

Summer 2004 Desktop GIS Benchmarks to Parcels to Street Maps, Oh My!

by Todd Lusk

Did you know that the Dakota County Office of GIS has a web page devoted entirely to property information? Do you also know that this page is available 24 hours a day, seven days a week, at the touch of your fingertips? No? Perhaps the time has come for a conversation regarding "Property Information Online".

The Office of Geographic Information Systems has assembled a web page containing links to various applications related to property information in Dakota County. The page allows realtors, surveyors, homeowners, and even the general public to access information about various types of property and geographic information in the County. The information, however, doesn't stop there. The page contains links to pages where standard map products can be downloaded or printed free of charge.



Have you ever wondered what all of the house numbers on all of the properties in your neighborhood are? Try checking out the Standard Property Address or Property Map Locator. These applications let people download a detailed map of their property (and surrounding area) as a PDF document. The document can be viewed on a home computer or printed on larger format printer.

Another extremely popular feature on this site is the link to the Real Estate Inquiry. This is an interactive web application that allows people to look up information the County maintains on various properties. Users can browse to their property location interactively or search for a property by house number, tax ID, or address, and then peruse various types of information collected by the Assessor's Office. The application also lets users compare properties to other properties to see how their property values relate.

Dakota County residents are not the only people who use the Property Information Online page. Surveyors working in the County regularly visit the page to find information for work they are doing. Regular stops for surveyors include Recorded Plats and Surveys, PLS Corner and Control Map, Section Subdivisions and Bench Marks. Developers will often stop by these pages to pick up information for future developments they are planning.



The goal of putting all of this information online was to make it easier for people to find what they need without having to make a trip to Hastings, Apple Valley, or West St. Paul to visit one of the County service centers. A side benefit of this approach, however, has been a reduction in the number of hours staff have spent in person-to-person requests for information. With the information available in just a few mouse clicks, many people find what they need before they pick up the phone or visit a service center.

Summer 2004 Department Spotlight Using ArcMap to Inform the Public About Mosquito-borne Diseases

by Steve Scott, Dakota County Environmental Management Department and Jon Springsted, Dakota County Public Health Department

The Dakota County Office of Geographic Information Systems (GIS) has developed an ArcMap extension for the Dakota County Public Health Department (DCPH) that can identify specific parcels and create mailing labels for them. DCPH uses the extension to quickly create a targeted mailing list of properties to send information to regarding potentially significant exposure threats to mosquito-borne viral diseases, most notably West Nile Virus encephalitis (WNV) and LaCrosse encephalitis (LCE). This application should prove to be very useful for sending out information to targeted populations regarding other natural and human-caused disasters as well.



WNV and LCE both have the capacity to kill or permanently disable its victims, which are primarily children and the elderly. In 2003, 148 cases (5 in Dakota County) of WNV were documented in Minnesota, resulting in five deaths. The total number of cases nationwide has increased each year since its appearance in New York in 1999. 46 states have now reported WNV activity. Nineteen southeastern Minnesota counties, including Dakota, have reported 117 cases of LCE over the past 18 years.

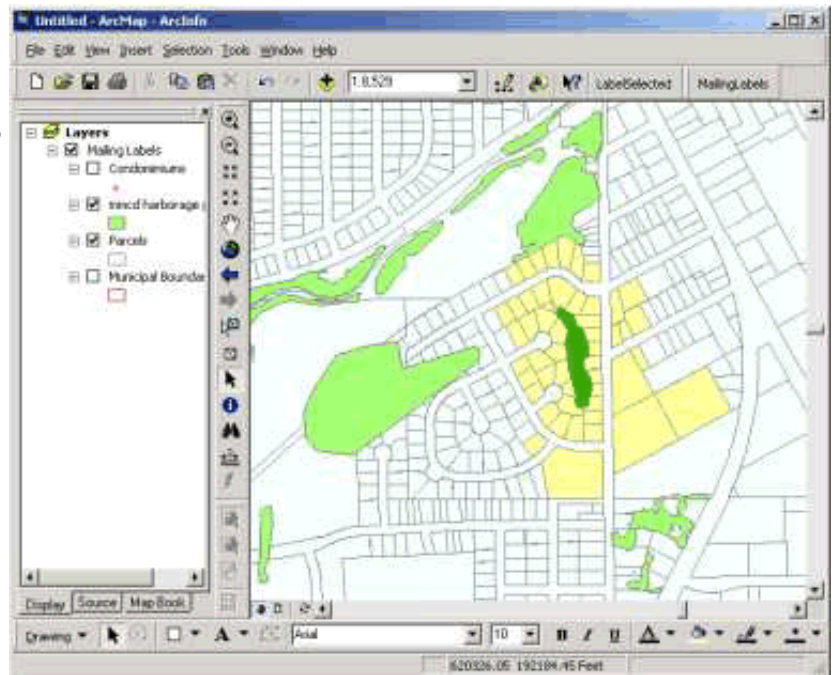
The Metropolitan Mosquito Control District (MMCD) performs routine and random mosquito surveillance in Dakota County to assess the human exposure risk to mosquitoes. The assessment may include identifying and quantifying the species and/or taking samples to determine virus activity. Based on the information obtained from this surveillance, the MMCD implements mosquito control measures. The MMCD is primarily responsible for chemical and biological control methods that either prevent the development of mosquitoes or else directly kills the adults.

