Winnipeg's

Water

Our Most Essential Resource

Safe, Reliable, and Abundant Water Has Been at the Centre of Winnipeg's Success for More Than 80 years.

Winnipeg

Water and Waste Department

Revised May 2002

In the early part of this century, securing a safe, reliable and abundant water supply was seen as a major challenge to Winnipeg's growth. After much debate, visionary Winnipeggers elected to proceed with a daring proposal to bring water by aqueduct from Shoal Lake on the Manitoba - Ontario boundary, to Winnipeg. Shoal Lake was described as one of the best fresh water sources in the world.

More than 80 years have passed since the completion of the large - capacity Shoal Lake aqueduct that serves Winnipeg to this day. Winnipeg's water utility has retained its early vision of providing all the necessary elements to give Winnipeggers a safe, reliable and abundant water supply.

The following pages highlight our water supply system, including its colourful early history, and the extensive distribution network that supplies our water.

A Brief History of Our Water Supply

Poor Water in a Growing City Sparked a Quest for a Better Supply in the Early 1900s

Water is vital to the growth and success of any city. In the early 1900s, Winnipeg's water system was not adequate for what most expected to be an important city on this continent.

For decades, "watermen" using ox carts had hauled untreated water from the Red and Assiniboine rivers and delivered it by barrel around Winnipeg. But sewage in the river eventually rendered that supply undrinkable.

After the watermen, most of the city's water came from artesian wells, which produced unreliable and sometimes dangerously polluted drinking water.

Typhoid fever outbreaks, aggravated by the poor water, killed thousands of citizens in the early 1900s, and posed a serious problem for Canada's third largest city.

The water was bad everywhere. It smelled! It was foul-tasting and discoloured. Even in the grand hotels along Main Street the toilets and ornate claw-footed bath tubs were disfigured by rusty stains.

Winnipeg in the Early 1900s

In 1911, Greater Winnipeg's population was almost 156,000 and had tripled in the preceding decade. The economy was booming. Wheat prices were high. American and British speculators were predicting Winnipeg would become "the Chicago of the North." In the early 1900s, Winnipeg had never seen a brighter future.

But, optimism was not enough. To assure its future, Winnipeg needed an abundant supply of fresh, safe drinking water.

A Search for Water Leads to a Visionary Proposal

A distinguished American engineer, Professor Charles Slichter, studied Winnipeg's situation and condemned the existing system as "very unsatisfactory." He offered the City three options:

- Drill new water wells north of the city
- Build a pipeline to the Winnipeg River
- Take a "daring" and "visionary" approach and build an aqueduct to Shoal Lake, which he described as a "fabulous" source of water "of exceptional softness and purity," in a lake of "clean Laurentian granite."

Far-Sighted Winnipeggers Show Support

Several challenges existed to bring water from Shoal Lake – the biggest was the cost of moving the water such a long distance. Slichter was accused by his critics of being a dreamer. "Who is going to pay?" they charged.

The city council of the day emphatically rejected Slichter's report. But, local newspaper editorials claimed Winnipeggers were looking to the future and they wanted "water of good quality and lots of it." More importantly, they were willing to pay for it.

Winnipeg Votes for Shoal Lake to Proceed

In 1913, an energetic young politician, Thomas R. Deacon, was elected mayor on the basis of his campaign to deliver clean, safe, and abundant water. He submitted the options to a vote by the people, and the expensive Shoal Lake plan won by a landslide.

Professor Charles Slichter was born in St. Paul, Minnesota on April 16, 1864 and died in Madison, Wisconsin in 1946 at the age of 82. Starting in 1898, he served as a consulting engineer to the U.S. Geological Survey.

In 1907, he was hired by the Public Utilities Commissioner of Manitoba, H.A. Robson as an expert of the "highest order and one entirely uninfluenced by any local interest" to determine which water supply was best for the city. In 1912, Slichter recommended Shoal Lake citing it as the best supply for the city, since it required no treatment and it was "...an enormous reservoir of clear, pure and soft water."

