

CONCORD PUBLIC WORKS

PUBLIC WORKS COMMISSION



From left: Peter Wallis, Andrew Boardman, Arthur Fulman, Chair; Toby Kramer, Nick Pappas.

The Public Works Commission acts as the Town Road, Water and Sewer Commissioners, and advises the Public Works Director in the Department's efforts to maintain and protect the Town's public works, utility and solid waste/recycling services. The Commission advises Town Meeting, the Town Manager, Planning Board and other Town officials and boards on matters that concern Town water and sewer service, drainage and roads. The Commission is responsible for setting policy and rate schedules for water, sewer and solid waste services; for acting as an appeals board for right-of-way permits and water and sewer bills; and for approving minimum standards for the final layout of Town roads.

The Commission provides a forum for review of water, sewer and solid waste rates, the annual roads and sidewalk program, public street layout, and water and sewer extensions.

The ongoing activities of the Commission can be found online at www.concordma.gov.

Highlights of the Commission's activities for 2015 included (in chronological order):

- Conducted a public hearing and approved revised curbside collection and disposal rates.

- Conducted a review and granted an appeal to Millbrook Tarry Condominium Assoc. located at 97-107 Lowell Rd. of a Water and Sewer Division denial of a sewer review request for an increase in Title 5 sewer flow of 1,428 gallons per day to accommodate 45 additional seats at the Trails End Café subject to the applicant receiving all other necessary permits and approvals and payment of the assessed Sewer Improvement Fee.
- Issued an official commendation to the Town of Concord Snow Fighting Team for their tireless efforts to make the streets and sidewalks of the Town of Concord safe for its residents and visitors during the record breaking blizzard and numerous additional snow events in 2015.
- Conducted a public information meeting to discuss the Main St. sidewalk project, which was a public/private partnership involving the Town of Concord and Concord Academy.
- Conducted a meeting and accepted a drainage easement granted by The Middlesex School to the Town of Concord, as required as part of a culvert reconstruction and drainage improvement project on Lowell Rd. and Westford Rd. This public/private partnership included a grant that was successfully secured from FEMA/MEMA representing 75% of the project cost.
- Conducted a public hearing for the Right-of-Way and Driveway Moratorium and Fee Structure, that was officially approved and granted.
- Conducted a Roads Program Briefing followed by a formal public hearing discussing the 2015/2016 Roads Program.
- Discussed Town Meeting preparations for items on the consent calendar including the Roads Program, Road Repair Revolving Fund Expenditures, Solid Waste Disposal Fund Expenditures, Sewer System Expenditures, Sewer Improvement Fund Expenditures and Water System Expenditures. The Commission had a discussion and decided not to take a position on the following articles:

Resolution to Ban Artificial Turf use on Publicly Owned Lands in Concord, Clean Water Resolution (Discontinuing the fluoridation of Concord's drinking water) and the Plastic Bag Reduction Bylaw. The Commission discussed and recommended affirmative action on the following articles: Authorization of Long Term Lease for Municipal Building Rooftop and Ground Mounted Solar Panels, Rideout and Emerson Playground Improvements, Parking Management Plan Implementation and the Special Town Meeting – W.R. Grace Land – 214Y Main St.

- Granted a waiver from a “property frontage” requirement as codified in Concord Public Works Sewer Rules and Regulations, Service Connection Policy, to Waterford Development Corp., owner of a 6.74 acre parcel of land identified as 320 Baker Avenue.
- Conducted the Water and Sewer Rate public hearing and approved the 2015 rate schedule.
- Conducted a Public Information Meeting regarding the Nagog Pond Water Supply Water Treatment and Solar Facility.
- Granted a water main extension waiver for 53 Independence Rd.
- Participated in a CPW winter maintenance discussion.
- Discussed the Plastic Bag Reduction Bylaw enforcement.
- Conducted a meeting and provided support for the CPA Application for Sleepy Hollow Cemetery Improvements.
- Conducted a meeting and voted to approve the Traffic Management Group's Crosswalk and Convex Mirror Policy.
- The Commission and Department continued their efforts to incorporate the Town's sustainability principles in its design and construction of Town infrastructure. Examples include: the Thoreau Street Pocket Park; the use of the Envision™ infrastructure sustainability rating system for large scale public works projects; the design of large scale solar facility within the Nagog Pond

water filtration project; multiple stormwater bio-retention areas designed and constructed as part of Road Program stormwater management strategies; the procurement of asphalt recycler/hot box for reuse and recycling of pavement millings; and the sponsorship of unwanted medication drop-off program.

The Commission and Concord Public Works continue to focus on their joint goal of promoting greater community involvement in Concord Public Works projects and programs. This deliberate strategy has resulted in greater responsiveness to all stakeholders and positive project outcomes. Examples of these efforts include neighborhood on-site meetings for large infrastructure improvement projects, and outreach meetings for the Roads Program. In addition, the Director continues to review the activities of Concord Public Works through the monthly Director's report and the Public Works Commission sets aside time for public comment during each meeting.

CEMETERY COMMITTEE

K.C. Winslow, Chair
 Paul Cooke, Vice Chair
 Carol Harney
 Andrea Solomom
 Gina Nasson

Concord cemeteries provide not only a place of burial for current and former residents of Concord, but a place for family, friends, tourists and historians to remember, reflect upon and learn from our predecessors. Caring for and maintaining these grounds is of utmost importance and many efforts were made this year to improve the general appearance as well as provide better access for all who visit.

An ongoing effort to maintain our many historic stone walls and public roads continued. CPW conducted an in-depth analysis to address and identify the long and short term maintenance requirements at Sleepy Hollow. In October, CPW submitted an application to the Community Preservation Committee (CPC) to request funding consideration for the restoration of stonewalls and roadways in Sleepy Hollow Cemetery. The proposed improvements will provide roadways and stonewalls that will protect and preserve the cemetery for many years to come. In December,

the CPC finalized their recommendation which will be brought to the 2016 Annual Town Meeting and allocates \$225,000 of Community Preservation Act funding to address infrastructure preservation at Sleepy Hollow.

Veterans Day ceremonies were once again held at Sleepy Hollow honoring all those interred here, as well as Concord's service members who never returned.

Statistics

There were 76 interments at Sleepy Hollow Cemetery, 35 were full burials and 41 were cremations. Of the interments, 26 were Concord residents. Lot sales for the year totaled 61, with 22 of these being sold to eligible former residents.

Friends of Sleepy Hollow

The Friends of Sleepy Hollow is a private, non-profit organization whose purpose is to promote the preservation, beautification and appreciation of the historic burial grounds in Concord. Additional information can be found at www.friendsofsleepyhollow.org.

This year, the Friend's generously funded five new professionally designed and constructed welcome signs at each of the Sleepy Hollow entrances. The signs include a removable plaque that can be updated should our regulations change. The signs were installed in December.

Also funded by the Friends this year, was the professional cleaning of one granite and two marble headstones that were heavily weathered and mostly illegible. The cleaning improved color and legibility.

ADMINISTRATION

Richard K. Reine, M.S.C.E., PWLF,
Director

The Concord Public Works Team continues to focus on its principal mission to enhance the quality of life for those living, working or visiting the Town of Concord, and through sound management, communication, leadership, innovation, teamwork and vision provide dependable, high quality, responsive public works and utility services consistent with community values and at reasonable costs to Concord's citizens, businesses, institutions and visitors for today and into the future.

Protecting Infrastructure / Providing Essential Services

CPW is comprised of four divisions. These include two staff divisions, (Administration (including Recycling and Solid Waste Management) and Engineering) and two line Divisions (Highway, Grounds & Cemetery and the Water & Sewer Division). CPW is responsible for planning and managing a large segment of the Town's infrastructure.

The infrastructure includes Concord's roads and roadsides; curbs and sidewalks; catch basins, storm drains, culverts and outfalls; traffic islands; guardrails; street signs and traffic signals; public shade trees and park trees; Town parks, common areas, playgrounds, ball fields, and recreation equipment; Town cemeteries; the Town's compost site and closed landfill (including the earth products and snow storage facility); the public water supply including its storage, pumping, and distribution systems; the Town's sewer collection, pumping, and treatment systems; and CPW buildings and equipment.

