Starting Points

CONVENTIONS FOR GEOGRAPHIC INFORMATION September 1996

THE GOVERNOR'S COUNCIL ON GEOGRAPHIC INFORMATION was created in 1991 by Governor Arne H. Carlson to provide leadership in the development, management and use of geographic information in Minnesota. With assistance from Minnesota Planning, the council makes recommendations for policies, institutional arrangements, education, stewardship, standards and more.

MINNESOTA PLANNING is charged with developing a long-range plan for the state, stimulating public participation in Minnesota's future and coordinating activities with state agencies, the Legislature and other units of government.

Acknowledgments

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For additional information or copies of *Starting Points: Shared Conventions for Geographic Information,* contact the council staff coordinator at the Land Management Information Center, (612) 296-1208; e-mail gc@mnplan.state.mn.us. The council's Internet home page is at http://www.lmic.state.mn.us/gc/gc.htm.

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Upon request, *Starting Points: Shared Conventions for Geographic Information* will be made available in alternate formats, such as Braille, large print and audio tape. For TTY, contact Minnesota Relay Service at (612) 297-5353 or (800) 627-3529 and ask for Minnesota Planning.

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Starting Points

Developing the data specifications and procedures necessary to use geographic information takes time and money. By adopting approaches taken by others, data producers can significantly reduce development costs and increase opportunities for sharing.

Starting Points: Shared Conventions for Geographic Information is a first attempt at cataloging publicly developed specifications and procedures, or "conventions," that focus on geographic information systems. By using the conventions listed in this catalog, data producers from around the state can capitalize on work already done.

The Governor's Council on Geographic Information hopes that this catalog will be the starting point for new data development activities. It is intended to reduce conflicting or duplicative practices. The ultimate goal of the catalog is to identify broadly used conventions that can eventually be elevated to standards.

Geographic information systems require many different kinds of standards. This report focuses on those conventions and standards used in coding and collecting data.

With this report, GIS users beginning to develop their own standard procedures and practices can identify others who have faced similar technical and administrative problems and gain insight, ideas and possible solutions. For example, a GIS database designer who must store locations by Public Land Survey descriptions can review the listings in this report for approaches that might improve information sharing between the designer's organization and potential business partners. Using this report, companies seeking to buy data development services can obtain documented specifications to provide to a vendor. A county can find information on how legislative mandates can be supported with GIS.

The more than 55 conventions in this report fall into five categories: boundaries, culture, data collection, natural resources and reference documents. Each category contains the following information:

- **Data type and themes:** The category or subject heading that best describes the purpose of the standard. Reference Documents items do not have this designation.
- **Convention:** The formal title of the cataloged convention, standard or document and the date it was developed.
- **Maintenance organization:** The name of the organization charged with maintaining the item, including, where available, the name of the person to contact for more information.
- **Description:** A brief description of the item, including whether the item is related to a legislative mandate.

The Governor's Council on Geographic Information hopes to expand this list and make it widely available as part of its effort to provide leadership in the development of geographic data standards and guidelines. Send recommendations to the Governor's Council on Geographic Information GIS Standards Committee, 658 Cedar St., St. Paul, MN 55155; e-mail, gc@mnplan.state.mn.us.

