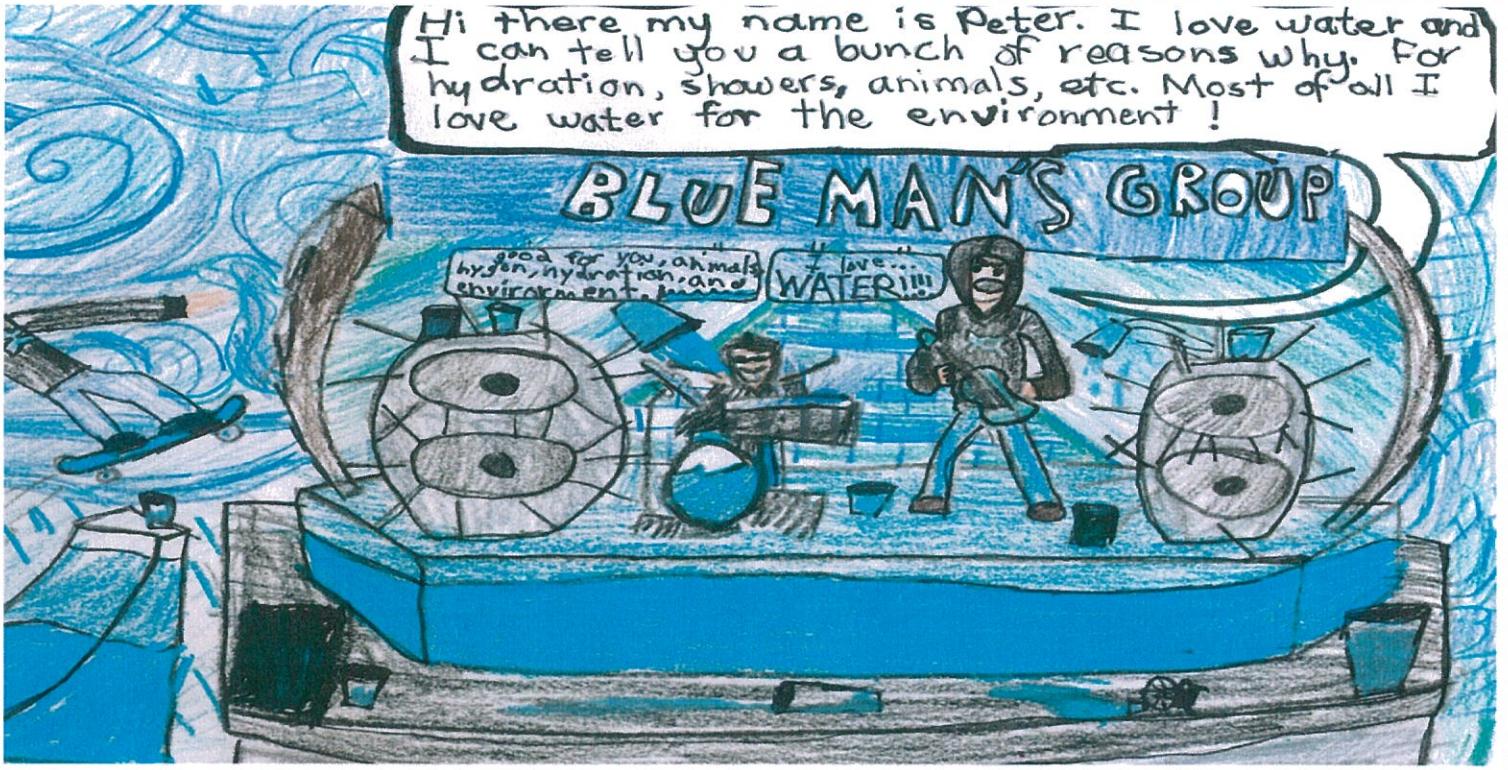
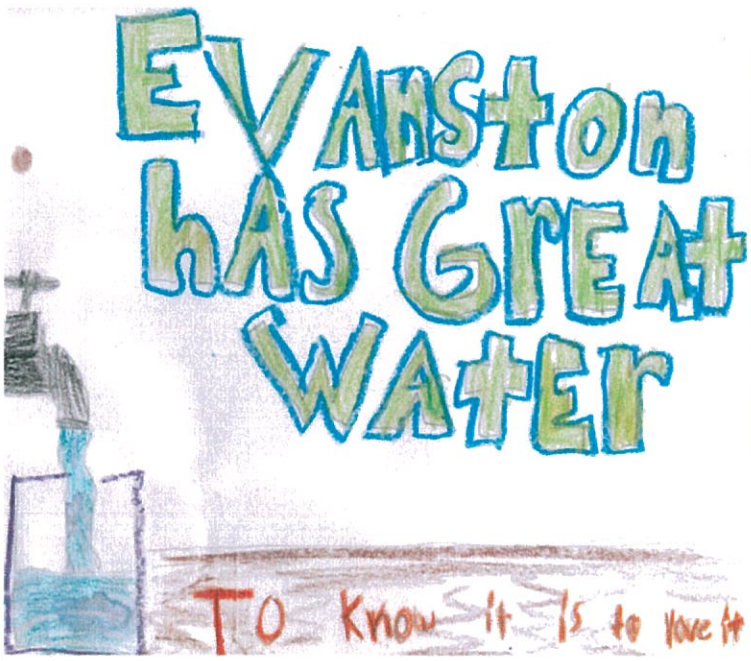
2016 Annual Report

City of Evanston

Evanston Public Works Agency
Water Production Bureau
Water and Sewer Utilities
Serving the Community for 142 Years





Cover photos, clockwise from top left: National Drinking Water Week 3rd Grade Art Contest Winners - People's Choice Award, Peter Jankowski, St. Anthanasius Elementary School, Mayor's Choice Award, Ryan Hecker, Willard Elementary School, Water Spirit Award, Lucy Marinacci, St. Anthanasius Elementary School.

City of Evanston

Table of Contents

Introduction

Pumping

Filtration

Distribution

Metering

Sewer

Evanston Water and Sewer Utilities Annual Accomplishments and Performance Measures

Introduction

The Evanston Public Works Agency manages water and sewer operations for the City of Evanston. The Water Utility is responsible for operation and maintenance of the Water Treatment Plant, which supplies water to over 400,000 people in Evanston and six other communities. The Water Utility also operates and maintains more than 155 miles of water mains, 2,000 valves, and 1,500 fire hydrants in the Evanston distribution system. This division also manages leak detection and cross connection control programs to minimize water loss and ensure the safety of the community's water supply.

The Sewer Utility is responsible for operation and maintenance of the sewer conveyance systems in Evanston, including a combined sewer system, a relief combined sewer system, and a storm sewer system. These systems are comprised of over 200 miles of sewer mains ranging in size from less than 6-inch diameter to 120-inch diameter, including over 5,500 manhole structures and over 9,000 drainage structures.

The Public Works Agency also coordinates with ComEd, Nicor, AT&T, and other private utilities on behalf of Evanston residents and businesses to help resolve service issues and improvement needs.

The Department's total FY 2016 budget was approximately $56.5 million ($41.1 million Water Fund and $15.4 million Sewer Fund). Public Works Agency staff includes 54.83 full-time equivalents (FTEs).

Year-to-Year Public Works Agency Metrics

	2014	2015	2016
Total Water Pumped (millions of gallons)	13,428	13,424	14,519
Fire Hydrants Repaired or Replaced	330	64	345
Water Main Valves Repaired or Replaced	53	71	56
Water Main Replaced or Rehabilitated (miles)	1.7	0.89	2.27
Large Diameter Sewer Rehabilitated (feet)	5,356	5,032	1,908
Small Diameter Sewer Rehabilitated (feet)	6,703	6,298	5,845
Sewer Mains Inspected (feet of pipe)	97,347	96,077	80,094
Sewer Mains Cleaned (feet of pipe)	151,091	150,406	225,966
Sewer Structures Repaired or Replaced	76	91	98

2016 Major Accomplishments

Maintained High Quality of Service
Remained a leader in the public drinking water industry by providing high quality service to over 400,000 customers in six communities, including vigilantly monitoring the quality and quantity of water provided to our customers.

Major Water Treatment Facility Improvements
Assured the quality and reliability of the potable water supply by the initiation of major water treatment plant improvements including chemical feed, treatment process reliability improvements, and Finished Water Storage Improvements to address structural deterioration the City's largest clearwell built in 1934.

Digitalization of Plant Information
The initiation of a Computerized Maintenance Management System (CMMS) at the water treatment plant to more effectively manage long-term maintenance and replacement of critical treatment plant equipment and structures.

Water Supply Expanded
Expanded Evanston's wholesale water customer base by successfully negotiating an agreement with both Morton Grove and Niles.

Completed Water Distribution and Expansion
Improved water distribution system reliability and reduced water loss by expanding on the current water main replacement and water main leak detection programs. Goals were to supplement water main replacement with water main lining where feasible, to improve upon our historical 1% annual water main renewal rate, and to survey the entire distribution system for leaks on an annual cycle. Completed other major distribution system improvements including rehabilitation and replacement of water mains on Sheridan Road between Lincoln Street and Chicago Avenue.

Coordinated Efficient Project Funding
Coordinated capital improvement projects with the Street Resurfacing Program and with TIF District improvement projects to ensure cost-effective and efficient use of capital improvement funding.

Designed and Funded Large Diameter Sewer Rehabilitation
Performed engineering design and secured state low-interest loan funding for two additional large diameter sewer rehabilitation projects scheduled for 2016 and 2017.

Continued Small Diameter Sewer Rehabilitation
Continued the annual small diameter sewer CIPP rehabilitation program at a rate of at least 1% of the combined sewer system rehabilitated per year.

Prevented Sewer Deterioration with Rehabilitation Program
Implemented a large scale sewer structure rehabilitation program that addressed deterioration of sewer structures on arterial streets.

Continued Coordination with Street Resurfacing Program
Continued to coordinate the inspection and repair of sewer main and drainage structures prior to the street resurfacing program.

Continued Preventative Measures for Sewer Mains
Continued preventative maintenance cleaning and inspection of sewer mains and drainage structures.

Completed Combined and Storm Sewer Inspections
Continued to perform inspections of combined and storm sewer outfalls in accordance with IEPA requirements.

Increased Storm Water Management Initiatives
Increased storm water management initiatives in compliance with requirements for National Pollution Discharge Elimination System (NPDES) permit and Municipal Separate Storm Sewer System (MS4) permit.

2016 Major Goals and Initiatives

Design and Fund Large Diameter Sewer Rehabilitation
Perform engineering design and secure State low-interest loan funding for a large diameter sewer rehabilitation project scheduled for 2017.

Small Diameter Sewer Rehabilitation
Continue the annual small diameter sewer CIPP rehabilitation program at a rate of at least 1% of the combined sewer system rehabilitated per year.

Arterial Street Sewer Structure Rehabilitation
Continue the sewer structure rehabilitation program to address deterioration of sewer structures on arterial streets.

Coordination with Street Resurfacing Program
Continue to coordinate the inspection and repair of sewer mains and drainage structures in advance of the street resurfacing program.

Continue Best Management Practices for Sewer Mains
Continue preventative maintenance cleaning and inspection of sewer mains and drainage structures.

Combined and Storm Sewer Regulatory Inspections
Continue to perform inspection of combined and storm sewer outfalls in accordance with IEPA requirements.

Increase Storm Water Management Initiatives
Increase storm water management initiatives in compliance with requirements for National Pollution Discharge Elimination System (NPDES) permit and Municipal Separate Storm Sewer System (MS4) permit.

Water Treatment Plant Data

Intakes
36/42" – 5,946' long, 28' deep
48" – 5,300' long, 28' deep
54" – 5,340' long, 28' deep

Suction Wells
2 – 22' diameter x 74' deep with traveling screens
1 – 20' diameter x 52.5' deep

Low Lift Pumps
2 – 30 mgd, electric motor driven
3 – 15 mgd, dual drive, electric/natural gas
1 – 30 mgd, dual drive, electric/natural gas
Total capacity of 135 mgd
Emergency standby capacity of 75 mgd

Flash Mix Basin
14.75' x 14.75' x 31.58' deep
Single vertical shaft mixer
Counter-flow rotation
Application point for alum, chlorine, fluoride, polymer, and carbon
Rated capacity 108 mgd w/ partial bypass

Slow Mix/Settling Basins
Four double-deck basins with series flow
2 – 2.865 MG capacity, five 60' shafts per basin, 4 paddle wheel sections
2 – 4.3 MG capacity, eight 60' shafts per basin, 4 paddle wheel sections
Retention time at 108 mgd (flash mix capacity) is 3 hours and 11 minutes

Treated Water Elevated Storage
South – 5.0 MG, 640 Hartrey Avenue
North – 7.5 MG, 2536 Gross Point Road

Filters
Anthracite-capped rapid sand filters
12 – 3.19 mgd, 738 ft^2 each, surface loading rate of 3 gpm/ft^s
12 – 8.01 mgd, 1,391 ft^2 each, surface loading rate of 5 gpm/ft^2
Total rated capacity of 134 mgd
Automatic surface and backwash system on all 24 filters

Treated Water Ground Storage
8 clearwells beneath filters – 4.4 MG total
1 clearwell beneath NU parking lot – 5.0 MG
Total Plant Storage – 9.4 MG

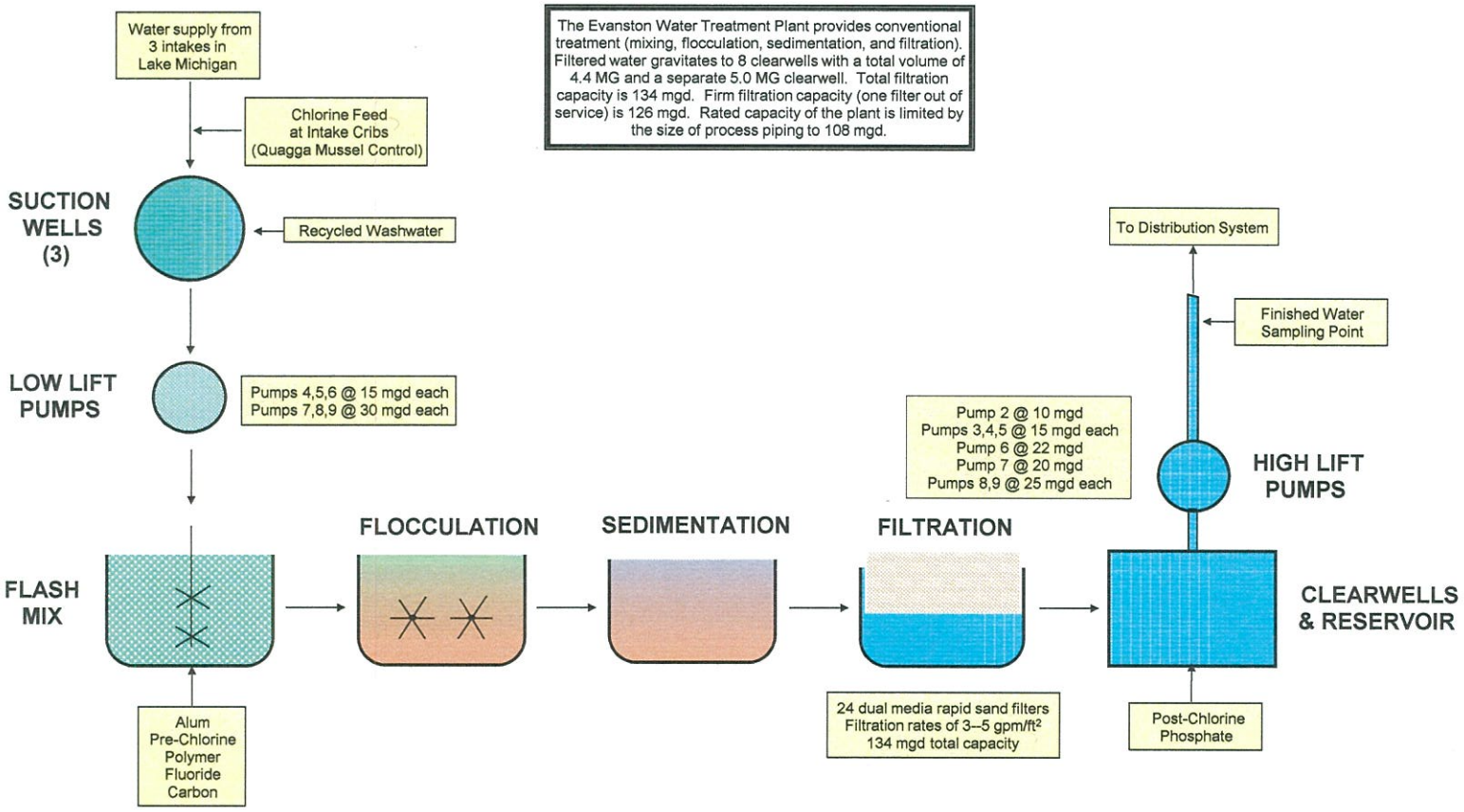
High Lift Pumps
1 – 15 mgd, electric motor driven
2 – 25 mgd, electric motor driven
1 – 10 mgd, dual drive, electric/natural gas
2 – 15 mgd, dual drive, electric/natural gas
1 – 22 mgd, dual drive, electric/natural gas
1 – 20 mgd, natural gas engine
Total capacity of 147 mgd
Emergency standby capacity of 82 mgd

Wash Water Pumps
2 – 20 mgd
2 – 10 mgd

Detention Tank
80' x 192' x 12' deep, divided in 2 sections
Total capacity of 1.1 MG
1 – submersible sludge pump at 700 gpm

Legend: MG = million gallons; mgd = million gallons per day; gpm = gallons per minute

Water Treatment Schematic



Volume (MG)	0.109	2.384	13.516	1.730	9.560*

Notes:
*based on 8.0' depth

Water Works Improvements (1874 to 2016)

1874 Evanston Community Water System established

1913 Constructed 12 mgd filter plant

1923 Expanded filter plant to 24 mgd

1934 Constructed 5.0 million gallon underground reservoir at plant site

1944 Contracted to supply water to Skokie

1949 Constructed high lift (finished water) pumping station
Expanded filter plant to 48 mgd
Constructed slow mix basins 1 and 2

1956 Constructed 48" intake and low lift (raw water) pump station
Constructed 36" feeder main to Skokie

1964 Expanded filter plant to 72 mgd
Constructed additional 36" feeder main to Skokie
Constructed slow mix basins 3 and 4

1971 Installed 20 mgd high lift pump and natural gas engine

1974 Constructed filter wash water detention basin, 1.1 MG capacity

1976 Constructed 54" intake, 5,340 feet in length
Extended 48" intake to 5,300 feet in length

1981 Constructed material storage building at south water tank yard
Installed 3 new boilers (2 – 50 HP and 1 – 20 HP)
Replaced 5 kV switchgear and motor starter equipment for low lift pumps
Upgraded slow mix equipment in basins 1 and 2

1982 Installed two 30 mgd low lift pumps
Replaced 5 kV motor starter center for high lift pumps

1983 Constructed new chemical building and chemical feed system
Installed a 500 kW emergency generator
Rehabilitated six 1914 and six 1924 filters to increase rate to 3 MGD per filter

1984 Constructed 5 MG standpipe with booster station to replace the 1.5 MG elevated tank in southwest Evanston

1985 Began selling water to Northwest Water Commission at the rate of 10 MGD
Installed dual drive 22 MGD high lift pump and new piping
Installed two 48" diameter pipes from reservoir to east side of high lift suction tunnel
Completed system automation which provided a microprocessor-based digital control system to perform control and supervisory functions

1986 Constructed a 7.5 MG standpipe with booster station to replace the 1.0 MG elevated tank in northwest Evanston
Began pumping to Northwest Water Commission reservoir in Des Plaines

1988 Installed two 700 gpm sludge pumps with automatic samplers in the settling basins along with 3,400 feet of 8" diameter sludge main from the Filtration Plant to the MWRD interceptor at Lincoln Street and Asbury Ave

1989 Completed filter control upgrade to microprocessors

1990 Turndown and extension of 48" raw water intake lines into North and South suction wells
Upgraded west filter influent valves from 16" to 24"

1991 Upgraded electrical substation and switchgear to 3,750 kVA
Upgraded west filter effluent piping

1992 Installed chlorine feed system to intakes for zebra/quagga mussel control
Installed a 15 MGD high lift pump to replace one 8 MGD pump and one 6 MGD pump
Installed two 48" diameter butterfly valves on suction piping from reservoir to high lift suction wells
Installed hydrofluosilicic acid tank and feed system in garage #6
Installed 60" diameter flash mix bypass pipe to influent duct of settling basins
Replaced slow mix equipment and flushing system in basins 3 and 4
Replaced 480 V filter plant switchgear
Installed blended phosphate system and initiated blended phosphate treatment for corrosion control

1994 Constructed new chemical storage and handling building

1995 Replaced Low Lift Pump #6 gasoline engine with natural gas engine

1996 Replaced 1949 filter building roof
Constructed loading dock on 1913 filter building

1997 Replaced High Lift Pump #2 gasoline with a natural gas engine

1998 Replaced Low Lift Pump #5 and #7 dual drive gasoline engines with natural gas fueled engines

2000 Installed individual effluent turbidimeters on all 24 filters

2001 Converted High Lift Pump #3 to dual drive
Replaced filter bottoms and rehabbed six filters in 1948 filter addition

2002 Completed installation of automatic fixed radio meter reading system
Replaced effluent settling basin sluice gates with rectangular butterfly valves

2003 Installed uninterruptible power supply to filtration and pumping equipment

2004 Constructed garages east of the settling basins
Constructed an access way to the chemical building from filtration division
Installed a scrubber

2005 Replaced Low Lift Pump #4 gasoline engine with natural gas engine

2006 Replaced Low Lift Pump #7

2008 Renovated administrative offices
Expanded filter shop area

2009 Implemented AQUAS (Harris) Utility Billing System
Installed anchor ice and zebra mussel control systems in 54" intake

2010 Installed a 25 kW solar energy facility on the high lift pump station roof

2012 Rehabilitated Filters 19-24 with new media, underdrains, and backwash equipment
Rehabilitated the 1963 filter building structure and roof
Replaced all windows in the high lift pump station
Replaced electrical switchgear in high lift pump station

2013 Modified electrical distribution equipment and settings on protective devices throughout the water treatment plant to reduce arc flash hazards
Conducted comprehensive maintenance and evaluation of electrical Switchgears

2014 Replaced five roofs: Boiler Room, Low Lift Pumping Station, Chemical Building, and 1948 Filter Building (2 roofs), replaced master flow meter on the 48" diameter feeder main to Evanston and Skokie

2015 Improvements to one of the water plant intakes, upgrade/replacement of the City's automatic meter reading and billing system, and chlorination equipment replacement.

