Framework Data Content Standard - Cadastral

Course Information

The National Spatial Data Infrastructure (NSDI) Framework is a collaborative initiative to develop a set of commonly used geographic datasets that are compatible based upon spatial location and content. The Framework approach allows data collected for variety of reasons and agencies to work together seamlessly; which can ultimately reduce project costs and increase interagency cooperation. The Framework Data Content Base Standards Suite dictates the requirements for Framework data.

This course covers the fundamentals of the Framework Data Theme: Cadastral as developed by the Framework Data Content Standard. It is designed for users who are both interested in an overview of the Framework Data Content Standard Cadastral theme as well as designers and developers implementing Framework data, and associated tools specific to Cadastral data.

Prerequisites

- General Understanding of GIS, Geospatial Data and Metadata
- Familiarity with the Federal Geographic Data Committee (FGDC)
- Familiarity with the National Spatial Data Infrastructure (NSDI)
- Basic knowledge of Geographic Data Standards (specifically ISO 19100 series)
- Completion of Framework Data Content Base Standard Course

Related Topics

NSDI Training Tracks:

An initiative to define areas, topics, and materials for training within the NSDI.

ISO 19100 Series:

Suite of standards developed for geographic data and datasets. The most notable is ISO 19135 which pertains to metadata.

ANSI Standards:

Similar work to ISO, but standards directly apply to data created within the United States.



Course modules

- Understanding Cadastral Data
- Cadastral (Part 1) of the Framework Data Content Standard
- Implementing the Cadastral Standard
- Course Review

Estimated Time

Estimated time for the entire course is 100 minutes.

Learning Objectives

Understand Cadastral Data

Comprehend Basics of Cadastral Framework Standard

Understand How to Implement the Standard



Module 1: Understanding Cadastral Data

Topics

- What are Cadastral Data?
- Types of Cadastral Data
- Cadastral in Action Module Exercise
- Summary

First Topic

What are Cadastral Data?

Time Requirement

Estimated time for this module is 30 minutes



What Are Cadastral Data?

Cadastral data are defined as the geographic extent of the past, current, and future rights and interests in real property including the spatial information necessary to describe that geographic extent. Rights and interests are the benefits or enjoyment in real property that can be conveyed, transferred, or otherwise allocated to another for economic remuneration. Rights and interests are recorded in land record documents. The spatial information necessary to describe rights and interests includes surveys and legal description frameworks such as the Public Land Survey System, as well as parcel-by-parcel surveys and description.

Additionally, cadastral data can include each of the following types of data:

- Location
- Extent
- Parcels
- Legal Descriptions
- Corners and Boundaries
- Rights and Interests
- Restrictions
- Transactions
- Agent
- Actions
- Values

Next Topic

Types of Cadastral Data

Three Fundamental Points To Remember about Cadastral Data

- 1. The focus of cadastral information is legal decisions and legal transactions.
- 2. The real power of cadastral information is tying records of transactions and status to survey data.
- 3. Cadastral data in a GIS should show what is on the ground, not what is on the map.



Types of Cadastral Data - Location

Location Cadastral Data can be defined as any area and where it is in respect to other features, either real or man defined. Location of an area relates directly to map projections, coordinate systems, and real and political boundary designations. In the map to the right you can see the location of the lake in relation to other reference data.