	Convention / Date	Maintenance	Description
Cities and Townships	Federal Information Processing Standards Publication 8-5: Metropolitan Statistical Areas (1984)	U.S. Department of Commerce	A four-digit numerical code for each of the Metropolitan Statistical Areas of the United States and Puerto Rico, including Consolidated Metropolitan Statistical Areas, Primary Metropolitan Statistical Areas and related units called New England County Metropolitan Areas.
Congressional Districts	Federal Information Processing Standards Publication 9-1: Congressional Districts of the United States (1990)	U.S. Department of Commerce	Numeric codes for representing U.S. congressional districts and similar areas defined for various U.S. Congresses.
Counties	Minnesota: Numeric Codes for the Identification of Counties in Minnesota (1996)	Minnesota Department of Administration, Information Policy Office	A set of three-digit codes for representing the 87 counties of the state. This standard is equivalent to the Minnesota portion of the Federal Information Processing Standard Publication 6-4, August 1990.
	Federal Information Processing Standards Publication 6-4: Counties and Equivalent Entities of the United States, Its Possessions and Associated Areas (1990)	U.S. Department of Commerce	Three-digit codes representing the counties and statistically equivalent entities of the 50 states, the District of Columbia and the possessions and associated areas of the United States.
Counties, Census Tracts and Blocks	Federal Information Processing Standards Publication 55 DC - 4: Codes for Named Populated Places, Primarily County Divisions and Other Locational Entities of the United States and Outlying Areas (1987)	U.S. Department of Commerce	A two-character state code and five-character numeric place code uniquely identifying each listed entity. Includes an exhaustive list of incorporated and census-designated places, primary county divisions, recognized Indian reservations and Alaskan Native villages and counties. About 4,500 entries for Minnesota are coded.
Geographic Quadrangles	U.S. Geological Survey Quadrangle Coding Scheme (1994)	Land Management Information Center at Minnesota Planning, Michael Baker	A recently developed U.S. Geological Survey code scheme for 7.5-minute quadrangles. The scheme is based on the 64 quadrangles that comprise a one-degree block of latitude and longitude. The code contains a two-digit latitude, three-digit longitude, one-character (A-H) row in ascending latitude and a one-digit column number (1-8) in ascending longitude.
	Land Management Information Center Quadrangle Coding Scheme (1976)	Land Management Information Center at Minnesota Planning, Michael Baker	Minnesota 7.5-minute quadrangle code in two-digit row, two-digit column format. The code for a given quadrangle is the SE corner number. Values range from 0011 to 9926. This field covers all of the quadrangles within all 26 1:250,000-scale U.S. Geological Survey maps that contain Minnesota. Values for 7.5-minute quadrangles within Minnesota range from 0017 to 4836.
	Minnesota Department of Natural Resources Quadrangle Coding Scheme (1968)	Land Management Information Center at Minnesota Planning, Michael Baker	The Minnesota Department of Natural Resources code scheme for 7.5-minute quadrangle identification, based on 15-minute quadrangle rows and columns. A row is designated with a capital letter, a column with a two-digit number and quadrants within a 15-minute block with a single letter — a, b, c, or d.
	U.S. Geological Survey Quadrangle Coding Scheme (1968)	Land Management Information Center at Minnesota Planning, Michael Baker	A commonly used coding scheme based on early 15-minute quadrangle sheet with designators for each of the four 7.5-minute quadrangles within each 15-minute block. The codes A (NE), B (NW), C (SW), or D (SE) designate the quadrant within each 15-minute block; each block is coded starting with 001 for the southeast corner of the state and ending with 457 for the northwest corner.

