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CanMatrix - Print Ready Data Product Specifications

Edition 1.0

2008-05-28

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Canada

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RELEASE HISTORY

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2008/05	1.0	Initial version

TABLE OF CONTENTS

1	OVERVIEW	1
1.1	TITLE.....	1
1.2	REFERENCE DATE.....	1
1.3	RESPONSIBLE PARTY.....	1
1.4	LANGUAGE.....	1
1.5	ABBREVIATIONS AND ACRONYMS.....	1
1.6	INFORMAL DESCRIPTION OF THE DATA PRODUCT.....	2
2	SPECIFICATION SCOPE	2
2.1	SCOPE IDENTIFICATION.....	2
2.2	LEVEL.....	2
2.3	LEVEL NAME.....	2
2.4	EXTENT.....	2
2.4.1	<i>Description</i>	2
2.4.2	<i>Vertical extent</i>	3
2.4.3	<i>Horizontal extent</i>	3
2.4.4	<i>Temporal extent</i>	3
2.5	COVERAGE.....	4
3	DATA PRODUCT IDENTIFICATION	4
3.1	TITLE.....	4
3.2	ABSTRACT.....	4
3.3	PURPOSE.....	4
3.4	TOPIC CATEGORY.....	4
3.5	SPATIAL REPRESENTATION TYPE.....	5
3.6	SPATIAL RESOLUTION.....	5
3.7	GEOGRAPHIC DESCRIPTION.....	5
3.7.1	<i>Authority</i>	5
3.7.2	<i>Code</i>	5
3.7.3	<i>Extent type code</i>	5
3.8	REFERENCE TO SPECIFICATION SCOPE.....	5
4	DATA CONTENT AND STRUCTURE	5
4.1	DESCRIPTION.....	5
4.2	COVERAGE INFORMATION (CD).....	6
4.2.1	<i>Description</i>	6
4.2.2	<i>Coverage type</i>	6
4.2.3	<i>Specification</i>	6
4.3	REFERENCE TO SPECIFICATION SCOPE.....	6
5	REFERENCE SYSTEMS	6
5.1	SPATIAL REFERENCE SYSTEM.....	6
5.1.1	<i>Authority</i>	7
5.1.2	<i>Code</i>	7
5.1.3	<i>Code space</i>	7
5.2.1	<i>Authority</i>	7
5.2.2	<i>Code</i>	8
5.2.3	<i>Code space</i>	8
5.3.1	<i>Authority</i>	8
5.3.2	<i>Code</i>	8
5.3.3	<i>Code space</i>	9
5.4	REFERENCE TO SPECIFICATION SCOPE.....	9

6	DATA QUALITY	9
6.1	COMPLETENESS (VD)	9
6.2	LOGICAL CONSISTENCY	9
6.2.1	<i>Conceptual consistency</i>	9
6.2.2	<i>Domain consistency</i>	9
6.2.3	<i>Format consistency</i>	9
6.2.4	<i>Topological consistency</i>	9
6.3	POSITIONAL ACCURACY	10
6.3.1	<i>Absolute external positional accuracy (VD, GD)</i>	10
6.3.2	<i>Relative internal positional accuracy (VD, GD)</i>	10
6.3.3	<i>Gridded data positional accuracy (GD)</i>	10
6.4	TEMPORAL ACCURACY	10
6.5	THEMATIC ACCURACY	11
6.6	REFERENCE TO SPECIFICATION SCOPE	11
7	DATA CAPTURE.....	11
7.1	DESCRIPTION.....	11
7.2	REFERENCE TO THE SPECIFICATION SCOPE	11
8	DATA MAINTENANCE	11
8.1	DESCRIPTION.....	11
8.2	REFERENCE TO SPECIFICATION SCOPE	11
9	PORTRAYAL.....	11
9.1	POLYCHROME MAP	11
9.1.1	<i>Title: Polychrome map</i>	11
9.1.2	<i>Date</i>	11
9.1.3	<i>Date type code</i>	11
9.1.4	<i>Reference to specification scope</i>	12
9.2	MONOCHROME MAP	12
9.2.1	<i>Title: Monochrome map</i>	12
9.2.2	<i>Date</i>	12
9.2.3	<i>Date type code</i>	12
9.2.4	<i>Reference to specification scope</i>	12
9.3	ORTHOPHOTOMAP	12
9.3.1	<i>Title: Orthophotomap</i>	12
9.3.2	<i>Date</i>	12
9.3.3	<i>Date type code</i>	12
9.3.4	<i>Reference to specification scope</i>	12
10	DATA PRODUCT DELIVERY	12
10.1	DELIVERY FORMAT INFORMATION: TIFF	12
10.1.1	<i>Format name</i>	12
10.1.2	<i>Version</i>	12
10.1.3	<i>Specification</i>	13
10.1.4	<i>Language</i>	13
10.2	DELIVERY FORMAT INFORMATION: PDF	13
10.2.1	<i>Format name</i>	13
10.2.2	<i>Version</i>	13
10.2.3	<i>Specification</i>	13
10.2.4	<i>Language</i>	13
10.3	DELIVERY MEDIUM INFORMATION.....	13
10.3.1	<i>Units of delivery</i>	13
10.3.2	<i>Transfer size</i>	13
10.3.3	<i>Medium name</i>	13
10.4	REFERENCE TO SPECIFICATION SCOPE	13

