

COMMERCIAL STATISTICS.

Name of harbor, Green Bay, Wis.; collection-district, Milwaukee, Wis.; nearest light-house, Grassy Island, Wis.

Arrivals and departures of vessels during the year ending December 31, 1878.

	Arrivals.			Departures.		
	No.	Tonnage.	Crews.	No.	Tonnage.	Crews.
Steamers	183	84,601	2,711	180	84,519	2,674
Sailing-vessels	117	27,940	802	111	26,972	764
Total	300	112,541	3,513	291	111,491	3,438

Exports for the year ending December 31, 1878.

Cattle	head..	749	Pulp	car-loads..	13
Salt	barrels..	2,480	Lumber	feet, b. m..	4,200,000
Empty barrels	number..	1,347	Hubs	car-loads..	17
Staves	do.....	6,428,000	Oil, carbon	barrels..	1,190
Fish	packages..	2,747	Beer	do.....	1,090
Flour	barrels..	32,402	Pig-iron	tons..	7,522
Shingles	M.....	13,401,000	Wheat	bushels..	1,942,700
General merchandise	tons..	3,291	General merchandise	pkgs..	221,704

Imports for the year ending December 31, 1878.

Apples	barrels..	4,727	Fish	barrels..	3,525	
Pork	do.....	1,172	Fresh fish	pounds..	2,378	
Carbon oil	do.....	11,972	General merchandise	tons..	947	
Railroad iron	tons..	1,100	Do	do.....	packages..	68,500
Cement	barrels..	3,248	Iron ore	tons..	17,400	
Salt	do.....	4,621	Liquor	packages..	679	
Coal	tons..	6,244				

The above information was obtained from Mr. Jule R. Morris, ex-deputy collector.

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HARBOR OF REFUGE AT ENTRANCE TO STURGEON BAY CANAL, WISCONSIN.

Original estimated cost	\$180,000
Appropriated since	110,000
Leaving to be appropriated	70,000
Amount that can be profitably expended in the fiscal year 1880-'81	40,000

With the exception of trifling repairs, there was no work done on this harbor between 1874 and the past season, Congress having failed to make any appropriations therefor during that time.

The act of June 18, 1878, having appropriated \$30,000 for this work, proposals were invited, and opened July 30, for building and sinking 14 cribs, more or less; 8 to be 50 feet by 20 feet by 12½ feet, and 6 to be 50 feet by 24 feet by 14½ feet. The contract was awarded to Truman & Schroeder, of Manitowoc, Wis., they being the lowest bidders. One-half of the cribs were to be completed by December 1, 1878, and the remainder by June 30, 1879.

When the contract was let, it was supposed that the canal which had been then opened would be available for use in scowling stone and tim-

ber, and in affording a harbor for the safe construction of the cribs. The canal having become closed before any such use could be made of it, it became difficult for the contractors to procure stone in sufficiently large quantities, or to push the crib construction with any rapidity. From these causes, and the extreme severity of the weather, the work had to be stopped for the season when but 4 of the cribs were in place, all being in extension of the north pier. One of these was carried out of the pier by a heavy sea on April 13, 1879, and lodged on the shore in shallow water. A fifth crib was sunk in the south pier on June 27, and the remaining cribs are now being built as fast as possible, and are expected to be in place before the close of this working season. A house has been built at a cost of \$75, to accommodate the government inspector, the locality being far removed from any place where he can obtain quarters.

In response to instructions from the Chief of Engineers I submitted, April 10, 1879, the following project for the expenditure of the appropriation for this harbor of \$30,000, made by the act of March 3, 1879:

It is proposed to build superstructures over the 14 cribs sunk and to be sunk under contract of August 8, 1878.

As the work under this contract will probably occupy the present working season, the cribs to be placed being all that are required for the pier extension, except the pier heads, and most of which will not be ready for superstructure until 1880, I would propose to build superstructure over the 4 cribs now placed, and over those to be put down this spring, which may be sufficiently settled, in the fall of the present year; the remaining superstructure to be built in the spring of 1880. From the uncertainty as to the number of cribs which will be ready for superstructure at any definite date, and the fact that a large quantity of stone can be utilized in this work from the rock excavation at Ahnepee Harbor, it is believed that this work can be most advantageously and economically done by hired labor and purchase of materials in open market, and this course is recommended. The above work will cost about \$15,000.