Delivering key services including water service; sewer service; recycling, curbside trash collection and disposal services; yard waste disposal; and winter snow and ice management along with other storm and safety services is also a core responsibility of CPW.

Keys to Organizational Excellence

CPW's strategy for success in meeting its goals relies on the principles of ingenuity, fact-based problem solving, accountability, safety and environmental stewardship, context sensitivity, respect and integrity, diversity, customer satisfaction, empowerment, communication and continuous improvement. These key principles along with the experience and dedication of the CPW team leads to organizational excellence.

CPW Team, Programs & Organization

CPW is made up of 55 dedicated individuals with a wealth of experience. It is a team that is passionate about Concord, which takes great pride in their work and fully understands their stewardship responsibilities.

The four CPW divisions manage eight programs - Administration, Engineering, Highway, Grounds, Cemetery, Recycling and Waste Management, Water, and Sewer. Two of the programs - Water and Sewer

er are totally supported by user fees while two other programs - Recycling and Waste Management, and Cemetery - are primarily funded from fees.

Infrastructure Improvements and Initiatives

The divisional reports that follow summarize a series of initiatives and notable accomplishments in 2015.

- The continued targeted roadway and sidewalk maintenance and management program resulted in the internal design and scheduled construction of approximately 3.51 miles of roadway and 1.20 miles of sidewalk improvements. This work also included the improvement of 33 curb ramps.
- Multiple improvements to the Town's drainage system were constructed; this included the replacement/installation of 18 drainage structures, installation of 400 feet of drain pipe and 2,800 linear feet of underdrain. The 97 Thoreau Street Pocket Park sustainable infrastructure demonstration project was completed. The Fitchburg Turnpike Culvert replacement was completed, while the Westford Road Culvert Replacement project was designed and bid, with construction to be completed in 2016. CPW successfully obtained Federal funding towards the work required for both of these culvert projects.
- EPA/NPDES MS4 Permit – The Permit Year 12 annual reporting to the Environmental Protection Agency was completed. Review and comments were completed for the Draft 2014 MS4 Permit by the February 27, 2015 deadline.
- Park and Tree Staff, under the direction of the Tree Warden, planted over 39 public shade and park trees as well as streetscape trees. 136 potentially hazardous trees were removed.
- Highway and Grounds Division Staff continued their expert maintenance of almost 50 acres of athletic fields for use by baseball, softball, soccer, lacrosse and other programs.
- Record breaking snow amounting to 99.5 inches challenged CPW crews who persisted in their significant efforts that included 66 responses for winter maintenance. Ten storms required mobilization for snow removal in the commercial and downtown areas seven times.

- The DropOff SwapOff events held in May and October that included unwanted medication and Sharps collection were well attended.
- Continued Water conservation rebate program for high efficiency clothes washers and toilets.
- Environmental Partners Group (EPG) completed the 25% design of a full scale water treatment facility planned for the Nagog Pond water supply. Full scale design for the replacement of the original cast-iron raw water intake pipeline is also planned.
- Numerous water main extension and replacement projects were undertaken including Deacon Haynes Rd., Hunters Ridge Rd., Bolton St. and the Black Birch residential development.

CPW Leadership and Innovation

Mass. Department of Environmental Protection's Drinking Water group presented CPW Water Division with its "2015 Source Protection Award" as part of its annual Public Water System Awards Program.

Learning and Growth

With the ever-increasing complexity of public works operations, the need for professional development of employees continues to play an important role in the Department. CPW is committed to providing its employees with opportunities to increase skills while endeavoring to make certain our team is comprised of motivated, informed and inspired team members who can utilize this knowledge for the benefit of Concord.

Safety

CPW's Safety Team worked with Mike Wallace of the Fire Department to develop a Confined Space Plan including training and the purchase of equipment for CPW Water/Sewer team. First Aid and CPR/AED training was conducted for all interested CPW employees. Planning for the initiation of a Pure Safety online training program began. This included setting up accounts for all CPW employees and working with the IT Department to establish kiosks for use by employees without computer access. Courses were selected and reviewed for future training.

Public Works Week – Middle School Event

CPW celebrated National Public Works Week on June 3 with the 8th grade class from Concord Middle

School for the eighth consecutive year. The theme was “Community Begins Here”. The entire public works team worked with Anna Trout, CPW Administrative and Special Projects Coordinator, and Doug Shattuck, Applied Technology Teacher, to showcase the importance of public works. Events included storm water system maintenance, stormwater and water quality, recycling/reuse opportunities, a tour of the Wastewater Treatment Plant, best management practice for turf grass and presentations of stormwater pollution prevention videos created by the students.

Personnel

CPW appreciates the contributions made by the following employees who moved on from their positions within the department. These include Dick Fowler (Highway & Grounds Superintendent), Hardik Ravai (Public Works Engineer-Water), Rick Winchester (Water/Sewer System Maintainer), Lisa Scruton (Administrative Assistant) and Tony Donlon (Highway Equipment Operator).

We were happy to welcome Dan Rowley (Highway & Grounds Superintendent), Nate Chin (Assistant Public Works Engineer) and Steve Barter (Park & Tree Specialist).

ENGINEERING DIVISION

William, J. Renault, P.E.,
Town Engineer

The CPW Engineering Division is responsible for the planning, design, engineering and construction of the Town road, sidewalk, bridge, and stormwater/drainage infrastructure assets. The Division provides a wide range of professional engineering and construction management services for CPW and other Town Departments and Boards.

Roads Program

There are approximately 107 miles of public roads, classified as arterial roads, collector roads and local streets. Arterial roads provide movement between collector roads, other arterial roads and major highways and make-up approximately 34% of Concord’s public roads. Collector roads, used primarily to connect local streets to other collector and arterial roads, make-up approximately 7% of Concord’s public roads, and the remaining 59% of public roads consist of local streets.

Concord’s pavement management strategy and 20-year Roads Program emphasize adequate capital investment in the roadway network combined with preventive and routine maintenance activities to prolong the pavement life cycle. Capital roadway improvements typically include the reclamation, mill and overlay and overlay pavement treatments. The reclamation treatment pulverizes the roadway’s pavement, regrades the new subgrade material and installs two new layers of hot mix asphalt pavement. A mill and overlay treatment cold planes off the top wearing course of pavement and a new pavement layer is installed over the grooved pavement. An overlay treatment is a thin asphalt layer installed over an existing roadway.

A condition survey of the Town’s roadway network is performed every four years and entered into the Town’s roads program software; this survey was most recently completed within the 2014 calendar year. The software utilizes the pavement condition data, estimated traffic volumes and treatment cost to recommend pavement improvement projects; the Engineering Division then utilizes this software output, engineering judgment and planned utility improvements to finalize the year’s roads program.

Maintenance activities are also used to preserve the integrity of the existing road structures while reducing the need for the more costly rehabilitation treatments. Crack sealing is utilized as the primary preventative maintenance activity, while full depth patching and infrared spot repair are used as the primary routine maintenance activities by CPW.

3.51 Miles of Roads Improved

The Engineering Division completed the development of internal design for two bids for the 2015/16 Roads Program. In total the projects improved 3.51 miles of Concord’s roadways. The Phase I Roads Program bid included 2.10 miles of reclaim treatment on Deacon Haynes Rd. and the Southfield/Riverdale neighborhood. The Phase I bid included 0.32 miles of mill and overlay treatment on Fitchburg Tpke. The Phase I bid was coordinated with the CPW Water and Sewer Division to incorporate a water main replacement design for Deacon Haynes Rd.

The Town received additional State aid transportation funding through the Winter Road Assistance Program (WRAP). Portions of the funds were targeted towards the rehabilitation of Conant St., from Main St. to Laws Brook Rd. The project was designed internally and added as a change order to the 2015/16 Roads Program Phase I contract. The Conant St. rehabilitation included 0.40 miles of mill and overlay treatment.

The second roads program bid of 2015 included 0.69 miles of reclaim treatment for Hunters Ridge Rd. The project included internally designed sidewalk replacement and was coordinated with the CPW Water and Sewer Division to incorporate a water main replacement. The bid incorporated drainage improvements on Thoreau Ct.

