL	Mall (E)	TLINE	Townline (E)
CROFT	Croft (E)	MANOR	Manor (E)	TRACE	Trace (E)
CROIS	Croissant (F)	MAZE	Maze (E)	TRAIL	Trail (E)
CROSS	Crossing (E)	MEADOW	Meadow (E)	TRNABT	Turnabout (E)
CRSSRD	Crossroads (E)	MEWS	Mews (E)	VALE	Vale (E)
CDS	Cul-de-sac (E)	MONTÉE	Montée (F)	VIEW	View (E)
DALE	Dale (E)	MOUNT	Mount (E)	VILLGE	Village (E)

Table 5.4 Road type (continued)

Type	Description	Type	Description	Type	Description
DELL	Dell (E)	ORCH	Orchard (E)	VILLAS	Villas (E)
DIVERS	Diversion (E)	PARADE	Parade (E)	VISTA	Vista (E)
DOWNS	Downs (E)	PARC	Parc (F)	VOIE	Voie (F)
DR	Drive (E)	PK	Park (E)	WALK	Walk (E)
ÉCH	Échangeur (F)	PKY	Parkway (E)	WAY	Way (E)
END	End (E)	PASS	Passage (E)	WHARF	Wharf (E)
ESPL	Esplanade (E)	PATH	Path (E)	WOOD	Wood (E)
ESTATE	Estates (E)	PTWAY	Pathway (E)	WYND	Wynd (E)
EXPY	Expressway (E)	…	…	…	…

Street direction code

The arc direction is not the geographic direction of the road feature, but a description used to identify it. A two character code is related to the arc when the feature is a single or multiple lane addressable street.

Table 5.5 Street direction code

Code	Description
Null	No type
E	East / Est
N	North / Nord
NE	North East / Nord-est
NO	Nord-ouest
NW	North West
O	Ouest
S	South / Sud
SE	South East / Sud-est
SO	Sud-ouest
SW	South West
W	West

Appendix A: Spatial file naming conventions

For the 2006 Census, spatial product file names for files disseminated to clients follow the Spatial File Naming Convention. The geographic area and code, file type, date stamp, software type and language will be imbedded within the name. Standardizing the names of the files should facilitate the storage of compressed files, all having the extension *.zip.

These file naming conventions are based on those used for 2001 Cartographic Boundary Files (CBFs) and Road Network Files (RNFs).

Each file name is 13 characters in length, which meets the requirements of ARC/INFO®'s and MapInfo®'s limitations for file name sizes. All alphabetic characters are in lower case to maintain consistency.

First character: projection of file

g if projection is Geographic (latitude/longitude)
l if projection is Lambert Conic Conformal

Next three characters: primary geographic area of file

Table A.1 Spatial file naming conventions — geographic area of file

Geographic area / product	English file	French file
National / provincial	pr_	pr_
Federal electoral district	fed	cef
Economic region	er_	re_
Census division	cd_	dr_
Census subdivision	csd	sdr
Census agricultural region	car	rar
Census consolidated subdivision	ccs	sru
Census metropolitan area / census agglomeration	cma	rmr
Census tract	ct_	sr_
Urban area	ua_	ru_
Designated place	dpl	ld_
Dissemination area	da_	ad_
Population ecumene	ecu	ecu
Agricultural ecumene	eca	eca
Road network file	rnf	frr
International boundary files (part of mainland U.S.A. and Alaska as well as Greenland)	int	int
Supporting hydrography (Great Lakes, St. Lawrence River, oceans, etc.)	hy_	hy_

Next three numbers: geographic code of coverage

Table A.2 Spatial file naming conventions — geographic code of coverage

National coverage	Provincial and territorial coverages	
000	010	Newfoundland and Labrador
	011	Prince Edward Island
	012	Nova Scotia
	013	New Brunswick
	024	Quebec
	035	Ontario
	046	Manitoba
	047	Saskatchewan
	048	Alberta
	059	British Columbia
	060	Yukon
	061	Northwest Territories
	062	Nunavut

Next character: file type (based on 2001 codes)

a if digital boundary file, detailed coverage for large-scale mapping excluding hydrographic coverage
b if cartographic boundary file, detailed coverage for small-scale mapping
c if detailed interior lakes hydrographic coverage (polygon)
d if detailed interior rivers hydrographic coverage (line)
e ecumene
f if detailed interior lakes hydrographic coverage – closure lines (line)
g cartographic boundary file, generalized for desktop mapping
h additional cartographic international boundary coverage and hydrographic coverage of Great Lakes, St. Lawrence River and surrounding oceans
l if detailed interior islands (part of hydrographic coverage (polygon))
r road network files (RNFs)

