North Dakota Digital Parcel File Standards

Version 1.1 – For Agricultural Property Assessment

Compiled By: Kate Schimetz, NDACo Cartography Consultant, acting for the North Dakota Digital Parcel File Work-Group

Date: November 13, 2007

Table of Contents

Introduction

There are numerous benefits associated with having standards for the format, quality and documentation of creating a parcel geodatabase and associated data files. Maps and map data are important not only for property appraisers, but for other agencies and individuals. For digital parcel boundary files from multiple counties to be used together, they must all be developed according to the same digital file standard or, at a minimum, have common, well-defined and compatible data elements. Without such standards, making digital files from multiple counties compatible requires an extensive (and expensive) amount of work. Standards for quality and for documentation provide assurance that the files can be used appropriately and that information from different sources can be combined, e.g. information on hazardous waste sites, property boundaries and public water supplies can be shown in a common geographic reference and correctly interpreted. Public safety applications including police/fire tasks such as crime mapping, mutual aid dispatch support, and lost person searches will also benefit from the standardized data. Flexibility in the final usage of the datasets and base maps is essential to capitalize on the investment and potential benefits that a cohesive GIS Parcel Map Layer can deliver.

A multipurpose Digital Parcel File shall have the following components: a series of current, accurate, large-scale photogrammetric base maps that are tied to a geodetic network; cadastral overlays delineating all agricultural land property parcels; a parcel unique identifier (PIN) assigned to each parcel that is used as a common index to all land records; and a series of land files each containing the parcel identifiers, in addition to other data.

Background

North Dakota government and private entities are currently realizing a need for a state-wide digital parcel layer. A major impetus for this project is the 2007 revision to the agricultural land assessment law (House Bill 1303) which mandates that each agricultural land parcel be valued by soil productivity using general or detailed soils maps provided by Natural Resources Conservation Service. Several North Dakota counties have been using this method of valuation for several years, having manually counted the soil/parcel acres prior to the widespread availability of Geographic Information Systems (GIS). Several of these counties have chosen to update their manual process to digital in an effort to streamline parcel updating and maintenance, as well as to apply the digital parcel layer toward other uses for the county, including economic development and emergency management. Many North Dakota counties will be developing this method of valuation for the first time and are encouraged to develop a digital method of parcel mapping in order to avoid costly changeover in the future.

Purpose

This document is designed to provide standards for the creation of county-wide and/or state-wide Digital Parcel File and to facilitate on-going maintenance practices. These standards provide the necessary information to create a quality, uniform parcel dataset. Following the developed standards will allow data sharing across multiple entities and ensure consistent data development and maintenance. Currently operating map programs which are technically or structurally unable to comply are not required to retrofit to these guidelines, but are encouraged to implement as many of these guidelines as soon as possible. Where there is difficulty to complete a retrofit to these guidelines, it is recommended to document these areas to ensure transfer and compatibility.

As stated above, the accurately developed basic Digital Parcel File may be built upon for several uses. However, the initial purpose for the development of the Digital Parcel File for North Dakota Counties is for Agricultural Property Assessment. The Digital Parcel File and its associated datasets for agricultural assessment purposes will be linked with the Detailed Soil Survey Geographic (SSURGO) Database Layer in order to determine acres of soil types per parcel. The SSURGO Layer is available from the Natural Resources Conservation Service (NRCS) branch of the USDA. Users of this Standard for agricultural property assessment purposes should pay special attention to information regarding pertinent Layers and Datasets.

For agricultural assessment purposes, the Digital Parcel File may or may not be developed in conjunction with a separate and distinct Modifier Dataset which shall be outlined by each North Dakota County. A Modifier Dataset can further delineate, in spatial or tabular format, measurable features on the land which affect land value (such as shelterbelts, forest land, or conservation easement acres).

Development Standards

Source Data

An assessment shall be made to determine the best available data to be used. The format, accuracy, condition, as well as access to the source data must be considered. **Counties shall make the best information and data available for compilation of features by any vendor host.** Data silos at the local level may significantly slow down the information gathering phase of putting the Digital Parcel File together.

Sources to refer to in compiling boundaries of parcels include but are not limited to:

- Title records
- Assessment records
- Infrastructure records (highways, utilities, transmission lines, etc.)
- Land use and zoning regulation records
- Resource and environmental records
- Court records
- Survey records (plats, plans, and surveyor notes)
- Aerial imagery
- U.S. Geological Survey maps
- Government Land Office Surveys (township plats and notes)
- Existing parcel (or tax) maps.