11	METADATA	14
11.1	REFERENCE TO SPECIFICATION SCOPE	14

1 OVERVIEW

1.1 Title

CanMatrix - Print Ready: Data Product Specifications, Edition 1.0

1.2 Reference date

2008-05-28

1.3 Responsible party

Natural Resources Canada
Earth Sciences Sector
Centre for Topographic Information
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URL: www.GeoGratis.gc.ca

1.4 Language

fra - French

eng - English

1.5 Abbreviations and acronyms

CGVD28	Canadian Geodetical Vertical Datum of 1928
CTI	Centre for Topographic Information
CTI-O	Centre for Topographic Information (Ottawa)
DMDB	Data Management and Dissemination Branch
DPI	Dots per inch
NATO	North Atlantic Treaty Organization
NRCan	Natural Resources Canada
NTS	National Topographic System
PDF	Portable document format
STANAG	NATO STANdardization AGreement
TIFF	Tagged Image File Format

1.6 Informal description of the data product

The Centre for Topographic Information (Ottawa) (CTI-O) has set up a program for producing raster topographic maps of the Canadian landmass. These digital topographic maps have been produced by scanning paper topographic maps at the 1:50 000 and 1:250 000 scales. For more recent maps, a digital map editing process has been used to create a PostScript file that becomes the input for the product.

The Data Management and Dissemination Branch (DMDB) is responsible for distributing the digital raster maps produced by CTI-O. The digital raster product, as distributed by DMDB, is known as **CanMatrix - Print Ready**. The data in the product files may be polychrome, monochrome or a photomap.

This product once again points to CTI's and the federal government's determination to offer products for the general public in order to promote geomatics among non-specialists.

CanMatrix - Print Ready is basically a non-georeferenced raster image that simplifies on-demand printing and provides a map aligned with the edge of the paper during plotting. *CanMatrix - Print Ready* can be used in a variety of ways such as the base information in an emergency measures program. Lastly, *CanMatrix - Print Ready* lends itself to creating value-added products.

The CTI completed the migration from paper format to *CanMatrix - Print Ready* in May 2004. The product is static, and will therefore not be updated because it will be replaced by a new digital product in the near future. The last updates were carried out in March 2008.

CanMatrix - Print Ready is distributed free on the GeoGratis portal (www.GeoGratis.gc.ca) according to the UTM (Universal Transverse Mercator) projection in TIFF (Tagged Image File Format) and PDF (Portable Document Format) output file formats.

Until the product is finalized, some files are labelled "Provisional" because their correction has not been completed (correction required because the text on the back of the paper maps shows through in the scan, and to standardize the indexed colours).

