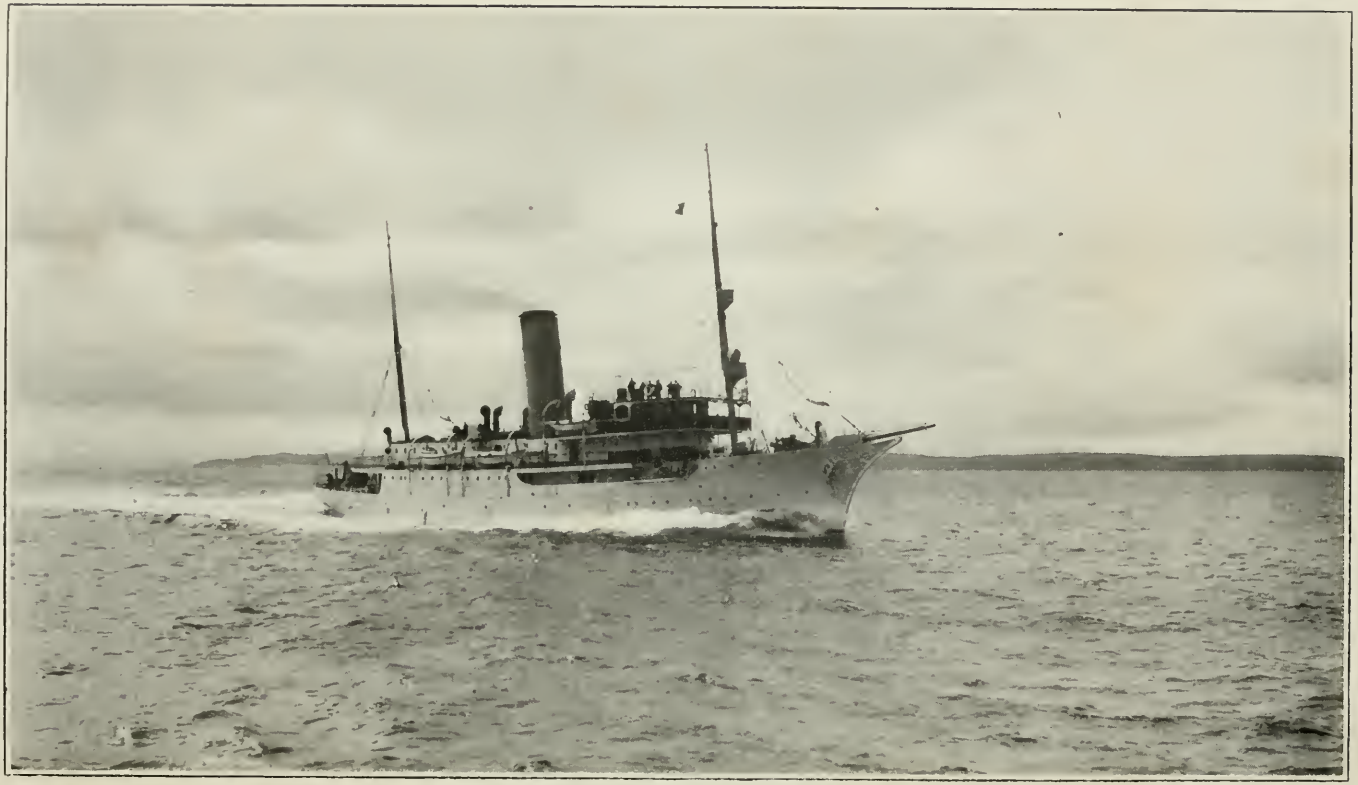
PORT DIRECTORY

OF

PRINCIPAL

CANADIAN PORTS AND HARBOURS.

DEPARTMENT OF MARINE AND FISHERIES



D. G. Icebreaking Steamer Earl Grey.

PORT DIRECTORY

OF

PRINCIPAL

CANADIAN PORTS AND HARBOURS

AT WHICH

MORE THAN FIFTY THOUSAND TONS OF SHIPPING ENTERED DURING THE FISCAL YEAR OF 1908-9

ALSO

DESCRIPTIONS OF NEW TYPES OF AIDS TO NAVIGATION INTRODUCED IN ALL CANADIAN WATERWAYS

DEPARTMENT OF MARINE AND FISHERIES

OTTAWA
GOVERNMENT PRINTING BUREAU
1909

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ERRATA.

Page 5 : Third line from top, 'his report' should read 'this report.'

Page 15 : Seventh line from bottom, 'size' should read 'sizes.'

Page 23 : Fourth line from top, 'unchartered' should read 'uncharted.'

Page 149 : Seventh line from bottom, 'of several millions' should read 'by several millions.'

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To the Hon. Louis Phillipe Brodeur,
Minister of Marine and Fisheries.

Sir,—I have the honour to submitt his report, the principal part of which is a port directory containing information about harbour accommodation and facilities for shipping. The directory is confined to ports where tonnage of vessels entered was 50,000 tons or more, during the fiscal year ending March 31, 1908, but embracing all the principal ports. It is a beginning, to which additions will be made as the interests of trade and navigation demand. The wharf and shed areas, depth of water, anchorage, &c., have been compiled from details furnished by harbour commissioners, collectors of custom, harbour masters and from charts and records in the department.

Information is given respecting new and improved types of aids to navigation introduced and established by the Marine and Fisheries Department, in all the important waters of Canada. The present depth and width of the St. Lawrence river ship channel and the increase of all kinds of aids to navigation, are described. Some tabular statements showing the gradual decrease in insurance rates since 1900 in the St. Lawrence river route, have been compiled. The advantages of the Canadian great waterways, from the head of lake navigation to seaports, for conveying agricultural products of the northwestern provinces, are pointed out. The facilities for handling and storing grain are shown by statements of figures.

Some important details respecting lights, diaphones, submarine warnings, gas buoys and beacons, wireless telegraphy, hydrographic surveys, storm warnings and ice-breaking steamers, are introduced. From the Canada Shipping Act a summary has been made of fees and duties of outside officers and the re-

quirements of the Act as they relate to seamen, engineers and vessels.

Illustrations of ports, so far as they could be obtained, were procured from outside officers and others. The whole report has been compiled and arranged by Mr. W. W. Stumbles of the department.

G. J. DESBARATS,
Acting Deputy Minister of Marine and Fisheries.

Department of Marine and Fisheries,
Ottawa, August 18, 1909.

INTRODUCTION.

This Report was compiled with a view of giving information in a concise form to shipowners, mariners, importers, exporters, traders, insurance companies, and others interested in the navigation of Canadian waters. The harbours described are ports at which 50,000 tons of shipping, or more, entered during the fiscal year 1907-8, and are situated on the Atlantic and Pacific coasts, Gulf and River St. Lawrence, Great Lakes and inland waters.

The Trade and Navigation returns show the tonnage of vessels from Great Britain and foreign ports that entered some of these harbours during the year, also vessels which entered ports on the Great Lakes and inland waters, from the United States. In many ports, the entire entries are of vessels engaged in the coasting trade and fisheries. The importance of a port is estimated by the tonnage of vessels which entered at the customs, but the tonnage which cleared from these ports being practically the same vessels was not taken into consideration.

Inquiries have been made at various times, from abroad, respecting port charges in certain Canadian ports, depth of water, extent of harbours, anchorage, pilotage charges and accommodation. The report contains information not only of the nature of the inquiries, but some additional facts, relating to the facilities for loading and unloading, extent of wharfs, capacity of sheds, cold stores, railway accommodation to the ship's side, &c., particularly in the largest ports of Canada.

The sailing directions, for entering the harbours are quoted from the St. Lawrence Pilot and other pilot books, published by the Admiralty and the Department of Marine and Fisheries.

The improved aids to navigation, introduced and established in Canadian waters, in recent years, and the dredging of important harbours and channels, have greatly reduced the dangers of navigation, enabling much larger ships now to use our important waterways and enter our principal ports, than in any period of the history of the country.

It is an important fact, that vessels of large carrying capacity and drawing 29 feet of water, can proceed up the St. Lawrence river without anchoring at night, as formerly, and moor at their piers in Montreal. The widening of the ship channel, straightening of bends and the increased number of lighthouses, gas buoys and lightships are unmistakable aids that now contribute to quick passages and safety of the route. The improvements in the aids at the entrance of the Strait of Belle Isle, in the strait itself and Gulf of St. Lawrence, Cabot strait and lights established by Canada on the coast of Newfoundland are very marked. The dangers in the Bay of Fundy and on the Atlantic coast have to a large extent been eliminated; the waters of British Columbia are navigated with infinitely less risk than in the past and the Great Lakes also, have received the attention which a constantly increasing traffic demands.

The increase in the volume of immigration, at the ports of Canada, has pressed upon the department the necessity of taking the most advanced steps in connection with the protection of life and property on the way to the points of debarkation. Canada also, has joined in the strenuous efforts made by different countries to convey products to the markets of the world and to receive imports in return in the shortest time. In this connection, the best kind of aids known to the world, have been introduced in our waters and their superiority has only been arrived at, in several instances, by experiments in Canada.

NATURE OF TYPES OF IMPROVED AIDS TO NAVIGATION.

The nature of the improved types of aids to navigation will be interesting to mariners, ship owners, insurance companies and others concerned in shipping.

The diaphone has proven in Canadian waters to be superior to the siren or explosive fog signals, though very much smaller in size and weight than the Scotch siren. The experience of the Marine Department with compressed air horns, steam whistles and explosive fog alarms was unsatisfactory. The Scotch siren which had been in use in Great Britain and considered the most effective sounding instrument at one time, was adopted at two of the most important stations on the Atlantic coast and the St. Lawrence river. The compressed air horn gave surprisingly good results in calm weather, but did not force the sound through external noises, with any degree of reliability, in thick or stormy weather.

In the year 1903, the diaphone was recommended to the department as the best known invention for producing signal warnings and neither cumbersome nor heavy, compared with the siren and its plant.

A trial of a small diaphone of 87 pounds weight alongside of a siren, which, with its horn weighed 9,280 pounds, showed that the diaphone could be heard at a greater distance. The siren operated by $14\frac{1}{2}$ horse-power, was heard $5\frac{3}{4}$ miles from the station, the diaphone was heard $6\frac{1}{4}$ miles but only required $1\frac{1}{4}$ horse-power to operate it.

The superiority of the diaphone was shown in every respect, taking up less space and being operated at much less expense. The use of the diaphone has proved that it is less likely to get out of order than other aerial signals and not so liable to uncertainty of sound, owing to its evenness of pitch.

The diaphone has been developed, until it has reached a greater state of efficiency and perfection, than when first introduced by the department. Its operations are carefully noted by the departmental officers, and, it has been ascertained that the notes are distinguishable from the noises made by the sea on

ledges and shoals, and by wind on the sea. The same results were not obtained, in all cases, with the siren and explosives.

Acting upon the discovery of the superiority of the diaphone, the department replaced a large number of other fog signals by the diaphone and is continuing to establish, at other points, this type of warning.

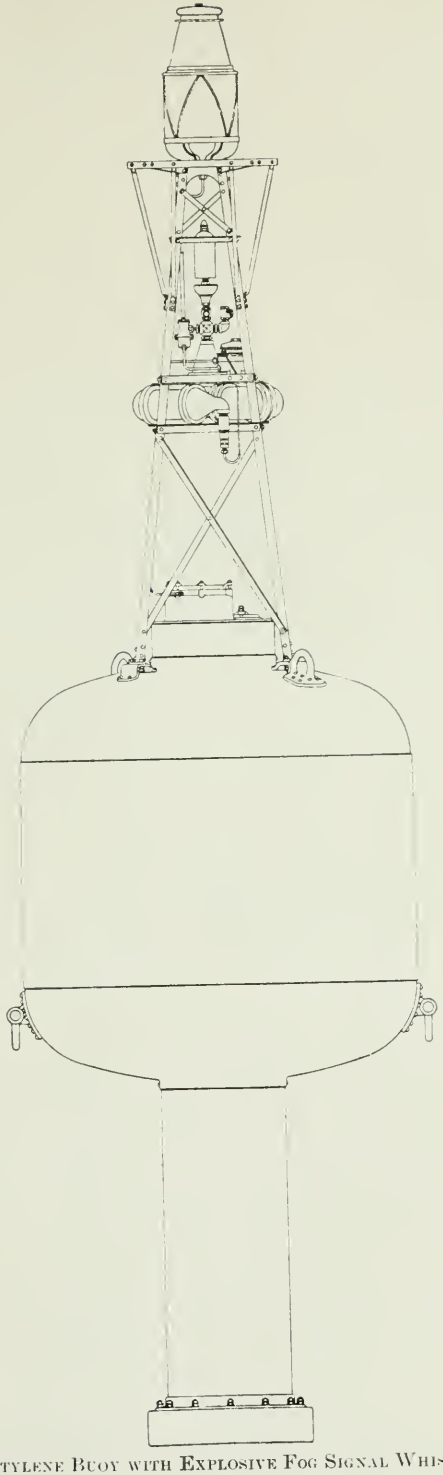
About sixty-four diaphones are now in use in the Dominion of Canada, varying from 1½-inch to 5-inch diaphones, and nine more will be put in operation before the end of the season of navigation of 1909, which will make the total number established and to be operated in the near future, about seventy-three. The stations are located in the main waterways of Canada and the distribution of instruments approximately, are, fourteen on the Atlantic coast, twenty in the gulf and lower St. Lawrence river, eight in the Bay of Fundy, nineteen on the Great Lakes and upper St. Lawrence river and twelve in British Columbia, on the Pacific coast. The other fog alarms of the Dominion consist of a small number of sirens and a number of fog horns, operated by steam.

The difficulties attending navigation in the Bay of Fundy on account of frequent fogs, have been largely overcome by the aid of the diaphone. The establishment of fog alarms or warnings are indispensable and vessels are never out of the range of sound of these instruments, from the entrance of the bay until the harbour of St. John is reached.

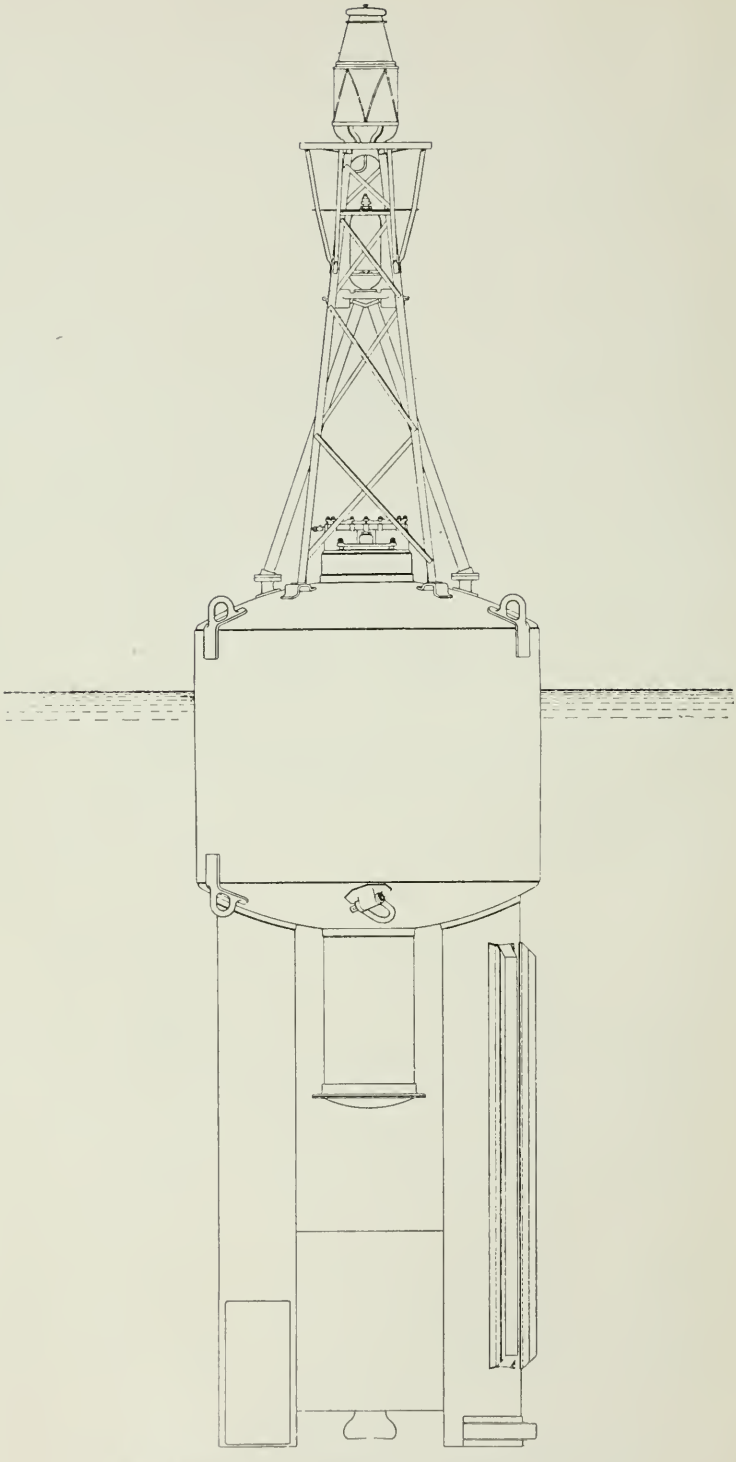
COMBINED LIGHTED AND WARNING BUOYS.

In addition to improving the fog and thick weather warnings established on land, low pressure acetylene buoys, combination acetylene lighted and whistling buoys and combination acetylene lighted and bell buoys have been introduced. These buoys are known as the Willson buoys and are manufactured by the International Marine Signal Company, Limited, of Ottawa.

The whistling device of the combination buoy is an improvement on the old type on account of the increased area of the compression tube, the increase being from 4½ square feet in the Courtenay whistling buoy to 7 feet and 25 feet in the combination gas and whistling buoy. This combination buoy is equipped



Acetylene Buoy with Explosive Fog Signal Whistle.



No. 9½ Automatic Whistling and Acetylene Buoy.

for receiving the standard automatic submarine bell apparatus, which conducts the sound of the bell by water to vessels equipped with receivers.

Acetylene from calcium carbide is used in these buoys. The largest size lanterns made for gas buoys, show a light of from 825 to 1,063 candle power and with the sounding power so great, that the combined buoys constitute a floating aid to navigation comparable to a lightship. The greater efficiency of these buoys has only been arrived at by careful observation of the defects of the automatic buoys formerly in use, and step by step have the improvements been thought out and adopted. It was not until the superiority of the acetylene buoy as now constructed, with low pressure gas, generated directly from calcium carbide in the buoy, was beyond dispute, that the combined buoys were adopted and, as they mark dangers by being placed outside the danger itself instead of being located on shore, they are indisputably a very valuable aid in navigating our waters.

Thirty-five of the combined automatic buoys have been placed to mark dangers along the coast of Nova Scotia from the eastern part of Cape Breton, and continued to St. John, N.B., in the Bay of Fundy. Several, of this class of buoy, have been placed in the gulf and lower St. Lawrence river and upper St. Lawrence and Great Lakes, whilst eleven have been located where most needed in British Columbia, making a total of about fifty-five. Some of these buoys in the maritime provinces have the lantern placed thirty feet from the water and therefore the light can be seen at a great distance.

The largest size combined buoy is 14 feet 6⅞ inches maximum diameter; weight, 38,000 pounds when fully charged; draft, 26 feet 8 inches; total area of whistle tubes, 25 square feet; size of whistle, 18 inches; height of focal plane, 29 feet 7 inches; lantern, 500 m.m.; candle power, 1,063. The light can be seen under favourable circumstances twenty miles. With the occulting light, a full charge, say 3,500 pounds of carbide, should show a continuous light for nine months. The smaller combined gas and whistling buoy measures 9 feet 6¾ inches in diameter with the parts correspondingly smaller excepting the gas generator, which is large enough to contain 3,500 pounds of carbide.

As the subject here dealt with, is the improved types of aids to navigation adopted by the department as distinct from the old types, it is pertinent to briefly and simply describe the construction and operation of the acetylene buoy. The buoys are of two shapes, one eliptical and the other cylindrical with the top of the body of the buoy forming a segment of a sphere. The gas generator is a tube of steel, placed vertically in the centre of the buoy and extending several feet below the body of the buoy, with a counterweight attached for the purpose of keeping the buoy upright. A grate is placed about one-third of the distance up from the counterweight, in the steel tube, and the calcium carbide crystals, size 4 by 8 inches, are put in at the top of the tube and rest upon the grate. The gas is generated by the water from beneath entering a hole in the counterweight and ascending to the grate in the tube. The gas when generated ascends through the carbide crystals to the purifier and from there to the lantern, by a small pipe. The light is shown by a cluster of flat flames with a round pilot flame to each flat flame, all surrounded by a Fresnel lens, giving to the lantern the property of throwing the light to a great distance. The lantern is supported by frame work of structural steel resting upon the body of the buoy. When gas is produced faster than the lantern consumes it, the pressure of gas, being greater than water, forces the water away from the carbide and a temporary suspension of generation occurs during the time the gas is being consumed. The generation is resumed when the pressure of gas below stops and thus, the automatic operation proceeds as long as the carbide lasts.

The ordinary Willson acetylene buoys are now made of three sizes: No. 7½ B, 8 feet 6 inches diameter; carbide charge, 1,300; height of focal plane, 9 feet 10 inches; lantern, 200 m.m.; candle power 140, through a lens. With occulting light the charge is supposed to last six months. The other sizes are Nos. 8½ B and No. 9½ B with a somewhat larger diameter respectively than No. 7½ B and showing more powerful lights. The charge of carbide for No. 9½ B, weighs 3,500 pounds and is supposed to last nine months with occulting burners. The department has in use smaller sized gas buoys and intermediate sizes, but the above sizes are standard.

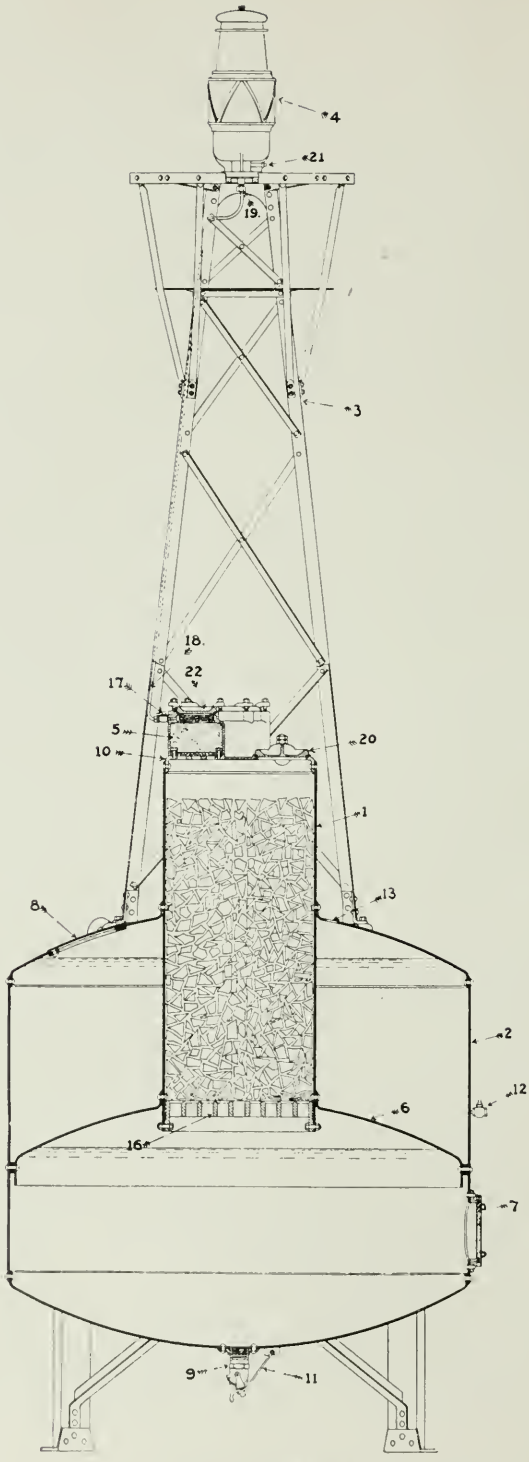
In a comprehensive way the mariner reaps the benefit of the

experiments which have taken place in Canada with the diaphone and with acetylene buoys, the superiority of these aids being recognized by different countries that are now introducing them in their waters. The department is confidently continuing to instal these aids, as they have been thoroughly tested, and at the same time looks forward to the time when the experiments now being made with gas fog guns and bells as part of the equipment of combined lighted and warning buoys, will add another type of improved aids to the several kinds adopted.

About 213 gas buoys were in position in Canadian waters at the end of the fiscal year 31st March, 1908. The number has since been increased to a total of about 233, including combined lighted and signal buoys. In addition to the gas buoys there are numerous buoys of all types consisting of the Courtenay whistling buoy, the Trinity bell buoy, the American pattern bell buoy, steel can and conical buoys, and spar and platform buoys.

Acetylene beacons, manufactured by the International Marine Signal Co., have been in use in British Columbia for three years and have each year proved so satisfactory that oil beacons have been replaced by them. The mechanism is similar to the lighting apparatus of the acetylene buoys but the gas is generated from the calcium carbide, by water held in the lower part of the beacon, the body corresponding to the shape of the cylindrical buoy. Supports, or legs of channel steel, are riveted to the sides of the body and braced from the under part. The bottom ends of the supports are increased in size by angles riveted to them and are bolted down to piers, rocks or other foundations. The distance, of course, at which these beacon lights can be seen, varies according to the height at which they are placed above the water level and the size of the lantern; the duration of the carbide also depends upon the size of the lantern. The charge of carbide in the size in use is 1,500 pounds and the lanterns range from 200 millimeters, charge lasting six months; 300 m.m., charge lasting four months; to 375 and 500 m.m., charge lasting three months.

The beacon lights are kept in operation throughout the year in British Columbia as frost does not interfere with the generation of the gas by the water in the body or tank of the beacon.



1. Gas generator.
2. Float chamber.
3. Lantern support.
4. Lantern.
5. Purifier chamber.
6. Counterweight.
7. Diaphragm.
8. Valve.
9. Valve stem.
10. Generator head.
11. Operating nut.
12. Stop collar.
13. Guard pipe.
14. Safety cap.
15. Rubber packing.
16. Grate.
17. Gas valve.
18. Gas pipe.
19. Coupling.
20. Carbide door.
21. Vent plug.
22. Purifier cover.

Acetylene Beacon.

SUBMARINE WARNINGS.

Submarine signalling has been tested in Canadian waters since the year 1904. The invention first attracted the attention of the department in that year. The introduction of the system was brought about by an agreement with the Submarine Signal Company of Boston, U.S.A. The agreement provided, among other things, that the apparatus must prove satisfactory after a fair trial, and that receivers for catching the sound on board vessels must be installed on a number of merchant lines, and operated for a length of time free of charge.

The first actual steps taken towards testing the submarine bells in Canada consisted of attaching them to the lightships *Lurcher* in the Bay of Fundy, *Anticosti* in the Gulf of St. Lawrence and Red island and White island lightships in the St. Lawrence river. At the same time sound receivers were installed on board several of the steamers of the department and several of the large ocean going steamers entering the St. Lawrence river and Halifax and St. John harbours. The first tests made it evident at once that submarine bells could be heard four or five miles, in any direction of approach. The use of receivers on board vessels, under a skilful observer, further proved that the direction of the signal could be determined within from one quarter to one point. Even without receivers sound can be heard on both the port and starboard sides of vessels when the ear is placed close to the side of a ship, below the water surface. In fact, it can be determined by the varying distinctness, whether the station from which the sound proceeds is on the starboard or port side, but of course, the aid of a receiver enables the expert listener to catch the sound at a greater distance and with more accuracy as to the bearings of the bell.

The submarine signal bells are attached to the *Lurcher* lightship, Bay of Fundy, *Anticosti* lightship, Gulf of St. Lawrence, and Red island, White island and Prince shoal lightships in the St. Lawrence river. Shore stations are established at Louisburg, C.B., Chebucto Head in the approach to Halifax harbour, Atlantic coast, Cape Fourchu approaching Yarmouth, Bay of Fundy and Negro Head approaching St. John, N.B. harbour. Bells have been attached to the gas buoys at Egg island, Sambro and Lunenburg.

The bells attached to the lightships are suspended from the hulls of the vessels and operated by compressed air, the shore stations are electrically operated. The bells are supported on steel tripods twenty feet high and sunk in about twelve fathoms of water. Cables are laid from the tripods to the shore and fastened securely in steel channels bolted to the rocks, connection being made by suspended wires with the generators at the power station. By the use of telephone wires with a receiver and dry battery in the station, the sound of the bell can be distinctly heard in the station.

The reports of officers from time to time, show that the sound from the bells attached to lightships have been heard from sea a distance of one, two, three up to six miles, and one report which reached the department states that the *Lurcher* bell, Bay of Fundy, has been heard twelve miles off, another report indicates that the Red island lightship bell has been heard ten miles from the lightship. Reports of the shore stations' bells indicate that they have been heard also at distances varying from one mile to six or seven. An officer of the department, reporting upon bells attached to buoys, has heard the sounds with a receiver four and one-half to five miles.

It cannot be stated that the system is yet perfect, the mechanical apparatus in connection with the bells attached to buoys is not as durable as can be wished, particularly in waters around the Nova Scotia coast, where there is often a very heavy sea which has a rapid wearing effect upon bell attachments. The progress made since the introduction of the signal bell has been very great and more effective appliances than the original equipment, have been from time to time tried. The department sees no reason to change its opinion about submarine signalling becoming eventually, one of the most effective means of warning vessels in thick or foggy weather, and even in darkness, where care is shown in the use of the bells and receivers. The Canadian government being the first to enter into a contract with the Submarine Signal Compny, has the satisfaction of knowing that other countries are now experimenting with this form of signal with a large measure of success.

LIGHTHOUSE IMPROVEMENTS.

The subject of lighthouse illumination has, in recent years, received special and most careful attention. The installation of more powerful lights at many of the most important stations along the Atlantic and Pacific coasts, the Gulf and River St. Lawrence, Bay of Fundy and Great Lakes, made it necessary for the department to build more expensive and a better class of towers. The greater weight and size of the new lanterns required more stable structures, where new towers were erected, and the strengthening and raising of old towers. It was imperative to guard against vibration as far as possible, and this led to the more extensive use of masonry and the introduction of concrete reinforced with steel, instead of wooden structures.

Cape Race tower was the first reinforced concrete tower and supports one of the largest lanterns ever produced by Messrs. Chance Bros. & Co., of Birmingham, England. The light is elevated 165 feet above high water mark and the lantern is 17 feet 1½ inches in diameter, having an illuminator or mantle 85 millimeters in diameter. It is fitted with the incandescent vapour oil system and has a hyper-radial single flashing apparatus of 1,330 m.m. focal distance, consisting of four panels of 90 degrees horizontal angle. The light is also floated on mercury and operated by clock work mechanism, the flash occurring every five seconds with an interval of darkness. The light should be seen nineteen miles at sea and has been observed at a much greater distance. It is classed amongst the most powerful in the world, the candle power being 1,000,000 candles. It is also claimed that this light is the most powerful in America.

The numerous improvements made within the last three years, consisted of the construction of about fifty new towers; some built of reinforced concrete, others of more or less heavy timber and some are galvanized steel skeleton towers. The changes consisted of replacing old-fashioned lanterns by new and modern ones, with incandescent mantle burners and vapourized oil as the source of light; other changes were made by replacing some lights by lights of greater magnitude having the same kind of optical apparatus, but with more distinctive features.

Four first order dioptric lights, ten second order, twenty third order, twelve fourth order and a number of lights of less power, in harbours and minor waters, have been added to the list of lights within the last two years. The following table may form an interesting study for the mariner who is constantly called upon to make comparisons between lights and to note their distinctive character:—

Approximate candle power of dioptric flashing apparatus used in Canadian lighthouses.

Order.	Character.	Burner used.	Candle power.
Hyper-radial	Single flashing	85 m m vapour	1,000,000
First	" "	85 "	450,000
"	Double "	85 "	450,000
"	Triple "	85 "	240,000
"	Quadruple "	85 "	160,000
Second	Single "	85 "	270,000
"	Double "	85 "	270,000
"	Triple "	85 "	135,000
"	Quadruple "	85 "	95,000
Third	Single "	55 "	100,000
"	Double "	55 "	100,000
"	Triple "	55 "	55,000
"	Quadruple "	55 "	40,000
"	Single " (small)	55 "	60,000
"	Double "	55 "	60,000
"	Triple "	55 "	35,000
"	Quadruple "	55 "	25,000
Fourth	Single "	35 "	25,000
"	Double "	35 "	25,000
"	Triple "	35 "	15,000
"	Quadruple "	35 "	11,000

Catoptric revolving lights have a power of less than 5,000 c.p. By substituting an oil vapour burner for a circular wick burner of same diameter, the power of an apparatus is increased about three and half times.

The light stations of the department now number about one thousand, and about twelve hundred separate lights are shown from lighthouses.

TIDAL SURVEYS AND TIDE TABLES.

The investigation into tidal currents in the Strait of Belle Isle and Gulf and River St. Lawrence and Bay of Fundy, has resulted in the discovery of currents previously unknown. The direction in which they flow, under normal conditions, have been ascertained and a pretty accurate knowledge of the effect of storm disturbances, has been acquired. The value of the publications on the tidal currents has been acknowledged frequently by the shipping interests and mariners. The hydrographic office of the British admiralty has made use of the information in publishing the sailing directions for the Gulf and River St. Lawrence.

The issuing of accurate tide tables, upon observations obtained by means of self-registering tide gauges, kept in continuous operation by the department, has been the subject of much congratulation from owners of steamboat lines and mariners. The yearly distribution of the published tables has been given prompt attention. The accuracy of the tables is represented by the length of the tidal observations on which they are based.

The tables for Quebec, Father Point, Halifax and St. John, where tide gauges have been maintained for several years, are said to be superior to the tide tables of any harbours on the Atlantic coast. The tide tables for British Columbia have been equally appreciated; the Sand Heads tables being the most accurate on the Pacific coast.

HYDROGRAPHIC WORK.

Surveys in the St. Lawrence river and in Lake Superior and on the Pacific coast, are progressing and during each season of navigation work in this line has been carried on by separate parties, with a view of issuing charts of accurate soundings. New charts were published within the past year of parts of the St. Lawrence river, viz.:—Chart No. 201 of that part of the river below Quebec from White island to Orignaux point. Chart No. 7*a* of the St. Lawrence from Berthierville to Lake St. Peter. Chart No. 18 of the same river from Ste. Croix to St. Antoine between Montreal. Chart Nos. 1 and 15 of Montreal harbour were also issued last year.

The charts of the St. Lawrence river, including Lake St. Louis, published by the department, are numbered as follows:—

No.	1,	St. Lawrence river,	Montreal to Longue Point.
"	2	"	" Longue Point to Varennes.
"	3	"	" Ile à l'Aigle to Ile Marie.
"	4	"	" Ile Marie to foot of Ile Bouchard.
"	5	"	" Ile Bouchard to Ile St. Ours.
"	6	"	" Ile St. Ours to Ile aux Foins.
"	7	"	" Ile aux Foins to Ile de Grace.
"	7*a*	"	" Berthierville to Lake St. Peter.
"	8	"	" Head of Lake St. Peter.
"	9	"	" Lake St. Peter.
"	10	"	" Vicinity of port St. Francis.
"	11	"	" Three Rivers to Bécancour.
"	12	"	" Bécancour to Champlain.
"	13	"	" Champlain to Pte. Citrouille.
"	14	"	" Batiscan to Cap Levrard.
"	15	"	" Cap Levrard to Ste. Emélie.
"	16	"	" Ste. Emélie to Deschambault.
"	17	"	" Portneuf to Cap Santé.
"	18	"	" Ste. Croix to St. Antoine.
"	50	"	" Lake St. Louis.
"	201	"	" White island to Orignaux Pt.
"	101,	Lake Superior,	head of Thunder bay to Pigeon river.
"	301,	Prince Rupert harbour,	B.C.

These charts can be procured at the department and from agents of the department at Quebec and Montreal, for the nominal sum of fifteen cents each.

Surveys in Prince Rupert harbour, the western terminus of the Grand Trunk Pacific Railway, and of the mouth of the Skeena river and Dixon's entrance have been made and charts published.

The work of surveying certain harbours and waters along the Pacific coast, is making headway in anticipation of the increased traffic which promises to be established all along that coast. The new steamer *Lillooet*, built for hydrographic surveying, has been engaged on the Pacific coast.

NOTICE TO MARINERS.

Notices to mariners are promptly printed and distributed concerning new aids to navigation established or change of a temporary or permanent character, and of unchartered rocks and shoals discovered, in order that captains and other navigators may be informed. The notices, in order to reach mariners, are sent in Canada to collectors of customs, agents of this department and other outside officers, to consuls of foreign countries, to the British admiralty and to the marine authorities of foreign countries.

STORM WARNINGS.

Storm warning bulletins, and signals considered by all cautious mariners useful aids in determining whether they should proceed to sea when ready, are displayed at all important ports on the Atlantic coast, Gulf of St. Lawrence, Bay of Fundy, St. Lawrence river, Great Lakes and Pacific coast. Information of weather conditions, forecasts and warnings of dangerous storms is almost hourly given in addition to the reports published twice daily by the officers of the meteorological service under the control of the department. Shippers of perishable goods consult these warnings and make it a point to be governed by them. The number of storm signal stations has increased annually. Of 131 storms and gales recorded during the year between the 1st of April, 1907, and the 31st of March, 1908, 102 were in the months of November, December, January, February and March. Of 1,555 warnings issued, 90 per cent were verified.

At Camperdown, Nova Scotia Marconi station, the time signal from land lines from Halifax is automatically repeated at the instant of one o'clock. Navigators find this method useful and practical for checking chronometers at sea.

WIRELESS TELEGRAPHY.

The wireless telegraph stations on the east and west coast of the Dominion and St. Lawrence river now number twenty-one, and the establishment of a station at Montreal and one at Three Rivers in the St. Lawrence river, will afford additional aids to navigation in this great highway. The stations on the Atlantic

coast are operated under the Marconi system, but at the Pacific coast stations, the Shoemaker system has been adopted. The latter system permits of inter-communication with vessels or stations having any other system of wireless telegraphy. The west coast stations have been well equipped and have been working satisfactorily.

Allusion has already been made to the adoption by the Canadian government of improved aids to navigation experimented with for the first time, in Canadian waters. In connection with the introduction and adoption of the method of wireless telegraphy for communication with stations on land, the late Minister of Marine and Fisheries was among the first, if not the first, to enter into a contract with the Marconi Wireless Telegraph Company for the erection and equipment of stations. The numerous messages which are now exchanged between ocean vessels and the stations in Canada, are daily proving the wisdom of continuing wireless telegraphy at sea and on our coasts. Some extraordinary instances of the value of this means of communicating the whereabouts of ocean liners, have been made known to the world. It is not, however, as generally known that one aid to navigation is dependent upon another to fix the position of a vessel in foggy or thick weather, when off the coast. For instance, vessels in distress, in the vicinity of a submarine warning station can tell by the distinctive sounds of the station the latitude and longitude and call to their aid other vessels by wireless telegraph. Having a knowledge of the approximate position to start with, the wireless telegraph can be used to bring assistance from vessels at sea or to communicate intelligence to the shore.

The important aid of our wireless stations has been recognized by the shipping interests generally, therefore up to date improvements in connection with them receive prompt consideration.

ICE-BREAKING STEAMERS.

The department has now what may be termed an ice-breaking fleet of steamers consisting of the *Stanley, Minto, Montcalm, Lady Grey* and *Champlain,* and the new steamer *Earl Grey* now outfitting for winter service. The steamers have been

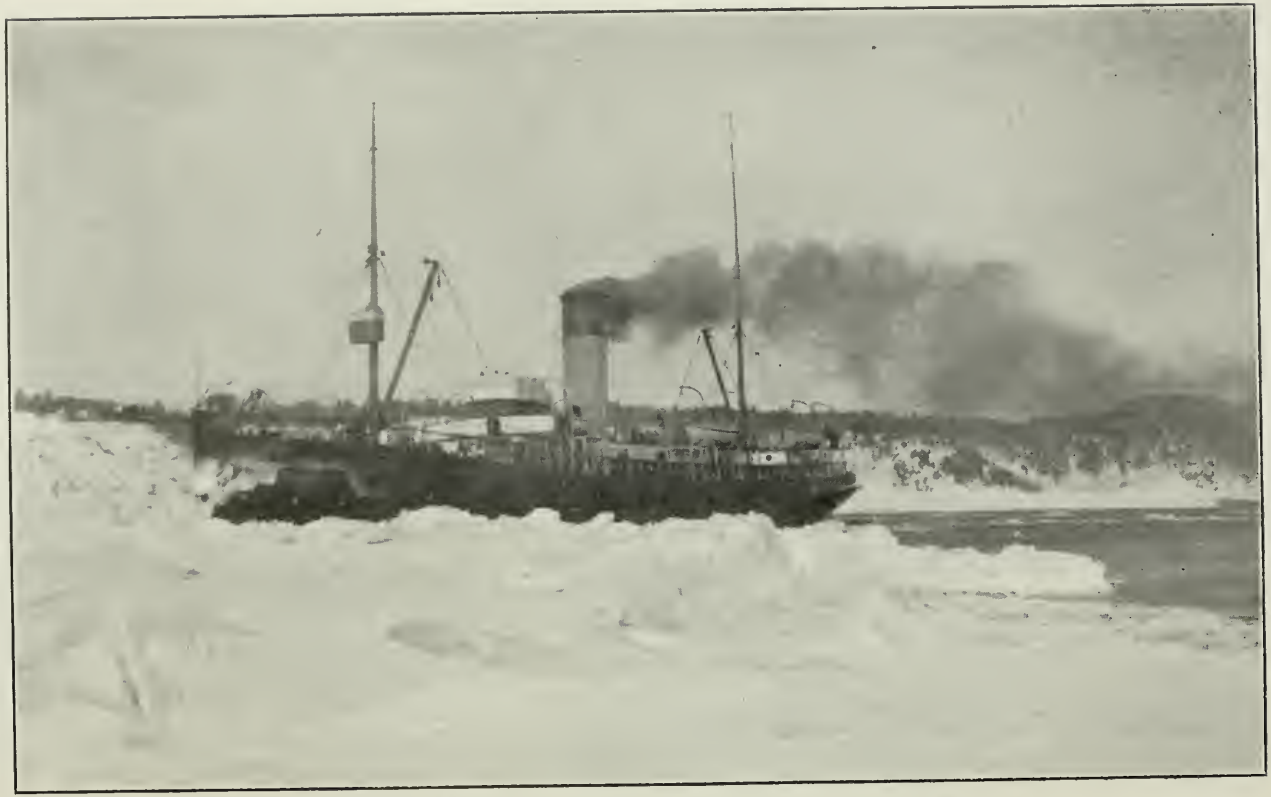
successfully employed in winter navigation; the *Stanley* and *Minto* in keeping up freight and passenger communication between Prince Edward Island and the mainland, the *Montcalm* in general service in the St. Lawrence above and below Quebec, the *Champlain* as a ferry boat between River Ouelle and Murray Bay on the St. Lawrence river and the *Lady Grey* in the ship channel work. The steamers are of steel, built very strong and possess great power for their size.

The first experiment in ice steamers was the *Northern Light;* this vessel was built of wood and served her purpose, which was to demonstrate that ice navigation was feasible a great part of the winter in the Strait of Northumberland. The *Stanley* was an improvement upon the *Northern Light,* and she is still in the service upon which she entered in 1887; her strength, durability, power and speed having proved her one of the best boats ever owned by the department. The steamer when built had no superior for her size, in ice navigation anywhere. She is 207 feet 9 inches in length, beam 32 feet, 2,540 indicated horse-power, steam pressure when the vessel was new, 180 pounds per square inch. Water tanks are located forward and aft to add to the vessels' weight in breaking ice or backing her off.

The *Minto,* built about twelve years later than the Stanley, was designed to be superior in strength and power and of larger dimensions. The *Minto* is a single screw steamer, built in 1899, her length is 225 feet, beam 37 feet 7 inches, and indicated horse-power 3,150. This steamer has also been successful as an ice-breaker and general purpose vessel.

The *Montcalm* is larger and more powerful than the *Minto* and is a twin screw steamer; her dimensions are, length 245 feet, beam 40 feet 6 inches, indicated horse-power 4,350 at a steam pressure of 220 pounds per square inch.

The *Montcalm* has been employed more directly in the service of prolonging navigation and opening it up than any of the steamers. Her work has been done on the St. Lawrence route, assisting incoming vessels and supplying to shipping by the Marconi wireless telegraph, valuable information respecting the movements of the ice.



C. G. S. "Montcalm" Icebreaking at Cap Rouge, Feb. 27, 1909.

Can. G. S. Montcalm Icebreaking At Cape Rouge, St. Lawrence River.

The vessel proved her efficiency and usefulness during part of January, March and April in opening a channel through the ice jam in the St. Lawrence river at Cap Rouge and finally reaching Lake St. Peter. The ice jam at Cap Rouge is familiarly known as the 'ice bridge' and extended from a point below the piers of the Quebec bridge to open water at high tide immediately above Cap Rouge, a distance of 16,000 feet or about three miles. The channel made through the centre of the accumulated ice was about 1,200 feet wide. The captain of the *Montcalm* reported in his daily report on the 19th of February, that the jammed ice was from 15 to 40 feet thick, but this was the extreme thickness and not the average. The ice having formed above in fresh water, was carried by the stream to this narrow part of the river and by the force of the current was piled one tier upon another. It was naturally of varying thickness, from a few feet to the depth of 15, 20 and even 40 feet, with the frazil ice underneath the solid ice sometimes showing a height above the solid ice.

In a memorandum of observations kindly furnished by H. T. Barnes, D.Sc., F.R.S.C., F. R. Met. Soc. Macdonald, Professor of Physics, McGill University, the professor states that his assistant, Mr. Jas. B. Woodyatt, devoted four months to the study of natural ice phenomena on the steamers *Stanley* in the straits of Northumberland, and the *Montcalm* in the St. Lawrence river. In connection with the work of the *Montcalm,* it is stated that frazil ice was far more difficult to pass through than solid ice. It rises in large masses and prevents the vessel from clearing herself and she is held fast by the frazil clinging to her bottom. It is stated that the depth of frazil was 15 feet.

The steamer operated from Quebec, returning every evening to Point à Carey wharf. On her way, fields of ice or pans which became attached to the shore ice were split and occasionally the ferry boats plying between Quebec and Lévis were assisted. The method of operation in removing the ice was simply to run with full force at a selected spot and allow the ice to move off down stream. The channel was purposely widened to prevent the ice from closing in upon the steamer, in the event of an ice shove from above. The whole work resulted in the removal of the ice jam and permitted masses of detached ice

formed above Cap Rouge, to pass clear on the way down the river.

Incidentally an interesting extract from Prof. Barnes' description of frazil is here given. He states that ' no form of ice gives the ice-breakers so much trouble as frazil or lolly ice. The ship is practically helpless when surrounded by masses of this material, chiefly from the difficulty of gaining sufficient water to float. It masses under the ship and by its buoyancy, and in cold weather its adhesiveness, pushes up and sticks to the plates.' It was discovered that a very small increase in the temperature of the water will relieve the pressure of the frazil from the sides and bottom of a vessel.

The experience of the past winter has lead several officers to express the opinion, that earlier efforts to clear the ice at Cap Rouge will prevent the accumulation of a large body of ice and save energy and time, permitting the vessel to be engaged in a more extended field of operations. The *Montcalm* was ordered to continue her work up the river to Lake St. Peter where she successfully made a channel in ice from 8 to 20 inches thick. The result of her work was to open navigation about three weeks earlier than it would have opened naturally. Although no ocean steamers appeared to take advantage of early navigation, yet interprovincial steamers, in the words of the Shipping Federation, ' benefited by the early opening.'

