

CAN'T BEAT HOMEMADE

Toms River Municipal Utilities Authority takes the initiative to create its own GIS as a valuable aid to system service and maintenance

By Angus W. Stocking, L.S.

When Doug Terry talked with consultants about creating a geographic information system (GIS) for Toms River Municipal Utilities Authority, estimates came back at up to \$1 million.

"For that, they would build us a system and hand us a disk, and we'd still have to buy the hardware and software," Terry says. "And unless we married the consultants, we'd have a lot of ongoing costs."

So Terry, director of operations for TRMUA, which handles wastewater collection in Toms River Township, N.J., led an initiative in which

the township created its own GIS.

By hiring a GIS director and training existing staff in CAD conversion and GPS location, the authority built a system that meets today's current needs and provides a GIS foundation for the entire township — all on a slender budget.

The system supports and streamlines basic functions like regular pipe inspection, root control, cleaning and maintenance. And it has been so beneficial that other township departments are taking advantage of it, achieving cost savings of their own.

Converting from paper-based asset management to digital tools

has already paid big dividends, and Terry envisions even more in the years ahead.

Blazing the trail

"Everyone's afraid of the cost of GIS, and we were too," says Terry, whose agency serves 41 square miles of land and 12 square miles of water with 54 employees. Some 450 miles of mainline sewer, with 44,000 connections, feed up to 7 mgd into the authority's wastewater collection system.

What has been known as Toms River Township since November 2006 was established as Dover Township by royal charter in 1768 — before

the United States became a nation. With a population of 95,000, Toms River is the seventh most populous municipality in New Jersey, and the fastest growing.

Like many utility agencies, TRMUA had a large file room devoted to paper plans, and staff members were starting to get nervous. "We had impeccable records and filing, but those things fade," says Terry. "We had several people using materials daily, staff members and others, and it was inevitable that they would get torn and illegi-



PROFILE:
Toms River
Township Municipal
Utilities Authority,
Toms River, N.J.