A project will be submitted at the close of the work of this season for the expenditure of the remaining \$15,000, which may include extension of the piers yet further, pier heads, repairs, and refilling of the old work, and dredging, together with a sand-tight revetment on the pile-piers, as the experience of this season's work may indicate. It will be observed from the foregoing that three-fourths of the above appropriation will not be expended during the present year, though it will probably be all expended during the fiscal year commencing next July. The appropriation of last year became available so late in the season that it was deemed advisable to provide in the contract for sinking only one-half of the 14 cribs last fall, the other half to be placed this spring. But, on account of the remarkably stormy fall and the exposed position of the work, only 4 of the 7 cribs were placed, leaving 10 to be sunk this season.

Major Houston, in his plan for this harbor (Report of the Chief of Engineers, 1873, page 199), after stating that pile-piers would be used for the inner portion of the work, says, "The remainder of the piers it is proposed to build of cribs filled with stone, provided that the canal is sufficiently advanced to provide room for their construction." When the project for this harbor was made out and the contract let last summer, the canal had been opened, and it was supposed to be available for the construction of the cribs as provided for in Major Houston's plan. The canal, however, rapidly shoaled at its lake entrance, and a dam was thrown across it; so that it is not yet "sufficiently advanced to provide room for their construction"—that is, of the cribs. As a result of this, the crib construction cannot be rapidly pushed without unreasonable risk, and the contractor is justly entitled to an extension of time in completing the contract. It may possibly take all the present season to sink the 10 cribs already contracted for, and no new contract could be now made without danger of troublesome complications.

There is another advantage in delaying the construction of the pier-heads. The canal has not yet been revetted, nor have the large deposits of sand on its banks been removed. The currents through it last summer carried with them great quantities of sand; and it is impossible to foresee the full effects of this in filling up the bed of the lake in extension of the piers.

At the close of this season the canal company propose to have the canal opened, and it may, and I think probably will, by that time appear advisable to extend the piers instead of building pier-heads.

The delay in commencing work this spring will modify the above so far as the number of superstructures to be built this season are con-

cerned, which will be confined to the cribs sunk last season and those put down earliest this season. It is also proposed to close the old pile-piers with brush and stone, beginning at the dock line and running out about 150 feet on each pier to the close piling, so as to prevent the further filling of the harbor with drifting sand.

The work contemplated for the fiscal year 1880-'81 is the building of pier-heads, or the extension of the piers, as may then seem best, and dredging out the harbor formed thereby.

This improvement is progressing quite as rapidly as the progress of the canal will justify; and by the time that that work is fully opened to general navigation the harbor will be in condition to protect it. The cribs now under contract, which will be all in place this summer (though the superstructures will not be placed on some of them until next season), complete the originally projected improvement, excepting 50 feet on each pier and the dredging of the harbor. This dredging cannot properly be done until the canal company dock the harbor front of their property and protect the sides of the canal from the operation of the currents, which must traverse its entire length with every change of wind; and when the current flows from the bay to the lake it will refill the harbor with sand from the unprotected banks of the canal. A year ago, when the canal was open for a short time, Assistant Engineer L. Y. Schermerhorn observed a current of $3\frac{1}{2}$ miles per hour therein; and the local paper published at Sturgeon Bay, the Door County Advocate, under date of June 19, 1879, says that the current, since the canal has been reopened, has reached a velocity of 4 to 5 miles per hour. The statement of the paper is as follows:

Now that there is a permanent "meeting of the waters" of our bay and the lake through the canal-cut, an opportunity is afforded to mark the variable currents caused by the winds. Sometimes the flow of water is from, and at other times to, the lake, the force varying from a hardly perceptible movement to a speed of 4 or 5 miles an hour. Whether this current will compel the construction of a guard-lock remains to be seen. It is evident that there will be occasions when our most powerful tugs will have all they can do to make head against the stream with a vessel in tow.

Such a current must endanger the permanence of the unprotected sides of the canal; and now that the canal is probably permanently opened, opportunity will be afforded for noticing the effects of the currents.