	Convention / Date	Maintenance	Description
Parcels, PLS	Parcel Map Metadata: Reference Information on Electronic Parcel Map Data (1995)	Washington County, Jay Krafthefer	A reference piece for parcel map documentation outlining the content of Washington County's parcel base map features and attribute information. Two significant subsets are the data dictionary and the mapping symbology chart.
	Public Land Survey Geocoding Standards for New Systems and Data File Interchange (1993)	Minnesota Department of Natural Resources Division of Minerals, Jill Christianson	Standards and coding schemes for Public Land Survey and other features. Coding schemes for: county, township, range, section, 40-acre parcel and government lots (all based on Minnesota Land Management System guidelines). Contains instructions for coding PLS lines, data file format and parcel identification using the department's Tract-ID system.
	Minnesota Land Management Information System Geocoding Procedures (1976)	Land Management Information Center at Minnesota Planning, Michael Baker	Standards and schemes for coding counties, Public Land Survey features, minor civil divisions and school districts developed by the University of Minnesota Center for Urban and Regional Affairs. Coding schemes include 14-digit geocodes for parcels defined to the government lot level, two-digit county code scheme based on the 1960 census, subdivision of counties into minor civil divisions and coded according to the Geographic Identification Code Scheme issued by the Census Bureau, and school districts coded by unique district numbers assigned by the former Minnesota Department of Education.
School Districts	Minnesota Land Management Information System Geocoding Procedures (1976)	Land Management Information Center at Minnesota Planning, Michael Baker	Standards and schemes for coding counties, Public Land Survey features, minor civil divisions and school districts developed by the University of Minnesota Center for Urban and Regional Affairs. Coding schemes include 13-digit geocodes for parcels defined to the government lot level, two-digit county code scheme based on the 1960 census, subdivision of counties into minor civil divisions and coded according to the Geographic Identification Code Scheme issued by the Census Bureau, and school districts coded by unique district numbers assigned by the former Minnesota Department of Education.
States and Territories	Minnesota: Codes for the Identification of the States, the District of Columbia and the Outlying Areas of the United States and Associated Areas (1994)	Minnesota Department of Administration, Information Policy Office	Two-numeral and two-letter codes representing the 50 states, the District of Columbia and outlying areas. This standard is equivalent to the codes described in the Federal Information Processing Standards Publication 5-2, May 1987.
	Federal Information Processing Standards Publication 5-2: Codes for the Identification of the States, the District of Columbia and the Outlying Areas of the United States and Associated Areas (1987)	U.S. Department of Commerce	A numeric and alphabetic coding scheme for all states and territories of the United States. The U.S. Postal Service uses this two-letter alphabetic code for state abbreviation.

	Convention / Date	Maintenance	Description
Cultural Data			
Transportation Features	Highway Functional Concepts, Criteria and Procedures (1974)	Metropolitan Council, Rick Gelbmann	A hierarchical classification scheme for roadways based on primary function or purpose. Roadways are classified as four types: principal arterials, minor arterials, collectors and locals based on the Transportation Development Guide Chapter Policy Plan.
Wells	Wellhead Protection Program Memorandum of Agreement Standards (1994)	Minnesota Pollution Control Agency, Liz Gelbmann; Department of Health, Bruce Olsen; Department of Agriculture, Jerry Spetzman	Developed by the departments of Health and Agriculture to promote efficient and effective transfer of wellhead-related data between those departments and the Minnesota Pollution Control Agency, public water suppliers and local government. Describes sites and facilities, monitoring points and contaminant plumes that are potential ground water pollution sources and located within the public water supply wellhead protection areas. Complies with Minnesota Rule 4720 (draft).
	Minnesota Unique Well Number System (1974)	Minnesota Department of Health, Justin Blum	A Minnesota Unique Well Number is assigned to any newly drilled well as recorded on the water well construction form required by the department. Wells drilled before the well code are assigned an alternate type of unique number, the W-Series number. These numbers are critical to the Minnesota Geological Survey's County Well Index database and Land Management Information Center's Ground Water Clearinghouse. The Minnesota Department of Natural Resources and Pollution Control Agency use these numbers extensively in ground water resource programs. Complies with Minnesota Rule 4725.
Other	Nitrate Data Advisory Task Force (Draft, 1994)	Land Management Information Center at Minnesota Planning, Susanne Maeder	Seeks to define a standard for high-quality data to be used in the design of monitoring or survey programs to ensure that any new sampling program collects quality information and more of the information that is automated is comparable.
Data Collection			
Data Exchange	Electronic Data Interchange Standards (1993)	American National Standards Institute	Establishes a formal standard for conducting legal and enforceable paperless business transactions.
Dumps and Landfills	Dump and Landfill Inventory Guidebook (1991)	Minnesota Board of Water and Soil Resources, Doug Thomas	Seeks to help local governments conduct standardized inventories of dumps and landfills within their jurisdictions. Outlines a two-level inventory procedure. Includes standards for location of sites on U.S. Geological Survey 1:24000-scale quadrangles, as well as standardized data collection forms for site specific inventories.
Feedlots and Agricultural Runoff	Feedlot Inventory Guidebook (1991)	Minnesota Board of Water and Soil Resources, Doug Thomas	Seeks to help local governments inventory feedlots and the potential for related water contamination. Includes standards for location of sites on U.S. Geological Survey 1:24000-scale quadrangles, as well as standardized data collection forms for site-specific inventories.
General	Minnesota Department of Natural Resources Data Collection Standards (Draft, 1995)	Minnesota Department of Natural Resources, Robert Maki	A source document to help create geographic databases. Contains guidelines for map preparation, source media, data compilation, standard source maps, scale, software compatibility, file naming conventions, coordinate systems, projections, datum, control and registration, digitizing, data processing, scanning, attribute coding topology, edge matching, proof plotting, accuracy assessment and documentation.

