

is in addition to 60,484 lbs. of computers, TV's, and other electronics that were collected at the two DropOff events. Another 6,604 linear feet of fluorescent bulbs and 13,301 lbs of computers and electronics were collected from businesses at the April and October business recycling events.

Underground Storage Tank Removals

Three underground storage tanks at the McGrath and Marshall farms (Town-owned conservation land) were excavated and removed. The project went smoothly. There was no leakage or contamination.

Annual Right-to-Know & Hazardous Waste training

Annual Right-to-Know & Hazardous Waste training was conducted for CPW employees. The RTK training is required by the Mass. Division of Occupational Safety (DOS), and Hazardous Waste training is mandated by the EPA and MA DEP.

SPCC Training

Annual SPCC (Spill Prevention Control & Countermeasure) training was conducted for Highway and Water and Sewer crews. The training covered oil spill prevention and countermeasure protocol, including a review of CPW's SPCC plan. This annual training is required by the EPA.

DEP Sustainable Materials Recovery Program Grant

CPW submitted a grant application and was awarded a "reimbursement" grant of \$1,250 for the purchase of seven new wire-frame recycling bins, under the DEP's Sustainable Materials Recovery Grant Program

WATER AND SEWER DIVISION

Alan Cathcart,
Superintendent

In 1974 and 1976, Annual Town Meeting established separate Water and Sewer Enterprise Funds to ensure that the operation, maintenance and capital improvement of the water and sewer systems would be financially viable. Expenses incurred for each system are covered entirely by revenues generated by the activity. The Water and Sewer Division of Concord Public Works is responsible for managing the day-to-day operations of the water and sewer infrastructure. The total assets for each system are 18.5 million and 27.3 million dollars, respectively.

WATER SYSTEM

Concord was provided with legislative authority to establish a public water system in 1872. In 1874, water from Sandy Pond, Lincoln, began flowing through the original network of water mains to Concord Center. Today, the water system has grown to include both groundwater and surface water sources, a total of seven pumping stations, two treatment facilities, and a high pressure water main network of over 130 miles of pipe. Two covered storage reservoirs, located at Annursnac Hill and at Pine Hill in Lincoln provide total reserve capacity of 7.5 million gallons. There are presently 5,437 customers receiving potable water service and fire protection from this supply. This represents approximately 95% of Concord residents and businesses, together with a small number of Acton properties along Route 2A.

Water Use and Demand Management

The total water production used to meet residential, commercial, institutional and municipal needs was approximately 748 million gallons with an average daily demand of 2.12 million gallons. The peak day water demand occurred on July 6, registering 4.63 million gallons.

A simple comparison of total rainfall (54.81 inches) versus the mean annual rainfall measured over a period of 120 years (41.78) would not accurately capture the year we experienced. 2010 was a year of extremes with record flooding in March (16 inches of rain) followed by an unusually extended period of hot, dry weather. Even the most casual observers would marvel at the swelling of local rivers which overtopped their banks, inundating neighboring roadways and properties. No one could have imagined that by mid-August, the Massachusetts Drought Management Task Force would be issuing a drought advisory within the same impacted area, throughout the Northeastern and Central Regions of the State.

After several months of less than average rainfall, Concord's system experienced an unusually sudden spike in seasonal water demand. At the end of the long July 4 weekend, the Public Works Commission declared a State of Water Supply Conservation. In keeping with prior declarations, this was done because of mechanical/operational issues which resulted in a reduction in

pumping capacity during an extended period of peak day demand. As State of Massachusetts water resource management policies tighten up, we can expect regional triggers will call for similar declarations on a much more regular basis. Regardless of the driver behind the Declaration of State of Water Supply Conservation, the goal is to increase awareness and, ultimately, response to varying stages of Water Bans. Despite Concord Public Works' best effort to effectively communicate the need for increased water conservation this past summer, system wide demand remained relatively high. Staff are presently reviewing the outreach tools available, including electronic posting on the Town Website ("News and Notices"), the local cable network, strategically placed bill boards, door hangers and local newspapers to increase Departmental effectiveness.

