WATERFORD TOWNSHIP
DEPARTMENT OF PUBLIC WORKS
2014 ANNUAL OPERATIONS REPORT

Respectfully Submitted March 9, 2015 to the
Honorable Charter Township of Waterford Board of Trustees

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Executive Summary

The following report is an overview of the activities of the Waterford Township Department of Public Works (DPW) in 2014. With a staff of 52 dedicated employees and a budget over $21M, the DPW continued, in 2014, to achieve its mission of providing high-quality, professional services. Much of this has been accomplished in spite of the harsh economic challenges facing our region. Water sales in 2014 were marginally higher than in 2013. Waterford's sewage disposal costs, also higher in 2014, continued to be DPW's largest expense.

The economic challenges facing our region demand innovative solutions. Through the deployment of advanced technologies, training, and planning, DPW continued, in 2014, to effectively and efficiently meet its goals. Today's staff maintains a substantially larger, highly regulated, complex and aging set of assets (water and sewer system, bike path, buildings, vehicle fleet, and, as of 2012, Parks and Recreation Facilities).

Through the deployment of innovative programs and leveraging the continual growth of available technology, the DPW remains a leader among its peers. The success of the DPW is evidenced in several ways:

- First, by continued requests from utility managers and technicians to visit our facility for tours and product demonstrations. In 2014 the DPW hosted several delegations from as near as Independence Township and as distant as Vail, Colorado.
- Second, by being selected to give topical presentations at professional conferences locally, regionally and nationally. In 2014, DPW staff shared their experiences with hundreds of colleagues on topics such as:
    - Advanced Water Metering Infrastructure (AMI)
    - Trenchless Rehabilitation of a Sanitary Sewer System
    - Trenchless Rehabilitation of a Water System
    - Cityworks Integration of a Document Management System
    - Biological Filtration of Drinking Water
- Third, by receiving awards presented by its peers. In 2014, the following employees were recognized:

Ron Arnold Selected Waterford Employee of the Year

Dale Dorrance (4th From The Left) Received the Edward Dunbar Rich Service Award for 25 Years of Service to the Drinking Water Industry

- Fourth, by its employees participation on Boards and Committees of Professional Affiliate Organizations:
    - DPW Safety Coordinator Hugo Cardenas' Appointment to the Membership Committee of the Michigan Municipal Risk Management Authority.
    - DPW Safety Coordinator Hugo Cardenas' Safety Committee Chairmanship of both the American Water Works Association – Michigan Section and the Michigan Water Environment Association.
    - DPW Engineer Dan Stickel's Membership on the Young Professionals Committee of the American Water Works Association – Michigan Section
    - DPW Engineering Superintendent Frank Fisher's Membership on the Michigan Local Government Benchmarking Consortium
    - I myself hold the following positions:
        - Trustee on the Board of Directors - American Water Works Association – Michigan Section.
        - Committee Member of the Government Affairs Council - American Water Works Association – Michigan Section.
        - Committee Member of the Strategic Management Practices Committee - American Water Works Association.
- Fifth, by grants received for program innovation and by being selected for advanced pilot projects. There are examples of these throughout this report.
- Lastly, by its employees' professional growth and development. This is evidenced by:
    - Nearly half of its staff holding State-issued licenses.
    - Again nearly half of its staff being members of professional organizations such as American Water Works Association (AWWA), Michigan Water Environment Association (MWEA), etc.
    - Two of its employees partaking of the employee benefit to pursue a college education.

In 2014, the DPW continued the capital improvement projects begun in 2012. These include:

- Rehabilitation of old cast iron water main via structural lining.
- Replacement of old cast iron water main via directional drilling of new pipe.
- Replacement of water meters and reading equipment.
- Rehabilitation of eleven sewage pumping stations

Sweeping changes to southeast Michigan's water and sewage landscape continued in 2014 with the creation of the Great Lakes Water Authority. The authority is scheduled to take control of Detroit Water and Sewerage Department operations in July of 2015. The DPW has been involved with, and kept abreast of, the continuously changing socio-political climate and has made operational and financial adjustments, as needed.

The Waterford Township Department of Public Works continues to be a robust, innovative organization of which I am privileged to be a member. We look forward to the challenges that lie ahead in 2015.

Respectfully,

William A. Fritz, P.E.
Director of Public Works

DPW Overview:

The DPW has two (2) Divisions and multiple Branches involved in providing quality water, sanitary sewer and facilities services for Waterford Township residents. The Water and Sewer Division operates and maintains 355 miles of water and 353 miles of sanitary sewer lines respectfully, 13 water treatment facilities, 18 production wells, 3,600 fire hydrants, 3,400 water valves, 8.25 million gallons of water storage contained in 3 storage tanks, 62 sewage pumping stations and 8,800 sewer manholes. The water system was largely implemented in the second half of the 20th century and closely followed housing growth in the Township. In 1992 and 1994, the first generation iron filtration plants were constructed in two phases, which dramatically improved the quality of water provided to customers. The sanitary sewer system was largely implemented in the late 1960's and 1970's, and continues to grow as residential and business development continues. There are currently over 24,000 water accounts and 25,000 sewer accounts, which are billed quarterly. The system is estimated to serve a population of approximately 62,000 customers within the 36 square-mile Township service area. Operation and maintenance challenges continue to require more investment as infrastructure continues to age. The DPW continues to reinvest in the system and leverage new technology to aid in effective and efficient administration.

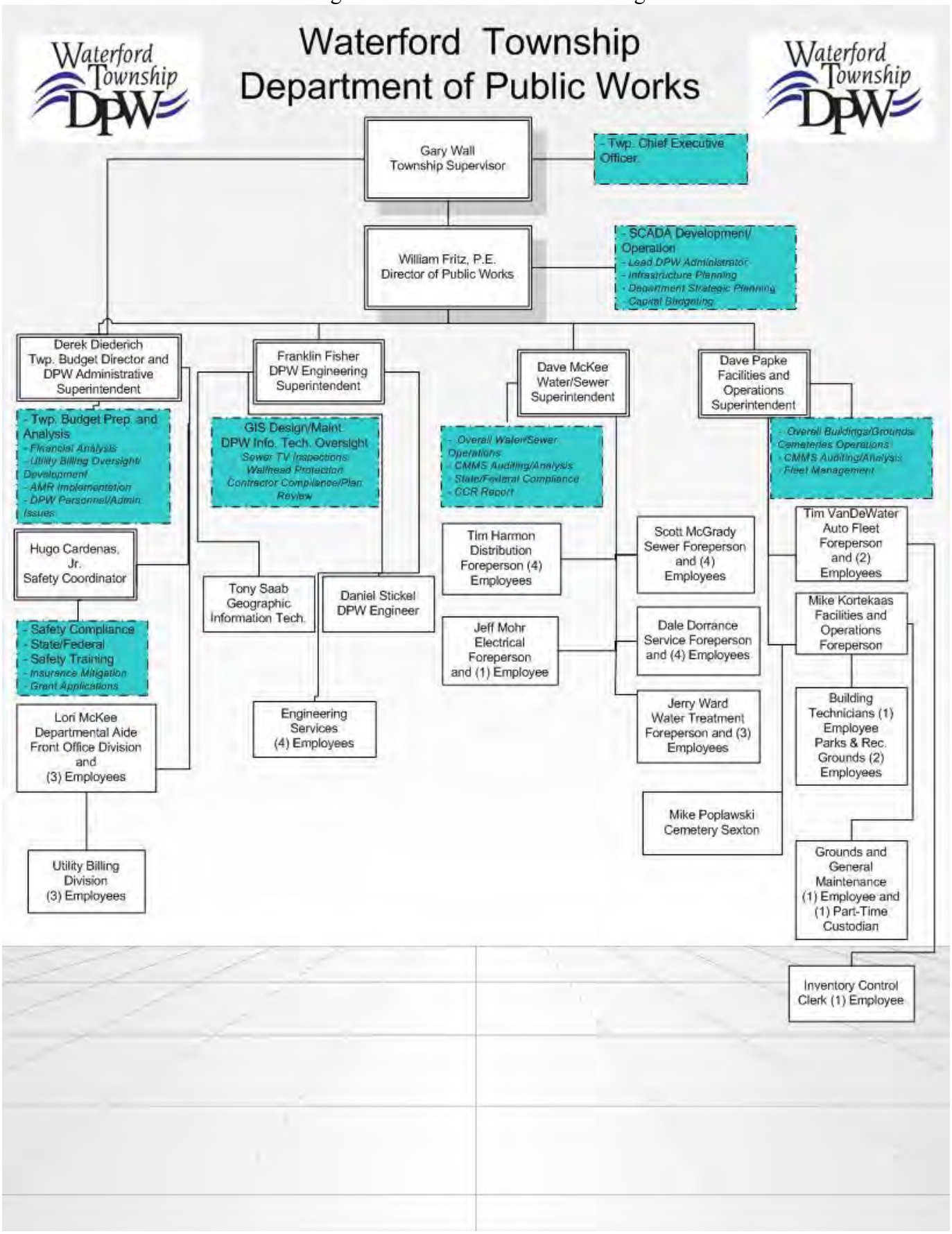
The DPW is almost unique in Southeast Michigan in that it solely provides drinking water to the Township independent of the Detroit Water and Sewerage Department (DWSD). On an average day, the DPW distributes 8,000,000 gallons of safe, potable drinking water to customers. Peak summer day demands can exceed 18,000,000 gallons per day. The raw source of water is from eighteen (18) active wells, located within the Township, which feed the iron filtration plants for processing and distribution to customers.

The Township is a member of the Clinton-Oakland Sewage Disposal System, which transports sewage to DWSD for processing. This system is a regional wastewater collection system that involves the partnership of Oakland County, Macomb County and DWSD.

The Facilities and Operations Division (F&O) is responsible for the efficient and effective maintenance and operation of the Township buildings, building systems, equipment, cemeteries, bike paths and vehicle fleet. These responsibilities specifically include the operation and maintenance of 281,600 square feet, or 6.5 acres, of Township building floor space, 54 acres of Township owned grounds, 41 miles of bike path, 5 Township Cemeteries, and a vehicle fleet of over 250 vehicles.

In 2012, Facilities and Operations Division also accepted the maintenance and operations responsibility for Parks and Recreation Department facilities. This comprises 26 sports fields and playgrounds, as well as over 845 acres of parkland.

The following chart outlines the 2014 DPW Organization:



WATER AND SEWER DIVISION

Administrative Services Branch

The mission of the Administrative Services Branch is to provide professional billing and customer service to both internal and external customers. Employees are called upon to leverage the latest in computing technologies, utilizing a variety of software packages and hardware to achieve quality information flow. Employees in this branch support every Division and Branch within the DPW as well as interact and provide services to other Township Departments, customers and contractors.

The Administrative Services Branch is headed by the DPW Administrative Superintendent and is comprised of 7 full-time employees. The positions and a brief description of their typical duties are listed below:

- Township Budget Director and DPW Administrative Superintendent
  Conducts planning, research and evaluation necessary to keep the DPW's Utility Billing and Receivable Systems operational and up to date. Performs specific project management as related to the DPW's meter reading systems, Computerized Maintenance Management Systems (CMMS), creates and analyzes data to look for efficiencies. Prepares financial and operational schedules needed for the Township's Financial Audit. Creates and analyzes specialized reports. Performs the personnel and accounting functions of the DPW as required. Coordinates and compiles the Township's Annual Budget. Conducts financial analysis related to various Township Financial Functions. Also compiles, organizes and is extensively involved with Waterford Township's Budget. This position serves in a dual capacity, the first being an administrator at the DPW and the second being the Budget Director for the Township as a whole.

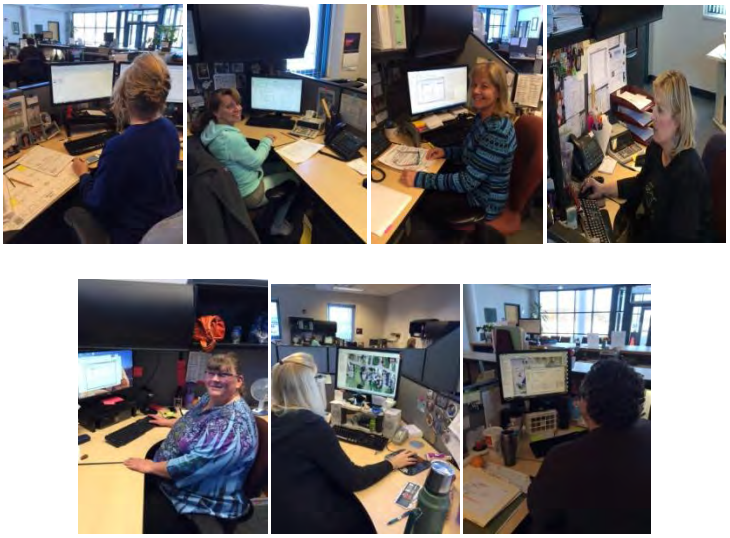
- Departmental Aide
  Serves as the office manager for the DPW's Administrative personnel and is responsible for the day to day functioning of the office. Oversees the DPW's daily payroll and accounts payable systems. Utilizes the DPW's CMMS package to ensure work orders and service requests are properly recorded. Prepares reports and oversees the DPW EFT-Auto-Debit payment program.

- Account Clerk II
  Responsible for DPW Accounts Payable and Payroll System. Also called upon to render customer service to both internal and external customers. Utilizes a variety of software programs to provide quality data to customers and employees.

- Utility Billing Account Clerk (3)
  Responsible for rendering 108,000 water-sewer bills annually to the Township's 25,000 customers on a prescribed schedule. Process the DPW's automated lock box system and utilizes the DPW's meter reading systems to interface with the Utility Billing System. Employees are called upon to utilize a variety of software applications.

- Account Clerk I (2)
  Responsible for Point of Sale (POS) Register and customer service. Processes a variety of customer payments and requests for service. Employees utilize the Computerized Maintenance Management System (CMMS) to record work orders.

Water & Sewer Front Office and Billing Branch Employees

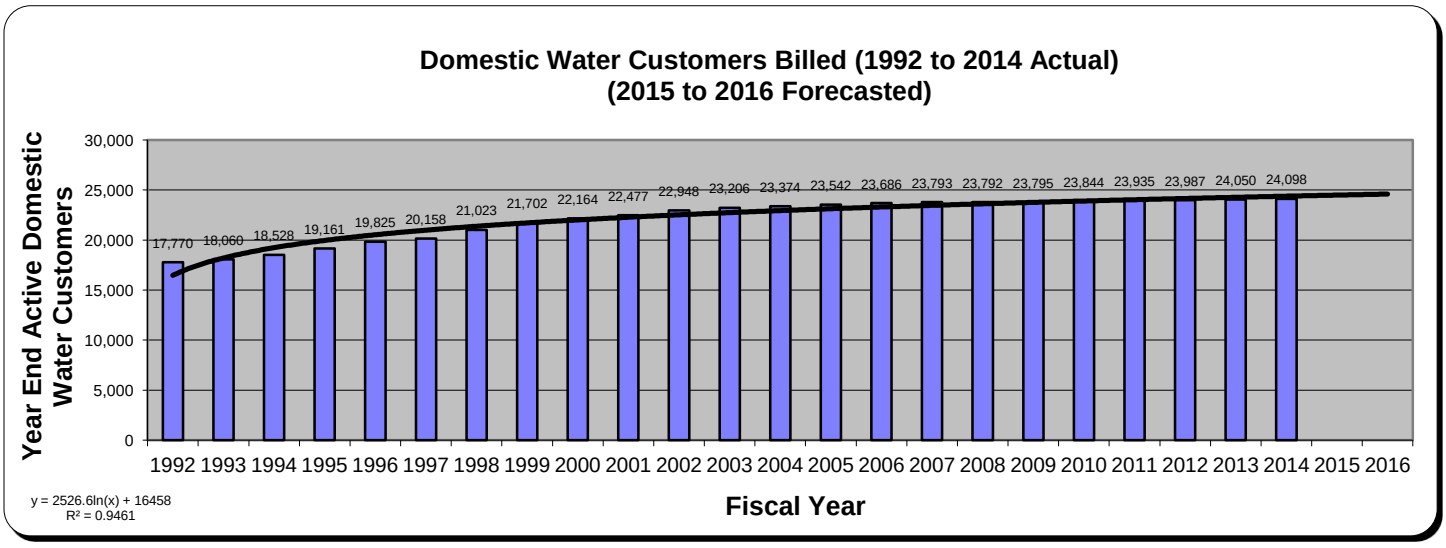


From Upper Left to Right: Connie Golding, Mary Bellehumer, Mary Ginter, Rose Ford, Joanne LaPratt, Pennye Holden, Jodi Burchett. (Not Pictured: Lori McKee).

*These Employees Utilize a variety of Technology to render the best possible Customer Service to the DPW's 26,000 Utility Customers.

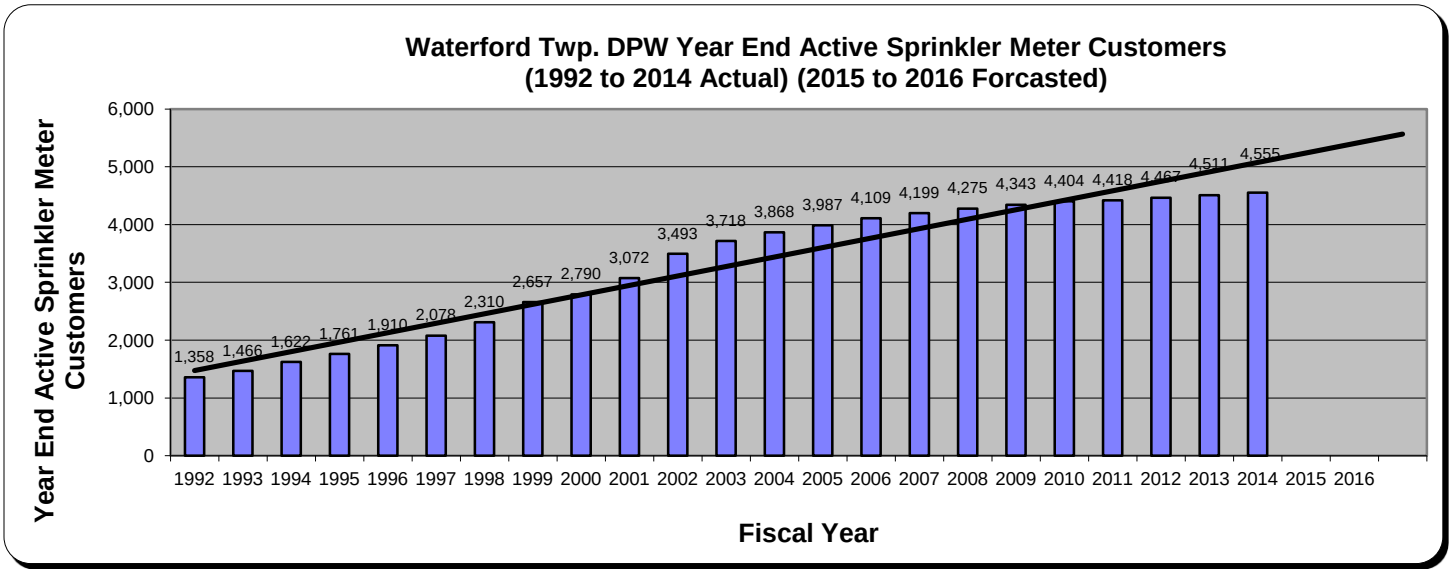
Water Customer Growth

Between 1992 and 2003, the DPW added an average of 344 water customers annually. In recent years, however, that growth has steadily slowed. Since 2003, the DPW has added less than 154 new water customers per year, with the exception of 2010, which saw many inactive accounts turned back on. The projection model below indicates similar trends in the short-term future. The graph below does not include sprinkler meters.



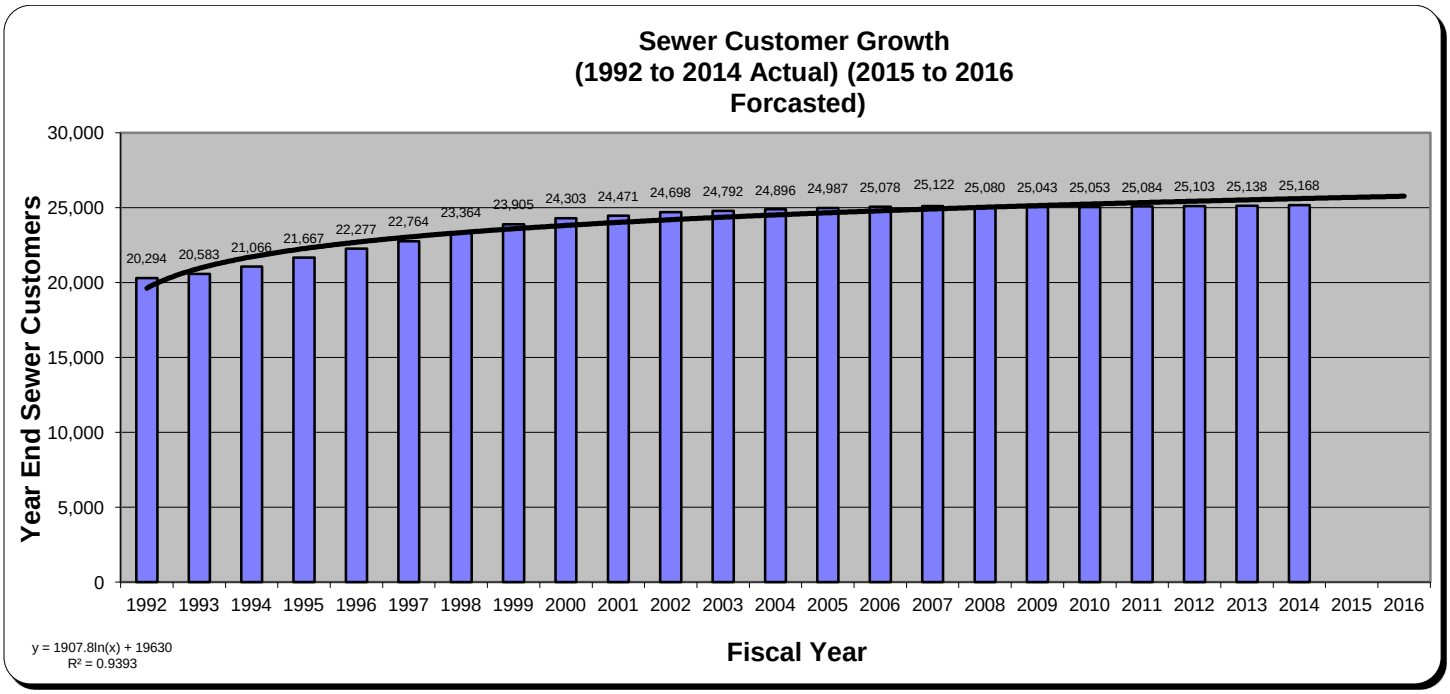
Sprinkler/Irrigation Meters

The DPW offers water customers the option of a separate water meter for outside watering and irrigation. This is a popular service with customers who enjoy gardening and a nice lawn. The benefit to the customer is that sewer fees are not imposed on the secondary sprinkler meter. From 1992 thru 2014, the DPW has installed an average of 137 sprinkler meters annually.

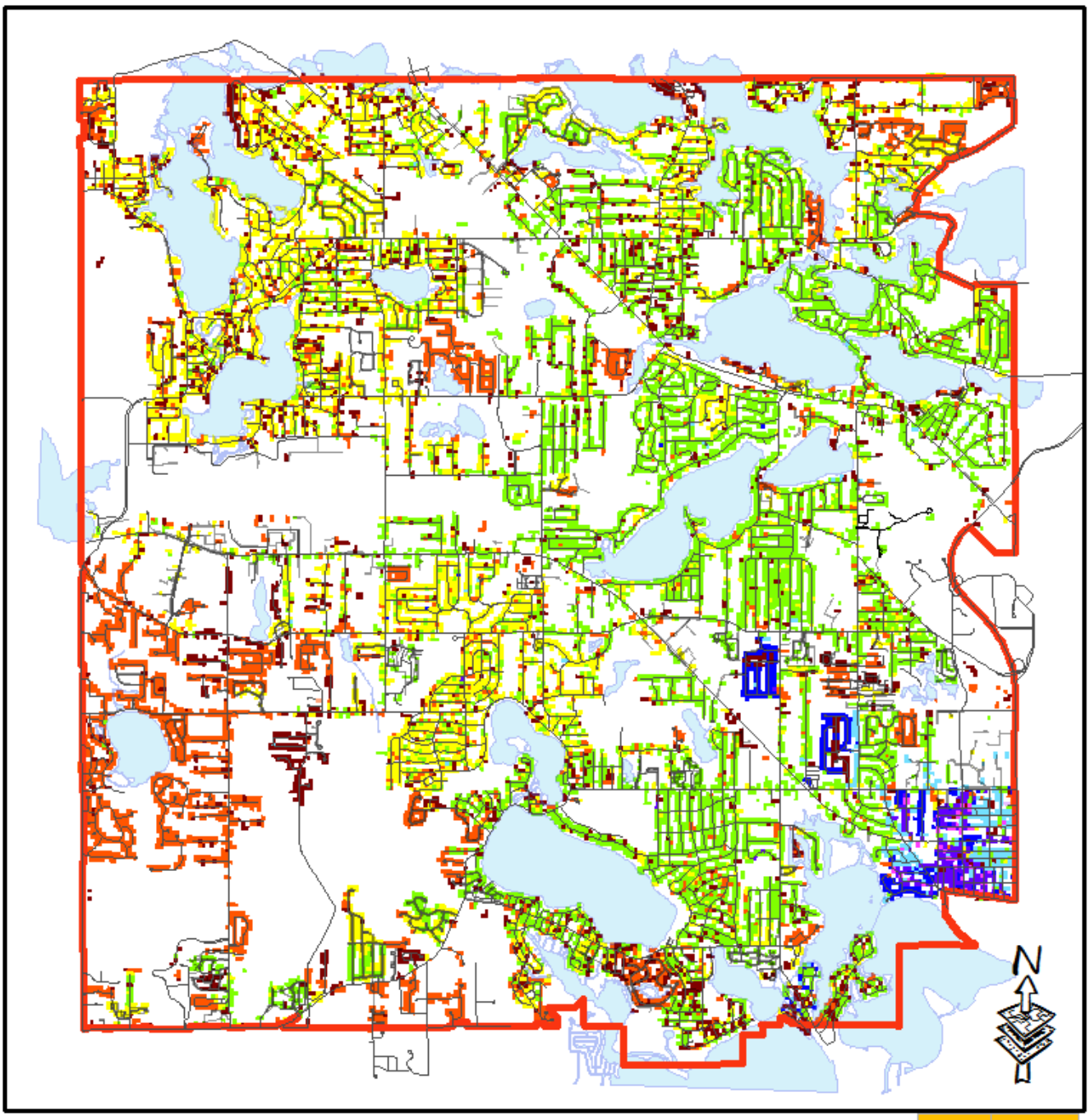


Sewer Customer Growth

Between 1992 and 2003, the DPW has added an average of 273 sewer customers annually. In recent years, however, that growth has steadily slowed. Since 2003, the DPW has added less than 98 new sewer customers annually. The projection model below indicates similar trends in the short-term future.



The Charter Township of Waterford
Sewer Customers by Decade



DECADE	CUSTOMERS
1926-1930	2
1931-1940	46
1941-1950	207
1951-1960	328
1961-1970	300
1971-1980	7816
1981-1990	5242
1991-2000	3627
2001-2010	2565
2011-2013	63

The following table illustrates the method in which a customer sewer bill is allocated in the DPW:

Waterford Township Sewer Bill Breakdown Diagram:

The Sanitary Sewer Network in Waterford involves (3) Agencies, each with their own respective charges. Example is based on average residential connection and 2014 empirical customer demand data.

In 2007, Waterford started getting charged for metered wastewater as opposed to the previous Residential Equivalency Units (R.E.U.) System that was used from the 1960's to 2007. In 2014 Detroit and Oakland County began using a new Rate Simplification Methodology based on Monthly Billing using a Municipalities most recent year's full flow.

Sanitary Sewer System 2014 Financial Breakdown

As of August 1, 2014 the Sewer Rates for Waterford Sewer Customers with water were $59.91 'Ready to Serve Charge'. Then $3.10 per 100 Cubic Feet thereafter. 1 C.F. = 7.48 Gallons

The average residential customer in 2014 used 1,691 C.F. of sewer per quarter. This resulted in a $112.33 average quarterly sewer bill. Of the average sewer bill Waterford Twp. retained $12.44 or 11.08%. The balance of $99.89 was distributed to Oakland County and Detroit Water and Sewer Dept.

Waterford Twp. has 26,438 Total Sewer Customers as of 1-27-2015. Waterford was charged a total of $7,669,683 from the City of Detroit and $1,822,633 from Oakland County in Operational Year 2014

11.08% of the Average 2014 Residential Sewer Bill Payment Retained by Waterford

Agency 1
Waterford Twp. DPW

Waterford Township Michigan

Sanitary Sewer System Characteristics and facts

Waterford Twp. Currently has approximately 360 miles of Sanitary Sewer lines. These lines are maintained by Waterford DPW.

Waterford Twp. Currently has 63 Sewer Lift Stations. These lift stations contain pumps and other Electro-Mechanical Devices that are maintained by Waterford DPW.

Waterford Twp. Sewer Lift Stations like the one pictured to the left (5025 Highland Rd. the Clinton River Sewer Station) convey wastewater to the Oakland County Sewer Interceptor

Sanitary Sewer System Financial Breakdown

Of the average $112.33 Quarterly Average Sewer Bill Waterford Customers paid, Oakland County received $27.36 or 24.36% of the total customer payment based on the average customer consumption of 1,691 C.F.

24.36% of Average Quarterly Waterford Residential Sewer Bill Payment Retained by Oakland County. 9.02% Maint. Charge and 15.34% OMI Debt Service Payments.

Agency 2
Oakland County Water Resource Commissioner (WRC) Formerly the Drain Office (O.C.D.C.)

Sanitary Sewer System Characteristics and facts

All of Waterford's wastewater is received by the Oakland County Interceptor. The lift station (at the corner of Elizabeth Lake Rd. and M-59 in Waterford Twp.) contains large sewer pumps and other Electro-Mechanical Devices that are maintained by the Oakland County Drain Office (O.C.D.C.).

Waterford belongs to the Clinton-Oakland Sewer System. This is a contract between the Township and Oakland County. Waterford pays quarterly invoices to the County, who in turn sends an allotment to the City of Detroit (D.W.S.D.).

After receiving the wastewater from one of Waterford's Lift Stations, Oakland County pumps all of Waterford's Wastewater onto the City of Detroit.

Agency 3
Detroit Water and Sewer Dept. (D.W.S.D.)

Sanitary Sewer System Financial Breakdown

Of the $112.33 average quarterly sewer bill Waterford Customers paid in 2014, Detroit (D.W.S.D.) received the balance of $72.52 or 64.56% of the average residential individual sewer customer payment based on 1,691 C.F. of consumption.

64.56% of Average 2014 Sewer Bill Payment Retained by Detroit (D.W.S.D.)

Sanitary Sewer System Characteristics and facts

All of Waterford's Wastewater is ultimately received by the City of Detroit for treatment and is ultimately returned to the environment in the Detroit River. Detroit's Wastewater Treatment Plant at 9300 W. Jefferson Avenue is the single largest Wastewater Treatment Plant in the United States. This plant is estimated to serve 35% of Michigan's population. (According to the D.W.S.D. Website).

Methodology:
* This study took the total charge from Detroit and Oakland County and Divided those totals by the total number of Sewer Customers in Waterford to obtain relative breakdown. As a customer uses more sewer the %'s retained per agency changes. Here are a few other examples:
1.) 1,691 C.F. per Quarter Waterford Retains: 11.08%
2.) 2,500 C.F. per Quarter Waterford Retains: 27.31%
3.) 4,500 C.F. per Quarter Waterford Retains: 49.91%

The Detroit River is the final discharge point for all of Waterford's Sanitary Sewer System after much conveyance, treatment and the diligence of the (3) agencies involved.

Utility Billing Revenue

The DPW's Water-Sewer Fund has three main sources of revenue. These sources of revenue are generated from water-sewer usage billing (largest category), sewer assessment revenue and water assessment revenue (smallest category). The assessment revenue is generated from customers whom have elected to defer their connection charges over a set number of years. Assessment revenue has been on the decline as the Township continues to age and nears build-out and customers pay off their assessments. This has had the affect of putting more fiscal importance on the water-sewer usage revenue component of the operation.

Water Rates:

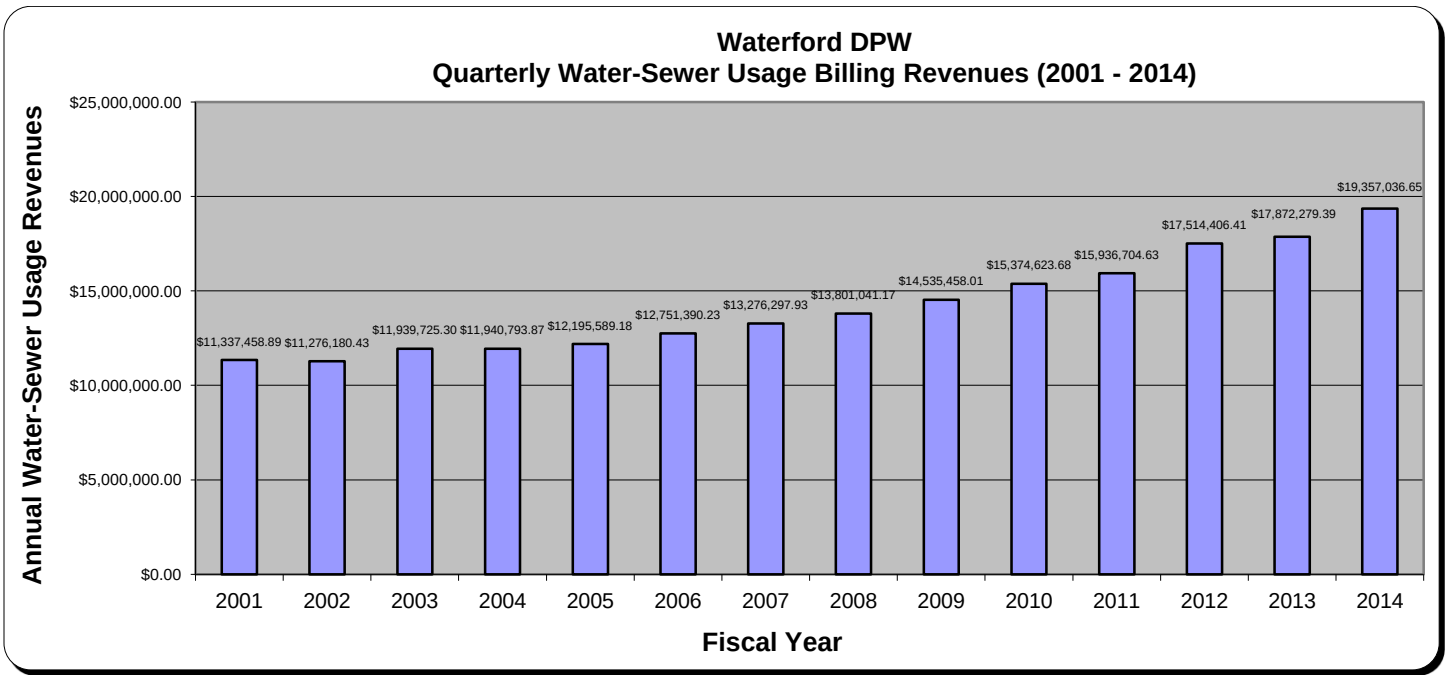
In August of 2014 water rates were adjusted to $15.43 for the first 1,000 Cubic Feet (CF) and $1.93 per 100 CF for all water used over the base 1,000 CF.

Sewer Rates:

In August of 2014, the Ready to Serve sewer charge was held constant at $59.91 to $59.91 per quarter and the Volume Charge was adjusted from $3.03 per 100 cubic feet (CF) to $3.10 per 100 CF as part of the annual pass through of the WRC/DWSD sewer rate increase. The DPW retains only a portion of all sewage charges collected for internal operations while the balance of charges collected are paid to the Oakland County Water Resource Commissioner's Office (WRC) and the Detroit Water and Sewerage Department (DWSD) for transport and treatment.

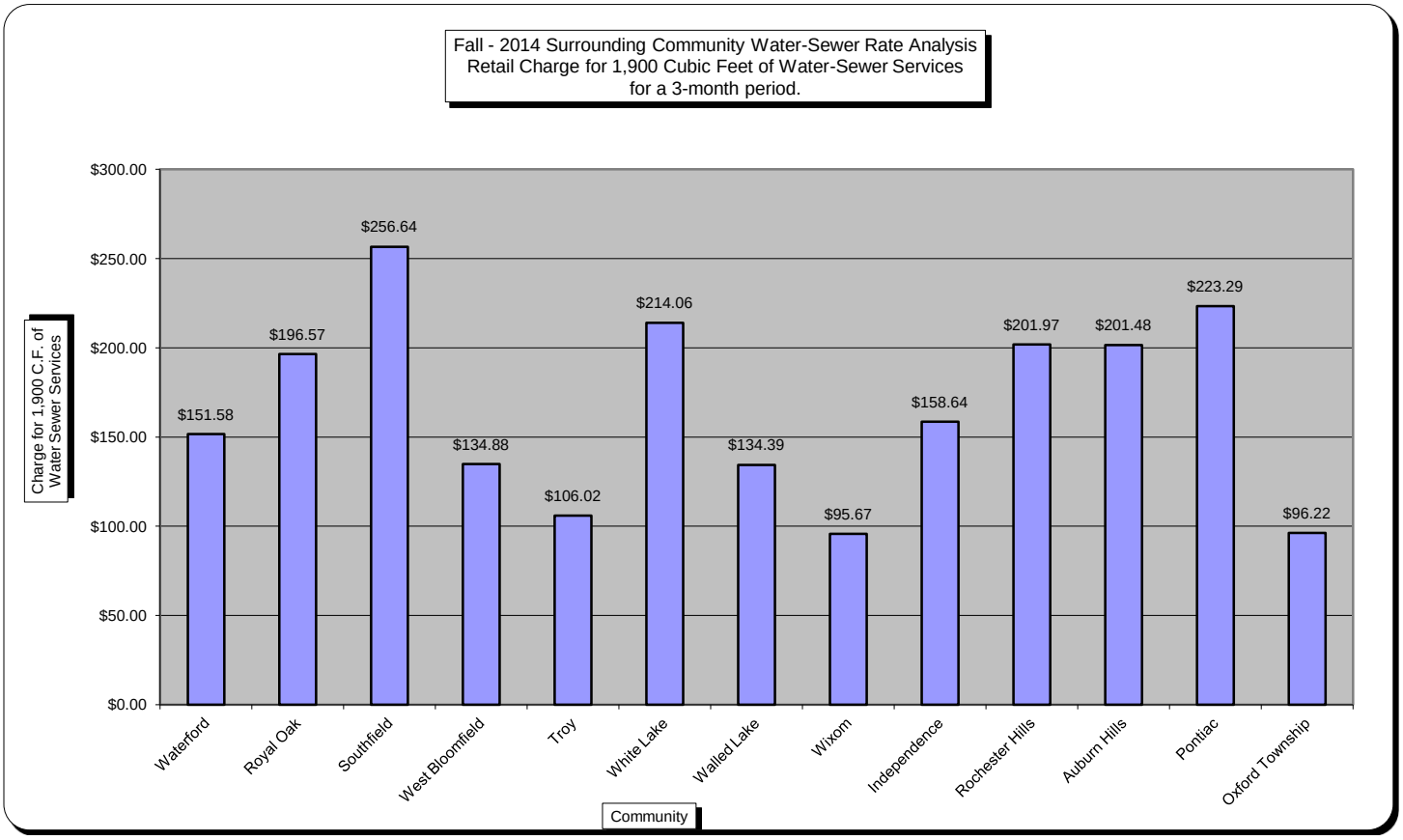
The graph below shows the Water & Sewer Division revenue stream since 2001. Assessment revenue is expected to continue to decline in coming years. It should also be noted that climate and weather conditions have an important impact on water-sewer revenue and charges. An extremely wet and/or cool summer would result in less water consumption and consequently less water/sewer sales revenue.

