PUBLIC WORKS

PUBLIC WORKS COMMISSION

K.C. Winslow, Chair
Steven Ng, Vice Chair
Andrew Boardman
James Terry
Peter W. Wallis

The Public Works Commission acts as the Town's 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 also 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 also 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 Public Works Commission also 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.

Highlights of the Commission's activities for 2018 included (in chronological order):

- Conducted a Public Hearing for Monsen Road Street Acceptance and voted to execute a report laying out the extension of Monsen road to be filed with the Town Clerk in anticipation of the acceptance consideration under an Article at the 2018 Annual Town Meeting.
- Reviewed and voted to approve a Water Service Agreement with homeowners in Carlisle near Monument Street to terminate non-conforming service and disconnect from Concord's Water Service. This agreement was then presented to the Select Board and Town Manager for their approval.
- Conducted a Public Hearing and voted to approve an application for water and sewer main extensions along Warner Street.
- Conducted discussions relative to a potential Leaf Blower Ban Bylaw and its possible impact to operations of Concord Public Works which ultimately was not moved at the Annual Town Meeting by the petitioner.
- Former Public Works Commissioner, Nick Pappas, was appointed as the Public Works Commission liaison for the Comprehensive Long Range Plan Committee. A briefing was conducted and a letter prepared incorporating comments from the Public Works Commission for submission to the Comprehensive Long Range Plan Committee.
- Conducted a Public Hearing and approved revised curbside collection and disposal rates.
- Conducted a discussion of the Nagog Pond Special Permit and Inter-Municipal Agreement, and subsequently voted to approve a draft Inter-Municipal Agreement recommending approval to the Town of Concord Select Board and Town Manager.
- Conducted a Roads Program Briefing followed by a Roads Program Public Hearing.
- Conducted executive sessions to discuss litigation strategy relative to the Nagog Pond Water Treatment Facility Upgrade.
- Discussed various Town Articles and voted on recommendations to be presented at the Annual Town Meeting.
- A letter from the Public Works Commission conveying gratitude to Concord Public Works for their efforts in battling recent snowstorms was prepared and delivered.
- Conducted a Public Information Meeting to discuss the Sleepy Hollow Infrastructure Improvement Project.
- Conducted the Water and Sewer Rate public hearing and approved the FY19 rate schedules along

with adoption of related policies regarding service renewals for water and sewer service lines exceeding 50 years of age and a revision to the single connection per parcel regulation for residential parcels.
- Conducted a Parking Lot Reconstruction Public Information Meeting.
- Gratitude expressed for the many years of dedicated service provided by Commissioner Art Fulman.
- Conducted a Complete Streets Presentation and voted to recommend approval and requested that the Select Board also recommend their approval.
- Voted to approve an increase in sewer capacity as requested for Linear's property identified at 49-57 Main Street (Caffe Nero).
- Voted to approve and accept a drainage easement at 300 Baker Avenue.
- Voted to appoint Arthur Fulman as an advisor to the Public Works Commission with regard to any potential dispute relating to Nagog Pond with the Town of Littleton going forward.
- Participated in a presentation of the Street Scan Roadway Asset Management System.
- Participated in discussions regarding a potential Conservation Restriction at the Walden Street Landfill. This included a meeting with Commissioner Winslow and Director Reine with Kathy Anderson of the Walden Woods Project. An additional review occurred with Concord's Select Board Chair attending a Public Works Commission meeting to discuss this topic.
- Declared a retroactive State of Water Supply Conservation effective July 29, 2018 and instituted a one day per week outdoor watering restriction with watering permitted before 9 AM and after 5 PM, consistent with the Seasonal Water Demand Management Plan dated April 13, 2017. Rescinded the State of Water Supply Conservation retroactively with an effective date of September 28, 2018 and provided the Public Works Commission Chair the authority to rescind any future State of Water Supply Conservation declared which will then be voted on at a future PWC meeting.
- Voted to remove specified trees for road and sidewalk accommodations with regard to the Cambridge Turnpike Project.
- Participated in a discussion relative to a Solid Waste brush fee waiver and design of new disposal tags.
- Participated in a winter maintenance presentation including a weather forecast from Hometown Forecast Services.
- Voted to indicate support of a proposed Emerson Field Improvement Plan urging the Community Preservation Committee to provide $510,000 in funding at the 2019 Annual Town Meeting.
- Participated in discussions relative to the Cambridge Turnpike Improvement Project.
- Participated in budget review and capital briefing meetings.

The Public Works 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

Paul Cooke, Chair
Whitney Kocher-Nguyen, Vice-Chair
Kimberley Connors
Carol Harney
Andrea Solomon

2018 was a busy, productive year for the Concord Cemeteries! Gina Nasson, who was serving as Vice-Chairperson, retired from the Committee and Kimberley Connors joined. Alice Kaufman served as our liaison to the Select Board. Paul Cooke was elected to another term as Chairperson.

Completion of Phase Two of the Roadway, Stone Wall and Drainage Improvement Project
Funded by a $300,000 Community Preservation Act grant, along with an $150,000 debt authorization—both approved by the Town in April, 2017—Phase Two of this multi-year project was completed in the fall of 2018. The work crew from Sunshine Paving did a good job and treated the cemetery carefully. At the present, after Phases One and Two have been completed, all the roads in Sleepy Hollow have been restored, granite curbing has been installed in a number of places, drainage problems have been corrected and one

major stone wall has been repaired. The roadway going up and down Prospect Avenue, a challenging job for road restoration, was completed very successfully.

Interment Fees were raised to $1000 for a full grave interment, and $1400 for a full grave interment on a weekend or holiday. These fees were increased incrementally over two years to bring our rates in line with those of surrounding communities.

Grounds Maintenance
Cemetery Supervisor Patricia Hopkins did an outstanding job clearing and opening the cemetery after a severe winter storm caused
significant tree damage on March 7-8, 2018. Einstein's Inc. continued to be the landscape maintenance contractor completing cemetery lawn care and spring and fall cleanups in Sleepy Hollow while town staff maintained both the Main Street and Old Hill Burying Grounds. A system was initiated to notify interested parties of the schedule when our fall and spring cleanups will be completed. This was accomplished through the town's News and Notices email announcement system to alert concerned citizens of upcoming cemetery activities.

Melvin Memorial Restoration was completed by the historical memorial restoration firm, Daedalus, Inc. Total cost was $93,700. The work was led by Daedalus principal, Mr. Joshua Craine, and his team of conservators. The work involved cleaning the memorial, repointing the seams and joints, removing the bronze rifles and old slates, placing new slates, cleaning and resetting the bronze rifles, installing new bronze lettering and resetting the steps. Kimberley Connors served as liaison between the Committee and Craine and his Daedalus, Inc. team. A dedication ceremony for the restored memorial is planned for June 16, 2019.

In February 2018, Dan Rowley announced that the $15,000 grant which he applied for from the Massachusetts State Historical Records Advisory Board was approved; this grant supplied additional funding for the restoration of the Melvin Memorial and for future maintenance. Patricia Hopkins did extensive research to confirm the birth and death dates of the Melvin brothers honored by the Melvin Memorial to ensure the accuracy of the information on the new memorial slates that have been placed there. She contacted the Melvin family about including the birthdates on the slates (they were not originally inscribed on the existing memorial stones). Patricia Hopkins also did outstanding work in finding additional information about the three Melvin brothers memorialized at the site—information that may be utilized in an historical sign to be placed nearby.

Standing before the Melvin Memorial created by Daniel Chester French, just before the 2018 restoration of the memorial was about to begin, are, from left to right: Joshua Craine, Principal of the historical restoration firm Daedalus, Inc. Dan Rowley, Kimberly Connors, Patricia Hopkins, Keith Baldinger, and Gompo Yarmolinsky, Conservator with Daedalus, Inc.