2 SPECIFICATION SCOPE

2.1 Scope identification

Global

2.2 Level

006 - series

2.3 Level name

Global scope of *CanMatrix - Print Ready*

2.4 Extent

For more information about the NTS, visit: http://maps.mcan.gc.ca/topo101/index_e.php

2.4.1 Description

Canadian landmass

2.4.2 Vertical extent

2.4.2.1 Minimum value

0 (Mean sea level (MSL))

2.4.2.2 Maximum value

5959

2.4.2.3 Unit of measure

Metre

2.4.2.4 Vertical datum

CGVD28

2.4.3 Horizontal extent

2.4.3.1 West bound longitude

-141.0

2.4.3.2 East bound longitude

-52.0

2.4.3.3 South bound latitude

+41.0

2.4.3.4 North bound latitude

+84.0

2.4.4 Temporal extent

2.4.4.1 Beginning date

1945

2.4.4.2 Ending date

2004

2.5 Coverage

Canadian landmass:

- at the 1:250 000 scale, coverage is complete.
- at the 1:50 000 scale, coverage is partial, many maps of the Canadian North have not been completed.

3 DATA PRODUCT IDENTIFICATION

3.1 Title

CanMatrix (Print Ready)

3.2 Abstract

CanMatrix - Print Ready was produced by scanning federal government topographic maps at the 1:50 000 and 1:250 000 scales. However, only the front side of these maps has been scanned. As a result, each CanMatrix - Print Ready file or dataset contains all the information on the front of the paper map scanned. This takes in all the topographic information included within the neatline (or NTS (National Topographic System) division) as well as the entire map surround outside of the neatline (that is, information in the border of the map).

The data in the CanMatrix - Print Ready files come from polychrome or monochrome maps or photomaps.

3.3 Purpose

Canadian topographic maps are detailed maps that allow users to visualize the Canadian landmass and its natural elements, man-made features and differences in ground levels. A government decision was made to distribute this product for free.

The product can be viewed on a computer, printed or be plotted in part or in whole. To maintain the scale when printing the entire product, it must be plotted on a plotter that can use paper that is a minimum width of 82 cm (32 inches).

3.4 Topic category

003 - boundaries

006 - elevation

010 - imageryBaseMapsEarthCover

012 - inlandWaters

013 - location

014 - oceans

017 - structure

018 - transportation

019 - utilitiesCommunication

3.5 Spatial representation type

002 - grid

3.6 Spatial resolution

50 000 and 250 000

3.7 Geographic description

3.7.1 Authority

International Organization for Standardization (ISO)

3.7.1.1 Title

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

3.7.1.2 Date

1997-10-01

3.7.1.3 Date type code

002 - publication

3.7.2 Code

CA - Canada

3.7.3 Extent type code

1 - inclusion

3.8 Reference to specification scope

Global

4 DATA CONTENT AND STRUCTURE

4.1 Description

The Canadian topographic maps at the 1:50 000 and 1:250 000 scales on which *CanMatrix - Print Ready* has been built follow National Topographic System (NTS) divisions. Since *CanMatrix - Print Ready* files are directly derived from scanning these maps, it follows that *CanMatrix - Print Ready* files or data sets comply with NTS divisions. Dataset coverage varies according to the area's geographic location within Canada.

4.2 Coverage information (CD)

4.2.1 Description

The polychrome *CanMatrix - Print Ready* files have a radiometry of 8 bits (256 greyscale levels) while greyscale monochrome maps have a radiometry of 16 bits (32,768 greyscale levels). The radiometry corresponds to the number of bits used to save the information for a pixel. In *CanMatrix - Print Ready* files derived from polychrome maps, the 8-bit radiometry is associated with a pseudo-colour table, which provides the means for conveying the colours in the original map.

Each pixel in a *CanMatrix - Print Ready* file represents a surface that is dependent on file resolution and scale. As a result, each pixel in a *CanMatrix - Print Ready* file at the 1:50 000 scale with a resolution of 300 dpi represents an area measuring 4.233 m x 4.233 m. Similarly, each pixel in a *CanMatrix - Print Ready* file at the 1:250 000 scale with a resolution of 300 dpi represents an area measuring 21.167 m x 21.167 m.

The National Topographic System of Canada http://maps.nrcan.gc.ca/topo_e.php

4.2.2 Coverage type

Continuous quadrilateral grid coverage

4.2.3 Specification

4.2.3.1 Domain extent

Canadian landmass tiled by NTS.

