

September 13, 2002 Revision

Public Land Survey
Geocoding Standards
for
New Systems
and
Data File Interchange

Adopted by the
Minnesota Department of Natural Resources
Geographical Information Systems Committee
April 21, 1993

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PLS DATA ELEMENT CODING STANDARDS

There is a need in the DNR as well as among various state, county and local government agencies and the private sector, to exchange and use a variety of data referenced to the public land survey. Currently, even within the DNR, many different formats are used to code PLS georeferenced data sets. The DNR has adopted the standards detailed in this document in order to allow future data sets to be developed with an efficient, complete and exchangeable PLS reference format.

The following information is used when referencing information to the public land survey:

County, Township, Range, Section, Forty, Government Lot

The standards chosen by the DNR to code this information are influenced by the peculiarities of the public land survey in Minnesota (for example, township number 58 ½ in St. Louis County), and the popular PLS referencing system developed in 1976 for the Minnesota Land Management Information System (MLMIS).

COUNTY 2 digit number of the counties in alphabetical order:

1 Aitkin	30 Isanti	59 Pipestone
2 Anoka	31 Itasca	60 Polk
3 Becker	32 Jackson	61 Pope
4 Beltrami	33 Kanabec	62 Ramsey
5 Benton	34 Kandiyohi	63 Red lake
6 Big Stone	35 Kittson	64 Redwood
7 Blue Earth	36 Koochiching	65 Renville
8 Brown	37 Lac Que Parle	66 Rice
9 Carlton	38 Lake	67 Rock
10 Carver	39 Lake of the Woods	68 Roseau
11 Cass	40 Le Sueur	69 St. Louis
12 Chippewa	41 Lincoln	70 Scott
13 Chisago	42 Lyon	71 Sherburne
14 Clay	43 Mc Leod	72 Sibley
15 Clearwater	44 Mahnomen	73 Stearns
16 Cook	45 Marshall	74 Steele
17 Cottonwood	46 Martin	75 Stevens
18 Crow wing	47 Meeker	76 Swift
19 Dakota	48 Mille Lacs	77 Todd
20 Dodge	49 Morrison	78 Traverse
21 Douglas	50 Mower	79 Wabasha
22 Faribault	51 Murray	80 Wadena
23 Fillmore	52 Nicollet	81 Waseca
24 Freeborn	53 Nobles	82 Washington
25 Goodhue	54 Norman	83 Watonwan
26 Grant	55 Olmsted	84 Wilkin
27 Hennepin	56 Otter tail	85 Winona
28 Houston	57 Pennington	86 Wright
29 Hubbard	58 Pine	87 Yellow Medicine

TOWNSHIP 3 digit township number

Township numbers range from 26 to 168 in Minnesota. In addition to the number, the public land survey attaches a "north" or "south" to the township number to reference it as being north or south of a particular regional base line*. Because all Minnesota townships are north of the regional base lines to which they are referenced, the "north" information is implied under these standards and not specifically a part of the data set. Another peculiarity of Minnesota is a case in which a surveying error has resulted in what is officially designated as a ½ township. This is township 58 ½, range 17 in St. Louis County. For this reason an extra code has been added to the range direction field (below) to account for this ½ township.

RANGE AND RANGE DIRECTION

Range numbers in Minnesota vary from 1 to 51. In addition, numbers 3 to 27 are used for both the 4th and 5th principle meridians, and numbers 1 to 7 exist both east and west of the 4th principle meridian. Since all PLS locations in Minnesota can be found without knowing the principle meridian (because the township numbers do not overlap between principle meridians), principle meridian is not a data element in the DNR's PLS geocoding standards. Range direction, however, is necessary for finding PLS locations in ranges 1 to 7 of the 4th principle meridian. For this reason, in addition to the 2 digit range number, east-west coding is required (below). Also, like with township above, there exists in Roseau County an officially designated ½ range. This is range 42 ½ in both townships 159 and 160. This unique range will also use the "range direction" code of "2" (below) to distinguish it from range 42.

RANGE DIRECTION 1 digit**:

0	= West
1	= East (Cook County only)
2	= Township 58 ½ (St. Louis Co.) and Range 42 ½ (Roseau Co.)

RANGE 2 digit range number

SECTION 2 digit section number

Section numbers in the public land survey go from 1 to 36, although not all townships contain all 36 sections.

* Principle Meridians. The public land survey in Minnesota is referenced to two different "principle meridians," the "4th" and the "5th." A principle meridian is a line of longitude defined by the public land survey from which "range" numbers are referenced. Range numbers may be "east" or "west" of a principle meridian. In Minnesota, some range numbers in eastern Cook County are "east" of the 4th principle meridian. The remaining range numbers are west of either the 4th or the 5th principle meridian.

Regional Base Lines. Each principle meridian has attached to it a "regional base line," which is a line of latitude define by the public land survey from which "township" numbers are referenced. Townships may be "north" or "south" of the regional base line of the principle meridian. In Minnesota, all townships are north of their regional base line.

