GIS FOR LINEAR BOUNDARIES (PART 2)

WITH THE EAST BOUNDARY OF THE WEBER GRANT AS AN EXAMPLE (BY LANDON BLAKE)

Introduction

This is the second article in our series of articles on GIS for linear boundaries. In this article series, we walk through the design and implementation of a GIS for the east boundary of the Weber Land Grant in Stockton, California.

In the last article, we reviewed the design for the tax assessor parcel maps we want to store in our GIS. In this current article, we are going to repeat the same process for the filed survey maps we want to store in our GIS.

The Design Process for Simple Feature Types and Layers

You will remember from our last article that the most important part of most GIS design is the blueprint created for each of the simple feature types. Here is a refresher on the 10 steps in that process:

TAX ASSESSOR MAP SIMPLE ATTRIBUTES

- Unique Identifier
- County Surveyor Map Book Number
- County Surveyor Map Book Page
- Survey Date
- Filing Date
- Surveyor Name
- Survey Organization Name
- Boundary Indicator Flag
- Corner Indicator Flag

GIS FOR LINEAR BOUNDARIES (PART 2)

1) Determine the entity type. (Should this really be a simple feature type? Would a non-spatial entity or relationship be more appropriate? Is this really a complex entity that should be represented by a set of related simple feature types?)

2) Determine the primary type of geometry that will be used to represent this feature in the GIS. (Is this a point, line, polyline, or polygon?)

3) Create the list of feature attributes. For each attribute, define the attribute name, attribute datatype, default value, and data validation rules, and attribute value domain (if needed).

4) Define the creation policy for the feature type. (What is the process to create features of this type in the GIS? What rules need to be followed during this process? What data sources will be used?)

GIS RULES FOR FILED SURVEY MAP SIMPLE FEATURES

	Topology Rule	Filed Survey Maps may overlap.
	Topology Rule	Filed Survey Maps must cover current or historic tax assessor parcels.
	Edit Rule	Filed Survey Maps are never archived or deleted.
	Edit Rule	Filed Survey Maps may be edited.
	Domain Rule	A Filed Survey Map Feature should be included for every map that touches or is divided by the linear boundary. Other nearby maps may be included.
	Relationship Rule	Filed survey maps create property corners.
	Relationship Rule	Filed survey maps set corner monuments.
	Relationship Rule	Filed survey maps find property corner monuments.
	Relationship Rule	Filed survey maps establish property corners where no monument is found.

GIS FOR LINEAR BOUNDARIES (PART 2)

5) Define the deletion/archival policy for the feature type. (What is the process for deletion or archiving of this type of feature in the GIS? What rules need to be followed during this process?)

6) Define the modification policy for the feature type. (What type of modifications or edits are allowed for this feature type? What is the process for making these edits? What rules need to be followed during this process?)

7) Determine what metadata needs to be stored for this feature type at the individual feature level and at the dataset level.

8) Determine the relationship of the simple feature type to other feature types and non-spatial entities in the GIS.

What are filed survey maps?

I use the term "filed survey maps" to described maps that are prepared by a land surveyor and filed with the County Surveyor. In my home state of California, this includes corner records, record-of-survey maps, parcel maps, and subdivision maps. (In California, parcel maps are subdivisions of fewer than 5 parcels. Subdivision maps are subdivisions of 5 or more parcels.)

There are a few states that don't have a requirement for land surveyors to publicly file there maps. The information in this article would still apply. In those case, the survey maps aren't "filed" with the County Surveyor, and could just be called "boundary survey maps" or "unfiled survey maps".

GIS FOR LINEAR BOUNDARIES (PART 2)

9) Determine the topology and spatial relationship rules that apply to this feature type.

10) Define limits on the domain of the simple features in this type. (For example: Is it all public roads in the jurisdiction, or just 2 lane highways?)

Defining The Simple Feature Type for Filed Survey Maps

Let's briefly walk through the simple feature type design process for filed survey maps.

1) Determine the entity type.

Tax assessor maps will be a simple feature type.

2) Determine the primary type of geometry that will be used to represent this feature in the GIS.

We'll represent filed survey maps in our GIS as polygon features. (There are alternative ways to represent filed survey maps. See the sidebar on this topic for more information.)

3) Create the list of feature attributes.

Our tax assessor maps will have 6 attributes:

1) A unique identifier. This unique identifier will be the map type, map book number, and map page number in a single text value.

2) County Surveyor Book Number.

3) County Surveyor Page Number.

GIS FOR LINEAR BOUNDARIES (PART 2)

4) Date the map was surveyed.

5) Date the map was filed.

7) The name of the surveyor that prepared the map.

8) The name of the organization that prepared the map (if applicable).

9) A link to a PDF copy of the current tax assessor map in our GIS file system.

10) Boundary indicator flag. (This is a simple flag value to indicate the relationship of the filed survey map to our linear boundary. If the value is 0, the map doesn't show any portion of the boundary. If the value is 1 the map shows the boundary along one of its edges. If the value is 2 the linear boundary runs through at least a portion of the area covered by the map.)

Why do we want filed survey maps in our linear boundary GIS?

Filed survey maps are going to be a critical component of our linear boundary GIS. We'll extract data on property corners, property corner monuments, and boundary segment definitions from our filed survey maps. They will be the main data source in our GIS. Our GIS will simply store a geometry representing the basic footprint of the map, with the simple set of attributes we described in this article. The actual data extraction will use a PDF copy of the filed survey map itself. Features created from data extracted from filed survey maps will include an attribute that identifies the map.

GIS FOR LINEAR BOUNDARIES (PART 2)

11) Corner indicator flag. (This is a simple flag value to indicate the relationship of property corners shown on the filed survey map to our linear boundary. If the value is 0, the map doesn't show any corners on or near our boundary. If the value is 1, the map shows no corners on the boundary, but it does show adjacent corners that could be used to reestablish the boundary. If the value is 2, the map shows corners found on our boundary. If the value is 3, the map shows corners found on our boundary and/or set on our boundary.

4) Define the creation policy for the feature type.
Our filed survey map features will be created using existing parcel geometry. The filed survey map geometry will be digitized over the parcel features in the GIS. The attribute data will be entered by a GIS analyst using data shown on PDF copies of the actual filed survey maps. (There is an alternative way to create the geometry for the map boundaries. See the

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GIS FOR LINEAR BOUNDARIES (PART 2)

sidebar on this topic for more information.)

5) Define the deletion/archival policy for the feature type.
Filed survey map features in our GIS should never be deleted or archived.

6) Define the modification policy for the feature type.
The tax assessor maps shouldn't be modified after creation unless a correction is being made to the original geometry or attribute values.

7) Determine what metadata needs to be stored for this feature type at the individual feature level and at the dataset level.
We want to store very basic metadata about the creation and any edits to the filed survey map feature. We will also store very simple dataset-level metadata.

8) Determine the relationship of the simple feature type to other feature types and non-spatial entities in the GIS.
Filed survey maps in our GIS will be related to property corners, property corner monuments, and segment definitions of the linear boundary. (We will talk more about this in future articles in this series.)

9) Determine the topology and spatial relationship rules that apply to this feature type.
We want the geometry of our filed survey map footprints to overlap and match tax assessor parcel boundaries in the GIS. The exception to this rule will be for a map that was filed before subsequent changes to the parcel boundaries.

10) Define limits on the domain of the simple features in this type.
We are only interested in creating and managing filed survey maps that touch or contain our linear boundary.

GIS FOR LINEAR BOUNDARIES (PART 2)

Next Steps

In the next article for this series, we will design the simple feature type for the property corners on our next to our linear boundary.