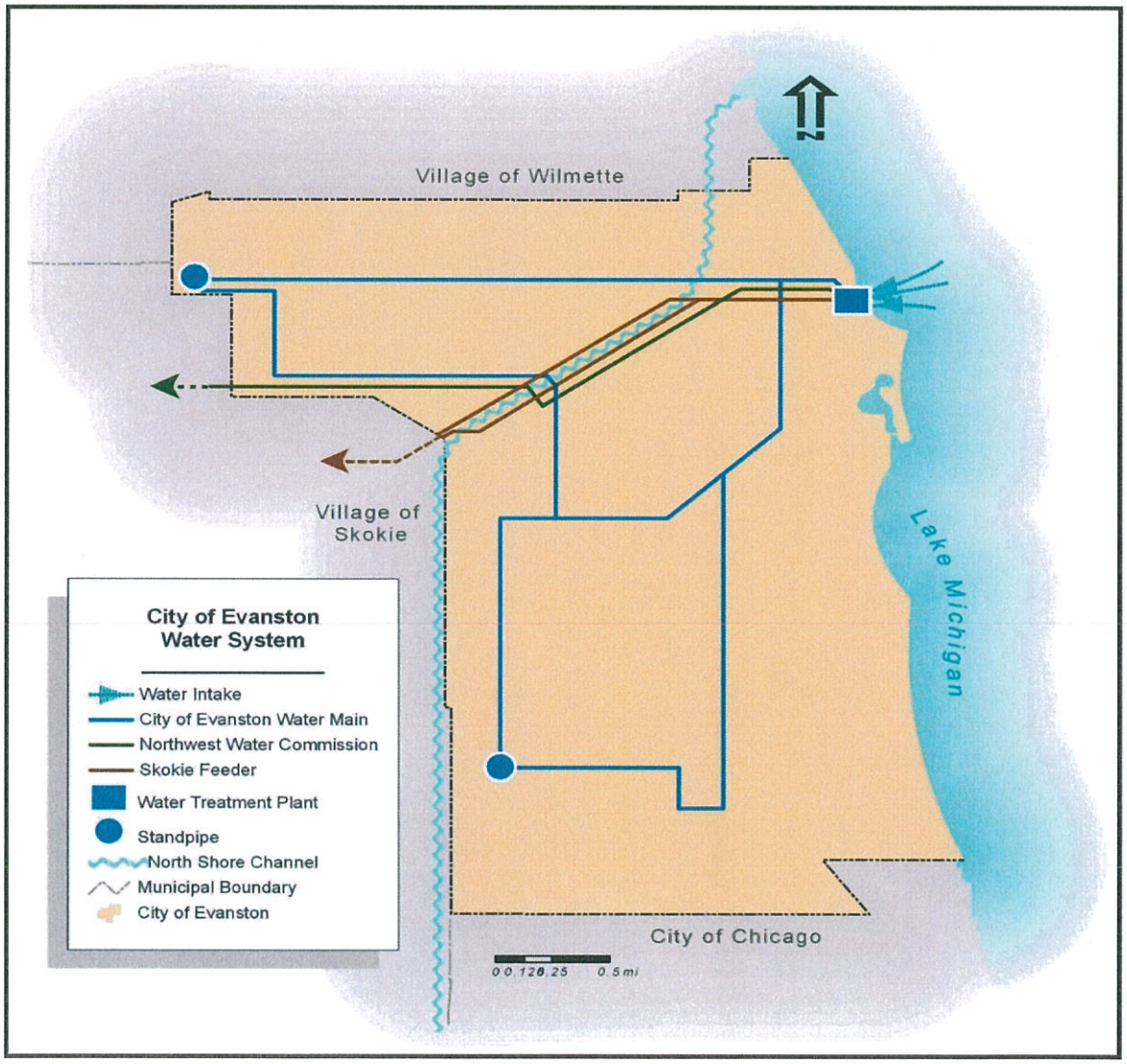
2016 Completed standpipe painting and replaced four roofs (1964 Filter Building Clerestory, 1948 Filter Building Clerestory, Filter Cross Corridor & Chlorine Building).

Notes: MG = million gallons
mgd = million gallons per day
HP = horsepower
kV = kilovolt
kW = kilowatt
kVA = kilovolt-ampere

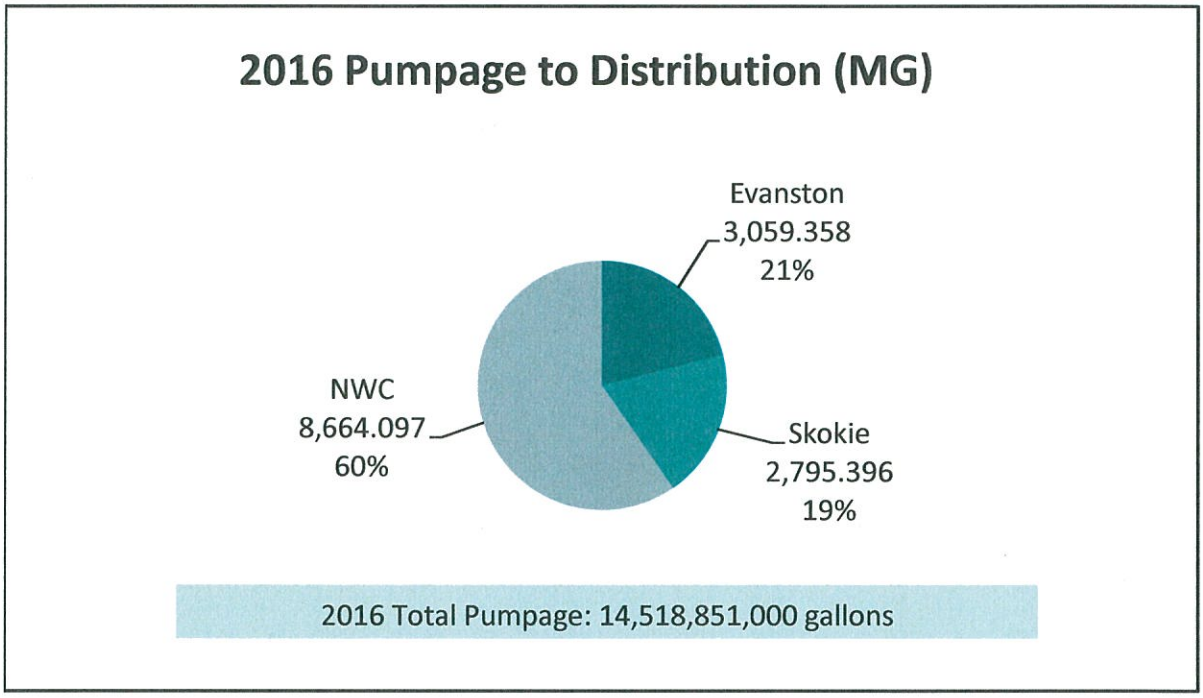
Service Area & Population

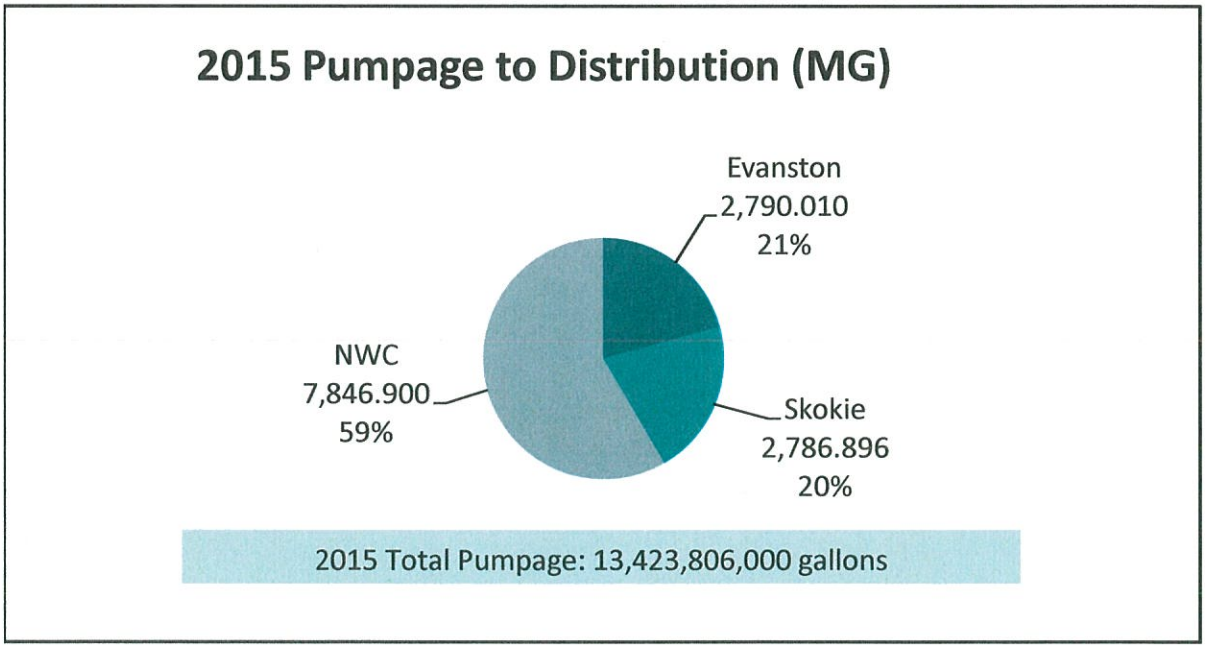
	Area (Square Miles)	2016 Persons*
Evanston	7.8	75,527
Skokie	10	64,821
NORTHWEST WATER COMMISSION		
Arlington Heights	16.6	75,926
Buffalo Grove	9.5	41,503
Palatine	13.6	69,308
Wheeling	8.7	38,079
Des Plaines	14.4	58,677
Total Served	**80.6**	**423,841**

* U.S. Census Bureau, 2015 Estimate



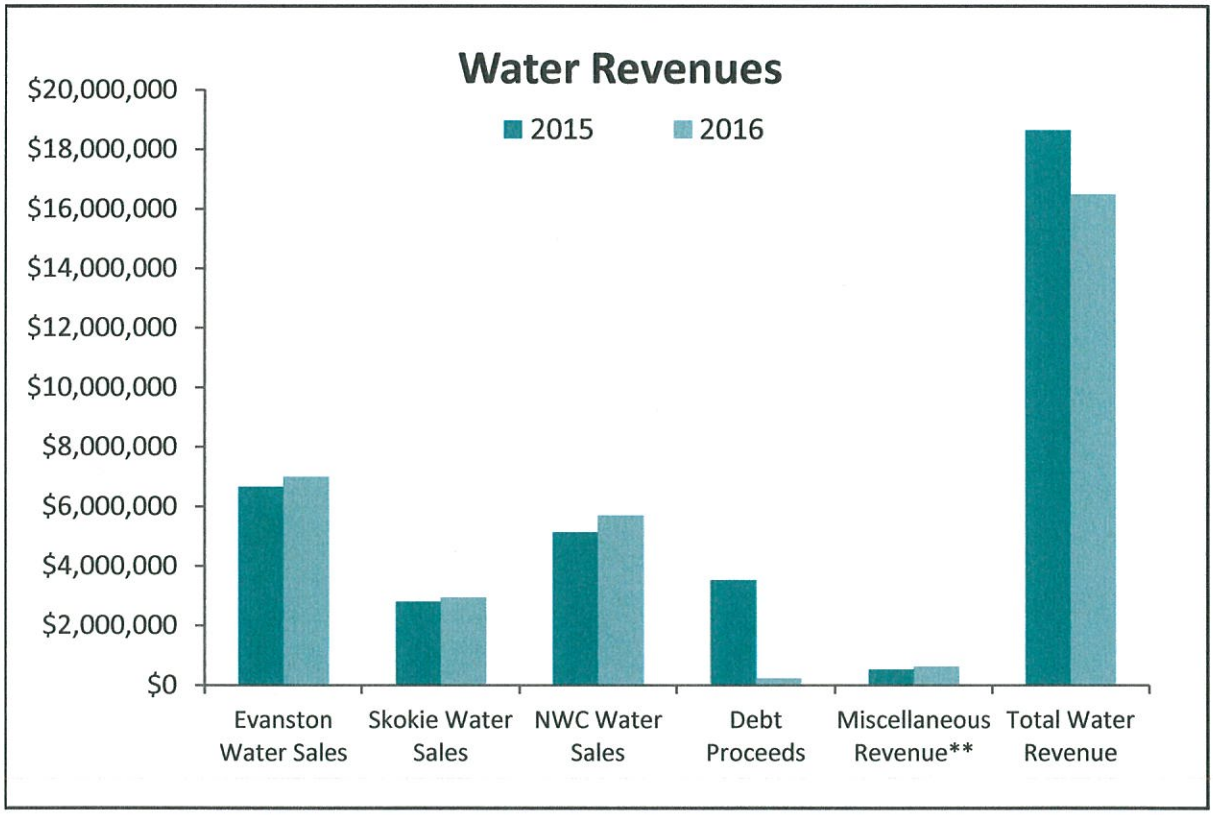
Pumpage to Distribution





Water Revenues*

	2015	2016
Evanston Water Sales	$6,651,000	$6,987,878
Skokie Water Sales	$2,800,000	$2,941,912
NWC Water Sales	$5,130,000	$5,695,812
Debt Proceeds	$3,525,000	$230,000
Miscellaneous Revenue**	$527,375	$629,414
Total Water Revenue	$18,635,390	$16,487,032

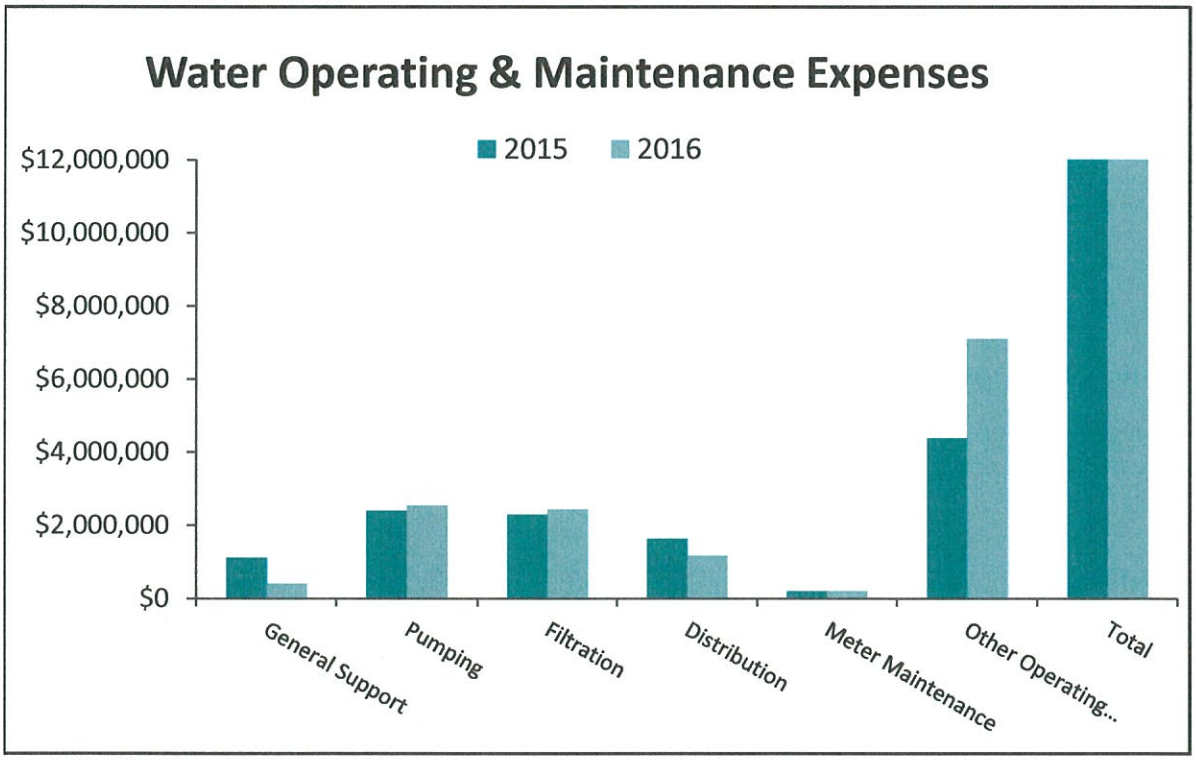


* Financial data are based on actual expenses and do not include audit adjustments such as depreciation and inventory. For audited financial records, see the Comprehensive Annual Financial Report for the City of Evanston, http://www.cityofevanston.org/transparency/budget-financial-reports/.

** Miscellaneous Revenue includes cross connection control fees, investment earnings, property sales and rentals, fees, outside work, grants, development fees, phosphate sales, and merchandise sales.

Water Operating & Maintenance Expenses*

	2015	2016
General Support	$1,117,602	$397,716
Pumping	$2,392,399	$2,533,001
Filtration	$2,293,890	$2,427,538
Distribution	$1,629,360	$1,162,091
Meter Maintenance	$202,759	$203,818
Other Operating Expenses**	$4,382,080	$7,097,052
Total	$12,018,091	$13,821,215



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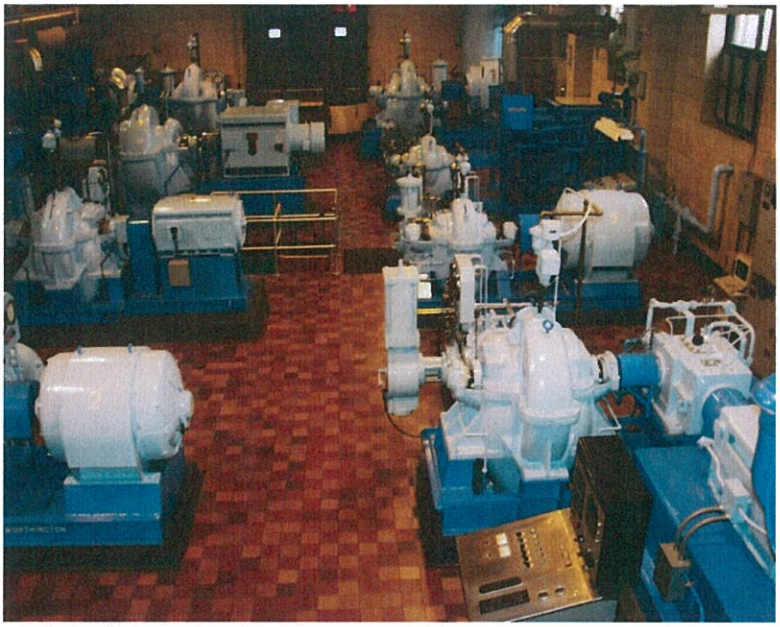
**Other Operating Expenses include capital outlay, interfund transfers (general and insurance), and other operating expenses.

Pumping

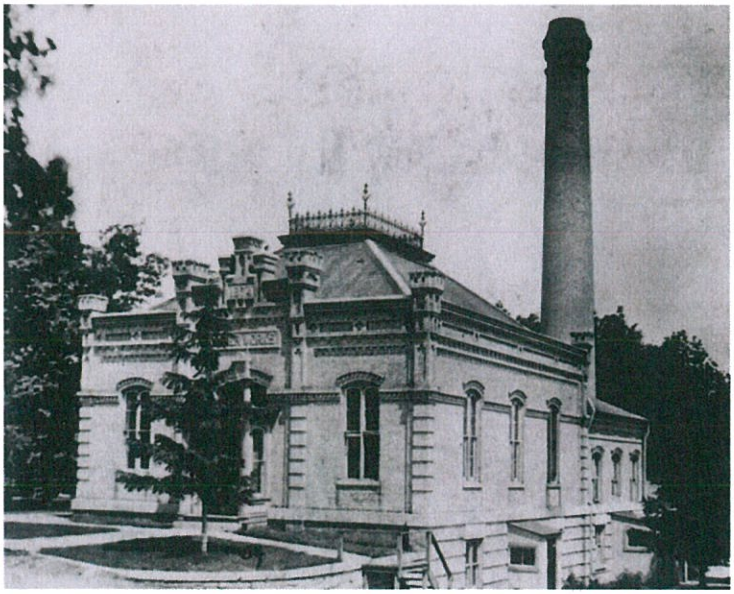
Evanston's Pumping Division manages the City's three Lake Michigan water supply intakes, pumping of raw water to the start of the water treatment process; pumping of treated water to retail customers in Evanston as well as wholesale customers; and operation and maintenance of Evanston's treated water storage facilities and remote water pumping stations. This division also monitors water storage tanks in the Village of Skokie, as well as controlling the rate of water supply to the Northwest Water Commission.



