



**Canadian Spatial Reference System
Data Base (CSRS DB)
Data Model and Data Dictionary**

Edition 01

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GeoBase®

REVISION HISTORY

Date	Version	Description
July - 2002	1.0	Original version

FUTURE WORK

Key-word	Description

ACRONYMS AND ABBREVIATIONS

ACSM	Alberta Survey Control Monument
CGIS	Canadian Geodetic Information System
CGVD28	Canadian Geodetic Vertical Datum 1928
CHS	Canadian Hydrological Service
CSRS	Canadian Spatial Reference System
GSD	Geodetic Survey Division
GPS	Global Positioning System
ITRF	International Terrestrial Reference Frames
LRIS	Land Registration and Information Services
NAD27	North America Datum 1927
NAD83	North America Datum 1983
NGDB	National Geodetic Database

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1 DATA MODEL

This data model is a subset of the Canadian Spatial Reference System Database (CSRS DB) represented in the form of an Entity-Relationship diagram (ERD). It contains the information that is outputted in the GeoBase Geodetic network related products. It corresponds to the physical model of the Oracle database used to store geodetic data at Geodetic Surveys Division. The fields part of the key for each table are indicated in bold.

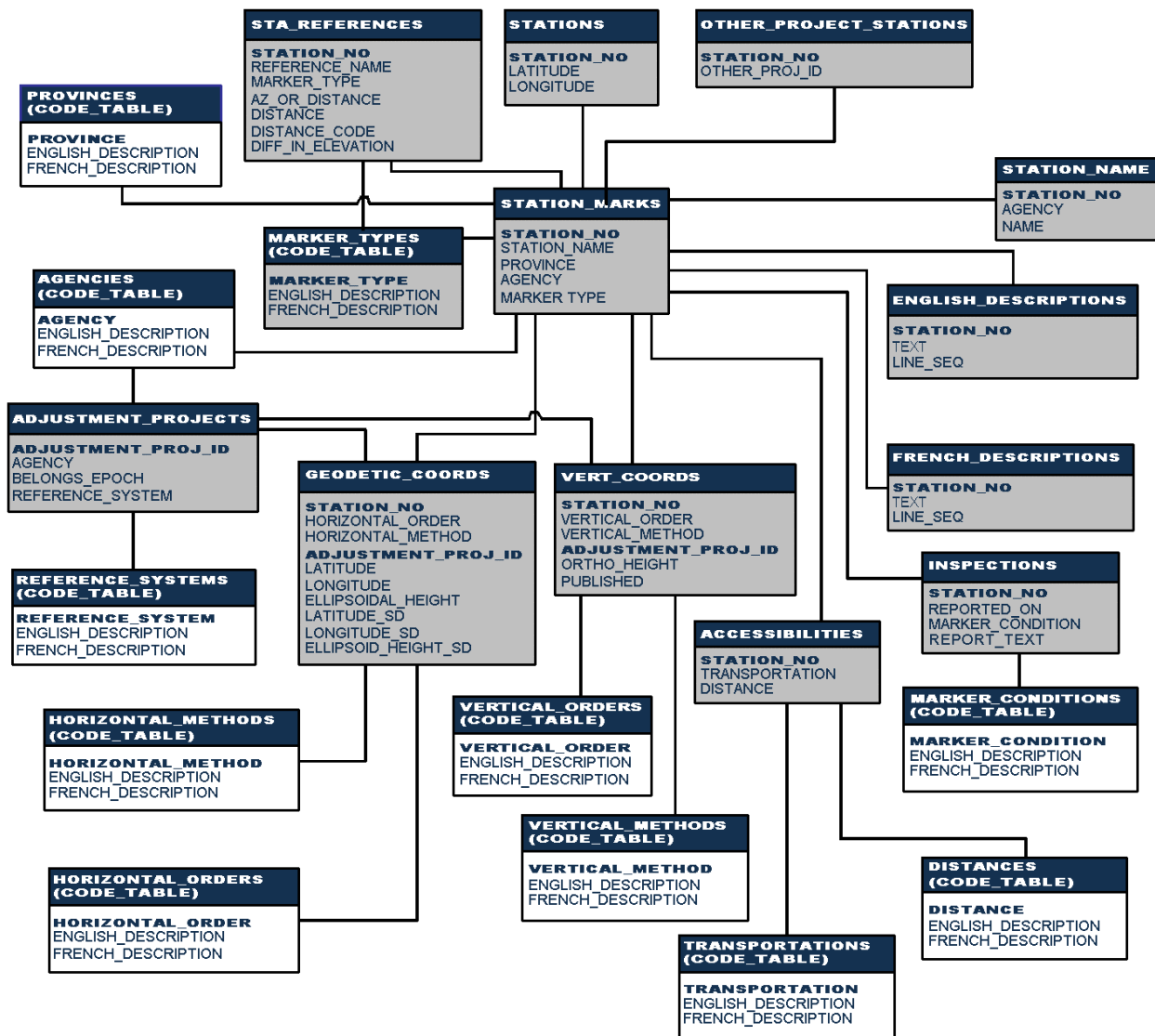


Figure 1: SCRS Data Model

2 Data Dictionary

The data dictionary of the CSRS database presents for each tables stored in Oracle: the field name or column, the data type, the domain (known possible values) of the attributes and the description of the column.

2.1 ACCESSIBILITIES

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
TRANSPORTATION	NOT NULL VARCHAR2(1)	Accessibility codes for transportation mode in Section 10 of Appendix C	The type of transportation used to get to the survey monument.
DISTANCE	NOT NULL NUMBER(2)	Accessibility codes for distance walked in Section 10 of Appendix C	The distance walked from the type of transportation used to the survey monument.

2.2 ADJUSTMENT_PROJECTS

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
ADJUSTMENT_PROJ_ID	NOT NULL VARCHAR2(10)		An adjustment net identifies a group of stations whose horizontal coordinates were derived from the same least-square adjustment.
AGENCY	NUMBER(3)	Agency codes in Appendix B	The agency responsible for the adjusted horizontal coordinates is assigned a unique three-digit number.
BELONGS_EPOCH	VARCHAR2(10)		A particular instant in time from which an adjustment(s) is calculated. This date coincides with the ITRF realization used in the adjustment.
REFERENCE_SYSTEM	VARCHAR2(10)	Horizontal Datums in Section 2 of Appendix C	A geodetic datum specifying the coordinate system in which horizontal control points are located.

