

STANDARD ON PARCEL MAPPING AND PARCEL IDENTIFICATION

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Revised June 2026

International Association of Assessing Officers

IAAO assessment standards represent a consensus in the assessing profession and have been adopted by the Board of Directors of the International Association of Assessing Officers (IAAO). The objective of the IAAO standards is to provide a systematic means for assessing officers to improve and standardize the operation of their offices. IAAO standards are advisory in nature and the use of, or compliance with, such standards is voluntary. If any portion of these standards is found to be in conflict with national, state, or provincial laws, such laws shall govern. Ethical and/or professional requirements within the jurisdiction may also take precedence over technical standards.

About IAAO

The International Association of Assessing Officers, formerly the National Association of Assessing Officers, was founded for the purpose of establishing standards for assessment personnel. IAAO is a professional membership organization of government assessment officials and others interested in the administration of the property tax. Over the years IAAO members have developed assessment practice and administration standards and many of these standards have been adopted by state and international oversight agencies, and some have been incorporated into legislation.

IAAO continues at the forefront of assessment in North America and has been expanding its reach to the global community for the last five decades. Because standards form the rules by which North American assessors perform their duties, they may not be directly applicable to an overseas audience. The standards have been updated to also present the broad principles upon which the rules are based. IAAO believes those principles may be adapted to many differing statutory and regulatory scenarios worldwide.

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STANDARD ON PARCEL MAPPING AND PARCEL IDENTIFICATION

1. SCOPE

This standard provides recommendations on the development and maintenance of a digital cadastral mapping program for the purpose of assessing real property. It describes a digital cadastral mapping system program, its components, cadastral data, content, design, creation, maintenance, contracts, and administrative controls within the context of a multipurpose cadastre. It also discusses the processing of title records, and parcel identification systems. This standard also addresses the interaction between the creators and maintainers of cadastral map data layers, users of broader geospatial information systems, and consumers of multipurpose cadastral data, and provides context for those interactions. State mapping functions not related to the construction of cadastral layers are not addressed in this standard. Technical aspects and recommendations may also be applicable to contractual services and state and provincial systems provided for local assessor use. International aspects are addressed in the paper *Guidance on Developing Mass Appraisal and Related Tax Policy* (IAAO 2023). For information on legacy manual cadastral mapping see the *Standard on Manual Cadastral Maps and Parcel Identification* (IAAO 2016).

2. OVERALL PRINCIPLES

The key principles within this standard are as follows:

- *Accuracy* - Maintain parcel and ownership data that accurately reflects the legal and physical characteristics of real property.
- *Consistency* - Apply standardized mapping, identification, and maintenance practices uniformly across all parcels and jurisdictions.
- *Accountability* - Establish clear responsibility for the creation, maintenance, quality control, and stewardship of parcel data.
- *Uniqueness* - Assign each parcel a unique and permanent identifier that supports assessment administration, historical tracking, and data integration.
- *Promptness* - Update parcel records promptly to reflect ownership changes, parcel splits, combinations, boundary adjustments, and other property-related actions.
- *Transparency* - Provide accessible, understandable, and reliable parcel information as a public asset that supports equitable valuation and property assessment.
- *Interoperability* - Develop parcel data and systems using recognized standards that support sharing and integration with other governmental and geographic information systems.
- *Historical Preservation* - Maintain parcel genealogy and historical records to document changes in ownership, boundaries, and parcel identification over time.
- *Sustainability* - Support long-term program success through documented procedures, trained personnel, appropriate funding, and continuous improvement.

3. INTRODUCTION

Cadastral maps for the entire jurisdiction, regardless of taxable status or ownership, are essential to the performance of assessment functions. Digital cadastral maps enable the assessor to access parcel location and information, reveal geographic relationships that affect property value, and provide a platform for the visualization of data layers and analytical results more efficiently. Digital cadastral maps also aid the assessor in meeting the digital demands of other local government users, such as planning and public works departments, and private business users.

The assessor is often recognized as the authoritative source of valuation and cadastral spatial data, which are integral to many non-assessment functions of other governmental agencies and the private business sector. Data aggregation companies acquire, manipulate, rebrand, and resell valuation and spatial data. Companies in the finance, insurance, and real estate sector incorporate assessor data into their business model for data validation and cost savings because the granularity of assessor data exists nowhere else. A comprehensive digital cadastral program enables the assessor to fulfill this expanded data provider role.

Some nations are likely to embrace different divisions of cadastral mapping responsibilities, that is, among multiple national agencies and levels of government (e.g., the cadastral agency, the ministry of finance and local levels of government).

Principles

- *Cadastral data is a public asset that often serves multiple government and private functions.*
- *A cadastral mapping program designed primarily for assessment purposes should, where possible, be structured to support legitimate secondary uses, including land administration, emergency management, and regional planning.*

3.1 AUTHORITATIVE DATA

Authoritative data is the trusted, accurate, and official validated source of information within an organization. It is considered the primary and most reliable source for a particular dataset, serving as the standard against which other data is compared. In data governance, authoritative data acts as the single source of truth, ensuring consistency and reliability across systems and teams. Data stewards manage and maintain this data, enforcing policies that uphold data quality, and compliance. By serving as a validated reference point, authoritative data enables better decision-making, reduces errors, and supports seamless integration between systems. It can also include data contributed to aggregated datasets maintained by state authorities or national bodies.

3.2 THE ROLE OF THE ASSESSOR

The assessor may assume many different roles as data steward in management, and maintenance of a jurisdiction's digital cadastral mapping system. The assessor, or an authorized agent, should act as the data steward for parcel and assessment data and possess the authority to inventory, create, and define all parcels and other cadastral layers. The assessor should maintain parcel identification for assessment purposes. The assessor may be involved in creating and maintaining data related to the parcel map, such as street centerlines, zoning, and other multipurpose layers. In contrast, the role of the assessor may be limited to maintaining all cadastral layers and parcel identification leaving responsibility for other non-cadastral data layers to other offices or to a jurisdiction-wide geographic information system (GIS) agency or information technology (IT) department. The assessor should work closely with GIS or IT agencies that create and maintain GIS data, including cadastral data, to ensure continuity and standardization for business processes.

The assessor should track current ownership of all parcels via the recording of deeds and other documents conveying title so that the responsible party can receive assessment and tax notices. Deed processing and cadastral mapping are functionally related through the review of ownership and the interpretation of property descriptions and should be organizationally linked in the assessor's office.

The assessor should address policy-level matters, such as how the overall mapping program is integrated in a multipurpose data-sharing environment. Policies for program financing, stewardship or ownership of data, communication frequency, and sharing and transferring of data, for example, should be documented.

3.3 THE VALUE AND IMPORTANCE OF PARCEL MAPS AND DATA

Digital cadastral maps and systems are an integral part of a comprehensive assessment system, without which a complete picture of the interests and value of the land and improvements to the land is not possible. Users working with digital parcel maps and tabular parcel-related data in a digital mapping system can selectively retrieve and manipulate layers of parcel and spatial information to produce composite maps displaying only the data layers desired or the results of assessment analysis. Digital cadastral maps allow users to access information over a network to make parcel data widely available. Data-sharing allows users to download data, prepare maps, and design and deploy sophisticated queries. Digital parcel map systems are increasingly important as a source of data that extends beyond local assessment. Locally maintained data is increasingly recognized as the best available, most authoritative data source for many applications. Aggregating locally maintained data from many jurisdictions creates a valuable resource for regional, state, and national uses.