High Lift Pumping Station at the Evanston Water Treatment Plant

There is at least one pump operating at the Evanston Water Treatment Plant at all times, to ensure that a sufficient quantity of water is always available for public consumption and firefighting. There is always at least one water operator present at the Pumping Station to control water supply and pressure and respond to emergencies.

Evanston has been pumping drinking water from the site of the existing water treatment plant on Lincoln Street since 1874. The original "water works" consisted of a coal-fired steam engine and a single pump with a capacity of 2 million gallons per day. Construction of a pumping station to serve the entire City drastically improved Evanston's ability to fight fires and allowed the City to reliably deliver Lake Michigan water to homes and businesses on demand for the first time.



Evanston's original pumping station in 1874

2016 Monthly Pumpage (MG)

Month	Lake Water Pumpage	Wash Water Recycled	Net Raw Water Pumpage	Finished Water Pumpage	Pumpage To		
					Evanston	Skokie	N.W.C.
Jan-16	1,086.931	14.906	1,101.837	1,104.406	221.282	236.778	646.346
Feb-16	981.320	13.083	994.403	1,003.059	239.849	205.449	557.761
Mar-16	1,006.181	13.824	1,020.005	1,036.734	218.994	224.519	593.221
Apr-16	1,021.884	13.316	1,035.200	1,051.962	223.289	222.227	606.446
May-16	1,228.108	19.911	1,248.019	1,258.027	250.406	239.398	768.223
Jun-16	1,301.329	28.010	1,329.339	1,325.218	268.991	252.723	803.504
Jul-16	1,425.218	29.663	1,454.881	1,462.990	301.121	274.199	887.670
Aug-16	1,394.120	31.256	1,425.376	1,425.783	300.573	270.068	855.142
Sep-16	1,271.030	21.755	1,292.785	1,297.671	277.058	239.415	781.198
Oct-16	1,206.712	18.985	1,225.697	1,224.607	267.044	216.809	740.754
Nov-16	1,106.157	13.555	1,119.712	1,130.757	250.221	194.252	686.284
Dec-16	1,172.180	12.756	1,184.936	1,197.637	240.530	219.559	737.548
Total	**14,201.170**	**231.020**	**14,432.190**	**14,518.851**	**3,059.358**	**2,795.396**	**8,664.097**

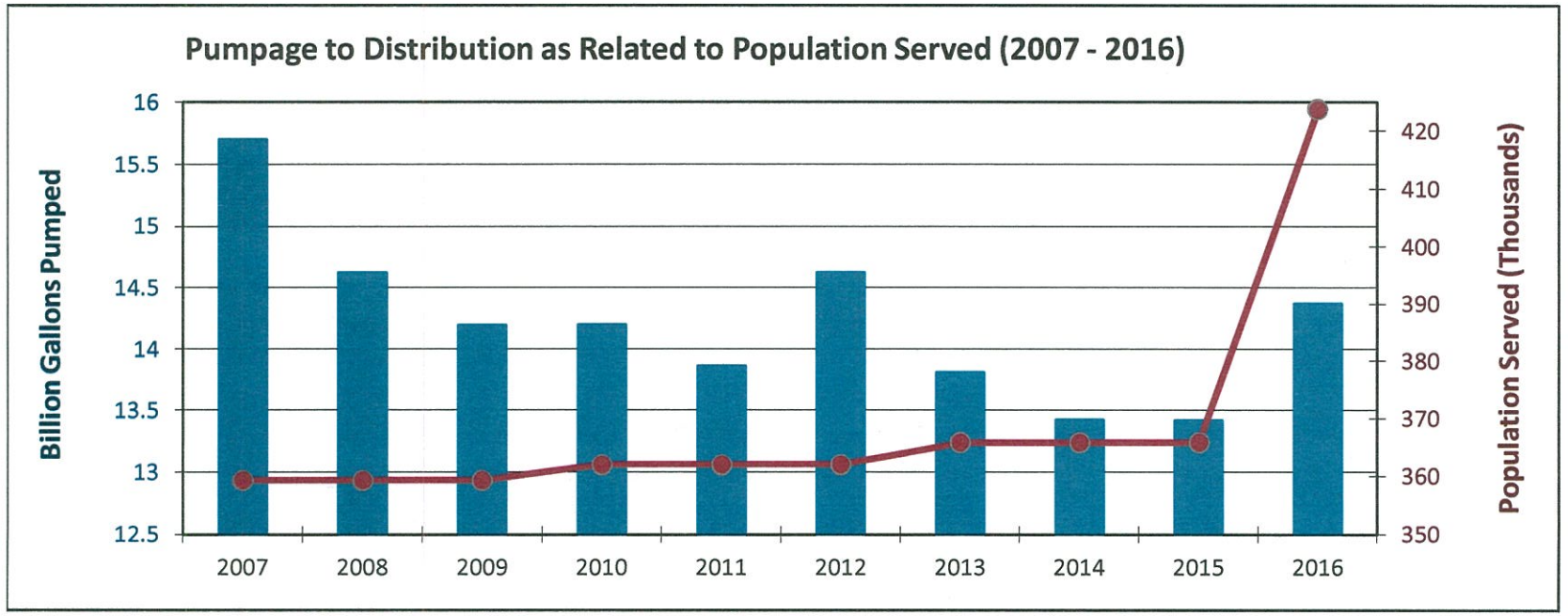
2016 Average Day Pumpage (MGD)

Month	Lake Water Pumpage*	Wash Water Recycled	Net Raw Water Pumpage	Finished Water Pumpage	Pumpage To		
					Evanston	Skokie	N.W.C.
Jan-16	35.062	0.481	35.543	35.626	7.138	7.638	20.850
Feb-16	35.047	0.467	35.514	35.824	8.566	7.337	19.920
Mar-16	34.400	0.446	32.903	33.443	7.064	7.243	19.136
Apr-16	33.939	0.444	34.507	35.065	7.443	7.408	20.215
May-16	39.616	0.430	33.394	40.582	8.078	7.723	24.781
Jun-16	43.378	0.934	44.311	44.174	8.966	8.424	26.783
Jul-16	45.975	0.957	46.932	47.193	9.714	8.845	28.635
Aug-16	44.972	1.008	45.980	45.993	9.696	8.712	27.585
Sep-16	42.368	0.725	43.093	43.256	9.235	7.981	26.040
Oct-16	38.926	0.612	39.539	39.503	8.614	6.994	23.895
Nov-16	36.872	0.452	37.324	37.692	8.341	6.475	22.876
Dec-16	37.812	0.411	38.224	38.633	7.759	7.083	23.792
Average	**38.907**	**0.633**	**39.540**	**39.778**	**8.382**	**7.659**	**23.737**

Note: "Pumpage to Evanston" includes process and domestic water uses at the water treatment plant.

Annual Pumpage (MG)

Year	Lake Water Pumpage	Wash Water Recycled	Total Raw Water Pumpage	Finished Water Pumpage	Pumpage To		
					Evanston	Skokie	N.W.C.
2016	14,201.170	231.020	14,432.190	14,375.415	3,059.358	2,795.396	8,664.097
2015	13,471.823	200.285	13,672.108	13,423.806	2,790.010	2,786.896	7,846.900
2014	13,416.872	239.547	13,656.419	13,427.979	2,719.978	2,766.348	7,941.653
2013	13,925.102	247.609	14,172.711	13,814.461	2,930.278	2,787.256	8,096.927
2012	14,817.637	322.302	15,110.465	14,627.115	2,939.417	3,068.004	8,619.694
2011	13,939.618	212.426	14,152.042	13,941.167	2,991.848	2,866.652	8,082.667
2010	14,087.849	218.251	14,306.100	14,268.257	2,701.569	3,094.554	8,472.134
2009	14,363.047	193.841	14,556.888	14,350.335	3,140.898	2,829.824	8,379.613
2008	14,872.552	134.595	15,007.147	14,693.877	3,142.816	2,961.341	8,589.720
2007	15,905.381	192.088	16,097.469	15,771.451	3,207.422	3,564.781	8,999.248



Average Daily per Capita Consumption

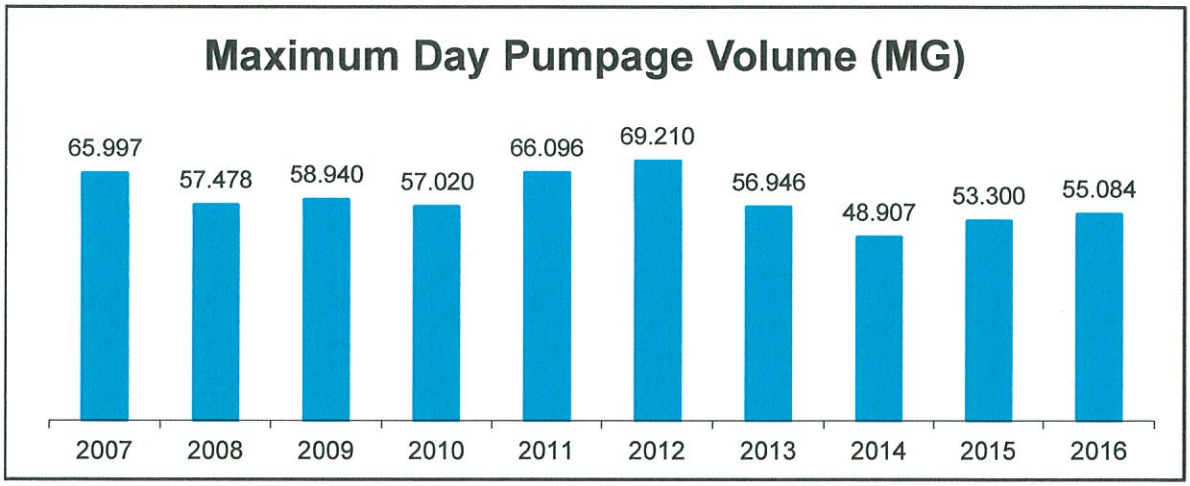
	Evanston		Skokie		NWC		Total	
Year	Population	Per Capita Use (gpcd)	Population	Per Capita Use (gpcd)	Population	Per Capita Use (gpcd)	Population	Per Capita Use (gpcd)
2016	75,527	111	64,821	118	283,493	84	423,841	94
2015	75,570	101	65,176	117	225,137	95	365,883	101
2014	75,570	99	65,176	116	225,137	97	365,883	101
2013	75,570	106	65,176	117	225,137	99	365,883	103
2012	74,486	105	64,784	130	222,802	106	362,072	110
2011	74,486	107	64,784	121	222,802	99	362,072	105
2010	74,486	97	64,784	131	222,802	104	362,072	107
2009	74,360	110	63,333	122	221,364	104	359,057	108
2008	74,360	114	63,333	128	221,364	106	359,057	112
2007	74,360	116	63,333	154	221,364	111	359,057	120

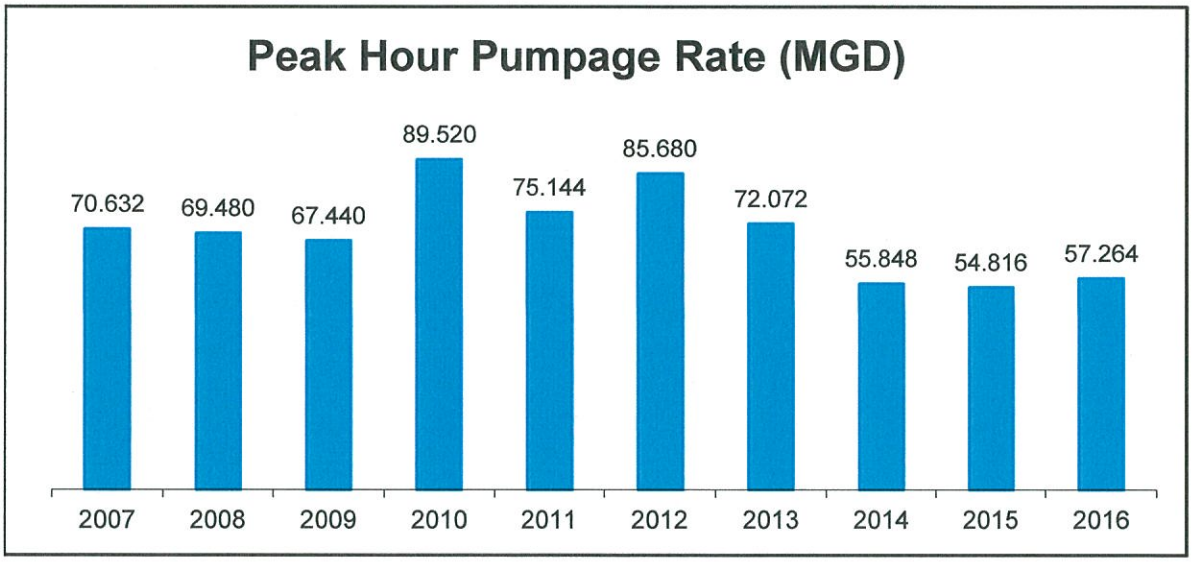
Maximum Pumpage to Distribution

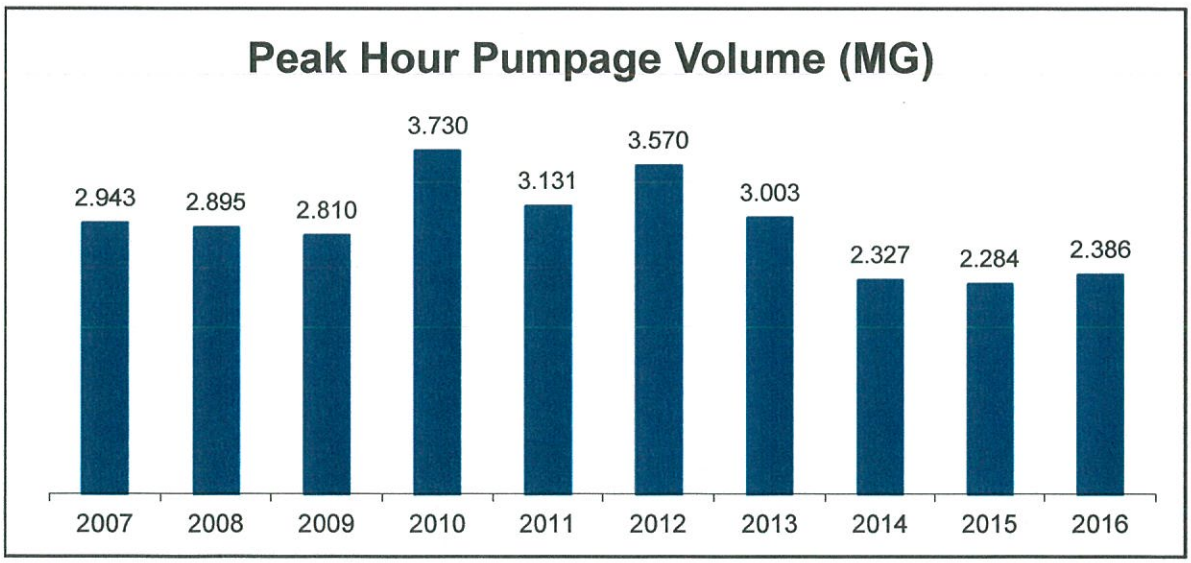
Year	*Max Day Pumpage Volume (MG)*	*Peak Hour Pumpage Rate (MGD)*	*Peak Hour Pumpage Volume (MG)*
2016	55.084	57.264	2.386
2015	53.300	54.816	2.284
2014	48.907	55.848	2.327
2013	56.946	72.072	3.003
2012	69.210	85.680	3.570
2011	66.096	75.144	3.131
2010	57.020	89.520	3.730
2009	58.940	67.440	2.810
2008	57.478	69.480	2.895
2007	65.997	70.632	2.943

Historical Maximum Day Pumpage: 95.154 MG on July 7, 1989

Maximum Day and Peak Hour Pumpage







Maximum Pumpage Days (MGD)

	Maximum Day Pumpage To			
Year	Distribution	Evanston	Skokie	NWC
2016	July 20th	July 20th	August 10th	July 22nd
	55.084	12.561	10.37	32.593
2015	August 14th	August 6th	August 14th	August 2nd
	53.300	11.852	10.95	30.414
2014	August 4th	August 15th	August 4th	August 4th
	48.907	9.875	10.87	30.871
2013	August 28th	August 28th	August 28th	August 27th
	56.946	12.585	11.209	33.374
2012	July 17th	July 17th	July 17th	July 6th
	69.210	18.580	13.579	43.775
2011	July 18th	July 18th	July 18th	July 19th
	66.096	12.614	13.724	40.820
2010	July 17th	July 29th	August 20th	July 19th
	57.020	13.643	12.957	34.661
2009	August 14th	August 13th	August 14th	August 6th
	58.940	13.992	11.495	34.725
2008	July 30th	July 30th	July 30th	July 29th
	57.478	11.788	11.495	33.670
2007	August 2nd	August 2nd	June 11th	August 2nd
	65.997	17.774	16.493	35.946

Historical Maximum Day Pumpage to Distribution: 95.154 MG on July 7, 1989

Energy Costs

Electric Power - Kilowatt Hours (kWh) Used

Year	Total kWh	Total Cost*	Average Unit Cost per kWh	kWh Per Million Gallons Pumped
2016	11,450,522	$943,798	$0.082	797
2015	10,365,952	$810,030	$0.078	772
2014	10,897,123	$787,444	$0.072	812
2013	11,529,489	$779,226	$0.068	835
2012	13,706,324	$924,422	$0.067	937

* 2012 cost is higher than usual due to increased pumpage during a drought.

Natural Gas Used for Pumping and Emergency Engines*

Year	Therms	Total Cost**	Average Unit Cost per Therm
2016	121,018	$58,307	$0.482
2015	132,575	$86,033	$0.649
2014	129,481	$86,926	$0.671
2013	124,954	$83,901	$0.671
2012	225,100	$116,272	$0.517

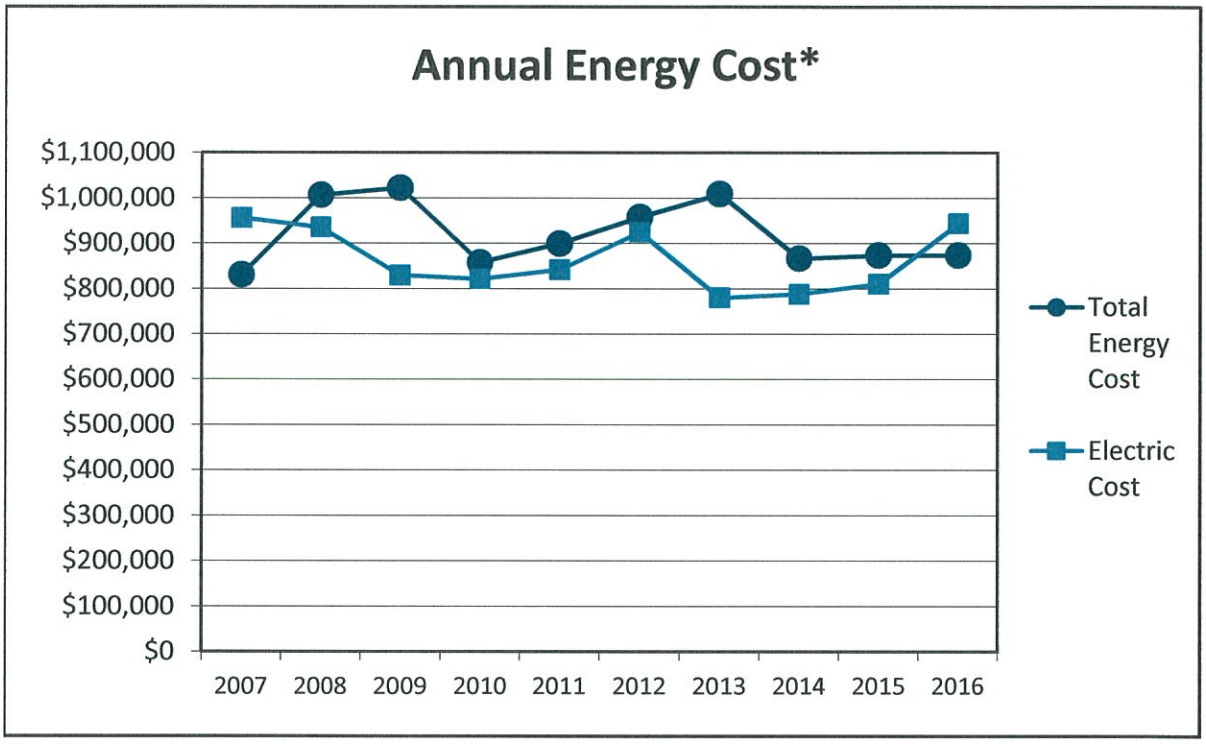
* Includes natural gas purchase and delivery charges.