FOUNDED:
1949

POPULATION:
95,000

AREA SERVED:
41 square miles

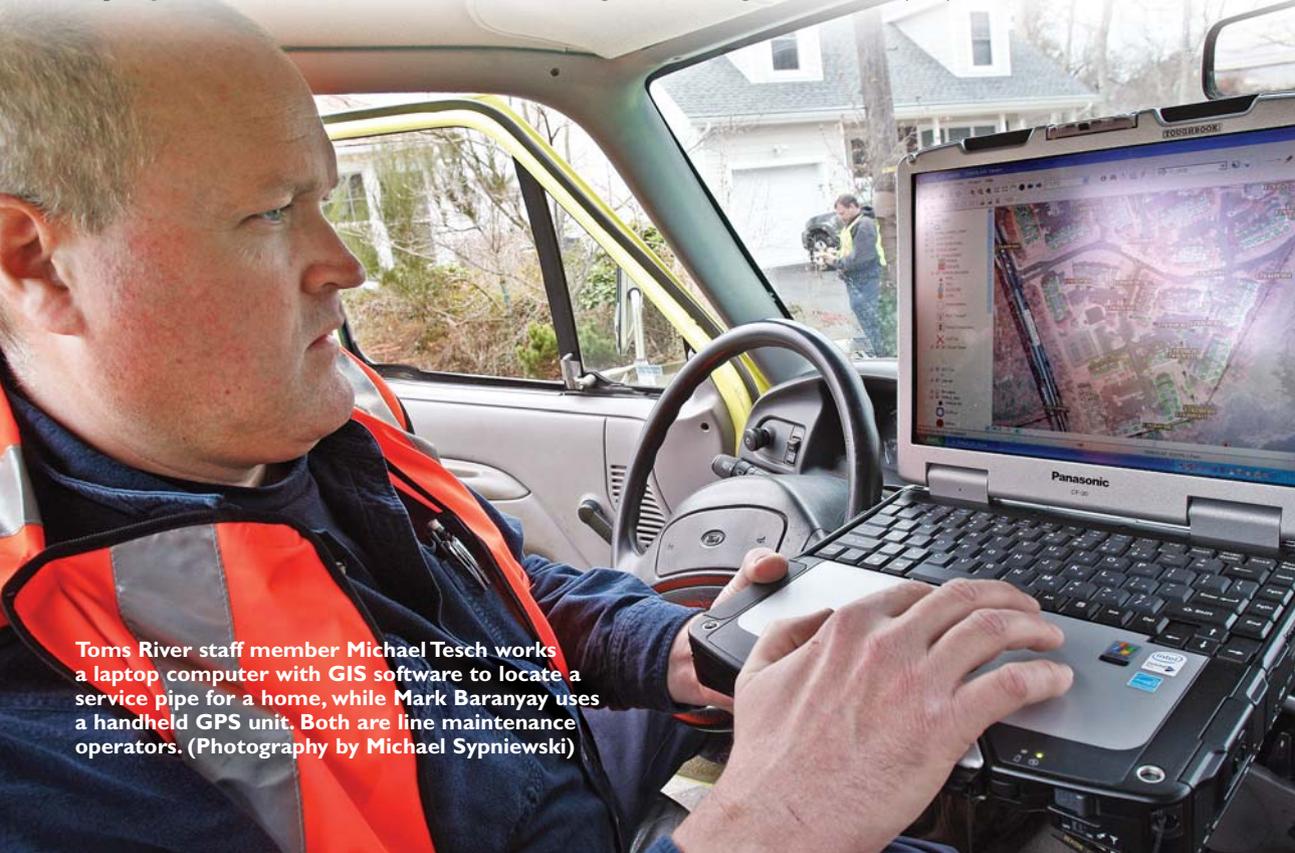
EMPLOYEES:
54

INFRASTRUCTURE:
450 miles of mainline;
44,000 connections

ANNUAL BUDGET:
\$20 million

WEB SITE:
www.townshipofdover.com

Toms River staff member Michael Tesch works a laptop computer with GIS software to locate a service pipe for a home, while Mark Baranyay uses a handheld GPS unit. Both are line maintenance operators. (Photography by Michael Sypniewski)



ble. Our entire town system was in that room, and if we lost those plans due to a fire or some other calamity, we'd be dead in the water."

It was time to put the entire system into a GIS. Terry, having an independent streak, believed TRMUA could build an effective system without outside help. "I'm convinced that anyone can have a system that will serve their needs, at a low cost, if consultants aren't involved," he says.

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Doug Terry

Getting going

Terry bought a variety of software from ESRI Inc., on which the GIS is still based. The company worked with him on exchanges and price breaks to make sure he ended up with the right tools.

Then it was time to hire a GIS expert. Hiring the right person for a critical job is always daunting, but Terry had a plan. "I said, 'Let's see if we can find someone who is working for a consultant,'" Terry recalls. "I figured if we found someone who had been working in a cubicle, maybe someone who had been traveling a lot, they would jump at a job near the beach where they could stay put for a while."

It was an unconventional strategy, but it worked. Terry hired Len Bundra, who had been in 22 cities in 12 years setting up GIS. "Len in my opinion is one of the best," says Terry. Bundra was intrigued by what TRMUA was trying to accomplish.

"My background is 12 years in consulting, and I've built many systems as part of a consulting firm," he says. "And in all that time, I have to say, I never saw an agency or city of any size that wanted to do it all themselves. It's a novel approach. And for me personally, it's satisfying to be able to say, 'I built that.'"

Doug Terry, director of operations, Toms River Municipal Utilities Authority.



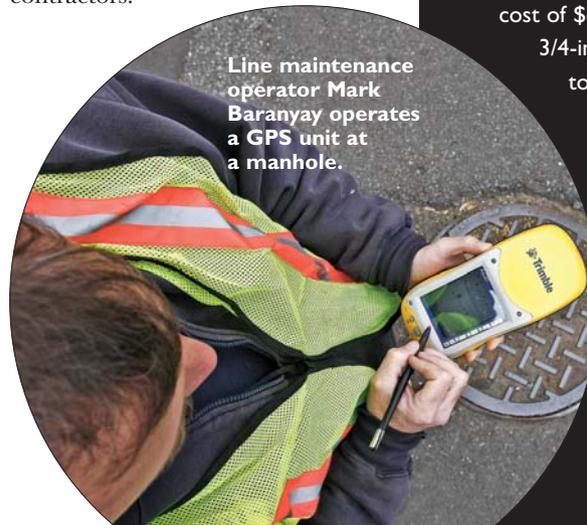
Building the maps

Parcel base mapping came from Toms River Township in the form of 193 AutoCAD drawing files. Bundra turned these files into a GIS base map, eventually creating 52,118 "parcel polygons" based on the AutoCAD drawings. With the polygons created, he moved ahead with linking the parcels to a relational database.