Spatial Reference

The Digital Parcel File shall be developed in a Geographic Coordinate System, thus allowing data to be converted for viewing using various projections.

Data to be used in the North Dakota Digital Parcel File shall have associated and documented projection information in the metadata that can be correctly interpreted by commercial GIS software. The systems in use on the North Dakota GIS Hub will allow the uploading or downloading of parcel data in other projections. Any parcel data stored on the North Dakota GIS Hub will be stored in the Geographic Coordinate System using the **North American Datum of 1983 (NAD83).**

Data Format

Data to be used in the North Dakota Digital Parcel File shall be in a GIS format that is known and readable by commercial GIS software. Current examples include Shape Files and Geo-databases.

In developing a state-wide seamless Digital Parcel File, the systems in use on the North Dakota GIS Hub will allow the uploading or downloading of parcel data

in multiple data formats. Any parcel data stored on the North Dakota GIS Hub will be stored in an enterprise geodatabase format.

Spatial Accuracy

A Digital Parcel File that is created using coordinate geometry information (plats and surveys, legal descriptions and metes and bounds) is the recommended method of data collection, however, it may result in parcel acreages different from that which has been recorded in the Deed of the parcel. This is not an unusual occurrence and the Deeded acres should be adhered to for property assessment purposes. Each county shall determine a percentage by which a variance in GIS acres versus Deeded acres warrants further investigation. (For example, a county may chose to review the Deed information *or* survey a parcel regarding data in which the digitally determined acres are off by more than 10, 15, or 20% of the acreage recorded on the parcel Deed.)

> If a county so chooses to survey a parcel in question, surveyed data shall be collected with an accuracy level of 1-3 meters or better at the 95% confidence level. Horizontal accuracy should meet or exceed U.S. National Map Accuracy Standards (NMAS). Note, however, that adherence to NMAS can usually be achieved only when maps are compiled directly by survey, GPS, and/or photogrammetric methods. When collecting data with mapping grade GPS equipment it is recommended to collect at 1 meter or better.

** In creating a Digital Parcel File for **agricultural assessment purposes**, it is recommended to keep survey grade collection methods to a minimum – as survey grade parcel boundary mapping exceeds the level of accuracy needed for the purpose of determining soil acres per parcel.*

Feature Type

The Digital Parcel File shall consist of polygon features for all parcels in the county Tax Assessor's database and/or shown on the respective county parcel map. Vector polygons shall be used to represent parcel boundaries. Parcel boundaries shall be processed using appropriate GIS procedures to create and maintain accurate topology.

Every polygon shall contain or be spatially referenced by a Polygon Unique Identifier *(PUID).*

Vector points ***shall not*** be used to represent a parcel in the interest of using the parcel polygon successfully for property assessment purposes and in order to eliminate future problems should the parcel need to be split.

Topology

Topologies shall be used to ensure that the polygons within the Digital Parcel File do no overlap and do not contain gaps. If the county assigns a county staff to develop the Digital Parcel File, a project manager shall be assigned to review the

Digital Parcel File and assign correction tasks to fix gaps and overlaps within the dataset. Vendor hosts developing the Digital Parcel File shall take quality assurance measures to review the spatial dataset for gaps and overlaps and make needed corrections prior to delivery of the dataset to the county.

Edge-Matching

All captured line features shall be both visually and coordinate edge-matched with features in adjacent files or other artificial boundaries within a file. Counties shall assign a project manager to oversee edge-matching with adjacent counties and/or vendor hosts shall cooperate with adjacent counties and/or other vendors working in adjacent counties to edge-match common borders.

Polygon Unique Identifying Number

Each polygon designated as a property parcel will be identified with a Polygon Unique Identifying Number (*PUID*) capable of digitally linking or joining it to the Tax Assessor's Database. In an effort to eradicate the use of duplicate polygon unique identifying numbers between counties in a state-wide parcel dataset, the PUID shall be preceded with a state and county identifying code.

The PUID shall be assigned using the following format:

2 digit FIPS state code (North Dakota = 38) followed by the 3 digit FIPS county code (see Appendix 1) followed by the county unique parcel number.

Base Registration

Digital Parcel File

Where surveying or monument registration is not readily available, the Public Land Survey System (PLSS) shall be used as the Base Registration.

For the Western two-thirds of the State of North Dakota, the GCDB, or graphical depiction (polygon dataset) of the PLSS shall be used. That information may be obtained at:
http://www.geocommunicator.gov/GeoComm/index.shtm

For the Eastern one-third of the State of North Dakota, the USGS Section Data shall be used. That information may be obtained at:
http://www.nd.gov/gis/mapsdata/data/extractdata

* PLSS and GCDB foundational data which is found to be erroneous during parcel data development should be documented in the NOTES field of the Attribute Table and reported to the respective creating organization. This will make the PLSS data more robust.

