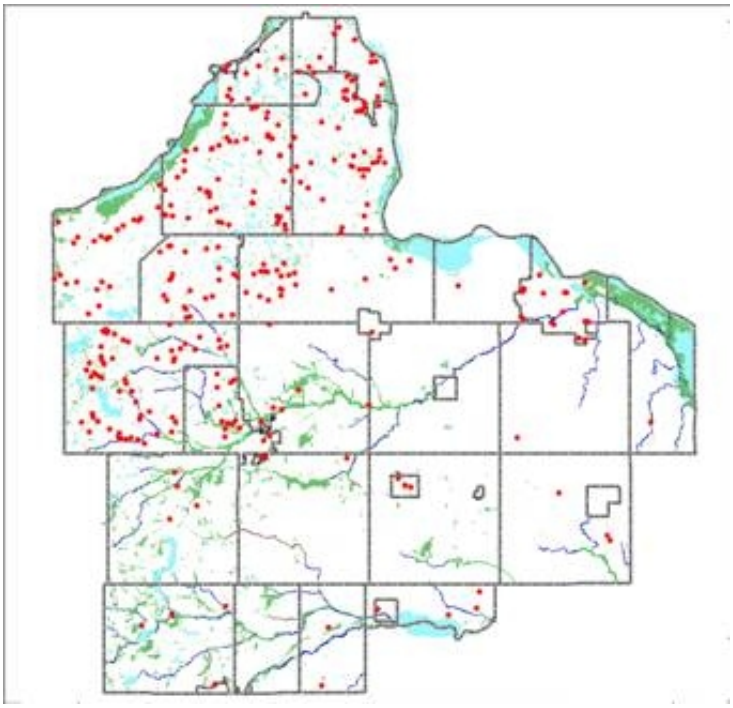
Spring 2006 Department Spotlight Dakota County SWCD Data Management of Construction Sites

by Mike Isensee - Urban Conservation Technician, Dakota County Soil and Water Conservation District

Since 2004 the Dakota County Soil and Water Conservation District (SWCD) has performed erosion and sediment control compliance inspections for construction sites that disturb over one acre of soil, as part of a partnership agreement with the Minnesota Pollution Control Agency (MPCA). The primary goal is to determine compliance with the site's National Pollutant Discharge Elimination System (NPDES) Storm Water Permit for Construction Activities. Other goals include identifying un-permitted construction sites, and establishing efficient methods for data collection and report generation.

To identify construction sites, the SWCD requested a list of active construction sites from each community. Identifying active construction sites in townships proved to be more challenging, and often times 2002 aerial photographs and parcel information was used to identify potential construction sites based on parcel changes (i.e. if an agricultural field was subdivided with a new road) and recent sales.



Identified construction sites were located and mapped. Information from the MPCA and the communities were used to create a countywide location map of 320 regulated construction sites. Construction sites were then identified with a point data layer and labeled with a unique identifier. The unique identifier was used to join the point layer to an Excel database that contained all owner, operator and permit information. The resulting map was then updated and reprinted prior to each round of field inspections.

Inspections were performed using Personal Digital Assistants (PDAs) and Pen Dragon Forms software which provides a user-friendly interface for collecting data. During the initial round of inspections, information about compliance with NPDES regulations and construction information was collected. Collected data was then synced with an Access database and merged to generate inspection reports that were then mailed to the regulated parties.

During the 2004 construction season the SWCD performed 860 field inspections at 320 construction sites. The data revealed a noncompliance rate of 86% with NPDES regulations. The resulting concern over a lack of compliance that was generated by our data was pivotal in starting a statewide two-year pilot program with 10 other local partners. As an MPCA pilot program partner, the SWCD maximizes efficiency of inspecting construction sites through the use of digital data collection and GIS.