2.3 ENGLISH_DESCRIPTION

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
TEXT	NOT NULL VARCHAR2(60)		The English station description describing how to re-locate the survey monument.
LINE_SEQ	NOT NULL NUMBER(3)		Each line of a station description is 60 characters in length and given a sequence line number.

2.4 FRENCH_DESCRIPTION

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
TEXT	NOT NULL VARCHAR2(60)		The French station description describing how to re-locate the survey monument.
LINE_SEQ	NOT NULL NUMBER(3)		Each line of a station description is 60 characters in length and given a sequence line number.

2.5 GEODETIC_COORDS

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
HORIZONTAL_ORDER	NOT NULL VARCHAR2(1)	Horizontal order codes in Section 3 of Appendix C	An accuracy indicator given to conventional 2-D adjusted horizontal control.
HORIZONTAL_METHOD	NOT NULL VARCHAR2(1)	Horizontal method codes in Section 4 of Appendix C	The survey method from which the horizontal coordinate were derived.
ADJUSTMENT_PROJECT_ID	NOT NULL VARCHAR2(10)		An adjustment net identifies a group of stations whose horizontal coordinates were derived from the same least-square adjustment.
LATITUDE	NOT NULL NUMBER(12,6)		The angular distance north or south of the earth's equator, measured in degrees, minutes, and seconds along a meridian.
LONGITUDE	NOT NULL NUMBER(13,6)		Angular distance on the earth's surface, measured east or west from the prime meridian at Greenwich, to the meridian passing through a position, measured in degrees, minutes, and seconds.
ELLIPSOIDAL_HEIGHT	NOT NULL NUMBER(9,4)		The height above the reference ellipsoid. Ellipsoidal heights exists only for stations with published NAD83CSRS coordinates.
LATITUDE_SD	NUMBER(10,4)		The standard deviation in metre of the latitude in the NAD83CSRS system.
LONGITUDE_SD	NUMBER(10,4)		The standard deviation in metre of the longitude in the NAD83CSRS system.
ELLIPSOID_HEIGHT_SD	NUMBER(9,4)		The standard deviation in metre of the ellipsoidal height in the NAD83CSRS system.

2.6 INSPECTIONS

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
REPORTED_ON	NOT NULL DATE		The date the survey monument was last inspected.
MARKER_CONDITION	MARKER_CONDITION NUMBER(1)	Survey marker condition codes in Section 8 of Appendix C	The survey monument's condition when last inspected.
REPORT_TEXT	NOT NULL VARCHAR2(240)		Comments made by the inspector on the condition of the survey monument.

2.7 OTHER_PROJECT_STATIONS

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
OTHER_PROJ_ID	NOT NULL VARCHAR2(10)		This identifies a group of stations that were part of a project that is not an adjustment or field project.

2.8 STATIONS

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
LATITUDE	NOT NULL NUMBER(7,1)		Scaled off an NTS map sheet or truncated latitude from the GEODETIC_COORDS table.
LONGITUDE	NOT NULL NUMBER(8,1)		Scaled off an NTS map sheet or truncated longitude from the GEODETIC_COORDS table.

2.9 STATION_MARKS

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		Each survey monument in the CGIS database has a unique station identifier, which may comprise from 5 to 8 alpha/numeric characters. For more information on “Unique Numbers” see Appendix A (Explanation Unique Station Numbers Used in CGIS).
STATION_NAME	NOT NULL VARCHAR2(15)		Station names are not unique and there could be several stations on the database with the same name. The name could be what is stamped on the monument or another agency’s identifier or a local name for the area.
PROVINCE	NOT NULL VARCHAR2(2)	Provincial codes in Section 1 of Appendix C	The province in which the monument is located. Canada Post and ISO3166 codes are used.
AGENCY	NOT NULL NUMBER(3)	Agency codes in Appendix B	The agency that established the monument is assigned a unique three-digit number.
MARKER_TYPE	VARCHAR2(2)	Marker type codes in Section 8 of Appendix C	The type of marker left behind to identify the survey monument.

2.10 STATIONS_NAMES

Column	Data Type	Domain	Description
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
AGENCY	NOT NULL NUMBER(3)	Agency codes in Appendix B	The agency whose identifier is used is assigned a unique three-digit number.
NAME	NOT NULL VARCHAR2(20)		The identifier used by the province in which the monument is located, if different from GSD’s Unique Number.

2.11 STA_REFERENCES

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
REFERENCE_NAME	NOT NULL CHAR(30)		The reference station identifier. The identifier could be what is stamped on the monument or another agency's identifier (see Appendix A).
MARKER_TYPE	VARCHAR2(2)	Marker type codes in Section 8 of Appendix C	The type of marker left behind to identify the survey monument.
AZ_OR_DISTANCE	NOT NULL NUMBER(8,1)		The azimuth or direction from the main station to the reference marker.
DISTANCE	NUMBER(11,3)		The distance in metres from the main station to the reference marker.
DISTANCE_CODE	VARCHAR2(1)		"H" for horizontal and "S" for slope.
DIFF_IN_ELEVATION	NUMBER(5)		The elevation difference between the main station and the reference point.

2.12 VERT_COORDS

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
STATION_NO	NOT NULL VARCHAR2(8)		See description in the STATION_MARK table.
VERTICAL_ORDER	NOT NULL VARCHAR2(1)	Vertical order codes in Section 6 of Appendix C	An accuracy indicator given to the orthometric elevation (Mean Sea Level).
VERTICAL_METHOD	NOT NULL VARCHAR2(1)	Vertical Survey Method in Section 7 of Appendix C	The survey method from which the orthometric elevation was derived.
ADJUSTMENT_PROJECT_ID	NOT NULL VARCHAR2(10)		An adjustment line identifies a group of stations whose orthometric elevation was derived from the same least-square adjustment.
ORTHO_HEIGHT	NOT NULL NUMBER(14,9)		The elevation in metres above a reference datum.
PUBLISHED	NOT NULL DATE		The year the adjusted orthometric elevation was published.

