



It Takes a Village

A sewer district's integrated approach aims to alleviate overflows in its member communities

STORY Traci Browne | PHOTOS Courtesy of The MDC

On your average sunny day in West Hartford, Connecticut, approximately 8 million gallons of water flows through the sanitary sewer system on its way to the state's largest treatment plant — The Metropolitan District's (The MDC) Hartford Treatment Plant.

It wasn't unusual for The MDC — a nonprofit municipal corporation serving eight member communities — to see as much as 69 million gallons flow through that one system during a rain event. So, yes, inflow and infiltration were a very significant problem for both The MDC and the communities it serves.

That situation was compounded by Hartford's 150-year-old combined sewer system and the 100-year-old sanitary systems of the surrounding towns that The MDC inherited when established in 1929. The unfortunate result was approximately 1 billion gallons of untreated wastewater that overflowed annually into area streams and waterways along with basement backups experienced by property owners.

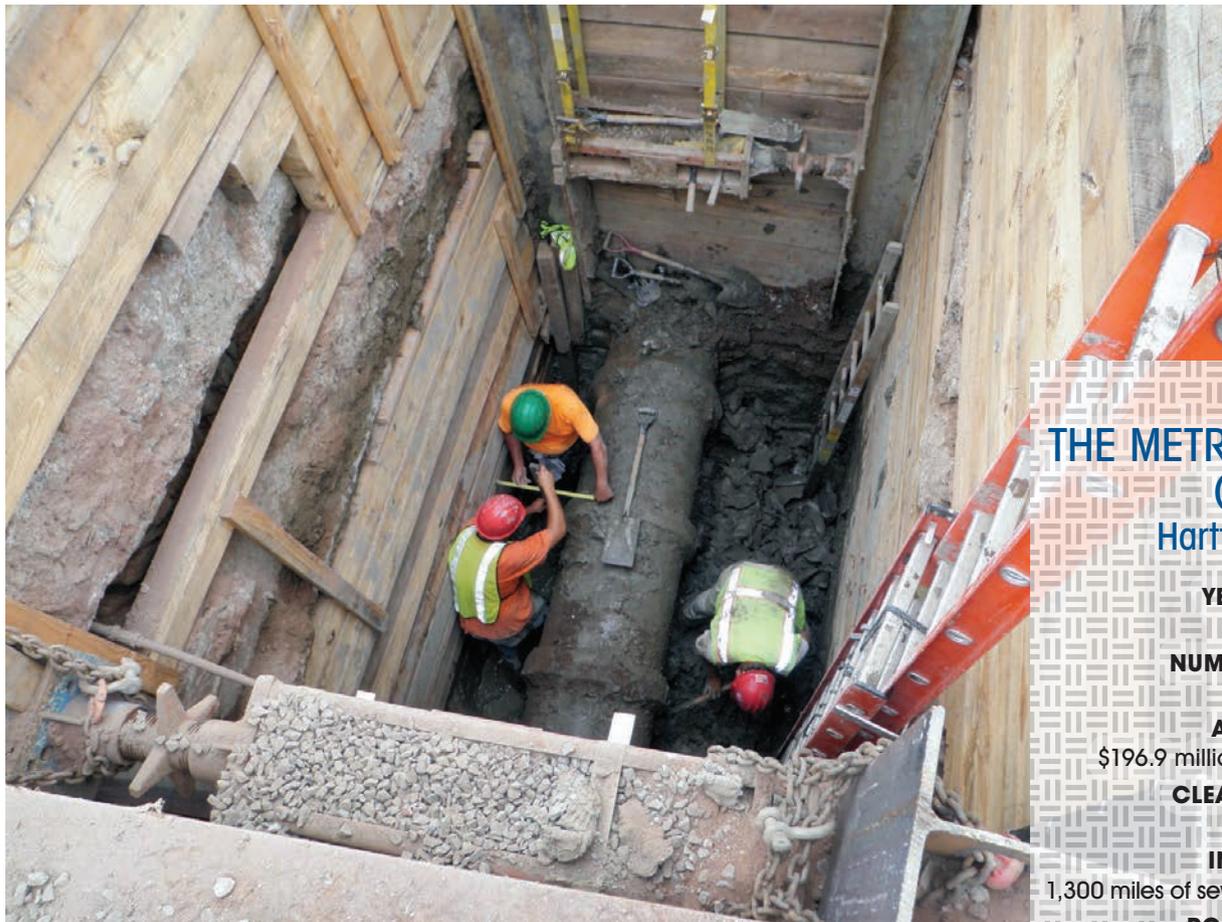
Those overflows caught the U.S. Environmental Protection Agency's attention, along with the Connecticut Department of Energy and Environmental Protection. In 2006, a federal consent decree and a state consent order were issued, calling for the complete elimination of SSOs in Wethersfield, Rocky Hill, Windsor, West Hartford and Newington. Also included in the consent decrees were necessary actions to be taken by The MDC and individual property owners to reduce inflow and infiltration of water into the sewer systems.