Following two numbers: dissemination year (date stamp for versioning)

05 if disseminated in 2005
06 if disseminated in 2006

Next character: file format

a ARC/INFO® shapefile (.shp)
m MapInfo® TAB file (.tab)
g Geography Markup Language (GML) file (.gml)

Final two characters: language

_e English
_f French

Table A.3 Example of the use of the file naming conventions

The 2006 Road Network File for Newfoundland and Labrador with English attributes in GML format	grnf010r06g_e.exe	Road layer

Appendix B: File names, 2006 Road Network File

Table B File name and sizes — 2006 Road Network File

Geographic area	File name ARC/INFO®	File size MB	File name MapInfo®	File size MB	File name GML	File size MB
Canada	grnf000r06a_e.zip	208.0	grnf000r06m_e.zip	110.0	…	…
Newfoundland and Labrador	grnf010r06a_e.zip	4.6	grnf010r06m_e.zip	2.5	grnf010r06g_e.zip	5.4
Prince Edward Island	grnf011r06a_e.zip	1.9	grnf011r06m_e.zip	1.0	grnf011r06g_e.zip	2.3
Nova Scotia	grnf012r06a_e.zip	7.9	grnf012r06m_e.zip	4.6	grnf012r06g_e.zip	9.3
New Brunswick	grnf013r06a_e.zip	6.9	grnf013r06m_e.zip	3.9	grnf013r06g_e.zip	8.0
Quebec	grnf024r06a_e.zip	41.0	grnf024r06m_e.zip	23.5	grnf024r06g_e.zip	48.2
Ontario	grnf035r06a_e.zip	52.5	grnf035r06m_e.zip	28.3	grnf035r06g_e.zip	61.9
Manitoba	grnf046r06a_e.zip	11.2	grnf046r06m_e.zip	5.3	grnf046r06g_e.zip	13.5
Saskatchewan	grnf047r06a_e.zip	24.4	grnf047r06m_e.zip	10.8	grnf047r06g_e.zip	29.5
Alberta	grnf048r06a_e.zip	26.2	grnf048r06m_e.zip	13.7	grnf048r06g_e.zip	31.4
British Columbia	grnf059r06a_e.zip	30.6	grnf059r06m_e.zip	15.3	grnf059r06g_e.zip	36.1
Yukon	grnf060r06a_e.zip	0.9	grnf060r06m_e.zip	0.5	grnf060r06g_e.zip	1.0
Northwest Territories	grnf061r06a_e.zip	0.8	grnf061r06m_e.zip	0.5	grnf061r06g_e.zip	1.0
Nunavut	grnf062r06a_e.zip	0.2	grnf062r06m_e.zip	0.1	grnf062r06g_e.zip	0.2

Appendix C: Terms and definitions

Cartographic boundary files
Cartographic boundary files contain boundaries of standard geographic areas, along with shorelines, at a level of detail appropriate for small-scale mapping. The file is supplemented with a layer detailing internal lakes and rivers.

Coordinate system
A coordinate system is a reference system based on mathematical rules for specifying positions (locations) on the surface of the earth. The co-ordinate values can be spherical (latitude and longitude) or planar (such as the Universal Transverse Mercator).

Cartographic boundary files, road network files and representative points are disseminated in latitude/longitude coordinates.

Datum
A datum is a geodetic reference system that specifies the size and shape of the earth, and the base point from which the latitude and longitude of all other points on the earth's surface are referenced.

The spatial data disseminated for the 2006 Census will be based on the North American Datum of 1983 (NAD83).

Ecumene
Ecumene is a term which means inhabited land. It generally refers to land where people have made their permanent home, and to all work areas that are considered occupied and used for agricultural or any other economic purposes. Thus, there can be various types of ecumenes, each having its own unique characteristics (population ecumene, agricultural ecumene, industrial ecumene, etc.).

Geocoding
Geocoding is the process of assigning geographic identifiers (codes) to map features and data records. The resulting geocodes permit data to be linked geographically.

Households and postal codes are linked to block-face representative points when the street and address information is available; otherwise, they are linked to block representative points.

Geographic code
A geographic code is a unique number used to identify and access standard geographic areas for the purposes of data storage, retrieval and display.