2.13 AGENCIES (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
AGENCY	NOT NULL NUMBER(3)	Agency codes in Appendix B	An agency is assigned a unique three-digit number.
ENGLISH_DESCRIP TION	NOT NULL VARCHAR2(60)		The English code description.
FRENCH_DESCRIP TION	NOT NULL VARCHAR2(60)		The French code description.

2.14 DISTANCES (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
DISTANCE	NOT NULL VARCHAR2(1)	Accessibility codes for distance walked in Section 10 of Appendix C	The distance walked from the type of transportation used to the survey monument.
ENGLISH_DESCRIP TION	NOT NULL VARCHAR2(60)		The English code description.
FRENCH_DESCRIP TION	NOT NULL VARCHAR2(60)		The French code description.

2.15 HORIZONTAL_METHODS (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
HORIZONTAL_MET HOD	NOT NULL VARCHAR2(1)	Horizontal method codes in Section 4 of Appendix C	The survey method from which the horizontal coordinates were derived.
ENGLISH_DESCRIP TION	NOT NULL VARCHAR2(60)		The English code description.
FRENCH_DESCRIP TION	NOT NULL VARCHAR2(60)		The French code description.

2.16 HORIZONTAL_ORDERS (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
HORIZONTAL_ORD ER	NOT NULL VARCHAR2(1)	Horizontal order codes in Section 3 of Appendix C	An accuracy indicator given to conventional 2-D adjusted horizontal control.
ENGLISH_DESCRIP TION	NOT NULL VARCHAR2(60)		The English code description.
FRENCH_DESCRIP TION	NOT NULL VARCHAR2(60)		The French code description.

2.17 MARKER_CONDITIONS (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
MARKER_CONDITION	NOT NULL VARCHAR2(1)	Survey marker condition codes in Section 8 of Appendix C	The survey monument's condition when last inspected.
ENGLISH_DESCRIPTION	NOT NULL VARCHAR2(25)		The English code description.
FRENCH_DESCRIPTION	NOT NULL VARCHAR2(25)		The French code description.

2.18 MARKER_TYPES (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
MARKER_TYPE	NOT NULL VARCHAR2(2)	Marker type codes in Section 8 of Appendix C	The type of marker left behind to identify the survey monument.
ENGLISH_DESCRIPTION	NOT NULL VARCHAR2(60)		The English code description.
FRENCH_DESCRIPTION	NOT NULL VARCHAR2(60)		The French code description.

2.19 PROVINCES (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
PROVINCE	NOT NULL NUMBER(2)	Provincial codes in Section 1 of Appendix C	The province in which the monument is located. Canada Post and ISO3166 codes are used.
ENGLISH_DESCRIPTION	NOT NULL VARCHAR2(60)		The English code description.
FRENCH_DESCRIPTION	NOT NULL VARCHAR2(60)		The French code description.

2.20 REFERENCE_SYSTEMS (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
REFERENCE_SYSTEM	NOT NULL VARCHAR2(10)	Reference system codes in Section 2 for horizontal references and Section 5 for vertical references of Appendix C	A geodetic datum specifying the coordinate system in which horizontal control points are located.
REFERENCE_SYSTEM_TYPE	VARCHAR2(1)	Reference system type codes in Section 11 of Appendix C	Indicates the reference system type (Horizontal or Vertical).

2.21 TRANSPORTATIONS (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
TRANSPORTATION	NOT NULL VARCHAR2(1)	Accessibility codes for transportation mode in Section 10 of Appendix C	The type of transportation used to get to the survey monument.
ENGLISH_DESCRIPTION	NOT NULL VARCHAR2(40)		The English code description.
FRENCH_DESCRIPTION	NOT NULL VARCHAR2(40)		The French code description.

2.22 VERTICAL_METHODS (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
VERTICAL_METHOD	NOT NULL VARCHAR2(1)	Vertical Survey Method in Section 7 of Appendix C	The survey method from which the orthometric elevation was derived.
ENGLISH_DESCRIPTION	NOT NULL VARCHAR2(60)		The English code description.
FRENCH_DESCRIPTION	NOT NULL VARCHAR2(60)		The French code description.

2.23 VERTICAL_ORDERS (CODE_TABLE)

COLUMN	DATA TYPE	DOMAIN	DESCRIPTION
VERTICAL_ORDER	NOT NULL VARCHAR2(1)	Vertical order codes in Section 6 of Appendix C	An accuracy indicator given to the orthometric elevation (Mean Sea Level).
ENGLISH_DESCRIPTION	NOT NULL VARCHAR2(60)		The English code description.
FRENCH_DESCRIPTION	NOT NULL VARCHAR2(60)		The French code description.

APPENDIX A: Explanation of Unique Station Numbers used on CGIS

Post 2000 Unique Station Numbering System

Federal Format

a) Established by Federal Agencies

The federal format consists of 6 to 8 alpha-numeric characters, i.e. **Myypssss**, where:

- M** would indicate stations established after 2000.
- yy** is the year the station was established, e.g. M01__ __ station established in 2001, or, if the year established is unknown, then the year it was first tied-in is used.
- p** is a provincial/territorial code to indicate the province/territory in which the station lies. The code is numeric for horizontal control and alpha for vertical control.
- ssss** is a sequence number. The fifth to seventh characters and, in some cases, the eighth character, comprise the sequence number.