Because they were based on tax assessor information, and not surveys, the CAD drawings were not especially accurate, and they were not geo-referenced — there had been no attempt to align the drawings with real-world coordinates.

Bundra had two methods to align the maps more accurately. Since he had access to recent, high-quality orthophotography, he was able to "rubbersheet" (stretch proportionally) the base maps to match features like fence lines and road intersections. And since Toms River crews were getting started with GPS location, he could also put precise coordinates on features like manholes and cleanouts. The entire system is in place now with sub-meter accuracy, or better.

Meanwhile, Terry sent two staff members to a three-day course to get training in the necessary CAD techniques. After that, they learned on the job, converting sewer plans to GIS drawings. Since TRMUA has been around since 1949, that was a huge task, and one many agencies delegate to sub-contractors.



Line maintenance operator Mark Baranyay operates a GPS unit at a manhole.



Dion Smith and Mike Cucinotta, line maintenance operators for Toms River Municipal Utilities Authority, use the company's off-road military vehicle with jetting and vacuum capability to clear out a sewer line.

TOUGH TRUCK FOR TOUGH JOBS

A special cleaning vehicle built by Toms River Municipal Utilities Authority turns residents' heads and has field crews jockeying to see who gets to use it.

It's built to clean lines in some of Toms River's wooded areas. "A lot of our mains are in the woods, along easement lines that are overgrown," says director of operations Doug Terry. "There aren't really roads, just trails. It's a hostile environment for our street equipment, which we didn't want to destroy, and we needed something better than a four-wheel-drive vehicle, because they get stuck."

So Toms River built its own rig. "The truck was purchased at Clark's Truck Equipment in Virginia," says Terry. "We traded them some other military surplus equipment that we owned and were able to get the truck for \$6,500. "We added about \$2,000 in paint and accessories and welded the brush guards.

The deck-mounted high-pressure cleaner is actually a trailer-mounted unit without the trailer. It was installed by Jet-Vac Inc. in New Jersey at a cost of \$62,000. The unit carries a 700-gallon water tank, 600 feet of 3/4-inch hose, and a pump system that can deliver 40 gpm at up to 2,000 psi.

"We didn't feel the need for a vacuum system," Terry says. "It would have added cost, and we couldn't have handled the overall weight and size on the military chassis we used. We can always collect the debris downstream with one of our combination cleaning units, once it enters an accessible manhole."

TRMUA deployed the vehicle in December 2007 and used it through the winter with good results. "The thing can't be stopped, and we've had no breakdowns," says Terry.

Here again, Terry had his own ideas. “We didn’t want to send them out to India and have them gone for two months, and we didn’t want to copy that many plans either,” he says. “We felt it was best to do it right here.”

The two staff members worked side-by-side, and had a friendly competition during the conversion. In about a year, they mapped and brought into the GIS 9,405 manholes, and they applied 65,835 attributes derived from plans. This was a huge jump start for the GIS.

By working with GPS information and the rectified base mapping, Toms River got a useful, accurate system early on that became a sound foundation for later work. Staff members also filed about 42,000 sewer triangulation plans, all ultimately scanned, converted to PDF files, and attached via the GIS to relevant features. That made a wealth of knowledge available at the click of a mouse.

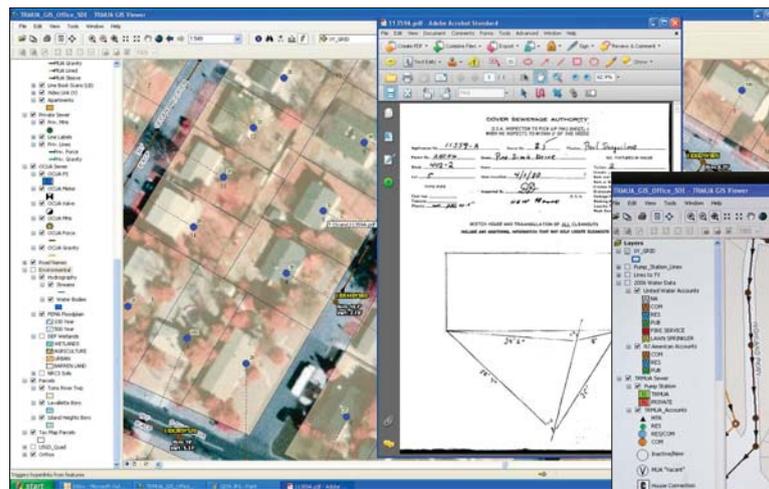
Location, location, location

As in real estate, location is critical to a useful GIS, and many communities hire surveying firms or other specialists to locate features like manholes, cleanouts and pumps. Toms River, on the other hand, purchased two Trimble GeoXT handheld receivers. Two staff members, who usually worked a CCTV truck and are “pretty savvy,” according to Terry, started using them, essentially training themselves.