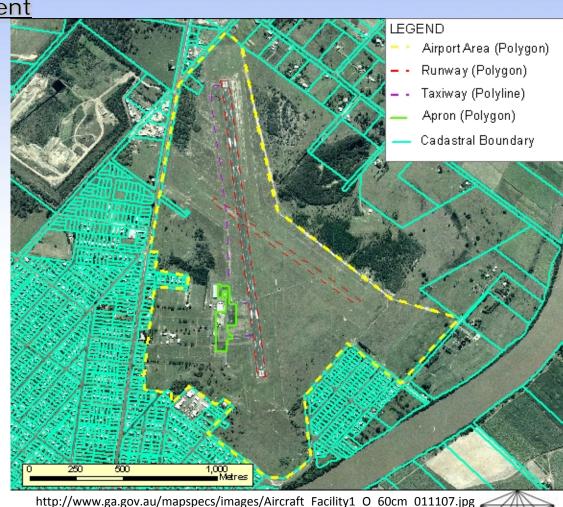


http://terrain-et-lac-prive-a-vendre.ca/images/dchicoine/cadastre.jpg

Next Topic

Types of Cadastral Data - Extent

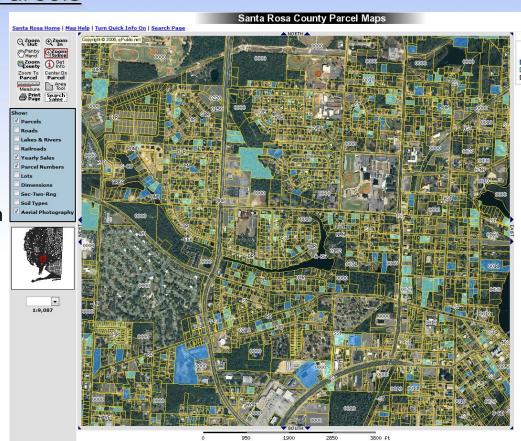
Extent Cadastral Data can be defined as any spatial area. It is typically a polygon feature that has defined boundaries and has an area that can be calculated. In the map to the right you can see the airport boundary in hashed yellow line.



Next Topic

Types of Cadastral Data - Parcels

Parcels Cadastral Data are a very specific type of Cadastral Data that express real property boundaries (at a given point in time) and include information about the rights and interests associated with that piece of property. The map at the right is a screen capture of an Internet Mapping Application that shows parcels and specific information about them.



 $http://qpublic6.qpublic.net/fl_santarosa.htm$

Next Topic



Types of Cadastral Data - Legal Descriptions

Legal Descriptions Cadastral Data are the deed description. It should include any encumbrances and appurtenances that run with the land. The legal description is the one used for conveyance and should be descriptive enough so that a particular parcel of land can be both located and identified. The legal description should be used in every deed of conveyance within the chain of title. The image at the right is an example of a legal description.

LEGAL DESCRIPTION

Parcel "A"

Being situated in the Northeast ¼ of Section 12, Township 6 North Range 1 East, City of Jackson, Hinds County, Mississippi, and being more particularly described by metes and bounds as follows, to-wit:

Commence at the southeast corner of Lot 36 of Block "B" of Fernwood Subdivision, the map or plat of which is recorded in Plat Book 4 at Page 76 of the Chancery Records of Hinds County at Jackson, Mississippi, and run thence north for a distance of 549.50 feet; thence run east for a distance of 558.05 feet to an iron pin which marks the northwest corner of that certain parcel which is recorded in Deed Book 3800 at Page 619 of the said Chancery Records of Hinds County, said iron pin being the POINT OF BEGINNING for the parcel herein described; thence North 89° 54' 35" West for a distance of 49.79 feet; thence North 00° 07' 53" East for a distance of 167.14 feet; thence South 84° 13' 34" East for a distance of 165.69 feet; thence South 86° 52' 02" East for a distance of 142.88 to the western right of way line of Interstate Highway No. 55; thence run 17.59 feet along the arc of a 9,599.30 foot radius curve to the left along the said western right of way line, said arc having a 17.59 foot chord which bears South 13° 01' 20: West; thence South 30° 49' 21" East for a distance of 34.73 feet along the said western right of way line; thence run 98.52 feet along the arc of a 9,575.30 foot radius curve to the left along the said western right of way line, said are having a 98.52 foot chord which bears South 12° 31' 30" West; thence leave said western right of way line of Interstate Highway No. 55 and run North 89° 54' 35" West for a distance of 250.57 feet to the POINT OF BEGINNING, containing 1.0928 acres, more or less.

