

An ArcGIS Path to Infrastructure Asset Management in Ottawa Kansas

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Abstract: The City of Ottawa, Kansas has realized the value of GIS and has taken steps to implement a comprehensive program that will allow the city managers and governing bodies to make better decisions about their aging infrastructure. With the assistance and guidance of a local consultant, the Utility Department began by establishing a base map in Kansas State Plane coordinates, rectifying existing CAD drawings, and field verifying all existing sanitary manholes, utility poles, hydrants, valves, and meters. Using Trimble GeoXT handheld GPS/data collectors, the process has been fast and allowed the City to save money by using temporary summer help to gather the data. Immediate payback will be seen through increased revenue from utility companies hanging lines on City-owned utility poles. Additional benefit has been increased knowledge of the connectivity and locational accuracy of sanitary sewer network. This paper details the process of getting our GIS to the current level and future goals.

In 1990, the City of Ottawa first contracted with George Butler Associates, Inc. to do a thorough inventory and evaluation of the City's sanitary sewer network. The City purchased one seat of GBA Sewer Master asset management software in which all the data initially collected was entered. The initial maps were in AutoCAD format and based on a city plat map as it appeared when first scanned and digitized for use in a computer based mapping environment.

In the late nineties the Utility Department started discussing the need for a complete inventory of the wastewater collection, electric distribution and the water distribution systems. For over two decades paper maps had been used by crews in the field, but the maps were only lines on a piece of paper and no where near accurate. Unfortunately, there were no designated funds in the budget to work with so in the year 2000, the first steps were taken to begin this project. The City purchased a seat of

ArcView for \$1,328.00 (software and maintenance) with monies left in the mapping budget at the end of the year. During the next two years, discussions took place to decide what steps should be taken to proceed with the project.

Knowing we were going to be doing the data collection, new utility maps were needed. The existing base map was outdated and not tied to state plane coordinates. By obtaining a parcel map from Franklin County, a new base map, in AutoCAD format, was developed. The existing maps were rotated and retrofitted to the new base map.



Above: Original maps were created in AutoCAD and rotated 90 degrees right - no one remembers why.

Right: New maps are correctly oriented (north to the top), in KS State Plane coordinates, and in color.



With money left in the budget in 2003, a Trimble GeoXT hand held GPS unit and ArcPad software were purchased for a cost of about \$4,700.00. Since the City already had the wastewater collection information in Sewer master database, in early 2004, the City contracted with Leonard Barnhill of George Butler Associates, Inc. (GBA) in Lenexa, KS to create a form in ArcPad to collect manhole locations and data, tie the existing sewer map to state plane coordinates and convert that

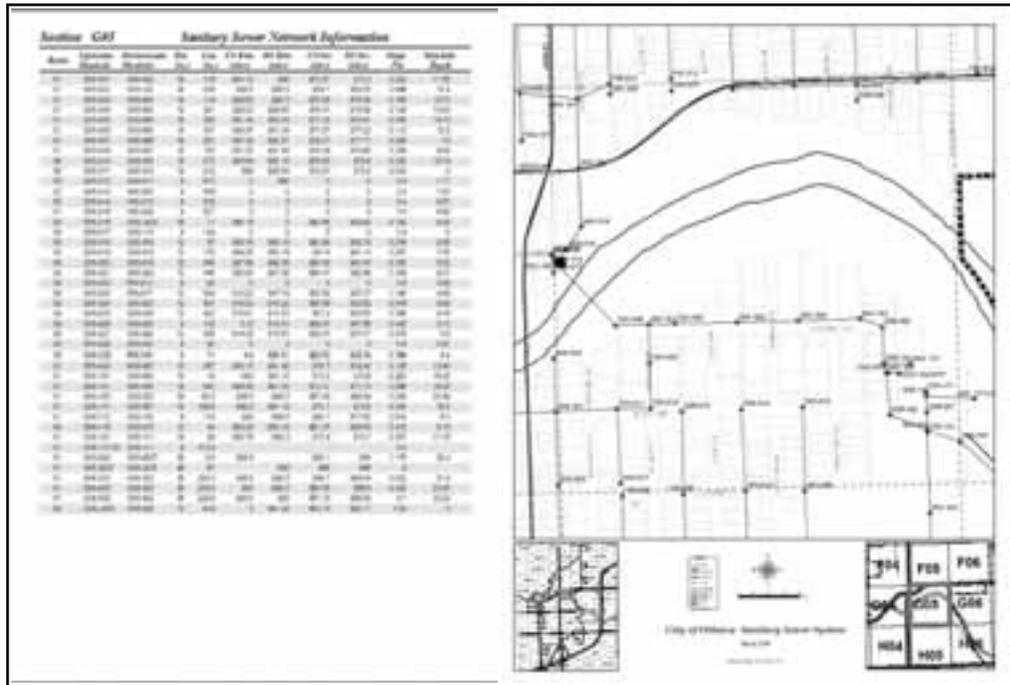
map to an ArcView file format. This work was roughly \$3,400.00 and was paid for out of our Sewer consulting budget. In May of 2004, the City hired a temporary seasonal worker for the summer to GPS each manhole in the system for about \$2,900.00. This was paid out of our Wastewater Collection Division budget that typically includes summer help with no additional request for funds.



