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The Ottawa River Canals and Portage Railways

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The Society accepted some years ago a paper dealing with a remarkable pioneer dam at Jones Falls, Ontario, Canada.[1] The reception given to the paper and the interest of members, especially in the insight that the account of this work gave to early developments in Canada, have encouraged the submission of this further contribution from a Canadian member of the Society. It presents, upon a rather broader canvas than that of the earlier paper, a summary account of other earlier engineering carried out in the virtually untouched forests of early Canada. Necessarily it has to be somewhat superficial in character, so vast is the territory to be covered. Detailed records are also unfortunately almost entirely lacking. Despite these serious limitations, it is hoped that the following notes will not be entirely out of place within the proceedings of the Newcomen Society, particularly since they do involve the use on the Ottawa River of one of the early engines made by Boulton and Watt in the famous Soho Works when the river was still the water gateway to a large part of the North American continent.

The Ottawa River

The Ottawa River is one of the main tributaries of the St. Lawrence, the two great streams coming together at the west end of the island upon which stands the city of Montreal. The catchment basin drained by the Ottawa has an area of 57,000 square miles, or more than the total area of England. Its mean annual flow is about 70,000 cu-sec., a volume said to be greater than the combined mean flow of all the rivers of the British Isles. It follows an irregular course of about 700 miles from the outlet of Lake Capimitchigama, approximately 155 miles due north of the city of Ottawa which, in turn, is about 100 miles west of the junction with the St. Lawrence at the Island of Montreal. Flowing first to the west through numerous lakes of the Canadian Shield of Precambrian rocks, the river turns to the south into Lake Timiskaming after passing the Quinze rapids. About 100 miles to the south, it turns to flow generally in an east-south-east direction towards Montreal.[2]

The level of the river drops more than 1,100 ft. in the course of its 700 miles. Half of this occurs in its upper reaches upstream of Lake Timiskaming. There is another drop of 460 ft. between the outlet from this large lake and the Chaudière Falls of Ottawa, and an additional fall of 60 ft. to the St. Lawrence. Almost all of this drop of 520 ft. is now harnessed for the generation of power in a series of notable hydro-electric plants, but the significance of the figure in the present context is the indication it gives of the rapids that used to feature so many locations on the Otawa River. Some

* Director, Division of Building Research, National Research Council of Canada until Sept., 1969.

[1] R. F. Legget, "The Jones Falls Dam on the Rideau Canal, Ontario, Canada," *Trans.* XXXI (1957–59), 205–218.

[2] *Hydrological Investigations of the Ottawa River Basin*—Report, Water Resources Branch, Dept. of Northern Affairs and National Resources; Ottawa (June 1962), 64 pp.

of these were amongst the most spectacular on any of the better known rivers of the world. They were certainly amongst the best known to travellers, for a glance at the map will show how conveniently located was this tributary of the St. Lawrence.

By travelling up the Ottawa as far as its turn to the north at Mattawa and then using the smaller Mattawa River which continues in a westerly direction, it was possible to cross the divide to Lake Nipissing by three short portages totalling about 3 miles. From Lake Nipissing, the French River carried the early traveller to Lake Huron, thus giving direct access to the Great Lakes system. This was the route followed by many of the great explorers of North America— from Champlain to La Vérendrye, from MacKenzie to Sir John Franklin. Truly, the Ottawa was the gateway to the continent, although another route must be mentioned. By leaving the Ottawa River at what is now the city of Ottawa, early travellers could go south on the Rideau River to the Rideau Lakes, and thence by the Cataraqui River to the city of Kingston at the eastern end of Lake Ontario.

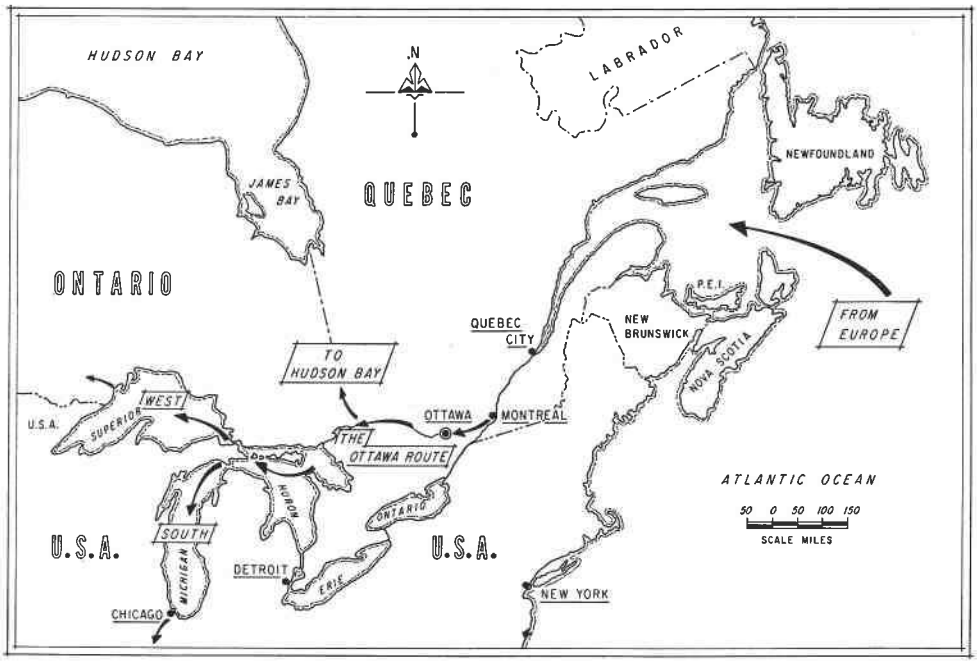


Fig. 1. North-eastern part of North America showing the important location of the Ottawa River route.