Data Development Methods

In developing a digital parcel file for agricultural assessment purposes, each county shall determine the appropriate method(s) to be utilized, using the best data available and considering each county's resources and unique needs.

Coordinate Geometry (COGO)

Coordinate geometry shall be implemented as much as possible to ensure consistency between recorded instrument (source data) and the base Digital Parcel File. Although coordinate geometry is usually regarded as the most reliable method of base Digital Parcel File construction, it is sound practice to integrate the COGO work with existing reliable digital sources to ensure accuracy and consistency and minimize the expense and effort of the duplication of existing digital work. When inconsistencies between the property records and other mapping sources (i.e.: photo evidence) appear, a thorough investigation shall be initiated to discover all the relevant evidence to make the judgment for locating the element on the map accurately. *The recorded instrument remains the authoritative record upon which all property valuations must rely.*

Basic Legal Descriptions

In most instances, parcel boundaries may be created simply by entering the legal description of the parcel into the GIS software. This method works especially well for parcels that are defined as basic four-cornered sections, quarter sections, quarter-quarter sections of land, and so on.

Metes and Bounds

Metes and bounds techniques pertain to the use of coordinate geometry with bearings and distances to accurately map the more complicated parcel boundary. Bearing and distance source data used may include but are not limited to legal descriptions, subdivision plats, and plats of survey.

Conversion of Existing CAD Files

Some counties may already have good quality digital vector files of parcel level data available, usually in a Computer Aided Drafting (CAD) format. In these instances it is possible, with the inclusion of geo-registration information, to transform these data directly into a GIS vector format. With the addition of unique polygon parcel identification it is then possible to add feature attribute data for usage in a GIS database. Verification of the scale and accuracy of the original sources from which the CAD data files emanated shall be included in the metadata.

Digitizing

Digitizing of maps shall be considered an acceptable method for the creation of spatial parcel features to be incorporated into a county-wide and/or state-wide Digital Parcel File where coordinate geometry or metes and bounds records are inaccurate or acreage discrepancy issues between GIS acres and Deeded acres are being addressed. However, digitizing of maps can produce varying degrees of accuracy if data capture standards are not followed. When using aerial imagery, parcels may need field verification with a map grade GPS unit. To ensure accuracy levels are maintained, digitizing procedures shall be completed using the following minimum standards:

Capture Scale for digitizing: 1:3600
Projection: UTM Zone 13 or Zone 14 (Or approved projection of aerial imagery)
Datum: North American Datum of 1983 (NAD83)
Units: Feet

The heads-up digitizing method shall only be used where clear visual ground evidence of ownership is present on the aerial imagery (i.e., fence line, tree line, grass line, etc.).

Heads-up digitizing from the most current *or the most accurate* aerial imagery shall be used to create a spatial version of the Modifier Dataset for agricultural land assessment purposes, if a county chooses to create a spatial version of Modifiers as well as a tabular dataset.

Geo- and Ortho-rectification of aerial and/or raster images shall be done to improve accuracy and/or to verify accuracy. Rectification shall be done on a minimum of 6 to 8 known coordinates.

Surveying - Global Positioning Systems (GPS)

Development of spatial parcel features may be created utilizing GPS technology, however, this is a more costly method of parcel development and exceeds the level of accuracy needed for property assessment purposes on agricultural lands. Where Coordinate Geometry and Digitizing Methods are not sufficient due to inaccurate source data or substantial acreage differences between the Deeded acres and GIS determined acres, it may be necessary to survey a parcel using GPS Methods. The GPS equipment and techniques must provide output that meets the accuracy levels established in this document. Real-time Differential Global Positioning System (DGPS) or post processing of the data may be required to obtain desired accuracy levels.

Random sampling of known property or field boundary lines utilizing high accuracy survey quality positioning systems can be used to tie county data sets together.

Data Maintenance

Map Geodatabase Maintenance

It is important that the Digital Parcel File and its associated data reflect the respective county's current tax roll. A regular maintenance program shall be implemented by the county or the vendor host to ensure that the maps are accurate and current. The Digital Parcel File, SSURGO Layer, and Modifier Dataset (spatial or tabular) shall be maintained, updated, saved, and archived as separate and distinct files to prevent problems which can arise if maintained and updated as a linked file. Independent datasets are required to ensure ease of upgrades and updates. Flexibility in cross usage and compatibility is also a basis for the need of separate and distinct filing systems.