** Range Direction Codes. Many different range direction codes have been previously used in DNR, none of which is identical to these standards. The old MLMIS codes, for example, used 1 for East and 2 for West. The MLMIS data used for EPPL7 uses 1 for East and 0 for West. Neither of these systems handles ½ townships or ranges. The Division of Forestry's system has used 8 for East and 9 for West and assumed T58 ½ was part of T59. It doesn't account for Range 42 ½. The DNR land records at one time used the original MLMIS codes but now use E for East and W for West, with a decimal place in the township field for T58 ½, but no decimal in the range field.

FORTY 2 digits as defined below:

The forty field is really a combination of a code for the quarter section and a code for the quarter of the quarter section as follows:

NENE = 11	NENW = 21	NESW = 31	NESE = 41
NWNE = 12	NWNW = 22	NWSW = 32	NWSE = 42
SWNE = 13	SWNW = 23	SWSW = 33	SWSE = 43
SENE = 14	SENW = 24	SESW = 34	SESE = 44

The forty field should be filled for government lots. Use the forty location containing the largest portion of the government lot. Where a lot lies equally within two forty locations, the forty location with the lowest number should be used. The DNR is developing a list of forty locator codes for all government lots within the state (in conjunction with the Control Point Generated PLS Layer Project). Contact the Division of Lands & Minerals for more information.

Where government lots exist outside the boundaries of the standard section, the two digit codes listed below will be used for the forty field.

				96	95	66	65	56	55				
				97	98	67	68	57	58				
				92	91	62	61	52	51				
				93	94	63	64	53	54				
76	75	72	71	22	21	12	11	15					
77	78	73	74	23	24	13	14	16					
86	85	82	81	32	31	42	41	45					
87	88	83	84	33	34	43	44	46					
				09	06	05	02	01					
				10	07	08	03	04					

GOVERNMENT LOT 2 digit number

Government lots are defined by the original public land survey and subsequent official resurveys around meandered bodies of water and along correction lines (usually, but not always, the north and west sides of a township). Government lots are numbered within each section starting with 1 and going as high as is needed. No section in Minnesota has more than 99 government lots. Some sections, however, have duplicate government lots due to separate surveys on each side of Indian reservation boundaries (e.g. Sec. 17, Twp. 50, Rng. 19 in St. Louis County).

SUBDIVISIONS OF FORTIES AND GOVERNMENT LOTS

Data sets that specifically define units in 10 acre or 2.5 acre cells should continue to use the 1, 2, 3, 4 method as is used for the quarter section and quarter-quarter section locations.

PARCEL 2 digit sequential number from DNR land records

When dealing with land ownership, forties and government lots are often subdivided into parcels of all sizes and shapes. Some subdivisions simply divide a forty into halves, while others may create hundreds of small platted parcels. The DNR land records use a simple two digit sequential number (1, 2, 3...) to uniquely define these parcels. It has no geographic attribute. This is the de facto parcel identifier for DNR-administered lands. To define parcels that are not in the land records (i.e., privately owned), use a parcel number greater than 50 to avoid duplication with parcel ID codes in the land records.

Note: see page 8 for the DNR "TRACT" coding standards used by the Division of Lands and Minerals Survey Unit.

DATA FILE FORMAT

FIELD NAMES

Since many software packages allow fields to have more than one name, this issue is not critical. However, we have some internal naming conventions for Arc/Info files (below). (Alternate names and redefined items can be added to customize data files.)

UNIQUE GEOCODE

A full unique geocode is created by combining (redefining) individual data fields in the order shown below. For example, GEOPARC includes all fields, GEOSECT includes information to the section level. In this way, data sets that do not contain all of the fields can use a geocode that represents only those fields included in the data set.

ORDERING SEQUENCE

The fields should be ordered as shown below in the INFO file definition. Note that the range direction field precedes the range field. This is done so that the range direction and range fields can be redefined as one field and still be used with software that utilizes 8 bit processing (i.e. EPPL7 requires data values from 0 to 256).

INFO FILE DEFINITION OF STANDARD PLS GEOCODE

<u>Start</u> <u>Column</u>	<u>Item</u> <u>Name</u>	<u>Item</u> <u>Width</u>	<u>Item</u> <u>Type</u>	<u>Alternate Name</u>
1	COUN	2	I	COUNTY.CODE
3	TOWN	3	I	TOWNSHIP
6	RDIR	1	I	RANGE.DIRECTION
7	RANG	2	I	RANGE
9	SECT	2	I	SECTION
11	FORT	2	I	FORTY.CODE
13	GLOT	2	I	GOVERNMENT.LOT
15	PARC	2	I	PARCEL.CODE
17	GLOTMATCH	14	I	GEOCODE especially useful for government lots (The 'FORT' value is zeroed out where 'GLOT' value is greater than 0)

Redefined Items (all leading zeros should be filled):

1	GEOPARC	16	I	GEOCODE (optional)
1	GEOGLOT	14	I	
1	GEOFORT	12	I	
1	GEOSECT	10	I	
1	GEORANG	8	I	

The GEOPARC field will serve as the standard parcel ID number or "PIN" for the DNR.