Military Route—Montreal to Kingston

Kingston was a major military centre at the time of the War of 1812, a somewhat restricted and strange conflict later known as "Mr. Madison's War," and now fortunately distinguished as the last occasion when there was major warfare across the border between Canada and the United States. Feelings ran so high at the conclusion of this war that there was for a long time thereafter a widely expressed fear that fighting would break out again. Roads being still non-existent, it was essential to have an alternative to the St. Lawrence as a military supply route to the fortress of Kingston, the danger of ambush on the St. Lawrence being very real. The British Government gave serious

attention to this problem, as records of the House of Commons so clearly show. As early as 1783 Lieutenant French of the Royal Engineers had carried out a survey up the Ottawa seeking a new route from Montreal (and so Quebec) to Kingston. After 1812, other surveys were made and serious consideration was given to the possible construction of a system of military canals.

The building of the Rideau Canal between 1826 and 1832, an achievement that included the building of the dam at Jones Falls and which was sketched in the earlier paper, was the major result of this official concern.[1] But the Rideau Canal could not be used by vessels from Montreal until the rapids on the Ottawa River, between the mouth of the Rideau River and its junction with the St. Lawrence,

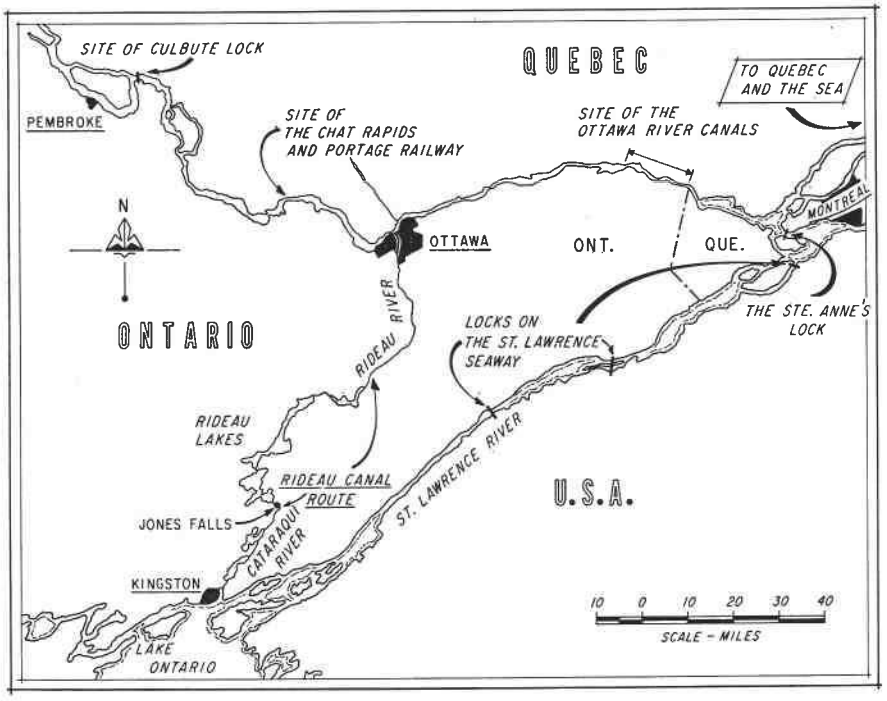


Fig. 2. Ottawa-Rideau-St. Lawrence River connections showing the location of the Ottawa River Canals.

had been circumvented. This vital link in the military route was provided by what are known as the Ottawa River Canals, with which may be included the low-lift lock at Ste. Anne de Bellevue at the western tip of the Island of Montreal.

The Lock at Ste. Anne's

As the Ottawa below the Carillon Rapids approaches its confluence with the St. Lawrence, its swiftly flowing waters enlarge into a singularly beautiful body of water known as the Lake of Two Mountains. This has four outlets, two to the south of Montreal Island past Ste. Anne de Bellevue and Vaudreuil, to join the St. Lawrence. Two other branches flow to the north of the island, another

[1] Robert F. Legget, *Rideau Waterway* (University of Toronto Press, 1955), 249 pp.

island (Ile Jésus) being formed between the two "rivers"; which come together again at the east end of the island where they, too, join the St. Lawrence. Originally, there was a small rapid at Ste. Anne's, first circumvented by a small wooden lock built by the St. Andrews Steam Fowarding Company in 1816 at Vaudreuil, some miles to the south of Ste. Anne's, at the extreme southern outlet of the Lake of Two Mountains.

The military engineers engaged on the Ottawa and Rideau Canals took time from their duties to investigate the construction of a lock on the more direct route past Ste. Anne's and the possibility of building locks on one of the rivers to the north of the island so as to avoid the Lachine Rapids on the St. Lawrence that were responsible for the original location of Montreal at the head of navigation from the sea. Lieutenant-Colonel By, builder of the Rideau Canal, recommended the latter course. It has since been followed, in part, by the construction of the Back River hydro-electrical plant which makes use of the entire drop from the Lake of Two Mountains. Lieutenant-Colonel Du Vernet, of the Royal Staff Corps, in command of the building of the Ottawa River Canals, recommended the building of a lock at Ste. Anne's.

The British Government considered the two detailed proposals. But before they took action, the Board of Works of the United Province of Canada decided that the lock was essential for civilian traffic and so built the first lock at Ste. Anne's between 1840 and 1843, with a clearance of 6 ft. over the sills. This proved to be too small for the heavy traffic up and down the Ottawa and it was replaced by a 200 by 45 ft. lock with a normal clearance over the sills of 9 ft., the lift being normally 3 ft. This lock, with its approach works, was constructed between 1879 and 1886. It is still in use today, although freight traffic is now generally restricted to sand barges; passenger traffic through it is, however, at an all-time high.

