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# GENERAL REPORT.

*To His Excellency Sir Peregrine Maitland, Knight Commander of the Most Honorable Military Order of the Bath, Lieutenant Governor of the Province of Upper Canada, Major General Commanding His Majesty's Forces therein &c. &c. &c.*

In pursuance of my instructions of the 9th June last. & having obtained the aid of George Rykert, Assistant Engineer & Surveyor, we proceeded to the Survey of the River St. Lawrence, and now respectfully beg leave to submit the following Estimates and Report.

## TWO ESTIMATES

Of the expense of improving the Navigation and constructing a Canal at the several Rapids in the River St. Lawrence from Johnstown to Cornwall of the following dimensions, viz:—

The first, eight feet in depth, sixty feet in width at the bottom and 84 feet in width at the surface of the water, the banks to slope one foot and a half to one foot perpendicular The Locks to be one hundred and thirty-two feet in length by forty feet in width, with turning bridges forty feet in the clear, and ten feet wide.

The second four feet in depth, twenty-six feet in width at the bottom, and thirty-eight feet in width at the surface of the water; the banks to slope the same as in the first; the Locks to be one hundred feet in length, by fifteen feet in width, with turning bridges fifteen feet in the clear, and ten feet wide.

| | Estimate No. 1, 8 feet Canal. | | | | Estimate No. 2, 4 feet Canal. | | | |
|---|---|---|---|---|---|---|---|---|
| | No. Cubic Yards | Rate S. d. | £ s. d. | £ s. d. | No. Cubic Yards. | Rate S. d | £ s. d. | £ s. d. |
| From Johnstown to the head of the Galloup Rapid, a distance of 4 miles, the river is well adapted to steam-boat navigation. It will be necessary, however, to form a towing path on the banks of the small canal. | | | | | | | | |
| Making towing path - - - - - - - - | | | | | | | 986 17 0 | 986 17 0 |
| At the head of the Galloup rapid we leave the river for a distance of 44 chains. The cutting runs above our level. The situation being however favourable, as the whole of the excavation may be deposited in the river, we purpose contracting the bottom width of the large canal to 40 feet, and that of the small to 17 feet in this place; by which means a great saving will be made. The distance being so short that boats will have no occasion to meet on the canal; besides those descending will naturally take the river, which is practicable in going down. Lock No 1, of 4 feet 6 inches lift, will be required in both, where the canal will descend into the river at the foot of the rapid. | | | | | | | | |
| Excavation - - - - - - - - - - | 98310 | 1 1 | 5325 2 6 | | 37055 | 7½ | 1157 19 4½ | |
| Puddling - - - - - - - - - - | 850 | 6 | 21 5 0 | | 500 | 6 | 12 10 0 | |
| Lock No. 1 - - - - - - - - - - | | | 2606 0 0 | | | | 972 0 0 | |
| Fencing - - - - - - - - - - | | | 22 0 0 | 7974 7 6 | | | 22 0 0 | 2164 9 4½ |
| From the foot of the Galloup rapid the river is navigable to Point Cardinal, a distance of 135 chains; all that will be required is the formation of a towing path along the bank & deepening some shoals for the boat canal. | | | | | | | | |
| Making Towing Path - - - - - - - - | | | | | | | 453 19 0 | |
| Deepening Shoals - - - - - - - - | | | | | 447 | 1 | 22 7 0 | 475 19 0 |
| At Point Cardinal we again leave the river for a distance of 25 chains. The cutting runs considerably above the level; the nature of the excavation is loam and large loose rocks. Here we again contract the bottom width of both, as at the Galloup rapid. Lock No. 2, of 2 feet 6 inches lift, will be required in each to connect the canal with the river at the foot of the rapid. | | | | | | | | |
| Excavation - - - - - - - - - - | 42685 | 1 | 1134 5 0 | | 14037 | 1 | 707 17 0 | |
| Puddling - - - - - - - - - - | 800 | 0 | 20 0 0 | | 400 | 6 | 10 0 0 | |
| Lock No. 2 - - - - - - - - - - | | | 828 0 0 | | | | 800 0 0 | |
| Fencing - - - - - - - - - - | | | 12 0 0 | 4494 15 0 | | | 12 10 0 | 1530 7 0 |
| From point Cardinal to the head of the rapid plat a distance of 11 miles the river is well adapted to steam boat navigation. No expence will therefore occur in the distance of the 8 feet canal. Some excavation and lock No. 3, | | | | | | | | |