16.04 Miles of Roads Maintained

CPW implemented a robust roadway maintenance program for 2015 due to the harsh conditions of the 2014/15 winter. A combination of contracted pavement patching, in-house full depth patching, contracted infrared repair and crack sealing were used with the roadway maintenance program. 2.24 miles of roadway were patched by the roads program contractor through a change order to the 2015/16 Phase I Roads Program bid. The work included mill and pave patching for portions of Monument St., Sudbury Rd., Main St., Wheeler Rd. and Old Marlboro Rd. The CPW Highway Division completed extensive full depth patching and pothole repair for approximately 1.0 miles on Cambridge Tpke. CPW completed 3.5 miles of infrared pavement repair on Lowell Rd., Lexington Rd., Main St., Elsinore St., Monument St., Kenny Dunn Sq., Church St. and Cottage St. The infrared repair process recycles the existing pavement by heating up the distressed area, adding a pavement rejuvenator and rolling the heated pavement in place.

CPW completed its annual crack sealing bid in the fall of 2015. The crack seal program selected 9.3 miles of roadway to be treated with a hot-poured asphalt fiber compound, specifically designed to improve the strength and performance of asphalt pavements and extend the life expectancy of the road. The project work is scheduled to begin spring of 2016. The roads selected for treatment include: Main St. (from Mon-

ument Sq. to Thoreau St. & Main St. from Rt. 2 to Old Stow Rd.), Sudbury Rd. (from Main St. to the railroad tracks), Walden St., Plainfield Rd., Old Stow Rd. and Hillside Ave.

Cambridge Turnpike Improvement Project

The Cambridge Turnpike Improvement Project (CTIP) proposes to construct roadway improvements to address a major flooding issue which causes frequent closure of the roadway in heavier rain events. The Town views this as an important opportunity to design and construct improvements to the roadway and other public infrastructure to enhance the experience of the people who use the area. To the extent that is feasible, a project objective will be to integrate several modes of transportation in an aesthetically pleasing manner that complements the community's character and is sensitive to the nearby environmental and historical resources that Concord residents value and enjoy. CPW initiated a significant public outreach program for the project to provide the residents with multiple input opportunities as the project's design is advanced.

The Engineering Division continued consultant management and technical engineering guidance for the preliminary design and preliminary permitting efforts for this complex infrastructure improvement project. Major accomplishments in 2015 included FEMA approval for the Letter of Map Revision (LOMR) for the upper Mill Brook watershed (from Main St. to Crosby Dam). The LOMR lowered the 100 year flood plain elevation between 3.5' - 4.5' within the watershed, which will reduce the complexity of the permitting process for the CTIP and provide flood insurance relief for many residents within the watershed that were erroneously included in the flood insurance program. The effective date of the LOMR was August 14, 2015.

Sidewalk/ADA Compliance Program

Concord's sidewalk management strategy emphasizes adequate capital investment in repair to the existing sidewalk network to maintain and/or improve the pedestrian experience for all sidewalk users. The sidewalk budget funds ADA compliance maintenance activities and upgrades to the sidewalk network including pedestrian access routes and curb ramps. The sidewalk

network contains approximately 59 miles of public sidewalks and approximately 876 curb ramps. A condition survey of the sidewalks is performed every four years in conjunction with the roadway condition survey. A Town-wide curb ramp inventory and condition assessment was completed in 2011. The inventories and conditions are updated annually based on repairs, reconstructions or installation of new ramps.

Sidewalks and curb ramp projects are prioritized for repair based on their proximity to high pedestrian generators, overall condition and compliance with current ADA accessibility standards. Sidewalk and curb ramp reconstructions are bid as stand-alone projects included within the roads program bid or completed as internal projects by the Highway Division.

1.20 Miles of Sidewalk and 33 Curb Ramps Improved
The Engineering Division incorporated sidewalk and curb ramp improvements into four bids. The Main Street Sidewalk Improvement Project installed 0.43 miles of new cement concrete sidewalk and upgraded 11 curb ramps from Keyes Rd. to Nashawtuc Rd. The Thoreau Street Pocket Park Project bid included a privately-funded stone dust sidewalk expansion on Walden St. and replaced/constructed 410 feet of sidewalk and installed 7 curb ramps. The 2015/16

Roads Program – Phase I bid incorporated 2 curb ramp improvements on Deacon Haynes Rd. Lastly, the 2015/16 Roads Program – Phase II bid included 0.69 miles of bituminous sidewalk replacement and two curb ramps on Hunters Ridge Rd. The Hunters Ridge Rd improvements will be constructed in the spring of 2016.

33 curb ramps were reconstructed to bring them current with the ADA standards related to width, slope, and surface type and 1.20 miles of sidewalk were constructed/reconstructed to improve the Town’s overall sidewalk network condition and meet ADA pedestrian access route requirements.

Roads and Sidewalks in Sound Condition

The accompanying tables show the condition of Town roads and sidewalks. The roads and sidewalks are located within the target range of 80-85 Pavement Condition Index (PCI) and 80-85 Sidewalk Condition Index (SCI) respectively. The Town’s overall investment in its road and sidewalk assets have resulted in cost effectively protecting and improving Concord’s public way infrastructure for pedestrians and drivers, while avoiding a multi-million dollar backlog to be paid by future residents of Concord.

ROAD CONDITION SUMMARY									
Pavement Condition Index	2007	2008	2009	2010	2011	2012	2013	2014	2015*
(PCI) Network Average	84	83	81	82	80	80	81	82	82
(PCI) Arterial/Collector Average			88	86	84	82	87	85	84
(PCI) Local Road Average			75	79	78	77	77	79	79
<i>* Includes 2015/16 Roads Program Phases I, II, & III to be completed by November 2016.</i>									
Recommended Repairs	2007	2008	2009	2010	2011	2012	2013	2014	2015
Rehabilitation	14%	12%	9%	8%	8%	10%	6%	7%	6%
Maintenance	42%	52%	51%	48%	52%	51%	40%	29%	36%
No Maintenance Required	44%	36%	40%	44%	40%	39%	54%	64%	58%
<i>The above referenced table is based on an infinite budget. Using the FY15 budget, the actual performed repairs breakdown was: (Rehabilitation 2%, Maintenance 8%, No Work Performed 90%)</i>									

SIDEWALK CONDITION SUMMARY							
	Sidewalk Condition Index (SCI)			Network Average			
	SCI Range	Miles	Percent	Year	SCI	Year	SCI
Replace	0-50	1	1%	2006	82	2011	81
Localized Repair	51-70	15	26%	2007	77	2012	81
Shows Wear	71-90	34	59%	2008	76	2013	78
No Distresses	91-100	8	14%	2009	76	2014	82
Total Miles		58	100%	2010	75	2015	81

Stormwater/Drainage Program

Concord's stormwater infrastructure consists of approximately 211 culverts, 438 outfalls, 1,185 drainage manholes, 2,861 catch basins, 143 leaching structures, 59.6 miles of drain lines, 15 detention basins, 2 infiltration basins, 5 bioretention areas, 8 treatment chambers and 3 dams. CPW plans, designs, coordinates and performs construction of drainage improvements in conjunction with the Roads and Sidewalks Programs to minimize disruptions and to eliminate expensive emergency repairs. All drainage maintenance activities are coordinated with the Division of Natural Resources and are typically performed under a general maintenance permit previously issued by the Natural Resources Commission.

In 2002 and 2003, the Town performed a closed drainage system inventory and in 2011 completed a culvert inventory. Within these inventory projects, condition assessments and rating systems were developed and integrated into the Town's geographical information system (GIS) to provide the basis for the development of the Town's 20-year Stormwater/Drainage Management Plan. This plan is intended to provide a cost-effective framework for the upgrade and repair of the Town's stormwater/drainage system and to prevent expensive emergency repairs from occurring in the future through a planned and scheduled maintenance and replacement program.

Staff continues to update the location and condition data of Concord's stormwater/drainage infrastructure within the GIS system. CPW Highway Division staff verifies and supplements GIS drainage data during annual catch basin system cleaning operations. The Engineering Division updates drainage data obtained through ground survey for various capital improvement projects. All updated inventory data is used to prioritize drainage rehabilitation/replacement projects and to meet Federal National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit requirements.

