

Exports for the year ending December 31, 1878.

Beer.....barrels..	2,500	Lime.....barrels..	120,000
Butter.....tons..	12	Malt.....bushels..	50,000
Castings.....do..	430	Oats.....do.....	5,000
Cattle.....number..	500	Plows.....number..	200
Eggs.....barrels..	150	Pork-barrels.....do.....	4,500
Fish.....packages..	2,000	Smut-machines.....do.....	95
Flour.....barrels..	3,800	Wheat.....bushels..	64,949
Hides.....number..	3,000	General merchandise.....tons..	125

Imports for the year ending December 31, 1878.

Coal.....tons..	709	Pig iron.....tons..	475
Coke.....do..	160	Reapers.....number..	250
Laths.....M..	1,003,500	Seeders.....do.....	250
Sand-plaster.....tons..	120	Shingles.....M.....	5,370,000
Lumber.....feet, b. m..	4,108,973	General merchandise.....tons..	120

The above information was obtained from the merchants.

APPENDIX A A.

ANNUAL REPORT OF MAJOR D. C. HOUSTON, CORPS OF ENGINEERS, FOR THE FISCAL YEAR ENDING JUNE 30, 1879.

UNITED STATES ENGINEER OFFICE,
Milwaukee, Wis., July 12, 1879.

GENERAL: I have the honor to transmit herewith annual reports for the works in my charge for the fiscal year ending June 30, 1879.

I am, general, very respectfully, your obedient servant,

D. C. HOUSTON,
Major of Engineers.

Brig. Gen. H. G. WRIGHT,
Chief of Engineers, U. S. A.

A A 1

IMPROVEMENT OF MILWAUKEE HARBOR, WISCONSIN.

HISTORY OF WORK.

A survey of this harbor was made in 1836 by Lieutenants Center and Rose of the Army. The Milwaukee River for a distance of 3,000 feet above and north of its mouth was separated from the lake by a sand-spit. At this upper point, the river approached the lake from the westward, and was only separated from it by a low strip of sand about 200 feet across. Two plans presented themselves—

1st. To improve the mouth of the river.

2d. To make a cut at the point above mentioned.

The second plan was recommended as giving more direct access to the business center, and avoiding the improvement of the lower stretch of the river. It was not until 1843 that an appropriation of \$15,000 was made by Congress for the improvement of the harbor. This was followed in 1845 by an appropriation of \$20,000. These sums were applied to the first plan, the improvement of the river mouth. In 1854 an appropriation of \$15,000 was made for the improvement of Milwaukee Harbor, and directed to be applied to the second plan, known as the "straight cut." This sum was inadequate, even to the commencement of the work, and the importance of the harbor was so pressing that the city undertook the work, which was carried out in the years 1855, 1856, and 1857 at an ultimate cost to the city of \$445,971.20. A channel was dredged from the river to the lake for a depth of 12 feet, sufficient for the then requirements of the lake commerce, and two substantial piers, each 1,120 feet in length, built for its protection.

A complete harbor was thus made at this the second port in importance on Lake Michigan, at the expense of the city with very slight as-

istance from the government. This was done at a comparatively early day, and was in the highest degree creditable to the enterprise of the city. The benefit of this harbor to the city and the general commerce and business of the country has been immense.

In 1866 the government resumed a system of general appropriations for river and harbors, and in that year appropriated the sum of \$48,283.17 for the improvement of this harbor.

The increase in the draught of vessels navigating the lakes necessitated the deepening of the channel, its extension into the lake, and the consequent extension of the piers for its protection.

Since and including 1866 there has been appropriated by Congress the sum of \$255,423.51. From 1867 to 1872 the work consisted mainly in the extension of the piers each a distance of 600 feet. The cribs of which these extensions are composed are wider and higher than those built by the city on account of the increased depth of water. In 1873 and 1874 the channel was dredged to a depth of 17 feet. The superstructure over the original piers has been replaced on the north pier by stone, and on the south pier by timber. The stone superstructure is just completed. Repairs to the work have also been made from time to time; a large number of oak piles have been driven and connected by wales of oak timber to protect the piers from collisions, and pile pier-heads have been put in at the lake end of each pier.