The *Lady Grey* was built with the object of making her generally useful in the work of the ship channel of the St. Lawrence river. The value of this vessel's services as an ice-breaker was realized in the spring of 1908, when she was engaged in opening the channel between Batiscan and Contrecœur and taking the place of the *Montcalm*. The latter steamer had met with an accident near shore, in the gulf, in the fall of 1907, and was laid up for repairs during winter. The work was considered hazardous from a navigation standpoint as no buoys were in position and, in manœuvering, the steamer was forced to leave the ship channel and work in shallower water, her draft, however, of 13 feet permitted this. The solid body of ice, bridged from shore to shore in many places, gave way to the attacks of the vessel and moved down the river. The attempt was interesting from the fact that the steamer was making her first trial in heavy ice-breaking.

The *Lady Grey* is generally employed in the season of navigation in sweeping the ship channel and heavy towing. She is a twin screw vessel, length between perpendiculars 172 feet, breadth 32 feet, speed 14 knots.

The *Champlain* is a single screw steel steamer, length over all 132 feet, outside breadth 30 feet 3 inches, and horse-power 850 indicated. The steamer was placed on the River St. Lawrence to ply as a ferry boat between River Ouelle and Murray Bay, winter and summer. The vessel was built of unusual strength for a ferry boat, to adapt her to winter crossing and has realized the expectations with regard to this work. She is comfortably fitted and furnished for carrying passengers.

The *Earl Grey*, now outfitting, will be in readiness for the winter service of 1909-10, between Prince Edward Island and the mainland. This vessel is designed to be superior and more powerful than the other ice-breaking vessels owned by the government. Her superority in construction consists of specially strengthened parts of the hull, which, experience has taught, should be stronger to withstand the usual contact with ice barriers and the stormy weather in winter. The rough usage to which vessels of this kind are subjected, require the latest and fullest equipment, to be efficient for successful navigation, and, at the same time afford passengers comfortable accommodation and the commercial public reasonably regular despatch of their freight. This vessel will be equipped in a manner superior to the other vessels in all that the designer and builders can suggest, for adaptation to the particular work for which she is intended.

The length of this vessel is 250 feet between perpendiculars and 279 feet 6 inches over all; breadth moulded, 46 feet; double bottom fore and aft; water tight bulkheads, and has a short bridge deck, promenade deck, forecastle deck, upper deck, main deck and lower deck, the last of steel. She is a twin screw steel steamer with triple expansion engines; horse-power 6,000 indicated; coal supply, 500 tons. Her passenger accommodation is to be equal in all respects to the latest first class passenger boats of the English channel and she was built under a guarantee.

The department has voluntarily aided vessels, particularly in

the St. Lawrence river, at the opening and closing of navigation and has frequently complied with requests to tow out belated vessels and break harbour ice in the spring. In this connection the ice-breakers have been valuable aids to navigation.

The *Arctic,* is not in the same sense as the above described steamers, an ice-breaker, but may be considered one of the fleet. This vessel has been employed in exploration work to the Arctic regions and northern waters. In the three expeditions in which she has been employed, much territory granted by the Imperial government has become Canadian territory and Canadian laws have been put in force. The *Arctic* was purchased from the German government and was built for arctic navigation, consequently is of great strength for withstanding ice pressure, but her speed is only seven or eights knots.

All of the ice-breaking fleet are quite able to break with ease any ice made in harbours, bays, rivers and what is called field ice, but the difficulties with which they contend, is ice piled one layer upon the other or shoved under, either by currents or tides and wind and called rafted or piled ice.

RIVER ST. LAWRENCE SHIP CHANNEL.

Satisfactory progress has been made in enlarging and deepening the ship channel in the St. Lawrence river and, as already stated, deep draught steamers can use the channel day and night without danger.

The present project for a 30-foot channel between Montreal and Quebec was adopted in 1899.

This project had in view a channel of 30 feet depth at the extreme low water of 1897, from Montreal to tide water at Batiscan and from Batiscan to Quebec at extreme low tide.

At the end of the season of 1908 there was a completed channel to a depth of 30 feet at extreme low water from Montreal to Cap Levrard, four miles below Batiscan, a distance of 104¼ miles below Montreal.

Below this, advantage is taken of the tide during low water season to obtain this depth to pass Cap à la Roche, and St. Augustin bar.

The available depth in the Cap à la Roche dredged channel is indicated by the St. Jean des Chaillons semaphore, and the

available depth over the undredged St. Augustin bar is indicated by the semaphore at St. Nicholas.

The completed channel has a minimum width in the straight portions of 450 feet, except for a distance of five miles in the straight portion of Lake St. Peter between the White Buoy and No. 3 curves, the present width there being 300 feet; this remaining portion is expected to be finshed and widened to 450 feet by the end of the season of 1909.

The curves in the completed channel are from 500 to 800 feet in width.

In the uncompleted channel now being widened and deepened to 30 feet at extreme low water (Cap à la Roche and Cap Charles) the present available depth is 27½ feet at ordinary low water, with a minimum width of 300 feet at the curves.

The project of work below Quebec has in view a 30 foot channel at extreme low tide at St. Thomas Flats and at Beaujeu Bank everywhere, 1,000 feet wide.

The work was commenced at Beaujeu channel in 1906. This channel was completed to 30 feet at extreme low tide and to 600 feet in width, and officially opened on July 29, 1908.

It is expected that it will be finished to 1,000 feet in width in the season of 1909.

The work of deepening St. Thomas channel to 30 feet at extreme low tide was commenced late in the autumn of 1907, and good progress has been made. It is expected that this channel will be completed in about three more seasons.

GOVERNMENT SHIP-YARD AT SOREL, P.Q.

The Sorel ship-yard is well equipped for the construction and repairs of tugs, dredges, scows and boats for the St. Lawrence ship channel. Extensive repairs are also made to vessels engaged in the general work of the department. For this purpose extensive shops, saw and planing mill and slipways in the Richelieu river have been built. During the winter season the ship channel dredge plant, scows and tugs are placed in winter quarters and thoroughly overhauled and repaired. Alterations are made and rebuilding is done at this yard in a satisfactory manner. Improvements have from time to time been made; the most recent being the addition to the number of sheds for

moulding sheds, workshops and storage of patterns. A railway branch of the South Shore Railway has been constructed into the yard, affording direct facilities for delivering and receiving building material and stores. The advantage of a government ship-yard has been found in the fact that the government work of construction, overhauling and repairing receives immediate attention as no other work interferes with the demands of the public departments.

DIRECT ADVANTAGES OF THE IMPROVEMENTS RECENTLY INTRODUCED, TO SHIPPING INTERESTS.

The advantages arising out of improvements in navigation in the St. Lawrence river, led to the collection of information upon marine insurance rates for the past eight years, and tables of these rates appear for the first time in any blue-book published in Canada. It will be seen by the tables, that the reduction in the yearly average premiums has been gradual. To arrive at the average rate it was necessary to consider the rates charged at different periods during the season of navigation, the charges becoming higher as the season advanced. It was impossible to get exact figures, owing to the fact that no tables of insurance rates have from time to time been prepared. The department is indebted to insurance companies and their agents, for figures showing the approximate average yearly rates of insurance on exports and hulls of vessels clearing from Montreal. It was not possible within a reasonable time, to obtain the average rates on imports from Great Britain and foreign countries. The same difficulty exists in obtaining the rates of insurance on grain shipped at lake ports and the ports of the maritime provinces, destined for European ports, as insurance is mainly effected in Great Britain and in some cases, in American companies or British companies doing business in the United States.

Owing to the fact that insurance rates on grain were generally higher than the premiums on provisions and merchandise, it was necessary to separate the value of grain from other exports, in order to arrive at the approximate rates of insurance on all exportation for the period of eight years. The prices of grain are necessarily in this case approximate as no public re-

cord appears to be available containing tables of prices for a series of years. Through the kindness of grain merchants and from other sources, the average prices have been procured, but it should be remembered, that the different grades and the almost daily fluctuations of the market, made it difficult to average prices and consequently to estimate the total value of the saving in insurance during a period of eight years.* For the present purpose it is important to be able to show the gradual reduction to insurers of the rates of premiums and to maintain that the improved aids and permanent work on the St. Lawrence route have directly and indirectly contributed largely to the saving in insurance. In this connection the advantages of the great Canadian route are drawing the attention of the shipping world to itself for freight and passenger traffic, and inducing more companies to establish lines between Canada and Europe. It is becoming more apparent that the route is the best one for exports from the lake ports and for importations destined to any port on the Great Lakes of the continent. The exportation of wheat from Montreal alone has gradually increased, excepting two years, from 10,000,000 bushels in round numbers in 1900 to 21,000,000 bushels in 1907 and 27,800,000 bushels in 1908. During the Cuban war shipments of grain were greater owing to large shipments from the American west, and this proved the adaptibility of the St. Lawrence route.

The premiums practically remained at the same rate per cent during the eight years on the Great Lakes, but this was due to variations, which had an important bearing in fixing the rates. The department has been informed by good authority, that an advance in rates for similar protection to that which has been given, would have taken place in recent years if the excellent work in navigable waters had not been done and improved aids established.

In the maritime provinces fishing and coastwise vessels are insured by local companies and it is contended, that rates have been maintained for the last eight years, as low as it is prudent to place them. Fishing vessels while on the banks are exposed to greater dangers than formerly owing to the large number of

*Note.—The grain prices were averaged for each year and then the average price for eight years for all kinds of grain to arrive at the approximate value upon which insurance was paid.

ocean steamers now crossing the Atlantic. It is admitted, however, by some insurance companies that the coasting vessels must find the increased aids to navigation much to their advantage.

VALUE OF IMPORTS AND EXPORTS SEA-WARD INTO AND FROM CANADA VIA THE ST. LAWRENCE RIVER, FROM TRADE AND NAVIGATION RETURNS.

1900.

Total imports from sea via St. Lawrence river...	$ 31,905,386
" exports for sea via St. Lawrence river.. ..	66,042,991
" merchandise received at Montreal for transhipment to foreign ports..	13,160,009
Total trade via St. Lawrence river..	$111,108,386

1901.

Total imports from sea via St. Lawrence river..	$ 35,113,535
" exports for sea via St. Lawrence river.. ..	65,679,437
" merchandise received at Montreal for transhipment to foreign ports..	10,707,369
	$111,500,341

1902.

Total imports from sea via St. Lawrence river...	$ 40,776,657
" exports for sea via St. Lawrence river.. ..	61,255,164
" merchandise received at Montreal for transhipment to foreign ports..	11,382,567
	$113,414,388

1903.

Total imports from sea via St. Lawrence river...	$ 46,990,221
" exports for sea via St. Lawrence river.. ..	73,339,417
" merchandise received at Montreal for transhipment to foreign ports..	11,689,912
	$132,019,550

1904.

Total imports from sea via St. Lawrence river...	$ 41,639,483
" exports for sea via St. Lawrence river.. ..	74,198,438
" merchandise received at Montreal for transhipment to foreign ports..	15,224,361
	$131,062,282

1905.

Total imports from sea via St. Lawrence river...	$ 40,479,890
" exports for sea via St. Lawrence river.. ..	66,358,205
" merchandise received at Montreal for transhipment to foreign ports..	14,095,449
	$120,933,544

1906.

Total imports from sea via St. Lawrence river...	$ 42,599,039
" exports for sea via St. Lawrence river.. ..	86,857,711
" merchandise received at Montreal for transhipment to foreign ports..	22,114,464
	$151,571,214

1907 (9 months).

Total imports from sea via St. Lawrence river...	$ 32,953,704
" exports for sea via St. Lawrence river.. ..	66,046,556
" merchandise received at Montreal for transhipment to foreign ports..	15,233,092
	$114,233,352

1908.

Total imports from sea via St. Lawrence river...	$ 64,502,096
" exports for sea via St. Lawrence river.. ..	95,656,910
" merchandise received at Montreal for transhipment to foreign ports..	18,955,468
	$179,114,474

STATEMENT of grain exported from Montreal by the St. Lawrence route from 1900 to 1907, both years included; also insurance at different rates, showing a gradual reduction in rates per $100 in value. The prices of the grain are average prices for eight years. The insurance rates and prices of grain are approximate but the quantities of grain are from records furnished by the Trade and Commerce Department.

WHEAT.

Year.	Bushels.	Price.	Value of Wheat.	Rate of Insurance.	Amount of Insurance.
		$ cts.	$	p. c.	$ cts
1900	10,408,501	1 00	=10,408,501	× ·0099	=103,044 16
1901	13,594,686	1 00	=13,594,686	× ·0078	=106,048 55
1902	16,888,505	1 00	=16,888,505	× ·0078	=131,830 34
1903	15,960,084	1 00	=15,960,084	× ·0056	= 89,376 47
1904	7,507,266	1 00	= 7,507,266	× ·0050	= 37,536 33
1905	9,946,948	1 00	= 9,946,948	× ·0041	= 40,782 48
1906	14,298,251	1 00	=14,298,251	× ·0045	= 64,342 23
1907	20,950,097	1 00	=20,950,097	× ·0038	= 79,610 37
	109,554,338		109,554,338		652,570 93

Insurance on $109,554,338 at 99 cts. per $100 the rate in 1900	= $1 084,587 94
Insurance as shown above	652,470 93
Gain on account of lower rates	432,117 01

OATS.

Year.	Bushels.	Price.	Value of Oats.	Rate of Insurance.	Amount of Insurance.
		$ cts.	$ cts.	p. c.	$ cts.
1900	4,435,004	40	= 1,774,001 60	× ·0099	= 17,551 62
1901	2,456,706	40	= 982,682 40	× ·0078	= 7,664 92
1902	1,937,268	40	= 774,907 20	× ·0078	= 6,044 28
1903	1,063,661	40	= 425,464 40	× ·0056	= 2,382 60
1904	1,214,300	40	= 485,720 00	× ·0050	= 2,428 50
1905	2,640,831	40	= 1,056,332 40	× ·0041	= 4,330 96
1906	2,977,011	40	= 1,190,804 40	× ·0045	= 5,358 61
1907	3,862,657	40	= 1,545,062 80	× ·0038	= 5,870 29
	26,587,438 00		= 8,234,975 20		51,631 78

$8,234,975.20 if insured at 99 cts. per $100	= $ 81,486 65
Insurance of same as shown above	51,631 78
Saving shown	29,854 87

BARLEY.

Year.	Bushels.	Price.	Value of Barley.	Rate of Insurance.	Amount of Insurance.
		$ cts.	$ cts.	p. c.	$ cts.
1900	996,250	47	= 468,237 50	× ·0099	= 4,635 55
1901	636,779	47	= 299,286 13	× ·0078	= 2,334 42
1902	262,561	47	= 123,403 67	× ·0078	= 962 54
1903	320,683	47	= 150,721 01	× ·0056	= 844 56
1904	817,220	47	= 384,093 40	× ·0050	= 1,920 46
1905	424,571	47	= 199,548 37	× ·0041	= 818 16
1906	923,911	47	= 434,238 17	× ·0045	= 1,954 07
1907	805,784	47	= 377,778 48	× ·0038	= 1,435 56
	5,185,759		= 2,437,306 73		14,905 32

$5,185,759 if insured at 99 cts. per $100 ..... = $ 24,129 33
The amount of insurance paid on same as above 14,905 32
Saving caused by gradual insurance reduction 9,224 01

CORN.

Year.	Bushels.	Price.	Value of Corn.	Rate of Insurance.	Amount of Insurance.
		$ cts.	$ cts.	p. c.	$ cts.
1900	11,175,985	56	= 6,258,551 60	× ·0099	= 61,959 56
1901	4,060,558	56	= 2,273,912 48	× ·0078	= 17,736 51
1902	7,058,956	56	= 3,953,015 37	× ·0078	= 30,833 51
1903	6,811,590	56	= 3,814,490 40	× ·0056	= 21,361 14
1904	3,721,695	56	= 2,084,149 20	× ·0050	= 10,420 74
1905	5,884,257	56	= 3,295,183 92	× ·0041	= 13,510 25
1906	4,497,783	56	= 2,518,758 48	× ·0045	= 11,334 41
1907	4,831,773	56	= 2,705,792 88	× ·0038	= 10,282 01
	48,042,597		26,903,854 33		117,438 23

$26,903,854 33 if insured at 99 cts. per $100 ..... = $266,348 15
Actual amount of insurance as stated above 177,438 23
Saving in insurance at lower rates 88,909 92

FLAXSEED.

Year.	Bushels.	Price.	Value.	Rate of Insurance.	Amount of Insurance.
		$ cts.	$ cts.	p. c.	$ cts.
1900	125,892	1 00	= 125,892 00	× ·0099	= 1,246 30
1901	669,634	1 00	= 669,634 00	× ·0078	= 5,223 15
1902	330,399	1 00	= 330,399 00	× ·0078	= 2,577 11
1903	115,569	1 00	= 115,569 00	× ·0056	= 647 18
1904	.....	.....	.....	.....	.....
1905	270,453	1 00	= 270,453 00	× ·0041	= 1,108 85
1906	2,926,116	1 00	= 2,926,116 00	× ·0045	= 13,167 52
1907	1,381,625	1 00	= 1,381,625 00	× ·0038	= 5,250 17
	5,819,688		5,819,688 00		29,220 28

$5,819,688 insured at 99 cts. per $100 ..... = $ 57,614 91
The actual cost as shown above 29,220 28
Saving caused by gradual insurance reduction ..... $ 28,394 63

RYE.

Year.	Bushels.	Price.	Value.	Rate of Insurance.	Amount of Insurance.
		$ cts.	$ cts.	p.c.	$ cts.
1900	509,665	0 61	= 310,895 65	× ·0099	= 3,077 87
1901	769,298	0 61	= 469,271 78	× ·0078	= 3,660 32
1902	878,409	0 61	= 535,829 49	× ·0078	= 4,179 59
1903	592,535	0 61	= 361,446 35	× ·0056	= 2,024 10
1904	2,105	0 61	= 1,284 05	× ·0050	= 6 42
1905	121,021	0 61	= 73,822 81	× ·0041	= 302 67
1906	124,287	0 61	= 75,815 07	× ·0045	= 341 17
1907	128,405	0 61	= 78,327 05	× ·0038	= 297 62
	3,125,725		1,906,692 25		13,889 76

$1,906,692.25 if insured at 99 cts. per $100 = $ 18,876 25
Actual insurance as stated above 13,889 76
Therefore saving at lower rate $ 4,986 49

PEAS.

Year.	Bushels.	Price.	Value.	Rate of Insurance.	Amount of Insurance.
		$ cts.	$ cts.	p.c.	$ cts.
1900	1,650,807	0 80	= 1,320,645 60	× ·0099	= 13,174 39
1901	734,543	0 80	= 587,634 40	× ·0078	= 4,583 54
1902	413,885	0 80	= 331,108 00	× ·0078	= 2,602 64
1903	281,521	0 80	= 225,216 80	× ·0056	= 1,261 21
1904	188,600	0 80	= 150,880 00	× ·0050	= 754 40
1905	660,150	0 80	= 528,120 00	× ·0041	= 2,165 29
1906	74,195	0 80	= 59,356 00	× ·0045	= 267 14
1907	141,714	0 80	= 113,371 20	× ·0038	= 430 81
	4,145,415		3,316,332 00		25,239 48

Insurance on $3,316,332 at 99 cts. per $100 = $ 32,831 17
" $3,316,332 at rates as above 25,239 20
Saving at lower rates $ 7,591 97

BUCKWHEAT.

Year.	Bushels.	Price.	Value.	Rate of Insurance.	Amount of Insurance.
		$ cts.	$ cts.	p.c.	$ cts.
1900	306,171	0 60	= 183,702 60	× ·0099	= 1,818 65
1901	89,453	0 60	= 53,671 80	× ·0078	= 418 64
1902	163,677	0 60	= 98,206 20	× ·0078	= 766 01
1903	50,629	0 60	= 30,377 40	× ·0056	= 170 11
1904	112,937	0 60	= 67,798 20	× ·0050	= 338 99
1905	83,778	0 60	= 50,266 80	× ·0041	= 206 09
1906	103,915	0 60	= 62,349 00	× ·0045	= 280 57
1907	47,749	0 60	= 28,649 40	× ·0038	= 108 86
	958,369		575,021 40		4,107 92

Insurance at 99 cts. per $100 on $575,021.40 = 5,881 80
Actual insurance as stated above 4,107 92
Saving $ 1,773 88

VALUE of Grain of different kinds Exported from Montreal *via* the St. Lawrence River from 1900 to 1907, including both years, eight years in all.

Year.	Wheat.	Oats.	Corn.	Peas.	Flaxseed.	Rye.	Barley.	Buckwheat.	Total.
	$	$ cts.	$ cts.	$ cts.	$	$ cts.	$ cts.	$ cts.	$ cts.
1900	10,408,501	1,774,001 60	6,258,551 60	1,320,645 60	129,892	310,895 65	468,237 50	183,702 60	20,850,427 55
1901	13,594,686	982,682 40	2,273,912 68	587,634 40	669,634	469,271 78	299,286 13	53,671 80	18,930,778 99
1902	16,888,505	774,907 20	3,953,015 37	331,108 00	330,399	535,829 49	123,403 67	98,206 20	23,035,373 93
1903	15,960,084	425,464 50	3,814,490 40	225,216 80	115,569	361,446 35	150,721 01	30,377 40	21,083,369 36
1904	7,507,266	484,720 00	2,084,149 20	150,880 00	.....	1,284 05	384,093 40	67,798 20	10,681,190 85
1905	9,946,948	1,056,332 40	3,295,183 92	528,120 00	270,453	73,822 81	199,548 37	50,266 80	15,420,675 30
1906	14,298,251	1,190,804 40	2,518,758 48	59,356 00	2,926,116	75,815 07	484,238 17	62,349 00	21,565,688 12
1907	20,950,097	1,545,062 80	2,705,792 88	113,371 20	1,381,625	78,327 05	377,778 48	28,649 40	27,180,803 81
	109,554,338	8,234,975 20	26,903,854 33	3,316,332 00	5,819,688	1,906,692 25	2,437,306 73	575,021 40	158,748,208 91

STATEMENT of Insurance paid on Merchandise and Provisions and Grain from 1900 to 1907, both years included. The rates on Merchandise and Provisions each year were the same but the insurance on Grain was higher except 1906 and 1907. The figures for Merchandise and Provisions were arrived at by substracting the value of Grain from the total exports.

Year.	Merchandise and Provisions.	Rate of Insurance.	Insurance.	Grain.	Rate of Insurance.	Insurance on Grain.	Total Exports	Total Insurance.
	$ cts.	cts. per $100.	$ cts.	$ cts.	cts. per $100.	$ cts.	$	$ cts.
1900	45,192,563 45	·00841/2	= 382,317 70	20,850,427 55	·0099	= 206,419 23	66,042,991	= 588,736 93
1901	46,748,658 01	·00631/2	296,853 97	18,930,778 99	·0078	147,660 07	65,679,437	444,514 04
1902	38,219,790 07	·0055	212,119 83	23,035,373 93	·0078	179,675 91	61,255,164	391,795 74
1903	52,256,047 64	·0049	256,054 63	21,083,369 36	·0056	118,066 86	73,339,417	374,121 49
1904	63,517,292 15	·0043	273,114 35	10,681,190 85	·0050	53,405 95	74,198,483	326,520 30
1905	50,938,229 70	·0037	188,471 44	15,420,675 30	·0041	63,225 79	65,358,905	251,697 20
1906	65,292,022 78	·0045	293,814 10	21,565,688 12	·0045	97,045 59	86,857,711	390,859 69
1907	38,865,852 19	·0038	147,690 23	27,180,703 81	·0038	103,286 67	66,046,556	250,976 90
	401,030,455 99		2,050,436 25	158,748,207 91		968,786 04	559,778,664	3,019,222 29

COMPARATIVE STATEMENT of Insurance on Exports *via* the St. Lawrence River route at the rates which prevailed in 1900 and the reduced rates up to 1907, a period of eight years, also insurance paid on hulls of vessels.

				p.c.	
Value of merchandise and provisions for eight years	$401,030,455 09	Insurance at the rates paid in 1900	·0084½	=	$3,388.707 34
" grain	158,748,207 91	" " "	·0099	=	1,571,607 26
	$559,778,664 00				$4,960,314 60

Value, $401,030,455 09	Insurance actually paid at graduated rates	2,050,436 25	
158,748,207 91	" " " "	968,786 04	
			3,019,222 29
	Saving		$1,941,092 31

Tonnage.

Value of hulls, viz.: 13,935,524 tons at $60 per ton = $836,131,440.

Amount of insurance on the above value at 5 % the rate charged in 1900 =	$41,806,572	Saving on merchandise and grain	$1,941,092 31
" " " 4½% average rate for eight years,	37,625,914	" hulls	4,180,658 00
	$4,180,658	Total saving	$6,121,750 31

INFORMATION RELATING TO OFFICES OF HARBOUR MASTERS, WRECK RECEIVERS, SHIPPING MASTERS, PORT WARDENS, STEAMBOAT INSPECTORS, INSPECTORS FOR SEAWORTHINESS OF VESSELS, WHARFINGERS, PILOTS AND PILOTAGE AUTHORITIES, AND THE FEES AND TONNAGE TAX FOR WHICH VESSELS ARE LIABLE.

Harbour Masters.—The Governor General in Council may by proclamation declare to be a public harbour any area covered with water within the jurisdiction of the parliament of Canada and appoint a harbour master. The rights, powers and duties, of the harbour master or deputy harbour master, are defined by regulation that applies to all harbours alike in the Dominion, with the exception of ports under the control of harbour commissioners or town corporations. The duties of harbour masters consist of superintending the buoy service in the harbour district, assigning vessels to berths, the prevention of discharging ballast or ashes in the harbour except at points assigned for that purpose and prevention of obstructions to navigation.

The remuneration forms one of the port charges and consists of fees. The fees are paid at the two first ports of entry of a vessel within the callendar year, and are fixed at 50 cents for vessels of 50 tons register up to $5 for vessels of 700 tons or over.

Port Wardens.—The Governor General in Council may determine at what ports shall be appointed port wardens or deputy port wardens, whose duties consist of the examination of cargo and the surveying of damaged cargo or wrecked vessels or their hulls, rigging and spars. Vessels, wholly or partly laden with grain, cannot leave any Canadian port for a port not within Canada without the port warden's certificate, as evidence of proper loading.

The maximum rate of fees of port wardens are as follows:—

For every survey of hatches, cargo or hulls or spars and rigging a sum not exceeding $8.

For valuation of a vessel for average or inspection of a vessel loading, a fee to be graduated according to tonnage but not to exceed $10.

For hearing and settling disputes between masters and consignee a sum to be graduated according to the question or amount in dispute, but not to exceed $20.

The port warden of any port may engage inspectors for valueing any parts of vessels, the fee for each inspector not to exceed $5.

The maximum charge or fee may, however, be increased or altered by the council of a board of trade or chamber of commerce, but all such alterations must be approved by the Governor General in Council.

Port wardens may also approve of the manner in which marks are made for load line and deck line, required by the Act respecting shipping in Canada.

The Shipping Masters.—The Governor General in Council may establish a shipping office at each port where a custom house is situated and appoint a shipping master, or, if no shipping master is appointed, the chief officer of the customs shall be a shipping master, under the Shipping Act. Part III of the Act relates to the provinces of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia in respect of shipping and discharging of seamen of Canadian foreign sea-going ships and Canadian home trade ships. Part IV relates to shipping of seamen on the inland waters of Canada. The different forms specified in the Act are from H to P, both included. Agreements or articles are signed by the masters and seamen of vessels on form H, in regard to foreign sea-going and coasting vessels over eighty tons register, before shipping masters or in the presence of a respectable witness. These agreements contain as terms:

(*a*) the nature and as far as practicable, the duration of the intended voyage or engagement;

(*b*) the number and description of the crew, specifying how many are engaged as sailors;

(*c*) the times at which each seaman is to be on board or to begin to work;

(*d*) the capacity in which each seaman is to serve;

(*e*) the amount of wages each seaman is to receive;

(*f*) a scale of the provisions which are to be furnished to each seaman;

(*g*) any regulations provided by form M as to conduct on board and as to fines, short allowance of provisions or other lawful punishments for misconduct which the parties agree to adopt.

The duties of a shipping master require him to afford facilities for engaging and discharging seamen, keeping a register of all seamen engaged and discharged and the fees paid by seamen for this service. It is also his duty to procure the presence of seamen engaged, on board, to deal with cases of desertion in port and to prevent improper discharging of seamen by masters. The fees for shipping salt water seamen are 50 cents for each seamen and 30 cents for discharging, excepting in British Columbia where the fee may be any sum agreed upon, not exceeding $10, including the fee of 50 cents. The fees on inland waters are 40 cents for shipping and 20 cents for discharging each seaman.

Receivers of Wreck.—The Governor General in Council may appoint any officer of customs or any other person, when more convenient, to be a receiver of wreck. It is the duty of a receiver of wreck, of any district, when a vessel is stranded or in distress in that district, to proceed to the place of stranding and take command for the preservation of the vessel and lives of the shipwrecked persons, but he cannot take command of the ship or cargo if the master, agent or owners object. Certain officers mentioned in the Shipping Act may exercise the powers of a receiver in the absence of a receiver. The receiver or officer may sell wreck or goods in his custody, pay the salvage fees and expenses and then shall deliver any remaining portion to the person entitled to receive it. The maximum fees charged by receivers in addition to expenses properly and necessarily incurred, are as follows:—

For every inquiry into a casualty regardless of the number of persons examined a sum not exceeding $8.

For furnishing copy of evidence, 20 cents per 100 words.

For every salvage dispute heard and determined by the receiver in which the claim does not exceed $100 or the value of the property saved does not exceed $250, a sum to be charged on the property saved, not exceeding $5.

For all other cases in which disputes are heard and determined by the receiver to be charged on the property saved, $10.

For wreck received or taken by the receiver into his custody, a percentage of five per centum upon the value; but in no case shall the percentage exceed $80, to be charged on the wreck or derelict.

For every sale of a wreck conducted by a receiver, a sum not exceeding one per cent on the proceeds of sale.

For copies of certificates of valuation when the value is under $3,000, a sum not exceeding $4.

In other cases, to be charged on the property valued, $8.

In cases where services are rendered by a receiver to any vessel in distress but not wrecked or in respect of the cargo, if the vessel with her cargo exceeds $3,000, the sum of $8 for the first day and $4 for every subsequent day during which the receiver is employed on such service. If such vessel and cargo are less than $3,000 in value, one-half the above mentioned sum.

In no case shall the amount exceed $100 to be charged on such vessel or articles.

Pilotage.—The Governor in Council may from time to time, make the payment of pilotage compulsory or not compulsory within the limits of any pilotage district fixed by the Governor in Council. Local pilotage authorities are appointed by the Governor General in Council, with the exception of the districts of Montreal and Quebec, the Minister of Marine and Fisheries being the pilotage authority for the two districts named. By-laws are framed and pilotage charges fixed by the pilotage authorities and approved by the Governor in Council. Pilots are licensed by the pilotage authorities after they prove themselves competent by examination. Their boats fly the pilot's flag and pilots are required to offer their services to vessels whether they require them or not. The employment of pilots is not compulsory in any Canadian pilotage district, but the payment of pilotage dues in many districts is compulsory if the services of a pilot have been accepted, or have been offered and refused; the charge in some districts being full pilotage rates and in others half rates, if spoken and the services refused. Where the

by-laws provide, the payment of outward pilotage is compulsory as well as inward pilotage. Unlicensed persons when requested may act as pilots, when a vessel is in distress or no pilot has offered to pilot a ship or made a signal, and the unlicensed person shall be entitled to full pilotage dues for his services.

In waters where pilotage districts exist and it is impossible to board a vessel, a pilot is entitled to pilotage for leading a vessel by his boat to her destination. Masters of steamers running regularly in certain waters, are sometimes licensed to pilot their own vessels upon payment of an annual fee.

His Majesty's ships and the Dominion government ships, are exempt from the payment of pilotage dues and also any ship bound inward when no licensed pilot offers his services, also—

Ships making or entering a harbour of refuge.

Ships registered in Canada of not more than 120 tons registered tonnage.

Any ship whose master or mate is licensed to pilot his own vessel within the waters she is then navigating.

Ships not exceeding two hundred and fifty tons that any pilotage authority determines to be exempt within its jurisdiction.

All ships registered in Canada of not more than two hundred and fifty tons registered tonnage, navigating the St. Lawrence river.

Further exemptions are vessels employed in trading between any one or more of the provinces of Quebec, New Brunswick, Nova Scotia or Prince Edward Island, and any other or others of them.

Vessels employed in voyages between any port or ports in the said provinces, or any of them, and the port of New York or any port of the United States of America on the Atlantic north of New York.

Vessels employed in voyages between any port in any of the provinces above mentioned and any port in Newfoundland.

Wharfingers.—The wharfingers are appointed by the Governor General in Council and are remunerated from tolls collected upon articles landed or shipped at the government wharfs and from vessels moored or laying at them. The tariff of tolls is reasonable, and forms part of the regulations under which the

wharfingers are authorized to levy tolls and dues. Persons refusing to pay tolls for the use of these wharfs, render themselves liable to penalties or imprisonment, and the tolls, dues and penalties are a lien on the goods and on vessels when payment is not made.

For sailing vessels making use of government wharfs, the side wharfage scale of charges is graduated from 10 cents for vessels of 50 tons up to $1.50 per day for vessels over 1,600 tons.

For steamers: from 20 cents per ton for steamers of 50 tons up to $3 for steamboats of 1,600 tons, payable once a day if the steamer calls at the same wharf twice in the same day, and steamboats making use of the same wharf three times a week, are required to pay twice only. Steamboats landing goods of which the freight amounts to $10 only or less, are required to pay only half of the usual rate of wharfage.

STEAMBOAT INSPECTORS AND STEAMBOAT INSPECTION.

The Governor General in Council shall, from time to time, appoint at such places as he deems advisable in Canada, steamboat inspectors whose duties shall be to inspect steamboats and examine applicants for engineers certificates.

All passenger steamboats over five tons gross tonnage are subject to inspection, yearly, of boilers, machinery, hulls and equipment according to the rules of steamboat inspection.

Every freight steamer of more than one hundred and fifty tons gross is subject to inspection yearly, according to the rules of steamboat inspection for boilers, machinery and hulls.

Freight steamers, tug boats and steamers used for fishing purposes, under one hundred and fifty tons and more than five tons gross tonnage are subject to inspection of boilers and machinery, according to the rules of steamboat inspection.

At present, there is no fee charged for inspection except upon steamers registered elsewhere than in Canada when engaged in carrying passengers between Canadian ports and not holding a British Board of Trade Certificate. The fee is then in Canada eight cents on the gross tonnage of such foreign steamer.

Engineer's Certificates.—For the first certificate granted to an engineer of any class the fee is five dollars, and for every

certificate after an examination for a higher class the fee is also five dollars.

If a certificate is lost or becomes illegible it may be renewed at half the cost of the original.

First-class engineers are permitted to take charge of any steamboat.

Second-class engineers are permitted to take charge of any freight steamboat or of any other steamboat except a sea-going passenger boat of more than one hundred nominal horse-power.

Third-class engineers are not permitted to take charge of any sea-going steamboat but may take charge of any coasting passenger steamer or passenger steamers on inland waters, of not more than thirty nominal horse-power, single cylinder engines or of forty-five horse-power compound engines, or any freight steamboat of not more than seventy-five nominal horse-power.

Fourth-class engineers may act in the capacity of assistant engineers on any steamboat except sea-going passenger steamers of more than one hundred nominal horse-power, but cannot act as chief engineers on any steamboats.

Temporary certificates are issued to applicants who have sufficient knowledge and experience of steamboat machinery to act as engineers on passenger steamers, provided the engines are not of more than four nominal horse-power if of the single cylinder type or fourteen nominal horse-power if of the compound type and confined to certain limits .

Masters and Mates.—No ship registered in Canada, over one hundred tons registered tonnage, shall go on a sea-going voyage unless the master and first mate or only mate have certificates for sea-going ships.

No sailing ship nor steamship registered in Canada over one hundred and fifty tons, registered tonnage, is permitted to leave any port or place in Canada on any coasting voyage or ply on any Canadian water, without a master who has a valid certificate.

Every passenger steamer, registered in Canada, carrying more than forty passengers on a coasting voyage or on any waters of Canada must have a certificated master or mate.

Pleasure yachts not used for carrying passengers or goods for hire, ships employed solely in fishing and barges not propelled

by steam or other vessels without masts, sails and rigging, and steamers five tons gross tonnage and under are not required by law to carry certificated masters and mates.

Scale of fees for Canadian certificates granted to masters and mates:—

For a certificate of competency as master, fifteen dollars.

For a certificate of competency to a sea-going mate, eight dollars.

For a certificate of competency to a mate coasting or sailing on inland waters or minor inland waters of Canada, six dollars.

For a certificate of service as master the fee is eight dollars, and for a certificate of service as mate sea-going, five dollars.

For a certificate of service as mate coasting or on inland waters, four dollars.

Sea-going certificates of service for vessels of not more than one hundred and fifty tons are granted to masters and mates who can prove service in the respective positions previous to 1884 and can produce satisfactory evidence of good character and can pass the colour test, on payment of the usual fee.

Service certificates for coasting and inland waters are granted to masters and mates who can produce satisfactory evidence of having been masters and mates previous to the year 1883, on payment of the usual fee.

Sick and Distressed Mariners—Duty on Ships.—There shall be levied and collected on every ship arriving in any port in the provinces of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia a duty of one and one-half cent for every ton which such ship measures registered tonnage, to be paid at the custom house of the port.

Ships of the burthen of more than one hundred tons register shall be liable to the payment of the said duty three times in one year but not oftener.

Ships of the burthen of one hundred tons or less, shall be liable to the payment of the said duty once in each year but not oftener.

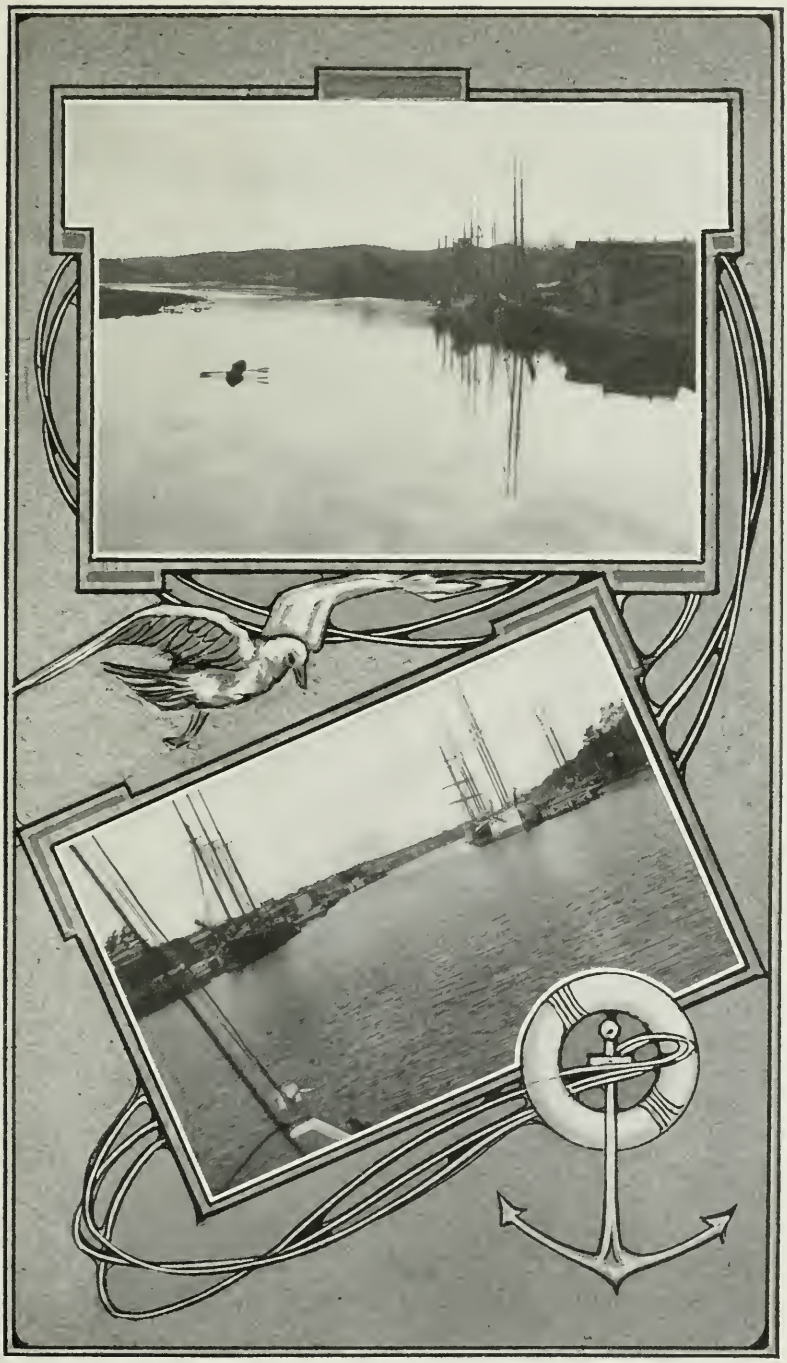
PARTICULARS RELATING TO PORTS IN THE MARITIME PROVINCES OF CANADA, GULF AND RIVER ST. LAWRENCE, AT WHICH 50,000 TONS OR OVER ENTERED DURING THE YEAR 1908, CONSISTING OF DESCRIPTION OF HARBOURS, DEPTH OF WATER, ANCHORAGE, WHARFS, FREIGHT SHEDS, RAILWAY SIDINGS, COLD STORES, FACILITIES FOR LOADING AND DISCHARGING.

Arichat Harbour is a capacious harbour and is extensively used for shelter. It has two entrances of which the northern is the least difficult although narrow; depth of water in this entrance is from 9 to 10 fathoms at low water; lighthouse at northern entrance in latitude 45° 30′ 20″ N., longitude 61° 3′ 10″ W. The southern entrance is three cables wide but lies between shoals. Jerseyman island east and west lies between the northern and southern entrances. The lighthouse in the southern entrance is situated on Marache point, latitude 45° 29′ 0″ N., longitude 61° 1′ 50″ W. The depth of water in the harbour is from 7 to 10 fathoms up to within a cable's length of the shore on both sides. The harbour is about two miles in length and from a half mile to three-quarters in width. There are five starboard buoys and two port buoys in the harbour. It contains six private wharfs, the depth of water at the head of each wharf being 10 feet at highwater; a short distance from these wharfs the water is 20 feet deep. The bottom in the harbour is mud and affords good anchorage. There are no railway sidings leading to the wharfs nor sheds upon the wharfs.

Drinking water is easily obtained and many ships' stores and provisions. Sailing directions into the harbour and in the waters outside the harbour are published in the 'St. Lawrence Pilot.'

The port charges are the same as in all other Canadian ports, viz., harbour masters' dues and sick mariners' dues. No pilotage returns have been received in recent years as no sailing vessels are employed in trading to Arichat. Fishing and other vessels find shelter and get water and provisions. See List of Lights and General Chart 2,727 (1,317). Total tonnage of shipping entered in fiscal year 1908, 107,913 tons.

Note.—See information, page 38, respecting general harbour dues and tonnage tax for which vessels are liable in the Dominion of Canada.



Bridgewater, N.S. From the Bridge looking down River (West.)
Looking up Lower Brook, toward Town (East).

Bridgewater Harbour, Nova Scotia, on La Have river, a tidal river. The harbour extends fifteen miles from the Atlantic coast; depth of water from 3 to 8 fathoms at the mouth at low water and 2 fathoms at Bridgewater. Tide rises 6 feet at ordinary tide. The wharf on the western side is about an eighth of a mile along shore and is principally used for small vessels discharging coal and merchandise and loading lumber. This wharf will accommodate ten schooners. Dawson's wharf is 700 feet along water front and will accommodate three vessels. Davison Lumber Company's wharf is about a sixteenth of a mile along shore and will accommodate seven vessels of 1,000 tons each. The railroad wharf, main wharf, affords room for two large vessels and the quay for about three large vessels on each side; this wharf has a railway siding. There are no sheds on the wharfs and no docks for repairing vessels, but they can be hauled out on the bank without trouble above water. Ship carpenters and materials are easily obtained and all kinds of stores and provisions.

The La Have river is buoyed from the mouth to Bridgewater, the bottom the whole distance of the harbour is mud and affords good anchorage. Lighthouse on West Ironbound island, near mouth of river, latitude 44° 13′ 42″ N., longitude 64° 16′ 20″ W., light on Moser island west side of entrance to river, latitude 40° 14′ 15″ N., longitude 64° 18′ 50″ W.; another light on Fort Point and a bell and gas buoy three miles from Moser island. See List of Lights and chart, No. 342. Total tonnage entered in 1908, 49,694. Port charges are harbour masters' and sick mariners' dues if not paid in any other port.

Campbellton Harbour, New Brunswick. This harbour is at the head of navigation for shipping on the Restigouche river which empties into Chaleur bay. The channel is well buoyed from Maguasha point in Bay Chaleur, about 14 miles from Campbellton. There are seven gas buoys and a number of spar buoys marking the channel. There is a small light vessel at Garde point and two range lights at Oak point about five miles below Campbellton and two range lights at Campbellton, latitude 48° 0′ 50″ N., longitude 66° 39′ 55″ W. Vessels drawing 18 feet of water can ascend at any stage of the tide to Oak point

Campbellton, N B. Harbour.

and at high tide to Campbellton. The ordinary tide rises 7 feet at Campbellton.

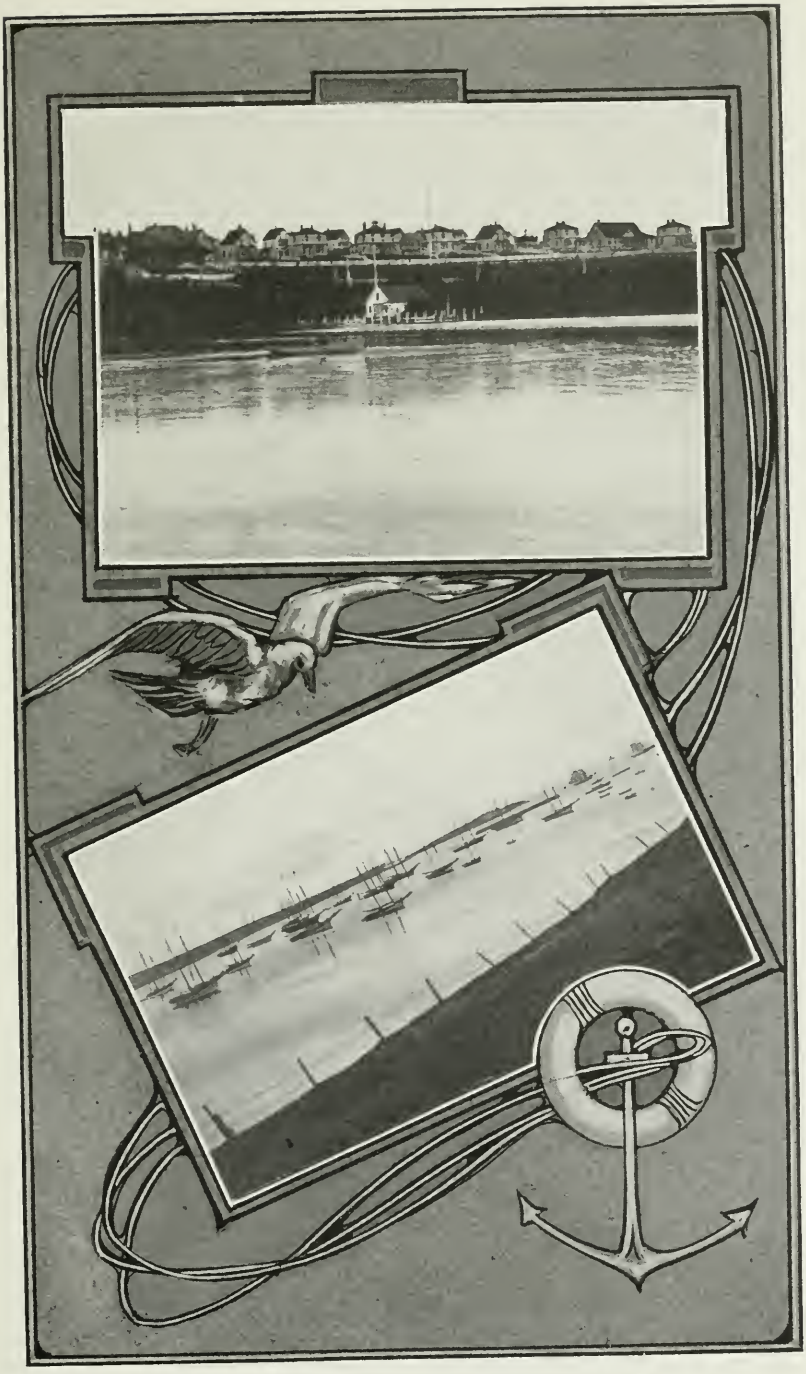
The government wharf or railway wharf, has a face of about 600 feet and a width of 30 feet with berths for two steamers to take cargo from the railway, one on the outside and the other on the inside, with 18 and 22 feet of water at low tides, according to berth. There is also an extension of the same wharf 300 feet, about completed, with 22 feet of water at both sides at low tide. There is also a wharf 200 feet at the head with large freight shed, but there are no cold stores.