	Convention / Date	Maintenance	Description
	Minnesota Pollution Control Agency Spatial Data Collection Standards (1993)	Minnesota Pollution Control Agency, Ann Bidwell	Details preferred data collection methods, instructions for performing these collections, geographic data automation procedures and documentation requirements, and procedures for creating a GIS library. Specifically addresses map preparation, source media guidelines, standard source maps, overlaying labels, handling non-geo-referenced maps, scale, map media, edge matching, line width, national map accuracy standards, coordinate systems, entity identifiers, projections, datum, control and registration, software compatibility, data management, tile structure, file naming conventions, coordinate transformation, coincident features, digitizing in Arc/Info and EPPL7, attribute coding, topology, accuracy assessment and documentation. Complies with Minnesota Rules 7011, 7050, 7020, 7045, 9220, 7150, 7035 and 7080.
Geocodes	Information Coding Standards for the Minnesota Pollution Control Agency's Locational Data Policy (1996)	Minnesota Pollution Control Agency, Ann Bidwell	The Minnesota Pollution Control Agency's Project DELTA data model specifies that locational data may be collected for "sites." A site is the location of a facility, operation, or resource that is of interest to the agency, usually because the activity is permitted, monitored or otherwise regulated by one or more agency programs. The document presents the agency's information coding standards for locational data and related source data that must be collected for each Project Delta site. Standards are provided for the following data: mandatory/conditional — latitude coordinate, longitude coordinate, coordinate point type, coordinate point sequence number, MPCA program code, method of coordinate collection, date of coordinate collection, date of coordinate collection qualifier, map scale, verification method, horizontal reference datum, accuracy (calculated); optional — coordinate point description, vertical measure, vertical measure method, coordinate source type, coordinate source organization.
	Proposed Geocoding Standards for Purposes of Information Interchange (1973)	Land Management Information Center at Minnesota Planning, Don Yaeger	Developed by the Minnesota Intergovernmental Information Services Advisory Council, these standards advocate adopting geocoding conventions for a variety of geographic features. Structures features by point (coordinate systems, point locators), line (transportation, river mile index, addresses) and area (administrative areas, watersheds and so on) entities.
Storage Tanks	Above and Below Ground Storage Tank Inventory Guidebook (1991)	Minnesota Board of Water and Soil Resources, Doug Thomas	Seeks to help local governments identify and inventory storage tanks. Includes standardized data collection sheets for the inventory of tanks, their location, condition and related features.
Water Resources	Data Compatibility Guidelines for Water-Related Data Collection and Automation (Draft, 1991)	Land Management Information Center at Minnesota Planning, Susanne Maeder	Sets specific guidelines for water-related data. Addresses standard geographic locators, base maps and automation procedures, water-related numbering and coding conventions, and recommended water data repositories.
Wells	Abandoned Well Inventory Guidebook (1991)	Minnesota Board of Water and Soil Resources, Doug Thomas	Seeks to help local governments inventory abandoned wells within their jurisdictions. Outlines a two-level inventory process and includes standards for location of sites on U.S. Geological Survey 1:24000-scale quadrangles, as well as standardized data collection forms for site-specific inventories. Also includes a description of the W-Series numbering standard for well identification.
Wetlands	Wetland Inventory Guidebook (1991)	Minnesota Board of Water and Soil Resources, Doug Thomas	Provides a framework and recommended practices for the inventory of wetlands at the local government level. Establishes a coding scheme for drained, altered and existing wetland basins. Provides a framework for three different levels of inventory. Includes inventory and data collection worksheets.