E.G.	<u>Horizontal</u>	<u>Vertical</u>
Newfoundland	0 (e.g. M010001)	F (e.g. M01F001)
Nova Scotia	1 (e.g. M011001)	N (e.g. M01N001)
Prince Edward Island	1 (e.g. M011001)	P (e.g. M01P001)
New Brunswick	1 (e.g. M011001)	B (e.g. M01B001)
Quebec	2 (e.g. M012001)	L (e.g. M01L001)
Ontario	3 (e.g. M013001)	U (e.g. M01U001)
Manitoba	4 (e.g. M014001)	M (e.g. M01M001)
Saskatchewan	5 (e.g. M015001)	S (e.g. M01S001)
Alberta	6 (e.g. M016001)	A (e.g. M01A001)
British Columbia	7 (e.g. M017001)	C (e.g. M01C001)
Yukon	8 (e.g. M018001)	Y (e.g. M01Y001)
Northwest Territories/Nunavut	9 (e.g. M019001)	T (e.g. M01T001)

Note: The provincial identifier for horizontal control stations in the 3 Maritime Provinces is the same (1).

Each federal agency has a unique range of sequence numbers as follows:

0	2899	Established by Geodetic Survey Division or Topographical Surveys
2900	2999	Established by an agency unknown
3000	3999	Established by another federal agency, e.g. MOT, E.C.
4000	4999	Established by the Canadian Coast Guard
5000	5999	Established by Department of National Defence
6000	6999	Unused
7000	7999	Established by the Legal Surveys Division
8000	8999	Unused
9000	9999	Established by CHS (Department of Fisheries and Oceans)

In some cases, the seventh and/or eighth character is an alpha suffix depicting reference, azimuth, or eccentric, example:

A	Reference A or reference 1	(e.g. M013001 A)
B	Reference B or reference 2	(e.g. M013001 B)
C	Reference C or reference 3	(e.g. M013001 C)
X	Eccentric	(e.g. M013001 X)
Z	Azimuth	(e.g. M013001 Z)
US	Station in the USA (province code is the closest province)	(e.g. M01301 US)

b) Stations Established under the Jurisdiction of Provincial Agencies, in which the Federal/provincial Format Has Been Adopted

- The first character will denote stations established after 2000 "M".
- The second and third characters being the year of establishment or if that is not known, the year first tied-in. e.g. M01pxxxx (established in 2001)
- The fourth character indicates the province. (G, K, R or V)
 - G** NFLD Provincial government responsible for assigning # (e.g. M01Gxxxx)
 - K** QUE Provincial government responsible for assigning # (e.g. M01Kxxxx)
 - R** MAN Provincial government responsible for assigning # (e.g. M01Rxxxx)
 - V** SASK Provincial government responsible for assigning # (e.g. M01Vxxxx)
- The fifth to seven characters, and in some cases, the eighth character, are sequential.

Note: Stations tied-in by Geodetic Surveys, which were established by a provincial agency other than the provincial agency responsible for geodetic control, and where the provincial agency responsible for provincial control will not assign it a number, a number will be assigned by Geodetic Surveys.

example:

NFLD	--- GT ---	(M00GT01)
NS	--- ET ---	(M00ET01)
PEI	--- ET ---	(M00ET01)
NB	--- ET ---	(M00ET01)
Quebec	--- KT ---	(M00KT01)
Ontario	--- DT ---	(M00DT01)
Manitoba	--- RT ---	(M00RT01)
Saskatchewan	--- VT ---	(M00VT01)
Alberta	--- XT ---	(M00XT01)
BC	--- HT ---	(M00HT01)
NWT	--- WT ---	(M00WT01)
Nunavut	--- WT ---	(M00WT01)

Pre- 2000 Unique Station Numbering System

Federal Format

This format is used for:

- stations established by federal agencies;
- stations established under the jurisdiction of provincial agencies, where the federal format has been adopted. Provincial agencies are responsible for assigning numbers to specific stations.

a) Established by Federal Agencies

The federal format consists of 6 to 8 alpha-numeric characters, i.e.: **yypssss**, where:

yy is the year the station was established, e.g. 90_ _ _ _ _ station established in 1990, or, if that is unknown, the year first tied in is used.

Except: 1) Stations established prior to 1900 will have XX as the first two characters, e.g. station established in 1891 will appear as XX_ _ _ _ _ (XX3041).

2) CHS navigational lights will have YY as the first two characters, e.g. yy_ _ _ _ _ (YY19001).

p is a provincial/territorial code to indicate the province/territory in which the station lies. The code is numeric for horizontal control and alpha for vertical control;

	<u>Horizontal</u>	<u>Vertical*</u>
Newfoundland	0	F
Nova Scotia	1	N
Prince Edward Island	1	P
New Brunswick	1	B
Quebec	2	L
Ontario	3	U
Manitoba	4	M
Saskatchewan	5	S
Alberta	6	A
British Columbia	7	C
Yukon territory	8	Y
Northwest Territories	9	T

Note: The provincial identifier for horizontal control stations in the 3 Maritime Provinces is the same (1).

* "Identifiers" for Geodetic Survey primary bench marks are assigned by the Primary Vertical Control Section.

ssss is a sequence number. The fourth to sixth characters, and in some cases, the seventh character, will be a sequence number.

Each federal agency has a unique range of sequence numbers as follows:

0000	2899	Established by Geodetic Survey Division or Topographic Surveys Division
2900	2999	Established agency not known
3000	3999	Established by other federal agency, e.g. MOT, E.C. etc.
4000	4999	Established by Canadian Coast Guard
5000	5999	Established by Department of National Defence
6000	6999	Unused
7000	7999	Established by Legal Surveys Division
8000	8999	Unused
9000	9999	Established by CHS (Department of Fisheries & Oceans)

In some cases, the seventh or eighth character is an alpha suffix depicting reference, azimuth or eccentric, example:

A	Reference A or reference 1
B	Reference B or reference 2
C	Reference C or reference 3
X	Eccentric
Z	Azimuth
US	Station in the USA (province code is the closest province)

Note: Unmonumented stations used for adjustment purposes will be numbered as follows:

- The first and second characters - year of adjustment
 - The third character - province code
 - The 4th character - the letter "M" denoting station for adjustment purposes only
 - The fifth to seventh characters - sequence number
- Example: ___ M ___ (901M001)

b) Stations established under the jurisdiction of provincial agencies, where the federal format has been adopted; (policy prior to March 1991)

- The first and second characters being the year of establishment or if that is unknown, the year first tied-in is used.
- The third character indicates province or territory.