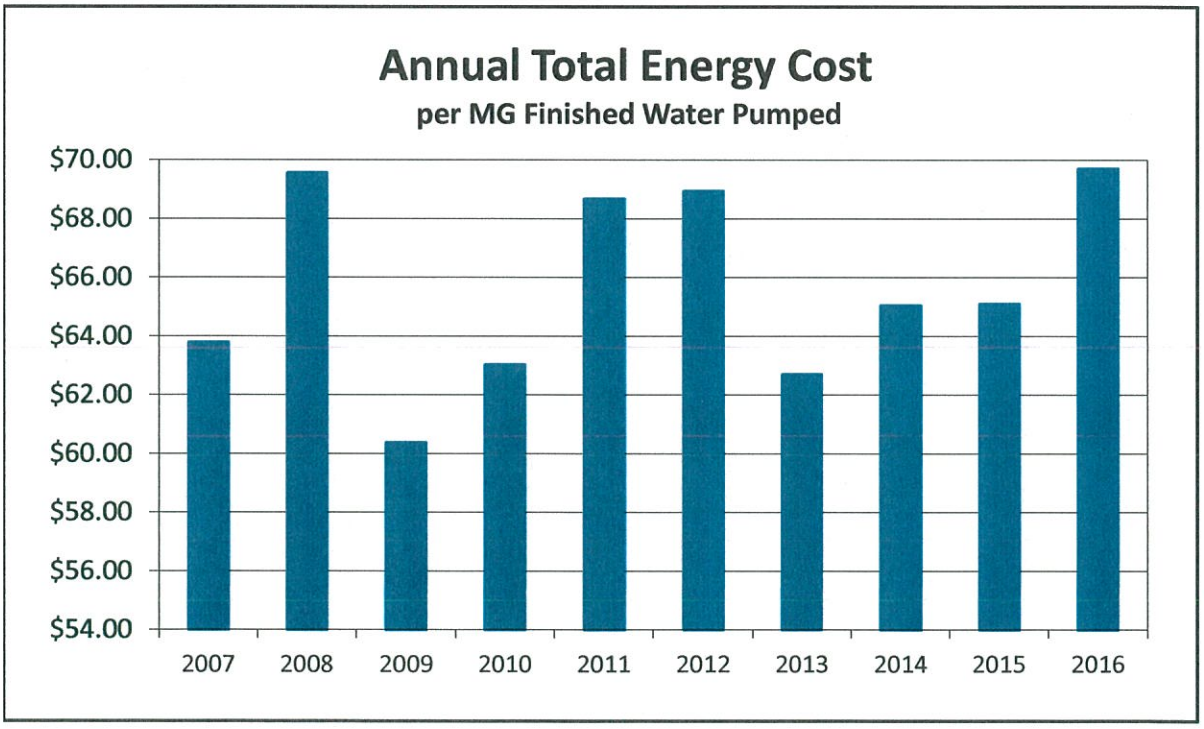
** 2011 cost is elevated due to switchgear fire, which required extended emergency generator use.

Total Energy Cost (Electric & Gas)

Year	Total Cost	Cost Per Million Gallons Pumped
2016	$1,002,105	$69.71
2015	$896,063	$66.75
2014	$874,370	$65.12
2013	$863,127	$62.48
2012	$957,517	$65.46

Energy Costs





* Energy costs increased in 2012 due to increased pumping during the summer drought.

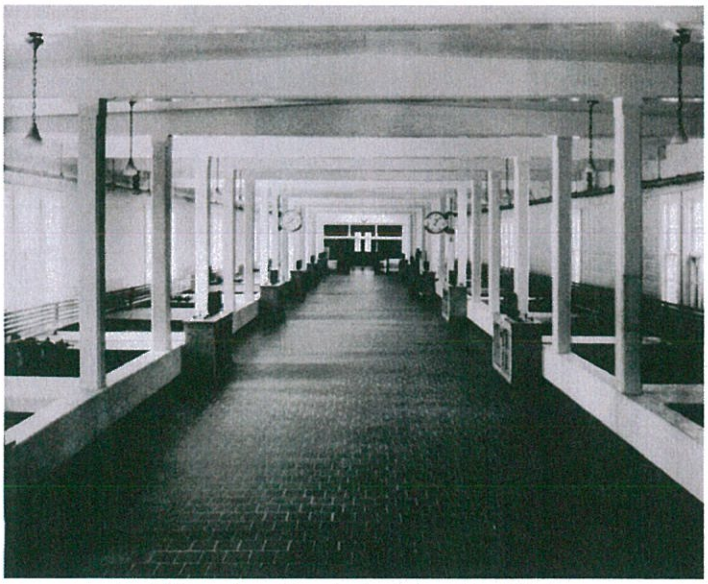
Filtration

The Filtration Division manages the water treatment process, including chemical addition, sedimentation, filtration, and disinfection. This involves operation and maintenance of 5 chemical feed systems, 4 settling basins, 24 filters, and numerous pipes, valves, and instrumentation systems. There is always at least one state-certified water treatment operator at the filtration plant at all times, who monitors instrumentation and water quality testing results to ensure that the water is always safe to drink.

Filters 1 – 12 in operation at the Evanston Water Treatment Plant

This division also includes the City's Water Quality Laboratory, which monitors Evanston's drinking water for compliance with state and federal water quality regulations and completes regular reporting to the public and the Illinois Environmental Protection Agency to certify the quality of Evanston's water.

Full-scale water treatment began in Evanston in 1914. The process included settling basins with chemical addition to allow larger contaminants to drop out of the water by gravity, filtration to remove smaller contaminants, and disinfection with chlorine. The new treatment process virtually eliminated waterborne disease in Evanston. This process was state-of-the-art at the time, and Evanston was one of the first communities in the region to adopt full-scale water treatment with rapid sand filtration. Though only the filters from the 1914 treatment plant survive to this day, Evanston's water treatment process still follows the same steps.



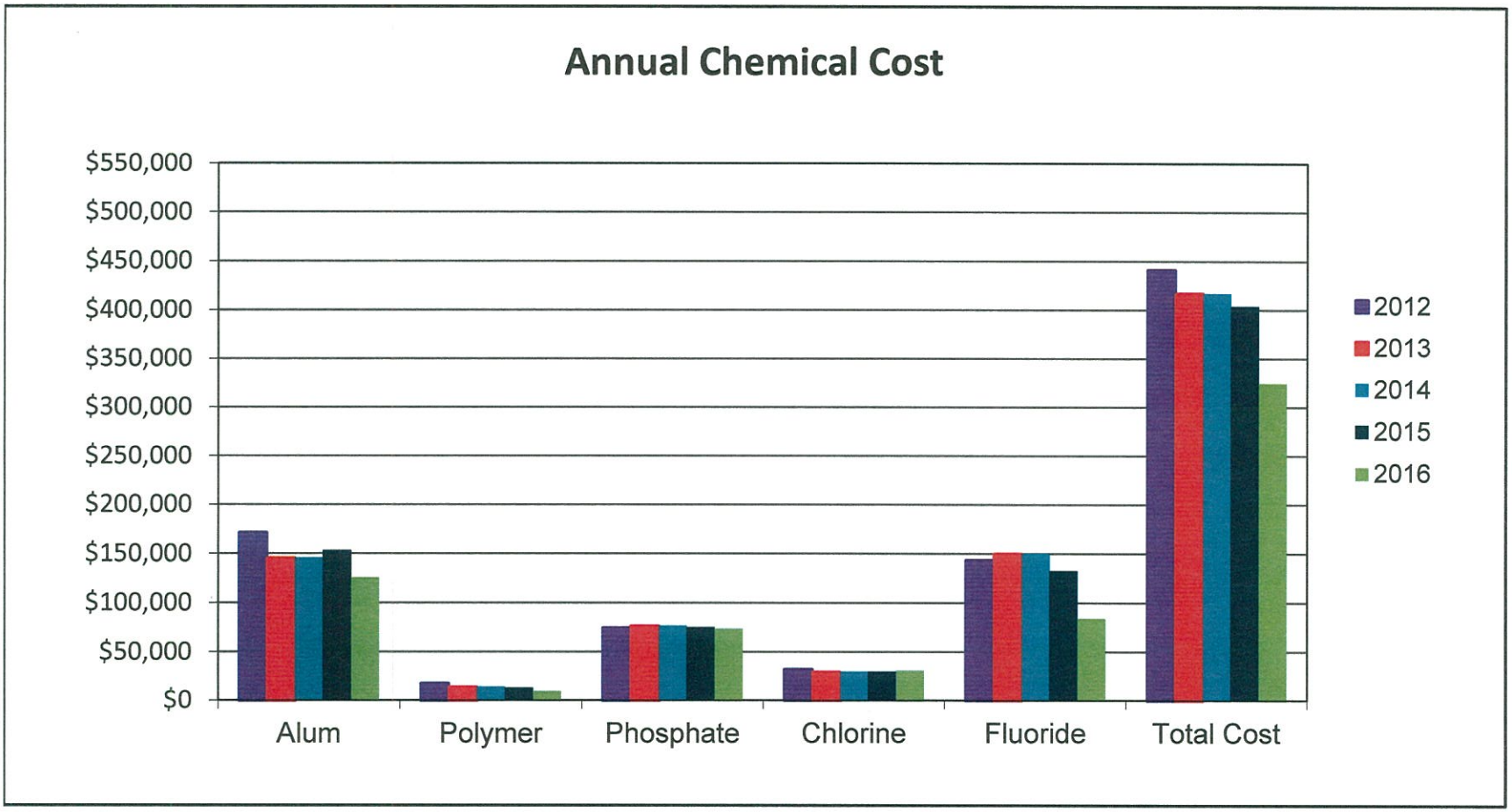
Filters 1 – 12, photo taken in 1924

Chemical Treatment: Chemicals Used and Costs

	Chemical Feed (lbs/MG)						
	Avg Daily	Max Day	Min Day	Unit Cost	Pounds per Year	Total Cost	Cost per MG Treated
Aluminum Sulfate							
2016	56.0	90.6	39.8	$346.15 / dry ton	798,936	$126,232	$8.75
2015	51.4	95.1	38.2	$447.28 / dry ton	686,299	$153,484	$11.39
2014	48.1	90.3	39.4	$447.28 / dry ton	653,896	$146,237	$10.71
2013	54.8	97.2	39.5	$447.28 / dry ton	770,838	$172,390	$12.16
2012	55.9	101.6	30.2	$447.28 / dry ton	830,624	$185,761	$12.27
Chlorine							
2016	12.2	16.2	8.9	$316.00 / ton	177,845	$30,781	$2.13
2015	11.9	16.1	6.6	$318.00 / ton	161,345	$29,445	$2.19
2014	11.7	18.4	8.1	$365.00 / ton	161,480	$29,470	$2.16
2013	12.2	17.9	7.6	$365.00 / ton	176,190	$32,155	$2.27
2012	12.0	20.0	7.0	$424.50 / ton	187,315	$39,758	$2.63
Activated Carbon*							
Hydrofluosilic Acid (Fluoride)							
2016	28.3	31.1	0.0	$412.00 / ton	409,596	$84,377	$5.85
2015	37.3	70.7	0.0	$443.37 / ton	492,533	$132,738	$9.85
2014	41.0	45.6	0.0	$519.00 / ton	558,523	$150,522	$11.03
2013	37.7	61.1	29.3	$539.00 / ton	534,550	$144,061	$10.16
2012	36.2	38.2	33.3	$596.00 / ton	547,011	$163,009	$10.77
Polymer							
2016	2.8	4.8	1.9	$480.00 / ton	39,726	$9,534	$0.66
2015	2.5	5.5	1.9	$578.00 / ton	33,903	$12,883	$0.96
2014	2.7	5.0	1.9	$538.00 / ton	36,832	$13,996	$1.03
2013	3.3	6.1	2.3	$760.00 / ton	46,584	$17,702	$1.25
2012	3.4	6.1	2.0	$870.00 / ton	51,318	$22,323	$1.47
Blended Phosphate							
2016	13.6	14.8	11.1	$4.27 / gallon	198,430	$73,678	$5.11
2015	13.1	17.7	11.4	$4.35 / gallon	173,430	$75,103	$5.57
2014	13.2	14.1	10.1	$4.48 / gallon	177,169	$76,722	$5.62
2013	12.5	14.0	11.3	$4.98 / gallon	173,141	$74,978	$5.29
2012	12.3	18.5	11.0	$5.15 / gallon	181,034	$81,072	$5.35

* Carbon can be fed for taste and odor control, though this has not been necessary since 2005.

Annual Chemical Costs



Filter Operations

Filter Runs

Year	Avg Hours per Filter Run		Total Hours per Year	
	3 MGD	8 MGD	3 MGD	8 MGD
2016	237.5	223.6	93,948	103,703
2015	238.6	229.0	80,514	103,404
2014	226.2	201.8	95,298	104,573
2013	224.5	200.6	95,958	101,536
2012	208.7	171.5	96,000	92,402
2011	229.1	197.3	96,336	88,162
2010	229.2	198.8	96,286	100,046
2009	253.8	239.2	97,313	94,790
2008	266.7	228.5	97,050	100,601
2007	234.9	200.7	91,395	104,530

Filter Washes

Year	Total Washes per Year		Max # of Washes per Day	
	3 MGD	8 MGD	3 MGD	8 MGD
2016	429	513	6	6
2015	347	462	5	5
2014	429	557	5	7
2013	427	524	7	7
2012	476	611	7	9
2011	430	486	5	6
2010	452	559	7	7
2009	387	409	6	5
2008	369	460	6	6
2007	425	569	6	7

Wash Water

Year	Total (MG)	Avg Daily %	Max Daily %
2016	239.545	1.60	9.65
2015	200.285	1.49	5.31
2014	243.089	1.78	6.20
2013	248.996	2.13	9.72
2012	321.030	1.49	5.14
2011	211.546	1.53	15.2
2010	223.704	1.02	4.54
2009	149.063	0.95	4.15
2008	145.593	1.15	4.86
2007	192.135	1.01	3.25

Bacteriological Water Analysis (Membrane Filter Method)

Report of Evanston Water Quality Control Laboratory

The U.S. Environmental Protection Agency (EPA) standard is based on the presence or absence of total coliform bacteria in a water sample. Evanston is required to collect 80 water samples per month from the distribution system. The EPA requires that no more than 5% of these monthly samples test positive for the presence of total coliform.

Distribution System		Positive for	Positive for
Year	Number Sampled	Total Coliform	E.Coli
2016	974	0	0
2015	989	3	0*
2014	987	4	1
2013	981	1	0
2012	995	2	0

**In March 2015 Fecal Coliform was no longer tested due to regulation changes*

Additional Bacteriological Samples Analyzed for the Village of Skokie

Year	Number Sampled
2016	889
2015	887
2014	892
2013	899
2012	914

Raw Water		Colony Count	
Year	Number Sampled	Average	Maximum
2016	732 (Twice Daily)		
2015	730 (Twice Daily)	59	>200
2014	728 (Twice Daily)	38	>200
2013	730 (Twice Daily)	45	>200
2012	732 (Twice Daily)	41	>200

After Primary Treatment		Colony Count	
Year	Number Sampled	Average	Maximum
2016	732 (Twice Daily)	0	0
2015	730 (Twice Daily)	0	0
2014	729 (Twice Daily)	0	0
2013	730 (Twice Daily)	0	0
2012	732 (Twice Daily)	0	0

Plant Tap A.M. and P.M. Samples		Colony Count	
Year	Number Sampled	Average	Maximum
2016	1403 (4 times Daily)	0	0
2015	1460 (4 times Daily)	0	0
2014	1459 (4 times Daily)	0	0
2013	1460 (4 times Daily)	0	0
2012	1464 (4 times Daily)	0	0

Taste & Odor, Turbidity, Temperature and Fluoride

Report of Evanston Water Quality Control Laboratory

Taste & Odor

Year	Number of Tests
2016	503
2015	506
2014	498
2013	508
2012	504

Turbidity (Expressed in Nephelometric Turbidity Units or NTU)

EPA standard is <0.3 NTU in 95% of samples and never >1 NTU in any single sample of finished water.

	Raw Water			After Primary Treatment			Plant Tap		
Year	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
2016	7.26	60	0.32	0.63	7.7	0.11	0.08	0.61	0.07
2015	6.49	79.70	0.42	0.61	1.81	0.23	0.08	0.19	0.06
2014	4.11	61.4	0.17	0.66	2.20	0.21	0.08	0.24	0.07
2013	8.49	85.5	0.49	0.75	2.35	0.06	0.08	0.16	0.07
2012	9.59	124.0	0.55	0.74	2.71	0.25	0.08	0.18	0.06

Raw Water Temperature

Year	Average	Maximum	Minimum
2016	11.1°C / 52.0°F	24.6°C / 76.3°F	1.0°C / 33.8°F
2015	10.2°C / 50.4°F	22.5°C / 72.5°F	0.9°C / 33.6°F
2014	10.0°C / 50.0°F	23.8°C / 74.8°F	0.8°C / 33.4°F
2013	11.2°C / 52.1°F	24.5°C / 76.1°F	0.8°C / 33.4°F
2012	12.9°C / 55.3°F	26.8°C / 80.2°F	2.1°C / 35.8°F

Fluoride Content (EPA target is 0.7 ppm)

	Plant Tap			Distribution		
Year	Avg	Max	Min	Avg	Max	Min
2016	0.70	0.85	0.16	0.71	0.82	0.64
2015	0.94	1.11	0.21	0.98	1.18	0.75
2014	0.96	1.10	0.22	1.07	1.07	0.90
2013	0.97	1.11	0.90	0.98	1.09	0.90
2012	0.98	1.09	0.90	0.98	1.08	0.90

Chlorine Residual (ppm)

Report of Evanston Water Quality Control Laboratory

Filter Influent

	Free Residual			Total Residual		
Year	Avg	Max	Min	Avg	Max	Min
2016	0.70	1.02	0.50	0.84	1.19	0.63
2015	0.68	1.06	0.46	0.81	1.21	0.11
2014	0.68	1.14	0.42	0.81	1.29	0.52
2013	0.64	0.92	0.35	0.77	1.06	0.49
2012	0.68	1.04	0.44	0.81	1.19	0.54

Filter Effluent

	Free Residual			Total Residual		
Year	Avg	Max	Min	Avg	Max	Min
2016	0.62	0.92	0.40	0.75	1.10	0.50
2015	0.59	0.92	0.39	0.93	76	0.49
2014	0.60	1.04	0.38	0.72	1.19	0.51
2013	0.55	0.83	0.30	0.67	0.97	0.40
2012	0.59	0.92	0.40	0.71	1.04	0.51

Plant Tap

	Free Residual			Total Residual		
Year	Avg	Max	Min	Avg	Max	Min
2016	0.72	0.92	0.54	0.87	1.12	0.69
2015	0.69	0.93	0.5	0.84	1.13	0.62
2014	0.68	1.00	0.51	0.83	1.20	0.61
2013	0.66	0.88	0.46	0.80	1.07	0.60
2012	0.67	1.00	0.48	0.81	1.15	0.60

Distribution Tap

	Free Residual			Total Residual		
Year	Avg	Max	Min	Avg	Max	Min
2016	0.45	0.73	0.17	0.61	0.94	0.34
2015	0.44	0.78	0.17	0.60	0.92	0.30
2014	0.45	0.80	0.17	0.61	1.02	0.31
2013	0.45	0.78	0.18	0.61	0.99	0.34
2012	0.44	0.90	0.13	0.59	1.05	0.30

Phosphate, pH, Alkalinity and Hardness

Report of Evanston Water Quality Control Laboratory

Phosphate (EPA standard is 0.15 - 0.50 ppm)

Year	Number of Tests	Plant Tap Avg	Max	Min
2016	365	0.28	0.41	0.17
2015	365	0.25	0.35	0.18
2014	365	0.24	0.30	0.20
2013	365	0.21	0.24	0.18
2012	365	0.16	0.26	0.16

pH (EPA standard is 7.1 - 7.9)

Year	Number of Tests	Raw Water Avg	Max	Min	Plant Tap Avg	Max	Min
2016	732	8.3	8.6	7.8	7.6	7.8	7.2
2015	730	8.3	8.5	7.9	7.6	7.8	7.3
2014	729	8.3	8.6	8.0	7.6	7.7	7.3
2013	730	8.3	8.5	8.0	7.6	7.9	7.3
2012	732	8.3	8.5	8.1	7.6	7.9	7.6

Alkalinity (ppm)

Year	Number of Tests	Raw Water Avg	Max	Min	Plant Tap Avg	Max	Min
2016	732	106	114	93	99	110	84
2015	730	106	121	92	100	115	91
2014	730	109	134	92	102	130	91
2013	730	105	112	94	98	108	90
2012	732	105	112	92	98	108	84

Hardness (ppm as $CaCo_3$)

Year	Number of Tests	Raw Water Avg	Max	Min	Finished Water Avg	Max	Min
2016	732	136	149	119	134	154	119
2015	730	135	149	124	133	154	124
2014	730	135	149	104	133	149	97
2013	730	135	142	111	131	141	119
2012	732	136	149	124	132	149	134