I concur in the views of Assistant Engineer L. Y. Schermerhorn upon this subject, as expressed in his report hereto appended, but still it has seemed best to authorize a small expenditure in repairing the open pile-piers, even though the piles were cut while the sap was running and are rapidly decaying. This repair is undertaken now mainly as an accommodation to the canal company, as they deem it of the utmost importance to their work. There is reason to doubt whether it will be of much value to the canal construction, as it will only extend to the dock line; and the company appears to have no intention, at present, to construct the dock so as to unite with the piers.

At the last session of the Wisconsin legislature a question arose as to the manner in which the canal company is carrying out the requirements which are made by the State for the canal construction; and the history of the appraisal of the land grant, and the legislation concerning the portions thereof deeded to the canal company, were fully discussed in the majority and minority reports of the committee on State affairs. As these questions are of interest in connection with the harbor improvement, the reports referred to will be of value to any officer having in charge this work in the future; and in order that they may be attain-

ble I append them to this report, with a copy of an act passed at the same session of the legislature, and in this connection would refer to my special report on the same subject, published in the Report of the Chief of Engineers for 1878, pages 1147 to 1154.

Money statement.

July 1, 1878, amount available	\$30,141 17	
Amount appropriated by act approved March 3, 1879	30,000 00	
July 1, 1879, amount expended during fiscal year	6,275 28	\$60,141 17
July 1, 1879, outstanding liabilities	546 65	
		6,821 93
July 1, 1879, amount available		53,319 24
Amount (estimated) required for completion of existing project	70,000 00	
Amount that can be profitably expended in fiscal year ending June 30, 1881	40,000 00	

Abstract of proposals opened July 30, 1878, by Major Henry M. Robert, Corps of Engineers, United States Army, for improving harbor of refuge, entrance at Sturgeon Bay Canal.

Materials.	Quantities.	Chicago Dredging and Dock Company, Chicago, Ill.	Knapp & Gillen, Racine, Wis.	Gibson & Rankin, Manitowoc, Wis.	Archibald McArthur, Chicago, Ill.	O. B. Green, Chicago, Ill.*	O. Tottson, Manitowoc, Wis.	Jasper Hanson, Manitowoc, Wis.	Green Bay Dredge and Diver Company, Green Bay, Wis.	Truman & Schroeder, Manitowoc, Wis.
		Rate.	Rate.	Rate.	Rate.	Rate.	Rate.	Rate.	Rate.	Rate.
Pine timber 12 inches by 18 inches.....linear feet..	1,400	\$0 55	\$0 33	\$0 36	\$0 45	\$0 39	\$0 30	\$0 30	\$0 27	\$0 30
Pine timber 12 inches by 12 inches.....do.....	50,000	26	25	26	24	26	22	22	21	20
White-oak timber 12 inches by 12 inches.....do.....	20,000	35	40	14	20	22	20	18	30	25
White-oak or Norway pine piles.....linear feet..	1,000	06	08	10	12	06	15	12	06	08
Pine planks, laid, 3 inches by 12 inches.....do.....	1,000	15	10	10	20	03	12	10	10	8
Iron drift-bolts 1 1/4 inches square.....pounds..	62,000	02 1/2	03	03	03	03	02 1/2	02 1/2	04	04
Iron screw-bolts 1 1/4 inches round.....do.....	1,000	05	04	04	05	04	07	05	04	04
Spikes, 9 inch, wrought.....do.....	1,200	03	04	05	05	03 1/2	05	06	04 1/2	03 1/2
Chain and fittings as required.....do.....	28,000	04 1/2	07	05	05	06	05	06	04 1/2	04
Stone.....number..	1,800	2 00	5 00	5 00	5 00	4 00	5 00	5 00	4 00	4 00
Driving piles as required.....do.....	170	6 00	2 00	3 00	3 00	3 50	4 00	4 00	4 00	2 50
Total approximate value.....		28,721 00	28,163 00	27,028 00	26,400 00	25,838 50	25,343 50	25,290 00	23,571 00	22,141 00

* This bid was rejected on account of informality.