The DCPH, using information provided by the MMCD, provides education and raises the awareness levels of targeted clusters of residents living near areas that the MMCD has identified as WNV or LCE high-risk exposure areas. The targeted educational efforts are meant to supplement chemical and biological control actions already underway or planned, by the MMCD, in residential neighborhoods. The DCPH is in the best position to provide information to local residents because it has the community familiarity and capacity in terms of staff expertise in risk communication.

Getting information on mosquito-borne viruses to the public in a timely manner is vital, because there is no vaccine for LaCrosse encephalitis or West Nile Virus. Prevention centers on public health action to control mosquitoes; on individual property owner's action to eliminate mosquito-breeding habitat in their yards; and on the individual's action to avoid mosquito bites. Timely and effective communication with residents at greatest risk of exposure to mosquitoes capable of transmitting these diseases is a must if prevention efforts are to be effective. The DCPH uses the ArcMap mailing label extension to target mailings to those residences adjacent to woodlots where MMCD staff have identified disease-carrying mosquitoes and have treated the woodlots to eliminate the mosquito population. Once treated, the location of the woodlots is reported to the DCPH staff. Using ArcMap, the target woodlot parcels are selected and buffered to capture the residences in nearest proximity to the woodlots. Since the mosquito species that carries LCE is a weak flyer, generally spending its life in the woodlot where it was hatched, buffering the woodlots and selecting the adjacent parcels effectively captures the residents at greatest risk of exposure. The lists can be further modified by property use to exclude commercial or vacant properties. The mailing label extension tools then format and output the selected records into a standard label format for printing.

The use of GIS and the mailing label extension assists in the delivery of health information directly to residents at greatest risk in a timely and effective manner. As previously mentioned, the most effective prevention and control measures of mosquito-borne diseases are the elimination of the artificial breeding habitat created in people's backyards and the adoption of personal protection against bites. When this information is delivered to residents informing them of the risks identified in their backyard, the matter becomes personal, and effective control measures are more likely to be taken. The use of GIS and the mailing label extension greatly helps in our efforts to communicate this information to residents.

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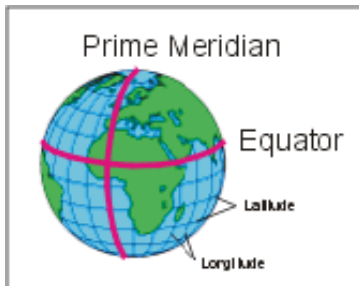


Select parcels within 300 feet of woodlot.

Summer 2004 GIS 101 The X-Y-Z's of GIS

by Mary Hagerman

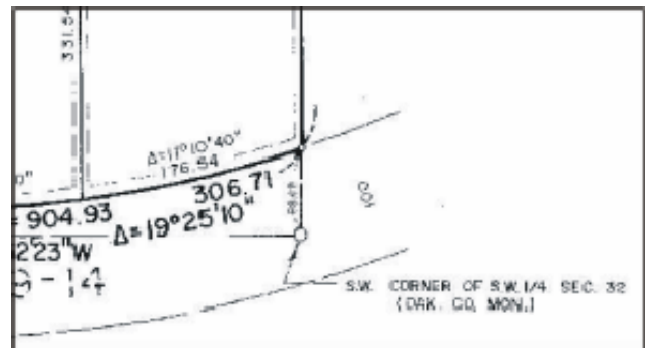
Every place has a set of coordinates that defines its location. They can be given as degrees of latitude and longitude, eastings and northings, or any of a vast number of coordinate systems. Locational coordinates are referred to as X and Y, similar to the X and Y axes of a graph. In the real world, there is a third dimension as well. The Z coordinate is the elevation at a given X-Y location.