Detected Substances: 2016 Water Quality Data

Substance	MCLG	Highest Allowed (MCL)	Highest Level Detected	Range of Levels Detected	Violation	Source of Contamination
Turbidity (NTU) (Cloudiness)	NA	TT=Monitored by % exceeding 0.3 NTU and max allowed is 1 NTU	100% of samples meet 0.3 NTU; 0.19 NTU Highest single measurement	0.06 - 0.61	NO	Soil runoff
Fluoride (ppm)	4	4	0.7	Single Sample	NO	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories.
Nitrate [measured as Nitrogen](ppm)	10	10	0.6	Single Sample	NO	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Sodium (ppm)	NA	NA	7.7	Single Sample	NO	Erosion from naturally occurring deposits
Barium (ppm)	2	2	0.02	Single Sample	NO	Discharge of drilling wastes; Discharge from metal refineries; Erosion of Natural deposits
Combined Radium 226/228 (pCi/L)b	0	5	0.99	Single Sample	NO	Erosion of natural deposits
Gross Alpha excluding Radon and Uranium (pCi/L)b	0	15	0.16	Single Sample	NO	Erosion of natural deposits
Cotinine (ppb)	NOT REGULATED	NOT REGULATED	0.001	Single Sample	NO	Nicotine metabolite/waste water discharge
Tris(chloropropyl) phosphate (ppb)	NOT REGULATED	NOT REGULATED	0.01	Single Sample	NO	Flame retardant
Acesulfame-K (ppb)	NOT REGULATED	NOT REGULATED	0.12	Single Sample	NO	Artificial sweetener
Sucralose (ppb)	NOT REGULATED	NOT REGULATED	0.039	Single Sample	NO	
Sulfate (ppm)	NOT REGULATED	USEPA National Secondary Standard of 250	24	Single Sample	NO	Naturally occurring, coagulant residual

Detected Substances: 2016 Water Quality Data

Disinfectants and Disinfection By-Products	MCLG	Highest Allowed (MCL)	Highest Level Detected	Range of Levels Detected	Violation	Source of Contamination
Total Trihalomethanes (ppb)	NA	80	25	12.5-37.6	NO	By-product of drinking water chlorination
Total Haloacetic Acids (ppb)	NA	60	9	3.0-10.7	NO	By-product of drinking water chlorination
Chlorine (ppm)	4 MRLDG	4 MRDL	0.4	0.4 - 0.5	NO	Water additive used to control microbes

Lead & Copper	MCLG	Action Level (AL)	90th Percentile	Range of Levels Detected	Violation	Source of Contamination
Lead (ppb)	0	15	3.9	<1 - 11	NO	Corrosion of household plumbing systems; Erosion of natural deposits
Copper (ppm)	1.3	1.3	0.14	<0.001 - 0.510	NO	Erosion of natural deposits; Leaching from wood preservatives; Corrosion of household plumbing systems

Additional Information About Your Water

Measured Parameter	Evanston Minimum	Evanston Maximum	Measured Parameter	Evanston Result
pH (0-14 pH units)	7.2	7.8	Calcium (ppm)	32
Hardness (as mg $CaCO_3$/L)	119	154	Chloride (ppm)	14
Hardness (gpg)	7	9	Dissolved Solids (ppm)	150
Alkalinity (ppm)	84	110	Magnesium (ppm)	11
Raw Water Temperature °F	34	76	Potassium (ppm)	1.4

Non-Detected Contaminants

2016 Water Quality Data

Inorganic Contaminants	MCLG	MCL	EEA MRL	Level Found
ARSENIC (ppb)	none	50	1	ND
CADMIUM (ppb)	5	5	1	ND
CHROMIUM (ppb)	200	200	0.01	ND
CYANIDE (ppb)	n/a	1000	0.02	ND
IRON (ppb)	n/a	150	2	ND
MANGANESE (ppb)	2	2	0.1	ND
MERCURY (INORGANIC) (ppb)	n/a	100	1	ND
NICKEL	50	50	2	ND
SELENIUM (ppb)	6	6	1	ND
ANTIMONY (ppb)	4	4	0.3	ND
BERYLLIUM (ppb)	0.5	2	0.3	ND
THALLIUM (ppb)	n/a	5000	5	ND
ZINC (ppb)	n/a	5000	5	ND
NITRITE (AS NITROGEN) (ppm)	1	1	0.01	ND
Synthetic Organic Contaminants				
ENDRIN (ppb)	2	2	0.1	ND
BHC- GAMMA (LINDANE)	200	200	0.1	ND
METHOXYCHLOR (ppb)	40	40	0.1	ND
TOXAPHENE (ppb)	0	3	1	ND
DIQUAT (ppb)	20	20	2	ND
DALAPON (ppb)	200	200	5	ND
ENDOTHALL (ppb)	100	100	9	ND
DI(2-ETHYLHEXYL)ADIPATE (ppb)	400	400	0.6	ND
OXAMYL (VYDATE) (ppb)	200	200	2	ND
SIMAZINE (ppb))	4	4	0.35	ND
DI(2-ETHYLHEXYL)PHTHALATE (ppb)	0	6	0.6	ND
PICHLORAM (ppb)	500	500	0.4	ND
DINOSEB (ppb)	7	7	1	ND
HEXACHLOROCYCLOPENTADIENE (ppb)	50	50	0.5	ND
ALDICARB SULFOXIDE	n/a	n/a	1	ND
ALDICARB SULFONE	n/a	n/a	1	ND
CARBOFURAN (ppb)	40	40	0.9	ND
ALDICARB	n/a	n/a	1	ND
ATRAZINE (ppb)	3	3	0.3	ND
ALACHLOR (LASSO)(ppb)	0	2	0.2	ND
HEPTACHLOR	0	100	0.04	ND
HEPTACHLOR EPOXIDE (ppt)	0	100	0.02	ND
DIELDRIN	n/a	1	0.05	ND
2,4-Dichloro-Phenoxyacetic Acid (2,4-D) (ppb)	10	10	1	ND
2,4,5-TP (SILVEX) (ppb)	50	50	1	ND
HEXACHLOROBENZENE (ppb)	0	1	0.1	ND
BENZO (A) PYRENE (ppb)	0	200	0.1	ND
PENTACHLOROPHENOL (PCP) (ppb)	0	1	0.4	ND
ALDRIN (ppb)	n/a	1	0.05	ND
POLYCHLORINATED BIPHENYLS (PCB) (ppb)	0	500	varies	ND
TOTAL DDT (ppb)	n/a	50*	1	ND
1,2 DIBROMO3-CHLOROPROPANE (DBCP) (ppb)	0	0.2	0.02	ND
ETHYLENE DIBROMIDE (EDB) (ppb)	0	50	0.01	ND
CHLORDANE (ppb)	0	2	0.2	ND

Non-Detected Contaminants

2016 Water Quality Data

THM/HAAs	MCLG	MCL	EEA MRL	Level Found
MONOCHLOROACETIC ACID (ppb)	70	na	2	ND
MONOBROMOACETIC ACID (ppb)	na	na	1.0	ND

Unregulated Contaminants	MCLG	MCL	EEA MRL	Level Found
Bisphenol A (ppb)	na	na	0.1	ND
Nonylphenol, isomer mix (ppb)	na	na	0.5	ND
4-n-Octylphenol (ppb)	na	na	0.5	ND
4-tert-Octylphenol (ppb)	na	na	0.5	ND
Pentachlorophenol (ppb)	na	na	0.1	ND
Phenylphenol (ppb)	na	na	0.1	ND
Tetrabromobisphenol A (ppb)	na	na	0.1	ND
2,4,6-Trichlorophenol (ppb)	na	na	0.1	ND
Pharmaceutically Active Compounds Positive	na	na	varies	ND
Pharmaceutically Active Compounds Negative	na	na	varies	ND

MCL= Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
EEA MRL= Eurofins Eaton Analytical Minimum Reporting Level
ND = Not Detected

Lead and Copper Statement

Report of Water Quality Control Laboratory

There is no detectable lead in the water produced by the City of Evanston's water treatment plant. Lead enters the water from lead solder and/or lead pipes in water services, or through plumbing fixtures. To minimize contamination resulting from corrosion, the EPA established a lead action level of 15 parts per billion (ppb) in 1992. The 90th percentile result of samples analyzed for lead and copper content in homes with lead pipes must be less than the action levels of 15 ppb and 1.3 ppm, respectively.

Lead and copper sampling is performed every three years in compliance with state law. In 2014, Evanston sampled water from 30 homes with lead service lines and analyzed them for lead and copper content. All results were below the action levels. The 90th percentile level for lead in these samples was 3.9 ppb. The 90th percentile level for copper was 0.14 ppm.

Definitions and General Explanations

Action Level – The concentration of a contaminant, which, if exceeded, triggers treatment or other required actions by the water supply.

Disinfection By-Products – Total Trihalomethanes and Total Haloacetic Acids are used to regulate the amount of allowable by-products of chlorination.

EPA – Environmental Protection Agency

Fluoride – The Illinois Department of Public Health recommends a target of 0.7 ppm.

Lead and Copper – There is no detectable lead in the water provided to the Evanston community. Lead enters the water from lead solder, lead pipes, or plumbing fixtures. To minimize contamination resulting from corrosion, the EPA established a lead action level of 15 parts per billion (ppb) in 1992. The 90^{th} percentile result of samples analyzed for lead and copper content in homes with lead pipes must be less than the action level of 15 ppb and 1.3 ppm respectively.

MCL – Maximum Contaminant Level, the highest level of a contaminant that is allowed in drinking water. A MCL is set as close to a MCLG as feasible using the best available treatment technology.

MCLG – Maximum Contaminant Level Goal, the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

mg $CaCO_3$/L – milligrams of calcium carbonate per liter.

mrem/yr – Millirems Per Year. A measure of radiation absorbed by the body.

MRDL – Maximum Residual Disinfection Level. The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG – Maximum Residual Disinfection Level Goal. The level of disinfectant in drinking water below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA – Not applicable.

NTU – Nephelometric Turbidity Units. A measure of the cloudiness of water.

pCi/L – Picocuries per liter. A measure of radioactivity.

ppm – Parts per million. A measure of the concentration of a substance in water. An equivalent unit of measurement is milligrams per liter (mg/L).

ppb – Parts per billion. A measure of the concentration of a substance in water. An equivalent unit of measurement is micrograms per liter (µg/L).

Sodium – There is not a state or federal MCL for sodium. Sodium levels below 20 mg/L (ppm) are not considered to be a public health issue.

TT – Treatment Technique. A required process to reduce the level of a contaminant.

Turbidity – A measurement of the cloudiness of the water caused by suspended particles. This is monitored because it is a good indicator of water quality as well as well as the effectiveness of the filtration and disinfection processes.

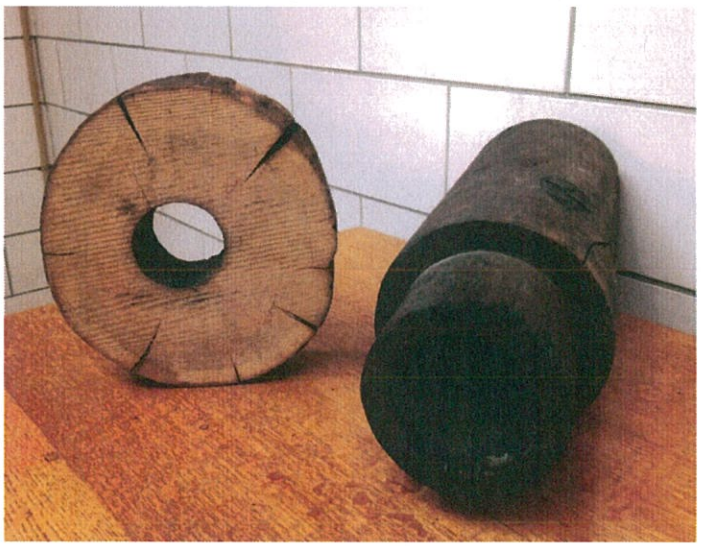
TOC – Total Organic Carbon. The Evanston Water Supply monitored the percentage of TOC removal quarterly and met all TOC removal requirements set by the EPA.

Distribution

The Distribution Division manages operation, maintenance, and repair of Evanston's water mains, valves, fire hydrants, and the City's portion of water service lines. This includes repairing water main breaks and water service leaks; and installing new valves, hydrants, and water mains to improve the operation and efficiency of Evanston's water distribution system. Annual maintenance programs administered by this division include water main leak surveying, valve exercising, and fire hydrant testing. The Distribution Division also performs routine water quality sampling in buildings throughout Evanston, and administers the City's cross connection control program. These two programs ensure that water remains safe to drink after leaving the water treatment plant.

A Distribution Division field crew installing a new fire hydrant connection on a 24" diameter water main, to improve the City's ability to clean and test this main.

Evanston has had a water distribution system since the 1870s, longer than most communities in the Chicago area. The original water mains were made of wood, with a transition to cast iron water mains by the 1890s. After completion of the water treatment plant in 1914, the plentiful supply of safe drinking water drew many new residents and businesses to Evanston. The distribution system underwent significant expansion over the next few years, and many of those 90 to 100+ year-old water mains are still in operation today. Evanston manages an annual water main renewal program to replace and rehabilitate old water mains as they develop maintenance problems.



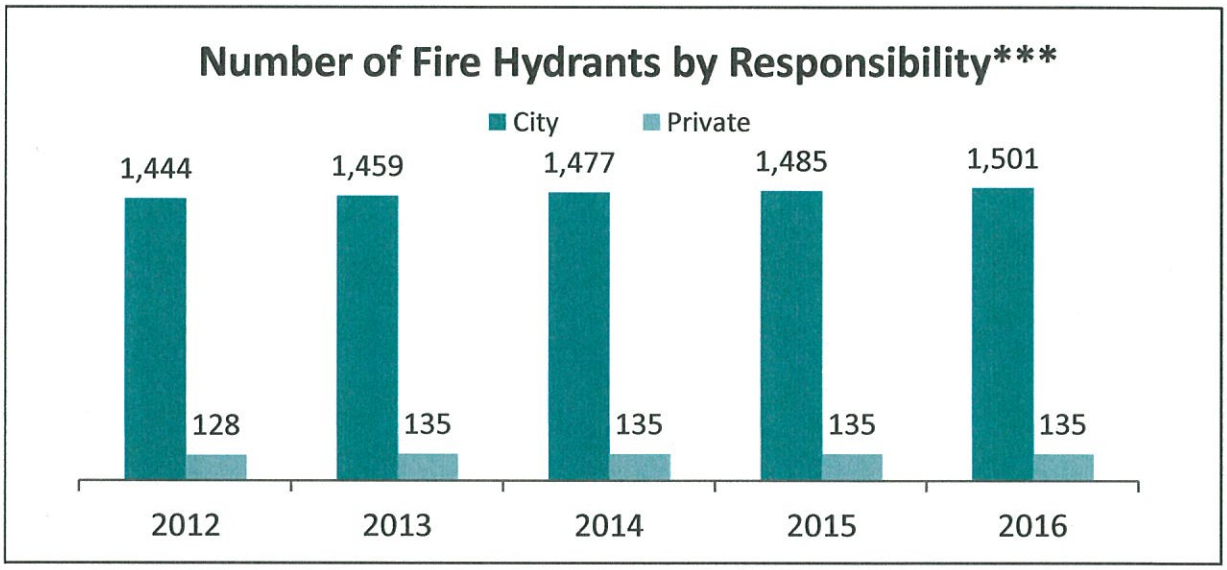
Pieces of wood water main from Evanston's original water distribution system.

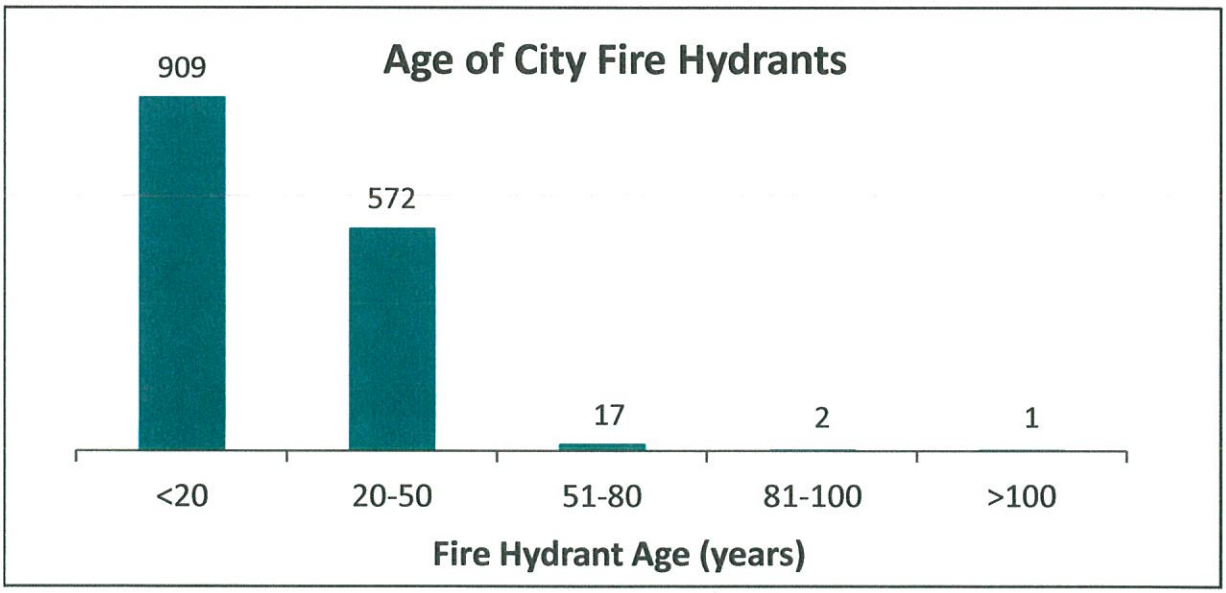
Fire Hydrants

System Data and Maintenance*

Fire Flow Testing	2012	2013	2014**	2015	2016
Fire Department	1,400	1,417	1,100	1,477	1,428
Public Works Agency	42	22	0	0	13

Installation & Maintenance	2012	2013	2014	2015	2016
Installed (new)	10	18	12	11	18
Replaced	17	22	15	13	18
Repaired	73	175	315	51	327





* All work completed by Public Works Agency staff unless otherwise noted.
** Testing was limited to avoid impacting water pressure during transmission main improvements.
*** Changes due to hydrant removal/addition during water main improvements and utility atlas updates.

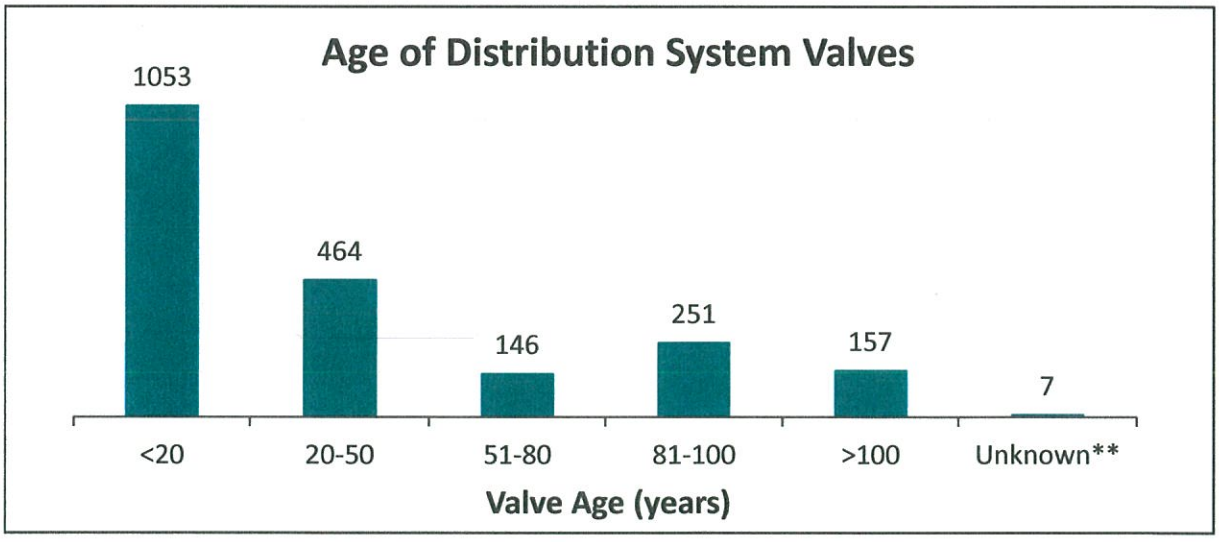
Water Distribution System Valves

System Data and Maintenance*

Testing & Inspection	2012	2013	2014	2015	2016
In-House	1,071	1,117	910	908	828
Contractor	0	0	0	0	0

Installation & Maintenance	2012	2013	2014	2015	2016
Installed (new)	11	14	14	13	27
Replaced	26	44	34	16	37
Repaired	38	41	19	55	19

Number of Valves by Size	2012	2013	2014	2015	2016
4" or smaller	30	28	23	23	23
6"	1011	996	979	975	961
8"	484	492	507	513	521
10"	185	183	189	192	199
12"	235	243	243	244	252
14"	2	2	2	2	2
16"	49	46	50	50	50
18"	4	4	5	5	5
20"	2	2	2	2	2
24"	30	33	33	33	33
30"	11	12	12	12	13
36"	12	12	12	12	13
42"	2	2	2	2	2
48"	2	2	2	2	2
Total	2,059	2,057	2,061	2,067	2,078



* All work completed by Public Works Agency staff unless otherwise noted.
** Valves are buried beneath paved surfaces and are not accessible for field verification of age.

