Chapter IV

IMPROVING NAVIGATION

The Long Sault Canal and its two locks were the most complex components of the United States' role in building the St. Lawrence Seaway. Nevertheless, on-schedule dredging of the ship channels leading to that key portion of the Seaway was also vital to the timely completion of the project. Dredging was less complex technically than the tasks involved in building either the two locks or the Long Sault Canal. For the Corps with its extensive experience in maintaining and improving United States waterways, certain aspects of the Seaway dredging proved routine. Others, however, presented complex organizational problems.

Determining standards for and making the improvements in navigation channels demanded close cooperation among a number of agencies with responsibility for the river and the Seaway. Perhaps because the dredging seemed so routine, orders and legislation authorizing the improvements for navigation were less precise than on other aspects of the project. Imprecision in standards and ambiguity in the assignment of responsibility, however, led to protracted negotiations which at times contributed to strained relations among the many groups involved. In a few instances, controversial issues prompted sharp diplomatic exchanges between the United States and Canada and public controversy between American agencies.

Corps officials confronted problems over dredging in much the same way as they had dealt with issues that arose in building Long Sault. As a rule, the Corps attempted to accommodate the interests of those with responsibility for the dredging while adhering as strictly as possible to standard Engineer practices. This procedure worked well in dealing with the Power Authority of the State of New York and the Hydro-Electric Power Commission of Ontario over criteria for navigation channels. It was not so successful in dealing with Canada over the division of responsibility for dredging in the south channel of Cornwall Island. The engineering issues there were not clearcut, and a good case could have been made for either side on technical points. Corps experience as a mediator between conflicting parties during the course of the project served it well in trying to reach a compromise. Canada, however, had political considerations that required the Corps to accede to Canada on the dredging issues, although the Engineers were able to make the dredging a cooperative enterprise once both sides agreed to what their responsibilities were. And Corps expertise did prove critical in getting the dredging done on time after advertisements produced no acceptable bids.

While the dredging in the Cornwall Island channels produced perhaps the most acriminious disputes of any in the entire project, other parts of the navigation works were fairly routine. Work proceeded smoothly in the Thousand Islands section. And, in all sections of American responsibility, the

Corps' long-term relationship with the Coast Guard helped when it came to working out the details of designing and installing navigational aids.

Determining Navigation Criteria

The St. Lawrence Seaway Development Corporation had sole responsibility for improvements to aid navigation in the Thousand Islands reach as well as in the Long Sault Canal area. The Corps of Engineers had been involved in studies about desirable navigation standards there since the 1920s. But determining criteria for Seaway navigation during the project was difficult because the power entities had responsibility for dredging that affected both power and navigation. That is, the dredging done by the power authorities in navigation channels that were also important to generating power would determine ships' sailing courses. In fact, as it turned out, the power agencies were not necessarily obligated by law to adopt the criteria that the Corps and the Corporation, in consultation with the Canadian Seaway Authority, had accepted for navigation channels. The failure to have the power authorities legally bound to follow the criteria determined by the Corporation and the Corps was the result of the two-stage approval of the project in which the power projects had received the "go-ahead" before the navigation project.

Even so, the power authorities could not act in total disregard of the Seaway Development Corporation and the Seaway Authority. HEPCO and PASNY were responsible to the St. Lawrence River Joint Board of Engineers, chaired by General Robinson, Deputy Chief of Engineers for Construction. Moreover, the power entities had to meet standards of river water-level control determined and supervised by the Board of Control, an agency of the International Joint Commission. It was that board's duty to assure that Lake Ontario water levels were not adversely affected by projects along the St. Lawrence River.

In dealing with navigation, therefore, the Corps and the Corporation had to determine navigation criteria early in the project so that planning, design, scheduling, and contracting could proceed. Determining the criteria proved to be a formidable organizational task. The Corps and the Corporation turned to the Joint Board of Engineers to help get both Canadian and power entity approval of criteria for navigation. Time was of the essence in the resultant negotiations because the power authorities planned to let contracts early for their dredging, much of which was critical to the timely completion of the power projects.

Early in 1955, a few months after the project had begun, the Corps and Corporation initiated detailed discussions over navigation criteria. The Corps took the lead in preparing what it thought to be desirable standards, cooperating closely with the Corporation and the Joint Board of Engineers. Navigation issues included determination of "negative deviations," that is, short-term fluctuations of water levels in the river. Other navigation subjects included depth of excavation in rock channels, agreement on duration of the navigation season, criteria for the widening of navigation channels at bends,

width of channels, and the basis for determining acceptable velocities. Under the terms of the International Joint Commission Order of Approval, the power authorities had to accomplish a considerable portion of the rock excavation in the channel of the St. Lawrence River, making necessary close cooperation among the power and Seaway entities.[1]

