

# A Geographical Information System Allows Unending Use of Information

As you may know, the Kansas Rural Water Association provides a GPS mapping service. As of December 31, 2009, 85 water systems, 16 wastewater systems, and three gas systems have been completed. As of Feb. 1, 2010, KRWA has 52 mapping projects in progress.

A Geographic Information System (GIS) allows local systems to incorporate an untold amount of information into a digital format that helps cities and RWDs better manage their utilities. The information that is gathered or entered is maintained in attribute tables and associated databases. There are several components that contribute to a GIS. These examples include digital representation of location, geographic location (X, Y coordinates),

There are sixty possible combinations PER PIPE SECTION with just the pipe types and sizes. With so many possible combinations, an accurate and easy-to-use attribute table is essential.

symbology, background layers, reference layers, features and attributes of features. The representation of the location of features in a system is obviously important to describe “where something is”. Equally important is being able to differentiate between features to determine if a person is looking at a 24-inch transmission line or a 2-inch pipeline. Background layers, such as photography, topology, roads, streams, water bodies and county

section lines are all available to include in a utility map document. Those “reference layers” are important to help users develop a quality printed or digital map. One component that is often taken for granted is the attribute table of a feature. A GIS is designed so that a user is able to associate information with each feature or item in the digital file. This gives the user the ability to quickly obtain information about each feature, determine answers about accounts associated with the features, query the files for similarities or differences and organize features based on unique attributes. The attribute table is an ever-present component but oftentimes overlooked.

## The city of Garnett’s gas system

When the city of Garnett asked KRWA to collect data for new gas system maps, they realized that having the global positioning system (GPS) data for future locating applications would be beneficial but another useful tool would be the capabilities associated with having the system in a digital format. There have been several new installations in Garnett, including the replacement of bare steel with new polyethylene pipe, the insertion of new pipe into old pipe, new residential development installations, transition locations from high pressure to low pressure lines and all the associated fitting locations. City personnel have measurements and notes about locations, pipe sizes and types but “thumbing through” all that information to determine an answer to a question

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6	Polyline	0 PE		X		888.7
7	Polyline	0 PE		X		861.28
8	Polyline	0 PS		X		60.27
9	Polyline	0 PE		X		66.12
10	Polyline	0 PS		X		66.03
11	Polyline	0 PE			X	465.76
12	Polyline	0 PVC			X	327.24
13	Polyline	0 PVC			X	855.79
14	Polyline	0 PVC			X	808.49
15	Polyline	0 PVC			X	571.2
16	Polyline	0 PVC			X	421.36
17	Polyline	0 BS			X	149.44
18	Polyline	0 BS			X	677.34
19	Polyline	0 PE			X	133.56
20	Polyline	0 BS			X	55.97
21	Polyline	0 PS		X		490.82
22	Polyline	0 PVC			X	802.3

For this area of Garnett, all 4-inch pipe was selected and the total length was determined.

Because every section of pipe was categorized into size, type and pressure the different types can be quickly selected and questions can be answered.

user can select all bare steel pipe, determine the amount of material he needs to order or have on hand, and ascertain its location simply by opening a digital file and using the computer to get the answers he needs. Without an accurate and detailed attribute table, this would be a time-consuming task that could possibly produce inaccurate results. GIS analysis software does what the user asks, does it quickly and is seldom incorrect.

was a hassle and very time consuming. City Manager Butch Rocker sent an outline of information he wanted to see in an associated attribute table. It included information including: main line size (1-, 1-1/4-, 2-, 3-, 4-, or 6-inch); main line type (bare steel, polyethylene commonly known as "PE", PVC, protected steel or inserted); pressure (high or low); installation date, and "other" information. There are sixty possible combinations PER PIPE SECTION with just the pipe types and sizes. With so many possible combinations, an accurate and easy-to-use attribute table is essential. KRWA staff developed a table that will identify each section of pipe, allow for the re-symbolization of each section by size, type or pressure, and allow for all lines to be sorted by category. Because the attribute table is editable and expandable, the files can be kept up-to-date as new installations occur.

When there is unique data about a specific attribute (such as pipe size), information can be extracted based on certain parameters. For example, in one area of Garnett, all 4-inch pipe was selected and the total length was determined.