List of materials and labor used at Sturgeon Bay Harbor, Wisconsin, during the working season of 1878. Building and sinking 4 cribs by contract, in extension of the North Pier; three cribs, each 50 feet by 20 feet by 12 1/2 feet, and 1 crib 50 feet by 20 feet by 14 1/2 feet.

Materials.	Quantity.	Price.	Amount.
12-inch by 18-inch pine timber, framed.....linear feet..	400	\$0 30	\$120 00
12-inch by 12-inch pine timber, framed.....do.....	11,740	20 1/2	2,406 70
12-inch by 12-inch oak timber, framed.....do.....	5,376	25 00	134 40
Piles, Norway pine.....feet b. m.	1,440	08	115 20
Piles, Norway pine, driven.....linear feet..	48	2 50	120 00
Stone (in addition to 98.4 cords taken from old piers).....number..	307.55	4 00	1,230 20
1 1/2-inch square drift-bolts.....cords..	16,774.50	02 1/2	461 30
Screw-bolts and washers.....pounds..	389.04	04	15 56
Chain (6,584.4 pounds at 4 cents, less \$183.06 paid by United States for wire rope).....do.....			
Total.....			4,716 59
Average cost of cribs 50 feet by 20 feet by 12 1/2 feet, with full chain.....			1,274 52
Cost per cubic foot of crib 50 feet by 20 feet by 12 1/2 feet, with full chain.....			25 49
Cost of cribs 50 feet by 20 feet by 14 1/2 feet, with full chain.....			10.2
Cost per linear foot of crib 50 feet by 20 feet by 14 1/2 feet, with full chain.....			1,469 68
Cost per cubic foot of crib 50 feet by 20 feet by 14 1/2 feet, with full chain.....			29 39
			10.13

REPORT OF MR. L. Y. SCHERMERHORN, ASSISTANT ENGINEER.

FEBRUARY 10, 1879.

SIR: I most respectfully submit the following remarks on future work at "harbor of refuge, entrance at Sturgeon Bay Canal."

The project of a ship-canal between the waters of Sturgeon Bay and Lake Michigan, considered in its entirety, involves—

- 1st. The canal proper, and,
- 2d. The necessary protection at lake entrance. The latter is so thoroughly a sequence of the former that, without the canal, the work at the entrance has no practical value, even in the most remote contingency; while the canal could, perhaps, with impaired facility discharge the functions for which it was constructed without the outer harbor. The Portage and Lake Superior Canal is an example in illustration; at its western end it debouches directly into Lake Superior with but slightly greater, if any, natural protection than exists at the entrance of the Sturgeon Bay Canal into Lake Michigan.

That the value and usefulness of both canals would be largely increased by the protection and facility afforded by a harbor of approach is beyond question, the parallel being made only to show that the construction and use of the Sturgeon Bay Canal was not necessarily dependent on an outer harbor.

The economical application of the appropriations for the outer harbor toward accomplishing the ultimate object of the project is the subject under consideration; and since the necessity for the outer harbor only exists by and through the construction of the canal, it is evident that an equitable and economical application of the appropriations must take into consideration the methods of canal construction and the results accruing therefrom.

The entire project, in the ultimate, supposes a canal with a sufficient and stable cross-section, and an outer harbor affording protection to the lake entrance; all commensurate with the demands of commerce as applied to the use of the canal. To accomplish this object two parties are supposed to be working together; one the general government, the other the State of Wisconsin, through the canal company. Let us examine how these correlative works are affected by each other.

In July, 1878, the canal company effected a junction between the waters of lake and bay, with a depth at lake entrance of about 7 feet; this it was found impossible to maintain without continual dredging, and very quickly the depth diminished to about 1 foot by the rapid deposition of sand, supplied both from the sand-laden currents from the canal and the tendency of the lake to return to its natural shore-line. The canal, throughout nearly its entire length, is a cutting, with unprotected slopes, through material most easily disturbed by the action of water, and constantly tending to equilibrium by sliding into the water and adding to the material to be re-excavated or swept away by the currents. These currents through the canal being due to a difference of level between the waters of lake and bay, as indicated in a former report, cannot fail at times to exist, and their action on unprotected slopes must ever continue the same. From personal observation, last summer, the current at the lake entrance had, at one time, a velocity of 3 1/4 miles per hour, the water being laden with sand,

