Spring 2008 - Desktop GIS: Collecting Features from Orthos

By Joe Sapletal, GISP

Keeping up with the growth of our area over the last ten years has been quite the task as far as keeping our various physical feature (vector) data current for users. When we refer to physical features, that could be just about anything you can see; buildings, roads, water towers, churches and more. But how do you keep all that data current?

One option is certainly GPS, and another that you can use, rain or shine, winter or summer, would be aerial photography. You can create or maintain just about any dataset using aerial photography, be it through photogrammetry (stereo digitizing), heads-up digitizing in GIS software or by using Pictometry's Electronic Field Study (EFS). Of course, there are always the issues of accuracy and cost, but they are dependent upon how accurate the data needs to be for its application(s) and the demand for its currency. It is a balancing act.

Some very simple datasets can be collected and maintained with aerial imagery in a small amount of time. There are many features visible in aerial photos that may or may not have street addresses or any other way of being captured, such as water towers, electric substations, boat launches, entrance roads to parks and so on. These features are easily seen on aerial photos and can be collected as simple point layers.

Orthos can also be used to create more complex datasets. The Traffic unit in our Transportation Department wanted to be able to relate a tabular database of information about their traffic signals to locations on a map. They did not have any GIS locations established, but their tabular database had street intersections for each intersection controlled by signals. GIS staff geocoded these intersections and adjusted the resulting shape locations to meet department requirements. It was then decided that this could be taken a step further: each hand hole, signal pedestal, signal pole, detector and signal pad would be mapped by a GIS staff person, without leaving the office, by utilizing Pictometry imagery. Points for the different features were collected in Pictometry EFS from the ortho imagery, using the oblique imagery to verify each feature. Those features were exported to shapefiles and joined to the already existing intersection data. Location information to be related to the existing data was then quickly collected. This information was then overlaid with the shapefile of the fiber optic lines in Dakota County, and they are currently being examined for overlap to help enhance the traffic system.

Keeping planimetric data (buildings, road edges, sidewalks, etc.) current has become difficult in recent years due to the growth in housing. In the past, using building permit data, and working in concert with our cities, we have selected 40 - 50 sections a year that have seen significant growth and have had aerial photography of them flown at 3000' (1"=500' scale) for stereo digitizing. But, as growth in the County surged, we realized that it hasn't been enough to keep up. There has been a need for additional data collection using heads-up digitizing to update areas

that weren't cost-effective to do with stereo digitizing.

Before   *After*

The above "**Before**" map shows our building lines database overlaid on a 2006 ortho, after a large building was torn down and rebuilt and other adjacent buildings were removed, too. The "**After**" image shows the results of a few minutes spent deleting the old and adding the new buildings to the database. These features are attributed the same so that those users who need to know the true accuracy, want to know the method of data collection, or want to know what year's photography the data was collected from can view an special attribute field that codes the source of the data collection.

Collecting data from various scales and qualities of ortho imagery when applied appropriately can fill needs and be a cost effective way of collecting information.

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Spring 2008 - GIS 101: What Is LUCA?

By Todd Lusk

In the summer of 2007, the United States Census Bureau began its rollout of the 2010 Decennial Census Local Update of Census Addresses (LUCA) program. According to Census Bureau documentation,

> *The Local Update of Census Addresses (LUCA) Program is an integral part of the decennial census activities. It uses the expertise of tribal, state, and local governments to improve the accuracy and completeness of the address list used to take the census. (Local Update of Census Addresses (LUCA) Program User Guide, pg. 1).*

Dakota County has decided to participate in the program and has selected Option 1, a Full Address Review, as its choice for the 2010 LUCA program. A full address review means that the County's Office of GIS staff will review all of the addresses within Dakota County and submit changes, errors, and omissions to the Census Bureau, for all portions of the County. Various cities and townships in the County are also participating in the LUCA Program and will be submitting information to the Census Bureau as well. Whenever possible, Dakota County will be working with these cities and townships to coordinate the information being submitted so that a consistent and accurate picture of existing conditions is relayed to the Census Bureau.

Dakota County will rely heavily on its property information for identifying addresses that are not in the Census Bureau records. Specifically, the County will be using its property point locations to identify those missing records. This dataset consists of a point location for each parcel and condominium located within the County. When combined these data provide a pretty comprehensive picture of where most properties are located in Dakota County.

