

INTERNATIONAL JOINT  
COMMISSION

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MIXTE INTERNATIONALE

75 ALBERT  
OTTAWA 4, April 21, 1967

The Honourable Paul Martin, P.C., M.P.  
Secretary of State for External Affairs  
Ottawa, Ontario


Sir,

I have the honour to transmit to you the "Report of the International Joint Commission, United States and Canada, on the Improvement of the International Champlain Waterway for Commercial Navigation", dated April 7, 1967.

Under the reference of July 5, 1962, the Commission was requested to examine into and report on the feasibility and economic advantages of improving or developing a waterway from the St Lawrence River in Canada through Lake Champlain to the Hudson River at Albany in the United States.

A copy of the report of the Commission's International Champlain Waterway Board dated June 30, 1965, together with a copy of the Board's Supplementary Report, dated December 31, 1965, are being sent to you under separate cover.

Yours sincerely,

  
D.G. Chance,  
Secretary.

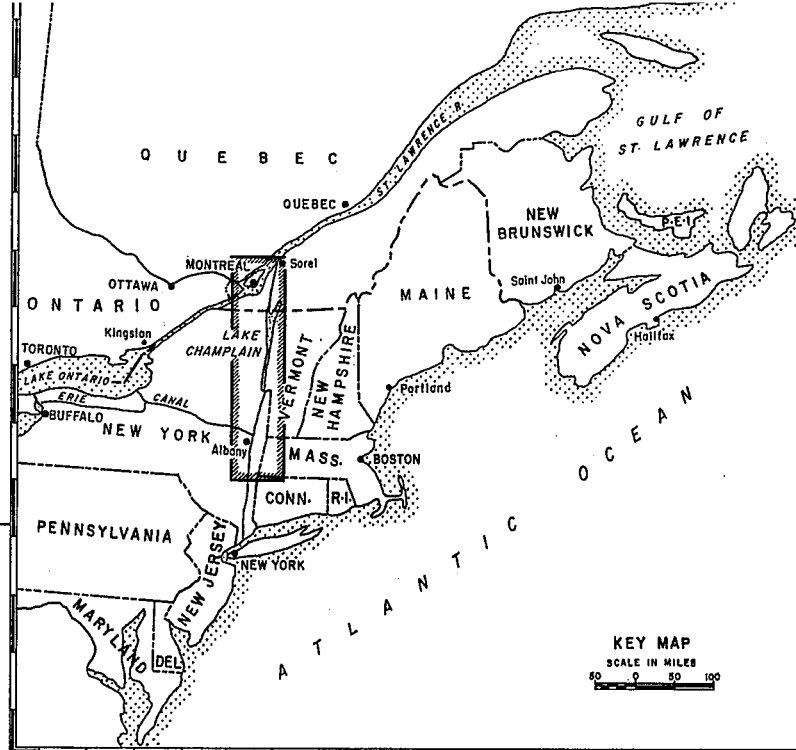
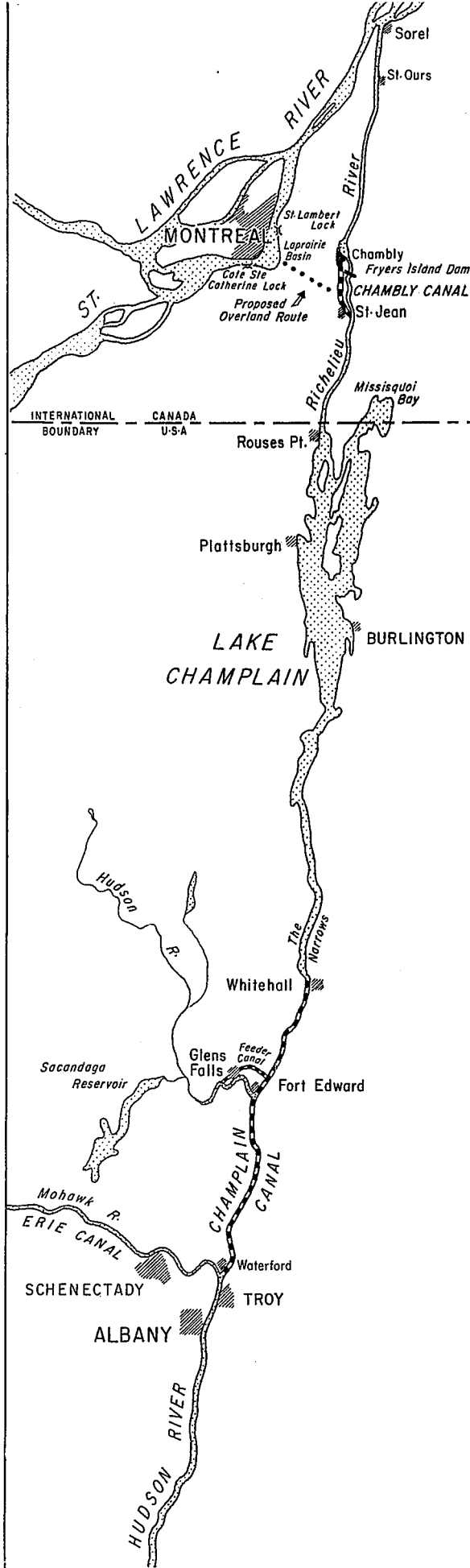
cc. W.B. Bullard - US side  
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**Report of the  
INTERNATIONAL JOINT COMMISSION  
United States and Canada**

**on the  
  
IMPROVEMENT OF THE  
INTERNATIONAL CHAMPLAIN WATERWAY  
for  
  
COMMERCIAL NAVIGATION**

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#### EXISTING PHYSICAL FEATURES

SECTION	LENGTH (Miles)	CHANNEL Width x Depth (ft.)	LOCKS			BRIDGES Number
			Nº	Total Lift (ft.)	Length x Width x Depth (ft.)	
Richelieu River (Sorel to St-Ours)	14.0	125 x 12				2
St-Ours Canal	0.1		1	5	339 x 45 x 12	
Richelieu River (St-Ours to Chamblly)	31.4	125 x 7				3
Chamblly Canal (Chamblly to St-Jean)	11.8	36 x 6.5	9	80	120 x 23 x 6.5	14
Richelieu River (St-Jean to Boundary)	23.0	125 x 7				4
Lake Champlain	98.4	30 to 400 Deep				2
Lake Champlain (The Narrows)	13.5	100 to 200 x 12				
Champlain Canal	60.4	75 to 200 x 12	11	168.3	300 x 45 x 12	27
Hudson River (Waterford to Albany)	11.2	200 x 14 to Troy 400 x 14 to Albany	1	17.3	492 x 44 x 13	7
<b>TOTALS</b>	<b>263.8</b>		<b>22</b>	<b>270.6</b>		<b>59</b>