	Convention / Date	Maintenance	Description
Forest Cover Type	Minnesota Department of Natural Resources Phase II Forest Inventory (1994)	Minnesota Department of Natural Resources Division of Forestry, Bud Kincaid	Forest inventory data describing individual forest stands on a township basis for all state-owned lands in Minnesota. Data classified according to departmental classification criteria: location, stand cover type, cover type class, density, understory type, size, class and density, tree damage, moisture regime and so on.
	St. Louis County Land Department Forest Inventory Manual (1985)	St. Louis County, Thomas Zeisler	A county-level forest inventory guidebook designed for the inventory of tax-forfeited land in St. Louis County. Similar in design to the Minnesota Department of Natural Resource's Phase II Forest Inventory, it contains inventory procedures, data collection guidelines, data collection worksheets, sampling methodologies and coding schemes.
Hydrology, Lakes and Rivers	Federal Information Processing Standards Publication 103: Codes for the Identification of Hydrologic Units in the United States and the Caribbean Outlying Areas (1983)	U.S. Department of Commerce	Identifies a hydrologic system dividing the United States and Caribbean outlying areas into 21 major regions. Regions are further subdivided into approximately 2,150 units that delineate river basins having drainage areas usually greater than 700 square miles. The codes provide a standardized base for use by water-resource organizations.
Land Use and Land Cover	Land Use Data Compatibility Guideline (1995)	Land Management Information Center at Minnesota Planning, Christopher Cialek	Land use classified into 19 categories emphasizing agriculture and forest lands developed by the International Coalition, Moorhead. This scheme is being used to complete a statewide land use and land cover database (1989-1997).
	Land Use Classification (1990)	Metropolitan Council, Rick Gelbmann	Land use is classified into 14 categories designed specifically for the seven-county Twin Cities metropolitan region. This scheme was used by the Metropolitan Council to collect land use data in 1990.
Soils	County Soil Survey (various dates)	U.S. Department of Agriculture Natural Resources Conservation Service (formerly the Soil Conservation Service)	Comprehensive or detailed soil surveys are county-level surveys of surficial soils. They are developed through the observation of steepness, length and shape of slopes; size of streams and general pattern of drainage; kinds of native plants and crops; kinds of rocks; and soil profiles. Soil map units also are classified using the National Standards for Soil Taxonomy (U.S. Department of Agriculture 1975).
Watershed	Minnesota Department of Natural Resources Major/ Minor Watershed Number (1978)	Minnesota Department of Natural Resources Division of Waters, Jim Solstad	Codes for 81 major watersheds and 5,600 minor watersheds in Minnesota. The numbering scheme is major watershed (two digits) plus minor watershed (three digits). Minor watershed numbers are unique only when used in conjunction with the major watershed number.
Wetlands	U.S. Department of Agriculture Soil Conservation Service Wetland Determinations (1986)	Natural Resources Conservation Service	In 1986, the Soil Conservation Service began a statewide field office-level inventory of wetlands as part of the Food Security Act. This mapping includes the identification of wetlands, farmed wetlands and wetlands converted to agricultural use after December 23, 1985.
	Minnesota Department of Natural Resources Protected Waters Inventory (1976)	Minnesota Department of Natural Resources Division of Waters, Bruce Gerbig	Minnesota began mapping wetlands in 1976 as a part of the Protected Waters Inventory. The classification scheme designates water basins and watercourses that meet the criteria set forth in Minnesota Statute 103G.005, subd. 15.
	U.S. Fish and Wildlife Service, National Wetlands Inventory (1974)	U.S. Fish and Wildlife Service	An effort to inventory and classify the nation's wetlands. The National Wetlands Inventory is a comprehensive classification and mapping of wetlands through the use of a detailed coding scheme: Classification of Wetlands and Deepwater Habitats of the United States, Cowardin et al., (FWS/OBS-79/31). The scheme incorporates special modifiers to help identify where a wetland may be partially drained or farmed.