Upon hearing of the completion of the aqueduct project, Professor Slichter wrote a congratulatory letter applauding the city's accomplishment. " It is as magnificent a supply as that of the city of Glasgow, or of Los Angeles, or of New York. None of these cities possesses a supply more wholesome or sanitary, and few indeed enjoy a supply of such delightful softness...you need not fear comparison with any supply of any place on earth."

The Challenges... From Pipe Dream to Reality

Cost was not the only challenge to bring Shoal Lake water to Winnipeg. Many others existed as well – accessibility, the difficult terrain, and aqueduct design.

Accessibility

The route to Shoal Lake lay across 137 kilometres (85 miles) of wilderness with no road access. The Greater Winnipeg Water District railway had to be built parallel to the route to carry workers, equipment, gravel and cement. Camps were set up along the way to house workers and stockpile materials.

The Terrain

Although the western part of the route was prairie, much of the eastern part crossed dense forest, muskeg, streams and rivers.

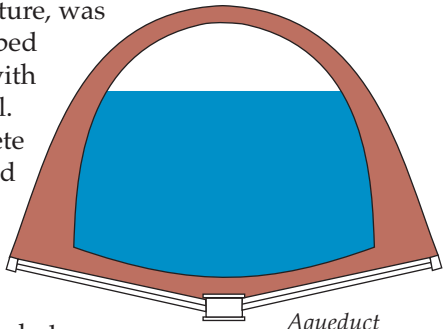
Original Aqueduct Specifications

Length: Intake to Deacon	135.18 km (84 miles)
Cross Section ■ Smallest area ■ Largest area	 1.95 m x 1.64 m (6′ 4 3/4″ x 5′ 4 3/4″) 3.28 m x 2.74 m (10′9″ x 9′0″)
Average slope	0.57 m per 1000 m (0.57 feet per 1000 feet)
Gravel used for base	217,133.58 cu. m (284,000 cu. yd.)
Concrete used	270,717.41 cu. m (354,085 cu. yd.)
Reinforcing steel used	2,423,977.63 kg (5,344,000 lb.)
Cast iron used	129,591.34 kg (285,700 lb.)
Earth excavated	1,650,673.94 cu. m (2,159,000 cu. yd.)
Sodding & seeding used	221.36 ha (547 acres)
Top soil used	130,738.88 cu. m (171,000 cu. yd.)

The Aqueduct Design

Winnipeg was expected to become a grand metropolis and a large-capacity aqueduct was proposed. Unlike aqueducts used in warmer climates, Winnipeg's would need to be enclosed to prevent freezing.

An uncomplicated design, patterned after ancient stone/masonry architecture, was developed – a dish-shaped concrete floor covered with a parabolic-shaped shell. The unreinforced concrete arch construction provided excellent durability and stability. Sections were poured in forms, coupled with copper expansion joints and manholes were installed every 1524 metres (5000 feet).

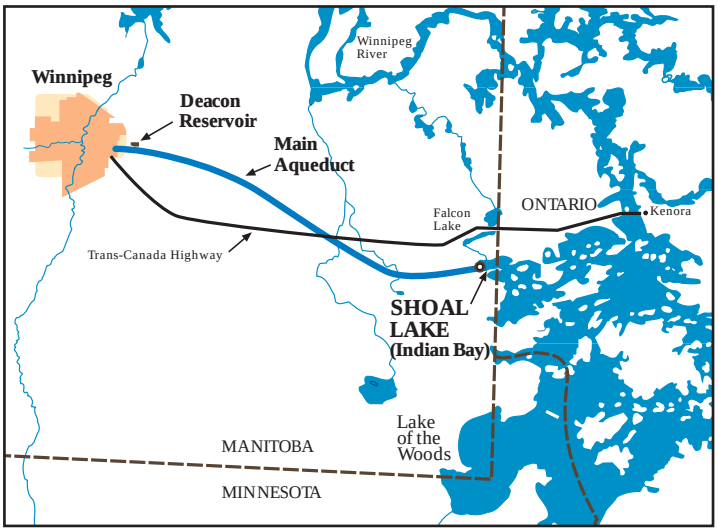


Aqueduct Cross-section.

