Municipal GIS Resources For Connecticut Municipal Inland Wetland Agencies
2010 DEP Segment 3 GIS Training

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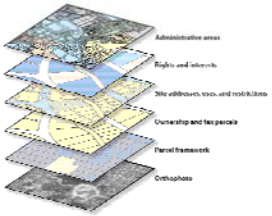
The Basics of Municipal GIS

- Framework GIS Datasets
  - Cadastral
  - Orthoimagery (Aerial photography)
  - Addresses*
  - Street Centerlines*
  - Planimetric Features (Edge of roads, buildings, utility poles, ….)*
- Other GIS datasets that can be constructed directly or indirectly from these.

What are framework GIS Datasets?

- Connecticut Geographic Framework Data

http://www.ct.gov/gis/lib/gis/Connecticut_Framework_Data_Themes_Final_Report_010708.pdf



What is Cadastral?

- **Definition: *Cadastre or Cadastral:***
- Tax inventory and assessment of real property. (Black's Law Dictionary, 5th ed.)
- An official register of the quality, value and ownership of real estate, used in appropriating taxes. (Definitions ofSurveying and Associated Terms, American Congress on Surveying and Mapping, 1941).
- Cadastral information includes the tabular information (owner, building info, values and other information) that has traditionally stored on property cards and currently in assessor Computer Aided Mass Appraisal (CAMA) databases, information in the city/town clerk land records and the property mapping represented on the assessor tax maps.
- Parcel Maps – Assessor Maps – Tax Maps
- Term used to conform with National Efforts

Parcels

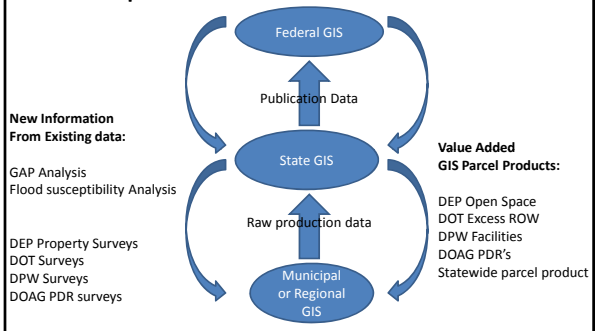
- Tax/Assessor Parcels
- Component of a Cadastre – relating to land ownership
- Cadastral Data Subcommittee developing standards for the creation, maintenance and distribution.
- http://www.ct.gov/gis/cwp/view.asp?a=3034&q=400016

Cadastral Data Subcommittee

State GIS

- Connecticut Geospatial Information System Council
- **Public Act 05-3:** This Public Act created the 21-member Geospatial Information Systems (GIS) Council to coordinate, within available appropriations, a GIS capacity for the state, regional planning agencies, municipalities, and others as needed. The GIS system must guide and assist state and local officials involved in transportation, economic development, land use planning, environmental, cultural, and natural resource management, public service delivery, and other areas as necessary.
- www.ct.gov/gis

Simplified GIS Parcel Data Flow



Cadastral Standard

- Multiple "standards" for different needs
  - Municipal Production
  - State Publication
  - Federal Publication
- Multiple "levels" for municipal production
  - Level I - Minimal quality, minimal usability
  - Level II - some quality/usability
  - **Level III** - Highest quality, maximum usability

GIS Cadastral Standard

- Components
  - Boundary Compilation Methods and Sources
  - Features and Format
  - Attribution
  - Spatial Accuracy
  - Horizontal Coordinate System and Datum
  - Quality Assurance and Quality Control
  - FGDC Compliant Metadata

Boundary Compilation Methods and Sources

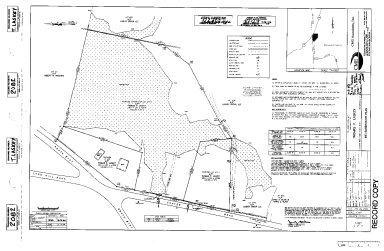
- are the ways a property boundary is created and the source information used to make the boundary. There are numerous valid methods in generating parcel boundaries. The method used is typically determined by the source and the means to translate the source into the parcel in GIS.