Geographic reference date
The geographic reference date is a date determined by Statistics Canada for the purpose of finalizing the geographic framework for which census data are collected, tabulated and reported. For the 2006 Census, the geographic reference date is January 1, 2006.

Land area
Land area is the area in square kilometres of the land-based portions of standard geographic areas.

The land area measurements are unofficial and are provided for the sole purpose of calculating population density.

Map projection
A map projection is the process of transforming and representing positions from the earth's three-dimensional curved surface to a two-dimensional (flat) surface. The process is accomplished by a direct geometric projection or by a mathematically derived transformation.

The Lambert Conformal Conic map projection is widely used for general maps of Canada at small scales and is the most common map projection used at Statistics Canada.

National Geographic Database
The National Geographic Database (NGD) is a spatial database that contains the road network in Canada, as well as road attributes (name, type, direction, class, and address ranges). Besides the road network layer, it also contains a Community boundary layer (for legally incorporated towns, municipalities, and Indian Reserves), and many other physical feature layers (hydrographical, railroad, and power line) used to support the boundary delineation, mapping and geo-referencing applications.

The National Geographic Database (NGD) is an internal maintenance database that is not disseminated. It supports a wide range of census operations, such as geocoding, updating the road network and address ranges, supporting the block program and delineating the boundaries of standard geographic areas (including the automated delineation of collection units, urban areas and dissemination areas). As well, the NGD will be the source for generating many geography products for the 2006 Census, such as reference maps and Cartographic Boundary Files.

Reference map
A reference map shows the location of the geographic areas for which census data are tabulated and disseminated. The maps display the boundaries, names and codes of standard geographic areas, as well as major physical features, such as roads, railroads, coastlines, rivers and lakes.

Representative point
A representative point is a single point that represents a linear or areal feature. The point is centrally located along the linear feature or centrally within the areal feature.

Representative points are generated for block-faces, blocks, dissemination areas, census subdivisions and designated places. The block-face and block representative points support the geocoding of households and postal codes.

Spatial data quality elements
Spatial data quality elements provide information on the fitness-for-use of a spatial database by describing why, when and how the data are created, and how accurate the data are. The elements include an overview describing the purpose and usage, as well as specific quality elements reporting on lineage, positional accuracy, attribute accuracy, logical consistency and completeness. This information is provided to users for all spatial data products disseminated for the census.

Standard Geographical Classification
The Standard Geographical Classification is Statistics Canada's official classification for three types of geographic areas: provinces and territories, census divisions and census subdivisions. The Standard Geographical Classification provides unique numeric identification (codes) for these hierarchically related geographic areas.

Thematic map
A thematic map shows the spatial distribution of one or more specific data themes for standard geographic areas. The map may be qualitative in nature (e.g. predominant farm types) or quantitative (e.g. percentage population change).

Appendix D: Geography Markup Language (GML)

Scope

The Geography Markup Language (GML) is an XML encoding for the modelling, transport and storage of geographic information including both the spatial and non-spatial properties of geographic features. This specification defines the XML Schema syntax, mechanisms, and conventions that:

- Provide an open, vendor-neutral framework for the definition of geospatial application schemas and objects;
- Allow profiles that support proper subsets of GML framework descriptive capabilities;
- Support the description of geospatial application schemas for specialized domains and information communities;
- Enable the creation and maintenance of linked geographic application schemas and datasets;
- Support the storage and transport of application schemas and datasets;
- Increase the ability of organizations to share geographic application schemas and the information they describe.

United States Bureau of Census (USBC) Partnership – TIGER/GML

Statistics Canada has committed to working with the United States Bureau of the Census (USBC) to ensure cross-border consistency in our products, and foster the development and application of a common, North American data model.

Like the United Kingdom Ordnance Survey and the United States Bureau of the Census, Statistics Canada has chosen to disseminate data in the Open Geospatial Consortium standard Geography Markup Language (GML) format. This standard allows organisations to achieve maximum compatibility not only of format but eventually of content. In partnership with USBC, Statistics Canada is committed to providing a harmonized North American street network file by 2008. This release of the Road Network File is the first step in delivering a harmonized international street network by 2008.

