# Canals & Tunnels of Niagara Falls

This article was written after watching a YouTube video on the tunnels of Niagara Falls. That video was interesting, but misleading and incomplete. Therefore, this article attempts to complete and accurate. Since most of  the tunnels and canals are associated with hydro-power generating plants, the topic is covered as these facilities exist along the Niagara River. Any tunnels and canals not associated with power plants are covered at the end of this article.

The difference between a tunnel and a conduit is simple. A tunnel is excavated entirely below ground. A conduit is built by excavating down from the surface, placing a water-carrying structure down into the excavation, and then restoring the land above the conduit.

## John Dean Adams Power Plant (U.S.):

Located about 1.5 miles up-river from the falls, this power plant was funded by George Westinghouse and designed by Nicola Tesla, Charles Proteus Steinmetz, Thomas Evershed, and several other notable engineers of the time. It the first of the three “deep pit” power plant designs in the area. In this design, the generators were at the level of the upper Niagara River and the turbines were located at the bottom of a deep pit. The turbines and generators were connected by a long shaft.

**Niagara River (left), Power House #2, Power House #1, Transformer House (circled)**

### *Intake canal:*

As can be seen in the photo above, this power plant had a 250 ft wide and 12 ft deep hydro canal that supplied water from the upper Niagara River to Power House #1 and Power House #2, which were located on opposite sides of the canal. Each Power House had 10 generators, supplied by the canal. The canal was mostly filled in when the State built the Robert Moses Parkway along the river. Only a small section of the canal exists today. The two Power Houses were razed in the mid 1960's.

The Transformer House had no source of water and, therefore, contained no generators, contrary to some erroneous sources. The Transformer House still exists and was later intended to house a museum, which never materialized. Located at 1501 Buffalo Avenue, it is now used as a warehouse for winter

storage of boats and RVs.

### *Discharge tunnel:*

The 7,000 ft long, brick lined discharge tunnel ran from below the wheel pit of the Power Houses to the lower Niagara River, between the Maid of the Mist boat landing and the foot of the Rainbow bridge. It was the 80 feet of elevation lost to the slope of this tunnel that made Adams very inefficient, leading to its closure in 1924 (not 1961 as erroneously stated in many documents). In 1924 Adam's water allocation was transferred to the newly constructed and more efficient Schoellkopf 3-C facility.

Since the mid 1980s, the tunnel is repurposed for the effluent discharge from the city's waste water treatment plant, built on the property adjacent to the Adams Power Plant.


**Adams Discharge Tunnel**

## Toronto Power (Canada):

This magnificent building was built in the early 1900s. Its beautiful architecture was chosen, because it was built within the park, not far from the main tourist area. It is one of the three “deep pit” power plant designs in the area.

**Toronto Power Plant**

### *Intake canal or tunnel:*

None. This power plant sat on the shore of  the upper Niagara River and took water directly from the river without the need for a canal or tunnel.

### *Discharge tunnel:*

This power plant had a discharge tunnel to that went from below the wheel pit to the lower Niagara River, behind the Horseshoe Falls. The tunnel is inaccessible, except from the bottom of the facility. The tunnel was built using concrete rings, so that rings would break off as the Horseshoe Falls erodes.

## Rankin Station (Canada):

This attractive building was built in the early 1900s with the first generators coming on line in 1905. Its architecture was chosen, because it was built within the park, in the main tourist area, near the brink of the Horseshoe Falls. Now a museum, it is the last remaining example the three “deep pit” power plant designs in the area.

**John Burch Rankin Station – now a museum**

### *Intake canal or tunnel:*

None. This power plant sat on the shore of  the upper Niagara River and took water directly from the river without the need for a canal or tunnel.