Screen shot of Ottawa sanitary sewer system with two inset ArcPad shots of what can be seen on the Trimble GeoXT handheld device.

During the fall and winter months, data were checked against information collected in the field and in the existing database by Leonard and me. The cost of the consultant fees was about \$6,800.00 and was paid for out of the consulting portion of the Wastewater Collection Division budget with no request for additional funds in the budget. Once we were satisfied the data was accurate, sewer map

books were created and printed, in house at no additional cost for publishing, for use by personnel in the field.

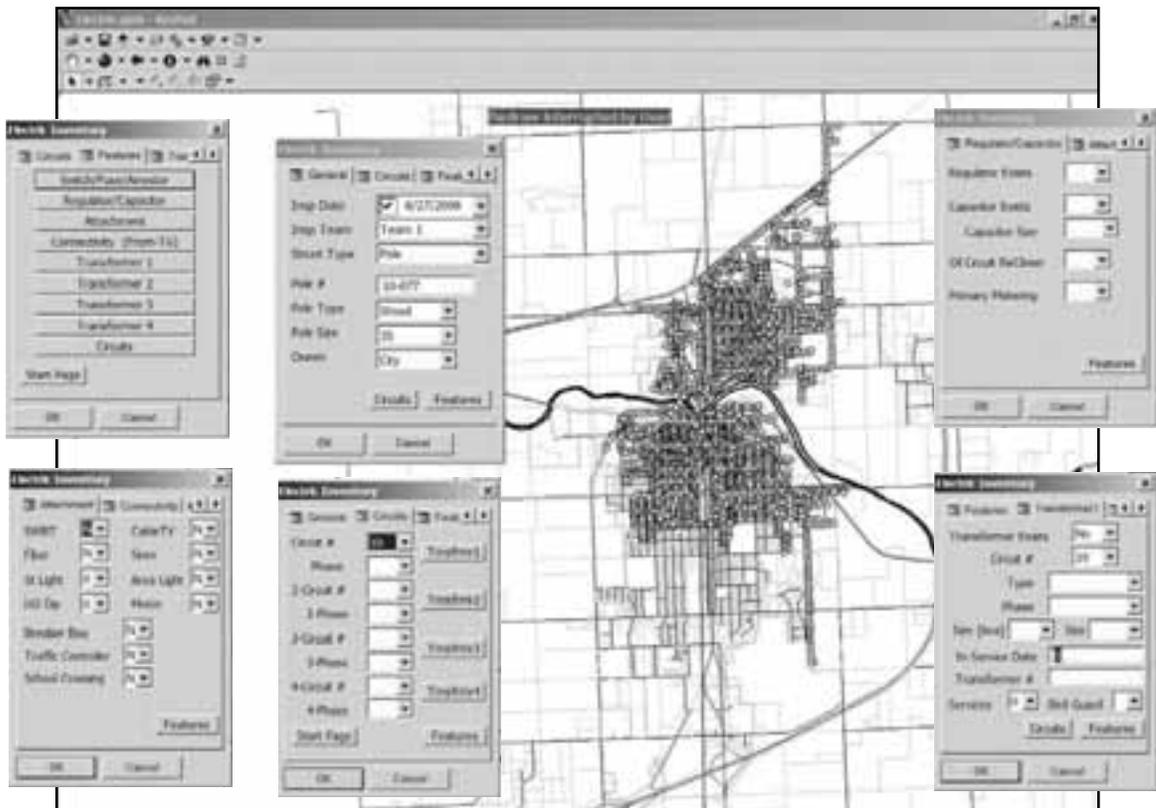


The above is a page from the new sanitary sewer mapbooks. The left side is attribute data for the pipes represented on the right page. This uses DS Mapbook within ArcMap to create the map joined to data in the GBA Sewer Master database. DS Mapbook identifies the pipe segments within each map page and exports a text file. The text file is joined to the Master Series database within Microsoft Access and a report is created representing the data for that page. Some careful front-to-back printing creates a very useful sewer mapbook for crews. This method also allows Darlene to reprint one page as needed when new manholes are added to the system.

The most accurate information was then used to target areas within the collection system for additional evaluation to determine where the repair dollars already in the budget could best be spent.

