Cadastral Mapping GIS

“Best Practices”
Best Practices

Topics

- Striving for Improvement
- Understanding the Process
- Planning for Change
- Do What Works
Best Practices

Striving for Improvement

- Maintaining land records is a **COMPLEX** endeavor
- The business process is largely misunderstood by most
- Everybody wants *something* from us (NOW!)
- Mapping departments are dedicated to improving service to many constituencies
Best Practices

Understanding the Process

Current Land Base Map

Land Development/Improvement Application (Unincorporated)
Land Development/Improvement Application (Incorporated, State, or Federal)

Improvement Plan Review (CDD and PW)
LAFCO Review

LAFCO Certificate of Completion

Recorded Documents
Subdivision Map (major/minor)
Lot Line Adjustment
Record of Survey Deeds

Permits Sometimes Issued Prior to Recording

Improvement/Building Permits Issued (PW, BI)

Map Major Subdivisions (PW)
Major Subdivision Line Work to Assessor

Map Minor Subdivisions (PW)
Map Minor Subdivisions (Assessor)

Map Lot Line Adjustments (Assessor)

Co. Fire Mapping (hydrants, roads and addresses)
Sheriff Mapping (dispatch zones, roads and addresses)
Elections Mapping (precincts, jurisdictions, roads, and addresses)

Public Works Mapping
Assessor Mapping

Public Works Maps to Customers
Assessor Maps to Customers

Updated Land Base Map(s)

Base Map Information Inputs

Base Map Information Outputs

Time
Best Practices

Understanding the Process

Recorded Documents → Name Change Only

Simple Map or Deed

Major Subdivision

Lot Line Data from PWD

Yes

No

Yes

No

Research/Resolve Issues

Update LIS

Publish and Distribute Maps

Yes

Re-Draft Map Page
Best Practices

Data Sources
- Records of Survey
- Subdivision Maps
- Converted CAD Files
- Scanned Paper Maps
- Countywide Parcel Layer

Future Process
- GIS COGO Data Entry
- Combination GIS COGO & Scanned Map
- Parcel Layer Updates

Products
- Paper Maps
- GIS Map Documents & Databases
- Countywide Parcel Layer
Best Practices

Planning For Change (Vision)
Best Practices

Phase I – Initiate Basic Structure

- Initiate a cross-departmental governance committee,
- Re-allocate staff resources,
- Upgrade hardware and software,
- Provide training,
- Begin restructuring workflow to more closely tie property boundary feature maintenance to recording transactions, and
- Identify and resolve problems with existing property boundary feature data.
Best Practices

Phase II – Enhanced Integration of Data and Workflow

- Actively engage various departments to take responsibility for providing commonly used land information data,
- Provide training,
- Improve the integration of data maintenance with property recording workflow, and
- Continue to resolve any outstanding problems with property boundary feature data as encountered, and
Best Practices

Phase III – Implement Parcel Management System.

- Expand the governance structure to include organizations interested in land information countywide,
- Implement tight integration between the LIS and GIS-based parcel management system,
- Implement new software and systems,
- Provide training,
- Modify workflow, and
- Maintain accurate, consistent, current and historical land information
Best Practices

Current Information Flow and Structure

Public Works Department
- Draft New Subdivisions
- Merge Subdivisions into Base Maps
- Create GIS Parcel Database

Assessor's Office
- Recorded Land Record Documents
- All Recorded Land Records
- Create Assessor Map Pages
- GIS Parcel Data Set
- Base Map Customers (Digital Files and Hardcopy)
- GIS Parcel Data Customers (Internal and Other Analysis)

Public Works Director
- Deputy Public Works Director
- Computer Mapping Services Manager
- Mapping Technicians

Assessor
- Assistant Assessor
- Drafting Services Coordinator
- Mapping Technicians
Best Practices

Phase I

Public Works Department
- Use GIS Parcels for Various Mapping Needs
  - Base Map CAD Files

Assessor's Office
- Maintain Property Boundary Features
- Create Assessor Map Pages
- Resolve and Fix Errors in GIS Data Set
- Merge PBF Changes into GIS Data Set
  - GIS Parcel Data Set
  - Subdivision CAD Files