### *Discharge tunnel:*

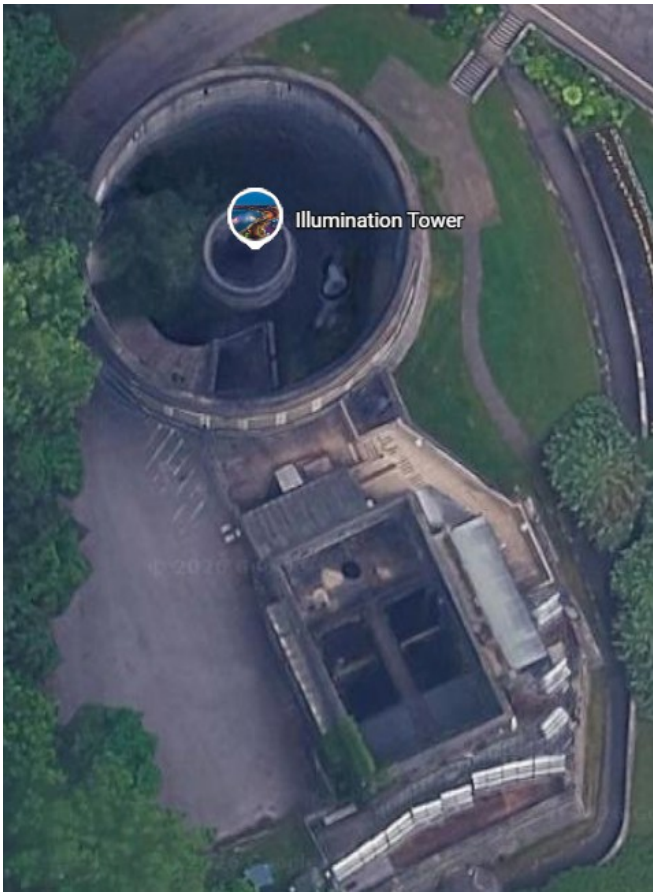
This power plant has a discharge tunnel to went from below the wheel pit to the lower Niagara River, just to the side of the Horseshoe Falls. Since this facility is now a museum, the tunnel and a viewing platform are now accessible from below the wheel pit at the bottom of the facility.

## Ontario Power (Canada):

**Ontario Hydro Power Plant**

### *Intake conduits:*

This power plant received its water from an up-stream intake structure via three conduits. These conduits are located beneath the Niagara River Parkway. Because the plant is in the midst of the main tourist area, everything is below ground. The only above-ground structure is a surge tank, which performs a function similar to a forebay. The lights that shine on the Horseshoe Falls at night are mounted on the roof of a structure attached to the surge tank.  The lights that shine on the American Falls at night are mounted on the power plant at the base of the gorge.




**Surge Tank (round structure)**

**Horseshoe Falls lights (rectangular structure)**

### *Discharge tunnel:*

None This power plant discharged directly into the lower Niagara River.

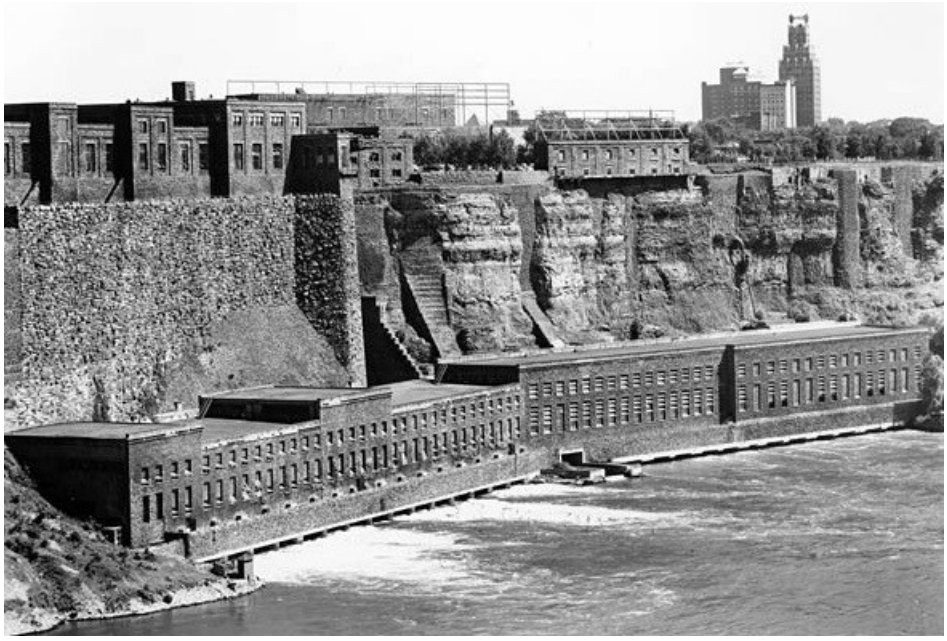
## Schoellkopf 3-A, 3-B, 3-C (U.S.):

The area of the Schoellkopf power plant was an industrial area long before electric power generation matured. The first generating plants in the area were built by Jacob Schoellkopf. Schoellkopf 1, at the top of the gorge, was built between 1882 and 1891. With the advent of higher pressure turbines, he built Schoellkopf 2 at the bottom of the gorge in 1895. Both can be seen in the photo below.