CONDITION OF WORK ON THE 30TH OF JUNE, 1879.

The general condition of the work is good. A narrow channel of 17 feet in depth still exists, but this channel is gradually shoaling, so that dredging should be resumed at once.

PROGRESS DURING FISCAL YEAR ENDING JUNE 30, 1879.

Assistant Engineer W. H. Hearding reports progress as follows:

By act of Congress of date June 18, 1878, the sum of \$15,000 was appropriated for its improvement. The work to be done was a continuation of the construction of the walls of the stone superstructure of the north pier, the length of which remaining to be built was 392.3 feet. The working season being so far advanced before the appropriation became available, it was important that the work should be commenced as early as practicable, and to avoid the delays incident to advertising for proposals the materials were purchased in the open market, and the work was done by hired labor.

The timbers of the old superstructure were cut down on both sides to a depth of 1 foot below mean lake-level. Platforms of 12 by 12 inch oak timbers were bolted to the substructure as in the section finished in 1877, and at the close of the month of October the walls were completed and the stone ballast replaced. The end of this section which terminates on the line of the east face of the light-house crib was finished with an end wall 4 feet in thickness, similar to the side walls. A number of sound timbers selected out of those taken from the old superstructure were used to replace the old work at the jointure of the light-house crib with the pier. A row of piles driven at equal distances of 4 feet apart from center to center, braced with a wale of 12 by 12 inch oak timber and bolted with screw-bolts to each pile, forms a protection to this section in continuation of the protection provided for the first section built. The total length of the stone superstructure is 1,052.6 feet. Of this, 660.3 feet is finished with a pavement of large quarry-stone between the side walls. During the past month the remainder has been filled up to within a distance of 8 inches of the top of wall with small stone and a packing of stone spalls mixed with gravel. Upon this a covering of concrete has been laid 8 inches thick at the sides and crowning to a thickness of 9½ inches at the center as a finish to the work.

The soundings taken last April show that a deposit of about 1 foot in thickness has been made on the channel bed between the piers since the soundings were taken in May, 1878.

PROPOSED APPLICATION OF FUNDS AVAILABLE FOR EXPENDITURE DURING THE FISCAL YEAR ENDING JUNE 30, 1880.

It is proposed to expend these funds in dredging the channel between the piers and in making certain repairs to the piers, particularly at the connections of the piers with the private docks.

PROPOSED APPLICATION OF FUNDS ASKED FOR THE FISCAL YEAR ENDING JUNE 30, 1881.

It is proposed to apply these funds to the maintenance of the harbor by dredging and extension of piers as explained below.

The letter of March 17, 1879, calling for annual reports, asks for specific information on certain points numbered from 1 to 10. These are given below in the same order.

The present plan is the maintenance of the channel and piers for its protection.

The channel will require periodical dredging, and the piers will have to be extended from time to time, to keep pace with the gradual shoaling caused by the accretions due to storms and currents in the lake and river. The timber superstructure will also have to be renewed from time to time or replaced by stone or iron. Repairs, rendered necessary by collisions and storms, will also be required. I estimate that an average yearly expenditure of \$10,000 will suffice for the maintenance of this harbor. This is necessarily conjectural, as it may be modified by unforeseen demands and change of plans.

Amount that can profitably be expended during the next fiscal year, \$10,000.

The nearest collection-district is Milwaukee, Wis.

The nearest port of entry is Milwaukee, Wis.

Amount of revenue collected at the nearest port of entry during the last fiscal year was \$93,813.36.

The general commerce of the lakes, as well as the local commerce, is benefited by this harbor. The total arrivals and departures at this port during the last fiscal year is reported by the United States collector as follows:

	No.	Tonnage.
Arrivals, steamers.....	2,283	2,002,280
Arrivals, sail.....	2,784	441,054
Total arrivals.....	5,067	2,443,334
Departures, steam.....	2,292	2,003,456
Departures, sail.....	2,909	458,363
Total departures.....	5,201	2,461,849

Work done by hired labor and purchase of materials in open market.

Money statement.

