

# THE CHAMBLY CANAL

## Location

Located on the west bank of the Richelieu River approximately 48 km (30 miles) north of the outlet of Lake Champlain, the Chambly Canal stretches nearly 20 kilometres (12 miles) alongside Route 223 between the municipalities of Saint-Jean-sur-Richelieu and Chambly, Quebec. This waterway has nine locks that allow boats to bypass the Richelieu River rapids and safely navigate an elevation difference of 24 metres (79 ft) over its length.

## Ownership and Uses Today

Designated a National Historic Site by the Canadian federal government in 1929, the Chambly Canal was transferred to the administration of Parks Canada in June 1972. As the manager of this National Historic Site, Parks Canada continues to carry out work to preserve the canal's infrastructure, operate it as a historic canal, document its history, and share it with the public. Parks Canada also ensures that the canal's infrastructure meets the requirements for public safety (e.g., management of water and dams) and works with the relevant authorities to make plans for response in the event of an emergency.

Although its use has changed from commercial shipping to pleasure boating, the Chambly Canal has retained its original function as **an operational waterway** since it opened in 1843. The navigation season runs over five months from mid-May to mid-October.

Today, the canal and the old towpath along its banks – which has been converted to a multi-use path – are used for recreational purposes (e.g., boating, cycling, hiking). The canal is one of the most popular recreational and tourist destinations of the Montérégie area (i.e., southwestern Quebec). In 2019, over 250,000 visitors and cyclists and 1,500 recreational vessels visited the site.



Lock No. 7 at Chambly, Quebec.  
Photo Credit: Parks Canada

## Did You Know?

- Commercial barges have been replaced by yachts, sailboats and pontoons in the canal.
- In 1843, it took 10 to 12 hours for a barge to travel the length of the canal. Today, a motorboat can easily complete the same journey in 3 to 5 hours.

## History

### Construction and Early Use

As the historic backbone of trade between the St. Lawrence River and Lake Champlain, the Richelieu River presented an assortment of navigation obstacles, including many turbulent rapids between Dorchester (today Saint-Jean-sur-Richelieu) and Chambly. Construction of a canal to bypass these rapids could reduce navigation obstacles and enhance trade opportunities. Although the government of Lower Canada gave permission for the building of this waterway in 1818, various problems arose and work did not begin until 1831. The Chambly Canal was completed, and its full length opened, in 1843.

Of note, is that before the construction of the canal, there were several docks and wharves upstream from Richelieu River Rapids. At that time, the St. Jean Harbor – the first port facility in the area – was a commerce connection with the United States. The location of this harbor as well as other docks such as the Marchand wharf influenced the location of the Chambly Canal entrance and the width of the river. As such, the upstream section of the canal at the level of the Saint-Jean shoals was built in the river bed. This shoal is the natural control point for flow and water levels for the Richelieu River.

This engineering infrastructure not only allowed commercial barges to bypass the Richelieu River rapids, it also significantly contributed to the development and the economic growth of adjacent municipalities. It allowed for the transportation of many products such as wood, pulp, hay and coal between the United States and Canada.

The Canal has nine (fairly small) manually-operated locks. Ten bridges still cross the canal along its 19.3 kilometers (12 miles). Four of these bridges are owned by the province of Quebec. Three are fixed bridges, like overpasses, and one is a drawbridge (the new Gouin bridge). Six bridges are owned and operated by Parks Canada (four are swing bridges; one is a rolling bridge, and one is a drawbridge). Four other historical bridges are still present in their “open” position alongside the canal and are owned by Parks Canada. Water levels are drawn down in winter.

Between 1880 and 1895, the locks were repaired in *timber and masonry* style, which means that part of their walls were built of wood and the rest of masonry. This type of construction, which is very sustainable, makes the structure of the Chambly Canal unique among Canadian canals.

### Did You Know?

- Draft (maximum vessel depth): 1.98 m (6.5 ft)
- Maximum vessel width: 7 m (23 ft)
- Maximum vessel length: 33.52 m (110 ft)
- Minimum bridge clearance: 8.84 m (29 ft)
- Canal length: 19.31 km (12 mi)
- Dimensions of smallest lock: 33.53 m × 7 m (110 ft × 23 ft)
- Maximum speed: 10 km/hr (5.4 knots)
- Passage time: 3 to 5 hours



Cyclists biking along the dike at St. Jean.  
Photo: Parks Canada



Overall, the canal's use peaked in 1870 when close to 6,600 vessels and 518,000 tons of goods passed through. In the 20th century, use of the canal peaked in 1909 when almost 4,500 vessels and 294,000 tons of goods passed through. Its use declined during the Great Depression and the two World Wars, and by 1960, only about 700 commercial vessels passed through, moving 124,000 tons of goods. At that time, fertilizer and newsprint made up 60% of the goods that were shipped.