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) continued to debate the merits of developing long-range water resource management goals with a renewed focus on integrated planning and allocation issues. Recently published studies conducted by United States Geological Society in partnership with EEA have helped inform this discussion. One of the more notable findings involves a strong correlation identified between the general health of individual watersheds (as defined by stream flow and fish habitat) and the percentage of impervious cover (pavement, rooftops etc.) within the same watershed. The magnitude of this problem is only just being realized and will certainly influence future water policy debates.

More directly, Concord Public Work's Water Division provided a written response to MassDEP's "5-Year [Water Management Act] Permit Review - Order to Complete." This submittal, a necessary pre-cursor to receiving a WMA permit required, for the first time, a considerable amount of information pertaining to Concord's water conservation and water resource protection programs.

Water Conservation Program Highlights

The Water Division continues to offer programs to support and encourage wise water use. We recognize that success and impact is not always easy to measure, however, as can be seen in the chart on page 58, customers are responding and real reductions have occurred. To those of you who continue to take heed and do

your part, thank you. On behalf of the Town, Concord Public Works was invited to the State House to receive MassDEP's Public Water Supplier Water Conservation Award for exhibiting "exemplary water conservation practices."



Melissa Simoncini, CPW water&sewer; Representative Cory Atkins; Alan Cathcart, CPW water & sewer; and Commissioner Laurie Burt

Despite the successes noted above, the greatest opportunity for significant water consumption savings involves seasonal and peak summer demands. As noted above, increasing regulatory pressure is being placed on communities across the Commonwealth to reduce unnecessary water consumption, primarily targeting outdoor water use in an effort to establish more sustainable water resources. Such regulatory pressure is mounting and Concord must be prepared. In preparation for pending water use restriction mandates, the Water Division will be retooling its seasonal water conservation message with support of residents, landscapers and local businesses. This effort will be partially supported by a \$30,000 water conservation grant recently awarded by MassDEP. This grant will also allow CPW to continue the low flow toilet rebate program, establish a new high efficiency clothes washer rebate program and perform water main leak detection activities.

To learn more about what can be done to save water and money, please visit the Town of Concord website (www.concordma.gov) and search for the Water and Sewer Division and water conservation programs. Additional information and opportunities can also be found through the Environmental Protection Agency national "watersense" initiative.

Water Quality

In accordance with Massachusetts Department of Environmental Protection regulations, all routine and non-routine water quality testing activities continue to demonstrate that the drinking water provided to customers satisfies State and Federal requirements imposed on public water systems. A summary of the water quality test results is available on the Town website, and the Annual Water Quality Report is sent to every customer each spring.

Seasonal water quality testing activities performed at Nagog Pond identified Chlorophyte algae at concentrations higher than typically observed during the summer months. Based on a literature review, such a proliferation is not uncommon for surface water bodies which are generally characterized as having high water quality and which have been subjected to flooding (March 2010). It is probable that elevated turbidity levels measured within the pond over much of the summer was attributed to this bloom.

Chlorine is the most widely used water disinfectant due to its effectiveness and cost. Using chlorine as a drinking water disinfectant has prevented millions of water borne diseases, such as typhoid, cholera, dysentery, and diarrhea. Most states require community water systems to use chlorination. However, research shows that chlorine has side effects. It reacts with organic matter present in water and forms a series of compounds that have been linked to cancer in animals. These compounds are called disinfection by-products (DBPs).

Concord continues to treat all of its potable water with chlorine and as such, conducts routine testing in accordance with EPA's Disinfection Byproduct Rule (DBPR). This past year, our DBPR sampling plan was revised to compliment other sampling activities performed within the distribution system.

Cross Connection Control Program

Another notable water quality protection initiative administered by the Water Division involves the Cross Connection Control Program (CCCP). A cross connection is a plumbing connection which exists between a non-drinking water substance and drinking water. Common examples of cross connections include fire protection services, commercial/industrial process water or less obvious connections such as irrigation sprinkler systems, hot tubs, etc. Customers are required to install specific devices to prevent water from flowing backwards to other plumbing fixtures after being exposed to potential contaminants as the result of a cross connection.