In 2005, the City again contracted with GBA to create an ArcPad form for the electric distribution data collection. The cost was about \$3,200.00, again paid for by money in the consulting portion of the budget, with no additional funds needed. In the mean time, Leonard and I worked on retrofitting the electric map as with the sewer map and tied it to Kansas State Plane coordinates.

During the summer, a temporary seasonal worker used the GPS unit to locate and collect all attributes for our power poles in 5 of the 12 electric distribution circuits in the City. This cost was about \$4,000.00 and was paid for out of personnel money targeted for seasonal workers in the Electric Distribution Division. The attributes collected included transformer, switch, fuse, wire size, and attachment information on each pole. Service connections were not collected in this effort. These will be added as work is done in those areas, new connections are made, or as time permits in the future.

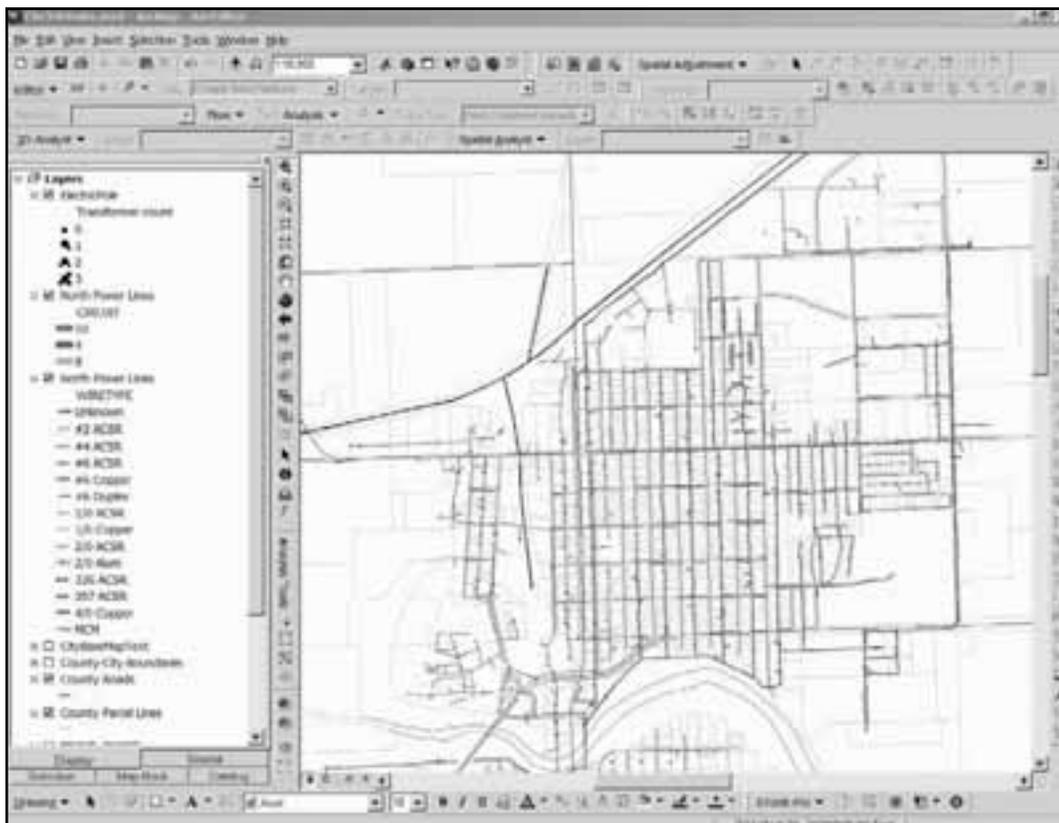


The above is a screen shot of the partially completed utility pole data collection effort showing progress during the summer of 2006. The insets are screen shots of the Trimble GeoXT screens using ArcPad. George Butler Associates, Inc. developed the ArcPad form for the City of Ottawa using ArcPad Studio Application Developer.