An example where a parcel can be identified as an apartment, but there is no unit information for it.

One place where this point dataset is not complete is on the presence of rental properties. In these cases, the County's parcel ownership data often includes a point for the parcel of the rental unit but has limited information on the number of units in the rental or, more specifically, what those units are. In these cases, the Office of GIS hopes to leverage the local knowledge at cities and townships to get specific information on those rentals.

The most significant source of missing information in the Census Bureaus Master Address File (MAF), at least for Dakota County, is in areas of new development. The Office of GIS will be using "year built" property information to identify those areas that have been developed since the Census Bureau compiled their master list of addresses. The Census list will be compared to the County's property information to identify those missing addresses. An example of a case where addresses are missing from the Census' Master Address File is shown in the graphic below.

Legend:
- ○ Census Addresses
- ● Dakota County Addresses

Red dots indicate an example of locations where there is an address in Dakota County's information but not in the Census Bureau's.

When the County's review is complete the addresses will be compiled and sent back to the Census Bureau. They in turn will then canvas areas in the upcoming months to verify that the addresses submitted are legitimate and correct in preparation for the 2010 Census.

Spring 2008 - Tech Talk: Tool(box) Time: Working With Fields

By Scott Laursen

ArcToolbox can be overwhelming to first time users. With literally hundreds of tools, scripts and models available, it is difficult to navigate through it all to find something that you can use. Many casual ArcGIS users have never explored ArcToolbox and are therefore unaware of the many timesaving tools that can be found there. This is the first article in an occasional series that will highlight tools in ArcToolbox that users will hopefully find to be quite useful.

The **Data Management Tools** toolbox is one of the larger toolboxes, with nearly 20 toolsets inside it, each containing multiple tools. One of these toolsets is the **Fields** toolset. It only contains four tools, but each of them can be very handy when working with attribute tables. Most of the tools work on all attribute tables, whether they are in geodatabases, raster catalogs or shapefiles. Let's look at each of them more closely.

Add Field: This tool does exactly what it says it does – it adds a new field to an attribute table. It only allows you to add one field at a time, to one attribute table at a time. If you are adding a field to a geodatabase, you can apply an existing domain to the field as well.

Assign Default to Field: This tool lets you pre-set what value will appear in a given field every time you add a new record to the table. It does not go back and change values for records that are already in the table. Note that this tool only works with geodatabases, not shapefiles or raster catalogs.

Calculate Field: This tool lets you perform simple calculations to derive values for an existing field. Advanced calculations using VB Script or other languages are not available through this interface, but simple mathematical operations (addition, subtraction, multiplication, division) can be performed on numeric fields, and concatenation is available for text fields. Keep in mind that you are not in an edit session, so using this tool will overwrite your existing data. It will also perform the operation on all records in the table, not just a subset.

Delete Field: This tool lets you delete multiple fields from an attribute table. Simply select your table and then check the boxes that contain the fields that you want to delete. Again, this will be a permanent change to your table, so "measure twice, cut once."

One big advantage to using these tools is that you don't have to have the shapefile or geodatabase open in ArcMap at the time that you make the changes. You can add, modify or delete a field in any shapefile or geodatabase that you have access to. This can be a real time saver. Try it out for yourself!
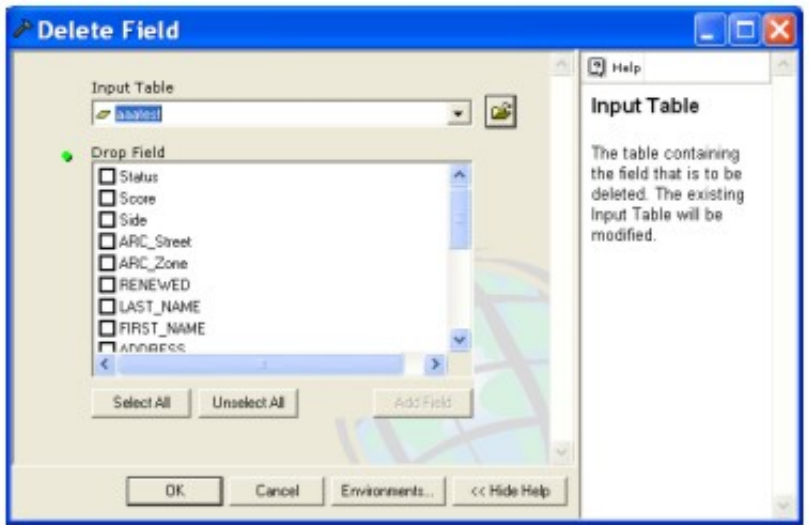
Spring 2008 - Department Spotlight: Illustrating Foreclosures in Dakota County