To assist in routine CCCP testing and reporting activities, the Division awarded a new three-year contract survey all commercial and industrial facilities to ensure plumbing or operational changes within individual facilities are appropriately identified and managed. This survey helped identify a total of 51 potential cross-connections within 30 different facilities. In accordance with our State-approved CCCP, violation notices were issued which included a directive and timetable for compliance.

ANNUAL WATER REPORT SUMMARY TABLE

Water Statistics	2010	2009	2008
Miles of Main	130	130.22	129.75
Hydrants	1,263	1,262	1,250
Main Pipe - New (linear feet)	N/A	2,491	1,080
Main Pipe - Replaced or Rehabilitated (lf)	2,262	1,908	3,600
Number of Service Accounts	5,448	5,437	5,436
Total Water Demand (million gal.)	748	676	707
Daily Average Demand (million gal.)	2.12	1.85	1.93
Peak Day Demand (million gal.)	4.63	3.00	3.47
Annual Precipitation (inches)	54.81	50.75	63.74
Mean Annual Precipitation (inches)	41	41	41
Residential Rate per Unit (unit = 748 gal.)			
Base Rate- Step 1	\$3.96	\$3.83	\$3.72
Conservation Rate – Step 2 (May 1 – Oct. 31)	\$7.76	\$7.51	\$7.06
Conservation Rate – Step 3 (May 1 – Oct. 31)	\$9.90	\$9.58	\$9.28
General Service Rate per Unit of 748 gallons			
Step 1 - (<50 Units)	\$3.96	\$3.83	\$3.72
Step 2 - (>50 Units)	\$5.03	\$4.86	\$4.62

The Town has established a residential component to its CCCP which includes general awareness/education via annual mailings of newsletters, information posted on the Town website, and materials included in water bill stuffers. The Town has also adopted a local in-ground irrigation system bylaw requiring registration of in-ground irrigation systems and installation of testable devices (reduced pressure zone) on all such systems. To date, over 600 in-ground irrigation system owners have registered with the Water Division.

While public education and registration of irrigation systems has met the minimum requirements of the State cross-connection control program, Concord has held back on implementing a more stringent residential program which would include inspections, testing and enforcement activities. To date, a lack of clear direction provided by MassDEP, the increased administrative resources required to advance such a program, and the significant cost and compliance challenges which would be placed on individual residential customers have prevented the Water Division from moving ahead with any such initiative. It is likely that within the next few years, MassDEP may require public water systems to become more aggressive in identifying and administering residential cross-connection programs.

Pumping Station Rehabilitation and Upgrades

Ongoing maintenance and inspection of all seven water production facilities and related treatment systems continue to be performed on a daily basis. Operations personnel continue to make system improvements to comply with Chemical Control Safety regulations which became enforceable as of July. In accordance with this initiative, continuous chlorine analyzers were installed at every water production facility and completed associated electrical retrofits to eliminate any potential risk of a treatment system overfeed.

A Phase II Inspection / Evaluation Report of the Nagog Pond concrete dam, spillway, and gate/control valves was completed. While the dam was reported to be stable, the assessment resulted in the following needs/recommendations: Concord must address concrete spalling/deterioration of dam structure, enhance the existing freeboard system, remove vegetation which has grown in the immediate vicinity of the dam structure to avert root damage, and the functional operation of the

associated gatehouse must be restored to allow for routine and emergency control. The estimated cost of this rehabilitation (or replacement) is \$450,000- \$655,000. A copy of the report was provided to the Office of Dam Safety and the executive summary of this report was submitted to MassDEP NERO.

Nagog Pond continues to be operated under a filtration waiver due to a comprehensive Watershed Protection Program and the high quality of the water. As noted previously, regulations promulgated by the United States Environmental Protection Agency, effective in 2013, will require the Town to provide additional protection against microbial contamination due largely to *Cryptosporidium* and *E.coli* in surface water supplies. In preparation for this new requirement, the Division awarded a contract to develop plans and specifications for the complete overhaul/replacement of the Rt. 2A Pump station. In addition to the replacement of many of the systems installed when the facility was placed on line over 60 years ago, the scope of work includes the addition of UV disinfection for compliance with Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) by 2013.