Boundary Compilation Methods and Sources

Sources
- Tax Map
- Deed
- Subdivision
- Survey
- Asbuilt
- DOT ROW Mapping
- RR Valuation Map
- Lines of Occupation

Methods
- Heads Up Digitizing
- COGO
- Non-Coordinated COGO
- Coordinated CADD
- Non-Coordinated CADD
- RTK GPS
- GIS Grade GPS

Boundary Source Example



Attribution

- Primary Linking Field (GISID?) = CT plus Town Code plus MBL (or whatever town users)
  - CT-116-01-001 (CT Putnam Map 1 Lot 1)
  - CT-004-3220015 (CT Avon 15 Mountain Estates Drive)
- Feature Level Metadata
  - Parcel Type
  - Parcel Name
  - Source Type
  - Source Document
  - Edit Method
  - Editor
  - Edit Date
- Supports linking to documents

Attribution

- Feature Level Metadata examples for Parcel Polygons:

Parcel Type	Parcel Name	Owner Type	Edit Date	Editor	Source Type	Source	Method
Fee Simple	Peoples State Forest	State	11/2/2008	MRG	Deed	v30p11	COGO
Fee Simple		Private	1/2/2006	MRG	Subdivision	1334	COGO
Condominium	Hill Condos	Private	8/7/2000	MRG	Survey	1201	COGO
Water	Park Pond	Municipal	1/1/1999	MRG	Tax Map	TM100	Digitize
Municipal ROW	Providence Pike	Municipal	1/1/1999	MRG	Tax Map	TM100	Digitize
State ROW	I-395	State DOT	1/1/2009	MRG	DOT ROW	116_16	COGO

Accurate Geographic Framework

- Connecticut is not a Public Land Survey System State
- Need to continuously develop and improve the "Framework" for parcels
  - Orthoimagery
  - Jurisdictional Boundaries (Town/State/Borough)
  - Survey Monumentation

Spatial Accuracy

- Spatial Accuracy can only be authoritatively determined by a Licensed Land Surveyor
- Accuracy improves with use of survey sources of parcel boundaries
- Accuracy improves with survey monumentation
- Accuracy improves with supplemental framework GIS datasets (survey control, Orthophotography and planimetrics)

QA/QC

- Component Verification
  - Format
  - Horizontal Coordinate System and Datum
- Attribution Audit Reports
  - Mismatches with CAMA (GISvsCAMA, CAMAvsGIS)
  - Duplicate ID's (GIS and CAMA)
  - Acreage Comparisons
- Spatial Tests
  - **Topology**
  - Parcel Line length compared to Dimension text

Town Boundaries

- Poor sources for Statewide town boundaries
  - US Census
  - USGS
  - DOT
- Recent or Active state/town boundary disputes
  - Monroe / Easton off Judd Road active
  - Waterbury / Watertown settled early 2009
  - Ashford / Willington settled 1991
  - CT-RI

Town Boundaries

- Dig up the Evidence
- Research
  - Enacting Legislation, Special Acts
  - Town Charters
  - Perambulation Reports – Deeds, Selectman Minutes, Town Meeting Minutes
  - Town Clerk Maps – Town Boundary Surveys, Property Surveys
  - County Records, State Archives, DOT….
- Field Work
  - GPS
  - Photographs

August 11th and 12th, 1786 then we the Subscribers Selectmen for the Town of Pomfret and Brooklyn with the assistance of Capt. Zebarian Ingalls surveyor for the lines between said Towns which lines are as follows, beginning at a heap of stones near Quinebaug River by a buttonwood tree marked, thence west 6° north 1120 rods to a heap of stones in Mortlake west line which heap of stones is about 40 rods south easterly from Joseph Williams now dwelling house thence southerly in said Mortlake west line 185 rods to a heap of stones thence west 6° north 172 rods on the Purchase line so called to a heap of stones thence south to Stoddards east line to a heap of stones thence west 6° north about 850 rods to a heap of stones in the Town of Windham on all which lines we have erected a heap of stones once in eighty rods as witness our hands the 12th day of August 1786.

Selectmen in Brooklyn	Selectmen in Pomfret
Seth Paine	Rhen: Kingsbury
Andrew Murdock	Zebariah Ingalls
Asa Pike	Stephen Williams
Daniel Tyler Jr.	Stephen Avery
Joseph Scarborough	Joseph Trowbridge

Union – Willington – Stafford corner

Cadastral Demo

Orthoimagery

- Aerial photography with real map qualities
  - Scale corrections
  - Topographic corrections
  - Camera orientation corrections
  - Lens aberration corrections
- Can be B&W, color and include infrared and other parts of the electromagnetic spectrum

Why orthoimagery?