July 1, 1878, amount available.....	\$17,089 42
Amount appropriated by act approved March 3, 1879.....	7,500 00
July 1, 1879, amount expended during fiscal year.....	\$24,589 42
July 1, 1879, amount available.....	14,572 51
July 1, 1879, amount available.....	10,016 91
Amount (estimated) required for completion of existing project.....	10,000 00
Amount that can be profitably expended in fiscal year ending June 30, 1881.	10,000 00

AA 2.

IMPROVEMENT OF RACINE HARBOR, WISCONSIN.

HISTORY OF WORK.

Previous to the year 1866 the sum of money appropriated by Congress to aid in the construction of a harbor at Racine was \$22,000, as far as is stated in the report of recorded acts. Important assistance must have been rendered by the city authorities of Racine to the same object, although a record of the money expended by them for this purpose is not known to this department, for the map of the survey made by the United States Government in 1867, before the general work of internal improvements was resumed, shows the length of the north pier as being 800 feet from its west end to its eastern extremity, and the south pier was 600 feet in length. Under the appropriations of 1866, 1867, and 1869 the north pier was extended 320 feet, and the south pier 256 feet, and dredging was done in the channel. In 1871 the south pier was extended 256 feet, making a total length, as it now exists, of 1,112 feet.

During the years 1869 and 1871 a length of 494 feet of the old superstructure was cut down and rebuilt. In 1873 and 1874 the north pier was extended 150 feet with cribs 30 feet in width, and the channel deepened by dredging. In 1875 and 1876 dredging was done in the channel and repairs were made to the piers. The superstructure of a portion of the inner section of the north pier, 634½ feet in length, was cut down and rebuilt in 1877. In May of this year a resurvey of the harbor was made and a recommendation was submitted for a further extension of the north pier of 150 feet, at an estimated cost of \$21,000.

Under this present approved project, one crib of dimensions 50 feet in length and 30 feet in width has been sunk, leaving 100 feet of further extension to complete it. Necessary excavation has been done by dredging in the channel in 1877 and 1878. The dredge is now at work, June 30, 1879. Excavation will probably be required each year in the channel.

The total length of the north pier is 1,320 feet. The total length of the south pier is 1,112 feet.

The money which has been expended under appropriations made by Congress for the improvement of this harbor is as follows:

1844.	Commencement of improvement by building parallel piers and	\$12,000 00
1852.	dredging channel between same.	10,000 00
1866.	North pier extended 320 feet	23,910 00
1867.	South pier extended 256 feet and dredging	45,000 00
1869.	288 feet of superstructure cut down and rebuilt	22,275 00
1870.	Repairs to piers and cribs ballasted with stone	10,000 00
1871.	South pier extended, 256 feet, and 206 feet of superstructure, west end, north pier, cut down and rebuilt	10,000 00
1873.	North pier extended 150 feet. Stone ballast supplied to deficiencies	20,000 00
1874.	through settlement and a large amount of dredging in channel.	10,000 00
1875.	Dredging in channel and repairs made to piers	10,000 00
1876.	634½ feet of superstructure, north pier, cut down and rebuilt	8,000 00
1877.		
1878.	North pier extended 50 feet and dredging	10,000 00
1879.		6,000 00

Total amount appropriated by the United States 197,185 00

CONDITION OF WORK ON THE 30TH OF JUNE, 1879.

Fair. During April and May of this year vessels drawing less than 12 feet of water grounded in the channel. The work of the dredge since then has provided a 14-foot channel 50 feet wide.

PROGRESS DURING FISCAL YEAR ENDING ON THE 30TH OF JUNE, 1879.

Assistant Engineer W. H. Hearing reports progress as follows:

By act of Congress of date June 18, 1878, the sum of \$10,000 was appropriated for its improvement. The work to be effected was the extension of the north pier 50 feet and dredging in the harbor channel between the piers. In response to an advertisement proposals were received for the construction of a timber crib 50 feet in length by 30 feet in width; and the Chicago Dredging and Dock Company being the lowest responsible bidder, a contract was made with that company on the 17th day of August to build and sink the crib. This was successfully accomplished on the 24th day of September. The crib was placed in good position upon a foundation of rubble-stone, and remains as it was placed excepting that the two upper timbers of the outer horn or extremity on the channel side have been broken by the collision of a vessel.