Example of 2006 Road Network File dataset in GML format

```
<?xml version = '1.0' encoding = 'ISO-8859-1'?>
        <wfs:FeatureCollection
                xmlns:wfs=http://www.opengis.net/wfs
                xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
                xmlns:gml=http://www.opengis.net/gml
                xmlns:xlink=http://www.w3.org/1999/xlink
                xmlns:GEO=http://geodepot.statcan.ca/tigercan
                xmlns:ogc="http://www.opengis.net/ogc">

<gml:boundedBy>
        <gml:Box>
                <gml:coordinates>
                        -64.41076248151016,45.949157446373746
                        -61.975049577832905,47.056845876958114
```

Example of 2006 Road Network File dataset in GML format, continued

```
                </gml:coordinates>
        </gml:Box>
</gml:boundedBy>
<gml:featureMember>
        <GEO:RoadSegment fid="GEO_RT_1095878">
                <GEO:rb_uid>
                        1095878
                </GEO:rb_uid>
                <GEO:name>
                        Trans-Canada - RTE 1
                </GEO:name>
               <GEO:type>
                        HWY
                </GEO:type>
                <GEO:addrFmLeft>
                        20527
                </GEO:addrFmLeft>
                <GEO:addrToLeft>
                        20611
                </GEO:addrToLeft>
                <GEO:addrFmRght>
                        20518
                </GEO:addrFmRght>
                <GEO:addrToRght>
                        20658
                </GEO:addrToRght>
                <GEO:centreline>
                        <gml:LineString>
                                <gml:coordinates decimal="." cs="," ts=" ">
                                        -63.500411040289066,46.24012250777137
                                        -63.50100971490974,46.240344881690326
                                        -63.50217046237347,46.24104185563962
                                        -63.505862621395394,46.24195250605576
                                        -63.50671918453118,46.242002742901576
                                        -63.50719727260221,46.241931577811606
                                        -63.508403092799554,46.24175228346016
                                        -63.50994657345562,46.24174539797723
                                </gml:coordinates>
                        </gml:LineString>
                </GEO:centreline>
        </GEO:RoadSegment>
</gml:featureMember>
..... additional featureMembers.....
</wfs:FeatureCollection>
```

Appendix E: National Road Network (NRN), GeoBase

In order to continue improving the quality and relevance of our spatial infrastructure, Statistics Canada has initiated a long term project in partnership with Elections Canada to migrate the Road Network File to the Department of Natural Resources' National Road Network (NRN) model in time for the 2011 Census of population. Additional agreements with provincial and territorial stakeholders are in the process of being negotiated and will become a source of GPS compliant data with more accurate and timely attribute information. A preliminary version of the GPS compliant Road Network File based on the NRN model, including data provided by our provincial/territorial partners, could be available as early as spring 2008.

The Department of Natural Resources' National Road Network (NRN) is available free of charge from the GeoBase web portal. http://www.geobase.ca/.

National Road Network (NRN) - Description[1]

The GeoBase portal offers access to over 1 million kilometres of accurate up-to-date centerline road network data. The National Road Network, Canada, Level 1 (NRNC1) is the representation of a continuous accurate centerline for all non-restricted use roads in Canada (5 metres or more in width, drivable and no barriers denying access).

The primary data source of NRNC1 was produced with field driven Differential Global Positioning System (DGPS) technology. Additional sources, such as existing accurate photogrammetric provincial and municipal data, were also integrated and updated. During the initial acquisition of the NRN data, efforts were made to utilize and update as much existing authoritative 'closest to source' centerline road data as was possible.

Natural Resources Canada (NRCan), in partnership with several provinces, managed and produced the first version of the NRN. Initial data collection of the NRN was undertaken in the summer of 1999 and was completed early in 2005.

The Canadian Council on Geomatics (CCOG) commissioned the Ontario Ministry of Natural Resources and Natural Resources Canada to work together in defining the NRNC1 Standards and Specifications and data model. These documents were then presented for final review and approval to all authoritative data-producing stakeholders throughout Canada. By working together, a consensus was reached in defining the first version of the NRNC1.

The resulting model of the NRN is based on Linear Referencing System (LRS) concepts. This approach allows for the management of geometric representation separate from the attribute information (referred to as an "event" in LRS). However, it is important to note that in order to satisfy the greatest number of road network data users, the data has also been modelled and will be distributed as a conventional road network.

One of the most important features of the NRN data is that each Road Element and each Event (Attribute) will contain a universally unique identifier (UUID), referred to as the NID. The importance of NIDs is quite significant. It will allow users of GeoBase-NRN data to receive, manage and introduce road network changes over time. NIDs will primarily be used to manage changes.

[1] Source: Department of Natural Resources, http://www.geobase.ca/geobase/en/data/nrnc1.html.

