by Pete Koenig, KRWA Mapping Coordinator

Since 2002, KRWA has GPS mapped 55 RWDs and 28 cities. So, what's the benefit?

KRWA has conducted GPS mapping services for 55 RWDs and 28 cities since initiating a mapping program. KRWA has collected nearly 59,000 data points. There were 34,630 meters, 10,808 valves, 2,594 hydrants and 10,719 line points. With all this experience, GPS data collection has become second nature for KRWA staff Jesse Knight, Mark Thomas and me. It is not always "easy" – it requires nights away from home and tedious work on a computer when working with the files to create the maps. However, it is rewarding, as we are able to get out, work with good people in cities and RWDs and help create improved mapping products. And talking to operators, clerks, bookkeepers and board and council members often allows KRWA to learn of any additional concerns, offer suggestions and provide assistance that may otherwise not be requested.

There are other benefits to GPS Mapping that are realized during the process of data collection, but even more benefits can be realized with the finished information!

It's location, location . . .

Another benefit of the data collection process is that the operator or manager of a system has to physically visit each meter, valve, hydrant, cleanout, well, pump station, plant, intake, known line location (including creek crossings with marker posts, etc.) for every location to be collected. Most operators do not have the opportunity to visit each feature of a system's infrastructure and inspect its integrity, look for leaks, or simply take note of needed repairs or replacement. Collecting data demands that someone, at the very least, stands over each feature for a minimum of thirty seconds! For some rural water districts in remote areas of Kansas, this is a welcome venture as some "pasture meters" and creek crossings are not visited for months or even years. Simply looking down a creek bank to see if any pipe is exposed or if rains have eroded the banks can reduce future line breaks and the loss of water. Broken lids on pasture meter settings need to be replaced before cold weather sets in and freezes un-insulated lines.

Benefits of having data collected for system infrastructure vary. The simple and obvious reason is to archive the location of valves, meters, pipelines, etc. A less obvious and more complex reason is that engineers do not need to recreate digital GIS data for modeling of a system.

Archiving locations; handling files

Gaining better map products is the goal most systems have when embarking on a GPS mapping of a water, wastewater, gas or other utility. Also, many operators have a lot of information in mental files – but it's not on paper or known to anyone else. There are numerous communities that have lost an operator and now have also lost all the system information as to locations of facilities. Sounds irresponsible – but that's the case. But once an accurate GPS point is collected for a feature, it never needs to be collected again. Future generations and operators will always be able to navigate to any feature that has a known GPS coordinate. Storing it in a digital format is very efficient and sometimes more reliable than storing it in a paper format as discovered in Greensburg after the tornado struck the town in May 2007. With the City Hall destroyed, and all of it contents scattered, finding a map of system infrastructure was nearly impossible. If the data had been in a digital format that was copied and backed up to multiple locations (which is a good practice), the data could have been readily available to crews who were trying to locate infrastructure during the clean-up process.

Future generations and operators will always be able to navigate to any feature that has a known GPS coordinate.

Data in a digital format can be generally transferred electronically much more easily and efficiently than a paper map and notes can be sent via the postal service. These days, it is not uncommon to transfer files as large as 1-gigabyte in size. Infrastructure shape files and system feature class files are relatively small, compared to images or other documents that are sent electronically everyday. Sending a main line shape file to an engineering firm for analysis or hydraulic modeling is quick and easy to do. Sending a system's infrastructure files to a central repository or "off-site" location for backup only takes seconds.

Data can be useful in other software, locates

GIS data is in a database format. Attribute information about a feature is stored in a format similar to an Excel spreadsheet or in an Access database. The rows and columns that contain the information about a meter can be joined with billing software to provide such information as meter size, address or other comments. It can also be joined to AMR (Automated Meter Reading) software to give the meters' real-world locations at the time the system is

This assortment of paper maps at the city of Alma has been replaced by GPS data, newly printed maps and an updated wall map and quick access to maps viewed on a computer.

collecting monthly readings. The same can be accomplished "in reverse" as well. Information from billing software can be extracted and joined to the meter attribute table to include updated name, address, cross street, physical location of meter well, condition, or information in other columns that the operator would like to access in the field or on a computer that is not near the billing software or files.

There is equipment available that allows a person to navigate to a feature that has a known GPS coordinate. A mapping grade GPS unit is rather expensive, but like most electronic devices, as technology advances, prices decrease. I foresee a time in the future when a system or city could purchase a GPS unit with mapping software and sub-foot navigation capabilities at reasonable cost. If data were collected with a mapping grade unit that has sub-foot accuracy, the accuracy of the data will never change and a comparable GPS unit will navigate back to those features very efficiently. The data and a GPS unit could be used for locating system infrastructure during times of emergency (such as a tornado or flood) or when a request for locate is received.