 $http://static.auctionservices.com/documents/9702/I55_Hotel_site_Legal_Description_1.0928_ac__A_.jpg$

Next Topic



Types of Cadastral Data - Corners and Boundaries

Corners and Boundaries Cadastral Data are simply the locations of actual survey measurements and monument location; as well as legal description of that location. Often times corners and boundaries are marked with a simple or complex

work. The images at the right highlight a couple different examples of these monuments.







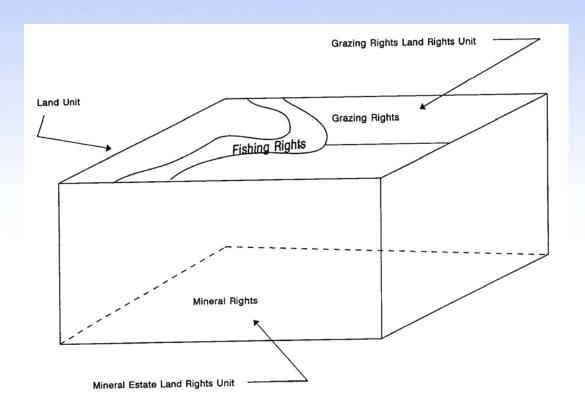
http://farm1.static.flickr.com/200/511311044 8812fdb948.jpg

Next Topic



Types of Cadastral Data - Rights and Interests

Rights and Interests Cadastral Data essentially reflect the land usage a particular area can have. More specifically it shows who, if anyone, can inhabit the land, and can develop and utilize resources (water, minerals, timber, wildlife, recreation, etc.) associated with the land.



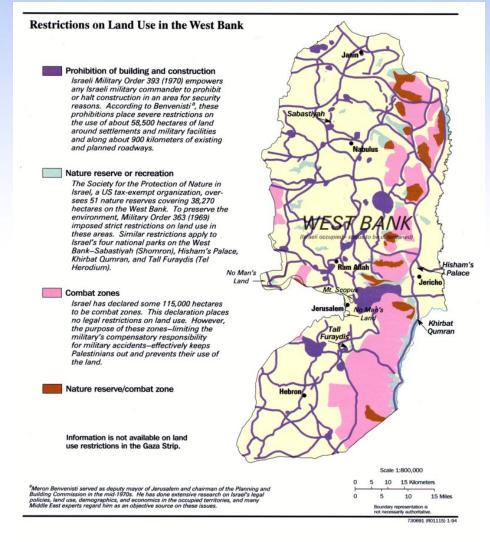
http://www.fairview-industries.com/gismodule/landuses.jpg

Next Topic



Types of Cadastral Data - Restrictions

Restrictions Cadastral Data show the limitations of use to a certain property. Normally these restrictions are placed to ensure that surrounding land value or use is maintained. For example most cities have ordnances prohibiting hog farming within city limits. The map at the right shows restrictions in the West Bank Region.



Next Topic

Types of Cadastral Data

http://www.globalsecurity.org/military/world/palestine/images/west-bank_land-restrictions.jpg

Types of Cadastral Data - Transactions, Agent, Action, Value

Transactions Cadastral Data show the rights within an area, most often proposed areas of sale or trade.

Agent Cadastral Data show an individual, organization, or public agency that holds rights, interests, or restrictions in land.

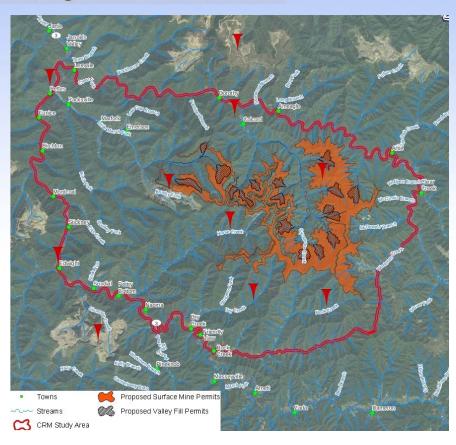
Actions Cadastral Data show proposed or current activities taking place on the land

Value Cadastral Data show the market worth or assessed value of an area of land.