The NPDES MS4 Phase II General Permit issued by the Environmental Protection Agency (EPA) is major component of the Town's drainage program. The permit, issued in August 2003, requires towns to meet multiple objectives or "minimum control measures"

to improve water quality within the Commonwealth including: public education and outreach, public involvement and participation, illicit discharge detection and elimination, construction-site stormwater runoff control, post-construction stormwater management in new development and redevelopment, pollution prevention and good housekeeping in municipal operations.

Stormwater/Drainage Projects

Multiple improvements to the Town's drainage system were constructed. The Engineering Division designed and constructed a rehabilitation of the drainage collection system in Deacon Haynes Rd. and designed and constructed the installation of a new underdrain blanket on Pilgrim Rd. and Southfield Rd. Both projects were included within the 2015/16 Roads Program Phase I bid. The 2015/16 Roads Program Phase II bid included significant improvements to the drainage collection system on Thoreau Ct., as well as Hunters Ridge Rd. In total, the drainage program replaced/installed 18 drainage structures, 400 feet of drain pipe and 2,800 linear feet to underdrain in 2015.

The Engineering Division completed the in-house design, bidding and construction oversight for the 97 Thoreau Street Pocket Park that was a sustainable infrastructure demonstration project. The project included the installation of a new tree box filter and porous paver area to promote stormwater infiltration, a new water fountain, a solar compactor and two new planting areas.



Completed Pocket Park at 97 Thoreau Street – A showcase of sustainability.

Lastly, the Engineering Division completed the design, and bidding of two culvert replacement projects within 2015. Both projects were funded through FEMA's Hazard Mitigation Grant Program (HMGP). The first project, the Fitchburg Turnpike Culvert Replacement, was also constructed and reached substantial completion by fall. The Town received over \$100,000 in Federal HMGP funds for Fitchburg Turnpike. The Westford Road Culvert Replacement Project was bid in the summer, however material lead times and environmental time of year constraints required the deferral of the construction to summer 2016.

EPA - NPDES MS4 Permit

The Engineering Division completed the NPDES MS4 Permit Year 12 annual reporting to the EPA. Major permit accomplishments within Year 12 included the further refinement of the residential rain garden program, as well as the stormwater technical review and environmental monitoring review and administration for 14 projects meeting NPDES permit thresholds. CPW Engineering and GIS staff continued efforts to update the accuracy of the Town-wide drainage system layer within GIS to meet current and anticipated NPDES MS4 permit requirements.

The Engineering Division completed review and comment of the draft 2014 MS4 Permit including the development of a planning level estimate of compliance cost by the February 27, 2015 deadline. The new 5 year permit proposes to build on the previous minimum control measures outlined in the 2003 permit. The permit is expected to have significant financial impact to Concord in staff time/equipment expense and consultant services if issued as currently constituted. Town of Concord comments highlighted excessive sampling/testing requirements, aggressive permit timelines and the one size fits all permit structure.

Bridges

The Engineering Division is responsible for the management and monitoring of the 5 Town owned bridges: Heath's Bridge, Pine Street Bridge, Flint's Bridge, Hurd's/ Nashawtuc Bridge and Pail Factory Bridge. Bridge inspections are completed every two years by Mass. Department of Transportation bridge staff and forwarded to the Engineering Division office for

inclusion within Town records and to prioritize any needed repairs. Inspections are completed to evaluate the structural condition of bridge components as well as underwater stability/erosion issues to meet National Bridge Inspection Standards. When required, bridge rehabilitation project scopes are developed and managed by the Engineering Division. Bridge repair funding comes from a variety of sources including: Chapter 90 State aid, local funding, State accelerated bridge program, etc.

HIGHWAY, GROUNDS & CEMETERY DIVISION

Daniel Rowley,
Highway & Grounds Superintendent

The CPW Highway and Grounds Division maintains approximately 107 miles of public streets along with the associated drainage systems consisting of approximately 59.6 miles of drain lines, 2,861 catch basins, 211 culverts, 1,185 drainage manholes, 438 outfalls, 143 leaching structures, 15 detention basins, 5 bio-retention areas, and 3 dams. In addition, the Highway and Grounds Division maintains 59 miles of sidewalks, 2,793 signs, over 90 CPW vehicles and equipment, and manages the compost facility. It is responsible for 82 acres of public parks and grounds including 50 acres of active recreation areas which includes ten athletic fields. The Grounds Division maintains all public shade and park trees, under the direction of the Park and Tree Supervisor who is also the Town Tree Warden.

Snow Removal Program

The record-breaking winter of 2014-2015 was very busy for CPW crews. A total of 99.5 inches of snow fell during the winter resulting in 66 total responses for winter maintenance efforts. One of the most challenging aspects of this winter was that almost all of this snow fell from the end of January through March. There were a total of 10 storms requiring mobilization of all plowing equipment and 7 snow removal events in the commercial and downtown areas. The most significant storm of the season was Winter Storm Juno where 32" of snow fell, causing blizzard conditions. Bitter cold temperatures persisted throughout the month of February. This resulted in minimal melting of snow between storms, requiring

significant road widening and snow removal efforts. The Highway Division continued the pilot program to use primarily all salt and significantly reduce the use of sand. This program has been very successful in delivering safe roads and greatly reducing the amount of sand entering sensitive environmental resources including the Town drainage system infrastructure as well as improvements in air quality due to the elimination of airborne sand.



Downtown Concord - Digging out from one of the many snowstorms of 2015.

Roads and Sidewalk Maintenance

The Highway Division continued to maintain and improve the condition of Concord roads throughout the year. The freeze and thaw cycles through the late winter and early spring resulted in many potholes requiring responses. In an effort to improve the efficiency of these efforts, crews maintained a log of locations that were patched so more permanent repairs could be coordinated. For the second year in a row, the State provided additional funds for road repairs due to the harsh winter. The Highway and Grounds Division worked with the Engineering Division to identify the sections of road to be repaired using these funds. A contractor performed mill and overlay repairs to these areas. Over 10,000 square feet of infrared pavement repairs were completed by a contractor. These repairs were completed on smaller sections of significantly deteriorated pavement and near manholes, catch basins, and water gates. Full-depth patching continued this year with repairs completed at various locations on Cambridge Turnpike.

Drainage

Drainage system maintenance and improvements were another priority of the Highway Division. The goal of cleaning approximately 50% of the total inventory of catch basins was achieved, consistent with the 'every-other-year' cleaning cycle. Catch basin cleaning began in East Concord to complete the program in that area and then moved over to West Concord. This work is completed by Highway Division crews utilizing Town-owned equipment and required significant effort from Highway Division crews. Some of the locations where these repairs were completed include Commonwealth Ave., Walden St., Prairie St., Main St., Virginia Rd., Sudbury Rd., and Barretts Mill Rd.

Additional effort was invested this year in maintaining other drainage structures such as bio-retention areas, detention areas, and drain swales. The drainage swale on Annursnac Hill Rd. underwent a thorough cleaning in June and a fall clean-up completed in November. These maintenance efforts were necessary to ensure the drainage swale functions properly. Additionally, crews weeded, mowed, and installed new mulch at bioretention areas and mowed detention areas throughout Town.

Parks and Playgrounds

The Grounds Division maintains Town grounds and public shade trees. The areas maintained are extensive, including almost 50 acres of athletic fields, playgrounds, traffic islands, and other Town owned properties. These areas are managed using horticultural best practices including fertilizing based on results from soil testing, mowing at proper cycles, maintaining appropriate moisture levels in soils, and improving turf density through overseeding to minimize the growth of weeds. The Grounds Division provides support to several programs including the hanging basket program in West Concord, and the community gardens.