- Geographically referenced digital aerial photography and satellite imagery
- Can be use as a base map layer with other digital map layers in a GIS
- Can be used to create new GIS data layers or update existing layers

Different types of orthoimagery

- Different imagery collection year and season (leaf-on vs. leaf-off)
- Different band combinations -natural color (RGB), color infra-red (CIR), panchromatic (black & white)
- Different ground pixel size – 3", 1', 1 meter, etc.

1999 Natural Color
Leaf-Off
1' Pixels

2004 Black & White
Leaf-Off
1' Pixels

2008 CIR
Leaf-On
1 Meter Pixels

2009 Natural Color
Leaf-Off
3" Pixels

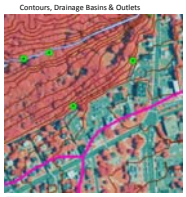
What are some applications of orthoimagery?

- Property Mapping & Assessment
- Zoning Enforcement
- Asset Management
- Environmental Monitoring & Planning
- Building Permit Tracking
- Emergency Dispatch
- Preliminary Engineering Design
- Municipal Growth Planning

Address Points & Parcels

Street Center Lines, Roads & Buildings

Contours, Drainage Basins & Outlets



Why don't we let Google™ and Microsoft® handle all this?

- Public Domain. All orthoimagery users benefit when more accurate and up to date imagery is made available to the public and created with standards set by the needs of the purchasing body
- Imagery Vintage. We need to know when the picture was taken and have access to a variety of vintages
- Version Control. They use many different sources with varying quality standards augmented with state and federal imagery programs as well as private satellite and aerial data providers

How can I learn more about the CGISC and orthoimagery?

Base Map Imagery Subcommittee web page at:
http://www.ct.gov/gis/cwp/view.asp=3034&q=400010

Orthoimagery Demo

- http://www.cteco.uconn.edu/map_services.htm

In ArcCatalog/ArcMap add ArcGIS Server
http://www.ctecoapp2.uconn.edu/arcgis/services

Municipal GIS websites

- http://gis.cdm.com/BridgeportCT/
- http://www.mapsonline.net/killinglyct/
- http://grotongis.town.groton.ct.us/homepage/mapservices.asp
- http://www.manchestergis.com/default.cfm
- http://gis.glastonbury-ct.gov/ceo/
- http://www.mainstreetmaps.com/CT/Mansfield/
- http://www.maphost.com/milford/
- http://gis.ci.rocky-hill.ct.us/
- http://host.appgeo.com/sccog/

Municipal GIS websites Demo

Wetlands GIS Data

- Numerous wetlands GIS datasets / producers
  - NWI – National Wetland Inventory – USFWS
  - SSURGO – State Soil – USDA-NRCS
  - USGS Topographic maps
  - UCONN – Land Cover Data
  - Town Official Wetland Maps (from USDA-NRCS?)
  - Town Orthophoto delineated “wet areas”
  - Town Photographically interpreted classified wetlands
  - Field determined and mapped wetland boundaries

Wetlands GIS data standards

- FGDC – Wetland Mapping Standard

http://www.fgdc.gov/standards/projects/FGDC-standards-projects/wetlands-mapping/index_html

- USFWS – Federal Data Standards for Wetlands

http://www.fws.gov/wetlands/WetlandsLayer/FederalStandards.html

- NRCS – Soil Survey Geographic Database

http://soils.usda.gov/survey/geography/ssurgo/

What can you do with this data?

- Depends on the quality of the GIS data
- Enforcement proceedings – in lieu of other information and/or augmenting other information
  - Wetland filling – historic/archived orthoimagery
  - Tree cutting complaints
  - Inquiries on or near property
- Environmental systems valuation
  - Combined with other information – ie habitat, NDDB, utility systems
  - Visualization

What can't you do with this data?

- Authoritative site decisions
  - Measurements - setbacks and buffers
  - Licensed operations – surveying, soil scientist
- Assume the quality of the data is valid or can be used in final decisions unless all boundary data created and field verified by a State of Connecticut Licensed Land Surveyor.

Wetlands GIS Demo

Community Viz

- Placeways LLC - software product developed in partnership with the Orton Family Foundation built upon ArcGIS desktop tools.

www.placeways.com

- Visualization and analysis tools:
- Scenario 360 - Analysis
- Scenario 3D - Visualization

Community Vis Demo