**Early Mills, Schoellkopf 1 (top), & Schoellkopf 2 (bottom)**

After the death of Jacob Schoellkopf, his sons Jacob and Hugo too over and built the third power plant, Schoellkopf 3 at the bottom of the gorge. They later added on to the facility twice, hence the names Schoellkopf 3-A, 3-B, and 3-C.

My Father was generator operator at Schoellkopf, until just before the collapse on June 7, 1956. He took me into this facility many times and tagged along whenever he lead tours of the facility.



**Schoellkopf 3-A (left, 1914), 3-B (center, 1918), & 3-C (right, 1924)**

The ruins of the Schoellkopf power plant can best be seen from the boat ride, below the falls; Maid of the Mist on the U.S. side or Hornblower on the Canadian side. It can also be accessed by a free elevator down to the floor of 3-A. All that remains of the building is the floor/tailrace of Schoellkopf 3-A and where the penstocks emerged from the wall of the gorge. A number of historical photos is displayed on a wall that now separates 3-A from the completely destroyed remains of 3-B and 3-C.

## *Intake canal:*

A hydro canal was built in 1853 to bring water to mills along the gorge. The canal brought water from about one mile above the falls, was 4,500 ft long, 22 ft wide, and 10 ft deep. At that time, mechanical power was transferred to the surface via shafts, belts, and ropes.

Jacob Schoellkopf purchased the canal in 1877 for $71,000 and soon enlarged it to 30 ft wide and 14 ft deep. After the old mills were gone, the canal supplied water to Schoellkopf 3-A, built between 1904 and 1914, and Schoellkopf 3-B, built between 1918 and 1920.

The canal was dammed near its source in the days following the June 7, 1956 collapse of the Schoellkopf power plant and filled in between 1958 and 1973. Today, the John Daly Blvd. exit of the Niagara Scenic Parkway sits at the site of the old canal.

## *Intake tunnel:*

When Schoellkopf 3-C was built between 1921 and 1924, the existing canal could not supply enough water for the existing and new plants. Therefore, a tunnel was added below the canal to supply more water to the facility. The tunnel's intake was actually in the center of the canal at the upper Niagara River. After the canal was dammed off, the tunnel alone supplied water the rebuilt Schoellkopf 3-A, until it shut down in 1961.

### *Discharge tunnel:*

None. This power plant discharged directly into the lower Niagara River.

## Sir Adams Beck #1 (SAB1), #2 (SAB2) (Canada):

The Sir Adam Beck facility was built in phases over 90+ years. SAB1 and its canal date to the 1920. SAB2 and one of its tunnels date to the mid 1950s, while the second tunnel was completed in 2013.

**Sir Adam Beck #1 (right) and #2 (left)**

Because the configuration of facilities and water-ways of SAB is more complex than that of the newer Robert Moses power plant the following satellite views below are provided. In the first image, the hydro-canal can be seen heading North from the Welland River. The second image shows the reservoir and long, wide canal that effectively serves as a forebay and destination for the hydro-canal and both tunnels.


**Welland River & Hydro-Canal (upper) & SAB Area in Queenston (below)**

## *Intake canal:*

Built in the early 1920s, Sir Adam Beck #1 (SAB1) received its water via the open-cut Welland-Queenston hydro-canal running between the Welland River, just West of Chipawa, to a wider feeder canal near SAB1 in Queenston, Ontario. The hydro-canal received water both from the Welland River and the Niagara River. Normally the Welland River would flow into the Niagara River. Now, the direction of flow in a portion of the Welland River has been reversed, flowing from the Niagara River

to the canal.

### *Intake tunnels:*

Built in the 1950s, Sir Adam Beck #2 (SAB2) received its water via two diversion tunnels, running from the upper Niagara River, below the city of Niagara Falls, Ontario, to the feeder canal in Queenston. The first tunnel was completed in the 1950's when SAB2 began operation. The second tunnel was completed in 2013. With the completion of the second tunnel, Canada can fully use its allocation of water from the Niagara River, per the international treaty.

The SAB Pump Station and reservoir were built in 1958. The international treaty and the purpose of reservoirs and pump stations are explained in a companion paper on the management of water and ice in the Niagara River.