Mother Nature posed several challenges throughout the year for the Grounds Division. The significant snowfall during 2014-2015 was slow to melt in the spring causing a late start for the users of athletic fields and outdoor recreation areas. Grounds Division crews were able to remove snow from the Doug White Fields so the fields were able to be used approximately two to three weeks sooner than if the snow hadn't



The 2015 CPW Snow Team.

been removed. The summer was also challenging due to the limited rainfall the Concord area received. This required Grounds Division crews to provide additional maintenance to irrigation systems and additional watering of plants. The winter of 2015-2016 was late to arrive allowing crews to continue working outdoors well beyond the usual season. Grounds Division crews were able to perform infield maintenance well into December at Ripley Field, the 90' baseball diamond at Emerson Field, and the softball field at Emerson Field.

Trees

CPW planted a total of 39 public shade and park trees. These trees were planted throughout the year on Town property and through the Public Shade Tree Planting Program. Each tree was carefully selected after reviewing the planting location to ensure it was planted within the established policy of planting "the right tree in the right place". Watering and monitoring of the newly planted trees was ongoing throughout the year to ensure they were well established and thrived. Plantings were limited this year in order to make funds available for a Town-wide public shade tree inventory and management program. This project will be completed in 2016 and will be a valuable tool for CPW to use in managing these resources. In future years, CPW will continue to strive to meet the goal of planting one tree for every tree that is removed or dies, however this goal continues to be a challenge to attain with the increased cost of public shade trees and limited public shade tree funding.

Under the direction of the Tree Warden, the Grounds Division pruned over 25 trees and removed 136 trees that were determined to be in declining health and potentially hazardous. Support for tree maintenance needs at Sleepy Hollow Cemetery was provided, which included tree pruning to address limited access to graves and the removal of three hazardous trees. Assistance was provided to the Concord Municipal Light Plant for tree issues that could potentially impact their infrastructure. No major tree damage was caused by storms this year.

CPW continues to promote the "public shade tree protection policy" as much as possible through interactions with the public, contractors, and Town Departments. Proper care and protection of trees is critical throughout the construction process because any damage caused is irreversible.

Cemetery

The Cemetery Division provided burials year-round and properly maintained the Town's cemeteries. A great deal of pride is taken in the professional and compassionate service that is provided to residents. The successful use of contracted landscaping services continued this year for the mowing and spring/fall clean-up needs of Sleepy Hollow Cemetery. Cemetery Division crews provided mowing and spring/fall clean-up for the Old Hill Burying Ground and South Burying Place. All other maintenance for the cemeteries was completed by CPW crews including pothole patching, tree and stump removal, and ongoing turf improvements.

An assessment of the roadways and stonewalls within Sleepy Hollow Cemetery was completed by the Highway and Grounds Division staff. This assessment provided a condition of all roadways within the cemetery, as well as a repair method to be used for budgeting purposes. Measurements of the stone walls were taken during this assessment and several were prioritized for repair. This information was necessary for completing an application for Community Preservation Act funding for roadway, drainage, and stone wall repairs for Sleepy Hollow Cemetery that was submitted in the fall.

The preservation of the Melvin Memorial continued to be a priority for the Cemetery Division. A firm was contracted this year to develop technical specifications for the efforts needed to properly preserve the memorial. These specifications will be advertised in 2016 with the anticipated completion of this project later in the year.



The Melvin Memorial at Sleepy Hollow Cemetery.

The annual monument restoration program that is progressing through Old Hill Burying Ground was put on hold this year while an assessment of the condition of the headstones could be completed. It is expected that the assessment will be completed in 2016 and the preservation efforts will continue based on this information.

RECYCLING AND WASTE MANAGEMENT PROGRAM

Rod Robison,
Environmental Services Program Administrator

Curbside Collection, Disposal, and Processing

The Municipal Curbside Collection Program (MCCP) provided trash and recycling services to 3,539 households. Subscribers to the MCCP set out 1,200 tons of mixed paper, 568 tons of commingled containers and 2,574 tons of trash for collection. The average subscriber on the Town's program recycled 0.50 tons of materials and threw away 0.73 tons of trash.

SUBSCRIBERS (AS OF JUNE 30)				
Year	Number of Subscribers	Recyclables collected (tons)	Trash collected (tons)	Recycling Rate
FY98	2,518	1,264	2,351	35%
FY08	3,305	2,025	2,467	45%
FY09	3,323	1,864	2,387	44%
FY10	3,407	1,810	2,426	43%
FY11	3,468	1,780	2,483	42%
FY12	3,488	1,794	2,484	42%
FY13	3,514	1,734	2,513	41%
FY14	3,517	1,760	2,544	40%
FY15	3,539	1,768	2,574	40%

Curbside Recycling Rate

Residents using Concord MCCP recycled 40% of the materials they set at the curb. This figure does not include yard waste, which residents manage at home or drop off at the Town composting site on Saturdays, April through mid-December. It does not include the tons of materials collected for recycling at the semi-annual DropOff SwapOff days, nor does it include information on the more than 1,000 households that contract with private haulers for the collection of trash and recyclable materials.

Recycling Savings Exceed \$2.0M

The curbside program received revenue of \$1,567 for paper and avoided \$90,946 in disposal costs by not disposing of paper as trash. Since July 1998, when the Town began receiving revenue for recycled pa-

per, recycled paper revenue has totaled \$495,579 and avoided disposal costs have totaled \$1,666,405 for an overall savings of \$2,161,984.

RECYCLING SAVINGS			
Year	Disposal Cost	Paper Revenue	Avoided Disposal Cost
FY98	\$110,564	(\$8,061)	\$38,798
FY08	\$194,254	\$58,188	\$116,818
FY09	\$194,254	\$25,833	\$93,282
FY10	\$186,786	\$20,220	\$93,247
FY11	\$191,191	\$30,325	\$91,915
FY12	\$191,815	\$32,200	\$92,352
FY13	\$196,067	\$4,981	\$86,868
FY14	\$193,318	\$5,904	\$89,756
FY15	\$199,925	\$1,567	\$90,946

Waste Management Contract

The Town signed a favorable five-year contract extension with Waste Management on June 23, 2015 for FY17-FY21 after lengthy contract negotiations. In researching options for a new curbside contract that would best fit the needs of the Town’s curbside program, CPW polled upwards of 100 other communities in northeastern MA and performed an extensive hauler analysis. The current dual stream recycling program was deemed to be the best fit for the Town, and Waste Management was deemed the vendor best fit for the Town curbside program. Annual contract increases for FY17-FY21 will range from 2.7% - 3.1% based on the number of curbside subscribers currently depicted in the Town contract with Waste Management. The terms of the extension mandate that Waste Management purchase two new dual stream recycling trucks during the first half of FY17 for utilization on the Town’s curbside routes.

Reuse and Recycling DropOff & SwapOff Events

The Spring DropOff & SwapOff event on May 9 was attended by 929 households. The Fall DropOff and SwapOff event on October 17 was a great success with 928 households participating. Both events went smoothly; thank you to the volunteers who made these events possible.

DROP OFF SWAP OFF PARTICIPANTS		
Year	May	October
1999	521	430
2008	974	918
2009	889	981
2010	931	989
2011	979	891
2012	890	852
2013	893	851
2014	931	893
2015	929	928

Unwanted Medication & Sharps Collection

Unwanted medication & Sharps were collected at the May 9 and October 17 DropOff events. Eight boxes of unwanted medication and eight boxes of Sharps were collected between the two events.



Jim Macone, Rod Robison, and Steve Barter at the DropOff SwapOff event.

Hazardous Products Collection

Subscribers to the curbside collection program receive one free pass per year to the Minuteman Hazardous Products Regional Facility in Lexington, where they can dispose of hazardous waste. The facility is open one weekend day a month from April – November. Ninety-six curbside subscribers visited the site in 2015, along with nine non-curbside subscribers who paid the vendor directly.

Composting Site Turns Yard Waste into Garden Gold

From April through mid-December, residents made more than 8,000 visits to the 755 Walden St. compost site, dropping off leaves, grass clippings and brush, while 432 residents dropped off paint at the paint shed and 196 residents picked up paint for reuse. At the compost site, 1,075 Christmas trees were recycled and 117 bags of Styrofoam™ were collected for recycling.

