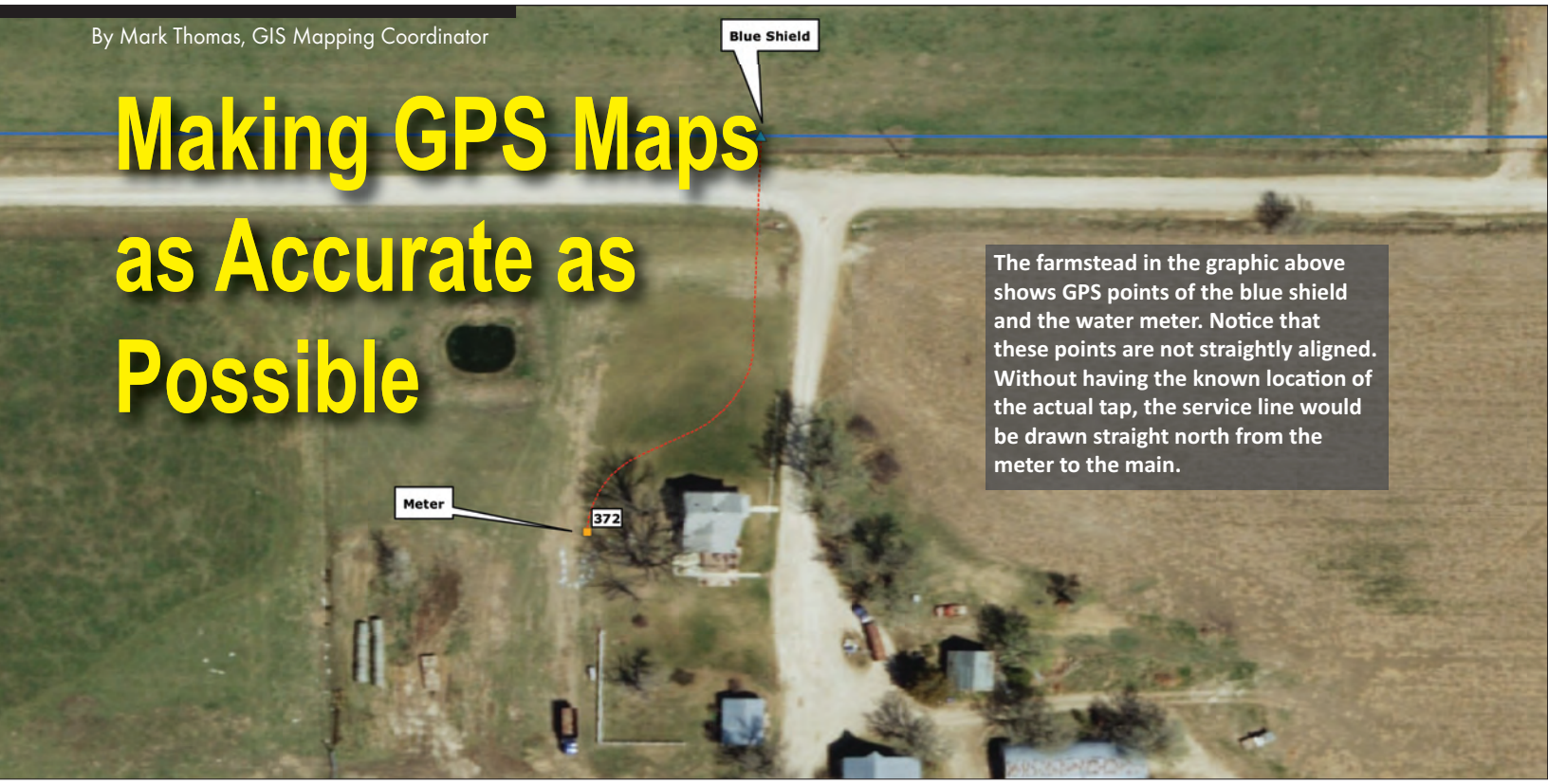
By Mark Thomas, GIS Mapping Coordinator

Making GPS Maps as Accurate as Possible



The farmstead in the graphic above shows GPS points of the blue shield and the water meter. Notice that these points are not straightly aligned. Without having the known location of the actual tap, the service line would be drawn straight north from the meter to the main.

Though GPS mapping is one of the best ways for utilities to maintain and archive system infrastructure, its been my experience that some RWD board and city council members of 50-year old water or wastewater systems aren't as aware as they should be about what goes into a GPS mapping project. Sometimes there is just a misconception of what GPS technology can, and cannot do. When KRWA collects data with a system, every known point or line is collected including valves, meters, and known waterline locations. Any unknown infrastructure will continue to be unknown until its hit by another utility, or a leak occurs, etc.