They went right to work locating manholes and other features, and because they got started while the GIS was being created, TRMUA was able to use their work to verify and correct the GIS from the beginning. One advantage of doing the work in-house was that staff members largely knew where the features were and could drive right to them.

The receivers worked so well that the authority bought two more within a few months. TRMUA now has four. The units are loaned out to other agencies. The fire department, for example, is tying fire hydrants into the GIS, and the police department is experimenting with tracking car locations.

Crews now consistently use GPS to locate cleanouts as they are uncovered and to tie in new installations, densifying the GIS.



Beginning in 2006, the authority bought Panasonic Toughbook laptop computers, and now all crews who need them are equipped to use the GIS in the field, using a custom ArcReader GIS application developed by Bundra.

At present, crews use the GIS by way of downloaded information, but soon Toms River will have a community-wide WiFi set up for municipal use, and crews will access the system wirelessly.

the GIS to improve scheduling and make better use of repair budgets. Work is organized by queries, which identify critical pipes. For example, a simple query based on as-built attributes can identify all pipes that are below mean sea level and so more at risk for corrosion. Queries like this help Toms River stay ahead of ongoing programs

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Len Bundra

How it’s used

The GIS is seeing constant and expanding use. It’s hard for Terry to estimate savings because, “There’s just so much we don’t do at all anymore.”

For example, all the township’s sewer inspection footage — two camera crews are at work every day — is stored digitally using Granite XP survey software from CUES Inc. and is accessed via the GIS. That saves many hours of manually filing, retrieving, and viewing tapes.

Seeing the amount of inspected area graphically also helps staff to schedule camera work. “Before, we had no idea” says Terry. Time is also saved when outside consultants and engineers come to the office looking for files.

A work order management program is to be deployed in 2009, but even without it managers use

like root control and inflow and infiltration (I&I control).

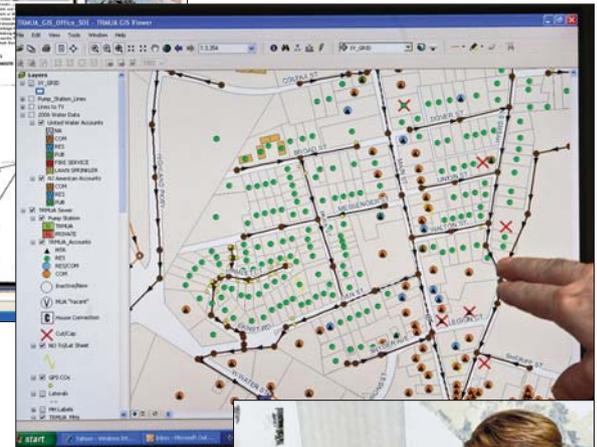
The sky is the limit when it comes to future uses. Terry contemplates tracking trucks to save time on emergency response, deploying work order management systems, simplifying billing, and other advanced uses. He’s also happy with the system as it exists right now.

Independent by nature

Terry is proud of the agency’s independence, which shows in areas other than GIS. For instance, “We may be the first municipality to do our own cured-in-place-pipe refurbishment,” he says. “At least, I haven’t heard of any others.”

Going it alone has been good business for Toms River. The agency has not raised rates in 25 years and carries no debt. It is generally considered more efficient to use

At left, an account layer is linked to scanned documents relating to a property. Below, the user interface for the GIS developed by Toms River Municipal Utilities Authority.



Len Bundra, IT/GIS director for Toms River Municipal Utilities Authority, in his office.

contractors for specialized tasks, but that hasn’t been the case here.

In fact, the simple, cost-effective foundation laid, using in-house talent and a “can do” attitude, has proven so valuable that other agencies, like the tax assessor’s office, the school district (New Jersey’s fifth largest), and the police and fire departments, are taking advantage of it.

The go-it-alone approach may not be for everyone — it takes considerable time and effort, and a lot of confidence. But the Toms River Municipal Utilities Authority is proving that an independent approach can be extremely effective. ♦

MORE INFO:

CUES Inc.
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www.cuesinc.com