Capturing the Geographic Value of Living in 3-D

Boulder County Assessor’s Office
In the city of Boulder, 25 of 37 plats in 2007 were for condos.

Condominiums are popping up all over Boulder County.
Introduction

Topics to be covered:

• Define condos and why it’s difficult to represent them spatially
• History of mapping condos in Boulder County
• Current representation of condos (containers)
• Development/description of current data model
• Where are we going – future uses
What is a condo?

• In Colorado, a condominium is a type of “common interest community” set up under the Common Interest Ownership Act. (C.R.S. 38-33.3)

• Unit owners own ‘walls-in’, but usually also an undivided interest in the common areas, including the land beneath their unit.
What is a condo?

General Common Elements and Limited Common Elements
What is a condo?

Condos are different from townhouses, where the owner actually owns the land under their unit.
Condo Challenges

Condos can be multi-level = one unit has 2 floors (townhouse-style)
Condo Challenges

Or...condos can be stacked
Condo Challenges

Difficult to represent accurately in 2-D
How we previously mapped condominiums

- In ArcInfo Workstation coverages, each unique condominium parcel number was represented by its own unique polygon
- Result: “Condo Boxes” were normally 5 foot by 5 foot polygons that ‘housed’ each unique parcel number/condo unit
- In each condo phase, one condo unit’s parcel number ‘housed’ the remainder geography
Condo Boxes: A Closer Look

Poplar Grove Townhome Condos
Longmont, Colorado
Phases 8 through 12

- 5 of the 6 units in Phase 11 are represented by condo boxes
- 1 of the 6 units is the ‘remainder’ geography within Phase 11’s general common elements
- Poor representation of condo units’ relative location to each other
Condos in the Real World

- Condo boxes are spatially inaccurate
- Derived x-y coordinates for modeling are arbitrary
- Limited ability to value condo units by location
How we map condos now... with “Containers”

- A container illustrates an entire condo phase in the parcel layer
- Each unit owns a partial interest in the GCE
- This is a better representation than the condo box
How containers work

• Containers are created in ArcMap using a custom vendor editing extension
  – Records for each unit are copied to a separate table
  – The table records are linked to the polygon via a common “feature key”
  – One-to-many relationship

• Brand new condo containers can be created

• Existing condo boxes can be converted to containers
Use of Containers

- An overnight SDE script builds stacked polygons from the non-mapped parcel table.
- By using the identify tool in the parcel layer, all condo unit parcel numbers are revealed.
Use of Containers
Pros and Cons

• Pros
  – Spatially a better representation than condo boxes
  – Less confusing to the public when viewing parcel layer
  – Much easier identifying units using a table

• Cons
  – Does not accurately illustrate location of unit; x-y coordinates are generalized to container
  – No help to the appraiser in valuation
How to make our condo data more useful and spatially accurate

• Digitize condo building footprints to a separate database
• Attribute individual features
  – Units, LCE, GCE
• Use a model that ensures uniformity
• Capture elevation for 3D modeling
All levels contained in same shapefile:

- Difficult to distinguish between floors
- This made for tough editing
Different floors were intentionally offset horizontally:

- Made editing between floors easier
- But...introduced greater spatial inaccuracy
Original Condo Footprint Model
Offsets cause problems when the features are 3-D
Original Condo Footprint Model

Attributes weren’t standardized:
- Same kind of features were assigned different attributes
- Fields weren’t required, leading to inconsistencies/data gaps

Consolidating shapefiles from various editors’ work:
- Difficult!
- Good information lost because attributes had to be generalized
Re-designing the Condo Parcel Data Model

What needs to be captured…

For each Condo Unit, LCE and GCEs within the building:

- The *footprints* of each feature as polygons
- The attributes that allow 3-D display and analysis
  - Level/floor and elevation
- Other important attributes of each feature
  - Parcel number: links the GIS feature to the record in the Assessor’s database
  - Condo unit number
  - Detailed classification of LCE or GCE
  - Primary polygon for each condo unit (X-Y)
Re-designing the Condo Parcel Data Model

In the Data Structure…

Fields and attributes should have:

- Rules for required fields
- Rules for types of data that can be entered
- Domains/pick-lists to eliminate arbitrary values

Digitizing and editing should be:

- Easier to work with and see
  - Levels/stories are discrete layers
- More efficient and less repetitive
  - Features and attributes can be copied from polygon to polygon and level to level
Re-designing the Condo Parcel Data Model

Data Consistency
- Makes consolidation easier
- Improves accuracy of final product

What we *didn’t* need in this model:
- The boundary of each condominium complex
- We already have container polygons in our parcel layer
The Personal GeoDatabase (PGDB) contains a **Feature Data Set** (FDS)

FDS contains seven **Feature Classes** for levels Basement through 4th Floor, and Rooftop
Current Condo Parcel Data Model

Each Feature Class:
- represents a level/story
- contains the same fields, domains and rules

Additional feature classes can be added to the PGDB for higher stories – 5th floor and above
Fields & Attributes

**Required Fields:**
- ✔ Subdivision Code
- ✔ Category
- ✔ Type of Area
- ✔ Floor Level
- ✔ Floor Elevation
- ✔ Editor

**Conditional Fields:**
- ❑ Parcel Number
- ❑ Unit Number
- ❑ Remarks

**Exclusive:** X-Y Polygon
Data Model – Fields & Attributes

- **Unit Number:** 1, 2, and 3
- **Category:**
  - CONDO
  - LCE
  - GCE
- **Type Area:**
  - Condo Unit
  - Balcony
  - Patio
  - Walkway
Data Model – Fields & Attributes

- **Floor:**
  2nd

- **Elevation:**
  5317 ft asl

- **X-Y Poly:**
  NO
  YES
Data Model – Fields & Attributes

- **Parcel Number (PIN):** Usually unique for condo units
- **PIN** also may apply to LCEs: When the LCE feature is associated with only one account
- **Remarks:**
  - Provides more specific details about a feature
  - Lists multiple unit numbers
Data Model – Fields & Attributes

- Subcodes:
  637
  8519

- Editors:
  Lori
  Rachel
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  Sandy
  Stef
  Brooke
  Ben

Iron Flats Condominiums
Fourth Supplement
Subcode # 637

Walnut Street Condominiums
Subcode # 8519
Georeferencing Plat Image and Other Tricks

Villas at Ute Creek
Longmont, Colorado
Original filing & phases
1 through 5
Attribute Condo Units
Quality Control and Edit Checks: Validate Features
Quality Control and Edit Checks: Labeling Attributes

Area Type

Label Category

X Y Polygon?

Unit Number

Parcel Number
The new condo model highlights

- Spatially accurate - but not survey quality
- Data structure promotes uniformity
- Consistency of GIS editing and data entry allows easier consolidation of multiple editors’ work
- Provides more detail for each unit and its relative position within the condo complex, in both 2-D and 3-D views
Ultimate Products / Future Uses

Publish condo footprints in online mapping application
  – Depicts the individual unit boundaries while retaining the boundary of the underlying land parcel of the condo complex
Ultimate Products / Future Uses

Capturing additional attributes for detailed property valuation:
- End units, west-facing units, 4th floor vs. 1st floor, etc
Ultimate Products / Future Uses

Appraisers can analyze properties in 3-D to assign attributes and determine which attributes affect value that we may not have realized before

• Floor level and view
• Relative location, traffic, and privacy
• Visual tool to help explain values to taxpayers
Comparable maps
• Traffic
• Golf Course
- Views
- Proximity to Open Space
• Golf Course
Sales Prices for 14th & Walnut in 3D

- Mountain Views

- RTD Bus Terminal
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