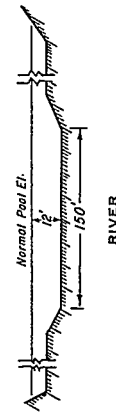
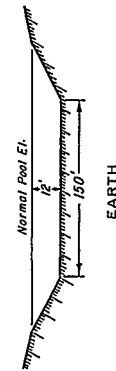
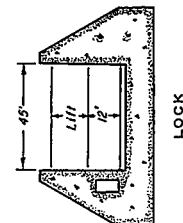
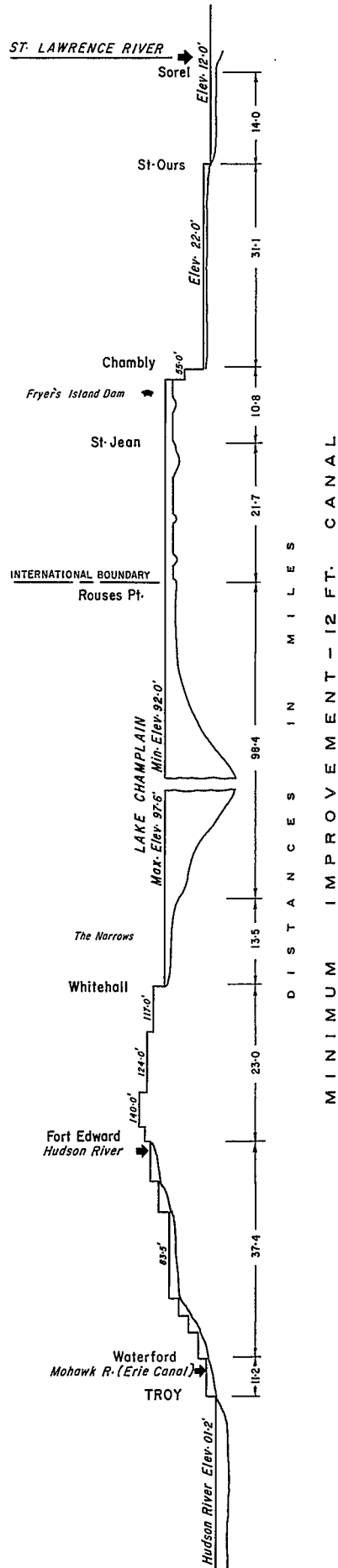
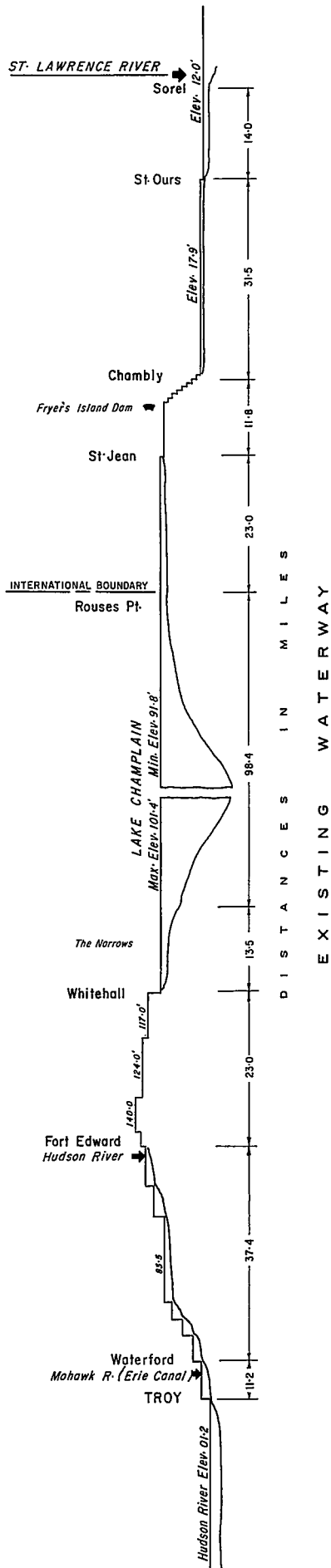
#### INTERNATIONAL JOINT COMMISSION GENERAL MAP OF INTERNATIONAL CHAMPLAIN WATERWAY

Scale of Miles  
0 10 20 30

Drawn by A-J-M

CAN-SEC-14-C  
October, 1966

FIGURE 1



TYPICAL SECTIONS OF 12 FT. CANAL

INTERNATIONAL JOINT COMMISSION  
HYDRAULIC PROFILES  
OF  
INTERNATIONAL CHAMPLAIN WATERWAY

DRAWN BY A-J-M  
CAN-SEC-13JC  
OCTOBER, 1956

FIGURE 2

## FOREWORD

In 1936 the Governments of the United States and Canada requested this Commission to investigate the advisability of improving the existing waterway from Montreal through Lake Champlain to the Hudson River. After studying alternative routes of various depths the Commission reported to the two Governments in 1938 that the cost of improvements would greatly exceed the transportation savings and that it was neither advisable nor economically practicable at that time to improve a waterway from Montreal through Lake Champlain to the Hudson River. It recommended reconsideration of the situation after the St. Lawrence Seaway was completed.

In 1962, four years after the opening of the St. Lawrence Seaway, the two Governments again asked the Commission to report on the feasibility of improving the International Champlain Waterway.

In the current investigation the Commission has examined closely three types of improvement for commercial navigation. This report presents conclusions on the improvement of the Waterway for the purpose of commercial navigation. It also presents general observations on the recreational potential of the Waterway.

Report on the  
IMPROVEMENT OF THE INTERNATIONAL CHAMPLAIN WATERWAY  
for  
COMMERCIAL NAVIGATION

On July 5, 1962 the Governments of Canada and the United States asked this Commission to report on the feasibility and economic advantages of improving or developing a waterway from the St. Lawrence River in Canada through Lake Champlain to the Hudson River at Albany in the United States.

The Commission was specifically requested to examine into and report on whether it would be feasible and economically advantageous to improve the existing waterway from Sorel, P. Q., to Albany, N. Y., and, if so, to what governing dimensions; to estimate the costs of such improvements in each country; and to make an economic appraisal of the value of such improvements to the two countries.

The Commission was also asked to report in similar terms on any other routes for a waterway connecting the St. Lawrence River at or near Montreal with the Hudson River at Albany by way of Lake Champlain which would be feasible and economically advantageous.

Finally the two Governments requested the Commission to bear in mind the effect such improvements or developments would have on conservation, recreation and other beneficial uses.

