

The last four results were taken from the receiving books of the two docks, the tonnage of each craft being as given in the government list of merchant vessels as published by the department, so that the result can be relied upon as correct. It must be remembered that the shore boats, with a very few exceptions, enter the harbor twice each trip, which would make the amount of their tonnage nearly double the amount given.

In addition to the crafts included in the statement should be included the tugs plying in and out of the harbor belonging to this port, 6 in number; also vessels loading at the port having through clearances, of which there were quite a number.

Very respectfully,

C. S. RAMSAY,  
*Deputy Collector.*

Maj. F. HARWOOD.

## APPENDIX G G.

### ANNUAL REPORT OF LIEUTENANT-COLONEL N. MICHLER, CORPS OF ENGINEERS, FOR PART OF THE FISCAL YEAR ENDING JUNE 30, 1879.

WASHINGTON CITY, D. C., *July 7, 1879.*

GENERAL: I have the honor to transmit herewith the annual reports upon the various works of harbor improvements under my charge during the first five months of the fiscal year ending June 30, 1879. In accordance with Special Orders No. 257, Headquarters of the Army, Adjutant-General's Office, Washington, November 29, 1878, Maj. John M. Wilson relieved me of this duty, and I proceeded to comply with the order of the War Department, dated November 15, 1878, and of the instructions of the Department of State of the 7th of the same month. A separate report of the special mission to which I was thereby assigned was submitted on the 21st of May, for the information of the government, and until the close of the fiscal year I was engaged upon the same duty.

Very respectfully, your obedient servant,

N. MICHLER,  
*Lieutenant-Colonel of Engineers,  
Bvt. Brig. Gen.*

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

## G G I.

### IMPROVEMENT OF MONROE HARBOR, MICHIGAN.

A description of this harbor having been given in the previous annual report, it is not deemed necessary to repeat it. At the close of the previous fiscal year there still remained to be completed about 1,500 feet of the renewed revetment on the sides of the United States Ship Canal, and 1,750 feet of the Monroe City Canal. It was estimated that about 600 feet of revetment could be renewed with the amount (\$2,500) appropriated for the year; of this the piles (1,132 linear feet) for 142 feet had already been driven when the work was suspended for the season. The south pier was repaired and will probably continue in good order for some years to come. The north pier was only partially repaired. The work was commenced on the 6th of November, and suspended on the 7th of December; it was executed by the purchase of the material in open market and by day labor. Soundings were taken out into the lake for a distance of 1,000 feet beyond the outer terminus of the United States Ship Canal; through the canals and that part of the Raisin River connecting them; and also along the river above the canal as high up as the head of navigation. There was no noticeable change in the depth

of the channel, measured by the gauge of average low stage of water in the lake, excepting near the head of the United States Ship Canal, where a small bar had formed. A small section of the revetment of the city canal, built in 1874, had been partially forced from its position. The report of the officer who succeeded me in charge of this work during the last months of the fiscal year will furnish such additional information as is usually required at its close.

## GG 2.

## IMPROVEMENT OF TOLEDO HARBOR, OHIO.

Descriptions of the several plans proposed for the improvement of this harbor have been presented in the last annual report. That finally adopted consists in dredging out the natural or existing channel to a width of 250 feet at the top and 200 at the bottom, with a depth of 15 feet at an average stage of low-water; also that the sweeps at the angles or elbows, of which there are four, shall be so rounded and widened as to enable vessels to move from one reach to another, and to pass each other without difficulty or danger of collision. The work during the year was executed by contract. On the 1st day of July, 1878, a project was submitted as to the application of the appropriation for this work made by the river and harbor act approved June 18, 1878. The plan received the authority of the Chief of Engineers, and specifications were accordingly prepared, and sealed proposals invited by public advertisement. The latter, of which the following is an abstract, were received in duplicate at the appointed time, and opened in the presence of the several bidders.

Abstract of bids received and opened at 12 o'clock m. of the 21st of August, 1878, for improving the harbor of Toledo, Ohio.

	Names of contractors.	Price per cubic yard.	Date of commencement.	Date of completion.
1	Chicago Dredging and Dock Company .....	\$0 20	Sept. —, 1878	Dec. —, 1878
2	Jesse Sims .....	20	.....	.....
3	Elias Sims .....	19	(*)	.....
4	John Kishler and Richard Arnoldt.....	18	Sept. 1, 1878	June 1, 1879.
5	Patrick Smith .....	16	do .....	Dec. 1, 1879.
6	Horace F. Stock .....	15	do .....	Sept. 1, 1879.
7	William Richardson .....	14	do .....	do .....
8	J. C. & J. H. Davis .....	12	do .....	do .....
9	E. H. French .....	09½	Sept. 1, 1878	June 30, 1879

\* Ten days after contract is awarded.

