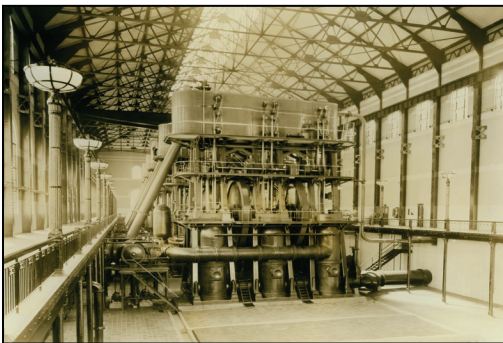


Col. Francis G. Ward Pumping Station and Filtration Plant



The **Massachusetts Pumping Station** in the Niagara River, viewed from Front Park. The Peace Bridge will bisect this view — circa 1920s. *Photo courtesy of Western New York Heritage Press.*



Installed in the engine room of the **Col. F. G. Ward Pumping Station** are five vertical, triple expansion, steam pumping engines, each with 30 million gallon per day (mgd) capacity. When completed in 1915, it was the largest pumping plant in the United States. *Photo courtesy of the Buffalo & Erie County Historical Society.*



The **Roundhouse Intake**, one of the City's most recognizable structures, is located 6,600 feet offshore in the Emerald Channel, a region in Lake Erie near the foot of the Niagara River known for its water clarity. Raw water is fed by gravity through a 12 ft. x 12 ft. tunnel bored beneath the lake bottom. The Roundhouse and its intake were completed in 1913.



The **Filtration Plant** was completed in 1927. At capacity, it can treat 160 mgd. Current usage is approximately 80 mgd. *Photo courtesy of the Buffalo & Erie County Historical Society.*



Taken by a Buffalo Evening News photographer on January 18, 1940, the tug “**Martha Stewart**” plows through the nearly frozen Buffalo Harbor at the Niagara River. It is carrying out its regular job ferrying employees to the water intake. At the helm is Captain Clarence V. (Paddy) Fix. Visible at right are the smokestacks of the Col. F. G. Ward Pumping Station. The Peace Bridge is in the distance at left. Who this “Martha Stewart” was is not known. *Photo courtesy of Western New York Heritage Press.*

As the City of Buffalo’s population steadily increased, City planners were under pressure to find a reliable and clean source of drinking water that could accommodate residents’ needs. Early on, reservoirs located in the Boston Hills were considered as a possible source of drinking water. But it was Col. Francis G. Ward, the City’s turn-of-the-century public works commissioner, who found a reliable source — the Emerald Channel, a region at the mouth of the Niagara River known for its water clarity and the emerald green color that is created by light reflecting off the limestone bedrock on the bottom. Once the location was agreed upon, plans were under way to replace the Bird Island Intake and build a new intake, as well as to construct a new pumping station for the City.

In 1907, the State transferred 12 acres at the foot of Jersey and Porter streets to the City to be used as the site for the new pumping station. However, the entire site was underwater. To convert the site into a usable tract of land, a contract was signed with the Buffalo Dredging Company, and work was begun that same year. In addition, construction of a 6,600-foot tunnel from the pumping station site to the Emerald Channel Intake, now known as the Roundhouse, began. A second 4,700-foot tunnel was also built northward that would connect the pumping station with the Bird Island Intake and the Massachusetts Avenue Pumping Station.

The architects of the pump station were Esenwein and Johnson, and the construction of these tunnels was said to be the largest work of its kind ever undertaken on the Great Lakes.

Five vertical shafts were sunk to a depth of 70 feet, and headings were started in each direction through solid rock. Dynamite was used to blast the rock and drills and all other machinery (was) run by compressed air. Compressed air was also forced into the tunnels to keep out the water.

The drilling was done by “airmen” who were physically fit and specially trained and could withstand air pressure of 30 to 35 pounds per square inch. To get to the work site, the men had to pass through a 4-foot pipe in a steel bulkhead with heavy steel shutters at either end that functioned on the same principle as a canal lock. There were two dynamite blasts every 24 hours at 4 a.m. and 4 p.m., each loosening 50 cubic feet of rock. Shovelers who removed the loose rock were relieved by another shift every three to four hours, “for the work was unhealthy.”¹

The pumping station went online in 1915 and housed five giant steam-driven pumps that each weigh 1,100 tons and stand 60 feet tall. Each 1,200-horsepower steam engine has two 30-ton flywheels that drove piston pumps capable of discharging 30 million gallons per day (mgd) through 48-inch pipes. The steam pumps were manufactured by the Holly Pump Company of Lockport, N.Y.