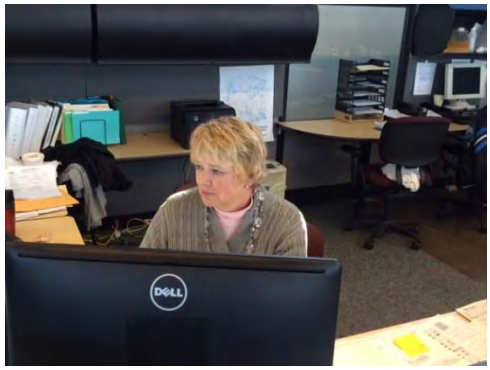
The following table illustrates the water-sewer usage revenue and its changes from 2001 forward.



Water-Sewer Community Rate Comparisons

Many factors influence the utility rate structure within a given community. The age of the system and need for capital improvements, a rate structure that encourages conservation and rate structures of supporting agencies that help provide the service are all factors. The following graph depicts what a typical residential water-sewer customer in 2014, with an average consumption of 1,900 C.F. per quarter, would pay in surrounding communities for the same services. As a whole, the Township rate structure is positioned very competitively with one of the lowest rate structures compared to surrounding communities. Waterford's average annual water-sewer rate was around 9% lower than the surrounding communities that were surveyed.



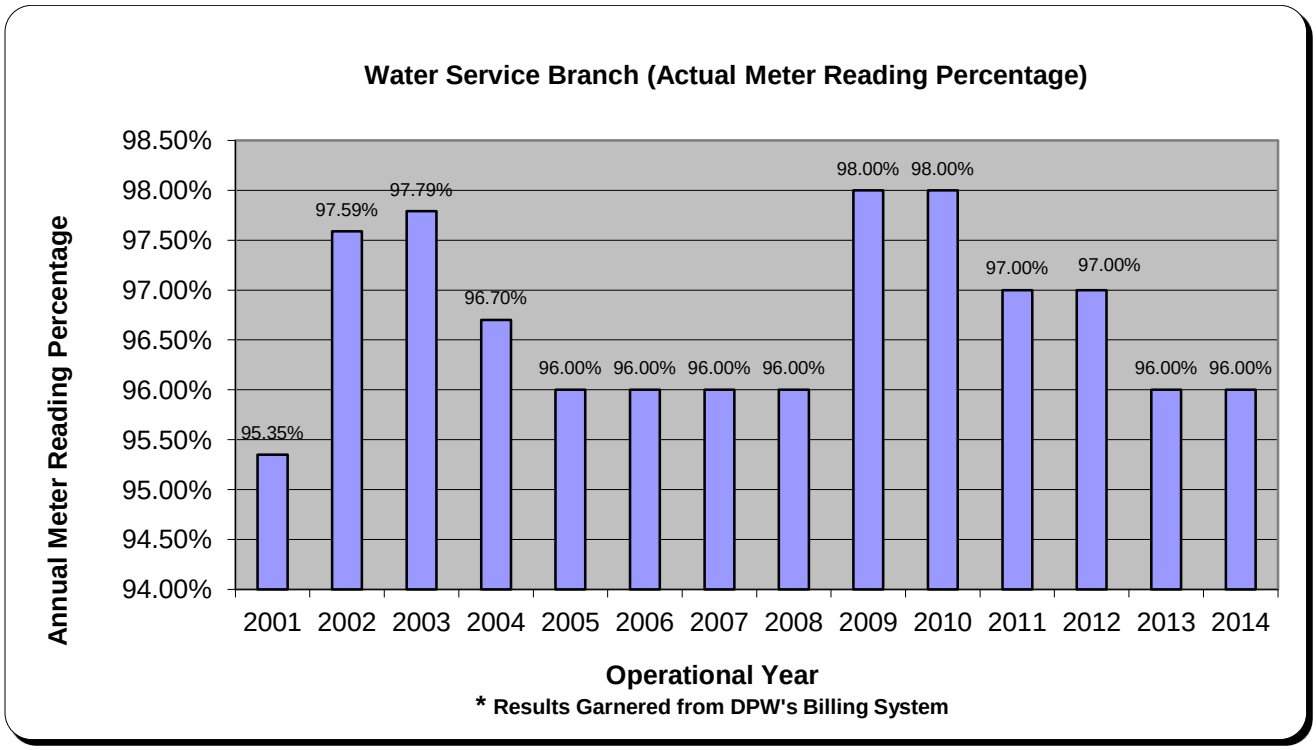


Departmental Aide Lori McKee working on a wide variety of software and technology systems.

Meter Reading

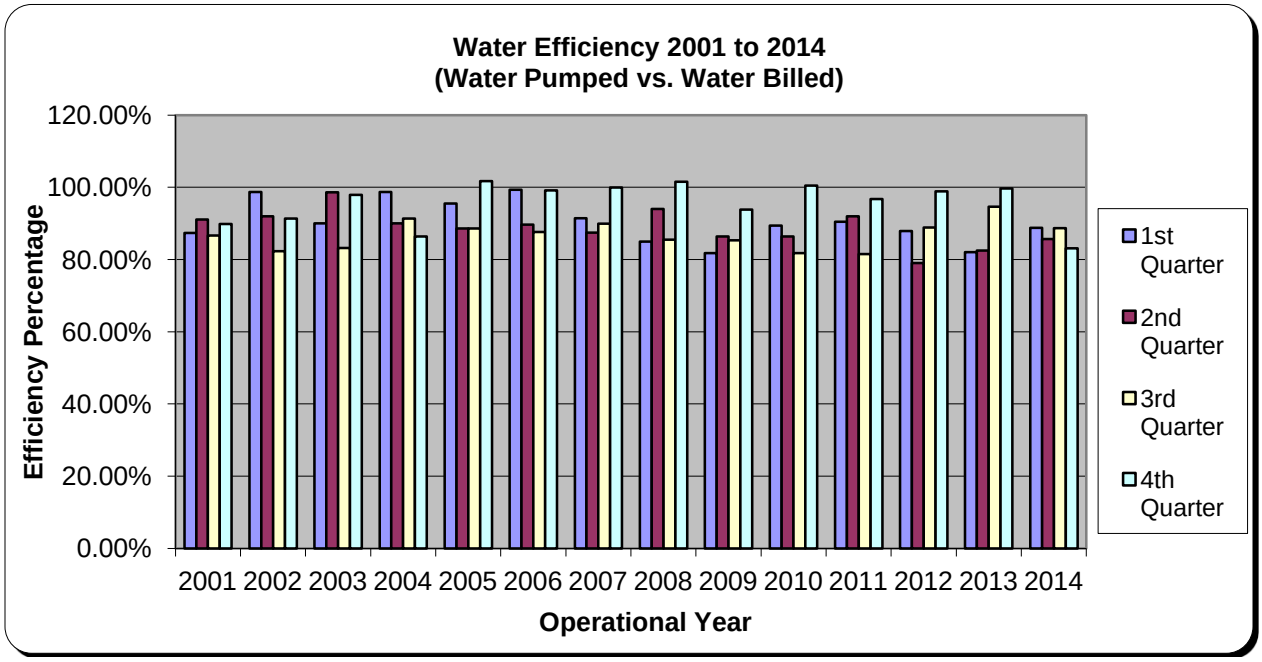
Meter reading is a vital part of the DPW operation and is referred to as the "cash box" component because meter readings are ultimately imported into the electronic billing system to create utility bills and the revenue they generate. The DPW strives to collect as many actual reads as possible because they permit maximum billable services while minimizing inconvenience and inaccurate bills to our customers. The Utility Billing and Water Service Branches work hand in hand to achieve a high actual meter reading percentage. Historically, the DPW has achieved 95% or higher actual reads and 2014 continued with a high percentage of reads. The graph below indicates the actual meter reading percentage achieved annually since 2001.

Service Branch employee Julie Griffin locating a Radio Meter Reading Interface Unit.



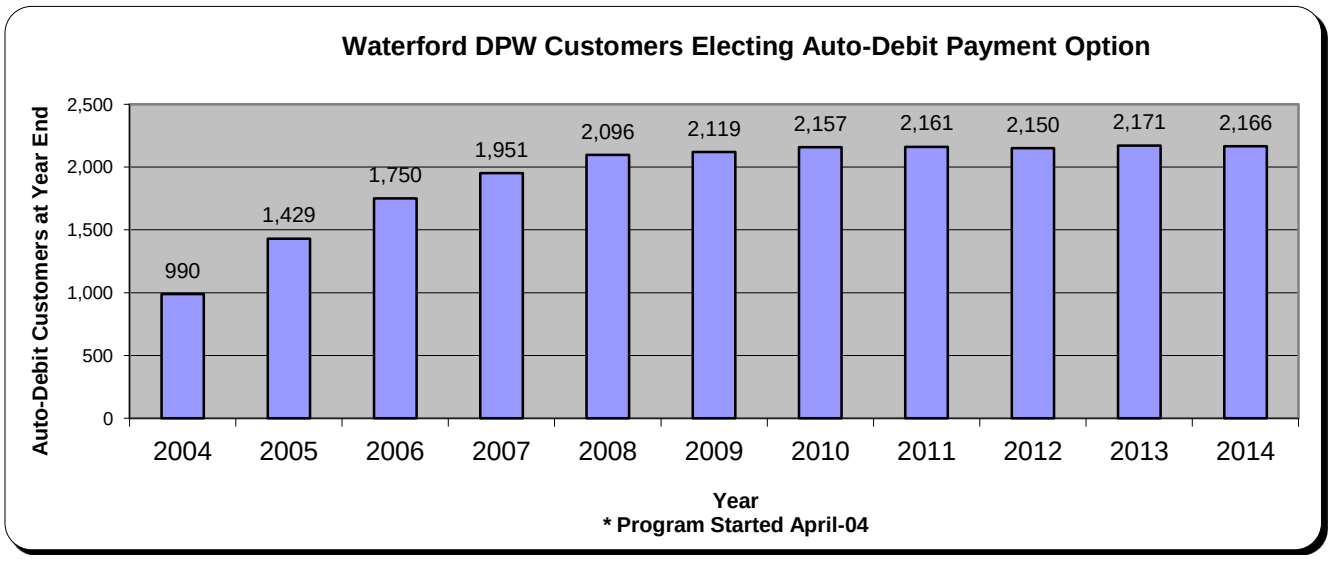
Water Efficiency

An important benchmarking statistic of any water utility is 'Water Efficiency,' which measures the ratio of water produced to water billed or sold. Meter readings are collected at the Water Treatment Facilities and compared against the customer account reads. In addition, other factors for water loss are taken into account including water used by the fire department, sewer jetting, hydrant flushing and tank maintenance. Other factors affecting water efficiency include the age of the distribution system, water main breaks, and composition of the pipe installed in the distribution system. With 100% water accountability as the goal, the DPW strives for the highest efficiency possible. Efforts have continued to improve efficiency through advanced SCADA monitoring, water modeling, and water main rehabilitation to identify and correct system deficiencies. The graph below depicts the water efficiency benchmarking statistics by quarter since 2001. It must be noted that anything over 90% is considered superior in the water industry. In 2014, the DPW realized very good water efficiency results.



Auto-Debit Payment Option

Starting in April 2004, the DPW began offering an Auto-Debit payment option for water-sewer customers. This service conveniently allows customers to have their water-sewer bill automatically deducted from a checking or savings account of their choice without the need to write a paper check, or send a payment via the mail. Customers still receive a paper invoice for their records. Since April of 2004, 2,166 customers or 8.17% of the customer base have elected this payment option. This growth percentage is expected to remain constant in the coming years. Customers who travel for work, go south for the winter, or have a busy lifestyle are finding this payment option convenient. The DPW advertises this service in the utility bills mailed to customers and maintains a posting on the Township web site to inform customers of the programs availability.

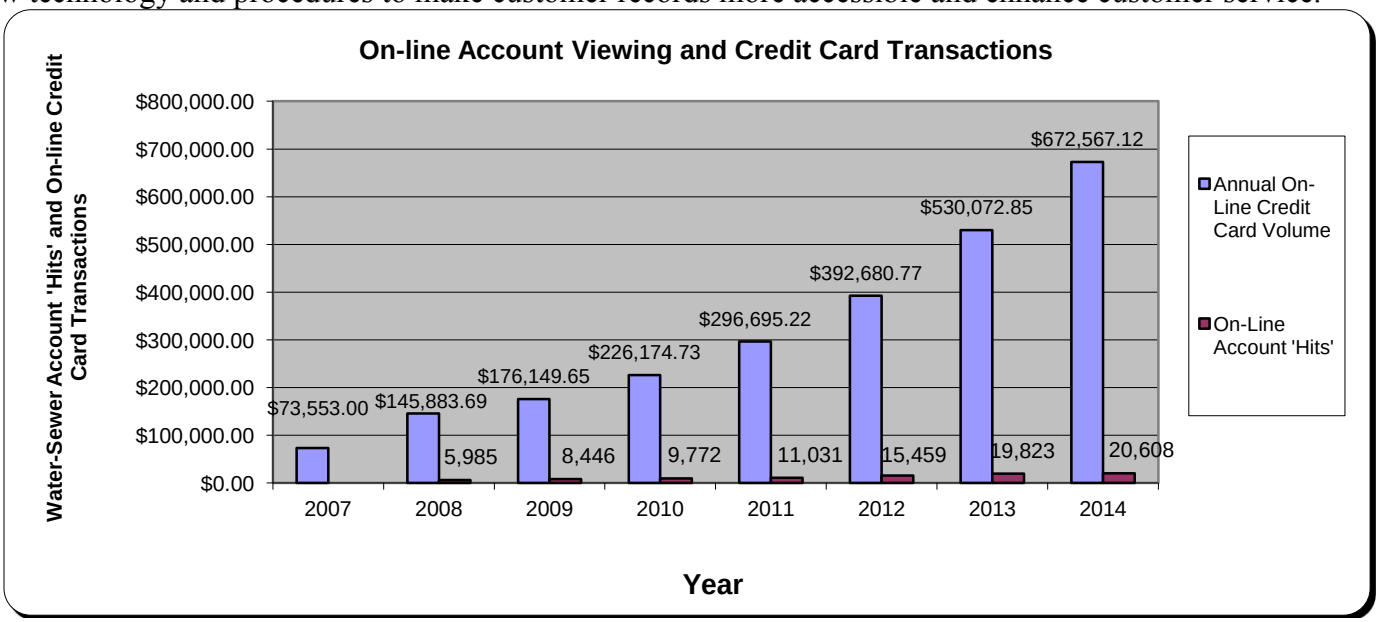


Lockbox Payment Processing

The bulk of the customer base continues to mail-in their payments which are processed in an automated fashion by the Township's financial depository. An electronic file is then transferred daily to the DPW and updated automatically into the utility billing/accounts receivable system. This lockbox processing collection service has saved the DPW many labor hours and thousands of dollars in manual payment processing and resulted in extra interest revenue from a decreased payment float time. Lockbox processing tends to be more accurate than manual processing. Float time is the time it takes for the depository institution to receive the actual funds and commence interest earning.

On-Line Account Inquires and Payment Options

In 2007, the DPW began offering customer data inquires and payment options via the Township Web Site. Customers can access their water-sewer account 24 hours a day 7 days a week at their convenience. On-line and on site credit card transactions were implemented for payment in June 2007. The DPW saw 20,608 customer account inquires in 2014 related to their water-sewer accounts. The DPW continues to stay abreast of new technology and procedures to make customer records more accessible and enhance customer service.



Fixed Network Meter Reading System

The DPW was one of the first communities in Michigan to begin implementation of a Fixed Network Meter reading system to collect and analyze customer meter reads automatically via radio to collectors, which are connected to the Township's broadband wireless network. This process allows for automatic daily meter read updates and real-time feedback of reverse flows and other diagnostic information. It also eliminates the need for service personnel to manually collect meter reads from customer addresses, which increases employee safety, reduces liability and saves money.

This technology allows service personnel to be more proactive in operational activities such as performing preventative maintenance on assets such as meters and curb boxes. The system also provides DPW customer service staff with an enhanced ability to more effectively and accurately address customer questions when they arise because they are able to collect specific meter reads while on the phone with the customer. DPW staff can analyze trends and patterns to isolate consumption and other issues before they become problems. It also allows for daily consumption trending so that potential water leaks can be quickly identified as well as meter tampering and reverse flow.

The pictures on the subsequent pages outline 2 Fixed Network Meter Reading Products. The existing Itron 200-W Fixed Network Readers units are displayed in yellow and the Neptune R-450 Fixed Network Readers are displayed in pink on the map. The Fixed Network Collectors are depicted with a Radio Tower Symbol. The transmission range of the units to the collectors has been very good and we look forward to performance improvements as the industry improves the technology.

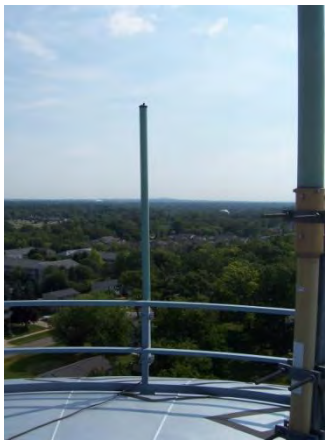
Waterford DPW 'All-In' on Fixed Network System

Prior to 2013, fewer than half of Waterford's homes and businesses were equipped with a fixed network meter reading device. In September of 2013 Waterford Township contracted with Vanguard Utility Service to install 18,000 Fixed Network Readers and High Resolution Residential Water Meters. When completed, all of Waterford's residential meters will be state-of-the-art High Resolution with Fixed Network Readers. The program is being funded through a DWRF – Drinking Water Revolving Fund low interest loan program. This project qualified for loan principal forgiveness as a Green Project initiative.

Once this technology is implemented throughout the township, the DPW will have the ability to deploy an on-line customer interface, where water customers will be able to access their account from their computers and mobile devices and see real-time water usage statistics. This will include the meter's leak detection alarms, as well as backflow alarms.

Waterford DPW Selected as a Beta Partner for Neptune Technology Group Fixed Network AMR System

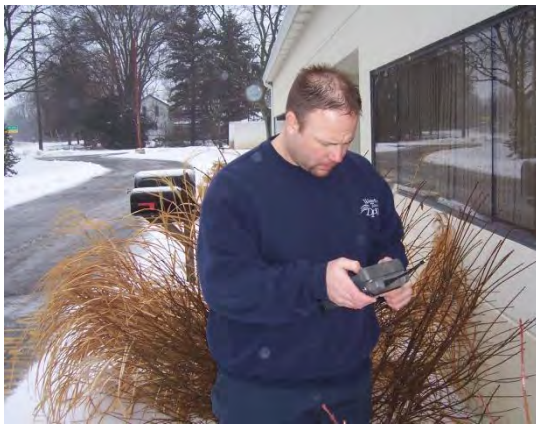
Waterford DPW was approached in 2006 by the Neptune Meter company to assist in their development of the next generation Fixed Network meter reading system, and the effort has resulted in deployment of a no-charge beta Neptune Fixed Network that will provide the basis of the reading system of the future. As a result of the collaborative program, the DPW is deploying a state-of-the-art water metering program utilizing a fixed collector, radio reporting unit and advanced software for processing reads, alarms and reports. This system permits daily reads as well as leak detection and backflow monitoring. Over 16,000 endpoints and over 14,000 high resolution meters have been installed to date.



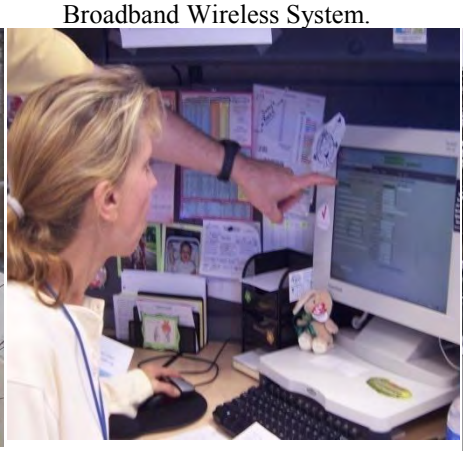
Neptune Omni-Directional Antenna Operating at 450 MHZ located on the Cass Water Tank.

Neptune R-450 Fixed Network Collector. These collectors receive daily meter reads and then transmit the data to the DPW using the Township's Broadband Wireless System.

Neptune R-450 Fixed Network Collector site with a solar panel for energy conservation.



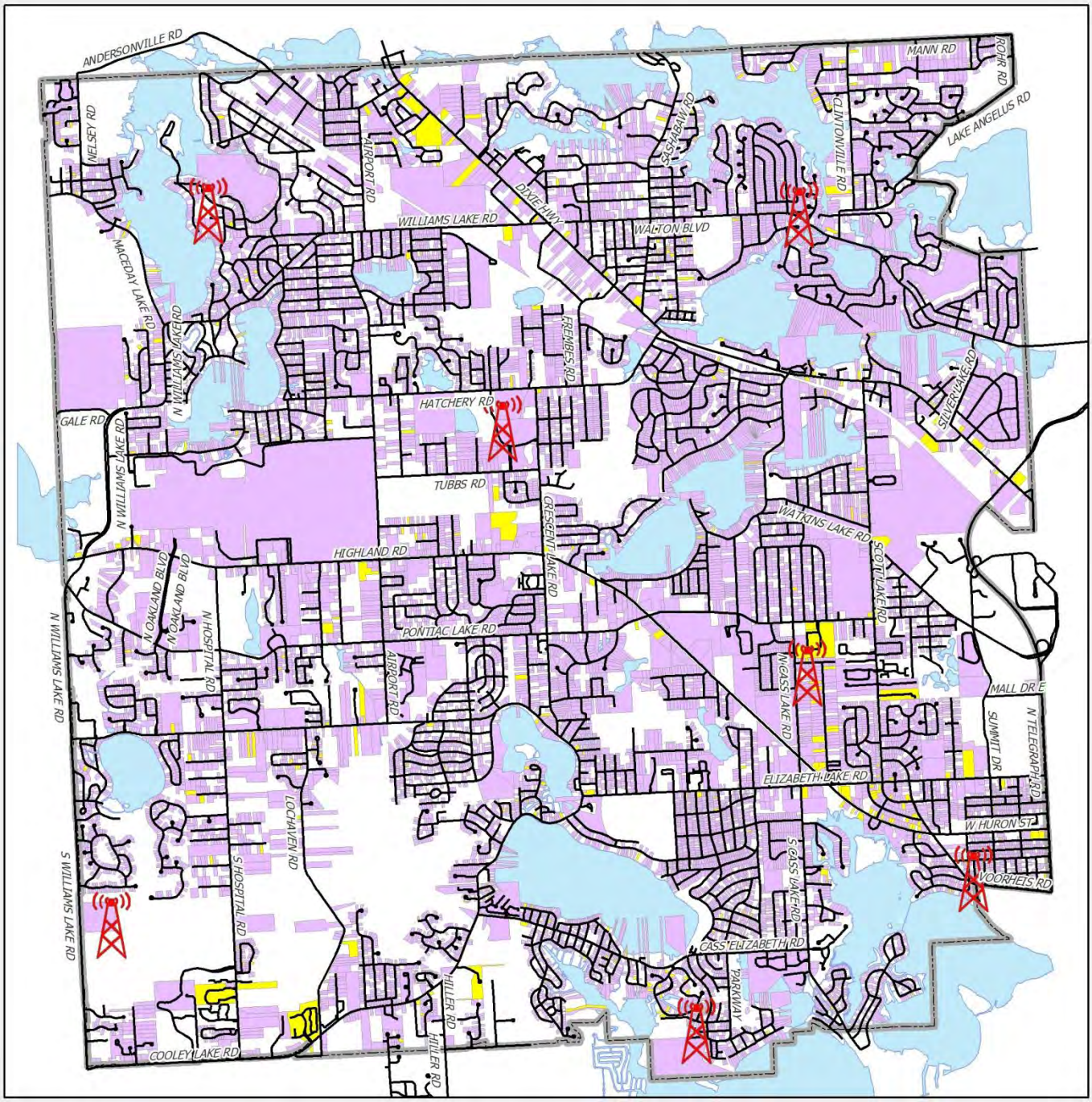
Service Branch employee Danny Watson configuring R-450 Reading Devices in the Field.



Billing Branch Employee Mary Bellehumer using the Software System that permits daily meter reads.

Jim Yearsin of Neptune Technology adjusting the Solar Panel that powers one of Waterford's Fixed Network Collector Sites.

Waterford Township Fixed AMR Network Map
(As of Jan. 2015)



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Updated: 01/21/2015

Engineering Services Branch

The mission of the Engineering Services Branch is to provide professional engineering support for the DPW and to assist other Township Departments such as Building and Engineering and the public as necessary. By utilizing the latest computer programming, software applications and field equipment, the branch is able to provide highly accurate information in the areas of water/sewer modeling, sewer main televising, utility staking and project coordination.

The branch is headed by the Superintendent of DPW Engineering Services and is comprised of 7 full-time employees and a variable number (1-3) of part-time employees. The positions and a brief description of their typical duties are listed below:

- Engineering Superintendent
  Provides overall administrative support duties for the Engineering Services Branch. Maintains all hardware and software necessary to operate the DPW's Information Management and Telecommunication Systems. Provides Geographic Information Systems (GIS) support to other Township departments.
- DPW Engineer
  Prepares drawings, specifications, and bid documents related to water and wastewater or other public works projects; gathers, assembles, analyzes data and statistics and prepares engineering studies and reports.
- DPW Information Systems Technician
  Assists the Engineering Department with an emphasis on the maintenance and updating of hardware and GIS-related software applications.
- Field Engineer
  Assists in the design and preparation of engineering plans. Performs construction inspection, testing and surveying on capital projects and oversees installation, repair and maintenance of underground utilities on private development projects.
- Civil Engineering Technician
  Assists in the design and preparation of engineering plans and specifications. Performs plan reviews and maintains engineering files and records. Conducts testing, inspections and prepares pay estimates on capital projects.
- Utility Coordinator
  Locates and marks all underground utilities owned by the township in advance of construction as requested by contractors and outside agencies. Makes and updates the corrections to existing utility records as needed.
- Collection System Maintenance Tech – Grade IV
  Performs a variety of duties related to sanitary sewage collection system inspection, operation and maintenance as well as pump station operations.

Engineering Services Group
From Left: Chris Donais, Joe Ashley, Karen Lee, Tony Saab, Terri Frey, Dan Stickel

The activities of the Engineering Services Branch can be broadly broken down into seven categories:

1. DPW Information Systems
2. Utility Coordination
3. Private Development
4. Infiltration – Inflow
5. Capital Improvement Projects
6. Wellhead Protection / Community Outreach
7. Community Lighting

1. DPW Information Systems

The DPW has worked in coordination with the Township Information Systems Department to develop a robust Information Management System that provides critical information and applications for the efficient operations of the department and to assist other departments. The Information Technology initiatives have streamlined operations and provided valuable tools to the department and to the public that would not be available without incorporating technology into the operations of the department.

The Information Management System includes all the various components necessary to provide data and applications to the department. The DPW Information Systems staff is tasked with implementation and maintenance of the components of the Information Management System. The following is a partial list of the hardware being monitored and/or maintained:

- ✓ 68 workstations (54 internal plus 14 at Wireless Sites)
- ✓ 18 Printers
- ✓ 2 42-Inch Plotters
- ✓ 24 Servers (Application and File Servers)
- ✓ 3 Desktop Scanners

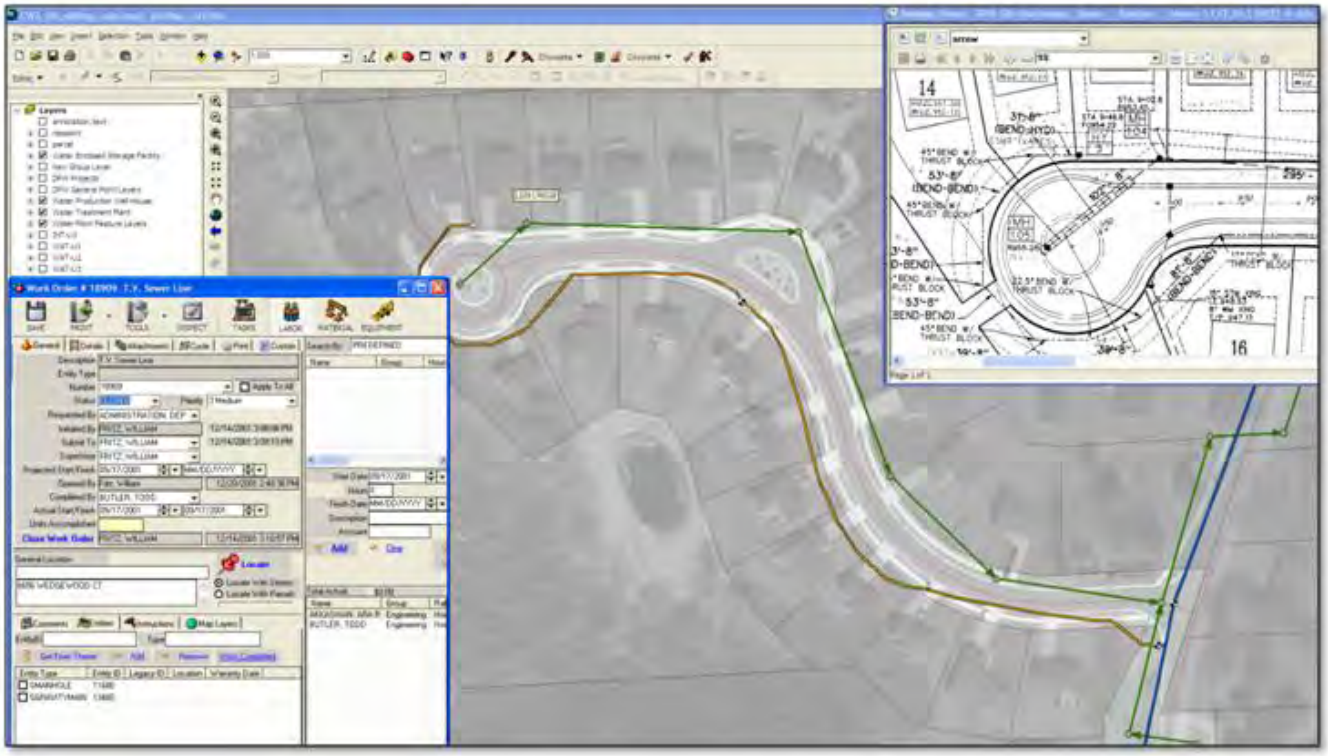
- ✓ 1 Stand-Up Large-Size Scanner
- ✓ 1 Sub-Meter GPS Unit
- ✓ 23 Network switches (8 internal and 15 at Wireless Sites)
- ✓ 28 Wireless Base Station Radios (Site to Site Communication)
- ✓ 29 Wireless Access Points (Secure 802.11x)
- ✓ 37 Standard Definition Security Cameras (2 internal and 35 at Wireless Sites)
- ✓ 50 High Definition Security Cameras (23 internal and 27 at Wireless Sites)

The following is a partial list of applications being maintained in whole or part by DPW Information Systems:

- ✓ ESRI ArcServer Enterprise Basic (SDE)
- ✓ ESRI ArcServer Enterprise Standard (ArcServer)
- ✓ ESRI ArcGIS Desktop (ArcInfo, ArcEditor, ArcView)
- ✓ Azteca Cityworks
- ✓ Hyland OnBase (Desktop, Web-Based, ESRI Integration, Cityworks Integration, and Mobile Client)
- ✓ Dig-Smart
- ✓ Kronos
- ✓ ONSSI
- ✓ NetMotion
- ✓ Neptune Fixed Base
- ✓ iWater Inframap
- ✓ GE Proficy iFix
- ✓ GE Proficy Workflow
- ✓ SAP Crystal Reports Server (Business Intelligence)
- ✓ Geocortex

Detailed below, are some examples of the various applications and technologies used by the DPW.

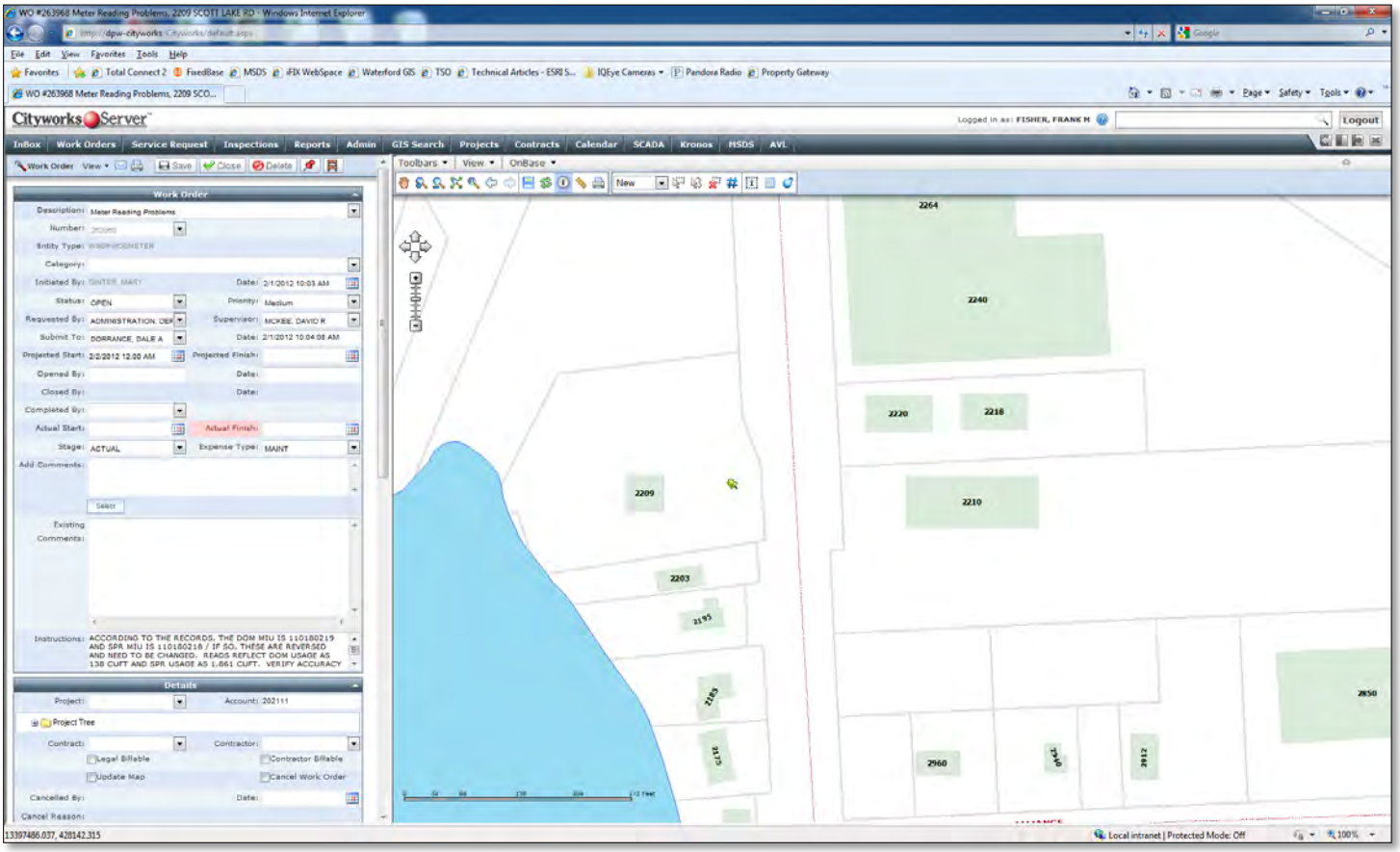
Geographic Information System (GIS) – The DPW has developed a GIS that allows spatial data to be displayed in a straightforward user interface. The GIS serves as a base for viewing infrastructure, and through integrations with work management software and document management software, functions as the central application for creating work orders and viewing supporting documentation regarding infrastructure.



GIS Application showing water/sewer infrastructure along with drawings and work management screens

Since 2011, the DPW staff has also been responsible for maintaining and expanding the GIS data and applications for all Township departments. These include Police, Fire, Building and Engineering, Community Planning and Development as well as all other Township departments. The entire township's GIS is comprised of over 500 individual layers of geospatial related data, as well as several applications used to access and analyze the data.

The DPW has begun implementation of a redesigned GIS interface that leverages the latest web based technology and standards. Users will migrate from a traditional client/server platform to an entirely web based interface. This new browser based application allows the software to be deployed to more computers throughout township departments without having to purchase additional software licenses or modifying systems permissions. The migration to a web based platform will allow DPW to develop and deploy a lightweight application that can be leveraged to improve workflow by enabling users to quickly generate service requests and work orders from any location and also track the status of these requests.