VISITS TO THE COMPOSTING SITE				
Year	Leaves & Grass	Brush	Paint Drop-off	Paint Pickup
2004	5,963	329	204	148
2005	6,078	418	230	118
2006	6,651	615	298	158
2007	7,880	697	296	171
2008	8,093	508	222	138
2009	6,723	667	210	145
2010	6,470	587	252	156
2011	5,106	650	279	156
2012	5,376	667	200	190
2013	6,547	675	341	183
2014	6,484	371	351	182
2015	7,556	486	432	196

Landfill Monitoring Contract

As part of the Town’s closed landfill, post closure monitoring and maintenance requirements (in accordance with 310 CMR 19.132), CPW obtained price quotes to continue both groundwater and landfill gas monitoring. There are nine groundwater wells and 23 soil gas probes associated with the 755 Walden St. closed landfill. The incumbent, Environmental Compliance Services (Agawam, MA), was the low bidder submitting a proposal totaling \$11,383 for the one-year period of 9/1/15 – 8/31/16. The former landfill that has now been put back into productive beneficial reuse with the construction of a utility scale solar facility, received formal closure certification from MassDEP on 10/16/13.

Keeping Mercury Out of the Environment

CPW collected 11,808 linear feet of fluorescent light bulbs and 269 lbs. of nickel cadmium, lithium, and lead acid batteries from residents and municipal facilities for recycling. This is in addition to 45,489 lbs. of computers, TV’s, and other electronics that were collected at the two DropOff events. Another 3,532 linear feet of fluorescent bulbs and 3,414 lbs. of computers and electronics were collected from businesses at the April and October business recycling events.

Annual Right-To-Know, Hazardous Waste Management, & SPCC Training

Annual Right-To-Know (RTK), Hazardous Waste Management, and Spill Control & Countermeasure (SPCC) training was conducted for CPW employees on June 24 and July 15. The RTK training is required by the Mass. Division of Occupational Safety, while Hazardous Waste Management and SPCC training are mandated by the EPA and MassDEP.

Grants

CPW obtained two grants from the Department of Environmental Protection: a Sustainable Materials Recovery Program grant in the amount of \$1,250, and a Recycling Dividends Program grant in the amount of \$3,600. These grants can be utilized to purchase recycling-related equipment and fund recycling-related activities including but not limited to curbside recycling bins, compost bins, public space recycling bins, and hazardous waste collection.

Plastic Bag Reduction Bylaw

The Plastic Bag Reduction Bylaw (Warrant Article 35) was approved by the Attorney General on July 30, 2015. The Bylaw bans the use of thin-film single-use plastic checkout bags in Concord retail stores and grocery stores. The Town Manager designated CPW to coordinate outreach and enforce this new bylaw (effective January 1, 2016). Outreach included mailers, a poll, flyers, informational meeting, website promotion, reusable bag distribution, and store visits.

WATER AND SEWER DIVISION

Alan H. 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 Concord's water and sewer systems would be financially viable. Expenses incurred for each system are covered by revenues generated by the enterprise. The Water and Sewer Division of Concord Public Works (CPW) is responsible for managing the day-to-day operations of drinking water and sewer infrastructure. As of 2014, the total assets for each system are 20.1 million and 20.1 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 evolved to include six groundwater wells and one surface water source, seven water pumping stations, two water treatment facilities, and a high pressure water main network consisting of over 132 miles of pipe. Two covered storage reservoirs, one located on Annursnac Hill and the other located on Pine Hill in Lincoln provide total reserve capacity of 7.5 million gallons. There are presently 5,570 accounts 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 Rt. 2A.

Regulatory/Policy Updates

Water Management Act: CPW Water Division operates under the general terms and conditions detailed within a 20-year Water Management Act (WMA) permit issued by the State. This 20-year permit, which was originally scheduled to expire on August 31, 2011, has been administratively continued pending formal review and approval of a renewal request made this past year. The State is presently reviewing this request under a new regulatory framework including changes made to this program in 2014. Concord has been put on notice that the new permit will be issued with operational and capacity conditions that are intended to

increase controls and accountability of each individual source as well as overall system capacity allowances. While the Town has historically been permitted to withdraw up to 2.51 million gallons a day, on an annual average, it is anticipated that this allowance will be reduced and tighter controls required on seasonal (summer) water use.

Fluoride Treatment: On April 27, 2015 the United States Department of Health and Human Services (HHS) updated their optimal drinking water fluoridation treatment target, reducing it from 1.0 ppm to 0.7 ppm. This recommendation was officially acknowledged by the Massachusetts Department of Public Health and the Massachusetts Department of Environmental Protection (MassDEP). In accordance with Article 67 of the 1969 Town Meeting, town meeting members voted affirmatively to "authorize the Concord Board of Health, acting by and under the authority of Chapter 548 of the Acts of 1968, after making such inquiry and other use of the consulting services of the State Department of Public Health or elsewhere as it chooses, to order the adjustment of the fluoride content of the water supply available for domestic use in the Town of Concord, if it considers doing so in the best interest of the Town of Concord." In accordance with this new guidance, the Board of Health was consulted and the target treatment goal for fluoride within Concord's public water system was subsequently reduced from 1.0 ppm to 0.7 ppm.

Water Use and Demand Management

As noted previously, Concord's WMA permit provides an "authorized" water withdrawal allowance of up to 2.51 million gallons per day (MGD) with an allowance of 65 gallons per day per capita and 10% system wide "unaccounted" water. Unaccounted water is a volume of water that is pumped but not measured through existing meters because of leaks, fires, etc.

The total water production required to meet residential, commercial, institutional and municipal needs was approximately 767 million gallons. This calculates to an average daily demand of 2.10 million gallons. A peak day demand of 3.79 million gallons was recorded on September 8. The residential gallons per day per capita and total system "unaccounted" for water use estimates were calculated to be 73 gal/day and 10.6.

In accordance with the Town's Seasonal Demand Management Plan, a seasonal water use advisory was issued on May 1 extending through September 30. At no time did conditions trigger a need for the Public Works Commission to impose a mandatory outdoor water use restriction.

Water Conservation Program Highlights

CPW Water Division continues to maintain its commitment to its comprehensive water conservation program that encourages water conservation through the adoption of seasonal increasing block rates, and by providing free residential water saving devices including, shower heads, aerators, garden nozzles, rain gages, and toilet fill cycle diverters as well as customized outreach and assistance to customers who are interested in learning more about indoor and outdoor water saving opportunities.

Water Impact Assessments: Natural water resources available to the Town of Concord are finite. Sound long-range planning and the aforementioned Water Management Act policies are driving increased accountability in the allocation and use of these natural resources with specific attention placed on water supplies. In keeping with these trends, CPW Water Division has made notable programmatic improvements in its water demand management efforts. Of special note is a local requirement for new, larger developments to perform a water demand impact assessment before being authorized to connect to municipal water. Specifically, this initiative requires large developments to incorporate water conservation and best management practices into their designs. Over the past ten years, this program has evolved to include compliance affidavits furnished to the Town prior to activation of these new water services. We are proud of this innovative program, which we believe is unique to Concord, and believe is in keeping with Concord's broader "sustainability" interests.

Water Conservation Rebate Program: Staff continued promoting rebate programs for high efficiency clothes washers (CEE Tier 2/3) and toilets (1.28 gpf or dual flush units) with consideration of further incentivizing most efficient units via a credit to the customers Water and Sewer bill. On March 7, new Federal water efficiency standards for clothes washers

became mandatory, increasing the required water and energy efficiency of all residential clothes washers. The standards require manufacturers to report Integrated Modified Energy Factor (IMEF) and Integrated Water Factor (IWF), instead of Modified Energy Factor (MEF) and Water Factor (WF). Concord's rebate program was adjusted accordingly.

New England Water Distribution Services (Windham, NH) performed a water main leak detection survey on 74 miles of water main, concentrating in the Northern section of Town beginning September 16 and continuing through October 12. This leak detection survey helped detect and pinpoint two water main leaks, one leaking hose, and one hydrant leak with an estimated total leakage rate of approximately 35 gallons per minute (50,400 gallons per day).

Water Quality and Regulatory Compliance

MADEP Sanitary Survey: In the fall, MassDEP performed a comprehensive sanitary survey of Concord's public water system. The survey is performed on all public water systems once every three years and involves a detailed evaluation of financing, management, and operations with consideration to Federal and State requirements and guidelines. No notable system deficiencies were identified.