second.
8.32
6.8
50
9.25
13.47
42.96
68.8
96.75
09.2
22.6
30.76
03.88

and further imparting a fluid-like motion of translation to the entire bed of the section, sweeping large quantities of sand into the canal. When the currents become reversed, it results in the deposition of large quantities of sand within the area inclosed by the breakwaters, and forming at the mouth of the entrance a fan-shaped bar extending well into the outer harbor. All of which is natural and to be expected when the lake and bay are liable, at times, to a difference of elevation of from 1 to 2 feet, and a straight channel of about 7,000 feet in length joining these two reservoirs.

Later in the season the canal company found it advisable to close the connection between lake and canal, by a dam, which quickly resulted in a return of the lake shore to its original conformation.

The unstable condition of the canal slopes can only be remedied by their protection. Whether the company anticipate or expect to meet such additional outlay, seems of uncertain determination, and this uncertainty of provision must leave the practical value of the canal an open question. Naturally it seems a question in which the company should have a vital interest; but it also affects the second party, viz, the United States; for the work they have undertaken, in providing a suitable harbor of entrance, only becomes of value when leading to a canal having a practical value, *i. e.*, meeting the requirements of commerce. Briefly, the work to be done in the formation of the outer harbor is the prolongation of the breakwaters to the 18-foot curve; the rendering of the pile-piers sand-tight; and the dredging out of the harbor to the required depth.

Further discussion is unnecessary to demonstrate the uselessness of dredging as long as an unlimited source for resupply exists in the canal.

As regards rendering the pile-piers sand-tight, work in that direction must necessarily be tentative, the value of which could only be determined by careful observation. But of what value would such observations be, when the natural operation of sand drift, in filling the harbor, is further complicated by an unlimited and indeterminate supply of sand from the canal? And until such source of supply be eliminated from the problem, indications as to the success or failure of any plan for rendering the pile-piers sand-tight have small, if any, value.

The only remaining work is the construction of the breakwaters; and this, taking the most favorable view possible of the ultimate completion of the canal in accordance with the requirements of commerce, is the only work I should recommend, until the canal company have rendered other work possible or of value.

Very respectfully, your obedient servant,

L. Y. SCHERMERHORN,
Assistant Engineer.

Maj. H. M. ROBERT,
Corps of Engineers, U. S. A.

REPORT OF THE COMMITTEE ON STATE AFFAIRS, WISCONSIN LEGISLATURE, ON BILLS
97 AND 303, A, AND JOINT RESOLUTION NO. 15, A.

[Journal of the Assembly, February 21, 1879.]

Your committee have had under consideration the above several bills and joint resolution, and would report as follows:

In order to give such a representation of the Sturgeon Bay Canal and its affairs, that an intelligent understanding of the questions involved may be obtained, it is necessary to go back to the inception of the enterprise and give the salient points of its history. The waters of Green Bay are separated from Lake Michigan by a narrow peninsula, about 75 miles long, and of an average width of about 12 miles. The large and constantly growing commerce of the bay is carried on by steam and sail vessels, which have to pass through the straits communicating with Lake Michigan at the northern end of the above-named peninsula. About 36 miles south from the straits an arm of Green Bay nearly cuts the peninsula in two, leaving a narrow isthmus of $1\frac{1}{2}$ miles in width. This inlet from Green Bay is known as "Sturgeon Bay"; it is 8 miles long, and varies in width from 2 miles, at the entrance, to about $\frac{1}{4}$ of a mile at its easterly end.

The waters of Sturgeon Bay are deep enough to float the largest lake craft, except within about 1 mile of the head of the bay. The banks are high, and the bay constitutes a safe and land-locked harbor of sufficient capacity to float all the shipping of the great lakes at one time. The ease with which the narrow isthmus which separates Lake Michigan from the head of Sturgeon Bay could be cut through, attracted attention at a very early day, and received favorable mention from General Lewis Cass while he was governor of the Territory. As the commerce of Green Bay increased in extent and importance, the annual losses of life and property by shipwreck at its outlet (which received the significant title of "Death's Door") made the necessity of secur-

ing communication between Lake Michigan and Green Bay by means of a canal across the Sturgeon Bay Isthmus apparent to all who gave the subject attention. The fact, also, that the larger part of this commerce was with Milwaukee and Chicago, and that a saving of 150 miles in distance could be made in each round trip to vessels passing between those ports and harbors on the south half of Green Bay, was another strong consideration in favor of its construction.