The text of the Reference from the two Governments is quoted in full in the Appendix.

CONDUCT OF THE ENQUIRY

In accordance with its usual procedure in such investigations, the Commission assembled a technical group - the International Champlain Waterway Board. This Board was composed of experts from the Canadian Departments of Transport, of Public Works and of Energy, Mines and Resources and from the United States Departments of the Army, of Interior and of Commerce. A list of the members of the Board and its Committee is set out in the Appendix.

The Board was directed to carry out, through appropriate agencies in the two countries, the technical investigations and studies necessary to enable the Commission to prepare its report and recommendations as called for under the Reference. The Board was instructed to conduct its studies in two phases; first, to examine carefully the economic consequences of an improved waterway and its effects in both countries, supplemented by preliminary engineering studies and cost estimates; and to proceed subsequently, if warranted, with a second phase consisting of more detailed economic and engineering studies.

Over the course of the next three years, as its work progressed, the Board submitted seven semi-annual progress reports. At the conclusion of the first phase of study, it produced a feasibility report dated June 30, 1965 supported by comprehensive data in the two volumes of appendices. Later that year, at the Commission's direction, the Board elaborated and clarified some aspects of its report in a supplementary report dated December 31.

During the course of its investigation the Board was in touch with a number of agencies in the States of Vermont and New York and the Province of Quebec on various aspects of the problem, notably engineering and statistical data and information on anticipated developments.

The Commissioners, accompanied by the Board inspected the existing waterway from Sorel to Albany in June of 1963. They also examined possible overland routes from the Richelieu River to the St. Lawrence Seaway.

In the early stages of the enquiry the Commission held public hearings at six major centres in the region that would be affected by changes in the Waterway. After the Commission made the Board's feasibility report available to the public, further public hearings were held at St. Jean and Burlington. Eighty-eight witnesses were heard at the initial hearings; thirty-four at the subsequent hearings.

During the course of the investigation the Commission received three briefs from the Quebec Chamber of Commerce and corresponded with interested private individuals and public officials.

### THE BOARD'S INVESTIGATION

At the Commission's direction the Board's investigation focussed on the economics of transportation and the cost of improved navigation facilities. The economic justification of improvements examined was sought in the savings to be derived therefrom in the transport of bulk cargo. Designs and cost estimates prepared by the Board were sufficiently accurate to evaluate and compare alternative proposals. The effect of such improvements on water quality, fish, wildlife and recreation were also examined.

#### Commercial Improvements Considered

Three types of improvement were considered in order to evaluate the economic potential of the Waterway. They represented a canal of minimum improvement that might provide some benefit to commercial navigation, a typical modern barge canal and a deep-draft ship channel.

In the United States portion the route of the improved Waterway is confined by geography to the present location, while in Canada two routes were finally selected for detailed examination.

#### Transportation Economics

The Board engaged economic consultants in each country to conduct surveys of prospective shippers and consignees in the economic area tributary to the Waterway, that is to say, the 11 northeastern states and the 42 counties in Canada contiguous to the

Waterway or to the St. Lawrence between Quebec City, Kingston and Ottawa (see Figure 1).

Information was obtained by written questionnaire supplemented by personal interview. Commercial concerns contacted were encouraged to include in their responses to the Board's enquiry all potential traffic they could foresee. The majority indicated that they would have no reason to use an improved Waterway whether because of location, transshipment costs or type and quality of service. Returns from the survey were screened to eliminate duplication and any traffic not considered potential for the Waterway. Remaining traffic was analysed by commodity and point of origin and destination.

For each commodity in the latter class point to point transportation rates were then constructed including the necessary prior or subsequent land haul and transshipment charges. If the estimated transportation costs via the improved Waterway were lower than costs via the alternative land or water routes now available, it was assumed that the traffic would move by the improved Waterway. This neglected the probability that present carriers would retain a substantial part of the traffic by judicious rate reduction.

Forecasts of potential traffic were based on the survey, the estimated growth of the 7 predominant groups of commodities and the economic growth patterns of the tributary area. Details are in Appendix D of the Board's report.

The estimates of savings were based on comparisons of freight rates on alternative land or water routes available and the freight rates "constructed" for the improved Waterway. They were calculated for the period 1970 to 2020 and were then converted into annual average savings, using interest rates of 3-1/8% for the United States and 5-3/8% for Canada and \$1.00 U.S. equal to \$1.08 Canadian.

Transportation savings on movements wholly within one country were credited to that country. On Canada-United States movements the savings were divided equally. With regard to ocean vessels of third nation registry using the waterway, one half of the savings was divided between Canada and the United States. A detailed analysis of the prospective diversion of scheduled ocean vessels to a 27-ft. waterway is in Annex 4, Appendix D of the Board's report.

#### Engineering

All available topographic, hydrographic and geological information was assembled by the Board and evaluated. Some additional mapping, limited geologic explorations, hydrologic studies and several field inspections were undertaken to supplement existing data. The information so acquired proved sufficient to evaluate the construction problems involved and to estimate the costs. Preliminary designs took cognizance of channel geometry and alignment, water supply, channel velocities, excavation, land acquisition and clearance standards for bridges. Route location maps, profiles and sketches of typical facilities for each alternative are included in Appendix A of the Board's report.

Although the designs and cost estimates prepared by the Board were provisional, they were sufficiently accurate for a feasibility report and for comparing alternative proposals. Cost estimates based on the types of design found most suitable were developed separately for each country. All property in Canada that would be affected by encroachments and disposal areas was appraised. Real estate values in the United States were based on data obtained in recent studies of the New York State Barge Canal System. The cost estimates for construction of new bridges or modification of existing ones were based on the type of span likely to be selected to meet specified clearance standards for each type of waterway.

The cost estimates in this report reflect prices as of September 1964 and are in the currency of the country in which the works would be located.

#### Water Quality, Fish and Wildlife

The Board evaluated the possible effects that increased navigation would have on future water quality. The study area encompassed a ten mile strip on either side of the Champlain Canal and Lake Champlain. Demographic and economic projections, water quality objectives, water uses and the effects of increased barge and deep-draft vessel traffic on water quality were all taken into account.

The evaluation of potential effects of navigation improvements on fish and wildlife considered the disposal of spoil from dredging

and channel relocation, vessel waste and the judicious utilization of waste materials. Details are in Appendix B of the Board's report.

PUBLIC HEARINGS

Initial public hearings lasting six days were held in September 1963 at Albany, N. Y., Burlington, Vt., Plattsburgh, N. Y., St. Jean, P. Q., Sorel, P. Q., and Montreal, P. Q. All those interested were given an opportunity at these hearings to convey relevant information to the Commission and express their views orally or by written statements.