### *Discharge tunnel:*

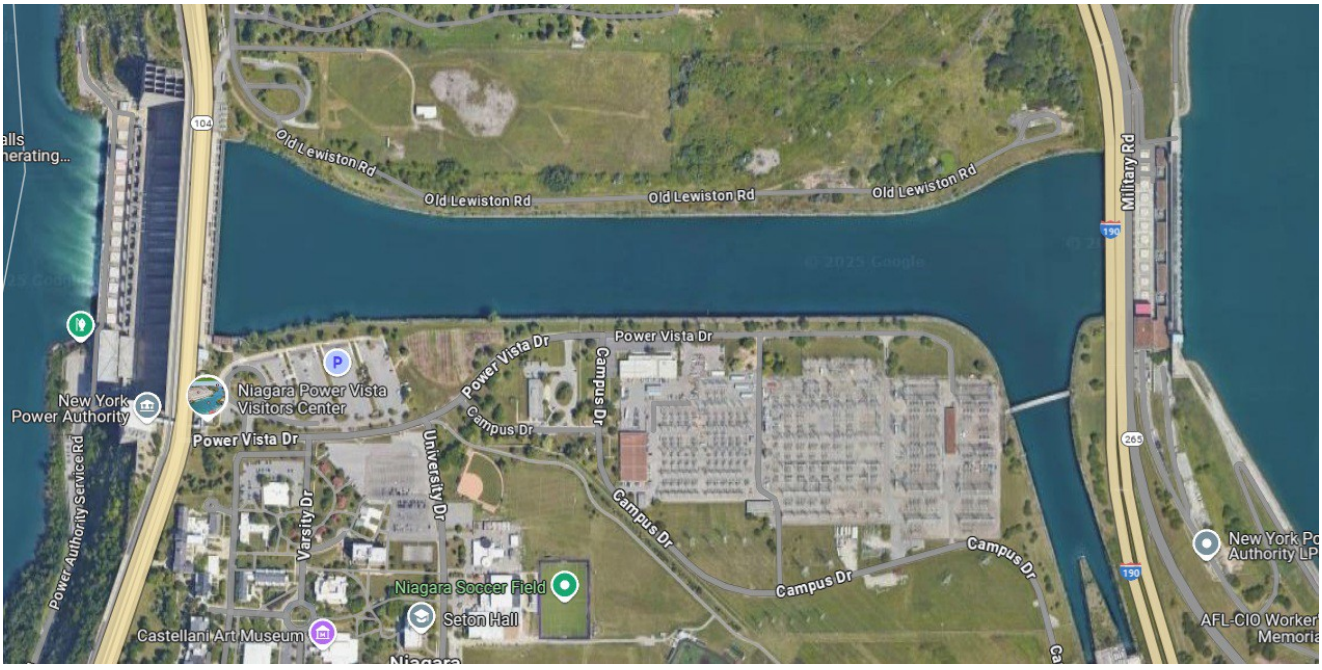
None. This power plant discharges directly into the lower Niagara River.

## Robert Moses (U.S.):

Completed in 1961, the Robert Moses power plant features the Power Vista, an excellent free set of displays. A spare turbine is on display in the parking area. There is a viewing platform from which there is a good view of the main part of the facility at the bottom of the gorge. Indoors, there are two levels of museum-like displays, one for children and one for adults. The adult section features a cut-away model of the plant and a great collection of historical photos.

Robert Moses implements a philosophical change for the U.S. that Canada made years ago. It was decided that a resource of this strategic importance should not be in the hands of a private, for-profit company, but should be publicly owned and operated. The New York Power Authority was created as the public entity, similar to Ontario Hydro in Canada. The expense and magnitude of constructing this facility and related projects was very likely beyond the resources of a private corporation.

**Robert Moses Power Plant with the Power Vista at the Faar Right**




**Robert Moses Power Plant (left), Forebay, & Lewiston Pump/Generating Facility (right)**

### *Intake canal:* None

### *Intake conduits:*

The Robert Moses facility uses two large conduits to bring water from the intakes, located on the upper Niagara River to the forebay, located near the pump/generating plant. Each conduit is 14 m, 46 ft wide, 20m , 66 ft tall, and 6 km long.

### *Discharge tunnel:*

None. This power plant discharges directly into the lower Niagara River.

## Other structures not associated with power plants.

### *Journey Behind the Falls:*

Located in the gift shop at the brink of the Horseshoe Falls, in Niagara Falls, Ontario, this attraction takes you down 125 ft to a tunnel that terminates behind the Falls' wall of water. Here, you are behind the falls, whereas the discharge tunnel of the Rankin Power plant terminates at a platform at the lower edge of the Horseshoe Falls and the Maid of the Mist or Hornblower boat rides take you close to the front of the falls.

### *Cave of the Winds:*

Located in the Goat Island State Park in Niagara Falls, N.Y., this attraction takes you down, by elevator, 170 ft to a man-made tunnel, terminating at a platform near the base of the American Falls.