Spring 2006 Desktop GIS CAD vs. GIS

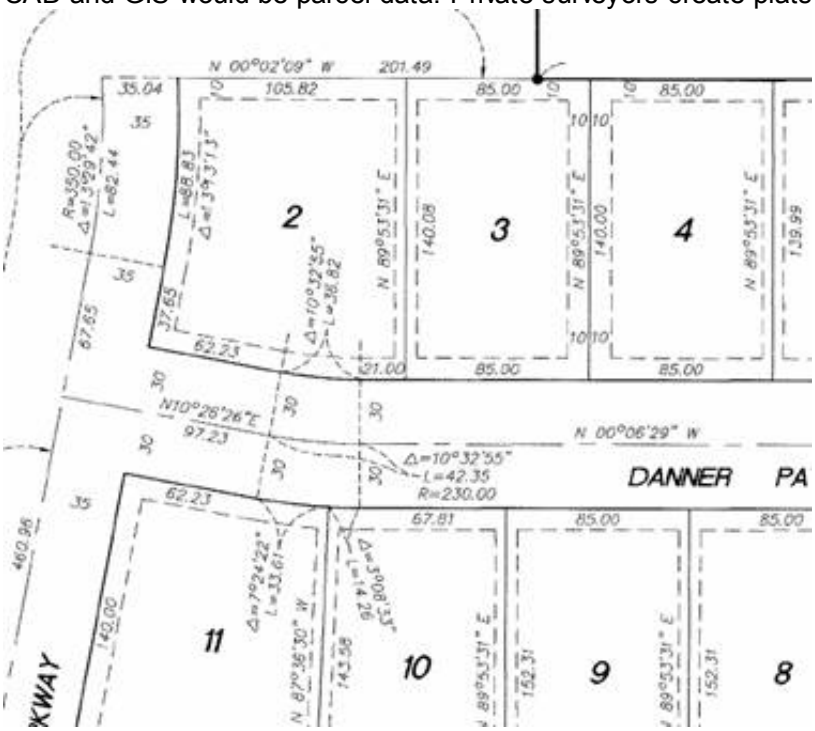
by Matt McGuire

CAD (Computer Aided Design) and GIS (Geographic Information Systems) can both make maps and work with spatial data. But as a GIS specialist, it wasn't until I worked closely with CAD users that I understood its capabilities.

CAD and GIS come from very different perspectives. CAD is a replacement for drafting, and is used mostly in the manufacturing and engineering fields. For example, one of the early CAD systems, called DAC, was developed by General Motors for designing automobiles. (See http://accad.osu.edu/~waynec/history/lesson10.html for a more thorough history of CAD.) On the other hand, GIS had its early origins in large scale (state- and national-level) spatial data collection for work on projects such as statewide land cover analysis.

In most fields, the uses of CAD and GIS are quite distinct. This article ignores all of those areas, such as remote sensing and electrical engineering. Overlap of GIS and CAD does occur frequently in fields where highly accurate mapping is necessary, such as in surveying or civil engineering, both important fields for local governments. To make matters more complicated, CAD companies like AutoDesk (makers of AutoCAD, the most-frequently used CAD package) are getting into the GIS field, while ESRI is trying hard to get into the surveying and engineering fields. So, CAD products may have GIS functionality, and GIS products may have functions that are more frequently associated with CAD.

So when is CAD used and when is GIS used? An example that illustrates the overlap and differences between CAD and GIS would be parcel data. Private surveyors create plats (which show parcel locations) and submit hard copies of them to the county. These plats are almost always drawn with CAD software, because all they need to store is the lines (and the associated text) and their precise relation to each other. They are making a technical drawing, and the CAD software is optimized to do this quickly and accurately.



If the plat is approved, it must be entered into the County parcel basemap. This is when a GIS is needed, as CAD can't store information. Here the lines that make Lots, Blocks, and Plats become parcel polygons. They must fit into the polygons surrounding them. Even more importantly, these polygons must store information like the PIN (Property Identification Number) and Owner Name and all the other great information that our parcel basemap has in it. That way, when people go to Real Estate Inquiry they can search for their parcel.

An important part of GIS is it's use as a decision support system. To use the parcels again in a simple example, suppose you needed to notify everyone in an area about a proposed development. You could ask a GIS to return all parcels within 1,000 feet of the development. You may have all the parcels and the development in CAD data. However you would have to do the 'spatial query' by hand. A more complicated example would be 'show me the largest undeveloped tract of land within 1 mile of the interstate'. Assuming you had the data to support this, asking

the question of the software would be relatively simple in GIS compared to CAD.

In general, I would summarize it like this: CAD programs that act like GIS notwithstanding, CAD is a graphics program, and GIS is a database program. With CAD, it's the lines themselves that are important. The drawing is the information. With GIS, the lines are just a representation of the data behind it.