Campbellton has no docks for repairs. Anchorage is good, with soft bottom in the basin, with from 16 to 20 feet of water, low tide. Vessels can lie aground with safety. A wharf about 400 feet long is used by small boats which ground when the tide is out, and a wharf owned by the Shives Lumber Company with about 10 feet of water, where schooners discharge when the other wharfs are occupied. Lumber and cargo is taken by rail to the ships' side on two tracks and loaded from cars on the government wharf.

Port charges are wharfage and the usual tonnage tax for harbour master's and sick mariners' dues. *Pilotage* is under the Restigouche Pilotage Authority and payment is compulsory. The rates for sailing vessels direct from sea are $2 per foot draught; vessels calling at any port in the pilotage district on the way to Campbellton, $1.50 per foot draught, and a further charge of 70 cents from said port of Campbellton. Steamers are charged in addition one cent inwards and one cent outwards per registered ton.

See List of Lights and General Chart 2,516 (1,271). Total tonnage of shipping entered in 1908, 74,947.

Canso Harbour, Nova Scotia, is at the entrance to Chedabucto bay and near Cape Canso at the entrance to the strait or gut of Canso, and is a port of call and shelter. The harbour is formed by Piscatiqui and Grassy islands on the east and by the mainland and Durell island on the west. It is sheltered on the northward by Cutler or Hart island upon which Canso harbour light is situated, latitude 45° 20′ 47″ and longitude 60° 59′ 5″. The ship channel entrance to the harbour is between Grave and Cutler islands, it has a least depth of 21 to 24 feet and the



Canso N.S. Cable Station, Hazel Hill, Canso, N. S.
and Harbour.

northern entrance between Cutler and Piscatiqui islands a least depth of 20 feet, but the latter is only 80 yards wide. The anchorage is good for vessels of almost any draught, but the harbour is limited in size and often fully occupied by fishing vessels which run there for shelter. The entrances to the harbour are well buoyed and lights are situated on both sides; range lights on Lanigan beach, south entrance of harbour, latitude 45° 20′ 4″, longitude 60° 58′ 30″, and a light at north entrance on False passage ledge, latitude 45° 20′ 48″, longitude 60° 59′ 26″.

The wharfs are as follows: one 110 feet in width with 14 feet of water at head; one 110 feet with 16 feet at head; one 60 feet wide, water at head, 12 feet; one 150 feet in width, 16 feet of water at head; one 80 feet in width, water at head, 16 feet. There are no docks for repairing vessels, but supplies and materials are easily obtained and workmen. The port charges are the usual harbour and sick mariners' dues and wharfage. Pilotage is under the Inverness Pilotage authority and non-compulsory, and the rates are for sailing or steam vessels of 200 tons, $5 inward and $2.50 outward up to $35 for vessels of 5,000 tons inward and $15 outward, the rates varying according to tonnage.

See 'Southeast Coast Nova Scotia Pilot' for sailing directions, and List of Lights and General Chart No. 2,727 (1,317). Tonnage which entered at customs, fiscal year 1908, 171,895.

Charlottetown Harbour, Prince Edward Island, is in latitude 46° 13′ 55″ N., longitude 63° 70′ 23″ W. This harbour is on the Hillsboro river which is practically an estuary or inlet of the sea, the harbour is capacious, well lighted and buoyed. Three tides meet from the North, West and East rivers about half a mile from the entrance of the harbour. Vessels drawing 27 feet of water can enter with safety, smaller vessels can ascend the East river above Charlottetown 10, and even 18 miles. Good sized vessels have been built and launched at the head of the river. Vessels can anchor close to the wharfs in the harbour, the anchorage being good all over the harbour. The harbour near the Three tides is over one mile wide and carries its depth for four miles from the harbour's mouth. The usual depth of water for anchorage is 30, 40 and nearly 60 feet, the

rise of the tide is 8½ feet at neap tides. There are eleven wharfs which are built out to the channel. The railway wharf is capacious, having 24 feet of water at low tide and rails to the ships' side, with sheds for freight. The Marine and Fisheries wharf is also capacious with from 20 to 24 feet of water on each side, at which vessels lay, and a greater depth at the head. The freight sheds on this wharf are being enlarged and will afford ample space for receiving cargo. A railway track is laid on this wharf for conveying freight. The Charlottetown Steam Navigation Company's wharf is used solely by that company and has spacious freight sheds and a railway track to the sheds; the water is not quite so deep as at the two wharfs mentioned. Other wharfs are owned by private individuals and two by the city corporation.

Some of these wharfs are spacious and from 300 to 500 feet long and have freight sheds and hoisting power for loading and discharging cargo. There is a ferry wharf for the accommodation of a ferry steamer.

There are no regular docks for repairing, but small vessels are hauled out at several wharf properties and vessels can be caulked on the flats at low tide. All kinds of material can be easily procured and workmen obtained; provisions and ships' stores in large quantities are available. Excellent water for drinking is conveyed by pipes to vessels.

Pilotage is non-compulsory and the rate $1 per foot draught. Tugs are available for towing. The port charges are the usual harbour masters' dues, not greater than $5 and less according to tonnage twice a year, and sick mariners' dues three times a year if not paid elsewhere.

Lighthouses are at Blockhouse point at entrance to harbour and Brighton beach. Automatic gas and warning buoys are placed to mark dangers outside the harbour in Hillsborough bay. See List of Lights and General Chart 1,651 (1,407). The total tonnage, which entered for fiscal year 1908, was 346,564.

Chatham Harbour, New Brunswick, latitude 47° 2′ 0″, longitude 65° 28′, extends from Chatham to the mouth of the Miramichi river, a distance of 30 miles. At the entrance are bars, the inner bar having about 2¾ fathoms of water over it at low tide and the neap tides rise about a foot and one-half. After

the inner bar is crossed, the depth of water in the channel, is from 4 to 5 fathoms and in places 8 fathoms. The anchorage is good all the way from the mouth of the river. The river is well lighted and is buoyed by twelve starboard hand and five port buoys, including two gas buoys. About 22½ miles from the mouth of the river at Loggieville there is an extensive wharf where lumber and fish are shipped and a railway branch, large salt sheds and storehouses; depth of water at the wharf 16 feet. Five and a half miles farther up the river on the north side is a wharf and pulp mill, depth of water 60 feet. About one-half mile farther up at the eastern end of Chatham port is Canada wharf; depth of water 17 feet, and a railroad branch. Snowball's wharf at Chatham town is a spacious wharf with 30 feet of water; adjoining is the Miramichi Lumber Company's wharf with a shed; water 20 feet, and used by steamers for loading pulp shipped to foreign markets. Next the town wharf, with 18 feet of water, used principally as a coal wharf; then adjoining is the ferry wharf and Loggie's wharf with large warehouses; depth of water at this wharf is 16 feet. Next is the Dominion government wharf used for storing buoys in winter. Following is Snowball's store wharf, with 18 feet of water and two large warehouses and a coal shed. The other wharfs are Johnson's wharf, 12 feet of water, coal shed and warehouses. Steam Navigation Company's wharf, 16 feet of water, two warehouses and a coal shed; the wharf is used by passenger boats; Welsh's wharf and boom; the Russell and foundry wharfs, 16 feet of water, and adjoining is Watt's ballast wharf; then Snowball's deal wharf, and at Clark's Cove, at the western extremity of the town, is another wharf used for shipping pulp; depth of water 20 feet.

The port has no dock for repairing vessels. The Miramichi river to Chatham is a fine harbour, with good anchorage, where vessels are safe from wind and weather. Loading and discharging is done by manual labour.

Port charges are harbour master's dues, collected twice a year, and sick mariner's dues paid three times a year if not paid in some other Canadian port.

Pilotage is under the control of the Miramichi pilotage authority and payment is compulsory; rates, $2.25 per foot draught

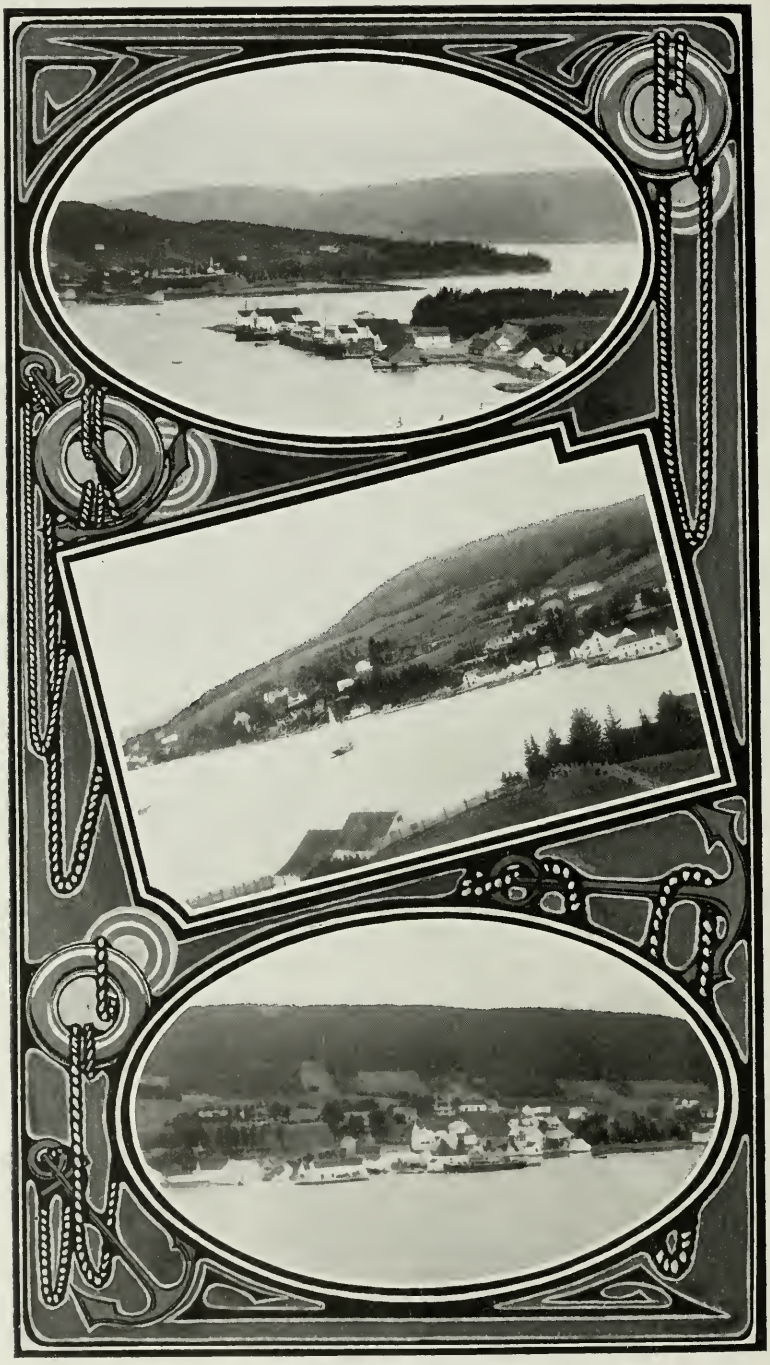
inward and $2 per foot outward; in addition, steamers pay 2 cents per registered ton. Removal in harbour within a mile, $4; barges in tow of a tug pay inward pilotage only. Stores and provisions are easily obtained. See List of Lights and General Chart 2,516 (1,271), and 'St. Lawrence Coast Pilot' for sailing directions. Total tonnage entered in fiscal year 1908, 84,088.

Dalhousie Harbour, New Brunswick, is situated at the head of Chaleur bay, on Dalhousie or Douglas island, at the mouth of the Restigouche river. The harbour is easy of access in two directions, one a narow channel 1½ cables wide with 6 fathoms of water, and the other over a flat with 3 fathoms at low water. It is well sheltered and the anchorage is good in 6 to 7 fathoms. The area of the harbour is about three miles by one and a half miles and is well buoyed and lighted; light-house in harbour, latitude 48° 3′ 45″, longitude 66° 8′ 0″.

The wharfs are the government wharf, frontage 600 feet; depth of water at low tide, 22 feet, and the south side of this wharf is 300 feet long by 34 feet wide; depth of water, 20 feet at low water. It has a railway siding and vessels can load from cars. The Intercolonial Railway wharf adjoining the other wharf has a face on the east side of 350 feet; width of wharf, 100 feet for 200 feet of its length and 60 feet for the remainder of its length; water, 17 feet at low water. Sheds and railway siding are in contemplation. There is also a private wharf with a berth of 450 feet; depth of water, 19 feet, and a ferry wharf available also for light draft vessels for 300 feet on each side and 14 feet wide. There is no dock for repairs nor cold stores.

Port charges are harbour master's dues payable twice a year, and sick mariner's dues three times a year if not paid elsewhere. *Pilotage* is under the control of the Restigouche Pilotage Authority and payment is compulsory. The rates are $1.50 per foot draught for sailing vessels and an additional charge of 1 cent inward and 1 cent outward per ton register for steamers.

See List of Lights and Chart 3,636 (1,715). Total tonnage entered in fiscal year 1908, 44, 013. For sailing directions, see 'St. Lawrenec Pilot.'



Entrance and Harbour,
Gaspé, Quebec.

Gaspé Harbour, Quebec.—From the northeast side of Cape Haldimand, Sandy Beach extends northward and forms Gaspé harbour. Sandy beach is a low narrow tongue of sand and within this tongue is the harbour, about 4½ miles long with a general width of one mile: depth of water from 4 to 11 fathoms with mud bottom and completely sheltered. The lighthouse in the harbour is in latitude 48° 49′ 45″ N., longitude 64° 28′ 45″ W. Southwest Arm is about two miles from the lighthouse mentioned and the deep water of this arm forms Gaspé basin, sufficiently capacious to hold a number of vessels; water from 5 to 9 fathoms.

Wharf Accommodation.—There are seven wharfs ranging from 300 to 400 feet in length, situated on both sides of the harbour, with coal sheds upon some of them and about 24 feet of water alongside the wharfs. There is sufficient room and water to accommodate a large fleet in the harbour and access to it is easy.

Port charges are, the usual harbour master's fees payable twice a year, and sick mariner's dues payable three times a year if not paid elsewhere. There is no pilotage authority and vessels depend upon fishermen to pilot them when necessary. See List of Lights and Chart 1,621 (1,278), and 'St. Lawrence Pilot' for sailing directions. Total tonnage entered during fiscal year 1908, 88,958.

Halifax Harbour, Nova Scotia, is one of the finest and safest harbours in the world. It is open all the year round and there is direct communication with all parts of the world by sailing vessels and steam communication with the United Kingdom, Newfoundland, Bermuda, West Indies and United States all through the year. Halifax is also the terminus of the Intercolonial Railway which has communication with all parts of Canada and the United States, and the port has railway communication with other ports in Nova Scotia east, west and north. The port has also telegraphic communication with all parts of Canada and United States by land lines, and with the United Kingdom, Jamaica, Bermuda, United States and Colon, by submarine cable

The entrance of the harbour lies between Devil's island

and Chebucto head, and is 5⅓ miles wide, extending in a north-westerly direction for about 13½ miles to the head of Bedford basin. From Georges island to the Narrows, a distance of three miles, the harbour is about three-quarters of a mile wide, with a depth of water of from 10 to 14 fathoms at low tide and good anchorage ground, but at the Narrows the harbour contracts to about one-quarter of mile and then expands into Bedford basin which has an area of 10 square miles, completely landlocked.

The citadel is 27 feet above the sea at high water, and with its flag staff is a leading mark easily recognized from a vessel off the entrance of the harbour. A gun is fired at the citadel at noon, mean time of the 60th meridian, equivalent to 4h .0m. 0s., Greenwich mean time.

There are thirteen lighthouses in the harbour and immediate approaches, three of the stations in the approaches being also fog signal stations. In addition there are numerous automatic signal buoys, gas buoys and three combined gas and signal buoys.

The wharf accommodation is spacious; there are seventeen wharfs, capable of accommodating coasting and freighting vessels, with an area of 125,559 square feet upon which a number of sheds are built; twenty-two wharfs capable of accommodating steamers from 1,600 tons upwards, with an area of 330,335 square feet and shed area of 104,981 square feet, the depth of water measuring from 29 to 46 feet. At these wharfs vessels can unload into the sheds and load from them. There is one cold store which will contain 1,000 tons.

The Halifax Tramway Company and the Dominion Coal Company own quays which together, hold 7,000 tons of coal. The King's wharfs have a frontage of 250 feet and depth of water 20 feet. The dockyard, under control of the Department of Marine and Fisheries, is 2,700 lineal feet and depth of water is from 12½ to 36 feet. Cranes in this dockyard will lift from 2 to 15 tons.

The graving dock, belonging to the Halifax Graving Dock Company, is 600 feet long, has a frontage of 825 feet, with three wharfs used as quays and three sheds with an area of 21,552 feet; the depth of water at these quays is from 36 to 51 feet at low tide. Breadth of entrance to the graving dock, 87¾

feet, with a depth of 30 feet on the sill at high water, and it is equipped with ample plant of a modern description for executing large repairs to steam vessels.

Sheers belonging to Messrs Patterson and Company will lift 30 tons.

The Intercolonial Railway wharfs have tracks to the ships' side and to the sheds; No. 1 is the immigration wharf and shed; No. 2 wharf is 490 feet in length by 80 feet; shed, 485 feet by 46 feet, two tracks; depth of water, 27 to 40 feet; No. 3 wharf, length, 620 feet by 165; shed, 590 by 125 with grain carrier, four tracks; depth of water, 27 to 30; No. 4, length, 550 feet by 90; shed, 435 by 33, two tracks; water, 27 to 30 feet; No. 5 wharf, 450 feet long by 40 feet, no shed, two tracks; water, 22 to 25 feet; No. 6, deal wharf, 450 feet by 82, no shed, four tracks; water, 20 to 47 feet; No. 7, length, 613 feet by 65, no sheds, four tracks; water, 17 to 24 feet; No. 8, length, 755 feet by 123; shed, 50 feet by 65; four tracks; water 22 to 35 feet; No. 9 quay being filled is 725 feet long. Vessels discharge into cars and sheds and load from cars alongside. There is a grain elevator with capacity of 500,000 bushels.

The port charges are harbour master's dues collected under an 'Act to provide for the appointment of a Harbour Master for the Port of Halifax.' The fees are similar to the general fees, with the exception that vessels under twenty tons are not charged. Sick mariner's dues are collected three times in the calendar year, provided they are not paid elsewhere.

Pilotage.—Vessels of 120 tons and under, registered in Canada are not compelled to pay pilotage charges. Payment of outward pilotage for all vessels 200 tons and upwards is compulsory. Rates, 120 to 200 tons, $9.60 in, $6 out; 200 to 300 tons, $13.20 in, $8.40 out; 300 to 400 tons, $16.80 in, $10.80 out; 400 to 500 tons, $19.20 in, $12 out; 500 to 600 tons, $21.60 in, $13.20 out; over 600 tons an additional 60 cents for every 100 tons or fractional part inwards and 30 cents outward. Ships' stores, provisions and water are easily obtained and reasonable in price.

See S. E. Coast of Nova Scotia Pilot for sailing directions. See List of Lights and Admiralty Charts Nos. 2,320 and 311

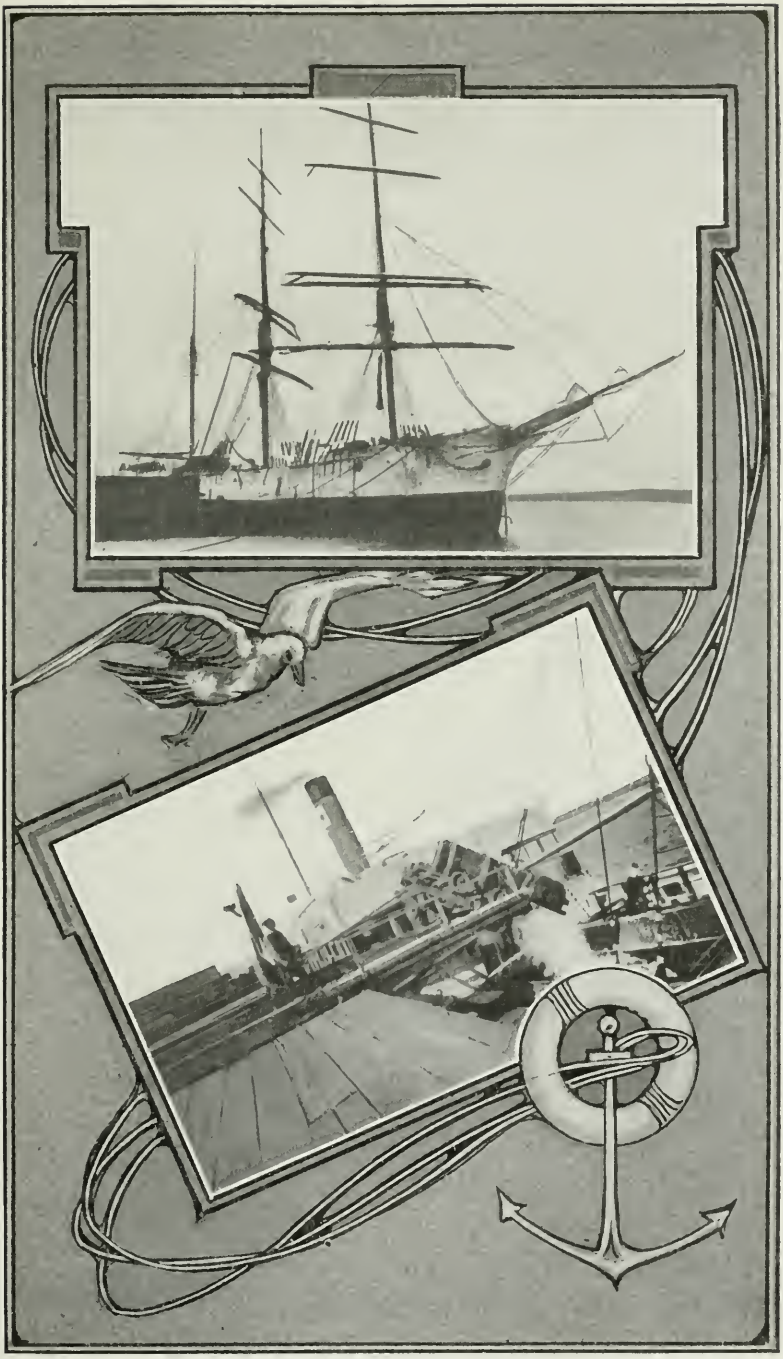
(2,410). Total tonnage entered during fiscal year 1908, 1,773,610 tons.

Hillsboro Harbour, New Brunswick, is situated on the Petitcodiac river five miles from its mouth. The anchorage ground is three miles below the harbour, with 5 and 6 fathoms at low water. The tide rises very rapidly in the river, a height of 38 feet at neap tides and 45 feet at spring tides. The harbour is left dry at low tide with the exception of about a quarter of a fathom in the channel. There are four wharfs in the harbour, three owned by the Albert Manufacturing Co., and used by the company for shipping gypsum, each wharf accommodating only one vessel at a time. The remaining wharf, owned by Messrs. Smith & Peek, is used for shipping lumber. There are two railway sidings to the wharfs upon which gypsum and lumber are carried. The depth of water at the wharfs is 14 feet at high spring tides and 8 feet at neap tides; vessels must arrive on the flood tide and load quickly or wait until the next spring tides to depart. There is no dry dock, but vessels can go on the beach at the end of spring tides and repair until the next high tide.

The *port charges* are harbour master's dues and sick mariner's dues paid twice and three times a year respectively if not paid elsewhere. See General Chart 354 and S. E. coast of Nova Scotia Pilot for sailing directions.

Total tonnage entered during fiscal year 1908, 50,023.

Ladysmith, Vancouver island, British Columbia, formerly called Oyster harbour, extends from Yellow point to Reef point, Thetis island, and from Boulder point to Jostling point on Kuper island, and includes all the waters west of Thetis island and Kuper island between Reef point and Jostling point. The harbour is nearly one mile wide at the entrance. Rocky shoals extend off Coffin islet to a distance of three cables. There are three wharfs on the south side where coal is shipped, length 800 feet, 540 feet and 300 feet respectively; depths of water, 33, 29 and 32 feet. Half a mile above Twin islands the harbour narrows to a quarter of a mile in width; small vessels may go as far as the west of Long island where there are 3 fathoms of water. From this point to the entrance the water is from



Hillsboro', N.B., Loading Lumber and Gypsum.

3 to 36 fathoms at the entrance of the harbour. Good anchorage is found in several places in the harbour for large vessels. Spring tides rise 10 feet and neap tides 8 feet.

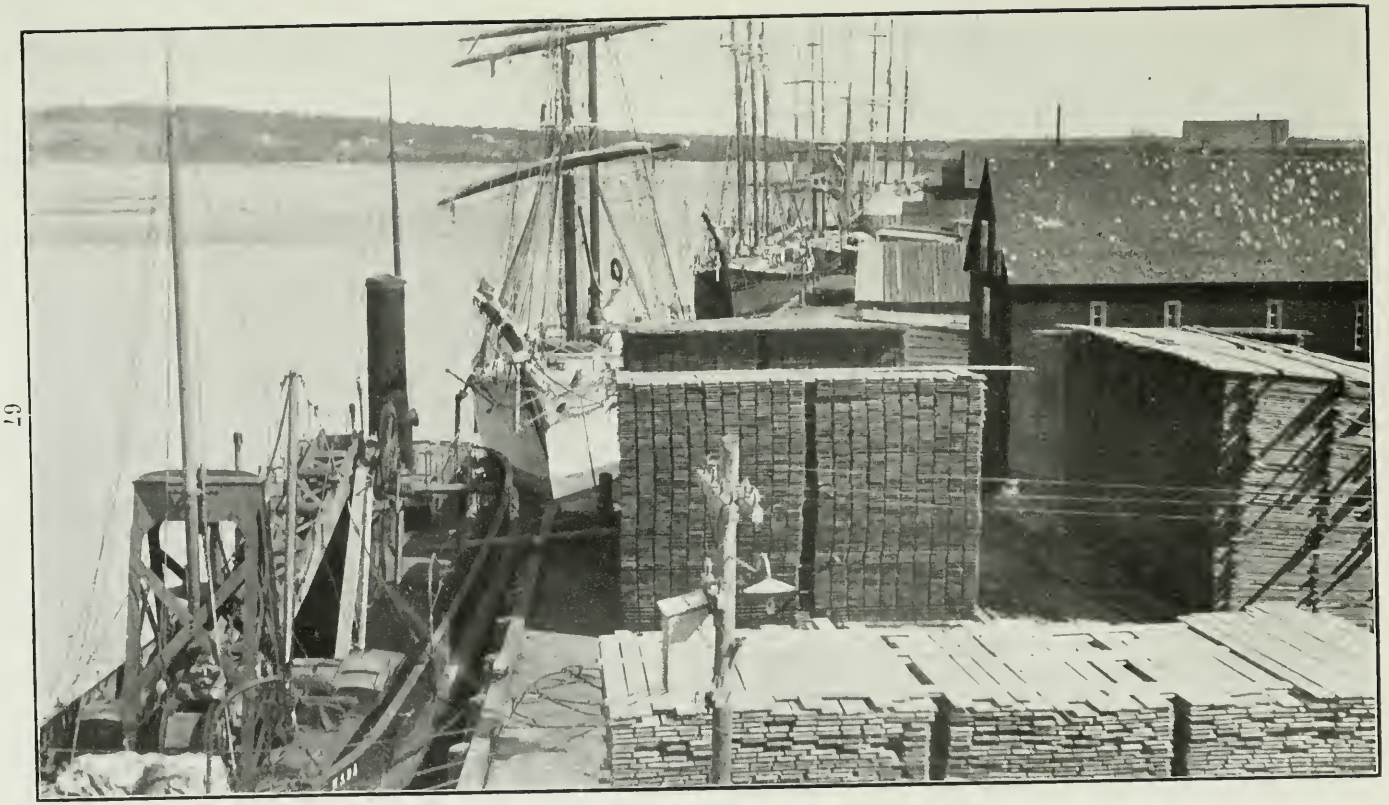
The lighthouse is on Coffin island, latitude 48° 59¼′ N., longitude 123° 45′ W., and north side of harbour. There are also two beacons, one the north beacon, and the other the south.

Liverpool Harbour, Nova Scotia, is in Liverpool bay on the southwest coast of Nova Scotia. The bay is open all the year round. There is a combined lighted and whistling buoy at the entrance of the harbour and a lighted bell buoy midway to the outer harbour. The lighthouses are one on Coffin island, latitude 44° 1′ 55″, longitude 64° 37′ 32″; at Fort Point, latitude 44° 2′ 35″, longitude 64° 42′ 20″, and a pole light on an old pier at Brooklyn. From the entrance the harbour extends three miles where it forms a basin known as Herring cove on the eastern side, and with the western shore forming the other side, anchorage is found for a fleet of vessels. The bottom is mud, and the depth of water from 4 to 6 fathoms in this anchorage.

Approaching the inner harbour is a bar which has been dredged, allowing vessels drawing 18 to 20 feet of water to enter and load at the wharfs. There are fifteen wharfs with an area of 168,000 square feet, including the space occupied by buildings on these wharfs. There is also a large coal wharf where coal can be loaded or bunkered. The Liverpool and Milton Railway Company have extended their line along the water front and cars are taken to the ships' side with lumber and general cargo. The Liverpool Marine Railway is operated by electricity and vessels of moderate size can be repaired. Labour, stores, provisions and water are readily procured. Stevedores and a large tug can be obtained. For sailing directions, see S. E. Coast Nova Scotia Pilot, List of Lights and Admiralty Chart No. 341.

Port charges are harbour master's dues, paid twice a year and sick mariners' dues three times a year if not paid elsewhere. Total tonnage entered in fiscal year 1908, 94,067 tons.

Louisburg Harbour, Cape Breton, Nova Scotia, latitude 45° 55′, longtitude 59° 58′, between Lighthouse point and



Liverpool, N.S. Harbour and Water Front.

Rocky and Battery islands, and is about $3\frac{3}{4}$ cables wide, but the navigable channel is 2 cables wide. Within the entrance, southwest arm continues westward over one mile with a general width of 3 or 4 cables; water in this arm, from 25 to 44 fathoms and deep water in all parts of the harbour.

The harbour is very well protected by lights and buoys; Louisburg light is on the north side of entrance to the harbour in latitude 45° 54′ 35″ N., longitude 59° 57′ 15″W., fixed white light visible 16 miles; a diaphone fog alarm is also operated here; Louisburg range lights are on the west shore of the harbour, red light visible 7 miles; two coal wharf range lights in harbour lead to the Dominion Coal Company's wharfs.

The principal wharfs are the Dominion Coal Company's two wharfs, both of which are 700 feet long; water from 25 to 35 feet; the freight wharf has a railway siding the full length of the wharf. Vessels unload with aid of donkey engine; a coal pocket is built on the other wharf which holds 6,000 tons, and coal is loaded on board vessels by the Robins' Conveyor system. The wharf of W. W. Lewis & Co. is about 300 feet long, with shed and storage capacity of about 8,000 barrels; depth of water, 15 to 25 feet; the wharf of P. O'Toole & Sons is about 250 feet in length, shed and storage capacity of about 3,000 barrels, and near the Sydney and Louisburg Railway sidings; the wharf of Z. W. Townsend & Sons at lower end of harbour is about 200 feet long, shed and storage capacity 2,000 barrels; C. L. Mitchell & Company's wharf and lobster factory is 150 feet long; depth of water on the eastern side, 15 feet; the wharf of James W. Townsend, in the lower part of the harbour, is about 200 feet long, shed and storage capacity about 1,000 barrels; sailing vessels discharge rock ballast at this wharf; depth of water on western side about 15 feet. There are in addition about twenty-five small wharfs owned by shore fishermen in different parts of the harbour. There are no dry docks for repairs in the harbour.

Port charges.—Harbour master's dues twice a year and sick mariners' dues three times a year for vessels over 100 tons, and once a year for vessels 100 tons and less if not paid elsewhere.

Pilotage.—Sailing vessels 80 and under 150 tons, $5 inward, $3 outward; 150 and under 250 tons, $8 inward, $5 outward;

Louisburg Cape Breton, Coal Pier.

250 and under 400 tons, $9 inward, $7 outward; steamships 80 to 500 tons, $8 inward, $5 outward; 500 to 1,000 tons, $10 inward, $6 outward; 1,000 to 3,000 tons, $12 inward, $8 outward. Winter pilotage is 50 per cent additional to above rates on sailing ships and steamships.

See 'St. Lawrence Pilot' for sailing directions and List of Lights and Admiralty Chart No. 2,692. Total tonnage entered during fiscal year 1908, 567,709 tons.

Lunenburg Harbour, Nova Scotia, is situated at the head of Lunenburg bay. The bay is about 5 miles in depth by about $2\frac{1}{4}$ miles wide between the entrance points. It is open to the southeast, but the force of gales from that quarter is much lessened by Cross island which acts as a breakwater. Lunenburg harbour is safe in all winds and affords good anchorage at 3 fathoms. A channel from the entrance of the harbour to the railway wharf, 200 feet wide and 27 feet at low water, has recently been completed. A channel along the heads of all the wharfs 60 feet wide and 17 feet deep at low water, is about completed. The harbour is well buoyed and the lighthouse on Battery point entrance is in latitude 44° 21′ 45″, longitude 64° 17′ 35″. It is connected with the Intercolonial Railway by the Halifax and South Western Railway, and is the terminus of a railway which connects the Annapolis valley with the south coast of Nova Scotia. A railway siding passes along the head of all the wharf properties. A marine slip of 600 tons capacity is maintained and repairs can be cheaply and quickly made.

The wharfs are the railway wharf, 600 feet long with two railway tracks and a most convenient wharf. Atlantic Fish Company's two wharfs 300 feet long by 35 feet wide, railway siding, five warehouses, bait freezer and cold stores of 1,500 barrels capacity; A. H. Anderson's two wharfs 350 and 300 feet long and 40 and 31 feet, respectively; railway passes the property; five stores for coal and cement; Messrs. Zwicker & Co., two wharfs, 300 feet long by 40 feet wide, seven warehouses; James Eisenhauer & Co., two wharfs, one 300 feet long, the other 100 feet; Messrs. Adams & Knickle, wharf, 300 feet long by 45 feet wide, large store 80 by 50; John B. Young, two wharfs, each 300 feet long and 35 feet wide, three large ware-

houses, a shipyard and railway facilities; W. C. Smith, one wharf 200 feet long, 35 feet wide and two warehouses. Supplies of all kinds and water can be easily obtained.

Port charges are harbour master's dues twice a year, sick mariners' dues payable once a year on vessels of 100 tons and less, and three times a year on vessels over 100 tons if not paid elsewhere. Total tonnage entered for the fiscal year 1908, 98,463 tons. See S. E. Coast of Nova Scotia Pilot for sailing directions and List of Lights and Chart No. 342. There is no pilotage authority in the district.

Montreal Harbour is in latitude 45° 30′ 17″ N., longtitude 73° 54′ W. The harbour is under the control of the Montreal Harbour Commissioners and has recently been extended from Longue Point, which was its northern limit to the north point of the island of Montreal. The limits controlled by the commissioners extend from a point above the Victoria bridge to the north end of Montreal island along the west bank of the St. Lawrence river, a distance of about 17 statute miles.

The ship channel of the St. Lawrence river is completed from Montreal to Cap Levrard, four miles below Batiscan, the head of tidal navigation, or a distance of 104¼ miles below Montreal. The least depth of water in the ship channel is 30 feet at extreme low water in the river. A slight rise and fall of the tide gives a full depth of 30 feet below Cap Levrard and over Cap à la Roche and St. Augustin bars. Semaphores are located at St. Jean des Chaillons, to indicate the available depth of water in the dredged channel at Cap à la Roche, and at St. Nicholas to indicate the depth of water in the undredged channel at St. Augustin bar. The completed channel has a minimum width of 450 feet, with the exception of four miles in Lake St. Peter, where it is 300 feet, but work at this point is now progressing in widening the channel there also. The curves in the completed channel are from 500 to 800 feet in width. The ship channel is buoyed by the Marine and Fisheries Department, under the Montreal agency, from Montreal to Platon, a distance of 125 miles. In this district, called the Montreal district, the St. Lawrence ship channel has in position 65 gas buoys, 25 steel can and conical and about 170 spar buoys. The starboard

Montreal Harbour — One of the Basins with Sheds.

Montreal Harbour — View from the G.T.R. Elevator.

hand buoys going up stream are painted red and the port black. The conical steel buoys are starboard and the can buoys port hand buoys. The lights from the gas buoys can be seen seven miles where the channel is straight. The lighthouse system from Platon up to Montreal includes single tower lights, range lights and a few pole and beacon lights, and at Montreal, electric arc lights, making in all about 110 separate lights and one lightship, from Montreal to Platon, a distance of 125 miles. Vessels of the largest size navigating the St. Lawrence river can come from sea to Montreal day or night without interruption, except on occasions when smoke from forest fires may obscure the lights, but this occurs very rarely.

The harbour is divided into three divisions; division 1, south of the Lachine canal; 2, the central harbour, and 3, the lower division. The wharfs extend from the upper part of Bickerdike pier to Sutherland pier. The lineal measurement of the wharfs is for 30 feet draught vessels and over, 16,354 feet equal to 3·099 miles, for 25 to 27½ feet draught 19,444 feet equal to 3·$\frac{6}{10}$ miles for 20 feet draught and under, 3,137 feet; total wharfage, 7·$\frac{4}{10}$ miles.

The piers are Alexandra pier with from 31 to 33 feet of water; King Edward pier with from 33 to 34 feet of water; Jacques Cartier pier, water from 32 to 34 feet; Victoria pier, 23 to 27 feet; Laurier pier, 28 feet of water; Tarte pier, 32 to 36 feet; and Sutherland pier, 31 feet, all at low water.

There are fourteen steel sheds two storeys high; No. 2 shed on shore wharf, section 12 and 13, length of shed, 634 feet 4 inches and 96 feet wide; No. 3 and 4 sheds on Alexandra pier, 507 feet 2 inches each by 96 feet; No. 5 and 6 sheds, also on Alexandra pier, 476 feet 6 inches each by 96 feet; No. 7 and 8 sheds on King Edward pier, 507 feet 2 inches each in length by 96 feet; No. 9, also on King Edward pier, 508 feet 2 inches by 96 feet; No 10, on King Edward pier, 460 feet 8 inches by 96 feet; No. 11, on shore wharf, section 17, 571 feet long by 96 feet; No. 12, on Jacques Cartier pier, 443 feet 10 inches by 96 feet; No. 13, 412 feet long by 96 feet, on Jacques Cartier pier, and No. 14 and 15, 381 feet 6 inches and 365 feet 8 inches, respectively, also on Jacques Carties pier. The sheds admit of the handling of 10,000 tons per week each, or 140,000

in all, inward and outward. The sheds are of steel with concrete floors, steel doors, and eleven have grain conveyors from the grain elevator enabling four vessels to load at their separate berths at one time. Other storage accommodation is afforded by the railway companies.

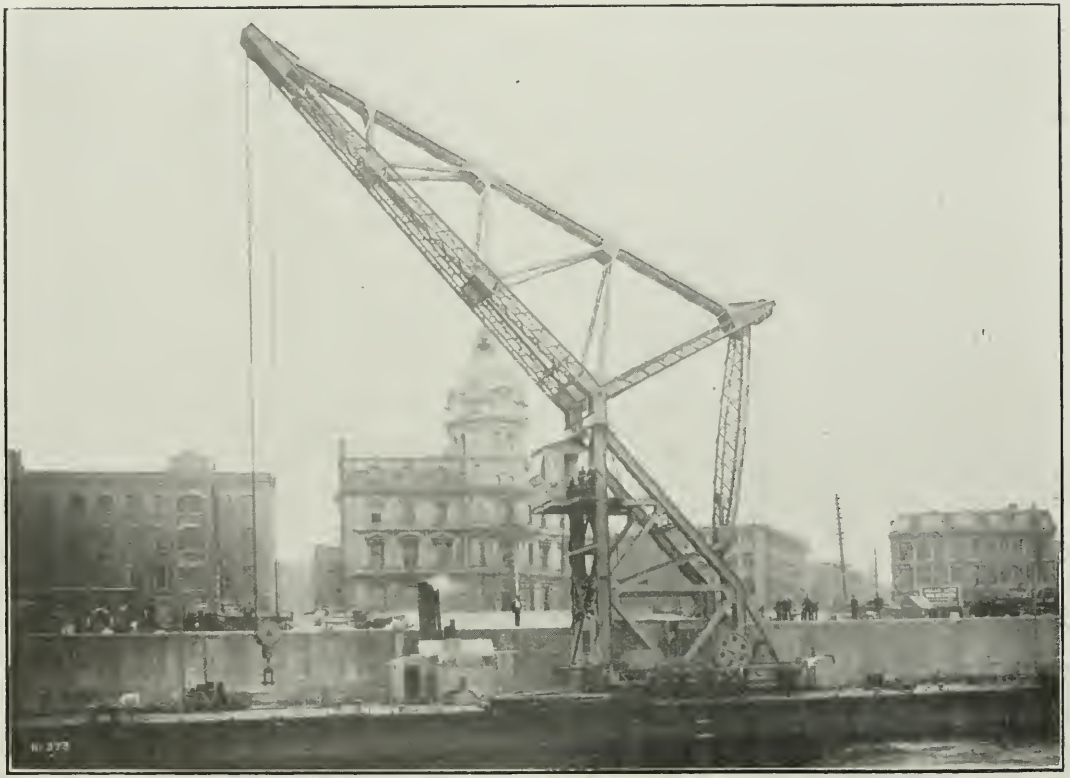
The Harbour Commissioners have established a traffic department, consisting of railway tracks on the wharfs and own locomotives for transferring freight from one railway to another, and for loading and discharging cargo directly on board vessels, by cars. Two railway tracks are laid along the inner side of the sheds and in some instances one track on the outer side.

The sheds are being equipped with the latest loading and unloading machinery, a seventy-five ton floating crane of the most modern description has been provided. Life saving and fire protection has also been provided.

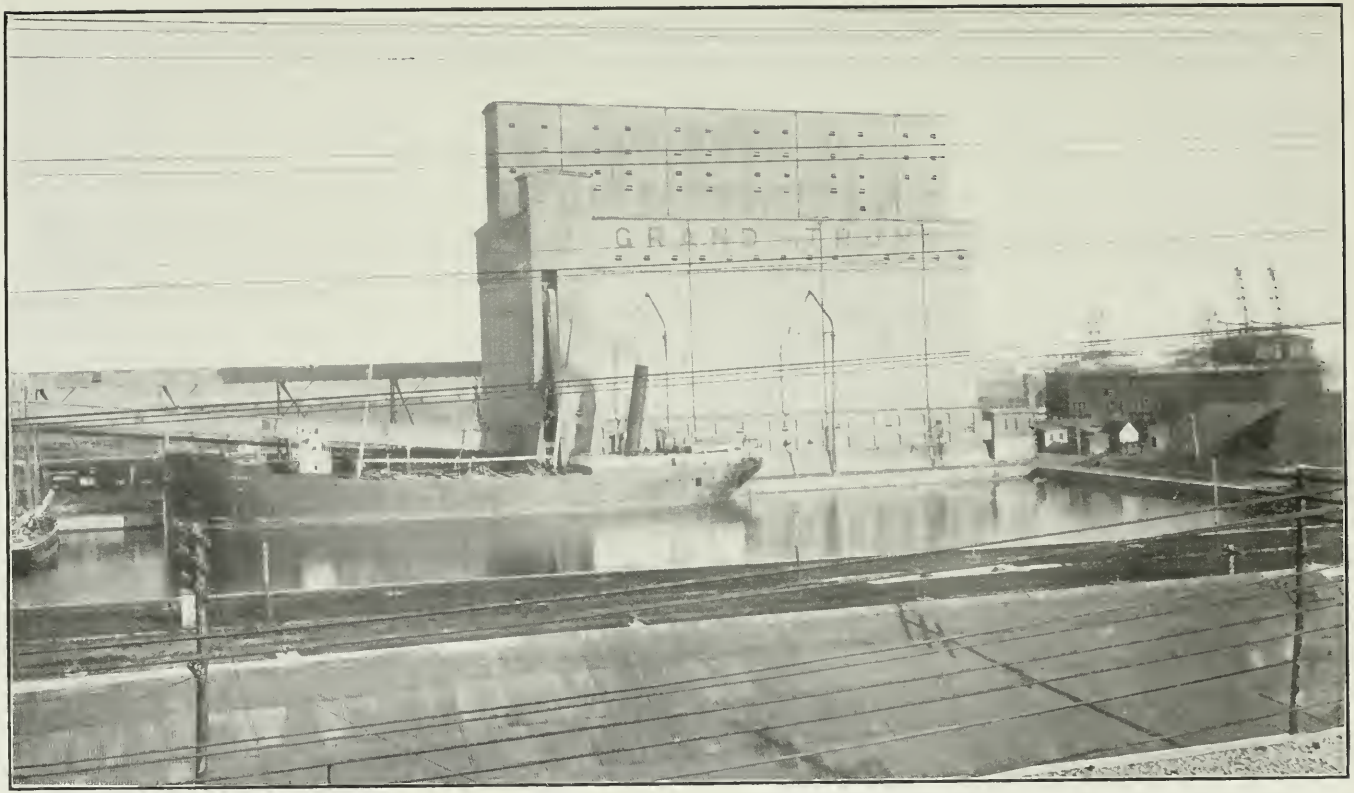
The harbour contains two dry docks for light draft vessels, each 400 feet long and 10 feet on the sill.