Grading in the navigation channels was the first issue that needed resolution. Corps officials believed that the "criteria providing for a 27-foot channel depth is well established." To achieve a 27-foot channel, the Engineers' experience in the Great Lakes suggested that the excavated depth in rock be 29 feet. The two-foot greater depth in rock than in softer materials was necessary for ease of maintenance and lower long-run maintenance costs. "In the rock cuts," Robinson, a key figure in the discussions, observed, "the propeller wash of ships seems to turn up loose slabs of rock thereby creating serious hazards which are difficult to detect and remove."[2]

Initially, there were questions over whether or not the power entities were required to excavate to the 27-foot depth. In February 1955, the Joint Board of Engineers ruefully concluded that "no basis had yet been found for requiring the power agencies to excavate" to 29 feet or indeed even 27 feet.[3]

That there should be such ambiguity over an issue that the Corps thought resolved was the result of the tortuous paths of approval of the power and then the Seaway projects. Robinson had instructed the Joint Board to investigate the long and tangled series of authorizations to determine exactly what responsibilities the power authorities had. A careful review of the International Joint Commission's Order of Approval of 31 October 1952 indicated that specific navigation criteria were not included in approving the power projects. This order noted that the project was to be constructed, operated, and maintained according to standards set forth in a Canadian-American joint report of 3 January 1941, the precursor of the important Corps report of 1942.[4]

What these investigations did find, however, was that both governments intended that the depth of the navigation channels be 27 feet. Although the order of approval did not specify such depth, the two governments in applying for an order of approval from the International Joint Commission specified that they sought a "controlling channel depth of 27 feet."[5]

While this satisfied the commission, Robinson looked for ways to accommodate the power entities who still were not convinced of their obligations. Digging a 29-foot channel in rock would increase their costs, understandably creating some resistance to the Corps' recommendations. As a compromise, Robinson suggested that HEPCO and PASNY compensate for the increased depth by narrowing the width of the channels they planned to excavate. The power authorities ultimately went along with these requests, especially after the Seaway Development Corporation and the Seaway Authority gave "informal indications that [they] would absorb any additional costs found necessary to obtain a 29-foot depth in rock." This was necessary to avoid continued wrangling and possible delay in the opening of the navigation works in July 1958. Both HEPCO and PASNY were also willing to accommodate the Seaway agencies because the power entities had to be

concerned about velocities in the river. The power works had important responsibilities toward maintaining IJC-mandated velocities in navigation channels, which in places required more substantial cuts in channels than were alone required for navigation. The Corps pressed navigation issues because, as Robinson said, these matters were of "some urgency since a number of excavation contracts [were] being planned by the power entities for award" in the spring of 1955.[6]

The power authorities' acquiescence on excavation depth was more easily gained than on some other issues. On channel alignment, the power entities let contracts before there was agreement on whether or not to have bends in channels in the vicinity of Canada Island and in the Ogden Island reach. In November 1954 HEPCO, on behalf of both power entities, proposed to the St. Lawrence River Joint Board of Engineers a channel alignment that the board found unacceptable. The Joint Board preferred a straighter alignment, one in fact mandated by the order of approval. The board's formal disapproval, however, did not reach the power agencies construction agents in time to be reflected in their initial construction schedules. The Corps, the Coast Guard, and Great Lakes shippers opposed the proposed channel alignments. All agreed that "curved courses are unacceptable to mariners." The Corps proposed instead an alignment that had straight reaches, definite turning points, and sufficient widening at unavoidable bends. Since the Corps had the support of so many other interested parties, the power agencies acquiesced in the desired changes, even though it required their construction agents to redesign and reschedule some of the work.[7]

Other navigation issues also involved the Corps in a coordination role. Perhaps none of these was more important than that of water levels. These levels affected the interests of almost all of those participating in the Seaway and power projects. Determining water levels required agreement on the methods of control of the river level and on how best to cope with "negative surges." The latter were sharp natural variations in the river level. In planning for the locks and the Long Sault Canal the range of these variations had to be taken into account. Their range was also important in determining the depth of cuts in navigation channels.

Essentially, the new power and navigation works were going to require a greater degree of control over the river's flow. Determining a method of regulation provided much of the background for the discussion of navigation criteria. The problem of controlling the river had received extensive study, especially by the Canadian Department of Transport.

All discussions of navigation standards had to take into account the criteria to be satisfied by the method of regulation of water-surface levels. These requirements were based on the need to keep within Lake Ontario's natural fluctuations. A further consideration that had important political implications in Canada was the need to ensure that the method of regulation did not allow the river to fall below the minimum levels at Montreal harbor. Similarly, in the interest of the efficient use of the power plants, the method of regulation had to ensure that water levels did not dip below the low levels that occurred naturally from December to the end of March. High water levels also had to be considered. Spring often brought an increase in the river level

because of the breakup of ice below Montreal. River regulation that did not provide for the high river flows during May might aggravate the high water levels in Lake St. Louis during the flood season in the Ottawa River. During the summer months, the regulation method had to hold back the natural outflows from Lake Ontario in order to keep the lake at high levels.[8]

Determining navigation criteria, therefore, took place as part of discussions of a basic plan for river regulation, the context of which was uncertain. Corps officials pressed for an early decision on the method of regulation. For the purposes of planning the navigation works, however, the Engineers had to assume that whatever plan was adopted would conform to natural changes in river level.