Following the completion of the Board's feasibility report, the Commission made copies available to appropriate officials, all persons and organizations who gave testimony at the initial hearings, the nine newspapers in which the hearings were announced, and the public offices indicated in the published notices. Subsequently, in May 1966 the Commission held further public hearings in St. Jean and Burlington to receive comments on the Board's report and additional information.

At the two series of public hearings statements were made by elected representatives from all levels of government in both countries, officials from governmental agencies, representatives of Chambers of Commerce, port authorities, transportation associations, some industries, groups specifically organized to oppose or support the Waterway, and private individuals. A list of persons giving testimony is in the Appendix of this report.

Some witnesses supported an improved International Champlain Waterway; others opposed it. Some not taking a firm position either way urged a thorough study by the Commission to establish the economic justification beyond a shadow of a doubt, and urged careful consideration of the impact of an improved Waterway on other modes of transportation, existing ports and water quality.

The proponents stated that an improved Waterway would reduce transportation costs, stimulate development of mineral and forest resources in Canada, induce new industries along the Waterway, create inland seaports, reduce the sailing time between Montreal and New York, expand foreign trade and utilize to a greater extent existing facilities such as Fryers Island Dam and St. Ours Lock. Some witnesses favoured a deep-draft improvement over 32 feet in depth and an overland route in Canada to reduce the cost of land acquisition.

Those opposed to an improved Waterway stated that freight rates had little economic influence on fabricators and convertors; that rehandling and transshipment costs would negate any possible savings; and that industrial growth promoted by the Waterway would not generate substantial traffic. Some contended that an improved Waterway would not only aggravate the transportation crisis by diverting traffic from existing facilities but would damage the aesthetic and recreational values of the area by increasing water pollution and shore erosion.

The preponderance of testimony presented at the hearings was opposed to further development of the Waterway for commercial navigation and favoured the preservation of the scenic beauty and water quality and protection of the recreational values. Verbatim transcripts of all the public hearings are on file at the offices of the Commission.

## THE EXISTING WATERWAY

### Physical Features

The International Champlain Waterway is an historic route linking the St. Lawrence and Hudson Valleys. It follows the Richelieu River from its mouth on the St. Lawrence River at Sorel, to its source in Lake Champlain. After passing through the main body and the narrows of the Lake it cuts through a 23-mile land section in a low lying trough to the canalized Hudson River, and thence to Albany. Thirteen locks are required to raise vessels from the Richelieu River at Sorel to the summit of the Champlain Canal and nine to lower them to the Hudson River at Albany. Ten locks are in Canada; twelve in the United States. The physical dimensions and geographical location of the existing waterway are shown on Figure 1.

The United States section of the Waterway and the portion in the Richelieu River between St. Ours and Sorel can accommodate barges with a 12-foot draft. However, the Chambly Canal in Canada limits vessels to a draft of 6-1/2 feet. The Waterway is closed for five months of the year due to ice conditions.

Traffic following the existing Champlain Waterway between Montreal and New York travels 454 miles. By sea, the distance is some 1680 miles.

### Condition of Existing Works

Navigation facilities are maintained at as high a level as feasible considering their age and the obsolescence of certain equipment. Existing terminal facilities are ample for present traffic.

### Present Commercial Traffic

In the United States, the domestic commercial traffic through the Narrows of Lake Champlain has not increased since 1958. It is dominated by tanker barges carrying petroleum products to distribution centres on the shores of the Lake. The total cargo averaged 1.1 million tons a year.

In Canada, domestic commercial traffic is limited to the lower part of the Richelieu River. The cargo, consisting primarily of fertilizers and some chemical products, has declined from 60 thousand tons in 1960 to 45 thousand in 1963.

The international traffic consists mainly of newsprint originating in Canada and destined for United States ports. It too has declined from 46 thousand tons in 1960 to 24 thousand in 1963.

Return cargoes in all cases are negligible.

### IMPROVEMENTS FOR COMMERCIAL NAVIGATION

The construction of an improved waterway of reasonable dimensions between the St. Lawrence River and the Hudson River at Albany does not present any insurmountable engineering problems. A sufficient supply of water can be made available for continuous lockage.

In the United States any improved canal would follow the existing route from Albany through the Champlain Canal, the Narrows of Lake Champlain and the Lake itself to the international boundary. (See Figure 1).

In Canada two routes were studied in detail. One, the "River Route", would follow the Richelieu River from its source in Lake Champlain to where it empties into the St. Lawrence River at Sorel, 46 miles downstream from Montreal. This route was studied for the three types of improvement. If this route were adopted the Richelieu would remain hydraulically a river with the attendant disadvantages of high flows, variable current velocities and bank erosion. A modern barge canal and especially a deep-draft ship channel would transpose the existing river and its natural scenic beauty and recreational areas into a commercial canal characterized by regular lines, massive earth works, retaining walls, rip-rapped banks and other engineering works. Sufficient depth would be obtained by a combination of dredging and artificially raising the water level.

The second route in Canada examined in detail, the "Overland Route", would follow the Richelieu River from its source in Lake Champlain to Ile Ste. Therese, two miles north of St. Jean, and thence by a 14 mile dry-cut canal to La Prairie Basin, midway between the Cote Ste. Catherine and St. Lambert locks on the St. Lawrence Seaway. Under a "minimum improvement" programme, the logical course would be to improve existing facilities. Therefore, it was necessary to consider the Overland Route only for a modern barge canal and a deep-draft ship channel because such improvements would require heavy excavation from Fryers Island Dam to the St. Lawrence River in any event.

Fryers Island Dam is an integral part of all improvements considered for commercial navigation. The utilization of this dam would necessitate construction of ancillary works such as protective dykes, alteration of the natural land drainage patterns and channel enlargement, particularly at the rapids near St. Jean.

The costs of various possible improvements, ranging from a capital cost of approximately \$100 million for a minimum improvement to approximately \$2000 million for the 27-foot waterway are shown in detail in Table 1 of the Appendix.

The improvements examined by the Commission are summarized below. Details are in Appendix A of the Board's report.

#### Minimum Improvement

This improvement would provide a canal 12 feet in depth with a 150 foot bottom width and locks 45 feet wide, 300 feet long and 12 feet over the sills, and a vertical clearance of 20 feet above high water.

In the United States the improvements to the existing 12-foot facilities would include rehabilitation of eleven 50-year old locks in the Champlain Canal, 23 bridge alterations, some channel excavation and straightening, and a new feeder system at Glen Falls.

Construction in Canada would include the ancillary works of Fryers Island Dam, a four mile dry-cut canal with two locks and a guard gate from Fryers Island to Chambly Basin, and altering eleven bridges. The existing Chambly Canal would be abandoned. Work has already commenced to replace the St. Ours weir by a modern dam.