Spring 2006 GIS 101 Asset Management and GIS

by Kent Tupper

Asset Management can be simply defined as a process of inventorying, operating, maintaining and upgrading assets in an efficient, effective manner. Government assets are defined as anything owned by a government unit, from picnic tables to snow plows. In local government, efficient and effective Asset Management is expected and even required in some cases, such as in the GASB 34 procedures.

Key components of an Asset Management system should include centralized databases, to help ensure data accuracy and organizational accessibility, and tools for analysis to aid with resource allocation, budgeting and long range planning. This is where the power of GIS is invaluable. If you are managing location-based assets, GIS gives you a way to quickly see your assets on a map and to access that information through a single interface (such as an interactive GIS map). Status, condition and location can be displayed in one quick glance. That alone saves valuable time, but GIS also provides you with tools to analyze assets based on location. This means not only can you determine the proximity of one asset to another, but you can look at and analyze other geographic information as well. How does the surrounding environment affect the things you are managing? You can look at property ownership, value and use. What is the terrain like? Where are the wetlands or floodplains? Aerial photography lets you see what the site looks like. What types of soils are in the area? How can I most easily get to where I need to go? Additional layers showing other datasets, such as streets or soils, lets you answer these questions and more.

Accurate GIS data can reduce and even eliminate costly field visits. Having an accurate location of your asset and the location of nearby construction can eliminate the need to make an extra trip to the site. Routine maintenance can be scheduled and routed in the most efficient manner. Keep in mind also that similar assets may have different characteristics. Properly identifying the asset in need of repair or maintenance before going out into the field means that you will know the proper tool or replacement part you will need before you leave to go to the site.

For example, let's say you receive a phone call from a citizen reporting that a street light is out on their block. You ask for their address, enter it into your GIS and a map of the area is displayed. You see that there are actually two streetlights in that vicinity. Not only that, but they are of two different styles that require different replacement bulbs. You also notice that one of them has had its bulb replaced just two months ago, so the problem may be more than just a bulb. You ask the citizen if it is the street light three houses down near the big spruce tree, or the one by the green house across the street? Hopefully the caller won't become distressed and peer out their front window to see who's out there.

The point is that GIS can give you quick access to an abundance of information, saving you time and money and helping you to make better decisions. Talk to your GIS specialist about how GIS can help you with Asset Management.

Spring 2006 Tech Talk - You Have GIS Options

by Joe Sapletal, GISP

There is no arguing the fact that ESRI is a leader in the GIS software world. Tens of thousands of people come from the world over to the annual users conference. But did you know there may be other GIS software packages out there that could help you get your job done?

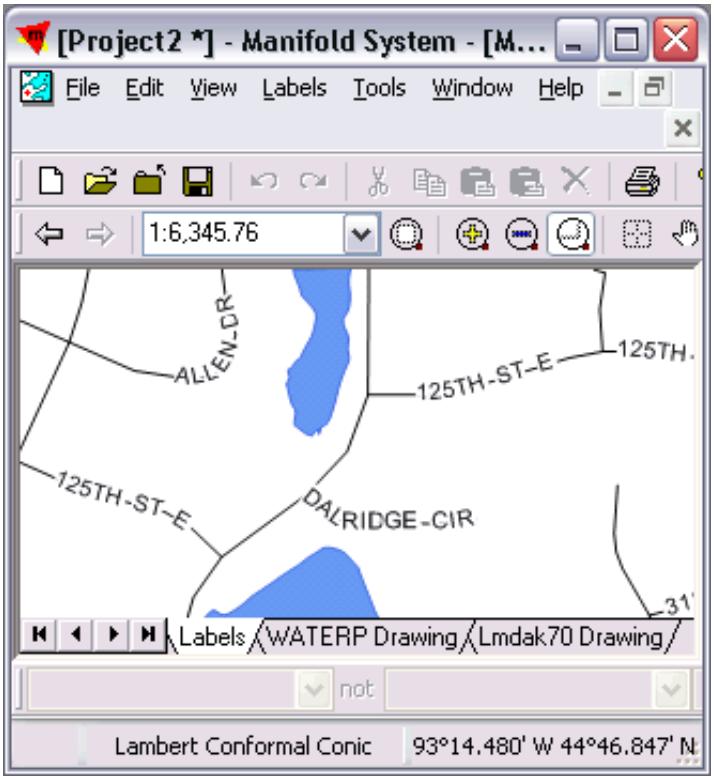
Key		
$	=	$1 - $99
$$	=	$100 - $499
$$$	=	$500 and up
Free	=	Free!*

*Commercial restrictions may apply.