3.3.1 Value to the Assessor

Examples of the benefit of digital cadastral maps to the assessor are as follows:

- Provides a complete inventory of real property.
- Aids in equitable valuation.
- Provides accurate land area using coordinate geometry.
- Allows for the capture of cadastral genealogy and history.
- Enables complex queries, analysis, and visualization of results.
- Provides for speed, production, and ability to disseminate geographically referenced information.
- Provides ease of use for the generation of reports and mailing lists.
- Provides a base for mobile applications and interactive web applications.
- Provides a base for additional value-added products and software.
- Leveraging GIS/CAMA Assessment Analysis for fair & equitable valuations.

3.3.2 Value to Other Users in a Multipurpose Cadastre Environment

Examples of the benefit of digital cadastral maps to other users are as follows:

- Provides a spatially accurate resource upon which to build value-added non-cadastral data layers.
- Intergovernmental sharing across regional, state, and national governments.
- Provides a fundamental base layer for the following, but not limited to zoning, economic development, permitting, E-911, transportation, smart cities, school districts, and conservation districts.
- Equips stakeholders with the tools to better understand the importance of shared data, which increases transparency and accountability.
- Facilitates collaboration of disaster management services.
- Provides economies of scale through data aggregation and sharing when possible.
- Provides a base for citizen access web applications.

4. CORE COMPONENTS OF A DIGITAL PARCEL MAPPING SYSTEM

A digital parcel mapping system in a multipurpose environment should have the following core components:

- A geodetic control network based on a mathematical coordinate projection.
- Imagery – a digital image Base map.
- Core Parcel Boundary Layers - A cadastral parcel layer delineating the boundaries of real property in the jurisdiction based on recorded public information.
- A unique parcel identifier assigned to each parcel.
- Other cadastral layers relating directly to the parcel layer, such as subdivision, lot and block, tract, and grant boundaries.
- A database system that links spatial data and parcel attribute data.
- Utilizing metadata as a basis for data producers to be viewed as an authoritative source.

Principles

- *Cadastral layers should be tied to a recognized geodetic reference framework to ensure spatial accuracy, reproducibility, and integration with broader geospatial infrastructure.*
- *All cadastral data should be supported by metadata that documents its source, accuracy, currency, and any limitations, in conformance with recognized national or international metadata standards.*
- *Core cadastral layers should be designed to integrate seamlessly with related spatial and administrative datasets, supporting a multipurpose cadastre rather than an isolated mapping product.*

4.1 GEODETIC NETWORK AND COORDINATE PROJECTION

A geodetic network consists of monument points whose locations on the surface of the earth are defined with certainty. For the purpose of creating parcel maps and related data layers, these points are typically monument survey points, such as a U.S. Public Land Survey System (PLSS) corner, subdivision/plat corners, or other identifiable property control corners. These points may be described in terms of latitude and longitude but are more commonly projected to a coordinate system, such as state plane coordinates. Density and placement of control points should be related to map scale, population density, property value, accuracy specifications, and anticipated product life span. Professional land surveyors use Global Navigation Satellite Systems (GNSS) and Real Time Kinematic (RTK) satellite navigation to locate points with accuracy in the sub centimeter range.

A digital cadastral mapping system within a multi-purpose cadastre environment encompasses the data required to create and maintain cadastral data layers, the cadastral map layers, accompanying records, and the resources necessary to support all cadastral mapping functions. In the digital environment, the system should be designed to work seamlessly as a key component within a broader geospatial framework. The map projection used should produce the least amount of distortion and be the most appropriate for the jurisdiction. The system must be thoroughly documented through metadata that describes its development, structure, datum and maintenance

practices. Metadata should conform to the *Federal Geographic Data Committee (FGDC) Geospatial Metadata Standard*, like those based on ISO 19115 and FGDC CSDGM and align with National Spatial Data Infrastructure (NSDI) requirements, ensuring consistent, interoperable documentation that supports the discovery, understanding, and effective use of geospatial data.

The assessor and cadastral mapping specialist should work closely with other industry professionals to assess the quality and completeness of data points that may already exist in a geodetic network and that relate to the creation of cadastral layers. If necessary, geodetic coordinates may need to be collected on additional data points to ensure densification of the network for the creation of cadastral layers.

The geodetic network, and data points consisting of monument corners contained therein, must be associated with the cadastral elements being mapped. The assessor and cadastral mapping specialist should be aware that many monuments on the ground have no relationship to land ownership. If new geodetic coordinates are being collected, all parties must understand the points that will serve the creation and maintenance of the cadastral data.

4.2 IMAGERY

Vertical aerial photographs have long been an essential imagery product for developing the cadastral map. Imagery has greater value when all distortions have been removed, it is tied to a geodetic control network, can serve as a base map, and meets the measurement tolerances required for use with a cadastral layer or as a base for the construction of the cadastral layer. Such images are called orthophotos, orthorectified images, or orthos. Orthophotos are most commonly provided in a digital form either in black and white or in color. Digital color orthophotos are the standard imagery product of most assessment agencies with digital mapping programs. At a minimum, jurisdictions should acquire new imagery of urban areas every five years and of rural areas every ten years. Jurisdictions experiencing rapid or slow growth or without construction permitting requirements should adjust this timetable. Partnering with other agencies that also derive a benefit from aerial imagery, such as law enforcement, fire rescue, emergency management, public works, engineering, utilities, planning, economic development, and aviation authorities, may allow for acquisition on a shorter timetable (annually in some cases), reduced costs, and a higher image resolution which could benefit all stakeholders.

Oblique imagery has many uses for the assessor and geospatial professionals. These measurements from the oblique imagery can be referenced in the construction of cadastral data such as subdivision, lot, and parcel lines but are not the authoritative source.

Orthoimagery can serve as a base or “basemap” for the construction of both cadastral and non-cadastral map layers. Any imagery used as reference for the construction of cadastral map layers should be tied to a geodetic network. The term basemap also has a more traditional meaning. Traditional basemaps locate major physical features of the landscape and are typically prepared by professional photogrammetry firms using photogrammetric methods and may include attributed lines (e.g., roads, edge of pavement, curbs, ditches, and fences, and so on), polygons (e.g., elevation contours, water bodies, building footprints, and so on), and points (e.g., power poles, fire hydrants, and the like).

This traditional form of basemap production can be costly when used solely for purposes of assessing. Because of rapid advancements in the quality, resolution, and production of digital color orthophotos, few assessors still contract for the traditional base map containing photogrammetrically derived features.

In more rural and remote areas, base map needs may be met by a national mapping program's digital topographic map or orthophoto quads or by other orthoimages. Examples are the U.S. Geological Survey Digital Raster Graphics (DRGs) or Digital Line Graphs (DLGs), the National Aerial Photography Program (NAPP), and the National Agricultural Imagery Program (NAIP).