The minimum water level of the Richelieu River would be raised four feet between Chambly and St. Ours. The water level between St. Ours and Sorel would remain unchanged. See Figure 2.

#### Modern Barge Canal - River Route

This improvement would provide a canal 14 feet in depth with a 270 foot bottom width and locks 92 feet wide, 600 feet long and 16 feet over the sills, and a vertical clearance of 22 feet above high water.

It would involve major excavation throughout the whole length of the waterway except in the deep section of Lake Champlain, extensive property acquisition for a right-of-way and spoil disposal, and demolition of existing locks.

In the United States five new locks would replace eleven existing locks in the Champlain Canal. The Troy lock would not be altered. Replacement or major modification of 26 bridges would be necessary.

Construction in Canada would include the ancillary works of Fryers Island Dam, a four mile dry-cut canal with a 70-foot lift lock between Fryers Island and Chambly, demolition of St. Ours facilities, a lift lock and regulating dam at Sorel, construction or alteration of 17 bridges and relocation of 30 miles of highway.

The minimum water level of the river between Chambly and St. Ours would be raised four feet and between St. Ours and Sorel ten feet.

#### Modern Barge Canal - Overland Route

This improvement would provide a canal and locks with the same dimensions as described in the previous section. Similarly, the works in the United States would be the same.

Construction in Canada would include the ancillary works of Fryers Island Dam, a 14-mile overland canal in a right-of-way averaging 1300 feet in width, a 58-foot lift lock, a reinforced

concrete culvert to carry the L'Acadie River under the waterway, and the construction or alteration of 12 bridges.

Traffic bound for Montreal and Sorel would pass through the St. Lambert lock on the St. Lawrence Seaway.

#### Deep-Draft Ship Channel - River Route

This improvement would provide a canal 27 feet in depth with a 250 foot bottom width and locks 80 feet wide, 766 feet long and 30 feet over the sills, and a vertical clearance of 120 feet above high water. These dimensions are similar to those of the St. Lawrence Seaway.

This improvement is similar to the modern barge canal, but would require much greater excavation, larger locks, much higher bridge clearance and increased property acquisition for right-of-way and spoil disposal.

In the United States the entire channel from Albany to the northern end of the Narrows of Lake Champlain would require deepening. Six new locks would replace the present twelve. Dredging would also be required near the international boundary. Twenty-three highway and railroad bridges would be replaced by high level crossings or lift span bridges.

Construction in Canada would include the ancillary works of Fryers Island Dam, a 67-foot lift lock near Chambly, a control

dam and lift lock at Sorel, 16 high level or lift span bridges and 54 miles of road relocation.

The minimum water level between Chambly and St. Ours would be increased by seven feet; between St. Ours and Sorel thirteen feet. Substantial encroachments on both banks of the Richelieu River would be physically unavoidable. In spite of dyking wherever practicable, 6500 acres, including modern residential property, would be directly affected. A further 2400 acres would be required for spoil disposal.

#### Deep-Draft Ship Channel - Overland Route

This improvement would provide a ship channel and locks with the same dimensions as described in the previous section. Similarly, the works in the United States would be the same.

Construction in Canada would include the ancillary works of Fryers Island Dam, a 14-mile overland canal, a 58-foot lift lock, a culvert for the L'Acadie River, a delta-shaped turning basin at La Prairie, 27 miles of road relocation and 10 high level or lift span bridges.

The canal right-of-way would be 1300 feet wide. An equal width would be required for spoil dumps. The volume of spoil would be equivalent to 3.7 square miles covered with waste 20 feet deep. Vessels bound for Montreal and Sorel would transit the St. Lambert Lock.

PROSPECTIVE COMMERCIAL TRAFFIC

The minimum improvement would permit through passage of all barges currently using the Champlain Canal in the United States. The modern barge canal would accommodate four barges in a single lockage. The deep-draft ship channel would accept all vessels presently plying the St. Lawrence Seaway and most scheduled cargo liners calling at Montreal.

Prospective cargo would consist predominantly of petroleum products, iron ore, feeds and grains, fertilizer, chemicals and chemical products, newsprint, wood products and zinc concentrate. In addition, the deep-draft ship channel would carry anthracite coal and titanite slag. Ocean going vessels would carry general cargo.

A summary of potential traffic for each improvement considered is set out below.

POTENTIAL CARGO FOR INTERNATIONAL CHAMPLAIN WATERWAY

Thousands of tons of 2000 pounds

<u>TYPE OF IMPROVEMENT</u>	<u>ROUTE</u>	<u>1970</u>	<u>1985</u>	<u>2000</u>	<u>2020</u>
12-foot canal	River	1,642	2,391	3,210	4,416
14-foot barge canal	River	1,944	2,778	3,715	5,184
	Overland	2,120	2,851	3,684	4,628
27-foot waterway	River	4,026	5,646	7,756	11,344
	Overland	3,892	5,409	7,415	10,788

Further details are contained in Volume 1 of the Board's report.

The potential commercial traffic for an improved International Champlain Waterway would be meager in spite of the apparent advantages of linking two great industrial and commercial areas. The low volume of potential cargo can be explained by the following:

- (a) The international boundary divides the tributary area into two separate economic and political components whose commercial transactions are subject to different national policies. Restrictions limit through movement of such items as petroleum products and grain.
- (b) The two direct railway routes parallel to the Waterway and trucking on good all weather highways between Montreal and New York, as well as large vessels carrying iron ore and newsprint from the lower St. Lawrence via the Atlantic to the eastern seaboard will remain formidable competitors. Generally speaking, masters of ships prefer such longer and wider sea routes to the restrictions of canals and locks.
- (c) Seasonal shipping imposes stock piling of bulk materials for use during the non-navigation period. General merchandise traffic tends to remain with land carriers for year round service.
- (d) All the bulk raw materials susceptible to water carriage must be drawn from distant sources.

- (e) New industrial developments along the Waterway are not likely to generate significant volumes of cargo.

ECONOMIC BENEFITS AND COSTS OF IMPROVEMENTS

There is no evidence that an improved Waterway would contribute in measurable degree to the economy of the two countries, jointly or separately. The savings to be derived in transporting commercial cargo are not impressive in relation to the costs of the improvements involved.

Transportation savings in the form of benefits, and costs of improvements estimated on an annual basis and distributed to each country, are set out in Table 2 in the Appendix.

