



How Aerial Photography Helps Locate Water Lines

I've mentioned in previous articles and training presentations how older aerial photographs/imagery can be another tool in the toolbox for mapping water lines running cross country, diagonally across a section. Pay attention to the words "can be", as there aren't any guarantees when using this process. A few key variables are working for or against you when doing this, such as knowing the year the line in question was installed, and what type of ground it was installed on. Knowing the year the line was installed is important so you know what year of imagery might reveal a visible trench line. Ground type, pasture vs. cultivated farm ground matters a great deal as pastures usually reveal a trench line for many years after installation. In contrast, cultivation makes finding water line trenches much more difficult.

Pottawatomie RWD 2 benefited a great deal from reviewing older imagery. Construction of the district

began in 1977 to serve 151 meters, and the district provides water to 400 meters today. Located in the middle of Kansas Flint Hills, a lot of the water lines were installed where the contractor would encounter the least amount of rock, and anyone that has ever spent much time in the Flint Hills knows that the mile road system doesn't exist there as it does throughout the rest of the state. This means the RWD has many water lines running cross country, making locating difficult for new operators. Lynn Webster took over as manager for the district in 2007

and was also new to the water industry at that time. Knowing that a lot of the district's infrastructure would be hard to find, Lynn knew he had to start somewhere; the district contracted KRWA to begin organizing their GPS/GIS mapping in 2008.

Taking on a mapping project with KRWA will not automatically find every water line in the system and put it accurately on a map. KRWA's process is to help locate and collect every known infrastructure point in the system, such as meters, valves, flush hydrants, water lines, etc. This first

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The pipeline trench that crosses under this cornfield in Clay County in Spring 2021 imagery can be detected (in the highlighted area), even though the pipeline was installed decades ago.



The blue dashes indicate the location of another "cross country" water line in Morris County. The trench line is very apparent in this aerial 2021 image. The pipeline was installed a few decades ago through native tallgrass prairie.

step in the process is called data collection. After this is completed, I will draw up a set of rough draft maps going off of old as-built maps for the system to review and correct.

At the time, Lynn could borrow old 1978 black and white aerial section maps from the Pottawatomie County NRCS office and cross-reference the rough draft maps with those maps. Even with the resolution being what it was in 1978, it was easy for Lynn to see the white limestone trenches and

help him correct where I had incorrectly drawn some of the water lines.

Since Lynn and Pottawatomie RWD 2 took on this mapping project in 2008, options for viewing aerial imagery were far from accurate compared to what they are today, but having a resource like the NRCS maps proved valuable to the district. I don't know what years of hard copy imagery is available pre-2001 at NRCS, but if anyone is interested, they should

definitely consult with their local NRCS office. Today, Pottawatomie RWD 2 and many other RWDs are utilizing Google Earth to view their mapping data and multiple years of aerial imagery as a background layer. Depending on the area, users can view imagery years from 2022 and earlier usually every other year to 2001, then to 1991, and then to 1985. But the 1985 imagery is very fuzzy and only reveals a little. From 2012 forward, the imagery is all high resolution, clearly revealing trench lines, especially through Flint Hill pastures.

Cultivated farm ground is still a lot more difficult, even with high-resolution imagery, to locate old water line trenches. Periodically, I'll find the location of the trench line, where there is an apparent different shade of green stripe through the growing crops. I believe the time of year the imagery was captured also makes a difference. In my experience, I think imagery that shows crops early in the growth phase from April to May, or in August when the crops are likely struggling for moisture, enhances the chances of locating the trench lines. The imagery of pastureland after control burning also really helps out. The size of the trench that was dug also makes a difference, as three large natural gas/oil pipelines installed in 1952, 2008, and 2010 run through extreme northeast Kansas and are all visible through all types of ground as shown in the graphic.

If any city or RWD is interested or has questions about using Google Earth, or learning the benefits of GIS/GPS Mapping, I encourage you to give KRWA a call at 785-336-3760 or email me at mark@krwa.net.

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