The magnitude of the commerce of Green Bay is not generally realized. In the year 1870 the imports were \$25,000,000 and the exports \$65,000,000. There has doubtless been a large increase since that year, as the very important iron industry of the Green Bay country has almost wholly come into existence within that period. Statistics show that fully two-thirds of the exports of Green Bay are to the ports of Milwaukee and Chicago. In 1870 there were shipped from the bay 500,000,000 feet of lumber, 900,000,000 shingles, 340,000,000 of lath, 35,000,000 pickets, 2,500,000 railroad ties, 1,600,000 cedar posts, and 650,000 telegraph poles, besides many other important articles of export.

From the records of the light-house keeper on Green Island, which is directly opposite the entrance of Sturgeon Bay, it appears that nearly 7,000 vessels passed the light last year, the great majority of which would have found their way to and from Lake Michigan by the Sturgeon Bay Canal had it been in operation. The importance of the work has been greatly enhanced by the location of a harbor of refuge by the national government at the eastern outlet of the canal.

This harbor is designed to afford an accessible and safe port in a storm, and vessels entering within the inclosure of the breakwater can pass through the canal into Sturgeon Bay, where the most perfect security is afforded.

This harbor is the only one of the kind on the lakes. It was rendered necessary by the long reach of dangerous coast south of Death's Door. The harbor was first located at Ahnepee, but afterwards changed to Sturgeon Bay, because it could be constructed at the latter point for about \$180,000, or one-half the expense necessary at Ahnepee, and besides, a much better and more commodious harbor would be secured. In the year 1878, the number of vessels that cleared from the port of Chicago was 10,494, and about 9,000 cleared from the port of Milwaukee.

The majority of these vessels pass by that part of the lake where the harbor of refuge named could be accessible in case of storm, and its construction would doubtless cause a great reduction in the number of wrecks which the history of navigation in the northern part of Lake Michigan has recorded.

As there is a widespread idea that the Sturgeon Bay Canal and Harbor enterprise is of but little importance and of trifling future value, your committee have felt it appropriate to give the above facts which have come to our consideration in our recent examination of the matters involved in the bills and joint resolution above named.

In the year 1864 "The Sturgeon Bay and Lake Michigan Ship Canal and Harbor Company" was formed, and among its members were many of the leading capitalists of Chicago, Milwaukee, and Northeastern Wisconsin. William B. Ogden was president of the company until his death, in August, 1877, since which time Jesse Spaulding has held that office.

In the month of April, 1866, Congress granted 200,000 acres of land to the State of Wisconsin, to aid in the construction of a breakwater, harbor, and ship-canal connecting the waters of Green Bay and Lake Michigan. Congress afterwards assumed the expense of constructing the breakwater and harbor.

The grant was accepted by the State in 1868, as appears by chapter 105 of the general laws of that year, "which provides for the laying out and establishing of the route of said canal and determining the termination thereof, and also preparing a plan for the construction of said canal in conformity with the provisions of said act of Congress, and making a diagram thereof to be approved by the governor, and when approved by him the same to be filed in the office of the secretary of state."

On the 21st of March, 1872, the diagram, plan, and specifications were approved by Governor Washburn, and on March 23, 1872, an act was passed amending chapter 105 of the general laws of 1868.

Section 3 of the act of March 23d, 1872, reads as follows:

"The dimensions of said ship-canal, so to be constructed by said company, shall be at least 100 feet in width at the water surface, with sides of the ordinary slopes of one and a half to one, and shall be at least 13 feet in depth at the bottom of said canal."

Work was begun on the canal July 9th, 1872, by dredging at the Sturgeon Bay end. According to the act of Congress, no part of the land grant was available to the company until one-fourth of the entire work was completed. Upon the certificate of the governor that such work had been done, it became the duty of the commissioners of public lands to give to the company one-fourth of the grant, and upon the completion of each succeeding fourth of the work, another fourth of the grant was to be given to the company, until the entire work was completed, and approved by the State officers.