| | Estimate No. 1, 8 feet Canal. | | | | Estimate No. 2, 4 feet Canal. | | | |
|---|---|---|---|---|---|---|---|---|
| | No Cubic Yards. | Rate S. d | £ s. d. | £ s. d. | No Cubic Yards. | Rate S d | £ s. d. | £ s d. |
| of 2 feet 6 in lift will be necessary in making a boat navigation at Shaver's Island. A towing path, bridges and deepening several shoals will also be necessary. | | | | | | | | |
| Excavation | | | | | 44837 | 1 3 | 2752 6 3 | |
| Tow path | | | | | | | 2887 0 0 | |
| Lock No 3 | | | | | | | 800 0 0 | |
| Puddling | | | | | 600 | 6 | 15 0 0 | 6454 6 3 |
| At the rapid plat we again forsake the river a distance of 2 miles 56 chains. Vessels may descend these rapids with safety, but being impracticable to ascend, a canal will be necessary to assist them on their way up only, which enables us again to contract the bottom width as at the upper rapid and avoid an immense quantity of deep excavation | | | | | | | | |
| In the first mile the cutting is from ten to twenty nine feet. Thence in the next half mile, it descends to 12 feet, after which it rises again gradually to 30 feet, and continues above the level to the end. One lock will be required in each to connect the canal with the river below the rapid. Lock No. 3 in estimate No 1 and lock No. 4 in estimate No 2, being a lift of 9 feet 8 inches—2 road bridges will also be required | | | | | | | | |
| Excavation | 996926 | 1 | 49846 6 0 | | 577404 | 11 | 26468 9 6 | |
| Lock No. 3 in estimate No. 1 | | | 3000 0 0 | | | | | |
| Do. No. 4 in estimate No 2 | | | | | | | 1450 0 0 | |
| Puddling | 1000 | 6 | 25 0 0 | | 800 | 6 | 20 0 0 | |
| 2 road bridges | | | 340 0 0 | | | | 140 0 0 | |
| Fencing | | | 100 0 0 | 53311 6 0 | | | 100 0 0 | 28178 9 6 |
| From the foot of the rapid plat to point Avoyon a distance of 11 miles, we adopt the natural channel A tow path and deepening shoals will be required for the 4 feet canal. | | | | | | | | |
| Excavation in river | | | | | 43340 | 1 | 2167 0 0 | |
| Making towing path | | | | | | | 2296 7 0 | 4463 7 0 |
| At point Avoyon we quit the river for a distance of 64 chains The situation is favourable. Like at the upper rapids we contract the bottom width of the Canal. The line being near the margin of the river, the earth may be deposited in the water. Lock No. 4 will be required in estimate No. 1 and lock No. 5 in No. 2, being a lift of 3 feet 6 in. | | | | | | | | |
| Excavation | 227819 | 10 | 9492 0 2 | | 175021 | 9 | 6563 5 9 | |
| Lock No. 4, in estimate No. 1 | | | 2500 0 0 | | | | | |
| Lock No. 5, in estimate No. 2 | | | | | | | 900 0 0 | |
| Puddling | 800 | 6 | 20 0 0 | | 500 | 6 | 12 10 0 | |
| Fencing | | | 30 0 0 | 12042 9 2 | | | 30 0 0 | 7505 15 9 |
| From thence to Doctor Archibald's point, a distance of three miles and a quarter, we adopt the natural channel. No expence will therefore occur in the 8 feet canal The formation of a towing path and some bridging will be required for the 4 feet canal. | | | | | | | | |
| Tow path and bridging | | | | | | | 997 12 6 | 997 12 6 |
| From Doctor Archibald's point, we leave the river for a distance of 3 miles and 72 chains to pass the Long Sault rapid. From the place of departure to Hoople's Creek is 40 chains, chiefly through low and favourable cutting. Thence we ascend the creek 60 chains in the first half of which very little expence will be incurred, being a wide sluggish stream with an average depth of 7 feet water. The remaining half will require deepening, the average depth of water being from 4 to 5 feet A towing path will be necessary along the bank of the 4 feet canal.—From Hoople's Creek the line runs through low and favourable cutting of black soil and clay about 2 miles; then it drops into a wide and deep ravine which continues to Brownell's Bay, the place of entrance, 3 locks will be required in each Nos. 5 & 6, each 6 feet lift and No. 7 of 6 feet 6 inches in the 8 feet canal and locks Nos. 6, 7 & 8 in the 4 feet canal, the lifts being the same. Three road and one tow path bridge will also be required. | | | | | | | | |
| Excavation | 763985 | 10 | 81832 14 2 | | 311375 | 9 | 11676 15 3 | 11676 15 3 |
| Locks Nos. 5, 6 & 7 in estimate No. 1 | | | 8150 0 0 | 39982 14 2 | | | | |
| Locks Nos. 6, 7 & 8 in estimate No 2 | | | | | | | 3962 0 0 | |
| Puddling | 3000 | 6 | 75 0 0 | | 2500 | 6 | 62 10 0 | |
| Three road bridges | | | 510 0 0 | | | | 210 0 0 | |
| One tow path do. | | | | | | | 33 0 0 | |
| Grubbing | | | 640 0 0 | | | | 405 0 0 | |
| Fencing | | | 116 0 0 | 1341 0 0 | | | 116 0 0 | 4788 10 0 |
| From Brownell's Bay we proposed adopting the natural stream to the head of Mill Roche rapid, distance 3 miles, a little rock excavation will be unavoidable in the 8 feet canal, at Moulinette rapid. A towing path and bridges will be required in the 4 feet canal. | | | | | | | | |
| Rock excavation | 5962 | 6 | 74 10 0 | | | | | |
| Making Towing Path | | | | | | | 608 0 0 | 608 0 0 |