Redesigned web based interface for DPW combining GIS and work management screens

The web based interface was implemented in 2011 for limited use, while the continued testing and integration of other core applications available in the client based version of the GIS was being ported over to the web based version of GIS. The most critical of these integrations being the document management interface. This integration allows the users to search documents related to the selected asset from within the GIS interface. The rollout of the web based interface was completed in 2012; users currently have both the traditional client and the new web based application available. The traditional interface will be phased out completely in early 2015, this will allow for increased savings when support for most of the existing client licenses is discontinued. This will also provide savings due to the decreased maintenance requirements necessary to maintain the application.

In addition to the conversion of the GIS application for DPW, the conversion of an existing custom web based application used by Police, Fire and other Township departments has also been under development. This conversion updates the existing application from an older web based platform to the latest web based GIS platform. In addition to updating the current application, the new framework allows DPW staff to quickly modify and develop applications that scale from PC's to tablets and phones. This allows for seamless data integration with the enterprise wide GIS database and increased functionality in the web application.

Wireless Wide Area Network (WWAN) – The DPW has implemented a WWAN that allows remote facilities direct access to the Township network. These remote sites are now able to pass live data and streaming video directly back to Township information systems. This allows the DPW to better monitor and control the remote sites and also provides live video monitoring and alarming at these remote sites. Secure wireless hot spots are also being implemented at these locations to provide DPW staff access to all information systems while in the field.

Wireless Communication Tower at Water Plant

Above: Exterior Security Camera at Water Plant
Below: Inside View of Water Plant from Recording Software

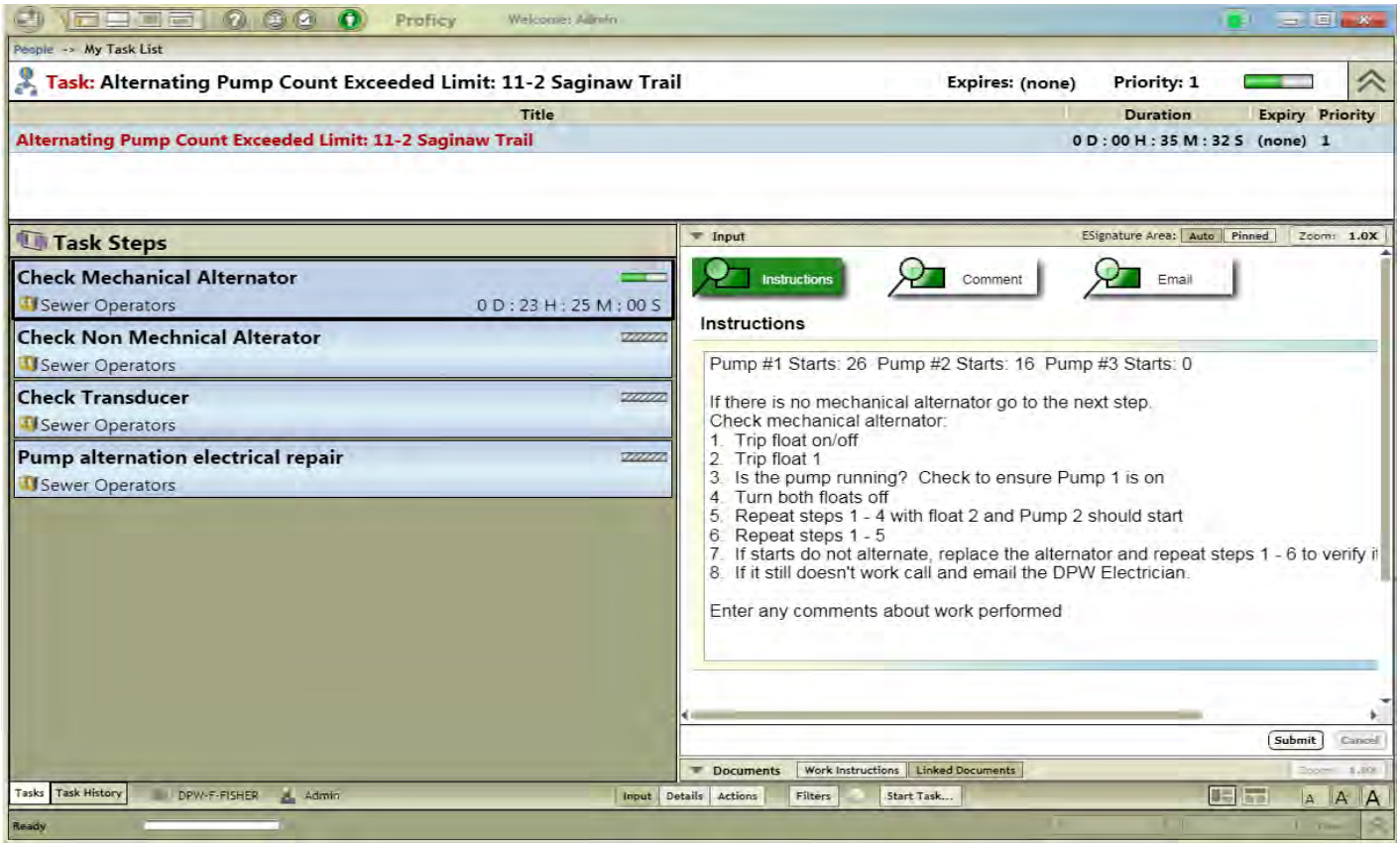
Virtual Private Network (VPN) –In addition to providing the personnel with field access via the WWAN, the DPW has also implemented the use of NetMotion software, which provides users an encrypted connection to the internal network. This VPN allows users secure access to data and systems available via the internal network, such as security data, system controls and all other data and systems on the network for which the user has privileges. This provides staff the ability to quickly connect to the network in order to access data or systems whenever and wherever they may be; all that is required is a broadband connection. This system provides the users with a reliable and secure connection from virtually anywhere and provides a safe means for the IT department to be able to secure the connection.

SCADA – Beginning in 2013 and stretching for the next several years, Waterford Township DPW started a major upgrade to the hardware and software that together make up the Supervisory Control and Data Acquisition (SCADA) system. This system is key to controlling and monitoring both the water and sanitary sewer systems. The system was updated from running on redundant workstation PC's to fault tolerant redundant server hardware. This update is a major revision in the overall design and operation of the SCADA system. The initial phase provided the necessary update to the system necessary for redundancy as well as a foundation for the upgrade of the rest of the SCADA network. With the SCADA core upgrade complete, the DPW has begun the process of upgrading all the remote facilities to leverage the new technology. The movement to the latest in technology will allow Waterford DPW to more efficiently and securely operate the water and sanitary sewer infrastructure.

Left: Prior to the upgrade the SCADA system ran on redundant workstation PC's.

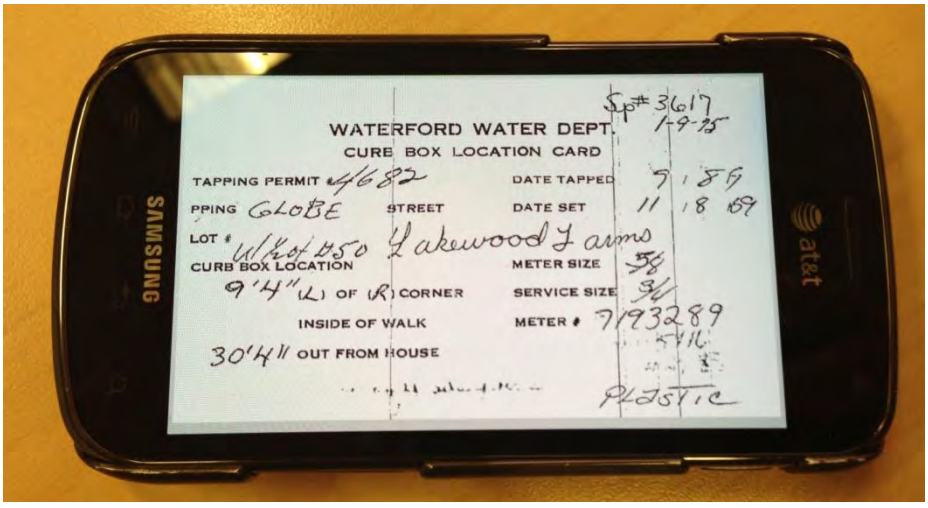
Right: After the upgrade the SCADA system has been incorporated into the DPW server center. Running the SCADA system on server hardware provides multiple levels of redundancy to ensure operation of this critical system.

Workflow – Waterford DPW has implemented a workflow application that integrates data from the Supervisory Control and Data Acquisition (SCADA), the system responsible for control of the water and sewer sites, with the GIS and work management software to function as a middleware solution for evaluating real time data and generating work orders based on logic defined in the workflow. This allows the DPW to leverage the power of real time data from the SCADA system, the logic of a workflow application and the work scheduling and tracking components of the work management system to create a seamless link to better manage the infrastructure. The workflow application also provides standard operating procedures to better standardize the steps necessary to perform maintenance on the equipment. The workflow application is easily adapted to be used throughout the department to standardize how other business processes are completed, such as following state required reporting procedures and executing specific steps in a billing process due to special requirements. The workflow application provides the flexibility needed to help automate operations throughout the department.



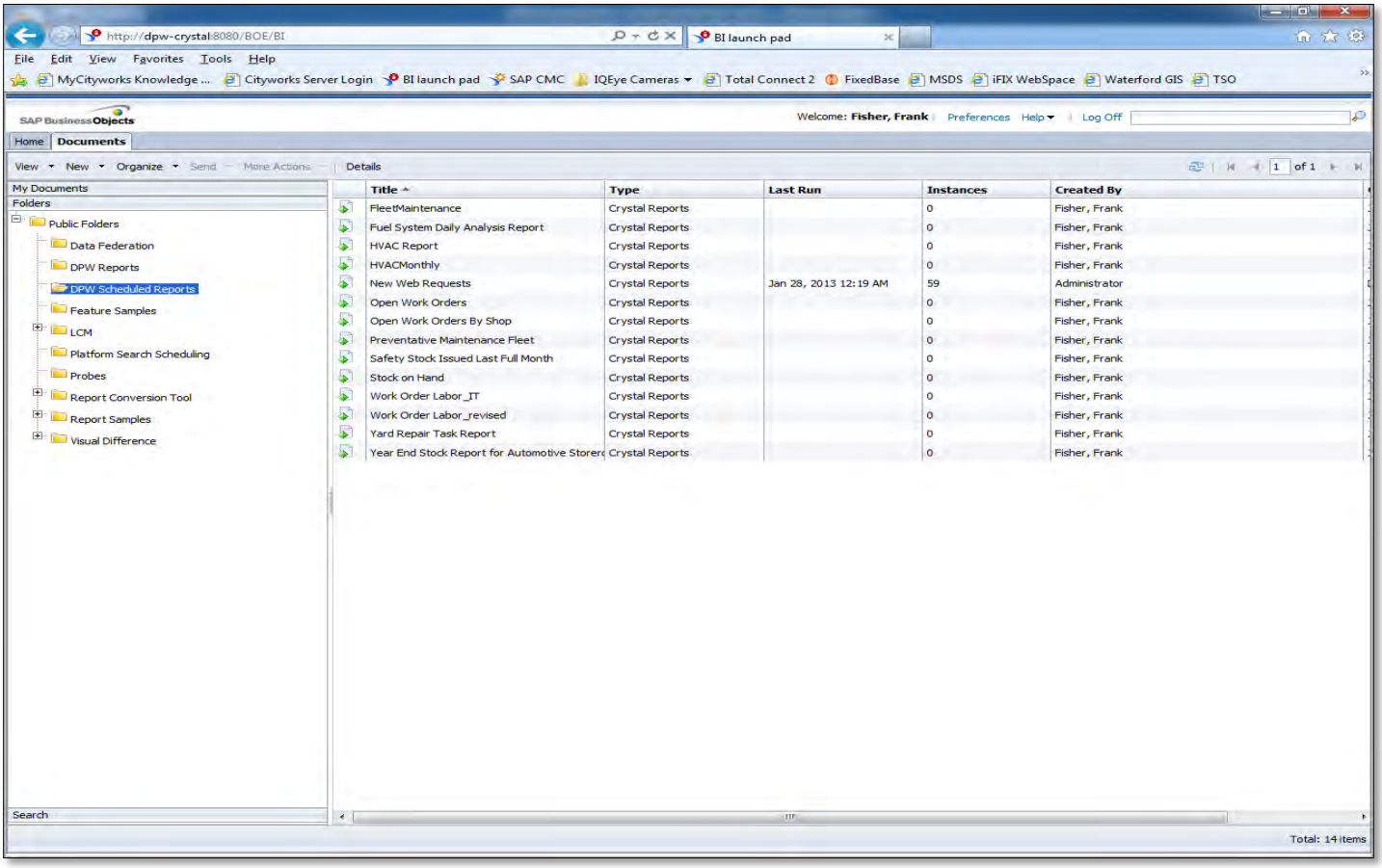
Workflow application showing the auto-generated request and the standardized steps for troubleshooting the issue

OnBase Mobile Field Access –Waterford DPW has deployed the OnBase Mobile App for mobile access of the document management system. The application provides DPW field staff with the ability to search and view documents remotely on their smart phones. The application is a module that interfaces seamlessly with the existing deployment of the OnBase Document Management System. The interface provides a method for after hours standby personnel, as well as other field staff, to quickly retrieve information needed to address water and sewer issues. The standby personnel can retrieve critical information at the location of the event, such as curb box location for a leaking water line in a house, without having to first visit the DPW office to retrieve the information. The application has been deployed to all field staff with a DPW issued cell phone and has been a great success in providing key information in the field.



Smart phone showing curb box information retrieved via OnBase Mobile Application

SAP Crystal Reports Server –Waterford DPW has implemented Crystal Reports server to provide an easy method of accessing and sharing critical information stored in various databases. This application automatically schedules reports and provides on-demand reports that access the DPW databases. The interface allows authorized users a method to quickly run or schedule predefined reports, without having to be familiar with the complex database structure. The application also emails scheduled reports to key personnel. These reports can provide key information that is needed for business processes as well as identifying operational exceptions that need to be addressed. This exception-based reporting allows for managers and staff to focus on items that need attention, instead of spending their time looking for problems.



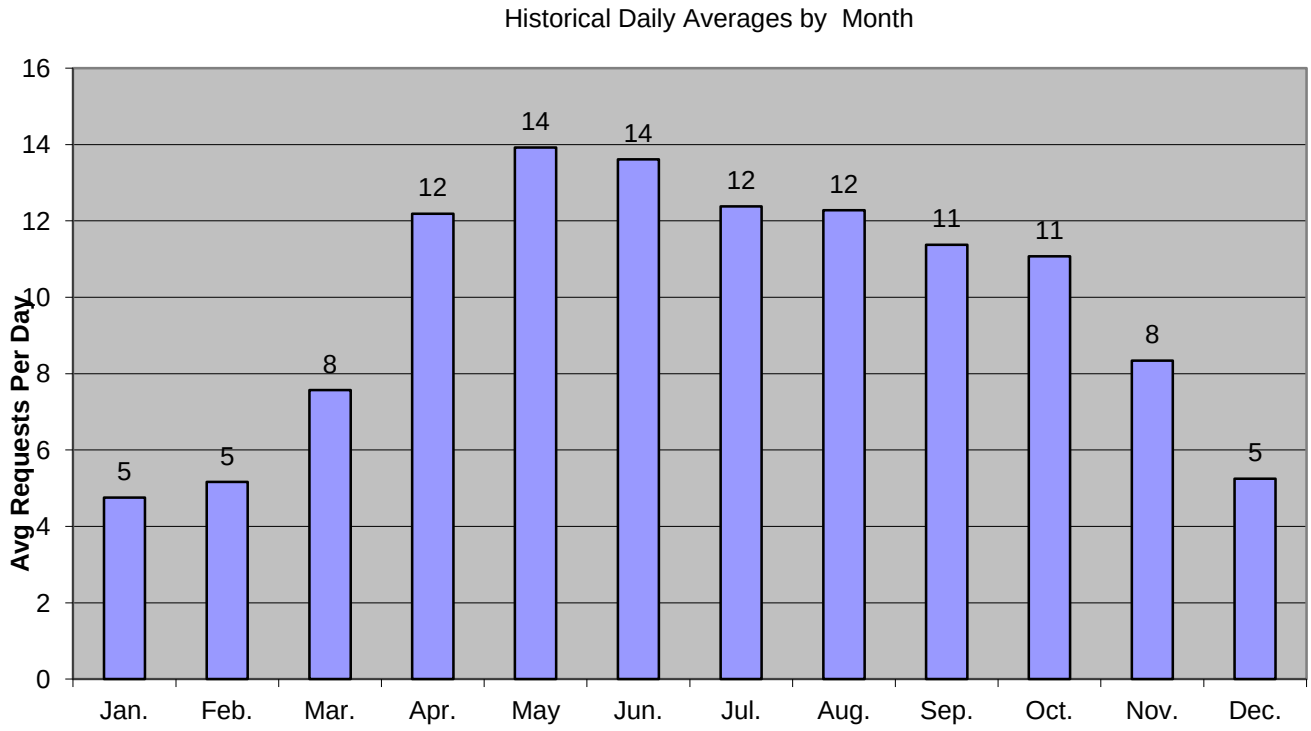
Crystal Reports Server Web Based Interface showing a list of scheduled reports for DPW

2. Utility Coordination

The DPW participates in the Michigan Miss-Dig program where contractors and others anticipating underground utility work contact the Miss-Dig agency and report the location of the proposed work. Miss-Dig, in turn, broadcasts a message to the affected utilities notifying them of the imminent work and requesting staking if necessary. The affected utilities then have three working days to respond to the request.

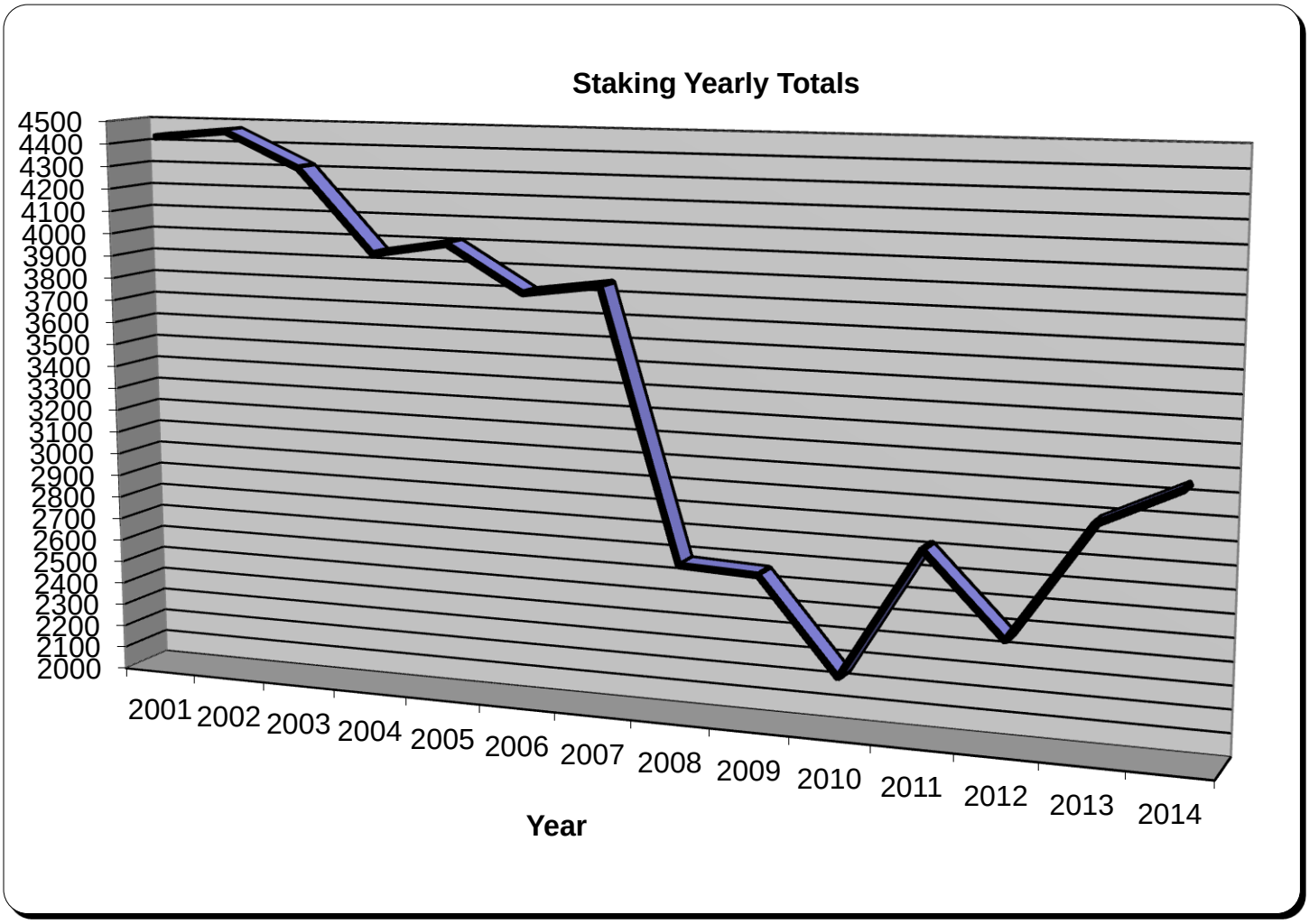
Typical Miss-Dig Markings

Terri Frey Locating a Water Shutoff

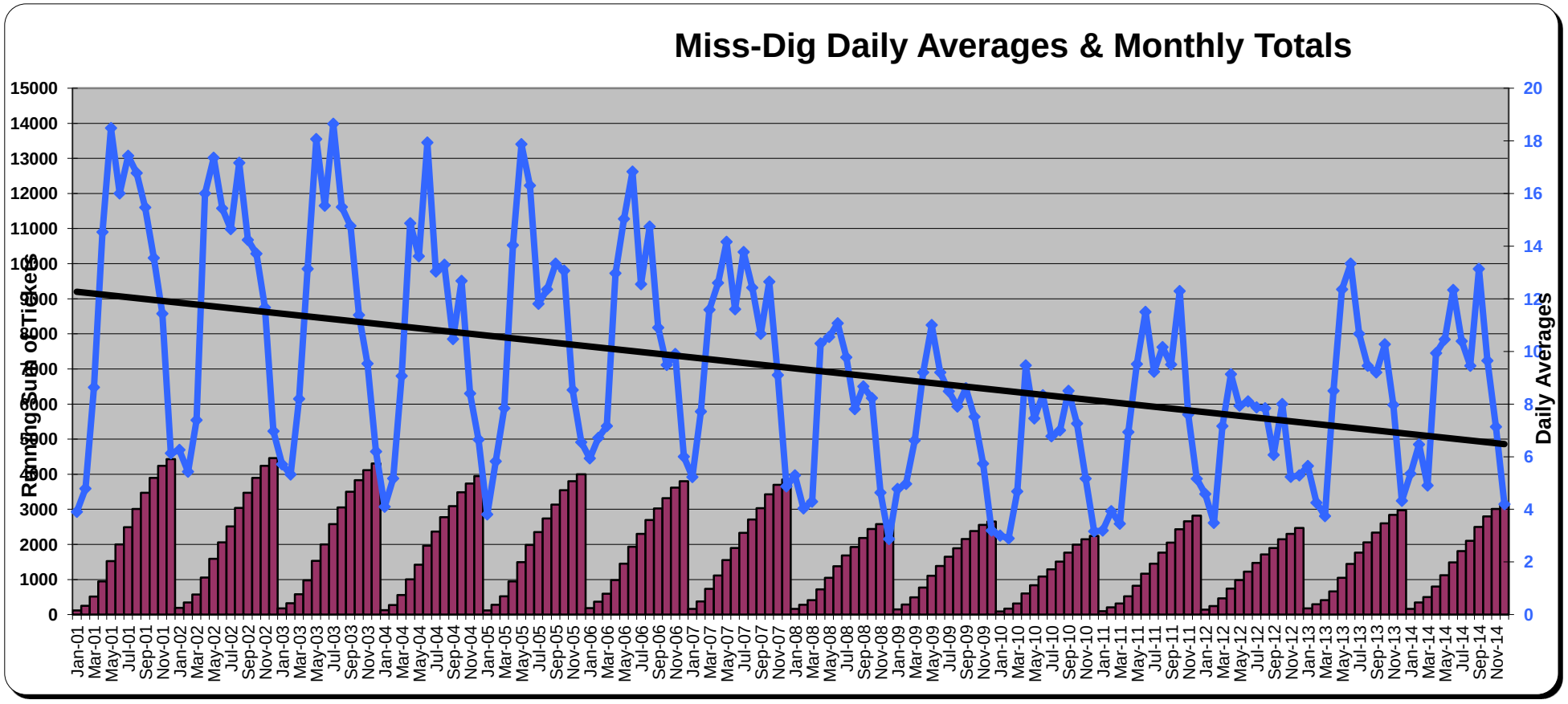


Requests are more numerous during the summer months than during the winter months. As the graph above illustrates, historically May is the busiest month. On average, May experiences 14 location requests received per day. The slowest month is January, averaging just 5 requests per pay.

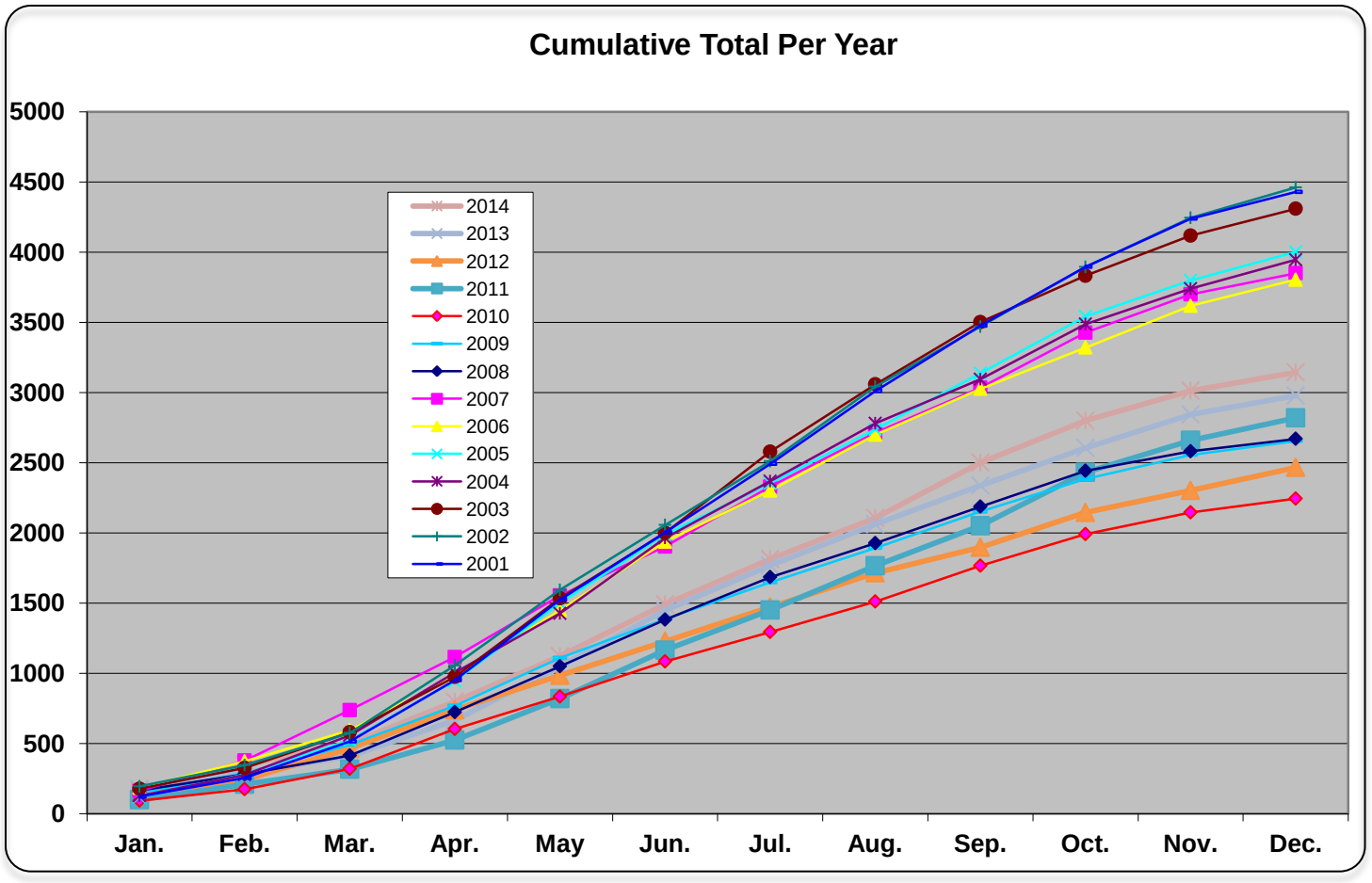
The total number of staking requests for 2014 was 3,143, up from 2,977 requests received in 2013, and higher than the recorded low of 2,244 in 2010. This represents the highest yearly total since 2007, but is still lower than the 3,850 tickets received that year. The sharp decline from 2008 to 2010 was an indicator of the economic slowdown experienced across the region.



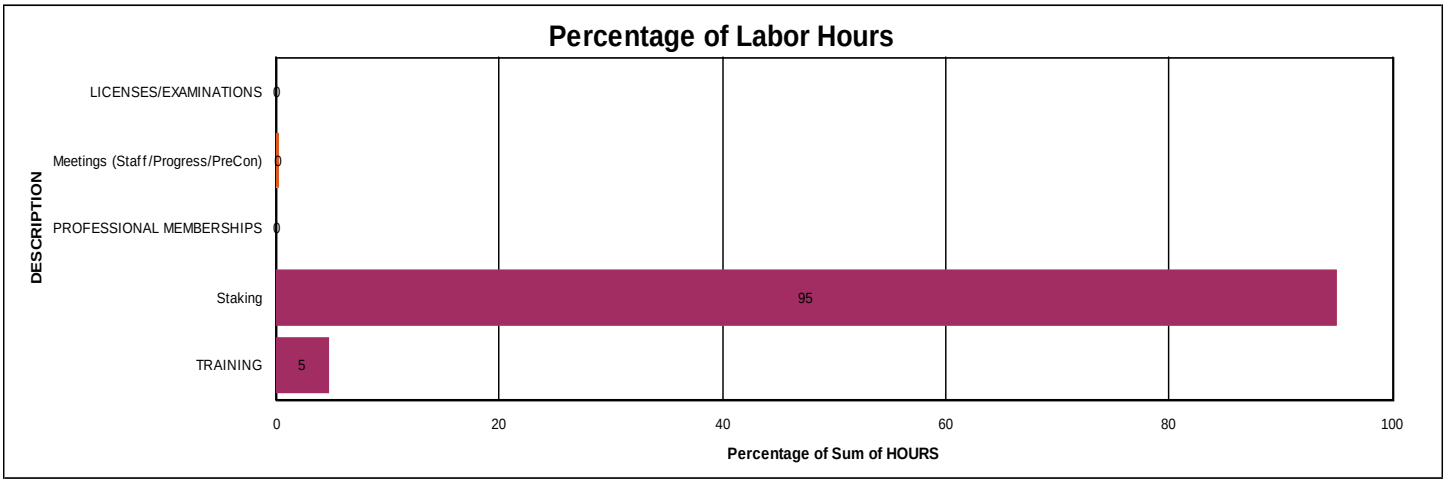
The actual daily averages for each month and the running sum of requests for each year are given below. As mentioned above, the gradual decline is an indicator of a mature, built-out community, characterized by slowing development and a reduction in new construction.



The drastic decline, begun in 2008 and continuing through 2010, is illustrated in the graph below, which shows the accumulation of staking requests throughout the calendar year. There is a data line for each year since 2001. There are four distinct groups of data, 2001-2003 are tightly grouped with an average yearly total of about 4,400 requests, 2004-2007 are also tightly grouped with an average yearly total of about 3,900 requests. 2008-2009 and 2011-2012 represented a significant decline while 2010 stands alone as the lowest recorded total. 2013 saw an increase over the period from 2008-2012, however it is still well below the period of 2001-2007.



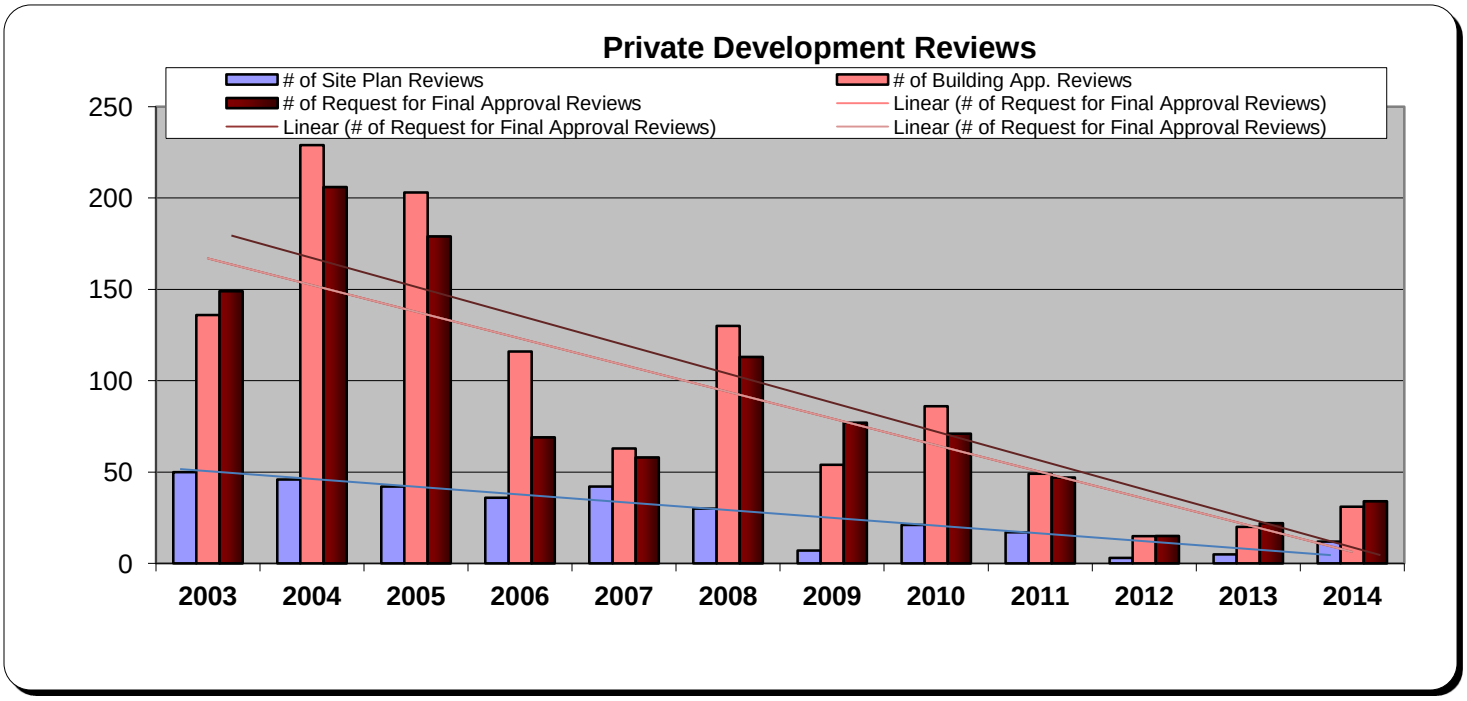
The decline in number of tickets received has allowed the Utility Coordinator to address issues such as incorrectly referenced items in the Document Management System and misrepresented objects in the GIS. The graph illustrates the diverse work performed by the Utility Coordinator. Over 95% of the Utility Coordinator's recorded time in 2014 was spent staking.



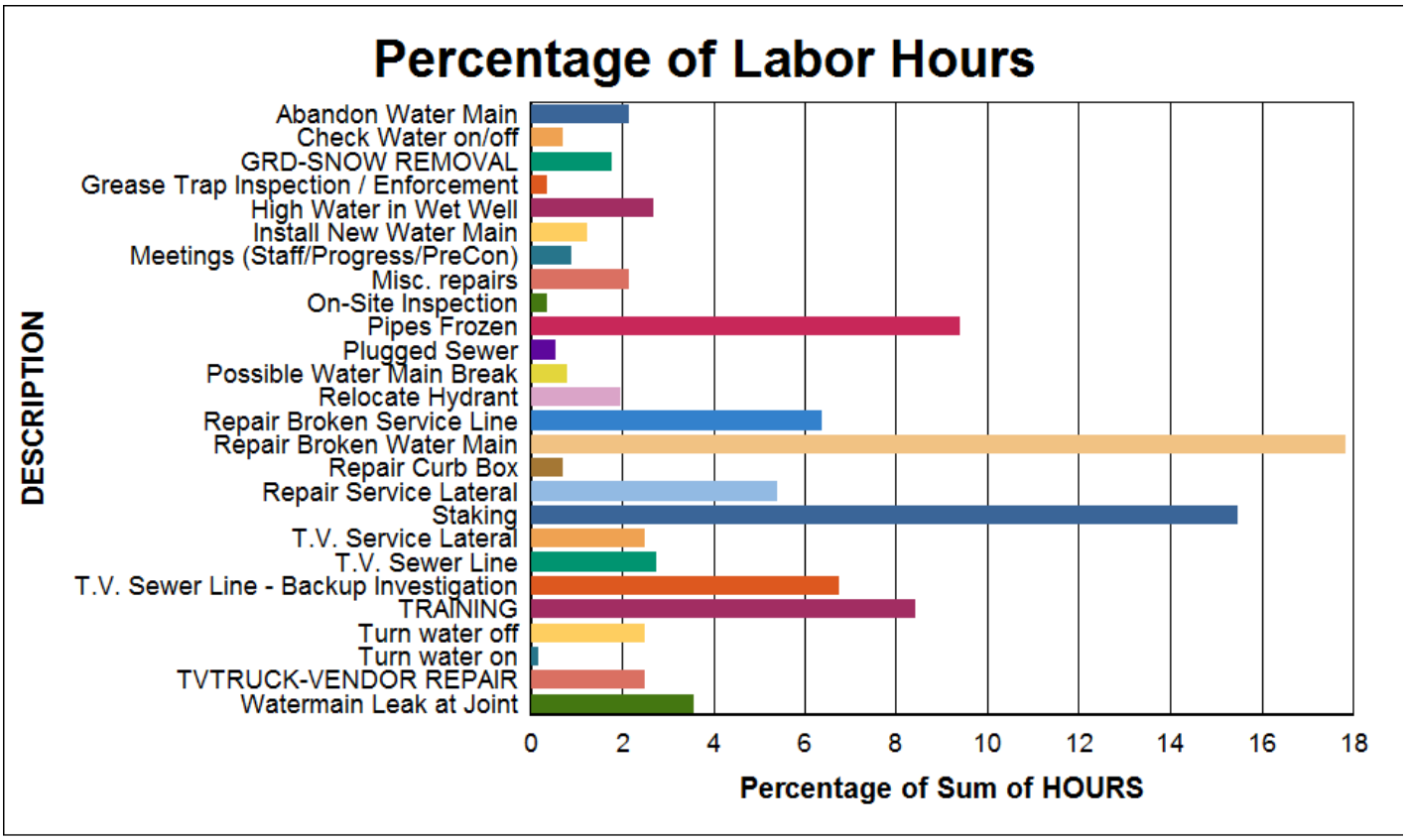
3. Private Development

Private Development is defined as all planning and construction activities that are for the primary benefit of private owners. Examples include new subdivisions, condominiums, apartment complexes or other residential units, offices, commercial and retail buildings.