But what constituted "natural" variations was not easily agreed upon. Indeed determining the range of negative surges affected the entire course of discussion of criteria for navigation channels. Agreement on interpreting the data on negative surges was critical and the matter took on a certain degree of urgency. Despite its being essentially a technical hydraulic question, it became a source of disagreement between Canadian and American officials. In large part this resulted from the different methods by which the Canadians and the Americans determined negative surges. Simply put, the issue was to agree on measurement techniques and a method of calculating the magnitude and frequency of negative surges which were likely to reduce the water surface below the lowest point allowed in whatever plan was adopted to regulate the river's range of levels. These issues were finally resolved in September 1955, allowing the Corps to proceed with its design, planning, and preparation for awarding of contracts.[9]

Other navigation issues also took time to resolve, although they lacked the immediacy of the questions of river control, channel excavation, and negative surges. The Corps, for example, was drawn into the consideration of spoilage areas to be used by the power entities. Plans to dispose of spoil between Chimney Point and Ogdensburg harbor faced local opposition, especially after it was proposed that the area to be use for dredged material be enlarged. Officials of the town of Ogdensburg, as well as New York State officials, objected. the spoilage area severely limited entrances to their harbor, making future expansion there uneconomical. They appealed to the Corps and the St. Lawrence Joint Board to intervene. After discussions with Uhl, Hall & Rich, consulting engineers to PASNY, new plans were drawn up to take into consideration the interests of Ogdensburg harbor. Since the Corps expected to have future responsibility for the navigability of the river, Buffalo District officials believed that the Power Authority's plans "should be critically reviewed before use of the spoil area is allowed."[10]

1955 also saw discussions of how long navigation would be interrupted when the power pool was flooded. This issue led to some strain between the United States and Canada. The problem stemmed from the idea in the early 1950s that the Canadians would themselves build a canal entirely in Canada. Even after the agreement to construct the project jointly with the United States, the Canadians continued to consider the possibility of building what in effect would have been duplicative works on their side of the border. Like their

counterparts in the Seaway Development Corporation, officials of the Seaway Authority had to contend with political pressures. Canada's interest, for example, in possibly keeping the Cornwall canals operational was in part the need to placate local interests. It was also a way to guarantee that there would be a means of relief should the Seaway become congested. Whatever the reason, the prospect of continuing to maintain the 14-foot Canadian canals near Cornwall caused anxiety in the Corporation. The prospect of deepening those canals to 27 feet truly alarmed Corporation Administrator Lewis Castle. He was "highly concerned" about this "by-pass" because of its potentially negative "impact on the self-liquidating prospects of the Long Sault Canal."[11]

New York's Power Authority and the Corps agreed with the Corporation on this matter. The issue arose indirectly early in 1955 as the St. Lawrence River Joint Board of Engineers began discussions about the date the power entities were to raise the power pool. As discussed earlier, July 1958 was ultimately decided upon as the time to flood the power pool. By that date, Long Sault was to be ready to accommodate 14-foot navigation. The future of the Cornwall canals arose during discussions of flooding the power pool. The immediate issue was how long navigation was to be interrupted by flooding the power pool. The IJC order of approval of October 1952 required "the continuance of 14-foot navigation during the construction." The order did not define "continuance."[12]

Canadian representatives on the Joint Board of Engineers thought that navigation would be interrupted for five days at least, perhaps for a month. The New York Power Authority believed that five days would be all that was required to elevate the pool and accomplish the work necessary to switch traffic into the Long Sault Canal. The Ontario Power Commission thought that it could construct a dike "plug" across the existing Cornwall canal in minimum time. Pool raising and plug construction would be accomplished at the same time. The Corps' position was based on its experience from similar situations elsewhere. On internal rivers of the United States, Corps practice was to stop navigation for up to two weeks or more on vital construction. In such instances, the Corps did not pay indemnities to the navigation interests affected.[13]

Thus, HEPCO, PASNY, and the Corps believed that flooding the power pool would not have an adverse affect on navigation. Corps officials, such as General Robinson, believed that a five-day delay in navigation did not violate the spirit of the order of approval's mandate for "continuance" of navigation. The Corps' position was that the faster the older 22 locks were abandoned in favor of opening the seven new locks of the Seaway, the better for river traffic.[14]

Canadian representatives on the Joint Board of Engineers, however, had other matters to consider. There were interests in the Cornwall area that did not want to see the older canals totally abandoned. At the national level, some Canadian politicians preferred that these canals be held in reserve and indeed, at some point, deepened to 27 feet. The cross purposes at work became clear in discussing plans for closing the canals. Canadian representatives on the Joint Board of Engineers proposed the construction of a concrete headworks with slots for quick insertion of stop logs. This project would have saved

the canals. The Corporation opposed this plan since it left open the possibility of a canal in competition with Long Sault. Both power entities also objected to the Canadian proposal since it would delay the flooding of the power pool.[15]