| | Estimate No. 1, 8 feet Canal. | | | | Estimate No. 2, 4 feet Canal. | | | |
|---|---|---|---|---|---|---|---|---|
| | No. Cubic Yards. | Rate S. d. | £ s. d. | £ s. d. | No. Cubic Yards | Rate S. d | £ s. d. | £ s. d. |
| From the head of Mille Roche to Cornwall Bay, a distance of 5 miles and 22 chains, we entirely abandon the river, it is therefore proposed to construct a permanent waste weir across the stream and raise the water 13 feet perpendicularly, the situation being very suitable for that purpose, by this means we gain a depth of 4 feet water in Brownell's Bay, and save the expence of deepening the natural bed all the way down except a little at Moulinette, and by raising the water 13 feet at Mille Roche, we also avoid the expence of 13 feet in the depth of excavation, the whole distance to Cornwall; besides it will guard the canal against fluctuations in the river and conduct all the surplus water down the natural channel which being at command will be eminently useful for hydraulic purposes. In the first 2 miles the cutting seems considerably above our level.—The nature of the excavation in the first mile is loam and clay mixed, with loose stones; the second mile is chiefly clay. Thence the cutting is favourable, except about 20 chains near the termination where the line crosses a high stoney ridge. Three embankments will be necessary in the above distance. A little under water excavation will be required in the Bay for a distance of 2 chains, averaging 3 feet cutting across a bar directly opposite the entrance of the canal Four locks will be required, Nos 8, 9, 10 & 11, in the 8 feet & Nos 9, 10, 11 & 12 in the 4 feet canal, the lifts being each 7 feet 6 inches. Seven road & 2 tow path bridges, will also be required | | | | | | | | |
| Excavation | 451382 | 1½ | 41622 19 3 | | 335168 | 9 | 13431 6 0 | |
| Do. in Cornwall Bay | 141 | 5 | 352 10 0 | | | | | |
| Embanking | 34144 | 10 | 1422 13 4 | | 34144 | 10 | 1422 13 4 | |
| Puddling | 7168 | 6 | 179 4 0 | | 6668 | 6 | 166 14 0 | |
| Locks Nos. 8, 9, 10 & 11 in estimate No. 1 | | | 11200 0 0 | | | | | |
| Locks Nos. 9, 10, 11 & 12 in estimate No. 2 | | | | | | | 6124 0 0 | |
| Waste Weir | | | 1000 0 0 | | | | 1000 0 0 | |
| Seven road bridges | | | 1190 0 0 | | | | 490 0 0 | |
| Two tow path do. | | | | | | | 99 0 0 | |
| Grubbing | | | 80 0 0 | | | | 70 0 0 | |
| Fencing | | | 200 0 0 | 57167 6 7 | | | 200 0 0 | 20003 13 4 |
| Total, | | | | 176378 8 5 | | | | 92834 1 11½ |

It will be seen by reference to the preceding Estimates that we have calculated the expense of constructing canals upon two different scales.