Routine and non-routine water quality testing activities continue to demonstrate that Concord's drinking water satisfies all applicable requirements. A summary of water quality test results is available on the Town website and the Annual Water Quality Report – updated each spring (www.concordma.gov/wqreport.pdf). For customers who prefer to receive a hardcopy of this information, please contact CPW Water and Sewer Division office directly to make such a request.

Source Water Protection Award: On May 4, MassDEP's Drinking Water group presented CPW Water Division with its "2015 Source Protection Award" as part of its annual Public Water System Awards Program. MassDEP recognized Concord for outstanding regulatory compliance along with effort and dedication as evidenced in implementing innovative and exemplary water supply protection strategies during the 2014 calendar year.

Nagog Pond Annual Water Quality Monitoring: In order to comply with increased watershed protection requirements associated with the long-standing filtration avoidance waiver for Nagog Pond, a Watershed Resource Protection Plan (WRPP) was developed in 1991. The WRPP is formally updated every 3 years and identifies existing land-uses and associated threats to this unfiltered surface water supply and includes a water quality monitoring plan for the watershed. Throughout the year, a number of water quality parameters were measured in Nagog Pond to characterize raw water quality of the pond, as well as to identify any changes and potential point sources of contamination or degradation such as agricultural or storm water inputs. Results from 2015 water quality monitoring activities continue to support that Nagog Pond is generally a well-protected, well-mixed reservoir with relatively stable water quality.

Cross Connection Control Program Update: What is a cross connection? A cross connection is any physical connection which is created between a drinking water supply line and a piece of equipment or piping containing water that does not meet drinking water quality standards, or contains other substances that could make the water unsafe to drink. For example, cross connections may exist between pipes containing drinking water and boilers, lawn irrigation systems, solar heating systems, photography equipment or fire protection systems. Water Safety Services (Woburn, MA) continued to perform inspections of new commercial operations to ensure appropriate protection controls are in place as well as testing of existing devices that are located within commercial properties throughout Town.

Nagog Pond: Filtration Plant Update

Environmental Partners Group (Weymouth, MA) completed the 25% design of a full scale water filtration facility planned for the Nagog Pond water supply. The design for this 1.5 MGD capacity water treatment plant integrates several large subsurface chambers associated with the existing ozone facility and will include the following new treatment processes: pre-oxidation; coagulation/flocculation; dissolved air flotation (DAF) for clarification; intermediate ozonation for enhanced organics control; and carbon

filter media for filtration. As the power demands and operational costs for this advanced treatment will increase, CPW Water Division is pursuing photovoltaic generation as an accessory use to this facility. If successful, this would offset long-term environmental and operational cost impacts.

Environmental Partners Group has been tasked to complete the full-scale design for the replacement of the original cast-iron intake line that extends over 1,800 feet out into Nagog Pond. Based on its advanced age (installed in 1909) and aquatic setting, the effective diameter of this 16-inch line has been reduced by approximately 50%.

State and local permitting activities for the construction of the treatment facility, photovoltaic array, and intake line will be initiated in 2016 with construction cost and request for borrowing authorization to be presented at the 2016 annual Town Meeting.

Water Pumping Station Rehabilitation and Upgrades

Daily attention is given to routine operation and maintenance of the seven water production facilities and related treatment systems which make up Concord's total water supply. In addition to routine inspection and service, capital upgrades are required to replace and improve failing or outdated motors, pumps, electrical systems, and treatment systems housed within these facilities. Notable improvements included:

Rt. 2A Pump station – MassDOT Bruce Freeman Rail Trail Construction (Phase 2A): MassDOT awarded the construction contract for Acton plan of work (Phase II) of the Bruce Freeman Rail Trail project to SPS New England, Inc. Site clearing commenced in the immediate vicinity of Concord's Rt. 2A pump station facility in anticipation of installing a new pedestrian bridge over Rt. 2A. This work will require the relocation of several hundred feet of Concord's 16-inch transmission main, including the replacement of several gate valves, immediately up gradient of the pump station and the re-alignment of a building drain line.

Second Division Station – Bulk Storage Relocation Project: Environmental Partners Group completed a preliminary design for the relocation of a bulk storage container located at the Second Division well drink-

ing water production facility. This design included a new building addition that would house the bulk storage – presently stored in an outdoor, uncovered bulk storage vault. Plans for this design have been deferred pending further evaluation of a potentially cost prohibitive fire protection system.

Water Main & Service Rehabilitation/Extension Programs

The water distribution system consists of over 133 miles of water main ranging in size from 6-inch to 16-inch. The replacement/rehabilitation program is prioritized based on age, condition and material of pipe. Plans are further refined with consideration to other public works initiatives such as drainage improvements, annual Roads Program or CMLP underground initiatives. Each year, new mains are also introduced into the system to serve new or existing properties where frontage to the municipal water distribution system does not otherwise exist. Projects completed within the past year include:

Deacon Haynes Water Main Replacement: Fenton & Sons (Acton, MA), serving as a subcontractor to Lazzaro Paving replaced over 1,700 feet of 8-inch transite main with new 12-inch cement lined ductile iron pipe (class 52) along Deacon Haynes Rd. Work included replacement of service laterals from the water main to individual property lines with 1-inch PE tubing, the replacement of all associated hydrants, the installation of a new 3-way valve assembly (12-inch size) at the intersection of Old Marlboro Rd. and Deacon Haynes Rd., the installation of a new 3-way valve assembly at the intersection of the Old Marlboro Rd. and the Jennie Dugan well access road, and the abandonment of a cross country 12-inch water main located in an easement between Old Marlboro Rd. and Deacon Haynes Rd.

Hunters Ridge Road. Water Main Replacement: Cedrone Trucking Inc. (North Billerica, MA) replaced over 3,100 feet of 8-inch transite water main with new 8-inch cement lined ductile iron (class 52) along Hunters Ridge Rd. Work included the replacement of service laterals from the water main to individual

property lines with 1-inch PE tubing, the installation of a new 3-way valve assembly (8-inch x12-inch x 12-inch) at the intersection of Old Marlboro Rd. and modest drainage improvements including replacement of some drainage pipe, manholes and catch basins.

Bolton Street Water Main Extension: Ferrante construction installed a new 8-inch cement lined ductile iron (class 52) water main approximately 110 feet from an existing 8-inch water main located on Bolton St. The work included the installation of a new 8-inch gate valve and new hydrant assembly at the end of the new main. The work was completed in accordance with a plan of work entitled “Water Main Extension, Bolton Street, Concord MA”, prepared by Mark Donohoe, P.E. and approved by the Public Works Commission in 2010.

Black Birch Planned Residential Development (PRD) – Water Main Extension: Patriot Excavating (Acton, MA) installed a new 8-inch cement lined ductile iron (class 52) water service line at approximately 1,550 feet which will be used to serve a 25-unit PRD located on Forest Ridge Rd. The plan of work involved the installation of new water service laterals, three new hydrants, one in-line gate valve and two 3-way gate valve assemblies at the connection to an existing 12-inch water main located in Forest Ridge Rd.

Emergency Water Main Repairs: Based on the age and condition of water main located throughout the water distribution system, it is not uncommon for sections to fail. When they do, they can create sudden pressure drops or water discoloration events that can affect a few customers or potentially entire neighborhoods. Depending on the nature and location of each break, water service interruptions can last from several hours to over 8 hours. This past year, CPW Water Division responded to emergency repairs at the following locations: Monsen Rd. (January 23); Bedford St. (February 22), Church St. (March 2), Sudbury Rd. (September 14), Lowell Rd. (October 28), and Carr Rd. (December 5).