Ultimately, the Canadians gave in. The $3.5 million in extra cost to build the concrete headworks undermined support in Parliament. The Seaway Authority also acquiesced because of pressure from HEPCO. Delay in flooding the power pool would have proved costly to the power entities. Moreover, in February 1955, the Canadian and American governments had exchanged notes that in principle agreed that there would not be duplication of works on both sides of the border. In view of the savings, the United States had agreed to abandon a lock originally planned at Rockway Point. It would have duplicated the Canadian works at Iroquois. In that same spirit, the Canadians ultimately abandoned the idea of duplicative 27-foot canals in Cornwall, canals that Castle and the Corps feared would compete with Long Sault.[16]

Dredging the South Channel

Few issues proved more devisive than the dredging in the south channel of Cornwall Island. The power authorities disputed their responsibility for any of the work to be done there, and the Canadian and American Seaway agencies disagreed on the way in which to approach the dredging. The negotiations over organizational, technical, and political problems were time consuming and threatened to delay completion of 14-foot navigation beyond the July 1958 deadline. As in other issues covered in this study, delay was serious because it created the possibility of a long-term interruption in navigation in the St. Lawrence River. The power authorities, as we have seen, had determined to flood the power pool in July 1958. This flooding would have inundated the existing 14-foot canal system. By that date, the Corporation and the Corps had to ensure that 14-foot navigation would be available in the new navigation channels planned as part of the St. Lawrence Seaway.

According to the Corporation, neither the order of approval of October 1952 nor the Seaway enabling legislation, Public Law 384, provided much guidance on the division of responsibilities for dredging in the channel south of Cornwall Island. The Corporation maintained that the power entities had responsibility for that dredging. The Corps' studies in the 1940s, which formed the technical basis of the 1954 Seaway Act, indicated that the south channel was for purposes "common to navigation and power." Public Law 384 empowered the Corporation only to perform work "solely for navigation," leaving to the power entities dredging that affected both power and navigation.[17]

The Joint Board of Engineers agreed with the Corporation's interpretation of responsibility for dredging. Its members were prepared to issue an order to PASNY and HEPCO on the work they had to do in the south channel. Castle, however, preferred to negotiate some compromise with the power entities, in part because he did not want to precipitate a court battle over the issue. Such a confrontation would have delayed the navigation project. The desire for

compromise was also based on a recognition that the Corporation's position was somewhat weak. Castle and the Corps had not budgeted funds for the dredging, assuming that the power companies would do the work. In contrast, the Canadians had allocated funds for dredging around the island. In anticipating some responsibility for work in the Cornwall channels, the Seaway Authority undermined the Corporation's position that HEPCO and PASNY were alone responsible for the work.[18]

For their part, the power entities vigorously protested taking on the dredging in the Cornwall channels. Early estimates were that in the south channel alone over nine and one-half million cubic yards would have to be excavated. It was to be a difficult job because of swift currents and the nature of the glacial till. All sides anticipated costs of about $18 million to complete the job.

The power entities based their position on what they saw as a certain degree of discretion in determining what dredging was necessary for the purposes of power. They argued that they were required only to perform such excavation downstream from the powerhouses as was needed to reduce the tailwater level at the powerhouses. This water level was critical since it affected both the dike works and property along the shore. Both the American and Canadian power companies maintained that they could achieve the tailwater reduction without the extraordinary and expensive dredging around Cornwall Island. They based their position on the 1952 International Joint Commission order. That order did not mandate how the power authorities were to lower the tailwater at the powerhouse, only that it had to be done. Indeed, the order left open to further study the determination of the method to reduce the tailwater level.[19]

Discussion of this issue took most of 1956. Robert Moses, chairman of PASNY, made the case that the dredging in the south channel would not be beneficial to either PASNY or HEPCO. Other courses could be adopted that would lower the tailwater. He conceded that, as originally planned, the power entities did have some responsibility for navigation, but not to the extent that the Corporation and the Corps believed. He objected strenuously to dredging solely for the purposes of navigation. The discussion of the issue became public when Moses accused both the Corps and the Corporation of inefficiency. The Corps had miscalculated costs, he said, and the Corporation had exacerbated the problem by mismanagement.[20]

While the dispute could have dragged on, HEPCO and PASNY were quick to compromise. An aggressive stance failed to force the Corporation and the Seaway Authority to back down. The power entities then sought a compromise. The finances of HEPCO and PASNY were such that they needed to open the power works on schedule. The revenues were necessary to begin the timely reduction of their indebtedness. After many meetings, the parties agreed to divide the work equitably between the power authorities and the Seaway development entities. Each power company contributed $6 million to the project, with the Canadian and American development agencies each providing half of the balance.[21]