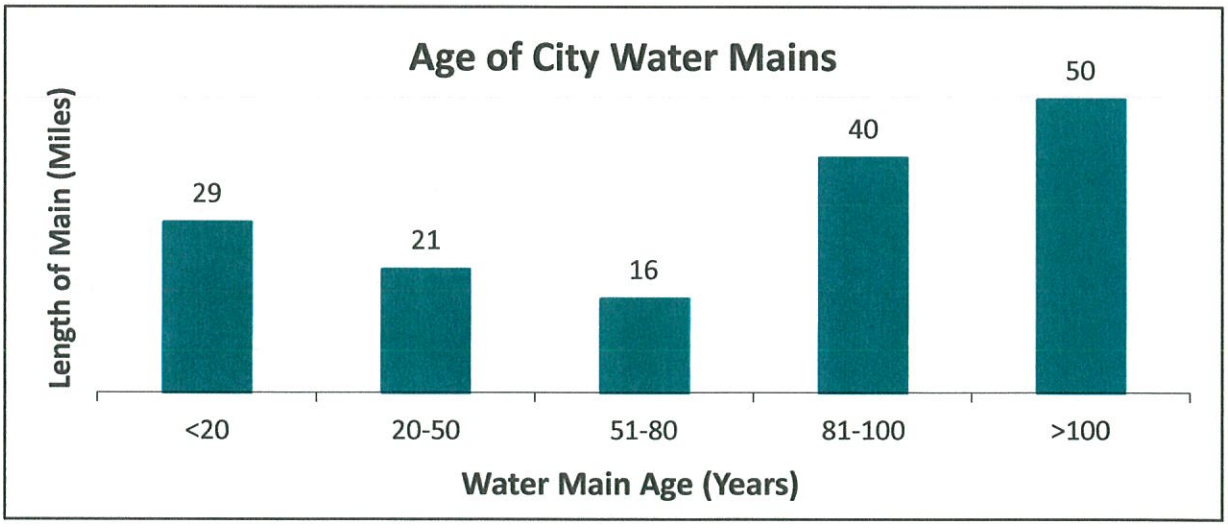
Water Mains

System Data and Maintenance*

Improvements (lineal feet)	2012	2013	2014	2015	2016
Replaced by City	181	50	0	0	0
Replaced by Contractor	9,868	8,870	8,526	4,303	8,172
Rehabilitated by Contractor	0	0	569	395	3,802

Water Main Break Repairs	2012	2013	2014	2015	2016
Blow-Out	56	21	32	5	21
Shear Break	8	30	36	18	7
Damage	2	3	2	0	0
Total	66	54	70	23	28

Pipe Sizes (length in miles)**	2012	2013	2014	2015	2016
4" or smaller	1.83	1.67	1.37	1.37	1.37
6"	76.02	74.99	72.99	73.26	71.88
8"	27.62	28.35	28.81	28.93	29.01
10"	12.47	12.30	12.76	12.81	13.18
12"	17.42	17.73	17.51	17.66	17.95
14"	0.37	0.37	0.37	0.37	0.37
16"	6.51	6.25	6.26	6.26	6.26
18"	0.83	0.83	0.83	0.83	0.83
20"	0.56	0.56	0.56	0.56	0.56
24"	8.30	8.60	8.60	8.60	8.60
30"	1.69	1.69	1.69	1.69	1.69
36"	3.30	3.30	3.30	3.30	3.30
42"	0.04	0.04	0.04	0.04	0.04
48"	0.68	0.68	0.68	0.68	0.68
Total	157.63	157.35	155.77	156.36	155.72



* All work completed by Public Works Agency staff unless otherwise noted.
** Changes due to water main removal/addition during improvement projects and utility atlas updates.

Water Services

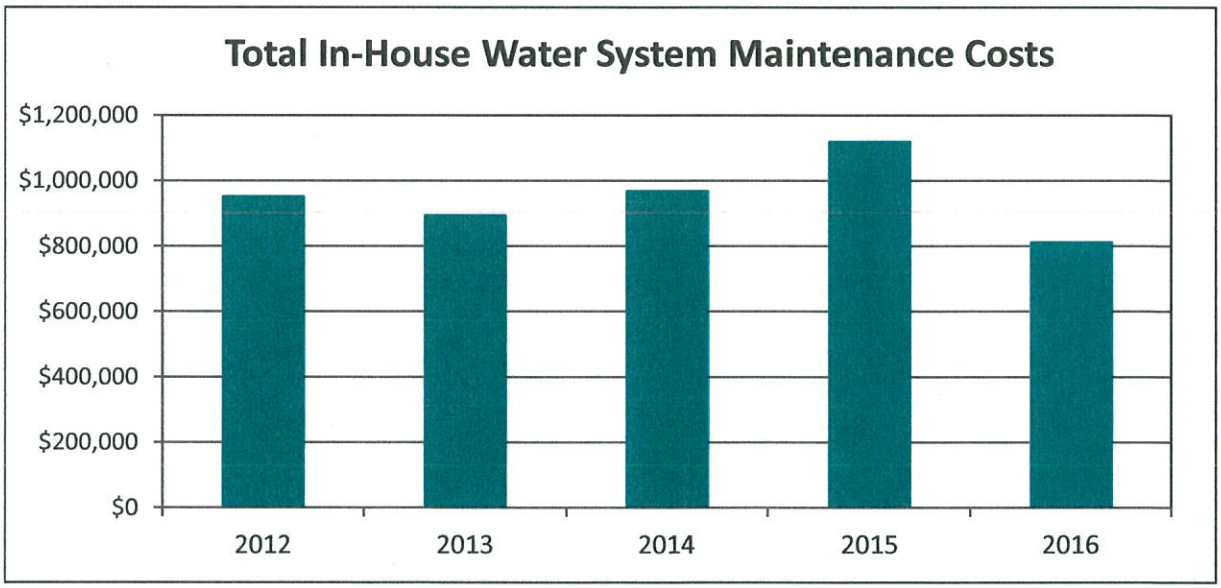
System Data and Maintenance*

Water Service Accounts: 15,129 (metered domestic services + unmetered fire services)

Installation & Maintenance	2012	2013	2014	2015	2016
New Services Installed	4	2	19	13	3
Service Taps Replaced***	55	28	33	36	53
Services Replaced by Contractor	-	188	124	147	78
Service Leaks Repaired	14	34	36	22	21

Breakdown of In-House Maintenance Costs

	2012	2013	2014	2015	2016
Water Mains	$274,946	$213,075	$322,859	$83,864	$109,939
Fire Hydrants	$95,065	$109,048	$42,398	$65,197	$41,150
Water Services	$135,193	$159,592	$293,347	$166,275	$133,658
Valves	$102,763	$128,645	$43,665	$148,309	$65,263
Snow & Ice Removal	$24,085	$42,384	$74,519	$46,314	$38,105
Assist Contractor	$70,848	$69,516	$71,591	$57,511	$96,170
JULIE Locates	$62,845	$73,519	$71,911	$108,200	$117,375
Equip/Facility Maint.	$62,757	$85,631	$62,051	$77,189	$86,794
Assist Other City Depts.	$16,053	$11,364	$25,509	$8,878	$26,713
Assist W&S Divisions	$13,739	$10,811	$5,581	$20,610	$4,617
Safety & Training	$10,853	$18,883	$17,207	$22,639	$31,543
Misc.	$25,370	$45,422	$88,294	$48,069	$60,838
Total	**$951,150**	**$894,518**	**$967,890**	**$1,118,932**	**$812,166**



* All work completed by Public Works Agency staff unless otherwise noted.

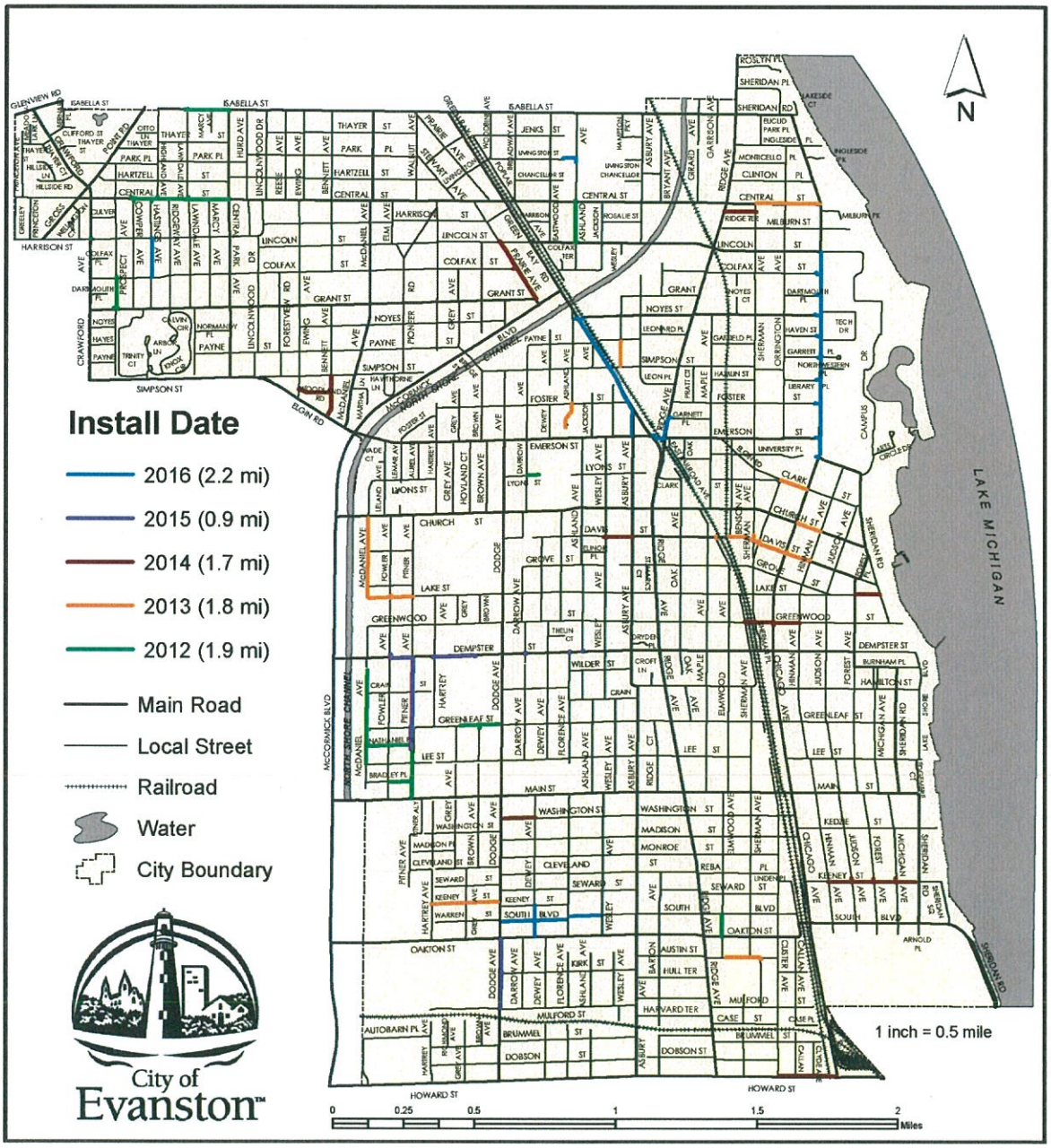
** Includes metered domestic water service accounts and unmetered fire service accounts.

*** Differentiation of replacement of existing water services from new water service installations began in 2012.

Water Main Improvements

The Public Works Agency manages an annual water main improvement program, with the goal of renewing at least 1.5 miles of water mains annually (1% annual system-wide renewal rate). This program addresses water mains that have developed maintenance problems due to their age, as well as water mains that need to be enlarged to satisfy current fire flow requirements.

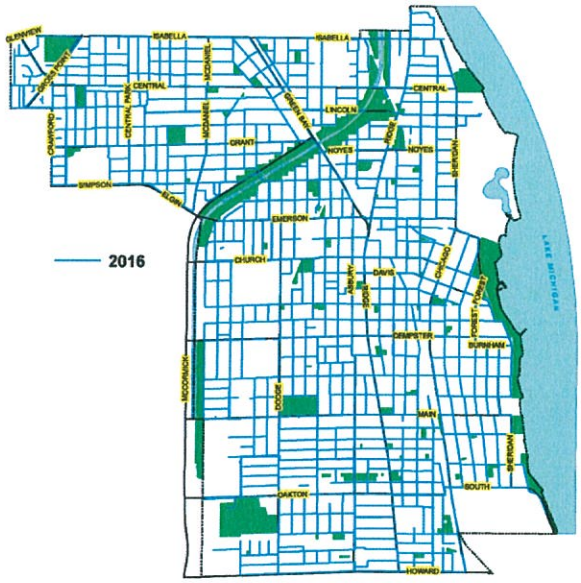
Water Mains Installed or Rehabilitated



Leak Detection Program

In 2013, the Public Works Agency developed a City-wide surveying program to catch water main leaks early and minimize our water loss. This saves operating costs to produce the water, conserves a vital natural resource, and allows more water mains to be repaired proactively rather than on an emergency basis.

The Public Works Agency uses leak noise loggers, small transmitters that sense the sound waves created by water escaping through a hole in a water main, to test water mains for leaks throughout the year. This proactive leak surveying program began in 2013, and water distribution crews were able to survey all 157 miles of Evanston's water mains in 2013-2014.



The 2015 survey found three leaks on building water service pipes and two breaks on water mains. These defects were all successfully repaired, and the estimated water savings is over 9.90 Million Gallons (MG) per year.

Year	Miles of Water Main Surveyed	Water Service Leaks Found	Water Main Breaks Found	Water Savings After Repairs
2013	59	1	2	8.85 MG/year
2014	98	4	1	6.26 MG/year
2015	135	3	2	9.90 MG/Year
2016	149	2	3	13.534 MG/Year
Totals	**441**	**10**	**8**	**38.544 MG/year**

In 2017 and future years, the Public Works Agency anticipates being able to survey the entire 157 miles of water mains in Evanston every year. This frequency is important since water main breaks and leaks can develop at any time; a water main that shows no signs of leakage one year can develop a large leak by the next year.

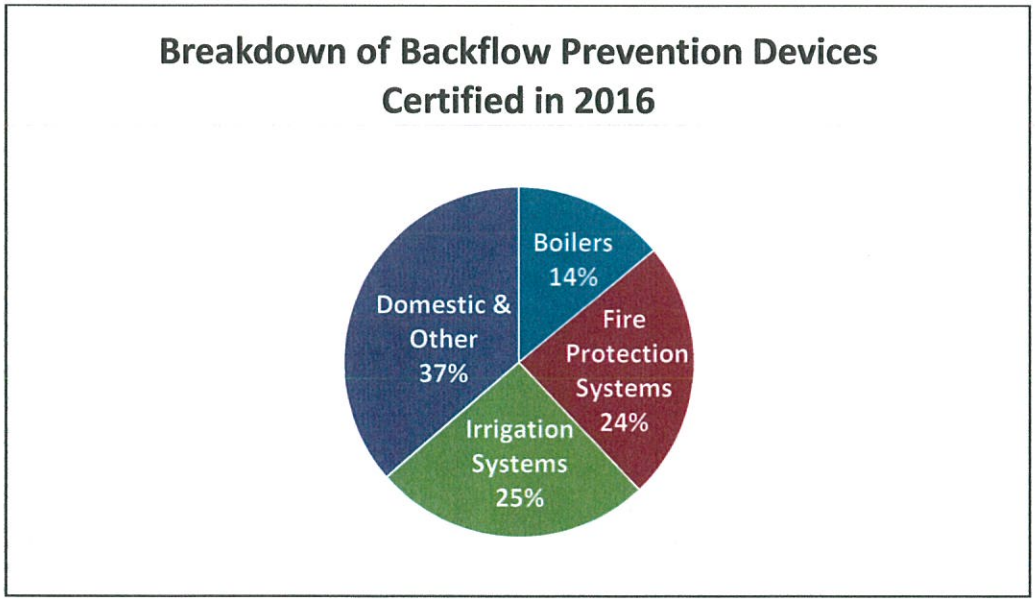
Cross Connection Control

A cross connection is a point in a plumbing system where the potable (safe, drinkable) water supply is connected to a non-potable (polluted or untreated) source. A cross connection exists whenever the drinking water system is or could be connected to any non-potable source. If cross connections are not properly protected and there is a drop in pressure, untreated sources and dirt can be pulled into household plumbing systems.

The State of Illinois and the City of Evanston require mandatory backflow protection on certain households and facilities where high health-hazard-type cross connections are normally found. Underground lawn sprinkling systems, fire protection systems, hospitals and health clinics, mortuaries, laboratories, food and beverage processing and car washes are just a few of the locations where backflow prevention is necessary to protect the quality of our public water supply.

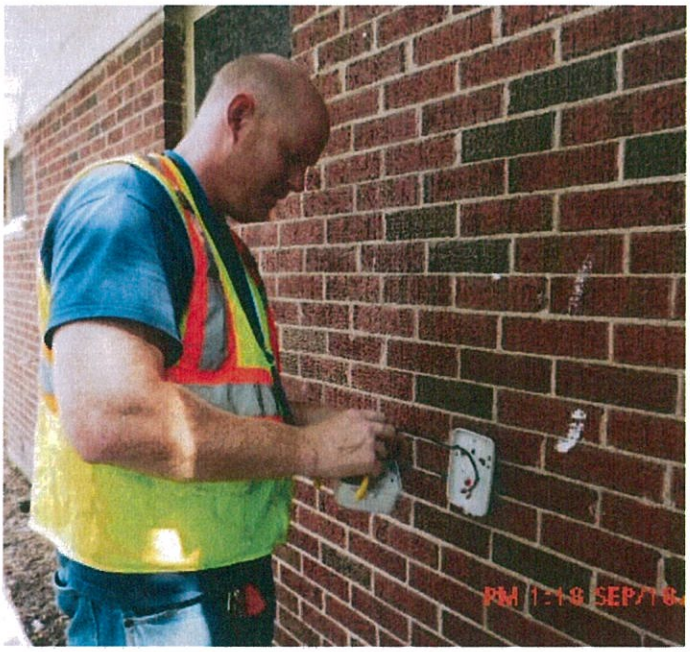
In 2008, the Public Works Agency hired a plumbing inspector to manage the City's cross connection control program. Since that time, over 4,000 backflow prevention devices have been added to the City's inventory and are now regularly inspected for compliance with State and City codes. An annual tracking system enables the City to ensure these devices are properly maintained throughout their life cycle. This helps keep the high quality drinking water produced by the City's water treatment plant safe to drink after entering the water distribution system.

Year	Backflow Prevention Devices Certified Annually
2012	2,786
2013	3,356
2014	3,644
2015	4,039
2016	4,241



Metering

The Meter Division manages water meter reading and billing for Evanston's 14,537 retail water and sewer customers, working with the City's Collector's Office to process water/sewer bill payments and cross connection control fees. The Meter Division also coordinates with the Distribution Division to manage replacement of damaged and obsolete water meters, accuracy testing for large water meters, and water service shutoff and restoration. In 2013-2014, the Meter Division managed Evanston's migration to a new Advanced Metering Infrastructure (AMI) system, which has improved accuracy and efficiency of the water metering and billing processes. The AMI system also generates automated hourly meter reads and leak alerts for customers to help reduce water loss.