by Sara Swenson, Dakota County Community Development Agency

In 2007, there were 1,581 Sheriff Sales in Dakota County – an 80 percent increase from 2006. Just a few years ago the county had only a few hundred sheriff sales in a year. While this is not an anomaly in today's housing market, it is of increasing concern to the Dakota County Community Development Agency (CDA). The CDA is the county's housing agency that administers a variety of programs for renters, homebuyers and homeowners, including the Mortgage Foreclosure Prevention Program. Through this program the CDA provides free counseling assistance to homeowners who are struggling to pay their mortgage, have fallen behind on their mortgage payments or who are in foreclosure.

The CDA has been researching ways to increase awareness of its services for homeowners and target its efforts to the areas in Dakota County with the greatest need. The Office of GIS provided their expertise by creating several maps to paint a picture of foreclosures using 2007 Sheriff Sales data. These maps were used to illustrate the growing situation to Dakota County cities and to solicit ideas or concerns they have in regards to foreclosures in their communities (i.e. code enforcement).

Density of Foreclosures

This map shows where clusters of foreclosures occurred in the county. None of the county's major cities were immune to foreclosures in 2007 and each has at least one dense area. There is no real reason why foreclosures are happening at a higher rate in certain neighborhoods in Dakota County; however, this map proves that the CDA's outreach efforts need to be very broad.
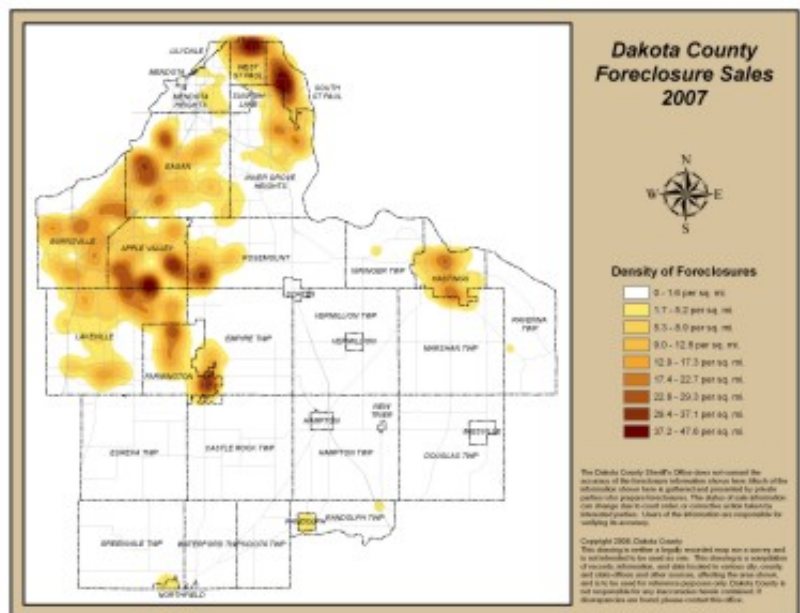
Single-family vs. Multi-family Housing

Sixty-three percent of all 2007 Sheriff Sales were single-family homes. In certain cities, the ratio of single-family home foreclosures to multi-family was much higher due to the type of housing stock in the city. The larger cities saw about a 50/50 split in type of housing in foreclosure.

The Office of GIS created these county-wide maps, as well as individual city maps. National predictions are stating that there will be more foreclosures in 2008 than in 2007. With the help of the Office of GIS, the CDA will continue tracking the rate of foreclosures by city in order to provide them with resources to make informed decisions that address the impacts of foreclosures, and to tailor outreach efforts to meet the needs of Dakota County homeowners.

For more information about the CDA's Mortgage Foreclosure Counseling Program visit www.dakotacda.org or call (651) 675-4466.

Dakota County Sheriff Foreclosure Sales for 2007