Even so, this compromise forced Castle to seek congressional author-

ity to raise more money. The dredging in the south channel, to be sure, was not the only reason for increased costs. Nevertheless, any approach to Congress opened the possibility of another salvo of criticism from adversaries of the Seaway. But the issue had to be resolved since Castle had to begin planning to go to Congress for more money in mid-1956.[22]

While the negotiations with the power entities were difficult, those with the Canadians proved even more troubling and time consuming. The major issue dividing Canada and the United States was that the dredging in the international waters of the south channel would affect conditions in the Canadian waters of the north channel. According to the 1909 International Boundary Waters Treaty neither country could disturb the natural flow of water without the consent of the other. Dredging in the south channel would require, therefore, compensatory dredging in the north channel.[23]

The Canadians adhered strictly to the terms of the treaty, maintaining that the magnitude of water flows should not be disturbed by the dredging work to be done. Normally, about one-third of the water flowed into the north and two-thirds into the south channel. The St. Lawrence River Joint Board of Engineers had mandated that water velocity be about 4 feet per second during the navigation season. In its natural state, water velocity was about 12 feet per second in the south channel. Dredging in the channel, as well as below the power pool upriver, would reduce this water velocity. But the Americans argued that if more water could be diverted to the north channel, the amount of dredging necessary in the south channel would be reduced, thus lowering their costs.[24]

Corporation and Corps officials challenged the Canadian position. Ontario's Power Commission, for one thing, had disturbed the natural flow of water in its dredging work being done near Waddington. And, of more significance, Buffalo District officials had discussed the issue with Canadian engineers who had agreed in principle that flows need not be balanced.[25]

The problem, however, was a political one, not a matter of engineering. Changing the condition of the north channel presented the Seaway Authority with some unpleasant problems. New velocities or depths in the north channel might adversely affect shipping at Cornwall. That city already was angry over roadway relocations that had rerouted a major highway around Cornwall. The Seaway Authority took great pains not to jeopardize town plans for an improved harbor that could accommodate ocean-going ships.[26]

The Canadians remained adamant for other reasons. Too great an alteration in the natural flow around the island, they thought, might jeopardize downstream interests near Montreal by altering river levels and flow near the important harbor there. Corps analyses indicated, however, that adjustments in depth and widths of channels could prevent adverse effects downstream. The Buffalo District had also studied proposals to constrict the entrance to Pollys Gut, the reach between the north and south channels.

In the meantime, the Corporation focused on keeping the costs of the excavation and dredging to a minimum. The more water diverted to the north channel, the lower the velocities in the south channel. Reduced velocities achieved in this way would reduce the amount of dredging and excavation needed along the shorelines of the south channel.[27]

Nevertheless, the Canadians refused to budge from their position. In part, their adamancy was the result of a superior bargaining position. As mentioned earlier, their original cost projections had included dredging in the north channel to compensate for the results of changes in the river brought about by the power projects. In contrast, the Corporation had not included such cost estimates. Thus, the Seaway Authority did not have the cost incentives that the Corporation had. But the Canadians had higher political "costs" than the Americans. Substantial alterations in the north channel had the potential of alienating the public in Cornwall and in Montreal.

For its part, the Corps wanted the dredging issue resolved, and the Engineers pressed Castle to come up with a solution. Other dredging projects in the Great Lakes area had been advertised in the summer of 1956, and officials in both the District and Division offices were concerned that not enough equipment would be available for the Cornwall project. By the end of July 1956, however, there was still no resolution.[28]

Part of the reason for the delay was technical, that is, over interpreting the results of model tests. In so obviously complex a set of issues as dredging around Cornwall Island, model tests were crucial. The Corps designed tests for the Corporation, while the Canadians conducted their own tests. Dredging around Cornwall then became more complicated because of a dispute between Americans and Canadians over interpretation of the results of model tests.

Corps testing at its Vicksburg facility indicated that the best way to proceed, from the American point of view, was for the Canadians to accept greater quantities of water and more dredging in the north channel.[29]

The Canadians fully rejected the idea, adamantly retaining their position that the natural division of flow around the island must be maintained. The Corporation and the Corps agreed to that and then focused exclusively on ways in which to minimize the costs of making the south channel meet the criteria for navigation.