A contract was awarded to respond to a pump failure identified at the Robinson Well located off of Sudbury Rd. A 60 HP motor and an in-line check valve were replaced. The pump and pump column were removed, cleaned, and inspected with no notable problems identified. A new well level transducer was also installed.

The Water Division issued a request for proposals for engineering design services to inspect and develop preliminary design plans for the rehabilitation of both the Annursnac Hill and Pine Hill treated water storage tanks (including the addition of state of the art mixing systems); for the exploration and assessment of replacement well(s) at the Deaconess well site for the purpose of restoring the permitted safe yield; and for an evaluation of the performance of the tubular well field located at Hugh Cargill well. Well replacement activities have also been initiated under a separate contract at the White Pond well.

Water Main Rehabilitation and Extension Programs

1,512 ft. of water main along Whittemore St. was replaced. The project was coordinated with the Roads Program and included renewal of all water services to

the edge of the publicly-owned right-of-way and drainage improvements.

The Water Division installed approximately 750 feet of new water main along Farmers Cliff Rd. in concert with a culvert replacement project performed by the Highway Division. This section of new main was installed at this time to minimize disturbance of an environmentally sensitive area and in anticipation of a replacement project planned along the rest of Farmers Cliff Rd.

The Water/Sewer Division was informed of a significant water main break on a water main located along Rt 2A near Commerford Rd. The neighborhood and all Acton customers (serviced along Rt 2A between the town line and Rt 27) were without water. The Water Division operations crew isolated the break quickly and within 12-hours had restored service.

SEWER SYSTEM

Concord was provided with legislative authority to create a municipal sewer system in 1894. By early 1900 a small centralized collection system was constructed, carrying wastewater from Concord Center via a network of gravity mains to a collection chamber located at 141 Keyes Rd. where it was then pumped to a cluster of filter beds located approximately one mile away on fields located adjacent to Great Meadows. Over the years, service needs and treatment goals have evolved resulting in a series of collection system expansion initiatives and treatment system improvements. The present sewer system serves over 1,811 customers (35% of the community) and consists of 33 miles of collector mains (gravity and low pressure), two pumping stations and six neighborhood lift stations.

The record March rains and resulting flooding stressed the carrying capacity of the wastewater collection system (specifically in Concord Center), the Lowell Rd. Pumping station, and the Wastewater Treatment Facility (WWTP). Flows processed through the WWTP reached 4 million gallons per day, averaging over 2.4 million gallons per day for the entire month. During peak flooding periods, sustained flows entering the Lowell Rd. pump station exceeded the capacity of the pump station by as much as 1.4 million gallons per day triggering a need for controlled storm water/sanitary sewer release to the Sudbury River behind Keyes Rd.

Prior to initiating this controlled release, a number of businesses in Concord Center had reported sewer back-ups in their basements. MassDEP was informed of these conditions and had communicated that similar surcharging had been reported in a number of other communities across the region.

In May, William Wheeler (1851-1932), was recognized as the “Pioneer in the Creation of Concord’s Municipal Water, Sewerage and Electric Power Systems” at a 50th Anniversary, American Public Works Week Celebration held at the Wastewater Treatment Facility. This tribute to one of Concord’s own was held in concert with a formal unveiling of the recently rehabilitated Wastewater Treatment Plant as well as the annual 8th grade facility tour.

Pumping Station Rehabilitation and Removal

Rehabilitation of the Laurel and Pilgrim Rd sewer ejector stations, two of the four original neighborhood lift stations was completed. The upgrade included the installation of emergency bypass piping systems and reconditioning of the subsurface chambers along with the integration of newer, more efficient and operator friendly submersible pumping systems. Park Lane and Gifford Lane stations are of a similar vintage and are slated for similar upgrades in the near future.

Sewer Main Extension and Rehabilitation Programs

The Water and Sewer Division continued normal daily activities in the sewer system. No new mains were installed and no major rehabilitation was undertaken.