It will be noted that the annual costs exceed the benefits for the various commercial improvements considered by the Commission. In the United States annual costs exceed benefits by amounts ranging from \$130,000 for the 12-foot canal to \$53,000,000 for the 27-foot waterway. Similarly in Canada annual costs exceed benefits by amounts between \$4,300,000 for the 12-foot canal to \$42,000,000 for the 27-foot waterway following the river route.

The benefit-cost ratios in Table 2 represent an economic evaluation of the national components of the three distinct types of improvements considered by the Commission. Since the benefits of each type of improvement are substantially less than the respective cost involved, the benefit-cost ratio throughout is less than unity. For example, in the United States the benefit-cost ratio for the 12-foot canal is 0.83, for the modern barge canal 0.26, and

for the 27-foot ship channel 0.08. Similarly in Canada, the benefit-cost ratio for the 12-foot canal is 0.04. For the modern barge canal, the ratio in Canada would be 0.02 for the river route and 0.03 for the overland route. For the 27-foot ship channel the ratio in Canada would be 0.03 for the river route and 0.04 for the overland.

If calculations are based on a common currency with no differential and on an identical interest rate in each country, i.e., U. S. dollars and 3-1/8% interest, the benefit-cost ratio varies from 0.22 to 0.09 for the Canadian component and from 0.29 to 0.08 for the United States component.

It is the Commission's firm opinion, furthermore, that a Waterway with greater depth than 27 feet would not divert or generate sufficient additional commercial traffic to justify its construction.

In 1966, 49.2 million tons of cargo was moved through the St. Lawrence Seaway to Lake Ontario. This is 4-1/2 times greater than the anticipated cargo on the Champlain Waterway in 2020. Yet, the estimated cost of a 27-foot improved Champlain Waterway using the 249 mile Overland Route would be 3-1/2 times greater than the cost of the 183 mile St. Lawrence Seaway.

EFFECTS ON CONSERVATION AND RECREATION

Pollution of the Waterway by commercial vessels can only be prevented by the effective enforcement of rigid controls. Commercial vessels equipped with waste holding tanks and employing shore disposal facilities at locks and terminals need not cause bacterial contamination to water supply and recreational areas nor necessarily impair aesthetic values of the Waterway.

The net effect of improvements for modern barges and deep-draft ships would be detrimental to fish and wildlife. Dumping or spilling of oil wastes would damage and could ultimately destroy these important assets. The disposal of large quantities of spoil in marshes or shoal areas adjacent to channel dredging would eliminate some irreplaceable water fowl habitats. Channel alignment would encroach on productive marshes in shore areas. The commercial eel fisheries in the vicinity of St. Jean would be flooded out. However, some rock spoil could be utilized to create artificial spawning reefs and dykes to improve existing low quality marshes. In addition, regulation of the water levels of Lake Champlain, especially during the low-water period of August to November, would improve the water fowl habitats bordering the Lake.

Finally, large commercial vessels could cause bank erosion particularly in the Hudson and Richelieu Rivers, and the traffic regulations occasioned by the increased commercial traffic would tend to discourage the movement of recreational craft.

CONCLUSIONS AND RECOMMENDATIONS

The Commission, after due consideration of all the information and technical advice made available to it during the conduct of the enquiry, evidence presented at public hearings and briefs submitted by interested parties, has reached the following conclusions:

1. Commercial Navigation

- (a) The construction of an International Champlain Waterway of reasonable dimensions from the St. Lawrence to the Hudson does not present any insurmountable engineering problems.
- (b) The best route for a canal requiring only minimum improvement would be along the existing Waterway.
- (c) The most practicable route for a modern barge canal or deep-draft ship channel would be along the existing Waterway in the United States, the Richelieu River in Canada to the vicinity of St. Jean and thence by a direct overland route to La Prairie Basin.
- (d) Improvement of the existing Waterway or the development of other routes connecting the St. Lawrence at or near Montreal with the Hudson River at Albany for the purposes of commercial navigation is not economically feasible.

- (e) In view of the wide disparity between the benefits and costs of improving the Waterway for commercial navigation, no further or more detailed studies of the commercial navigation aspects of the Waterway are warranted.

2. Other Uses of the Waterway

Notwithstanding the foregoing adverse conclusions concerning possible improvements for commercial navigation purposes, the Commissioners, during the course of the enquiry and subsequent deliberations, have been impressed with the value of the recreational developments that have taken place along the existing Waterway as well as with the future recreational potential of the region. The Commission is convinced that recreational developments to date have provided significant economic, social and aesthetic benefits in both countries.

The water-related recreational activities of the region were analyzed under this Reference primarily in relation to the question of need and justification for development of the Waterway for commercial navigation purposes. From these incidental studies there is evidence that a rapid increase in recreational boating is likely to occur with a consequential increase in demand for marinas, parks and other water-related recreational developments and improvements. This demand will, in turn, influence the requirements and standards for maintenance of navigability and water quality throughout the existing Waterway.

There will be opportunities for appropriate agencies in each country to contribute in many ways to the realization of the recreational potential of the entire region through their established water-use activities. For example, the Commission notes that rebuilding of the St. Ours Dam and studies of improvement of the Chambly Canal have recently been initiated in Canada. Developments on either side of the boundary can have important effects in both countries. In such cases the economic and physical relationships between the two national portions of the region should be considered. So, for example, the future employment and development of the Fryers Island Dam could have implications on both sides of the international border.

Since the Commission's investigations under this Reference were addressed primarily to the questions of need and justification for improvements for commercial navigation purposes, on which it has concluded that no further or more detailed studies were warranted, the Commission is not in a position to present more detailed observations on recreational, water quality and aesthetic aspects than those outlined above.

The Commission recommends that the two Governments pursue policies designed to preserve and enhance the natural beauty, the water quality and the recreational potential of the Champlain-Richelieu area, having in mind the physical, economic and other

interrelationships of the region that affect the realization of benefits to their mutual advantage.

If the two Governments share the opinion of the Commission that, because of the close physical, economic and other relationships between the two national portions of the region, a joint investigation of these aspects would be helpful to the achievement of these objectives, a specific request to that effect should be directed to the Commission in the form of a new reference; and the Commission so recommends.

SIGNED this 7th day of April, 1967.



Matthew E. Welsh



A.D.P. Heeney




Eugene W. Weber



D. M. Stephens



Charles R. Ross



René Dupuis

## **APPENDIX**

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TEXT OF IJC REFERENCE

On July 5, 1962, the Minister for External Affairs, for the Government of Canada, and the Secretary of State, for the Government of the United States, sent the following Reference to the International Joint Commission through identical letters addressed respectively to the Canadian and United States Sections of the Commission:

"The Governments of Canada and of the United States of America, pursuant to Article IX of the Boundary Waters Treaty of January 11, 1909, have agreed to request the International Joint Commission to examine into and report, as soon as possible, on the feasibility and economic advantages of improving or developing a waterway from the St. Lawrence River in Canada through Lake Champlain to the Hudson River at Albany in the United States.