Updating of the Cemetery Master Plan
This work was led by a subcommittee constituted of Whitney Kocher and Andrea Solomon. The updated plan includes sections about gravesite supply, cemetery operations, infrastructure, monument restoration and further development of the new section of the cemetery. Under the section focusing on supply of gravesites, new burial options were researched at length; concerns under this heading included responding to a mausoleum site request dating back two years, the pressing need for new cremation burial spaces, and the possibility of adding a columbarium at the bottom of the stairs already in place at the Knoll. After considering the many aspects of the plan and discussion of priorities for the Committee, Superintendent Dan Rowley suggested a priority list including completion of the restoration of the Melvin Memorial, the layout of a new area for the burial of cremated remains, and preparing for and holding a public information

meeting on burial supply sites in the cemetery. All these were accomplished in 2018. Other items on the priority list to be addressed in 2019 and 2020 include: 1) continuing the project of restoring broken or fallen headstones; 2) completing the project of digitalizing all cemetery records; 3) addressing the problem of cars driving too close to graves in the Chestnut Hollow area of the cemetery; 4) improving the landscaping on the slope of both sides of Upland Avenue; 5) considering the placement of trees, shrubs or a guardrail along the downslope of Prospect Avenue; 6) beginning to institute a plan to identify and tag all the tree species indigenous to Massachusetts in the cemetery; 7) creating an online cemetery tree map; 8) securing funding for stone wall reconstruction along Bedford Street and at the Main Street Burying Ground; 9) exploring funding sources for stone wall reconstruction at Old Hill Burial Ground; and 10) following up on instituting the two chief alternative burial options addressed in the November, 2018 public information meeting: a columbarium and additional mausoleum sites for sale.

Public Information Hearing on Gravesite Supply
After an almost year-long review to update the Cemetery's Master Plan, the Cemetery Committee, wishing to utilize available space in the cemetery to meet Concord's needs in ways that honor the cemetery's importance to the town, unanimously agreed to hold a public information hearing to communicate with the public and elicit public comments about a number of alternative burial categories the Committee felt could be useful additions to the Sleepy Hollow gravesite supply. These included the addition of a columbarium and of mausoleum sites. The meeting was not for the purpose of initiating policy changes, but was to solicit thoughts and comments from the community about these issues.

In preparation for the meeting Committee members investigated how engineering and construction of mausoleums are handled in a variety of Boston area cemeteries; costs involved and styles available for the construction of a columbarium; and consideration of areas within the present cemetery grounds that may be used for burials, mausoleums, scattering gardens and columbaria. This information was included in materials presented to the public in advance of a November 7th public information meeting. Extensive outreach was completed including inviting members of the Natural Resource Commission, the Historical Commission and the Friends of Sleepy Hollow Cemetery. The meeting, held in the Town House's second floor assembly room at 22 Monument Square, featured Superintendent Dan Rowley's sharing of a PowerPoint presentation illustrating the extensive work the Committee and the Town has been doing in Sleepy Hollow Cemetery over the past several years. This included the results of a lengthy study of burial options and future interment needs in the cemetery. Committee Chair Paul Cooke then led a discussion and invited attendees to complete a survey to determine community attitudes toward various types of interment methods. The survey results indicated significant interest in seeing the cemetery build a columbarium and in providing more single family mausoleums. Over half of those attending the meeting and completing a survey said they already own a gravesite in Sleepy Hollow. Twenty-three people attended, as well as the five Committee members, the Cemetery Superintendent, the Cemetery Supervisor, staff members including Mallory Price, and Select Board liaison Alice Kaufman.

Walkway through the Wetlands
Lori Capone, Assistant Director of Natural Resources, was contacted regarding the possibility of building a boardwalk to connect the old part of Sleepy Hollow with the new part (the Knoll) through the wetlands area behind Sleepy Hollow's old section. A joint walk-through the area by members of the Natural Resources Committee and the Cemetery Committee was held in October, 2017. It was then estimated by Capone in April 2018, that to construct a boardwalk there would cost between $250,000 and $400,000 depending on the quality. There were further concerns that any footings/structures being placed within or over the existing trail might affect water elevation on the northern side of the swamp.

Remediation of the Hoar Family Lots #35 and #36 on Glenn Avenue in Sleepy Hollow Cemetery
Among the many individual issues addressed by the Cemetery Committee this year, one matter that was happily resolved was that of an ongoing concern of lot owner Alex Hoar, to do with the border of two of his family's cemetery lots. A large white pine tree adjacent the Hoar lots that has for decades slowly caused significant movement of two granite blocks forming a perimeter around the lots, had created a safety concern

and was causing erosion within the cemetery lot. The Cemetery Committee agreed to Mr. Hoar's request that we take down the tree as well as grind the stump and remove the displaced granite blocks. Mr. Hoar agreed in return to the cover the costs of replacing the granite blocks once we had removed them to address the problem of the tree and its trunk.

Equipment Staging for a Film Project in Concord
Joshua Gibbons, from Ungrown Productions and Netflix came to the Committee asking permission to locate a camera in the Old Hill Burying Ground on Sunday, September 23rd in order to film a brief scene for a series on Netflix. They proposed to station a small crew with only light-weight equipment to film a car driving through the town center. Patricia Hopkins agreed to stay with the crew to ensure proper care was taken in the cemetery. Mr. Gibbons made a donation to the Cemetery to express his company's appreciation for the use of this site for the filming of a scene. The Committee unanimously approved; the filming took place without incident.

Website Updates and Improvements
Anna Trout of Concord Public Works has created a detailed webpage for the three Concord cemeteries. The updated Cemetery Master Plan was put up on the website and a place on the website for the posting of "Concord Cemeteries in the News" has been initiated. The Committee hopes to keep the new site updated regularly.

Friends of Sleepy Hollow
The Cemetery Committee, the Cemetery Superintendent and Supervisor continued our successful, ongoing partnership with the Friends of Sleepy Hollow in 2018. Kevin Plodzik and Susan Dee requested permission to place a stone with a plaque honoring Carolyn Handley and the late Thurston Handley for their years of care of the plantings in the cemetery. This stone was placed near newly planted shrubs that had been funded by the Friends last year. A reception to honor the Handleys was planned for May 20. Carol Harney was again the liaison between the Cemetery Committee and the Friends of Sleepy Hollow this year. Thanks to information provided by Rick Frese who informed us that the Melvin family, of the Melvin Memorial, had belonged to the Trinitarian Congregational Church. It was arranged for the lower part of the three old slates taken from the memorial to be donated to that institution for a memorial garden. Thanks to Nancy Reilly the upper portions of the old slates were donated to the Concord Library for a planned children's garden.

New Cremation Section
An area in the Knoll was laid out through the measuring efforts of the Concord Public Works' Engineering Division. The Committee named the new burial section "Ivy Path." This area will provide 8-10 years of burial space for cremated remains. Other sections of the Knoll will be available in the future for further development to provide burial places for cremated remains.

Statistics
In 2018 there were 104 interments at Sleepy Hollow Cemetery; of these 39 were Concord residents at the time of their death. Of the interments, 37 were full burials and 67 were cremations. Lot sales for the year totaled 61 with 12 of those being sold to eligible former residents.

ADMINISTRATION

Richard K. Reine, Director of Public Works and Engineering / Tree Warden

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, and teamwork. We also strive to 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 the Town's Infrastructure/Providing Essential Services
Concord Public Works (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 (which includes Cemetery Operations) and the Water & Sewer Division. The Department is responsible for planning and managing a large segment of the Town's infrastructure.

These assets include 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, recreation equipment, and Town cemeteries are all also under our care. Included in CPW is the Town's compost site and closed landfill, including the earth products and snow storage facility. CPW's divisions also manage 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 service; yard waste disposal; and winter snow and ice management along with other storm and safety services is also a core responsibility of Concord Public Works.

CPW Team, Programs & Organization
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.

Concord Public Works is made up of 53 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 (Parks and Trees), Cemetery, Recycling and Waste Management, Water, and Sewer. Two of the programs, Water and Sewer are totally supported by user fees. The 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 accomplishments in 2018. Notable accomplishments include:

- The continued targeted roadway and sidewalk maintenance and management program resulted in the internal design and scheduled construction of approximately 1.65 miles of roads improved, 11.9 miles of roads maintained and 1.3 miles of sidewalk improvements. This work also included the improvement of 22 curb ramps.
- Multiple improvements to the Town's drainage system were accomplished. This included ten new catch basins, eight drainage manholes, five gutter inlets and 1,060 linear feet of drainage pipe in the Independence/Alcott neighborhood prior to paving. A number of drainage improvements were also made as part of parking lot improvements which included the installation of two tree box filters, 3 bioretention areas, nine new catch basins, six drainage manholes and 290 linear feet of drainage pipe.
- EPA/NPDES MS4 Permit –The new permit was issued in July of 2018.
- Park and Tree Staff planted 22 public shade and park trees as well as street/scape trees. 63 potentially hazardous trees were removed.
- Expert maintenance continued by CPW Highway and Grounds Division staff of almost 50 acres of athletic fields for use by baseball, softball, soccer, lacrosse and other programs.
- The winter of 2017-18 included over 64 inches of snow with a total of 42 responses for winter maintenance which included applying salt brine before forecasted storms, deicing roads, plowing and snow removal.
- DropOff SwapOff events held in May and October which also included unwanted medication and Sharps collection were well attended.
- Concord Public Works hosted a hazardous waste collection on September 24 which was very well attended with 230 vehicles. This local collection is held every two years.
- Continuation of the water conservation rebate program for high efficiency clothes washers and toilets occurred.
- The unanticipated and contentious permitting process for the Nagog Pond Filtration Plant continues to adversely impact Concord's design and construction schedule.
- Numerous water main extension and replacement projects were undertaken including the extensive

upgrades in the Alcott/Independence Road neighborhood and Cambridge Turnpike.
• A great deal of effort has been undertaken relating to the Cambridge Turnpike Improvement Project.