The first or largest to cost £176,378 8 5, and the other £92,834 1 11 1 2. Thus it appears that a safe and permanent line of navigation down the River St. Lawrence to Cornwall for vessels capable of navigating the lakes may be effected at an expense absolutely trifling when compared with the many advantages to be derived from an improvement of this nature.

The above sums are considered sufficient to complete the work, yet we are aware that in an undertaking like this, unforeseen obstacles often present themselves in the progress of the work, and being generally of a contingent nature, it is impossible to ascertain or calculate them actually by the most minute surveys.

A question will naturally arise that will admit of some discussion, as to which of the above scales it would be most expedient to adopt, but upon due reflection upon the comparative advantages and the local situation of the country, we feel decidedly in favor of the largest, being designed both for steam-boat navigation and schooner navigation. One inducement for giving a preference to this scale, as one of primary importance, is the advantages that would accrue to the trade of the Western Districts from the practicability of passing through the canal with such vessels as are suitable to the navigation of the upper lakes. By making it of corresponding dimensions with the Welland Canal, already so far advanced toward completion, it would, in connexion with that work, not only facilitate and expedite transportation, but save a vast expense and inconvenience in breaking bulk and transferring cargoes from one kind of vessel to another, subjecting goods to injury already too frequently experienced by the existing mode of transportation.

We must express our regret, however, that having not been authorised to extend our survey beyond the boundary line of this Province, we are not enabled to give a full and satisfactory statement of the practicability and probable expense for effecting a safe navigation throughout, without which, the principal object of our enterprise will be but in part attained.

We feel sanguine, nevertheless, that upon proper representation, Lower Canada will come forward with alacrity to unite with us in support of an improvement enhancing their own commercial interests equally with ours. Of this they are no doubt sensible, and will therefore be more ready to co-operate in an undertaking which, without their aid and concurrence, can never be fully accomplished. The Cedar Rapid and Cascades, although serious obstructions in the present navigation, offer (as we are informed) great facilities for improvement.

Then by making the necessary alterations in the Lachine Canal we should open a direct and uninterrupted navigation from one extremity of the Provinces to the other, and might cheerfully anticipate the time, as not far distant, when vessels of burden would be enabled to pass and repass from Quebec to the most western settlements of this Province.

In taking a nearer view of the objects of this contemplated improvement in the navigation we would beg leave to suggest the great propriety of making a canal for steamboat navigation, for by steamboats we anticipate the greater part of our trade will eventually be carried on Safety and expedition in the transit of goods being two essential requisites in commercial economy.

Steamboats will therefore always have a decided advantage—besides after passing through the canal at the several rapids, they will seek their way up the channel of the river without any interruption, requiring neither towing path nor any other extra expence to assist them on their passage up. Whereas sloops and schooners depending entirely on canvas must in case of contrary winds or calm weather be unavoidably detained or depend upon towing.

In this case a towing path and bridges would require to be constructed upon the banks, the whole course of the river. A channel would also have to be cut through shoals in many places of great length, and after all an insurmountable difficulty would present itself upon their arrival at Kingston, and cause delays provided they are destined for the Upper settlements.

The same objection as it respects the formation of a towing path, bridges and cutting a channel along the shore is also applicable to boats though in a less degree.

A canal upon the scale recommended would also be of great advantage to the lumber trade, by making the locks 10 feet wide as proposed, rafts &c of the ordinary size might pass through with ease and safety, avoiding the expence of pilots as well as the danger in running over the rapids

It has hitherto been argued that steamboats are injurious to canals and should therefore not be admitted, but the fallacy of this argument we believe has been fully demonstrated in Europe. At all events we feel convinced that it can only apply to canals of small dimensions.