Before proceeding up the Ottawa, it may be noted parenthetically that the Lachine Rapids have now been eliminated for all traffic going up the St. Lawrence by the recently completed Seaway, located on the south side of the St. Lawrence. Until the opening of the Seaway, however, the Lachine Canal was probably the most vital link in the inland waterway system of Canada. The first "cut" was made in 1680, but it was never really finished, being usable only by canoes. The first real canal was started in 1821, finished in 1825, and rebuilt in 1879, being still in existence although not in actual use today. As was the case with the Ottawa River Canals, the route of the Lachine Canal was paralleled by one of Canada's first railways, the Montreal and Lachine Railroad, which opened for use on 19 November 1847, second only to the Champlain and St. Lawrence Railroad (from Laprairie to St. Johns) which opened on 21 July 1836. It was built to a gauge of 4 ft. 9 in., but was later changed to standard gauge. Its first locomotives came in 1847 from Richard Norris in Philadelphia, and in 1848 from the Wallace works of Kinmond, Hutton and Steel in Dundee, Scotland. The little line was later absorbed into the main rail network of Montreal.[1]

The Ottawa River Canals

Twenty-seven miles up the Ottawa from the lock at Ste. Anne's the smooth waters of the Lake of Two Mountains gave way to rough water at the foot of the Carillon Rapids. In the 14 miles above this point the river level dropped 57 ft. Most of the drop took place in, first, a long section of "rough water" known as the Long Sault, which started opposite the present site of the city of Hawkesbury and extended downstream a distance of about 6 miles to Grece's Point: and , second, in a turbulent rapids at Carillon, with a sharp drop of about 10 ft. Between the two main falls was a smaller rapid at Chute à Blondeau. Upstream from the head of the Long Sault the river was navigable all the way to Ottawa, a distance of 56 miles.

[1] R. G. Bales, "The Montreal and Lachine Rail Road and its Successors," *Canadian Rail* (177, May 1966), 95–99, 105–110.

Provision of suitable navigational facilities to by-pass these three rapids was the counterpart of the construction of the Rideau Canal, since only when vessels could sail directly up the full length of the Ottawa from Montreal as far as the entrance to the Rideau system would the military route to Kingston be complete. This project was placed in the hands of the Royal Staff Corps, with Lieutenant-Colonel Henry DuVernet as the Officer Commanding reporting to the Officer Commanding the Royal Engineers in Canada, Colonel E. W. Durnford, resident at Quebec. Lieutenants Lloyd and Chather of the Royal Staff Corps made a survey of the relevant section of the River in 1816 (a copy of their map is in the Public Archives at Ottawa). A little work was started in 1819, but it was not until well into the twenties that construction really got under way on the Grenville Canal which was to circumvent the Long Sault.

The work was not difficult to plan for the land on the north shore of the river, on which all portage roads had been developed, slopes gently back from the water's edge, with solid rock usually close to the surface. Taking advantage of the downstream slope of the land, the drop of about 46 ft. was taken up in six locks, a seventh lock acting as a guard lock at the entrance. The route of the canal paralleled the shore. Excavation was almost wholly in solid rock, earth embankments being needed only immediately below each lock. These statements are easy to make with thoughts of modern construction methods in mind. When, however, it is recalled that all the work had to be carried out by hand, without the benefit of any mechanical aids, then the full magnitude of the job can be appreciated in some measure and the fact that the canal was not really completed until 1831 can be understood a little better.

All drilling had to be done by hand; the rock to be excavated was Chazy sandstone and limestone, a Palaeozoic formation. It is not surprising, therfore, to find listed in a typical "pay-roll" for the works, 11 miners and 10 smiths, a telling indication of the drill iron that was being used. Two hundred and forty-nine labourers constituted the main working force, masonry for the locks being the work of 28 stone cutters and 22 masons.[1] Most of the stone for the locks was obtained from a quarry on the south shore of the river, near the lower end of the canal.

The owner of the quarry was one of the many who entered petitions for more generous treatment financially. One of the strangest aspects of the entire project is the time and effort that had to be expended, not on technical matters but in dealing with irate settlers. The south bank of the Ottawa was then almost completely virgin country, forests coming to the water's edge, a few buildings only surrounding a small mill opposite the upper end of the canal (now Hawkesbury). The north bank had been subdivided before the turn of the century into the usual waterfront lots, 18 chains wide with parallel boundaries at right angles to the river, so that each settler would have access to the water, then the only means of transportation. The first settlers had come into this area in the closing years of the eighteenth century, but it is clear from contemporary records that they had done little clearing except by the river. Their claims, however, from the start of the acquisition of the necessary lands, could well form a classic example of sudden escalation of land values.

One of the earliest of the settlers was Mr. C. P. Grece, after whom Grece's Point was named (now known as Greece's Point). When he died in 1831 he left an unsettled claim against the Government for £9,000 as payment for what Lt. Col. DuVernet described as a "few acres of uncleared land."[2] Throughout it all, Henry DuVernet kept his composure. One of his many comments to the Commandant of the Royal Engineers is typical: "If any inference is to be drawn from the extravagant demands made in the late arbitration, Mr. Grece's property as well as that of the other proprietors similarly situated must be greatly improved instead of injured by the said canal. I have the honour to be etc., etc."[3] In an earlier report, in asking for the assistance of a land valuer, he states that "I am not a

[1] *Military MSS Records*, 'C' Vol. 51, Public Archives, Ottawa, (1830), 106.
[2] *Loc cit.*, C51, 82.
[3] *Loc. cit.*, C52, 23.

competent judge of property and some of the Tenants speak no other language that Gaelic."[1] It is not surprising to find this man, who was so very clearly an officer and a gentleman, "suggesting the necessity of having a person appointed to assist me as a Clerk; the only one I have hitherto had being a Corporal of the Detachment and the increased number of returns and writing renders it impossible for me to comply with the whole without further assistance."[2]

Recalling that all documents had to be written out, and copied, by hand, one wonders how such good records were ever kept of these early works in Canada, especially in view of the continuing