GIS Parcel Data Customers
- Internet, Mapping, and Analysis

All Recorded Land Records

PBF Steering Committee
- Assessor, PW Director, Recorder, CDD Director, B.I. Director, County Fire Chief, CIO

Assessor

Assistant Assessor

PBF Project Coordinator
- Temporary/Contract

Mapping Supervisor

PBF Data Analyst
- Temporary/Contract

PBF Data Integrator/Administrator

PBF Technician

Mapping Technicians
Best Practices

Phase II

Public Works Department
- Use GIS Parcel for Various Mapping Needs
  - Base Map CAD Files

Assessor's Office
- Maintain Property Boundary Features
  - Subdivision CAD Files
- Create Assessor Map Pages

GIS Parcel Data Customers
- Internet, Mapping, and Analysis
- Merge PBF Changes into GIS Data Set
- GIS Parcel Data Set

Recorded Land Record Documents
- All Recorded Land Records

PBF Steering Committee
- Assessor, PW Director, Recorder, CDD Director, B.I. Director, County Fire Chief, CIO

Assistant Assessor

PBF Project Coordinator
- Temporary/Contract

Mapping Supervisor

PBF Data Integrator/Administrator

PBF Technician

Mapping Technicians
Best Practices

Phase III

Use GIS Parcels for Various Mapping Needs

Base Map CAD Files

Recorded Land Record Documents

All Recorded Land Records

Maintain Property Boundary Features

Create Assessor Map Pages

GIS Parcel Data Set

GIS Parcel Data Customers (Internet, Mapping, and Analysis)

Assessor Map Customers (Hardcopy)

PBF Steering Committee
(Assessor, PW Director, Recorder, CDD Director, B.I. Director, County Fire Chief, C/O)

Assessor

Assistant Assessor

Mapping Supervisor

PBF Data Integrator/ Administrator

PBF Technician

Mapping Technicians
Best Practices

A Liberating Concept

Publication Process (es)

Production Process
Best Practices

Workflow Overview

Digital Map Submittal

Scanned Subdivision Maps

Scanned Deeds

Subdivisions

Equalized Roll

Property Information

Working Roll

Parcel History

Geographic Control

Land Information Portal
Best Practices

Example Components to Design

- Assessor Page Geodatabase design
- Countywide Parcel Layer Geodatabase design
- Subdivision Geodatabase design
- Assessor page Status Database design
- ArcMap templates for standard SBE assessor maps
- Directory structure to store all parcel mapping data
- Procedures and Parcel Editor workflows for:
  - Adjusting parcels (parcel split, parcel merge, lot line adjustment)
  - Importing data to assessor page geodatabases
  - Creating and updating assessor parcel maps
  - Updating the Countywide Parcel Layer
  - Comparing the Property database and the Countywide Parcel Layer
  - Updating the assessor page Status Database
Best Practices

Subdivision
Geodatabase Design

Directly imported from CAD files
Boundary lines
Boundary line annotation (bearing/distance)
Mapping lines (road ROW, hooks, etc.)
Mapping annotation (blocks, neighboring pages, page titles, road names, etc.)
Lot labels
Best Practices

Countywide Parcel Layer
Geodatabase Design

Temporary (working) feature classes
- For importing parcel labels
- For constructing polygons
- For georeferencing data

Topology to enforce data integrity
Boundary lines will store several boundary types with source data
Parcel polygons will store APNs
Book and Page feature class
Condominium feature classes (one per level)
All parcels and condos in one feature class

Countywide Parcel Layer
Geodatabase Design

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Topology to enforce data integrity
Boundary lines will store several boundary types with source data
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Book and Page feature class
Condominium feature classes (one per level)
All parcels and condos in one feature class
Best Practices

The ArcCatalog tree views

- Assessor Page Geodatabase template
- Countywide Parcel Layer
Best Practices

Assessor Page

Geodatabase Design

Directly imported from CAD files

Topology to enforce data integrity

Boundary lines

Boundary line annotation (bearing/distance)

Mapping lines (road ROW, hooks, etc.)

Mapping annotation (blocks, neighboring pages, page titles, road names, etc.)