Having been particularly directed to ascertain the situation of the channel on the north side of Barnhart's Island, we devoted some time to that purpose; finding however upon due examination that all endeavours to render that channel practicable for the transportation of lumber and other produce from the upper country must ultimately prove abortive. There being no possibility of approaching it with safety in descending the river on account of its immediate connexion with the principal rapid of the Long Sault, where no vessels or rafts can ever attempt to descend

The channel along the North side of the island is much contracted and very shoal, without water sufficient to float a loaded boat of the ordinary size. But inasmuch as it is not capable of access at the head, we abandoned all ideas of making improvements on any other part of that channel, besides it might probably be questioned whether we have the right of such improvement since it cannot be done without interfering with the island, which is unfortunately claimed by another government.

By adverting to the estimates it will be seen that from Mille Roche a little above the confluence of the two streams that form Sheek's Island, we propose to construct a waste weir across the north branch in order to raise a sufficient depth of water and entirely abandon the river to Cornwall bay, where our line of Canal terminates. The navigation to the foot of Barnhart's Island being almost exclusively claimed by the State of New York, and the remaining part to Cornwall being obstructed by shoals and rapids, we deemed it inexpedient to attempt any improvement in the natural stream, but make an entire canal on our own shore for which the situation is well adapted.

It is highly gratifying to us to be enabled to state for the information of your Excellency and others, that the natural advantages for the improvement of the navigation of the river St Lawrence, are such in general as far exceed our most sanguine anticipations.

The Long Sault, which has been thought an almost insurmountable barrier in the navigation, possesses uncommon facilities for canal operations. The only place on the whole route that will be attended with any particular inconvenience is at the rapid Plat, the lands adjacent to the river be very high and will cause some deep excavation which it is impossible to avoid.

It has been suggested that the navigation of the river St. Lawrence might be sufficiently improved by deepening the natural bed, constructing locks, &c and supersede the receipts and expence of canals. We feel conscious however from actual survey and due reflection that such opinions could only originate with persons who have not properly examined the nature of the different situations or at least, they cannot be fully aware of the expence and inconvenience that must naturally attend an attempt to effect a channel capable of passing vessels down those rapids where the work would be constantly exposed to interruptions by the water. Partial improvements can probably be made that would materially assist the passage of boats; but the only effectual method of making a safe channel for vessels of burden is to cut canals where the river cannot interfere. It will be seen however that we propose to adopt the natural channel where it appears practicable. The distance from Johnstown to Cornwall by the river is about 47 miles and the total fall ninety five feet. It may not be unworthy of remark that 13 miles of excavation and eleven locks averaging six feet lifts is all that will be required, (having neither aqueduct or culvert) to effect a complete line of navigation, the whole of the above distance. All the rapids above the Long Sault are practicable in going down. vessels will of course prefer the natural channel being more expeditious and less expensive. It is those ascending only, that will require the canal which allows us to contract the width of those places and greatly reduce the expence.

It would be impossible for us at this moment to anticipate the innumerable advantages that must naturally result from an enterprise like this; neither do we consider it necessary to point out the importance of opening such a line of communication for advancing the prosperity of this country; for if we look back to Europe and even to the state of New York we see the fact fully demonstrated.

With such salutary examples before us, it is to be hoped, that every individual acquainted with the geography of our country, and the advantages which the hand of nature has so liberally bestowed upon us, is fully convinced of the profits it would secure to the trade of these Colonies. We shall therefore only attempt to point out a few leading facts immediately connected with our commercial interest.

The St. Lawrence being the shortest and most direct line of communication with the Atlantic, will, by removing a few natural obstructions, ever be the highway for commerce notwithstanding improvements in any other quarter.

The Rideau Canal, if carried into effect upon the plan suggested, will be a most stupendous work, and will in time of war be of infinite importance to the security of this Province; being in the interior it will form a safe depot and open an independent line of communication through the country completely out of reach of the enemy. It will not only be eminently useful in a military point of view, but it will also open an outlet to a large extent of fertile country hitherto nearly excluded the market, and materially facilitate the transport of lumber from immense forests, now one of the chief sources of trade. Besides, if accomplished by the Imperial Government, (without the aid of the Provincial fund) as at present contemplated, it will cause a large amount of capital to be brought into and expended in the Colonies which will render it the more desirable. But as it respects our commercial interest in general, the St Lawrence is an object of primary importance, and which should naturally first occupy the attention of our Legislature, as the particular object in expending money on canals is to facilitate and expedite the transportation of our commodities to market. No route, we believe, possesses equal natural advantages with the one now in contemplation; being the shortest, it will always enable forwarding merchants to transport goods much cheaper and quicker than by any other line, and it is reasonable to suppose that commerce will find its way by the shortest and cheapest route.