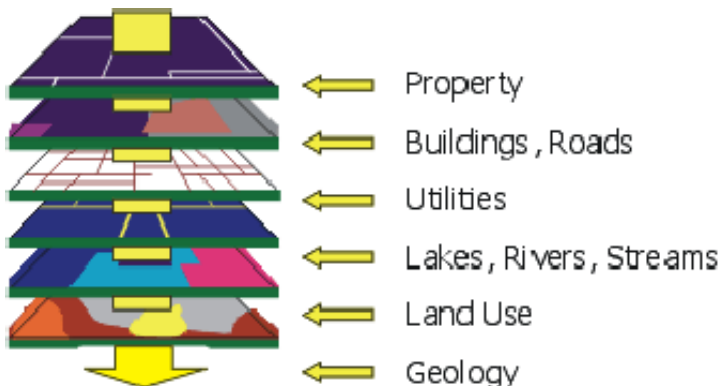
Coordinate systems such as latitude and longitude are based on distances along imaginary lines on the surface of the earth. Latitude refers to the distance north or south of the Equator, which is an imaginary line around the Earth that lies at an equal distance between the poles. Longitude refers to the distance east or west of the Prime Meridian, a north-south line running through Greenwich, England. Other coordinate systems similarly describe real world locations.

GIS uses X-Y-Z coordinates to tie geographic features to the real world. The parcels, streets, and water layers all have coordinates that define their location on the surface of the earth. Without coordinates, these data layers would simply be digital drawings or pictures.

Plats and as-builts are examples of drawings, and air photos are, of course, pictures. They may be very accurate, precise, and realistic representations of the real world, but they lack coordinate ties to the earth's surface. Plats incorporate points with known coordinates, such as section corners, upon which parcel and right-of-way lines are based. By referencing these known points we can create and maintain parcels in GIS as features with accurate coordinates. Air photos can be georeferenced, a process by which identifiable points on a photo, such as intersections, are assigned X-Y coordinates. Once the coordinates are assigned, the photo can then be lined up with the data layers in GIS.



Detail of Plat



Coordinates not only allow us to tie features to the real world, but also provide a common link between different features. This allows us to overlay multiple datasets for analysis. We can easily see where industrial areas overlap a floodplain, or how zoning matches up with land use.

Coordinates also make it possible to take measurements and calculate area. Because we know, or can measure, the distance between points in the real world, we know what the distance is in GIS or on a map. The map scale defines that relationship. For

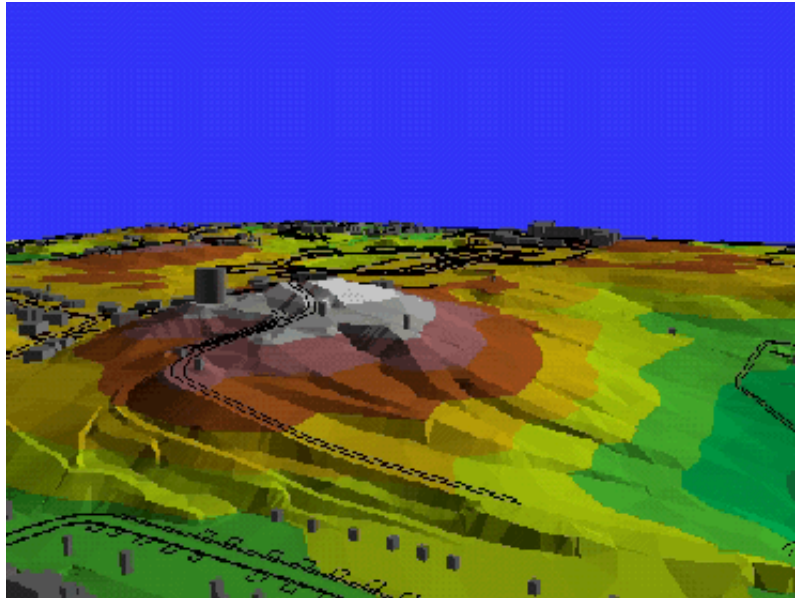
example, a scale of "1 inch = 100 miles" means that 1 inch on the map equals 100 miles on the earth's surface.