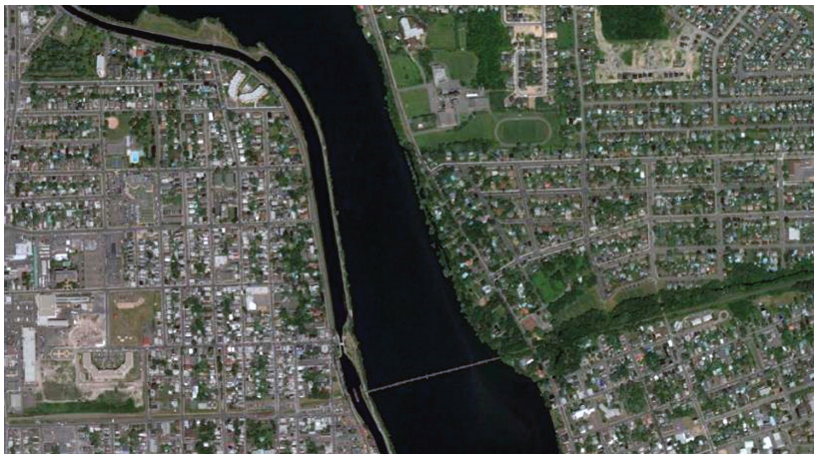
By 1970, shipped goods amounted to only 12,797 tons, and included only newsprint, explosives and containers. A shift in ownership of vessels was also observed over time. In 1913, the US-based Lake Champlain Transportation Company owned more than half of the vessels that passed through the canal; whereas, by 1950, only 19 of the nearly 800 vessels that used the canal hailed from the United States. Even though the last commercial barge passed through the canal in 1978, the canal had shifted to recreational use by 1972-1973.

## Widening of the Canal and Modern Usage

In the early 1970s, Transport Canada widened the canal in the Saint-Jean-sur-Richelieu reach. It is thought this was done to accommodate the movement of larger vessels through it. Downstream of lock No. 9, the dyke separating the canal from the river was shifted eastward by 30.5 m (100 feet) into the main river channel, reducing the width of the river channel by the same amount. The widening of the canal in the Saint-Jean-sur-Richelieu reach was completed in 1973. The images below illustrate the extent of the widening of the Chambly Canal.



After the canal was widened, the International Champlain-Richelieu Board (ICRB) researched the impacts of this modification on lake water levels. (The ICRB was established by the International Joint Commission (IJC), which is responsible for the resolution of disputes related to water management on transboundary water bodies.) As the Saint-Jean shoals are next to the areas of the canal that were widened and act as a natural water level control, the ICRB determined that the widening of the canal led to an increase of between 3 and 10 cm (1.2- 4 in) in the level of Lake Champlain.



Widening of the Chambly Canal in the Saint-Jean-sur-Richelieu area was complete in 1973.  
(Top panel is before 1973.  
Bottom panel is after 1973.)  
Figure from Syed Moin.

## The 2011 Flood and the Chambly Canal

The main causes of the major flooding event in 2011 in the Lake Champlain-Richelieu River basin were the quick melting of a large snowpack in the basin because of warming temperatures as well as record breaking rainfall over the area from March to May 2011. This combination of conditions delivered a very large quantity of water to Lake Champlain. The increased volume in the lake quickly led to flood levels in the river, and flooding persisted for over two months as the lake slowly drained.



Flooding near the Chambly Canal in 2011.  
Photo by: Ville de Saint-Jean-sur-Richelieu



Flooding at Gouin bridge and the Chambly Canal lock in Saint-Jean-sur-Richelieu. May 23, 2011.  
Photo credit: Pierre CB.

Historic water levels and the flooding in 2011 affected Park Canada installations, including the Chambly Canal. For instance, both the dike alongside the canal and lock in Saint-Jean-sur-Richelieu were inundated and impacted by the flood. In addition, the start of the boating season was delayed as was access for visitors to several locations along the canal. In some areas, the sides of the canal were completely submerged.

Some residents suggested that Parks Canada open the canal doors in the spring to help draw down Lake Champlain. This solution was not viable because the canal and the locks were not designed to resist high water levels and the lock doors are constructed in such a way that they cannot all be open at the same time.

# WHY ARE WE INTERESTED IN THE CHAMBLY CANAL AS PART OF OUR PRESENT STUDY?

## Location with Respect to the Saint-Jean Shoals and Resulting Impact on Lake Water Levels

Lake Champlain drains north, emptying into the Richelieu River. As previously noted, the Saint-Jean shoals naturally restrict the flow of the river, and water draining from Lake Champlain must flow through this small bottleneck. The widening of the canal into the river bed in the Saint-Jean shoal area increased this bottleneck effect during high flow periods.



Map of the Chambly Canal near lock No 9.  
Figure from Parks Canada Management Plan.

## Implications for Water Levels

As previously noted, in the 1970s, the estimated water level changes in Lake Champlain due to the Chambly Canal widening ranged from 3-10 cm (1.2- 4 in) at high flows.

Two recent studies also concluded that the widening of the canal likely had an impact of the same magnitude on the hydraulic conditions of the upper Richelieu River and Missisquoi Bay (Murphy, 2014; WSP, 2017).

## Next Steps

Using a variety of sophisticated tools and models, the Study will examine the ongoing impacts on water levels and flows as a result of the widening of the Chambly Canal. The study will also assess the impacts of other anthropogenic modifications to the Richelieu River such as, but not limited to, the establishment of eel cribs, and rail and road transportation piers. While overall, these anthropogenic modifications might exacerbate flood impacts in the area of Saint-Jean-sur-Richelieu, their cumulative impacts during a large flood might be minor and remain to be quantified.

## Mitigation Measures Alternatives

The Study Board is considering a variety of moderate structural alternatives that may be implemented in the Richelieu River to reduce water levels during episodes of high water. These include water diversion structures, such as modifications to the Chambly Canal including a bypass of water through a reinforced canal in the Saint-Jean shoal section (before and/or during high flows), with flows directed to return to the Richelieu River downstream of the shoals.



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