Vessels from the Great Lakes enter Montreal harbour through Lachine canal, which has a depth of 14 feet, and the Richelieu and Ontario passenger steamers run the Lachine rapids. Lake St. Louis, above Montreal, is well lighted and buoyed, and from Montreal to Kingston there are 40 gas buoys and about 100 spar and steel buoys in the St. Lawrence river, irrespective of the lights in the Soulanges, Cornwall, Farran's Point, Rapide Plat and Galops canals, through which vessels pass to avoid rapids on the river between Montreal and Kingston. About forty shore lights consisting of towers, acetylene lighted beacons and other forms of lights are in operation between Montreal and Kingston. Vessels drawing 14 feet of water can pass down the canals to Montreal from the Great Lakes and the tonnage is very large.

Grain Elevators.—Montreal is very well equipped for loading and unloading grain. There are three stationary grain elevators and seventeen floating elevators. The floating elevators do not warehouse grain, but are employed in discharging from one vessel into another, and can, during the season of navigation, if required, handle sixty millions bushels of grain, all conditions being favourable. The floating elevators are the property of the Montreal Grain Elevating Company. This



Montreal Harbour — Floating Crane and Harbour Building.



Montreal Harbour — Grand Trunk Elevator — Built 1904.

company was established in 1860 and has transferred from inland to ocean-going vessels up to the year 1908, 658,232,832 bushels. The present charges are, three-tenths of a cent for the vessel delivering and three-tenths of a cent for the vessel receiving. The grain is weighed as it passes through the elevator, to determine the charges.

The Harbour Commissioners' elevator has a capacity for holding one million bushels. With one leg, grain can be taken from barges or steamers at the rate of about 10,000 bushels per hour. With the extensive system of grain conveyors, grain can be taken to ten berths and grain can be delivered at one time to four vessels berthed at the Harbour Commissioner's piers. This enables vessels to proceed with loading other cargo, or if a hatch is clear for grain, unloading from other hatches may go on. The rate of delivery from each spout is about 16,000 bushels per hour or 64,000 from four spouts. Two spouts can be used for one vessel, thereby loading 32,000 bushels if the spouts are not all employed for four vessels loading at the same time. The conveyor system of the Harbour Commissioner's grain elevator is said to be the most complete on the continent. At present there is used about $3\frac{3}{4}$ miles of belting, to convey grain from the elevator, with the near prospect of increasing the length to five miles. Portable trippers are used to deliver the grain at different points in the galleries opposite the hatches of vessels lying at the piers. Grain is also delivered from the elevator into cars using the Harbours Commissioner's tracks. The power used is electric.

The Grand Trunk Railway elevator at Windmill point has a larger capacity for storing grain than the Harbour Commissioners' elevator; it is very well equipped and operated by electric power. Vessels are loaded alongside the elevator pier and two large vessels at the same time can be loaded or a greater number of small vessels. This elevator has facilities for unloading over 900 cars in one week and delivering the grain at the same time to vessels. Conveyors are used on one side of the elevator pier. The pier is reserved for the purpose of loading and unloading grain.

The elevator of the Canadian Pacific Railway had a capacity for storing 400,000 bushels, but not much grain is now loaded from this elevator, part of the machinery having been removed.

The elevator charges are regulated by by-law No. 144 of the Harbour Commissioners, and are:—

On Grain ex Steamer or Barge.—Elevating into elevator and weighing, one-quarter of one cent per bushel; storage for twenty days, including delivery to vessel, one-quarter of one cent per bushel.

On Domestic Grain ex Cars.—Oats, elevation and ten days storage, one-half of one cent per bushel; all other grain, elevation and ten days storage, three-quarters of one cent per bushel; succeeding term of ten days on all grain ex steamer, barge or cars, one-quarter of one cent per bushel.

On Export Grain ex Cars.—Elevation, ten days' storage and delivery to ocean steamer through carrier or otherwise, at the option of the commissioners, nine-tenths of one cent per bushel.

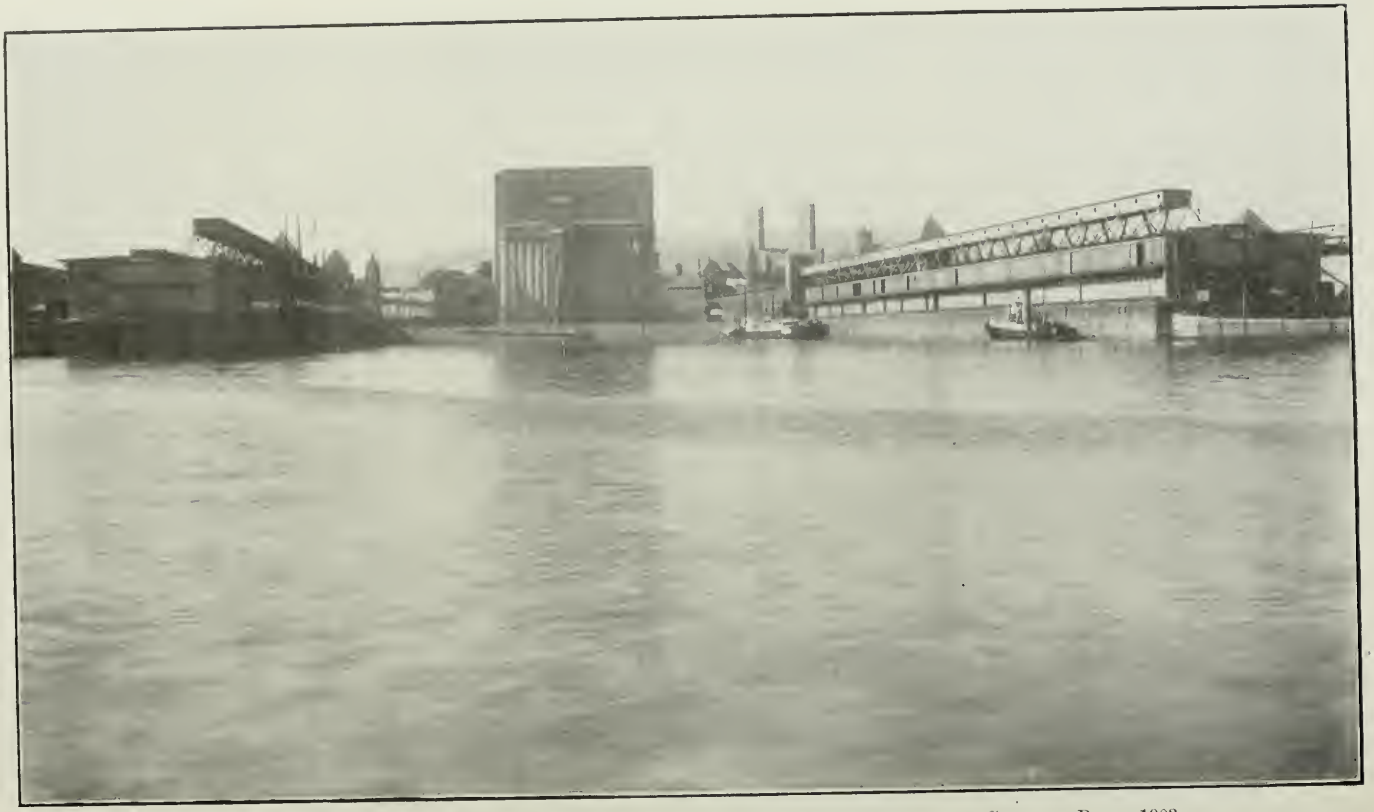
For other services.—Loading on cars, one dollar per car; cleaning grain, one-half of one cent per bushel; turning grain, one-eighth of one cent per bushel; floating grain from elevator to alongside, in harbour, three-quarters of one cent per bushel.

Winter Storage on Grain.—(Begins 15th November and expires on 15th May.) Including elevating, storage and delivery, when charges at regular rates amount to one and one-half cent per bushel, no further charge will be made. Grain stored during winter months, and remaining in elevator after 15th May will be charged one-quarter of one cent per bushel for each succeeding ten days or portion thereof, in addition to the charges already accrued.

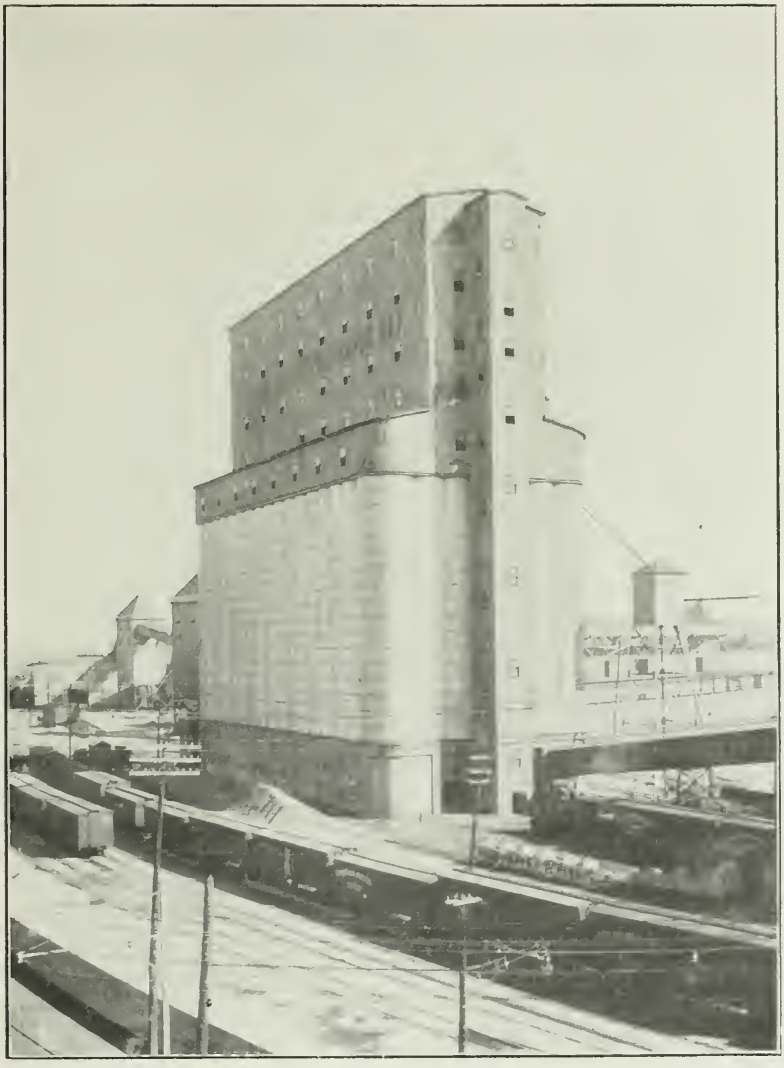
Inspection.—All grain ex cars be subject to inspection by the official grain inspector, and forty cents per car will be charged in addition to the storage charge.

Shovelling Grain ex Steamer or Barge.—Shovelling grain by power or hand, as the steamer or barge will permit, $2 per 1,000 bushels, to be paid by the steamer or barge.

Wharfage.—The wharfage rates charged on articles landed or shipped from the piers or warehouses are: grain, 3 cents per ton; rice, seeds, malt, coal, coke, pulp, meat, flour, oil cake and similar articles, 6 cents per ton; asphalt, ballast, cement, chalk, salt, marble, gypsum, iron ore, sand and similar articles, 8 cents



MONTREAL HARBOUR — HARBOUR COMMISSIONERS' ELEVATOR AND ADJOINING FREIGHT SHEDS — BUILT 1903.



Montreal Harbour — Harbour Commissioners' Elevator — Built 1903.

per ton; fruit, vegetables, animals, fish, crockery, tobacco, steel rails, metallic ores and such articles, 12 cents per ton; raw and refined sugar, pig and scrap iron, steel billets and similar articles, 16 cents per ton; brick (ordinary), 8 cents per thousand; pressed brick, 12 cents; enamelled brick, 20 cents; cordwood, 4 cents per cord; lumber and timber, 8 cents per thousand feet. The charge on bulky articles like agricultural implements, musical instruments, hollow ware, is made on the measurement of 40 cubic feet, equals a ton.

The charges made by the Harbour Commissioners for switching cars on the wharfs are $2.50 per car, which includes two movements and additional movements, $1 each, the maximum charge not to exceed $2. The new floating crane is in operation and charges for it fixed.

The rental charged for low level wharf space per season of navigation is 8 cents per square foot or 2 cents per square foot per month or part of a month; high level wharf space, 10 cents per square foot, and small offices on wharfs, 25 cents per square foot.

Coal Plants.—Coal discharging plants are operated in Montreal harbour; the plant at Hochelaga within the harbour and owned by the Dominion Coal Company is the most extensive, the steel towers having buckets of two tons capacity deal with from 300 to 400 tons per hour, the wooden towers deal with 200 tons per hour. The discharging plant of the same company at Windmill point has five steel towers and each tower can deal with 300 or 400 tons per hour. A storage pocket connected with this plant holds 7,000 tons, and with the storage pile 14,000 tons can be stored in twenty-four hours. The Intercolonial Coal Company, the Inverness Coal Company, the Port Hastings Coal Company, the Nova Scotia Coal and Steel Company, Acadia Coal Company, discharge coal but not to the extent of the Dominion Coal Company. Some English, Scotch and American coal for steam purposes is used in the port.

Port charges at Montreal are harbour master's dues collected as at other harbours twice a year, sick mariners' dues paid three times a year on sea-going and coasting vessels but not on vessels navigating inland waters; port wardens' dues for inspection of cargo, cattle shipments inspection dues and wharfage on cargo

shipped and discharged. *Pilotage* is under the authority of the Minister of Marine and Fisheries and payment of pilotage is compulsory. The rates in the Montreal pilotage district which extends to Quebec are:

		$ cts.	
Quebec to Portneuf	Vessels in tow or steamers per ft. draught.	0 50	upwards.
" "	" " " "	0 50	downwards.
" "	Sea-going steamers	0 62½	upwards.
" "	" "	0 62½	downwards.
" "	Sailing vessels	1 05	upwards.
" "	"	0 70	downwards.
" Three Rivers	Vessels in tow or steamers per ft. draught.	1 50	upwards.
" "	" " " "	1 50	downwards.
" "	Sea-going steamers	1 75	upwards.
" "	" "	1 75	downwards.
" Sorel	Vessels in tow or steamers per ft. draught.	1 50	upwards.
" "	" " " "	1 50	downwards.
" "	Sea-going steamers	1 87½	upwards.
" "	" "	1 87½	downwards.
" "	Sailing vessels	3 15	upwards.
" "	"	2 10	downwards.
" Montreal	Vessels in tow or steamers per ft. draught.	2 00	upwards.
" "	" " " "	2 00	downwards.
" "	Sea-going steamers	2 50	upwards.
" "	" "	2 50	downwards.
" "	Sailing vessels	4 20	upwards.
" "	"	2 80	downwards.
Montreal to Sorel		1 00	upwards.
" "		1 00	downwards.

For the removal of any vessel from one wharf to another into or out of Lachine canal or from the foot of the current into the harbour or to Longueuil, $5.

The shipping using the port of Montreal in one of the largest years amounted to 743 sea-going vessels with a tonnage of 1,923,658 tons, and 14,420 inland water vessels with a tonnage of 3,620,750 tons; total tonnage, 5,544,608 tons for the season of navigation 1908. Navigation opened 27th April, 1907, closed 13th December, seven months and twenty days, being the longest season of navigation recorded; depth of water in channel, 30 feet 10 inches. Montreal has daily and weekly lines of steamers running up and down the river to ports on the St. Lawrence river and above Montreal to the head of navigation. Also ocean-going lines to Great Britain and European ports, the United States, West Indies, South American ports and the maritime provinces. Railway communication with all parts of Canada and the United States is provided. See List of Lights and Marine and Fisheries Chart No. 1.

The port being the largest in Canada, all kinds of supplies and material for vessels can be cheaply purchased.

MONTREAL HARBOUR — C.P.R. ELEVATORS — BUILT 1885.

Tariff for floating Crane.—The Commissioners will load into vessels and unload from vessels in the harbour, with their floating crane, articles weighing from two to seventy-five tons, at the following rates and upon the following conditions:—

Radius.	Weight. Tons.	Class.	First piece or case—per lift.	Other pieces of same class at same time and place.
72 ft.	2 to 5 tons	A	$10 00	$5 00
	Over 5 and not exceeding 10 tons	B	12 00	6 00
66 ft.	" 10 " 15 "	C	18 00	10 00
	" 15 " 20 "	D	30 00	15 00
	" 20 " 25 "	E	40 00	20 00
	" 25 " 30 "	F	60 00	30 00
	" 30 " 35 "	G	75 00	40 00
	" 35 " 40 "	H	90 00	55 00
	" 40 " 45 "	I	115 00	75 00
	" 45 " 50 "	J	140 00	95 00
	" 50 " 55 "	K	165 00	115 00
			Each Piéce	
51 ft.	" 55 " 60 "	L	$200 00	
	" 60 " 65 "	M	275 00	
	" 65 " 70 "	N	375 00	
	" 70 " 75 "	O	475 00	

For the purpose of this by-law, a ton shall be calculated as being 2,000 pounds weight or 40 cubic feet measurement, according as the article to which the same applies has been or shall be carried by water by ton weight or ton measurement, but in cases where bills of lading do not show the weight or measurement, the Commissioners may charge by ton weight or ton measurement at their option.

No heavy lifts will be made by the crane after dark. Should the crane, however, be required after ordinary working hours, an additional charge of $15 per hour or any part thereof will be made.

The Commissioners assume no responsibility for injuries to persons or damage to property.

1. The crane will, at all times, be under the superintendence of the crane captain, who will direct the operations and control the work.

2. The minimum charge for the use of the crane will be $25.

3. Six hours' notice must be given when the use of the crane

is required. A deposit of the minimum rate must accompany the application for the crane in all cases. This application must be in writing and must state that maximum weight to be lifted whenever such weight exceeds five tons. It must further state that the applicant agrees to all the conditions contained in this By-law. The application will be in such form as the Commissioners may from time to time determine.

4. The Commissioners do not guarantee to deliver the crane at the time for which it is applied for; they merely undertake to deliver it as soon after such time as they can reasonably do so, and particularly shall not be liable for delay in delivering it or failure to deliver it should it be engaged in work at the time or not be in working order or available, or should the captain or crew be unavailable or on strike.

5. The exact weight or measurement of every article over five tons must be marked thereon, and the applicant shall be deemed to warrant that the weight or measurement mentioned in the application is the same as the weight or measurement marked on the article. The applicant shall also be deemed to warrant that if no weight or measurement is marked on any article, it does not weigh or measure over five tons.

6. Vessels not ready to use the crane at time for which the crane was ordered forfeits her turn in favour of next that may be in readiness. Should, however, no other order for the use of the crane be on the register, and the crane be detained owing to article or articles to be lifted not being ready, waiting time will be charged after first hour at the rate of $15 per hour, or any portion thereof.

7. If steam is got up on the crane, and while under steam notice is given that the crane is not required, the amount of the deposit will be forfeited.

8. In all cases the above rates include the use of the crane and crew, from the lifting of an article off its carriage or lighter until stowed or adjusted in the vessel, or from the lifting of an article from the vessel until placed on its carriage or lighter.

9. If the crane barge is used for lightering articles an extra charge of one half the above rates will be made, to include towage to or from any part of the Montreal Harbour, and loading or unloading. If delay occurs during the lightering,

and steam has to be raised a second time, full rates will be charged extra.

Newcastle Harbour, Miramichi, New Brunswick. This harbour is forty-two miles from the mouth of Miramichi river, described under the head of Chatham harbour. Newcastle is eight miles above Chatham and the harbour extends to the head of navigation or about fifty miles from the mouth of the river; from that point above, the river is navigable for tugs drawing 9 feet at low water; rise of tide 4½ feet. For sea-going vessels the harbour extends a distance of eight miles up and down. In this distance there are eight large piers or wharfs at which sea-going vessels load lumber to their full capacity, and the depth at low water at these piers is not less than 22 feet. Vessels carrying as much as 3,000,000 feet have loaded in the harbour and schooners can sail upwards and downwards, the channel being half a mile wide at Newcastle. The anchorage gives a depth of 42 feet in the stream with good bottom for holding. Besides the mill piers referred to in this harbour, there are along the water front of Newcastle town: wharf No. 1, known as the Anderson Furniture Co.'s wharf, 300 feet frontage and 300 feet deep; No. 2, deep water terminus of the Intercolonial Railway, frontage 100 feet; No. 3, J. Russell & Co.'s wharf, 500 feet long by 100 feet, with coal shed and warehouse; No. 4, wharf of D. & J. Ritchie, frontage 100 feet, 600 feet deep with three large warehouses for grain and general merchandise; No. 5, N. A. Parker's wharf, 125 feet frontage and 400 feet deep with two large warehouses for grain and merchandise; No. 6, public wharf, 200 feet frontage by 400 feet in depth with warehouses and coal shed; No. 7, M. Bannon's wharf, 100 feet frontage by 700 feet deep and warehouses for coal and merchandise; No. 8, D. & J. Ritchie's wharf or slip for hauling out a vessel for repairs.

The lighthouses are a wooden tower on lime-kiln bank, north side of river below the town in latitude 47° 0′ 45″, longitude 65° 33′ 40″, and one on the northwest branch of Miramichi river, latitude 46° 58′ 11″, longitude 65° 35′ 39″. There are seven buoys in the harbour. Supplies and water are easily obtained.

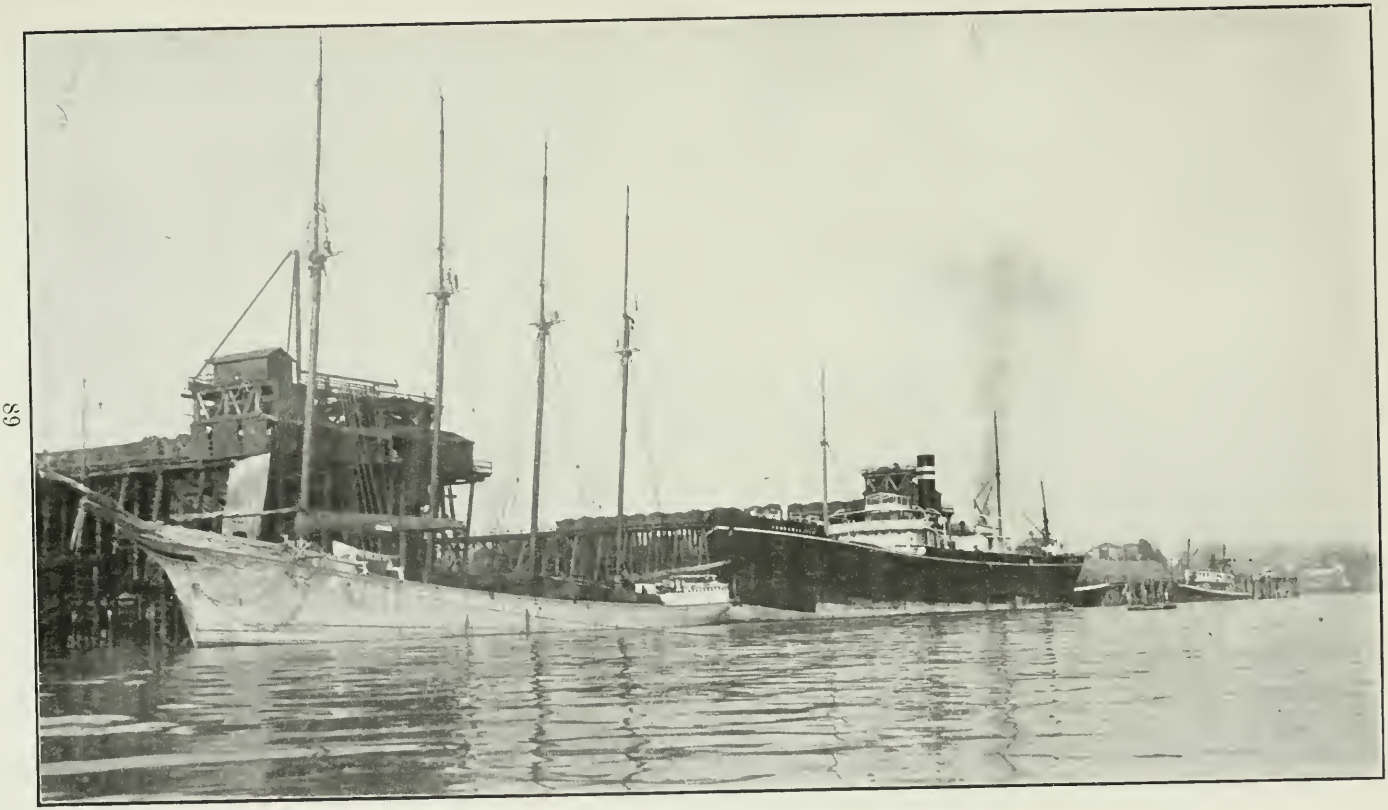
Port charges are harbour master's dues, payable twice a year,

from 50 cents for vessels of 50 tons or under up to $5, according to tonnage and sick mariners' dues payable once a year on vessels of 100 tons and three times a year on vessels over that tonnage if not paid elsewhere. *Port warden's charges* when services required.

Pilotage is under the control of the Miramichi Pilotage authority and payment is compulsory, the rates are $2.25 per foot draught inward and $2 per foot outward; in addition 2 cents per registered ton for steamers. Removal of vessels within one mile, $4. See Chart 1,712. Total tonnage entered in fiscal year 1908, 253,620.

Nanaimo Harbour, Vancouver island, British Columbia, is in latitude 49° 10′ N., longitude 123° 57′ W., on the eastern side of Vancouver island and is entered between lighthouse and Gabriola island. The immediate entrance to Nanaimo harbour is between Gallows point, Protection island on the north and the mud bank formed by the silt from the Nanaimo river. Two channels lead to the wharfs, one called the north channel, north of the middle bank in the centre of the harbour, and the other called the south channel, south of the bank. The depth of water in each channel is from 38 to 40 feet each side of middle bank, gradually decreasing as the shore and wharfs are approached. The north channel leads to the anchorage ground off the town, where there is 5 fathoms of water and mud bottom. Vessels also anchor outside Gallows point in 10 to 15 fathoms of water. The harbour affords safe anchorage, being well protected from winds from all quarters. Departure bay is also part of the harbour and is connected by Exit channel, a stretch of water $1\frac{1}{4}$ miles long and about one cable in breadth, with a depth of 14 feet at low water. The entrance from the Gulf of Georgia to Departure bay is between Boulder point, a steep cliff on the north end of Newcastle island and Jesse island, a small island to the northward of Newcastle island. Departure bay affords room for a large number of vessels to anchor in from 18 to 25 fathoms of water. The tides in the harbour are very irregular and springs rise approximately 10 feet.

The harbour is well buoyed, having nine platform buoys with distinguishing marks on pyramidal slatwork consisting of drums, balls and diamonds. A beacon with white light marks



Nanaimo, British Columbia, Harbour and Coal Wharves.

the north end of the middle bank; a stone beacon with a staff and lattice work is built on beacon rock north of Johnston's wharf. A black pile beacon surmounted by an acetylene tank showing a white flashing light is placed on the mud flats on the south side of the entrance to the harbour. This beacon stands in about 6 feet of water at low water.

The large wharfs in the harbour are used for shipping coal, the main exports of the port. In addition to full cargoes many steamers get bunker coal. The Nanaimo wharfs belonging to the Western Fuel Company are on the west side of the harbour directly opposite the entrance and close to the town. The main wharf is 810 feet long; three leading chutes deliver 700 tons of coal per hour; in close proximity to the loading wharfs coal bunkers are situated with a capacity of 7,000 tons; depth of water alongside, 30 feet at low water. A three-track car ferry slip is located on the south end of the main wharf, to make tidal and railway connection of the main line of the Esquimalt and Nanaimo Railway. This slip accommodates freight cars carried on barges to the mainland of British Columbia. North of the main wharf is a small wharf owned by the same company for loading scows and bunkering small steamers, with two berths 160 feet long; another wharf belonging to the same company is situated north of the last wharf and is used for discharging freight and loading fish bait and is 285 feet long; depth of water, 20 to 24 feet at low water. To the west of this wharf is a ferry slip used for Protection island ferry. Hirst's wharf at foot of Wharf street is 200 feet long by 100 feet, with a depth of 15 feet at low water; the wharf is covered nearly its full length and breadth by sheds which are used for loading and discharging general cargo. Adjoining Hirst's wharf is the government wharf and float used as a public boat landing. Johnston's wharf is 250 feet long by 125 feet and is covered nearly its entire length by sheds for general merchandise and cattle, storing salt and fish. The wharf is generally used by passenger steamers plying between ports in British Columbia. Vessels of 2,000 tons can discharge cargo at this wharf at certain stages of tide; the depth of water at low water is 16 feet.

Repairs to hulls and machinery are made near Dobeson's foundry, where small vessels are placed on beams. At the Red

Fir Company's saw mill a pier is used for loading lumber on scows. In Exit channel towards Departure bay, mainland side, Hogan's wharf is situated; its length is 84 feet, width 72 feet, and it is nearly covered with freight sheds for general merchandise; water, 14 feet at low water. Several small wharfs with sheds in Exit channel are used for packing herrings for shipment to the Orient from Nanaimo and Vancouver. The ship channel in Exit channel is on Newcastle island side, and near Departure bay is the quarry wharf with from 14 to 18 feet of water at low water and rocky uneven bottom. On Newcastle and Protection islands are several small wharfs with sheds used for landing, salting and packing herrings caught in Nanaimo harbour and Departure bay.

Passing into Departure bay from Exit channel, on the south-east side is a large wharf connecting with the Brechin and the Western Fuel Company's mining property. The wharf is 410 feet long; water alongside, 35 to 40 feet; an electric chute in the centre of the wharf can deliver into bunkers or hold 400 tons per hour directly from the mines. A system of conveyors reduces the breakage. Coal is stored in bunkers or pockets, which have a capacity of 3,000 tons when vessels are not loading. Large vessels can be laid alongside these wharfs in safety at all times. There is no dry dock at this port. The cold stores are in small sheds for fish. Ship stores and water are easily procured and tugs are available.

Port charges are harbour master's dues twice a year, sick mariners' dues three times a year as in other Canadian ports. Port warden's fees when surveys are made and wharfage.

Pilotage is under the Nanaimo Pilotage authority and the rates are $1 per foot draught and 1 cent per ton net register when vessels are spoken, and half pilotage when not spoken, payment being compulsory. Special rates for mail steamers and tugs are charged. See List of Lights and Admiralty Chart No. 573. Total tonnage of vessels which entered in 1908, 815,507.

New Westminster Harbour, British Columbia, is on the Fraser river, about 15 miles above its entrance, in latitude 49° 12′ N., longitude 122° 55′ W. The Fraser river is navigable for large vessels for about 30 miles from its entrance.

New Westminster, British Columbia. Part of Water Front on the Fraser River.

NEW WESTMINSTER, B.C. PART OF WATER FRONT.

At New Westminster there are forty-four wharfs having an area of about 185,000 square feet, and in nearly every instance these wharfs have sheds or warehouses for storage of freight. Nine of the wharfs are for public use, all having sheds and railway sidings to the ships' side. For a distance of three miles one railway runs along the inside ends of the wharfs, and for two miles there are three railways having separate tracks and each having switches to various wharfs.

The facilities for loading are good, a number of moveable hoists being available, and the depth of the water along the wharfs is from 25 to 40 feet. Small vessels are repaired at two docks and large vessels at one dock. Material for repairs and workmen are obtainable and machine shops are located at this place. The average depth for anchorage is 40 feet and the bottom good for holding. The dockage facilities of the port are three sets of ways and one floating dock. No. 1 of the Westminster Marine Railway Company has a capacity of 1,000 tons, length of 350 feet, cradle 120 feet, width of cradle 36 feet, depth of water at foot of ways 15 feet at high water and the motive power is electric. No. 2, one set of ways owned by the Brunette Sawmill Co., is 120 feet long, length of cradle 75 feet, width 30 feet, capacity 200 tons, and the water is 20 feet at high tide. No. 3, owned by Barnet & McDonald is about 100 feet long, with cradle 50 feet long and 20 feet wide, capacity about 150 tons. No. 4, a dry dock owned by Seaton Bros., 130 feet long by 40 feet wide and 4 feet deep.

The Schaake works owns a wharf and floating pontoon, water frontage 196 feet, depth of water 30 feet. The steam railway trucks pass along this wharf and an electric railway in front of their works close to the wharf. The wharfage frontage of E. J. Fader is 666 feet long, with 200 feet of the wharf built with switch lines on the inner side and one on the outer side by which vessels load from and unload into cars or a warehouse. Large warehouses are under construction at this wharf which will accommodate several ship loads of freight. The depth of water at the wharf front is 35 feet at low water. The Fraser River Lumber Company owns a lumber mill with large capacity for sawing, planing, &c., and a wharf with 30 feet of water. The Royal City Planing Mills Branch of the B. C. M. T. & T. Co.,

has a water front of 1,848 feet and a wharf; depth of water, 16 feet. The mills of this company are of large capacity, turning out large quantities of lumber, shingles, doors, windows and mouldings, &c., and the water frontage is largely used by the company.

The city water frontage in use at the present time includes the use of property occupied by the following companies, viz.:— Small & Bucklin Lumber Company, water frontage, 500 feet; depth of water, 20 feet. Gilley Bros., 132 feet frontage, with coal bunkers and storehouses; depth of water, 30 feet. Dominion government, frontage, 264 feet with storehouses; depth of water, 30 feet. Canadian Pacific Railroad, water front 330 feet, with warehouses; depth of water, 25 feet. British Columbia Electric Railway Company, waterfront 264 feet with freight sheds and tracks; depth of water, 25 feet. St. Mungo Cold Storage fish freezing plant, depth of water, 30 feet. Columbia Cold Storage fish freezing and ice plant, Canadian Pacific Railway Navigation Co., water frontage, 399 feet; storehouse and freight sheds; depth of water, 30 feet. Myers & Preston, water front, 66 feet; coal bunkers; depth of water, 25 feet. Brackman & Ker Milling Co., 198 feet water front, hay and grain sheds; depth of water, 30 feet. V. W. & Y. Railway, frontage 462 feet, with freight sheds; depth of water, 25 feet. New Westminster Fruit Packing Company, 198 frontage; depth of water, 25 feet; Butterfield & Co., fish canning establishment, frontage, 66 feet; water, 25 feet deep; Packers' Association fish canning, depth of water, 30 feet. Swanson & Co., boat sheds, depth of water, 25 feet. Monck & Co., 66 feet frontage, depth of water, 25 feet. V. W. & Y. Railway, frontage, 396 feet; depth of water, 25 feet; railway ferry to Vancouver island. Myers & Preston, water frontage 132 feet, sheds, storehouses, &c.; depth of water, 25 feet.

The least depth of water between the mouth of Fraser river and New Westminster is 12 feet at low water at a point 5½ miles within the entrance, and 22 feet at high water springs. Lights have been placed for guiding vessels, on New Westminster bridge, latitude 49° 12′ 43″ N., longitude 122° 53′ 43″ W. Other lights are located at Garry point, mouth of the river, North dam and South curve, also a lightship at Sands heads

and a gas and whistling buoy at Roberts' bank. The Fraser river is well buoyed at the entrance. See List of Lights, British Columbia Pilot and Chart No. 2689. Coal and supplies of all kinds can be obtained readily. *Port charges* are harbour master's dues paid twice a year, sick mariners' dues three times a year if not paid elsewhere. Port warden's charges when surveys are made. *Pilotage* is under the New Westminster Pilotage authority, and the rates for the district are:—

(*a*) For vessels under sail $2 per foot draught of water and one cent per net registered ton.

(*b*) For vessels in tow of a steamer $1 per foot draught and one cent per net registered ton.

(*c*) For steamers $1 per foot draught of water and one cent per net registered ton.

North Sydney Harbour, Cape Breton, Nova Scotia, is in latitude 46° 13′ N., longtitude 60° 14′ W. It is a safe harbour, easy of access for vessels of all classes, and is a port of call as well as a large coal shipping port. The water area of the harbour is about 12 square miles, with a depth available of 46 feet at high water and 42 feet at low water. The port is the terminus of the Intercolonial Railway and the railway pier has a depth of 24 feet alongside for two hundred feet in length of the pier at high water, while the inner end of the wharf has a depth varying from 24 to 10 feet. There are sheds for receiving all kinds of merchandise on the pier. The Nova Scotia Steel and Coal Company have two large piers, the first is 900 feet long, with a depth of water of 28 feet at high water. Storage pockets for coal with a capacity of 5,000 tons; the top of the pier is 70 feet above tide and the discharging end of the highest chute is 45 feet above high water; the second pier is 650 feet long, fitted with two gantry cranes with lifting power of ten tons each, and the dock between the two piers has been dredged to a depth of 28 feet; at the head of this dock is a low level wharf 250 feet in length, available for storage of goods.

There is a breakwater east of these piers about 1,500 feet in length, with depth of water alongside 300 feet of its length; water 16 feet at low water.

There are three other good wharfs about 400 feet in length,

North Sydney, Cape Breton, Harbour, Coal and Ore Piers.

with large storehouses, and a depth of water of 16 feet at low water. There is also a small marine railway at which vessels of 250 tons can be hauled out.

North Sydney roads afford good open anchorage with off shore winds. The roads are much used by vessels seeking freight, and vessels anchoring are exempted from port charges (harbour dues), but are subject to North Sydney inward pilotage unless a pilot is employed inward and outward.

The harbour is under control of harbour commissioners, who regulate port charges and these charges are harbour dues. Supplies of all kinds are readily obtained.

Pilotage is under the control of the North Sydney Pilotage authority and the inward rates are: for vessels of 120 to 150 tons, $6.50; vessels 150 to 200 tons, $7.50; from 200 to 250 tons, $9; from 250 to 300 tons, $10; from 300 to 350 tons, $11; from 350 to 400 tons, $12, and for every additional 50 tons or fraction thereof, 75 cents extra. Outward pilotage is half rates. Payment of pilotage is compulsory, with the exception of upon vessels belonging to the county of Richmond and fishing vessels not exceeding 250 tons, which are exempt. The lights are: Low point, at entrance to Sydney harbour, latitude 46° 16′ 12″ N., longitude 60° 7′ 22″; one on Sydney bar, west end of S. E. bar and Sydney range lights on Point Edward. See List of Lights, St. Lawrence Pilot and Chart 2,727, plan 2,042. The total tonnage entered during the fiscal year 1908, was 477,601.

Parrsboro Harbour, Nova Scotia, is at the head of an indentation in the Bay of Fundy, three miles east of Cape Sharp. The harbour is dry at low tide and the average tide is 17 or 18 feet, and at high tide 26 to 27 feet. Vessels drawing about 17 feet of water can load there. Larger vessels load at West bay, a distance of about four miles. Lumber is carried out to large vessels by schooners. The wharf accommodation at Parrsboro is about 255,000 square feet, all of which is reached by railway. Besides the above area, the Cumberland Railway and Coal Company have a shipping pier for coal which is about 1,000 feet long by 40 feet wide. There are good marine blocks at Parrsboro for repairing vessels as large as 1,265 tons. Supplies are readily obtained and coal is easily procured.

tom mud, protected from all winds excepting from E.N.E. to tom mud and protected from all winds excepting from E.N.E to south. Spring tides rise 45 feet and neap tides 35 feet. The lights are: one on Parrsboro or Partridge island in latitude 45° 23′ 11″, longitude 64° 19′ 5″; one on Cape Sharp on the southern extremity of the cape. See List of Lights, S. E. Coast of Nova Scotia Pilot and Admiralty Chart No. 2,042. Port charges are harbour master's dues twice a year and sick mariners' dues three times a year if not paid elsewhere. Tonnage entered at Parrsboro during fiscal year 1908, 199,235.

Paspebiac Harbour, province of Quebec, is in Paspebiac bay, between Paspebiac point and Carleton point, and is the principal fishing port in Chaleur bay. Paspebiac light is in latitude 48° 1′ N., longitude 65° 14½′ W. The anchorage in the roadstead is good. The wharfs in the harbour are No. 1, owned by the Dominion government, No. 2, owned by C. Robin Collas & Co., Ltd., and No. 3, by the LeBoutillier Bros. Co., Ltd. These wharfs are of considerable length and are used by fishing vessels and small vessels which load lumber and ties. There are no docks for repairing vessels, but small vessels can be beached by the tide. There is one can buoy in the harbour at the western side of Paspebiac spit. The lighthouse is on the end of Paspebiac point. A limited quantity of stores can be obtained.

The large fishing establishments of C. Robin Collas & Co., Ltd., are situated in the harbour, also the fishing establishment of the LeBoutillier Bros. Co., Ltd. Both of these firms carry on fishing very extensively and have cold storage for this industry.

Port charges are the same as generally prevail in Dominion harbours, and are harbour master's dues and sick mariners' dues when not paid elsewhere. See List of Lights, St. Lawrence Pilot and Chart 1,633. The total tonnage which entered during the fiscal year of 1908 was 84,413.

Percé Harbour, province of Quebec, is in Percé bay, between White head and Perce rock; the harbour is known as South beach and the first small bay north westward of Percé rock is known as North beach. There are landing piers in both coves, the one in the northern cove being 670 feet long, with 13

feet of water at the head. The tide rises 5 feet at spring and 3 feet at neap tides. The water in the southern part of the bay is from 4 to 5 fathoms in depth and at the mouth of the bay, 8 to 9 fathoms. The bottom is mud at the latter depths. Coasting steamers running between Montreal and Pictou call at Percé. It is principally a fishing port. The lighthouse is on White head, latitude 48° 30′ 30″ N., longitude 64° 12′ 40″ W. A black can buoy is moored off South beach and a red can buoy off North beach, both in about 17 fathoms of water.

The *port charges* are harbour master's dues and sick mariners' dues when not paid elsewhere. See St. Lawrence Pilot, Admiralty Chart 1,163 and List of Lights. Total tonnage entered during fiscal year of 1908 was 77,676.

Port Hawkesbury, Cape Breton, Nova Scotia. This harbour is in the Gut of Canso and is much used for shipping coal. The trade consists of shipping coal, fishing and in general produce. The harbour is a large cove with from 2 to 4½ fathoms inside Premier shoal, one channel is north of the shoal with 4½ fathoms of water at low water, the other channel south of the shoal has a depth of 3½ fathoms at low water. Premier shoal forms a middle ground and the least water over it is 12 feet, the tide rises 4 feet at spring tides and 2 at neap tides. The anchorage outside Premier shoal is good for large vessels, the depth of water being from 7 to 9 fathoms with sand, gravel and mud bottom. This anchorage is, however, open to north-north westerly winds, which at times cause a heavy sea. In the harbour there is safe anchorage in 3½ fathoms, low water. The Intercolonial Railway has its terminus at Point Tupper, where a large group of wharfs has been built, extending about 400 feet from shore, with a frontage of about 500 feet. The railway station and sheds are on this wharf, and a ferry steamer with railway tracks for carrying cars to the mainland of Nova Scotia runs throughout the year. The steamer carries nine railway sleeping cars 80 feet long, weighing 52 tons unloaded.

There are patent slips at Port Hawkesbury which take on vessels of 1,000, 200 and 130 tons respectively. The largest is 200 feet long, 45 feet wide with 20 feet of water over the cradle at high water or during springs. Provisions, coal and all material are readily obtained.

The lighthouse is at Point Tupper, latitude 45° 37′ N., longitude 61° 22′ W. *Port charges* are harbour master's dues paid twice in the year, and sick mariners' dues paid three times in the year if not paid elsewhere. *Pilotage* is under the Inverness Pilotage authority, and the rates are: for vessels from 200 to 500 tons, $5 inwards, $2.50 outwards; 500 to 1,000 tons, $10 inwards, $5 outwards; 1,001 to 1,500 tons, $15 inwards, $6 outwards; 1,501 to 2,500 tons, $20 inwards, $8 outwards; 2,501 to 3,500 tons, $25 inwards, $10 outwards; 3,501 to 5,000 tons, $35 inwards, $15 outwards.

See St. Lawrence Pilot, Admiralty Chart 3,383, plan 3,383 and List of Lights. The total tonnage which entered in the fiscal year 1908 was 310,258.

Pictou Harbour, Nova Scotia, is a good harbour and very easy of entrance. Vessels drawing 22 feet can enter at low water and vessels drawing 28 feet at high tide. The course is straight. Inside the bar vessels can anchor in from 5 to 7 fathoms. Opposite the town the harbour expands into three large arms, the mouths of East, Middle and West rivers. Large quantities of coal from the mines in the vicinity are shipped and many steamers bunker at this port. The principal piers are the railway piers, one of which is 500 feet long where ships load lumber up to 26 feet draught; upon this wharf are large sheds for general merchandise carried by the Intercolonial Railway Company and shipped in large quantities via the winter steamers to Prince Edward Island; another railway pier is 150 feet long, with 26 feet of water; railway tracks are laid on these piers. One coal pier owned by the Acadia Coal Company and one by the Intercolonial Coal Company, where ships can load to 28 feet from chutes. There are several small wharfs where vessels drawing 14 feet can load and discharge.

The marine slip at this port can haul out a vessel of 1,400 tons net tonnage. Foundries and machine shops afford facilities for repairs to steamers and shipyards to wooden vessels. Provisions, stores of all kinds, coal and water are readily procured.

Port charges are harbour master's dues paid twice in the year, and sick mariners' dues paid three times in the year if not paid elsewhere. Port warden's dues when surveys are made. Wharf-

age is charged on cargoes of general merchandise and produce. *Pilotage* is under the Pictou Pilotage authority and payment is compulsory. Half rates are charged if a vessel is spoken in the district and refuses a pilot. The rates are: vessels of 120 to 140 tons, $6 inwards, $4 outwards; 140 to 200 tons, $10 inwards, $6 outwards; 200 to 300 tons, $12 inwards, $8 outwards; 300 to 400 tons, $14 inwards, $9 outwards; 400 to 500 tons, $15 inwards, $10 outwards; 500 to 600 tons, $16 inwards, $11 outwards; 600 to 700 tons, $17 inwards, $12 outwards; 700 to 800 tons, $18 inwards, $13 outwards; 800 to 900 tons, $19 inwards, $14 outwards; 900 to 1,000 tons, $20 inwards, $15 outwards; 1,000 tons and upwards, 2½ cents inwards and 2 cents outwards per ton. All vessels under 120 tons, $4 inwards and $2 outwards. Docking and moving vessels from anchorage in harbour, $4.

The lights are: one on the Custom House, Pictou, latitude 45° 41′, longitude 62° 42′; two range lights inside the harbour; one on Pictou bar and three on Pictou island. The harbour is also well buoyed. See St. Lawrence Pilot for sailing directions, Admiralty Chart 1,989, and List of Lights. Total tonnage entered this harbour in the fiscal year of 1908 was 208,450 tons.

Prince Rupert Harbour is entered from Graham sound by vessels from the north, between Kinnahan islands and Lima point, the extreme south point of Digby island, and from the south by Grenville channel, Arthur passage and Malacca passage inside channels and by Hecate strait on the outside. The depth of water in the course which vessels from the north take at the entrance, is from 21 to 29 fathoms, and the least depth at low water is 14 fathoms southwest of Georgia rock which is buoyed with a gas buoy. The course from the south to the entrance is from 20 to 25 fathoms. The northern entrance is about 1½ miles wide between Lima point and the Kinnahan islands. The width between Digby island and Kaian island about the same distance when the entrance to the north narrows until it reaches Casey point on the west shore of Kaian island, where the width is about nearly half a mile. At Parizeau point, on the same shore, the entrance widens to half a mile. At Pilsbury point on the same side, the entrance expands to about a mile and

PRINCE RUPERT.

continues this width for some distance along the front of the town. The water north and east of the town is about 20 fathoms deep and opposite the town from 23 to 17 fathoms in the channel and about 6 fathoms alongside the wharf.