Updating

Each county or vendor host shall update the Digital Parcel File with its associated tabular data to reflect property ownership changes and parcel splits on a regulated basis (i.e. as changes occur, monthly, or quarterly) which shall be determined by the county. Custom user interface is advised to facilitate ease of updates.

Quality Control

Standard procedures for quality control shall be established to continuously edit and inspect all ownership maps for accuracy and completeness.

Data Archival

Each county or vendor host shall implement a plan for archival of the Digital Parcel File. In order to avoid loss of digital map and tabular data in the event of mechanical failure, a back-up copy of the map database shall be made on a regular schedule. The frequency, method, and media used for data back-up will be determined by the county or vendor host's maintenance schedule. Consideration should be given to off-site storage of the map database to protect against the loss of on-site archived data in the event of theft, fire or natural disaster. *For agricultural property assessment purposes, counties shall maintain a separate dataset for **each year** in which property assessments were derived from the linked geo-databases.*

Data Distribution

The county-wide Digital Parcel File shall be submitted to the state for distribution via the North Dakota GIS Hub at no cost to public or private users. Information attached to that data which is not already publicly available shall not be included in the distributed data. Each county or vendor host shall submit updated Digital Parcel Files to the North Dakota GIS Hub on a scheduled basis. The frequency of these submittals will be determined by the county or vendor host, working with the state. For example: jurisdictions that update their data on a quarterly,

monthly, or weekly schedule may submit their data quarterly and jurisdictions that update their data on a bi-annual or as-needed basis may submit their data every six months.

Table Structure

Attributes

The incorporation of attributes into the defined fields shall be through manual or automated processes.

Attributes for the North Dakota Digital Parcel File shall follow the defined table structures outlined on the following pages. The table structure represents the minimum fields. Local applications may require additional fields. Additional fields shall be documented to show data purpose and formatting.

Required Minimum Fields for Basic Digital Parcel File and Associated Polygons

PUID	PIN	SOURCE	REF_DOC	TWP	SECTION	RANGE	GIS_ACRES	SP_UPDATE	NOTES
Polygon unique identifier - 2 digit state code followed by 3 digit county code, followed by county specific PIN.	*Parcel identifying number – from Tax Assessor's data.*	*Identifies how parcel was digitally derived. See below for entries*	*Identifies the number of the legal document that the parcel was mapped from. i.e. Title No., Plat No., Aerial Photo No., etc.*	*Township – can be derived on demand from the PLSS data.*	*Section – can be derived on demand from the PLSS data*	*Range – can be derived on demand from the PLSS data*	*Parcel polygon acreage derived from GIS.*	*Date of last polygon feature update.*	*Use this section for additional comments. i.e. erroneous PLSS data, etc.*
80 Digit Text	25 digit Text	15 digit Text.	50 digit Text	3 digit Text	2 digit Text	3 digit Text.	Double precision real number. To 3 decimals.	Date field	125 digit Text

SOURCE:

Entries in this field reflect the method in which the digital parcel was derived (see Data Development Methods section). Use the entries outlined below:

COGO
CAD
DIGITIZED – HEAD-UP
DIGITIZED – GEO-REF
SURVEYED

Punctuation

Punctuation and characters such as &, #, /, -, etc., and spaces between commas shall not be included in any fields within the Digital Parcel File.

Additional Suggested Fields for Parcel Layer for Agricultural Property Assessment Purposes (May be added to Basic Parcel Layer Fields)

TAX_ACRES	LAND_USE	OW_NAME	OW_ADD	TX_NAME	TX_ADD	TA_UPDATE
Recorded acres from Tax Assessor's database. (Deeded Acres) – can be connected to the parcel layer with a join. Double precision real number – to 3 decimals.	*Two digit code describing actual agricultural use of the land. From FSA's Common Land Unit data or Tax Assessor's Data. See below for codes.* 2 digit text	*Owner name of parcel.* ***Last, First, MI*** *From tax assessors database* 50 digit text	*Complete address of Owner. Physical, State, Zip* 100 digit text	*Name of the taxpayer of the parcel – if different than owner name.* 100 digit text	*Complete address of Taxpayer – if different than Owner.* 100 digit text	*Date of last tax assessor's attribute database update – will update automatically if a live link is maintained with the tax assessors database.* Date field

Suggested Land Use Codes

Each county shall decide how detailed the coding shall be for land-use. The minimum use of codes should be Cultivated Cropland (CC) and/or Non-Cultivated Cropland (NC).