An advanced digital cadastral mapping system should contain a digital terrain model (DTM) or digital elevation model (DEM) that will enable a three-dimensional representation of the ground. This allows the assessor to visualize geographic features, such as floodplains or lot views. The DEM/DTM will also provide the foundation for development of orthophotos (orthorectification).

Traditional DEM/DTM products were developed using stereo image models using conventionally collected (a.k.a. film based) aerial photography. However, jurisdictions may now acquire high-resolution digital elevation data through a separate remote sensing process that employs airborne LIDAR (light detection and ranging) technology. Assessors acquiring or updating digital elevation data should review and consider the costs and benefit of LIDAR for this purpose. Aerial imagery and any photogrammetric work performed to delineate or extract surface features should meet industry-recognized standards.

The **USGS 3DEP LidarExplorer** (apps.nationalmap.gov/lidar-explorer) provides easy access to find and download publicly available lidar data.

4.3 CORE CADASTRAL MAP LAYERS

Core cadastral map layers are layers relating directly to the ownership and description of property. All core cadastral layers should be constructed as polygons, attributed with their unique associated data, and tied to the geodetic network.

At a minimum, core cadastral map layers should consist of the following:

- A PLSS layer, if geographically applicable.
- Subdivision, plat, and condominium boundaries as recorded or filed.
- Block and lot boundaries as recorded or filed.
- Parcel boundaries; platted and un-platted, both taxable and non-taxable.

Parcel maps may include layers containing data referenced in property descriptions and related to property ownership boundaries. Examples include PLSS section, township, and range lines; government or GLO lot lines; road right-of-way ownership; street centerlines; railroad right-of-way ownership; hydrography; and normal high-water lines.

4.4 PARCEL IDENTIFICATION

Each parcel polygon should be attributed with a unique identifier that serves as the common index for all associated property records. Parcels should be keyed to a unique identifier or code that links the cadastral layer to related data, including ownership, land and improvement values, use, and zoning information. Parcel identification systems are described in Section 7.

4.5 ADDITIONAL MAP LAYERS

A digital parcel map should have a variety of layers that support the work of the assessor and other users such as municipalities or taxing authorities and school districts. Examples of layers are as follows:

- Taxing districts
- School districts
- Economic districts
- Appraisal neighborhoods and market areas
- Zoning, future land use
- Street centerlines
- Soil types, floodplains
- Billboards, cellular towers
- Land line layer delineating various assessment land uses
- Valuations of multi-use parcels

Examples of additional layers that typically rely upon the cadastral parcel foundation, or that can be tied to or integrated with the digital cadastral mapping system through either a common spatial reference or related attribute to serve a multipurpose cadastre function are as follows:

- Political boundaries
- Jurisdictional boundaries
- Utility and transit infrastructure
- Points of interest such as locations of fire and police stations, public buildings, parks, schools, and hospitals
- Common area or comment elements
- Public and Private Right-of-ways
- Layers supporting public safety, emergency management, site and occupancy address information, broadband Internet access, public land records coordination, energy development, planning, and economic development.
- Metadata that are machine readable, as well as human readable, should exist for all layers.

4.6 DATA INTEGRATION: LINKING MAPPING TO RELATED DATABASES

GIS integration is a complex topic. One size does not fit all, nor will a single solution be appropriate for different applications or even the same application within different jurisdictions. Levels and styles of GIS integration are many, and choosing the appropriate level of integration is a function of the intended outcome of the application and business processes. There are three levels of GIS integration that can be considered for a CAMA system.

- **GIS Centric** – In this approach, the land records transaction processes would start with a map and would be housed and driven through a graphic interface. CAMA users would select the parcels they were editing through a map interface. This interface would include

the ability to query by parcel number, site address, subdivision name, or any other location-based attribute. Map editing would also take place within this interface as a component of the workflow. Once a parcel or set of parcels was selected, the user would be able to select the attribute operations they wanted to perform, such as ownership change, new parcel geometry, assessment attributes, re-valuation analysis, or other operations. Screen interfaces, such as the one below would be used to enter information into the database and changes would be seen immediately on the map interface.

The screenshot displays a web-based interface for 'Ownership Maintenance'. At the top, there is a navigation bar with tabs: Listing, Ownership (selected), Documents, Description, Site Address, Valuations, Parent(s), Property Type, and Districts. Below the navigation bar, the main content area is titled 'Ownership Maintenance' and includes a sub-header 'Property ownership last updated by on 1/1/1900.'.

The interface is divided into two main sections: 'Owner Inventory' and 'Assigned Property Owners'.

Owner Inventory: This section features a list of owners on the left, including OLSON, DIANE (LUCK, WI), OLSON, DICK (ELK RIVER, MN), OLSON, DONALD AND KATHLEEN (WEBSTER, WI), OLSON, DONALD AND MONICA (HASTINGS, MN) (highlighted), OLSON, DONALD E (ROCKFORD, IL), OLSON, DONALD W (WEBSTER, WI), OLSON, DONN N (WYOMING, MN), OLSON, DOROTHY L (GRANTSBURG, WI), OLSON, DOROTHY M (DANBURY, WI), and OLSON, DOUGLAS J (DANBURY, WI). To the right of the list are input fields for 'Last Name / Org:', 'First Name:', 'Address 1:', 'Address 2:', 'City:', 'State:', and 'Zip Code:'. The 'SEARCH' button is located to the right of the 'Last Name / Org:' field. Below the input fields are buttons for 'ADD & ASSIGN', 'ASSIGN', 'CLEAR FIELDS', and 'UPDATE PERSON'.

Assigned Property Owners: This section shows a table of assigned owners. The table has columns for 'Remove', 'Billing', 'Name', 'Address(1)', 'Address(2)', and 'City-State-Zip'. The first row shows 'OLSON, DONALD AND MONICA' with '809 11TH ST W' as the address and 'HASTINGS, MN 55033-2319' as the city-state-zip. Below the table, there is a section for 'Alternate Billing' with input fields for 'First Name', 'Last Name / Org.', 'Address(1)', 'Address(2)', 'City', 'State', and 'Zip Code'. At the bottom, there are buttons for 'UPDATE OWNERS' and 'PRINT SCREEN'.

GIS Centric Screen Interface

- **GIS Embedded** – In this approach, the CAMA system would operate as a stand-alone attribute management system, much as it does in many CAMA systems existing today, except a map tool, which could be another tab or display option in the system, would be able to display the current map and display attributes of the parcel in the production environment. The map display would be live with the CAMA system and attributes on the map would change as the production system updated attributes. The map maintenance would be an independent operation and would not be an integral part of the CAMA maintenance procedures. The GIS would not drive the CAMA system maintenance and operations.
- **GIS Linked** – In this approach, both the map maintenance and the attribute management would continue as independent operations. The GIS information and the CAMA information would be linked at the time of publication, which could occur on a regular basis through a system launched routine. Parcel maps could continue to be analyzed based on CAMA attributes and the attributes from the CAMA system would be available to other county operations. This would cause the least amount of organizational and business process change within the Assessor's Office.

The GIS centric level of integration could allow for more error checking and decrease the number of personnel needed to maintain all land records data within the Assessor's Office.