CPW Leadership and Innovation
The Centers for Disease Control and Prevention and the American Dental Association presented Concord Public Works with its Water Fluoridation Quality Award. This was in recognition of maintaining effective dosing and documentation of ongoing drinking water fluoridation efforts.

Public Works Day 2018

Learning and Growth
With the ever increasing complexity of public works operations, the need for professional development of CPW employees continues to play an important role in the organization. Concord Public Works 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
All employees continue to utilize the Pure Safety online training system customized for specific public works job risks to accomplish their monthly training goals.

Public Works Week – Middle School Event
Concord Public Works celebrated National Public Works Week on May 23 with the 8th grade class from Concord's Middle School for the twelfth consecutive year. The theme was "The Power of Public Works" The entire public works team worked with CPW's Administrative and Special Projects Coordinator, Anna Trout and Applied Technology Teacher, Doug Shattuck to showcase the importance of public works. Events included stormwater 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
Concord Public Works appreciates the contributions made by the following employees who moved on from their positions within the department. These include Keith Baldinger (Assistant highway & Grounds Superintendent), Chrisscheyl Bango (Equipment Operator), Scott Cullinane (Park and Tree Specialist), Tim Porter (Equipment Operator), Bill Renault (Town Engineer), We were happy to welcome Richard Byajuta (Equipment Operator).

ENGINEERING DIVISION

Chris Olbrot, Town Engineer

The Concord Public Works (CPW) Engineering Division is responsible for the planning, design, engineering and construction of the Town road, sidewalk, bridge, and stormwater/drainage infrastructure assets. CPW's Engineering Division provides a wide range of professional engineering and construction management services for Concord Public Works (Administration, Water, Sewer and Highway/Grounds/Cemetery) and other Town departments and boards.

Roads Program
There are approximately one hundred and seven 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 reclaimation, mill and overlay and overlay pavement treatments. The reclaimation treatment pulverizes the roadway's pavement, re-grades 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 inputted into the Town's roads program software. This allows the Town to have up-to-date information and plan ahead for a series of years. The survey data provides the Town with Pavement Condition Index (PCI) and Sidewalk Condition Index (SCI) values. These values allow the Town to make capital investments properly and ensure that roadways and sidewalks are being maintained in an equitable fashion while addressing critical infrastructure distresses, ADA compliance concerns and drivability.

CPW's Engineering Division converted to the use of Street Scan as the Town's new asset, data and software solution for Pavement and Sidewalk management in 2018. For many years Concord has been on the cutting edge of roadway and sidewalk management through the use of a data oriented and proprietary software program developed by Vanasse Hangen Brustlin, Inc. (VHB). VHB has been assisting Concord in that capacity since the mid-1990s and was generally considered a single source entity. When researching for the 2019 roads survey CPW approached Street Scan for a possible contract to perform the aforementioned data collection and asset management. After several meetings, presentations and research, CPW entered into a contract with Street Scan.

The contract consists of a two phased approach. The two phases of service consist of data collection and data management. 1) Data Collection: Patented Sensing Technology - Instead of a typical "windshield survey" Street Scan eliminates subjectivity through the use of a revolutionary multi-sensory van that records acoustic, optical, and electromagnetic waves that translates to countless data points. Ground penetrating Radar, Surface Radar, front and rear cameras, microphones, etc. all combine to allow Street Scan to provide PCI and SCI information. 2) Software Management Tool: Once the data is collected and sorted it is uploaded into PAVEMON, a web-based application which allows the Town to plan and engineer our road and sidewalk improvements with consideration to benefit/cost analysis, financial constraints, and pavement treatment options. The software is a user friendly GIS application and has the ability to be accessed in the field or the office.

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.

1.65 Miles of Roads Improved

CPW's Engineering Division completed the internal design and bidding for the FY19 Roads Program in 2018. In total the project bid has programmed improvements of 1.65 miles of Concord's roadways including the reclaim of Baker Ave., Baker Ave. Extension, Alcott Rd., Independence Rd. and Dee Rd. 11.90 Miles of Roads Maintained

CPW continued with a significant roadway maintenance program within calendar year 2018, maintaining a total of 11.90 miles of Concord's roadways. A total of 1.2 miles of roadway patching were bid within the 2018 patching contract. The contract included portions of Old Pickard Rd, Old Bridge Rd., Wheeler Rd., Sudbury Rd., and Main St. CPW also completed its annual crack sealing bid in 2 phases in 2018, selecting 10.7 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 roads selected for crack seal treatment included: Belknap St., Grant St., Middle St., Academy Ln., Main St., Laws Brook Rd., The Valley Rd., Holden Wood Rd., Garfield Rd., Nashoba Rd., Stow St., and Strawberry Hill Rd.

Cambridge Turnpike Improvement Project

The Cambridge Turnpike Improvement Project (CTIP) will construct roadway improvements to address a major flooding issue which causes frequent closure of the roadway in heavier rain events. The Town also 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 project is a 2 phased project which includes the following areas:

The Phase I work will include the standard roadway and utility construction sections:

o Section #1 - From Lexington Road to the Mill Brook Farm

o Section #3 - From Hawthorne Lane to Sandy Pond Road.

The Phase II work will include bridge and culvert sections with deep ground improvements:

o Section #2 - Mill Brook Farm Stand wetland crossing

o Section #4 – Crosby Dam wetland crossing

In 2018, the design team advertised the Phase I CTIP bid on May 16th to support the June 14th bid opening. The low bidder was J. Tropeano of North Andover, MA. Tropeano began construction on Phase I with the installation of the waterline from Lexington Rd. to the Farmstand. Following favorable testing results Tropeano then installed water services along this stretch of roadway to individual house curb stops. Once the water main and services were installed, Tropeano began closed drainage system improvements. Tropeano shut work down for the winter season at the end of 2018. They are expected to resume when weather allows which is expected in March of 2019. Tropeano will need to closely coordinate with the project contractor for Phase II.

Phase II improvements was bid on December 19th, 2018. This contract is expected to be awarded in late January of 2019. Phase II will begin with preliminary matters such as submittals, design consideration and approval for structural elements, installing erosion control and the control of water and demolition of existing elements. Once those initial items are completed, the contractor will begin to install the deep

ROAD CONDITION SUMMARY

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pavement Condition Index (PCI) Network Average	81	82	80	80	81	82	82	80	78	75
(PCI) Arterial/Collector Average	88	86	84	82	87	85	84	82	82	78
(PCI) Local Road Average	75	75	79	78	77	77	79	78	77	73
Recommended Repairs										
Rehabilitation	9%	8%	8%	10%	6%	7%	6%	12%	12%	15%
Maintenance	51%	48%	52%	51%	40%	29%	36%	38%	53%	42%
No Maintenance Required	40%	44%	40%	39%	54%	64%	58%	50%	35%	43%

Note: The above referenced table is based on an infinite budget.

o Using the FY2018 budget, the actual performed repairs breakdown was: (Rehabilitation 0%, Maintenance 2%, No Work Performed 98%)

SIDEWALK CONDITION SUMMARY

Sidewalk Condition Index (SCI)	SCI Range	Miles*	Percent
Replace	0-50	0.8	1%
Localized Repair	51-70	15	25%
Shows Wear	71-90	32	55%
No Distresses	91-100	11.3	19%
Total Miles		59.1	100%

*Approximate Miles

**The 1.1 Miles increase in sidewalk is due to the sidewalk extension as a part of the Cambridge Turnpike Improvements Project.

Network Average	Year	SCI
	2014	82
	2015	81
	2016	79
	2017	77
	2018	**75**

ground improvements which consist of bi-modulus columns and a bearing matt constructed of crushed stone. This will allow for a structurally sound roadway in addition to building up the roadway and bridge structures out of the floodplain to minimize roadway closures due to flooding. Phase II construction may begin as early as March. It is anticipated that the majority of work will be completed in 2019 with the possibility of final topping, blending driveways, and cleanup being finalized in spring of 2020.