Cultivated Cropland (small grain or row crop)	**CC**
Pastureland (in rotation)	CP
Hay land (in rotation)	CH
Irrigated Cropland	IC
Conservation Reserve Program (CRP)	RP
Non-Cultivated Cropland	**NC**
Rangeland (native plants)	RL
Permanent Pasture	PP
Permanent Hay land	PH

Additional Considerations: Using the Digital Parcel File for Agricultural Property Assessment

Assigning a Value to Soil Types

Each county will need to assign a value to each soil type which falls within their county for property assessment purposes. This information shall be documented in table format and shall reflect the per-acre value for each soil type. (It is recommended that each county develop a Soils Committee of trusted landowners, township assessors, and other county officials to determine the best method of assigning values to the county unique soil types. Further instruction and assistance in assigning values to the soil types may be available from the Natural Resources Conservation Service.)

Linking to SSURGO

Soil Productivity Index (PI) can be generated from official data sources using the Weighted Average PI or Mapunit PI. This can be generated through official data sources such as eFOTG or the SSURGO data using Soil Data Viewer (Crop Productivity Index, Weighted Average). Manipulating the data to derive any other properties and interpretations are done at the user's discretion. Soil Surveys were created at scales between 1:12,000 and 1:24,000 and are intended for general land use planning.

It is a simple matter to intersect this Digital Parcel File with the current accurate soil data set from SSURGO. Counties shall maintain a Digital Parcel File that is separate and distinct from the soils layer. All splits and maintenance should be done on these separate datasets. If, on the contrary, an intersected data set is maintained by doing the splits on parcels that already have soils in them, then a costly problem arises. If, as has happened, the Soils Data Layer (SSURGO) is updated, the county faces the task of re-mapping all the parcels so that they can be intersected with the "new" soil data. Upon linking the Digital Parcel File and Modifier Dataset to SSURGO, acres of soils per parcel should be determined in tabular format upon query. After the acres of soil per parcel are determined, a value on the parcel shall be determined upon query, intersecting soil acres per parcel with the per-acre value for each soils type.

(Software such as PAT and FARMS reads these datasets and integrates the acres of each soil type and the Modifiers to evaluate the assessed value of the parcel.)

Modifier Dataset Development – For Agricultural Property Assessment

In accordance with House Bill 1303, each county shall determine what, if any, Modifiers they wish to apply to their agricultural property valuation process. ***This Modifier list must be submitted to the State Supervisor of Assessments for approval prior to application of the Modifiers in the valuation process.***

A county may choose to inventory approved Modifier data in tabular (or spreadsheet) format only. This information may be entered directly into the Digital Parcel File's attribute file or maintained as a separate dataset. The tabular-only method of inventorying Modifiers may be the preferred method for many counties to use at this time. This is due to the fact that many township assessors will be determining the acres of Modifiers and may not have access to the GIS software/hardware required to maintain a spatially formatted dataset. If a county chooses to inventory additional features on the land in a spatial (or digitally mapped) format, the separate and distinct Modifier spatial layer shall be created using the most current *or most accurate* digital orthophotography or aerial imagery available for the county. This layer shall then be linked with the Digital Parcel File and SSURGO spatial data for assessment purposes, yet maintained and archived as a separate file.

The Modifiers listed in tabular format shall include the acres of each feature defined. Each county shall assign a percentage value or factor by which the Modifier acreages affect the assessed value of the parcel. Examples of Modifiers which have been used by North Dakota counties are as follows:

Previously Used Modifiers and Suggested Codes for Table Entries
(Suggestive only – Each county must submit a list of Modifiers for approval prior to inventorying their agricultural properties.)

Alkaline	AL
Built-up (rural airport, buildings, etc.)	BU
Conservation Easement	CE
Erosion	ER
Forestland/Thickets	FO
Inaccessibility	IA
Inundated Lands	IN
Irregular Fields	IF
Marsh/Wetland	WL
No Modifiers on the Land	NM
Roads	RD
Rocks	RK
Salty Slough	SS
Shelterbelts/Tree Claims	SB
Stream Overflow	SO
Waste	WS
Waterway	WW

Linking to the Modifier Dataset

Counties or vendor hosts shall maintain a separate Modifier dataset as described in the previous section. This dataset may be intersected with the Digital Parcel

File and with the Soil Layer (SSURGO) in an automated way to assist in determining the value of the parcel.

Linking to the County Tax Assessor's Database

Adding attributes from the assessor's database is typically accomplished by obtaining a copy of the existing assessor's information (e.g., as a comma delimited ASCII, or file or table from a relational database), importing it to a database table in the GIS software, and joining it to the Digital Parcel File based on the database common identifier attribute field *(PIN*).