The first step in new development is the planning and design stage. Once the site plans are approved, the next step is construction. This can be quantified in the number of building permits and the number of request-for-final-approval applications (RFA in Figure below). Both of these indicators followed the same pattern as site plan reviews.



Some private development projects require the installation of new water and/or sewer infrastructure. This includes water and sanitary sewer mains, sewer manholes, water valves, hydrants, and other categories. The Field Engineer acts as the DPW's representative to ensure that all new water and sanitary sewer installations are done so in accordance with current standards. The following graph represents the breakdown of labor hours reported in the CMMS.



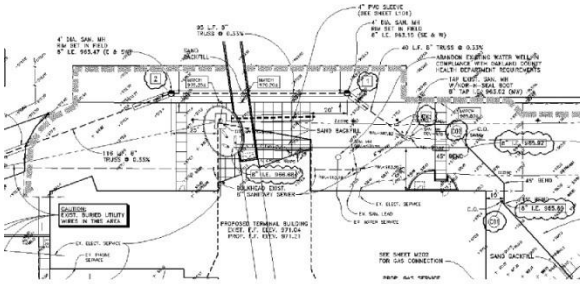
The Field Engineer also works on the CCTV crew, which actually occupies approximately 15% of his time, as seen in the labor hours graph above.

The final steps in private development projects are:

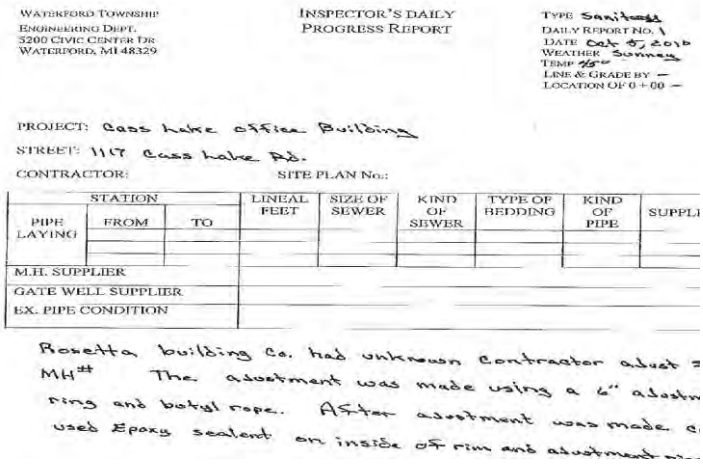
- ✓ Collecting the exact location of new infrastructure via GPS collectors
- ✓ Verification that structure casting shave been adjusted to the proper grade.
- ✓ Updating the water and/or sanitary sewer line work in the GIS/CMMS
- ✓ Importing the supporting documentation (inspection reports, testing reports, as-built construction plans, permits, etc.) into the document management system.

Chris Donais GPSing a Fire Hydrant

New Water and Sanitary Sewer in GIS



Example of Utility Plan in Document Mgt



WATERFORD TOWNSHIP
ENGINEERING DEPT.
5200 CIVIC CENTER DR
WATERFORD, MI 48329

INSPECTOR'S DAILY
PROGRESS REPORT

TYPE Sanitary
DAILY REPORT NO. 1
DATE Oct 5, 2010
WEATHER Sunny
TEMP 75°
LINE & GRADE BY —
LOCATION OF 0+00 —

PROJECT: Cass Lake office Building
STREET: 1107 Cass Lake Rd.
CONTRACTOR: SITE PLAN No.:

PIPE LAYING	STATION FROM	STATION TO	LINEAL FEET	SIZE OF SEWER	KIND OF SEWER	TYPE OF BEDDING	KIND OF PIPE	SUPPLI
M.H. SUPPLIER								
GATE WELL SUPPLIER								
EX. PIPE CONDITION								

Rosetta building Co. had unknown Contractor adjust
MH# The adjustment was made using a 6" adjustm
ring and butyl rope. After adjustment was made e
used Epoxy sealent on inside of rim and adjustment

Inspection Report in Document Mgt

4. Infiltration-Inflow

The Township sanitary sewer system is a separated collection system that is designed to convey wastewater only. The aging of the collection system has allowed, however, for ground water and storm water runoff to infiltrate into the system. In addition, illegal connections exist that introduce direct storm water runoff and other non-wastewater flows into the collection system. Problems such as sewer main surcharging and overflows can develop in the collection system during heavy and prolonged rain events. The DPW is committed to continuously improving the performance of the collection system through investigation, capital improvements and disconnection of illegal connections.

Infiltration-Inflow Reduction is a multi-faceted program. The components are:

- ✓ Sewer Cleaning and CCTV Inspection
- ✓ Trenchless Sewer Rehabilitation
- ✓ Flow Metering
- ✓ Smoke Testing
- ✓ Manhole Rehabilitation

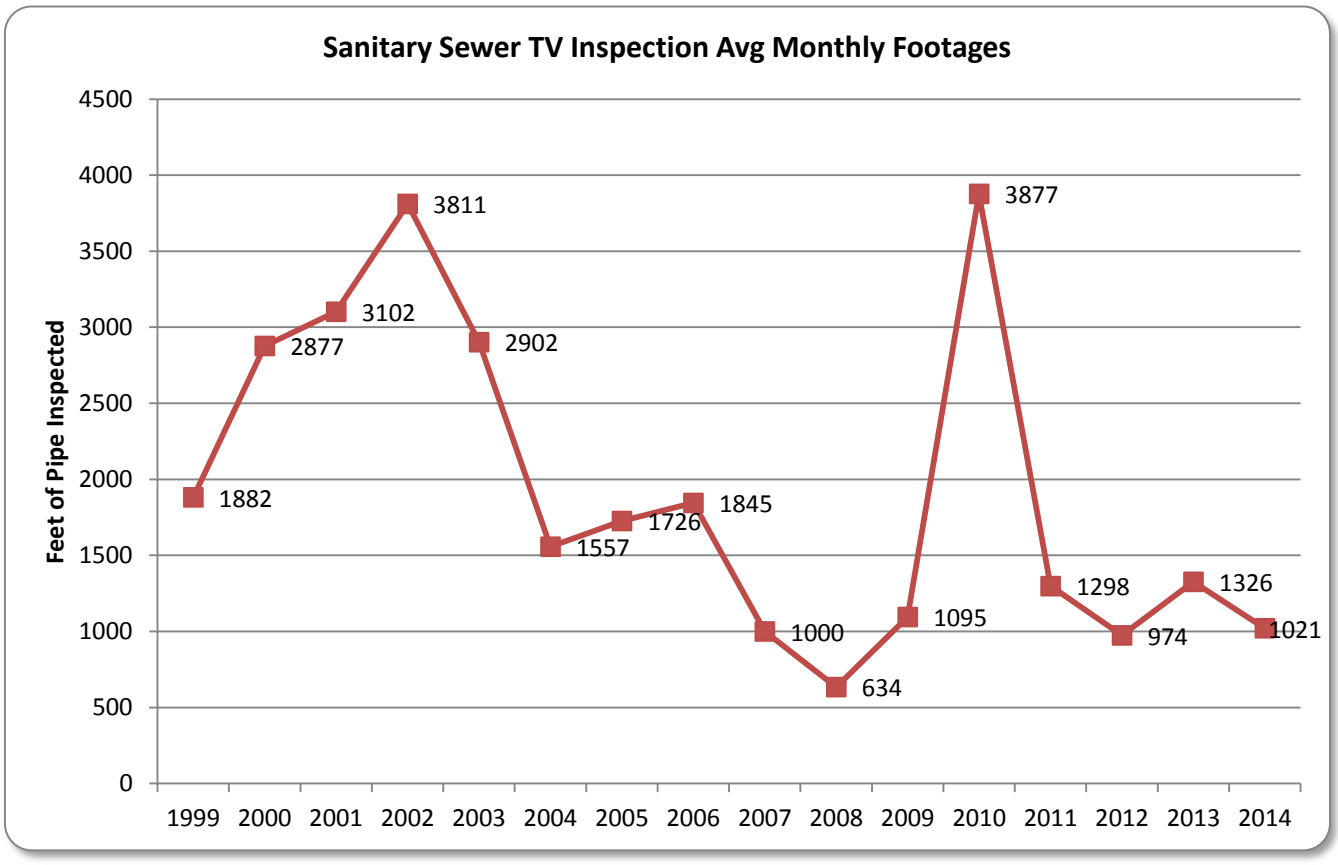
Joe Ashley Lowering CCTV Camera into Sewer Manhole

Karen Lee at the Controls of the CCTV System

Joe Ashley Performing Flow Meter Maintenance

Sewer Cleaning and CCTV Inspection

Since 1999, DPW staff has averaged about 2,000 feet of pipe inspected per month. The production rate has varied dramatically year to year due to many factors (personnel change, hardware/software problems, supplemental hardware/software upgrades).

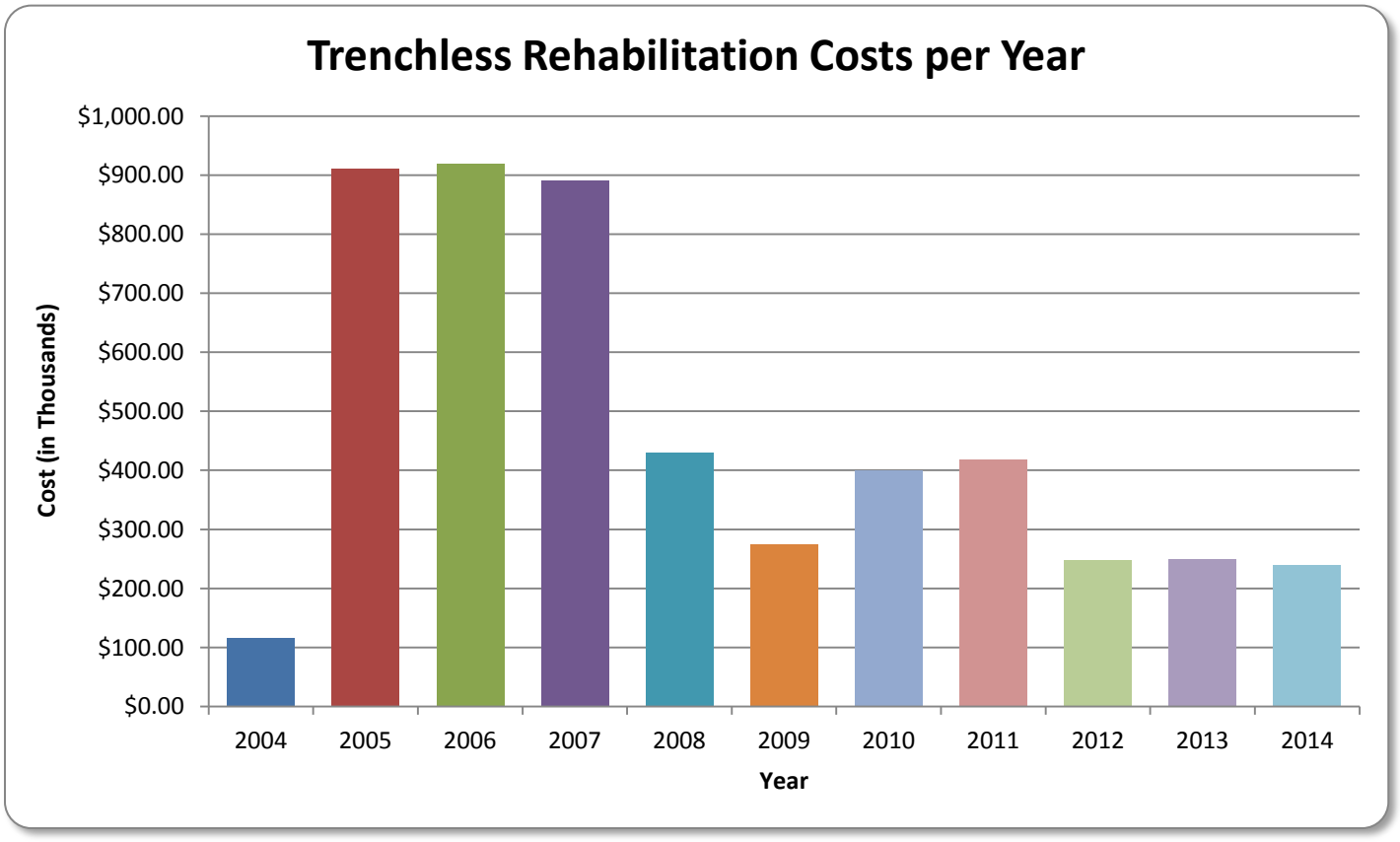


Trenchless Sewer Rehabilitation

Every year since 2004, Waterford Township DPW has rehabilitated a portion of its sanitary sewer collection system. The areas were selected using several criteria:

- Age of Pipe
- Pipe Material
- Required Maintenance Frequency

Liquiforce Sewer Services has been under a multi-year rehabilitative maintenance contract. The services provided include cleaning and inspection, installation of cured-in-place liners, pipe reaming and grouting. The graph below shows the yearly costs.



The following is a thumbnail description of the activities included in trenchless rehabilitation:

Facility	Activity Name	Activity Description
Sanitary Gravity Main	• Full Length Liner	CIP Liner installed from manhole to manhole
	• Point Liner	CIP Liner installed in 3-ft, 6-ft, 15-ft segments
	• Grouting	Acrylamide grout injected into cracks and joints
Sanitary Service Lateral	• Lateral Lining	CIP Liner installed at wye connection and extended up building lead to property line
	• Smoke-Testing Private Repairs	Repair Broken, missing clean-outs. Disconnect surface water draining facilities as follow up to smoke testing.
Manhole	• Seal Frame & Cover	Replace gaskets and frame bolts
	• Chimney Liner	CIP Liner installed at transition from frame to cone section
	• Plug Lift Hole	Install/replace rubber bolt and pick hole plugs
	• Plug Leak at Section Joint	Chemical grout installed at manhole section joints
	• Reconstruct/Adjust Frame & Cover	Repair/replace block, brick and mortar

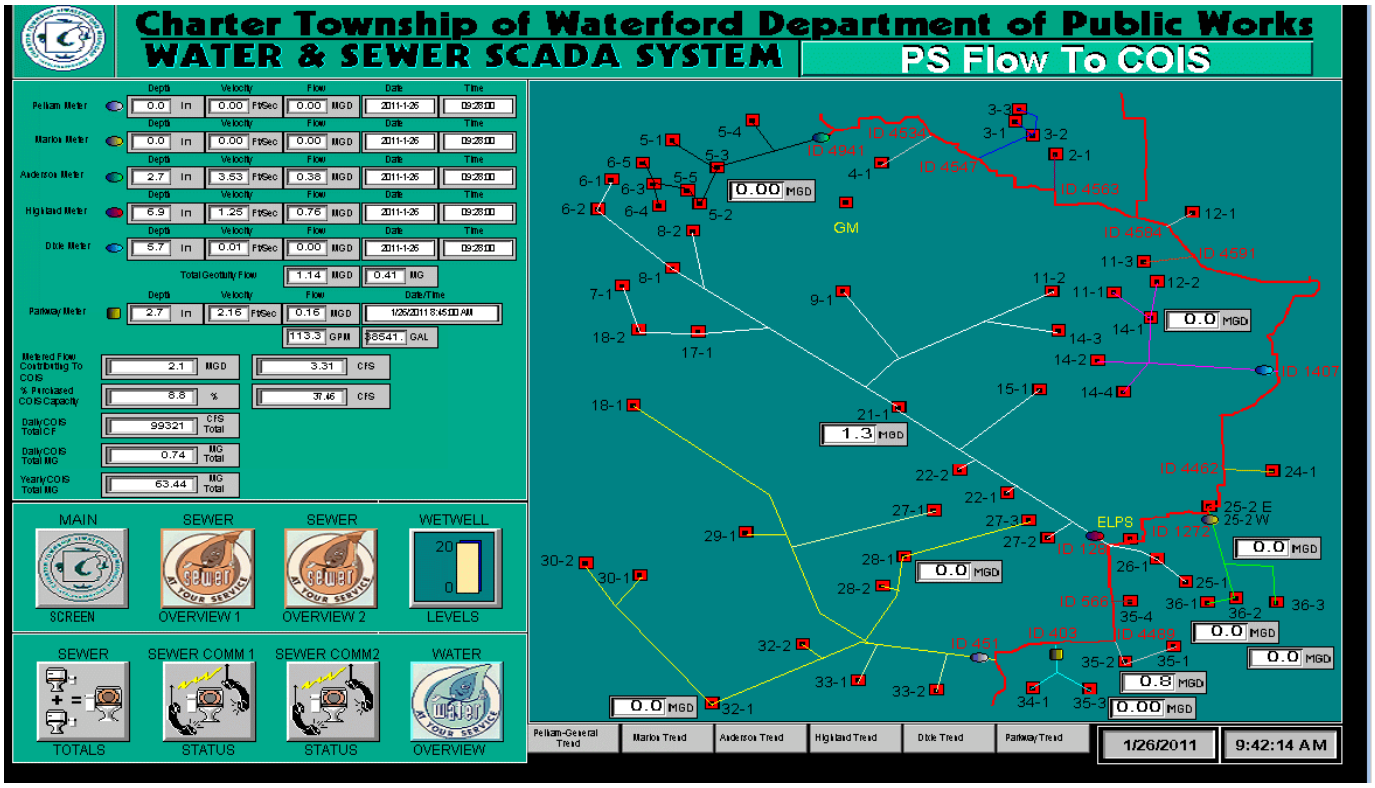
Waterford has successfully reduced the I/I in some of the areas that required it the most. Estimated reduced flow quantities are given in the table below.

Infiltration Reduction Activity	Estimated Flow Reduction	
Sanitary Gravity Main Trenchless Rehabilitation	**408**	**GPM**
Sanitary Service Lateral Trenchless Rehabilitation	**103**	**GPM**
Sanitary Manhole Rehabilitation	**2775**	**GPM**
Smoke Testing Initiated Rehabilitation	**1006**	**GPM**
TOTAL	**4292**	**GPM**
	9.6	**CFS**

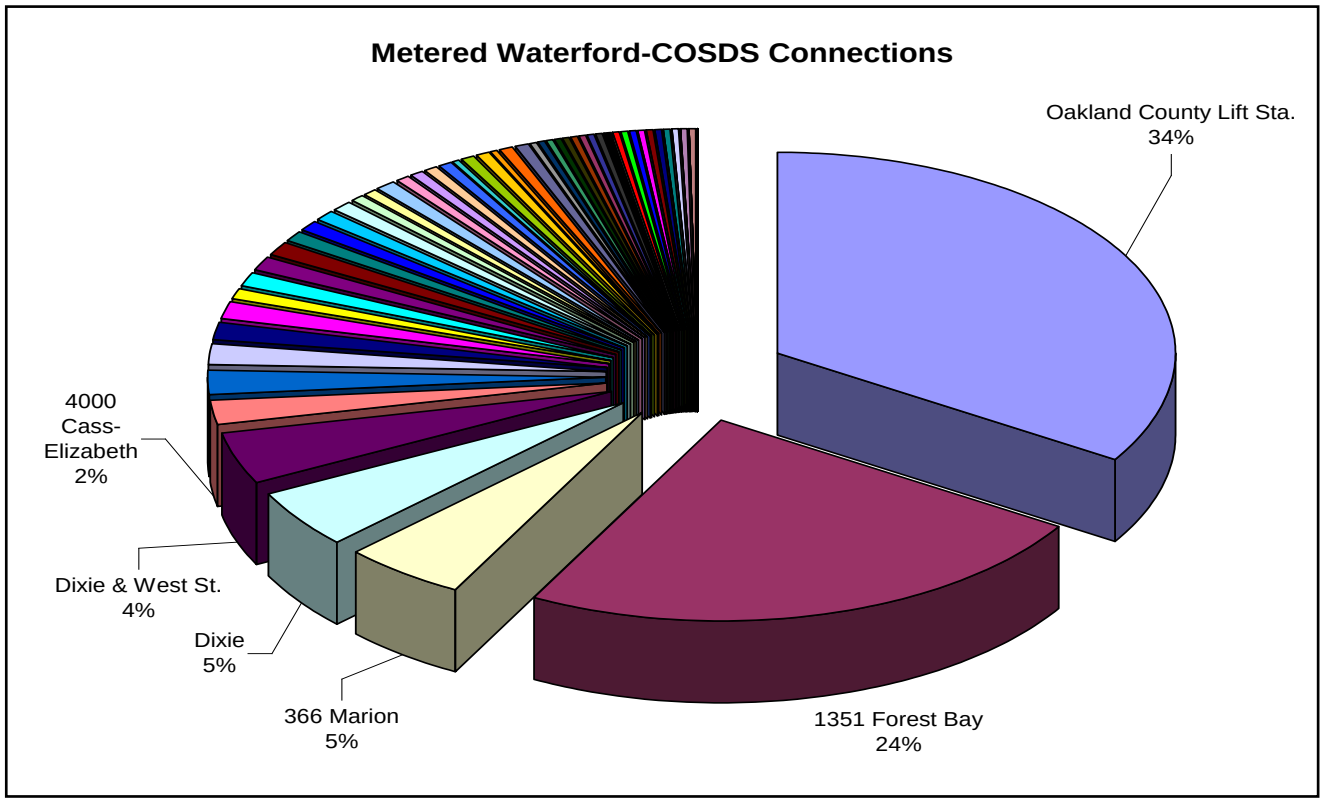
Flow Metering

Another facet of I&I reduction is flow metering of key junctions in the sanitary sewer system. The Waterford Township sanitary sewer collection system has 84 connections to the Clinton Oakland Sewage Disposal System (COSDS). The amount of flow contributed from each connection varies tremendously. Nearly all of the connections are public sewer mains but there are a few individual homes tied directly into the COSDS. There are connections with as few as 2 building leads and as many as 8,200 building leads.

In 2009, five meters were installed at strategic connection points to the COSDS. Another was added in 2010. The meters are continuously monitored (see map below).

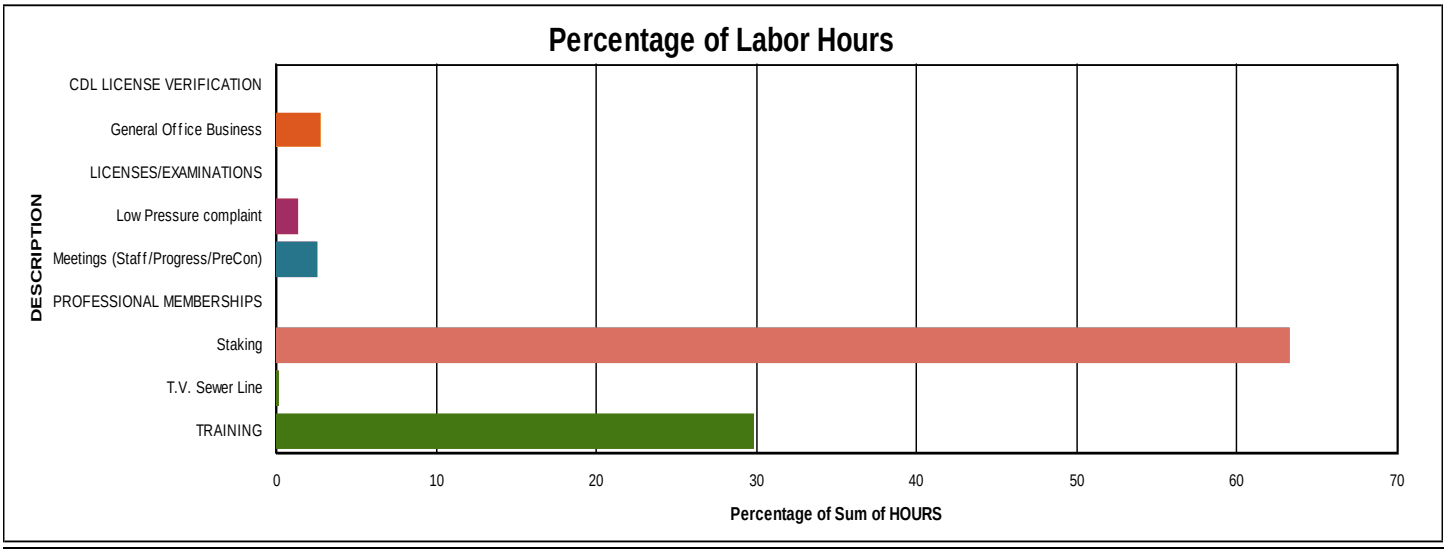


All together, the six meters are measuring the flow contributed by nearly 75% of Waterford Township's connections.



Infiltration & Inflow

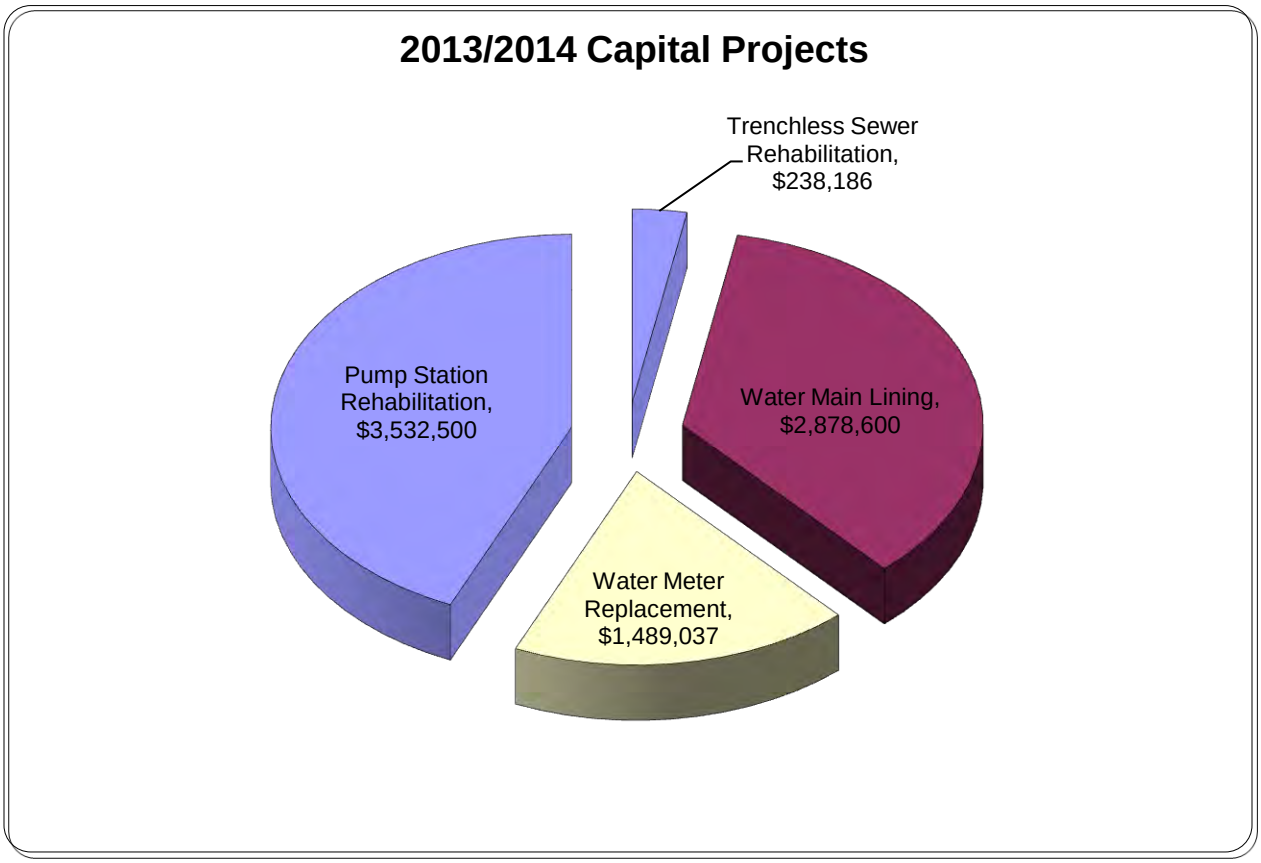
Excess water that flows into sewer pipes from groundwater is called infiltration and inflow, or I/I. Groundwater seeps into sewer pipes through holes, cracks, joint failures, and faulty connections. Water may also flow into sanitary sewer systems through holes in manhole covers or by roof & foundation drains connected directly to sanitary sewer systems. Infiltration & Inflow has associated cost increases, and therefore efforts are made to reduce I/I through sewer rehabilitation, grouting, replacement, etc. Karen Lee, Collection Systems Operator, is the primary employee tasked with monitoring Infiltration & Inflow reduction efforts and coordinating activities.



5. Capital Improvement Projects

This category includes the projects and activities that the DPW financially participated in 2014. They may be projects for which work was performed in-house, or where the work was contracted directly by the DPW or they may be projects performed by other agencies with financial participation agreements.

The graph below illustrates the scale of each capital project's budget in relation all capital projects. The Table below lists the projects along with a brief description and the 2013 costs for each.



2013/2014 CAPITAL IMPROVEMENT PROJECTS		
Project	**Description**	**2013 Cost**
Trenchless Sanitary Rehabilitation	Televise, Clean, ream, grout, line aging sewers	$ 249,522
Water Meter Replacement	Replace 17,000 residential water meters	$ 1,489,037
Pump Station Rehabilitation	Rehabilitate 11 aging sewage pumping stations	$ 3,532,500
Water Main Lining	Line approximately 11,000 linear feet of water main	$ 2,878,600

2013/2014 CAPITAL IMPROVEMENT PROJECT HIGHLIGHTS

Pump Station Rehabilitation

Bypass pumping system in place while work is being completed on the McCormick Dr. sewage pumping station.

Newly rehabilitated McCormick Dr. sewage pumping station.

Water Meter Replacement

An old water meter is removed from service

A new water meter is installed

Water Main Lining

Temporary water services is established and provided through specialized fire hydrant taps.

Cured-in-place water main liner is pulled into existing aging water mains.

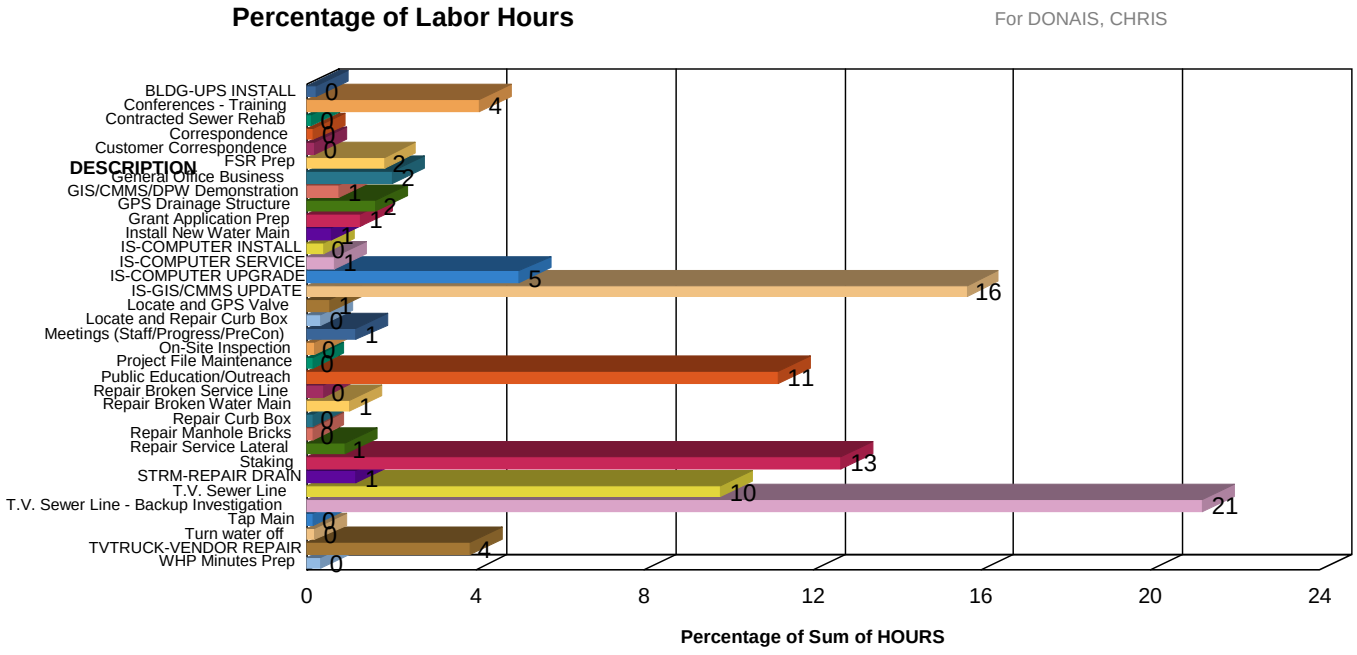
Access pit undergoing dewatering

Fire hydrants on any rehabilitated mains were replaced

6. Wellhead Protection / Community Outreach

The success of the DPW's Wellhead Protection Program (WHPP) is due, in large part, to its emphasis on educating the public about the importance of source water protection. Each year the DPW conducts demonstrations for elementary, middle and high school classes, as well as community organizations, reaching nearly 2,000 people.

Hands-on demonstrations and distribution of items such as tee shirts, squish-balls, cup holders, etc. help to embed the experience into the student's lives. The DPW also participated in educational programs at Hess-Hathaway Park for local children, at the Waterford Area Chamber of Commerce Open House at Mott High School, and hosted 6th grade science classes at a tour of our facilities.



7. Community Lighting

In the early 2000s, the DPW Engineering Services group began management of the township's streetlight program. Waterford Township contracts streetlighting services with Detroit Edison's Community Lighting department. DTE currently owns and operates over 3,000 lights in Waterford Township. The Township in turn pays a monthly fee for each light which covers operation and maintenance of the lights. Streetlight outages are reported to DTE who then fixes the outages within a few short business days. The DPW Engineering Services Group maintains a database of all the lights and also manages any upgrades or new lighting projects.

LED Lighting

In the past few years, DTE has been incentivizing its community lighting partners into upgrading streetlights from old technologies into new, energy efficient Light Emitting Diode (LED) lights. In addition to being aesthetic upgrades, the LED lights provide a higher quality light at a fraction of the cost of the old technologies. Waterford has committed itself to these upgrades and has seen significant savings, having completed three separate upgrade projects since 2011, with more to come. Waterford projects $130,000 in annual savings thus far with the LED upgrades that have been completed.

Old mercury vapor streetlight on Highland Rd.

New and improved LED Light on Highland Rd.

The LED Lighting program has been a success for the township, realizing returns on investment of under 3 years for each project, netting a total annual savings to date of over $120,000. In the three upgrade projects, 805 lights have been upgraded from mercury vapor or high pressure sodium to LED. Each of these projects has been boosted by contributions from DTE Energy in their continued effort to eliminate mercury vapor lighting and create a more energy efficient grid. Waterford will continue to partner with DTE to complete these upgrades for the foreseeable future.

Water Distribution Branch

The mission of the Water Distribution Branch is to provide maintenance services for the safe and efficient operation of the Township's water distribution system. The employees in this branch utilize a wide array of specialized equipment for underground excavation and other maintenance activities.

The branch is headed by the Water&Sewer Superintendent and is comprised of six full-time employees. The positions and a brief description of their typical duties are listed below:

- Water&Sewer Superintendent
  Provides overall administrative duties for the Water Distribution Branch. Provides research and analysis of the water distribution system and suggests areas of improvement. Provides budgeting support and technical assistance to employees as needed. Analyzes the DPW's CMMS.

- Distribution Foreman
  Serves as the general day-to-day supervisor for field employees in the distribution branch. Assures that water taps and related activities are prioritized and scheduled properly. Ensures that the branch has materials and supplies.

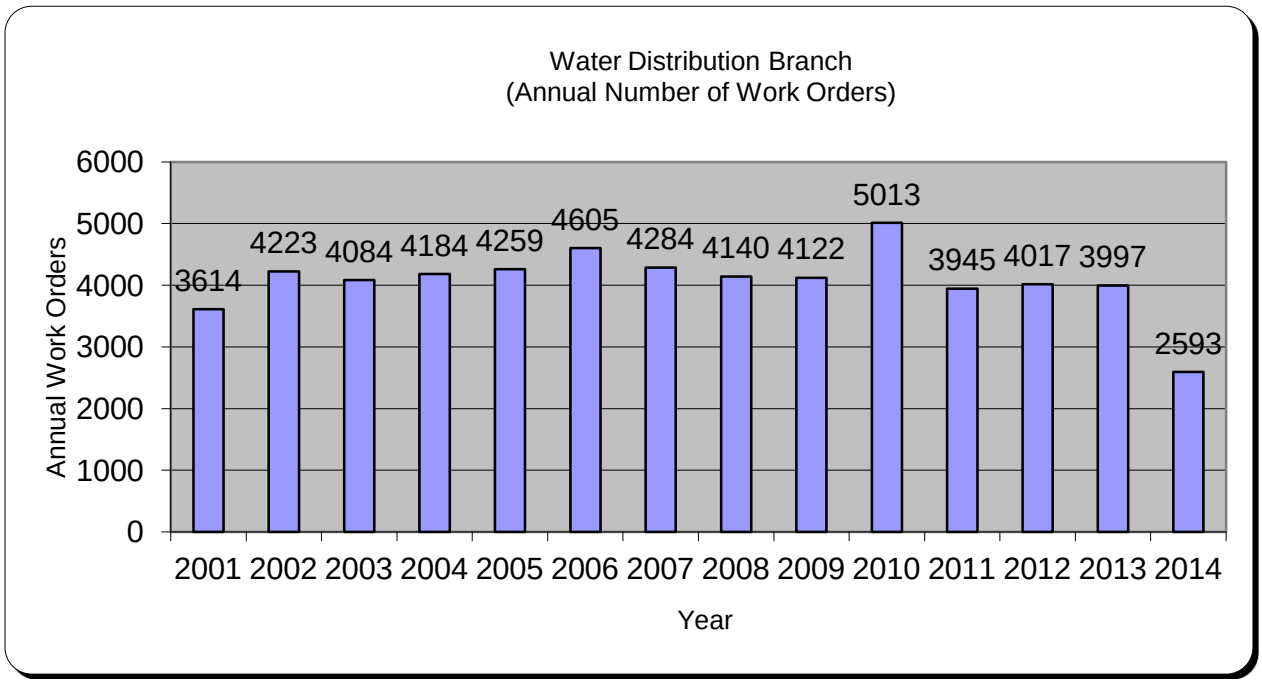
- Crew Leaders (2)
  These individuals serve as the lead employees on the job site. They ensure that proper safety procedures and work routines are followed.