5. MAP PRODUCTS AND PROGRAM MANAGEMENT

The assessor should be capable of providing cadastral data in a variety of formats. Providing access through the Internet, either as a map viewer or data download, allows for easy public access. An internal Intranet can provide similar access to all offices in the jurisdiction. A virtual private network (VPN) can facilitate data dissemination and sharing with stakeholders at remote sites. A geospatial personal document format (PDF) provides the user with the ability to control data layers inside the PDF.

Principles

- *Cadastral data should be readily available in multiple formats and delivered through technologies that support both public transparency and internal operations.*
- *Map products should adhere to recognized cartographic standards and provide users with clear, reliable, and easy-to-use information.*
- *Mapping systems should utilize open standards and modern technologies that facilitate data sharing, system integration, and efficient workflows.*
- *Mapping programs should establish procedures, quality controls, documentation, and historical records to preserve the integrity and continuity of cadastral information.*
- *Adequate staffing, ongoing education, and sound program administration are essential to maintaining a high-quality digital cadastral mapping program.*

5.1 HARD COPY MAPS AND MAP BOOKS

Regardless of the level of technological capabilities of the office the assessor should be capable of providing printed cadastral maps. At a minimum, digital cadastral maps should be capable of displaying or printing the following elements:

- Boundaries of all parcels as polygon features
- Parcel identifiers
- Parcel dimensions as platted, deeded, or where otherwise known
- Parcel area
- Subdivision or plat boundaries as originally platted
- Subdivision or plat names and book and page number where recorded
- Block and lot lines as originally platted and block and lot numbers
- Boundaries and names of political subdivisions, such as counties, towns, townships, and municipalities.
- Boundaries and names of geographic subdivisions such as section, township, and ranges, government lots, land districts, and land lots or grants.
- Locations and names of streets, highways and rights-of-way, alleys, railroads, rivers, lakes, and other geographic features.

- Situs addresses
- Appraisal boundaries such as market areas, neighborhoods, zoning/use, soils, floodplains, and so forth.

Printed cadastral maps should include fundamental cartographic elements and reference information, such as map scale, legend, north arrow, map sheet number (if applicable), title block, key, or link to adjoining maps, quality standard achieved, date of publication, date of last update, and an appropriate disclaimer, caveat, or notice of intended use.

Digital cadastral maps should provide functionality to identify parcels, query attributes, pan and zoom, and export or print maps in multiple formats.

5.2 WEB MAPS AND APPLICATIONS

Web maps and applications serve as the primary tools for delivering cadastral and assessment data to both internal users and the public. They should be designed to provide secure, efficient, and user-friendly access to authoritative geospatial information through web browsers and mobile devices.

All web maps and applications must adhere to established cartographic, data accuracy, and accessibility standards to ensure consistency and reliability. Applications should utilize current web mapping technologies that support dynamic data services, allowing real-time updates from enterprise geodatabases or feature services. Clear symbology, intuitive navigation, and search capabilities (such as by parcel ID, address, or owner name, where appropriate) should be included to enhance usability.

Internal web applications deployed via an Intranet or VPN should provide advanced functionality for staff and authorized users, including editing, analysis, and data extraction tools. Public-facing applications should prioritize data privacy, performance, scalability, and accessibility ensuring that sensitive information is protected while maintaining transparency.

Web maps should be developed and maintained following open standards (e.g., OGC-compliant services such as WMS, WFS, and REST) to promote interoperability with other systems. Regular maintenance and version control should be applied to ensure that both internal and public web maps reflect current data and comply with jurisdictional data governance policies.

5.3 PROGRAM MANAGEMENT AND STAFFING

Mapping program management includes supervision or coordination of the following:

- Cadastral and associated map layers (e.g., spatial, image, and text data)
- Ownership records
- Parcel genealogy
- Quality control
- Archival processes
- Data changes for annual tax roll

- Contractual mapping services
- Data stewardship responsibilities
- Sharing and selling of map products
- Metadata files
- Hardware and software acquisition
- Review, testing, and maintenance of software
- Procedure manual
- Training
- Public relations
- Budget

A digital cadastral mapping program requires trained staff to administer the cadastral mapping function. When required staffing levels are being determined, the following should be taken into consideration:

- Functions and tasks
- Efficiency of mapping automation, processes, and workflows
- Economies of scale
- Quantity of vertical parcels (e.g., condominiums, mineral rights) and land parcels
- Geodetic densification
- Volume and complexity of deeds and plats filed that require mapping action
- Public request
- Use of contracted mapping services
- Creation and maintenance of layers for non-assessment purposes
- Interaction with other agencies and/or users of the data

All mapping personnel should receive training in procedures appropriate to their assigned tasks and job descriptions. At a minimum, mapping and deed-processing staff should understand:

- The engineering basis of highway and railroad rights-of-way.
- The surveying basis of boundary creation and description throughout the history of the jurisdiction, including applicable legal principles of boundary and title law; and
- Surveying concepts such as bearings and angles, correction angles, closure error, and closure tolerances.

Once these foundational competencies are achieved, staff should receive training in techniques for mapping using coordinate geometry (COGO), computer-aided drafting (CAD), and/or digital cadastral mapping systems.

Changes to mapping data should be documented and maintained as a historical reference. Procedures for recording and preserving these changes are discussed in detail later in this standard.

Data stewards who maintain or contribute data for purposes beyond basic cadastral functions may require supplemental training and resources to effectively use and interpret digital cadastral mapping systems and geospatial data.

6. MAPPING SYSTEM MAINTENANCE AND ASSESSMENT DATA LIFE CYCLES

Map and ownership data represent a substantial capital investment. Assessors must manage and maintain this investment to maintain the system's relevance. Digital cadastral map layers and ownership databases should be maintained and published in a timely manner and on a continual basis as part of the assessment roll production cycle, and they should be fully integrated into the sales review, exemption review, and assessment review and analysis functions of the assessor's office through workflow processes. Other non-cadastral map layers should be maintained by the assigned data stewards in a timely manner and on a continual basis following the publication of updated cadastral data.

Principles

- *Cadastral data should be maintained to reflect the current legal status of parcel boundaries, ownership, and identification as promptly as operational capacity allows.*
- *All changes to cadastral data, including splits, combinations, boundary adjustments, and identifier assignments should be documented to preserve the genealogy and history of parcels.*
- *Cadastral data management should be aligned with the jurisdiction's assessment and taxation life cycle, ensuring consistency between working data and finalized tax roll data.*

6.1 OWNERSHIP MAINTENANCE

The current owner and parties of interest for each parcel should be identified. In addition, the basis of ownership (recorded deed, contract, court decree, and so on) should be documented, should cite an instrument number, record book, page, volume, and so on of the source document, and should be linked to the cadastral parcel via a unique parcel identifier.