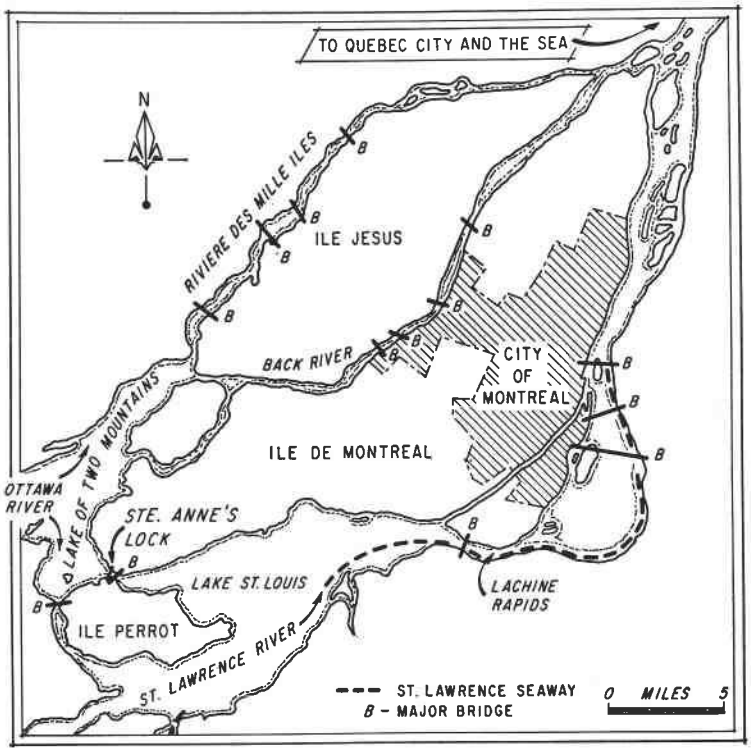


Fig. 3. The Island of Montreal and associated water routes.

parsimonious attitude of the Commissary General of the day towards all requests for such additional help. It is greatly to be regretted, for two reasons, that most of the records of the building of the Ottawa River Canals were apparently destroyed in the burning of Government buildings in Montreal on 25 April 1849 by an unruly mob of English-speaking Canadians. Fortunately, a few records remain in the Public Archives at Ottawa from which it is still possible to piece together something of the difficulties of the men of the Royal Staff Corps on these early works.

The canal at Chute à Blondeau was a relatively simple job involving only one lock, with a lift of 3 ft. 10 in., and short approach channels, although the downstream excavation did go to a depth of 28 ft. It was well advanced when work started in 1831 on the canal around the Carillon rapids. The

[1] *Loc. cit.*, C51, 78.
[2] *Loc. cit.*, C51, 78.

planning of this was somewhat unusual since the easiest route as far as excavation was concerned took the canal up a relatively steep bank from the centre of the tiny settlement of Carillon to an elevation well above the river level. The total length was just over 2 miles. The third lock on this route, therefore, dropped down again to river level, the net total rise being only 10 ft. In order to get a water supply for the upper section of the canal the plans included a feeder channel from a loop in the North River which, most fortunately, came within half a mile of the proposed canal at exactly the desired elevation. The North River then swung to the east again to enter the Ottawa well below the Carillon rapids, after flowing through the centre of the little village of St. Andrews.

In view of the difficulties experienced with such simple matters as the expropriation of undeveloped land, it can well be imagined that this proposal of Colonel DuVernet aroused most ardent opposition. The Seigneur of Argenteuil, Major Johnston, lodged a formal protest against "the ruination of his Mills" that the little feeder would cause. There is in the Public Archives at Ottawa a beautifully

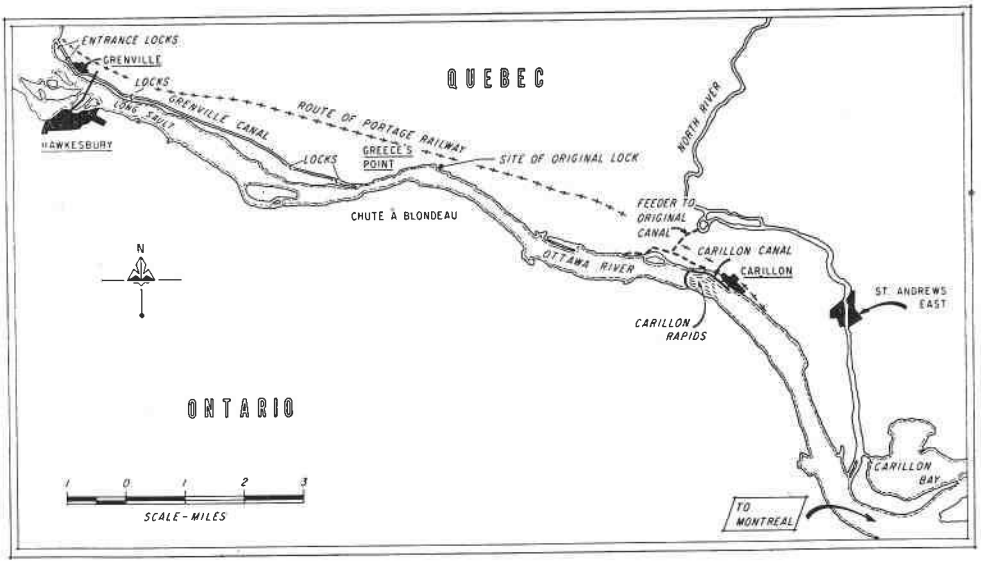


Fig. 4. General plan of the Ottawa River Canals and Portage Railway.

written petition containing over 500 signatures—every single settler in the district must have signed it—with a similar protest, but adding the suggestion that the canal should follow the route of the North River for over 40 miles to the small town of Berthier 40 miles east of Montreal. This was quite seriously suggested as "affording a short and secure conveyance for Military Stores in case of a war with the United States."[1] The only thing that the petition did not explain was the purpose of such a route, but the incident is mentioned to indicate still further the unusual difficulties of carrying out early engineering works in Canada. Lieutenant-Colonel By had to come down from his works on the Rideau, Colonel Durnford came up from Quebec, and with other officers of the Royal Engineers and the Royal Staff Corps reviewed the whole proposal. This Committee recommended to His Excellency the Commander in Chief, on 23 August 1830, that since the proposed feeder would not use any more water from the North River than was then running to waste at the Mills at St. Andrews,

[1] *Loc., cit.*, C51, 112.

the work be proceeded with subject only to legal requirements with which the committee did not consider itself qualified to deal.[1] The work did go ahead as planned, and the canal was opened on 24 April 1834, thus completing the fully navigable water route between Quebec City and Kingston.