- Distribution Service Workers (3)
  Employees in this classification serve primarily as general laborers and utilize heavy excavation equipment to conduct water main taps, curb box repairs, fire hydrant repairs, and sewer repairs.

Water Distribution Branch: (from left to right) Tim Harmon, Dave Smith, Noah Bigelow, Frank Patrello, Lee Potter, and Kevin Neeb.

Water Distribution Branch Annual Work Orders

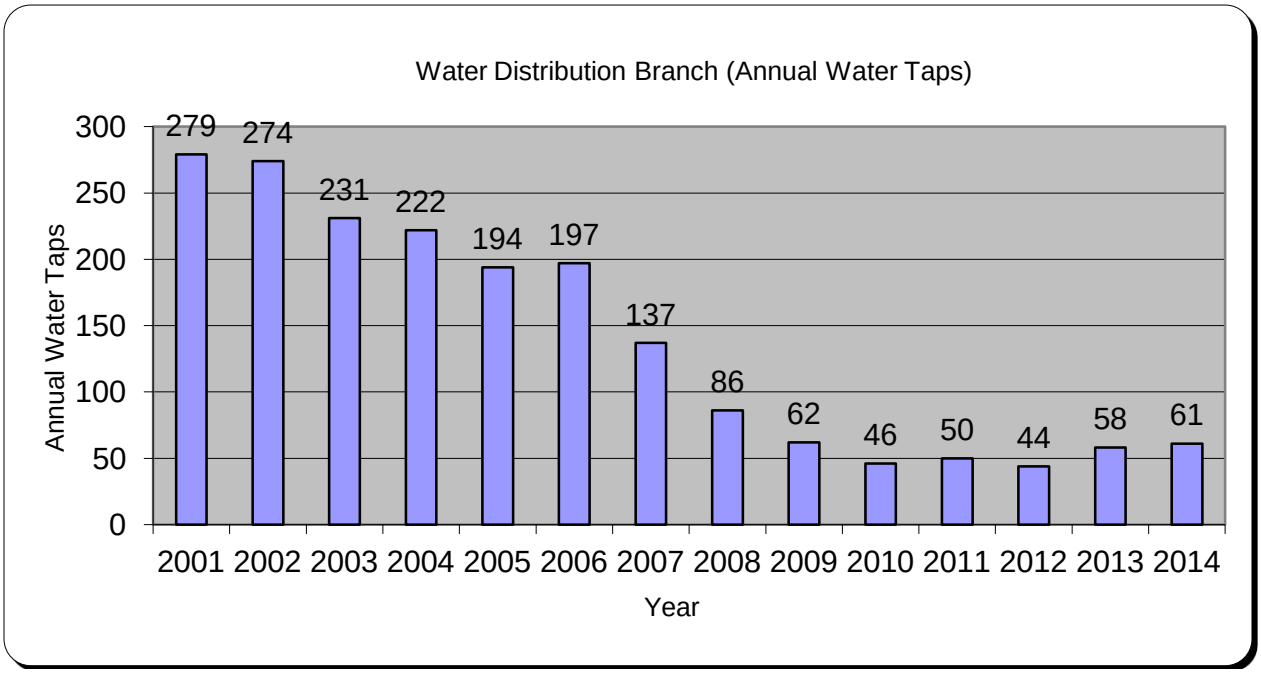
This Branch is responsible for all water main taps, water main break repairs, fire hydrant repairs and sewer main repairs. The graph below shows the aggregate annual number of the activities performed in this branch. Current work also includes raising sewer manhole rims to grade or sealing them to prevent leaking. The branch also maintains and winterizes nearly 3,600 hydrants per year to ensure reliable operation throughout the year. Similar work activity is expected to continue with additional sewer work and valve preventative maintenance work increasing.



Distribution Branch employees repairing a water main. The Township has approximately 360 miles of water main of various age and composition.

Water Taps

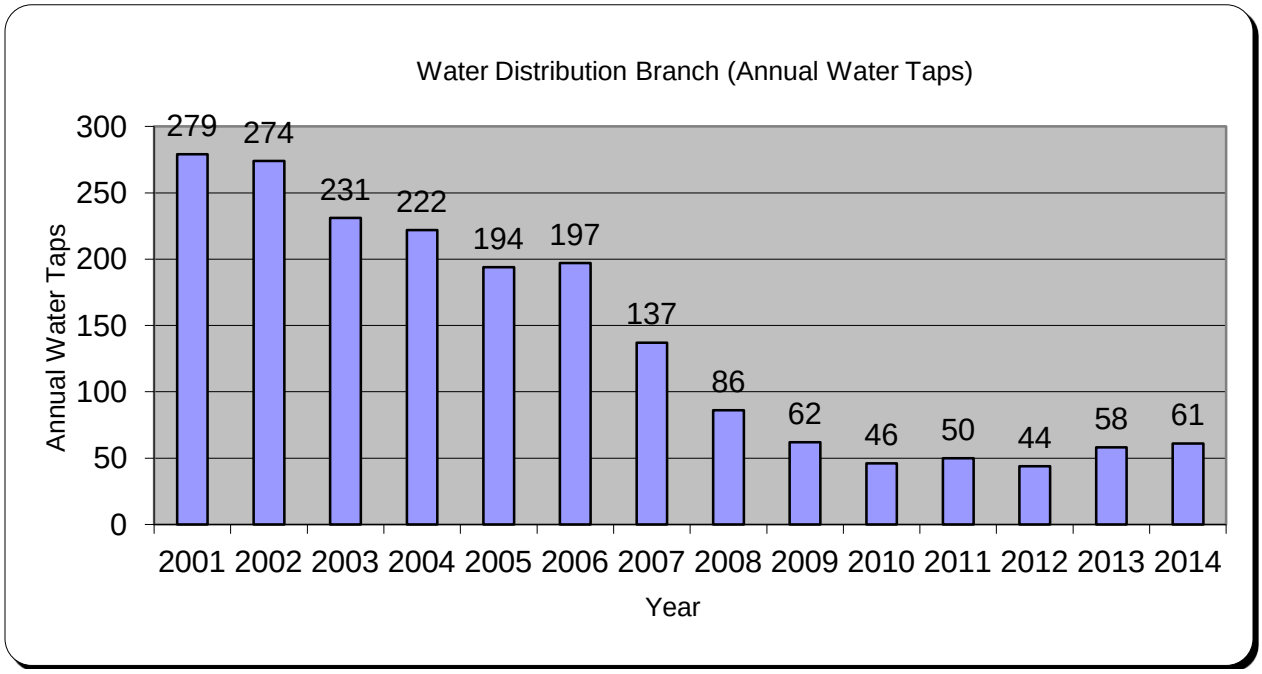
Water taps involve connecting new water customers to the water distribution system or reconnecting old worn out connections. Trends in recent years indicate a decline in new taps. This downward trend is expected to continue as the Township continues toward build-out. The graph below shows the annual water taps since 2001.



Distribution Branch crew placing a 'Trench Box' in place prior to a water main repair. Trench boxes are used as a safety measure to prevent cave-ins when working near unstable soil conditions.

Hydrant Winterizing

The Township has nearly 3,600 fire hydrants. These hydrants are a vital part of the water distribution system and an important health and safety asset of the Township. To ensure proper functioning of these vital assets, they are maintained throughout the year. In the fall, they are inspected and pumped down as part of the winterization program to prevent damage from freezing. The graph below depicts the annual number of these activities since 2001.



Distribution Branch Employee Shane Solheim inside a water gate well vault conducting maintenance.

Water Treatment and Supply Branch

The mission of the Water Treatment and Supply Branch is to ensure safe potable water is delivered to the customers of the Township. Responsibilities include maintenance of the Township's 13 water treatment plants, 2 elevated and one 1 ground storage tank totaling 8.25 million gallons of storage and 18 production wells. The branch is also responsible for the daily testing of water in the distribution system as well as ensuring compliance with the Safe Drinking Water Act.

The annual Consumer Confidence Report (CCR) is also compiled from operational data collected and maintained by the branch. This report serves as an annual audit detailing regulatory requirements of the water supply system and the results of the various tests conducted by the branch. It is mailed out to all customers annually and is available on line for viewing at anytime.

The branch is headed by the Water&Sewer Superintendent and is comprised of 4 full-time and 1 part-time employees. The positions and a brief description of their typical duties are listed below:

- Water&Sewer Superintendent
  Provides overall administrative duties for the Water Treatment Branch. Provides research and analysis of the water treatment system and suggests areas of improvement. Provides budgeting support and technical assistance to employees as needed. Analyzes DPW's Computerized Maintenance Management System to look for system and branch improvements.

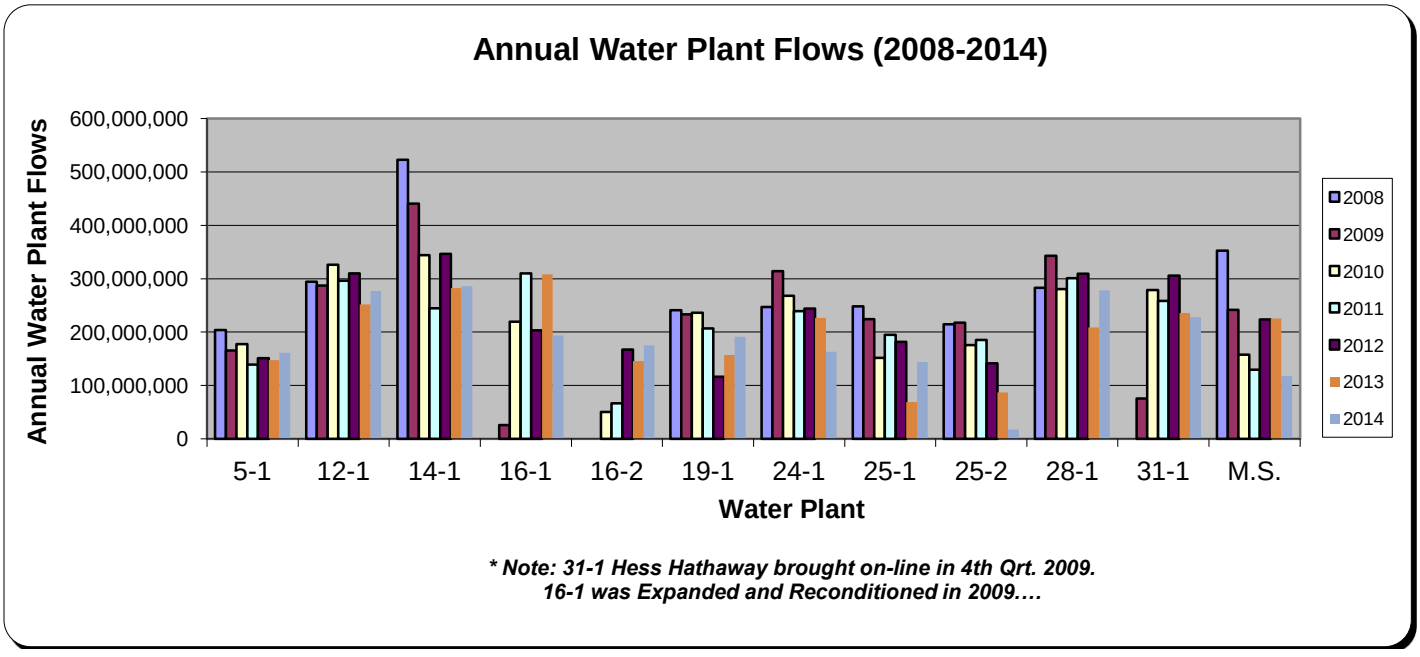
- Water Supply Foreman
  Schedules all work performed at the water treatment plants and oversees monitoring schedules required by the DEQ. Oversees work order completion and assists as needed in the field to provide support with tasks on everyday maintenance.

- Water Supply Operator IV (3)
  Performs daily maintenance and records field data information at all treatment plants, tanks and related facilities. Performs and maintains records for monthly reporting to the DEQ. Completes work orders as assigned by the Foreman.

Treatment Branch employees Aaron Potter, Jerry Ward, Jim Cassidy, and Alan Gill

Water Pumped Analysis

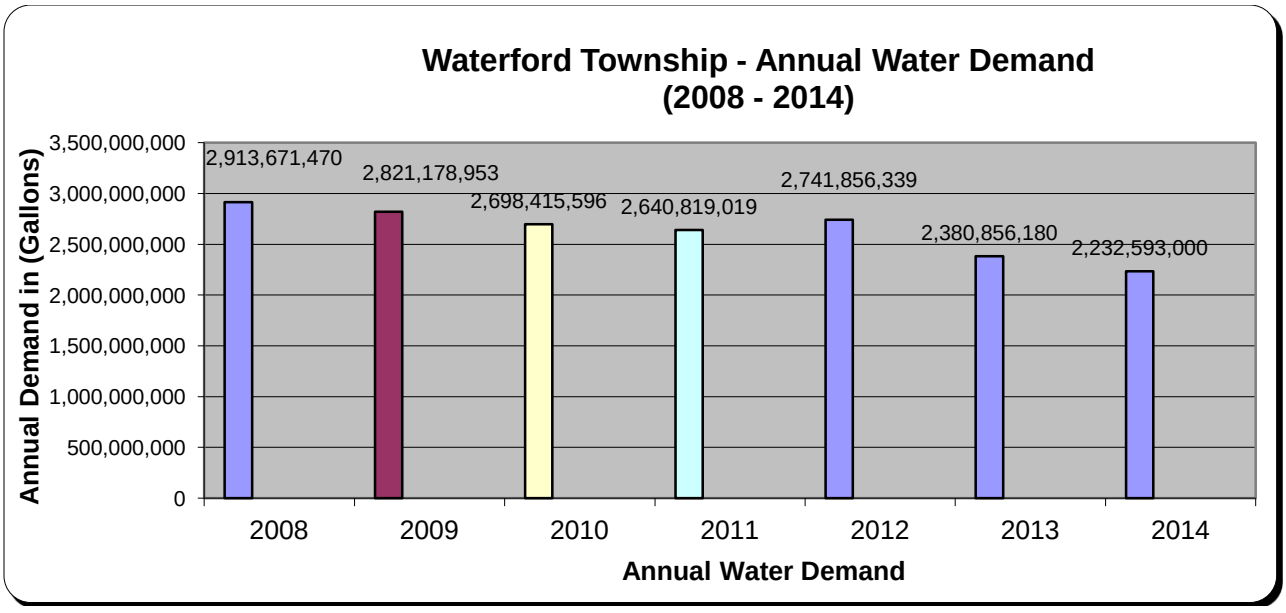
The volume of water treated and distributed to Township customers is an important component of operations. Many factors contribute to this number such as growth and development, weather, and fluctuating demand. Continuous monitoring of operational conditions and performance is performed by staff and made possible through the use of the DPW's advanced Supervisory Control and Data Acquisition (SCADA) system and hydraulic modeling. The graph below shows the annual totals per water treatment plant for 2008 through 2014.

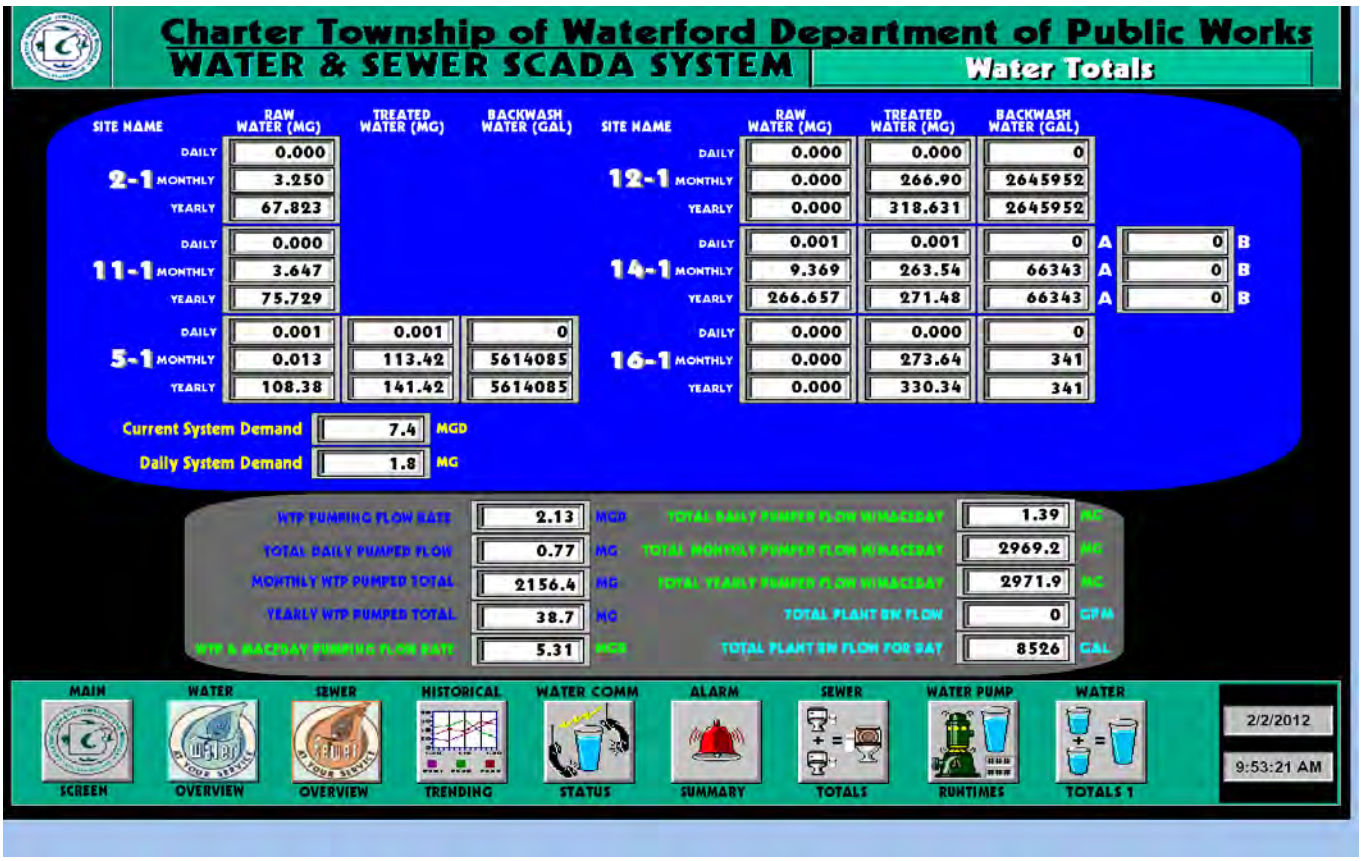


Treatment Branch employee Aaron Potter, performing maintenance on instrumentation at WTP 28-1. The Branch takes over 800 water samples per year in order to comply with MDEQ standards.

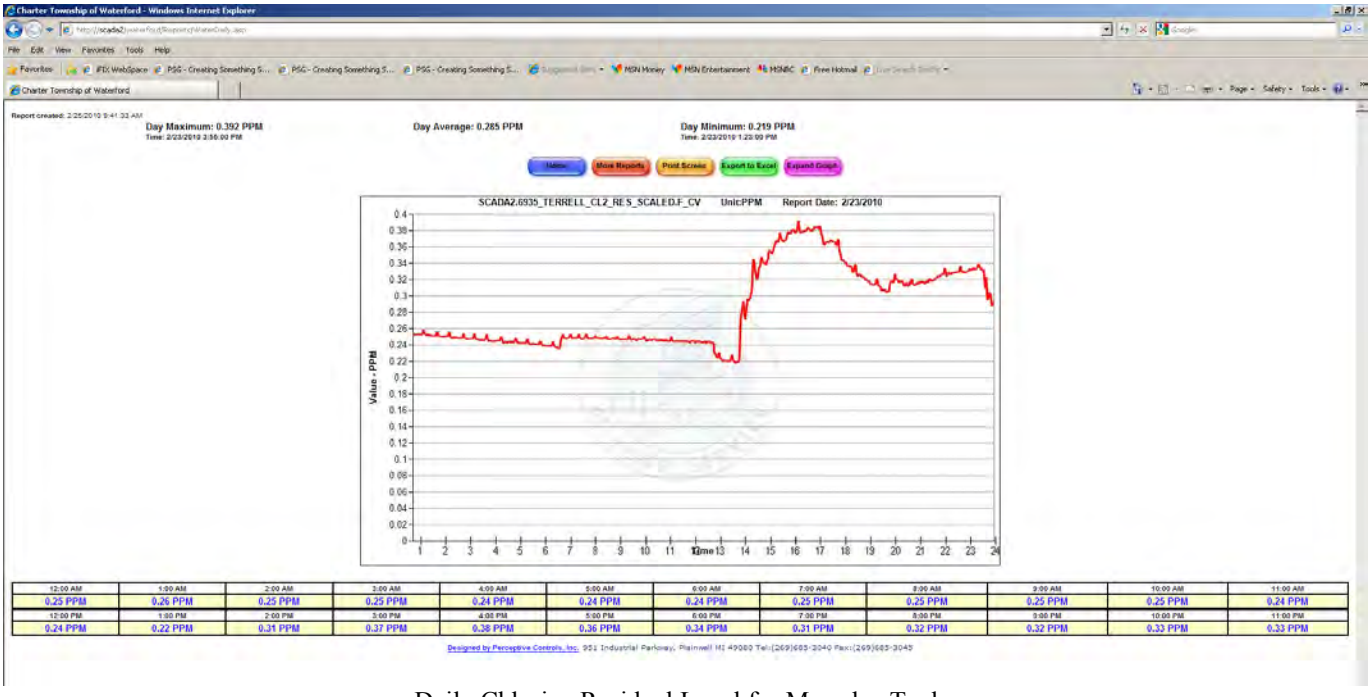
Supervisory Control and Data Acquisition (SCADA)

The day-to-day monitoring and operation of the water production, storage and delivery systems of the distribution system is performed via a computer controlled SCADA. This system also provides a wealth of information that is vital to the efficient administration of the water supply system. The following charts demonstrate just a few of the statistics that are utilized to ensure the customer base will receive the amount of water that is demanded in the safest and most efficient means possible.





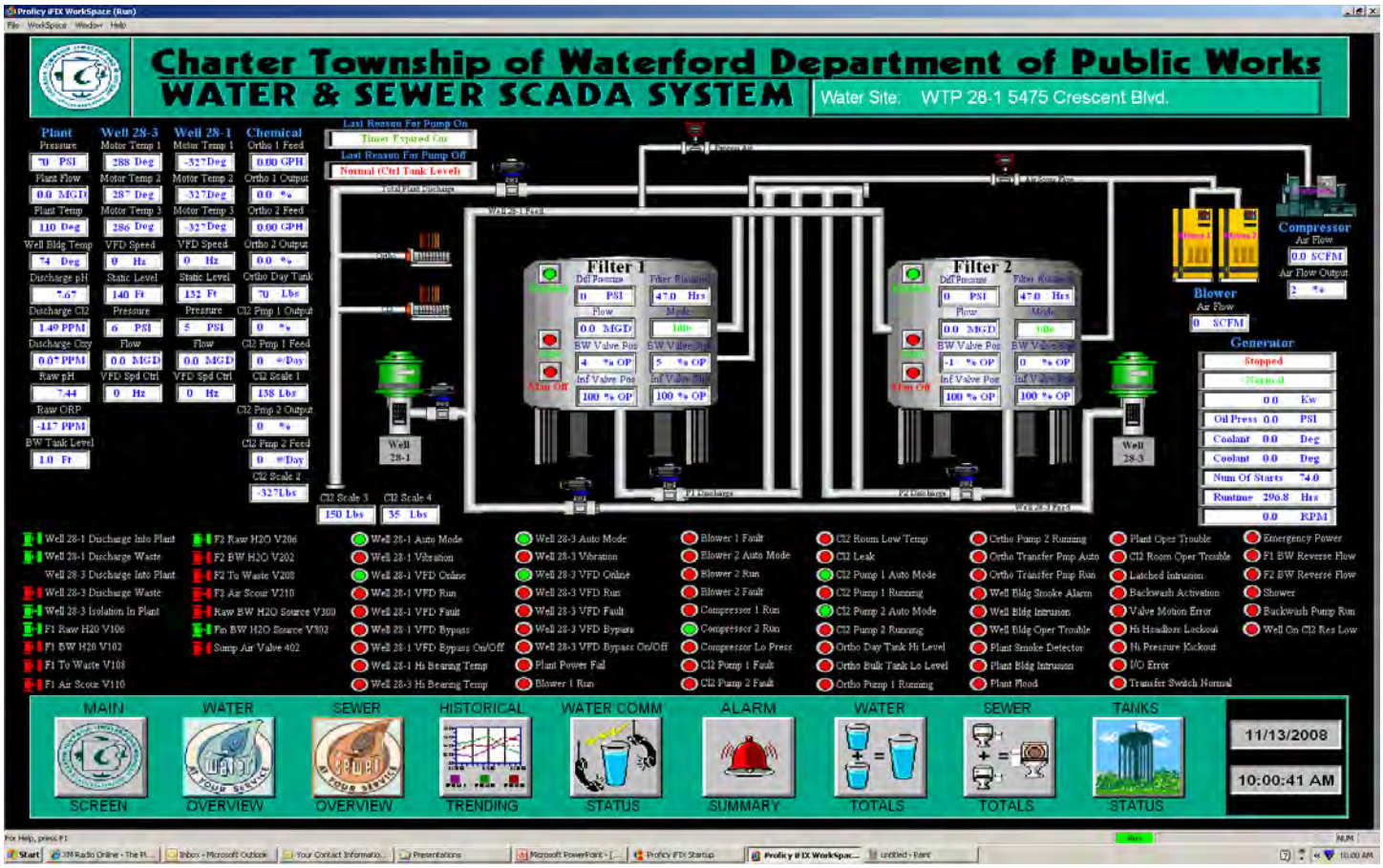
Example of the Daily Water Demand Screen in SCADA; used to calculate total Water Demands.



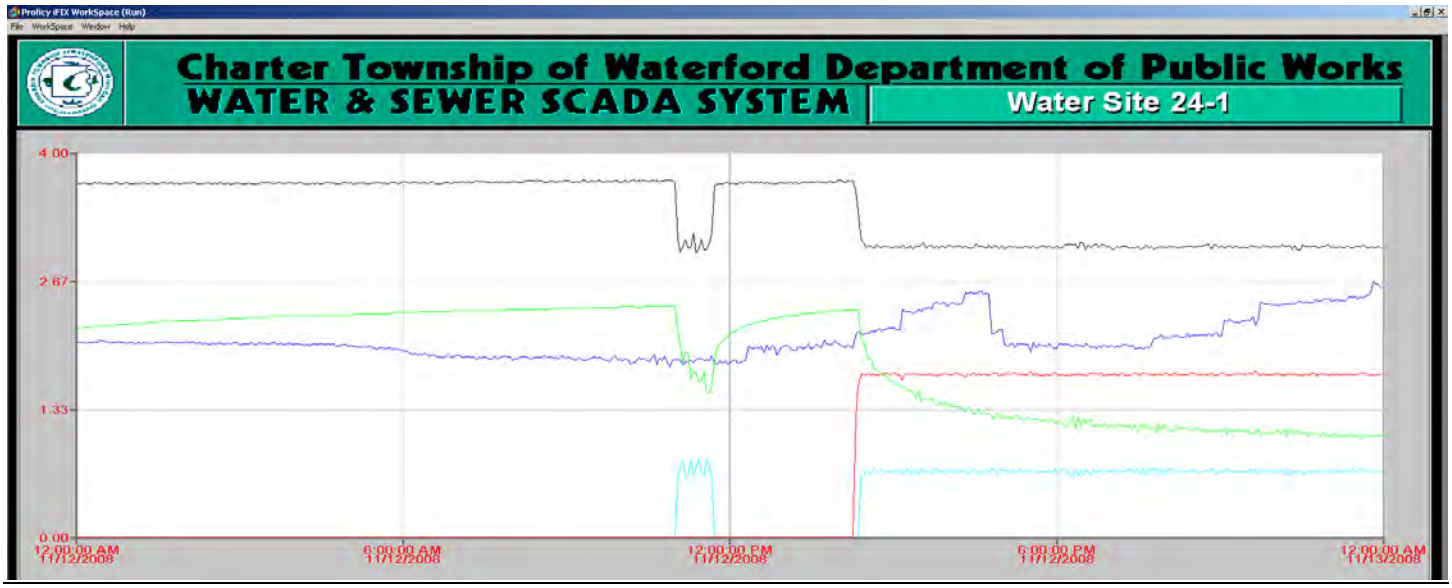
Daily Chlorine Residual Level for Maceday Tank.

SCADA – Supervisory Control and Data Acquisition System

(The Control System Monitors and looks for anomalies and alerts staff)

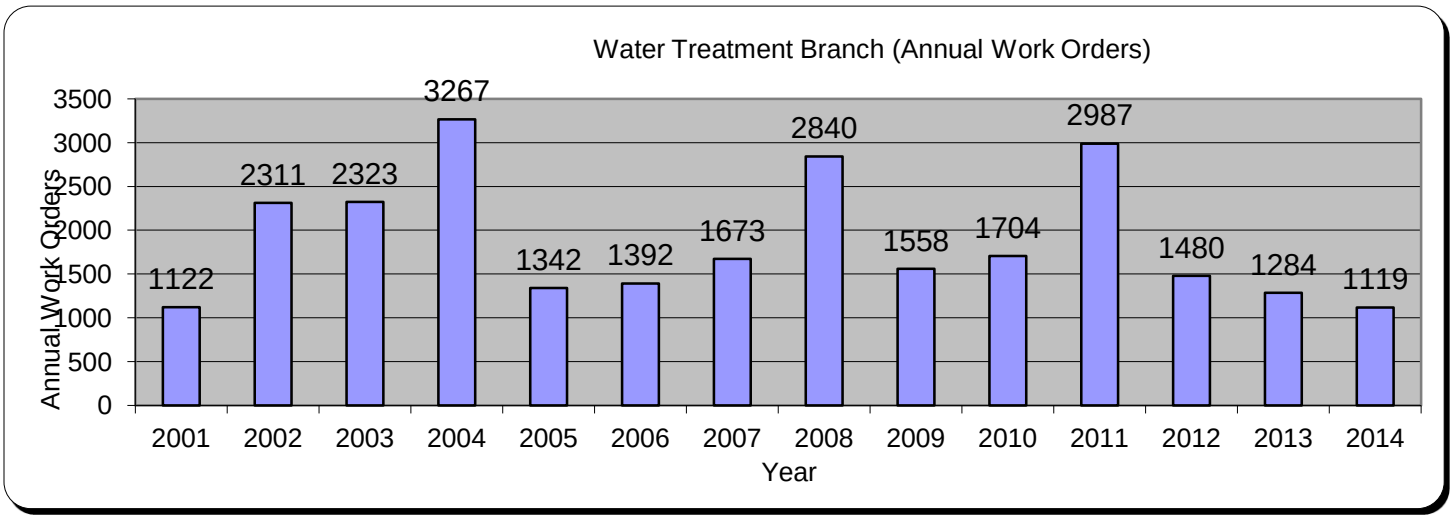


Treatment Plant 28-1 Real-Time Operations Screen (above) and Treatment Plant 24-1 Data Trending Screen (below)



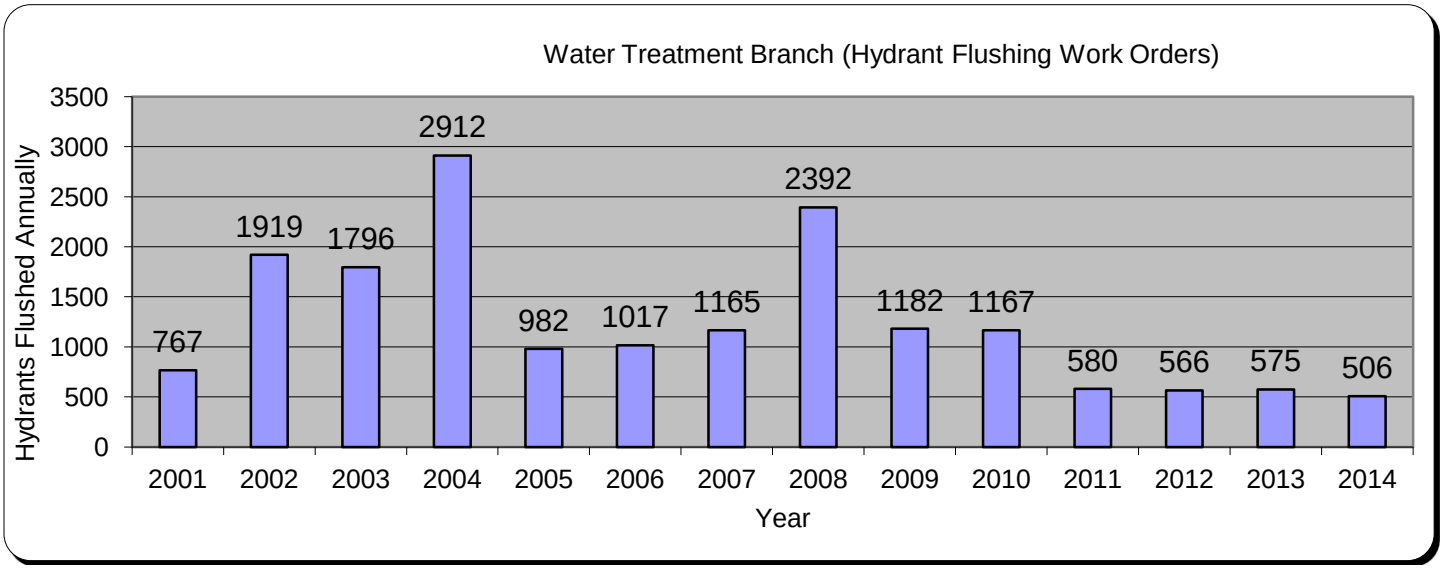
Water Treatment Branch Annual Work Orders

The graph below shows the aggregate annual number of work orders for this branch. Activities will continue to fluctuate as system components age, operational and capital modifications are made, drinking water regulations become more stringent and system demands dictate.



Hydrant Flushing

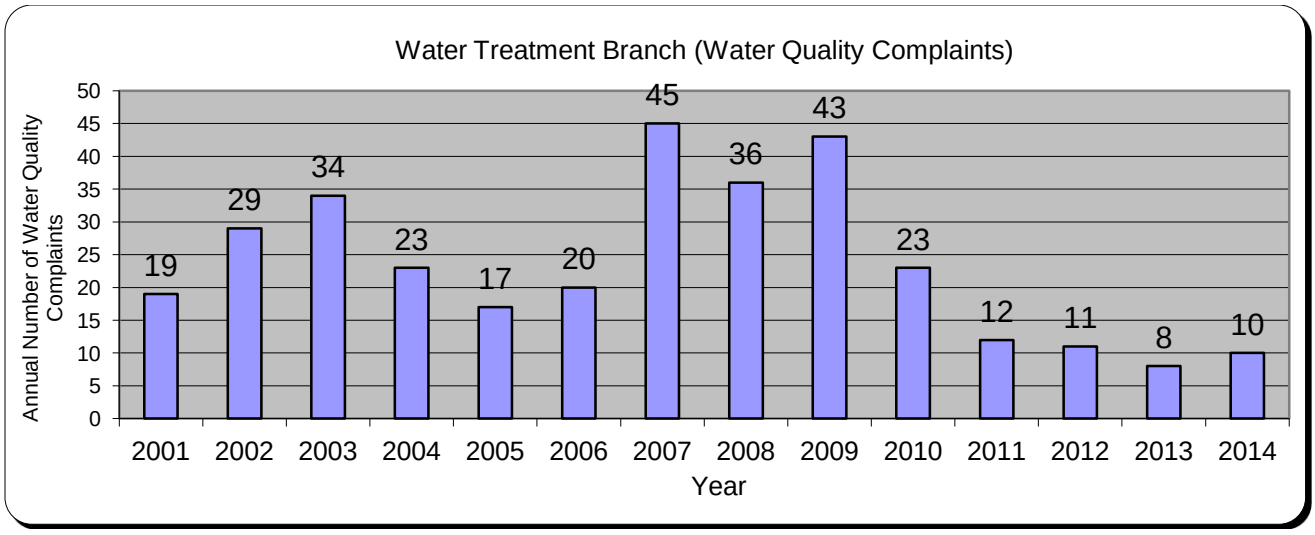
The Township has approximately 3,600 fire hydrants, which are a vital part of the water distribution system and an important safety asset. To improve and maintain the quality of the water in the system, hydrants are flushed periodically. The graph below depicts the annual number of hydrants flushed since 2001. The amount of hydrant flushing is dependent on observed and tested water quality parameters, but generally performed in the spring and fall of each year. A full flushing of the hydrants was not warranted in 2013. Only "dead-end" hydrants were flushed.



Example of hydrant flushing. Hydrant flushing is conducted to help ensure the Township's Water Supply is of the highest quality.

Water Quality Complaints

Water quality complaints can range from taste to odor issues. Examples of complaints range from water softeners, reverse osmosis filters or other items malfunctioning or needing replacement in homes or businesses to red water at the tap. However, these types of calls are relatively infrequent given the customer service population of the Township. The graph below shows the annual number of water quality complaint calls since 2001. The Iron Removal Plants that were brought on-line back in the mid 1990's, along with continually monitoring the effectiveness of the process through SCADA, hydrant flushing, continuous water turnover and analysis has had a very positive effect on the quality of the Township's water.



Water Quality Report – Public Outreach

The branch also compiles water analytical data, as well as general information about the water that is treated and distributed to customers in the form of an Annual Water Quality Report, which is referred to as the Consumer Confidence Report (CCR). This report provides a wealth of information about the public water system water quality parameters in the reporting operational year. The reports are compiled every year in an effort to educate and inform the public about their public water supply system. The DPW also maintains current and past yearly reports on the Township's web site in an effort to educate and inform customers about the Township's water supply.