A record of prior ownership (ownership history) should be maintained. Deeds and other ownership documents should be processed within two weeks of recording. Ownership information should then be published. Procedure manuals should provide detailed step-by-step instruction. At a minimum, maintenance of ownership databases involves the following steps:

- Collecting all relevant deeds, trusts, judgments, contracts, plats, court cases, owner requests, and other muniments of title.
- Identifying the parcels affected by these documents.
- Determining the effect of the documents through an interpretation of the property description, such as a simple ownership change or a change affecting parcel boundaries through splits, combinations, property line adjustments, new subdivisions, right of way taking e.g., Eminent Domain, or other map edits.
- Interacting with property owners, surveyors, attorneys, title insurance companies, and other land information professionals to resolve problems when necessary.
- Entering changes in the appropriate databases.
- Controlling the quality of the data.
- Integrating the database.

6.2 PARCEL MAP MAINTENANCE

Procedure manuals should provide detailed step-by- step instruction; at a minimum, maintenance of the parcel map layer involves the following steps:

- Obtaining all relevant documents.
- Editing the database to effect changes to parcel lines, identifiers, and associated cadastral data layers.
- Editing any non-cadastral data layers for which the assessor may possess stewardship.
- Performing quality control measures.
- Archiving all changes affecting parcel geometry and parcel genealogy.
- Distributing or publishing map data.
- Collecting geodetic network data points (densification) on a continual basis.
- Correcting and improving the cadastral layer when new and more accurate data becomes available.
- Performing daily backups of map data and periodic backups for remote site storage.

Data management through clearly identified stewardship and responsibilities is essential to keeping a parcel map and its attendant data current and in sync. Map layers, image data, and text data for multipurpose layers come from many sources (e.g., clerk of courts, planning, zoning, law enforcement, assessors, tax collectors, water management districts, taxing districts, emergency management agencies, response agencies, utility providers, public works departments) and may be used by multiple entities. These collaborative groups consist of a policy-making component and a technical component to manage an intergovernmental data-sharing system. The primary entity responsible for maintaining individual multipurpose map layers must be clearly identified, as well as how the data are incorporated into a digital cadastral mapping system.

6.3 ASSESSMENT LIFE CYCLE AND DATA MAINTENANCE

Effective management of cadastral data requires a thorough understanding of the local assessment life cycle, including key dates and processes for property valuation, taxation, and parcel updates. Cadastral data systems should integrate seamlessly with other departmental and jurisdictional datasets, ensuring that parcel information can coexist and interoperate with related geospatial and property data. Maps generated from these systems should clearly reflect the distinction between data in production, which may be updated frequently throughout the assessment process, and the finalized tax roll digest data, which represents the authoritative values used for taxation. Maintaining up-to-date and accurate cadastral records throughout the assessment life cycle supports reliable property information, facilitates informed decision-making, and promotes consistency and coordination across all data users and systems.

7. QUALITY CONTROL

A comprehensive Quality Control (QC) framework for organizations utilizing cadastral mapping should ensure accuracy is addressed for both property ownership and cadastral mapping components. The assurance of these standards is essential - whether verifying a parcel's legal history through title records or confirming its precise geographic representation. Quality control and assurance should be designed to support fair, consistent, and equitable assessment practices. Quality control checklists can be implemented within internal workflows to ensure mapping and ownership data meet statutory requirements.

Principles

- *Quality control processes should provide objective evidence that cadastral data meets defined accuracy requirements, with results documented in metadata.*
- *Accuracy standards and quality control thresholds should be calibrated to the intended use of the data and the characteristics of the jurisdiction.*
- *Published cadastral data and map products should include clear disclaimers regarding accuracy, intended use, and known limitations.*

Examples of ownership-related quality control items may but may not be limited to the following:

- Property ownership validation
- Owner's Mailing Address accuracy
- Recording number confirmation
- Applicable tax or resolution years
- Tax area codes and special district assignments
- Subdivision characteristics such as lot, block, and tract
- Parent and child parcel number relationships
- Uniformity in representations of parcel description
- Historical Changes

Examples of mapping-related quality control items may but may not be limited to, the following:

- Identification of parcel gaps or overlaps
- Verification of stated parcel area or land size
- Correct parcel numbering & CAMA reconciliation
- Recording information in the attribute table
- Tax line annotation accuracy
- Right-of-way dimension verification
- Alignment of parcels with adjacent features

Standards such as these create a foundation and environment that allows for accountability and productivity to exist. Therefore, quality control can be a key element of the tracking of an organization's production and quality in addition to many other performance indicators.

7.1 HORIZONTAL SPATIAL ACCURACY

Digital cadastral map layers should be tested for horizontal spatial accuracy, and the results should be documented in metadata. Map horizontal spatial accuracy is typically expressed in one of three ways:

- **The National Map Accuracy Standard (NMAS) (U.S. Bureau of the Budget 1947)** for large-scale maps typically requires that 90 percent of all well-defined points on a printed map should vary no more than 1/30 of an inch from their true location. Thus, if a map is drawn or compiled at a scale of 1 inch equals 100 feet, then an easily identified point on the ground should be within 3.33 feet of its true location. The NMAS is most appropriate for paper maps that are viewed only at the printed scale. This standard would be applicable only to the digital mapping environment if accuracy was described for a particular map scale (e.g., “This map layer meets NMAS at a scale of 1 inch equals 100 feet”).
- **The American Society of Photogrammetry and Remote Sensing (ASPRS 1990)** has developed standards that define three classes of positional accuracy, based on limiting root mean square error. The quality standard is based on full (ground) scale and is well suited to large scale base maps prepared through digital orthoimagery.
- **The National Standard for Spatial Data Accuracy (NSSDA) (FGDC 1998)** presents a rigorous statistical methodology for evaluating the positional error observed when a sample of well-defined map points varies from their true geospatial location. However, the standard does not provide positional accuracy thresholds; it merely provides a way of describing the accuracy of a digital map.

A major problem with any cadastral map, manual or digital, is that positional accuracy tends to vary within a single map layer. For example, in the township, range, and section environment, parcels close to a section corner may tend to be mapped more accurately than parcels in the center of a section, unless the center of section is a monumented control point. In the metes and bounds environment, parcels in a new subdivision with known monumented corners may be very accurate, whereas nearby parcels described by fences, creeks, and roads may tend to be less accurate. Thus, while accuracy should be tested and documented in metadata, accuracy measures must be used judiciously; their greatest value may be in pointing to areas where additional survey work or map effort should be employed. No one accuracy standard meets all needs. In an urban environment, accuracies of 1 foot or less (0.30 meters) is usually desired or necessary, whereas in rural areas, it may be sufficient to specify an accuracy of 8 feet (2.4 meters).

Assessors should recognize that cadastral mapping specialists may not have the equipment, skills, training, qualifications, or legal authority to perform formal spatial accuracy tests. Consultation with a county surveyor, engineer, or professional geospatial expert is recommended to conduct and report on spatial accuracy assessments within the cadastral system.

It is important to acknowledge that the primary purpose of the tax map is to support property assessment and taxation. Any maps released to the public should include a clear disclaimer regarding their intended use, limitations, and the potential variability of positional accuracy, to avoid misinterpretation or reliance on the map for purposes beyond assessment.

7.2 QUALITY CONTROL PROCESSES

In both the creation and the maintenance of digital maps, cadastral mapping specialists must establish and adhere to quality control processes. Cadastral layer construction processes should be documented, adhered to, and structured to facilitate topological analysis and promote quality control and correctness at each touch point. Processes can be either manual or embedded within the software.