The map to the right shows an example of proposed actions "mining"

Next Topic

Cadastral Exercise



http://auroralights.org/map_project/images/maps/crm/Proposed_Mines.jpg



Cadastral Module 1 Exercise

Cadastral data is being applied and used in real world projects by many different agencies. These agencies use cadastral data for a variety of reasons. Now that you have some basic Cadastral knowledge let's see some cadastral data sets in action.

- Step 1) Open an Internet Browser and proceed to: http://qpublic6.qpublic6.qpublic.net/fl_santarosa.html?layers=roads+lakes+rr
- Step 2) Explore the mapping service
- Step 3) Turn on different layers and pan around the map
- Step 4) Pay specific attention to the cadastral data and how it is displayed, and how the tools provided can be used to view and acquire the data
- Step 5) Close all Internet windows and proceed with the course

Questions to Consider:

- 1. How many different types of Cadastral Data can you identify in the IMS?
- 2. Using the Get Info Tool what additional information can you find?
- 3. Does the Cadastral Data line up with the aerial photography, and why is this important?

Next Topic

Module Summary



Cadastral Module 1 Summary

In this module we have explored Cadastral Data, the different types and why it is important.

- Cadastral data are defined as the geographic extent of the past, current, and future rights and interests in real property including the spatial information necessary to describe that geographic extent
- There are several different types of cadastral data and different ways to portray that data
- Cadastral information, applies to, influences, and is the basis for a wide range of issues and actions related to the status of land ownership and land use. Just about every GIS project or analysis inevitably relies on some kind of cadastral information which we depict as spatial data and related attributes.

Next Topic

Module 2: Cadastral (Part 1) of the Framework Data Content Standard



Module 2: The Framework Data Content Standard: Cadastral

Time Requirement

Estimated time for this module is 30 minutes

Topics

- What is the Cadastral Standard?
- Purpose for Standard
- Goals of the Standard
- Capacities of the Standard
- Standard Related Contact Information
- Module Exercise and Summary

Key Terms

Cadastral Framework Standard Framework

Parcels

Next Topic

What is the Cadastral Standard?



What is the Cadastral Standard

The Cadastral Framework Data Content Standard is:

- One of the seven themes defined by the FGDC as Framework data
- Establishes a baseline for Cadastral data collection and distribution
- Builds on the Framework Data Content Base Standard and Framework Cadastral Standard.
 - Only when a dataset meets the requirements set forth in its thematic standard part and the Framework Base Standard can it be considered Framework data.

Quick Facts

Each Framework standard part was developed and edited by thematic experts

Cadastral is one of the seven themes of Framework data. Each has a separate standard, some including subparts.

All standards use the Framework Data Content Base Standard as the baseline for this data.

Next Topic

Purpose for the Standard



Purpose for the Cadastral Standard

The primary purpose of the standard is to provide a standard for the definition and structure for cadastral data which will facilitate data sharing at all levels of government and the private sector and will protect and enhance the investments in cadastral data at all levels of government and the private sector. Furthermore the purpose is to ensure that cadastral data works in harmony with other data sets. For example, to determine whether there is parcel or cadastral information available in a specified city, users will need to navigate to that geography and then verify that the minimum core parcel information and its metadata have been made available for that area. Finally, the standard provides the information necessary to identify the existence of parcel-level cadastral information and the source of that information. The geospatial metadata provided in conformance to this part will include the contact, distribution, and access requirements for the cadastral data. Additional information on the content of the full parcel or cadastral data sets, its accuracy, and its spatial projection, is also provided with the metadata.

Next Topic

Goals of the Standard



Goals for the Cadastral Standard

The goal of the cadastral standard is to include only the minimum data necessary to facilitate locating the existence of parcel-level information and identifying the source. These data, along with the appropriate metadata, will provide the information describing how and where to get the data needed to support applications.

Further, The Geographic Information Framework Data Content Standard, Part 1: Cadastral establishes common data requirements for the exchange of National Spatial Data Infrastructure (NSDI) framework data for the Cadastral theme. The purpose of the part is to facilitate the exchange of cadastral (real property) data.