Document / Date	Maintenance	Description
Assistance for Preparing Primary Series Digital Cartographic Data for the Public Domain (1996)	U.S. Department of Interior, Geological Survey	Provides technical descriptions for U.S. Geological Survey map data, including digital line graphs, digital elevation models, raster graphics, digital ortophoto quadrangles and aerial photography. The purpose of this announcement is to identify sources of accurate digital cartographic data outside the federal government.
Minnesota Geographic Metadata Guidelines (Draft, 1996)	Minnesota Governor's Council on Geographic Information, Christopher Cialek	A proposed guideline to help document data important to GIS users in Minnesota. The purpose of the guideline is to make it easier for creators and stewards of geographic data to thoroughly describe their data and then share that information with data users. The guidelines are based on the Federal Geographic Data Committee standard, but have been condensed to make data documentation more manageable.
Geographic Data Compatibility Guidelines (1995)	Land Management Information Center at Minnesota Planning, Susanne Maeder	Presents recommendations for database integration. Discusses source maps, data entry, file naming conventions, map projections, feature representation, vector and raster data models, data structures and accuracy, data output, documentation, acceptance testing and media types.
St. Louis County Biophysical Inventory Manual (1995)	St. Louis County, Thomas Zeisler	A comprehensive manual for inventory of biophysical characteristics, including soils, vegetation and geology. Contains sampling plot worksheets, method for location and coding of plots, and procedures for interpreting and coding data elements, including the U.S. Department of Agriculture species codes for vegetation.
Spatial Data Integration Guidelines for Legislative Commission on Minnesota Resources Inventory Programs (1995)	Land Management Information Center at Minnesota Planning, Christopher Cialek	Describes procedures to deliver compatible databases by setting data encoding guidelines and file transfer requirements. Specifies what data must comply and provides some reference to nonspatial data standards.
Content Standards for Digital Geospatial Metadata (1994)	Federal Geographic Data Committee	This standard provides a common set of terminology and definitions for the documentation of geographic data. The standard establishes the names and groups of data elements to be used for this purpose, the definitions of these names and groups, and information about the values that are to be provided for the data elements.
Method Accuracy Description: Information Coding Standards for the U.S. Environmental Protection Agency's Locational Data Policy (1994)	U. S. Environmental Protection Agency	Presents information coding standards for the nine required fields (latitude, longitude, method of collection, accuracy value and unit, description category, vertical measure, horizontal datum, source scale and point-line area) and nine additional recommended fields (date of collection, source, description comments, vertical measure method of collection, vertical measure accuracy, vertical datum, verification, data-point-sequence and description sequence) for compliance with the agency's locational data policy.
Annotated Bibliography on GIS Related Standards (1993)	Standards Committee, Urban and Regional Information Systems Association, Peter Croswell	Comprehensive documentation of articles pertaining to GIS, geographic data and procedural standards.
Minnesota Department of Transportation Process for Developing Information Standards and Guidelines (1993)	Minnesota Department of Transportation, Kathy Hofstedt	Identifies and sets priorities for areas in which standards are needed for researching and evaluating alternatives, recommending or justifying a preferred alternative and developing and supporting implementation plans for endorsed standards.
Minnesota Public Land Survey Corners Control Point Inventory System (1993)	Minnesota Department of Natural Resources, Larry Swenson	Promoted by the Legislative Commission on Minnesota Resources and implemented by the Minnesota Department of Natural Resources and the Land Management Information Center, this project is designed to create a single database as a comprehensive Public Land Survey point referencing system. The database is intended to hold the most current and accurate set of coordinate points and adheres to recognized standards for the documentation and coding of geo-referenced control point features.