Checklists should be reviewed, tests conducted, and queries performed to ensure that all relevant documents have been gathered and properly processed, and that correct ownership and map changes are reflected in the appropriate databases and map data layers.

Queries should be run to identify parcels with null attributes and to identify any holes or slivers between parcels that may not be visible to the naked eye. Queries should be run to ensure that all parcels in tabular databases are found in the digital cadastral map layer, and vice versa. A one-to-one correlation must be maintained between parcels in tabular databases and parcels in a digital map layer. Parcel areas, as generated and stored in the parcel polygon, should be compared to areas stored in tabular databases for review and correction of significant differences. If geospatial data edits are performed by a state oversight agency, queries should be structured and run to match the edits of the state.

Parcel polygons should be viewed with orthoimagery and older scanned maps, if necessary, in the background to visually inspect for misregistration or areas of change.

Workflow should be structured to promote accountability, timeliness of review, and coordination with tax roll production to ensure accuracy of processing.

7.3 OTHER QUALITY CONTROL CONSIDERATIONS

For a cadastral map to function as a representation of the legal documents that define land title and ownership, the boundaries of parcels, lots, blocks, subdivisions, plats, government lots, land lots, land grants, and the like should be drawn as legally defined by the source document, and the map product should be capable of displaying and publishing the information.

7.3.1 Trimming

Many mapping program procedures include trimming of subdivision, lot, and block lines to match the ownership boundary of the parcel in situations in which an action has altered the parcel, such as when an acquisition for right-of-way purposes takes a portion of a parcel, and the parcel boundary no longer matches the original source deed, plat, block, or lot line. In these cases, the newly altered parcel should be displayed to the user and the original parcel should be archived. The practice of trimming any applicable subdivision, lot, block lines and polygons to match the newly altered parcel is acceptable as a cadastral procedure only when the assessor also maintains a reference of the original legally defining plat, block, and lot boundaries.

This practice usually requires a more complex data schema and the maintenance of multiple layers or lines for all data elements subject to trimming (a layer for the original legal location of the boundary and a layer for the trimmed or relocated boundary).

When trimming is deemed necessary, required, or institutionally implemented, an explanation of the practice should be included in the metadata and in the map disclaimer for other users in a multipurpose environment who may rely on, or require, the location of subdivision, lot, and block boundaries as originally defined and for the end user of the map product.

In the digital environment in which the cadastral mapping specialist or other geospatial technician has the ability to easily control, share, view, and publish individually desired data layers or elements extreme prudence should be exercised when the practice of trimming is utilized.

7.3.2 Parcel Area and Dimensioning

Caution should be exercised when parcel area data are published. A parcel may have multiple areas:

- System Generated
- Surveyed
- COGO
- Deeded
- PLSS sectional breakdown

A parcel attribute table may store all these areas. Great caution should be used in publishing the deeded area because of potential discrepancies. For example, a PLSS sectional breakdown parcel may be described in a deed as being 10 acres (660 feet x 660 feet). However, 30 feet may have been taken from one side for right-of-way; rendering the parcel to be only 9.54 acres (most attorneys and title companies will continue to use the description from the chain of title even in such cases), and the system-generated area based on the proportional breakdown of the section can produce a completely different (third) area.

Metadata should define the areas, and any area measurement published on a map product should be defined and distinguishable as to the type of area (system, surveyed, COGO, deeded, or sectional) for the end user. It is not recommended to publish only one type of area and exclude all others. For example, it is not recommended to publish only those parcels with a deeded area and exclude from publication areas determined by COGO, areas surveyed, areas from PLSS sectional breakdown, or areas only known to be system generated. Doing so presents an incomplete picture of the work of the assessor and could deprive end users of desired information. It is recommended the assessor provide the user with parcel table data containing all stored areas, rather than graphically labeling a parcel area through attribution or annotation, unless the source of the area is clearly indicated in the attribution or annotation and for the user.

Parcel boundary lines should be attributed or annotated with distance data when known from recorded documents such as plats, deeds, and right-of-way maps or from private documents such as land surveys prepared by licensed professionals. Private surveys should be copied and filed or scanned and stored. Any distance data, either attributed or annotated, that is not known by document and is generated by the mapping system software should be noted as such for the end user.

7.3.3 Edge-Matching to Adjacent Jurisdictions

Both the assessor and cadastral mapping specialist must recognize that cadastral data in a multipurpose environment are shared among users and agencies that compile cadastral data on a multijurisdictional, state-wide, and national level for a variety of uses. One such use is analysis during disasters such as wildfires or weather events such as hurricanes. Events such as wildfires and hurricanes do not stop at township or county lines. State and county emergency managers and

the Federal Emergency Management Agency (FEMA) compile cadastral data for events spanning numerous jurisdictions. Cadastral data should edge-match as coincident lines and polygons between adjacent jurisdictions to facilitate these types of uses.

Another use of coincident jurisdictional polygons is state-wide analysis. Geospatial analysis using parcel data is performed by state property tax oversight agencies, economic and demographic research agencies, and state universities.

The assessor and cadastral mapping specialist should work with adjacent jurisdictions to review all parcels along their township or county boundaries. Monumented points shared by multiple jurisdictions should be agreed upon and adhered to in the geodetic network and cadastral data so that no gaps or overlaps exist between each agency's respective cadastral polygons. This will also ensure no lands are omitted from assessment or double assessed among the jurisdictions.

7.3.4 Parcel Discrepancies

The goal should be to produce a final cadastral map product with seamless polygons.

Digital cadastral layers (subdivision, lot, block, parcel) of individual parcels or groups of parcels often have gaps, overlaps, closure errors, or nonconformity compared to ground occupation. Decisions on representing such discrepancies should be based on the following:

- Mapping and boundary law, such as principles of junior and senior rights, priority of "calls" in a property description, latent error versus patent error, water boundaries, and adverse possession.
- Surveying techniques and technology, such as the need to rotate descriptions to a common basis of bearing.
- Land division systems affecting the jurisdiction, such as the evolving PLSS and/or Spanish, French, Dutch, or English colonial practices (Price 1995) in North America.
- Capabilities and limitations of the software being employed, such as the ability to snap, extend, trim, generalize, adjust closure by compass rule, and use of topological rules.
- Intent of the description.
- Jurisdictional Policy.
- Good judgment and common sense.

Gaps or overlaps between parcels should not be displayed. Parcel polygons should not overlap, creating a double assessment, either real or perceived, and no gaps should exist between jurisdictions, creating a situation whereby land escapes assessment.

The assessor or mapper should bring significant parcel discrepancies to the attention of the property owner, the attorney or title company, or other party involved in the property conveyance, private surveyors, and if necessary, the county surveyor for resolution.

Discrepancies should be documented and include recommendations from the cadastral mapping specialist on how to address the issues and reasons for the visual representation of the parcels to the public. Documentation should include annotations attached to points, lines, or areas on the map and stored in a data layer specified for such purpose.