Thereafter, the Ottawa River Canals and the Rideau Canal were operated by the Ordnance Department on behalf of the British Government until 1856, when they were handed over to the Department of Public Works of the United Province of Canada. They were inspected on behalf of the Department by one of Canada's most famous early civil engineers, Mr. Walter Shanley, who found the canals in a poor state of repair, further evidence of the bent for economy on the part of the Commissary General.[2] Rather more serious was the fact that careful measurements showed rather critical discrepancies between the over-all dimensions of the eleven locks, all traffic being controlled by the dimensions of the guard lock, No. 11, to a beam of less than 19 ft. $3\frac{1}{2}$ in. and a length of not more than 106 ft. 8 in. These dimensions may be compared with the dimensions adopted by John By for the locks on the Rideau Canal, 134 ft. by 33 ft. Shanley estimated that the sum of £6,665 must be expended immediately upon urgent repairs and this was done. The canals, with their small locks, were a real bottle-neck to efficient navigation on the Ottawa. They were therefore completely rebuilt as two canals, the Carillon and Grenville, with a connecting channel in the river between 1879 and 1886. The locks were increased in size to 200 ft. by 45 ft., and the clearance over sills to 9 ft. (Plate IX (*a*)). In this state they continued in use until 1965 when they were entirely replaced by one major electrically-operated ship-lock built integrally with the main dam of the Cerillon hydro-electric plant. With a touch of imagination that is not always present in modern Canadian engineering work, one wall of the first lock of the 1879 canal was incorporated into the concrete guide wall to the new lock (Plate IX (*b*) and (*d*)). The adjacent first lock of the original canal, naturally without its gates, is being preserved in an area that is being developed as a pleasant park. Two of the original buildings from the time of the building of the first small canals are still in use, the larger most happily transformed into a museum and now used by the Argenteuil County Historical Society.

Traffic on the Ottawa River

Although the completion of the Ottawa River Canals in 1834 did make it possible for vessels to proceed from Montreal to Ottawa, the development of traffic on the river did not wait for this event. Fleets of steamers gradually came into being on the two sections of the river—from Lachine to the foot of the Carillon Rapids, and from the head of the Long Sault to Ottawa. As early as the year 1822 the first small "steamer" was built for service on the upper reach of the river. It was constructed at Hawkesbury by Thomas Mears, one of a small company that, in 1803 or 1804, had constructed the first paper mill in Canada at St. Andrews. Named the *Union of the Ottawa*, she must have been a slow and ungainly vessel, but it is on record that she was equipped with "two heavy marine side lever engines, made by Messrs. Boulton and Watt at the Soho Works, Birmingham, and imported by Mr. John Molson of Montreal." Mr. Molson was a prominent brewer of Montreal (Molson's ales being still favourably known in Canada). Inspired by reports of the voyage of Robert Fulton's first vessel on the Hudson, also said to have been equipped with Boulton and Watt engines, Mr. Molson built a vessel called the *Accommodation* at Montreal on the shore behind his brewery. She was equipped with Boulton and Watt engines and was launched sideways in the summer of 1809. In November of that year, she sailed from Montreal to Quebec at a speed of 4 miles per hour.[3]

[1] *Loc. cit.*, C51, 92.

[2] Report of the Commissioners of Public Works for year ending 31 Dec. 1856. Finished in accordance with the Provisions of the Act, IX, Victoria, C. 37. Printed by order of the Legislative Assembly, Toronto (John Lovell, Toronto, 1857), p.11.

[3] J. W. Hughson and C. C. J. Bond, *Hurling down the Pine* (Hist. Soc. of the Gatineau, Old Chelsea, Que., 1965, 2nd. Ed.) 14.

Philemon Wright, the pioneer settler at Hull immediately opposite the future site of Ottawa, was at least a part owner of the *Union of the Ottawa*, but by 1831 she was owned by the Ottawa Steamboat Company, for on 13 May of that year Mr. Peter McGill, Chairman of the Company, wrote to Colonel By about the possibility of taking the "Union Steam Boat" into the still incomplete Rideau Canal in order to transfer castings and other stores as far up the Canal as Burritt's Rapids. The first steam boat built for the lower Ottawa was the *St. Andrew's* in 1830, but the *William King* was built in 1826 to supplement the *Union of the Ottawa* on the upper reach of the river. Although of much local interest the subsequent history of "Steamboats on the Ottawa" is outside the main theme of this review, apart only from one general feature.

With the intense activity on the Ottawa that developed in mid-century, concurrently with the great days of its timber trade, the idea of vessels having to progress slowly through no less than eleven locks in order to move from Carillon to Grenville was something that could not always be countenanced. Although, therefore, the canals were used steadily for heavy freight traffic, the general pattern of passenger traffic on the river was organised to utilise two separate fleets, with portage arrangements between Carillon and Grenville. A typical schedule in what may be called the great days of Ottawa River travel was to leave Ottawa at 7.30 a.m. in the steamer *Empress*, due to arrive at Grenville at 12.50 p.m.; transfer to the *Sovereign* and leave at 1.45 p.m., arriving at Lachine at 5.25 p.m., and Montreal (by rail from Lachine) at 5.50 p.m. (The fare was £4 return, first class, excellent meals being served on board for 50c each.) The transfer from Grenville to Carillon was made by rail on one of the most unusual railways in Canadian history.