4.2.3.2 Range type

Name: Radiometry

Value: Integer (0-255)

4.2.3.3 Common point rule

High is the default

NOTE: The value of the pointing may vary depending on the application used.

4.3 Reference to specification scope

Global

5 REFERENCE SYSTEMS

5.1 Spatial reference system

The NTS On-line product can be attributed one of the three datums below, depending on the creation year of the source document:

The first blocks (1972–1980) were created using the North American Datum of 1927 (NAD27);

The blocks completed between 1980 and 1989 were created using the May 1976 Adjustment (MAY76) of NAD27;

All the blocks completed since 1989 were created using the North American Datum of 1983 (NAD83).

5.1.1 Authority

5.1.1.1 Title

Directory containing reference system parameters:

EPSG Geodetic Parameter Dataset

5.1.1.2 Date

Reference date:

2007-02-08

5.1.1.3 Date type code

Type of date according to ISO 19115 Standard:

002 - publication

5.1.1.4 Responsible party

OGP (International Association of Oil and Gas Producers)

URL: <http://www.epsg.org>

5.1.2 Code

Reference system identifier or CRSID (Coordinate Reference System Identifier):

4267

5.1.3 Code space

EPSG - European Petroleum Survey Group

5.2.1 Authority

5.2.1.1 Title

Directory containing reference system parameters:

EPSG Geodetic Parameter Dataset

5.2.1.2 Date

Reference date:

2007-02-08

5.2.1.3 Date type code

Type of date according to ISO 19115 Standard:

002 - publication

5.2.1.4 Responsible party

OGP (International Association of Oil and Gas Producers)

URL: <http://www.epsg.org>

5.2.2 Code

Reference system identifier or CRSID (Coordinate Reference System Identifier):

4608

5.2.3 Code space

EPSG - European Petroleum Survey Group

5.3.1 Authority**5.3.1.1 Title**

Directory containing reference system parameters:

EPSG Geodetic Parameter Dataset

5.3.1.2 Date

Reference date:

2007-02-08

5.3.1.3 Date type code

Type of date according to ISO 19115 Standard:

002 - publication

5.3.1.4 Responsible party

OGP (International Association of Oil and Gas Producers)

URL: <http://www.epsg.org>

5.3.2 Code

Reference system identifier or CRSID (Coordinate Reference System Identifier):

4617

5.3.3 Code space

EPSG - European Petroleum Survey Group

5.4 Reference to specification scope

Global

6 DATA QUALITY

6.1 Completeness (VD)

After initial scanning, the files were viewed and classified by the operators according to map type. On the polychrome maps, the reference text printed on the back of the map shows through. A process was therefore introduced to correct this problem.

After the initial colour was corrected, on the most frequently sold maps, standardizing the colours to be consistent with the printed map was added to the file standardization process.

On monochrome maps and photomaps, the white is standardized instead, and small defects on the original map are cleaned, which means the files can be improved to optimize the product.

After some files were discovered to contain a scale error, we added a process to rescale the file so that the error is less than 1 mm.

After all the processes are performed, a map is printed and checked to ensure the product meets the specifications, and the product is pronounced completed.

6.2 Logical consistency

The product improvement process has not been completed. However, in order to make all *CanMatrix - Print Ready* files available, the uncorrected files are identified as “Provisional”. They will be corrected in the coming years.

6.2.1 Conceptual consistency

Not applicable.

6.2.2 Domain consistency

The radiometry values of the colours in the palette resulting from the process are compared and corrected using the TOPO colour palette (standardized colours for topographic maps).

6.2.3 Format consistency

An ISO process is used, as well as a function to finalize the product to ensure that the files are in the format that complies with the established standards.

6.2.4 Topological consistency

Not applicable.

6.3 Positional accuracy

6.3.1 Absolute external positional accuracy (VD, GD)

CanMatrix - Print Ready is created by scanning topographic maps (or photomaps). The absolute accuracy of the dataset is therefore equivalent to the accuracy of the data source. However, the impact on the absolute accuracy of the dataset due to the scanning process and distortion of the paper over time is not taken into consideration. For the corrected maps, a planimetric adjustment is applied to correct scan errors and paper distortion. In this case, the resolution of the file will be slightly different from 300 dpi.