8. PARCEL IDENTIFIERS

All parcels in a digital cadastral map layer must be linked to the corresponding assessment data. The primary link between the spatial representation of a parcel and its associated tabular data is the parcel identifier. This identifier is commonly referred to as the Parcel Identification Number (PIN) or Parcel ID (PID). A PIN or PID may consist of numeric characters, alphabetic characters, codes, or a combination thereof, and must uniquely identify a single parcel. For the purposes of this standard, the term PIN will be used.

The PIN shall be defined and recognized as the official reference for all documents or data related to each parcel. All jurisdictions within a state or province should adopt a uniform primary system of parcel identification. Secondary identifiers may also be used for indexing parcel data; however, all secondary identifiers must be cross-referenced to the PIN to maintain consistency and integrity of the data.

Principles

- *Every parcel should be assigned a unique identifier that remains stable over time, changing only when the parcel's legal boundaries are altered.*
- *Parcel identification systems should support linkage between spatial and tabular data and, where possible, interoperability with regional, national, or international cadastral systems.*
- *Parcel identification systems should be designed to minimize operational complexity and administrative burden, supporting accurate assignment, retrieval, and long-term maintenance.*

8.1 DESIRABLE CHARACTERISTICS

Many formats of parcel identification are in use. Whether in use or proposed, a PIN should be judged based on six attributes: compliance with standards, uniqueness, permanence, simplicity and ease of use, ease of maintenance.

8.1.1 Compliance with Standards

If a national, state, regional, or local parcel identification format has been adopted, jurisdictions should adhere to the standard. While several national Parcel Identification Number (PIN) formats have been proposed (PRIA 2023), no single format has been universally mandated.

For example, in the United States, at the federal level, the National Research Council suggests a national parcel number could simply add an appropriate *Federal Information Processing Standards (FIPS)* code, developed by the National Institute of Standards and Technology, to the front of each jurisdiction's existing PINs (National Research Council 2007). In 1995, the FGDC Cadastral Subcommittee developed the *Cadastral Data Content Standard for the National Spatial Data Infrastructure (NSDI)*. The standard was subsequently revised and updated in 2008 (FGDC-STD-003-2008) and identifies core parcel data elements that are useful to a wide range of stakeholders. It further recommends that this information be captured and maintained by assessors. The core data elements described in the standard are incorporated by reference and serve as the foundation for the elements outlined herein.

Internationally, the *Land Administration Domain Model (LADM)* (ISO 19152) likewise emphasizes the use of unique and persistent parcel identifiers. This approach demonstrates how adherence to established standards promotes interoperability, reduces ambiguity and duplication, and supports the reliable integration of cadastral, legal, and administrative records.

8.1.2 Uniqueness

Uniqueness is the most important attribute of a parcel identifier. There should be a one-to-one relationship between a parcel and its identifier.

8.1.3 Permanence

Parcel identifiers should be permanent and change only when absolutely necessary, such as when the boundaries of a parcel change.

8.1.4 Simplicity and Ease of Use

Parcel identifiers should be easy to use and understand. A parcel identifier that is uncomplicated and easily understood helps to reduce errors in its use.

8.1.5 Ease of Maintenance

The parcel identification system should be easy to maintain and should efficiently accommodate changes, such as the subdividing or consolidating of parcels.

8.1.6 Flexibility

The parcel identification system should be designed to be reasonably flexible, capable of supporting a variety of uses beyond traditional land parcels. This includes, but is not limited to, multi-story condominiums, subsurface rights, air rights, easements, leases, and other property interests that require unique identification.

8.2 TYPES OF PARCEL IDENTIFICATION SYSTEMS

There are five basic types of parcel identification systems described as follows. The first two types, which incorporate geographic location references, are recommended for assessment purposes. While numerous parcel identification systems exist, the most commonly used systems are identified and described below.

8.2.1 Geographic Coordinate System Identifiers

The geographic coordinate system is a method of locating a point on the Earth's surface based on its distance from each of two intersecting grid lines known as x and y axes. These grid lines can be based on latitude and longitude, the Universal Transverse Mercator (UTM) system, or state plane coordinates. Parcel identifiers using this system comprise the coordinates for a single point, usually the parcel centroid.

Parcel identification systems based on geographic coordinates are easy to maintain, because new numbers are quickly assigned by picking parcel centroids. They are easy to use in the field because the PIN can help locate the parcel when a global positioning system (GPS) is used.

These PINs meet the desired characteristic of uniqueness. However, geographic coordinate-based PINs may not meet the criteria of simplicity because a complete parcel identifier could be a lengthy numeric character string containing x, y, and z coordinates. The z coordinate is required for multi-story condominiums and apartments, where parcels at different levels could have the same x–y centroid. The elevation problem could also extend to subsurface parcels, such as underground parking or mineral rights. In addition, the desired characteristic of permanence can be problematic. Assessors should be aware that minor map edits, corrections, or adjustments can alter the x, y, and possibly z coordinates of the parcel centroid, thereby breaking the link with the number stored in tabular databases and undermining the permanence aspect. An alternative to the centroid may be the use of coordinates associated with a separate point or label within each parcel polygon. Points or labels are less likely to have their x and y locations altered due to minor edits of the parcel polygon.

8.2.2 Rectangular Survey System Identifiers

This system of parcel numbering is based on section/ township/ range systems such as the PLSS. Parcel identification based on a rectangular survey system are developed by using the section/ township/ range, quarter-section, and quarter-quarter-section numbers, along with individual parcel identifiers assigned to each tract or subdivided lot and block. This kind of PIN provides an approximate geographic location of each parcel that is easy to understand and maintain and meets the criteria of uniqueness and permanence; however, it is not applicable in geographic locations not subject to the PLSS.

8.2.3 Map-Based System Identifiers

This system is based on the incorporation of the cadastral map into the parcel identifier. This PIN consists of a map (or page) number, block (or group) number, and parcel location as numbered within a block or group of parcels. For example, a PIN of 32–02–16, indicates 32 represents the map on which the parcel is found, 02 the block on the map, and 16 the parcel location within the block. Map-based identifiers may reference a geographic area and are convenient for use with printed maps in the field. However, they have limited usefulness in the digital cadastral mapping environment in which the map exists in a seamless environment rather than as individual map sheets.

8.2.4 Name-Related Identifiers

Name-related identifiers use the names of individuals claiming an interest to a parcel as the parcel identifier. A common example of this is the use of name codes in the grantor–grantee index. Use of such identifiers is discouraged because they do not meet the criteria of permanence in reference to geographic location, and ease of use.

8.2.5 System Assigned Identifiers

System-assigned identifiers are unique codes automatically generated by a database or GIS system to distinctly identify records, objects, or parcels. These identifiers ensure each item can be referenced consistently, prevent duplication, and serve as the primary key for linking spatial and tabular data. While human-readable identifiers may exist for convenience, system-assigned identifiers provide a stable, authoritative reference that remains unchanged even if other descriptive attributes are modified.

The system-assigned identifier is intended to provide a stable, unchanging reference that supports data integrity, indexing, querying, and interoperability across GIS layers, departments, and jurisdictions. Use of a system-assigned identifier is optional and may complement the primary human-readable Parcel Identification Number (PIN), with all secondary identifiers cross-referenced to either the PIN or the system-assigned identifier to maintain consistency.