This information benefited the City threefold. The City needed to have a study and modeling done on an older portion of the distribution system on the

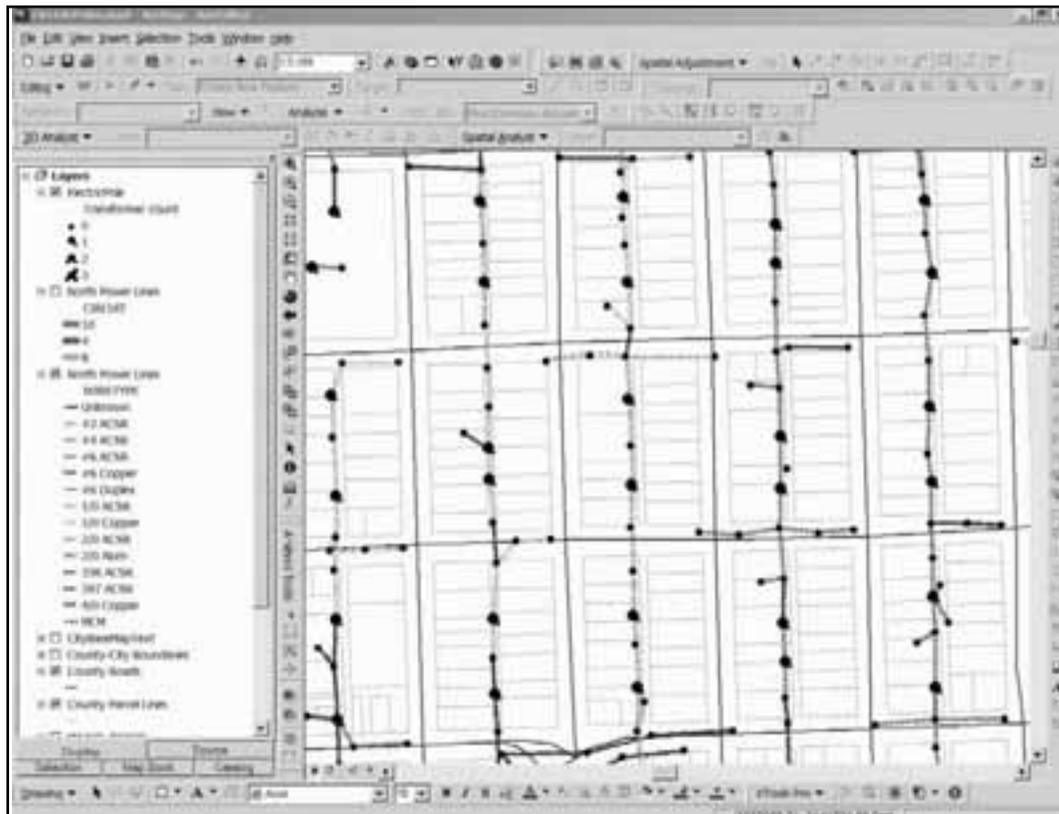
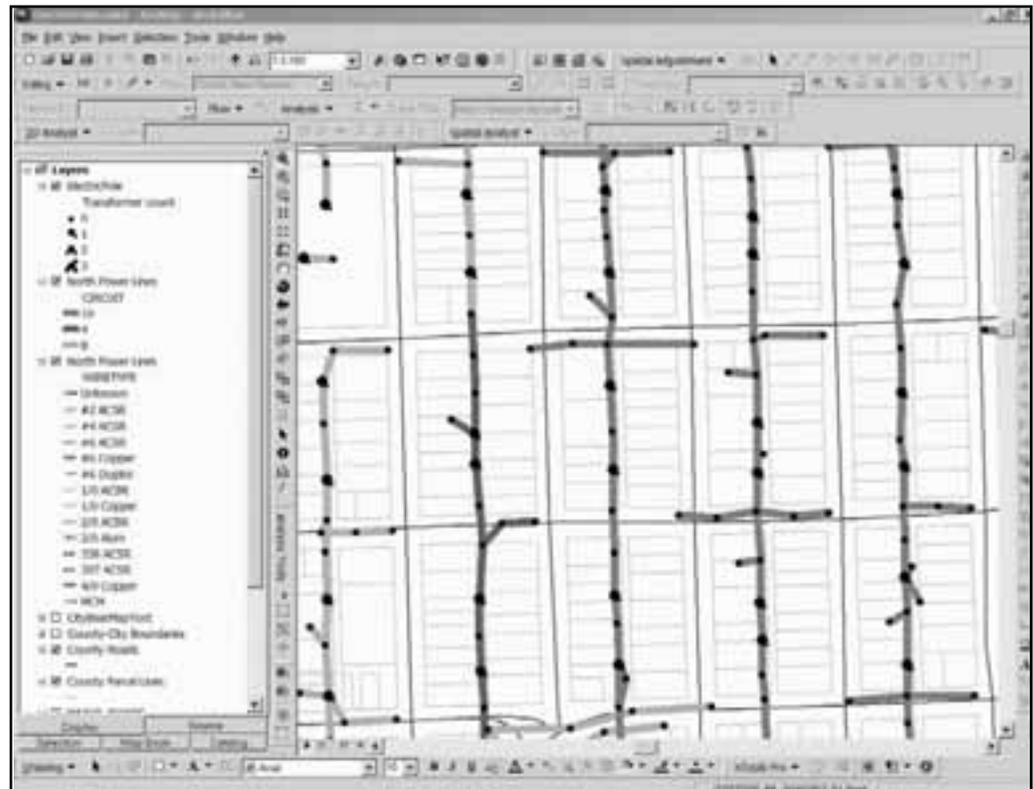
north side of the Marais des Cygnes River where new residential and industrial growth has been experienced. We now know exactly what equipment exists, how it is all connected, and the type of wire making the connections in our distribution system. Secondly, this data collection effort gave us an accurate accounting of City-owned utility poles as well as the number of poles owned by Southwestern Bell. Lastly, the City now has an accurate count of telephone and cable TV attachments to City-owned utility poles for which there are franchise agreements stating these companies pay a specific dollar amount per attachment .