The MDC hired construction and engineering firm CDM Smith as program management consultant and Smith immediately started with a Sanitary Sewer Evaluation Study to identify areas with high amounts of I&I. This study included flow metering, flow isolation, smoke testing, CCTV and building inspections. Identified were sewers in need of rehabilitation and replacement and areas to target private inflow removal, both of which often require coordination with the individual towns The MDC serves.

“We have a whole department that’s dedicated to outreach, and we try to go into the neighborhoods and have meetings with people before we do projects.”

Susan Negrelli

One major initiative of the Clean Water Project is expanding the capacity of the Hartford Water Pollution Control Facility (pictured) and the Rocky Hill Water Pollution Control Facility. The expansions will result in fewer CSOs into the Connecticut River.



Crews work on a sewer separation project blocks away from downtown Hartford. The original pipes for the city's combined sewer system were designed for a population much smaller than today.

THE METROPOLITAN DISTRICT (THE MDC) Hartford, Connecticut

YEAR ESTABLISHED:
1929

NUMBER OF EMPLOYEES:
450

ANNUAL BUDGET:
\$196.9 million total / \$94.8 million sewer

CLEAN WATER PROJECT:
\$2.5 billion

INFRASTRUCTURE:
1,300 miles of sewer main in the collections system

POPULATION SERVED:
400,000 people served via 100,000 customer accounts



Susan Negrelli, director of engineering at The MDC, says her favorite part of the Clean Water Project is the massive South Hartford Conveyance and Storage Tunnel. The tunnel is four miles long, 200 feet deep and has an 18-foot diameter.



During a sewer separation project in Hartford, workers add a second pipe in the street to serve as a sanitary sewer.

THE CLEAN WATER PROJECT

To address all the problems uncovered in the study and outlined in the consent decrees, The Metropolitan District created a comprehensive plan titled the Clean Water Project.

Five components comprise the Clean Water Project:

- Eliminating both inflow from private property and infiltration via cracked or broken pipes and laterals, faulty connections, and deteriorated manholes.
- The separation of Hartford's combined sewer system.
- Construction of two storage tunnels (see sidebar).
- Installation of a mile-long, five-foot-diameter interceptor pipe. (This project won The MDC the National 2011 Public Works Project of the Year for the first-time use of curved micro-tunneling technology in the United States.)
- Critical upgrades to The MDC's Hartford Treatment Plant

Phase I of the CWP first tackled the infiltration in The Metropolitan District's system. Susan Negrelli, director of engineering at The MDC, explains that they immediately went after the quick fixes and easy wins with CIPP. By lining the mainline sewers and rehabilitating manholes, they were able to eliminate 10% of I&I. Another 20%-30% would be eliminated by lining laterals. The MDC has lined about 17% of its system with steam cured-in-place lining systems to date.

The more challenging piece of the puzzle to address in Phase I was the private property inflow sources. Sump pumps and foundation drains connecting directly into the sanitary sewer service are common in areas with older houses. This is where The MDC's outreach team was deployed for full effect.

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On the streets those projects are taking place, The MDC educates homeowners with a direct connection into the sanitary sewer on the need to install new laterals or perform foundation drain retrofits. In areas where private property fixes are critical, The MDC will coordinate the work, and in some cases, even pay for it.

FUNDING REMAINS A STRUGGLE

The MDC estimates that this private property work reduces I&I by an additional 20%, bringing the total reduction to 50%. And therein lies the problem.

“We’re 15 years in, and we’ve spent a lot of money on our project, and we’ve already eliminated half our overflows,” says Negrelli.