Another important advantage worthy of notice in this work is, the many valuable sites that will be obtained for mills and machinery, as there is not a durable stream of water from Kingston to Lower Canada on our side, except the Gananoque, capable of turning mills for manufacturing the quantity of flour necessary for home consumption, an inconvenience severely felt by the inhabitants of a large tract of country which, for the growth of wheat, is not surpassed by any other part of the Province. Among the few mills occasionally in operation, not one of them save on the stream above alluded to) is capable of making good merchantable flour for market, and owing to the fluctuations of the water in the river during the summer, and the accumulation of ice in the winter, they become so limited in their operations that farmers are frequently compelled to go from 40 to 50 miles and cross into the United States to get grinding done, and then (unless they smuggle) their grain is subject to duty in crossing the lines.

Mills and machinery, to any necessary extent, may be erected at *Mill Roche*, Cornwall, and at the foot of most Rapids where the canal will descend by means of Locks, and where there will be an inexhaustible supply of water at all seasons completely at command without materially interfering with the navigation.

This, among many others, is an object that will not be the least to stimulate the trade and agriculture of this rising Colony.

Our present shackled mode of conveyance up the St Lawrence causes a very serious impediment to the trade of our upper districts: the enormous rates of transportation amount almost to a prohibition of heavy articles. It excludes merchants & others along the frontier from a fair competition with their American neighbours. The easy access to the New York market by means of their canals gives them a decided advantage over our trade, and except we effect similar improvements on our line of transit, a great proportion of the commerce of Upper Canada must necessarily seek a vent the same way, which will cause a constant drain of money from this province to the U. S. and encourage smuggling (which no restrictions can ever entirely suppress) to the injury of our revenue.

We have not been enabled to collect all the necessary information in order to enter into a minute detail on the comparative advantages that an improved line of navigation would produce. It appears however that the present price of transportation from Montreal to Prescott, a distance of 135 miles, is 4s. per cwt or £4 per ton. Thence to York or Niagara, about 250 miles, the price is 2s. per cwt. or £2 per ton, by which it will appear that owing to the imperfect state of the navigation, one ton of goods costs as much in proportion from Montreal to Prescott as three tons and three quarters from the latter place up, adverting simply to the difference of the expence of carriage and saying nothing of the hazard delay and wear and tear of boats in dragging them over rocks and shoals.

We are not in possession of the rates of transit on the Erie Canal, but are informed that the average cost of a ton of goods is about 3d per mile; at which rates 135 miles, the distance from Montreal to Prescott, a ton of goods would only cost £1 13 9 where we now pay £4 making a difference of £2 6 3 on every ton in that distance. A ton of goods from New York to Niagara costs £5. From Montreal in the event of an improved navigation it could not exceed £3 13 9 leaving a balance in favour of Montreal, market, of £1 6 3 on every ton admitting them to be subject to the same rate of tolls the whole distance to Prescott as on the Erie Canal; but the probability is that the expence would be considerably diminished to the latter place as tolls could only be demanded where the canal passes the rapids, whereas on the Erie Canal they pay toll the whole distance, which must give us an advantage in the expence of transportation.

Should there be any persons, less sanguine than we are, who still doubt whether the advantages to be derived from this canal would warrant the undertaking, we would beg leave to refer such to the very able letter written by John Macaulay, Esq. President of the late Commissioners of internal navigation, and subjoined to their report of the 25th February 1825. By which it will be seen that from his immediate knowledge and active researches he has proved beyond a doubt, that a canal by the Rideau, would not only pay the interest on the capital expended, but yield an annual revenue.

The line of intercourse down the St. Lawrence being 54 miles shorter, and having at least 350 feet less lockage, (one of the chief sources of expence on canals) besides many other superior natural advantages, must always command a greater proportion of transit, and will consequently be more productive.

All which is humbly submitted,

(Signed)

**SAMUEL CLOWES.**
*Principal Engineer.*

(Signed)

**GEORGE RYKERT,**
*Assistant Engineer.*

*York, 12th December*, 1826.

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