Sidewalk/ADA Compliance Program

Concord's sidewalk management strategy emphasizes adequate capital investment to the existing sidewalk network to maintain and/or improve the pedestrian experience for all sidewalk users. The sidewalk budget also funds ADA compliance maintenance activities and upgrades to the sidewalk network including pedestrian access routes and curb ramps. The sidewalk network contains approximately 58 miles of public sidewalks and approximately 809 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 initially completed in 2011. Also an assessment of physical mobility barriers along pedestrian access routes (sidewalks and curb ramps) was completed as part of an update to the Town's ADA Right of Way Transition Plan in 2016. Most recently, in June of 2018, StreetScan inventoried the sidewalks in Town in conjunction with the roads scanning as outlined above.

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 standalone projects, included within the roads program bid or completed as internal projects by CPW's Highway Division when appropriate.

1.3 Miles of Sidewalk and 22 Curb Ramps Improved

CPW's Engineering Division incorporated 22 new curb ramps in bids for 2018/19 Road Program (3), Cambridge Turnpike Improvement Project (8) and Parking Lot Rehabilitation Phase I bids (11). Additionally 1.3 miles of sidewalk was bid with the Cambridge Turnpike Improvement Project Phase I & II.

ADA Public Right of Way Transition Plan

CPW's Engineering Division completed the installation of 10 new accessible parking spaces with associated signage and pavement markings within two main parking lots in the down town area. Walden St. and Keyes Road each received improvements while maintaining the number of regular parking stalls.

CPW's Engineering staff continued to update the Town's Right of Way Transition Plan by updating pertinent information such as improved ADA Pedestrian Access Routes (PAR) and facilities.

Roads and Sidewalks in Sound Condition
The accompanying tables show the condition of Town roads and sidewalk. The roads and sidewalks are located just outside of the target 80-85 PCI (Pavement Condition Index) and 80-85 SCI (Sidewalk Condition Index) 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. The 2018 season experienced a slight decrease in the PCI as a result of setting aside sufficient funding and appropriate construction contingency for the Cambridge Turnpike Project phases I and II. The PCI is expected to rebound when the money set aside for CTIP in FY 2020 can be repurposed back into the program.

Stormwater/Drainage Program
Concord's stormwater infrastructure consists of approximately 216 culverts, 431 outfalls, 1,214 drainage manholes, 2,770 catch basins, 162 leaching structures, 61.1 miles of drain lines, 15 detention basins, 2 infiltration basins, 7 bioretention areas, 8 treatment chambers, 3 dams, and 3 tree box filters. Concord Public Works 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. Drainage maintenance activities are also coordinated with the Division of Natural Resources and are typically performed under a general maintenance permit previously issued by the Natural Resources Commission and last renewed in 2017.

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. CPW's Engineering Division provides updated 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 NPDES MS4 permit requirements.

The Town's National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase II General Permit is also a key component of the Drainage Program. The new permit was issued in July of 2018. Municipalities and other agencies are required to meet six 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 house-keeping in municipal operations. The Town, in accordance with Permit requirements, filed the Notice of Intent in September of 2018 outlining the best management practices (BMPs) that will be implemented in the permit cycle to meet the six minimum control measures outlined above. Additionally, a gap analysis was completed by the Town in late 2018 to verify that the minimum control measures and the BMPs identified to meet those measures will be adequate in the coming permit cycle.

Stormwater/Drainage Projects
CPW's Engineering Division incorporated significant improvements to the Town's drainage collection system within 2018. The Parking Lot Improvements - Phase I project made significant improvements to drainage infrastructure. The contractor installed 2 tree box filters, 3 bio-retention areas, 9 new catch basins, 6 drainage manholes and 290 LF of drainage pipe. These improvements significantly improved drainage

capacity and mitigation of runoff from the newly constructed parking lots while maintaining an emphasis of point source pollution prevention, sustainable design and recharge of groundwater. The project was designed by staff with drainage BMPs specially designed to maximize improvements to the existing system.

Further, the 2018/19 Roads Program also contained a large drainage improvements portion. Significant drainage improvements were completed within the Independence/Alcott neighborhood prior to paving. Ten (10) new catchbasins, eight (8) drainage manholes, five (5) gutter inlets and 1,060 LF of drainage pipe was installed. Also, bid within the project are significant improvements on Baker Avenue, Baker Avenue Extension, and Dee Road which will be installed in spring 2019.

Bridges
CPW's Engineering Division is responsible for the management and monitoring of the (5) Town owned bridges: Heath's Bridge (Sudbury Road), Pine Street Bridge (Pine Street), Flint's Bridge (Monument Street), Hurd's/ Nashawtuc Bridge (Nashawtuc Road) and Pail Factory Bridge (Commonwealth Avenue). Bridge inspections are completed every two years by MassDOT bridge staff and forwarded to CPW's 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 CPW's Engineering Division. Bridge repair funding comes from a variety of sources including: Chapter 90 State aid, local funding, State accelerated bridge program, etc.) CPW's Engineering Division contacted the State in 2018 to make repairs to the Damon Mill Bridge on Rte. 62 in West Concord in late July. The bridge is owned and maintained by the State.

Cemetery Infrastructure
CPW's Engineering Division finalized construction inspection and contract administration for the second phase of the infrastructure rehabilitation of historic Sleepy Hollow Cemetery. In total the project included the rehabilitation of 4,000 linear feet of roadways, installation of 11 new drainage structures, 420 feet of new drainage pipe, and 300 feet of new stone waterways.

Parking Lots
CPW's Engineering Division began in-house design and permitting for the second phase of the Town's Parking Lot Improvements Project rehabilitation of the Fairyland, Stowe Street Annex and Library and Harvey Wheeler Center parking lots. The design will incorporate significant drainage, pavement and ADA improvements.

HIGHWAY AND GROUNDS

Daniel Rowley, Highway & Grounds Superintendent and Deputy Tree Warden

The Concord Public Works, Highway and Grounds Division maintains approximately 107 miles of public streets along with the associated drainage systems consisting of approximately 61.1 miles of drain lines, 2,770 catch basins, 216 culverts, 1,214 drainage manholes, 431 outfalls, 162 leaching structures, 15 detention basins, 7 bioretention areas, and 3 dams. In addition, CPW's Highway and Grounds Division maintains 58 miles of sidewalks, 2,793 signs, over 90 pieces of CPW vehicles and equipment, and manages the Compost Site. It is responsible for 82 acres of public parks and grounds including 50 acres of active recreation areas which includes ten (10) athletic fields. CPW's Grounds Division maintains all public shade and park trees, under the direction of the Town's Tree Warden.

Snow Removal Program
The uncertainty of winter weather and the powerful impact it can have proved to be true for the winter of 2017–2018. The first response of the season was on December 9, 2017, with a 6" snow storm and the last response was on March 28, 2018, when a storm featuring sleet moved through our region. In the end, the total accumulation for the season was 64.25" with a total of 42 responses for winter maintenance which included applying salt brine before forecasted storms, deicing roads, plowing, and snow removal. The most significant storm of the season was on March 7-8, 2018, when 8 inches of snow fell. The snow during this storm had high moisture content so it was very heavy and wet which caused extensive tree damage. CPW

received over 250 calls for tree related issues during that storm and worked closely with CMLP in the cleanup efforts which lasted into May. The storm on March 13-14, 2018, had the greatest accumulation – 18.5 inches. This storm was quite impactful to communities in our county so FEMA declared it to be a major disaster on July 19, 2018, making Concord eligible for reimbursement for storm related costs. The application for reimbursement was completed and submitted in November. Again this year, the Compost Site at 755 Walden Street and an area opposite MCI on Commonwealth Avenue were utilized for snow storage for removal that took place in the downtown areas.

Roads and Sidewalk Maintenance

CPW's Highway Division completed ongoing maintenance and improvement to Concord's roads and sidewalks throughout the year. One program that continued to be a priority was replacing street signs. Significant effort was invested in completing the replacement of street name signs throughout Town. Town-wide street sweeping and sweeping of the designated sidewalk route was completed by the middle of June with weekly sweeping of the downtown areas completed through the fall. Sweeping of the arterial roads was completed in late fall to remove leaf debris from catch basin grates to prevent the debris from entering the storm water drainage system and to prevent flooding. Other roadway improvements included CPW's Highway Division completing full depth patching at selected areas of roadways with deteriorating pavement. Repairs using this technique were completed to sections of pavement on Harrington Avenue, Old Marlboro Road, Monsen Road, Hill Street, Strawberry Hill Road, Buckmaster Drive, and Cambridge Turnpike. CPW Highway Division Crews also assisted Concord Municipal Light Plant with full depth patching of several areas of the parking lot at their facility on Elm Street.