It appears that the only available funds at the disposal of the company, when the work began, were about \$26,000, which had been collected on account of trespass on the lands. As money was needed in the prosecution of the work, the members of the company advanced it from their private means to the extent of \$60,000, until the first quarter of the work was finished. This money still remains invested in the enterprise, and the company has issued paid-up stock to the persons advancing it.

The enterprise suffered greatly from the financial panic which began in 1873, and the first quarter of the work was not finished until November, 1874. The financial pressure was so great that work was suspended until 1877. The company, having received one-fourth of the lands, endeavored to raise money by selling bonds secured on the lands; only about \$3,000 worth of bonds were disposed of, and the company changed its plan, took back and canceled all the bonds sold, and offered its lands for sale in April, 1877. A sufficient sum was raised to warrant a resumption of the work, and a contract was made with O. B. Green, in which he agreed to finish the entire canal, according to the required plans and specifications, by the first of December, 1879.

The contractor took the work at a much lower rate than the first quarter had been constructed for, Green's contract being for 20 cents per cubic yard, while the price paid for the first quarter was 30 cents. The company are not bound to pay him more than \$2,000 per month unless a greater sum is realized from the sale of their lands, and ten per cent. of the amount earned is retained as security for the completion of the work.

In 1877, Governor Ludington certified on the report of Capt. John Nader, civil engineer, who had been appointed to examine the work, that a second quarter had been completed, and last March the public land commissioners issued patents for the second installment of lands. In November, 1878, the company's engineer, Capt. W. T. Casgrain, estimated that the third quarter of the work was completed, and the company applied for another installment of lands.

Under the commission of Governor Smith, Captain Nader proceeded to Sturgeon Bay, and, according to directions received, made a careful and complete survey and estimate of the work already done, and also of what remained to be done, in order to construct such a canal as the contract of the company required. His report stated that a revetment, or pile and plank protection, would be needed at the Sturgeon Bay end, and two piers at the Lake Michigan end, in addition to what the company had supposed to be necessary, and which would cost in all \$17,000. This so increased the total cost of the canal that the company lacked \$11,000 of having completed the third quarter of the work on the basis required. Upon this showing the governor declined to issue a certificate that the third quarter of the canal had been completed, and until such certificate had been made, the patent for the lands cannot be granted. The company have acquiesced in the decision, and give assurance of entire willingness to go on with the work, on the plan proposed by Captain Nader, as soon as navigation opens. In a word, the company have nearly completed three-fourths of the work, and have received only one-half of the lands.

The above is, in brief, the history of the canal enterprise to the present time, and the question now arises, Do the interests of the State require any present legislation upon the matters pertaining thereto? In order to meet this issue squarely and frankly, let us consider the reasons given why such legislation should be had.

In the first place, it is claimed that the canal is not being constructed according to the plan originally adopted. The evidence before your committee shows that the company originally intended to submit a plan and specifications made by Major Houston, of the United States harbor works, in 1871, as the basis of a contract with the State, but that this plan and specifications were never so submitted. The contract with the State was upon a different basis, and in accordance with the modifications of the legislative act of March 23, 1872. The reason for the change seems to have been that there had been expectations of getting an additional grant, which Congress, however, refused to give. The erroneous impression above referred to is doubtless owing in part to a report of the United States engineer, Major Houston, in 1873, respecting the work upon the harbor of refuge, in which he states that work had been commenced upon the canal "in accordance with his plan of 1871."

As the work on the canal was being prosecuted under the State authorities, it is evident that Major Houston was not informed of the character of the contract between the canal company and the State. Your committee do not consider it pertinent or necessary to refer to all the questions that have been raised in regard to the manner in which the canal shall be constructed, but deem it sufficient to state that the governor, land commissioners, and Captain Nader, who has been twice appointed to inspect the work, interpret the contract to call for the construction of "a canal which shall be 100 feet wide at the surface of the water, 13 feet deep below low-water mark of 1847, with banks sloped in the proportion of two bases to one perpendicular, with a revetment of about 1,500 feet on each side at the Sturgeon Bay end, and two piers of 350 feet in length each at the Lake Michigan end." This is the requirement of the State with respect to the manner in which the canal shall be constructed, and the

canal company give a positive and unqualified assurance that they are willing and expect to complete the canal in accordance with said requirements.