It may be desirable to create a live link between the tax assessor's database and the Digital Parcel File for updating and maintenance purposes. It is common practice to import existing assessor's information and joining it to the Digital Parcel File. However, at the state level, it may not be feasible to live link or join to the county assessor's database.

In many cases it may not be desirable or practical to include all data in the assessor's database in the GIS database. Privacy issues or conflicting or redundant data fields may require further consideration.

Attribute names are suggested to match those listed above to allow parcel data from multiple counties to be used in regional applications. The ability to use data from adjacent counties is relevant not only for multi-county digital parcel files but also for use within individual counties. For example, parcel data from adjacent counties may be needed to support abutter notification mailings, "comparables" for property assessments, or reviewing proposed developments that straddle county boundaries.

It is strongly encouraged that each county Tax Director of Equalization receives sufficient instruction in GIS software to effectively access and utilize their GIS derived data for agricultural property assessment purposes.

Land Use Information

Information regarding land use for assessment considerations may be derived from available county data or from FSA's Common Land Unit Layer. FSA information may be downloaded from the following website:

http://datagateway.nrcs.usda.gov (Follow the 'Get Data' header on the upper left hand side of the front page. On the lower left and enter the desired county and state information. In step two, a screen with available layers will be displayed. Check the 'Common Land Units' layer and continue on to step three. Choose desired formats and proceed to 'Check Out'. Information will be delivered in zip files via e-mail for download.)

Metadata

Metadata shall be provided and updated on all data layers. This information is critical in today's data-sharing world. The primary purpose of metadata is to provide a complete answer to *who, what, when, why* and *how* on the individual layer, to aid in the distribution of the spatial dataset.

The metadata shall be developed and maintained following the Federal Geographic Data Committee (FGDC) metadata standards and saved in a txt or xml format. Up-to-date metadata shall be provided for any information to be included in the statewide parcel file. Metadata shall accompany any county parcel information when distributed or transferred between entities. Metadata must successfully be passed through an FGDC compliant parser such as the U.S. Geological Survey Metadata Parser (mp).

County level metadata shall be included with each county-wide, completed parcel dataset. This will include but not be limited to:

- Data Custodian, Contact and Creating Organization
- Date of last update
- Recommendations stating limitations of use.
- Projection in which Parcel Map Layer was created.
- Data Attribute Definition and Coding Descriptions (Sometimes called a Data Dictionary) for all spatial and assessor's database attribute fields.
- Automation Process Methods and Dates (A description of methods used and company [if done by outside consultant] creating and/or updating data. The detail should also include the name and version of the Computer Assisted Mass Appraisal (CAMA) software from which the parcel attributes were drawn and the file format of the extract from the assessor's database).

Glossary

Attribute - A single element of non-graphic (e.g. number or character text string) information stored in a database field and usually, in context of this standard, associated with a single geographic feature (e.g. a property parcel on a map) such as name of owner, property area, property value, etc.

Base map - A map showing certain fundamental information, used as a base upon which additional specialized data are compiled.

Cadastre - An official register of the quantity, value, and ownership of real estate; used in determining property value.

Cadastral map - A map showing the boundaries of subdivisions of land, for the purposes of describing and recording ownership; used in determining property value.

CAMA (Computer Assisted Mass Appraisal) - The process of using a computer to assist in property tax appraisal and equity evaluation. A CAMA system will include one or more relational databases and may also have a GIS component.

Coordinate – An x, y location in a Cartesian coordinate system, or an x, y, z location in a three-dimensional coordinate system. Coordinates are used to represent locations on the earth's surface relative to other locations.

Coordinate geometry (COGO) - Automated mapping software that translates the Alpha-numeric data associated with a survey (distances, bearings, coordinates, etc.) into a digital map information for creating and updating a digital cartographic data base.

Centroid - A code (usually numerical) used to locate or identify a point, such as the center of a parcel.

Deed - The historic record of conveyance for property ownership. It is the primary legal record defining the property and its boundaries and is usually stored in the Land Evidence records maintained by the county or town.

Digital Parcel File - A computer file or files containing a graphic (vector) representation of the boundary information originally depicted and maintained on a county assessor's maps. These files may also include public and private rights of way and various kinds of easements. In a GIS database the digital parcel file contains attribute information in or from a relational database further identifying individual graphic features represented by points, lines or polygons on the map.

eFOTG – Electronic access to Filed Office Technical Guides, containing technical information about the conservation of soil, air and related plants and animal resources.