Water Treatment Plant 28-1 is one of 13 such facilities located in the Township. These plants pump groundwater through a treatment process that removes iron and manganese, disinfects, and provides corrosion control into the distribution system.

Water Service Branch

The mission of the Water Service Branch is to provide efficient and effective domestic and commercial water services including maintenance of water meters. Utilizing a variety of traditional tools, as well as handheld computers, fixed collector readers, radio read units, hi-resolution electronic meters, and various software systems, staff works closely with the Utility Billing Branch to ensure timely and accurate utility bills are distributed to customers. This branch also has general cross connection responsibilities to help ensure the safety of the public water supply.

The branch is headed by the Water&Sewer Superintendent and is comprised of five full-time employees. The positions and a brief description of their typical duties are listed below:

- Water&Sewer Superintendent
  Provides overall administrative support duties for the Water Service Branch. Provides research and analysis of the water metering system and suggests areas of improvement. Provides budgeting support and technical assistance to employees as needed. Analyzes the DPW's CMMS to look for service improvements.

- Water Service Foreman
  Schedules all work performed at various service locations throughout the Township. Oversees Work Order completion and assists as needed in the field to provide support with tasks on everyday maintenance.

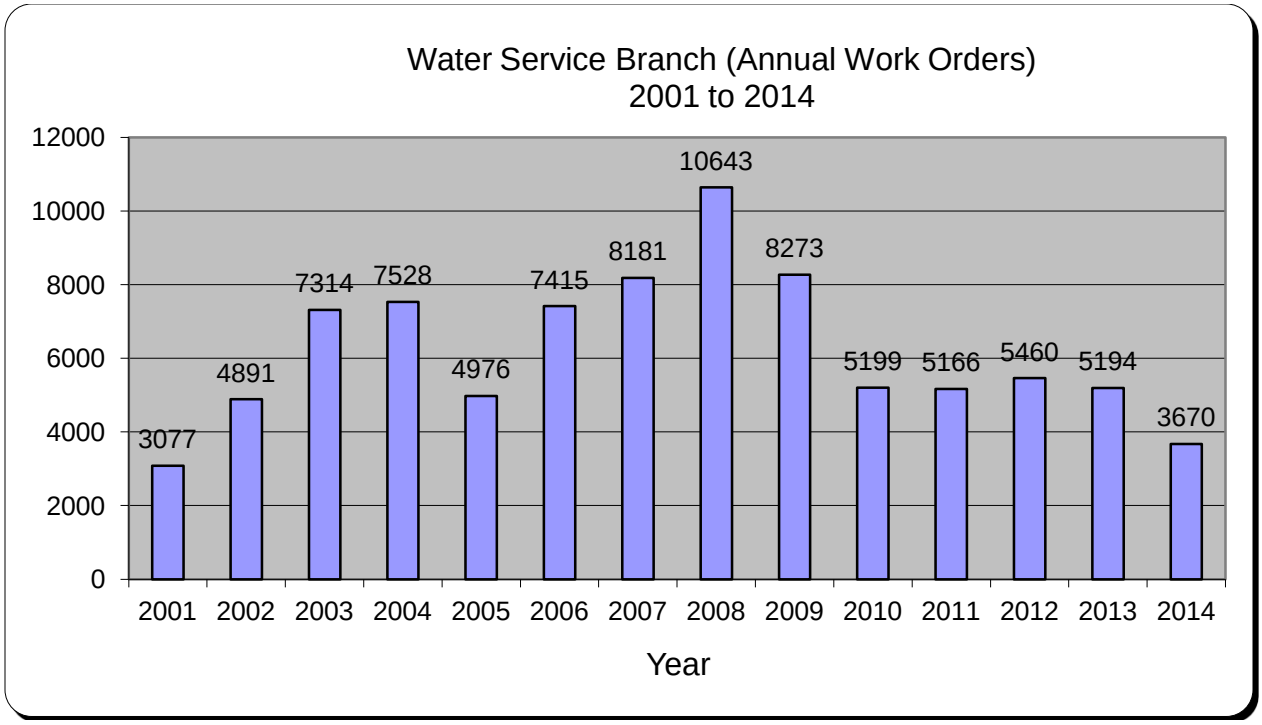
- Utility Service Tech (4)
  Performs the meter reading activities on a scheduled basis. Also conducts meter sets and meter repairs as necessary. Ensures work activities are properly recorded in the DPW's CMMS System.

Water Service Branch Employees (from left to right) Bill Collier, Julie Griffin, Dale Dorrance, Dawn Zormeier, and Danny Watson

Water Service Branch Annual Work Orders

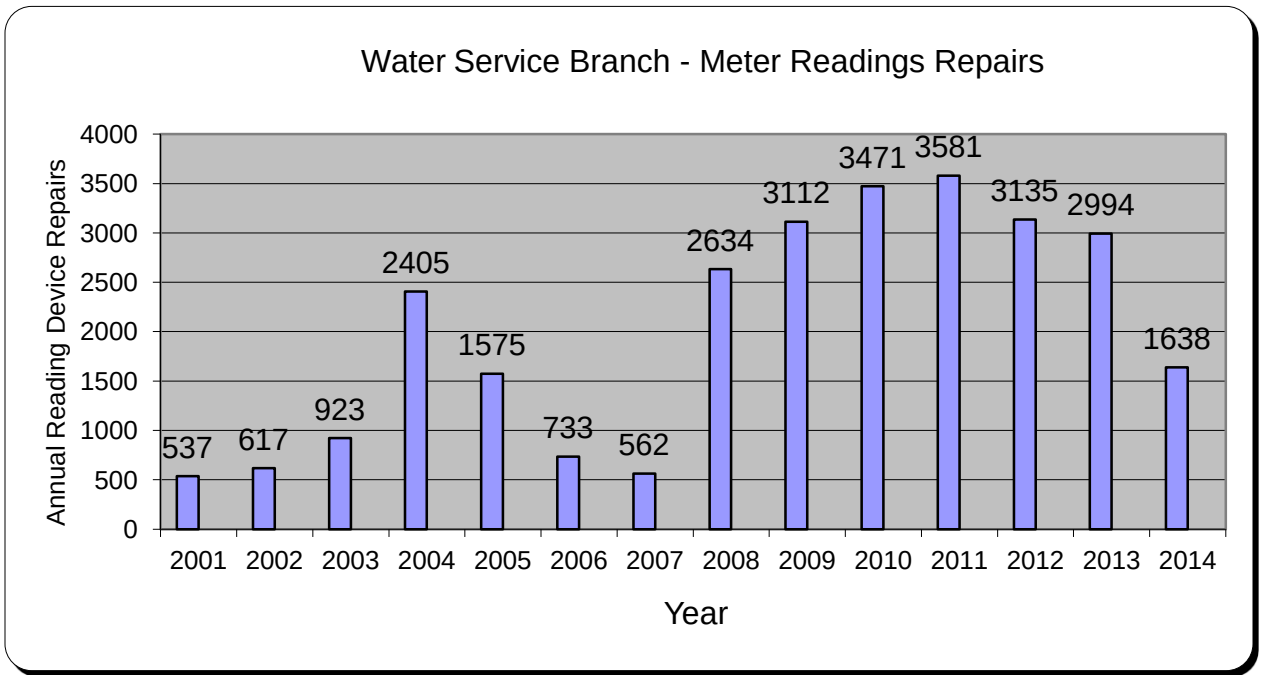
This branch is responsible for all new meter sets for new homes after taps have been made as well as repairs to existing meters and their components at existing homes and businesses to ensure accurate meter reads for billing. The branch is also responsible for retrieving all meter reads for the scheduled billing cycles.

The graph below depicts the annual number of work orders conducted by the branch. The higher numbers in recent years represent increased activity primarily due to installing new Automated Meter Reading (AMR) devices to read water meters via radio transmission, which eliminates the need for staff to enter private property to get readings. With the AMR devices, service personnel can drive by the property and upload the meter reading automatically, which has eliminated hundreds of meter reading hours and reduced Township liability. In 2006, DPW began to install AMR units at customer locations, allowing the meter readings to be directly transmitted to a Fixed Collector. The collector then downloads the meter readings directly to the office for processing. Installation will continue over the next several years to install these devices.



Meter Reading Repairs Annual Work Orders

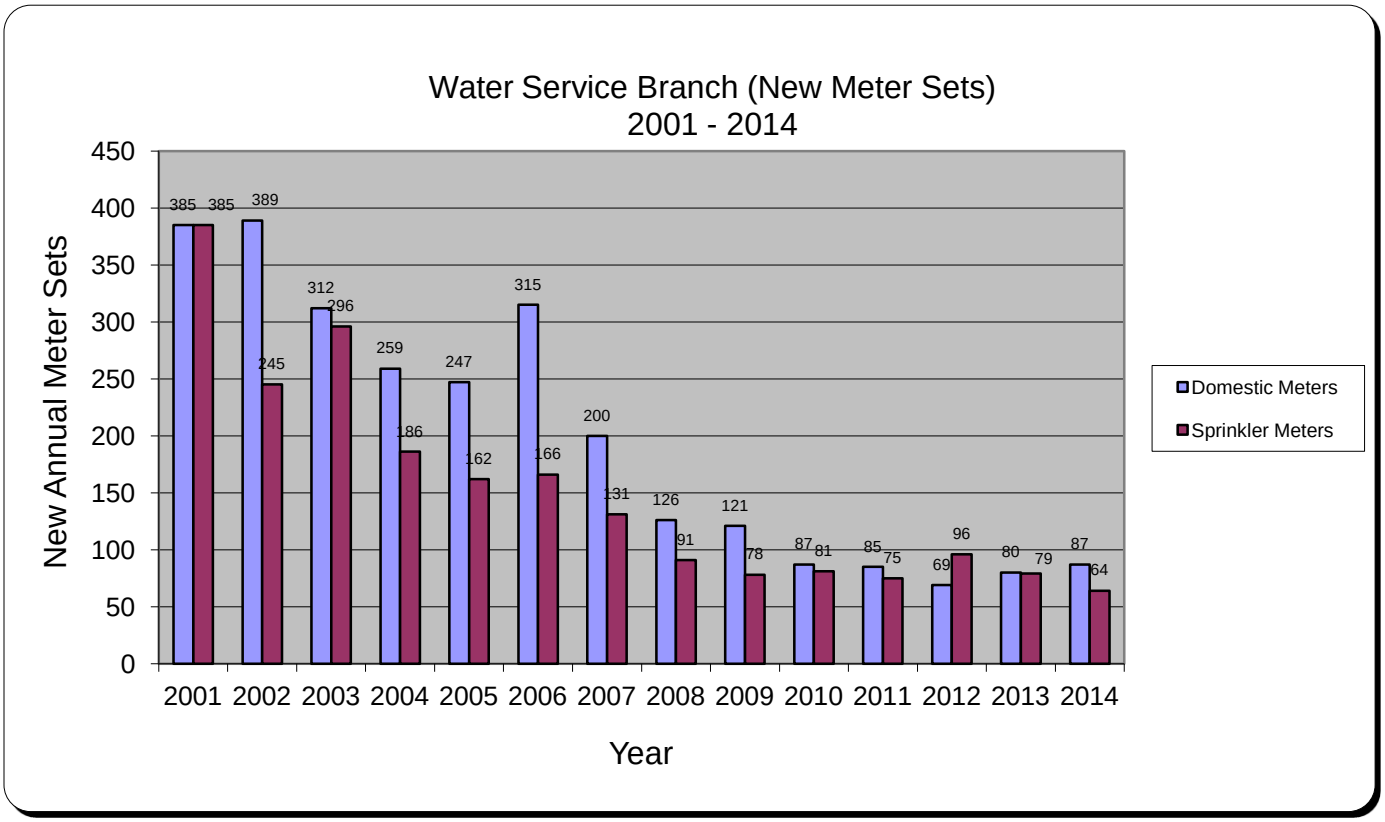
One of the largest segments of work performed by the branch is the repair and maintenance of meter reading equipment. The graph below depicts the annual number of repair activities conducted on AMR and ARB reading devices since 2001. The spike in AMR devices in 2004 was due to quality control issues related to the manufacturer, which have since been corrected. The elevated number of repairs in 2008 and 2010 was primarily due to an older generation of AMR devices reaching the end of their operational life.



Service Branch employee Dale Dorrance utilizing the DPW's Electronic Meter Reading Equipment to Debug and Troubleshoot a water account. The DPW strives for a high percentage of actual meter reads which reduces the need for estimated utility bills.

New Domestic Meters and Sprinkler Meter Sets

Domestic meters measure the water consumed inside a home or business. The DPW also permits a separate sprinkler meter that measures water that does not drain into the sanitary sewer system. The sprinkler meter benefit is that additional sewage charges will be eliminated, saving the customer money. New domestic meter installations are expected to steadily decline as the Township approaches build-out. However, the rate of sprinkler meter installations is likely to remain constant, if not grow, in the coming years as more customers take advantage of this cost savings opportunity (see graph below).



Service Branch employee Dawn Zormeier installing a water meter. The water meter has a set of wires connected to an outside reading device. New meters monitor and alarm on leak detection, reverse flow and no flow. In addition, meter reads are transmitted to fixed collectors that are connected to the Township's Broadband Wireless Network which sends the reads directly to the DPW Office for processing.

SEWER BRANCH

The mission of the Sewer Branch is to operate and maintain 62 sewage pumping stations, 8,800 manholes and approximately 355 miles of sanitary sewer main in the Township. Operations are enhanced with the utilization of a state-of-the-art SCADA system to control and monitor all pumping stations and a Computer Maintenance Management System (CMMS) to initiate and track all work orders.

The branch is headed by the Water&Sewer Superintendent and is comprised of five full-time and 1 part time employees. The positions and a brief description of their typical duties are listed below:

- Water&Sewer Superintendent
  Provides overall administrative support duties for the Sewer Branch. Provides research and analysis of the sanitary sewer system and suggests areas of improvement. Provides budgeting support and technical assistance to employees as needed. Analyzes the CMMS to look for system and branch improvements.

- Sewer Foreman
  Reviews SCADA data and assigns crews as needed to perform routine maintenance of the Sanitary Sewer system and oversees all work orders generated by the DPW's CMMS program. Also responsible for scheduling of sewer main and pump station cleaning crews.

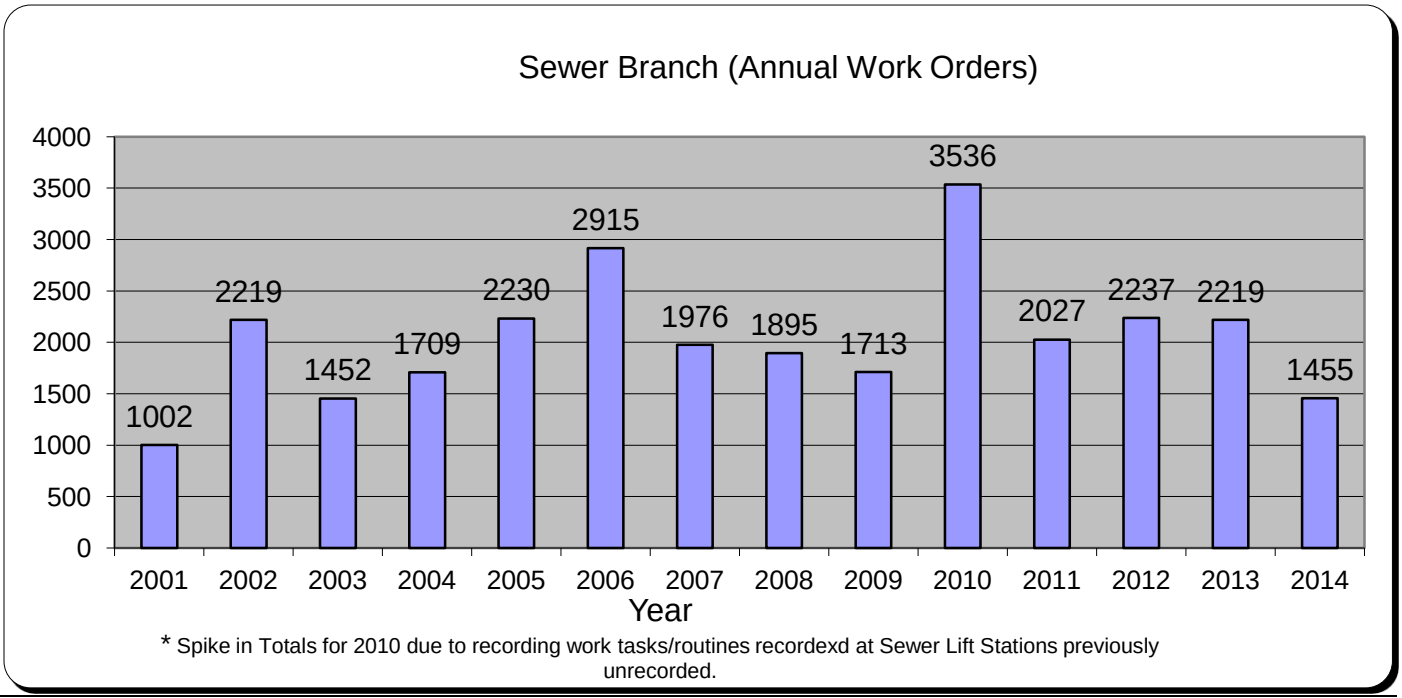
- Collection System Maintenance Tech's (4)
  Performs maintenance on all sanitary sewage pumping stations and sanitary sewer mains in the Township as scheduled by the Foreman. Completes work orders per Foreman's directions. Collects data and keeps records of daily activities.

- Part-time (1)
  Performs painting and cleaning of pump stations as weather and operations permit.

Sewer Branch employees (from left to right) Sam Powell, Randy Bunce, Richard Chittick, Scott McGrady, and Derek VanDam.

Sewer Branch Annual Work Orders

The branch is responsible for 62 pump stations and 355 miles of sanitary sewer main throughout the Township. Various maintenance activities are conducted on the pump stations and sewer mains to ensure proper operation. The graph below indicates the annual number of work orders conducted since 2001.

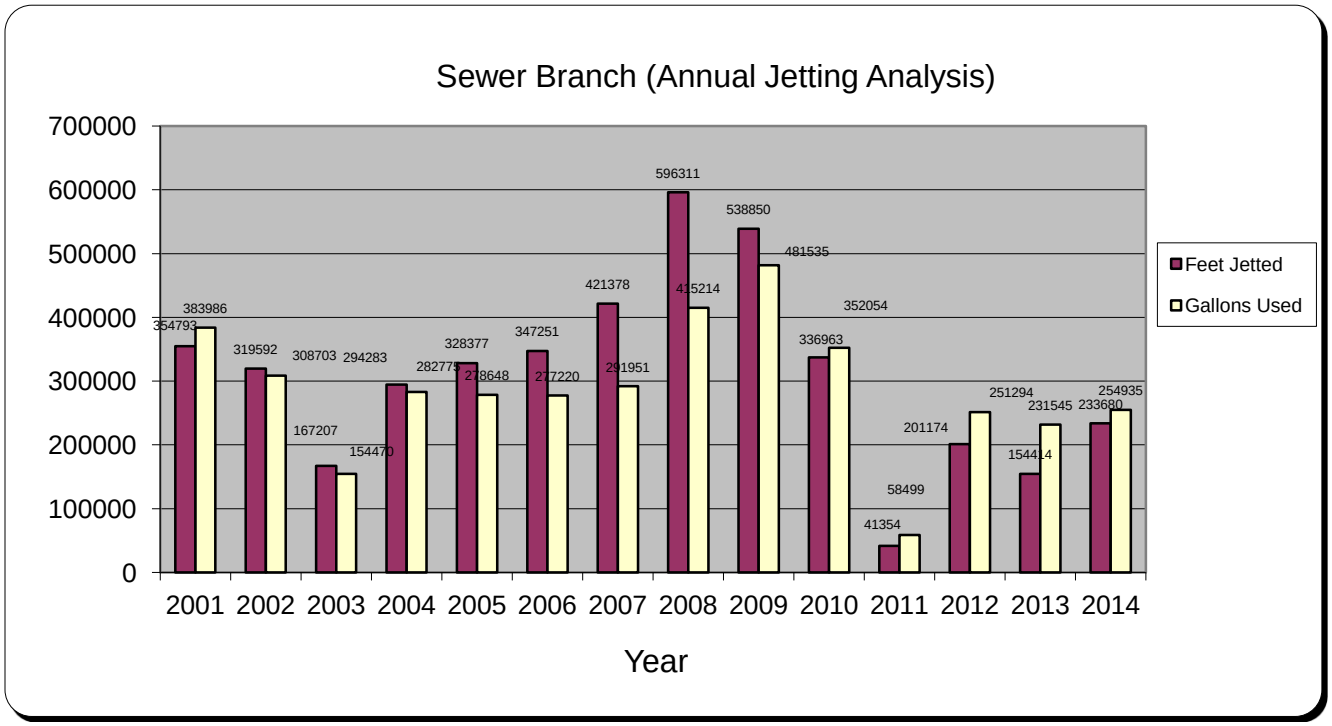


* Spike in Totals for 2010 due to recording work tasks/routines recordexd at Sewer Lift Stations previously unrecorded.

Sewer Main Jetting

Jetting and vacuuming of the sanitary sewer main is one of the most effective preventative maintenance activities conducted by the sewer branch to help ensure the sewer mains are clear of debris and other blockages. The DPW has 2 sewer vactor-jet trucks that perform this function. Cleaning schedules are organized through the CMMS and include data on the specific type of work conducted, the equipment used and all labor involved to provide a complete cost of the activity. The graph below indicates the annual feet of sanitary sewer main cleaned since 2001 as well as the number of gallons of water used to complete the work.

DPW Sewer Branch employees, Rich Chittick (left) and Brandon Sluiter (right), working with one of the DPW's Diesel Fuel Tanks.

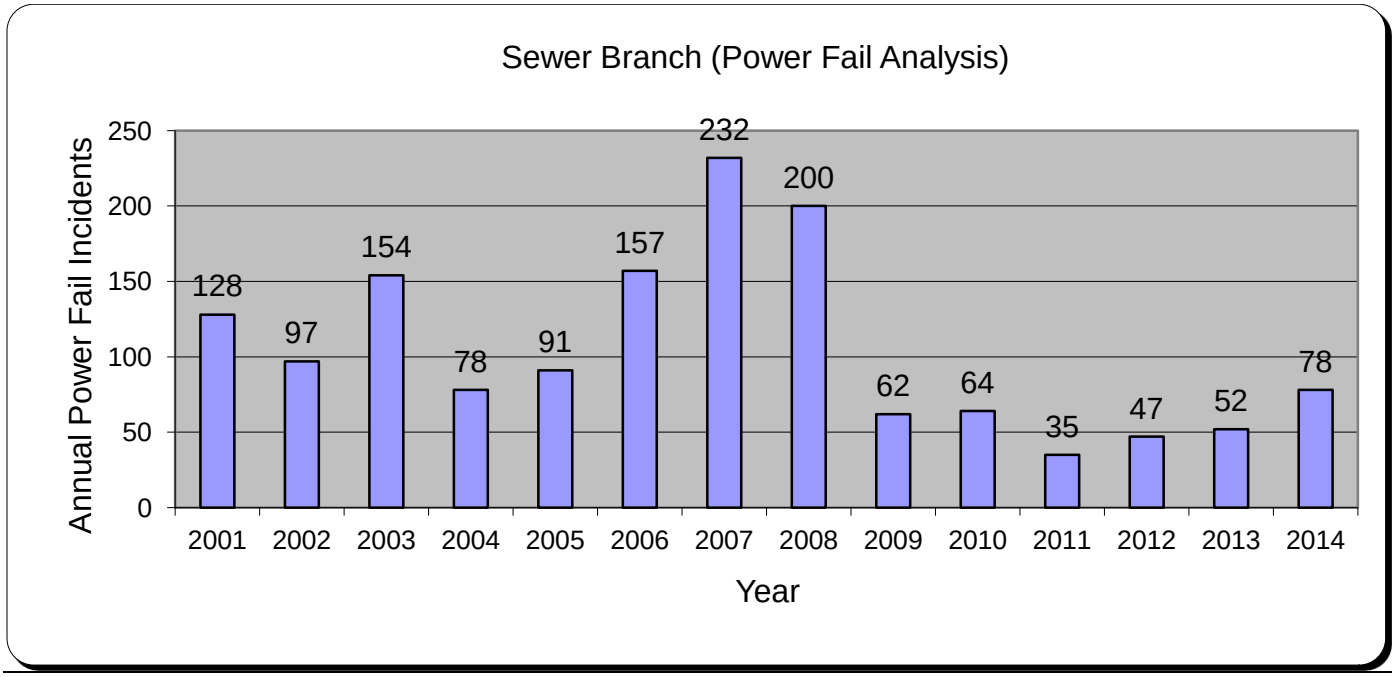


Sewer Power Fail Events

One of the most critical parameters monitored by the branch through the SCADA system is power failures. Loss of power to a station is considered an emergency requiring immediate response. Many sites are equipped with stationary generators, the rest rely on portable generator power. Depending on the length of power failure and the incoming flow to the station, the branch can have as little as 20 minutes to respond before backups and or Sanitary Sewer Overflows (SSO's) may occur. The graph below indicates the annual number of power fail events experienced since 2001.

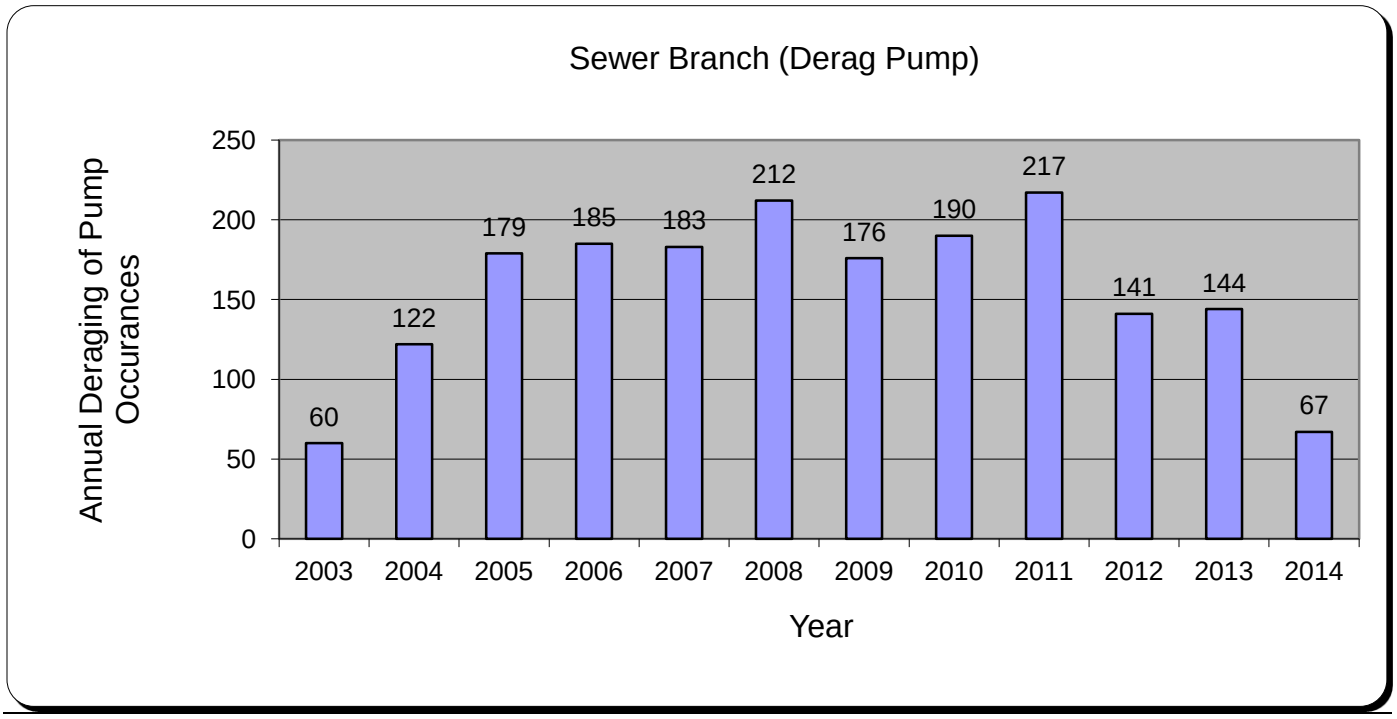
A portable generator used by the DPW during power failures. These are used at sites without permanent stationary generators.

Stationary generator at one of the Township's 62 sewer pumping stations. At these sites, the generators automatically start and transfer load for continued operation during power failures.



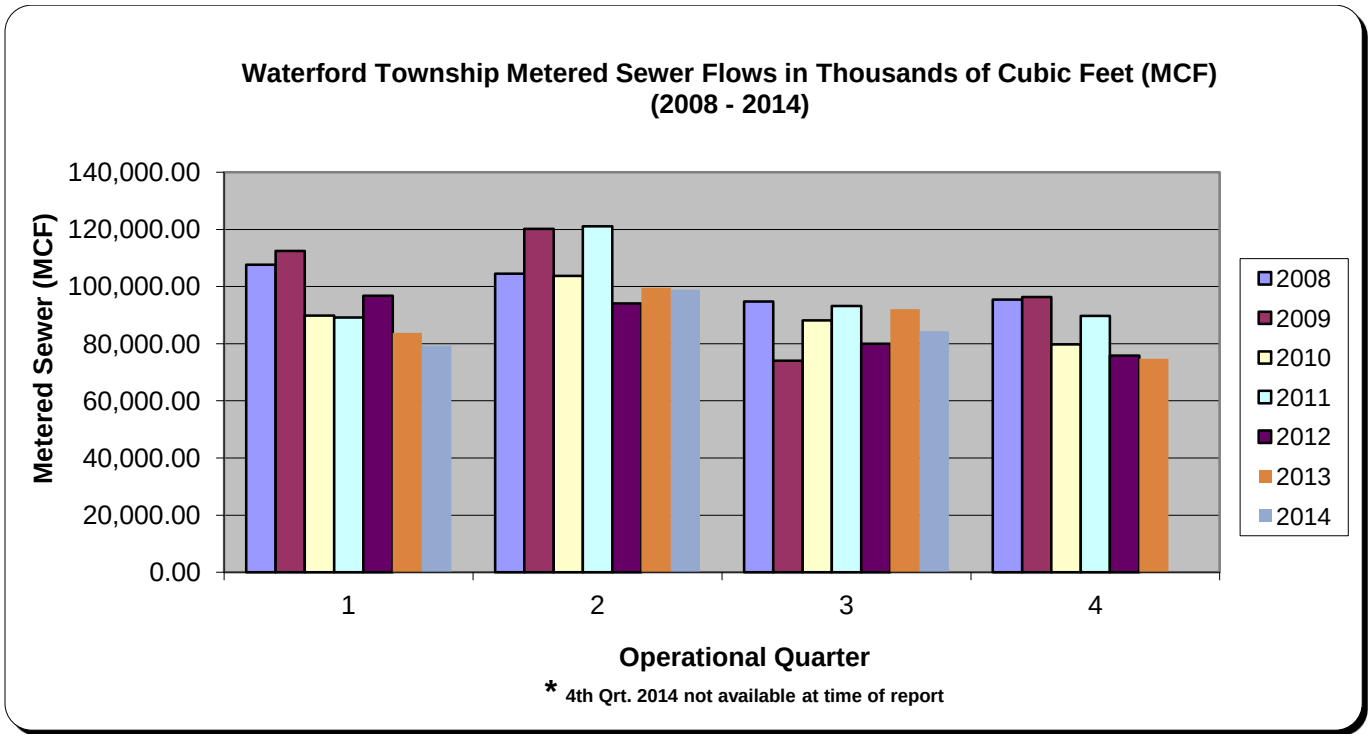
Pump Cleaning

The SCADA system is analyzed daily with respect to sewage pump starts and run times to identify potential problems with pumps at the stations. If station pump runtime data indicates long run times on a given pump in relation to normal, the pumps are inspected for ragging and/or other problems to return them to normal pumping ability before a problem occurs. Ragging means the pump volute housing and impeller are plugged with debris, which impedes the pump's ability to pump water. This situation can cause premature failure due to wear and tear on the pump and can snap shafts resulting in a total loss of the pump. When this condition is suspected, work orders are created and tracked in the CMMS. A general response would consist of two employees and a hoist truck being dispatched to pull the pump, clear it of debris, inspect it and return it back to service. The following graph indicates the number of times this activity has occurred since 2003.



Metered Sewage Flows

Beginning in Operational Year 2008, the Township, along with the other member communities of the Clinton-Oakland Sewage Disposal System began to be billed from Oakland County based on actual sewage flows. Previously, the Township and member communities were billed based on a system of Residential Equivalency Units or (REU's). Financial planning has to factor in such items as wet or dry summers (seasonality) and the need for Capital Infrastructure Maintenance and Replacement into rate models to ensure adequate funds are available to continue to fund the Township's Sanitary Sewer operational, infrastructure and treatment costs.



Electrical Branch

The mission of the Electrical Branch is to provide electrical service for the DPW. Staff in this branch includes 1 Master and 1 Journeyman Electrician. They are skilled in all facets of electrical work including motor controls and the SCADA system.

The positions and a brief description of branch staff duties are as follows:

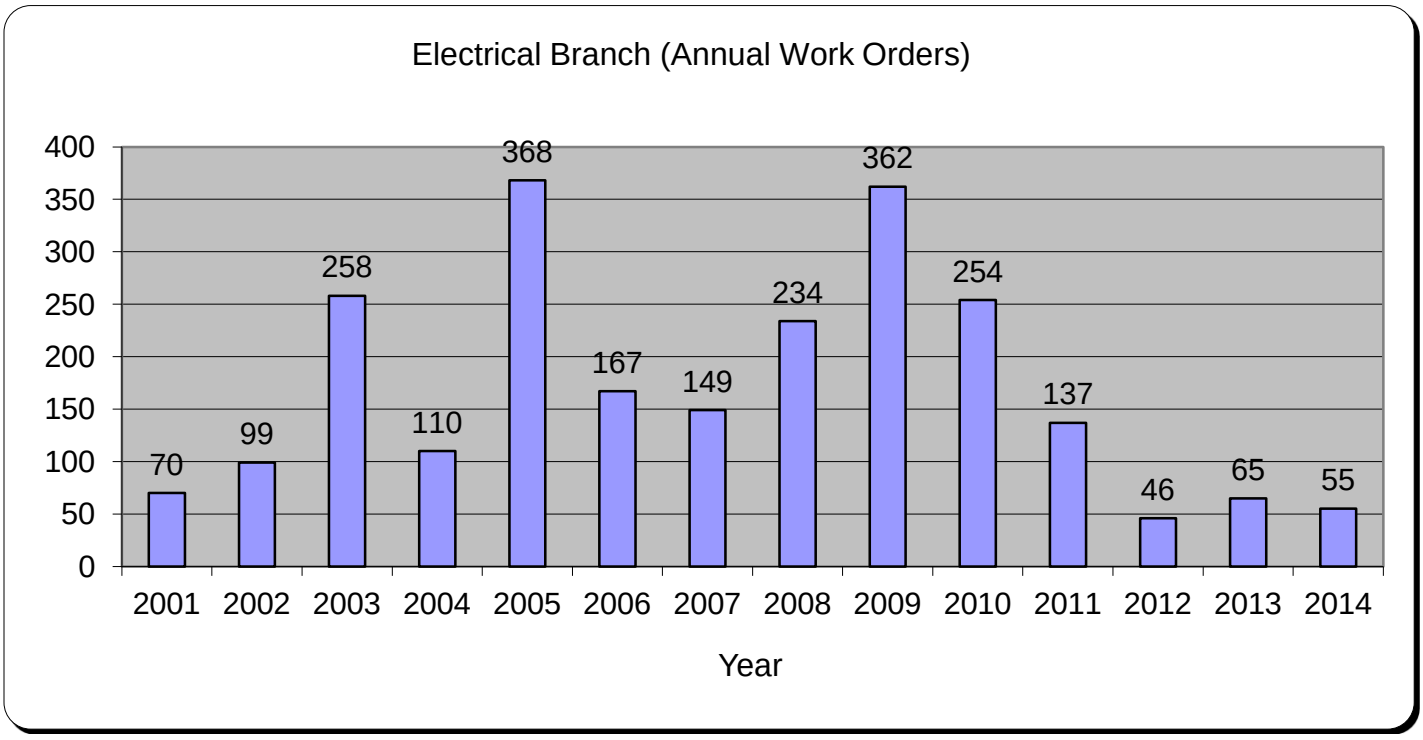
- Water&Sewer Superintendent
  Provides overall administrative support duties for the Electrical Branch. Provides research and analysis of the water/sewer plant electrical systems and suggests areas of improvement. Provides budgeting support and technical assistance to employees as needed. Analyzes the DPW's CMMS to look for system and branch improvements.

- Electrical Foreman
  Performs scheduling and planning of all work submitted to the Electrical Branch. Oversees all work completed in the CMMS program performed by the other two employees under his charge. Performs work in the field as needed to keep up with requests for electrical work.

- Electrical Service Tech II
  Performs work as assigned by the Foreman which includes all SCADA related instrumentation and related components. This employee performs electrical repairs at both water and sewer facilities as assigned.