By November 1956 both sides were ready to compromise. The Canadians, after all, had nothing to gain by a stalemate that might delay opening the Seaway on schedule. Since the power entities had already agreed to provide some funding for the south channel dredging, only the division of responsibility for dredging in the south channel was left to be determined. The Canadians had won the point that the natural flow of water around the island was to be maintained. On 6 December 1956 they agreed to take responsibility for a large cut of excavation along the southern shore of Cornwall Island. This cut, along with the widening and deepening of channels, was necessary to allow the Corps and the Corporation to meet the navigation criteria in the channel, especially the requirement that water not run faster than four feet per second. This compromise was a sensible one, since the international boundary ran through the south channel and the Canadians therefore would be performing work in their own territory. And that factor was not a minor consideration in view of the fact that the project had already suffered from labor disputes prompted in part by United States and Canadian unions angered by foreign nationals doing work in each other's countries.[30]

Throughout the negotiations in 1956, Corps officials in the Buffalo District and the North Central Division had warned of the difficulties that

would be met in finding acceptable bidders on dredging contracts. There was considerable work to be done in the Great Lakes area. Equally significant, the work in the south channel was extensive and difficult. Water currents were swift. There were nine and a half million cubic yards to be removed, four and a half million of which were marine excavation. Moreover, because the work was to be done in the vicinity of the international boundary, labor difficulties were likely.[31]

During most of 1956 Corps officials believed that Corporation Administrator Castle was not moving swiftly enough in coming to an agreement with the Canadians. Buffalo District Engineer Olmstead perhaps summed up the apprehension best when he said that "anything that can be done to persuade the Seaway Corporation to expedite their negotiations with the Seaway Authority and the power entities should be pushed to the utmost." As the discussions continued into the fall of 1956, the Corps began to make alternate sets of plans for the work. These plans were based on each of the several major proposals under discussion. If deadlines were to be met, officials in Buffalo thought mid-November the latest possible time to come to some agreement with Canada.

As early as July 1956, General Holle had made clear to Castle that in the Corps' estimation the 1956 season was lost to work on the south channel. Under the circumstances, Holle was not sure that the Corps could produce anything other than a "substandard navigation channel south of Cornwall Island." He went on to say that "the realization of even this limited objective will be endangered unless the current negotiations" with Canada were completed promptly.[32]

Agreement was finally reached on 6 December 1956. Engineers from the Corporation, the Corps, and the Seaway Authority divided up the work between miles 107 and 110 of the Seaway, with the United States taking responsibility for most of the marine dredging in this reach. The Canadians agreed to do a small portion of the marine work and all of the cuts necessary on the southern tip of Cornwall Island. The Corps had anticipated the final settlement and had advertisements for bids ready. They were published on 10 December 1956.[33]

No bids were received. The work advertised covered dredging of 5.14 million cubic yards. Corps officials, therefore, called a series of conferences with the various dredging companies in the Great Lakes area. As a result, the work was rescheduled and resubdivided. Some of the dredging originally contemplated for the south Cornwall channel in 1957 could be deferred. This latter dredging was necessary for the 27-foot navigation channel scheduled for April 1959, although it would not meet completely at that time all the required navigation criteria. Channels would be narrower and water velocities faster than originally contemplated. Bringing the channels south of Cornwall up to required standards was scheduled for completion in 1960 and 1961.[34]

Advertisements for the rescheduled work went out on 6 February 1957. When bids were opened on 4 March 1957, the Corps discovered that the contractors had bid well in excess of Buffalo's estimates of the cost of the project. Indeed, the total cost of the bids was almost twice ($32 million) what

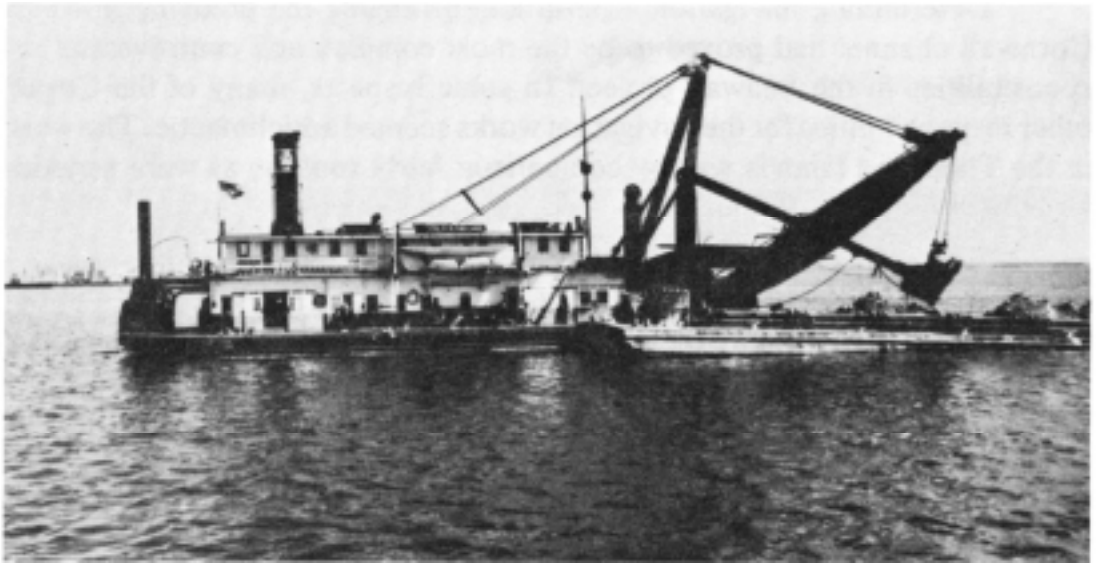
the Engineers had estimated ($18 million). The one bid accepted was for dry excavation. All the others, for marine excavation, were rejected.[35]