Next Topic

Capacities of the Standard



Capacities for the Cadastral Standard

The development of this part of the Framework Data Content Standard, used in conjunction with the Cadastral Data Content Standard will greatly assist in mitigating the following issues:

- Duplication of data and application development
- Complications exchanging cadastral data and information
- Difficulties in integrating data
- Poor framework/support for analytic activities
- Difficulties managing multiple representations of features

Next Topic

Contact Information

More Information

The FGDC is the responsible organization for coordinating work on all parts of the Geographic Information Framework Data Content Standard including the Cadastral Theme.



Who to Contact for Questions about the Cadastral Standard Part

Federal Geographic Data Committee Secretariat c/o U.S. Geological Survey 590 National Center Reston, Virginia 20192 USA Telephone: (703) 648-5514

Internet (electronic mail): gdc@fgdc.gov WWW Home Page: http://www.fgdc.gov

Facsimile: (703) 648-5755

Standard Coordination

The FGDC is the responsible organization for coordinating work on all parts of the Geographic Information Framework Data Content Standard. The development and maintenance authority for Part 1: Cadastral is held jointly by the U.S. Geological Survey and U.S. **Environmental Protection** Agency. The FGDC shall be the sole organization responsible for direct coordination with the **InterNational Committee for Information Technology** Standards (INCITS) concerning any maintenance or any other requirements mandated by INCITS or ANSI.



Module 2 Exercise



Cadastral Module Exercise

- 1. Open an Internet browser
- 2. Explore Adam's County, IL Map website: http://www.emapsplus.com/ILAdams/maps/
- 3. The data created for this IMS was created using the Cadastral Framework Standard. Can you see the differences between this and the IMS explored earlier?
- 4. Close web browser and continue on with the next part of the module

Next Topic

Module Summary



Module summary

- The goal of the Cadastral part of the Framework Data Content Standard is to provide common definitions and model to enable collaborative development, use, and exchange of Cadastral data.
- Cadastral establishes common data requirements for the exchange of National Spatial Data Infrastructure (NSDI) framework data for the Cadastral theme
- The Cadastral part is just one piece of the seven themes of Framework Data that collectively in unison with the Base Standard comprise the Framework Data Content Standards

Next Topic

Module 3: Cadastral Standard Requirements



Module 3: Cadastral Requirements

Time Requirement

Estimated time for this module is 60 minutes

Topics

- Framework Data Content Cadastral Standard Requirements
- Encoding and Implementing the Standard
- Module Summary

Key Terms

UML Coding Elements Feature Relationships

First Topic

Cadastral Standard Requirements



Framework Data Standard Cadastral Requirements

In this module you will learn about the three main requirements for Framework Cadastral data, as specified in the standard. Each requirement is addressed as a separate topic, however more attention may be given to certain requirements as they are the most crucial requirements for creating Framework quality Cadastral data. The three main requirements are:

- 1. Application Schema
- 2. Data Dictionary
- 3. Code List

These materials assume a basic understanding of UML diagrams and flow charts, if you need more information about these topics please visit http://www.uml.org

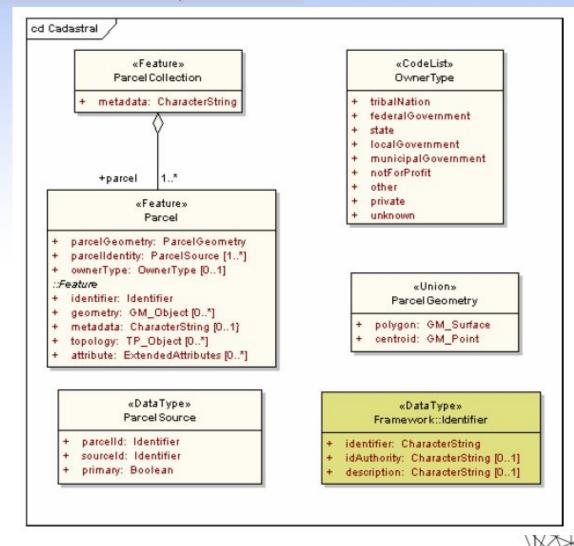
Next Topic



Framework Data Standard Cadastral Requirements

The diagram to the right is the UML flow chart for the Framework Cadastral Standard. This diagram shows the components and relationships that comprise the Framework Cadastral Standard. UML is designed to show these relationships in a generic manner without specifying a coding language or specific software needed to complete the task. For more information about UML visit: http://www.uml.org