* G	NFLD	Provincial government responsible for assigning #
E	NS	Numbers assigned by GSC Data Services
E	PEI	Numbers assigned by GSC Data Services
E	NB	Numbers assigned by GSC Data services
* K	QUE	Provincial government responsible for assigning #
D	ONT	Numbers assigned by GSC Data Services
* R	MAN	Provincial government responsible for assigning #
* V	SASK	Provincial government responsible for assigning #
X	ALTA	Numbers assigned by GSC Data Services
* H	BC	Provincial government t responsible for assigning #
W	NWT	Numbers assigned by GSC Data Services

** Provinces that follow federal numbering policy and are responsible for assigning numbers.*

- The fourth to sixth characters, and in some cases, the seventh character, are sequential.

IDENTIFIERS for PROVINCIAL Stations in the NGDB (after March 1991)

The unique numbering policy of provincial stations was revised due to the amount of provincial data now being stored in the NGDB. Not all provinces follow the federal numbering format; some that did in the past now either no longer conform to it or are changing to a completely new format.

Note: For our purposes (FEDERAL IDENTIFIER), the unique numbers assigned to provincial stations in the NGDB prior to March 1991, or published in the Primary Vertical Quad booklets will not be changed. However, the provinces may choose to change their identifiers.

- NFLD** -New stations will be numbered as done prior to March 1991 with the NFLD government being responsible for numbering. However, the NFLD government did not adopt our numbering policy until after 1975, and stations established prior to this date were assigned sequence numbers that do not conform to our numbering policy. In the past, they were assigned a number by Geodetic to conform to our policy. This number was based on the year tied-in; the provincial character "G"; and a sequence number. Now these stations will be numbered with the prefix "G" in front of the number originally assigned by the NFLD government.
E.G. NFLD station established in 1971 with the provincial number 029070 will be given the unique number G029070.
- N.S.** -The federal identifier will be the Nova Scotia LRIS number with the prefix "NS".
E.G. LRIS number 4021 - Geodetic number NS4021
- PEI** -The federal identifier will be the PEI LRIS number with the prefix "PE".
E.G. LRIS number 23101 - Geodetic number PE23101
- NB** -The federal identifier will be the NB LRIS number with the prefix "NB".
E.G. LRIS number 32101 - Geodetic number NB32101
- Quebec** -New stations will be numbered as done prior to March 1991 with the Quebec government being responsible for assigning numbers.
E.G. 87K0124
- Ontario** -The federal identifier will be a sequential number with the prefix "D".
E.G. Ontario station 008710072 - Geodetic number D11750. This federal identifier will be retained and assigned by a Powerhouse routine.
- Manitoba** -New stations will be numbered as done prior to March 1991 with the Manitoba government being responsible for assigning numbers.
E.G. 87R183
- Sask.** -New stations will be numbered as done prior to March 1991 with the Saskatchewan government being responsible for assigning numbers.
E.G. 85V189
- Alberta** -The federal identifier will be the Alberta ASCM number with the prefix "A".
E.G. ASCM number 53322 - Geodetic number A53322

B.C. - New stations will be numbered as done prior to March 1991 with the B.C. government being responsible for assigning numbers.

E.G. 87H1048

Note: The B.C. government has plans to renumber their stations with a randomly generated number. After that policy is implemented, the federal identifier for provincial stations established after March 1991, and those prior to but not presently in the NGDB, will be the BC random number with the prefix "B".

NWT -The federal identifier will be the NWT number with the prefix "W".

E.G. NWT number 6019243 - Geodetic number W6019243

Note: In the case of stations tied-in by the Geodetic Survey Division established by a provincial agency other than the provincial agency responsible for geodetic control and not assigned a number by the provincial agency responsible for provincial control, the Geodetic Survey Division will assign a number. The numbers will follow the provincial numbering system used prior to March 1991 with a "T" as the fourth character.

Example:

NFLD	-- GT --
Nova Scotia	-- ET --
PEI	-- ET --
New Brunswick	-- ET --
Quebec	-- KT --
Ontario	-- DT --
Manitoba	-- RT --
Saskatchewan	-- VT --
Alberta	-- XT --
BC	-- HT --
NWT	-- WT --

New Markers at Old Stations

Should a new marker set at an existing station be assigned the unique number of the marker replaced?

I don't think there should be any hard and fast rules. Treat each case separately and use common sense. Remember that any marker with new identification requires new measurements sufficient to integrate it into the network.

Two criteria that can be used to decide the course of action in most cases are:

- a) Can the marker be placed, with certainty, in the exact position of the old marker?
 - b) Is the marker a Primary Vertical Control Bench Mark?
- a) If the station is a horizontal control point, not a primary vertical control point, and the new tablet can be placed with certainty in the exact location of the old tablet, that should be done and the unique identifier of the old tablet assigned to the new tablet. Sample scenarios: the old tablet is removed from a drill hole in bedrock or a large undisturbed boulder; a partially broken concrete monument whose pieces can be reassembled in the original location; main marker destroyed but reference markers remain intact. NB: it is often possible to use one of the reference markers as the control point when the main reference is destroyed. If not, then the main reference can be reset by measuring from the references.
 - b) If the station is only a primary vertical control point, the station must be considered destroyed. If a new station (BM) is established, it must be assigned a new unique identification.

Other Scenarios

Horizontal Control Marker with First-order Elevation Determined

Same approach as a) above except that the first-order elevation designation must be removed, unless first-order procedures are used to re-establish the elevation. If no re-levelling is done, a lower-order elevation could be assigned or a "consult agency" designation entered in the database records. In any case, an explanation should be given in the station description.

Primary Vertical Control Marker tied to the Horizontal Network

Same approach as b) above. If, under special circumstances, it is absolutely necessary to retain the marker as a horizontal control point and it can be reset in its original position, continue to use the old unique identification but the elevation must be down-graded or re-levelled. In any case, an explanation must be given in the marker description.