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V AND WHEREAS the parties hereto are desirous of entering into a licence agreement on the basis herein set forth,

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5.4 The Licensee shall indemnify the Licensor, its officers, directors, employees, authorized agents and contractors from all claims whatsoever alleging loss, costs, expenses, damages or injuries (including injuries resulting in death) arising out of the Licensee's possession or use of the Data or the exercise by the Licensee of its rights hereunder.

5.5 The Licensee's obligation to indemnify the Licensor, its officers, directors, employees, authorized agents and contractors, under this Agreement shall not affect or prejudice the Licensor from exercising any other rights under law.

5.6 The provisions of this Article shall survive termination of this Agreement.

6.0 TERMINATION

6.1 This Agreement may be terminated

(i) automatically and without notice, if the Licensee commits or permits a breach of any of its covenants or obligations under this Agreement;
(ii) upon written notice of termination by the Licensee at any time, and such termination shall take effect thirty (30) days after the receipt by the Licensor of such notice; or
(iii) upon mutual agreement of the parties.

6.2 Upon termination of this Agreement, for whatever reason, the Licensee's rights under section 3 shall immediately cease; and all obligations of the Parties which expressly or by their nature survive termination shall continue in full force and effect subsequent to and notwithstanding such termination, until they are fully satisfied or by their nature expire. For greater clarity, but without restricting the generality of the foregoing, the following provisions survive termination of this Agreement:

- section 5 (representations, warranties, indemnities)

6.3 Notwithstanding subsections 6.1 and 6.2 above, the Licensee may continue to use the Data for the purpose of completing orders of Derived Products made before the termination date of this Agreement

6.4 Notwithstanding the termination of this Agreement, all agreements entered into by the Licensee in the exercise of its rights under section 3 thereof prior to such termination and all obligations imposed therein shall continue in full force and effect subject to their terms.

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7.1 Applicable Law
This Agreement shall be construed and enforced in accordance with, and the rights of the parties shall be governed by, the laws of Ontario and Canada, as applicable.

7.2 Entirety of Agreement
This Agreement hereto constitute the entire agreement between the parties with respect to its subject matter. This Agreement may only be amended in writing, signed by both parties, which expressly states the intention to amend this Agreement.

7.3 Alternate Dispute Resolution
If a dispute arises concerning this Agreement, or if a proposed modification of any term of this Agreement cannot be agreed between the parties, the parties shall attempt to resolve the matter first by negotiation.

If the parties have not succeeded in negotiating a resolution, then they shall jointly submit the dispute to a mutually accepted mediator. If the parties cannot agree on an acceptable mediator, then either party may submit the dispute to binding arbitration.

The arbitral tribunal shall be governed by the UN Commercial Arbitration Code (the "Code"), referred to in the Commercial Arbitration Act, R.S.C 1985, c. C-4.6, and judgment upon the award rendered by the arbitral tribunal may be entered in any court having jurisdiction over the matter.

The arbitral tribunal shall consist of one arbitrator chosen by the parties.
Subject to the Code, the parties agree that the award and determination of the arbitral tribunal shall be final and binding on both parties, shall be without right of appeal and shall be the exclusive remedy between the parties regarding any claims, counterclaims, issues or disputes presented to the arbitral tribunal.

Costs
The Parties shall bear the costs of the mediation equally, except that each party shall bear its own personal costs of the mediation.

The costs of the arbitral tribunal's fees and expenses shall be shared equally by the parties. The parties shall bear their own personal costs except that the losing party shall pay all costs, fees, levies and taxes arising from and necessitated by the enforcement of the arbitral tribunal's award, including, without limitation, registration, enforcement charges or other judicial levies or costs

7.4 No Joint Venture
The Parties expressly disclaim any intention to create a partnership, joint venture or joint enterprise. The Parties acknowledge and agree that nothing contained in this Agreement

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7.5 No Waiver

No condoning, excusing or overlooking by the Licensor of any default by the Licensee, at any time or times, in performing or observing any of the Licensee's obligations hereunder, will operate as a waiver, renunciation, surrender of or otherwise affect the rights of the Licensor in respect of any continuing or subsequent default. No waiver of these rights will be inferred from anything done or omitted by the Licensor, except by an express waiver in writing.

7.6 Order of Precedence

If there is a conflict or ambiguity between this Agreement proper and any schedules thereto, the interpretation consistent with this Agreement proper (taking into consideration the statements in the recitals and headings) shall prevail and apply, notwithstanding any wording to the contrary in the applicable schedule.

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