Infiltration and Inflow Inspection and Rehabilitation

Concord Public Works has an ongoing program to investigate and eliminate infiltration and inflow (I/I) from the Town sewer system. Inflow refers to rainwater that enters the sewer system via connections to storm drainage systems (e.g., catch basins, roof gutters, or sump pumps tied into sanitary sewer pipes). Infiltration refers to water which seeps into cracks or leaks in the sanitary sewer system. The goal of this program is to increase available capacity to serve the needs of our community while decreasing the amount of clear water unnecessarily treated at the municipal wastewater treatment plant.

A contractor is working with Water and Sewer staff to develop a sewer collection system model which, when completed, will assist in ongoing inflow/infiltration

analysis and highlight collection system carrying capacity constraints and needs. Work completed this past year included infrastructure data verification of the existing wastewater collection system. The next phase of work will be to add historic flow data from individual pumping stations to allow for final calibration.

Wastewater Treatment Plant Operations & Facilities Improvements

Woodard & Curran, Inc. continues to operate the Town's Wastewater Treatment Plant (WWTP), located off of Bedford St., under the supervision of the Water and Sewer Division. The plant maintains excellent compliance with its regulatory requirements, in accordance with state and federally issued permits.

Water/Sewer Division System Maintainers serve on a monthly rotation in support of day-to-day operations at the WWTP. This arrangement, whereby the Town is providing one of its own operators to assist Woodard & Curran in expanded duties which resulted from the recent facility upgrade (ultimately driven by State and federal permit conditions) continues to be a positive and creative cost savings measure for the sewer fund.

Both secondary clarifiers were taken off-line, drained, cleaned, and visually inspected. Apart from needing normal preventative maintenance, Unit #2 appeared to be in good condition. Unit #1 is in poorer condition and will require more extensive work on the rake arm assembly at a later date. A scope of work will be developed for bidding purposes.

The National Pollutant Discharge Elimination System (NPDES) permit is reviewed and reissued by both the State and federal government once every five years. The

first step in this process is the completion of a request for information. A draft permit including flow and loading (nutrient) limits, established in accordance with the Clean Water Act is forthcoming. As the cost of treatment is directly tied to these limits, and these limits generally get more stringent over time, the final permit is typically negotiated between the impacted communities and the issuing authority (EPA and DEP).

Wastewater Planning

The community continues to have a high level of interest in wastewater planning. The Wastewater Planning Task Force has undertaken an evaluation of wastewater treatment and capacity management alternatives to accommodate wastewater flows above and beyond those flows necessary to meet existing requirements and obligations resulting from development and re-development under current zoning.

A contract was awarded to perform technical support services required to develop a Wastewater Capacity Alternatives Analysis. Coordination meetings between CPW staff and the consultant continue. A wastewater management alternatives evaluation matrix has been developed as a guidance tool which will allow for a comprehensive and objective comparison of all likely management alternatives with specific consideration of the following key factors; economic, environmental, feasibility, public acceptance, regulatory, and timing. Once reviewed and accepted by the Wastewater Task Force, this matrix will be populated for likely "conceptual" approaches. The matrix will be designed to stay current and allow for repopulation of data given site specific information when such information is made available.

ANNUAL SEWER REPORT SUMMARY

Sewer Statistics	2010	2009	2008
<u>Assabet Pumping Station</u>			
Total Pumped (million gallons)	96.06	87.92	98.44
Monthly Average (million gallons)	8.00	7.33	8.2
Daily Average (million gallons)	0.26	0.24	0.27
<u>Lowell Road Pumping Station</u>			
Total Pumped (million gallons)	363.48	340.88	387.80
Monthly Average (million gallons)	30.29	28.41	32.32
Daily Average (million gallons)	1.00	0.93	1.06
<u>Collection System</u>			
Number of Service Accounts	1,811	1,804	1,780
Miles of Sewer Main	33.36	33.36	33.36
Main Pipe Inspected (lf.)	2,257	11,123	6,340
Main Pipe Rehabilitated (lf.)	0	832	0
Rate per Unit (unit = 748 gallons)	\$8.76	\$8.35	\$7.95