Compost Site Maintenance

The Compost Site at 755 Walden Street continued to be a critical asset to CPW's operation and a valuable resource for the community. Due to the ongoing positive feedback received, CPW continued the pilot program of offering Wednesday afternoon hours for residents to access the Compost Site in addition to the regular Saturday hours to dispose of brush, leaves, grass clippings, invasive species, and paint. CPW continued to utilize the Compost Site for equipment storage and as a staging area for wood chips and logs that are a result of CPW's Grounds Division tree maintenance efforts. It is also critical to CPW's winter maintenance operations by providing significant storage for snow. Snow removed in the downtown area is hauled to this location. In September, a contractor disposed of the wood chips and processed the brush and logs and disposed of them at a small cost to the Town. CMLP and the Facilities Division installed a utility pole and LED flood lighting which is used to illuminate the drop off area during Wednesday afternoon hours and during snow storms when snow is being hauled during the night.

Drainage

Drainage system maintenance and improvement efforts continued to be another priority of CPW's Highway Division. This year CPW contracted with New England Storm Water Management LLC of Westford, MA, to assist with cleaning catch basins to reach the goal of cleaning 25% of the Town's total catch basin inventory. The contractor completed the cleaning of 519 catch basins and CPW's Highway Division completed the cleaning of 250 catch basins for a total of 769, which reached the goal. The elimination of sand from regular roadway deicing efforts, which began in the winter of 2013-2014, has greatly reduced the amount of debris collected during the catch basin cleaning process. This also reduces the amount of debris which must be disposed of in accordance with DEP standards and also aids in keeping waterways clean. Catch basin repairs and manhole cover adjustments required ongoing attention from CPW Highway Division crews. Many of these needed repairs were identified as part of the inspection that was completed during the catch basin cleaning process.

Ongoing monitoring and maintenance of other drainage structures such as bioretention areas, detention areas, drain swales, and culvert headwalls and outfalls continued to be a priority this year. The drain swale on Annursnac Hill Road received ongoing cleaning and maintenance to ensure its proper function. Bioretention areas were weeded, mowed, and new mulch installed to maintain their functionality and aesthetic properties. Detention areas were mowed and cleaned during the season.

Parks and Playgrounds

CPW's Grounds Division continued to provide exceptional care to the Town's grounds and trees throughout the year. The work completed by CPW's Grounds Division is done in an environmentally sensitive and sustainable manner to care for athletic fields, playgrounds, traffic islands, and other Town owned properties. Improving upon the efficiency of operations, reducing environmental impact, and sustainability remained a priority for CPW's Grounds Division in 2018. Soil testing of the sports fields, parks, and public grounds which the Grounds Division maintains was completed over the summer. The collected samples of soil were sent to the UMass Extension in Amherst, MA for analysis. The results of the analysis were used to determine the nutrient levels of the soils so the appropriate fertilizers could be purchased and the pH adjusted where needed. Maintenance efforts this year included spring and fall cleanups, regular mowing of all turf areas, grooming infields, aerating and overseeding turf areas in the fall, and supporting Concord's many youth sports programs. CPW's Grounds Division also continued to support several other programs including the hanging basket program in West Concord and the community gardens.

The Assessor's Office, located on Court Lane adjacent to Sleepy Hollow Cemetery, had landscaping improvements completed to control erosion. CPW Grounds Division crews, with assistance from an MCI crew, worked with the Facilities Division to rejuvenate a planting area, improve drainage along a stone wall, and install stone on a slope near the parking area.

Maintenance of the Doug White Memorial Fields remained a priority of CPW's Grounds Division. After removing approximately 12" of snow from the two turf surfaces, the Doug White Memorial Fields opened for the season on March 19, 2018, weeks before natural grass fields were ready to be used. This was very beneficial for sports team allowing them to begin practicing for the spring season. The fields were cleaned and groomed on a regular basis with CPW's Grounds Division completing trash removal for the complex and the restrooms cleaned by a contracted custodial service. The perimeter netting was replaced over the summer because the existing netting was in poor condition due to its age – it was installed when the complex was constructed. The annual G-max testing was completed in September to ensure players' safety and was well within established safe levels. The fields were closed for the season in December.
After receiving $200,000 in Community Preservation Act funding during the 2017-2018 application process for infrastructure improvements at Emerson Field, a second application was submitted in September 2018, for additional funding. The aging infrastructure at this location is in need of renovation or replacement. The proposed improvements include irrigation system upgrades, on-site water supply well redevelopment or replacement, infield and outfield renovations for the two baseball fields and one softball field, sustainability and operational improvements to the spray fountain. CPW is anticipating this will work will need to be completed in a phased approach and plans to complete survey and engineering design and begin construction in 2019/2020.

Trees

CPW's Grounds Division and the Town's Tree Warden began implementing the management plan that was developed by Davey Resource Group as part of the tree inventory project completed in 2017. The tree inventory project included inventorying 23,871 trees, locating 846 stumps, and identifying 2,135 planting locations within the Town's right-of-way, the three cemeteries, parks, and selected Town properties. To assist CPW in its effort to maintain the Town's urban forest to the highest professional standards possible, two separate bid solicitations were completed with contracts issued for supplemental tree related services to augment the efforts of Town crews. The first contract was awarded to Mayer Tree Service, Inc. of Essex, MA, for tree removal and trimming services and the second contract was awarded to Davey Resource Group, Inc. a division of The Davey Tree Expert Company headquartered in Kent, OH, for planting both set-back trees and trees planted within the Town's right-of-way. Under the direction of the Town's Tree Warden, 63 trees were removed that were considered hazardous and 22 trees were planted.

Arbor Day was once again celebrated with the planting of a tree and a commemorative ceremony. Continuing a long standing tradition, the Garden Club of Concord once again gifted a tree to be planted in celebration of Arbor Day. A Carolina silverbell tree was planted at the CMLP facility at 735 Main Street, adjacent to the roadway. This location was significant because it

allowed for the replacement of a tree that failed during the March 7-8, 2018, snowstorm which had to be removed. A celebration was held the morning of Arbor Day, April 27, 2018, at that location with members of CPW and the Garden Club of Concord present.

A Carolina Silverbell Tree was donated and planted for Arbor Day 2018 by the Garden Club of Concord

Recognizing the potential for irreversible damage that can be caused during the construction process, Concord Public Works continued to actively promote the "public shade tree protection policy" as much as possible through interactions with the public, contractors, and Town Departments.

Cemetery

CPW's Cemetery Operating Unit provided burials year round and properly maintained the Town's three cemeteries. A great deal of pride is taken in the professional and compassionate service that is provided to residents. This year 104 interments were completed; of which 37 were full burials and 67 were cremation burials. The use of contracted landscaping services continued for the mowing and spring/fall cleanup needs of Sleepy Hollow Cemetery. CPW's Cemetery Operating Unit crews provided mowing and spring/fall cleanups 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.

Phase two of infrastructure improvements was completed this year in Sleepy Hollow Cemetery by contractor Sunshine Paving Corporation of North Chelmsford, MA, which included reconstructing selected roadways and improving the storm water drainage system. The construction improvements included removing all asphalt in the roads, installing drainage upgrades, and repaving with base course and top course bituminous asphalt. Roads included in phase two of improvements were Pine Ridge Avenue, Goldenrod Hill, Sycamore Avenue, Sections of Division Avenue, Sections of Sleepy Hollow Avenue, Sleepy Hollow Path, Prospect Avenue, and a section of Linden Avenue. The original contract for the project was $382,369.08 with one change order authorized in the amount of $23,632.94 to add more amenities to the cemetery including a replacement waterline on Prospect Avenue, an extension of granite curbing, and a river stone slope stabilization pad. Survey for this phase of improvements was completed by GCG Associates, Inc. of Wilmington, MA, at a cost of $23,370.00, and engineering design and construction management was completed by CPW's Engineering Division. This project was funded by Community Preservation Act funds and a debt authorization secured at the Annual Town Meeting in April 2017, as well as funds from the Cemetery Fund.