Electrical Branch Annual Work Orders

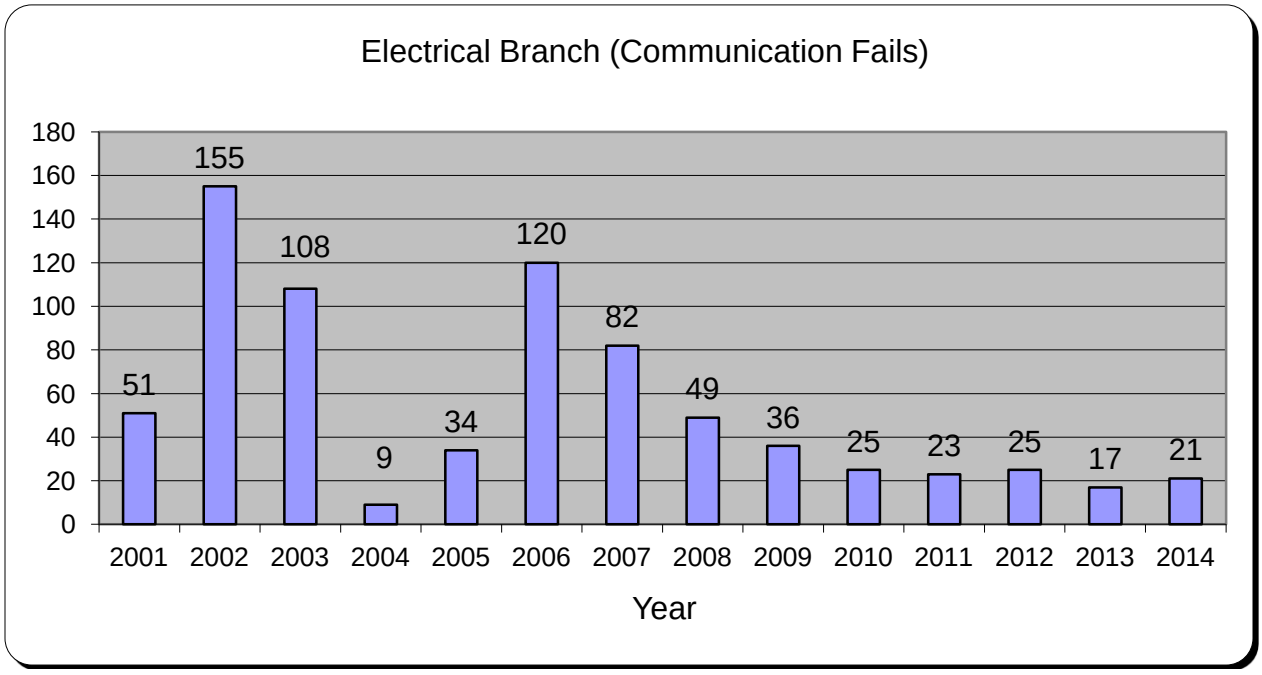
One of the main functions of the branch is the installation and maintenance of electrical, instrumentation and radio components related to the SCADA system. Additionally, this branch installs generator transfer switches, electrical upgrades and new services at the Township's water and sewer pump station facilities. The graph below indicates the annual number of work orders performed by the branch since 2001. Depending on the scope and complexity of the work, some activities can take several weeks to complete.

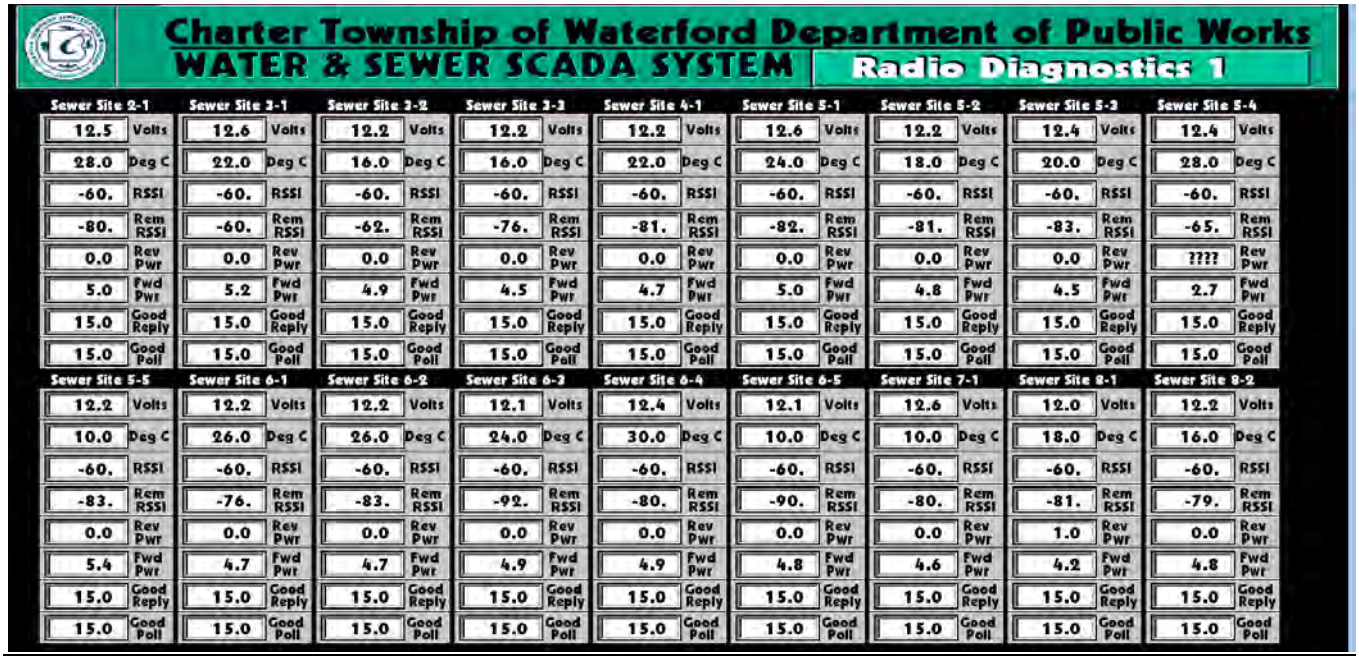


Electrical Branch Foreman, Jeff Mohr, utilizing a computer at the Clinton River Sewage Pumping Station to interface with the SCADA control program.

Communication Fails

Communication failures occur when the SCADA system loses communication with a water or sewer facility. This is an important alarm condition because it means there could be a problem ranging from electrical failure to physical damage at the site. The graph below depicts the annual number of communication failures since 2001. There are over 85 remote sites in the Township that are continuously monitored for communication and other operational condition by the SCADA system.





SCADA System Monitor's many different Radio Diagnostics to keep essential communications going.

Generators and Auto Transfer Switches (ATS)

The DPW currently utilizes permanent generators with automatic transfer switches at 27 sewage pumping stations and seven water treatment plants. When an Edison power failure occurs, the generator will automatically start and transfer the electrical load at the site eliminating the need for an employee to respond while still keeping the site fully operational. With these devices in place (43%) of the Township's Sewer Stations are automatically backed up in terms of power, which leaves the balance of 35 sites to be operated by DPW personnel utilizing portable generators. Of the 13 water treatment plants, 7 are equipped with stationary generators and transfer switches. These generators and transfer switches provide the DPW with the means to continue supplying the residents with a safe and adequate drinking water supply and adequate sewage pumping means during power outages.

Safety & Personnel Branch

The mission of the Safety & Personnel Branch is to provide safety management and training to ensure occupational safety and health compliance with local, state, and federal laws. By using the latest technologies and the most recent training materials available, this branch continues to ensure the DPW meets all MIOSHA and governmental guidelines. The Safety & Personnel Coordinator also performs personnel functions of the DPW as required and reports to the Director of Public Works. The abbreviated job duties are listed below.

Safety Coordinator

Responsible for personnel, planning, training, monitoring, implantation of environmental safety and health related programs, and personnel issues. Additionally, gathers, analyzes, and inputs data for technical reports in the DPW's CMMS.

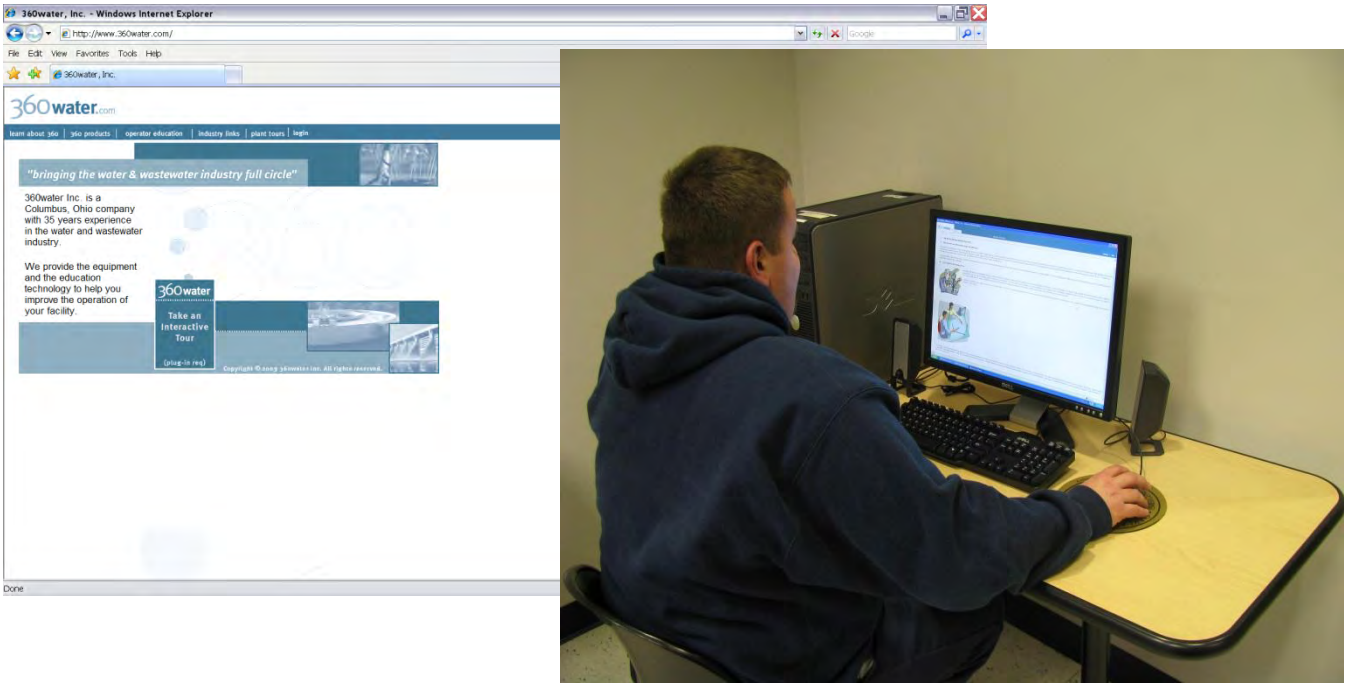
DPW Career Ladder

In 2014 the DPW has on staff one (1) Storm Water Management designation, sixteen (16) Water Distribution and Limited Treatment Operator licensees, six (6) Michigan Water Environmental Association and California Water Environment Association Sewer Collection licensees, two (2) State Certified Master Electricians, one (1) state certified Master Motor Mechanics and one (1) State licensed Motor Mechanic in several automotive areas.

The licenses and certification listed above have been encouraged and promoted through the DPW's career ladder program to ensure highly trained professional staff to carry out the required duties of their respective responsibilities.

Online Training for Continuing Education Credits

Operational year 2014 marked the 7th year of money and time saved utilizing on-line computer training for DPW staff including the ability to attain Continuing Education Credits (C.E.C's) through an on-line State of Michigan approved training program by 360water.com. These credits are needed to maintain State licenses and certificates over a period of time for Water Distribution, Limited Treatment, and Sewer Collection System operators. The Safety Branch also utilizes a multitude of on-line clerical training tutorials for programs such as Word and Excel to assist and train DPW staff to better leverage their daily software tools.

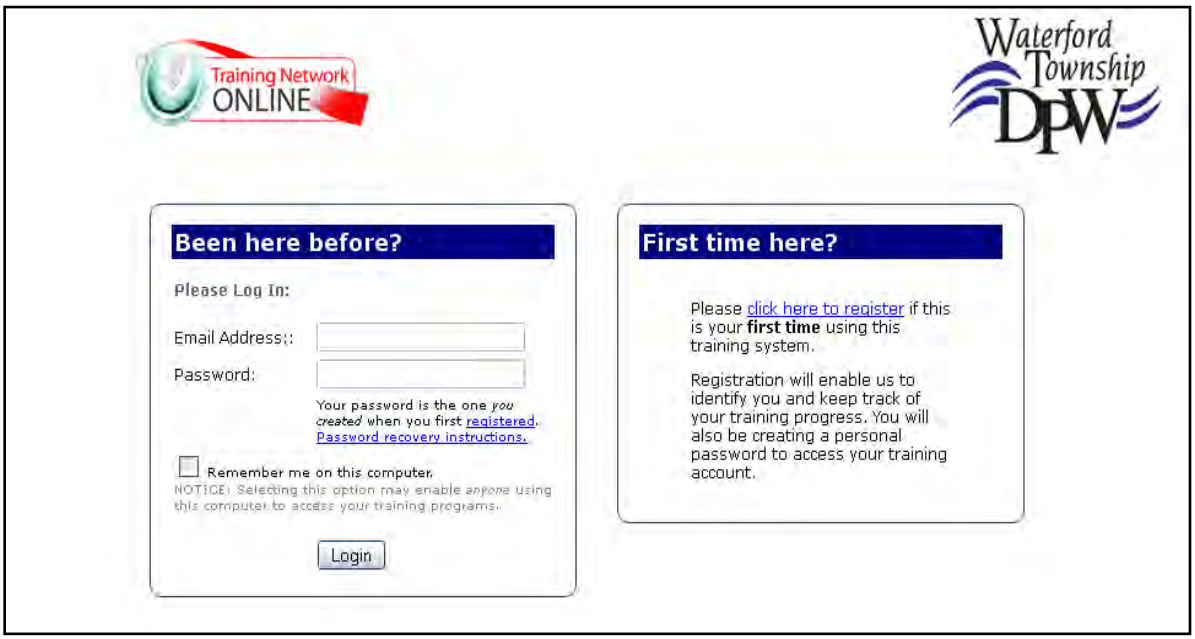


DPW employee Justin Westlake utilizing the online services to obtain Continuing Education Credits (C.E.C's)

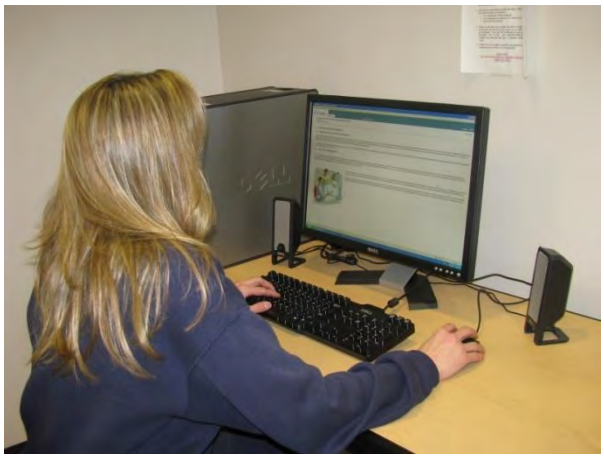
Online Safety Training

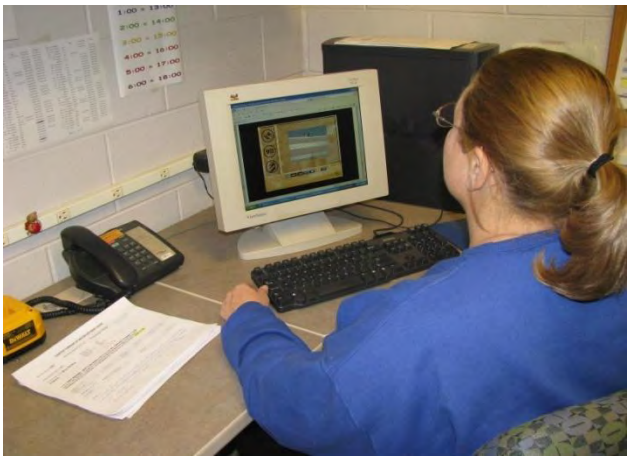
The Safety Branch has extended computer training to include on-line safety training through the use of an Employee Training Portal by The Training Network. Operational year 2010 saw the introduction of on-line safety training, which saves DPW staff time and saves training dollars.

On-line training has received positive feedback from DPW staff because it provides staff with the flexibility to work this training in around their regular work schedules. They can start and stop the training until they have completed it resulting in no missed safety training.



Screen shot of the Employee Training Portal that DPW employees utilize to conduct their online safety training.





DPW employee Karen Lee (above) and Dawn Zormeier (above, right) are conducting the same on-line safety training in two different locations within the Department of Public Work.

Classroom Safety Training

In 2014 the Safety Branch presented topics on a multitude of topics ranging from Temporary Traffic Control & Aerial Work Platform training. In partnership with many of the DPW vendors, staff was trained on-site by professional trainers such as the presenter from Michigan Rural Water Association (MRWA) Bruce Gasaway and Dave Maloney CGS from Safety Training, Inc.

Bruce Gasaway (above) teaching Temporary Traffic Control

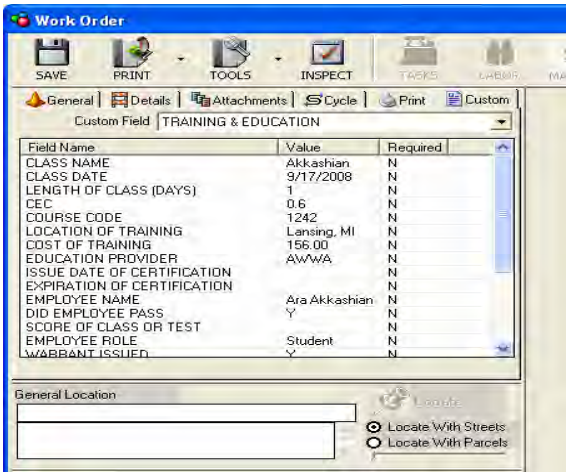
Dave Maloney (above, left) from CGS Safety Training Inc. conducting class room training, while (above right) hands on training was being conducted of different aerial work platform equipment that the DPW utilizes.

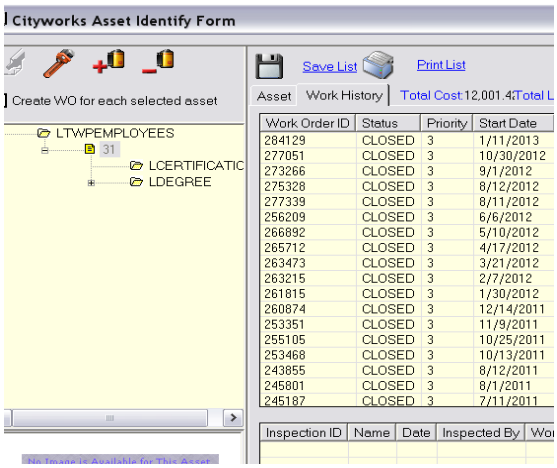
Safety Management Software Systems

J.J. Keller Online and Business and Legal Resources (BLR) are two on-line resources the Safety Branch continues to utilize to ensure proper staff training. The on-line service has a wealth of information and training related to environmental, safety and health topics. It is also a great tool for disseminating regulatory updates, posters and any other safety training resources.

DPW Employee Database

The Safety Branch also continues to utilize and enhance the in-house developed DPW Employee Database. This database documents all training, licenses, equipment and associated costs related to DPW staff.

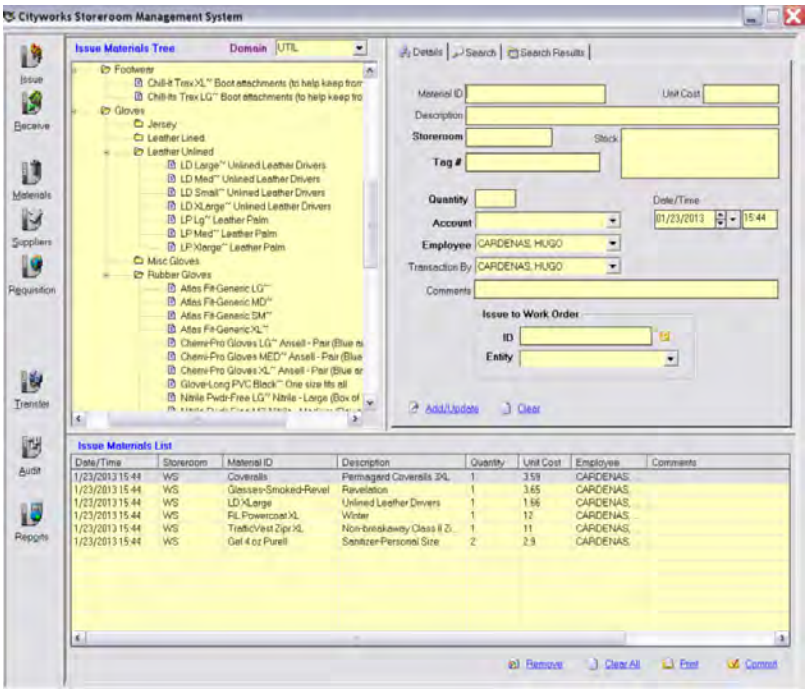




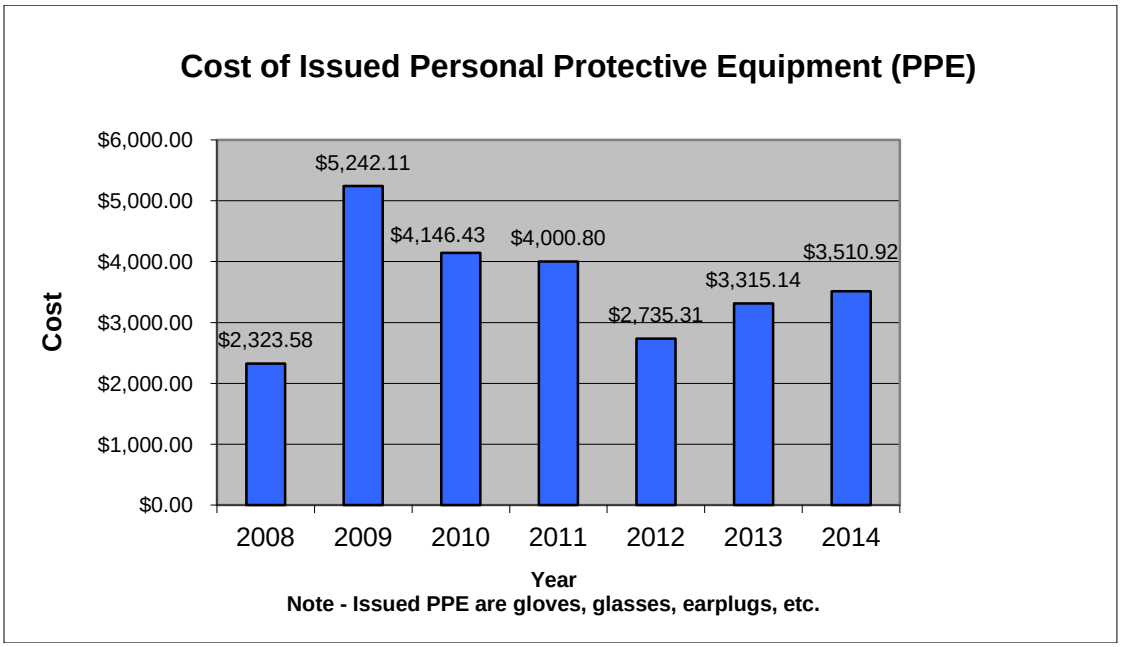
Work Order sample of how the DPW tracks all training utilizing the Employee Database.

Safety Branch Storeroom

2008 was the first year that the Safety Branch was able to implement the CMMS Storeroom module. This has significantly helped the Safety Branch in tracking the cost of issued personal protective equipment (PPE). When a DPW employee is issued PPE the Safety Branch issues that specific item to that individual. Using Storeroom helps keep track of cost and items that have been issued.



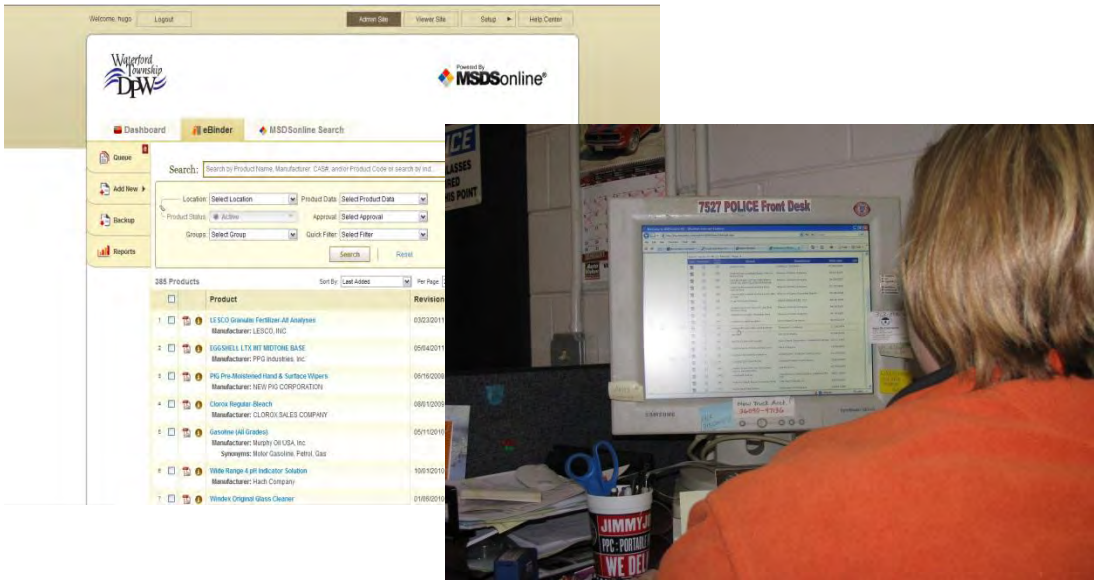
Screen shot of CMMS Storeroom module used by the Safety Branch to issue safety equipment.



Statistical data of how much safety equipment has been issued annually.

M.S.D.S. Online

The Safety Branch also continues to utilize an on-line Safety Data Sheet (SDS) program to ensure accurate and up to date information related to materials utilized by the DPW to comply with Federal and State law. This web-based program provides all relevant MSDS information for various chemicals used in the DPW and provides automatic updates and alerts when MSDS information changes for specific chemicals. Since implementation of the on-line MSDS program, the list of tracked chemicals has grown from 192 to 423.



Inventory Control Clerk Heather Krupic using the web based SDS on-line program to lookup a chemical

Statistical data on how much the SDS on-line web service was utilized in 2014 by DPW staff.

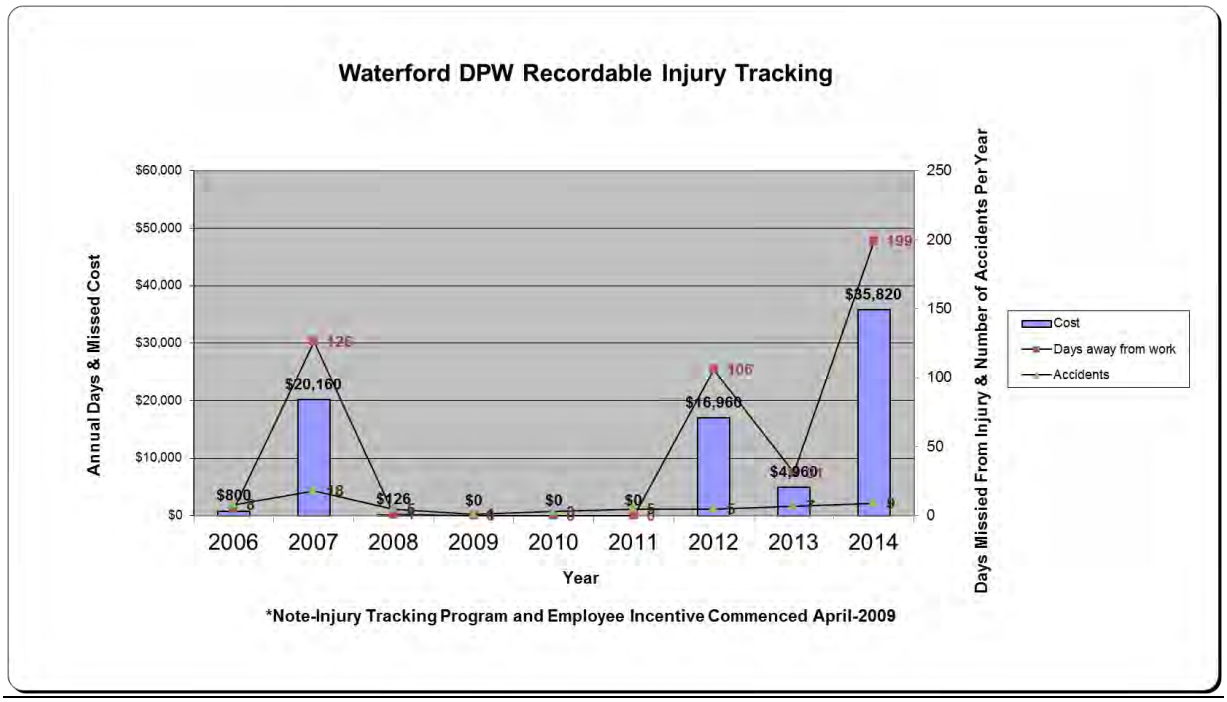
DPW Safety Performance

The number of production hours without a recordable injury or lost work day accident has increased over the past five (9) years through the efforts of the Safety Branch and DPW staff. The Safety Branch continuously works to reduce the number of recordable injuries and lost work day accidents through enhanced training and mock exercises.

OSHA 300 Log	300	300	300	300	300	300	300	300	300
Year:	2006	2007	2008	2009	2010	2011	2012	2013	2014
A. Number of Recordable Injuries	8	18	5	1	3	5	5	7	9
B. Number of Lost Work Days	5	126	1	0	0	0	106	31	199
C. Number of Productive Hours Worked	82820.99	87460.25	87657.75	86743.56	88749.35	75517.75	70948.91	76616.00	78386.75

Year	Cost	Work Days Lost	Accidents
2006	$800	5	8
2007	$20,160	126	18
2008	$160	1	5
2009	$0	0	1
2010	$0	0	3
2011	$0	0	5
2012	$16,960	106	5
2013	$4960	31	7
2014	$35,820	199	9

Cost Based off of $20.00 hour pay rate

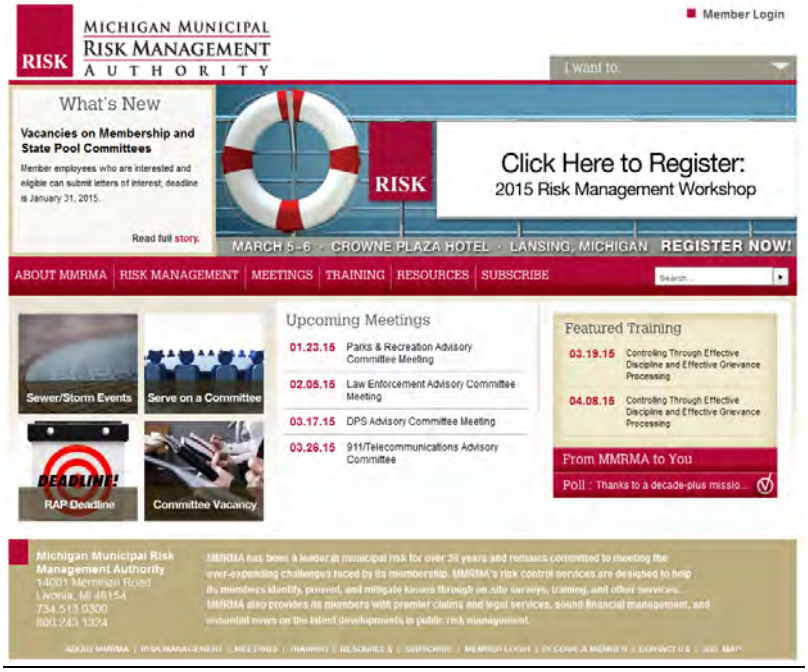


DPW Employee Incentive Program

In April 2009, the Safety Branch introduced an employee incentive program for DPW staff to help in lowering lost work day accidents. A threshold number of lost work day accidents are established and if staff meets the established goal, an in-house lunch is provided. This simple program has been met with enthusiasm and is paid for by a self sustaining returnable pop can program.

Safety board keeps track of how many days the DPW has gone without a lost time accident.

MMRMA, Claims, and Public Act 222



The Safety Branch investigates and processes all general liability and sewer back up claims as well as all automotive accidents, working in conjunction with the Township insurance provider, MMRMA, to reach claim resolutions.

Public Act 222 governs how and when the DPW is liable to pay for sewer backup claims. When a sewer backup claim is received by the DPW, a thorough investigation is completed to determine if the DPW is liable for the claim under Act 222. Under Act 222, a sewer backup claim would have to meet the four major conditions outlined in the Act below:

- The Township at the time of the event owned, operated, or directly or indirectly discharged into the portion of the sewage disposal system that allegedly caused damage or injury.
- The sewage disposal system of the Township had a construction, design maintenance, operation or repair defect.
- The Township knew, or in the exercise of reasonable diligence should have know, about the defect and failed to take necessary precautions to correct it; and
- The defect was substantial proximate cause of the event, damage or injury.

MMRMA, Risk Avoidance Program (RAP) Grant Program

Through the Township insurance provider, MMRMA, the DPW is able to take advantage of the Risk Avoidance Program, which is only available to MMRMA members. This program in assists in preventing liability injuries and improve work place safety. Grants are submitted through the Safety Branch to MMRMA and are reviewed by the MMRMA Membership Committee. Approved grants assist in the purchase of new equipment for the DPW to help reduce liability risk within the DPW. The Safety Coordinator of the DPW is also a Vice-Chair MMRMA Public Utility Advisory Committee and a member of the MMRMA Membership Committee.

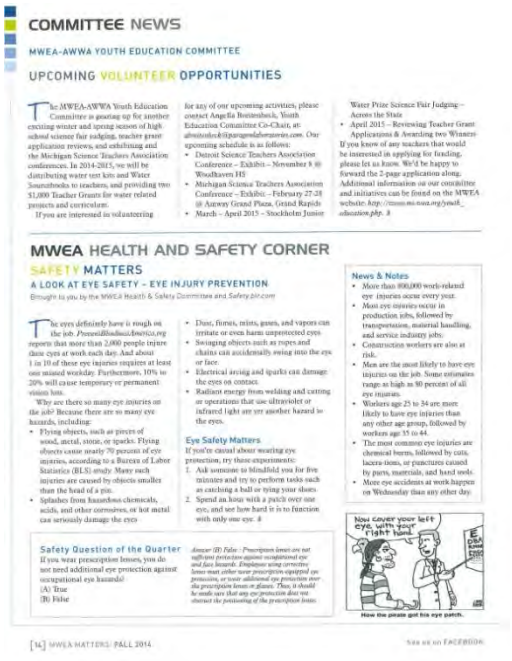
Risk Avoidance Program

Guidelines

MICHIGAN MUNICIPAL RISK MANAGEMENT AUTHORITY

Safety and Health Quarterly Publications

The Safety Coordinator is also involved in two safety and health quarterly articles for the Michigan Water Environment Association (MWEA) Matters magazine and the Michigan Section American Water Works Association (MI-AWWA) Waterworks News magazine. The quarterly articles bring knowledge and awareness of safety and health in the area of public works to members of both organizations. The Safety Coordinator is also the Committee Chair of the AWWA Safety Practices Committee and the Committee Chair for the Health & Safety Committee which works to develop programs to reduce risk liability and increase safety.



COMMITTEE NEWS

MWEA-AWWA YOUTH EDUCATION COMMITTEE

UPCOMING VOLUNTEER OPPORTUNITIES

MWEA HEALTH AND SAFETY CORNER

SAFETY MATTERS

A LOOK AT EYE SAFETY – EYE INJURY PREVENTION

COUNCIL NEWS

SAFETY MATTERS

Fat, Oil, and Grease (F.O.G.) Program

The Safety Branch is also responsible for implementing and monitoring the Township's Fat, Oil, and Grease (FOG) program to reduce and/or eliminate grease and other oils from entering the public sewer system through faulty grease and other types of traps at businesses such as restaurants. The introduction of fats, oils and grease into the public sewer system can cause sewer backups and sanitary sewer overflows (SSO's). The FOG program has also been a useful tool to help educate businesses on the importance of proper maintenance of these traps.

FACILITIES AND OPERATIONS DIVISION

The mission of the Facilities and Operations Division (F&O) is to provide professional services to Township Departments and the Citizens of Waterford Township. Efficient and effective administration of these responsibilities are accomplished through the use of trained and dedicated personnel using an advanced CMMS program to assign and track work activities on all facets of the operation and utilization of computer controlled Heating, Ventilation and Air Conditioning (HVAC) systems.

F&O is headed by the Superintendent of Facilities and Operations and is composed of 7 full-time employees.

- Superintendent of Facilities and Operations
  Responsible for planning, project evaluation, building system evaluation, design and bid specification preparation, budgeting, construction management, fleet management and quality review inspections of work performed by various contractors. Gathers, analyzes, and inputs data for technical reports as well as the CMMS.

- Administrative Specialist
  Provides administrative and clerical support, including scheduling appointments and meetings, answering phones, opening and distribution of mail, composing and typing correspondence to routine inquiries, providing counter assistance and receiving payments. Additional duties include purchase order, contract, bidder, budget and financial records keeping, cemetery sales and records. Assists in updating the CMMS and the Geographic Information System (GIS).

- Facilities Maintenance Technician (1)
  Performs a wide variety of tasks related to maintaining, repairing and constructing buildings, fixtures and equipment. Responsible for the completion of data entry and documentation of work order requests in the CMMS system.

- Maintenance Worker (2)
  Performs tasks related to plumbing, carpentry, welding, painting, masonry and other general buildings and grounds maintenance work.

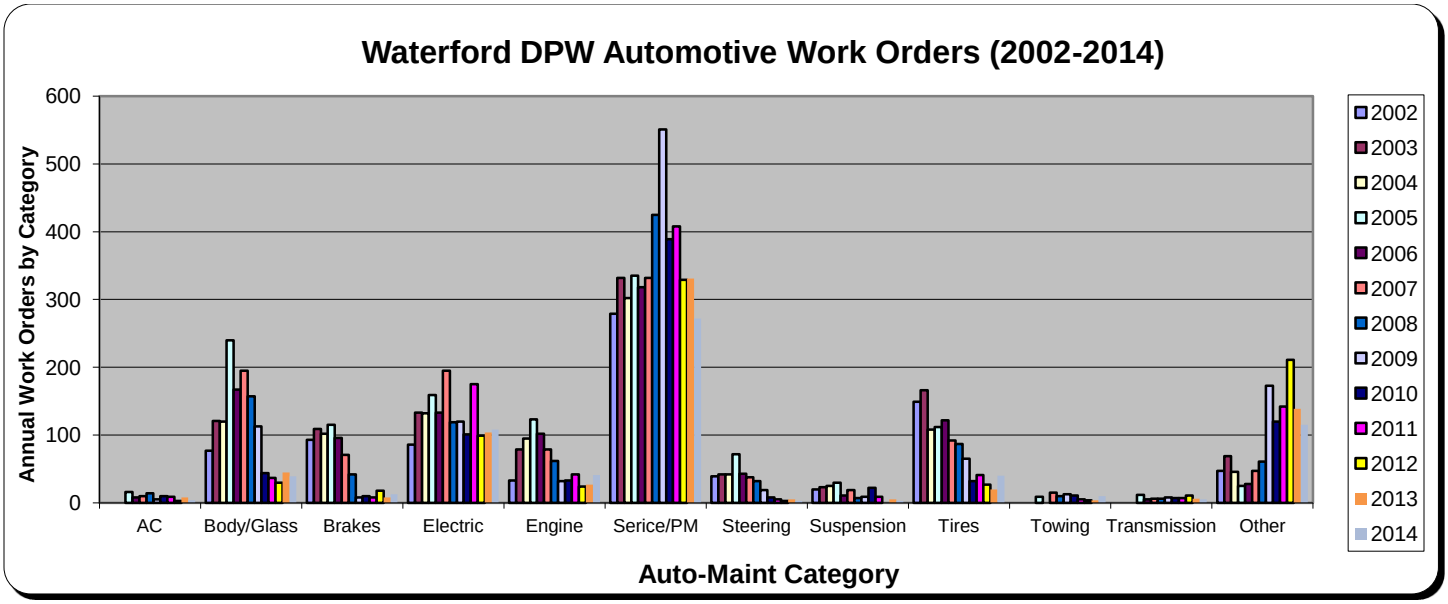
- Mechanics (3)
  Performs repairs and maintains a variety of makes and models of passenger automobiles, light and heavy duty trucks and light and heavy duty construction equipment requiring gas or diesel engine operation. Responsible for the completion of data entry and documentation of work order requests and inventory control utilizing the CMMS.