The Carillon and Grenville Railway

As early as 1840 there was talk of building a portage railway to parallel the Ottawa River Canals, and a charter was taken out in that year for the Upper and Lower Ottawa Railway. The charter lapsed, however, when no start was made, as did that for at least one other attempt. With the coming of the railway fever to Canada in mid-century, the badly needed little line was included in a much more grandiose scheme. As a rival to the Grand Trunk line along the St. Lawrence, an alternative westward route up the north shore of the Ottawa from Montreal was projected by a group of leading residents of Montreal and the Ottawa Valley. It was to be called the "Great Montreal and Ottawa Valley Trunk Line."

If the full story of the subsequent developments were to be related, the record would probably go down in the annals of the Society as the "Canadian tall story." Suffice, then, to say that as was the custom of the time a contract for the financing and construction of the railway was arranged with Mr. James Sykes of Sheffield, England, who subsequently formed a company—Sykes, deBergue and Company—to carry out the work. In response to urgent public demand, a start was made on the section of the line between Carillon and Grenville, with the intention of incorporating this into the main line from Montreal to Bytown (Ottawa) when this was complete. As required by law, the line was built to the broad gauge of 5 ft. 6 in., then in common use in Canada. Wrought iron U-shaped rails, weighing 56 lb. to the yard, were used. Rails for the 12½ miles between Carillon and Grenville were completed on 25 October 1854, and the first train steamed into Grenville on that day.

Early in December of the same year Sykes went back to England to raise more funds. Returning to Canada in the spring of 1855 with at least $50,000 raised by the sale of Montreal and Bytown bonds, the vessel on which he travelled ran into a serious storm off Portland, Maine, and was lost with all hands, and the money. The company went bankrupt, with only the Carillon to Grenville stretch of its 120-mile line complete. After various legal vicissitudes, the little line eventually was sold for the remarkable sum of $21,000 to John J. C. Abbott, solicitor to the old company. A new company, the Carillon and Grenville Railway Company, was incorporated; the line was rehabilitated,

with better wharf connections at the two ends; and it started on its career as a portage railway. It continued this unique service until the end of the 1910 navigation season, still as a broad-gauge line. Throughout its history, it was served by four locomotives only, the best known, a *Birkenhead*, built about 1856 by Peto and Co. at their Canada Works at Birkenhead, Cheshire. Originally a 2–4–0, it was converted to a 4–4–0 in 1858. Named the *Carillon*, it was changed to *Ottawa* after the retirement in 1895 of an earlier Kinmond locomotive with this name (Plate IX (*c.*)). Most unfortunately, all the old rolling stock was disposed of as scrap, and most of the right-of-way was incorporated into a regular line of Canadian National Railways.[1]

Navigation of the Upper Ottawa

The fall in the level of the Ottawa River of over 500 ft. between its exit from Lake Timiskaming and the Chaudière Falls at the city of Ottawa will suggest, correctly, that although the rapids downstream of Ottawa were impediments to navigation, the rapids above were very much more serious handicaps for travel, both up and down the river. The Chaudière itself can be visualised from its name ("Kettle") to have been a waterfall of spectacular appearance. Suggestions were made at a very early date for a canal system around these Falls and plans were actually prepared for an offshoot from the Rideau Canal, at the head of its great flight of locks out of the Ottawa River, to run parallel with the shore of the Ottawa to a point above the rapids upstream of the Chaudière itself. But with no military necessity for such a canal system, and with the gradual change in the character of traffic up and down the Ottawa Valley with the coming of railways, no construction was ever carried out and the idea has remained a dream to this day.

At the next great fall, known as the Chats Rapids, about 30 miles upstream from Ottawa, very early ideas for a canal were actually put into effect, but with rather unfortunate results. The river drops here about 20 ft., with a long stretch of very rought water upstream, and several hundred islands in its course to add to the hazards even of running logs through, quite apart from navigating canoes. The idea of circumventing this barrier to almost all navigation was therefore an obvious one. Work was started in the 1840's, and a good deal of excavation was carried out that can be seen to this day, but at quite remarkable cost in human energy and in money. When the work was finally stopped in 1855 no less a sum than $379,191.98 had been spent on the project, but nothing more has ever been done.

Steamboats provided a regular service for over 30 years from a convenient point a few miles upstream of Ottawa (the Aylmer wharf) to the foot of the Chats Rapids. For the convenience of passengers who had to get round the rapids before boarding another steamer sailing up the next stretch of comparatively smooth water, a small railway was constructed—another of the isolated portage railways on the main river routes of early Canada. This one was constructed in 1846 and first used in the fall of that year. It was really a tramway on which ran two covered cars drawn by a horse. It operated, apparently, until the cessation of steamer service on this part of the Ottawa in 1879. Although mentioned in many records of the travellers on the Ottawa in those days, it has so far proved impossible to obtain any details about this interesting little line and only one photograph showing the horse and cars is known to exist.

The only really abortive navigation work upon the Ottawa was constructed at Culbute, another 60 miles upstream. Here was yet another of the stretches of rapid water that impeded steamboat navigation. With enthusiasm but with little eye to the future of transportation, a pair of locks was built in 1870, but of timber and not masonry, as were all the other works described. They were seldom used, for by the time they were available for use the railway had come to the Ottawa Valley,

[1] R. R. Brown, "The Last Broad Gauge," *Bulletin No.* 18 Can. Railroad Hist. Assoc. (October 1954) 1–6.

and the day of the passenger, and even the freight steamer was almost at an end. This part of the story was completed by the destruction of the unused locks in a fire in 1912, probably the only example in which navigation locks have been lost by fire.

The (proposed) Georgian Bay Ship Canal

If a general small-scale map of Eastern Canada (such as Figure 1) is even casually examined, it will be seen that the route between the waters of the Great Lakes and Montreal, the head of navigation from the sea, is much shorter by way of the direct line provided by the Ottawa River than by the now world-famous route through Lake Huron and Lake Erie, down the Welland Canal at Niagara Falls, across Lake Ontario and down the St Lawrence to Montreal. The saving in distance is almost exactly 500 miles. The obvious economy to be gained by the use of the direct route was noted by early travellers, and as soon as modern ideas of river traffic came into being the idea was studied in some detail. Colonel By sent to his Commandant, Colonel Durnford, in 1829 a report on the proposed route prepared by Charles Shirreff, of Fitzroy Harbour (near Chats Falls).