APPENDIX B: List of Agency Codes

Agency Codes (STATION_MARKS and ADJUSTMENT_PROJECTS tables, AGENCY column)

Federal and Territorial Government Agencies

<u>Code</u>	<u>Agency</u>
100	Geodetic Survey Division - Geomatics Canada
101	Topographical Survey Division - Geomatics Canada
102	Legal Survey of Canada - Geomatics Canada
103	Geological Survey of Canada - Geomatics Canada
104	International Boundary Commission - Geomatics Canada
105	Mapping and Charting Establishment – DND
106	Canadian Hydrographic Service - F & O
107	Water Survey of Canada – EC
108	Tides, Currents and Water Levels (CHS) - F & O
109	Public Works Canada (PWC)
110	Transport Canada (TC)
111	National Capital Commission
112	Harbours Board Canada – TC
113	National Research Council
114	Earth Physics Branch – EMR
115	Polar Continental Shelf Project – EMS
116	International Waterways Commission
117	Trent Canal Survey – TC
118	St. Lawrence Ship Channel – TC
119	Dominion Water and Power Bureau
192	Canadian Coast Guard
215	Prairie Farm Rehabilitation Administration
216	St. Lawrence Seaway Authority
230	Defense Research Board (Establishment) – ND
236	Agriculture Rural Development Administration
250	Town Planning & Lands Division – N.W.T. Government
251	Agriculture Canada (AGRC)
252	Indian and Northern Affairs (IANA)
253	Highways Division (DPW) N.W.T. Government
254	Department of Communications
224	Miscellaneous Federal and Territorial Government Agencies
222	Unknown Agencies (All Groups)

Provincial Agencies

<u>Code</u>	<u>Agency</u>
120	Nfld. Dept. of Forest Resources and Lands (Survey & Mapping)
121	Nfld. Dept. of Rural Agriculture and Northern Development
122	Newfoundland and Labour Hydro
123	Nfld. Dept. of Fisheries
125	N.S. Dept. of Lands and Forest
129	N.B. Dept. of Public Works
130	N.B. Dept. of Natural Resources
131	N.B. Electric Power Commission
132	N.B. Geographic Information Corporation
133	P.E.I. Dept. of Provincial Treasury
135	Land Registration and Information Services (LRIS)
140	Québec Ministère des Ressources naturelles (Service de la Géodésie)

141	Québec Ministère des Ressources naturelles (Comm. des eau courantes)
142	Québec Ministère des Transport (VOIRIE)
143	Hydro Québec
144	Québec Ministère des Transport (Tous sauf VOIRIE)
145	Ontario Ministry of Natural Resources (Survey and Mapping Branch)
146	Ontario Ministry of Transportation & Communications (Lands Surveys)
147	Ontario Hydro
148	Ontario Ministry of Consumer & Commercial Relations
350	Ontario Dept. of Public Works
150	Manitoba Dept. of Natural Resources (Surveys and Mapping Branch)
151	Manitoba Dept. of Highways & Transportation (Public Works included)
152	Manitoba Hydro
155	Saskatchewan Dept. of Energy, Mines and Resources
156	Saskatchewan Dept. of Highways and Transportation
157	Saskatchewan Dept. of Agriculture
158	Saskatchewan Property Management Corp.(Central Survey & Mapping)
160	Alberta Dept. of Energy & Natural Resources (Alberta Survey & Mapping)
161	Alberta Housing and Public Works
165	B.C. Ministry of Environment (Surveys and Mapping Branch)
166	B.C. Ministry of Environment (Water Investigation Branch)
167	B.C. Ministry of Lands, Parks and Housing (Legal Surveys Branch)
168	B.C. Ministry of Transportation & Highways
169	B.C. Hydro and Power Authority
300	Surveys and Mapping, Government of N.W.T.
175	Miscellaneous Provincial Government Agencies
222	Unknown Agencies (All Groups)

Other Agencies

<u>Code</u>	<u>Agency</u>
180	Miscellaneous Regional and Municipal Government Agencies
233	Miscellaneous Commercial & Private Firms
223	United Kingdom Survey Agencies
224	United States Survey Agencies (National Geodetic Survey and Others)
226	Denmark Survey Agencies

Regional And Municipal Government Agencies

<u>Code</u>	<u>Agency</u>
500	Municipality of Metropolitan Toronto (Central Mapping Agency)
501	Regional Municipality of Hamilton/Wentworth
502	Regional Municipality of Ottawa/Carleton
503	Regional Municipality of Peel
504	Regional Municipality of Sudbury
505	Regional Municipality of Waterloo
506	Regional Municipality of York
507	Corporation of the County of Essex
508	Corporation of the City of Kingston
509	City of London
510	Corporation of the City of Oshawa
511	Corporation of the City of Mississauga
512	Corporation of the City of Burlington
513	Corporation of the City of Thunder Bay
514	City of Windsor
515	City of Hamilton
520	Cité de Sillery

521	Cité de Québec
522	Montréal
535	Fredericton
536	Halifax
537	Charlottetown
545	City of Winnipeg
555	City of Saskatoon
556	City of Regina
565	City of Edmonton
566	City of Calgary
575	Greater Vancouver Regional District
576	City of Victoria
585	St. John's
590	Whitehorse
595	Yellowknife

Commercial And Private Firms

<u>Code</u>	<u>Agency</u>
190	CN Rail
191	CP Rail
203	All-West Surveys (1980) Ltd.
204	Azimuthal Surveys Ltd.
205	Acres Consultants Services Ltd.
206	Aero-Photo Inc.
207	Atlantic Righfield Co.
208	J.D. Barnes Ltd.
209	Canadian Engineering Surveys Ltd.
210	Imperial Oil Ltd.
211	International Nickel Co. of Canada Ltd.
212	Marshall, Macklin and Monaghan Ltd.
213	Northway Survey Corp. Ltd.
214	Photo Air Laurentides
216	Shell Canada Ltd.
218	Bowaters Nfld. Pulp and Paper Ltd.
219	Atlantic Air Survey Ltd.
220	East Kootenay Power Co.
221	Domtar
227	Anglo Canadian Pulp and Paper Mills
228	Canadian Industries Ltd.
229	Aluminum Company of Canada (Alcan Ltd.)
231	E.B. Eddy Company
232	Alterra Surveys Ltd.
234	Prairie Surveys Ltd.
235	Hosford, Impey, Welter & Associates Ltd.
237	Alberta Gas Trunkline
238	Airborne Geophysical Surveys Ltd.
239	A.E. Peterson Consulting Ltd.
240	Aero Geometric Systems
241	Berrick King Surveys Ltd.
242	Burnett Resource Surveys Ltd.
243	Beta Surveys Ltd.
244	Bell Canada
245	Les Service Géométriques B.L.L. Inc.
246	B. C. Telephone Co.
247	The Bowater Power Co. Ltd.