Shoal Lake's elevation, being 92 metres (300 feet) higher than Winnipeg, meant gravity could move the water to Winnipeg.

Project Timing and Cost

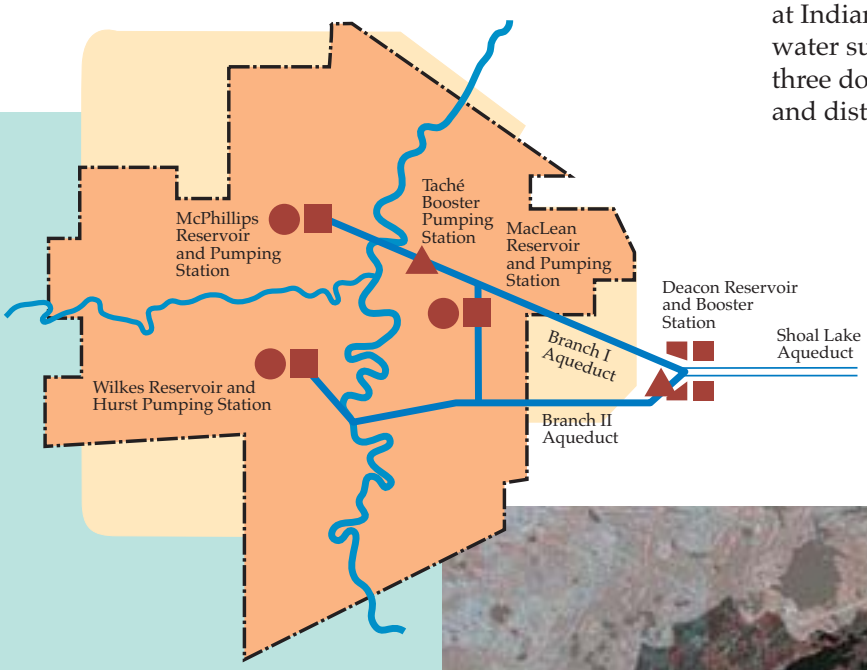
Construction started May 15, 1915, and Shoal Lake water first flowed from Winnipeg taps April 6, 1919. The aqueduct was officially opened by His Royal Highness, Edward, Prince of Wales on September 9, 1919. The total cost was $17 million.



Today's Water System: Modern, Reliable and Serving more than 630,000 Winnipeggers

The Ability to Safely and Dependably Store, Pump and Distribute Water is the Essence of our Water System

Winnipeg's water system is made up of a complex, but integrated group of parts that delivers water from Shoal Lake to our homes and businesses on demand. Since completion in 1919, the aqueduct has provided a reliable water supply, and Winnipeg's waterworks system has expanded to deliver an average of 225 million litres of water to approximately 270,000 Winnipeg households and businesses across approximately 297 square kilometres (114 square miles) of the developed portion of Winnipeg.