In response, Buffalo began negotiations with four dredging companies to develop contracts for any portion of the work the firms would be willing to undertake at acceptable costs. The excessive bids were in part the result of competition from other work in the Great Lakes area. Involved also were concerns over labor problems in the Seaway work area. Labor was scarce and bringing workers from other areas often required special living allowances. Moreover, there were long-standing problems with labor unions, in particular prolonged territorial disputes between longshoremen and members of the International Brotherhood of Engineers. Such disputes were likely to cause shutdowns which led to increased costs.[36]

Ultimately, the negotiations with dredging firms failed to produce satisfactory contracts for most of the work to be done in the south channel. A negotiated contract was awarded 29 April 1957 to Merritt-Chapman & Scott for the removal of 470,000 cubic yards in marine excavation. This was, however, only a small part of what needed to be done. Buffalo recommended that contracts be awarded to other firms with whom the District Engineer had been negotiating. The Corporation, however, opposed the high bids and recommended instead that United States government plant and hired labor be used for the approximately 390,000 cubic yards of dredging necessary.[37]

While the District Engineer and the Division Engineer appreciated the Corporation's desire to keep costs down, there were real problems with using government equipment and hired labor. Corps responsibilities would extend to arranging for the equipment, that is, dredges and scows, and hiring the crews to man these craft. Such a method was undoubtedly cost-efficient, but Buffalo District personnel doubted that it would be as economical as Castle and the Corporation hoped. Buffalo questioned whether adequate crews could be secured and retained. While the government would pay union scale, it was not empowered to pay certain fringe benefits. These included a portal and board payment of $5.00 per day. Officials in the Buffalo District office worried that the $30.00 difference for a six-day week would make attracting a crew impossible, especially in view of the continuing shortage of labor in the Massena area. Despite such reservations, the Corporation wanted to go ahead and take what Buffalo considered the "last resort" approach. Considerations of cost were uppermost in Castle's mind after being sharply criticized in congressional budget hearings in the winter and spring 1956-1957.[38]

Corps officials did not want to appear as obstructionists, nor as advocates of a more expensive approach to dredging. Therefore, Buffalo complied with the request for government equipment and hired labor. Indeed, as early as February 1957, the Corps began to survey the availability of both private and Engineer dredging equipment in the Great Lakes and East Coast areas. As a result, when the assignment finally came in April, both the Buffalo District Engineer and North Central Division Engineer were prepared to provide the dredges and necessary scows. Indeed, both officials had collected names of potential workers in the Great Lakes area, men willing to work without some of the fringe benefits laborers in the Massena area had come to expect. Crews were recruited for the dredge *Gaillard* and Corps personnel were assigned



Corps of Engineers dipper dredge ***Colonel D. D. Gaillard***, used for the critical work in the south channel area.

from the St. Paul, Buffalo, and Chicago Districts to supervise the work.[39]

Corps-sponsored dredging proved a success. The project was kept on-schedule, and the Corporation could confidently report at the end of 1957 that 14-foot navigation would be ready in July 1958 as originally planned. Indeed, experience with the *Gaillard* found that the Corps costs were $1.00 less per cubic yard than Buffalo itself had originally estimated. The success of dredging at considerably lower costs than originally projected by private contractors induced the Corporation to turn to the Corps for the remaining work to bring channels to 27 feet. The bids received for the 27-foot dredging in November 1957 were high when compared to estimates of expenses based on government hired-labor costs. The Corporation turned to the Corps for the rest of the work, using the ***Gaillard*** and the dredge ***Paraiso*** which had been rented from the Panama Canal Company.[40]

Castle was both relieved and pleased with the results of the Corps taking direct responsibility for the dredging in critical reaches of the Cornwall channel. Within the Corps, however, there was less enthusiasm. For one thing, the assignment presented complicated labor negotiations. The Corps could not pay full fringe benefits to workers on its project, but it did pay prevailing union scales and endeavored to make clear to the unions that the current dredging was a last-resort policy. Even more troubling to the Corps was the attitude of companies in the dredging industry. Representatives of one of the dredging industry's trade associations protested to Buffalo. They saw the Corps' role as unfair government competition for what had traditionally been the preserve of the private sector. The association was also critical of what it interpreted as the Corps' unwillingness to negotiate, even when in some instances contractors were willing to work with the government to negotiate a contract acceptable to both parties. These protests were of no avail in view of the Corporation's desire to keep costs as low as possible. But the Buffalo District was troubled by alienating a group whose members it would have to do business with in the future.[41]

Determining navigation criteria and arranging the dredging in south Cornwall channel had proved to be the most complex and controversial responsibilities in the Seaway project. In some respects, many of the Corps' other responsibilities for the navigation works seemed anticlimactic. The work in the Thousand Islands was by comparison fairly routine, as were negotiations with the Coast Guard.