Next Topic



Framework Data Standard Cadastral Requirements: Application Schema

The following is a list of the four main components to the Cadastral Standard Application Schema including a brief description of each class:

Application schema:

The Cadastral part extends the basic Framework Data Content Standard UML model by adding five part-specific classes, as shown in Figure 1. The primary class for the Cadastral part is the Parcel. These classes define the Cadastral part referenced in the Base Document. The five Cadastral part classes are described below.

Parcel class - The Parcel class is the main class to convey cadastral information. It is stereotyped as a << Feature>> and as such has identity and geometry properties.

OwnerType class - The OwnerType class is a code list of valid values that classify the owner type. This is not the ownership type, but rather is the classification of the owner.

ParcelSource class - The ParcelSource class groups elements regarding each parcel and its source information.

ParcelGeometry class - This class represents a choice between a centroid or polygon representation of the parcel.

ParcelCollection class - These features were introduced for conformance with the other Geographic Information Framework Data Content Standard parts and as such are not a part of the Cadastral part. These represent a super type of data collection with metadata. They are a set of features that occur within the context of a container object known as a "feature collection". This is a convention used to delimit a group of features of a given type and common schema.

Next Topic



Framework Data Standard Cadastral Requirements: Data Dictionary

A data dictionary is a collection of definitions, rules and advisories of data, designed to be used as a guide or reference with the data warehouse. The directory includes definitions, examples, relations, functions and equivalents in other environments. Each Framework Data Content Standard Part has its own data dictionary that describes the necessary elements needed to define that theme as Framework. Below is a portion of the Cadastral Data Dictionary, for the full table please consult the standard itself.

Line	Name/Role Name	Definition	Obligation/ Condition	Maximum Occurrence	Data Type	Domain
1	ParcelCollection				< <feature>></feature>	Lines 2-3
2	metadata	Information that describes this information transfer represented as a URL or as a block of text	М	-1	CharacterString	Unrestricted
3	Role name: parcel	Links ParcellCollection to the Parcel that belongs to the ParcelCollection	М	*	Parcel	Unrestricted
4	Parcel				< <feature>></feature>	Lines 5-12
5	parcelldentity	Parcel identifier	М	*	< <datatype>> ParcelSource</datatype>	CharacterString and Boolean
6	parcelGeometry	Centroid or polygon representation of parcel location	М	1	< <union>> ParcelGeometry</union>	GM_Polygon or GM_Point
7	ownerType	Classification of the ownership for the primary surface interest	0	1	< <codelist>> OwnerType</codelist>	Restricted to the values in the code list OwnerType
8	Framework::Feature::identifier	Feature identifier for the Parcel	М	1	< <datatype>> Framework::Identifier</datatype>	Unrestricted
9	Framework::Feature::geometry	Shape and geolocation of a feature	0	*	< <type>> GM_Object</type>	Defined in ISO 19107
10	Framework::Feature::metadata	Structured or unstructured metadata as defined by the community of practice	0	-1	CharacterString	May be text or structured metadata fragment
11	Framework::Feature::topology	Connectivity of the participating elements	0	**	< <interface>> TP_Object</interface>	Defined in ISO 19107
12	Framework::Feature::attribute	Producer-defined attribute for inclusion in transfer	0		< <datatype>> Framework::</datatype>	Unrestricted