Uses by engineers

After speaking with an engineer working in a firm in Kansas, I now have an understanding of what engineers can do with digital GPS or GIS data. I learned that most engineers today work in a "GIS world" where everything they do is entered into a Geographic Information System. This allows the engineer to extract information based on stored data. He stated, "We (engineers) are more interested in the 'data within the data' than the GPS data itself." The data that he refers to is the information about a particular feature, which could include it's geographic location, but also includes size, material type, pressure, number of customers or points of use and the number of fittings or elbows and interconnections. Data in a digital format allows an engineer to use hydraulic modeling software to obtain answers to questions regarding capacity, flow rate, a potential need for line loops, etc. Because the data is already in a digital format, the engineer does not have to "re-create" the data at additional charge to the client. Data that is already in a digital format saves time and money.

When GPS data is available for infrastructure, it allows engineers to more accurately plan improvements.

When GPS data is available for infrastructure, it allows engineers to more accurately plan improvements. By seeing an accurate representation of a water line on a map that shows the aerial photograph in the background, an engineer can

What owners say . . .

Two water systems recently commented on the benefits of GPS mapping.

John White, Operator of the recently constructed Phillips County RWD 1 writes:

The Phillips RWD #1 is a new system that began construction in the spring of 2007. The Board of Directors decided we wanted to do GPS from the start. We purchased a Trimble GeoXH unit. After we received the Trimble, we had no idea on how to turn it on much less how to use it. Pete and Jesse at KRWA were very helpful and came out and trained us on the equipment. The mapping was done during the construction phase. That made it a piece of cake. KRWA helped and then put all the data together for us and brought out a CD and showed us how to find the pipe in the ground. The maps that we received are much better than our as-built maps and the GPS is more accurate. We have used the Trimble unit on just about every locate that Dig Safe sends us. I don't know how we would get it done without the GPS mapping.

Jon Bolinder, Superintendent at the City of Alma, writes:

"We had numerous rolls of maps of our water, wastewater and gas systems. These maps consisted of everything from hand drawn, on various sizes of paper, to engineering plans for every addition and repair made to our systems dating back to the 1960's. The new aerial maps we received with the GPS mapping makes it easier to identify the location of our systems by looking at one wall map that is kept updated. We also use the computer version to print an 8.5 X 11 to send out on locates. This sheet can be discarded or attached to the locate ticket for added documentation. It's great that KRWA provides this service to its members – helping us obtain and maintain updated maps at an affordable cost."

determine what the best route will be to avoid obstacles. Farmers today have the ability to plant and harvest while using GPS technology. I presume that if a system has accurate GPS data for its water lines, it is conceivable that an "auto-steer" feature could be added to a trencher or backhoe that will guide an operator in order to avoid existing lines! Much like farmers today who are saving hundreds and thousands of dollars by not over planting or over spreading fertilizers/chemicals, machinery operators could confidently trench and dig by following the direction on a computer monitor mounted on their equipment! Might sound far-fetched but farmers are using this sort of technology regularly.

Kansas Rural Water has been collecting GPS data and developing a GIS for systems/cities since 2002, but it has never been as beneficial to the systems as it is today. The information that can be extracted from the data, when used with the right type of software can make managing a system more efficient, planning improvements less time consuming and allow more things to be done without leaving the office to visit a site.

Subsidy for GPS mapping

The Kansas Water Office, thanks to the Clean Drinking Water Fee, has offered a subsidy program to help smaller systems receive the lesser of up to $4000 or 50% of the costs of GPS data collection and map production. Smaller cities and RWDs that desperately need new maps but have not allocated for mapping costs in their annual budget cannot afford to have the data collected and have new maps produced! More information about the subsidy can be found at the Kansas Water Office Web site: www.kwo.org and then by clicking on the link "Public Water Supply System GIS Mapping Assistance Program" located on the right-hand side.

The 2009 KRWA conference will have a session about the benefits of GPS mapping and the development of a GIS. Please make plans to attend and learn how new practices and technology may make management for your utility more efficient. Copies of several system maps will be available for review also.

Pete Koenig is KRWA GIS Coordinator and KAN STEP Technician. He has been employed by KRWA since 2004. He is currently serving on the board of directors for Nemaha RWD 2.