The wharf at Prince Rupert is about 1,500 feet along the water front, with two sheds on it. The anchorage in the harbour is good for vessels of any size and draught. Range lights are placed on coast island in line with the course used by vessels from the north. These lights are in latitude 54° 12′ 43″, longitude 130° 19′ 53″. Acetylene buoys are located near Georgia rock, Spire ledge, Barrett rock, Holland island and Casey point. These buoys show flashing lights. A lighthouse tower is situated on the west side of the northernmost island of Lawyer islands in Malacca passage, latitude 54° 6′ 58″, longitude 130° 20′ 47″.

Prince Rupert is the selected terminus of the Grand Trunk Pacific Railway, now under construction, and the harbour is one of the finest on the Pacific coast, having great depth of water and the tide rises from 17 to 24 feet at alternate spring tides and 16 feet at neap tides. Quite a trade has already sprung up at this port and steamers run between ports to the south and north of Prince Rupert. Nothing can be said of the port charges until a harbour master and port warden are appointed. Pilotage is under the control of the Vancouver Pilotage authority and vessels going north can procure pilots at Vancouver or within the pilotage district. The total tonnage of vessels which entered during the fiscal year of 1908 was 388,110. See List of Lights and Marine Chart No. 301.

Quebec Harbour, province of Quebec, is in latitude 46° 49′ N., longitude 71° 13′ W., and is situated on the St. Lawrence river. It comprises the river and its navigable tributaries between St. Patrick hole and Carouge point (Cape Rouge), at about eight miles above the city. The harbour affords excellent anchorage over its greater part, the water between the banks of each shore being deep; anchorage is prohibited between lines drawn from the southeastern corner of Crawford's wharf to the southeastern corner of Barras wharf on the northeast and from the middle of Champlain market hall to the northwestern corner of Simpson's wharf on the southwest. This space is in-

QUEBEC—OUTER BASIN.

dicated in day time, by sign boards and at night, by red lights on both sides of the river.

The harbour affords wharfage accommodation for a large number of vessels. In the inner basin seven steamships can be berthed, and in the outer basin eight large steamers at one time. At Point à Carcy wharf and the breakwater and the breakwater extension, four of the largest steamers can also be berthed at one time; in addition wharfage accommodation can be given to a large number of ordinary size and small vessels.

Wet Dock.—The wet dock is an inclosed basin of 40 acres water surface. Entrance 66 feet wide, depth of water, 28 feet over sill at high tide, general depth 25 feet.

Quay Frontage of the Wet Dock.

Louise Embankment Quay wall... ..	Frontage, 2,085 lin. feet. Min. depth of water, 25 feet.
Dominion Coal Co's berth...	Frontage, 400 lin. feet. Min. depth of water, 25 feet.
Cross wall north of entrance...	Frontage, 600 lin. feet. Min. depth of water, 25 feet.
Cross wall south of entrance..	Frontage, 230 lin. feet. Min. depth of water, 18 feet.

Tidal Harbour.

The tidal harbour is a basin with a water surface of 20 acres; general depth of water, 26 feet at low tide; the entrance to the basin is 200 feet.

Quay Frontage of Tidal Harbour.

Louise Embankment Quay wall (under construction)..	Frontage, 1,070 lin. feet. Depth of water at low tide, 28 feet.
Cross wall, north of entrance..	Frontage, 600 lin. feet. Depth of water at low tide, 26 feet.
Cross wall, south of entrance...	Frontage, 150 lin. feet. Depth of water at low tide, 24 feet.
Point-à-Carcy..	Frontage, 600 lin. feet. Depth of water at low tide, 29 feet.
Breakwater, Tidal harbour face...	Frontage, 680 lin. feet. Depth of water at low tide, 24 feet.

Surface of Quays about 50 acres.

Point-à-Carcy, Pond face	Frontage, 280 lin. feet. Depth of water at low tide, over 40 ft.
River face	Frontage, 580 lin. feet. Depth of water at low tide, over 40 ft.
Breakwater	Frontage, 880 lin. feet. Depth of water at low tide, over 40 ft.
Breakwater extension completed	Frontage, 850 lin. feet. Depth of water at low tide, over 40 ft.
Under construction	Frontage, 610 lin. feet. Depth of water at low tide, over 40 ft.

The cold store has a refrigerated space of 100,000 cubic feet, and in connection with the cold store there is a general warehouse of four flats 130 x 35 feet.

The cross wall divides the wet dock from the tidal harbour, forms part of the quay frontage in both of the basins, and connects the Louise embankment with the city.

Dry docks are located at Lévis on the opposite side of the river. The Lévis or dry dock owned by the Dominion government, sometimes called the Harbour Commissioners' dock, is 600 feet long on blocks, breadth of entrance 62 feet, and depth of water on the sill is 26½ feet and 23¼ on the blocks at high water, spring tides. Geo. Davie & Sons own two floating docks also at Lévis. No. 1 is 230 feet long, width of entrance 41 feet, and will take a vessel drawing 13 feet of water. This dock is sometimes lengthened by a water tight compartment at the end. The lifting power at the dock is 2,175 tons. The length of No. 2 dock is 180 feet, breadth of entrance 39 feet; it will take a vessel drawing 13 feet, lifting power is 1,605 tons. Davie's patent slip close to the floating docks has a length of 150 feet and can take a vessel drawing 10 feet of water. Russel's floating dock is also situated at Lévis and is 225 feet long over all, 41½ feet broad at entrance, takes a vessel drawing 15½ feet of water and has a lifting power of 2,500 tons. Close to this dock is Russel's gridiron 200 feet in length.

There is a twenty-five ton crane and a nine ton steam hammer at Quebec. Steel castings of large size are made at Montreal and large forgings are made at New Glasgow and forwarded to Quebec by rail.

Quebec, Outer Tidal Harbour, Louise Docks.

Quebec, Outer tidal Harbour Louise Docks, SS. Michigan, (11,900).

Repairs can be made to large steamers in Quebec, covering hull, machinery and boiler repairs. The tides rise 18 feet at springs and neaps 12½ feet, neaps ranging 10 feet.

All kinds of supplies, stores and provisions can be procured at very reasonable rates.

Ferry steamers cross between Quebec and Lévis all the year round, the ferry steamers being specially equipped and strengthened for ice in winter. Point à Carey wharf, Quebec, is the point from which the ice-breaking steamer *Montcalm* makes her trips and returns, when engaged during the winter in ice-breaking above and below Quebec. The *Montcalm* was engaged in breaking the ice bridge or jam at Cap Rouge during the most of the winter 1909, enabling the ice to move down the river gradually and thus opening navigation to Quebec at an early date.

The harbour is under the control of Harbour Commissioners, who conduct all arrangements for improving their own wharfs and docks on the Quebec side, and manage the affairs of the harbour. A number of private wharfs are owned as well in Quebec.

The *port charges* are harbour master's dues, paid to the Harbour Commissioners on vessels and cargo using their wharfs and docks. Moorage is also charged at Quebec on vessels and wharfage on cargo, a reduction being made in moorage if a full cargo is not shipped in the port. Sick mariners' dues are paid three times in the year when not paid elsewhere. Port warden's charges are made for surveys of cargo and vessels when required. A salvage plant subsidized by the Department of Marine and Fisheries is maintained at Quebec.

Pilotage is under the control of the Minister of Marine and Fisheries, and the rates are:—

From Father Point to harbour of Quebec per foot draught of water, from May 1 to November 10, $3.87; from November 10 to 19, $4.95; from November 19 to March 1, $6.02; from March 1 to May 1, $4.41.

From Brandy Pots to Quebec, two-thirds of the amounts from Father Point.

From St. Roch point to Quebec, one-third of the amounts from Father Point.

From Pointe-aux-Pins or Crane island to Quebec, one-quarter the amount from Father Point.

From Quebec to Father Point, from May 1 to November 10, $3.40; from November 10 to 19, $4.46; from November 19 to March 1, $5.54; from March 1 to May 1, $3.93.

From any place in the harbour of Quebec, not being a wharf, to any other place, not being a wharf, $5.

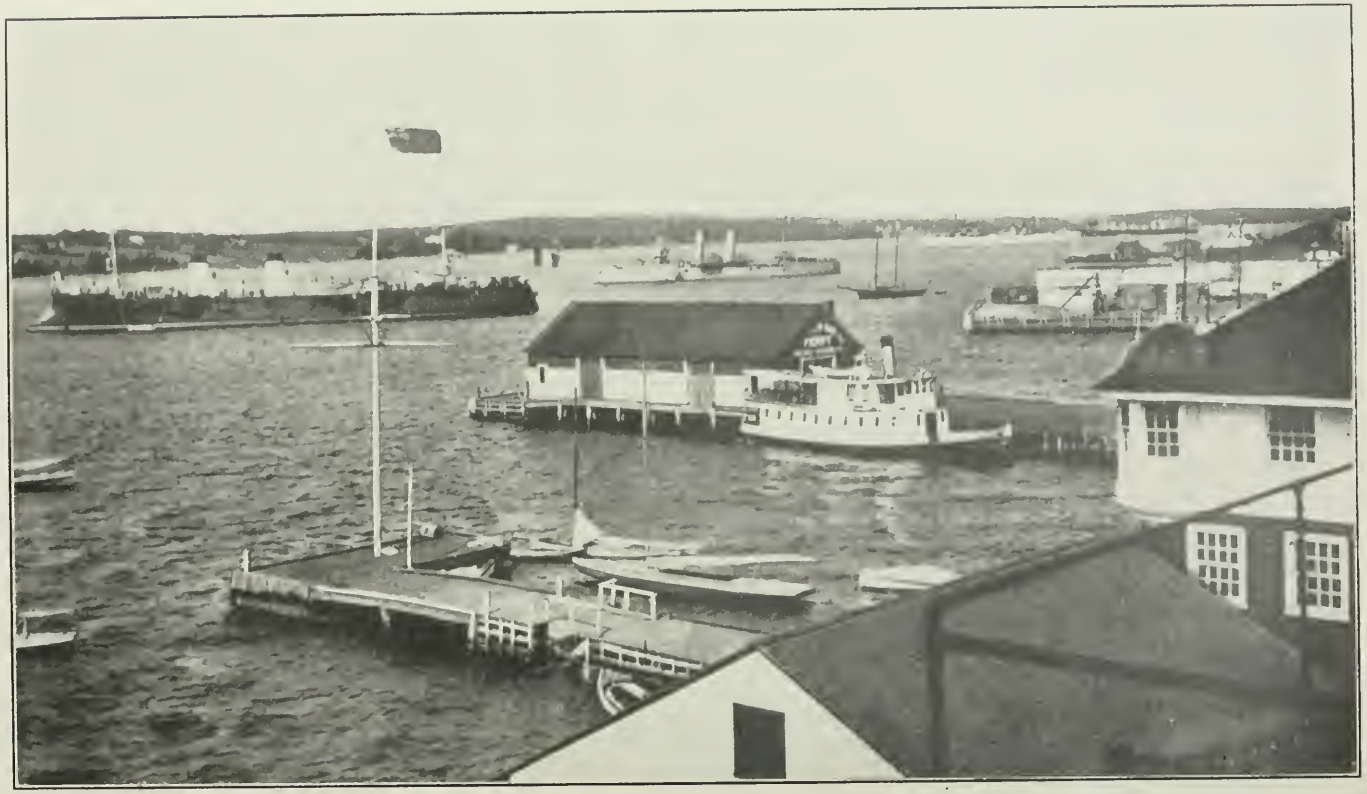
From any wharf in the harbour between Point à Carey below, and the west end of Allan's wharf above, both inclusive, $2.50.

Range lights are situated in Quebec harbour, one on N.E. corner of Princess Louise embankment in latitude 46° 49′ 17″, longitude 71° 12′ 15″, and one on Cross wall, Louise basin, 1,690 feet W.S.W. in rear of front light. Other lights in the vicinity are the Upper Traverse, Lower Traverse, one on the extremity of the wharf, Island of Orleans, and one at St. Laurent, same island. The river is also well buoyed from Beaujeu bank below Quebec to Platon above with gas buoys, thirty being now in position showing strong lights and a number of steel can and conical buoys.

See St. Lawrence Pilot, List of Lights, Admiralty Chart 319. The total tonnage which entered Quebec during the fiscal year of 1908 was 2,225,377.

Sydney Harbour, Cape Breton, Nova Scotia, is an inlet extending south-westward five miles from its entrance, with a general width of 1$\frac{1}{10}$ miles; it then divides into West arm, which runs west-south-westward for 3$\frac{3}{4}$ miles to Ball creek, with a general width of three-quarters of a mile; and South arm which runs southward and southwestward for five miles, with a width decreasing from nearly a mile to 1$\frac{1}{2}$ cables. The harbour is entirely land locked, with a depth of water of from 6 to 10 fathoms and no obstructions. The area of water from 5 to 7 fathoms is approximately 2$\frac{8}{10}$ square miles in the harbour of Sydney. The depth of water along some parts of the frontage of the town is over 8 fathoms within a few feet of the shore.

The Dominion Coal Company has two piers known as the International piers No. 1 and No. 2. No. 1 pier is 1,120 feet long by 40 feet in width. It has two high level tracks for the



Sydney, Cape Breton, Harbour.

full cars and two return tracks which carry empty cars to the low level yard. The pier is equipped with two Ludlow towers and cranes, by which coal is hoisted in buckets and deposited in bunkers and holds of vessels. The loading berth has 26 feet of water at low water. The rise of the tides are 6 feet at springs and 4 feet at neaps. Pier No. 2 is 1,150 feet long, with double tracks laid, equipped with steel chutes and a Denton hoist. From this pier can be loaded 1,800 tons per hour on one side and 15,000 tons in 24 hours. Four steamers can be berthed, loaded or bunkered at one time. Berths for schooners are also provided. The piers are electric lighted and are equipped with stand pipes, and hose fed by a large fire pump which has direct connection with the sea as well as with the city water main. This company has another large pier and low level wharf in good condition.

The Dominion Steel Company also has two piers, and from No. 1 pier is shipped steel rails, billets, &c. It has four towers with a capacity of four tons each, and has ample length and water to accommodate a steamer of 10,000 tons; No. 2 pier has six Hoover and Mason grabs which lift five tons each. At this pier a vessel of 7,000 tons can be discharged in ten to eleven hours, and can discharge from ten to eleven thousand tons in one day. There are several small piers with considerable warehouse accommodation.

The lights are Low point light, east side of entrance to Sydney harbour, latitude 46° 16′ 12″, longitude 60° 77′ 22″, with a fog alarm building and a marine telegraph and signad station; Sydney bar light on west end of southeast bar; Sydney range lights, front light on a point south side of west arm of Sydney harbour, back light half mile S. 59° W. from front light; there is also a gas and whistling buoy near Low point moored in 19 fathoms of water, and a gas buoy near Sydney southeast bar, moored in 7½ fathoms.

Port charges are harbour master's dues paid twice a year, and sick mariners' dues three times a year when not paid elsewhere. *Port warden's* fees are paid when surveys are made. *Pilotage* is under the North Sydney Pilotage authority and payment is compulsory and half pilotage when spoken, and the inward rates are for vessels of 120 to 150 tons, $6.50; vessels 150 to

200 tons, $7.50; from 200 to 250 tons, $9; from 250 to 300 tons, $10; from 300 to 350 tons, $11; from 350 to 400 tons, $12; and for every additional 50 tons or fraction thereof 75 cents extra. Outward pilotage at half rates. Payment of pilotage is compulsory, with the exception of vessels belonging to the county of Richmond and fishing vessels not exceeding 250 tons, which are exempt.

See List of Lights, St. Lawrence Pilot and Admiralty Chart 2,042, plan 2,042. The total tonnage of vessels which entered Sydney during the year 1908 was 1,266,152, which does not include vessels that cleared.

St. John Harbour, New Brunswick, lies at the head of the bay into which the St. John river flows on the north side of the Bay of Fundy. The harbour is safe, commodious and always accessible. The tide rises and falls in the harbour of St. John from 20 feet at ordinary neap tides to 28 feet at spring tides. The rise and fall of the tides keep the harbour free from ice all the year. The port is the terminus of several steamship lines in winter. Partridge island protects the harbour on the south side, from Partridge island to the head of the harbour is a distance of two and one-half miles. There are two channels, known as the east and west, on each side of the island. The east channel is 800 feet wide, varying in depth from 22 feet to 30 feet at low water, spring tides, and is used by all vessels drawing more than 9 feet of water. The channel is being deepened and will shortly be navigable at any stage of the tide, for the largest steamers.

About one mile inside Partridge island, a beacon marks the western boundary of the main channel, and from the beacon looking north to the head of the harbour it is one and a half miles long and from 1,400 to 2,900 feet wide, and this harbour is fully developed.

There are at present in use fifteen deep-water berths for ocean steamers, with capacious warehouses, seven berths for steamers drawing not more than 10 feet of water, and one mile and a half of frontage, including slip-faces at which vessels can be moored and receive cargoes, although grounded, without inconvenience or damage. The facilities for repairing consist of sets of blocks owned by the city and private concerns.

St. John, N.B., Harbour — General View.

St. John, N.B., Waterfront.

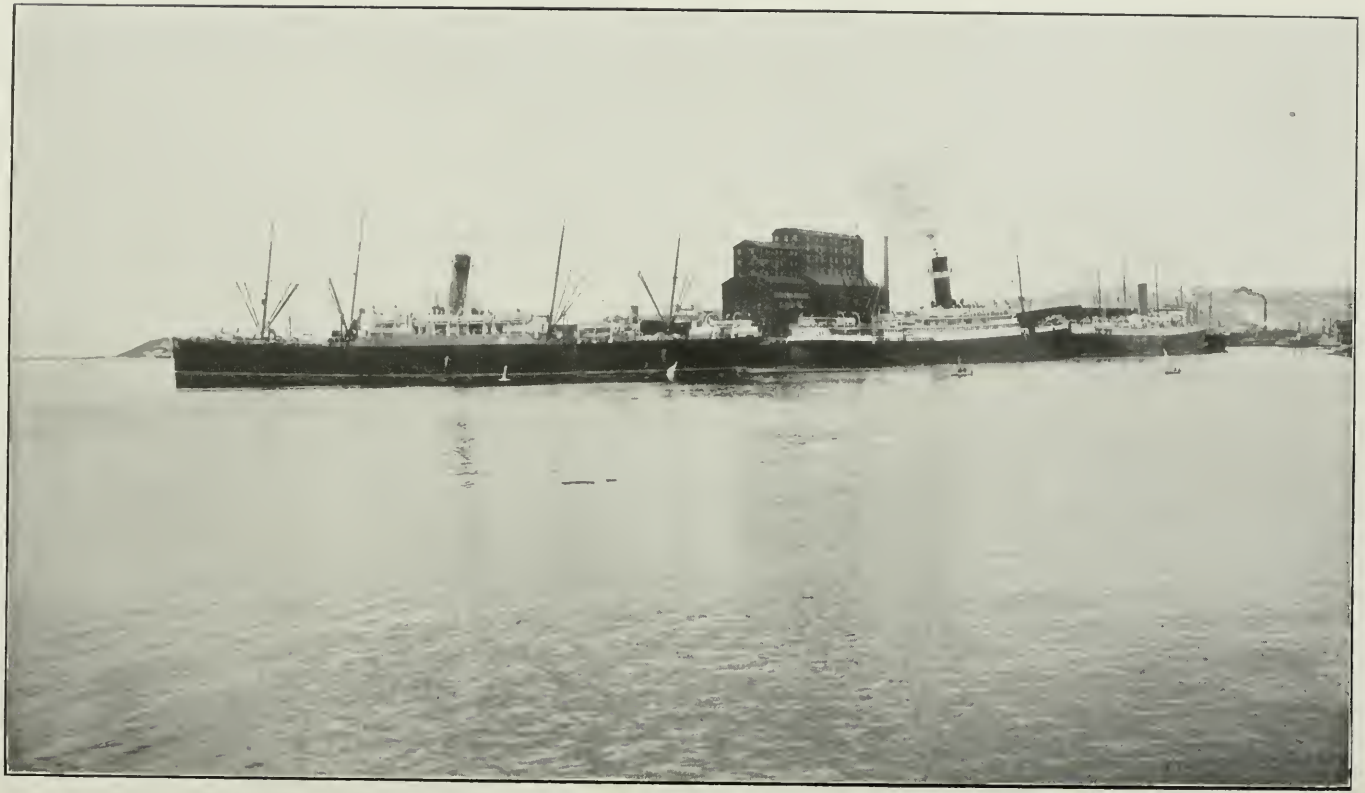
The anchorage grounds in and adjacent to the harbour extend over a wide area. For large vessels there is ample anchorage accommodation; the bottom is composed of soft mud with gravel in places.

There are thirty-eight wharfs ranging in length from 200 to 1,540 feet. There are fifteen large sheds, besides coal sheds and pockets. There are about eighteen railway sidings belonging to the Canadian Pacific Railway Company, the Intercolonial Railway and the New Brunswick Southern Railway adjacent to the wharf sheds. At nineteen wharfs the depth of water ranges from 18 to 31 feet at low water. At eighteen wharfs it is 20 feet at high tide.

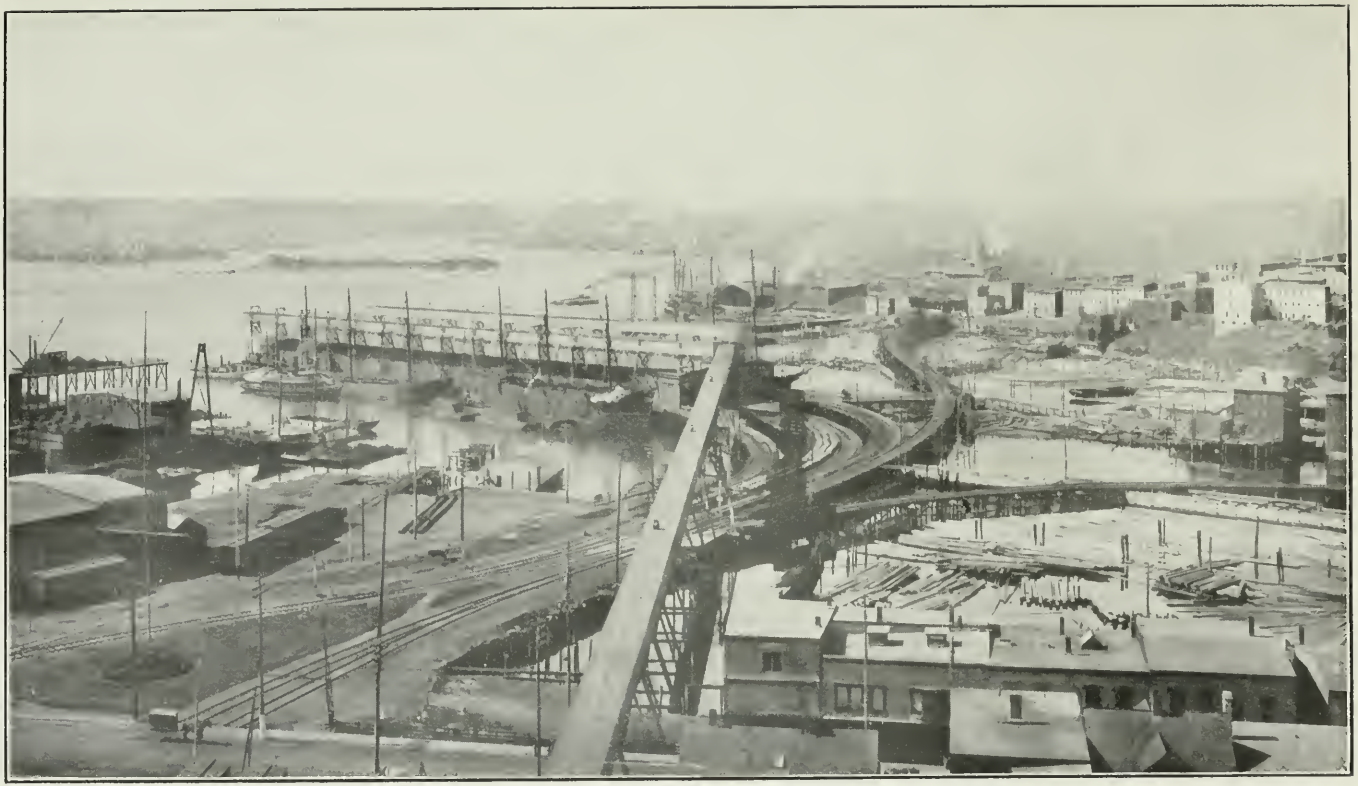
At St. John west, the Canadian Pacific Railway extends its tracks to the Canadian Pacific Railway wharf, Union wharfs 1, 2, 3 and 4 and New South Rodney 5 and 6, upon which wharfs are sheds; the New Brunswick Southern Railway to North Rodney wharf and Nelson wharf, upon which is a coal shed. At St. John east the Intercolonial Railway extends its tracks to the Intercolonial Railway ballast wharf slip and to the same slip west and north and to the public pier to Petingell wharf and McLeod wharf, also to the Intercolonial Railway pier east and west.

The Canadian Pacific Railway has a grain elevator at St. John west from which grain is conveyed to vessels lying at the company's wharf and at the Union wharfs. The conveyor is 1,800 feet along the front of the wharfs. The capacity of the elevator is 1,032,000 bushels and is in constant use during the winter season by transatlantic steamers. Excellent cattle sheds are connected with the Canadian Pacific Railway wharfs, so arranged that cattle are taken into them from the cars at one side and driven aboard the vessels from the other side.

The Intercolonial Railway has connected with its terminal wharf at York point an elevator with a capacity of 500,000 bushels, equipped with all the facilities for handling grain. The wharf is a crib wharf, tight faced, 535 feet long and 156 feet wide, two tracks, a shed 510 feet long by 118 feet wide, with doors on both sides for handling freight and two tracks in the centre holding thirteen cars. Depth of water at this track 30 feet at low spring tide on each side of the wharf and the



St. John, N.B.



St. John N B. Harbour From C. P. R. Elevator Looking West.

same on the harbour front. The Intercolonial Railway has also a crib wharf with large shed for flour shipped to Bay of Fundy ports. A number of private wharfs are located in the harbour. The harbour is under control of the city corporation.

A cold storage plant is owned by the New Brunswick Cold Storage Company, and is located beside and facing the Intercolonial pier. Any large or small vessel running into the port may easily dock there at any time. There is siding accommodation for sixteen cars at one time, operated either by the Intercolonial or Canadian Pacific railways, when required. The cold store, in addition to large space for general storage, has accommodation of 80,000 cubic feet for fresh fish.

St. John has communication with different ports of the world by water and railway, and telegraph communication with most of the most important towns and cities in the maritime provinces and with Quebec and Ontario and the United States. It is used as a winter port for the shipment of lumber, grain, cattle and agricultural products to European ports and the landing of passengers and mails.

The lights on the approaches and harbour are: one at Tiner point approaching with a fog alarm, latitude 45° 9′ 22″, longitude 66° 11′ 22″; submarine bell off Negro head, Partridge island lighthouse in the harbour, latitude 45° 14′ 7″, longitude 66° 2′ 45″; Negro point lighthouse; light on a beacon in the harbour; one also on the Intercolonial Railway wharf and one at Reed's point. A bell boat with gas lantern is anchored off Partridge island and a gas buoy off Negro point.

Port charges are dues collected by the city corporation for the use of wharfs: sick mariners' dues are paid three times a year when not collected elsewhere, and port warden's charges when surveys of cargo and ships are made. *Pilotage* is under the control of the St. John Pilotage authority and the rates are:

INWARD.

First District, from Partridge Island to Musquash Head, bearing N.W., per foot draught of water	$1 50
Second District, from Musquash Head to Point Lepreaux, N.W., per foot draught of water	1 75

Third District shall be from the outside limit of the Second District to a bound ranging from the North Head of Grand Manan to Liberty Point, bearing N.W. by W., North Channel, and from Machias Seal Island to Cape Sable, Seal Island, bearing S.S.E., South Channel, per foot draught of water.. .. .. 2 25

OUTWARD.

From the harbour of the Port of St. John, N.B., to outside of Partridge Island, per foot draught of water.. .. .. 1 25
Down the Bay of Fundy, when required, shall be two dollars per foot ($2) draught of water, over and above the one dollar and twenty-five cents ($1.25) harbour pilotage outwards.

INWARD.

From Partridge Island to Musquash Head, bearing N.W. per foot draught of water.. .. .. $2 00
From Musquash Head to Point Lepreaux, N.W., per foot draught of water.. .. .. 2 50
From Point Lepreaux to Sable Island 3 00

OUTWARD.

From the harbour of the port of St. John, N.B., to the outside of Partridge Island, per foot draught of water.. .. .. 1 75
Down the Bay of Fundy, when required two dollars and seventy-five cents per foot draught of water ($2.75) over and above the one dollar and seventy-five cents ($1 75) harbour pilotage outwards.
For all steamers not exceeding 120 tons.. .. .. 2 00
Over 120 tons and not exceeding 200 tons.. .. .. 2 50
Over 200 tons and not exceeding 300 tons.. .. .. 3 75
Over 300 tons and not exceeding 400 tons.. .. .. 5 00
and thirty cents additional or every 50 tons over 400 tons.

See S. E. Coast of Nova Scotia and Bay of Fundy Pilot, List of Lights and Admiralty Charts Nos. 352 and 1,551. The total tonnage which entered St. John in the fiscal year 1908 was 1,526,310.

St. Stephen Harbour, New Brunswick, is situated at the head of the tidal waters of Ste. Croix river, on its northern bank which flows into Passamaquoddy bay, latitude 45° 11′ 30″ N., longitude 67° 15′ W. Vessels of 600 tons and under load alongside the wharfs and lay aground at low water in soft mud. Spring tides rise 26 feet, neap tides 21 feet. The Ledge, an outport of St. Stephen, has ample water for the largest ships to load afloat, is capable of accommodating 500 vessels and is well sheltered. Vessels of 18½ feet draught can load alongside the wharf; the bottom is of soft mud. There are ten wharfs at St. Stephen with sheds on five of them. St. Stephen is a ter-

minus of the Canadian Pacific Railway and has railway communication with Calais on the opposite side of the river, State of Maine, U.S., and therefore has communication with railways in the United States as well as telegraphic connection. The lights are, one at Marks' point and one at Spruce point in the Ste. Croix river, north side. Ships' stores can be readily procured at reasonable prices.

Port charges are harbour master's dues payable twice a year, and sick mariners' dues payable three times a year if not collected elsewhere. *Pilotage* is under control of the Charlotte County Pilotage authority, and the rates are:

(1) From Seal island, Cross island, Little river, Southwest ledges of Grand Manan, Kent's island, Long Island bay, Moose river and Bailey's Mistake, to Saint Andrew's, Saint Stephen, or any harbour or loading place in the county of Charlotte, (except Campobello or the lines) pilotage inwards and outwards, $2.25 per foot.

(2) From North head of Grand Manan, Beaver harbour and West Quoddy lighthouse to any port or harbour in the county of Charlotte (except Campobello or the lines) pilotage inwards or outwards, $1.60 per foot.

(3) From Head Harbour lighthouse, Letite passage or Clam Cove head to any port or harbour in the county of Charlotte (except Campobello or the lines) pilotage inwards and outwards, $1.50 per foot.

(4) From or to Campobello or the lines the pilotage inwards or outwards to be 20 cents per foot less than the above rates.

See S. E. Coast of Nova Scotia and Bay of Fundy Pilot, List of Lights and Charts 464 and 1,743. The total tonnage for fiscal year of 1908 was 29,601.

Shelburne Harbour, Nova Scotia, is situated in the eastern arm of an inlet. The entrance is between government point on the mainland and Cape Roseway, McMitt's island. The harbour is safe, commodious and easy of access. The depth of water ranges from 7 fathoms in the inlet to 2 fathoms near the wharfs. There is safe and convenient anchorage for vessels seeking temporary shelter about half a mile north of Sand point. Adamant shoal, about two-thirds of a mile in extent,

Shelburne, N.S. Harbour.

lies nearly in the middle of Shelburne harbour, but two channels exist, each of which can be safely taken.

The wharfs beginning at the southeast part of the town are: one belonging to N. W. White, length 100 feet from the shore and 80 feet at the outer end where there is 15½ feet of water at low tide; the steamer wharf owned by G. A. Cox, which consists of a double wharf, one wing being 120 feet long by 40 feet wide, with a freight shed upon it; between this and the other wing is a space of 40 feet, the shortest wing is 100 feet long by 40 wide, the water at the outer end of each is 12 feet deep. The shore end of this wharf has a space of 160 feet in width, and upon this is a sail loft and salt fish warehouse; Hipson's wharfs, one 140 feet long from shore by 40 feet wide, depth of water 12 feet, the other 110 feet long by 30 feet having a water space of 90 feet between the two wharfs; depth of water at the outer end 13 feet; Jos. McGill's wharf, 120 feet long on one side and a diagonal front of 80 feet at the outer end with 12 feet of water. On this wharf is a crane which lifts five tons. Spring tides rise 7 feet and neaps 5½ feet in the harbour. There are no cold stores in the port. The town has railway and telegraph communication with other parts of the province.

A light is located on Cape Roseway with a trumpet fog alarm and one on Sand point on the east side of the entrance of the harbour in latitude 43° 41′ 25″, longitude 65° 19′ 28″. A fairway whistling buoy is moored off the entrance of Shelburne harbour in 18 fathoms of water. See S. E. Coast of Nova Scotia Pilot, the List of Lights and Chart No. 340. Provisions, ships' stores and water are readily obtained.

The *port charges* are harbour master's dues, paid twice a year, and sick mariners' dues three times when not collected elsewhere. The total tonnage which entered Shelburne during the fiscal year 1908 was 75,818. See Admiralty Chart No. 3,482.

Sorel is situated at the mouth of the Richelieu river which empties into the St. Lawrence river. Within the mouth of the river for a distance of two miles the depth of water is from 4 to 5 fathoms and good anchorage is found. Here steamers escape the heavy ice which moves down the St. Lawrence river in the spring and many steamers, tugs, barges and small vessels find winter quarters. The place consequently presents

Port of Sorel, Quebec.

Sorel, Quebec.

a busy scene during the winter and spring, while a large number of steamers and tugs are undergoing repairs, many of them having been hauled out on the east bank of the Richelieu river. There are four shipyards at Sorel, the principal one is the government shipyard, where government steamers, tugs, dredges and barges are constructed each year. Extensive repairs are made at this yard of vessels owned by the government, but under the control of several departments. The plant used in deepening and widening the St. Lawrence ship channel is put in winter quarters at this shipyard, overhauled every season and put in good working order for the summer operations. Repairs to the plant are also made when required, at any time. Marine slips with sufficient power to haul out vessels of 1,200 tons are located in the shipyard. The yard is equipped with machine shops, foundry, stores, saw mill, moulding loft, paint shops and sheds, in which about 650 men on an average are constantly employed. A railway track is laid from the station in the town to the shipyard and constantly used for conveying materials. The yard is under the control of a director who is an officer of the Marine and Fisheries Department.

The Richelieu and Ontario Navigation Company place their fine river boats at Sorel in the autumn, and during the winter overhaul and refit them for the summer's traffic on the St. Lawrence river and elsewhere. The company has a well equipped shipyard at Sorel, where steamers are built and repaired. Other shipyards are the Manseau and Poupore yards, at which repairs are made and small steamers and tugs built.

There are six wharfs along the river front on the town side, including the government wharfs, having a total frontage of 6,350 feet, with three sheds used for receiving general freight. Coal is also landed in considerable quantities. (A railway siding from the Sorel station is used for transhipping and forwarding freight to and from vessels.) The system of navigation between Lake Champlain and the St. Lawrence river begins at Sorel and is continued from Whitehall, at the southern end of Lake Champlain, to the Hudson river and New York, a total distance of 411 miles. The navigable depth of water in the Richelieu river at the locks is 7 feet.

Range lights are situated at Sorel in latitude 46° 2′ 50″,

longitude 73° 7′ 18″. See List of Lights, St. Lawrence Pilot, and Marine and Fisheries Chart No. 77.

The *port charges* are harbour master's dues paid twice a year, and sick mariners' dues payable three times a year.

Pilotage is under the Montreal Pilotage district and the rates will be found in the information given under the port of Montreal.

Three Rivers Harbour, St. Lawrence river, is situated on the north shore of the river. The harbour has constant communication with Montreal, Quebec and various small towns by steamer and railway. The port has excellent facilities for ocean-going vessels. It has a channel right along the wharfs of from 30 to 50 feet in depth and a roadstead of from 1,200 to 1,500 feet in width, and in the narowest part of about 900 feet, with little tide and no excessive current. The wharfs are spacious and the Dominion Coal Company has a discharging plant at this port where coal can be easily obtained for bunkers.

The present wharf accommodation extends from the western bank of the St. Maurice river up to the ice-breaker, a distance of about 5,500 feet. Within this distance there are several wharfs; the St. Maurice Lumber Company's wharf used for local and inland waters traffic and one berth for an ocean-going steamer; the harbour commissioners' wharf with accommodation of 1,350 feet, the depth of water at the front of the wharf being from 30 to 35 feet, and reserved exclusively for ocean-going vessels. The commissioners have another wharf 420 feet in length, with 25 feet depth of water for vessels of inland waters, and another wharf 300 feet, with a depth of 25 feet of water, that is used by passenger and freight lines.

The Richelieu and Ontario Navigation Company's wharf is between the last two mentioned wharfs, and is used by the steamers of the company.

A private wharf intervenes between the 300 feet wharf of the commissioners and the new government dock. This new dock is 2,000 feet long and built of concrete, with a minimum depth of 30 feet of water along the front extension and intended for ocean traffic exclusively.

The top surface of the commissioners' wharfs varies from 200 to 275 feet in width and the government wharf from 200

Three Rivers Harbour P.Q., Western Section, New Quay.

to 300 feet, the area being over 500,000 square feet for the government dock alone.

Other wharfs are the old Grand Trunk wharf, the wharf at Cap la Magdaleine, which accommodate large freight and passenger traffic.

A railway line runs along the whole water front and branches connect the port with manufacturing centres.

The port of Three Rivers is also directly connected with the most important trunk lines of the country, and facilities for loading freight from cars to the vessels and from vessels to the cars, have been provided. In the southern part of the harbour, however, there are no railway sidings.

The harbour is under the control of harbour commissioners who charge wharfage on articles passing over their wharfs. The port charges, therefore, consist of wharfage and sick mariners' dues payable three times in a year if not paid elsewhere.

Pilotage rates are fixed by the by-laws of the Montreal district and are already stated. The lights consist of two range lights in latitude 46° 20′ 11″, longitude 72° 32′ 40″. A gas buoy is placed on the upper end of Three Rivers shoal.

See List of Lights, Marine and Fisheries Chart No. 11, and St. Lawrence Pilot. The total tonnage of vessels entered in the port of Three Rivers for the fiscal year 1908 was 1,004,694.

Union Harbour, Vancouver Island, British Columbia, is on the western side of Baynes' Sound, and the shipping point for coal brought from Cumberland. The Union Collieries Company has a coal wharf with pockets and chutes for loading coal into ships' holds and bunkers. This wharf is about 700 feet long and the depth of water at low water mark is 27 feet and 44 feet at high tide, showing that vessels can load at any stage of the tide. A small wharf with a warehouse 81 by 31 feet is used by passenger and freight steamers. There is also an apron or slip for running cars loaded with coal into barges. There is also a gridiron on which repairs to small vessels can be made. Anchorage is found in the bay for vessels of deep draught, the water being 8 fathoms and more, at low water. Lights are located on Denman island, latitude 49° 32′ 15″, and longitude 124° 49′ 12″, and range towers on Yellow island and lights

on the wharf, and at this place is a wharf used by passenger steamers.

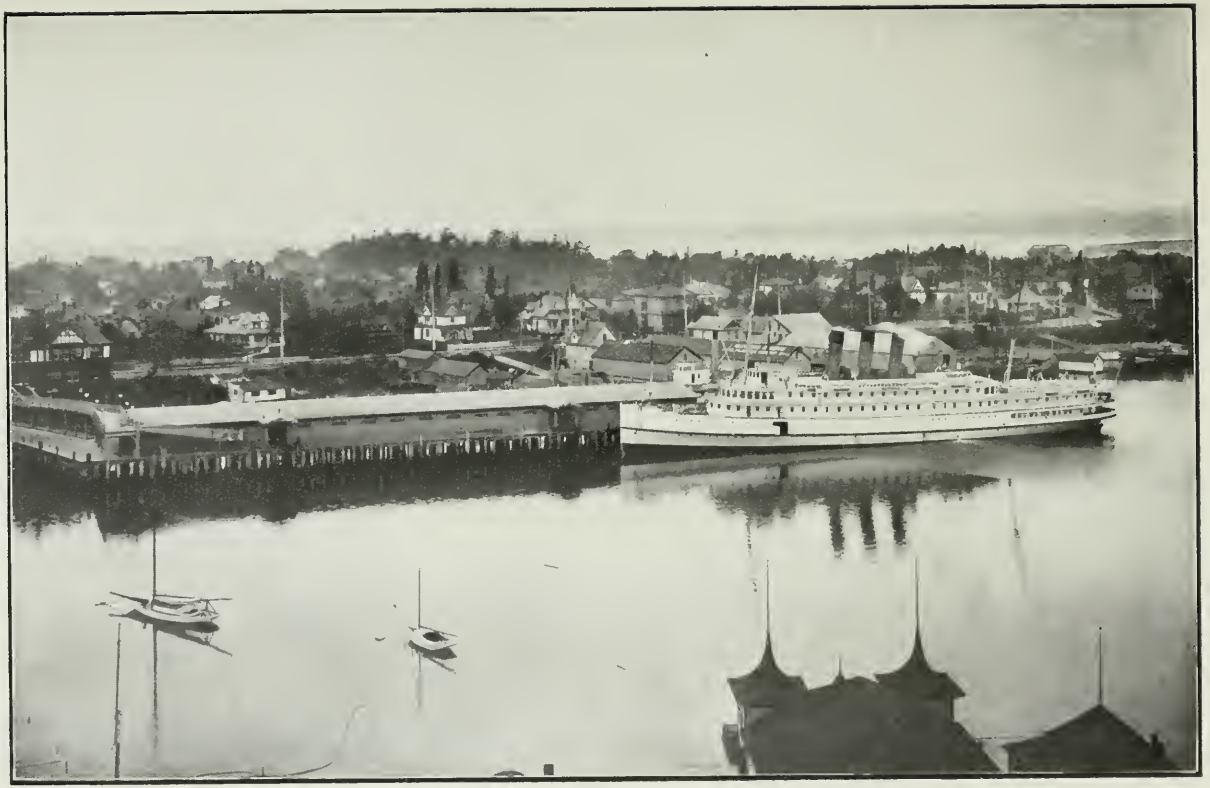
Port charges are harbour master's dues payable twice a year, and sick mariners' dues collected three times a year if not paid elsewhere. *Pilotage* is under the control of the Nanaimo Pilotage authority, and the rates are the same as at other ports in the pilotage district. See List of Lights, British Columbia Pilot and Admiralty Chart No. 333. The total tonnage which entered Union during the fiscal year of 1908 was 326,353.

Victoria Harbour, Vancouver Island, British Columbia, has its entrance between Ogden and Macloughlin points. The entrance to the harbour is shoal, narrow and intricate, but there is sufficient depth of water for ocean-going vessels to enter the outer harbour and berth at two wharfs called the ocean docks, where the general depth of water is 33 feet at low water, except at one place where it is 26 feet at low water. Vessels calling at Victoria for orders or cargo, are not recommended to anchor off the entrance of the harbour owing to the exposed position, but good anchorage will be found during the summer months in the Royal Roads, with from 12 to 20 fathoms of water, and good holding ground, and in winter Esquimalt harbour, about two miles distant from Victoria harbour, affords good anchorage and shelter in from 5 to 8 fathoms, with mud bottom. The dry dock at Esquimalt is 480 feet 10 inches long by 90 feet wide at coping level and 65 feet wide at entrance.

Vessels drawing from 14 to 15 feet or thereabouts, may enter between Beren's island and Shoal point, where a channel of about 400 feet in width with a depth of 17 feet at low water, is being dredged. At high tide vessels drawing 17 feet may enter the inner harbour. After passing Laurel point the harbour expands into what is named James bay, which is well sheltered and vessels lie with safety at the wharfs along the city.

The wharfs in Victoria are divided into three groups; the outer wharfs, sometimes called the ocean docks, are used by ocean-going steamers. They are situated on the east side of the entrance of the inner harbour and consist of two wharfs, the old and the new wharf. The old wharf is 754 feet long on one side and 590 feet on the other; it is 100 feet wide except at the outer

Victoria, B.C. Outer Wharves.



Victoria Harbour, British Columbia, C. P. R. Wharf.

end, where it is 140 feet wide. The freight shed upon this wharf is 524 feet long by 60 feet wide, giving a floor space of 31,440 feet.

At the new wharf, ships use the north side and end only; the berthing space at the side is 940 feet and at the end 140 feet. The freight shed is 770 feet long, giving 47,900 superficial feet of shed room. The general depth of water at these wharfs at low tide is 33 feet, excepting at one spot, where it is 26 feet only.

The wharfs of the inner harbour have a frontage of 4,136 feet and shed area of about 84,000 superficial feet. These wharfs lie along the city front and the depth of water at low tide ranges from 12 to 18 feet.

Around the inner harbour there are 11 wharfs, owned by industrial concerns. These have a frontage of some 15,000 feet, depth of water from 6 to 12 feet at low tide. Sheds on these wharfs have a floor space of about 20,000 feet.

There are no railway connections at Victoria wharfs. The city has one cold storage plant and shed of 30,000 cubic feet capacity.

Steamers use their own winches for loading and unloading, but freight in coasting steamers is handled by small trucks. Sailing vessels are loaded by means of movable hoisting engines.

The lights are: one on Brotchie ledge, with a fog alarm, at the entrance to Victoria harbour in latitude 48° 24′ 20″, longitude 123° 23′ 40″; one on Beren's island, western entrance to harbour; one on Shoal point in Victoria harbour; one on Middle rock, Victoria harbour; one on Laurel point, Victoria harbour; one on Trial islands, and one on Discovery island, the two last on the route to Burrard inlet. Fisgard light is at the western entrance to Esquimalt harbour, and one on Race rocks in the Strait of Juan de Fuca has a powerful fog alarm. The harbour of Victoria is buoyed but pilots are always taken by ocean steamers, as the entrance to the harbour is intricate and currents are strong. It has communication by water with the mainland of British Columbia, Puget Sound and Pacific coast ports in North America and South America and the Orient and Australia, and by rail with many points on Vancouver island. Telegraphic communication is by means of cables from

Departure bay, Nanaimo and from Beechy bay, Juan de Fuca strait.

Provisions and stores are easily procured in Victoria, as well as material for shipbuilding and repairs. Extensive repairs can be made in the port to steamers and sailing vessels, but large vessels are repaired at Esquimalt where there is a graving dock 450 feet long over all and 430 feet on the blocks, 65 feet wide at the entrance and 26½ feet of water over the sill at high water, ordinary spring tides. The dock is closed by a caisson which gives an additional length of 30 feet. There is also a marine slipway capable of hauling out a vessel of 2,500 tons at Esquimalt, sheer legs to lift 25 tons, and forgings and castings are made there.

The *port charges* of Victoria are harbour master's dues, collected twice in the year, sick mariners' dues collected three times in the year if not paid elsewhere, and port warden's dues when services are required. *Pilotage* is under the control of the Victoria and Esquimalt Pilotage authority and payment of pilotage is compulsory. The rates are:

Vessels bound to other ports and coming to anchor in 'Royal Roads,' the pilotage shall be free, except the services of a pilot are employed, when pilotage according to the following graduated scale shall be payable:—

From inside, or north of 'Race Rock,' to Royal bay, or vice versa, 50 per cent of the prescribed rates under clause (*b*), section 18. From Beechy head to 'Royal Roads' or vice versa, $1 per foot.

From Pillar point to 'Royal Roads' or vice versa, $3 per foot draught of water.