Reference Documents

Document / Date	Maintenance	Description
Point Location Data Base (1993)	Minnesota Department of Health, Justin Blum	Details point location data created for automating the transfer of global positioning system data from field data files to GIS. Includes documentation of locations, equipment and quality control procedures. Based on federal locational data policy.
Federal Information Processing Standards Publication 173: Spatial Data Transfer Standard (1992)	U.S. Department of Commerce	Specifies the organization and structure of digital spatial data transfer, definition of spatial features and attributes, and data transfer encoding.
TIGER Line Files (1992)	U.S. Department of Commerce, Bureau of the Census	TIGER 1990 census files containing census tracts, voting districts, addresses, street networks and so on.
Minnesota Land Management ARC System (1991)	Land Management Information Center at Minnesota Planning, Michael Baker	Used to translate between several common naming conventions and standards for U.S. Geological Survey quadrangle map series.
Recommended GIS Data Standards, Guidelines and Procedures: Building a Minnesota GIS Map Library (1989)	Land Management Information Center at Minnesota Planning, Christopher Cialek	Prepared by the Minnesota Natural Resources GIS Consortium, defines terms, specifies standards and documents procedures used in developing small-scale databases for natural resource-related geographic information systems. Topics covered include data classification and documentation standards and data interchange standards.
Federal Information Processing Standards Publication 70-1: Representation of Geographic Point Locators for Information Interchange (1986)	U.S. Department of Commerce	Specifies uniform formats for representing geographic point locations to be used by federal agencies in the interchange of data. The standard is applicable to the three most widely used point location systems in the United States.
Federal Information Processing Standards Publication 45: Guide for the Development, Implementation and Maintenance of Standards for the Representation of Computer Processed Data Elements (1976)	U.S. Department of Commerce	Describes basic concepts and terminology of data standardization, data characteristics, basic coding methods and principles of data code development.

Methodology

This catalog is based on interviews with experts in geographic data processing. The experts, most of whom work in state agencies or county governments, were chosen to reflect the diversity of geographic users in Minnesota. The experts were asked nine questions:

- What types of geographic data do you use in your work activities?
- What types of data standards do you use when working with geographic data?
- What types of geocoding standards do you use when working with geographic data?
- How did you select, develop or modify these standards to meet the specific demands of your work?
- Do you know the history of the standards in use, that is, who authored the standards and for what purpose?
- How prevalent or common are these standards within the geographic data community?
- Do you know of any similar standards being used in the geographic data community?
- Would you be willing to provide any documentation, data dictionaries or catalogs regarding the use of these standards?
- Do you have any additional information or sources to add that would help us to further document data standards?

Twenty-two people were interviewed, including: Michael Baker, Land Management Information Center, Minnesota Planning; Michael Barnes, Minnesota Department of Transportation; Anne Bentley, Minnesota Department of Administration, Information Policy Office; Anne Bidwell, Minnesota Pollution Control Agency; Justin Blum, Minnesota Department of Health; Jill Christianson, Minnesota Department of Natural Resources; Christopher Cialek, LMIC; Richard Fong, LMIC; Rick Gelbmann, Metropolitan Council; Brian Johnson, MDH; Larry Klemenhagen, Olmsted County; Bud Kincaid, DNR; Mark Kotz, Metropolitan Council; Jay Krafthefer, Washington County; Les Maki, DNR; Robert Maki, DNR; Susanne Maeder, LMIC; John Poate, DNR; Glenn Radde, DNR; Gary Stevenson, Dakota County; Don Yaeger, LMIC; and Thomas Zeisler, St. Louis County.

Conventions identified through the interviews were categorized using the data classification system designed in the council-sponsored survey *1994 Minnesota GIS Survey of GIS Organizations, Geographic Data Files and Data Needs.* Information collected for each entry included date of publication, originating organization, maintenance organization and a description of the scope and applications of the standard. The council's 1994 GIS survey is available online at http://www.lmic.state.mn.us/gc/gisdir.htm.

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