PLS LINE CODING STANDARDS

In order to display and conduct analyses with various PLS lines, the lines must first have attributes that allow one to differentiate between various categories (e.g. county boundaries, section lines, meander lines). The hierarchical nature of PLS lines makes integer values a logical choice for coding. For example, one can select all lines with a value greater than 40 to get a section lines coverage.

INFO item name = PLSLINE 2 digit integer

Values are as follows:

STATE LINES

- 01 State line that is also a township or range line (all PLS state lines are county and forty/government lot lines)
- 02 State line that is not a township line but is a section line (border with S. Dakota in Rock Co.)
- 03 State line that is a PLS line but is neither a township line nor a section line (e.g. east side of state along Pine & Carlton Counties)
- 04 State boundary that is not a PLS line (e.g. center line of Mississippi River, Lake of the Woods) excluding Lake Superior state boundary
- 05 Pseudo state boundary along northern shoreline of Lake Superior
- 06 State boundary in the middle of Lake Superior

Note: Generally, state and county boundaries are statutorily defined to go to the center of meandered waters. The one exception is the north shore of Lake Superior which is coded separately.

COUNTY LINES

- 11 County line that is also a township or range line (all county lines are forty/government lot lines)
- 12 County line that is not a township or range line but is a section line
- 13 County line that is a PLS line but is neither a township line nor a section line (e.g. south side of Marshall County)
- 14 County boundary that is not a PLS line (e.g. center lines of rivers)

TOWNSHIP/RANGE LINES

- 21 Township or range line (all township and range lines are also section lines and forty/government lot lines)
- 22 Pseudo township or range line (line extending across meandered water body to complete the polygons). Both points defining the line are shown on the GLO plat as having been surveyed.
- 23 Type 2 pseudo township line. Same as above except that at least one point defining the line was not surveyed (no distance to it is shown on the GLO plat).

SECTION LINES

- 31 Section line (all section lines are also forty/government lot lines)
- 32 Pseudo section line (line extending across meandered water body to complete the polygons). Both points defining the line are show on the GLO plat as having been surveyed.
- 33 Type 2 pseudo section line. Same as above except that at least one point defining the line was not surveyed (no distance to it is shown on the GLO plat).

FORTY/GOVERNMENT LOT LINES

- 41 Quarter section line
- 42 Sixteenth section line
- 43 Meander line (Note: Meander lines are rough approximations of water body boundaries at the time of the public land survey. They ARE NOT current water boundaries, but they may be coincident.)
- 44 Pseudo government lot lines (e.g. lines extending from meander line to current water boundary)
- 45 Reservation line dividing forties and forming government lot boundaries.
- 46 Miscellaneous government lot line. (e.g. previous meander line (originally a meander line, but now a government lot boundary due to a resurvey) or other government lot lines that do not fit any of the above categories.)

PARCEL LINES

Additional codes will be added later for a variety of parcel and other legal ownership boundaries (i.e. subdivisions, easements, rights-of-way, etc.). They will be part of a parcel/ownership layer that will be created using the PLS layer as a base. For the time being, the only code we have defined is below:

- 51 Subdivisions of state ownership

DNR "TRACT ID"

The Lands and Minerals Survey Unit has used a unique "tract" ID system to define tracts of land being acquired. As of September 2002, the ID is no longer actively assigned. For purposes of these standards, a "parcel" will be defined as a 40 or government lot, or smaller unit of land. A "tract," however, may be 640 acres or larger. In other words, a tract is made up of one or more parcels being acquired at a particular time, for a particular purpose (a wildlife management area for example).

The "TRACT ID" field consists of five subfields:

MANAGEMENT PROGRAM TYPE

This is a three character field defining the type of DNR program involved. (e.g. WMA = wildlife management area, SPK = state park, CBR = canoe and boating route) This is the "LMGPGM" field in the land records. Contact the Division of Lands and Minerals for a complete list of management program types and management project numbers.

MANAGEMENT PROJECT NUMBER

This is a five digit number used to uniquely define separate projects of the same program type. In other words, each state park will have a different project number. This is the "LMGPRJ" field in the land records.

TRACT NUMBER PREFIX

This is a single character field that sometimes precedes a tract numbers. For example, tracts in the R.J. Dorer State Forest are preceded by an "H".

TRACT NUMBER

This is a three digit number used to uniquely define tracts within a management project.

TRACT NUMBER SUFFIX

This is a single character field that sometimes succeeds a tract numbers. For example, certain tracts have a "B" at the end.

INFO FILE DEFINITION OF DNR TRACT ID

<u>Start</u> <u>Column</u>	<u>Item</u> <u>Name</u>	<u>Item</u> <u>Width</u>	<u>Item</u> <u>Type</u>	<u>Alternate Name</u>
1	MGPGM	3	C	MGMT.PROGRAM
4	MGPRJ	5	I	MGMT.PROJECT
9	TCTPF	1	C	TRACT.PREFIX
10	TCTNO	3	I	TRACT.NUMBER
13	TCTSF	1	C	TRACT.SUFFIX

Redefined Items (all leading zeros should be filled for integer items):

1	TRACTID	13	C
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