Captain Nader also reports that it is probable that a revetment of about 2,000 feet may be needed to fortify certain places along the banks where springs enter the canal, or where the bank shows symptoms of breaking down. It is proper here to remark that the contract gives to the State full authority to make every needed requirement in order to secure a canal of sufficient capacity for the purposes required, and of reasonable permanence.

In the second place, it has been claimed that the land grant has been improperly handled, and that a change in existing laws is required in order to secure to the State the fulfillment of the canal company's contract. The company claim that on taking the grant they supposed they were to receive the grant in installments of 50,000 acres each. When they applied for the first quarter of lands, a question arose as to the interpretation of the act of the legislature as to the method of giving the lands. The law was ambiguous and indefinite, and the supreme court decided that under the statute referred to they should be given according to value and not in quantity.

The value of the grant, as appraised by an agent of the State and an officer of the company, was \$577,580.59, and 32,294 acres were patented to the company as the first installment. Last winter, a law was passed directing the land commissioners to issue the lands for the second quarter in acres, not to exceed in the total amount issued one-half of the entire grant. And the land commissioners were also authorized to issue the remaining two quarters of the grant in acres or values, as they deemed best. This act also repealed all previous acts relating to the manner of issuing the grant. In accordance with the law, this company received 66,116 acres of land. The reason which the company gives for desiring the passage of the above act is that they wished to be able to secure such lands as were immediately salable. A law was passed in 1876 requiring the land to be distributed by lot, and as the company had received numerous applications for various tracts of land, they wished to be able to obtain such tracts in order to realize money upon them at once.

The evidence submitted to the committee showed that the company, expecting in time to secure the entire grant, has been more solicitous to obtain such lands as they could sell immediately than those which were most valuable. It was also claimed by the company that a large proportion of the lands selected last summer were of a low grade, and that many valuable tracts which are isolated and remote, and consequently not marketable, were not taken. It has been claimed that the half of the grant issued to the company amounts to seven-eighths of the whole value; there was no evidence before the committee to substantiate this statement. The appraisement in the secretary of state's office shows that the part of the grant yet remaining is fully two-fifths of the whole in value. It was claimed by the company that the valuation of the entire grant on the appraisement was too high, and the report of an investigating committee, appointed in 1876 by the legislature, showed that it was not strictly correct in the proportionate values put upon the different grades. The appraisement of the company on the lands unpatented is about \$117,000, and this is considered a minimum valuation.

It was also claimed by the company that none of the lands of the grant are absolutely worthless, and, in the opinion of the president and the company's land-agent, that 50 cents per acre, or thereabouts, could be realized from the disposal of the poorest half of the lands yet unpatented.

It is also charged that the contractor has not done his work in full accordance with the terms of his agreement, and Captain Nader reports that if the excavation had been prosecuted less rapidly, and more attention given to removing material dredged out and placed on the banks, it would have been better. In his estimate of work yet to be done, however, he includes whatever outlay may be necessary to repair and perfect the banks in full accordance with the contract and specifications. There are also charges that the terms of the contractor's agreement with the company have been changed to his advantage; but the evidence shows that whatever advantage he gains in one direction by the change he loses entirely or in great part in other ways.

The last charge which we shall here notice is that the principal office of the company is not kept in Wisconsin, in accordance with the requirements of the statute. The officers claim that they have an office in Milwaukee, which is the only distinctive office which the company has. The president, secretary, and treasurer draw no salary, and perform such official acts as devolve upon them at their private offices. The land department, under the charge of D. W. Maxon, and the superintendence of the construction of the canal is under the charge of the chief engineer, Capt. W. T. Casgrain, both of whom have an office at 102 Wisconsin street, Milwaukee, which is rented and paid for by the company.

In conclusion, we wish to say that the only interest which the people of Wisconsin and the legislature have in the whole matter is simply this, that if such a ship-canal is constructed at Sturgeon Bay as is contemplated by the law, that the State retain sufficient security during the construction of the canal to guarantee the completion of

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