From Cape Flattery to 'Royal Roads,' or vice versa, $6 per foot draught of water.

(*b*) For vessels entering into or clearing from the ports of Victoria and Esquimalt, the rates of pilotage shall be as follows:—

(1) For regular ocean steamers, 50 cents per foot draught of water and ½ cent per net registered ton up to a maximum of 3,500 tons, on the inward voyage, and 50 per cent of the above on the outward voyage subject to a discount of 20 per cent.

(2) For irregular ocean steamers, $1 per foot draught of water and $\frac{3}{4}$ cent per net registered ton.

(3) For regular steamers in the coasting trade between San Francisco and Lynn canal inclusive, the rates shall be the same as for regular steamers as rated in clause 1.

(4) For vessels under sail, $2 per foot draught of water and 1 cent per net registered ton.

(5) For sailing vessels in tow, $1.50 per foot draught of water and 1 cent per net registered ton.

(6) For all vessels entering into or clearing from Williams' Head Quarantine Station, the rates shall be 50 per cent of the prescribed rates of any class of vessel for Victoria and Esquimalt, subject to exemption in section 17, clause 7; provided, however, that all coasters between San Francisco and Lynn canal inclusive, when compelled by special instructions from the Dominion government to call at William's Head Quarantine Station, shall be exempt from pilotage dues unless the services of a pilot are requested.

(7) For all vessels of 500 tons and under, 75 cents per foot draught of water.

See British Columbia Pilot, List of Lights and Charts Nos. 1,897*b* and 576. The total tonnage of vessels which entered Victoria for the fiscal year of 1908 was 2,117,417 tons.

Vancouver Harbour, British Columbia, is within Burrard inlet. This inlet is between Grey point on the south and Atkinson point on the north. Burrard inlet is easy of access to steamers and vessels of any size or class. Good anchorage is found in almost any part. English bay is the outer anchorage, Vancouver harbour and Port Moody being inside what is called the first narrows. The depth of water in English bay is from 5 to 9 fathoms and the channel entering False creek is from $\frac{1}{2}$ to 1 fathom at low water; the spring tides rise 13 feet and the neap tides 11 feet. False creek is used by light draft vessels only. Two mooring buoys have been placed, one on each side of the entrance in sufficient depth of water to allow tugs and barges to remain when the tide is falling, and to pass into the creek when the tide is rising or at high water. In the first narrows entering Vancouver harbour the width of the channel is about one cable, the depth of water is from 10 to 17 fathoms as far in

Vancouver, British Columbia, Water Front.

as Prospect bluff on the south side, and from 6½ to 8 fathoms between Prospect bluff and Brockton point. The tide runs from 4 to 8 knots in the narrowest part of the narrows. Parthia shoal lies in mid-channel, northwestward of Brockton point, with least depth of water of 3½ fathoms and deep water on each side of the shoal. Burnaby shoal is the only real danger at the entrance and has 1½ fathoms on its shallowest part in low water. These shoals are buoyed to mark them. Inside the narrows the harbour is a fine, capacious and secure one. The depth of water within the harbour is from 5½ fathoms in the vicinity of the wharfs to 36 fathoms in mid-harbour at low water, opposite the city. The spring tides rise 13 feet and neap tides 11 feet. The second narrows above Hastings village has a depth of water of from 10 to 16 fathoms at low water, and vessels pass up to Port Moody, a snug harbour having a depth of from 4 to 6 fathoms at low water.

The wharfs in Vancouver harbour along the city front are the Canadian Pacific Railway, main wharf having 2,800 lineal feet berthing accommodation and 270,100 square feet area. For a distance of 1,160 feet the depth of water is 27 feet at low tide and 43 feet at high tide; for a distance of 1,640 feet the depth of water is 23 feet at low tide and 39 feet at high tide. The company owns five freight sheds, with an area of 136,510 square feet.

They have also a transfer slip, at present handling two barges per day of twelve cars capacity each; the business can be increased by employing more barges.

The means of loading and unloading employed are generally by ship tackle and trucking, and one steam crane five tons capacity and one derrick of 30 tons capacity, for loading direct from the cars to ships. Railway tracks are adjacent to all sheds.

A new wharf is under construction which will add 1,500 lineal feet of berthing, 126,000 square feet of area and sheds of 33,000 square feet. The depth of water alongside the wharf is 30 feet at low tide and 40 feet at high tide.

The Evans-Coleman wharf has a surface area of 169,540 square feet; depth of water at high tide, from 36 to 57 feet; at low tide, from 20 to 41 feet; the number of sheds on the

North Vancouver Marine Railway.

wharf is thirteen and the area of floors is 128,315. A railroad siding runs to the end of the westerly arm of the wharf and cargo can be loaded into and out of steamers directly from the cars.

The Vancouver Ice and Cold Storage Company have two public cold storage buildings, one for butter, cheese and eggs, and the other for freezing and storage of fresh fish. These buildings are on the water front and have a railway siding. The present storage capacity is 350,000 cubic feet, and the ice-making capacity 50 tons per day.

The MacDonald-Marpole Company, Limited, own bunkers; capacity about 600 tons, and two coal sheds of 2,000 tons capacity.

The Union SS. Company lease a wharf from the Canadian Pacific Railway Company, which has a surface area of 59,500 square feet, depth of water alongside is from 36 to 12½ feet at low tide. On the wharf are four sheds, area of floors 24,450. There is a railway siding to one shed.

Messrs. Brown & Howey have a large warehouse for feed, hay and grain, and the outer end on the wharf is occupied by the New England Fish Company, operating four steamers in the halibut fishery.

In False creek, there are about fifteen small wharfs and one wharf in the east end of the city, owned by the Sugar Refiner's Company.

There is a marine railway at False creek at which small vessels and tugs can be hauled out and repaired in the Wallace shipyard. In the main harbour, on the Vancouver side, are shipyards and a patent slip where vessels 1,500 tons are repaired.

The government of Canada has recently entered into an arrangement to subsidize a steel floating dock, of sufficient size and capacity for any size steam vessels and sailing ships, trading on the Pacific coast. It is contemplated to complete this floating dock within a reasonable time, and it will be equipped with every modern appliance and have repair shops in connection therewith.

Vancouver has communication with North Vancouver, opposite the city on the north side of the harbour, every fifteen

minutes. At this point a marine railway has been built by the Wallace Shipyards, Limited, with a capacity of handling a vessel of 1,700 tons; length of ways, 240 feet; width, 65 feet; draught forward, 14 feet, aft 18 feet neap tides; length of track, 529 feet.

At Hastings saw mills, large piers accommodate vessels loading lumber, the largest pier having a depth of water of 25 feet alongside.

The lights are Prospect point light at the entrance of the first narrows in latitude 49° 18′ 34″, longitude 123° 8′, with a bell; Brockton point light inside the narrows, also with a bell; Point Atkinson light, entrance to English bay, where there is a steam horn. A bell buoy is placed at Grey point and one on Spanish bank.

All kinds of ships' stores and good water can be easily procured at Vancouver and bunker coal. Vancouver is the terminus of the Canadian Pacific Transcontinental Railway. The Great Northern Railway line from Washington runs into Vancouver, and the city has communication by water with all the ports on the Pacific coast and with China, Japan, Australia, Mexico and other South American ports, and with the east by rail and telegraphic communication, with all parts of Canada and the United States, and by cable with Australia.

The *port charges* are sick mariners' dues paid three times a year, and harbour master's dues twice a year if not paid elsewhere. *Pilotage* is under the Vancouver Pilotage authority and payment is compulsory. The rates are:

For vessels under sail, $2 per foot draught of water and 1 cent per net registered ton.

For vessels in tow of a steamer, $1 per foot draught of water and 1 cent per net registered ton.

For steamers, $1 per foot draught of water and 1 cent per net registered ton.

Any portion of a foot, not exceeding six inches, shall be paid for as half a foot; any fraction exceeding six inches shall be paid for as one foot.

The pilotage from Cape Flattery or Royal Roads to a line drawn from Point Atkinson to the nun buoy on Spanish bank, or to the limits of Howe sound, as herein before described, and

vice versa, is not compulsory, but if the services of a pilot are required he shall be paid the following rates, viz.:—

From Cape Flattery	$6 00
" Callum bay	5 00
" Beechy head	4 00
" Race rocks or Royal roads	3 00

For vessels under steam or in tow of a steamer the following rates shall be paid:—

From Cape Flattery	$3 00
" Callum bay	2 50
" Beechy head	2 00
" Race rocks or Royal roads, vessels under steam	1 00
" Race rocks or Royal roads, vessels in tow of a steamer	1 50

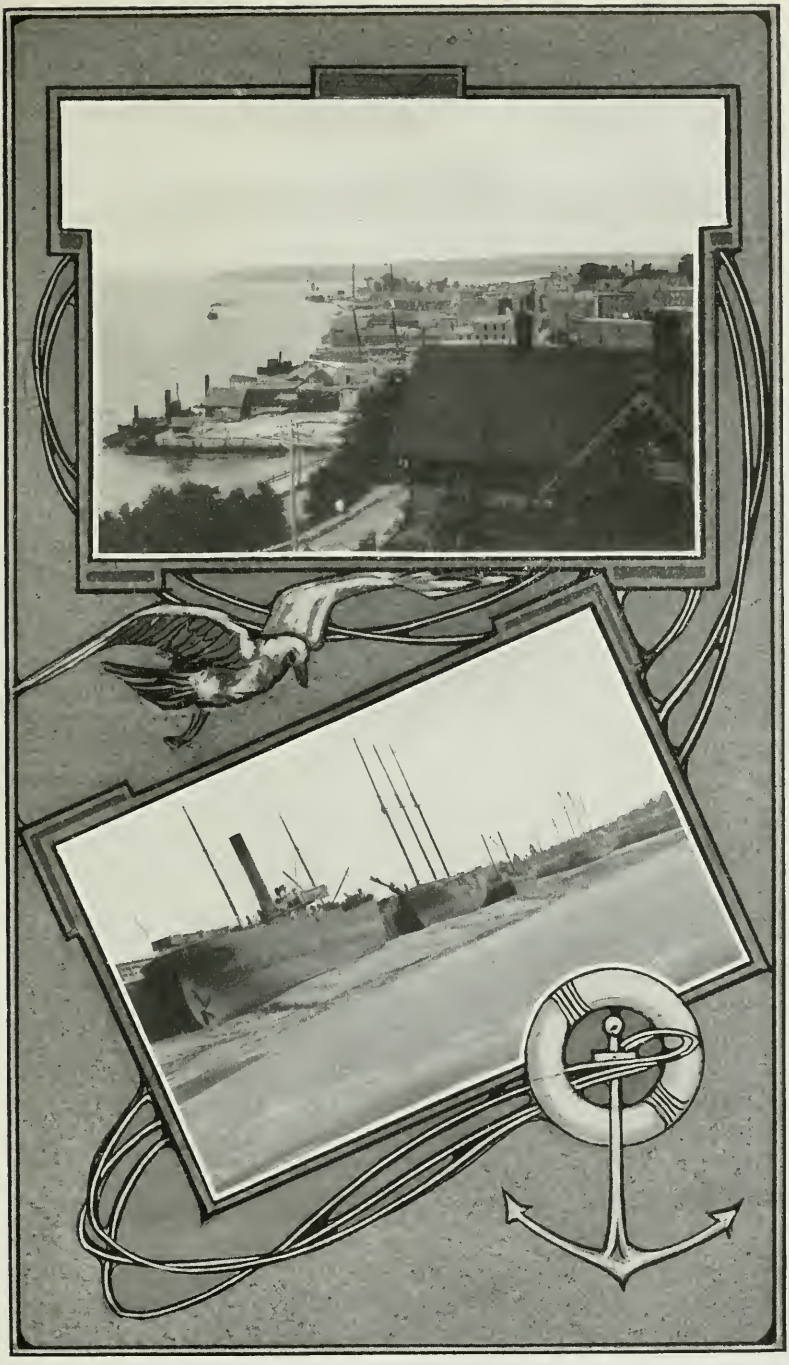
See British Columbia Pilot, List of Lights and Admiralty Chart 922. The total tonnage which entered Vancouver in 1908 was 1,902,293 tons.

Windsor Harbour, Nova Scotia, is at the confluence of the Avon and Ste. Croix rivers. The depth of water at low water is 1½ fathoms to 3½. The tide rises at Horton bluff, a few miles below; 48 feet at spring tides and 40 feet at neap tides. There is good anchorage at the mouth of the Avon river for vessels drawing 16 feet.

The wharfs at Windsor, number eleven, extending along the river front 2,300 feet , and railway sidings at the government wharf and Mosher's wharf, and sheds are convenient for handling freight by rail to and from vessels; the depth of water at the wharfs is 16 feet. There are also freight sheds on Dimock's wharf but no railway siding; depth of water at other wharfs about 14 feet. There are no docks for repairs at Windsor, but at Hantsport, seven miles from Windsor, there are good marine blocks on which to repair vessels, and also at Summerville, eight miles from Windsor.

Lights are at Horton, latitude 45° 6′ 30″, longitude 64° 13′ 20″, and electric lights on Windsor bridge.

The *port charges* are sick mariners' dues collected three times in a year, and harbour master's dues payable twice a year. See



WINDSOR, N. S. THE WATER FRONT.
" LOW TIDE.

plan of Avon river on Admiralty Chart 353. The total tonnage entered at the port in the fiscal year 1908 was 280,891.

Yarmouth Harbour is situated in Yarmouth sound, and the entrance is at the east cape of Cape Forchu, where there is a depth of 6 fathoms running to 3½ fathoms opposite the town of Yarmouth. There is no anchorage in the harbour, but vessels can find anchorage at 20 feet depth in Yarmouth sound and will be safe with all winds, except those between south and west, which are dangerous winds and positively unsafe if heavy. The channel inside the entrance is marked by port and starboard buoys and with forty-two dolphins made of piles driven in the flats. About half way to the town the channel turns and at this turn is a light on one of the dolphins.

There are nineteen wharfs in the harbour of Yarmouth, all on the eastern side of the harbour, and all of these wharfs have sheds for receiving freight; the depth of water alongside the wharfs is 19 feet at low water. At three of them where lumber is loaded, cars run to the ships' side. At Baker's wharf passenger steamers from Boston daily in the summer, land passengers from the boat directly into the cars. On the south side of Baker's wharf a berth has been made for unloading coal, 250 feet long, 90 feet wide with 20 feet of water at low tide. The tide rises in Yarmouth harbour 16 feet at spring and 13 feet at neap tides.

There is a marine slip for hauling vessels out up to 1,000 tons register for repairs, and a shipyard belonging to the new Burrill-Johnson Iron Company, where steel vessels are built or repaired. The yard is covered from the weather and work can be carried on night and day.

There is one cold store at Yarmouth. Vessels load and unload by manual labour, in which hand trucks and gangways are used by steamers, and in the case of lumber when loaded in steamers, it is hoisted and lowered by the vessel's own winch into the hold.

Yarmouth has long been known as a shipbuilding and owning port and has had communication with all ports where North American vessels have sailed, consequently all kinds of ships' stores are kept in stock and can be easily procured. On an average from 3,000 to 5,000 tons of coal is kept on hand by

Yarmouth, N.S. Harbour, Looking North.

dealers. Yarmouth has railway communication east by the Dominion Atlantic Railway running to Halifax and with St. John by rail and ferry steamer from Digby. It has telegraphic communication with all parts of the province of Nova Scotia and other parts of Canada.

The lights are: one on east cape of Cape Fourchu in latitude 43° 47′ 30″, longitude 66° 9′ 25″, with a whistle fog alarm attached; one on Bunker island on end of reef off southwest point of island; one on northwest extremity of island; one on Yarmouth harbour corner beacon. A gas and bell buoy is placed on the western side of the shoal called 'Hen and Chickens,' a bell buoy in 10 fathoms off Yarmouth sound in the fairway and one gas and whistling buoy in the fairway in 34 fathoms of water ten miles S. 62° W. from Cape Fourchu light, and another gas and whistling buoy in 22 fathoms five miles N. 56° W. from Cape Fourchu light. The *Lurcher* lightship is anchored in about 36 fathoms of water off Lurcher shoal, about seventeen miles from Yarmouth. This lightship is a steel vessel built specially for this shoal; has a boiler and engine and is able to move under her own steam. A diaphone is operated on her by compressed air, and a submarine fog bell is also attached to the lightship.

A life-boat is stationed at Baker's cove, and there is a marine hospital on Bunker's island, both within the harbour of Yarmouth. The *port charges* are sick mariners' dues collected three times a year, and harbour master's dues paid twice a year if not paid elsewhere. The total tonnage which entered at the port was 294,412 for the fiscal year of 1908. This does not include vessels which cleared. See List of Lights and Admiralty Chart No. 2,537.

TRANSPORTATION BY WATER FROM THE HEAD OF LAKE NAVIGATION TO TIDE WATER, ETC.

As stated in the introduction of this report, inquiries have frequently been received by the department from abroad respecting the harbours and waterways of Canada and facilities for shipping, including inland waters and ports.

By the reports of three departments of the government, it will be seen that most careful atttention is being given to inland navigation from the head of the Great Lakes to sea ports. The rapid settling of the Northwestern provinces and the ever increasing quantity of agricultural products grown for markets across the seas, as well as for our own markets, has made the question of lake navigation a very active one. The problem of transporting grain of various kinds to the east and commodities to the west, by the cheapest route, has kept before the attention of the country the great advantages of the waterways from the head of lake navigation.

The hydrographic surveys and establishment of new types and additional aids to navigation by the Marine and Fisheries Department, the dredging of channels, harbours and construction of piers and breakwaters by the Public Works Department, are being vigorously prosecuted. The traffic receives the constant attention of the Railways and Canals Department in the renewal and maintenance of canals. Intermediate ports and the canals between Fort William, Port Arthur and Montreal, including Georgian bay ports, now offer excellent means for receiving and transferring grain to vessels or cars.

The railways conveying grain and other products from interior points of Manitoba and the Northwestern provinces, are steadily increasing the capacity of the terminal elevators at Fort William and Port Arthur, on Lake Superior, and elevators at Georgian bay ports. By the use of the Canadian canals, vessels carrying 80,000 bushels of wheat can now clear from Fort William or Port Arthur or any lake or bay ports, and deliver their cargoes at Montreal or tidal ports, without transhipment at any point. If it is preferred to transfer grain at Port

Colborne, Kingston or Prescott, these ports offer facilities for discharging and loading into vessels or cars. Steamboat lines employed on the route carry package freight, machinery of all kinds, railroad iron and various kinds of merchandise, for delivery at way ports and at Fort William and Port Arthur at the head of navigation forming important gateways of the Northwest.

The largest vessels on the lakes, exceeding 10,000 tons, can carry grain via the Sault Ste. Marie canals to Midland, Tiffin, Depot Harbour, Collingwood, Owen Sound and Victoria Harbour, all in Georgian bay. Large vessels may load for Goderich on Lake Huron, and the largest size for Point Edward, at the extreme southern end of Lake Huron, and for Port Colborne, near the eastern end of Lake Erie.

Grain is shipped from Fort William and Port Arthur to Buffalo, but is transferred at that point into small barges for conveyance to Atlantic ports in the United States, if carried via the Erie canal.

At Montreal, facilities exist for transferring grain from lake vessels to ocean-going vessels at a rapid rate. The Harbour Commissioners' elevator is unique in its equipment of grain conveyors which enables the elevator to discharge into four separate vessels at different wharfs, whilst the vessels proceed with loading or unloading other cargo. Nearly four miles of grain-carrying belting is employed at present and the conveying equipment will probably be increased to the capacity of delivering grain to ten large ocean-going steamers lying at their separate berths at the piers, upon which stand the immense new steel sheds of the Harbour Commissioners. In addition, the larger elevator of the Grand Trunk Railway Company is well equipped for rapid discharge and loading of vessels and cars. The Canadian Pacific Railway Company's elevator of smaller size and seventeen floating elevators of the Montreal Floating Elevator Company, together with the elevators already mentioned, provide the power and means for handling about 100,000,000 bushels of grain during the season of navigation.

The natural waterway, the St. Lawrence river improved by dredging, carries large ocean-going vessels far inland and by the connecting links of channels and canals between the Great

Lakes, shippers of grain find an advantageous outlet for the grain of the western fields. To these advantages the whole shipping interests of western Canada should be alive.

The wheat shipments from Montreal by vessels, according to the report of the port warden, through the board of trade, to this department for the calendar year, increased in 1908 about one-third over 1907, and doubled the shipments of 1906. The quantities being 14,530,617 bushels in 1906; 21,267,639 in 1907; and 27,888,906 in 1908. From a statement published by the Trade and Commerce Department, showing the exports of wheat from Montreal for the calendar year of 1908, it appears the total quantity exported from Montreal was 30,460,946, of which 10,908,194 bushels was United States wheat. Other grain and corn shipped via this route did not show increased shipments, due to scarcity. From Montreal, 1,002,868 barrels of flour and meal in 1907 were shipped, and 875,460 barrels in 1908, nearly all of which was ground at points west and from western grain.

The western cattle carried by rail to Montreal and exported in vessels, as shown by the returns of the live stock inspectors, were 99,830; sheep, 10,111, and horses, 116. Of the cattle 10,380 were United States cattle. Although not shipped by the St. Lawrence route, it is interesting to note that during the winter of 1908-9 western cattle were shipped from St. John for Great Britain; the number reported by the inspectors of live stock was 20,210—9,304 being United States cattle; sheep, 4,168, and horses, 51. During the year 1908, 5,845,073 bushels of wheat were shipped from this port.

Much depends upon the elevator capacity for storing grain at the terminals. Port Arthur and Fort William together, have elevator capacity for holding 28,490,000 bushels, and when the Grand Trunk Pacific elevators are completed, the total capacity will exceed this number of several millions.

The total capacity of elevators for storing grain in Georgian bay ports, viz., Collingwood, Owen Sound, Meaford, Midland, Tiffin and Victoria harbour is 19,500,000 bushels; Lake Huron ports, viz., Goderich, Point Edward and Sarnia, 1,300,000 bushels; Lake Erie ports, viz., Port Colborne and Port Stanley, 825,000 bushels; Lake Ontario ports, viz., Toronto, Kingston

and Prescott on the St. Lawrence river, 4,160,000 bushels; Montreal, 4,081.000; Quebec, 500,000; St. John, N.B., 1,500,000, Halifax, 500,000 bushels; total, including Fort William and Port Arthur, 60,856,000 bushels. These elevators are used only in connection with the transhipment of grain. Separate from these are the numerous elevators in the country where the grain is originally collected from farmers for shipment, and the elevators used in connection with flour mills.

The shipments of grain from Fort William and Port Arthur, by vessels, amounted for the whole season of navigation, or 242 days, according to the records of the grain office at Fort William, to 68,194,300 bushels, of which 53,391,620 bushels was wheat, the other grains being oats, barley and flax.

The following statement from the records of the grain office at Fort William shows the quantities and ports to which this grain was shipped from Fort William and Port Arthur:—

	Wheat.	Oats.	Barley.	Flax.
	Bushels.	Bushels.	Bushels.	Bushels.
Owen Sound	1,105,769	2,040,909	98,870	
Midland	1,741,727	108,122		
Tiffin	7,049,513	1,224,761	174,863	
Depot Harbour	2,196,642	364,608	63,372	
Collingwood	1,004,181	78,453		
Point Edward	1,533,528	308,172	205,534	82,277
Meaford	750,538	113,771	40,579	
Goderich	5,450,441	2,255,297	63,604	254,107
Port Colborne	477,157			
Thorold	381,641			
Sault Ste. Marie	.....	1,764		
Kingston, Prescott, Montreal	15,677,324	1,688,743	971,213	820,625
Port Huron	1,927,036			
Erie, U.S	831,039			
Chicago, U.S	158,927			
Ogdensburg, U.S	63,042			
Buffalo, U. S	12,070,973	2,279,632	539,665	173,334
" "	1,881,136	746,153	.....	104,242
	53,391,320	11,210,391	2,157,703	1,434,585

Grain carried by Canadian Vessels	51,113,689
" " Foreign vessels	17,080,608
	68,194,297

An examination of the list of vessels published by the Trade and Commerce Department and a list also published by the

Board of Trade of Fort William, shows that the foreign vessels were of much larger capacity, individually, than the Canadian vessels, but the latter made more frequent trips to the two ports. The average capacity of 77 Canadian vessels was 95,090 bushels and of foreign vessels 251,000 bushels; the largest Canadian vessel has a capacity of 300,000 bushels and the smallest 35,000, while the largest of the foreign vessels carries 380,000 and the smallest 75,000 bushels, but the proportion of larger vessels is much greater among foreign than Canadian vessels.

In addition to grain carried by vessels, there was a considerable quantity, during the same year, conveyed by the all rail routes from the two ports. A statement published by the Trade and Commerce Department shows that the quantity carried by all rail route for the crop year of 1908, ending 31st August, was 14,364,177 bushels. It will be observed that the period is not the same as the season of navigation in which vessels were the conveyors, but the statement affords material for an approximate idea of the total grain which passed through the elevators at Port Arthur and Fort William, within a year, for eastern markets and for export.

Large shipments of flour, ground feed and food cereals from Keewatin, Kenora, on Lake of the Woods, or other western flour mills, find their way to Fort William and with the flour and feed milled at these two ports, swell the shipments via the Great Lakes waterway to Canadian ports. To this must be added the same kind of products manufactured at Port Huron and Georgian bay ports and which form part of the domestic, internal and foreign commerce of this great highway to the sea. No adequate conception of the trade from port to port on the Great Lakes arising from the flour milling industries, fruit growing, lumbering, carrying of mineral ores and manufactured articles, can be conveyed until statistics showing the domestic commerce are prepared as is done by ports on the United States side of the international line. The volume of domestic and foreign trade on the continuous waterways which extend from Thunder Bay to Montreal, and on the separate lakes and canals east and west includes shipments of merchandise, lumber, minerals, ore, coal, fish, agricultural and natural products, machinery, railroad iron and the passenger traffic.

The Marine and Fisheries Department is interested in the extent of the trade and commerce of the lakes and rivers which flow into them, as the necessity for aids to navigation is largely determined by the shipping, freight and passenger traffic from and to particular ports and points. The particulars herein contained, gathered from various sources, are not only interesting in themselves but have a bearing on the question of maintenance and establishment of aids to navigation and improvements in the waterways. While unable from the lack of statistics, to present the total volume of trade, some conception of it may be formed by the details published by the Railways and Canals Department relating to the tonnage of freight conveyed through the canals.

The total freight which passed through the St. Lawrence canals upwards and downwards, for the season of 1908, was 2,009,102 tons; the Welland canal, 1,703,453; the Murray canal, 25,901; the Trent Valley canal, 81,690; and the Sault Ste. Marie canal, 12,759,216; total, 16,579,362 tons; of this total 5,297,688 tons were agricultural products, the other freight being general merchandise, manufactures and wood products. As nearly all the grain cargoes originated in Lake Superior ports and Georgian bay ports, conveyed there by rail, doubtless the grain tonnage is repeated in all the canals east of the Sault Ste. Marie canal. The freight classed as agricultural products which passed through the Sault Ste. Marie canal amounted to 2,419,146 tons, and the other freight to 10,340,070 tons, showing that most of the upward freight carried through this canal originated at ports along the lakes.

As already stated, it is impossible to give with any degree of accuracy the freight tonnage of the coasting trade, which is enormous on the Great Lakes, and the import and export trade to and from United States ports.

In the description of harbours which follows, information is furnished mariners, owners and shippers, relating to harbour accommodation, depth of water, lights, &c., and also the tonnage of vessels which entered these ports and sub-ports during the fiscal year 1907-8, from which it will be seen that the means for carrying freight indicates that the tonnage of freight shipped and transhipped must be of great magnitude.

The total tonnage of vessels which entered the Canadian ports on the Great Lakes including inland and coasting vessels that entered Montreal was 20,044,657 tons. The tonnage for departures is not here mentioned, but of course would equal the entries as they were practically the same vessels, making the total shipping some 40,000,000 tons for arrivals and departures. These figures do not include the entries nor departures from harbours where the tonnage has not reached 50,000 tons during the fiscal year, nor do they include ferry steamers, of which there is a large number along the water stretches between Montreal and Sault Ste. Marie.

The traffic between Fort William, Port Arthur and Georgian bay ports has become of such great importance that ice-breaking tugs are employed by the department at the two first mentioned ports and at Midland, Collingwood and Depot Harbour, for the purpose of keeping open these harbours in the fall for vessels on the passage between the ports and to enable vessels to clear and enter early in the spring. The rapid advance of the grain trade to Midland is notable. The receipt of grain at the elevators amounted in round numbers to 17,000,000 bushels, about 6,000,000 bushels arriving from Chicago and Duluth. The use of the water route permits the carriage of grain to the bay ports from Port Arthur and Fort William at a small rate compared with the rail haul. By water the rates for 1908 averaged $2\frac{1}{2}$ cents per bushel and by rail 12 cents per bushel, but grain for export is carried from Georgian Bay ports to Montreal at 5 cents per bushel and at the same rate to St. John, N.B., by the railways.

The average rate by water to Montreal from Port Arthur and Fort William was $5\frac{3}{3}$ cents per bushel for the season and from the bay ports somewhat less, and a little less than the all rail route to the same port. It is clearly manifest, therefore, that the route either from Lake Superior ports or Georgian Bay ports, is beyond question the most convenient and cheapest route by which agricultural products can be carried to the sea.

The most important channels drawn into a narrow compass are the Detroit river and Sault Ste. Marie canal. The tonnage which passes the length of the Detroit river during the season of navigation is greater than that in any similar waterway in the world, both in point of numbers of vessels and size. The

constant stream of vessels requires the utmost vigilance by the Canadian and United States authorities in order to prevent accidents. The aids to navigation are numerous and require constant attendance, owing to the necessity for keeping large vessels within the confines of the dredged channel. This channel is on the Canadian side of the river, from Limekiln crossing to the mouth of the river, and is 600 feet wide. It has been deemed prudent by the department, to station a patrol boat on this river, and rules and regulations approved by the Dominion and the United States governments and the Marine Lake Associations are being enforced. Infractions by Canadian vessels are dealt with by the Dominion authorities and by the United States authorities in the case of American vessels.

HARBOURS ON THE UPPER ST. LAWRENCE RIVER, GREAT LAKES AND GEORGIAN BAY.

THE PORT CHARGES ARE HARBOUR MASTER'S DUES WHERE HARBOUR MASTERS ARE APPOINTED AND WHARFAGE; PILOTING IS DONE BY OFFICERS ON BOARD VESSELS.

Algoma Mills, Ontario, is in the north channel of Lake Huron. The town is situated on the shore of a bay and the depth of water between Sandford island and the bay is from 3 to $3\frac{3}{4}$ fathoms. In the bay vessels can anchor in 15 feet of water, but at the wharf and channel leading to it the depth is $14\frac{1}{2}$ feet. It is principally a coaling station for the Canadian Pacific Railway and a harbour from which lumber is shipped. There is one wharf only and on it is a shed 30 by 40 feet for general freight. The Canadian Pacific Railway Company has two derricks which have a capacity for unloading 600 tons of coal in ten hours. The Northern Transportation Company's steamers call at this port, and there is communication daily by water with Collingwood and Owen Sound, in Georgian Bay, and Sault Ste. Marie, at the head of St. Mary's river or foot of Lake Superior. The place is an important Canadian Pacific Railway station and has communication by this railroad and by telegraph east and west. Supplies to a limited extent may be procured, but there are very few facilities for repairing vessels of any considerable size.

There are no port charges and vessels are piloted by their own officers. The total tonnage which entered this port during the fiscal year of 1908 was 100,220 tons; this does not include vessels which cleared. See List of Lights and Admiralty Chart No. 908.

Amherstburg Harbour, Ontario, is near the mouth of the Detroit river. An island named Bois Blanc runs parallel to the main shore and the channel between has been dredged to give 21 feet of water. There is anchorage opposite the south-eastern end of Bois Blanc island on the Amherstburg side; depth of water about $19\frac{1}{2}$ feet, well sheltered. The port is prin-

cipally a coaling station and cargoes are handled by steam derricks and clams. The docks are almost continuous for 1,500 feet, with coal sheds and other small sheds. Dredges and drills used in the work of deepening the Detroit river are repaired while laying at the docks. On the west side of Bois Blanc island is the American channel, but being crooked it is not much used by vessels of any size.

The lights are: front and back range lights at Amherstburg in latitude 42° 5′ 40″, longitude 83° 6′ 10″; also range lights at Limekiln crossing on the Detroit river; one stone tower on Bois Blanc island opposite Amherstburg, light seen 14 miles in clear weather on Lake Erie; two range lights on Elliot point maintained by the Lake Carriers' Association; two light vessels at Limekiln crossing maintained by the United States government, and a lightship on Bar point, also maintained by the United States government.

Amherstburg has communication by water with all ports on the lakes and by rail with the main lines in Canada and the United States.

The *port charges* are harbour master's dues charged twice in one year if not paid elsewhere. The total tonnage which entered Amherstburg during the fiscal year was 268,558 tons; this does not include vessels which cleared. See List of Lights and Admiralty Chart No. 330.

Bath Harbour, Ontario, is in the north channel of Bay of Quinté, opposite Amherst island, which is in the eastern end of Lake Ontario. The depth of water in the harbour is from 15 feet alongside the wharfs to 40 feet off the town, where there is good anchorage. The wharfs are: one 140 feet front and 140 feet long with 17 feet of water, with coal shed, grain warehouse, ice-house and general freight shed; one 140 feet long and 85 feet front with 12 feet of water, with a flour mill upon it, coal shed and grain warehouse and wharf with similar buildings. Lights are maintained on these wharfs by the owners of steamboat companies. The total tonnage of vessels which entered Bath during the fiscal year of 1908 was 114,716; this does not include the tonnage of vessels which cleared. See List of Lights and Admiralty Chart No. 2,961.

Brockville Harbour, Ontario, is on the St. Lawrence river. The depth of water for anchorage is from 16 to 40 feet. The wharfs belong to companies and private individuals. All the wharfs are continuous along the water front and are about 15 feet wide with warehouses and sheds. The frontage of the water works wharf is 240 feet; of Jas. Bresnan's wharf, 70 feet; other wharfs belong to R. Bowie & Co., 160 feet; Ault & Reynolds, 218 feet; Canadian Pacific Railway Co., 650 feet; I. Smart Mfg. Co., 400 feet; C. C. Coal Co., 100 feet; and electric light works, 110 feet. The depth of water alongside these wharfs ranges from 12 to 16 feet. There is a railway siding on the Canadian Pacific Railway wharf and one on the wharf of the Jas. Smart Mfg. Co. The extent of the harbour used by vessels is along the river front inside the main channel.

The lights are Cole shoal light about five miles west of Brockville, a gas buoy off eastern end of Brockville narrows, another in 18 feet of water, 250 feet from north shore in narrows west of Brockville group. The total tonnage entered at Brockville during the fiscal year of 1908 was 702,163, not including vessels which cleared. See List of Lights and Admiralty Chart No. 2,789 G.

Belleville Harbour, Ontario, is on the north shore of Bay of Quinté and at the mouth of the Moira river. The water is very shallow opposite the town, but east of it there is a depth of 15 feet. A channel has been dredged in the mouth of the river about 1,000 feet, with a width of 450 feet at its outer end and 200 feet at the shore end. At the pier along the channel, the depth of water is 14 feet. On the pier are warehouses for general merchandise and fruit storage. The lights are one on a crib southeast edge of shoal at entrance of harbour in latitude 44° 9′ 9″, longitude 77° 22′ 43″, another on Bay of Quinté bridge immediately west of Belleville.

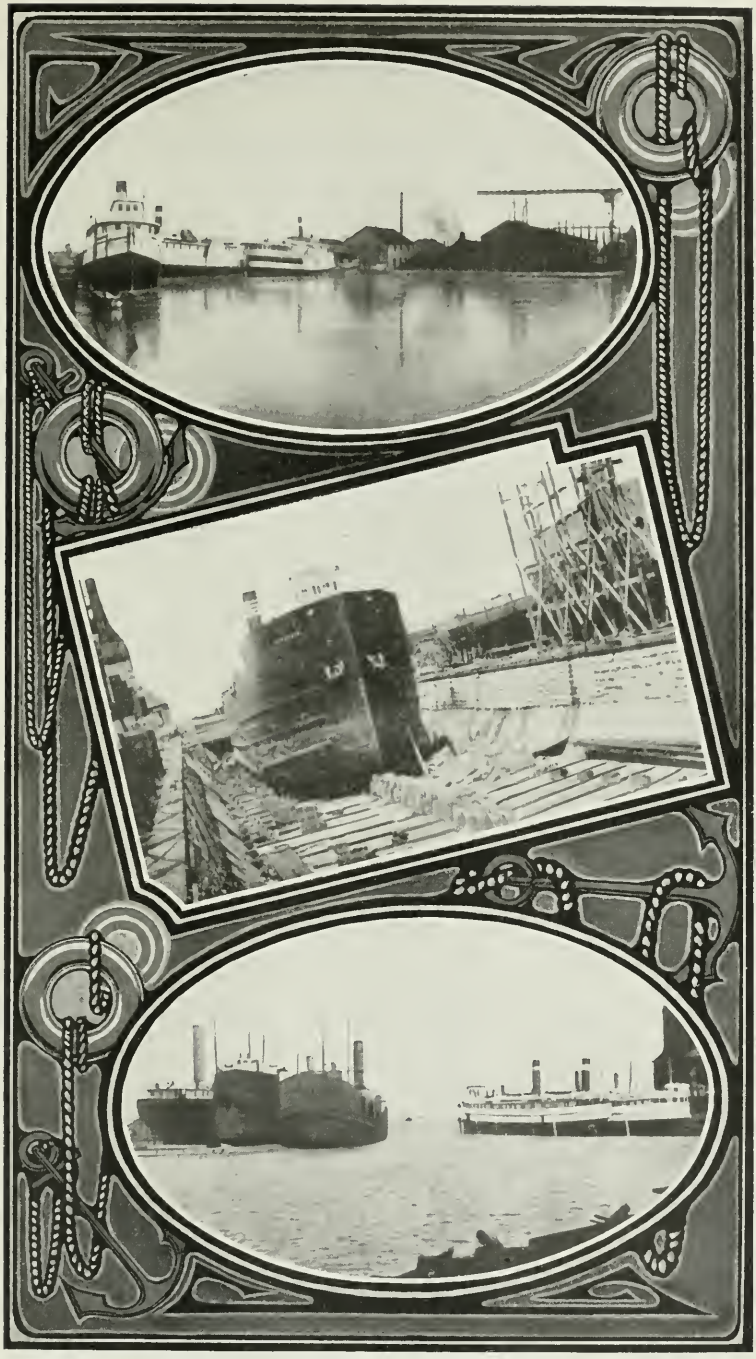
The harbour is under the control of Harbour Commissioners, and the port charge is wharfage on goods landed and shipped. The total tonnage of vessels which entered Belleville during the fiscal year was 182,253; this does not include vessels that cleared. See List of Lights and Admiralty Chart No. 3117.

Chatham Harbour, Ontario, is on the Thames river which empties into Lake St. Clair. The river has been dredged along the wharfs to a depth of 10 feet. There are ten wharfs in all and a shed adjoining the city wharf available for freight. One wharf has a railway siding upon it. The nearest lighthouse is at the mouth of the river, where two range lights are located in latitude 42° 19′ longitude 82° 26′ 50″. A gas buoy is moored in 14 feet of water in Lake St. Clair, 1½ miles from Thames river light. The total tonnage which entered Chatham during the fiscal year of 1908 was 51,126, which does not include vessels which cleared. See List of Lights and Admiralty Chart No. 3,117.

Collingwood Harbour, Ontario, is on the south side of Georgian bay and is a capacious harbour for lake vessels, having good wharf accommodation of about 7,000 lineal feet and 22 feet of water in the ship channel at the approach to the harbour and inside the harbour. There are seven wharfs for loading and discharging cargo, grain, coal and lumber. No. 1 wharf is the Grand Trunk Railway Company's lumber wharf, 500 feet long and 80 feet wide with railway siding and switches, depth of water 16 feet alongside wharf; No. 2, Grand Trunk Railway elevator wharf, 1,100 feet long with elevator, railway siding and switches; No. 3, Grand Trunk Railway freight wharf, 1,200 feet long with freight shed 200 by 80 feet and railway track running through the centre of the shed; No. 4, Collingwood Shipbuilding Co.'s wharf, 400 feet long; No. 5, government wharf, 650 feet long with freight shed 100 by 50 feet; No. 6, Collingwood Meat Company's wharf, 800 feet long; and No. 7, Charlton Sawmill Company's lumber wharf, 2,500 feet long. The water at Nos. 6 and 7 is only 16 feet deep.

The capacity of the grain elevator 165,000 bushels. Grain can be unloaded from vessels at the rate of 4,250 bushels per hour, cars can be loaded at the rate of 5,000 bushels per hour and the largest sized vessels can be unloaded by loading grain directly into cars. 4,250,000 bushels of grain have been handled in one season.

The accommodation for docking vessels is superior to any port on the Canadian side of the Great Lakes and the port has



Collingwood, Harbour, Dry Dock and Shipyard.

one of the most complete shipbuilding plants anywhere on the Great Lakes for construction and repairs. Heavy castings and forgings are made and heavy boiler plate turned for boiler construction. Marine engines are constructed and steel, composite and wooden hulls of large sized vessels built. Steel grain barges of 400 feet and longer can be built and equipped with engines and boilers, and some of the best passenger and freight steamers on the upper lakes have been built and equipped at this port. One dry dock in active service is 545 feet long and 75 feet wide, which will accommodate the largest vessels on the Canadian register on the lakes; a second dock under construction is 400 feet long and 100 feet wide; a third dry dock is contemplated and a landing slip 1,000 feet long for further mooring accommodation of vessels while undergoing repairs.

The harbour has been made by the construction of crib breakwaters and the ship channel has been dredged 200 feet wide, having 22 feet of water, in hard pan and rock. This channel is well buoyed to mark its width. The lights are: Collingwood breakwater light, outer end of west breakwater in latitude 44° 31′, longitude 80° 13′ 50″; one on cribwork pier at the turn of the dredged channel, which is a front light to the shore range on the mainland 2,644 feet south; one back light on a cribwork pier, which is a range to the wharf from the light on the turn; one light on Nottawasaga island, two miles northwest of Collingwood harbour. There is a gas buoy moored in 5 fathoms of water 400 feet west of Lockerbie rock.

The *port charges* are harbour master's dues collected twice a year if not paid elsewhere and wharfage on cargo. At the government wharf moorage is charged according to registered tonnage. See List of Lights, Chart No. 327, and the Georgian Bay Pilot for sailing directions. The total tonnage which entered the port in the fiscal year 1908 was 187,331, which does not include the tonnage which cleared.

Cornwall is at the eastern end of Cornwall canal on the St. Lawrence river. The wharf at the foot of the canal is concrete and has a depth of water of from 9 to 12 feet, according to the stage of the river. The storehouses are removed at the end of the season of navigation, owing to the rise of the water in the river in the spring. The wharf on the north side of the

canal is 800 feet long and has a depth of water of 14 feet. There is also a government wharf and a dry dock which will take in vessels drawing 12 feet and not more than 200 feet long by 50 feet beam. About six vessels of this size can be accommodated at one time. The channels are good and clearly distinguishable. The nearest lights are canal lights and an acetylene light on St. Regis dyke which leads up the river to turn at Cornwall island, and also a gas buoy opposite east end of Cornwall island, latitude 45° 18′, longitude 74° 39′ 50″. The total tonnage of vessels which entered at Cornwall during the fiscal year of 1908 was 163,754, which does not include vessels which cleared. See List of Lights and Chart No. 2,789 D.

Deseronto Harbour, Ontario, on the north shore of Bay of Quinté is a commodious harbour for lake vessels. Good water is found up to the wharfs for an extent of one mile east and west, and the harbour extends north and south about two miles. The depth of water at the eastern end is about 13 feet at low water, in the bay and about 11 feet at the western end. There are four wharfs at which vessels drawing 14 feet can tie up at the highest stage of the water. The water in the channel from Deseronto to Lake Ontario going east, is from 30 to 100 feet and safe for navigation, but vessels passing up to Murray canal draw less than 14 feet; the bay affords excellent shelter in storms, the bottom being of clay and mud and good holding ground.

The port has about a dozen wharfs nearly all connected by sidings with the railway track which runs along the shore end of the wharfs, and loading with lumber is easily and quickly effected. There is a large cold storage building on the railway wharf with separate compartments for storing cheese, butter, meat, fruit, &c. The wharf has also a large shed where cheese and fruit are loaded directly into refrigerator cars, and articles can be taken from the cold store and also placed in refrigerator cars.

Extensive repairs to wooden steamers and sailing vessels can be made at Deseronto, in a well situated shipyard with a complete equipment for hauling out and repairing. Several large steamers have been built at this port. It has convenient water

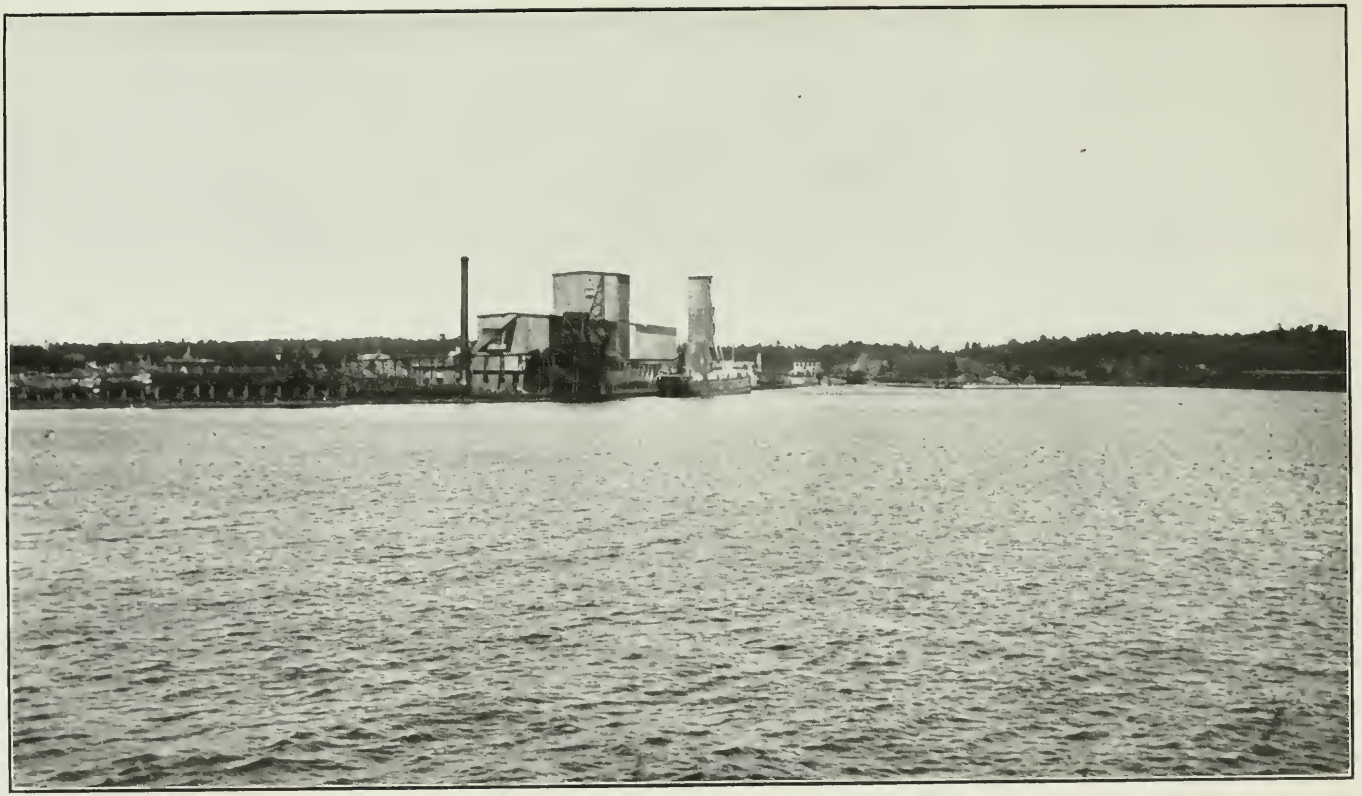
communication with all lake ports and railway and telegraph communication with all points. The *port charges* are harbour master's dues paid twice a year if not paid elsewhere and wharfage.