The planimetric accuracy of topographic maps is expressed in metres. It is determined according to NATO STANAG 2215 Edition 5 (CMAS or Circular Map Accuracy Standard). The result is a classification with four or five ratings according to the representation scale:

Rating	1:50 000 Scale	1:250 000 Scale
A	25 m	125 m
B	50 m	250 m
C	100 m	500 m
D	500 m	1000 m
E	1000 m	

The planimetric accuracy obtained applies to 90% of all the points at the publication scale.

The altimetric accuracy is also expressed in metres. It is determined according to NATO STANAG 2215 Edition 5 (LMAS or Linear Map Accuracy Standard). This standard identified five ratings for each representation scale:

Rating	1:50 000 Scale	1:250 000 Scale
0	5 m	25 m
1	10 m	50 m
2	20 m	100 m
3	> 20 m	> 100 m
4	Unknown	Unknown

The altimetric accuracy obtained applies to 90% of all the points at the publication scale.

REFERENCE: NATO STANAG 2215, Edition 5, Evaluation of Land Maps, Aeronautical Charts and Digital Topographic Data.

6.3.2 Relative internal positional accuracy (VD, GD)

Unknown

6.3.3 Gridded data positional accuracy (GD)

Not applicable

6.4 Temporal accuracy

Not applicable

6.5 Thematic accuracy

Not applicable

6.6 Reference to specification scope

Global

7 DATA CAPTURE

7.1 Description

CanMatrix - Print Ready was produced by digitally scanning Canadian topographic maps at the 1:50 000 and 1:250 000 scales and a resolution of 300 dpi with 8-bit radiometry.

Some more recent maps were produced from a digital PostScript file produced by the CES (Cartographic Edition System) at CTI-O.

7.2 Reference to the specification scope

Global

8 DATA MAINTENANCE

8.1 Description

No updates will be made to *CanMatrix - Print Ready*.

8.2 Reference to specification scope

Global

9 PORTRAYAL

9.1 Polychrome map

9.1.1 Title: Polychrome map

National Topographic System, Polychrome Map, Standards and Specifications, version 2.0, Centre for Topographic Information, Natural Resources Canada (<http://maps.nrcan.gc.ca/cartospecs/>).

9.1.2 Date

2001-10

9.1.3 Date type code

002 - publication

9.1.4 Reference to specification scope

Global

9.2 Monochrome map

9.2.1 Title: Monochrome map

Map compilation instructions and specifications manual

9.2.2 Date

1974

9.2.3 Date type code

002 - publication

9.2.4 Reference to specification scope

Global

9.3 Orthophotomap

9.3.1 Title: Orthophotomap

Map compilation instructions and specifications manual

9.3.2 Date

Unknown

9.3.3 Date type code

002 - publication

9.3.4 Reference to specification scope

Global

10 DATA PRODUCT DELIVERY

10.1 Delivery format information: TIFF

10.1.1 Format name

TIFF – Tagged Image File Format with LZW (**Lempel-Ziv-Welch**) compression

10.1.2 Version

6.0

10.1.3 Specification

TIFF6, Revision 6.0, Final - June 3, 1992 (<http://partners.adobe.com/public/developer/en/tiff/TIFF6.pdf>)

10.1.4 Language

fra - French

eng – English

10.2 Delivery format information: PDF

10.2.1 Format name

PDF – Portable Document Format

10.2.2 Version

1.4

10.2.3 Specification

PDF Reference, third edition, Adobe Portable Document Format, Version 1.4, Adobe Systems Incorporated, December 2001 (<http://partners.adobe.com/public/developer/en/pdf/PDFReference.pdf>)

10.2.4 Language

fra - French

eng - English

10.3 Delivery medium information

10.3.1 Units of delivery

File according to National Topographic System (NTS) sectioning

10.3.2 Transfer size

In most cases *CanMatrix - Print Ready* files in TIFF (.tif) and PDF (.pdf) format range from 1.5 to 110 megabytes (MB), with an average of about 35 MB.

10.3.3 Medium name

GeoGratis FTP site

10.4 Reference to specification scope

Global

11 METADATA

Not applicable

11.1 Reference to specification scope

Global