The Commission is specifically requested:

- i) to examine into and report whether it would be feasible and economically advantageous to improve the existing waterway from Sorel on the St. Lawrence River to the Hudson River at Albany and, if so, to what governing dimensions;
- ii) to make an estimate of the costs in each country of improving the said waterway to any such governing dimensions;
- iii) to make an economic appraisal of the value to the two countries, jointly and separately, of improving the said waterway to any such governing dimensions;
- iv) to examine into and report in similar terms on any other routes for a waterway connecting the St. Lawrence River at or near Montreal with the Hudson River at Albany by way of Lake Champlain which would be both feasible and economically advantageous;
- v) in making its examination and report, to bear in mind the effects which the improvement of the existing waterway or the development of any other routes for a waterway would have on conservation, recreation and other beneficial uses.

"In the conduct of its investigations, and otherwise in the performance of its duties under this Reference, the International Joint Commission may use the services of engineers and other specially qualified personnel of technical agencies of Canada and of the United States of America. In addition to its Report of January 4, 1938, the Commission will, so far as possible, make use of information and technical data which have been acquired by such technical agencies and by the Commission itself, thus avoiding duplication of effort and unnecessary expense."

MEMBERSHIP OF THE BOARD AND ITS COMMITTEE

The International Joint Commission appointed the International Champlain Waterway Board on October 2, 1962. The members were as follows:

Canadian Section

G. A. Scott, Assistant Deputy Minister, Department of Transport, Chairman;

Gerald Millar, Chief Engineer, Harbours and Rivers Engineering Branch, Department of Public Works;

Robert H. Clark, Chief Hydraulic Engineer, Water Resources Branch, Department of Energy, Mines & Resources; and

Jean-Paul Chevalier, District Engineer, Montreal, Department of Public Works (alternate to Gerald Millar).

United States Section

Henry C. C. Weinkauff, Chief of the Planning Division, Office of the Chief of Engineers, Department of the Army, Chairman;

Melvin E. Scheidt, Program Consultant, Technical Services Branch of Division of Water Supply, Department of Health, Education and Welfare;

John B. Bennett, Staff Assistant, Resources Program Staff, Office of the Secretary, Department of the Interior; and

Donald C. Leavens, Chief, Division of Water Transportation, Department of Commerce.

Joint Secretaries

Ralph H. Smith, Chief Hydraulics Studies Division, Department of Transport; and

John W. Roche, Engineer, Office of the Chief of Engineers, Department of the Army.

As authorized by the Commission, the Board established a committee or working group composed as follows:

Canadian Section

D. M. Ripley, Department of Transport, Chairman;  
J. E. Bright, Department of Public Works;  
H. J. Darling, Department of Transport;  
D. McIntyre, Department of Energy, Mines & Resources;  
C. J. Daly, Department of Public Works; and  
R. H. Smith, Department of Transport.

United States Section

Colonel M. M. Miletich, Corps of Engineers, U. S. Army,  
Chairman;  
Mark Abelson, Department of the Interior;  
Earl J. Anderson, Department of Health, Education and Welfare;  
C. Robert Miller, Department of Commerce; and  
Joseph M. Kennedy, Corps of Engineers, U. S. Army.

TABLE 1 - ESTIMATES OF CAPITAL COSTS AND ANNUAL CHARGES

	COST TO CANADA					COST TO UNITED STATES		
	27-foot Waterway		14-foot Canal		12-foot	27-foot	14-foot	12-foot
	River	Overland	River	Overland	Canal	Waterway	Canal	Canal
THOUSANDS OF DOLLARS								
<u>CAPITAL COST</u>								
Land acquisition	65,273	13,808	42,939	12,679	4,910	19,400	11,928	36
Channel excavation and disposal	210,848	172,039	75,868	56,726	22,459	570,572	124,592	150
Embankments, shore protection	33,618	5,069	16,274	6,914	4,264	10,853	8,832	-
Canal structures	56,878	29,356	50,897	29,779	14,327	146,189	72,690	6,710
Bridges and road relocation	80,431	47,290	32,087	13,160	5,186	113,712	16,531	1,835
Other works	2,929	1,546	2,366	1,237	1,277	5,735	3,400	1,964
Contingencies	89,995	53,821	44,087	24,100	10,485	173,292	47,595	2,139
Engineering and supervision	80,996	48,440	39,678	21,689	9,436	155,963	42,835	1,925
Interest during construction	66,754	39,922	32,701	17,878	7,775	74,732	20,525	922
<b>TOTAL</b>	<b>687,722</b>	<b>411,291</b>	<b>336,897</b>	<b>184,162</b>	<b>80,119</b>	<b>1,270,448</b>	<b>348,928</b>	<b>15,681</b>
<u>ANNUAL CHARGES</u>								
Interest and amortization	39,881	23,851	19,536	10,680	4,646	50,555	13,885	624
Maintenance, operation and administration	4,347	2,600	2,129	1,164	507	8,370	2,299	1,300
LESS - Maintenance, operation and administration of existing waterway	640	110	640	110	640	1,200	1,200	1,200
<b>TOTAL</b>	<b>43,588</b>	<b>26,341</b>	<b>21,025</b>	<b>11,734</b>	<b>4,513</b>	<b>57,725</b>	<b>14,984</b>	<b>724</b>

TABLE 2 - AVERAGE ANNUAL BENEFITS AND COSTS

		AVERAGE ANNUAL BENEFITS	AVERAGE ANNUAL COSTS	BENEFIT- COST RATIO
TYPE OF IMPROVEMENT	ROUTE	Thousands of Dollars		
UNITED STATES				
12-foot canal	River	598	724	0.83
14-foot barge canal	River	3,821	14,984	0.26
	Overland	3,912	14,984	0.26
27-foot waterway	River	4,557	57,725	0.08
	Overland	4,491	57,725	0.08
CANADA				
12-foot canal	River	203	4,513	0.04
14-foot barge canal	River	357	21,025	0.02
	Overland	363	11,734	0.03
27-foot waterway	River	1,263	43,588	0.03
	Overland	1,166	26,341	0.04

WITNESSES PRESENTING TESTIMONY  
AT THE  
INTERNATIONAL JOINT COMMISSION PUBLIC HEARINGS

Where witnesses testified at more than one hearing, only the first appearance at the initial hearings held in September, 1963, and the first appearance at the subsequent hearings held in May, 1966, are recorded hereunder.

September 16, 1963 at Albany, N. Y.