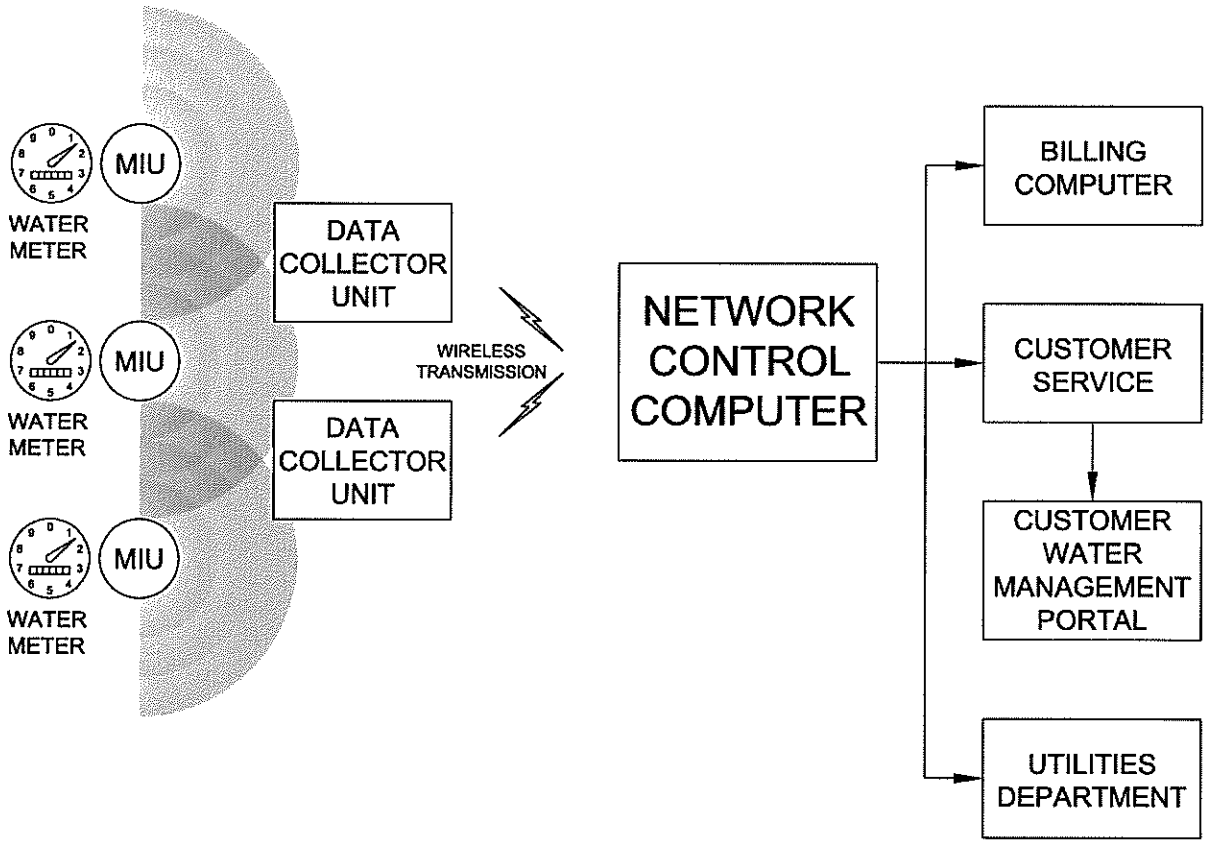


A Public Works Agency employee installs a new remote water meter reading unit on the exterior of a home as part of the Advanced Metering Infrastructure (AMI) project. This unit makes it possible for meter readings to be transmitted via wireless network without City staff having to visit each property to manually read the meters.

Evanston has been metering water consumption since at least the early 1920s, well before many communities in the Chicago area. Water rates established to pay for the 1914 water treatment plant were only $0.16 per 1,000 gallons of metered water use! The City originally sent meter reading staff into every building in the City once a quarter to manually read water meters. Water metering technology has evolved considerably over the last 100 years. Current technology allows meter readings to be taken automatically every hour, with once-daily, wireless upload of readings to a computerized billing system.

Evanston's first female water meter readers, Dorothy Jay (left) and Marjorie Nantkes (right). They were hired in 1943 to replace men serving in World War II.

Automatic Metering Infrastructure (AMI) System



How it works:

- A Meter Information Unit (MIU) is attached to every water meter in Evanston. The MIU takes a meter reading once an hour and stores these readings for a full day. Each MIU broadcasts the readings once a day using a wireless transmitter.

- The Data Collector Unit (DCU) receives the meter readings from the MIUs. Evanston currently has 6 DCUs located on various buildings throughout the community. Each DCU sends its meter reading information to the Network Control System at the Water Treatment Plant on a daily basis.

- The Network Control System supports customer service and system management activities. It transfers the meter readings to the billing system to generate bi-monthly water and sewer bills for Evanston customers.

- The Network Control System monitors fluctuations in water usage, and sends leak alerts to the network administrator if a customer's real-time meter readings are significantly higher than historical usage trends.

- The AMI system includes an online portal where Evanston customers can monitor their water usage, compare usage trends under various weather conditions, and set up leak alerts of their own.

Transmitter Tower Locations

Water Meter Inventory

Water is billed bi-monthly in units of 100 cubic feet (CCF). The minimum service charge every two months is based on water meter size as follows:

Meter Size	Number of Meters
5/8"	11660
3/4"	991
1"	1095
1.5"	260
2"	473
3"	55
4"	26
6"	3
8"	4
Total	14537

Water Rates for Evanston Customers

Water is billed bi-monthly in units of 100 cubic feet (CCF). The minimum service charge every two months is based on water meter size as follows:

Meter Size	Minimum Charge Effective 1/1/2016
5/8" & 3/4"	$7.78
1"	$15.53
1 ½"	$29.07
2"	$45.77
3"	$80.61
4"	$129.13
6"	$227.72
8"	$385.46

The minimum demand charge includes the first five hundred cubic feet (500 CCF) of water consumed every two months, which is roughly equivalent to 3,740 gallons of water.

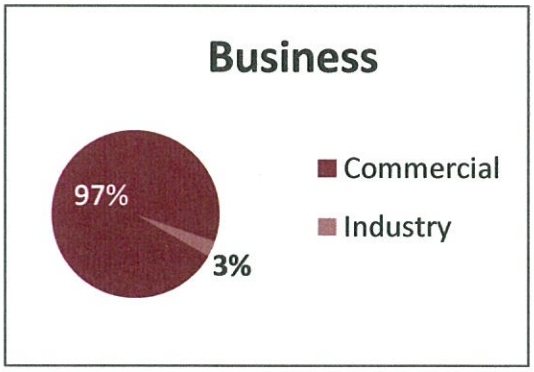
Water usage over the minimum is billed at $2.18 per CCF effective 1/1/2016. This is equivalent to a rate of $2.91 per 1,000 gallons.

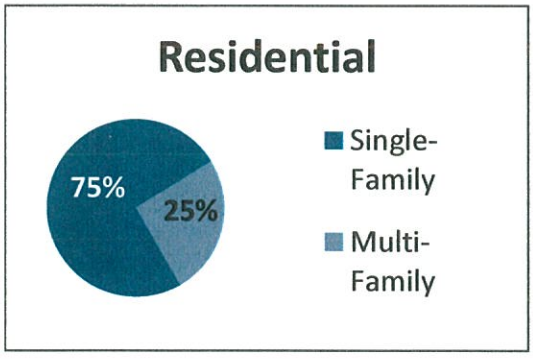
Water Customer Classes and Metered Usage

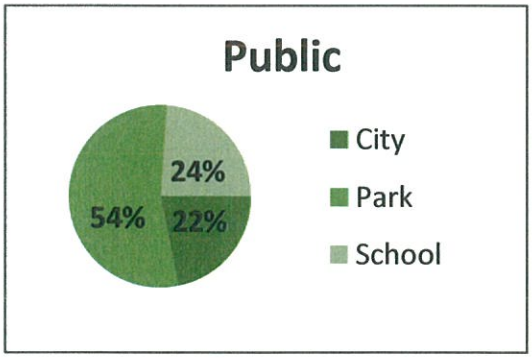
Billed by Category and Water Usage for 2016

Category	Number of Accounts	2016 Usage (CCF)*
Metered Water Services		
Single-Family	10,008	916,853
Multi-Family	3,412	1,140,860
Commercial	945	1,061,080
Industry	30	9,808
City	31	14,351
Park	77	5,969
School	34	37,645
Subtotal	14,537	3,186,566
Unmetered Water Services		
Fire Services**	592	-
Totals	**15,129**	**3,186,566**

Water Service Accounts by Category:



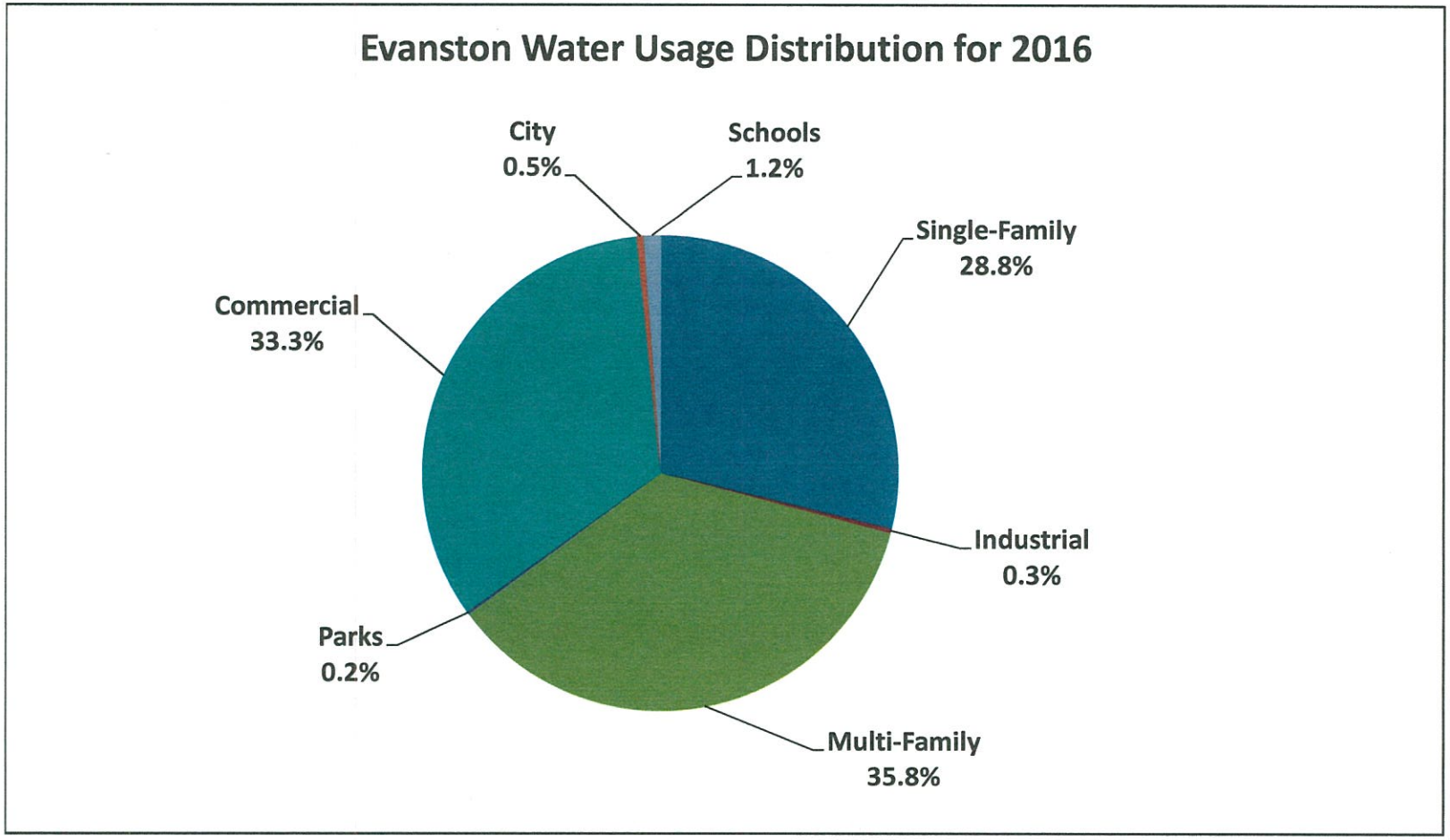




* Water usage is metered in units of 100 cubic feet (CCF). 100 CCF is approximately 748 gallons

** Fire services are not metered. They are billed a flat charge twice per year.

Water Usage Breakdown for Evanston Customers



Sewer

The Sewer Division manages the operation, inspection, maintenance, and repair of the City's sewer mains and structures (sewer manholes, catch basins, and stormwater inlets). This includes proactive programs such as sewer main and drainage structure cleaning, root cutting, and televised internal sewer main inspection; as well as responding to all reports of sewer backups and flooding. This division also inspects work done by contractors including sewer main lining and manhole rehabilitation. Sewer Division staff conduct regular inspection of sewer outfalls and other facilities throughout Evanston for compliance with the City's sewer system operating permits with the Illinois Environmental Protection Agency.

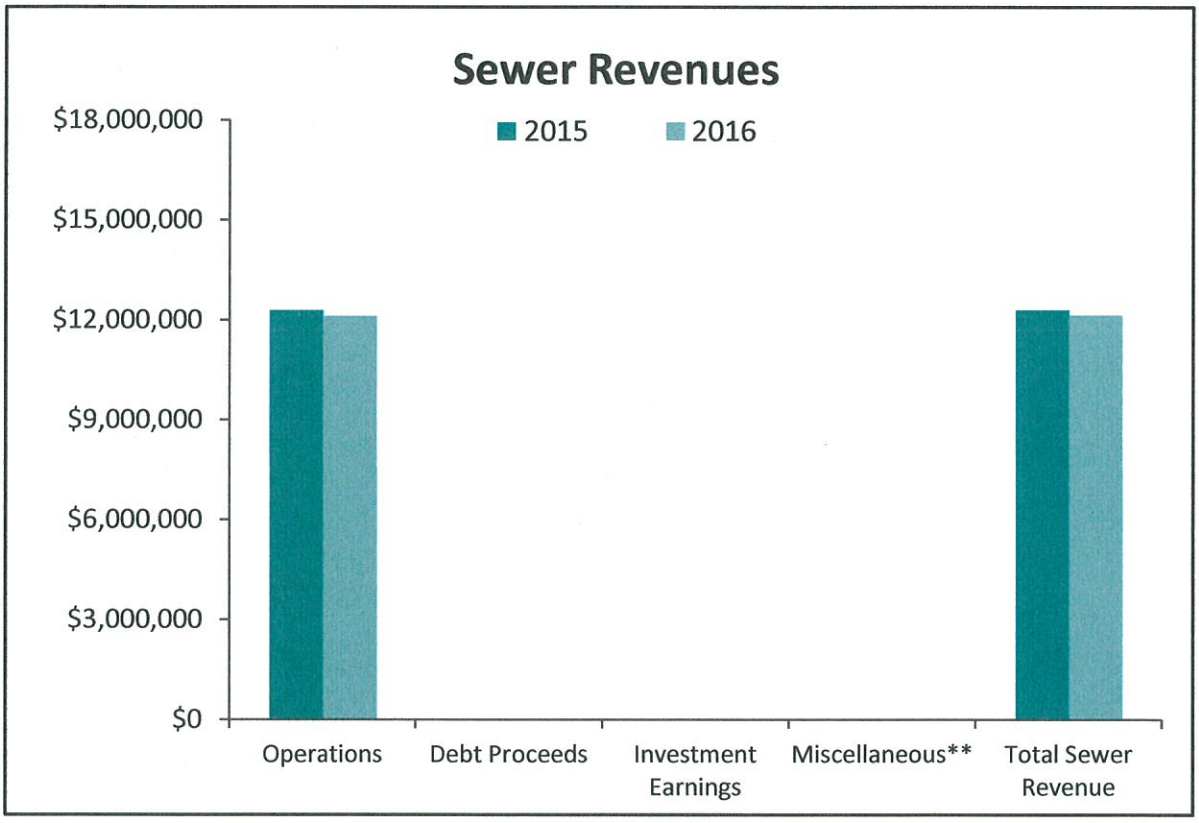
Sewer Division staff operate a sewer cleaning truck to remove debris from a catch basin.

Much of Evanston's sewer system was constructed in the late 1800s to early 1900s. These pipes are far too small to convey both domestic sewage and stormwater runoff as they were intended to do. Beginning in the early 1990s, Evanston constructed a network of relief sewers, which are much larger and deeper than the original combined sewers. The relief sewers now convey most of the stormwater runoff, to avoid overwhelming the combined sewers during rain events. The relief sewers run to a number of drop shafts located along the North Shore Channel, where they discharge directly to the Metropolitan Water Reclamation District's (MWRD) deep tunnel system.

This drop shaft was one of the starting points for a tunneling machine that installed Evanston's relief sewers as a part of the Long Range Sewer Program in 1992 – 2008. Relief sewers are installed at depths of up to 60 feet to efficiently collect and transport large volumes of stormwater without impacting customers and other utilities.

Sewer Revenues*

	2015	2016
Operations	$12,276,650	$12,100,000
Debt Proceeds	$0	$0
Investment Earnings	$1,000	$4,450
Miscellaneous**	$4,165	$21,600
Total Sewer Revenue	$12,281,815	$12,126,050

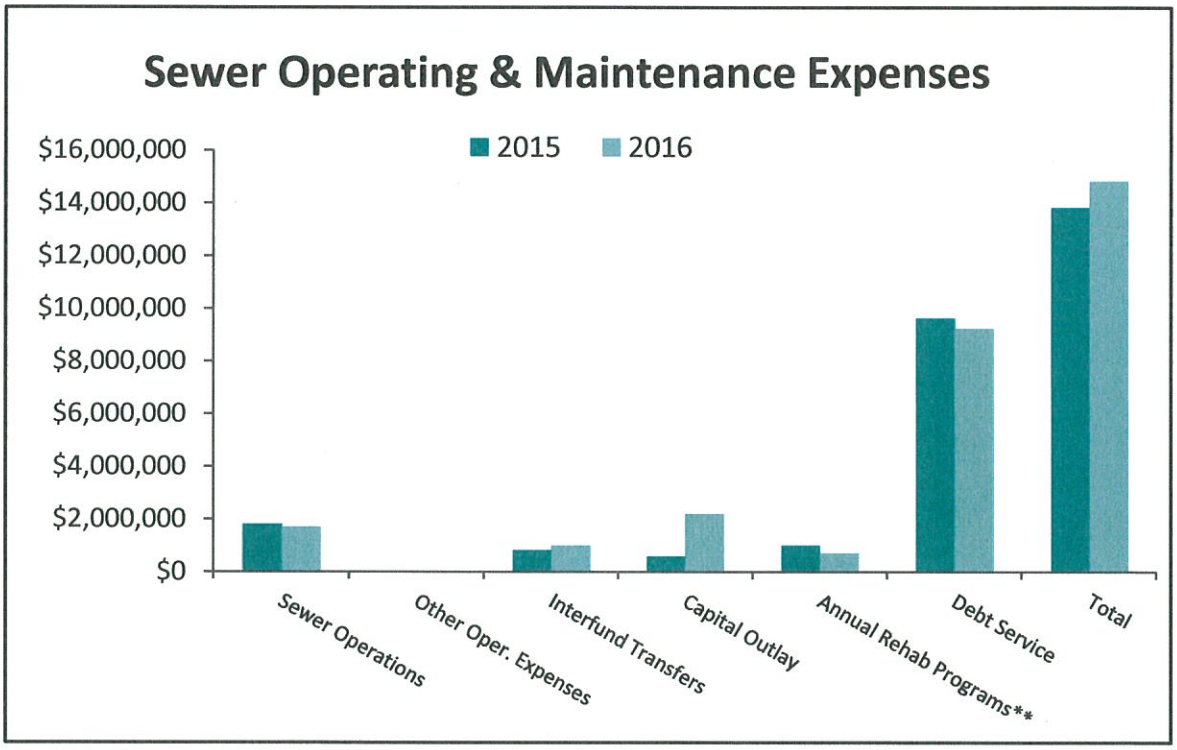


* Financial data are based on actual expenses and do not include audit adjustments such as depreciation and inventory. For audited financial records, see the Comprehensive Annual Financial Report for the City of Evanston, http://www.cityofevanston.org/transparency/budget-financial-reports/.