Most of the readers of this newsletter work for government agencies and are ESRI ArcGIS users. Government employees have a need to be extremely fiscally responsible with the taxpayer's dollar, or else it can end up on the news. ArcGIS is an expensive product to purchase and maintain, so it is always a good idea to periodically investigate the other products that are out there competing with ArcGIS. Are they easier to use? More efficient? Cost-effective? User-friendly? Are they intuitive? Do they meet the users' needs - be they advanced users or basic users? Let's take a look at a few.

Manifold GIS - $$

"Manifold System Release 6.50 Professional Edition is the most comprehensive, the most powerful and the easiest to use GIS and mapping system ever created. Nothing else, at any price, even comes close." - Manifold.net



Manifold GIS is a comprehensive data creation, data editing, analysis and cartography tool that comes with an integrated IMS (Internet Map Service). At version 6.5 this application almost has too many capabilities to mention, such as importing data from over 80 different formats, integrated GPS capability, and photo-editing software-like functions for map creation. These are in addition to the software's standard view, identify and edit tools.

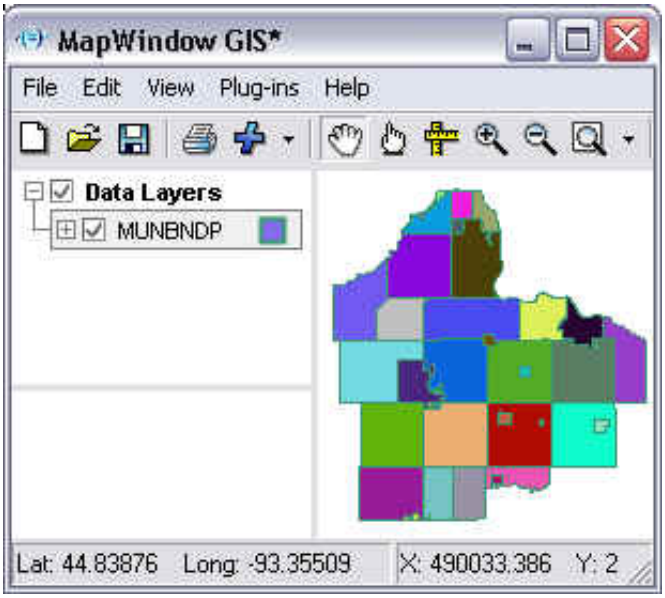
MapInfo Professional - $$$

"MapInfo Professional is a powerful Microsoft Windows-based mapping application that enables business analysts and GIS professionals to easily visualize the relationships between data and geography. With MapInfo Professional, you can perform sophisticated and detailed data analysis by leveraging the power of location." - Mapinfo.com

Another of the leaders in GIS software. A comprehensive software package for data creation, editing and analysis that is strongly focused on business users. They have many analytical tools and use Crystal Reports to create reports from your analysis. They also have a number of cartographic tools for making quality products and various training options for learning the product.

MapWindow GIS - Free - Open Source

"MapWindow is a 'Programmable Geographic Information System' that supports manipulation, analysis, and viewing of geospatial data and associated attribute data in several standard GIS data formats. MapWindow was



developed to address the need for a GIS programming tool that could be used in engineering research and project software, without requiring end users to purchase a complete GIS system, or become GIS experts." - MapWindow.org

MapWindow is not just a data viewer, it has plug-ins for other tasks, and because it is considered an extensible GIS, users can write plug-ins to share with one another. With the MapWinGIS ActiveX Control you can program into your own software mapping functionality.

MapWindow allows for viewing of all of the ESRI file types, such as shapefiles, GRID data and so on, along with a number of image formats as well. One of the built-in plug-ins enables you to edit shapefiles.

Quantum GIS (QGIS) - Free - Open Source

". . . a user friendly Open Source Geographic Information System (GIS) that runs on Linux, Unix, Mac OSX, and Windows. QGIS supports vector, raster, and database formats. QGIS is licensed under the GNU Public License." - QGIS.org

QGIS supports shapefiles, ArcInfo coverages, Mapinfo and a number of other formats. It also has the ability to identify, select and label features, as well as display an attribute table.

These brief overviews cover just a few GIS applications that we have noticed in recent months. There are more than likely many more out there. If you are a user of one of these mentioned above or of another and would like to write a unbiased review, please contact a GIS Specialist.