The Thousand Islands

Work in the Thousand Islands section of the Seaway proved relatively easy. On organizational and technical issues, relations between the United States and Canada were marked by mutual cooperation. Most of the Thousand Islands section of the Seaway project lay within American waters. Where it crossed into Canada, the 23-mile lower reach from mile 45 to Chimney Point (mile 68), the Seaway Development Authority took responsibility for widening channels and deepening them to 27 feet. The Corps, at the suggestion of the Corporation, undertook hydrographic surveys to assist the Canadians.[42]

Both governments had to grant exemptions to coastwise laws for work in the Thousand Islands section. These waivers allowed work vessels of either country to cross boundaries at will. Prior agreements were also needed to allow Americans to serve on Canadian vessels operating in the Thousand Islands section, and vice versa. These understandings were coordinated between the United States Secretary of State and Canadian Secretary of State for External Affairs.[43]

One of the major tasks to ensure opening of navigation on time was the placement of aids to navigation. These aids were the responsibility of the Coast Guard. Although the contacts were formally between the Corporation and the Coast Guard, the Corps played an important role as a liaison between the two. Good working relationships between the Corps and the Coast Guard on numerous other projects eased the work of the Corporation.

As early as July 1955 the Coast Guard and the Buffalo District began discussions on procedures for the placement of aids to navigation. By March 1956, the details were completed. The Corps agreed to construct the mountings for the placement of the Coast Guard's equipment. The relationship for the most part went smoothly, although the Coast Guard objected to some of the Corporation's review procedures. "The Coast Guard cannot accept," Rear Admiral F. A. Leamy, commander of the Ninth Coast Guard District, observed in discussing procedures, "any provision whereby its statutory responsibility for determining [type, number, and locations of aids to navigation] are subjected to review for purposes of approval by another agency." The Corporation acquiesced in this regard, although it insisted on a major role in the design stages of aids to navigation.[44]

The agreement worked out between the Coast Guard and the Engineers followed procedures similar to those used on other projects where both agencies had responsibilities. In the design stage of the work on navigation aids, the Coast Guard took responsibility for the location, type, and char-

acteristics for each piece of equipment. In the construction stages, the Coast Guard provided and installed "Coast Guard peculiar items," that is, items which were either manufactured only by or for the Coast Guard or which could be obtained most easily under Coast Guard supply contracts. These latter items included buoys, lanterns, lamp chambers, and batteries. The Corps took responsibility for the construction of both substructure and superstructure of each fixed aid, for the acquisition of necessary real estate, and for connections to commercial power lines when they were used. As a rule, the Coast Guard preferred more economical battery-operated equipment. The Coast Guard had to approve the finished work before turning it over to the Corporation. This latter stage of the work also included issuing notices to mariners about the new devices.[45]

The Corps reimbursed the Coast Guard for its work, with the approval of the Corporation. The Coast Guard assigned two men full-time to design and then to supervise the installation of the aids to navigation. This procedure generally worked well. The only difficulty arose in the need to include the Corporation in the discussions between the Corps and the Coast Guard. At times, both the Corporation and the Corps felt that the Coast Guard was not fully informing them of the progress of work. For its part, the Coast Guard found it irritating to have to keep the Corporation informed about what it considered to be fairly routine work. The Corporation, however, insisted on being fully informed and represented at any meeting about navigation aids.[46]

Thus, the navigation aspects of the Seaway presented some of the most complex technical and organizational problems encountered in building the Seaway, even though they might at first have appeared as fairly routine. On balance, the Engineers succeeded in getting the power entities to accept Corporation and Seaway Authority navigation standards. To do so required the Corps and the Corporation to recognize and compromise on some of the power entities' cost concerns related to adopting those criteria. In determining the division of responsibility in the south channel of Cornwall Island, however, the Corps' negotiating skills came up against Canadian adamancy. The Corps and the Corporation had to accommodate themselves fully to the Canadian viewpoint, an accommodation that complicated and increased the costs of the American task. Navigation also required coordination among the largest number of agencies. But despite all of the organizational and technical problems, the Seaway did open for 14-foot traffic on 1 July 1958 as scheduled and for 27-foot traffic with the spring of 1959. Not all of the navigational issues of course were disputed. Indeed, the work in the Thousand Islands reach was marked by cooperation.

Ultimately, however, the Corps had had to take greater responsibility for dredging in the south Cornwall Island channel. While this turned out to be a success in terms of cost and meeting schedules, it became a source of irritation between the Corps and the Corporation. And the Corporation, as we shall see in the next chapter, did not want the Corps to take over maintenance and operation of the completed Seaway. But to the Engineers, the Corps' handling of the south Cornwall channel dredging problem was an excellent argument in favor of continued responsibility for the Seaway once it opened.