Geographic Information System (GIS) - A computerized data-base system for capture, storage, retrieval, analysis, and display of spatial data.

Georectification - The digital alignment of a satellite or aerial image with a map of the same area. In georectification, a number of corresponding control points, such as street intersections, are marked on both the image and the map. These locations become reference points in the subsequent processing of the image.

Geo-referencing - software procedure that consists in positioning, through points with known coordinates (check points), scanned paper images in the respective area of the real territory according to a given reference system

Global Positioning System (GPS) - Determination of coordinates of points using a network of satellites intended for this purpose.

Index map - (1) A map of smaller scale on which are depicted the locations (with accompanying designations) of specific data, such as larger-scale topographic quadrangles or geodetic control. (2) Photography: A map showing the location and numbers of flight strips and photographs.

Lot - A plot of land, generally a subdivision of a city, town, or village block, or some other distinct tract, represented and identified by a recorded plat.

Monument - A permanent physical structure marking the location of a survey point or boundary line. Common types of monuments are inscribed metal tablets set in concrete post, solid rocks, or parts of buildings: distinctive stone posts; and metal rods driven in the ground.

Multipurpose cadastre - A framework that supports continuous, readily available, and comprehensive land-related information at the parcel level.

Nodes- In regards to a geodatabase, a node is the point representing the beginning or ending point of an edge, topologically linked to all the edges that meet there.

Orthorectification - [satellite imaging] The process of correcting the geometry of an image so that it appears as though each pixel were acquired from directly overhead. Orthorectification uses elevation data to correct terrain distortion in aerial or satellite imagery.

Parcel - A single, discrete piece of land having defined physical boundaries and capable of being separately conveyed.

Photogrammetry - The art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring, and interpreting images and patterns of electromagnetic radiant energy and other phenomena.

Planimetric map - A map that presents only the horizontal positions for the features represented; distinguishable from a topographic map by the omission of relief in measurable form.

Plat - A diagram drawn to scale showing all essential data pertaining to the boundaries and subdivision of a tract of land, as determined by survey or protraction.

Polygon – An areal feature defined by the series of lines (arcs) comprising its boundary. A polygon has an area and a perimeter, and has attributes that describe the geographic feature that it represents.

Projection - A systematic representation of all or part of the surface of a sphere onto a plane.

Public Land Survey System (PLSS) – A method used in the United States to survey and identify land parcels, particularly for titles and deeds of rural, wild or undeveloped land, with basic units of area being township and section.

Raster - [data models] A spatial data model that defines space as an array of equally sized cells arranged in rows and columns, and composed of single or multiple bands. Each cell contains an attribute value and location coordinates. Unlike a vector structure, which stores coordinates explicitly, raster coordinates are contained in the ordering of the matrix. Groups of cells that share the same value represent the same type of geographic feature.

Shapefile - A vector data storage format for storing the location, shape, and attributes of geographic features. A shapefile is stored in a set of related files and contains one feature class.

Snapping- A function/procedure in GIS software that takes two nodes and connects them together

State plane coordinate systems - A series of grid coordinate systems prepared by the U.S. Coast and Geodetic Survey for the entire United States, with a separate system for each state. Each state system consists of one or more zones. The grid coordinates for each zone are based on, a mathematically adjusted to, a map projection.

SSURGO – Soil Survey Geographic database is the most detailed level of digital soil mapping by the Natural Resource Conservation Service (NRCS).

Topology- Topology stores the relationships of one spatial element with respect to another. In terms of GIS data, topology is a spatial data structure used primarily to ensure that the associated data forms a consistent and clean topological fabric. Traditionally, this would mean that by building topology into a dataset, intersections would be created whenever lines crossed, dangling nodes could be identified as an error, polygons of certain areas could be identified as slivers, and small gaps in polygons could be identified as errors. With advances in technology, topology can now be thought of as a collection of rules and relationships that, coupled with a set of editing tools and techniques, enables the geodatabase to more accurately model geometric relationships found in the world (ESRI help).

Vector - A coordinate-based data model that represents geographic features as points, lines, and polygons. Each point feature is represented as a single coordinate pair, while line and polygon features are represented as ordered lists of vertices. Attributes are associated with each vector feature, as opposed to a raster data model, which associates attributes with grid cells.

