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# MANAGE YOUR ASSETS FROM PAPER TO DIGITAL: ONE STEP AT A TIME

By Suzanne M. Zitzman, GISP

Keeping track of sewer assets and infrastructure can be a daunting task. The sheer number of assets that need to be located, maintained and tracked alone is one thing, but keeping the details related to each asset from year to year at your fingertips has been a long time struggle for sewer authorities. While pen and ink drawings on mylar were the best system in the past, today using a highly accurate GPS system to locate assets and a web-based GIS program to help maintain them is no comparison. The problem lies between the two in transitioning from one system into another. The Township of Middletown Sewerage Authority (TOMSA) in Monmouth County, New Jersey, which serves a population of 75,000 with 24,000 customers, took on the task to make the switch in 2009. After many hurdles from evolving software to setbacks from Hurricane Sandy, they have made headway with no regrets.

"This process was a little rough in the beginning because there was just so much that had to be done to get online with the system," explained Raymond Nierstedt, PE, TOMSA Executive Director. "But switching to a system that gives you a complete take on every detail of every asset in the system including accurate location, the installation date, description of prior service requests, and who did the work is invaluable."

## Developing Technology

As in most cases, conventional survey methods were initially used to collect asset information in the field using hand written field books to describe features with station and offsets to a set surveyed baseline. As the maps were hand-drawn from this information, corresponding tables were typed out, showing coordinate locations (x,y,z), materials of those assets, and sizes of pipes. These maps and tables were stored in a manageable fashion, either rolled up in tubes or in space-eating flat files. Detailed asset maps had corresponding key maps showing the spatial location of each feature and could entail upwards of 200 detailed sheets. Eager to reap the benefits from using technology, TOMSA began using the desktop version of ESRI ArcGIS to help them manage data. Looking back, early technology was problematic because while each product provided a different function such as client billings, service requests, and asset mapping, the software didn't necessarily talk to each other, making it difficult to get answers quickly about a property, customer account or sewer assets experiencing issues. TOMSA initially had one ESRI desktop ArcGIS software license, hence one computer workstation to view, edit and report their digital asset data. Knowing they needed help to fill in the gaps for things they didn't have capabilities for, they hired Maser Consulting to help facilitate the process to transfer existing digital asset data from NJ State Plane Coordinate System NAD27 to NJ State Plane Coordinate System NAD83, scan and link 3,000 paper as-built documents to the appropriate sewer assets. This strengthened their ability to build a system to manage assets from field to office more efficiently. Having this partnership in place also helped steer TOMSA in the right direction as technology advanced.

Maser Consulting introduced TOMSA to VUEWorks® Asset Management Software that couples with ESRI ArcServer, ESRI ArcSDE and Microsoft SQL Server then installed and configured the "off the shelf" solution by integrating TOMSA GIS data and scanned documents. This system is accessible 24/7 as a 100% web-based solution for field and office personnel.

The result of advancing software technologies produced many of the techniques currently used in the GIS industry as standard. Global Positioning System (GPS) total stations are used to collect digital data about assets which is fed into GIS programs. GIS produces highly accurate digital mapping that can be easily accessed. Using Environmental Systems Research Institute (ESRI) software solutions with partner solutions such as VUEWorks® Asset Management Software helped further the development of asset management technology by connecting people and ideas globally. This caught on like wild fire.

## How it Works

In 2003, Monmouth County conducted a digital fly-over which was inclusive of Middletown Township's municipal boundary. This initiative provided TOMSA digital 1" = 100' color imagery and planimetrics (roadways, buildings, parcels, fences, spot shots, contours) that gave them a good initial electronic base map. As TOMSA oversees 42 square miles including one treatment plant, 13 pump stations, 7,500 manholes, and over 310 miles of sewer lines (without laterals), they had their work cut out for them.

The GIS management program enabled TOMSA to access their sewer collection system mapping containing a vast amount of information including the verification of manhole and cleanout locations, subsurface features, inventory of asset types, sewer

collection system manhole and pipe characteristics. The system was configured to enable staff to launch service requests, manage and report on the status of those work assignments. GIS programs are also a valuable tool because they offer design tools for the creation of construction documents and as-built plans. Because GIS is a web-based system with data stored within a secure web server (cloud), data can be retrieved for usage instantaneously and shared in real-time by all users in the field and office. Additionally, it can be accessed and edited from the convenience of a smart phone, digital pad or computer rather than dragging heavy laptops or cumbersome paper drawings into the field.

## Verification

While digital techniques enabled the field personnel to collect an abundance of asset data, they also enabled the verification of position and asset characteristics. This is a huge advantage because as this information is field-verified for positional accuracy, standard drop down lists are available to the field personnel to select asset types such as; drop manhole, cleanout, meter, as well as condition of asset. For example, inspections are performed to verify type of manhole, material of manhole, depth, cover type, and record any visual issues that may require a maintenance work order request.