With the Clean Water Project, The MDC committed to spending just over \$2 billion to control combined sewer overflows, and in some cases eliminating them. So far, it has spent about \$1.8 billion, and yet it’s just halfway toward its goal. And sewer overflows are not the only issue needing to be fixed to meet the EPA’s consent decree.

As far as paying for this aggressive renewal, The MDC actively pursues funding through the State Clean Water Fund grants and loans, and from the issuance and sale of bonds by The MDC.

Negrelli says they’re lucky because the state of Connecticut has been very generous with its clean water funds.

Unfortunately for The MDC’s ratepayers, they must help pay back the debt that The MDC incurs. The Metropolitan District collects its sewer fees through an ad valorem system. However, The MDC also supplies water service to its customers, and it now includes a Clean Water Project fee based on their water usage. Currently, that fee is higher than the water rate property owners pay.

“It’s getting very difficult to keep raising that Clean Water Project charge every year. We can’t maintain this pace of spending that we’re doing right now,” says Negrelli.

AN INTEGRATED PLAN

For that very reason, The MDC went back to CTDEEP and said it needed to create an integrated plan that would fix the myriad of problems with more holistic solutions, and they would need more time to do it.

The extensive list of projects required for The MDC to meet its objectives creates competing needs and priorities. To assess each project’s relative priority, The MDC created a set of common scoring criteria to determine the

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importance of each project and benefit relative to one another. Projects that achieved the goal of overflow reduction and system rehabilitation ranked higher on its prioritization list.

The MDC submitted the integrated plan to CTDEEP in December of 2018 and is awaiting final approval.

“They’re working with us, we haven’t gotten approval yet, but I think they understand what’s going on,” says Negrelli.

But The MDC is not alone in convincing CTDEEP to give them an extension. The MDC is showing up at neighborhood meetings and town council meetings asking for help, and its efforts are bearing fruit.

“We received eight letters of support, and some towns submitted a proclamation supporting our integrated plan,” says Negrelli.

The Metropolitan District is a nonprofit municipal corporation chartered

ENGINEERING OPPORTUNITY OF A LIFETIME



Susan Negrelli

For Susan Negrelli, director of engineering at The MDC, her favorite part of the Clean Water Project is the South Hartford Conveyance and Storage Tunnel. The tunnel is the largest component of the Metropolitan District’s Clean Water Project with a \$500 million price tag.

“It’s not every day an engineer gets to be involved with a project like this. (The SHCST) is bigger than the dams that we built a hundred years ago,” says Negrelli.

The MDC contracted with Kenny/Obayashi, a joint venture of Granite Construction subsidiaries Kenny Construction and Obayashi Corp., which purchased the German boring machine used for the tunnel project.

The SHCST is a four-mile-long, 200-foot-deep, 18-foot diameter, deep-rock tunnel that will convey and temporarily store excess wastewater and stormwater from portions of South Hartford, along with sanitary sewer overflows from West Hartford and Newington. The corridor of the tunnel will also extend from West Hartford to the Hartford Water Pollution Control Facility.

The tunnel includes a 38-foot-diameter launch shaft, a 33-foot-diameter retrieval shaft and 74-foot-diameter pump station excavation shaft, drop shafts, adits, de-aeration chambers, and odor control at potential release points.

The MDC enlisted the help of students at Hartford’s Environmental Sciences Magnet School in the naming of the tunnel boring machine in keeping with tradition. That tradition says that the TBM cannot begin work until it’s been named, typically after a woman, to bring good luck to the project. This particular school was chosen because the tunnel will run right underneath the students.

The MDC conducted an essay contest, and the winning name for the TBM was Iris, which comes from the Greek word for “rainbow” and from the Greek goddess who personified the rainbow.

The author of the winning essay wrote that the tunnel would allow everyone to enjoy the rainbow, which appears after the storm.

So far, Iris has brought plenty of good luck and fortune. For Negrelli and her crew, it’s a once in a lifetime engineering project. For The MDC, the tunnel is on schedule and is about halfway complete. It is expected to be fully operational by 2023.

by the Connecticut General Assembly in 1929 to provide potable water and sewerage services on a regional basis.

In addition to water and sewer services, MDC also provides GIS mapping and household hazardous waste collection to eight member municipalities. Drinking water is also provided to portions of four nearby nonmember towns. **I&I**

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