The lights are one on the railway wharf in latitude 44° 11′ 27″, longitude 77° 2′ 55″, and one on Telegraph island, about four miles westward. See List of Lights and Admiralty Chart No. 2,961. The total tonnage which entered Deseronto during the fiscal year was 213,769.

Depot Harbour is situated on the north shore of Parry island, Georgian Bay, 5½ or 6 miles distant from Parry Sound harbour. The approximate extent of the harbour used by vessels is one and a half miles by one-quarter mile, and the depth of water for anchorage is 5 fathoms with good holding clay bottom. The harbour is well sheltered from heavy seas and its approach well marked by acetylene buoys, port and starboard spar buoys and compression gas light houses and beacons for a distance of twenty miles out into the open Georgian bay.

The elevator and coal wharf, is 1,200 feet long by 81 wide, situated on the north side of the harbour, and owing to its length forms a breakwater against heavy seas from the north. The elevator which stands on the wharf has a capacity of two million bushels and has one marine leg. The amount of grain handled in the harbour averages 15,000,000 bushels, received principally from Fort William and Chicago during the season of navigation up to November 1, and then is transhipped in cars to Montreal, St. John, N.B., and Portland, Me. The wharf is also fitted with coal bins where from 80,000 to 85,000 tons of coal are handled in one season. For loading and unloading coal a steam derrick with buckets is used, principally by the Grand Trunk Railway vessels. Six railway sidings have been placed on this wharf, two of which run into the elevator, two along the north side and two run to the coal bin and end of breakwater on the south side. The depth of water alongside this wharf is from 18 to 30 feet.

The cement dock is situated in the centre of the harbour and consists of crib-work with concrete top; it is 800 feet long by 150 feet wide. Two railway sidings run upon this wharf and



Depot Harbour, Ontario.

the depth of water on both sides and across the face is from 18 to 20 feet. The wharf is used for handling mostly, lumber and steel rails.

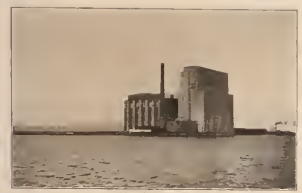
The package freight wharf is situated on the south side of the harbour and is 1,200 feet in length by 100 feet in width, with depth of water alongside from 21 to 35 feet. There are two extensive freight sheds, No. 1 being 600 feet by 80 and No. 2 is 650 feet by 80. Two railway sidings run alongside the sheds and the ships' side with facilities for unloading freight by steam conveyors.

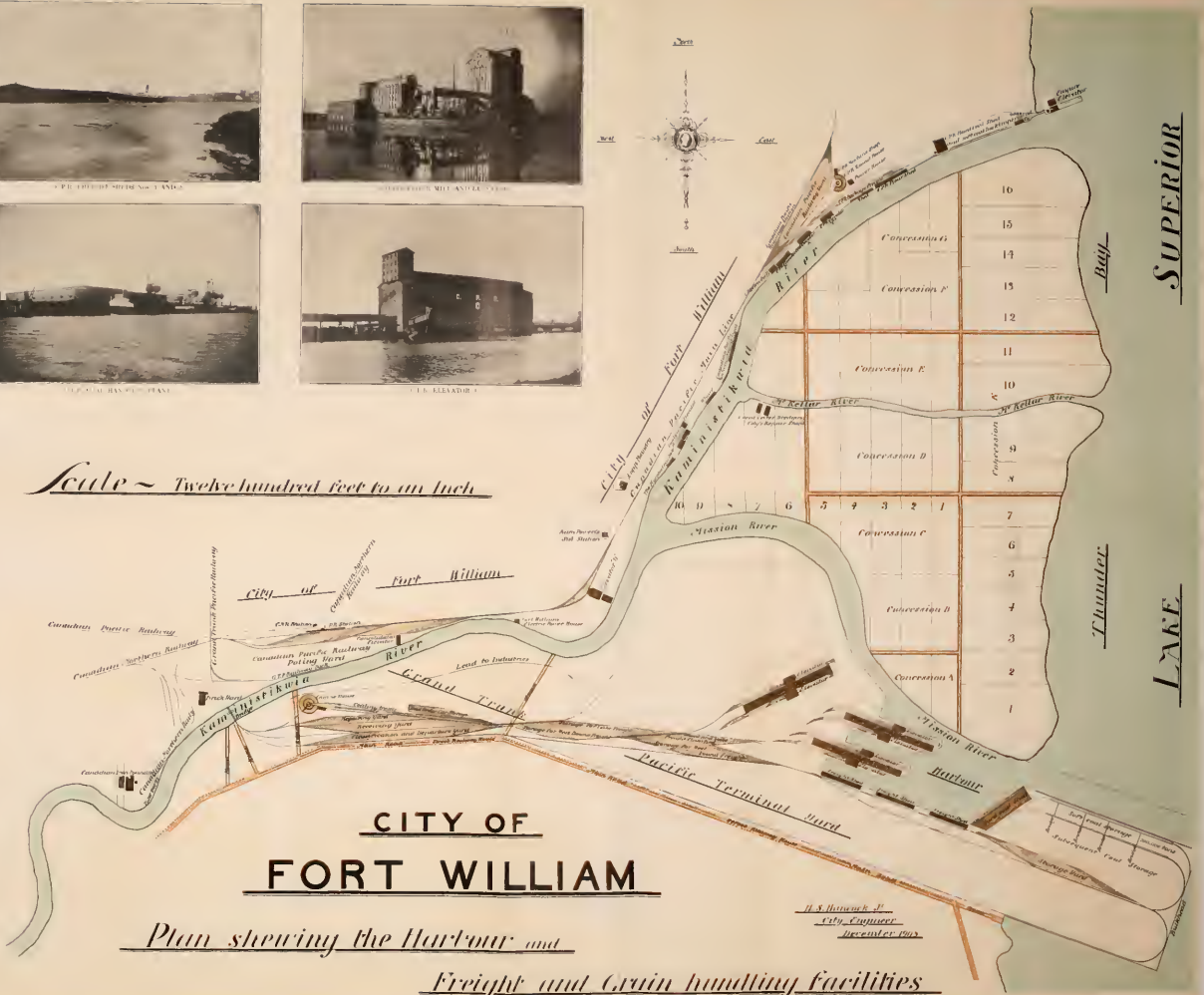
The immediate lights are Depot island light on the beach at extremity of the island in latitude 45° 20′ 1″, longitude 80° 7′ 25″, and Kilbear point.

The tonnage included in the port of Parry Sound, being an outport, was 218,585, which does not include vessels which cleared. See List of Lights and Admiralty Chart 1,731.

See plan of Fort William herein.

Fort William Harbour, Ontario, is on the west side of Thunder bay, north shore of Lake Superior. The bay is a fine sheet of water, having a depth of 3½ fathoms at the mouth of Kaministiquia river, where the harbour is situated, to 40 fathoms out in the bay. The Kaministiquia river has three channels emptying into the bay at three distinct points, viz.: the Fort William channel, McKeller's channel and Mission channel. The river has been made navigable for five miles up and coal is conveyed to the unloading plant of the Canadian Northern Railway. Basins have been dredged for the accommodation of the large steamers which carry freight of all kinds and coal to this port and return with grain. The port has a large transportation trade of merchandise, machinery and articles shipped from the east by water and loaded on cars for the Northwest and British Columbia. It has advantages over almost any port on the lakes owing to the fact that vessels carrying cargo to Fort William are always sure of a cargo of grain on the return trip. The wharfs run along the bank of the Fort William channel of the Kaministiquia river. At the point where the river flows into the bay and on the north side of the river the first wharf is met running out into the bay at which the Empire grain elevator is situated, with a capacity of 1,500,000 bushels, and proceeding up the river is the Imperial




Scale ~ Twelve hundred feet to an inch
CITY OF
FORT WILLIAM
Plan shewing the Harbour and
Freight and Grain handling facilities
City of Fort William
Kaministikwia River
Mission River
Pacific Terminal Yard
Harbour
Lake Superior
Thunder Bay
Canadian Pacific Railway
Canadian Northern Railway
Grand Trunk
Lead to Industries
Concession G
Concession F
Concession E
Concession D
Concession C
Concession B
Concession A
16
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1

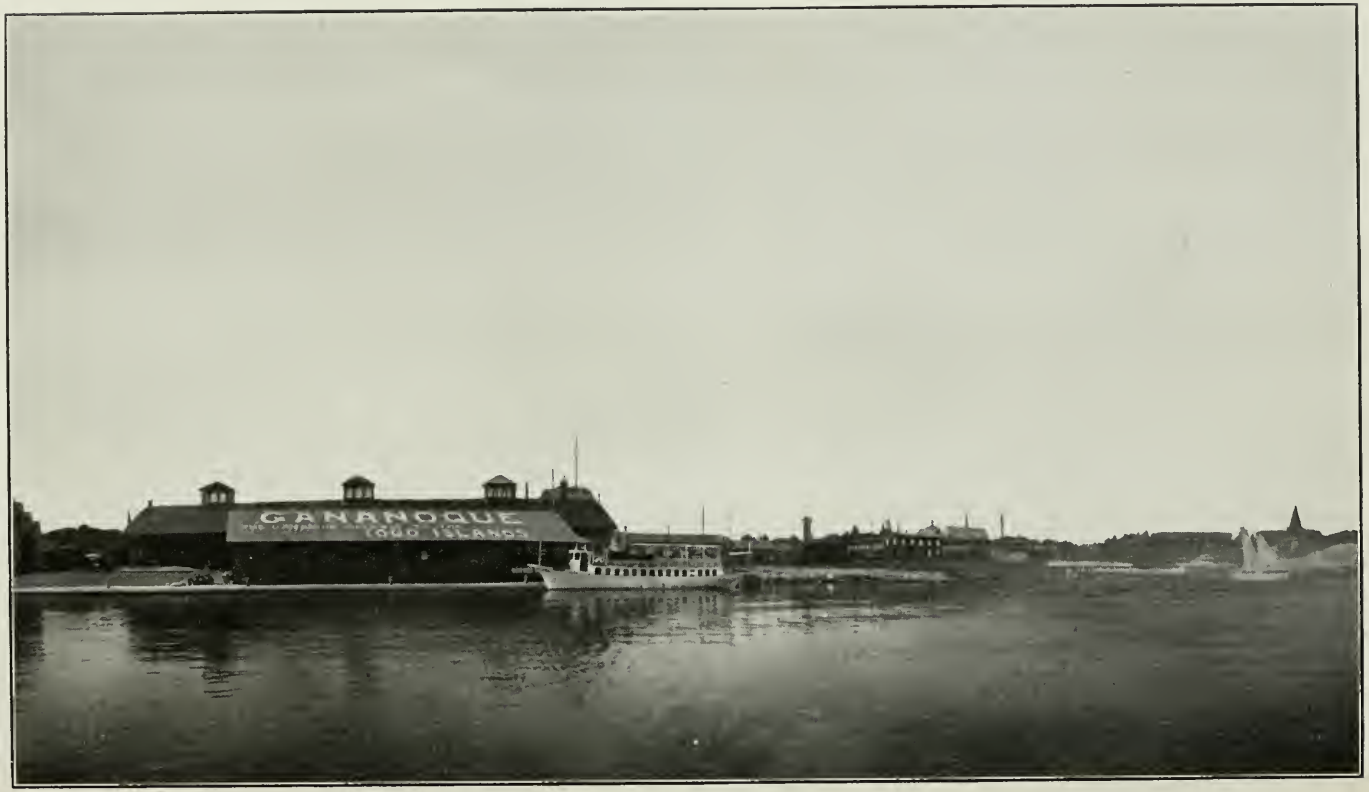
Oil Company's shed, and next the Canadian Pacific Railway coal shed, package, freight and flour shed and the company's grain elevator, with a capacity of 1,250,000 bushels, B with a capacity of 500,000 bushels, C with a capacity of 1,500,000 bushels, and E with a capacity of 2,500,000 bushels; and next in order are freight sheds of this company and wharf, and then Ogilvie's grain elevator and flour mills, Murphy's coal dock and elevator D belonging to the Canadian Pacific Railway, with a capacity of 3,000,000 bushels, and the Consolidated elevator, capacity, 1,000,000. The Grand Trunk Pacific wharfs, elevators and sheds are on Mission channel of the harbour, and when the grain elevator is completed will have a capacity of seven million bushels, the largest of its kind in the world. The grain storage capacity of Fort William and the twin city of Port Arthur is now, in round numbers, 28,500,000 bushels, placing them fourth on the list among grain ports of the Great Lakes for elevator capacity.

The shipping entering and clearing from Fort William consists of regular lines, passengers and package freight carriers, grain carriers, iron ore and steel rails and heavy freight carriers.

The lights are: one on Thunder cape, entrance to Thunder bay; one on the northeast extremity of Welcome islands; one at the mouth of the Kaministiquia, on the Empire elevator wharf, in latitude 48° 23′ 41″, longitude 89° 12′ 48″. There are also two gas buoys on the edges of the dredged channel in the mouth of the Kaministiquia river.

The *port charges* are harbour master's dues paid twice a year if not paid elsewhere and wharfage. Vessels are piloted by their own officers. A strong tug is employed by the government in the spring to break the ice in the harbour and in the fall, to keep open the harbour until all vessels depart. The total tonnage which entered the port in the fiscal year of 1908 was 1,447,443. See List of Lights and Marine and Fisheries Chart No. 101.

Gananoque Harbour, Ontario, is on the St. Lawrence river at the mouth of the Gananoque river. It has five wharfs, one wooden wharf 374 feet long by 27 feet wide and a freight shed 24 feet by 30 feet, with 12 feet depth of water; one a cement



Gananoque, Ontario, Harbour.

wharf 241 feet long by 54 feet wide, warehouse 85 feet by 30 feet with canopy exterior shelter for freight and passengers; this wharf and warehouse are lighted by electricity. A railway siding runs in the rear of warehouse, water 14 feet in depth; another dock 129 feet long by 17 feet wide, with a railway siding and a wharf 63 feet long by 30 feet wide.

Lights, the Gananoque Narrow's light and a gas buoy opposite the lighthouse and Jackstraw lighthouse, two miles from Gananoque, in latitude 44° 19′ 28″, longitude 76° 7′ 15″. The total number of vessels which entered Gananoque during the year of 1908 was 71,167, which does not include vessels which cleared.

Goderich Harbour, Ontario, is on the southeastern part of Lake Huron. The harbour has been formed by the construction of two long piers, one called the north pier and the other the south pier, running out into the lake, at the mouth of the Maitland river. The harbour inside the piers is a basin entirely surrounded by crib-work, faced with timber and decked with plank with mooring hooks and posts. The landing or dock on the south side is 1,400 feet long, on the east side 650 feet long and on the northwest side 800 feet long; this side is protected on the north by a breakwater along the river. The land on the west side of the harbour between the harbour and lake shore has been formed by accretion from the bed of the lake, and has an area of seven or eight acres. This land is leased by the government to the Goderich and Guelph Railway Company and the Ontario and West Shore Railway Company and is reached by passing over the northwestern dock.

There are two railway sidings along the entire length of the south side dock, where merchandise and freight of all kinds are handled, and two grain elevators with a capacity of 500,000 and 200,000 respectively. The dock on the northwestern side has also a railway track running along the centre for handling lumber, which is piled on the wharf. The dock at the east end of the harbour is used principally for lumber purposes, and the water in the harbour at the south side is 19 feet 6 inches in depth and at the northwest side, 16 feet; the east side has a depth varying from 9 feet to 19 feet 6 inches. The water is no deeper in the centre of the harbour than at the wharfs or

Goderich, Ont. Harbour.

Goderich, Ont., Breakwater.

docks. Opposite the ends of the entrance piers is a breakwater for the purpose of breaking the sea and permitting vessels to enter between the north and south pier, in comparatively smooth water. The entrance is narrow; at the inner end of the piers is a check water to protect vessels lying at the south side dock from the sea, which sometimes rushes in between the piers.

The lights are: the main light on a high bank at the south side of the entrance to the harbour in latitude 43° 44′ 33″ N., longitude 81° 43′ 34″ W.; the front range light is near the end of the north pier at the entrance, and back light on the edge of the western side of the harbour basin. An acetylene light has been placed on the western end of the new breakwater built out in the lake about one thousand feet from the outer end of the north pier. The fog alarm is on the town waterworks building. At the inner end of the south pier is a life-boat station.

The *port charges* are harbour master's dues collected twice a year if not paid elsewhere. The total tonnage which entered the harbour during the fiscal year of 1908 was 93,675. See List of Lights and Admiralty Chart No. 1,152.

Hamilton Harbour, Ontario, is practically the whole of Burlington bay in the extreme west end of Lake Ontario. The harbour is approximately six miles long by one mile wide. The harbour is land-locked and anchorage is good in 50 feet of water with mud bottom. Burlington beach, a narrow neck of sand varying in width from 250 to 1,000 feet, separates the bay from the lake, through which the entrance from the lake to the harbour has been cut and piers built on each side; the north pier being about 2,305 feet and the south pier 2,721 feet long, the width between, varying from 174 feet at the outer to 103 feet at the inner end. There is a shoal in the harbour off the wharfs, but it is marked by buoys.

The wharfs beginning on the western side are some unused wharfs, then Brown's wharf, 173 feet long on the west side, 173 feet frontage and 205 feet on the east side, with one shed 160 feet by 40, and another 160 feet by 53, the depth of water at this wharf is from 16 to 18 feet; McIlwraith's wharf with several sides and angles, at the shore end 132 feet

long, one side 80 feet at right angles, another side 135 feet, one 116 feet and the front face 234 feet, and the eastern side 187 feet in length; two sheds are upon this wharf, one 87 by 40 and one 100 by 30 feet; the depth of water is 14 feet. McKay's wharf, 294 feet on the west side, 148 feet frontage; the east side adjoining a slip, 63 feet wide, with 14 feet depth of water in it. There is a large warehouse upon McKay's wharf covering nearly the whole area, the depth of water is 14 feet. Adjoining the slip is the Hamilton Steamboat Company's wharf, length 110 feet at the head; a passenger shed and a freight shed are upon this wharf, 147 feet by 40. The Turbine Steamship Company's wharf adjoins the city warehouse property. East of the revetment wall the Intercolonial Harvester Company of Canada has a dock 600 feet long by 75 feet, with two sheds measuring 300 feet by 150, and two railway sidings; the depth of water is 12 feet at this dock. The Hamilton Steel and Iron Company's dock is 200 feet long by 60 feet wide, with one railway siding; depth of water, 16 feet.

The lights are the main light near middle of southern pier in Burlington channel, latitude 43° 18′ 20″, longitude 79° 48′ 25″; front range light on outer end of pier temporarily and back range, 750 feet S. 64° west from front range and one on inner end of south pier. See List of Lights and Admiralty Chart No. 1,152, Burlington Bay.

The total tonnage entered at Hamilton during fiscal year of 1908 was 330,380, which does not include the tonnage which cleared.

Kingston Harbour, Ontario, is situated on the St. Lawrence river, at the northeastern extremity of Lake Ontario. The Cataraqui river empties into the St. Lawrence river at Kingston, and the mouth of it forms part of the harbour above the bridge. The extent of the harbour, from Portsmouth on the west to Bell island on the eastern side is about $3\frac{3}{4}$ miles, and the depth of water varies from about 12 to 20 feet at the outer ends of the wharfs to 40 feet in places opposite the city in the St. Lawrence river.

The wharfs from the west to the east are Portsmouth pier, about 610 feet long by 20 feet wide; depth of water from 4 to 17 feet. Penitentiary wharf, frontage 1,040 feet, with an

angle from the west side 230 by 30 feet. Clark's malt house wharf, 180 feet on the west side by 35 feet, the front side of the angle is 140 feet; depth of water, 21 to 22 feet along the front side. Rathbun's wharf, length along the front, 275 feet by 30 feet in width with sheds; water from 11 to 17 feet. Maitland street wharf, 120 feet long by 20 wide; water, 17 feet. Waterworks wharf, front side of angle, 155 feet long by 20 feet wide; depth of water from 14 to 18 feet; another waterworks wharf, 220 feet from shore to outer end by 25 feet wide; water, 27 to 29 feet at outer end. Moder's elevator wharf, with 20 feet of water at the outer end. Kingston Locomotive Works wharf, 410 feet long by 265 wide on the front; water along the front side, 18 feet. Craig's wharf, frontage, 145 feet; depth of water, 10 to 11 feet. Grand Trunk freight shed, 272 frontage, with from 12 to 14 feet of water alongside. Swift's wharf, west side, 400 feet long by 82 feet wide, with freight sheds; depth of water along the front, 12 feet. Ferry dock, 214 feet long by 36 feet wide; depth of water, 9 feet at outer end. Richardson's elevator wharf, 394 feet long by 65 feet wide; water at outer end, 10 feet 6 inches. Mrs. Harty's wharf, 200 feet long by 104 wide; depth of water at outer end, 8 feet. Crawford's wharf, 196 feet long by 64 feet wide; depth of water, 8 feet at the head of the wharf.

Montreal Transportation Company's wharf, 810 feet long, width varying from 66 feet to 20 feet, with two projections on the east side 80 feet long each; water alongside projection, 17 feet; at the outer end, 13 feet 6 inches. Montreal Transportation Company's elevator wharf, 645 feet long by 92 feet wide; depth of water along the west side, 10 feet; at the outer end, 16 feet. Above the bridge over the Cataraqui river is the coal wharf of the Kingston and Pembroke Railway Company, 400 feet long, and another wharf of the same company 925 feet long by 66 feet, and one 760 feet long by 68 feet wide, upon which are railway tracks on all of the three wharfs.

There are two dry docks for repairing vessels, one belonging to the government, 305 feet long by 70 feet wide at coping level, 47 feet at floor level, with 13 feet 7 inches over the sill; the other, Davis' dock, for light draft vessels and is situated


MIDLAND HARBOUR
MIDLAND
TOWN of

above the bridge; it is 175 feet long by 32 feet at the entrance, and depth of water 4 feet 6 inches over the sill.

Kingston has four grain elevators with a capacity of 1,546,000 bushels, and considerable quantities of wheat are transhipped to ocean ports from the port. Extensive repairs are sometimes made to vessels, and material can easily be procured. Kingston has water communication east and west and railroad communication with all parts of Canada and with the United States. The harbour is under the control of the city corporation. The lights are, one on the City Hall in latitude 44° 13′ 50″ N., longitude 76° 28′ 53″ W.; one on Snake island five miles west of Kingston, and gas buoys are in position from Kingston to Montreal and above Kingston on the St. Lawrence river and Bay of Quinté. The total tonnage which entered the port during the fiscal year of 1908 was 2,225,038, not including vessels which cleared. See List of Lights and Admiralty Chart No. 1,152.

Little Current Harbour, Ontario, is on the north shore of Manitoulin island and in the narrow channel between the island and Goat island. A channel 100 feet wide carrying 22 feet of water at low water has been cut through the rock bar between Spider island and Goat island, north of the town of Little Current. The place is a lumber shipping port and a series of boom piers have been built to facilitate the towing of logs.

The harbour is well sheltered and has wharfs with ample water alongside of them. The place has communication by water with all Georgian Bay ports and with Sault Ste. Marie, and at a short distance by steamer with the Canadian Pacific Railroad east and west. The lights are a front light near the shore in the village, latitude 45° 58′ 52″, longitude 81° 51′ 25″, and back light on high ground south of the front light. The total tonnage of vessels which entered Little Current in the year 1908 was 204,801, which does not include vessels which cleared.

Midland Harbour, Ontario, is in Midland bay, on the southeast side of Georgian bay. The entrance is between Midland point and Elimere point, a distance of 2½ to 3 miles.

Midland bay runs a distance of four miles from the turning point at which vessels come in line with the electric range lights, situated on a hill in the southwest part of the town. The harbour is spacious, with a depth of 25 to 100 feet of water for anchorage of large vessels, with the exception of Middle shoal, which has a depth of 12 feet only. This shoal is in the track of vessels from Midland point to the wharfs situated on the southeast side of the harbour, but there is ample depth of water on each side of the shoal. The east side of the shoal in the harbour has a depth of from 50 to 100 feet with ample room, the west side of the shoal has a channel 24 feet deep, narrow but without obstructions. Vessels are well sheltered at the wharfs, no storm interferes with loading or discharging and many large steamers are put in winter quarters in this harbour. The government has for several years employed, by contract, tugs of the Midland Towing and Wrecking Company to keep open navigation late in the fall by making tracks in the newly formed ice.

Grand Trunk Pacific Terminal Elevator.—This elevator has a full capacity of about two million bushels and facilities to unload vessels at the rate of about twenty-five thousand bushels per hour. There are two sidings running into it, on which cars can be loaded nearly as fast as can be elevated from vessels. This is a very fine iron and cement structure, with all the most modern appliances for work; water, 25 feet.

Aberdeen Elevator.—This elevator has a capacity of about one million bushels, with facilities to unload vessels at about the rate of ten thousand bushels per hour. It is an iron structure and has one siding on which cars can be loaded; water, 25 feet.

The Midland Elevator Co.—This elevator has a capacity of about one million bushels and facilities to unload vessels at the rate of about ten thousand bushels per hour. It is a wooden structure, iron sheeted, with a railway siding into it on which cars can be loaded; water, 22 feet.

Manly Chew's Mill.—This mill has a capacity of about eighteen to twenty million feet of lumber per season, with large dock frontage to load vessels from; water from 15 to 20 feet.

Aberdeen Elevator, Midland, Ont., Capacity, 1,000,000 bushels.
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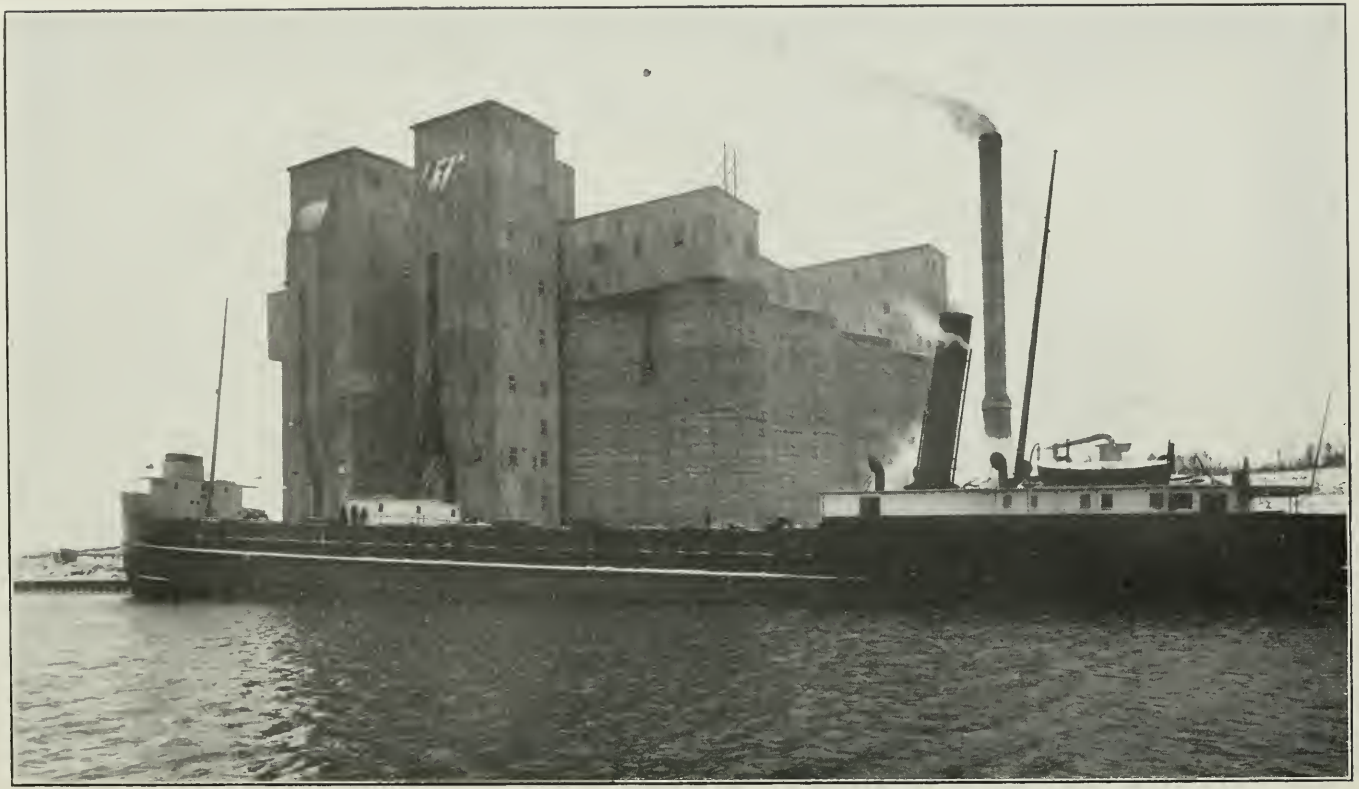


G. T. Pacific Elevator, Midland, Ont., Capacity, 2,500,000 bushels.

Georgian Bay Shook Mills Co.—This factory is large and manufactures boxes, doors, sash and all kinds of mouldings and house-building material. Its facilities for work are of the most modern and up-to-date description. About seven million feet of lumber required for each year's output; water front from 16 to 18 feet in depth.

N. L. Playfair Mill.—A most modern mill with a capacity of about twenty million feet of lumber per season. A fine dock front at which vessels can be loaded; water from 12 to 16 feet.

Jas. Playfair & Coy's Mill.—This mill's capacity is about eighteen to twenty million feet of lumber per season; with large dock frontage at which vessels can be loaded; water from 12 to 22 feet. Two railway sidings lead to the dock.

Midland Towing and Wrecking Coy's Dock.—The water at this dock is about 22 feet. Wrecking sheds are located here, and appliances used at wreckages, stored.

Midland Coal Dock Coy's Dock.—This dock handles yearly about 75,000 tons of coal, and has a storage capacity of 25,000 tons, and facilities to unload boats at the rate of 1,800 tons every twenty-four hours. Railway siding leading to this dock. The largest size lake vessels can coal here. The water is from 22 to 24 feet.

Government Dock.—This dock has a good frontage, and water 14 to 22 feet in depth.

Shipway and Shipbuilding Yard.—Vessels 100 tons capacity can be hauled out here, and vessels of 150 tons can be built in the yard. A large business is done.

Government Dock at end of Grand Trunk Railway Dock.—This dock has a good frontage, and water from 10 to 22 feet. Railway siding on side of it.

Grand Trunk Railway Dock.—This dock has two railway sidings leading over it, and has a large shed 36 by 150 feet; water, 10 to 22 feet.

Chew Bros. Mill.—This mill has a capacity of eighteen to twenty million feet of lumber per season; with large dock frontage; water, 22 feet.

Steel Works and Canada Iron Furnace Co.—These works are of a very substantial character, the furnace turning out about one hundred and twenty-five tons of pig iron per day, and the steel works doing a large business. Long dock, most solidly built, with water from 14 to 22 feet. Railway siding leading along the dock front.

Provisions and other ships' stores can be procured at Midland at reasonable prices, and coal can be easily obtained for bunkers. The port has communication with all Georgian Bay and lake ports, including Fort William and Port Arthur. From the latter ports large quantities of grain are received; over 10,200,000 bushels were received from them in 1908, and about 6,700,000 bushels from Chicago and Duluth. The port has also railway communication with all parts of Ontario and with the United States.

The lights are Midland range lights on rising ground at the southwest part of the town of Midland in latitude 44° 44′ 58″, longitude 79° 53′ 56″, and Midland point range lights on the shore of Georgian Bay east of Sucker creek point. There is a shoal in the harbour marked by a buoy. See List of Lights, Georgian Bay Coast Pilot and Admiralty Chart No. 2,102. *Port charges* are harbour master's dues paid twice a year if not collected in other ports and wharfage. The total tonnage entered at Midland for the fiscal year of 1908 was 191,738 tons, not including vessels which cleared as they were practically the same vessels.

Niagara-on-the-Lake Harbour, Ontario, is at the mouth of the Niagara river, Lake Ontario. The harbour is not much used for anchorage. There are two wharfs, the main one is 600 feet long by 45 feet wide, and depth of water 15 feet. Adjoining this wharf are railway tracks, station and freight shed. Another wharf in the port is 100 feet long by 35 feet wide, upon which stands a small freight shed. Between the two wharfs is a slip where small vessels may be repaired. Though the harbour is not much used for anchorage, there is room with good shelter for a large number of vessels.

The lights are a range light; the front tower is on the southeast corner of the Niagara Navigation Company's wharf, latitude 43° 15′ 22″, longitude 79° 3′ 54″, and the back light on

Niagara Ontario Water Front.

shore 690 feet south 21½° east from the front light. A bell buoy is anchored off one side of the mouth of the Niagara river in 20 feet of water. See List of Lights and Chart No. 336. The total tonnage which entered Niagara-on-the-Lake during the fiscal year of 1908 was 1,282,846 tons, not including vessels which cleared. Niagara has daily communication with Toronto.

Ottawa is situated on the southeast side of the Ottawa river in latitude 45° 25′ N., longitude 75° 45′ W. The shipping trade is done by small river steamers and barges which also ply on the Rideau canal, having the termini at Ottawa and at Kingston at the eastern end of Lake Ontario. Passenger and freight steamers ply between Ottawa and wharfs along the Ottawa river, some of them communicating daily with Montreal. The canal basin is situated a short distance above the locks by which steamers and barges ascend from the Ottawa river. The basin has a wharf frontage where a number of freight steamers load and unload, and passengers are taken aboard on their way up the canal. The depth of water in the basin is about 6 feet. At Chaudière docks, Ottawa river, lumber is loaded in large quantities on both sides of the river for shipment via the Rideau canal going westward and by the lower Ottawa river going eastward. These docks extend along the shore of the river on the Ottawa side and around a basin at the foot of the cliff up to the suspension bridge and along the shore from the suspension bridge on the Hull side of the river eastward below the Alexandra bridge. The Chaudière falls and rapids immediately above the suspension bridge, prevent navigation for several miles. The river below the falls is called the lower Ottawa. The Queen's wharf below Nepean point is the principal passenger and package freight wharf, and upon it is a freight shed; depth of water at low water at the wharf is from 8 to 10 feet. At the foot of the Rideau canal locks the water varies from 15 feet in depth to a depth of 25 feet, at the same place during the spring freshets, but there is only 5 feet of water over the sills of the locks. East of the Queens' wharf several small lumber docks are used for loading lumber into barges. Ottawa has railway communication by the Canadian Pacific Railway in six directions, including two transcontinen-

tal lines, by the Grand Trunk in three directions, and by the New York Central to New York and by the Canadian Northern railroads east and west.

The total tonnage that entered at the customs during the fiscal year 1908 was 83,015 tons, which does not include clearances.

At Ottawa a large factory for manufacturing acetylene buoys and beacons has been established. The Department of Marine and Fisheries decided in 1904 to experiment with acetylene as an illuminant for buoys, beacons and lighthouses. A series of tests was made in connection with these aids and improvements were introduced, which resulted in the use of calcium carbide from which acetylene is generated in the buoys and warranted the establishment of gas buoys, combined warning and gas buoys and lights at various points in all the important waters of Canada. The example of Canada in testing carbide buoys and beacons has been followed by other countries, and now the International Marine Signal Company exports to about thirty different countries, buoys and beacons manufactured at their factory in Ottawa. Branches of their factory have been established in the United States, where the different kinds of buoys and beacons are made. Separate companies manufacture calcium carbide in this country, one of them at Ottawa.

Owen Sound Harbour, Ontario, is situated at the bottom of Owen Sound bay. The bay is eight miles wide at the entrance, gradually narrowing until the town is reached twelve miles from the entrance. The bay is well sheltered and its shores can be approached with safety to within one-quarter of a mile from shore, except at Vails and Squaw points on the east side of the bay or sound. The anchorage is good in the bay in 6 to 7 fathoms of water at certain points with mud bottom.

The wharfs in the harbour on the east side are: No. 1, town dock, 450 feet long by 20 feet wide; No. 2, owned by Davis Son & Malone, 200 feet by 20 feet; No. 3, Northern Navigation Company, 400 feet by 20 feet; No. 4, owned by the Canadian Pacific Railway Company, 1,900 feet long by 70 feet; No. 5, Canadian Pacific Railway Company's slip, 1,200 feet

Owen Sound, Ont., Harbour, 1908.

by 70 feet; No. 6, Keenan Bros.' wharf, leased from the Canadian Pacific Railway, 400 feet by 30; No. 7, McQuay Tanning Company, 100 feet long by 20 feet; No. 8, Maitland & Rixon, 200 feet by 30 feet; No. 9, Imperial Cement Company's slip, 600 feet long by 40 feet; No. 10, Carney Lumber Company, 1,000 feet by 40; No. 11, Keenan Bros.' sawmill wharf, 100 feet by 30. Wharfs on the west side: No. 1, town dock, 625 feet by 30; No. 2, J. R. McLauchlan, 383 feet by 30; No. 3, Grand Trunk Railway wharf, 1,000 feet by 30; No. 4, N. A. Bent Chair Company, 316 feet by 30 feet; No. 5, John Harrison & Sons, 400 feet by 30; No. 6, Sun Cement Company, 235 feet by 30; No. 7, Owen Sound Cement Company, 290 feet by 30 feet; No. 8, John Harrison & Co., 800 feet by 30; No. 9, Grey and Bruce Cement Company, 370 feet by 150 feet. The depth of water along the wharfs is 22 feet.

The freight sheds are, the Canadian Pacific Railway cattle sheds, 50 feet by 30 feet; Canadian Pacific Railway freight sheds, one 350 feet by 40 feet, one 300 feet by 60, one 650 by 70 and another 200 by 50 feet. The Apple Company own one cold store. The Grand Trunk sheds are, cattle shed 75 feet long by 50 feet and a freight shed 300 feet long by 60 feet wide.

Railway tracks run both sides of the river adjacent to the sheds, and freight is moved to and from vessels directly into the cars by hand trucks.

Owen Sound has two grain elevators, one with a capacity of 250,000 bushels and one with a capacity of 800,000 bushels. Grain is shipped from Fort William and Port Arthur to Owen Sound by steamers and transferred to cars. The port has daily communication by water with many Georgian Bay, Lake Huron, North Channel, and some Lake Superior ports, and railway communication with all parts of Canada. Provisions and ships' stores are easily procured at reasonable prices.

The lights are two range lights, the front light on the east side of the Sydenham river in the town, latitude 44° 34′ 43″ N. and longitude 80° 56′ 19″ W., and the back light 1,060 feet S. 21° W. from the front tower: Presqu'ile light on a wharf in the sound. See List of Lights, Georgian Bay Pilot and Admir-

alty Chart No. 1214. The total tonnage which entered the port during the fiscal year of 1908 was 479,406, which does not include vessels which cleared.

Port Colborne Harbour, Ontario, is situated near the eastern end of Lake Erie at the entrance to the Welland canal. The harbour is formed by two piers or breakwaters, the west breakwater is 4,424 feet long, running north of west to the shore of the lake, the east pier or breakwater is 2,400 feet long running north of east to the lake shore. The entrance is about 675 feet wide, but vessels are cautioned in the List of Lights to keep 100 feet from the end of the east pier, leaving a clear entrance of about 575 feet between the piers. The area protected by the breakwaters is about 70 acres, with a depth of 22 feet between the buoys placed to show the limits of the deepened part. In this area on the western side is the government grain elevator built on a dock 700 feet long, which with a loading berth in the centre of 200 feet width is 600 feet wide, giving a width on each side of the loading berth of 200 feet. On the westerly side of the elevator is the unloading berth, with a depth of 22 feet to the limit of the deepened part. On the easterly side of the elevator dock a continuous dock extends up to the Welland canal basin, with a depth of water alongside of 22 feet and 75 feet in width, but increasing in width to 100 feet, which is the width of the entrance to the canal basin. Outside of the deep cut of 22 feet the water is 16 feet deep in the approach to the canal basin between a line of isolated cribs or blocks opposite the continuous dock.

The Department of Railways and Canals has a siding on the west side of the canal running to the elevator, open to any railway which chooses to connect with it. The Grand Trunk Railway has a siding along the east side of the canal basin and a grain elevator of small capacity for lighterage purposes. The government elevator belonging to the Railways and Canals Department, has four marine legs and a capacity of 70,000 bushels per hour, and a storage capacity of 800,000 bushels. On the east dock of the canal basin are coal chutes for unloading and bunkering steamers.

The harbour was originally made by a corporate company and is not among the harbours controlled by the Department

Port Colborne, Ont. Harbour and Entrance.

of Marine and Fisheries. At Port Colborne, provisions and supplies of all kinds can be easily obtained. The lights are, front light on the outer end of the western breakwater in latitude 42° 52′ 2″, longitude 79° 15′ 13″, with a fog alarm building, and back light on the eastern side of the canal 4,620 feet N., 22° 15′ E. from front light; one on the outer end of the eastern breakwater. See List of Lights and Admiralty Chart No. 1605. The total tonnage which entered Port Colborne during the fiscal year of 1908 was 160,680, which does not include the vessels which cleared.

Point Edward, Ontario, is situated on the St. Clair river, at the southern end of Lake Huron, at the point where the waters of the lake enter the river. The wharfs are continuous along the river for about 3,000 feet and divided as follows:— The dock at which fish tugs and other small boats lie, 600 feet in length; iron ore dock, 300 feet; shed docks, 1,500 feet where general merchandise and cargo is handled, length of shed, 800 feet; elevator docks, 600 feet long, one elevator, capacity 500,000 bushels. The average depth of water along the docks is 22 feet. At this place the Hamilton Steel and Iron Company has established a large plant. Two railway sidings are laid on the ore docks, two leading to the freight sheds, two to the grain elevator and one siding along the remainder of the docks. The shipping to and from this port conveys general merchandise, grain, flour, iron ore, gravel, fish, lumber and small shipments of other articles. The machinery and appliances for loading and unloading are considered excellent. The port has railway communication with all parts of Ontario and with the United States, with excellent appliances for shipment of goods.

The lights are two range lights on the shore of Lake Huron, latitude 43° 0′ 11″, longitude 82° 24′ 49″, and the back light 579 feet S. 2½° W. from front light. The lights in one, lead to the head of St. Clair river from Lake Huron and should be kept in one ahead until their alignment is intersected by the alignment of Fort Gratiot range, on the United States side of the river. The total tonnage of vessels which entered at Point Edward during the fiscal year of 1908, was 253,330, not including clearances.

Port Stanley Harbour, Ontario, is on the north shore of Lake Erie about the centre of the shore line, between the east and west ends. Kettle creek empties into the lake at that point, and the harbour is formed at its mouth by two piers extending out into the lake. The west pier runs out a distance of 2,456 feet from the shore end and the east pier is 1,263 feet long; the width of the entrance at the end of the east pier is 86 feet and the depth of water, from 14·6 feet to 17 feet along the west pier until the water gauge is reached at an angle in the pier. The basin opposite this point is very shallow. The Père Marquette Railway pier is west of the west pier of the harbour, its length being 783 feet, and a ferry slip with from 17 to 19 feet of water in depth in the centre exists between the two piers. At the end of the railway pier a breakwater is connected with it running in a southwesterly direction for 200 feet, and this breakwater continues in a southeasterly angle a distance of 800 feet more, forming a protection against storm winds from the lake which come from the southwest. The harbour is thus made a harbour of refuge. The Père Marquette Railway has a freight shed and ice-house on the inner side of the west pier, and the London and Port Stanley Railway has a terminal track running to the shed, while the Père Marquette Railway has several tracks and switches leading to the railway slip. A grain elevator stands upon the western pier within the basin with a capacity of 25,000 bushels.

The lights are the front light on the outer end of the breakwater, and the back light on the outer end of the west pier in latitude 42° 39′ 55″ N., longitude 81° 12′ 40″ W. The total tonnage which entered Port Stanley during the fiscal year of 1908 was 659,978. There is a life-saving station on the west pier of this harbour. See List of Lights and Admiralty Chart No. 1605.

Parry Sound. The entrance to this harbour is between Deepwater and Bobs' points, it has a width of 250 yards and a depth of four fathoms on Deepwater point side of the channel. Opposite Bobs' point a bank runs out upon which the water is only 11 feet deep, but the edge is marked by a buoy. Inside the harbour, there is good anchorage in about 5 fathoms of water, with clay bottom. The extent of the harbour is about

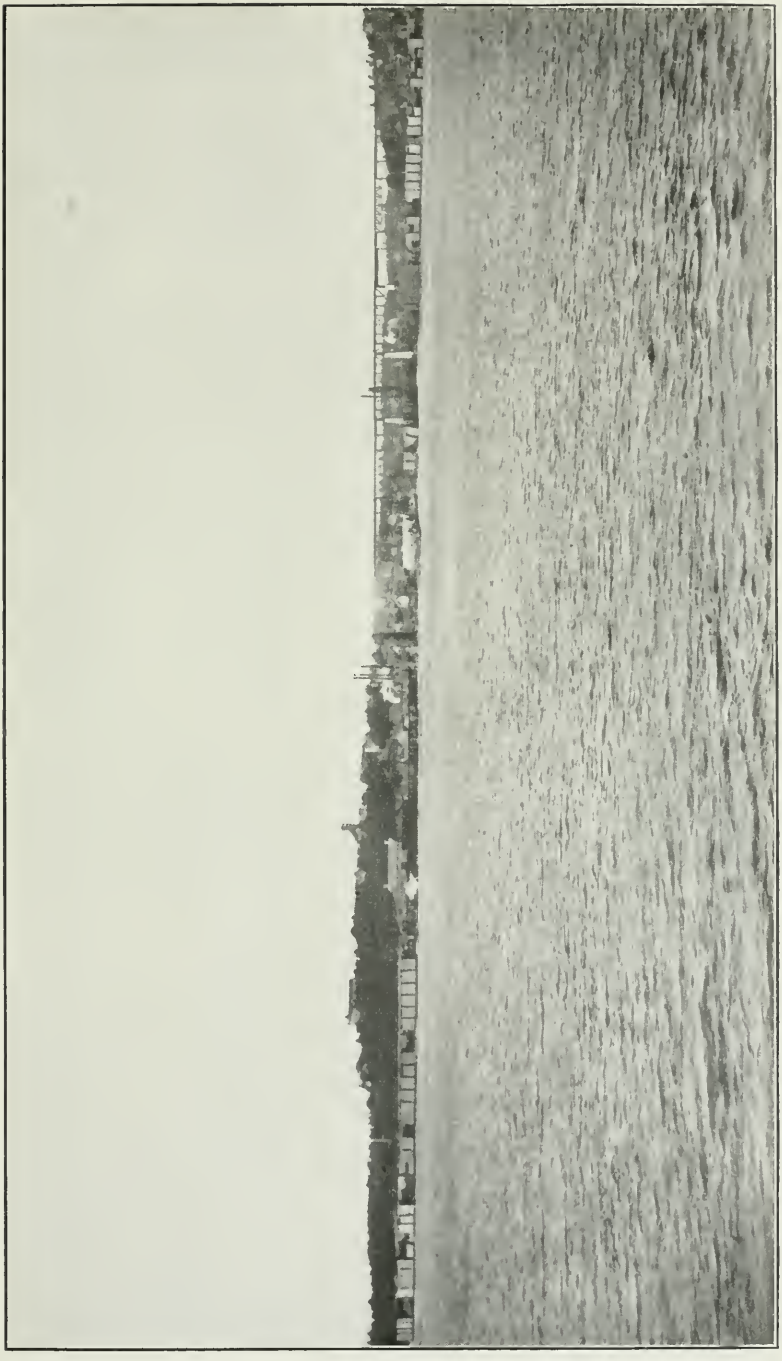
1½ miles square with good water all over, except off Silbow's rock, also off Galnas dock, Parry island; off Conger Lumber Company's wharf and off 9-foot spot near Parry harbour dock. These dangers are marked by buoys and can easily be avoided. The harbour is well protected on all sides and the channel leading to it well buoyed.