8.3 ASSIGNMENT AND MAINTENANCE OF PARCEL IDENTIFIERS

The assessor is responsible for maintaining parcel identification numbers (PINs), ownership information, and property descriptions as new parcels are created. Parcel identifiers should be established in accordance with any adopted national, state, regional, or local format and should be assigned to all parcels during the initial phase of a digital cadastral mapping program. These PINs are considered provisional until the mapping program is completed, and all maps have been formally approved.

When parcels are divided (split) or combined (joined), two generally accepted methods exist for managing parent and child parcels:

1. **Retire or Delete Method:** Retire or delete the PIN of the parent parcel when it is divided into two or more child parcels.
2. **Retain and Assign Method:** Retain the original PIN of the parent parcel and assign new PINs to each child parcel.

Both methods are acceptable and exist due to system configuration workflows and other processes tied to the PIN, including:

- Researching the history of a PIN
- Retaining assessment limitations or caps
- Maintaining base values in special taxing situations

Consistency in applying either method is required. Once a PIN has been retired, it should not be reused unless absolutely necessary due to parcel-numbering schema limitations. If a retired PIN is reused, clear notations must exist in the parcel record, and a review must be conducted to ensure no outstanding taxes or liens remain.

Parcel identifiers should only change when the parcel's geometry is altered, such as through subdivision, consolidation, plat recordation, or other governmental actions affecting the parcel or its property description (e.g., vacating a recorded plat). Assessors must notify property owners when a PIN changes, particularly in cases governed by the *Dodd-Frank Wall Street Reform and Consumer Protection Act*, which requires accurate PINs on mortgage documents for pledged real property.

All changes to parcel identifiers must be documented in the assessor's notes or digital cadastral mapping system to maintain a clear historical record. Adherence to these practices ensures consistency, supports reliable integration with cadastral, legal, and administrative records, and enables accurate tracking of parcel histories for assessment, taxation, and public-facing mapping purposes.

GLOSSARY

Certain definitions contained in this standard vary from those published in the *IAAO Glossary for Property Appraisal and Assessment, Third Edition (2022)*. Where revisions were necessary to ensure consistency with the terminology and concepts presented in this standard, the revised definitions have been adopted.

Assessment Life Cycle – The sequence of activities involved in property assessment and taxation, including parcel creation, ownership maintenance, valuation, tax roll production, and ongoing data updates.

Assessor – The public official or designated authority responsible for identifying, listing, valuing, and maintaining records for real property within a jurisdiction for taxation purposes.

Authoritative Data – The officially recognized and validated source of data that is considered the most accurate and reliable reference within an organization or jurisdiction.

Cadastral Data – Information related to land ownership, parcel boundaries, property descriptions, and associated legal and administrative records.

Cadastral Map – A map that shows the boundaries, ownership, and identifiers of land parcels within a jurisdiction, used primarily for land administration and property assessment.

Cadastre / Multipurpose Cadastre – A comprehensive land information system that includes records of land ownership, value, use, and physical characteristics. A multipurpose cadastre supports multiple governmental and public functions beyond taxation.

CAMA (Computer-Assisted Mass Appraisal) – A computer system used by assessors to manage property data and perform mass property valuation for taxation purposes.

Coordinate Geometry (COGO) – A method used in GIS and surveying to calculate and represent parcel boundaries using bearings, distances, and coordinate points.

Data Steward – An individual or organization responsible for the management, quality, integrity, and governance of specific datasets.

Datum – A reference system used to define the location of points on the Earth’s surface. It provides the framework for geographic “geodetic” coordinates and ensures that maps and spatial data align correctly.

Digital Cadastral Mapping System – A computerized system that stores, manages, and maintains digital parcel boundary data and related land records within a geospatial framework.

Digital Elevation Model (DEM) – A digital representation of ground surface elevations used to analyze terrain, generate orthophotos, and support three-dimensional visualization.

Digital Terrain Model (DTM) – An enhanced elevation model that includes terrain features and surface characteristics used for advanced geographic analysis.

Geodetic Control Network – A network of precisely surveyed reference points on the earth’s surface used as the spatial framework for mapping and surveying activities.

Geographic Information System (GIS) – A computer-based system used to collect, manage, analyze, and visualize spatial and geographic data.

Global Navigation Satellite System (GNSS) – Satellite-based positioning systems, such as GPS, used to determine precise geographic coordinates on the earth’s surface.

Horizontal Spatial Accuracy – The degree to which the mapped position of a feature corresponds to its true position on the ground.

Imagery (Aerial Imagery) – Photographic or remotely sensed images of the earth’s surface used as a reference layer for mapping and geographic analysis.

LIDAR (Light Detection and Ranging) – A remote sensing technology that measures distances using laser pulses to produce highly accurate three-dimensional elevation data.

Metadata – Structured information that describes the content, quality, origin, format, and structure of data, allowing users to understand and properly use geospatial datasets.

Orthoimagery / Orthophoto – An aerial photograph that has been geometrically corrected to remove distortions so it can be used as an accurate map base layer.

Parcel – A defined tract of land with legally recognized boundaries that is treated as a single unit for ownership, assessment, and taxation purposes.

Parcel Boundary Layer – A GIS map layer that represents parcel boundaries as polygon features.

Parcel Genealogy – The historical record of parcel changes over time, including splits, combinations, boundary adjustments, and ownership transfers.

Parcel Identification Number (PIN) / Parcel Identifier – A unique numeric or alphanumeric code assigned to each parcel that links the parcel map to related ownership, valuation, and assessment records.

Photogrammetry – The science of obtaining reliable measurements and mapping information from aerial photographs or imagery.

PLSS (Public Land Survey System) – A land survey system used in 30 U.S. states to divide land into townships, ranges, sections, and smaller subdivisions for identification and description of property.

Real Time Kinematic (RTK) – A satellite navigation technique used with GNSS to achieve high-precision positioning in real time.

Right-of-Way (ROW) – A legal right allowing the use of land for transportation, utilities, or other infrastructure purposes.

Spatial Data – Information that represents the geographic location, shape, or relationship of features on the earth’s surface.

Tax Roll Digest – The finalized record of property values and ownership used for taxation within a given tax year.

Topology – The spatial relationships between geographic features, such as adjacency, connectivity, and containment, used to maintain map integrity.

Vertical Parcels – Property units that exist in three-dimensional space, such as condominiums, mineral rights, or air rights, rather than traditional land parcels.

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ASSESSMENT STANDARDS OF THE INTERNATIONAL ASSOCIATION OF ASSESSING OFFICERS

Guide to Assessment Standards

Standard on Assessment Appeal

Standard on Automated Valuation Models

Standard on Contracting for Assessment Services

Standard on Digital Cadastral Maps and Parcel Identifiers

Standard on Manual Cadastral Maps and Parcel Identifiers

Standard on Mass Appraisal of Real Property

Standard on Oversight Agency Responsibilities

Standard on Parcel Mapping and Parcel Identification

Standard on Professional Development

Standard on Property Tax Policy

Standard on Public Relations

Standard on Ratio Studies

Standard on Valuation of Personal Property

*Standard on Valuation of Property Affected
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