The Racine Dredging Company's dredging-machine (Baker), with the services of dumping-scows and tug-boat, was hired to do the necessary work of excavation in the channel, at the rate of \$70 per day of 10 hours of actual work. Two cuts were made with the dredge in the middle of the channel-way between the piers, which provided a channel of 15 feet in depth and 50 feet wide for the whole length of the harbor entrance. The time of actual work done by the dredge was 26 days. The amount of material excavated was 9,751 cubic yards, scow measurement.

Soundings were taken at this harbor on the 1st and 2d days of May last, a plat of which disclosed the presence of an unusually large deposit in the channel during the winter and early spring months. Upon investigation it was found that the principal source of trouble was derived from northerly winds lifting the light dry sand (of the accretions which have formed extensively to the northward of the harbor piers) and carrying it over the pier into the channel. To counteract the serious effect of this cause of obstruction to navigation, a solid fence constructed of plank 6 inches wide and 8 feet high has been built upon the north wall of the pier for a length of 300 feet, where it crosses the shore accretions. During April and May of the present year, several vessels drawing less than 12 feet of water grounded between the piers, and were obliged to discharge portions of their cargoes upon lighters before they could be towed to the respective wharves to which they were consigned. These facts, coupled with earnest solicitations from the citizens of Racine and others interested in maritime affairs that dredging might be resumed, induced a reapplication of the services of the dredge, which is now engaged in removing the deposit at a rental of \$65 per day of 10 hours' actual work, including the necessary scows and tugboat.

PROPOSED APPLICATION OF FUNDS AVAILABLE FOR EXPENDITURE DURING THE FISCAL YEAR ENDING JUNE 30, 1880.

It is proposed to expend these funds in extension of the north pier and in necessary dredging between the piers.

PROPOSED APPLICATION OF FUNDS ASKED FOR THE FISCAL YEAR ENDING JUNE 30, 1881.

It is proposed to expend these funds in the further extension of the north pier and dredging between the piers.

The letter of March 17, 1879, calling for annual reports asks for specific information on certain points numbered from 1 to 10. These are given below in the same order.

The present plan is the maintenance of the channel and piers for its protection. The channel will require periodical dredging and the piers will have to be extended from time to time to keep pace with the shoaling caused by storms and the currents in the lake and river. The timber superstructure will also have to be renewed from time to time, or replaced by stone or iron. Repairs rendered necessary by collisions and storms will also be required. I estimate that an average yearly expenditure of \$8,000 will suffice for the maintenance of this harbor. It is important that the extension of the north pier of 150 feet recommended in my annual report for 1877 be completed at an early day. Only one crib 50 feet in length has been sunk. The appropriations have been much less than the estimates, and it has been necessary to expend a considerable sum

CONDITION OF WORK ON THE 30TH OF JUNE, 1879.

The general condition of the work is fair. The channel will admit vessels drawing not more than 11 feet of water with safety.

The total length of the north pier is 1,450 feet. The total length of the south pier is 1,306 feet. One hundred and forty-six feet of the total length of the south pier, at its west end, has been built by private parties for business purposes.

PROGRESS DURING FISCAL YEAR ENDING JUNE 30, 1879.

Assistant Engineer W. H. Hearing reports progress as follows:

An appropriation of \$8,000 was made by act of Congress of date June 18, 1878, for the improvement of this harbor. In answer to an advertisement requesting proposals, bids were received for the construction of 2 cribs, each 50 feet in length by 24 feet in width, to be placed in extension of the north pier in accordance with the projected plan of improvement, and on the 17th day of August a contract was made with the Chicago Dredging and Dock Company to do this work, they being the lowest responsible bidders. These two cribs were sunk in accordance with the specifications in October. Both cribs were placed in good alignment and position upon foundations of stone, and were filled up to within a distance of 1 foot from the top with stone ballast, and were then covered with a decking of plank. An imperfect connection of the work commenced in 1867 with the work formerly done by the government has been a source of trouble for some time past. The shore accretions have formed to a great extent both in area and thickness to the northward of the pier. The shore line now extends to within a distance of 12 feet of the commencement of the extension of 1867. Several attempts have been ineffectually made to check the running of sand through the opening left by this imperfect jointure of the cribs. By cutting down a section of the old superstructure to the water-surface, from the point of commencement in 1867, running 10 feet west, or shorewards, the cause of the difficulty was disclosed, and a framework of timber and plank was inserted, which is expected to be permanently effective in keeping out the sand.