Because every section of pipe was categorized into size, type and pressure the different types can be quickly selected and questions can be answered. If the city wants to replace all bare steel pipe with PE pipe, the



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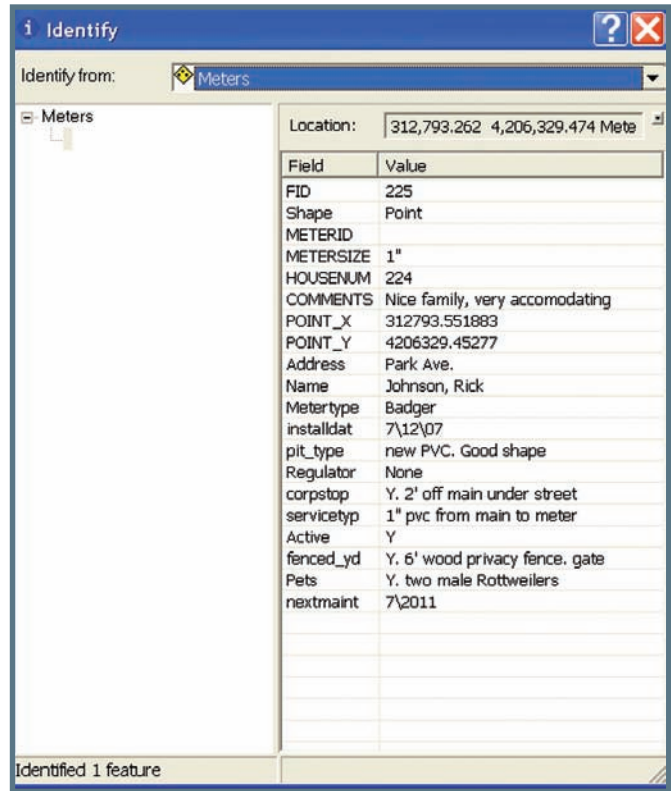
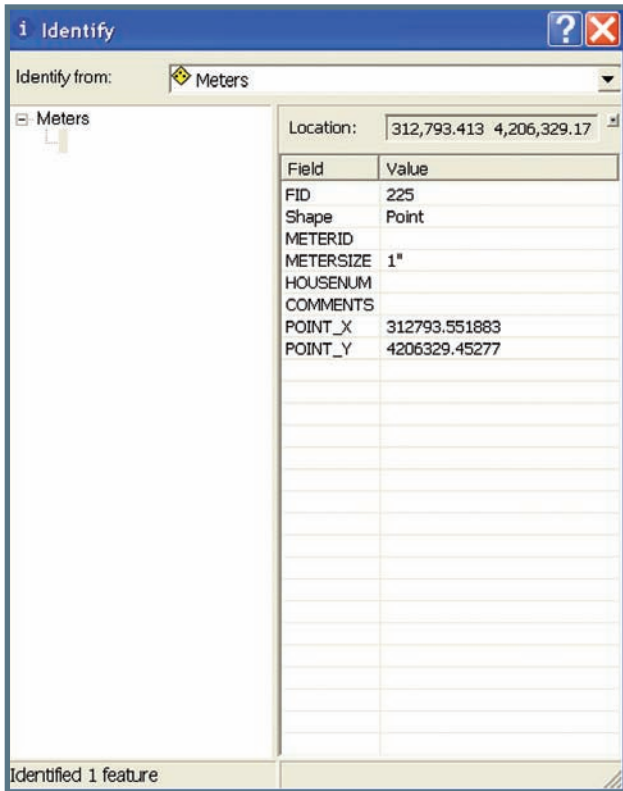
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### Don't redesign the digital wheel

Entering data into an attribute table can be monotonous. The process is nothing more than basic data entry of pipe sizes, meter numbers, installation dates, brand names and other such information. However, most of this data has already been archived in the form of spreadsheets or databases that exist in a clerk's or utility manager's computer. It may simply need to be brought up-to-date. With the capabilities of today's software to reformat files, usually these infrastructure data files can be imported into an attribute table that is associated with a digital map and vast amounts of information can be stored about each feature such as a meter. For example: An existing spreadsheet that contains meter account information can be saved as a database file and joined to an existing attribute table. The difference is shown above.

