By Mark Thomas, GPS Mapping Coordinator

Paper Maps vs. a Smartphone

With smartphones becoming a replacement for such things as credit cards, cameras, calculators, etc., some rural water districts and cities in Kansas have taken notice of this common gadget's capabilities to replace their paper maps in the field. That's not to suggest that paper as-builts or wallmaps are a thing of the past, but being able to determine where a valve or manhole is located by just driving up to the location and looking at your smartphone is quite remarkable. As long as an entity has had its utility infrastructure collected with "mapping grade" GPS, the city or RWD is able to take advantage of this technology. Best of all? It's free!

Three or four years ago, more and more operators who I had worked with on their mapping projects were asking me how to transfer the mapping data to their phone. At the time, I really didn't think anything outside of a mapping grade GPS unit such as KRWA's Trimble GeoXH would prove useful for a water utility because of limited accuracy. After doing some research and discussing this with David Rinaldi of Leavenworth RWD 7, I realized that a simple, yet free app such as Google Earth would be a viable option for using maps in the field

I'm not saying that a new I Phone 6 has a highly accurate GPS, because it doesn't. But being able to have utility data on a phone with modest GPS is proving to be very beneficial. Typical modern smartphone GPS receivers achieve an average accuracy of five to eight meters. That is just the average; sometimes it's better; sometimes it's worse. This accuracy isn't even close to what any operator needs when marking waterline locations, but that's not really the purpose of what the Google Earth App is intended for.

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Most of the projects that KRWA has mapped were constructed in the 1970's or later. With a sub-foot accurate utility mapping-grade GPS, district personnel drive the vehicle and KRWA does the data collection of every known point. By known point, I'm referring to meters, valves, cleanouts, and line points, or every water line location that they know of. Line points are typically road crossing signs, trench lines that are still visible, or visible spots where a leak was repaired. Waterlines that do not have any GPS points collected are simply drawn in according to the system's as-built plans or with district personnel who have the most knowledge about the locations. In areas such as these where

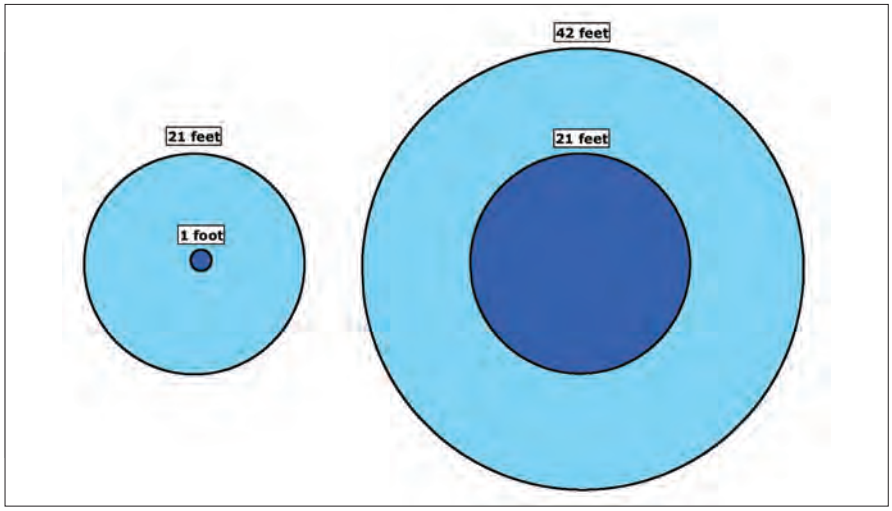
Mark Thomas demonstrates that checking for this manhole on his cell phone has the location nearly 15 feet from the actual point.

waterline locations are not exactly known, even a sub-foot accurate GPS will not be of any help, as you will be locating a guess.

KRWA's ultimate goal with every GPS mapping project is to get every bit of information about the system into the project, so that everything that is on all of the old maps or in the former operator's mind will be reflected on the finished project. KRWA can print all types of maps at the conclusion of the project, and they are great to have at board meetings and such. Remember though that everything that is on those maps can be on your smartphone.

All of the operators who I have spoken to in the last few years who have been using Google Earth on a phone, tell me that they don't really ever look at a paper map any more. The same can be said for the operators who were using laptops and office computers five to ten years ago. Andy Petesch of Jefferson RWD 1 recently contacted me to help set him up with Google Earth on his phone. KRWA finished their project in 2009, so the data was in place to do this. Andy has commented how beneficial the Google Earth mapping has been for him to help with locates. Instances such as an emergency locate no longer require him to go get his map that's either in a different pickup or somewhere else. He can simply drive to the locate site, get his phone out, open his Google Earth Map, and the GPS feature brings the map to the location so he can see exactly what the district has in the specific location. Even if the GPS feature shows that he is standing over a valve, when he is actually in the ditch 15 feet away, it is easy to see with Google Earth imagery that the valve may be on the other side of a fence. But it's close and revealing.

Any utility that has its infrastructure data in a digital format such as shapefile or geodatabase is able to use the Google Earth feature. One of the things that led me to choose Google Earth for a mobile app for RWDs and cities, outside of it being free, is the familiarity people already have with it.



These circles depict the degree of inaccuracy if someone were to collect a location with GPS on a smartphone. The circle to the right shows how the inaccuracy is compounded when that same point is located with a cell phone.

Most people already have Google Earth on their computers, and the data can also be viewed on those as well. All anyone has to do is go to their app store, and download it, along with another free app called Drop Box. Drop Box is just a storage app to use for a smartphone, similar to the Cloud, but it is actually on the phone. On my end, I just create a .kmz file using ArcMap here at the KRWA office, and send it via email. When the utility representative receives the email, he or she just saves the .kmz file into Drop Box. I recommend putting the file in Drop Box so that in a year you don't have to scroll through countless emails to keep finding the kmz file. Also phones are not like a computer where you can just put something on the desktop.

How about data collection with a cell phone?

At almost every city council or RWD board meeting, I explain the ability to use Google Earth once the mapping project is completed. The question that is always asked is, "Why can't we just use a phone to collect the data?"

Collecting data with a smartphone that has an average accuracy of five to eight meters will only compound the problem of limited accuracy. Simply put, a cell phone alone is not an accurate data collector! When I set up a city or RWD with Google Earth, every point in the data set was collected with a GPS unit with an average accuracy of approximately one foot. That means when navigating to those points, the user is guaranteed to be within five to eight meters of them with you're phone. If you collect all of your data with a phone that is five to eight meters accurate, then you try and navigate to those inaccurate points with the same phone, you are guaranteed to be within five to eight meters of a point that was already only five to eight meters accurate to begin with. Consequently you have doubled the level of inaccuracy.

If your system is interested in GPS Mapping, I encourage you to call KRWA at 785-336-3760 or email me directly at mark@krwa.net. The Kansas Water Office is also still providing a subsidy of up to $4,000 for GPS Mapping as a benefit of the Clean Drinking Water Fee.

Mark Thomas has been a GIS Mapping Tech since September 2006. Mark has a bachelors degree in geography from Kansas State University and has specialized studies in ESRI's ArcView and ArcPad software.