Congressman Emanuel Celler, 10th Congressional District of  
New York State

Edward F. Crawford, New York State Joint Legislative  
Committee on the Barge Canal

Bernard Handwerker, New York City Council on Port Development  
and Promotion

Michael J. Power, Albany Port District Commission

Mario J. Rossetti, Niagara Frontier Port Authority

Austin J. Tobin, Port of New York Authority

C. K. Bullock, New York Farm Bureau

Richard McGuire, Washington County Farm Bureau

James W. Danahy, West Side Association of Commerce in the  
City of New York

William E. Cleary, New York Tow Boat Exchange and Harbour  
Carriers of the Port of New York

David A. Wright, New York State Waterways Association

J. Gilbert Maurer, U. S. Route 9 Improvement Association

William F. Giesen, Maritime Association of the Port of  
New York

J. Frank Belford, Jr., The American Waterways Operators

Leland D. Smith, New York State Grange

Walter Howe, Citizens Public Expenditure Survey

William Lathrop Rich, Committee for the New York-Montreal  
Seaway

Peter S. Paine, Jr., Lake Champlain Committee

John P. Hiltz, Jr., Delaware and Hudson Railroad

W. W. Thoms, Erie-Lackawanna Railroad

Arthur E. Baylis, New York Central Railroad and Pittsburgh-  
Lake Erie Railroad Company

Lyman A. Beeman, Finch, Pruyn and Company

Julius Meltzer

September 17, 1963, Burlington, Vt.

James L. Oakes, Vermont Champlain Waterway Commission

John Dinse, Vermont Champlain Waterway Commission

Reinhold W. Thieme, Vermont Water Resources Board

Fred Westfall, Town of Elmore, Vt.

Foster R. Spofford, Vermont State Railroad Association

Capt. C. E. Dunton, Lake Champlain Committee

Willett Foster, Waterways Committee of INCOCHAMP

John W. Edwards, Central Vermont Railway

C. Douglas Cairns, Champlain Oil Company

Rock of Ages Corporation

Paul H. Bilhuber

William H. Myers

Richard Snelling

Kenneth Webb  
Milton Potash  
Thomas Sproston, Jr.  
Fred C. Webster  
Frederic O. Sargent  
Malcolm I. Bevis  
George A. Schumacher  
J. S. Bedford  
Grace Persis Fisher

September 18, 1963, Plattsburgh, N. Y.

Congressman Carlston J. King, 30th Congressional District of  
New York State

Grant W. Johnson, New York-Vermont Interstate Commission on  
the Lake Champlain Basin

Warren Schlickensieder, New York State Department of Health

Edmond H. Galemie, American Maritime Association

Cyrus H. Woodbury, Lake George Association

Mrs. Mabel Connor, Adirondack Grange No. 971

Harold Harris, Lake Champlain Committee

Francis B. Boardman, Brotherhood of Locomotive Firemen and  
Enginemen

Elwood Keyser, Diamond-National Corporation

A. W. Buck, Imperial Paper Company

Paul F. Robinson, Delaware & Hudson Railroad

G. H. Rand, International Paper Company

Ralph Grover

Robert L. Buck

Allen Child

Frank McKeefe

Mrs. Harold Hayden

Horace Noxon

September 19, 1963, St. Jean, P. Q.

Yvon Dupuis, M.P., St. Jean-d'Iberville

L. McMillan, Mayor, City of St. Jean

Maurice Riel, City of St. Jean and Ville St. Jacques

J. A. Gaudreau, Richelieu-St. Mathias Chamber of Commerce

Louis Regnier

Roger Beauvais

E. G. Dolquier

L. E. Martel

Herbert Gailer

September 20, 1963, Sorel, P. Q.

Hon. Lucien Cardin, M.P., Sorel

Bernard Pilon, M.P., Chambly-Rouville

G. Robert Fiset, Mayor of Sorel

Edouard Berthiaume, Town of Beloeil, P. Q.

Henri Olivier

Maurice Boulianne

September 30, 1963, Montreal, P. Q.

Ray March, Port of Halifax Commission

Craig S. Dickson, Maritimes Transportation Commission

Michel Chevalier, Montreal Port Council

Maurice Labelle, La Chambre de Commerce de la Province de Quebec

J. P. Letourneau, La Chamber de Commerce de la Province  
de Quebec

Pierre Brassard, Comité Voie Navigable Interieure Champlain  
et Chambre de Commerce de Valleyfield

C. Archambault, The Trucking Association of Quebec

J.W.G. MacDougall, Q.C., Canadian National Railways

J. A. Wright, Q.C., Canadian Pacific Railway Company

Gerald Morin

May 17, 1966, St. Jean, P. Q.

Paul Beaulieu, M.P., St. Jean-Iberville-Napierville

L. N. McMillan, Mayor of St. Jean

B. R. Guss, Q.C., Municipality of the County of Saint John,  
N. B.

E. A. Whitebone, Municipality of Saint John, N. B.

Hartley G. Green, Municipality of the County of Saint John,  
N. B.

J. L. Dery, Committee on Water Utilization, Quebec Chamber  
of Commerce

J. P. Letourneau, La Chambre de Commerce de la Province  
de Quebec

Marc Visau, Champlain Inland Waterway Committee of Valleyfield

Jean Philippe Toupin, L'Acadie Co., St. Jean, P. Q.

May 18, 1966, Burlington, Vt.

Hon. Philip H. Hoff, Governor of Vermont

Hon. Francis J. Cain, Mayor of Burlington

Robert B. Williams, Interstate Commission on Lake Champlain

~~Howard~~ Jeffrey, Vermont Recreation Department

Reinhold W. Thieme, Vermont Water Resources Board

Richard M. Brett, Vermont Natural Resources Council

C. Arnold Lockwood, New York State Conservation Council

Edmund Morette, New York State Conservation Council

Leland D. Smith, New York State Grange

Peter S. Paine, Jr., Lake Champlain Committee

C. Douglas Cairns, Lake Champlain Committee

Capt. C. E. Dunton, Lake Champlain Committee

John P. Hiltz, Jr., New York State Association of Railroads

Paul Atherton, Chittenden County Fish and Game Club

E. Warner Shedd, Jr., Vermont Federation of Sportsmen's Clubs

William Wessell, Basin Harbour Club

C. K. Bullock, New York Farm Bureau

Buffalo Area Chamber of Commerce

Wilbur E. Dow, Jr., Lake George Steamboat Company

A. S. Morrill, A. D. Pease Grain Company

Barbara Winslow, Brown Ledge Camp, Mallett's Bay, Vermont

Robert Marshal, Camp Dudley

Henry van Loon

Frederic O. Sargent

Karl R. Manning