## Digital Management

Today, the continued development of GIS technology has enabled TOMSA to maintain and manage a larger amount of asset data, more efficiently and accurately than ever before. To fully reap the benefits of GIS asset management solutions, TOMSA can now search by address, customer account, manhole number and pump station name. Historic data such as scanned as-builts, historic and current service calls and work orders, I&I project data, and sewer lining rehabilitation project information is available for viewing with a click of the mouse. Staff can print out various reports and maps by choosing filter options of the programs data. These documents are used during traffic control and work status meetings.

## Efficiency

GIS management programs go deeper than just mapping assets as they are highly configurable to specific needs and tasks, including planning and prioritizing work activities; tracking progress and costs; triggering work orders that automate the process for reoccurring maintenance; and notifying crews to perform work through smart phone and digital pads being used in the field. As a result, TOMSA's work crews experienced a more efficient response time, when having access to asset mapping, historic records, digital work orders, and inspection forms from their field vehicles.

Once the asset management program was populated with operational and maintenance activity, asset performances were analyzed. Time-based analysis enabled TOMSA to report on costs associated with assets located within a spatial region (i.e. service district, municipality), or report on assets of a certain characteristic (year installed, manholes within a basin area, sewer system assets along a certain route).

## Along Came Sandy

While TOMSA set their hurricane emergency action plan into place in anticipation of 2012's Super Storm Sandy, no one could have put together all of the variables that made the storm such a destructive disaster in advance. This storm set a precedent of destruction that was never experienced along the Atlantic coast ever before. Where the storm hit hardest and the total damage

that would be done was anyone's guess. Area waterways rose to over 13 feet and there was 2 feet of water inside their offices rendering them useless. While damages reached $1 million and TOMSA had facility damage, lost equipment, computers, and original documents, none of their scanned data was compromised because all of their asset management plans were safely stored in the web-based GIS ArcServer cloud. Even as the storm approached and reports came in about the its potential devastation, TOMSA and Maser Consulting's engineering staff were able to keep working and began preparing the GIS asset management program reports for FEMA. These reports were approved by the assigned FEMA representative so the GIS program could be used to manage the tracking of damaged equipment, cost of repairs and management of vendor invoices.

## TOMSA Today

TOMSA fit their field personnel with their own GPS Trimble Geo 7X data collector and Trimble Zephyr antenna, which has enabled them to better handle field inspections and service call visits locating customer cleanouts and adding them to the GIS program. The cleanouts are found by accessing the GIS program and viewing the attributes that describe the measurements from the house corners which lead them to the location of the cleanout. This is a time-consuming and ongoing process due to house additions and buildings that have been rebuilt in new locations on properties due to previous damage from Super Storm Sandy.

"Having the GIS system in place has changed the way TOMSA does everything," stated Brian Rischman, PE, Staff Engineer. "After successfully overcoming some of the challenges of making this transition, and especially Super Storm Sandy, our facility is now 100% fully operational with 95% of damaged equipment repaired or replaced, and we are continuing to test and replace electrical feeds damaged by salt water exposure."

## TOMSA's Future

TOMSA's future includes being able to tie-in their clean-outs to a video camera application; new applications will include the linkage of Edmunds software which handles customer data, and future work order processing through VUEWorks® MobileVue™ extension. Their field crews will also have the ability to close out their work orders and inspection forms in the field, sending notification to the office through the GIS asset management program that work has been completed.

## Conclusion

Using GIS asset management solutions provides one access point for viewing, maintaining, and managing your assets. Employing the use of web-based GIS asset management programs, managers are supplied with an invaluable tool that can help support budgeting for future rehabilitation projects through informative maps showing failing assets thematically, with construction and/or rehabilitation cost estimate reporting. In an emergency situation such as Super Storm Sandy or other disaster, having a web-based management system proved to be an invaluable decision. Asset managers at municipal authorities can reap benefits through better customer response, and increased life expectancy of assets, while maintaining compliance with agency regulations. While the initial implementation of a GIS application takes a little leg work to set up, once it is up and running it is well worth the effort over the long term to have the depth of detail regarding your assets and improvement in your ability to manage them.


## Suzanne M. Zitzman, GISP

**Principal Associate**
**Discipline Leader GIS Services**


Ms. Zitzman is experienced in all aspects of data collection and data modeling using geospatial technology. Her experience in understanding client business processes enables her team to implement cost effective asset and facility management solutions tracking work orders, asset conditions, and capital project planning. In addition, Ms. Zitzman has extensive knowledge in traditional land base mapping providing clients with cadastral, environmental and, infrastructure mapping. She received her Associates Degree in Applied Science from Brookdale Community College, Architectural Studies NJIT, and Geomatics Certification from Rutgers University.