PROPOSED APPLICATION OF FUNDS AVAILABLE FOR EXPENDITURE DURING THE FISCAL YEAR ENDING JUNE 30, 1880.

It is proposed to expend these funds in the extension of the north pier.

PROPOSED APPLICATION OF FUNDS ASKED FOR, FOR THE FISCAL YEAR ENDING JUNE 30, 1881.

It is proposed to expend these funds in the extension of the piers, dredging the channel, and needed repairs.

The letter of March 17, 1879, calling for annual reports asks for specific information on certain points numbered from 1 to 10. These are given below in the same order.

The present plan is the maintenance of the channel, and piers for its protection. The channel will require periodical dredging, and the piers will have to be extended from time to time to keep pace with the shoaling caused by storms and the currents in the lake and river. The timber superstructure will also have to be renewed from time to time, or replaced by stone or iron. Repairs, rendered necessary by collisions and storms, will also be required.

I estimate that an average yearly expenditure of \$8,000 will suffice for the maintenance of this harbor. It is important that the extension of the north pier recommended in my annual report for 1877 be completed at an early day. I estimate therefore for the next fiscal year the sum of \$14,000, and a subsequent annual expenditure of \$8,000 for mainten-

ance. This latter estimate is necessarily conjectural, and may be modified by unforeseen demands or changes of plan.

The amount that can be profitably expended during the next fiscal year is \$14,000. Kenosha is situated in the collection-district of Milwaukee, Wis. The nearest port of entry is Milwaukee, Wis. The amount of revenue collected at the nearest port of entry during the last fiscal year was \$93,813.36.

The general commerce of the lakes as well as the local commerce is benefited by this harbor. The number of clearances at this port during the past fiscal year is reported as 244, with a tonnage of 25,345.

Money statement.

July 1, 1878, amount available	\$8,938 25	
Amount appropriated by act approved March 3, 1879	5,000 00	
		13,938 25
July 1, 1879, amount expended during fiscal year		6,854 43
July 1, 1879, amount available		7,083 82
Amount (estimated) required for completion of existing project		67,000 00
Amount that can be profitably expended in fiscal year ending June 30, 1881		14,000 00

Abstract of proposals received and opened July 30, 1878, for pier extension, Kenosha Harbor, Wisconsin.

No. and name of bidder.	Residence.	12" by 18" pine	12" by 18" hem-	12" by 12" pine	12" by 12" hem-	Iron drift-bolts.	Stone.	Framing timber.	Total cost of 1
		timber.	lock	timber.	lock				
		L. ft.	L. ft.	L. ft.	L. ft.				
1. F. M. Knapp and E. Gil-	Racine, Wis.....	\$0.26	\$0.24	\$0.18	\$0.17	\$0.3	\$7 00	\$0.9	\$2,888 23
2. H. McArthur	Chicago, Ill.	36	36	24	24	3	6 00	4	2,873 65
3. Robert M. Steele	St. John's, Mich.	27	24	18	16	2 1/2	7 25	6	2,655 24
4. Chicago Dredging and Dock Company	Chicago, Ill.....	49	28	20	17	3	7 00	5	2,647 39

Contract made August 17, 1878, with Chicago Dredging and Dock Company, for pier extension, at prices given in their proposal as shown above.

AA 4.

IMPROVEMENT OF THE FOX AND WISCONSIN RIVERS.

HISTORY OF WORK.

By acts of Congress approved August 8, 1846, March 2, 1849, August 3, 1854, and March 3, 1855, grants of land were made by the United States to the State of Wisconsin "to aid in the improvement of the Fox and Wisconsin Rivers, and to connect same by a canal." The State commenced the work of improvement in 1848, and it was carried on by the State at first, and subsequently by private companies under State authority until 1873, when the United States purchased the property of the Green Bay and Mississippi Canal Company, connected with the improvement of navigation.

This property consisted of the works for the improvement of the Fox