Down through the years, thereafter, report after report was prepared, with steadily increasing degrees of reality. Walter Shanley, already mentioned in connection with the Ottawa River Canals, was commissioned in July 1856 to make yet another survey. His report is a most interesting document, but even it did not lead to action. A private company was later incorporated with the idea of constructing this deep inland waterway. Finally, on 20 January 1909, a comprehensive report based upon most detailed surveys and extensive test drilling was presented to the Minister of Public Works for Canada by a special Engineering Board appointed for this purpose.[1]

The Report showed that it was quite possible to construct a deep waterway, or ship canal, from Montreal to the Great Lakes, by the Ottawa route. Designed to carry the largest Great Lakes freighters of the time, 600 ft. by 60 ft. with a 20 ft. draft, a 22 ft. deep waterway was estimated to cost $100,000,000. Annual maintenance costs were estimated to be $900,000 and the necessary construction period, 10 years. Twenty-three locks would be necessary to the summit and four locks for the descent from Lake Nipissing into Georgian Bay. The Report even considered the extra cost required if the locks were to be made 800 ft. long and 75 ft wide, with a further estimate of the cost of increasing the depth over lock sills to 24 ft. The waterway thus provided would, naturally, have been entirely Canadian, giving no interference with any international waters.

It has never been built, There are some grounds for thinking that if, in the Canadian general election of 1911, the Liberal party led by Sir Wilfred Laurier had been successful, work might have started. Even had this been so, the first Great War would have interfered inevitably with construction, so that the question mark must remain. When, however, the traffic upon the St. Lawrence Seaway of today is considered, the proposed Georgian Bay Ship Canal can well be seen to provide one of the greatest of all "ifs" in the history of civil engineering.

Conclusion

The Ottawa River Canals and Portage Railways are now a thing of the past, but the Ottawa River continues to be an important waterway. Logs are still floated down most sections of the river, aided by small fleets of powerful tugs. Passenger traffic in pleasure craft during summer months, between the St. Lawrence at Montreal and the Rideau Canal system, entered at Ottawa, continues to increase—its use of the great single lock at Carillon being the only reminder of the earlier aids to navigation. Occasionally, freight is brought up the river, the most recent shipments being barge

[1] *Georgian Bay Ship Canal.* Report upon Survey, with Plans and Estimates of Cost (1908); Dept. of Public Works; 8–9 Edward VII Sessional Paper No. 19a (A 1909), 599 pp.

loads of heavy structural steel sections. One of the highlights of Canada's centennial celebrations of 1967 was the cross-country journey of a large flotilla of canoes, finishing at Montreal. As the canoes swept past Ottawa, past Grenville and Carillon, the past lived again momentarily and one could imagine the almost untouched river as it was first seen 150 years ago by Lieutenant-Colonel Henry DuVernet and his men of the Royal Staff Corps.

Discussion

Mr. Dawson had noticed the name of Kinmond Hutton and Steel. Steel was the name of his in-laws who a long time ago had interest in a steel foundry in Dundee. A later Steel, researching into family history had sent him a photostat of the drawing of the original locomotive mentioned, a photograph of a model made therefrom, an engraving of the Portage Railway train, and a letter from the Canadian Railroad Historical Association to his brother-in-law to say that they had received a grant from the Molson Foundation to build a replica of the original Molson locomotive.

In reply to a question by Mr. Bryan Earl, Dr. Legget was almost certain that the explosive used in constructing the Hoosac Tunnel was nitro-glycerine. The tunnelling is described in *Daylight through the Mountains*, a book about Walter Shanley and his brother.

In reply to a question by Mr. J. H. Boyes, Dr. Legget said that there had never been any suggestion to use a lift lock on these canals, the country being quite unsuitable. At the entrance to the Rideau Canal in Ottawa there is a flight of 8 locks.

Mr. C. E. Lee said Dr. Legget had mentioned that the old 5 ft. 6 in. broad gauge in Canada continued in operation until 1910. Mr. Lee wondered if this was the last use of the broad gauge, as he believed that on the American Continent most of this gauge had gone many years earlier. Dr. Legget had given a precise date for the opening of the Carillon Railway but not the date when public traffic began; could Dr. Legget provide this date? Dr. Legget had seen it stated by one of his friends in the Canadian Railway Historical Association that this was the last use of the broad gauge in America. It had continued because the Railway was quite isolated until after 1910 when the right of way was incorporated into Canadian National Railways. The use of the first train came right at the end of the Navigation season; the Ottawa River cannot be used in the winter because of the weather conditions; the railway was opened for public use in the spring of the year following —Dr. Legget thought on a day in May.

To a question by Mr. Frank Nixon, Dr. Legget replied that as far as he knew all the masonry on the locks was done by Scotsmen brought in for this purpose—there is a wonderful tradition of this masonry work up the Ottawa Valley and up the St. Lawrence Valley. Most of the masons, when they were discharged from work on the locks, were given a grant of land and so throughout the Ottawa Valley and all the way down the Rideau Canal one can find in the most isolated places beautifully built masonry houses—much sought after today for re-furbishing.

Mr. Rex Wailes said the author might like to know that, when Sydney Harbour Bridge was built, Aberdeen masons went out to do the stonework and the very first thing they did before starting work was to found a Caledonian Society.

In reply to a question by Mr. D. H. Tew, Dr. Legget had the impression that the Canada Works locomotive was specially ordered.

Mr. C. E. Lee said that several members of the Society, in particular Mr. J. Foster Petree, had been trying to trace the history and the products of the Canada Works at Birkenhead, originally an off-shoot of Peto and Betts the great contractors, but records are extraordinarily deficient. These members would be most interested to hear anything that Dr. Legget could find in Canada as to the original intention of the firm to establish a works in that country.