** Miscellaneous Revenue includes fees, grants, and merchandise sales.

Sewer Operating & Maintenance Expenses*

	2015	2016
Sewer Operations	$1,802,652	$1,698,475
Other Oper. Expenses	$6,611	$8,500
Interfund Transfers	$818,608	$987,194
Capital Outlay	$581,270	$2,195,200
Annual Rehab Programs**	$1,002,000	$706,603
Debt Service	$9,613,727	$9,222,913
Total	$13,824,868	$14,818,885



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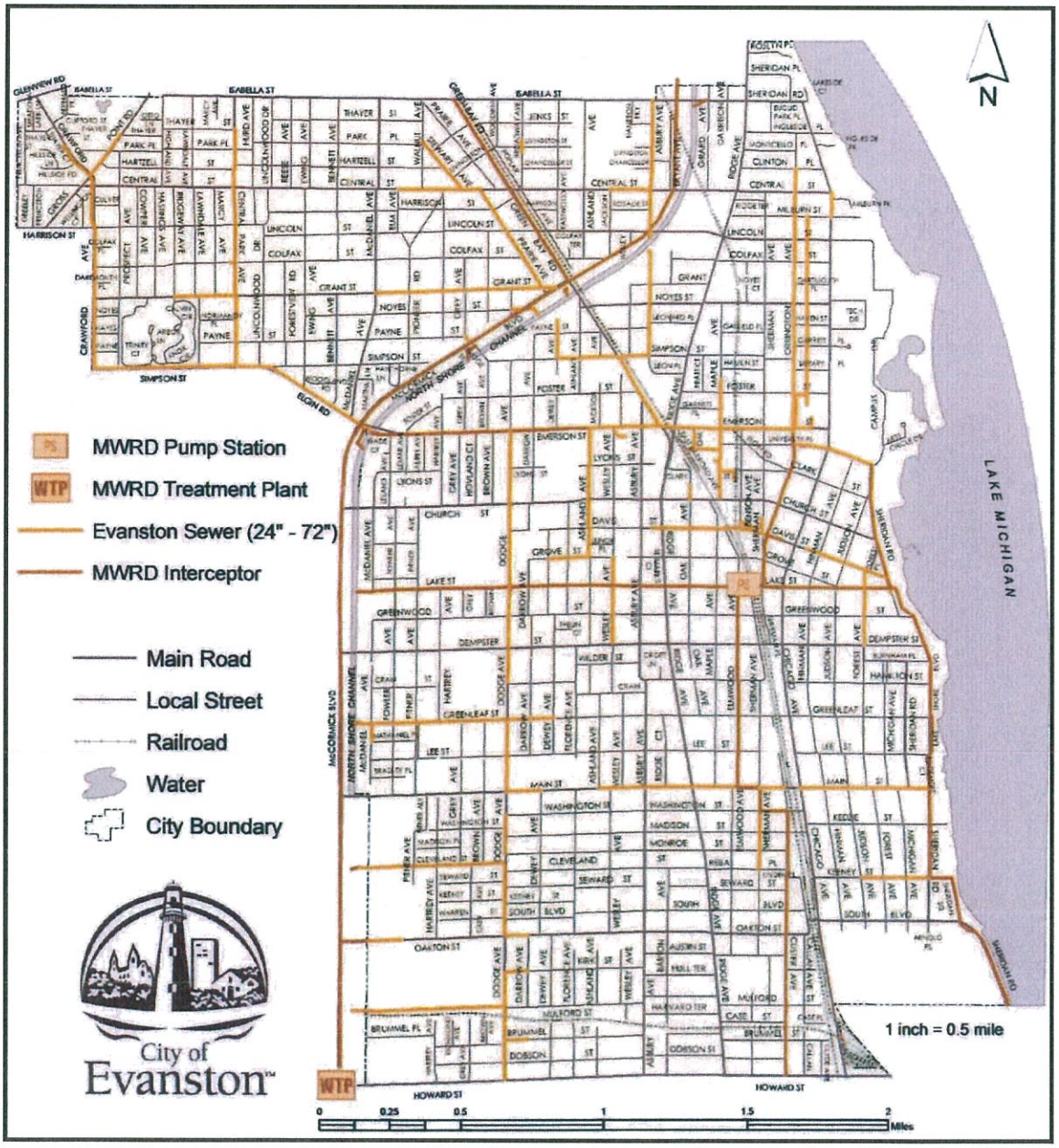
**Includes CIPP sewer rehabilitation, drainage structure replacement, stormwater management improvements, and emergency sewer repairs

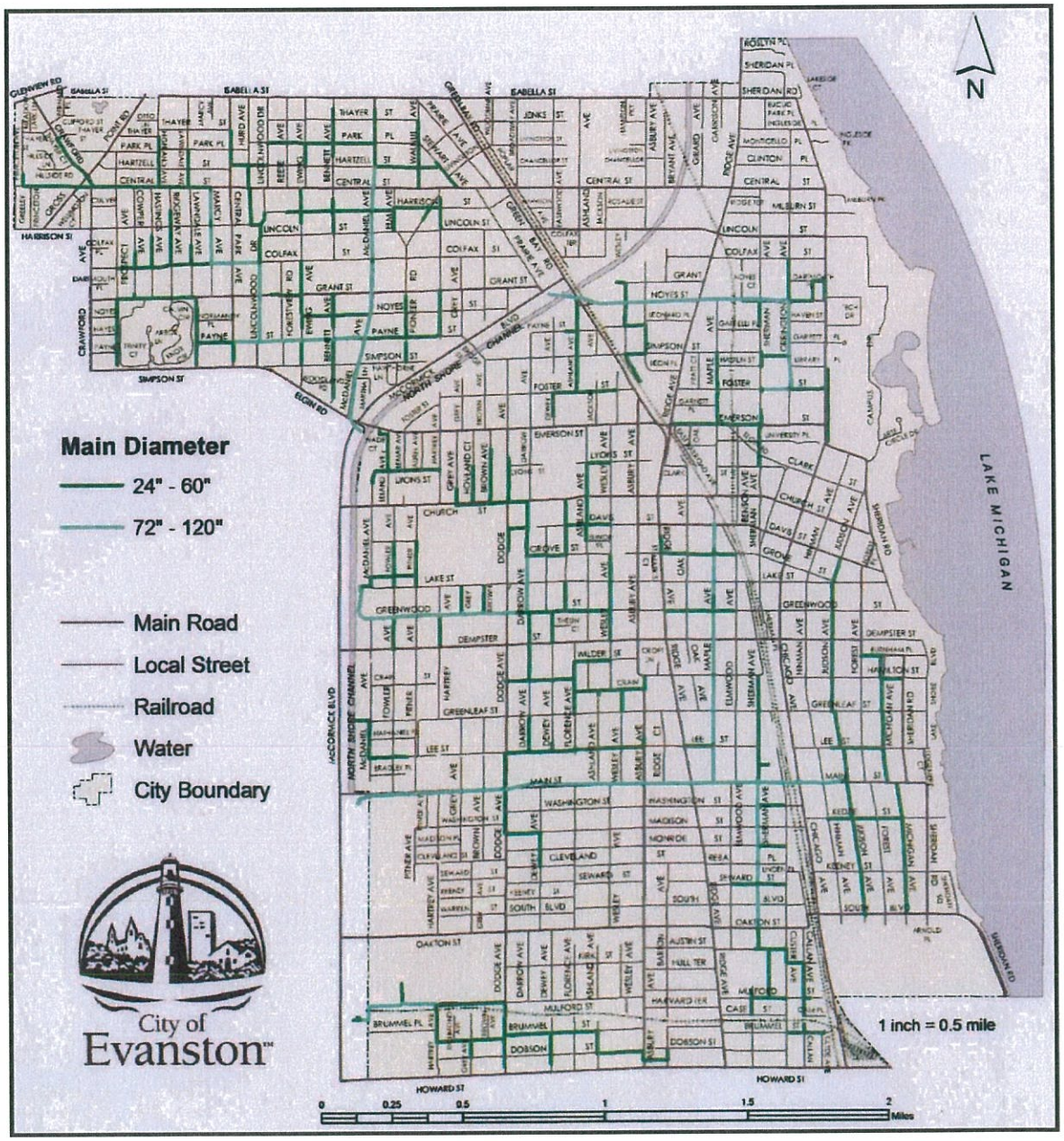
Major Combined Sewer System

The combined sewer system is Evanston's original sewage collection system. Much of this system was constructed in the late 1800s to early 1900s. The system was intended to capture and convey both domestic sewage and stormwater runoff, though as early as the early 1900s the City experienced flooding and basement backups during rain storms because the combined sewer pipes were not large enough to handle stormwater. In the early 1990s, Evanston began constructing a relief sewer system to convey the majority of the stormwater runoff and lessen the risk of basement backups.



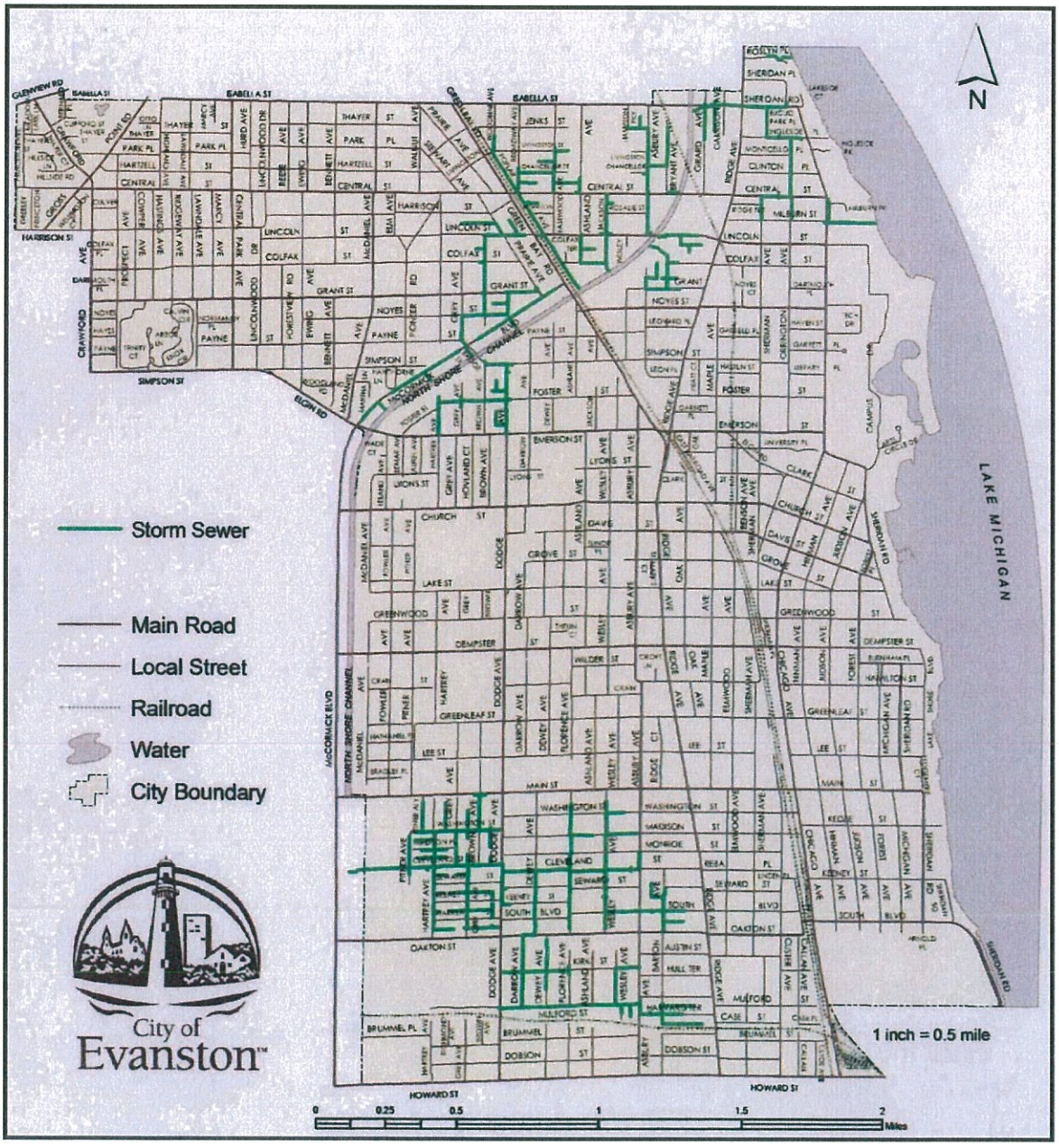
Major Relief Sewer System

Starting as long ago as 1902, property owners in Evanston experienced sewage backing up into basement during significant rain events. In 1990, the City Council approved a Long Range Sewer Improvement Program to mitigate property damage caused by basement backups. As part of this program, a network of large diameter relief sewers was constructed between 1991 – 2008 at a cost of $210 million. These pipes are larger and deeper than the combined sewers, and convey stormwater runoff and sewage overflows to avoid overwhelming the combined sewers.



Major Storm Sewer System

The storms sewer system discharges directly to the North Shore Channel and Lake Michigan. It is only utilized during rain events to convey stormwater from the streets to the channel or the lake. Most of the storm sewers in southwest Evanston were installed in the late 1970s to early 1980s. The remainder of storm sewers in this area, as well as the storm sewers in north central and northeast Evanston, were installed between 1991-2008 as part of the Long Range Sewer Improvement Program. Evanston operates the storm sewer system under a special permit issued by the Illinois Environmental Protection Agency.

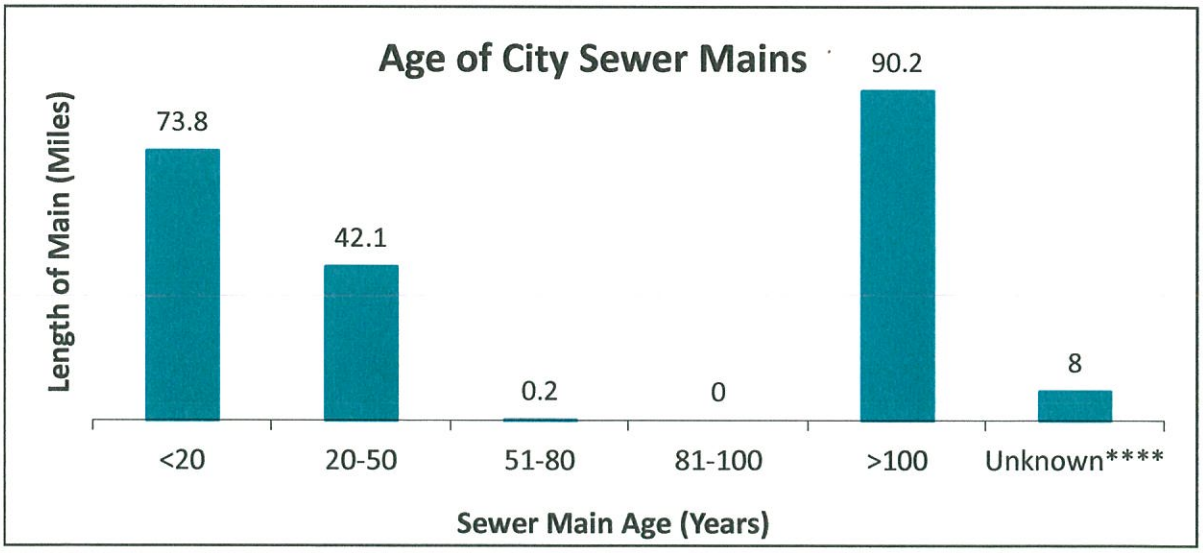


Sewer Mains

System Data and Maintenance*

	Pipe Length (miles)				
Sewer Length by Type	2012	2013	2014	2015	2016
Combined Sewer	143.78	143.93	143.85	144.30	144.27
Relief Sewer	51.78	52.65	52.82	53.54	53.69
Storm Sewer	16.21	16.31	16.31	16.29	16.30
Total Length	211.77	212.89	212.98	214.13	214.26

Sewer Installation	Pipe Length (feet)				
and Maintenance	2012	2013	2014	2015	2016
Installed (new)	239	1,682	0	2,782	0
Replaced	0	0	0	0	0
CIPP Rehabilitation (Lining)	8,850	15,995	12,059	11,330	7,753
Spot Repair	1,183	4,804	780	2,143	2,943
Clean - Hydroflush	242,791	180,309	136,679	110,419	217,566
Clean - Root Cut	5,372	7,657	14,412	39,987	8,400
Inspection - General	19,695	21,421	26,570	45,777	28,492
Inspection - Televised	83,942	78,022	69,805	50,300	51,602
Inspection - Storm-related**	0	1,981	971	530	0



* All work performed by the Public Works Agency except CIPP Rehabilitation (Lining).

** Includes sewers installed as part of alley improvement projects.

*** Inspection of City sewer mains as a result of sewer surcharge during or after a wet weather event, and inspection of storm sewer outfalls into the North Shore Channel.

**** Mains of unknown age were installed prior to detailed record keeping on sewer installations.

Length of Sewer Mains

By Type and Diameter

	Combined Sewer		Relief Sewer		Storm Sewer	
Diameter	Feet	Miles	Feet	Miles	Feet	Miles
<6"	2,993	0.57	243	0.05	0	0.00
6"	796	0.15	0	0.00	0	0.00
8"	21,365	4.05	10,961	2.08	1,933	0.37
9"	124,763	23.63	7,510	1.42	1,031	0.20
10"	108,751	20.60	29,467	5.58	10,994	2.08
12"	224,435	42.51	25,409	4.81	9,703	1.84
14"	1,019	0.19	0	0.00	0	0.00
15"	92,566	17.53	5,903	1.12	5,249	0.99
16"	2,085	0.39	6,160	1.17	724	0.14
18"	61,857	11.72	16,581	3.14	7,695	1.46
20"	8,410	1.59	127	0.02	0	0.00
21"	15,052	2.85	2,747	0.52	1,910	0.36
22"	858	0.16	0	0.00	0	0.00
24"	21,405	4.05	46,295	8.77	15,967	3.02
27"	6,434	1.22	6,373	1.21	3,240	0.61
30"	6,973	1.32	19,185	3.63	3,913	0.74
33"	3,771	0.71	1,309	0.25	482	0.09
36"	19,757	3.74	18,386	3.48	6,730	1.27
39"	421	0.08	0	0.00	0	0.00
40"	377	0.07	0	0.00	0	0.00
42"	6,700	1.27	12,282	2.33	3,570	0.68
45"	1,029	0.19	0	0.00	0	0.00
48"	13,108	2.48	22,580	4.28	7,966	1.51
51"	1,104	0.21	0	0.00	0	0.00
54"	1,981	0.38	3,159	0.60	609	0.12
57"	784	0.15	0	0.00	0	0.00
60"	7,206	1.36	4,916	0.93	3,633	0.69
72"	4,077	0.77	11,640	2.20	0	0.00
78"	0	0.00	5,440	1.03	0	0.00
84"	0	0.00	88	0.02	0	0.00
96"	0	0.00	2,366	0.45	0	0.00
108"	0	0.00	5,025	0.95	0	0.00
113"	0	0.00	9,275	1.76	0	0.00
120"	0	0.00	7,340	1.39	0	0.00
Unknown	1,686	0.32	2,722	0.52	691	0.13
Totals	**761,761**	**144.27**	**283,486**	**53.69**	**86,040**	**16.30**

Total Sewer Main Length: 214.26 miles

Sewer Structures

System Data and Maintenance

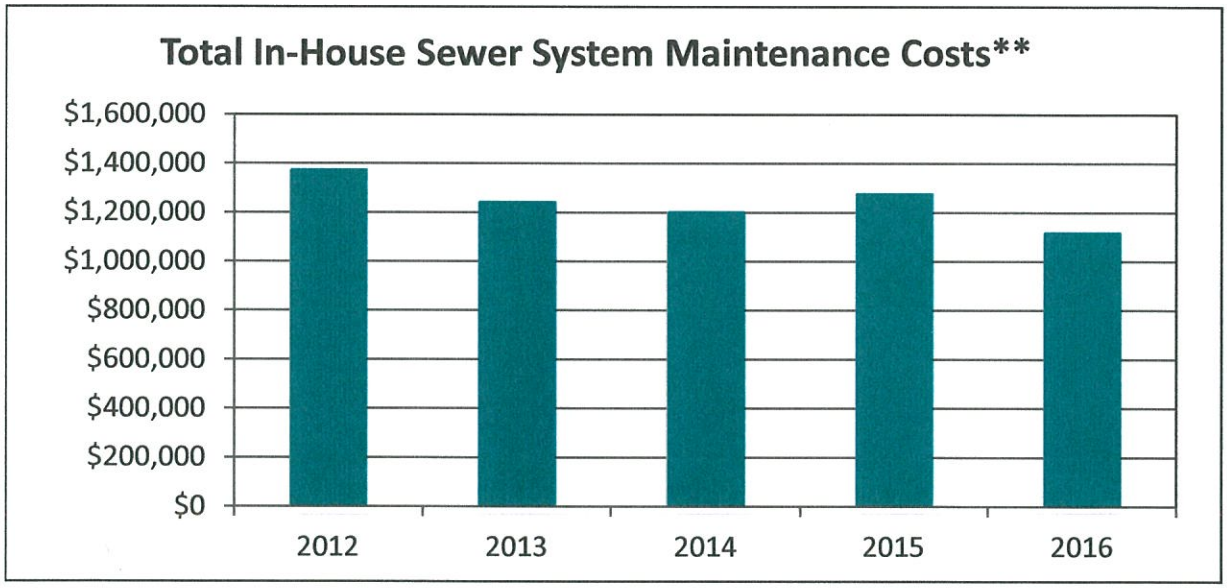
Number of Sewer Structures	2012	2013	2014	2015	2016
Manholes	5,532	5,561	5,566	5,582	5,583
Inlets	2,927	2,973	2,974	3,018	3,024
Catch Basins	6,179	6,203	6,208	6,238	6,246
Total	14,638	14,737	14,748	14,838	14,853

Sewer Structure Installation & Maintenan(	2012	2013	2014	2015	2016
Installed (new)	2	16	1	41	3
Replaced	39	5	21	18	9
Repair	133	87	55	73	89
Clean	4,109	2,732	3,181	3,262	2,779
Inspect - General	411	327	161	614	156
Inspect - Storm-Related*	479	1001	985	935	689

* Inspection of City drainage structures as a result of street or alley flooding during or after a wet weather event.

Breakdown of In-House Maintenance Costs*

Description	2012	2013	2014	2015	2016
Sewer Mains	$413,919	$449,960	$355,398	$344,407	$396,738
Sewer Structures	$615,415	$423,665	$353,667	$547,051	$388,196
Equip/Facility Maint.	$161,460	$176,489	$87,884	$162,452	$122,994
Assist W&S Divisions	$45,855	$48,692	$73,275	$80,729	$52,271
Snow & Ice Removal	$31,396	$66,675	$243,207	$68,538	$32,077
Assist Contractors	$18,240	$39,542	$18,681	$16,637	$16,955
Assist Other City Depts.	$57,269	$13,569	$35,943	$17,107	$61,226
Safety & Training	$21,321	$15,233	$18,759	$27,486	$30,844
Miscellaneous	$5,966	$6,808	$13,868	$10,588	$14,874
JULIE Locates	$1,300	$135	$553	$193	$357
Total	**$1,372,141**	**$1,240,768**	**$1,201,233**	**$1,275,188**	**$1,116,533**



* All work completed by Public Works Agency staff unless otherwise noted.

** Costs fluctuate from year to year due to changes in maintenance needs and prioritization of repair projects.

Sewer Mains Rehabilitated (Lined)

The Public Works Agency manages an annual sewer improvement program, with the goal of rehabilitating at least 1.5 miles of combined sewer mains annually (minimum 1% annual system-wide renewal rate).