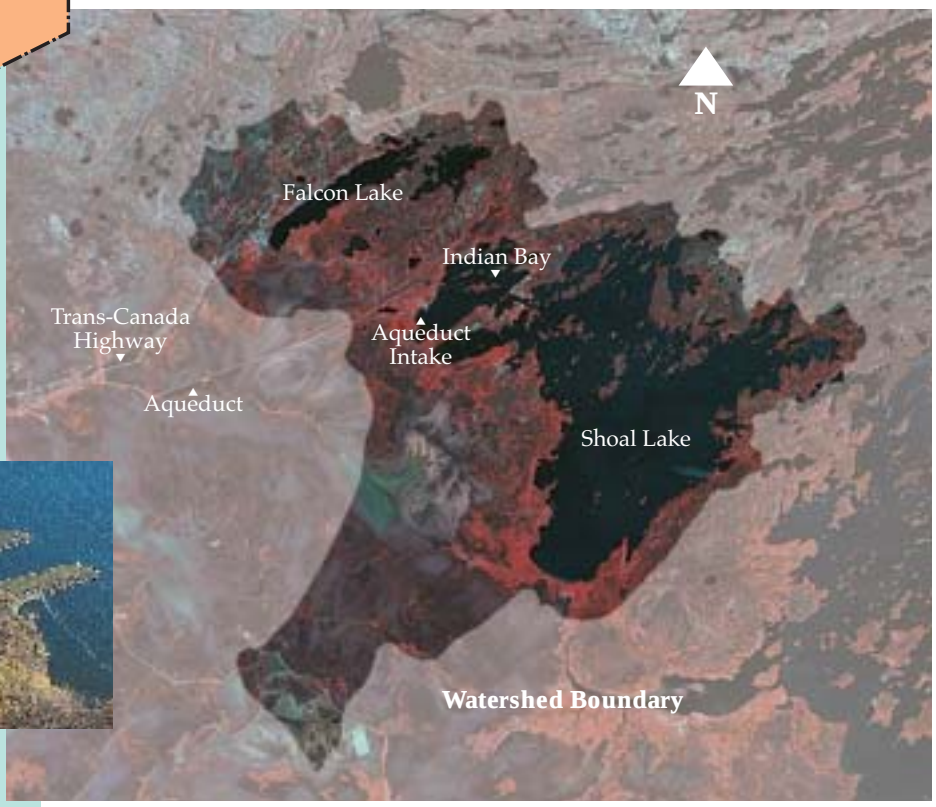


Shoal Lake : A High-Quality Natural Water Source

Shoal Lake covers 277 square kilometres (110 square miles) and contains 2.64 billion cubic metres (93 billion cubic feet) of water. Winnipeg is licensed to take up to 455 million litres (100 million gallons) of water per day from the lake.

The intake for Winnipeg's water system on Indian Bay at the western end of Shoal Lake is still only accessible by rail or boat.

Besides the Shoal Lake water source, the intake at Indian Bay and the aqueduct, Winnipeg's water supply and storage system consists of three downstream parts: storage, pumping, and distribution piping.



Aqueduct Intake

Water Storage: Winnipeg's System of Reservoirs

Winnipeg's waterworks system includes four reservoirs. Deacon is the city's main reservoir supplying water to three regional reservoirs – MacLean, Wilkes and McPhillips. The regional reservoirs supply water to homes and businesses in designated areas of the city.

Deacon – Winnipeg's Largest Reservoir

Deacon Reservoir on Winnipeg's eastern edge was built in 1972. It provides water storage close to Winnipeg to better handle peak summer demands for water and allow brief shutdowns of the Shoal Lake Aqueduct for repairs. It was expanded in 1978 and in 1997 and it currently stores 8.8 billion litres (1.93 billion gallons), the equivalent of a 20-day supply for the city.

McPhillips Reservoir, *Winnipeg's first, is an enclosed reservoir at McPhillips Street and Logan Avenue. It holds 227 million litres (50 million gallons) of water and mainly serves customers in northwest Winnipeg.*

Wilkes Reservoir, *an enclosed reservoir on Hurst Way at Waverley Street, holds 251 million litres (55 million gallons) and mainly serves customers in southwest Winnipeg.*

Chemical Feed Facility, *built in 2000 at Deacon Reservoir, this facility adds orthophosphate and fluoride to the water. Orthophosphate is added as part of our Lead Control Program, and fluoride is added to help prevent tooth decay.*

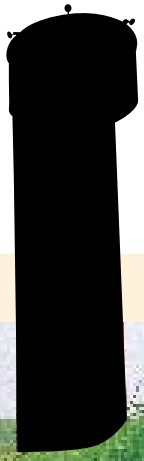
MacLean Reservoir, *an enclosed reservoir on Lagimodiere Boulevard at Marion Street, holds 205 million litres (45 million gallons) and mainly serves customers in east Winnipeg.*

A Giant Pumping System Moves Millions of Litres of Water Throughout the City Daily

The Shoal Lake Aqueduct conveys water to the city by gravity, although lift pumps at the intake are used to fill the aqueduct when lake levels are low. Once water reaches Winnipeg, huge pumping facilities move water across the city to fill regional reservoirs and provide water pressure to homes and businesses.