### *Love Canal:*

Although never completed as a canal, the Love Canal deserves dishonorable mention, due to the misery, pain, expense, and death that it caused and continues to cause. Niagara Falls, N.Y. was mainly a chemical town, with industries that produced enormous amounts of toxic waste. Dig a hole in the area and the chemical companies will fill it with toxic waste. As such, the Love Canal became the nation's first Supper Fund site.

There is an excellent documentary on the Love Canal, entitled “Poisoned Ground,” done as part of the American Experience series of the Public Broadcasting System (PBS). It is available from PBS and on YouTube. The most comprehensible documentation can be found on Wikipedia.

**Love Canal Area Today**

In the early 1980's William T. Love raised money to build a canal between the upper Niagara River and presumably Lake Ontario or the lower Niagara River, below the escarpment, to provide transportation, power, etc. He also purchased land for his Utopian city, called Model City. It appears that the canal would be a U.S. equivalent to an earlier version of the Welland Canal in Canada.

Digging a portion of a canal, near the upper Niagara River, began in 1894, but the project was soon abandoned, leaving a big hole in the ground, about 1 mile in length. Part of Model City exists today, but part was also used as a radio-active dump for by-products of Uranium enrichment during the Manhattan Project. Remediation of this site is expected to be complete in 2030.

The canal property was purchased in the 1940's by the Hooker Chemical Company, now a division of the Occidental Petroleum Company, a.k.a., OxyChem. Between 1942 and 1952, Hooker used it to dump 19,800 metric tons of chemical waste, mostly in 55 gallon drums. With the fear that the property would be taken emanate domain, Hooker sold the property in April, 1953 to the School Board for $1. This allowed Hooker to have a release clause in the deed that avoided any future liability. The property was to be used for a park, with a school nearby.

In 1957 and 1958, the school board sold land to private developers for the construction of homes. 800 private homes and 240 low-income apartments (Griffin Manor) were built (Note the streets, but no homes in the photo above.) The 99$^{th}$ Street School was also build at the end of the canal. Due to the unusually wet winters of 1962 and 1977, chemicals began to invade basements, form puddles in yard and the school's play area. The health consequences were disastrous.

Today, the school and houses are gone, although the streets remain. The Griffin Manor housing project

is gone. The canal is capped with plastic and clay and fenced off. A few small companies were allowed to build on the edge of the area. The hamlet of Black Creek Village, just North of the Love Canal is on the migration path of chemicals from the canal to Burgholtz Creek and continues to have health problems. There is also a small retirement community at the South-West corner of the canal. In short, the problem was never properly remediated and removal of the chemicals would be more problematic than remediation in-place.

The Love Canal disaster is intensely personal, as I am most likely an early victim of the chemical poisoning, with multiple birth defects, a history of many surgeries, and a lifetime of pain. Long before the chemicals surfaced in the canal's immediate vicinity, chemicals were migrating below ground to Burgholtz Creek to the North. Burgholtz Creek empties into Cayuga Creek, which flows South to the upper Niagara River. My grandparents had a store on Cayuga Avenue with a direct connection to the creek. The basement was always partially flooded with creek water and, during times of high water, the entire basement was flooded to the level that would put out the fire in the coal furnace. I was told that they also got their drinking water from the creek, before being hooked up to city water. My Mother worked in her parents' store while she was pregnant with me and my Father was in the Army

## *Water Supply Tunnels:*

The city of Niagara Falls, N.Y, obtains its water supply from a channel of the Niagara River, between Grand Island (U.S.) and Navy Island (Canada), via tunnels beneath the river. Both the earlier water plant had the new water plant have such tunnels. The new water plant was built and the old water plant abandoned, because toxins from a chemical dump on the adjacent property has begun to corrode and infiltrate pipes of the city's water supply.

## *Erie Barge Canal:*

Although near, but not in Niagara Falls, the historic Erie Canal was completed in 1825, providing the first water-way between the Atlantic Ocean (via the Hudson and Mohawk Rivers), across New York State, to the Great Lakes. It included side canals to several other destinations in New York State and to Lake Ontario. Originally, the canal terminated at Lake Erie in Buffalo, N.Y., via a canal along side the Niagara River. The reason for the side canal to Lake Erie at Buffalo was that a horse-drawn barge would never survive the swift current of the Niagara River. Today, with powered pleasure water-craft, the side canal has been filled in and the Erie Canal terminates into the upper Niagara River at the boundary between Tonawanda and North Tonawanda, N.Y..