The window on the left is the original attribute table of a meter. The window on the right shows the same table after the additional data had been joined. This is an effective way to quickly view information about a feature such as a meter or valve in the system. Basic maintenance information has been added to the attribute file making it more beneficial to people such as meter readers, maintenance personnel or someone looking up ownership information. The attribute table is editable, but only from the computer that runs the GIS software. A process called hyperlinking is better suited to making the files more beneficial and editable to a network community.

### What is hyperlinking

As data files grow, a different approach may be needed to maximize space on the computer screen and in each feature file. Linking a feature to a file on a computer or network is a way to access vast amounts of data without having to store that data within a shapefile. This is how it works. If a meter has basic information in its attribute table like meter number, account number, size, address and install date, it can also have "fields" (these are the different columns that are contained within an attribute table like columns in a spreadsheet) that identify different paths in a network or on a computer to other sources of data:

Meter number	123
Account number	02-0934
Meter size	5/8-inch
Address	1 Park Ave, Anytown, USA
Install Date	1/1/10
2000 – 2005 Account information	E:\Projects\City of Anytown\Account history\2000-2005
2006 – 2009 Account information	E:\Projects\City of Anytown\Account history\2006-2009
Billing information	E:\Projects\City of Anytown\Billing\Compiled data\123
Customer information	E:\Projects\City of Anytown\Customer info\123
Water usage	E:\Projects\City of Anytown\Billing\Water usage\123

The paths to the different files are linked to databases stored in the computer and will open upon request. This is all done automatically and allows a user to access different sets of data at the same time from one directory instead of exploring a computer for several different files. Also, if the linked files are from a network database where several different departments have access and are constantly updating those files, the user will have real-time accurate data to work with. When the user clicks on a link, the computer will display the most recent file that includes all updates.

**Attend and learn how your community can benefit by having information stored in digital format.**

The attribute table is a very useful tool that is often overlooked as the “form that I have to type everything into”. Different functions of the GIS software allow us to select, edit, sort, determine length, determine ownership, review dates and schedules, view images and generally allows us to maintain our files from within the attribute table. Developing an accurate

and complete attribute table will increase efficiency and decrease hours spent “looking things up”.

I encourage you to attend the 43rd Annual Conference in Wichita, March 30 – April 1. I will demonstrate how a functioning and accurate attribute table and GIS can benefit city and county personnel in the Inaugural City Clerks’ Workshop on Tuesday, 3/30. That session should provide answers to any questions concerning GIS / GPS mapping. Attend and learn how your community can benefit by having information stored in digital format. Also, stop by the KRWA booth to review map products. Bring your questions.

### Why hyperlink?

When storing vast amounts of information within an attribute table, the GIS program will become less efficient and run slower because it has to include that information when loading, refreshing and compiling. When hyperlinks are stored in the attribute table, the program does not slow down because all of the information is stored in databases that do not “clog up” the program. Any type of database can be linked to a feature. Parcel information, appraisal information, past records, account information and anything that has a unique identifier such as an account number, address or name. This kind of functionality has made GIS software and people who know how to use GIS software, very sought-after in city, county and state offices.

Other types of documents can be linked to features in a GIS as well. One application that is very useful to maintenance departments is the use of scanned images or digital photos. When repairs take place, most utility managers take digital photos of the work as it is being completed to document the location for future use. If those locations are also marked via measurements from visible features, or by way of GPS collection, that point in the digital file can be linked to the digital photos that were taken of the area. Videos of repairs, of routes that were followed in the field for line installations, and even videos of surveying or data collection can be linked to features making them readily available for future reference. Memories fade but don’t take long to refresh if there is a photo to look at to remind the person “where something was.” Resolution of a conflict can be reached as well if there is an image or a video of a location or procedure that took place. And it’s all readily available. Instead of saying to a patron, “...I know I’ve got that here somewhere...” Now, it’s as simple as clicking on a parcel or meter or line point and opening the associated documentation.

*Pete Koenig is a GPS/GIS Tech at KRWA where he has been employed since 2004. Pete is also currently serving on the board of directors for Nemaha RWD 2.*





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