A substantial restoration and preservation project was completed to preserve and protect the Melvin Memorial. Project contractor Daedalus, Inc. of Watertown, MA, began working on the project in late August and completed all of the work by December. This project included cleaning the memorial, repointing all joints, fixing cracks and spalls, removing and replacing the existing slate panels, installing new bronze lettering and treating the existing rifles and installing them on the slates. Bronze letters were used and the birthdates of the Melvin brothers were added to make the replacement slates appear as close to the original slates as possible. The slates that were removed as part of this project were installed in the 1940's and were in poor condition due to the impacts of exposure to winter weather which had damaged the area surrounding the rifles as well as the lettering which was etched into the slates and not the bronze letters used originally. The total cost for the project was $93,700.00 which was covered by fundraising efforts completed many years ago and a $15,000.00 grant from the State Historical Records Advisory Board. A rededication ceremony is being planned with a tentative date of June 16, 2019, exactly 110 years after the original dedication.

RECYCLING AND WASTE

Rod Robison, Environmental Services
Program Administrator

Curbside Collection, Disposal, and Processing
The municipal curbside collection program provided trash and recycling services to 3,671 house-holds. Subscribers to the municipal curbside collection program set out 1,062 tons of mixed paper, 658 tons of commingled containers, and 2,637 tons of trash for collection. The average subscriber on the Town's curbside program recycled .47 tons of materials and disposed of .72 tons of trash.

Curbside Recycling Rate
Residents using Concord's municipal curbside collection program recycled 39% 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 Composting Site on Saturdays and Wednesdays, April through mid-December. It also does not include the tons of materials collected for recycling at the semi-annual DropOff-SwapOff events, nor does it include information on the more than 1,000 households that contract with private haulers for the collection of their trash and recyclable materials.

Curbside Collection 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	1,767	2,574	40%
FY16	3,608	1,761	2,581	40%
FY17	3,639	1,716	2,548	40%
FY18	3,671	1,720	2,637	39%

Curbside Recycling

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
FY16	$204,424	$480	$88,723
FY17	$201,261	$19,524	$87,785
FY18	$208,343	$5,941	$74,854

(FY = July 1 through June 30)

Recycling Savings Exceed $2.4M
The curbside program received revenue of $5,941 for paper and avoided $74,854 in disposal costs by not disposing of paper as trash. Since July 1998, when the Town began receiving revenue for paper, paper revenue has totaled $521,524, and avoided disposal costs have totaled $1,917,767, for an overall savings of $2,439,291.

Reuse and Recycling DropOff & SwapOff Events
The Spring DropOff & SwapOff event on May 5th attracted 945 households. The Fall DropOff event on October 13th (the fall SwapOff was canceled due to rain) was also a great success with 865 households participating. Both events ran smoothly, thanks to the many volunteers who make these events possible.

DropOff SwapOff Participants

Year	May	October
1999	521	430
2009	889	981
2010	931	989
2011	979	891
2012	890	852
2013	893	851
2014	931	893
2015	929	928
2016	918	749
2017	894	947
2018	945	865

Unwanted Medication & Sharps Collection
Unwanted medication & sharps were collected at the May 5th and October 13th DropOff events. Eight boxes of unwanted medication and six boxes of sharps were collected between the two events.

Hazardous Products Collection
Subscribers to the curbside collection program receive one free pass per year to the Minuteman Household Hazardous Products Facility in Lexington (for up to 25 lbs. or 25 gallons of hazardous waste). The facility is open one weekend day a month from April – November. Seventy-four curbside subscribers visited the site in 2018, along with thirteen non-curbside subscribers who paid the vendor directly.

Additionally, Concord Public Works (CPW) hosted a hazardous waste collection for residents and businesses on September 24th. The event was very well attended with 230 vehicles. This included 212 curbside program subscribers, 12 non-curbside program subscribers, 4 municipal sites and 2 businesses. This was CPW's largest hazardous waste collection event to date. As a comparison, there were 207 vehicles in attendance at the September 2016 hazardous waste collection event (these events are held every two years).

Composting Site Turns Yard Waste into Garden Gold
From March through mid-December 2018, residents made more than 13,000 visits to the 755 Walden Street Compost Site, dropping off leaves, grass clippings and brush, while 492 residents dropped off paint at the paint shed and 177 residents picked up paint for reuse. At the Compost Site, 1,278 Christmas trees and 154 bags of Styrofoam™ were collected for recycling from the 2018 holiday season.

Landfill Inspection & Reporting
MassDEP requires an annual landfill inspection by a third-party MassDEP-approved inspector for closed landfills in the Commonwealth. Concord Public Works coordinated the annual landfill inspection with Weston & Sampson. The inspection was conducted on November 8, 2018. The annual landfill inspection report included a summary of the 2018 monitoring results at the landfill.

The Town's closed landfill post closure monitoring and maintenance requirements in accordance with 310 CMR 19.132, mandate groundwater and landfill gas monitoring. There are nine groundwater wells and twenty-three soil gas probes associated with the 755 Walden Street closed landfill. The former landfill, which 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
Concord Public Works collected 9,140 linear feet of fluorescent light bulbs and 265 lbs. of nickel cadmium, lithium, and lead acid batteries from residents and municipal facilities, for recycling. This is in addition to 20.11 tons of computers, TV's, and other electronics that were collected for recycling at the two DropOff events. Another 6,096 linear feet of fluorescent bulbs and 1.77 tons of computers and

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	489	432	196
2016	6,558	590	267	183
2017	9,968	684	437	178
2018	8,459	5,250	492	177

NOTE: Brush activity was higher than usual in 2018, due to the amount of storm debris associated with nor'easters, including the March 7 th - 8th storm (one of four nor'easters over a 21 day period in March). Given the high volume of debris generated from the storms, residents were able to bring brush to the 755 Walden Street Compost Site during the off season, as well as regular hours, at no charge. Brush fees were waived for 2018.

electronics were collected from businesses at the April and September business recycling events.

Annual Right-To-Know, Hazardous Waste Management, & SPCC Training
Annual Right-To-Know (RTK), Hazardous Waste Management, and SPCC (Spill Control & Countermeasure) training was conducted for Concord Public Works employees on June 28th and July 11th. RTK training is required by the Mass. Division of Occupational Safety (DOS), while Hazardous Waste Management and SPCC training are mandated by the EPA and MassDEP.

Grants
Concord Public Works obtained a Recycling Dividends Program (RDP) grant from MassDEP in the amount of $6,000. This is a points-based grant. The Town earned ten points for its recycling programs. The grant can be utilized to purchase recycling-related equipment including but not limited to curbside recycling bins, compost bins, public space recycling bins, etc.

Bike Giveaway
Concord Public Works hosted a bike giveaway on June 20, 2018. The bike giveaway included bikes collected at the DropOff portion of the October 14, 2017 and May 5, 2018 DropOff events. The bike giveaway was very popular with residents. There was a long line of residents at the door well in advance of the 4:00 PM start time. Leftover bikes were donated to Worcester Earn-a-Bike, a nonprofit organization. The next Concord Bike Giveaway will be held on May 16, 2019.

WATER AND SEWER

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 each respective 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 2017, the total assets for each system are 21.9 million and 17.3 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 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 134 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 5,623 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 Route 2A.

Regulatory/Policy Updates

Water Management Act Policy

The Massachusetts Department of Environmental Protection convened two different working groups to evaluate regulatory and non-regulatory approaches that could potentially be advanced to augment water conservation practices across the State. One group was tasked with evaluating what if any demand management conditions could be imposed on a.) water systems that maintained registered withdrawals, and b.) smaller presently unregulated withdrawals such as owners of private wells. The other group was tasked to evaluate how the State may move forward on imposing new regulations that would require the use of interruptible devices on in-ground irrigation systems including appropriate design, installation, maintenance, and tracking requirements. While Concord established its program back in 2002, there is some concern that a State mandated program could reduce system specific flexibility, particularly in the area of enforcement.

Drought Management Planning

The Executive Office of Energy & Environmental Affairs (EEA) established a working group to evaluate drought management preparedness with a focus on public water supply. The group has considered establishing regional drought indices with system specific demand management response actions. This effort draws further attention on a desire to increase the frequency duration of outdoor water use restrictions. Concord staff participated in this working group and will continue to track developments as they will relate to Concord's needs and potential challenges.

Per- and Poly-fluoroalkyl (PFAS) Substances

National and State regulatory agencies have been evaluating policies, and potential regulations relating to the presence of polyfluoroalkyl substances (PFAS) identified in drinking water. Given the most current toxicological information associated with these compounds, MassDEP is moving ahead with the development of drinking water standards/guidance limits to address emerging public health and safety concerns. Early indications suggest that MassDEP has determined that this is a very important and time-sensitive issue which may have broad-reaching implications on public water systems. As part of a national testing initiative, Concord and 170 other public water system in Massachusetts tested for PFAS or Per- and Poly-FluoroAlkyl Substances. While some systems did identify PFAS in their drinking water supplies, Concord did not.