ANNUAL WATER REPORT SUMMARY TABLE

Water Statistics	2015	2014	2013	2012	2011
Miles of Main	132.8	132.5	131.6	130.9	130.9
Hydrants	1,321	1,318	1,306	1,283	1,270
Main Pipe - New (linear feet)	1,660	2,557	3,476	1,595	4,300
Main Pipe - Replaced or Rehabilitated (lf)	4,800	7,328	98	1,950	785
Number of Service Accounts	5,554	5,518	5,497	5,537	5,491
Total Water Demand (million gal.)	767	722	755	745	684
Daily Average Demand (million gal.)	2.1	1.98	2.05	2.04	1.98
Peak Day Demand (million gal.)	3.79	3.82	3.91	3.91	4.11
Unaccounted for Water (percent)	10.6	10.9	11.3	12.1	9.1
Residential per Capital per day (gal.)	73	64	68	68	63
Annual Precipitation (inches)	35.51	48.29	41.73	40.48	57.63
Mean Annual Precipitation (inches)	41.92	41.97	42	42	42
Residential Rate per Unit (unit = 7.48 gal.)					
Base Rate - Step 1	\$0.0477	\$0.0459	\$0.0441	\$0.0424	\$0.0410
Conservation Rate - Step 2 (May 1 - Oct. 31)	\$0.0954	\$0.0918	\$0.0882	\$0.0848	\$0.0820
Conservation Rate - Step 3 (May 1 - Oct. 31)	\$0.1193	\$0.1148	\$0.1103	\$0.1060	\$0.1025
General Service Rate per Unit (unit = 7.48 gal.)					
Step 1 - (<50 Units)	\$0.0477	\$0.0459	\$0.0441	\$0.0424	\$0.0410
Step 2 - (>50 Units)	\$0.0606	\$0.0583	\$0.0561	\$0.0539	\$0.0521



Water & Sewer Division responded to a water main break on Lowell Road on October 28.

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 designed and 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, the service area has expanded and treatment systems improved resulting in a system that consists of over 34 miles of collector mains (gravity and low pressure), two pumping stations, six neighborhood lift stations and a 1.2 MGD treatment plant. The present sewer system serves over 1,858 customers or 35% of the community.

Sewer Pumping Stations

The sewer pumping stations vary in size and complexity based on local land elevations and grades as well as the volume of wastewater handled. The Lowell Rd. and Assabet Sewer Stations are the two largest facilities in Concord and are designed to handle flows from the more densely populated and commercialized neighborhoods of West Concord and Concord Center. These two facilities are over 30 years old and are scheduled to be refurbished in the near future. The six neighborhood lift stations serve smaller service areas and have much more modest physical footprints. While inspections and routine maintenance occurs at all stations on a daily basis, no notable capital improvement projects were undertaken in the past year.

Collection System

The sewer collection system is composed of over 33 miles of gravity and low pressure collection main (ranging in size 2-inch to 27-inch diameter) with manholes. While there has been no recent public effort made to expand the sewer service area, smaller private extensions are reviewed and approved so long as they serve areas consistent with the Town's Comprehensive Wastewater Master Plan.

Infiltration and Inflow Program

Approximately 50% (15.4 miles) of Concord's sewer collection system is made up of clay pipes – much of it dating back to the original sewer system installed

over 100 years ago. Concord continues to investigate the condition of this infrastructure and repair or replace it as needed to reduce preventable inflow and infiltration (I/I). Inflow and infiltration refers to groundwater and stormwater that enters a sanitary or industrial wastewater collection system through illicit connections or leaking pipes. Unlike many cities and towns across the country, Concord is fortunate that the stormwater and sanitary wastewater drainage systems were originally designed and constructed as completely separate systems. As such, Concord is fortunate that we are not burdened by the operational, financial, and environmental challenges associated with managing combined sewer overflows (CSO's) that occur when peak flows of stormwater are added to sanitary sewer flows.

A successful I/I program not only reduces the frequency of sanitary sewer overflows during periods of high groundwater but also reduces treatment costs otherwise incurred by requiring treatment of otherwise "clean" groundwater or stormwater. This past year, there were no reportable sanitary sewer overflows identified within our system and the 12-month discharge rate recorded at the wastewater treatment plant was reported as a ten year low of only 0.88 mgd (annual rolling average). While some reduction in total flow would be attributed to recent I/I efforts and effective collection system maintenance activities, some is certainly attributed to regional climactic conditions – notably an unusually dry spring and late summer.

Equally unusual was the significant amount of snow pack measured over the winter of 2015 resulting from the 99.5 inches of snow recorded in Concord. This provided CPW Water Division with a unique opportunity to capture and characterize spring time snow melt impacts on our infiltration rates. This effort required the leasing of eleven non-contact flow meters, installed and calibrated by DDS Select Service (Lowell, MA). These meters were equipped with electronic flow registers which allowed for the real time data collection and monitoring through a web interface. While the data provided a general sense that the system is not presently compromised by any notable source of infiltration, data is being further compiled for a more detailed analysis which may ultimately

help quantify infiltration rates for each respective sewer “sub-basins” monitored. Once the analysis is complete, the findings will be used to prioritize and target more costly inspection (via TV inspection) and sewer main rehabilitation efforts.

Wastewater Treatment Plant Operations

Woodard & Curran, Inc. (Portland, ME) continues to operate the municipal Wastewater Treatment Plant (WWTP), located off Bedford St. They are in the 4th year of a 10-year service contract. CPW Water and Sewer Division continues to work closely with Woodard & Curran to ensure day to day operations and maintenance is performed in a quality manner. Within the past year, the facilities and associated equipment ran reliably in accordance with State and Federally issued permits.

Hemi Enterprise (Attleboro, MA) cleaned and refurbished the structural components of the unit 2 secondary clarifiers and the unit 2 trickling filters. The scope of work for the secondary clarifier rehabilitation included tank and equipment cleaning, surface preparation (sandblasting) and painting of all steel components, replacement of structural members, replacement of access door for center column and disassembly and reassembly of secondary clarifier mechanisms. The scope of work for the rehabilitation of Trickling Filter #2 included the cleaning, sandblasting and painting of spray nozzles, splash plates and

accessories on the distributor arms and painting of all steel components on the trickling filter including distributor arms, center column, and rotating stationary base and installation of new sewage seals, supporting seal, and guide bearing for the center drive mechanism prior to reassembly of the trickling filter. During this work, an alignment issue was identified on the trickling filter arms, necessitating the installation of a leveling plate.

Wastewater Treatment Permit: Concord’s appeal of its National Pollutant Discharge Elimination System (NPDES) (originally issued back in August, 2, 2013) remains open. In accordance with recently revised permit appeal procedures, the Town submitted a formal petition for relief of contested provisions to both EPA and MassDEP. Bowditch and Dewey, LLP, provided legal counsel through this formal appeal process. On May 22, 2014, the Town was afforded a rare opportunity to have its arguments heard in front of the EPA Environmental Appeal Board. This hearing was offered to provide the Town with an opportunity to clarify its positions as they related to a new Aluminum discharge standard, more stringent pH limits, and flow limits that continue to restrict Concord’s ability to meet wastewater needs that have been clearly identified and supported by Town Meeting action. The Town will continue to work with both EPA and DEP, where appropriate, towards a mutually beneficial resolution.

ANNUAL SEWER REPORT SUMMARY TABLE

Sewer Statistics	2015	2014	2013	2012	2011	2010
Assabet Pumping Station						
Total Pumped (million gallons)	73.85	78.67	78.31	72.71	89.48	96.06
Monthly Average (million gallons)	6.15	6.55	6.53	6.06	7.46	8
Daily Average (million gallons)	0.2	0.22	0.21	0.2	0.24	0.26
Lowell Road Pumping Station						
Total Pumped (million gallons)	272.02	341.13	322.92	278.64	352.89	363.48
Monthly Average (million gallons)	22.67	28.43	26.91	23.22	29.41	30.29
Daily Average (million gallons)	0.75	0.93	0.88	0.76	0.97	1
Collection System						
Number of Service Accounts	1,851	1,834	1,832	1,837	1,823	1,811
Miles of Sewer Main	34.03	34.03	34	33.8	33.74	33.36
Main Pipe Inspected (lf.)	3,500	3,700	2,062	1,119	1,478	2,257
Main Pipe Replaced/Rehabilitated (lf.)	0	705	0	40	1,194	0
Rate per Unit (unit = 748 gallons)	\$0.1086	\$0.1055	\$0.1014	\$0.0966	\$0.092	\$0.0876