Winnipeg has two booster pumping stations that supply water from Deacon Reservoir through the branch aqueduct system to the regional reservoirs. Three regional pumping stations deliver water to our homes and businesses.

Deacon Booster Pumping Station *pumps water to Wilkes and MacLean reservoirs through the Branch II Aqueduct. Built in 1978 it has a current capacity to deliver 455 million litres (100 million gallons) per day.*



Taché Booster Pumping Station, *located along Branch I Aqueduct on Taché Avenue just east of the Red River, pumps water to the McPhillips reservoir. Built in 1950, it has a capacity to deliver 173 million litres (38 million gallons) per day.*

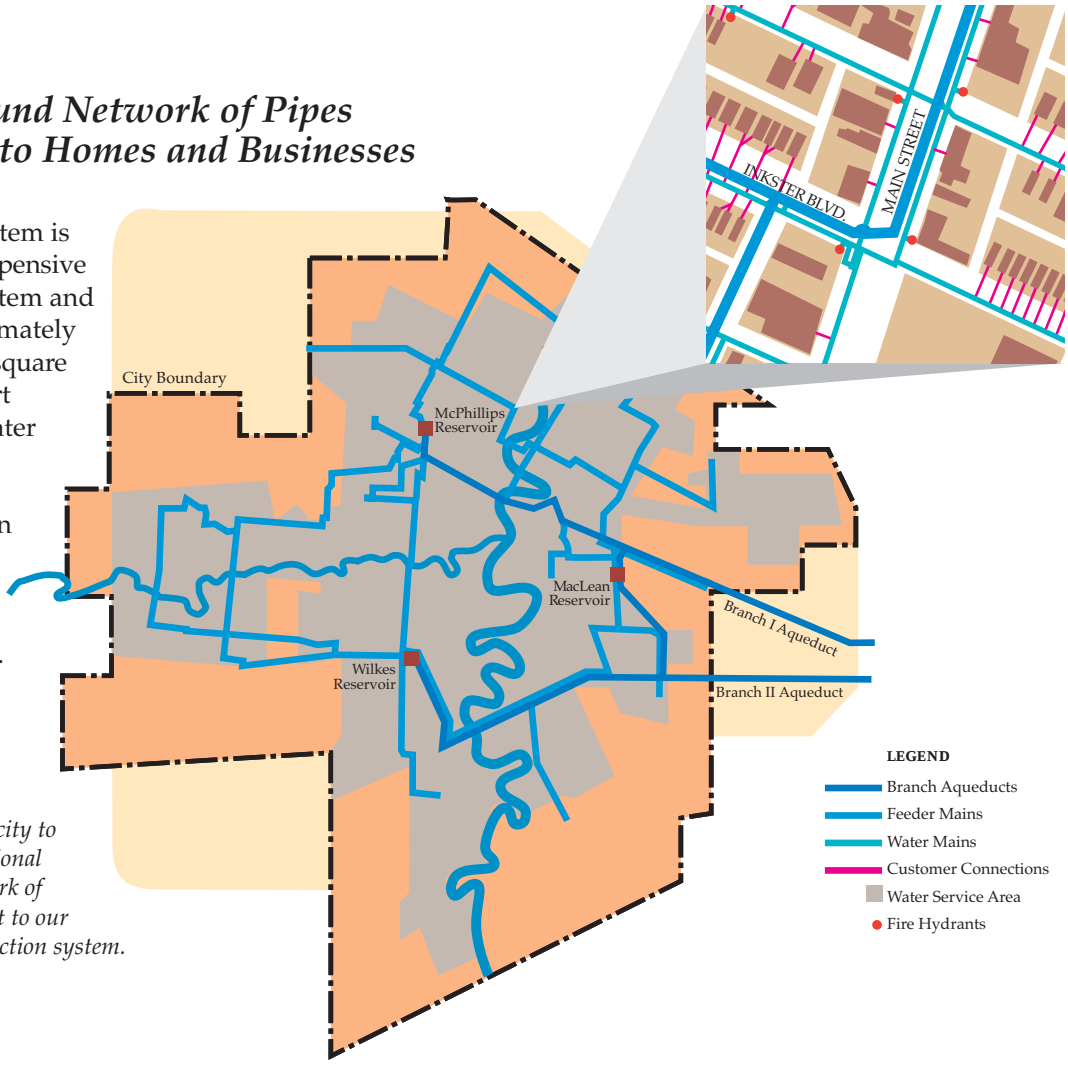
MacLean Pumping Station *was built in 1964 and is capable of supplying 318 million litres (70 million gallons) per day to east Winnipeg.*