Water Use and Demand Management

On May 1st, the Town's "State of Concord's Seasonal Demand Management Plan" went into effect, proactively, as it does before each peak demand period. On August 1st, 2018, the Public Works Commission elevated the level of our Seasonal Demand Management Plan outreach from an "advisory" of one day per week lawn watering to a 'mandatory" limit of no more than 1-day per week. Despite the unusually

wet summer, this action was triggered when Nagog Pond had to be shut-down to prevent an automatic forfeiture of a long-standing filtration avoidance waiver. CPW's Water Division continued to provide targeted outreach to customers interested in installing in-ground irrigation systems, particularly with respect to registration, design, and connection fee requirements as specified in the Town Bylaws.

Municipal Vulnerability Preparedness
Staff participated in local planning activities designed to comport with the Executive Office of Energy and Environmental Affairs Municipal Vulnerability Preparedness (MVP) Program. This effort partnered municipal departments with local watershed associations, land trusts, conservation commissions, and climate groups to identify climate change resiliency challenges and opportunities. As the risk and frequency of extreme weather increase, so do the risks associated with maintaining essential water and wastewater services.

Water Capacity Resiliency Planning
Weston & Sampson (WSE) was tasked to begin to evaluate and document the capacity of all of Concord's existing drinking water resources, develop a water needs forecast, and evaluate the Town's ability to meet future water supply needs during extreme and drought conditions. The plan includes an evaluation of the existing water conservation program and water use restrictions as well as the Town's emergency response plan for compliance with the anticipated Massachusetts Drought Management Plan. In addition, the effectiveness of Concord's response to the 2016 State drought declaration will be evaluated to identify opportunities to improve overall effectiveness.

Concord's WMA registration and permit presently provides a cap on "authorized" water withdrawals of up to 2.51 million gallons per day (MGD) on average or 916 million gallons per year to meet all residential, commercial, institutional and municipal needs. Conservation limits included in this permit are an allowance of 65 gallons per day per capita (RGPDC) for residences and a 10% allowance for system losses (primarily attributed to leaks). In 2018, the total water production required to meet our system demands was 1.84 million gallons per day or 673 million gallons per year. A peak day demand of 3.18 million gallons was recorded on July 9, 2018. The RGPDC and total system losses (or "unaccounted" for water use) was calculated to be 66 gals/day and 6%, respectively.

Water Conservation Program Highlights

Residential Irrigation Outreach Pilot
CPW's Water Division partnered with MassDEP and the University of Massachusetts Donahue Institute on a pilot campaign designed to promote behavior change among residents that rely heavily on municipal water for outdoor irrigation purposes. Staff served on an advisory board to guide and customize this messaging campaign which was developed and implemented through a third party social marketing research group, Action Research. While the effort will help advance Concord's ongoing interest in educating our customers while informing us as to effective messaging tools that may be incorporated into a broader smart metering initiative, equally important, the effort may also provide Concord with an opportunity to influence and understand pending State policies relating to outdoor water use.

Water Main Leak Detection
New England Water Distribution Services LLC (Windham, NH) performed a water main leak detection survey on approximately 50% of the water distribution system. The acoustic survey targeted water mains, hydrants, select gate valves, and select service lines located in the southern half of the system. In areas where non-metal mains existed, NEWDS traced the main using acoustic monitoring every 10 feet using a ground microphone. Two (2) hydrant leaks and one (1) private service line leak were detected totaling a loss of approximately 28,080 gallons per year. The hydrant leaks and private service leak have been repaired.

CPW's Water Division continues to maintain its commitment to its comprehensive water conservation program that encourages efficient water use via seasonal increasing block rates, the provision of complimentary residential water saving devices including, showerheads, 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 savings opportunities. As funds allowed, CPW's Water Division continued to offer rebates on water saving toilets and high-efficiency clothes washing machines.

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

2018 Water Fluoridation Quality Award
CPW's Water Division once again received an annual award from the Centers for Disease Control and Prevention (CDC) and the American Dental Association (ASTDD) in recognition that CPW's Water Division has maintained effective dosing and documentation of ongoing drinking water fluoridation efforts.

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
Nagog Pond water supply was voluntarily taken off-line on August 6th due to deteriorating raw water quality observed within the Pond. While this upset did not cause any finished water quality issues post treatment, had the facility not been taken off-line, Concord would have violated its federally issued filtration avoidance waiver. By taking Nagog off-line before the waiver was compromised Concord maintained control over permitting, design and the construction schedule associated with Nagog Pond *Filtration project.*
Concord has continued to move forward with increasingly time-sensitive design and permitting activities associated with a federally compliant drinking water treatment facility. Regrettably, these efforts have been burdened by regulatory and legal challenges which have been imposed upon Concord by neighboring communities. Because the Nagog Pond water supply represents Concord's oldest and single most important drinking water resource, Concord has needed to invest considerable time and effort to protect its interests. Until the much-needed treatment facility has been constructed, Concord's ability to use Nagog Pond in a reliable manner will continue to be significantly curtailed.

Water Pumping Station Rehabilitation and Upgrades
CPW's Water Division crews continued to perform routine operation and maintenance of the seven water production facilities and related treatment systems which make up our total water supply. In addition to these routine inspection and service activities, capital upgrades are also planned and performed on the millions of dollars of assets including associated mechanical, electrical, plumbing and instrumentation and control systems housed within these facilities. Notable improvements performed within the past year include: the rehabilitation of a satellite groundwater well (10G) located at the Deaconess well site (performed by Denis L. Maher Company of Ayer, MA), the replacement and rehabilitation of the Hugh Cargill pump and motor assembly, respectively (performed by Maher Services of North Reading); the replacement of the original process controller with a new state of the art programmable logic controller (PLC) that is more compatible with CPW Water Division's current SCADA platform; replacement of variable frequency drive unit (VFD) at the White Pond Well (performed by Jasco Electric of Franklin, MA); and the replacement of high capacity chlorine transfer pump at the Deaconess Treatment facility.

Annursnac Hill Reservoir Rehab/Replacement Project
Weston & Sampson (Peabody, MA) performed site investigations and developed concept plans for the permanent repair /sealant of a concrete structure using a membrane/paint application and installation of an improved mechanical flow mixing system. In addition to these improvement needs, they have also

recommended additional site modifications required to maintain and protect this facility, engineering solutions to reduce operator safety risks, and minor system changes to improve water quality optimization and monitoring goals. As repair costs have been determined to be significant, our consultant has been asked to compare replacement costs prior to determining the most advantageous alternative.

Water Main Rehabilitation and Extension Activities
The water distribution system consists of approximately 134 miles of water main ranging in size from 6-inch to 16-inch. A replacement/rehabilitation program has been developed to maintain and improve upon system service reliability. New projects are 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 may also be added to the system to allow for service to new or existing properties where frontage to the municipal water distribution system had not otherwise existed.

Notable water main replacement or extension project activities performed within the past year include:

- Alcott/Independence Road Neighborhood: Fenton & Sons General Contracting (Acton, MA), sub-contractor to Lazaro Paving Corp, performed water main and stormwater system replacement and upgrades within the Alcott/Independence Road neighborhood. The scope of water main work included the replacement of approximately 5,000 ft. of 8-inch transite water main (circa 1938) with 8-inch cement-lined ductile iron pipe (class 52), nine hydrants and fifty-six service laterals has been completed. A new three-way 8x12x12 gate valve assembly was also installed at the intersection of Lexington Road and Alcott Road.
- Cambridge Turnpike Water Main Project: J. Tropeano Inc. (North Andover, MA) is performing phased underground utilities replacement/ installation work along Cambridge Turnpike, including the scheduled replacement of approximately 5,000 ft. of 12-inch cast iron water main (circa 1947) with 8-inch cement-lined ductile iron pipe (class 52) from the intersection of Lexington Road to Sandy Pond Road. Approximately 2,300 feet of water main, along with associated service laterals located within the right of way, was replaced in 2018, from the intersection of Lexington Road to just beyond the Millbrook Farm Stand.

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 cause sudden pressure drops or water discoloration that can affect a few customers or larger neighborhoods. Depending on the nature and location of each break, individual water service interruptions can also occur and last from several hours to over eight hours. This past year, CPW's Water Division performed emergency repairs at the following locations: Sandy Pond Road (January 5, 2018), Sudbury Road (January 17, 2018), Potter Street (June 19, 2018), and Oxbow Road (September 10, 2018).