248	Beaver Geophysical Services Co. Ltd.
249	Brown and Cave Surveys Ltd.
601	Can-Am Surveys Ltd.
602	Chevron Standard Ltd. (Chevron Geoscience)
603	Century Geophysical Corporation
604	Cadaster Surveys Ltd.
605	Canadian Superior Oil Ltd.
606	Canadian Seismic Surveys
607	Cominco Ltd.
608	K.B. Drake & Associates Surveys Ltd.
609	Trans Canada Pipe Lines
610	D.J. Surveys Ltd.
611	Dome Petroleum
612	Dome Survey
613	Dendron Resources Survey Ltd.
614	Datum Surveys Ltd.
615	Digiseis Exploration Ltd.
616	R.C. Dearman Surveys Ltd.
617	Explorer Petroleum Corporation
618	Felix Seismic Surveys Ltd.
619	Ford Surveys Ltd.
620	HDS Focum Surveys Ltd.
621	Foothills Pipe Lines (Yukon) Ltd.
622	Geophysical Services
623	Geosource Exploration
624	Gendron et Lefebvre Inc.
625	Great-Western Construction (Surveys) Ltd.
626	G & H Surveying Ltd.
627	Geophysics GPR International
628	Husky Oil Co.
629	Hudson Bay Oil & Gas Ltd.
630	Horkoff Surveys Ltd.
631	Integrated Resources Photography Ltd.
632	J.R.S. Exploration
633	Société d'Énergie de la Baie James (James Bay Development Corporation)
634	Kenting Exploration Services Ltd.
635	Lanmark Surveys Ltd.
636	McElhanney Surveying & Engineering Ltd.
637	Midwest Surveys (Sask.) Ltd.
638	Miksoo Survey Inc.
639	Mobil Oil Canada Ltd.
640	McWilliam Surveys Ltd.
641	Mainline Engineering Surveys Inc.
642	Northwest Surveys
643	Petty Rae Geophysical
644	Petro Cities Surveys
645	Polar Gas Project
646	Photocan Surveys Ltd.
647	Raymac Surveys
648	Resources Mapping Services Ltd.
649	Shelltech Canada
650	Seisport Exploration
651	Sefel Geophysical
652	Seiscan-Delta Ltd.
653	Teledyne Exploration Ltd.
654	Texaco Canada Resources Ltd.

655	Terra Surveys
656	Western Geophysical Co.
657	Underhill & Underhill
658	UNO-TEX Petroleum Corp.
659	X-Act Surveys Ltd.
660	M. Young & Associates Surveys Ltd.
661	Webb & Webster Surveys Ltd.
662	W.D. Surveys Ltd.
663	Wilson Seismic Survey Ltd.
664	Control Land Surveys
665	Underwood McLellan & Associates Ltd.
666	Usher & Associates
667	C.H. Weir
668	Canadian Marconi Company
669	W.S. Gibson & Sons Ltd.
670	Rody, Boyd & Meisner
671	Beliveau & Couture Arpenteurs Géomètres
672	Tecni-Metric
673	J.H. Hogg Associates Ltd.
674	D.A. Martin and Associates Ltd.
675	Letham, Jarvella and Robertson Ltd.
676	Fairhall & Moffat
677	Phosur Inc.
678	Ice Consulting Ltd.
679	Martin & Company
680	Monaghan Delph Miller Ltd.
681	CEP Consultants (1985) Inc.
682	D.A. Watt Consulting Group Ltd.
683	Eagle Surveys Ltd.
684	Alpha Engineering & Surveying Ltd.

Academic Institutions

<u>Code</u>	<u>Agency</u>
200	Université Laval
201	University of New Brunswick
202	Laurentian University
800	University of British Columbia
801	Simon Fraser University
802	Nova Scotia Land Survey Institute
803	University of Manitoba
804	University of Saskatchewan
805	University of Sherbrooke
806	University of Waterloo
807	SIAS Woodland Campus

APPENDIX C: Codes Table Lists

1 Province Code (STATION_MARKS table, PROVINCE column)

- NF - Newfoundland
- PE - Prince Edward Island
- NS - Nova Scotia
- NB - New Brunswick
- PQ - Quebec
- ON - Ontario
- MB - Manitoba
- SK - Saskatchewan
- AB - Alberta
- BC - British Columbia
- YT - Yukon Territory
- NT - Northwest Territories
- NU - Nunavut

States and Countries

- | | |
|-------------------------------|-------------------|
| MN - Minnesota | NY - New York |
| AK - Alaska | ND - North Dakota |
| ID - Idaho | OH - Ohio |
| ME - Maine | PA - Pennsylvania |
| MI - Michigan | VT - Vermont |
| MT - Montana | WA - Washington |
| NH - New Hampshire | WI - Wisconsin |
| DK - Greenland | |
| FR - Saint-Pierre et Miquelon | |
| US - U.S.A. (State Unknown) | |

2 Horizontal Datums (ADJUSTMENT_PROJECTS table, REFERENCE_SYSTEM column)

- NAD83CSRS** North American Datum 1983 Canadian Spatial Reference System. An adjustment of the Canadian Base Network and high-order GPS tied to the Canadian Active Control System (CACS). Reference ellipsoid is GRS80. These coordinates may not be compatible with NAD83 public values.
- NAD83** North American Datum 1983. (public horizontal reference system). The horizontal control datum for the U.S., Canada, Mexico, and Central America, based on the geocentric reference ellipsoid of the Geodetic Reference System 1980 (GRS80).
- NAD27** North American Datum 1927. A non-geocentric horizontal control datum for the U.S., Canada, and Mexico, a location and azimuth on the Clarke 1866 reference ellipsoid, with origin at the Meades Ranch.
- MAY76** Test datum based on the Clarke 1866 reference ellipsoid model. A readjustment of 1st and 2nd order networks in Canada on the NAD27 datum, completed in 1976. Subsequent lower-order surveys have been included by constrained adjustments or by transformation modeling.