Mr. IAN DAVIDSON remarked that these Canal works were originally financed by the British Government for military purposes, but that a substantial commercial traffic grew up. Had civilians free use of these facilities; was there a charge; was the waterway a profitable concern? The works of Colonel By on the Rideau seem to have been accurate and speedily constructed; those of Colonel DuVernet on the Ottawa River took a long time and finished up with some odd dimensions. Were these gentlemen members of the same Corps: or were they competing with each other?

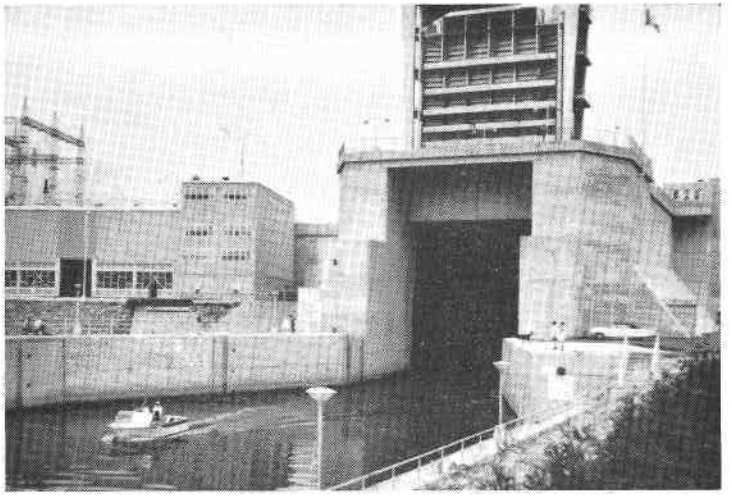
Dr. LEGGET replied that the financing of the canal by tolls or otherwise was almost continuously under discussion from its opening until the time when the Government of Upper and Lower Canada finally took it over. No tolls have been charged since that time (1858), and even before then only token amounts were collected. Colonel By and his officers were members of the Royal Engineers and clearly all had excellent engineering training. Four of Colonel By's assistants became Generals in the British army. Colonel DuVernet of the Royal Staff Corps was pretty much on his own; he had with him only one or two young officers. One of the most moving documents he had been privileged to examine in the course of his studies was a letter on the slow progress of the work written by Colonel By in his own handwriting. It describes the difficulty of the job, the excellence of the officers, how devoted they were to their duty, what difficulty they had with the local inhabitants, how hard the rock was, until the last page when, in the most gentlemanly terms he indicates what a "lousy" job he thinks it is!

Mr. R. D. PEAKMAN enquired of Dr. Legget whether the portage railway was used entirely for passengers; if there was a track cable; and if there were any facilities for interchange at the entrance. Dr. Legget replied that the portage railway was essentially a passenger railway with two passenger cars, but thought that it could be assumed that it would have carried small light packages.

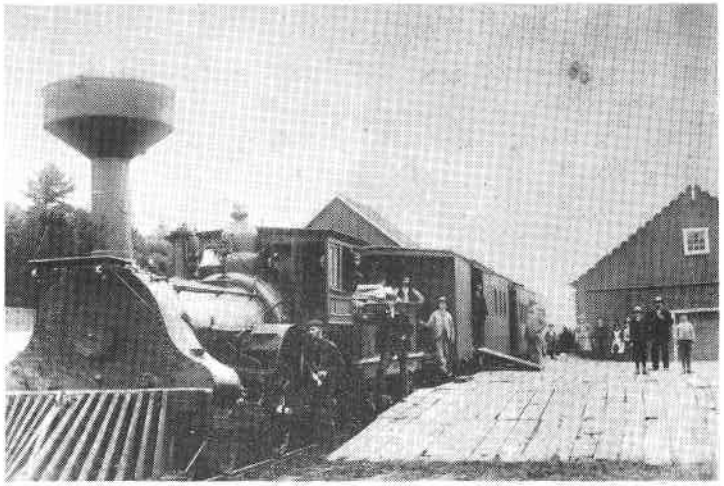
Mr. R. J. M. SUTHERLAND asked if the rails for the railway were imported from England; did they remain until 1910; do any of them survive anywhere?

Dr. LEGGET, speaking from memory, thought they were imported; later replaced by standard flat-bottomed rails; to the best of his knowledge and great regret, none of the original track had so far come to light.

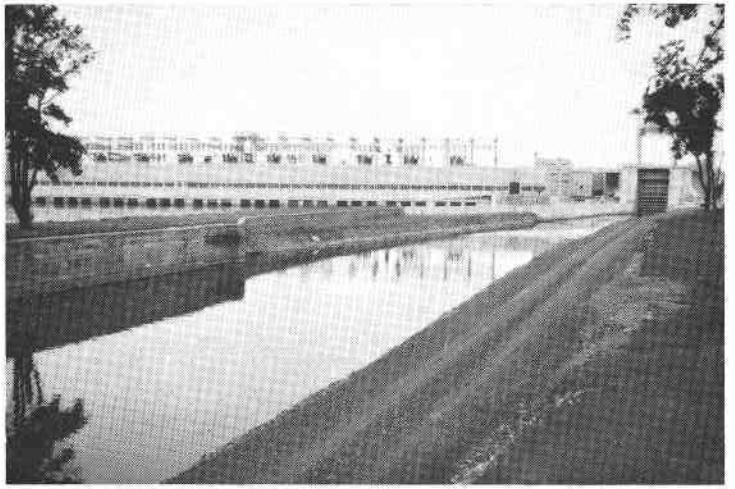
(*a*) Upper guard lock to Grenville Canal, as now preserved without lock gates.



(*b*) New electrically-operated, single-lift lock in the Carillon Hydro-electric dam.



(*c*) Broad-gauge Portage Railway train believed to be at the Carillon terminus.



(*d*) Carillon Hydro-electric Dam and Power House. Masonry of the 1878 lock is incorporated in the concrete approach wall.

OTTAWA RIVER CANALS AND PORTAGE RAILWAY.