Next Topic

Framework Data Standard Cadastral Requirements: Code List

A Code List is a list of the most common used elements for a certain class. It normally has the name of the feature as well as a definition to help a user determine the appropriate choice. It is not necessarily an exhaustive list, rather a list of the most common and expected values for a given element. Below is the only code list associated with the Cadastral Standard and it applies directly to the Class: OwnerType

Name	Definition		
tribalNation	An American Indian Tribe or nation		
federalGovernment	The United States federal government and its agencies and departments		
state	A State government or the city of Washington DC		
localGovernment	A county, parish, or borough government		
municipalGovernment	A municipality of government		
notForProfit	A not for profit organization which is also exempt from real estate taxes		
other	Any other organization		
private	A private firm, for profit organization, or an individual or group of individuals		
unknown	The type of ownership is not known		

Next Topic

Encoding and Implementation



Encoding and Implementation

The process of encoding is simply formatting or structuring data in a regulated manner. The Framework standards are encoded by applying the application schemas through the use of several different modeling and markup languages:

- Unified Modeling Language (UML)
- Extensible Markup Language (XML)
- Geographic Markup Language (GML)

Specific knowledge of each language is important for data and tool designers; for more information see the Framework Base Standard Training Materials.

The Bigger Picture

The Framework Standards do not have a specific application schema that can be implemented. Implementation of the Framework Standards in relation to data and tool creation occurs at the thematic level. Each thematic part complies with the Framework Base Standard. As such a layer (for example) created in accordance with the Framework Cadastral part meets all Framework requirements.

Next Topic

Module Review



Module 3: Cadastral Requirements Summary

- Cadastral Data is available in many different formats however the standard dictates the specific requirements to ensure it is Framework
- Can be used for many different types of analysis
- This module covers the specifications for Cadastral framework data implementation
 - Application Schema
 - Data Dictionary
 - Code List
- Provides rigid requirements to ensure proper structure and documentation for Cadastral data
- UML diagrams and data dictionaries provide specifics for programmers and data creators to develop Cadastral data that meets Framework specifications

Next Topic

Module 4: Standard Implementation



Module 4: Examples, Exercise, and Certificate

Topics

- Cadastral Implementation Example
- Cadastral Review Exercise
- Certificate of Completion

First Topic

Review Exercise



Implementation Example

This example is from the standard itself and illustrates how cadastral data can be implemented, how that data applies directly to the data dictionary elements, and how that information can be displayed in an attribute table.

The diagram below shows four parcel polygons each with a centroid and a related table that contains attributes for those features.

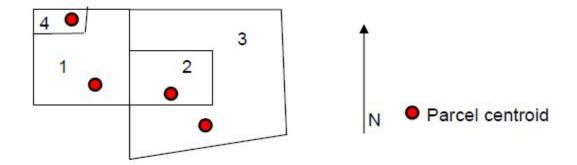


Figure B.1 - Four parcel polygons with centroids and ParcellDs

The table below contains attributes for the features in the figure above.

Table B.1 - ParcelIDs related to a ParcelSource and OwnerType

ParcellD	ParcelSource ParcelSource	OwnerType		
1	39-063	TribalNation		
2	39-063	LocalGovernment		
3	39-063	Private		
4	39-063	Private		

Next Topic

Cadastral Final Exercise

Cadastral Final Exercise

1. Click on the following hyperlink:

http://wagic.wa.gov/Framework/cadastre/Default.htm

- 2. Review the website and read about the State of Washington's Framework Cadastral Project
- 3. After reviewing all the information about the project and their approach to creating Framework Cadastral Data, click on the Cadastral ArcIMS Application.
- 4. Explore the IMS and consider how the data is similar and different to the sites explored earlier in this course. How are things similar and different?

Next Topic

Course completion



Course Certificate

Congratulations, you have successfully completed the Framework Cadastral Standard Training! In order to print the certificate below you will need a copy of Adobe Acrobat Reader, http://www.adobe.com/products/acrobat/readstep2.html.

After you open the certificate file, type your name and today's date on the name/date line and print.

Click here to receive course certificate