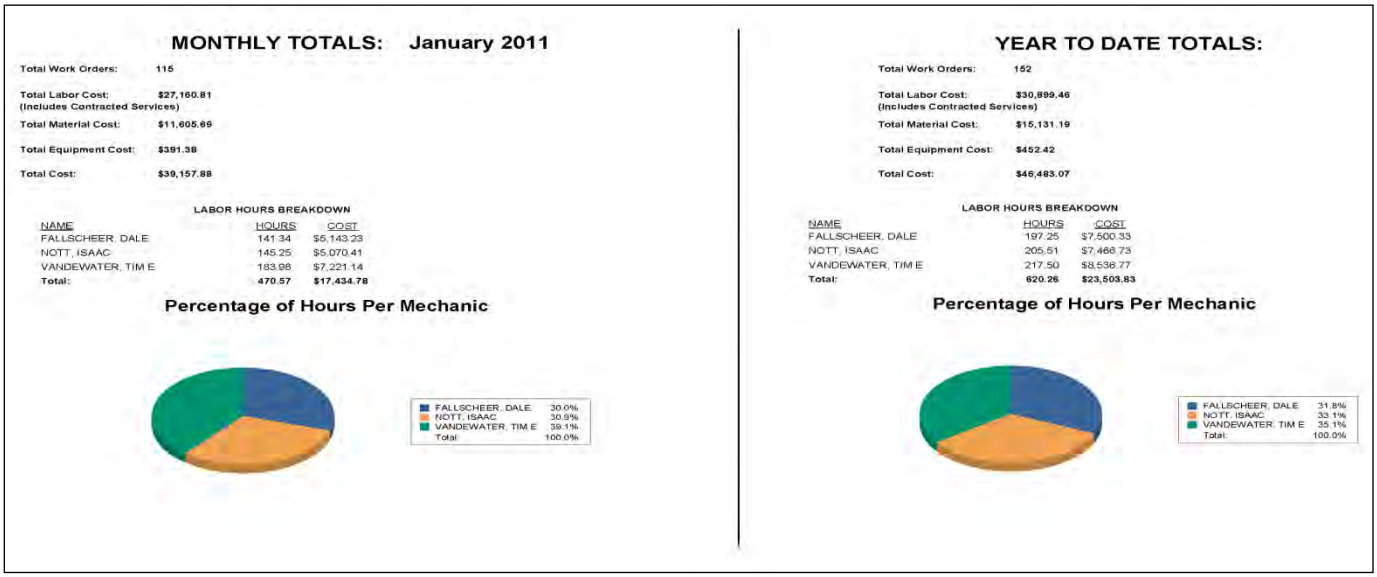
- Cemetery Sextons (1)
  Responsible for showing and selling cemetery lots to the general public, maintaining precise cemetery plot maps and records, lays out graves, sets up and prepares the grave site for funerals, receives funeral procession and collects proper papers and monies due. Responsible for the completion of data entry and documentation of work order requests in the CMMS and GIS systems.

- Inventory Clerk (1)
  Responsible for maintaining accurate records for DPW's supplies. Responsible for physical counts and reconcilement against the DPW's CMMS System. Purchases inventory supplies based on the CMMS work order history.

Automotive Branch

The Automotive Branch conducts routine and complex service on the Township's Vehicle Fleet. Currently, there are over 250 vehicles, tractors, mowers, large trucks, generators and other specialized pieces of equipment cataloged and tracked through the CMMS. Maintenance, labor and other costs are recorded and tracked in the CMMS. Township Departments are invoiced monthly for services rendered on their respective vehicles and/or equipment. The graph below depicts the major categories of maintenance per year since 2002. Similar trends are likely to continue as the Township fleet and equipment age. To better understand these trends, we are now able to produce a weekly/monthly Fleet/Equipment Maintenance Report that includes information for vehicle identification, technicians name, labor and material cost breakdowns, providing the capability to track monthly and annual progress of individual technician labor hours and material costs.





MONTHLY TOTALS: January 2011

Total Work Orders:	115
Total Labor Cost: (Includes Contracted Services)	$27,160.81
Total Material Cost:	$11,605.69
Total Equipment Cost:	$391.38
Total Cost:	$39,157.88

LABOR HOURS BREAKDOWN

NAME	HOURS	COST
FALLSCHEER, DALE	141.34	$5,143.23
NOTT, ISAAC	145.25	$5,070.41
VANDEWATER, TIM E	183.98	$7,221.14
Total:	470.57	$17,434.78

Percentage of Hours Per Mechanic

FALLSCHEER, DALE 30.0%
NOTT, ISAAC 30.9%
VANDEWATER, TIM E 39.1%
Total 100.0%

YEAR TO DATE TOTALS:

Total Work Orders:	152
Total Labor Cost: (Includes Contracted Services)	$30,899.46
Total Material Cost:	$15,131.19
Total Equipment Cost:	$452.42
Total Cost:	$46,483.07

LABOR HOURS BREAKDOWN

NAME	HOURS	COST
FALLSCHEER, DALE	197.25	$7,500.33
NOTT, ISAAC	205.51	$7,466.73
VANDEWATER, TIM E	217.50	$8,536.77
Total:	620.26	$23,503.83

Percentage of Hours Per Mechanic

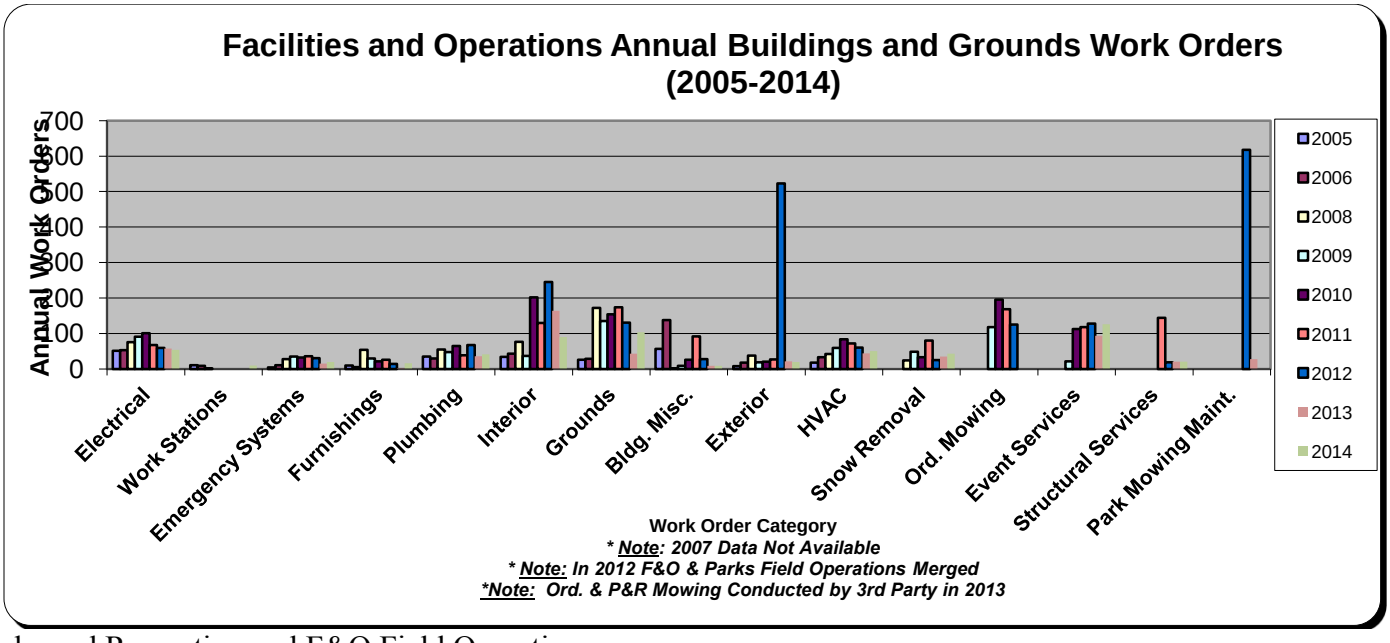
FALLSCHEER, DALE 31.8%
NOTT, ISAAC 33.1%
VANDEWATER, TIM E 35.1%
Total: 100.0%

Example of Monthly and Year to Date Mechanic Work Distribution

DPW Mechanics Isaac Nott, and Dale Fallscheer
(Not Pictured Inventory Clerk Heather Krupic).

The CMMS was developed and implemented in-house approximately six (6) years ago as the core program for operational activity related to equipment, grounds, buildings and bike paths work and cost tracking. The system is continually improved and updated to provide for quicker data entry, material costing, inventory control, scheduling and tracking of diverse work activities. Integration of F&O operations into the CMMS resulted in the entire DPW using the same platform and interface for work order scheduling and cost tracking saving thousands of dollars in development and annual software maintenance fees.

The graph below depicts a summary of work history in the branch since 2005. Please note that 2007 work order history is not available due to development of the new CMMS program.



Parks and Recreation and F&O Field Operations

In 2012 Parks & Recreation Facility Maintenance merged with the Facilities & Operations Division of the DPW. This change permitted greater flexibility with respect to services provided without duplication of efforts.

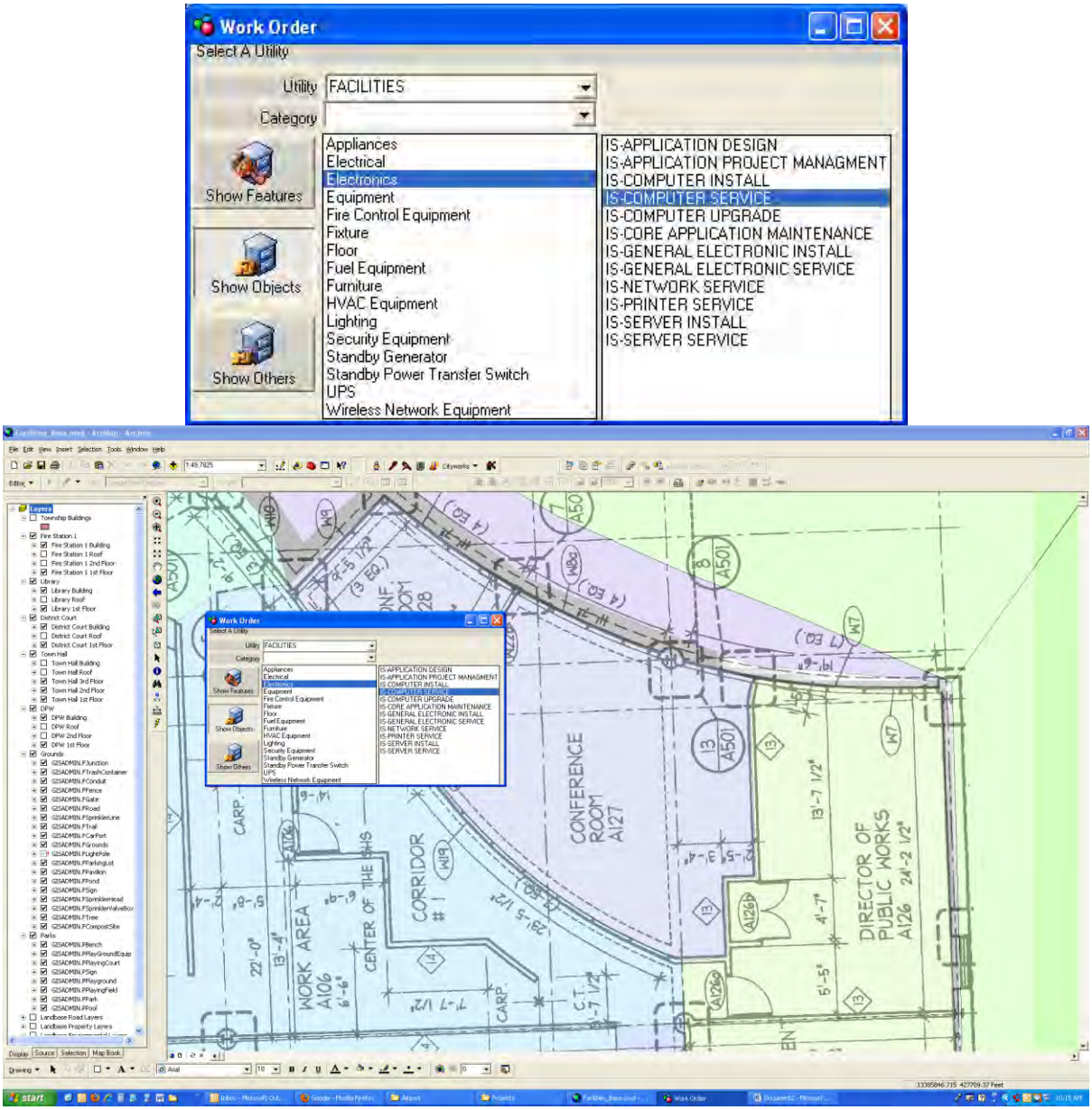
Additionally, with the restructuring of the Parks & Recreation and Facilities and Operations Departments closing of the Parks and Recreation building was possible in 2013 yielding additional cost savings for the Township.

F&O Employees (from left to right): Mike Poplawski, Todd Butler, Mike Kortekaas Ron Arnold, Ara Akkashian, Dave Papke, and Shane Solheim,

Mike Kortekaas and Todd Butler fix a salt spreader.

F&O Computerized Maintenance Management System (CMMS)

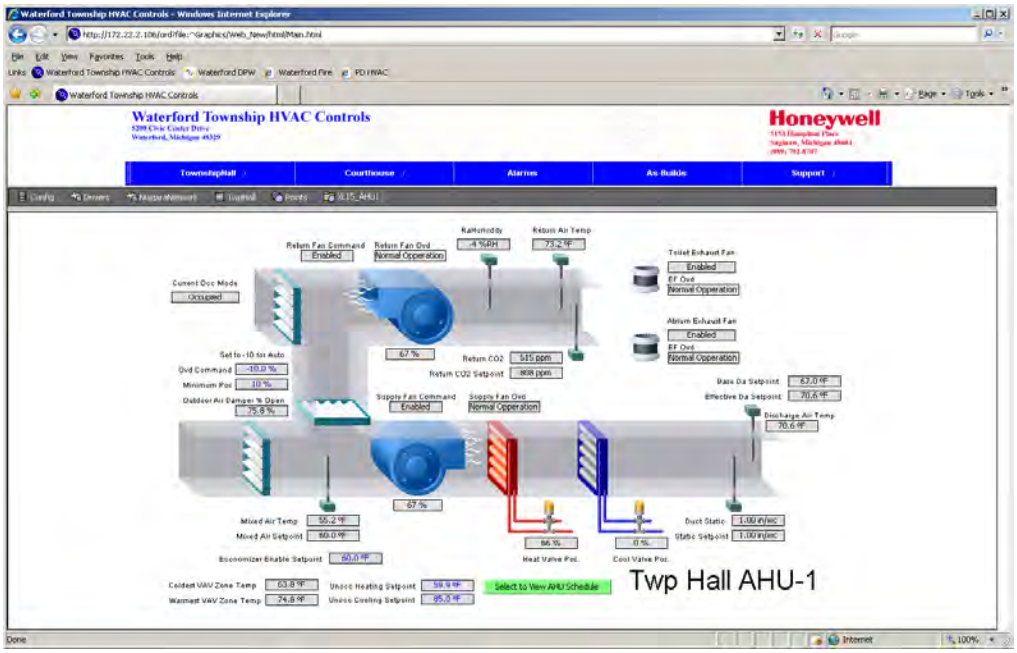
The F&O CMMS provides the means for routine maintenance and capital projects management. Both preventive and corrective maintenance activities are recorded to ensure that the Township's assets and facilities are maintained efficiently and to ensure that programs and services are never interrupted. As mentioned earlier, the system was developed in-house saving over $50,000 in software and license fees. The screen shots below depict a typical work order that has been spatially coded to a specific room in the DPW Building for a repair.



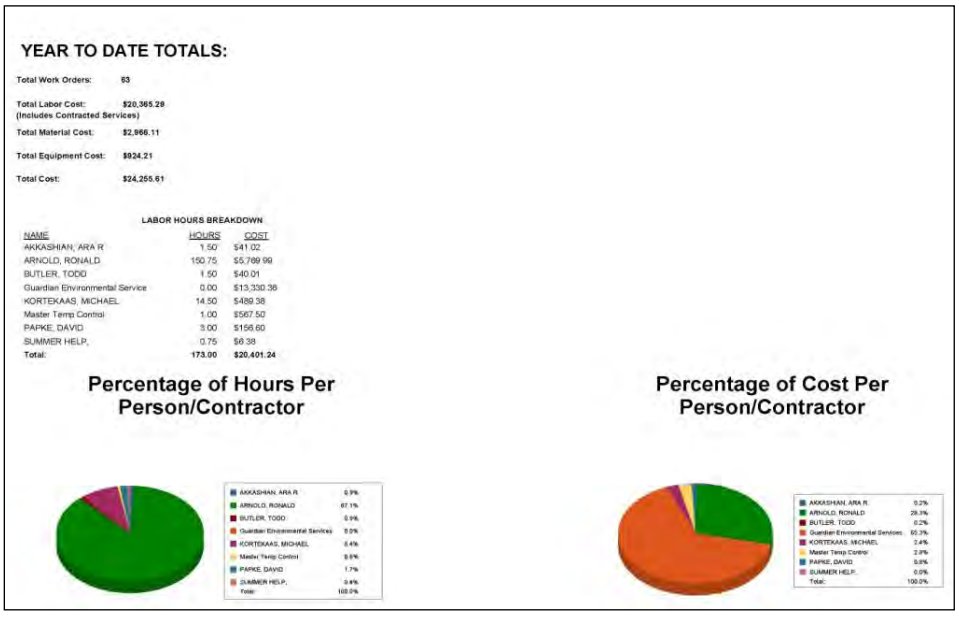
Building Work Order Generation within the CMMS System.

Building HVAC Control

F&O continues to monitor and improve building operations through the use of advanced computerized HVAC systems at Town Hall, Police Department, Fire Department and the DPW to monitor and control building temperatures and air flow. The systems also include email alarm notification and web based interfaces for remote access to analyze and correct problems. In 2010, monthly and annual HVAC operational reports that include repair, labor and other costs associated with HVAC operations was developed and generated from information contained within the CMMS. This information not only provides a cost summary to operate and maintain the HVAC systems, but also assists in identifying potential malfunctions and/or breakdowns before they happen.



Screen shot of one screen for the Townhall's HVAC Control System. This computerized system is utilized to ensure HVAC systems are working properly and energy consumption optimized.



YEAR TO DATE TOTALS:

Total Work Orders: 83

Total Labor Cost: $20,365.29
(Includes Contracted Services)

Total Material Cost: $2,966.11

Total Equipment Cost: $924.21

Total Cost: $24,255.61

LABOR HOURS BREAKDOWN

NAME	HOURS	COST
AKKASHIAN, ARA R	1.50	$41.02
ARNOLD, RONALD	150.75	$5,799.99
BUTLER, TODD	1.50	$40.01
Guardian Environmental Service	0.00	$13,330.38
KORTEKAAS, MICHAEL	14.50	$489.38
Master Temp Control	1.00	$567.50
PAPKE, DAVID	3.00	$156.60
SUMMER HELP,	0.75	$6.38
Total:	173.00	$20,401.24

Percentage of Hours Per Person/Contractor

Percentage of Cost Per Person/Contractor

Report from CMMS tracking total costs for HVAC Maintenance.

Cemetery Branch

The Cemetery Branch is responsible for the operation and maintenance of five Township cemeteries with varying degrees of burial availability. F&O conducts all of the burials, internments and grounds maintenance for the cemeteries. Two of the cemeteries are essentially full, resulting in diminished revenue, while annual maintenance liability and related expenses continue to increase. Through the CMMS program, the branch is able to accurately record and analyze burial, maintenance and cost data, which is used to determine actual cost of service so that rate structures can be incorporated to provide sufficient funds for operation.

Cemetery Name	Location
Crescent Hills	Civic Center Drive
Waterford Center	Corner of Airport Road and Pontiac Lake Road
Four Towns	Cooley Lake Road near Lochaven
Drayton Plains	Dixie Highway and Williams Lake Road
Waterford Village	Rockcroft off of Dixie Highway

Cemetery	Total Spaces	= Burials	+ Obstacle	+ Sold-Empty	+ Available	+ Unknown
Crescent Hills	6067	2996	111	1557	1221	24
Waterford Center	2089	1129	23	937	0	0
Drayton Plains	3463	1500	23	1235	702	3
Four Towns	658	341	11	306	0	0
Totals	12277	5966	168	4035	1923	27

* There are currently 158 gravesites that are not plotted in Crescent Hills Cemetery.

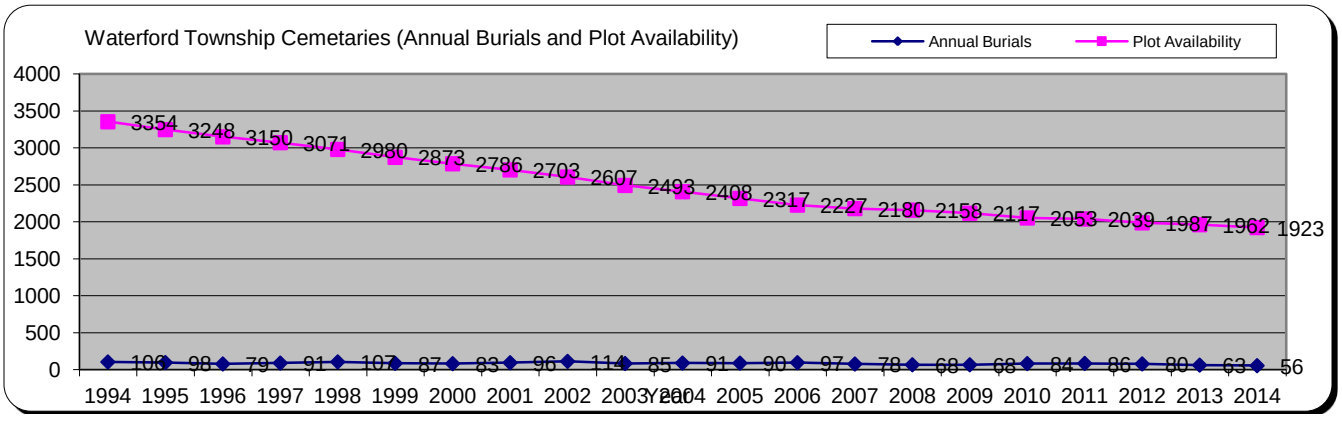
- Grave site status based on data from the DPW CMMS and GIS.
- Equipment costs based on M-Dot Schedule C.

Cemetery- Burial Trends

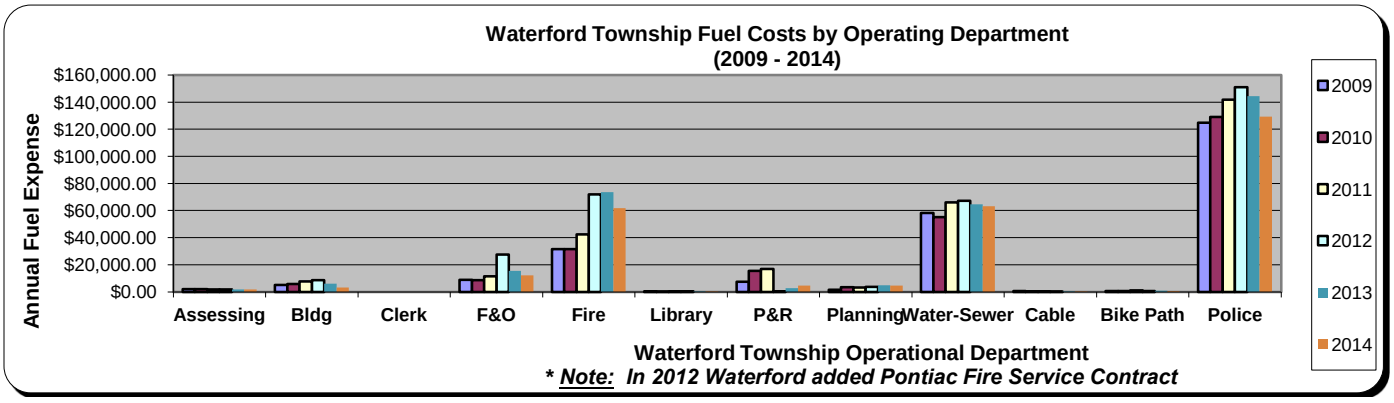
From 1994 to 2014, Waterford Cemeteries have averaged 86 burials per year. Holding all other contributing factors constant, current trend projections indicate that all 1,923 available plots will be completely utilized in the year 2036. This trend could escalate as the population continues to age.

In order to help address long term perpetual care of the cemeteries and to minimize General Fund obligations to cover these expenses, a Perpetual Care Fund was established in 2007. This fund will be used as a primary source of revenue for future cemetery operation and maintenance when all plots are sold in the future. A Perpetual Care Fund fee of $200 is collected at the time of each new lot sale.

The graph below depicts the average annual burials since 1994. The graph also demonstrates the declining availability in plots into the future.



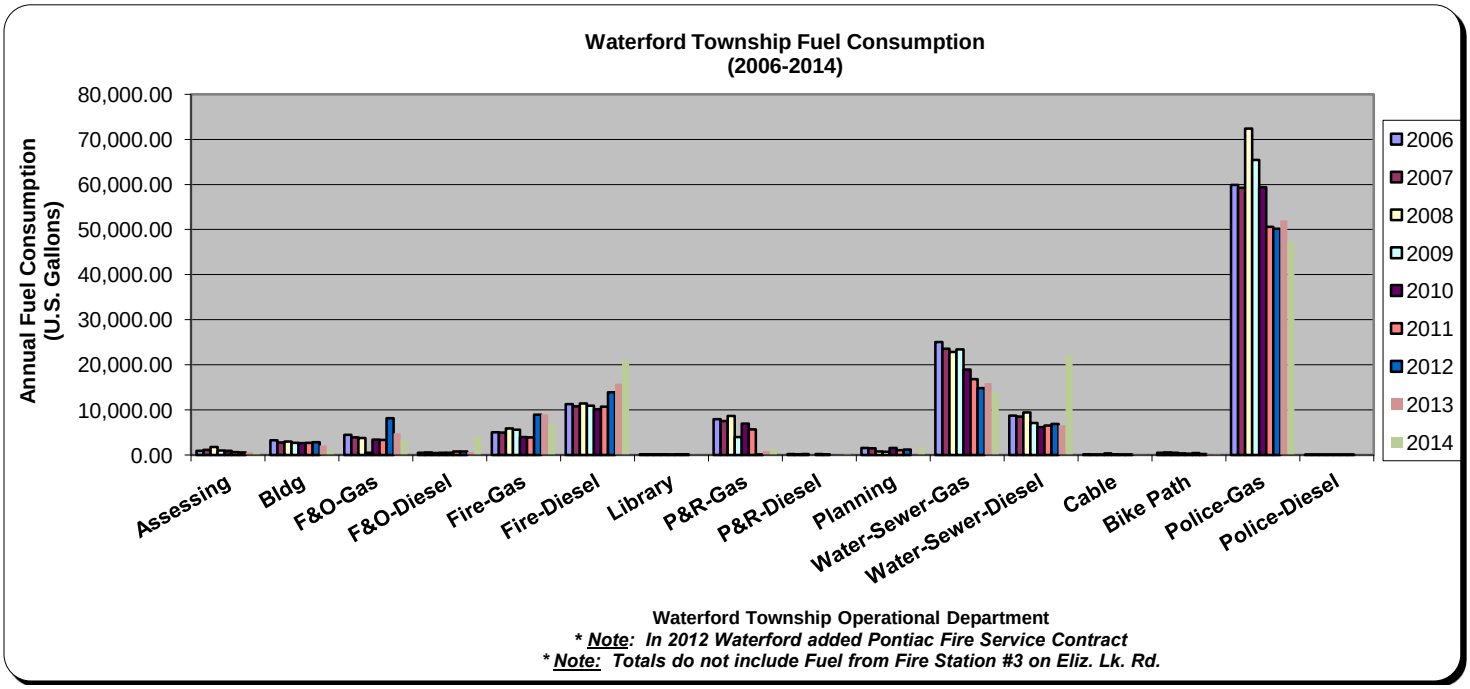
Fuel Island



F&O is also responsible for the operation and maintenance of the Township's Fuel Island. The Township's Fleet of over 250 vehicles obtain gasoline and highway-grade diesel 24 hours a day, seven days a week from the fuel island located on the DPW Compound. Every vehicle is issued a vehicle number and every driver is issued a number so that these products can be tracked to the vehicle and driver for appropriate Departmental billing and accounting purposes. In 2009 automatic integration of fuel island data, such as miles and fuel used, into the CMMS is used to facilitate automatic work order generation of vehicle and equipment service work orders. The graph below indicates the fuel consumption by year and department.

Annualized Fuel Statistics

In 2014, the Township spent $281,665.56 for gas and diesel fuel. On a blended (gas/diesel) annual basis, the Township averaged $2.27 per gallon in operational year 2014. The graph below depicts the petroleum product expenses per operational department for 2014.



Daily Fuel Analysis Report

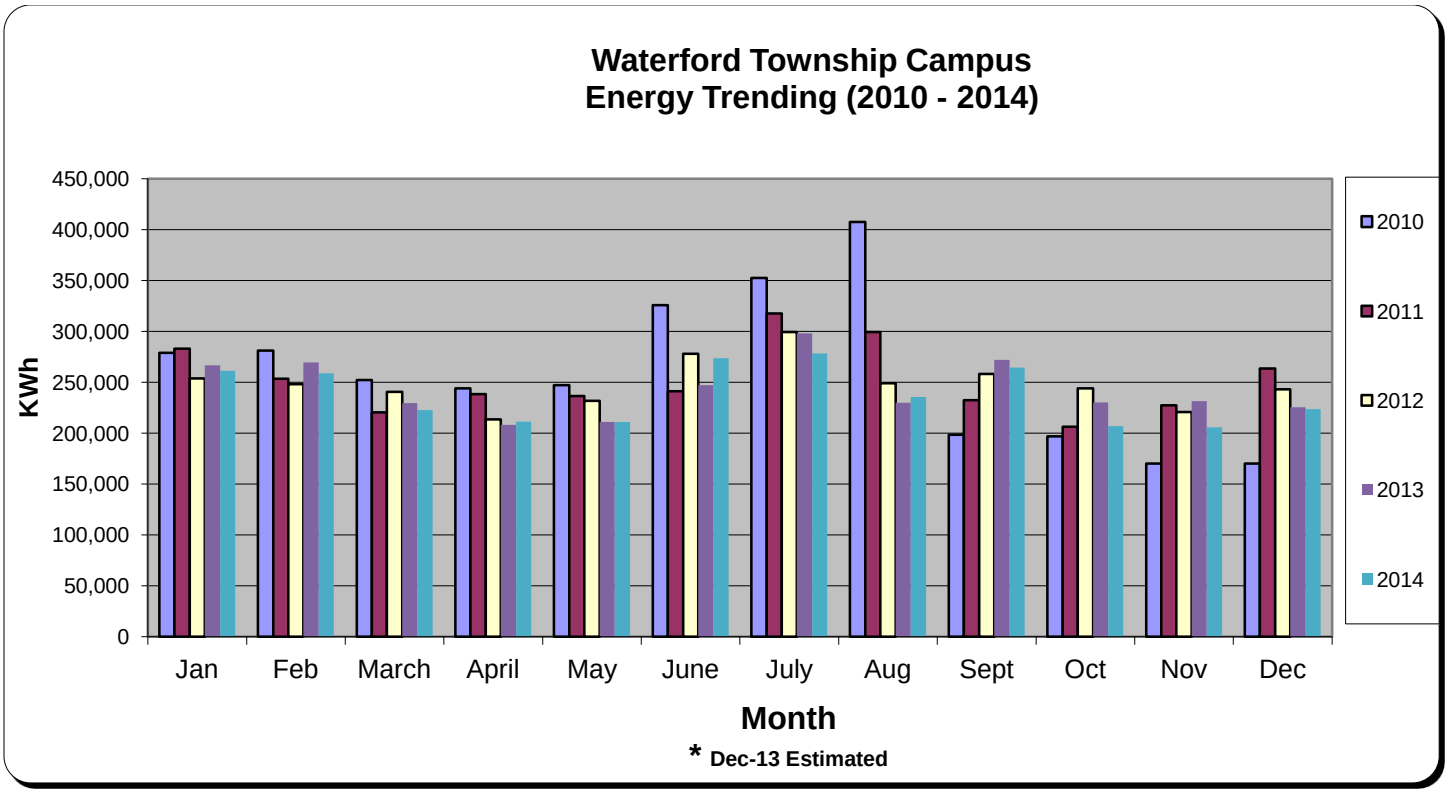
A detailed daily fuel consumption report that includes information on the operator, vehicle, fuel obtained and an estimated Miles Per Gallon (MPG) statistic is emailed daily to Department Heads. This information provides departmental information on fuel consumed and the resulting cost.

Energy Conservation and Efficiency

In 2011, the facilities branch installed motion controlled light sensors throughout Township Facilities reducing energy consumption and expense when not required. In addition, high energy consuming incandescent lamps were replaced with cost saving LED lamps, and cost reducing fluorescent lamps where applicable in the facilities. All Township campus outside lighting was also replaced with high efficiency LED lights.

Additional energy improvements consisted of boiler replacements at Town Hall and District Court. These units are smaller and compact and utilize the latest technology yielding greater output for less cost. Future monitoring of energy consumption will verify exact cost savings of these replacements.

In 2014 the Waterford Twp. Campus consumed 8.71% less energy than in 2010. In addition, the Twp. participates in an Electric Consortium. This arrangement permits the Township to have the most competitive energy rates available. The Twp. continues to strive for energy optimization and efficiencies.



Grounds Branch

F&O is also responsible for the grounds maintenance of Township properties including winter snow removal. The grounds crew works very hard to ensure campus roads and parking lots are clear for operation at all times. F&O Crews are also responsible for the maintenance of Township bike paths and other remote properties under Township control.

Snow Removal Equipment.

F&O Grounds Crew is responsible for Township Campus and other off-site snow removal.

Monteith School Demolition

Constructed in 1953, Monteith School was an elementary school in the Waterford School District until the 1980s, when it was purchased by the Township for use as the new Waterford Police Headquarters. The building served in this capacity until 2005 when it became the Waterford Parks & Recreation offices. In 2012 the Waterford Parks & Recreation department relocated to the third floor of the Township Hall in an effort to reduce operating costs. Due to the age of the structure and significant needs in terms of utility upgrades and other updates, the decision was made in 2014 to demolish the building. Waterford Facilities & Operations hired a consultant to perform an asbestos and hazardous materials survey of the building and to provide demolition plans & specifications. Asbestos was found in the building and the project was awarded to Ahern contracting. Demolition and remediation efforts began in late December of 2014 and are expected to be completed before Spring of 2015. The project is expected to save the township over $30,000 annually in maintenance and operating costs.

Monteith School in 2014 prior to demolition

Demolition underway of the main hallway

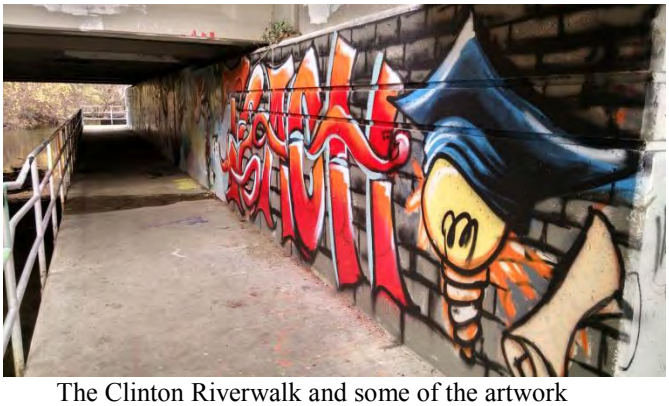
More demolition progress

More demolition progress

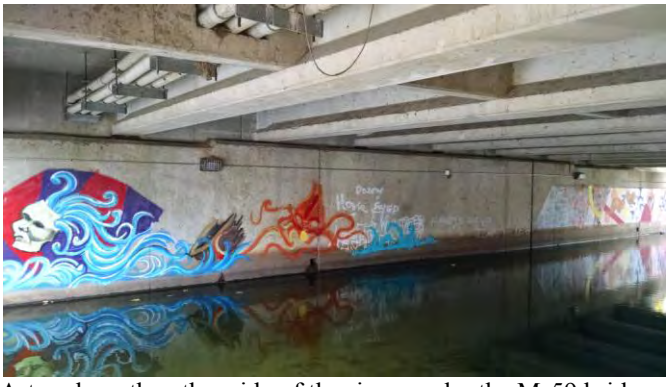
Clinton Riverwalk Safety Upgrades

The Clinton Riverwalk beneath M-59 has received a facelift. Local artists, working together with the Waterford Township Clerk's office and Michigan Department of Trasnportation, were given permission to paint artwork on the underside of the bridge beside the walkway.

To help preserve the artwork and prevent graffiti and vandalism, the DPW, Police Department, and Planning Department have coordinated efforts to have motion-activated LED lights and a security camera installed beneath the bridge.



The Clinton Riverwalk and some of the artwork



Artwork on the other side of the river, under the M-59 bridge

Artwork across the river, showing the new motion-activated LED lights and the security camera.