APPENDIX 1

STATE AND COUNTY FIPS CODES TO BE APPLIED TO PARCEL IDENTIFYING NUMBERS

State FIPS Code:

North Dakota	38

County FIPS Codes:

Adams	001
Barnes	003
Benson	005
Billings	007
Bottineau	009
Bowman	011
Burke	013
Burleigh	015
Cass	017
Cavalier	019
Dickey	021
Divide	023
Dunn	025
Eddy	027
Emmons	029
Foster	031
Golden Valley	033
Grand Forks	035
Grant	037
Griggs	039
Hettinger	041
Kidder	043
LaMoure	045
Logan	047
McHenry	049
McIntosh	051
McKenzie	053
McLean	055

Mercer	057
Morton	059
Mountrail	061
Nelson	063
Oliver	065
Pembina	067
Pierce	069
Ramsey	071
Ransom	073
Renville	075
Richland	077
Rolette	079
Sargent	081
Sheridan	083
Sioux	085
Slope	087
Stark	089
Steele	091
Stutsman	093
Towner	095
Traill	097
Walsh	099
Ward	101
Wells	103
Williams	105

References

Arkansas Cadastral Mapping Standard. July 2, 2004. Arkansas State Land Information Board. Little Rock, AR

Department of the Interior, Bureau of Land Management. 1973. *Manual of Surveying Instructions*. Washington, DC: Government Printing Office (GPO).

Federal Geodetic Control Committee. 1990. *Multipurpose Land Information Systems: The Guidebook*. Washington, DC: GPO.

Federal Geographic Data Committee. 1998. *Content Standard for Digital Geospatial Metadata. W*ashington, DC: GPO.

Federal Geographic Data Committee. 1996. *Cadastral Data Content Standard for National Spatial Data Infrastructure.* Washington, DC: GPO.

Federal Geographic Data Committee. 1998. *National Standard for Geospatial Positioning Accuracy, Part 3: National Standard for Spatial Data Accuracy (NSSDA)*. Washington, DC: GPO.

International Association of Assessing Officers (IAAO). 2003. *Standard on Manual Cadastral Mapping*. Chicago: IAAO.

International Association of Assessing Officers. 2002. *Standard on Facilities, Computers, Equipment, and Supplies.* Chicago: IAAO.

National Research Council. 1983. *Procedures and Standards for a Multipurpose Cadastre.* Washington, DC: National Academy Press.

National Research Council. 1980. *Need for a Multipurpose Cadastre*. Washington, DC: National Academy Press.

National Data Standard for Accuracy
http://www.fgdc.gov/standards/projects/FGDC-standards-projects/accuracy

Federal Geographic Data Committee
http://www.fgdc.gov/

FGDC metadata parsing software
http://www.fgdc.gov/dataandservices/getmeta

NENA GIS Data Standards
02-010 NENA Standard Formats & Protocols for ALI Data Exchange, ALI Response & GIS Mapping, Issue 6, February 25, 2006
http://www.nena9-1-1.org/pages/Content-4069553475.asp

RIGIS Standards for Digital Parcel Data Sets for Use in a Geographic Information System *Revision: December 18, 2003.* Rhode Island Geographic Information System RIGIS Executive Committee – Secretary RI Department of Administration Statewide Planning Program, One Capitol Hill, Providence RI 02908-5872

State of Florida Cadastral Mapping Guidelines. Compiled by the: Florida Department of Revenue Property Tax Administration Mapping & GIS Section

Acknowledgements – ND Digital Parcel File Standards Work-Group

Aaron Norby	Kadrmas, Lee & Jackson, Inc.
Adam Canfield	Prairie Mapping
Annette Theroux	Pro-West & Associates, Inc.
Bob Nutsch	North Dakota Information Technology Department
Cindy Melby	Wells County Director of Tax Equalization
Don Borgen	Lightowler Johnson Associates
Janet Cron	Burke County Director of Tax Equalization
Jason Fetch	Bartlett & West, Inc.
Joe Brennan	Natural Resources Conservation Service
Kate Schimetz	Consulting for ND Association of Counties
Larry Cowart	Michael Baker Jr., Inc.
Mark Dagley	Secure Software Solutions
Mel Obbink	The Sidwell Company
Noel Johnson	Stutsman County Director of Tax Equalization
Ron Luethe	Natural Resources Conservation Service
Sara Hewson	North Dakota State Tax Department
Stacey Heckaman	Golden Valley Director of Tax Equalization
Sue Finneman	Burleigh County Director of Tax Equalization
Tim Penfield	Houston Engineering, Inc.

I woud like to gratefully acknowledge all the vendors, county officials, and state officials who have volunteered their time and expert knowledge toward the development of this Standard. This project would have never left the ground without you! As work continues on creating the parcel dataset, any additions or corrections to this Standard will always be welcomed – we'll consider it a work in progress! With sincere 'thanks' – Kate Schimetz kdschimetz@ndaco.org