Information = improved accuracy

The amount of information that is available concerning the location of "what is buried where" varies drastically from system to system. Of course the age of the utility is a factor, but my point is that some water districts have done far more in the way of record keeping, notes on old maps, etc., than others, and this aspect is reflected in the end product of the GIS for those systems. Utilities with a lack of in-depth knowledge of their water or wastewater system should not expect the same amount of detail as others who have more information. A GPS mapping project is not the same turn-key product that everybody can just go out and purchase.

Unknown service line locations are particularly troublesome for many RWDs in Kansas. By service line I mean the 1-inch to 1.5-inch lines from the main to the meter. Many RWDs today have adopted a policy to place the meter on a certain side of the driveway along the public right-of-way and a certain distance from the main. This also eliminates excessive amounts of service line to maintain. During original construction, without such a policy, water meter settings were allowed to be placed at various location without any consistency. In some cases, the farmsteads are a quarter-mile to a half-mile from the public road. With changes in landowners and water operators over the years, knowledge of these service line locations becomes lost, leaving just a few clues. The direction that the meter setter sits, and if there is any noticeable trench line are usually all there is to go by. Outside of those two features, it is the operator and a best guess as to how a service line is drawn on the map in instances such as this.

Blue plastic shields?

This past year I have been collecting data with a large RWD in central Kansas that was constructed in late 1970s. The operator commented to me how important it was that we collect all

This locator is used by the RWD to locate the blue shields. A strap is attached to the metal loops shown on the top, turn it on, and wand it back and forth like a metal detector. The blue shield is found when the unit buzzes.

of the "blue shields" in the district. If you are like me, you would have asked, "What's a blue shield?" He explained that these blue plastic shields were buried on top of every original service tap, and that he has a locator that finds them. These blue shields contain a coiled wire that the locator picks up. His main worry was that if the locator would stop working, all of the locations of these blue shields would be lost, making GPS locations of these spots very valuable. I draw your attention to the photo of the locator. You may agree that his worries are warranted. Locators do not look anything like this anymore, but then again, if you've ever heard the term, "they don't make 'em like that anymore", this locator is still working 36 years later. Just recently he and I discovered that 3M sells these blue shields that look identical to his, and also produces locators to find them, but he still hasn't determined if one of the new locators is compatible with his old shields. I have heard of similar technology being used in telecommunications line locating, using a plastic ball or little wheel buried over the top of fiber splice vault or something of that nature. When given the opportunity to test the blue shield locator with the phone company's objects it did not work. 3M sells different locating objects for different utilities, so it is still possible that something is compatible with his original equipment. The original equipment was manufactured by Automation Products Co., Austin, Texas. The RWD's unit is a model #1207 electronic marker system.

This blue shield technology, for lack of a better term, works just like a metal detector, except that, this locator easily finds a blue plastic shield that is four feet deep. But the secret is likely in the coil of wire that is embedded in the shield. The main similarity of the locator to those on the market today is that it simply buzzes when waved over the shield. Anyone who has ever operated a metal detector knows that it

This photo shows a locating shield, known as a blue shield to a central-Kansas rural water district. This type of shield was buried on top of each of the 400 service taps in the water system during original construction in the late 1970's.

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is quite helpful if the operator has a good idea where to look in the first place. During the data collection process, while I'm collecting the meter location, the operator is locating and marking the blue shield, so I can collect that point without taking too much time. That RWD has approximately 800 meters in 2016; approximately 400 of the meter settings are original construction. While collecting data, we recognize that any meter with a customer number less than 400 is where we also need to try to locate the blue shields.

Having known locations of not only the meter, but the tap as well, is extremely valuable when trying to accurately map a service line. Having point "A" and a point "B" makes it much easier to connect the dots than just having point "B", the meter setting. Not to mention that it is also marking the mainline location. Being quite impressed with this old technology, I asked that operator, "Why don't the rest of the service taps have blue shields on them?" You could tell that it was painful for him to reply. He said, "Well, the operator before me didn't think they were that important, and threw a large number of extra shields away!" This just goes to show that one man's trash is another man's treasure. It is hard for me to believe that other RWDs didn't utilize this technology. I had never before seen a similar locating system.

Accuracy matters

When I send out a set of rough draft maps for a system to review, I expect those rough drafts to be thoroughly marked up, noting errors or needed changes. Long service lines as mentioned above should be penciled in to the best of the water system operator or board's ability. Systems need to utilize every possible resource when working with KRWA on a GPS mapping project. On areas in the RWD where there is uncertainty as to the location of pipelines, etc., anyone having any idea of the locations is helpful. That person may be a former operator, board member, contractor, landowner or others. My suggestion is to utilize whatever resources may be available.

Unless all available information is incorporated into the GPS mapping project, the system may only receive a newer version of the old maps, or the same lines on new maps. I don't think that this is the end result anybody wants to have as a result of GPS mapping.

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