There are three wharfs in the harbour of Parry Sound. The Parry Sound wharf is 901 feet in length and 30 feet in width; the depth of water, starting 50 feet from the shore line and running to the southern extremity, is from 15 to 18 feet and 17 feet across the end. Adjoining the wharf, are two storehouses, one belonging to the Parry Sound Lumber Company, measures 64 by 26 feet, and the other to the William Beatty Company, is 86 by 38 feet. The wharf is also fitted with coal bins which hold from 2,500 to 3,000 tons. The Canadian Northern Ontario Railway wharf measures 465 feet in length by 75 feet in width, and has a depth of water of from 18 to 23 feet along both sides. There is a freight shed on the wharf 100 by 30 feet and a railway siding which runs to the extremity of the dock. Freight is loaded and unloaded from the cars. The Parry Sound shore wharf is a crib wharf, running along the shore front about 83 feet, with a depth of water of about 11 feet; a storehouse partly on the wharf, measures 103 by 24 feet. Rose point wharf is used for passengers from the Grand Trunk; it measures 73 by 20 feet; depth of water, 18 to 20 feet along the front.

There is one small repairing dock fitted with lifting gear and ways on Parry island, used for repairing small steamers and scows. There are extensive lumber docks along the shore front, covering an area of about two miles where the water averages from 15 to 20 feet except two points.

Water and supplies of all kinds can be easily obtained at Parry Sound and repairs to vessels not requiring to be docked, are reasonably made. Shipbuilding of small vessels is carried on.

The lights, beginning from Red rock light at the entrance of Parry Sound are: Snug harbour range, Jones' island range; Spruce shoal beacon, Carling rock light, Kilbear point, Depot island light, Three Mile point light, and one on Rose point



Parry Sound, Ont., Harbour, 1909.

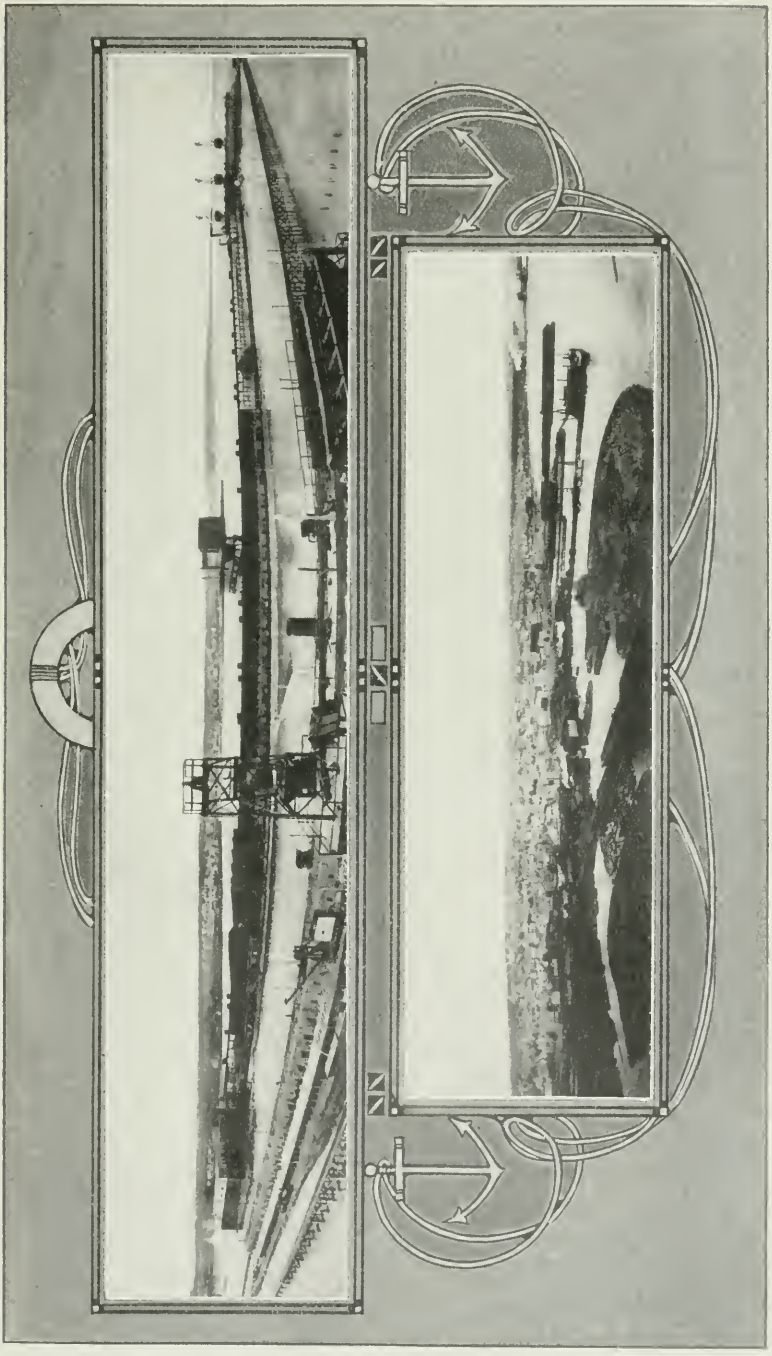
swing bridge in the harbour, in latitude 45° 18′ 57″ N., longitude 80° 2′ 49″ W. Gas buoys also mark the dangers in the approaches to the harbour.

The tonnage which entered the port of Parry Sound during the fiscal year of 1908 was 426,310; this does not include the tonnage which departed. See List of Lights and Admiralty Chart No. 1731.

Port Arthur Harbour, Ontario, is situated on the northwest shore of Lake Superior, in Thunder bay. The inner harbour has been formed by the construction of a breakwater, with an entrance at each end and a main entrance between the northerly part of the breakwater and the southerly part. The measurement of the northerly part of the breakwater is 3,654 feet, and the southerly part 1,507 feet. The main entrance between the piers is 366 feet wide, and depth of water from 20 to 21 feet; 19 feet of water may be carried to the Canadian Northern Railway elevator wharf. The western entrance at the end of the breakwater is 1,800 feet wide, water varying from 12 to 18 feet deep; and the eastern entrance, at the other side of the harbour, at the end of the breakwater is 250 feet wide and depth of water 17 feet. The water in the basin varies from 14 to 18 feet, but the channel from the main entrance to the Canadian Northern Railway elevator is dredged to 20½ feet and to the Canadian Northern Railway wharf No. 1, and the Canadian Pacific Railway wharf to the same depth (20½ feet).

The breakwater has made the inner harbour a safe one for mooring vessels at the wharfs.

The wharfs beginning from the east side and at the northeastern entrance of the harbour are King's elevator wharf, with a channel one-third of a mile and 150 feet wide leading to it; the depth of water at this wharf is 19·6; the next is the Canadian Pacific Railway wharf, 990 feet long extending into the harbour and 75 wide, with a shed standing upon it 400 feet long by 50; upon this wharf is a railway track running to the outer end; the Canadian Northern Railway wharf, 960 feet long on the east side and 400 feet on the west side by 220 feet wide at the outer end; the freight shed upon this wharf is 640 feet long by 50 feet wide, with five railway tracks alongside; the distance between the Canadian Pacific Railway wharf and



PORT ARTHUR OST. HARBOUR.

the Canadian Northern Railway wharf is 125 feet, and depth of water 20 feet; the Fisher wharf, 700 feet long by 40, with ice-house and packing-house upon it; next is Clavet's wharf, 770 feet long by 55 wide, with two storehouses 165 feet long each and a shed 180 feet long; the water between the last mentioned wharfs is used only by tugs; the coal wharf is next in order and is 930 feet long by 40 feet wide, having at the outer end a block 150 feet long by 125 feet; between the coal wharf and Clavet's the water is from 7 to 8 feet deep and small craft only use it; at the outer end of the coal wharf, the water is from 18 to 19 feet deep; No. 5, Canadian Northern Railway wharf is 800 feet long by 100 wide for two-thirds of its length, and upon it is a freight shed 450 feet long and another 440 feet long on the same wharf, with a railway track alongside; the Canadian Northern Railway elevator wharf running out from shore 1,200 feet on the west and east sides, with a water area within the two wings of the wharf 400 feet wide, and from 10 to 22 feet deep where vessels load grain; then follows a coal dock of very large capacity for handling and storing coal. Upon the coal dock, is a discharging plant consisting of towers with hoisting engines and buckets for discharging into small cars, which run on an elevated track to any point desired along the wharf and discharge into cars or steamers or upon the storage pile.

The elevators are the Canadian Northern Railway Company's elevator on the elevator wharf already mentioned. Elevator A is 235 feet by 100 feet and elevator B, 220 feet by 90 feet; between these elevators are two annexes 200 feet long by 165 wide each. The capacity of these elevators and annexes is 7,000,000 bushels. The King's elevator, at the other side of the harbour, has a capacity of 800,000 bushels.

Port Arthur is an important railway centre and has railway shops and communication by rail east and west it has direct communication by rail east and west and direct communication with ports in Lake Superior, Lake Huron, Georgian Bay and other lake ports; grain laden and freight steamers communicating as far east as Montreal. Supplies of various kinds can be procured without difficulty.

The lights are one on the northerly breakwater at the main entrance in latitude 48° 25′ 50″ N., longitude 89° 12′ 39″ W.;

one on Welcome island in Thunder bay, and a light on Thunder cape. An acetylene buoy is moored in five fathoms of water on the notheastern edge of the dredged channel leading into the inner harbour. The Department of Marine and Fisheries has arranged, under contract, for the employment of a tug to break the ice up to the 17th of December each year and to open navigation into the harbour as early as possible in the spring. The *port charges* are, harbour master's dues collected twice a year if not paid elsewhere. The total tonnage which entered Port Arthur during the fiscal year of 1908 was 1,404,951, which does not include vessels which cleared. See List of Lights and Marine and Fisheries Chart No. 101.

Port Hope Harbour, Ontario, is situated on the north shore of Lake Ontario, about 63 miles east of Toronto. There is an inner and an outer harbour, with room for quite a number of vessels. The harbour is formed by two piers running out into the lake. The west pier is 1,641 feet long and the east pier 1,471, and a breakwater 500 feet long. The piers are 120 feet apart, with a depth of 14 feet or sufficient to admit all vessels which use the canals. The harbour is open practically all the year round and is a good harbour of refuge from all winds. The town has daily communication by water, with Lake Ontario ports and one or two United States ports. There are over one and a half miles of wharf accommodation; the water from the mouth of the harbour to Queen's wharf, some 1,600 feet, is over 18 feet deep.

Port Hope has railway communication with the Midland district on Georgian Bay, and with all other points. There are three grain elevators with railway tracks leading to them which are frequently in use. Shipments of lumber and ore are made from this port.

The light is 110 feet from the extremity of the eastern breakwater in latitude 43° 56′ 20″ N. and 78° 14′ 30″ long. W. The harbour is under the control of the Port Hope Harbour Board, and *port charges* are regulated by that board. The total tonnage of vessels which entered during the fiscal year was 139,244, which does not include the tonnage outward. See List of Lights and Admiralty Chart No. 1152.

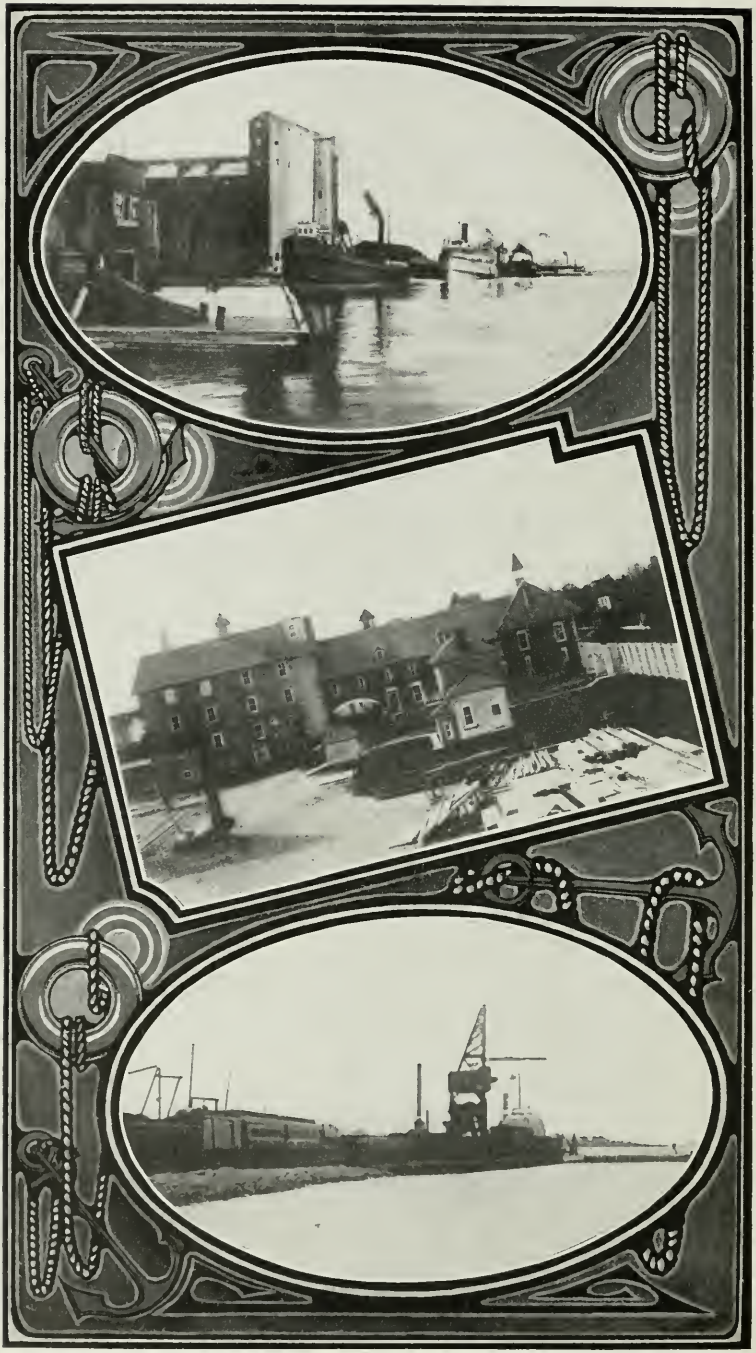
Port Hope, Ont., Harbour.

Prescott Harbour, Ontario, is on the upper St. Lawrence river. The harbour is an open roadstead but not exposed to storms owing to the limited width of the water between the river banks. Anchorage can be found in 50 feet of water opposite the town. The wharfs number eleven, having a frontage of three-fourths of a mile. Beginning at the west end, the first wharf is the Prescott waterworks and electric plant wharf, and the wharf of J. P. Wiser & Sons, which is a continuation of the other wharf, having a depth of 20 feet along these two wharfs; next, the Dominion Lighthouse Depot wharf, water 20 feet at its head; the Imperial Starch Company's wharf, with 18 feet of water; I. W. Plumb's coal wharf and M. J. Buckly's coal wharf, with 20 feet of water at the head; then I. Purkis' coal and ferry wharf; next the grain elevator wharf, and then follows the Canadian Pacific Railway wharf with 24 feet of water; on this wharf stands a large freight shed; at the extreme east is the coal derrick of the George Hall Coal Company, with 24 feet of water alongside.

The Dominion Depot, under the control of the Department of Marine and Fisheries, is located at Prescott lighthouse; lanterns, lenses, oil and other lighthouse supplies are kept at the depot and repair shops are maintained. Tests are also made of gas vapour and all kinds of burners and lenses and of illuminants. Acetylene buoys and beacons are stored and sent to various points where aids to navigation are established. The Depot wharf is the headquarters of small steam tenders, employed in light and buoy service, on the upper St. Lawrence river and part of Lake Ontario.

The lights are one on outer end of east pier of Dominion Depot in latitude 44° 42′ 21″, longitude 75° 31′ 10″, another at Windmill point about 1½ miles below Prescott. See List of Lights and Admiralty Chart No. 2789 F. The total tonnage which entered Prescott during the fiscal year 1908 was 920,527, not including vessels which cleared.

Rondeau Harbour, Ontario, is situated on the north shore of Lake Erie, about 64 miles east of the Detroit river and a short distance from Point aux Pins. The bay of Rondeau is about six miles deep and two miles wide, water from 5 to 12



Prescott Ontario, Harbour.
Dominion Lighthouuse Depot.,
River Front, Lookimg East.

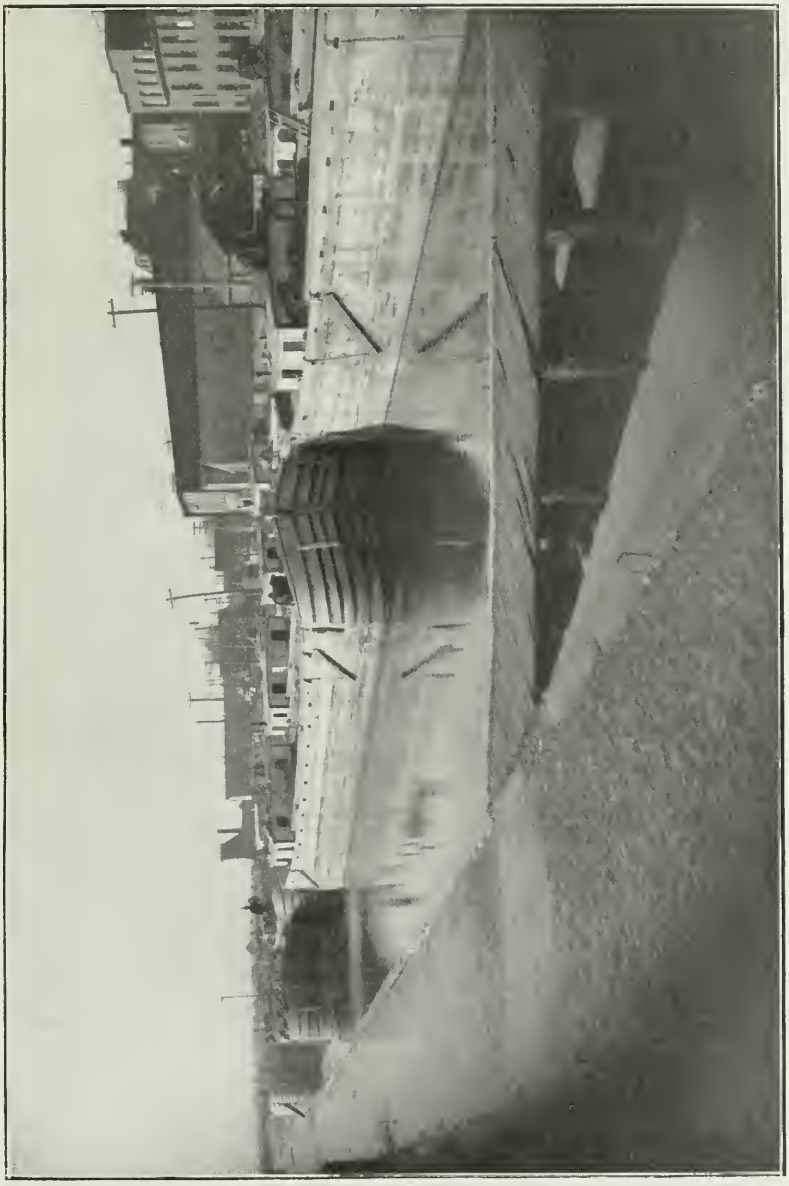
feet deep. The harbour in the bay is formed by two piers, the west pier 900 feet long and the east pier 750 feet long, width between these piers is 250 feet and the water 23 feet deep, but the water leading to coal slip is at places 26 feet deep. A breakwater runs at right angles to the east pier for 300 feet and a basin is formed 600 feet long by 400; the water in this basin varies in depth from 8 to 20 feet, except in the channel already mentioned. Rondeau is used as a harbour of refuge and a depot for coal for the Père Marquette Railroad. There is a coal slip with two hoists in one corner of the harbour and a railway track alongside of it.

There are two lights, one on the outer end of the eastern pier and a back light 780 feet N. by E. ½ E. from the front light in latitude 42° 15′ 32″ N., longitude 81° 54′ 18″ W. See List of Lights and Admiralty Chart No. 332. The total tonnage which entered in the fiscal year 1908 was 111,949, not including clearance.

St. Johns Harbour, province of Quebec, is on the Richelieu river. This river is navigable for canal boats from Sorel at the mouth of the river, to Lake Champlain. St. Johns is quite an important place of business for canal boats, and has wharf accommodation running continuously along the river at which barges tie up. Passenger steamers run on the river and have communication with Rouse's Point, in the State of New York. The *port charges* are harbour master's dues collected twice a year if not paid elsewhere. The river is buoyed for steamers from St. Johns to Rouse's Point and from Chambly to St. Johns. The total tonnage entered at the port for the fiscal year of 1908 was 155,303. St. Johns has frequent railway communication with Montreal.

Sarnia Harbour, Ontario. This harbour lies on the east bank of the river St. Clair, at the head of the river, where the waters of Lake Huron enter that river. The limits of the harbour include all the waters of the St. Clair river between the Canadian shore and the International boundary in the middle of the stream, and extending from the head of the river at the outlet of Lake Huron to the foot of the river, at the entrance of St. Clair flats, a distance of about two miles. These waters

Port of St. John's, P.Q.



Port of St. John's, P.Q.

include the inlet known as Sarnia bay, where vessels make their winter quarters and rafts of timber are handled.

The Grand Trunk Company wharfs are at Point Edward, one 450 feet long by 40 wide, is used by the Hamilton Steel and Iron Company for unloading cargoes of iron ore which is shipped to Hamilton. There are three steam power ore-hoisting machines of the total capacity of one thousand tons per hour on this wharf. South of the ore wharf is an open wharf 340 feet by 85 feet, equipped with a platform operated by steam for the unloading of flour, and a shed 650 feet by 85 feet used for the storage of flour and package freight. South of the general freight wharf of the Northern Navigation Company is also a coal wharf 110 feet by 85, having a storage capacity of 2,500 tons and equipped with a coal-handling plant of modern construction, consisting of hoisting apparatus and pockets for fuelling the steamers. The unloading capacity is 800 tons per day, and the loading capacity 300 tons per hour.

South of the Northern Navigation coal wharf is the wharf of the Point Edward Elevator Company, 500 feet by 25 feet. The Point Edward elevator has a capacity of half a million bushels, and is equipped with grain-cleansing apparatus. The grain is loaded into cars on the Grand Trunk Railway.

South of the Point Edward elevator on Sand Point, is an open wharf 1,400 feet by 150 feet, operated by the Ontario Lumber Company, of Toronto, for unloading cargoes of lumber.

On the east shore of Sarnia bay is a double deck tramway owned by the Cleveland -Sarnia Sawmills Company, with a wharf at the outer end for the loading of lumber vessels. The tramway is 2,770 feet by 14 feet in width and the wharf at the outer end is 100 feet from north to south, by 70 feet wide. The depth of water is from 8 to 14 feet. A large pool has been inclosed in the bay and the water kept warm by exhaust steam from the mills, to enable them to operate during winter.

South of the Cleveland-Sarnia mill property is a wharf 400 by 150 feet and owned by W. A. Brown, with three houses for the storage of ice, having a total area of 15,000 square feet; depth of water at this wharf 8 feet.

Next is the coal wharf of John Garroch, coal dealer; length of wharf, 262 feet by 120 feet; area of coal sheds, 4,000

square feet, equipped with coal plant operated by steam, capable of unloading 300 tons per day; depth of water, 13 feet.

South, is the property of the Sutherland Wire Fence Company, comprising a wharf 128 feet by 90 feet, with a warehouse 40 by 80 feet, used for storing goods manufactured by the company; depth of water, 13 feet.

Further south is the wharf of the Loughead Hub and Spoke and Bent Goods Manufacturing Company; length of wharf, 200 by 125 feet; sheds, 40 by 50 feet; another shed, 100 feet by 40 feet; depth of water, 16 feet.

Next in order, are the headquarters of the Reid Wrecking and Towing Company who own the most extensive plant on the Great Lakes. The Reid Company's wharf is 360 feet by 150 feet, with machine shop 100 feet by 40 feet for repairing and rebuilding hulls and machinery. The company's outfit includes eight powerful tug steamers with lighters, wooden pontoons, twenty-one hundred ton hydraulic jacks, four large air compressors and other appliances.

Further south are the waterworks wharfs, 225 feet by 50, with one coal shed, area 2,000 square feet.

King's Milling Company's wharf, 200 feet by 60 feet, with two warehouses, area 2,200 square feet.

Gardner's wharf, 65 feet by 60 feet, one warehouse, area 2,600 square feet.

Lochiel street wharf, owned by the municipality, 60 feet by 40 feet.

Clark's wharf, 235 feet by 60, with four warehouses, area 5,800 square feet; another wharf belonging to the Reid Wrecking Company, 200 feet by 100 feet, with warehouse, area 60 feet by 100 feet, used for fuelling and storage; another wharf owned by the town, 60 feet by 100, used as a ferry landing. South of this wharf is the Grand Trunk Railway Company's wharf, 1,100 feet by 25 feet, with freight sheds, 300 by 30 feet, used as a joint passenger terminal by the Grand Trunk and Northern Navigation Company. It is proposed to build an extensive station for the use of passengers, equipped with all modern conveniences and appliances and tracks to be laid to the new terminal, for the use of the new steamboat train connecting with the Northern Navigation steamers; another Grand Trunk and Northern Navigation joint terminal wharf

is 180 feet by 30. The Grand Trunk elevator wharf is 180 feet by 25 feet. The elevator itself is 180 feet by 25 feet, capacity 100,000 bushels, used for the transfer of western grain from vessels for shipment into cars.

South of the elevator wharf, are the last of the Grand Trunk Company's wharf properties, the lumber wharfs, 1,300 feet by 25 feet, operated by F. McGibbon & Sons, E. A. LeBel and W. F. Lawrence & Sons.

Further south the Sarnia Salt Company has a wharf 400 feet by 25 feet, warehouse 100 feet by 50 feet.

Below Devine street are the extensive properties of the Imperial Oil Company, with a wharf frontage 400 feet, where bulk oil products and packages are unloaded on this wharf. It is equipped with coal unloading machinery with a capacity of 400 tons per day. The average depth of water is 16 feet along the northern part and from 20 to 25 feet along the southern part.

Below the Imperial Company's wharf is the Sarnia terminal of the Père Marquette Railway Company, including a wharf 350 feet by 25 feet, with a warehouse 120 feet by 14 feet; depth of water, 20 feet.

Last in order, near the southern boundary of the town, are the premises of the Standard Chain Manufacturing Company. The wharf is 152 by 80 feet, and is used for coal and iron for the company's purposes and the shipment of chain manufactured; depth of water, 18 feet.

The depth of water at the wharfs, except in the cases mentioned, average about 20 feet. There are railway tracks running upon and alongside of the wharfs, with the exception of two or three; the depth of water for anchorage varies from 30 feet in the channel to 9 feet or less.

The holding ground for anchorage is everywhere good.

The harbour is of great value as a harbour of refuge, it is easy of access and can be entered from Lake Huron by vessels under sail with the wind in any quarter but from the south.

The water in the river runs rapidly, but in Sarnia bay it is slack and vessels are not exposed to any ice movement in the winter.

The lights were described in Point Edward harbour and are on the shore of Lake Huron.

A gas buoy is in position on the shoal off Point Edward near the Point Edward elevator.

The United States government has a gas buoy on the middle ground of Lake St. Clair, and a lightship at the foot of Lake Huron, two miles above Point Edward.

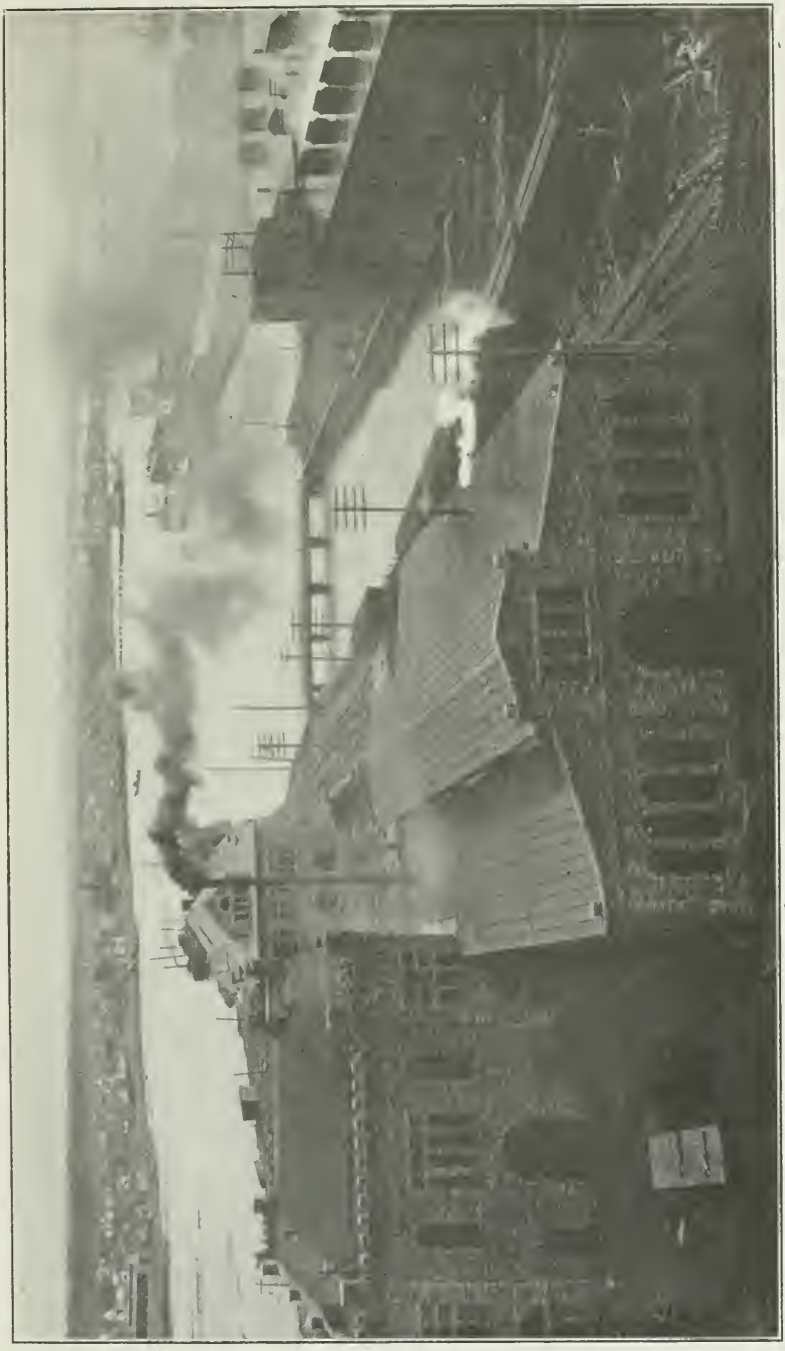
See List of Lights and Admiralty Chart No. 330.

The tonnage of vessels which entered Sarnia during the fiscal year of 1908 was 964,683. The Grand Trunk Railway Company has communication at Sarnia with Port Huron by means of a tunnel under the St. Clair river.

Sault Ste. Marie Harbour, Ontario, is on the St. Mary's river, about five miles east of the extreme easterly end of Lake Superior. The harbour of Sault Ste. Marie embraces the dredged approaches to the Sault Ste. Marie canal, and approaches to the different docks therefrom which have been deepened. Safe anchorage can be found within the areas mentioned, and towards the centre of the river outside the canal ranges, from a depth of 21 feet to 40 feet. The nature of the bottom of the river is sand and boulders overlying Potsdam sandstone.

The wharfs along the townsite of Sault Ste. Marie comprise, one owned by the Dominion government which is used principally for passenger steamer service and package freight, and upon it stands a commodious warehouse for receiving the freight; the Algoma Coal and Metal Company's dock is used principally for unloading coal and wood cargoes, and tugs are there supplied with fuel; the New Ontario Dock and Coal Company's dock is used for package freight and passenger service, and upon it is a large area for coal and the wharf is equipped with unloading plant and coal chutes for fuelling steamboats of all classes; seven docks of the Lake Superior Corporation comprise, (*a*) ferry dock used exclusively for the ferry service between the Canadian town of Sault Ste. Marie and the United States town of the same name; (*b*) international dock, a commercial wharf which provides accommodation for boats of light draught engaged in passenger and freight service; (*c*) the north wharf and south wharf along the tail race provides facilities for handling machinery, and repair work can be done to advantage at the company's shops, situated

Sault Ste Marie Harbour, Lake Superior Corporation Docks Above Canal (Lake Superior level).



Port of Sault Ste. Marie, (below lock).

a short distance from the wharf; (*d*) the company's commercial wharf is used principally in connection with its own industries but is available with its rail connections for general service, this wharf is on the Lake Superior level; (*e*) the ore wharfs are used exclusively by the Algoma Steel Company in connection with the steel industry, and are situated to the west of the commercial wharf forming an extension of it; (*f*) the sawmill wharfs at which lumber cut at the company's mills is shipped, is on the Lake Superior level.

At Sault Ste. Marie, the canals cut by the Canadian and United States governments are very extensively used by shipping, passing up and down between Lakes Huron and Superior. The Canadian canal on the north side of St. Mary's river is 7,100 feet, equal to about $1\frac{1}{3}$ miles long from end to end of the upper and lower piers and its width is 150 feet at the water surface and 141 feet 8 inches at the bottom. The approaches to the canal are channels cut through boulder shoals; the upper approach is at least 250 feet wide, with 17 to 19 feet depths and the lower approach at least 500 feet wide with 21 feet depth. The canal has one lock 900 feet long by 60 feet wide, built of masonry; at the lower end of the canal depth of water on the sills at the lowest water level is 20 feet 3 inches, and the total rise of this lock is 18 feet; the gates and culvert valves are operated by electricity. The construction of the canal was begun in 1888 and opened for traffic in 1895. It was built to overcome the rapids of St. Mary's river and has been improved and the piers extended since the date of its opening.

Sault Ste. Marie has water communication with ports on Lake Superior on the west and with lake ports on the east, more particularly with Georgian Bay ports, and lines of steamers running daily, convey passengers and freight to and from the port. At this port large steel smelting works have been established by the Algoma Steel Company, large quantities of ore are received at the docks of the company. The approaches to the canal are well and carefully buoyed. Wharfage is charged at the different wharfs. The lights are, one on the shore, north of entrance to canal, latitude 46° 30′ 54″ N., Longitude 84° 20′ 8″ W.; one 1,356 feet N. $35\frac{1}{2}$° W. from front light. The canal and its approaches are illuminated by two rows of

are lights, one on each side of the canal. The most easterly and the most westerly lights in each row being green lights and all others white. At the upper entrance are two gas buoys, one called the turning gas buoy. The total tonnage which entered at the port during the fiscal year of 1908 was 1,282,463, not including clearances. See List of Lights and Admiralty Chart No. 324.

Toronto Harbour, Ontario, is situated on the north shore of Lake Ontario, about 35 miles from its western end. The harbour is on the south side of the city, is in extent about two miles east and west and one and a quarter miles north and south, containing about two and a half square miles. Adjoining Toronto harbour, but separated therefrom by a strong dyke is Ashbridge's bay, containing an area of about one and a quarter square miles. The harbour of Toronto is perfectly landlocked, a formation of sand, called the Island, extends the whole length of the southerly limit of Toronto bay. There are two entrances to the harbour, the west is called the Queen's wharf channel and the eastern entrance, which has been dredged and faced with piers with a width of 1,000 feet at the outer part of the channel forms the chief entrance, is called the eastern channel. The western channel is now being deepened to 16 and 18 feet, width 400 feet between concrete piers. The harbour forms a perfect harbour of refuge and is accessible during a storm blowing from any direction, by one or other of its channels. The average depth of water in the harbour is about 20 feet, with good anchorage in parts of the bay, and 14 feet along the wharf frontage.

The face frontage of the wharfs measures about one mile, separated by slips of various widths; some of the wharfs extend out a distance of 500 feet from the shore. Twenty-five railway sidings run along the water front, twelve of these are placed on coal docks as follows: on the wharfs of McConnell & Co., at the foot of Bathurst street; of Milne & Co., foot of Yonge and Scott streets; of Elias Rogers Coal Company at the foot of Church and also foot of Princess street; Dickson & Eddy at the foot of Church street; Conger Coal Company at the foot of Church street; Crown Coal Company at the foot of Jarvis street. The lumber wharfs contain eleven railway sid-

ings, one track has been laid by the Canadian Pacific Railway Company on the Queen's wharf at the foot of Bathurst street to convey square timber to the waterside for rafting; one siding belongs to the Richelieu and Ontario Navigation Company and is laid on Yonge street wharf for the transfer of fruit from the steamers to the railway express companies. The storehouses on the wharfs of Toronto are, the Canadian Lake Line store, with a capacity of 4,500 tons; the Merchant's Line, capacity of 4,500 tons; the city wharf, capacity 2,500, and the Richelieu and Ontario Navigation Company, capacity 2,000 tons. There are two cold storehouses, viz., one owned by Manning & Co., capacity 200,000 cubic feet, and one by the Toronto Cold Storage Company, capacity also 200,000 cubic feet.

The shipbuilding industry is carried on by the Polson Iron Works, Limited, and the Toronto Ship Yards, in which are built wood and steel vessels. There are two small marine railways in the harbour, one owned by Medlar & Arnot, and one by the Royal Canadian Yacht Club. Vessels are repaired by Medlar & Arnot, being contractors. The facilities for building in the Polson Iron Works shipyard include space for laying down four canal-sized steamers at one time. In the same yard are machine shops, boiler shops and facilities for building engines and hulls equal to the largest sized steamers on inland waters, but steamers drawing more than 14 feet light cannot pass through the canals unless in sections either above or below Lake Ontario. The company now possesses a pair of sheer legs alongside a slip, of a capacity of 60 tons and a gantry crane running full length of the slip of a capacity of 10 tons, and extensive repairs can be made to vessels of all classes.

The Toronto Ship Yards have also all up-to-date appliances for constructing wood and steel vessels and engines. Extensive repairs can also be made at this shipyard.

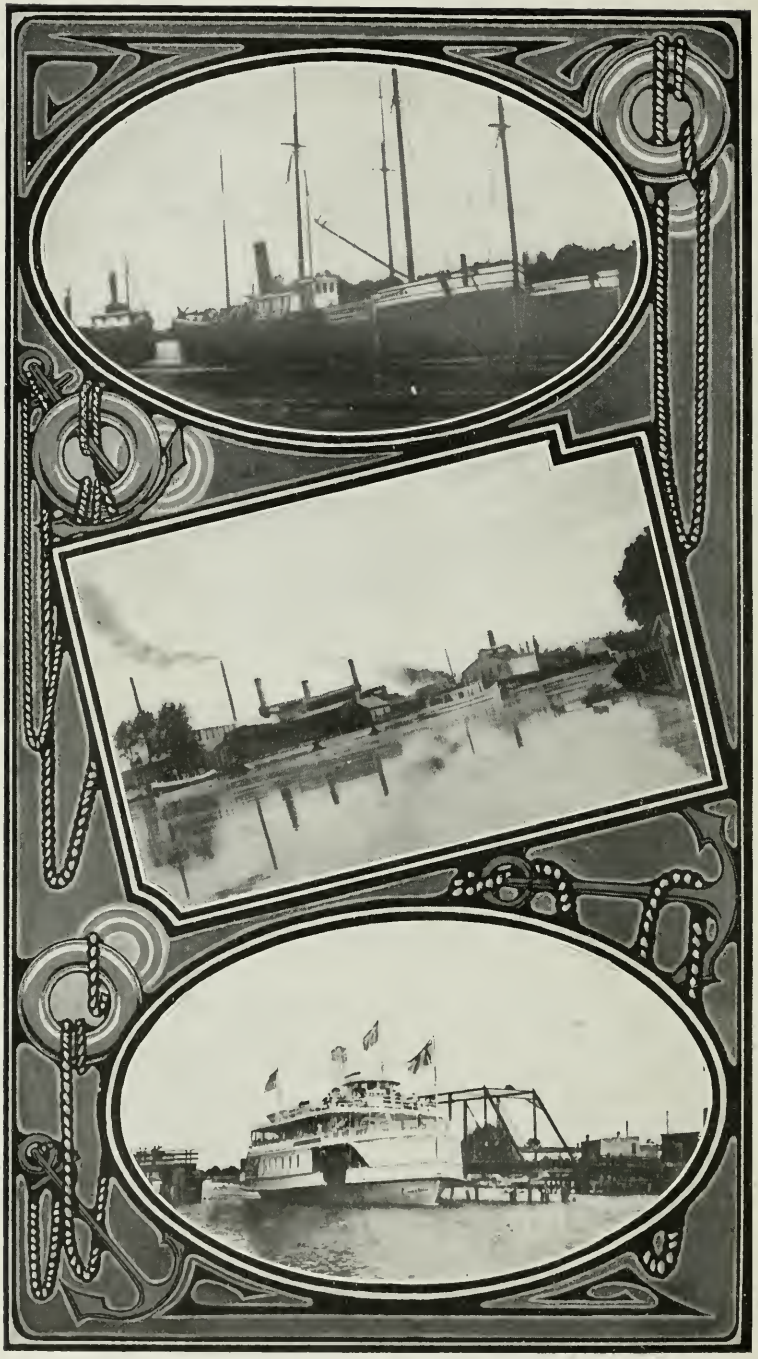
At Toronto the diaphone used by the department as an aerial warning at many fog alarm stations with signal success, is manufactured by the Canadian Fog Signal Company. Other countries are experimenting with the diaphone, manufactured by this company at their works in Toronto.

Toronto being the largest city in Ontario, all kinds of ships' stores and materials can be easily and cheaply purchased at

this port. It has water communication by daily line of steamers with many ports on Lake Ontario and with ports east and west, by vessels that can use the canals with their depth of 14 feet. Railway communication is maintained daily with all towns and villages in Ontario through which lines run, and connections with all transcontinental railways running east and west and with United States railway lines. See List of Lights and Admiralty Chart No. 337. Lights are: Eastern Entrance, front range, 100 feet from outer end of East pier latitude 43° 37′ 48″, longitude 79° 20′ 20″ back range, 2,400 feet from front light with fog alarm; Western Entrance, Gibraltar Point, light and fog alarm.

Wallaceburg Harbour, Ontario, is situated on the Sydenham river, a stream navigable from its mouth to a point several miles above the town. The river empties into Lake St. Clair and is navigable for vessels drawing not over 15 feet of water; it has a clay or mud bottom, free from rocks or boulders, and from Wallaceburg to its mouth is not subject to any decided variations from freshets, ice jams or other causes. Vessels can be safely moored at any point, either to the various wharfs or to the banks along the river.

The wharfs are built parallel to the river shore and are from 10 to 30 feet in width, and are as follows:—Sydenham Glass Company wharf, about 600 feet long; McMairnie Bros.' wharf, about 150 feet long; Premier Electric Light Company, 50 feet long; Wallaceburg Cooperage Company, 100 feet long; public wharf at foot of Nelson street, about 50 feet long. Railway sidings have been laid to the wharfs of the Wallaceburg Sugar Company and the Sydenham Glass Company; the former is equipped with a McMyler clam operated by steam for unloading coal and sugar beets. These two wharfs have sheds on them and in the immediate vicinity, for the storage of goods of the two companies. The depth of water alongside these wharfs is 18 feet. Vessels can be laid up here in safety at any point in the river and repairs made. The repair yard of W. J. MacDonnell has a plant equipped with a marine railway on which vessels 150 feet in length drawing not more than 12 feet of water, can be hauled out.



Wallaceburg, Ont., River View.
" " Glass Docks.
" " Central Bridge.

The total tonnage of vessels which entered during the fiscal year 1908 was 119,644 tons, which does not include vessels which cleared.

Windsor Harbour, Ontario, is situated on the east side of the Detroit river, near the outlet of Lake St. Clair. Walkerville, a flourishing manufacturing town, is one mile from Windsor and is a sub-port. The wharfs at Windsor and Walkerville afford good accommodation for vessels, the water being from 4 to 4½ fathoms along the frontage. The Grand Trunk Railway wharf is over 600 feet long, with a railway track running the full length of the wharf, on which articles of all kinds are loaded or unloaded from cars to vessels and vice versa; the depth of water at this wharf is 25 feet, with clay bottom. The Canadian Pacific Railway wharf is 700 feet long, with a shed 500 feet in length by 46 feet wide; two railway tracks run the full length upon which merchandise is loaded and unloaded from the cars to vessels or from vessels to cars; depth of water, 25 feet, with clay bottom. The Michigan Central Railway wharf is 500 feet long, with a railway track running the full length of the wharf, and goods are loaded and unloaded from vessels to cars and vice versa. The wharf of J. T. Hurley & Co. is 250 feet long, upon which is erected a shed 22 feet by 30 feet; depth of water, 19 feet, with clay bottom. The Detroit, Belle Isle and Windsor Ferry Company's wharf is 300 feet long, and depth of water 20 feet, with clay bottom. This wharf is used by the company's ferry boats which ply every few minutes between Windsor and Detroit on the United States side of the river. The wharf is also used as a coal wharf. At Walkerville the wharf of Walker & Sons is over 800 feet long, upon which stands a store 50 feet by 40 feet; a switch track runs the whole length of the wharf and goods are loaded and unloaded from cars to vessels and from vessels to cars; the water at the wharf is 26 feet deep, with clay bottom. Four railway companies have transfer boats running between Windsor and Detroit, and there are two passenger lines, one plying between Windsor and Detroit and the other between Walkerville and Detroit. The Michigan Central Railway, has completed a tunnel under the river by which communication is maintained with Canada and the United States at that point.

Windsor has communication with several lake and Detroit river ports by water and with all parts of Canada and the United States by rail. Owing to its situation it is mainly a railway centre but an immense tonnage from the upper lakes, passes up and down the channel of the Detroit river close to the water front of the city.

At Windsor all kinds of stores for vessels can be purchased and repairs made at the wharfs, but the port has no marine slip or dry dock. The total tonnage which entered the port during the fiscal year of 1908 was 492,377, not including clearances. See List of Lights and Admiralty Chart No. 330.


MARINE AND FISHERIES, CANADA
COMMISSIONER OF LIGHTS BRANCH
Chart Showing
QUICK FLASHING LIGHTS
ON THE
Atlantic Coast of Canada
lights shown thus were in operation during The Fiscal Year 1908-9
Apparatus for lights shown thus has been provided and will be installed during the Fiscal Year 1909-10
GULF OF St LAWRENCE
NEW BRUNSWICK
PRINCE EDWARD ISLAND
CAPE BRETON ISLAND
NOVA SCOTIA
NEWFOUNDLAND
ANTICOSTI I.
MAGDALEN ISLANDS
BAY OF FUNDY
MAINE
QUEBEC
MONTREAL
PORTLAND
HALIFAX
SABLE I.
CANSO
CAPE RACE
ST JOHNS
CABOT STRAIT
STRAIT OF BELLE ISLE
ATLANTIC OCEAN