Parcel labels with feature linked annotation

Lot labels with feature linked annotation
Best Practices

Topological rules help ensure data integrity

- Topology rules built for the assessor page geodatabase include
  - Parcel lines must not have dangles
  - Parcel lines must not intersect
Best Practices

Boundary lines are divided into ‘subtypes’

- A single feature class stores multiple line types
- Simple model of ‘real-world’ lines
- Conforms to ESRI’s parcel data model

Simple feature class
**BoundaryLine**

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<th>Domain</th>
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Subtypes of BoundaryLine

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List of defined default values and domains for subtypes in this class

- Source
- Generic CAD
- Line_Source
Best Practices

Tracking Page Status

- A single database used to report the status for each book-page (as a Microsoft Access database)
- Fields to include:
  - Book-Page
  - Date of last update
  - Person who last updated the page
  - Type of last update eg. parcel split, lot line adjustment
  - Current format of the page data
  - Scale and Rotation
  - Is the page georeferenced?
- Updated with map changes – providing capability to summarize current status of mapping efforts
**Best Practices**

**Status Database**

- A single user interface provided through the ‘Update Page’ Form

![Update Page Information](image)
Best Practices

Metadata (Documenting Data)

- Use the ‘ISO’ stylesheet and wizard in ArcCatalog
- Suggested fields to populate
  - Originator
  - Abstract
  - Keywords
  - Update Cycle
  - Accuracy and Precision
- Important information on appropriate use of your data that is being published
Best Practices

Metadata Suggestions

• ‘ISO’ wizard greatly simplifies metadata editing
Best Practices

Sample SBE Standard Layouts

Standard No. 3
County Index to Assessor’s Map Books

Standard No. 7
Detailed Map – Urban Property,
Scale 1” = 100’

Standard No. 9
Detailed Map – Orchard and Small Farm Property,
Scale 1” = 400’
Best Practices

Parcel Editor Workflows
Best Practices

Parcel Editor Workflows

Workflows will be used as a guide through the steps of creating and maintaining parcel data.

Workflows can only describe actions, simplify tool selection, and set up the working environment, they do not perform any editing actions.
Best Practices

How workflows work

- Each panel is a prescribed action or set of actions
- Some panels are only descriptions of tasks
- Some panels set environment variables, such as selection, editing, and snapping
- Start with the top panel and work down
- As each task is completed, check the ‘check box’ to avoid duplicating or skipping a step
Best Practices

Workflows break complex tasks into simple steps

- An initial set of workflows have been created to do:
  - Simple assessor page maintenance
    - *Parcel_Split, Parcel_Merge, Lot_Line_Adjustment*
  - Adjusting and importing whole assessor pages
    - *Georeference_AssrPg, Import_CAD_to_AssrPg, Build_AssrPg_from_RoS*
  - Editing Countywide Parcel Layer
    - *Edit_CPL, Load_AssrPg_to_CPL*
  - Assessor page mapping
    - *Edit_Hybrid_Raster, Edit_Hybrid_Vector, Edit_Carto_Anno*
  - Importing subdivisions building assessor pages
    - *Import_CAD_to_sub, Split_sub, Load_sub_to_CPL, Build_sub_from_RoS*
Best Practices

Sample Editing Steps

1. Review source material
2. Identify type of edit
3. Open assessor page map document
4. Choose workflow
5. Edit assessor page geodatabase
6. Print new assessor page
7. Update countywide parcel layer
8. Update status database
Best Practices

Editing Steps

1) Review source material

Current assessor page

New page with edits drawn in from Record of Survey
Best Practices

Editing Steps

2) Identify type of edit

Edit identified as a parcel split

Current assessor page

New page with edits drawn in from Recorded Deed
Best Practices

Editing Steps

3) Open assessor page map document
Best Practices

Editing Steps

4) Choose workflow
Best Practices

Editing Steps

5) Edit assessor page geodatabase
Best Practices

Editing Steps

6) Print new assessor page
Best Practices

Editing Steps

7) Updating Parcel Layer with Assessor Geodatabase features

Initial Parcel Layer (without new subdivision)

Add new boundaries from Assessor page

Delete old boundaries and polygons

Use topology to fix errors and construct polygons
Best Practices

Editing Steps

8) Update Status Database
Best Practices

Do What Works!!