Less commonly used is the Z coordinate, which is also called elevation. Elevation is the distance above some level plane, usually sea level. You can think of X-Y coordinates as a two-dimensional (2D) flat surface, like a map. Adding the Z coordinate makes this surface three-dimensional (3D), like the real world. GIS is often used to

produce flat, 2D maps, but it is well suited for 3D modeling and analysis as well. The Z coordinate, or elevation, in GIS allows us to create contours and 3D surfaces such as digital elevation models (DEMs).

X-Y-Z coordinates are the geographic locations that put the "G" in GIS. Those three letters define the difference between GIS and computer-aided drafting or computer graphics. It's the geography that makes GIS such a powerful tool for modeling real-world, real-life scenarios.

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Summer 2004 Tech Talk Introducing ArcSDE

by Matt McGuire

In a previous Newsletter article (see Fall 2003), we learned about the Geodatabase. A Geodatabase is actually not a product, but rather a technology. ArcSDE is the product that supports the technology. Dakota County will start using ArcSDE for a parcel-update redesign, and likely other projects in the future. Well, what is ArcSDE? How will it impact GIS at Dakota County? Below is a simplified explanation of what ArcSDE is, followed by a short evaluation.

What is ArcSDE?

ArcSDE (or just SDE), which stands for Spatial Database Engine, is the software used to allow access to Relational Database Management Systems (RDBMS), such as Microsoft's SQL Server, from GIS clients. ArcSDE creates and manages geodatabases on the various RDBMS products. Each RDBMS may work different internally, or even have different methods for storing spatial data. ArcSDE manages the geodatabase in each RDBMS differently but provides a consistent view to GIS clients such as ArcIMS or ArcView.

What are the benefits of ArcSDE?

ArcSDE gives the user all of the advantages of using an RDBMS. These include the relational model, concurrent transaction management, database constraints, and error management and recovery. For GIS this allows for more robust data models, faster data editing, and less time managing data.

Scalability is an important benefit of using ArcSDE. Scalability means that database systems can handle many users at once much more easily than file-based systems. Another benefit to having your data in the RDBMS is that the rest of the organization's data is in the same database. This makes it easier to integrate business data with spatial data.

What are the trade-offs?

There are some advantages of a file-based data structure that you will lose with the RDBMS. First of all, RDBMS are more complicated. If you don't have access to a Database Administrator (thankfully, we do!) it's probably not a good idea to use ArcSDE. Second of all, the GIS industry hasn't spent years fine tuning file-based structures for nothing. File-based structures such as shapefiles are very fast when used by a small number of users.

How will ArcSDE be used at Dakota County?

Dakota County has chosen to start using ArcSDE for the parcel editing process. This process was chosen first because it will improve a foundation dataset used by a lot of people. Implementing ArcSDE will allow us to exploit the relational data model to allow a more complex parcel data model. It will allow multiple people to update it at the same time, while simultaneously supporting all the clients viewing the data. This includes the several hundred Parcel Query and the several hundred thousand Real Estate Inquiry users, in addition to the 50+ ArcView and ArcINFO licensed users here at the County. Finally, it will allow us to move away from workstation Arc/INFO by bringing our parcel management platform up to speed with the rest of our GIS technology.

Gradually, and where appropriate, ArcSDE will allow us to develop applications that integrate the business data from other departments with spatial data. We would like to do this in order to make GIS information more accessible to more Dakota County employees and business units. It just might open up new ways of looking at your existing data and improve support for decision making.

Don't worry though, shapefiles are not going away! They will still be the storage medium for many datasets. If any datasets that you use do switch to database storage, our goal is that you, the GIS user, do not notice the change. However, if you can think of applications in which ArcSDE might be helpful to your department, please let

us know, we'd love to brainstorm with you!

For more information about SDE, see "Understanding SDE", an in-depth introductory document from [ESRI](#).

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