In 1924, a \$4-million referendum (equal to \$50 million in 2008) was approved by City residents for the

¹ www.penndixie.org/events/03cruise/2/ca/ca.html

On the morning of June 30, 1911, workmen were putting a tile covering on the recently completed steel roof of the Col. Frances G. Ward pumping station, when the roof suddenly collapsed, taking the sidewalls with it. After the rescuers frantically dug through the rubble, the death toll emerged: eight dead out of the 20 who were buried.
— *The Buffalo Evening News*, 3/14/82

construction of a water filtration plant.

Since it was believed at that time that the plant would serve all of Erie County, below-grade foundations, gallery substructures and piping were constructed for 60 filter beds and a treatment capacity of 240 mgd — although only 40 filters with a capacity of 160 mgd were initially, and to this day, completed (current system average day demand is approximately 80 mgd). A 12-foot conduit was built, connecting the 30-million gallon clean water storage well (clearwell) to the pumping station. The plant contains six low-lift pumps that raise water from the lake level into the filter plant and 40 filter beds and interconnecting process and backwash piping. East of the filter plant, a 30-million gallon, two-section, sedimentation basin was built.

Since first built, the pumping station and filter gallery have undergone periodic renovation. In 1938, three 25-cycle electric pumps were installed at the pumping station. These 50-mgd pumps replaced the five original steam-driven pumps, which were maintained in service for use as backup until 1975. In 1983, the Col. F. G. Ward Pumping Station was rehabilitated to a state-of-the-art facility with the installation of new controls and instruments.²

On Feb. 25, 1985, the water intake system of the Col. F. G. Ward Pumping Station was named one of Western New York’s most historic engineering achievements by the Buffalo & Erie County Historical Society and the Erie-Niagara Chapter of the New York State Society of Professional Engineers.³

In 2001, Conestoga-Rovers & Associates (CRA) was hired to conduct a comprehensive study of the filtration plant, including filtration process performance and backwash procedures. The study report, completed in 2002, recommended improvements to the structural, mechanical and electrical systems as well as comprehensive process control improvements to the facility. CRA began extensive design of the upgrades in 2003, and construction began in early 2006. All filtration plant improvements are expected to be complete by mid-2008.

² *Tour of Ward Pumping Station Evokes Memories of Buffalo’s Water History*, by Howard and Jean Heidenburg, Buffalo’s Industrial Heritage Committee Newsletter, 1991 spring/summer edition.

³ *Classic Buffalo: A Heritage of Distinguished Architecture*, by Richard O’Reisem, Canisius College Press, 1999.

Filtration Plant Renovation and Improvements Project



The first major upgrades to the City’s water filtration plant in its 80-year history are scheduled for completion in 2008. Evaluation, planning and design efforts for the more than \$20-million in improvements were underway for nearly five years before construction began in 2006.

The improvements undertaken at the plant were diverse, ranging from structural rehabilitation of concrete filter walls and conduits, to the installation of a state-of-the-art computerized filter process control system. Major upgrades undertaken as part of the \$20-million improvements project include the following:

- The replacement of 240 outdated, hydraulically-actuated (water pressure) large filter valves of up to 36-inches in diameter with electrically-actuated valves
- The installation of new filter process instrumentation — including flow meters, turbidity meters, pressure elements and level sensors — all connected to a computerized monitoring system that provides automatic and manual filtration and backwash process control from both the operating galleries and a centralized filter plant control room
- The installation of glass partitions to atmospherically separate the filter cells from the operating galleries to provide isolation of both personnel and sensitive electronic and mechanical equipment from residual chlorine and humidity
- The installation of new medium voltage electrical switchgear to increase reliability of the plant’s incoming power service
- The installation of new higher-capacity heating and ventilating equipment and controls to improve upper and lower gallery and filter area conditions
- Grouting and structural rehabilitation of concrete filter cell walls and conduits to restore structural integrity and mitigate leakage

The John W. Danforth Company of Buffalo performed the general/mechanical/HVAC construction; the O’Connell Electric Company of Buffalo performed the electrical construction.

With these improvements in place, the City’s treatment plant will continue to be capable of efficiently producing high-quality drinking water for generations to come.