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 Road 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 1,869 customers or 35% of the community.

Regulatory/Policy Updates
The Environmental Protection Agency (EPA) established final aquatic life water quality criteria for aluminum emphasizing the site-specific nature of the agency's approach, expressing both acute and chronic values as a range that will vary as a function of a site-specific water quality conditions (pH, total hardness and dissolved organic carbon). Unlike the values found in EPA's 1988 criteria recommendation, these final 2018 recommended criteria provide users the flexibility to develop site-specific criteria based on local water chemistry. Massachusetts intends to adopt its own water quality standard for Aluminum that will be based, in part, on the new national criteria.

Annual Water Report Summary Table

Water Statistics	2018	2017	2016	2015	2014
Miles of Main	133.6	133.5	133.3	132.8	132.5
Hydrants	1,328	1,328	1,327	1,321	1,318
Main Pipe - New (linear feet)	442	1,073	2,510	1,660	2,557
Main Pipe - Replaced or Rehabilitated (lf)	6,735	626	1,568	4,800	7,328
Main Breaks	4	5	6	6	1
Number of Service Accounts	5,623	5,605	5,601	5,554	5,518
Total Water Demand (million gal.)	673	674*	728	767	722
Daily Average Demand (million gal.)	1.84	1.85*	1.99	2.10	1.98
Peak Day Demand (million gal.)	3.18	3.04	4.15	3.79	3.82
Unaccounted for Water (percent)	6.0	8.7	11	10.6	11.3
Residential per Capital per day (gal.)	66	65	70	73	65
Annual Precipitation (inches)	57.53	45.49	35.59	35.51	48.29
Mean Annual Precipitation (inches)	42.09	41.98	41.95	41.92	41.97
Residential Rate per Unit (unit = 7.48 gal.)					
Base Rate- Step 1	$.0537	$.0516	$.0496	$ .0477	$.0459
Conservation Rate – Step 2 (May 1 – Oct. 31)	$.1128	$.1084	$.0992	$ .0954	$.0918
Conservation Rate – Step 3 (May 1 – Oct. 31)	$.1423	$.1367	$.1240	$ .1193	$.1148
General Service Rate per Unit of 7.48 gallons					
Step 1 - (<50 Units)	$.0537	$.0516	$.0496	$ .0477	$.0459
Step 2 - (>50 Units)	$.0681	$.0655	$.0630	$ .0606	$.0583

Ultimately, these activities will be used to inform future permit conditions and treatment activities associated with Concord's wastewater facility.

Sewer Pumping Stations

Sewer pumping stations carry wastewater from local networks of gravity flowing pipes (collection system) and then pump this wastewater to a central wastewater treatment facility located off of Bedford Street. The size and complexity of each pumping station depend upon local land elevations, topography, and the actual volume of wastewater handled. The Lowell Road and Assabet Sewer Stations are the two largest facilities in Concord, designed to handle flows from the most densely populated and commercialized neighborhoods of West Concord and Concord Center. Six smaller neighborhood lift stations serve less populated areas of Town with much more modest physical footprints.

The Lowell Road and Assabet Sewer pumping stations were last upgraded in the mid-1980s. As most of the mechanical, electrical, plumbing and instrumentation and control systems associated with these two facilities have served well beyond there useful life, planning efforts were initiated towards the replacement or reconditioning of these facilities. Kleinfelder, a qualified water and wastewater engineering firm, has evaluated existing conditions of each facility and developed a 25% (preliminary) design for needed improvements at each respective facility. It is expected that this coming year final design will be completed and construction contracts awarded.

CPW Water/Sewer Division crews continued to perform routine operation and maintenance of the eight operating sewer facilities. In addition to these routine inspection and service activities, non-routine improvements performed over the past year included; the replacement of one of two existing submersible pumps located within the Laurel Street pump station; the replacement of one of two existing submersible pumps located within the Cousins Park pump station; and the replacement of a faulty relay in the Park Lane pump station.

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 (CWMP).

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 stormwater and groundwater that flows into the sanitary wastewater collection system through illicit connections or leaking pipes. Unlike many cities and towns across the country, Concord is fortunate in that the stormwater and sanitary wastewater drainage systems where originally designed and constructed as completely separate systems. As such, Concord is spared the costly burden of managing combined sewer overflows (CSO's) that is more common when stormwater is directed to the sanitary sewer system. While routine collection system inspections and maintenance efforts continued throughout the year, no major capital improvement projects or system expansion initiatives were realized.

Infiltration and Inflow Program
A successful I/I program is developed to reduce risks and frequency of sanitary sewer overflows, reduces the operating cost required to treat what is essentially clean water, and increases the likelihood of maintaining water quality standards that are included in a strictly enforced discharge permit. This past year, there were no reportable sanitary sewer overflows identified within Concord's system. Furthermore, the 12-month (rolling average) of wastewater flow processed through Concord's wastewater treatment plant was 1.13 MGD, below the 1.2 MGD permitted capacity assigned to this facility. The infiltration rate (of groundwater) into the collection system was calculated at 23.3%, and the inflow rate (stormwater) was estimated at approximately 0.8%. Both rates fall within acceptable industry limits and well below "excessive" rates as defined by the MassDEP.

In an effort to optimize routine maintenance and inspection activities, Weston & Sampson was tasked to compile and analyze flow data collected from the eleven (11) non-contact flow meters which had been leased from HACH back in 2014/2015. Of the 11 meters installed, four of the meters yielded sufficient data that could be analyzed. On a positive note, these four meters captured data for approximately 58% of the sewer system. The estimated infiltration rate for the area covered by these meters was determined to be 1,383 gallons per day per inch-mile (gpdim) MassDEP considers 4,000 gpdim or greater as "excessive."

Wastewater Treatment Plant Operations
Woodard & Curran, Inc. (Portland, ME) continues to operate the Concord Wastewater Treatment Plant (WWTP), located off of Bedford Street. They are in the 5th year of a 10-year service contract. CPW's 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 with and in accordance with State and Federally issued permits.

In addition to routine inspection and service activities, non-routine improvements performed over the past year included; the refurbishment of stem/screw drive assembly on the knife gate required to isolate flow entering Primary Clarifiers Unit #1; dewatering of Primary Clarifiers Unit #2 to allow for inspection of tank and associated drive unit; completion of energy efficient lighting retrofit (performed by M-V Electrical Contractors, Inc. of Acushnet, MA) for the lighting system located on the first floor of the WWTP; the cleaning of the two septage receiving tanks, removing over ten years of grit/solids accumulation on the bottom of the holding tanks performed by BMC Corporation (Billerica, MA); and refurbishing two original Alum feed pumps (installed in 2007) associated with the CoMag system.

NPDES Permit Renewal
Concord submitted a formal request to renew its National Pollutant Discharge Elimination System (NPDES) permit to EPA in accordance with the federally established five-year permit cycle. EPA provided an acknowledgment that the application was received and appeared to be complete, with an understanding that they may request additional information as the permit is developed, should it be necessary to clarify, modify or supplement any previously submitted information. A draft permit and statement of basis or fact sheet to be prepared by EPA is pending and will be forwarded upon the opening of the public comment period.

Sewer Statistics	2018	2017	2016	2015	2014
Assabet Pumping Station					
Total Pumped (million gallons)	94.28	88.09	74.47	73.85	78.67
Monthly Average (million gallons)	7.86	7.34	6.21	6.15	6.55
Daily Average (million gallons)	0.26	0.24	0.20	0.20	0.22
Lowell Road Pumping Station					
Total Pumped (million gallons)	350.37	312.64	258.44	272.02	341.13
Monthly Average (million gallons)	29.20	26.05	21.54	22.67	28.43
Daily Average (million gallons)	0.96	0.86	0.71	0.75	0.93
Bedford Street					
Total Pumped (million gallons)	7.92	6.18	5.80	5.48	5.23
Monthly Average (million gallons)	0.66	0.51	0.48	0.46	0.44
Daily Average (million gallons)	0.02	0.02	0.02	0.02	0.01
Collection System					
Number of Service Accounts	1876	1,869	1,866	1,851	1,834
Miles of Sewer Main	34.03	34.03	34.03	34.03	34.03
Main Pipe Inspected (lf.)	4,515	11,350	1,500	3,500	3,700
Main Pipe Replaced/Rehabilitated (lf.)	0	0	0	0	705
Rate per Unit (unit = 7.48 gallons)	$ .1153	$ .1141	$ .1119	$ .1086	$.1055