McPhillips Pumping Station *was built in 1968, and is capable of supplying 436 million litres (96 million gallons) per day to northwest Winnipeg.*

Hurst Pumping Station *(at Wilkes Reservoir) was built in 1961 and is capable of supplying 500 million litres (110 million gallons) per day to southwest Winnipeg.*

A Vast Below-Ground Network of Pipes Distributes Water to Homes and Businesses

The water distribution system is the most expansive and expensive part of the waterworks system and currently services approximately 297 square kilometres (114 square miles) of the developed part of Winnipeg. It delivers water from the reservoirs to our homes, businesses and industries. The distribution system has several parts: branch aqueducts, feeder mains, water mains and customer connections.



Feeder mains extend across the city to deliver water from the three regional reservoirs to the intricate network of water mains (inset) that connect to our homes, businesses and fire protection system.

Facts about Winnipeg's Water Distribution Network

Water system Components	Purpose	Size of Pipe (Diameters)	Lengths (Kilometres)	Materials Used	Other Information
Branch I - Aqueduct	Connects Deacon with McPhillips and MacLean reservoirs	1.7 metres (5.6 ft.) 1.2 metres (3.9 ft.)	18.8 km (11.6 miles)	■ Reinforced concrete ■ Cast iron	■ Built: 1919 along with Shoal Lake Aqueduct ■ Can carry 173 million litres (38 million gallons) per day.
Branch II - Aqueduct	Connects Deacon with Wilkes and MacLean reservoirs	1.7 metres (5.6 ft.)	18.8 km (11.6 miles)	■ Reinforced concrete	■ Built in 1958. ■ Can carry 455 million litres (100 million gallons) per day.
Feeder Mains	Connects regional pumping stations with network of smaller water mains throughout city.	406 mm - 1067 mm (16″ - 36″)	158.33 km 98.4 miles)	■ Reinforced concrete ■ Asbestos cement ■ Cast iron	■ No customer service connections occur directly to feeder mains.
Water Mains	Vast pipe network under most streets that supply water from feeder mains to customer connections	152 mm - 305 mm (6″- 12″)	2,426.33 km (1,507.96 miles)	■ Cast/Ductile iron ■ Asbestos cement ■ Polyvinyl chloride ■ Copper	
Customer Service Connections Residential	Connects individual homes to water mains under streets.	16 mm - 19 mm (5/8″)	N/A	■ Copper ■ Lead ■ Galvanized iron	■ 270,000 residential, commercial and industrial customers connect to Winnipeg's water system
Customer Service Connections Commercial/ Industrial	Connects commercial industrial customers to water mains under streets.	19 mm - 254 mm (3/4″ - 10″)	N/A	■ Copper ■ Lead ■ Galvanized iron ■ Cast/Ductile iron ■ Polyvinyl chloride ■ Asbestos cement	

Other Water System Components:

Fire Hydrants	19,464
Water Main Valves	25,322
Water Meters	182,684