3 Horizontal Order (GEODETTIC_COORDS table, HORIZONTAL_ORDER column)

- 1** - First order (20 ppm)
- 2** - Second order (50 ppm)
- 3** - Third order (120 ppm)
- 4** - Fourth order (300 ppm)
- N** - Non-adjusted field values
- L** - GPS - Low Accuracy (+/- 10 m)
- S** - Scaled or Truncated
- T** - Consult Provincial Agency (assigned by system - Values Restricted in the Station Marks table)
- U** - Adjusted Unclassified
- Y** - Consult agency (unique condition)

4 Horizontal Survey Method (GEODETTIC_COORDS table, HORIZONTAL_METHOD column)

- A** - Doppler positioning
- B** - Triangulation – Trilateration
- C** - Baseline triangulation
- D** - Trilateration
- E** - Electronic traversing
- F** - Chain traverse
- G** - Air trilateration (Shoran, Aerodist)
- H** - Astronomic position
- L** - GPS - Low Accuracy (+/- 10 m)
- M** - Multiple methods
- P** - Inertial Survey System
- Q** - Photogrammetric position
- R** - Global Positioning System
- S** - Scaled position, stadia, photo fixing, etc.
- T** - Provincial Values (assigned by system - Values Restricted in the Station_Marks table)
- X** - Survey pending
- Y** - Values available in another datum
- Z** - Method of survey unknown

5 Vertical Datums (ADJUSTMENT_PROJECTS table, REFERENCE_SYSTEM column)

- CGVD28** Canadian Geodetic Vertical Datum 1928, mean sea level. (Adopted, public vertical reference system.). The average height of the surface of the sea for all stages of the tide. Usually determined by averaging height readings observed hourly over a minimum period of 19 years.
- IGLD55** International Great Lake Datum 1955. A vertical control datum with zero at mean sea level at Pointe-au-Père, as determined from readings from 1941 to 1956.
- IGLD85** International Great Lake Datum 1985. A vertical control datum with zero at mean sea level at Rimouski, as determined from readings from 1982 to 1988.
- NAVD88** North American Vertical Datum 1988. A readjustment of Canadian primary vertical networks defined on the North American datum. The primary networks are being readjusted in cooperation with USNGS according to an agreement signed in 1982. (not Public)

6 Vertical Order (VERT_COORDS table, VERTICAL_ORDER column)

- S** - Special order (± 3mm x $\sqrt{\text{km}}$ distance between bench marks)
- 1** - First order (± 4 mm x $\sqrt{\text{km}}$ distance between bench marks)
- 2** - Second order (± 6 mm x $\sqrt{\text{km}}$ distance between bench marks)
- 3** - Third order (± 24 mm x $\sqrt{\text{km}}$ distance between bench marks)
- 4** - Fourth order (± 120 mm x $\sqrt{\text{km}}$ distance between bench marks)
- 5** - Fifth order
- I** - Interpolated
- N** - Unadjusted field
- U** - Adjusted unclassified
- Y** - Consult agency (Unique condition)

7 Vertical Survey Method (VERT_COORDS table, VERTICAL_METHOD column)

- 1** - Spirit levels
- 2** - Simultaneous trigonometric levels
- 3** - Non-simultaneous trigonometric levels
- 4** - Airborne trigonometric levels
- 5** - Other methods used in mapping controlled surveys including Gem, Stadia, APR, Barometric Levelling, etc.
- 6** - Inertial Levelling
- 7** - Doppler derived
- 8** - Global positioning system
- I** - Interpolated from contours
- X** - Survey pending
- Y** - Consult agency
- Z** - Survey method unknown

8 Marker Type (STATION_MARKS table, MARKER_TYPE column)

- | | |
|---|--|
| A - Aluminum tablet | M - Chiselled mark |
| B - Copper survey bolt | N - PVC plug |
| C - Brass survey bolt (Type 2) | O - Sleeve type |
| D - Brass/bronze tablet/cap | P - Obelisk |
| E - Steel ball (DBM) | Q - Spike |
| F - Datum point (DBM/Ground rod) | R - Split cap |
| G - Drill hole | S - Survey plaque |
| H - Stem of tablet | T - Wooden post |
| I - Self centring plate | U - Cairn |
| J - Copper wire | V - Others (explained in description) |
| K - Iron bar | |
| L - Nail | |

9 Survey Marker Condition (INSPECTIONS table, MARKER_CONDITION column)

- | | |
|----------------------|---------------------------------------|
| 1 - Good | 6 - Marker displaced |
| 2 - Damaged | 7 - Inaccessible |
| 3 - Repaired | 8 - Unreliable |
| 4 - Destroyed | 9 - Special equipment required |
| 5 - Not found | |

10 Accessibility Code**(ACCESSIBILITIES table, DISTANCE column)****Transportation Mode**

- | | |
|-----------------------------|--|
| A - Car/light truck | E - Helicopter |
| B - Four-wheel drive | F - Railway |
| C - Boat | G - Others (explained in description) |
| D - Seaplane | |

Distance Walked

- | | |
|--------------------------------------|-------------------------------------|
| 1 - Walk of 0.0 m to 50.0 m | 4 - Walk of 2.0 km to 5.0 km |
| 2 - Walk of 50.0 m to 500.0 m | 5 - Walk of over 5.0 km |
| 3 - Walk of 0.5 km to 2.0 km | |

11 Reference System Type (REFERENCE_SYSTEMS table, REFERENCE_SYSTEM_TYPE column)

- H** - Horizontal
V - Vertical