After the temporary worker went back to school in the fall, Leonard and I went through a quality control check to make sure all information needed was in the database. Within a couple of months, discrepancies were identified, field verified, and corrected information entered into the database.



A screen shot of the current electrical distribution system north of the Marais des Cygnes River showing the 3 different circuits.

A closer view of the circuits in the north Ottawa electrical distribution system. You can see the different symbology for poles with multiple transformers.



The same area as above showing the different types of wire within the electrical distribution system. This will help determine what lines will need replacement improve efficiency and load carrying capabilities.

In the fall of 2005, anticipating the collection of water distribution data in the next couple of years, the City purchased a single seat of GBA Water Master asset management software and maintenance for \$3,400.00 with money requested for this specific purpose in the 2005 budget.

In 2006, the City rehired the previous summer's temporary seasonal worker to continue the data collection of the electric distribution system. The cost for 2006 will be about the same as in 2005 for the data collection.

With the anticipated completion of the electric distribution system this year, the City's consultant is working on an ArcPad form for the collection of fire hydrants and valves in the water distribution system in the summer of 2007.

Leonard and I will also retrofit the water map to the county parcel map and tie it to Kansas State Plane coordinates. The City will again hire a seasonal summer worker, included in the water distribution budget, for the water data collection, and at the same time begin a



Existing water distribution system in AutoCAD still rotated 90 degrees and not in KS State Plane coordinates.

program of inspecting and exercising the valves, which was started several years ago, but never completed.

In conclusion, the City has spent approximately \$35,730.00 of which only \$5,400 was an additional budget request for the database software and software

maintenance for 5 years. This averages to be a little over \$7,000.00 per year and proves with a little advanced planning, you can have a GIS on a shoestring budget. This also means we will have more accurate data for our regular usage and for engineering consultants in the future if a study is necessary on any of our systems.

The next big challenge - can we keep the data current and accurate as we move ahead? We have been able to keep up with sanitary sewer system improvements and hopefully have established habits that will be applied to electrical and water systems as the databases and maps are completed.

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