With the approval of the Chief of Engineers, the contract, at 9½ cents per cubic yard, was awarded to E. H. French, of Fulton, N. Y., and the necessary articles of agreement entered into between him and the government. By the terms of the contract, five dredges, with the necessary accompaniment of scows and tugs, were placed on the work, two on the 4th, two on the 9th, and one on the 28th of September, the early arrival of the last having been prevented by heavy storms on the lake. They consisted of the *General Meade*, the *Colonel Harwood*, the *Champion*, the *Enterprise*, and the *Fulton*. The dredging was at first confined to the outer or Phenstock range and to the two elbows at the extremities of the same. Subsequently work was resumed on the south reach. The

length of one cut made on the outer range was 4,650 feet by 25 in width. Eight other cuts, each 400 feet long, and in all 200 wide, were also dredged, the work on this range being thereby completed. The elbow at the intersection of the middle and outer ranges was also completed by making an additional cut of 1,200 feet in length by 50 in width. The elbow at the intersection of the outer range and the southwest reach was also finished, the work accomplished being a cut with an average width of 50 feet and a length of 600. During the last month of the working season of 1878, November, the operations were limited to the south reach, running north and south to the west of the light-house on Turtle Island. In this time there was completed one cut of 6,850 feet in length and 25 in width, also a second of 4,225 feet in length and 25 in width was partially finished, and a third of 300 in length and 25 in width was made. Owing to the inclemency of the weather, ice having already formed in the river, the work was suspended on the last day of November. During the working season of three months the quantity of material removed amounted to 194,235 cubic yards. The dumping-ground was easily accessible, and situated to the northwest and about 1½ miles from the nearest point.

The report for the remainder of the fiscal year will be furnished by the officer who succeeded me in charge of the work, and such information given as is usually called for by the circulars of the Engineer Bureau.

## GG 3.

## IMPROVEMENT OF PORT CLINTON HARBOR, OHIO.

The plan of improvement adopted for this harbor has been described in the previous annual report. The work was suspended on the last day of September on account of the appropriation for the fiscal year having been almost entirely exhausted. During the season of operations, the last few days of July and the two succeeding months, the following work was accomplished: The west pier has been extended 300 feet, and the east pier 205 feet; the passage-way of the old channel through the east pier, a space of 150 feet, has been closed, and a new channel has been dredged from the mouth of the Portage River out into the lake as far as the curve of 10 feet. The dimensions of the new cut are, in length, 2,000 feet, with a width of 60, and a depth of 10 feet; 19,487 cubic yards of clay, sand, and mud were removed by dredging, a great deal of the material being handled twice, from the necessity of the case. The storms of the 11th, 12th, and 13th of September, which were very severe on the lake, the wind veering and hauling from every point of the compass, severely tested the stability of the work. It escaped, however, without any damage. The new channel was improved instead of being injured by the heavy storms.

The material was purchased in open market, and the work performed by day labor. In order to complete this harbor improvement, there still remains to be executed a very considerable amount of work, and it is to be hoped that a liberal appropriation may be granted for the purpose. The report of the officer who succeeded me in charge will contain such needed information as is usually called for in this connection.

## GG 4.

## IMPROVEMENT OF SANDUSKY CITY HARBOR, OHIO.

To describe the nature of this improvement will be but a repetition of its history as given in the last annual report. The plan adopted consists in dredging out the natural ship-channel through Sandusky Bay to the east of Johnson's Island, known as the West Channel. The specifications called for a width of 200 feet at the bottom, with a depth of 15 feet at an average stage of low-water in the lake. A project was submitted for the approval of the Chief of Engineers with a view to the expenditure of the appropriation contained in the river and harbor act approved June 18, 1878. In accordance with the same, specifications were prepared and new proposals invited by public advertisement for its execution. Under a previous contract made during 1877 with Orville J. Jennings, of Dunkirk, N. Y., at 11 cents per yard, the operation of dredging was continued from the commencement of the fiscal year until its expiration on the 10th of August; by this agreement, which began on the 15th of June, 1877, the number of cubic yards dredged and removed from the west or natural channel between the line of the city front and the curve of 15 feet in the lake amounted to 84,550 cubic yards, at a cost of \$12,500. Agreeable to the last advertisement, proposals for dredging were received in duplicate and opened on the 21st of August, and are tabulated as follows:

*Abstract of bids received and opened at 12 o'clock m. of the 23th of August, 1878, for improving harbor of Sandusky City, Ohio, in accordance with advertisement inviting proposals for harbor improvements, dated July 25, 1878.*

	Names of contractors.	Price per cubic yard.	Time of commencement.	Time of completion.
1	Chicago Dredging and Dock Company.	\$0 19	September, 1878.	December, 1879.
2	Patrick Smith	18	September 1, 1878	December 1, 1879.
3	Elias Sims	18	Ten days after contract.	
4	Franklin Lee	18	September 1, 1878	September 1, 1879.
5	Jesse Sims	15		
6	William Richardson	15	September 1, 1878	September 1, 1879.
7	E. H. French	14	do	June 30, 1879.
8	John Kishler	13	do	June 1, 1879.
9	J. C. & J. H. Davis	12		

Copies of the proposals, with an abstract of the same, were transmitted for the information of the Chief of Engineers, and by his authority the contract was awarded to Messrs. J. C. & J. H. Davis, of Toledo, Ohio. On the 3d of September articles of agreement were accordingly entered into with these parties. Owing to several days of severe stormy weather on the lake the dredges could not be towed to the locality, and the dredging was consequently not commenced until the 18th of the same month. Two good dredges, the Continental and the No. 4, with the necessary tugs and scows, were placed on the work, in accordance with the terms of the contract. The line of operations was confined to the inner reach, or the Illuminated Clock Range. The dumping-ground was selected to the rear of Johnson's Island. Several cuts, parallel and in juxtaposition one to another, were made at an average width of 25 feet. One of these cuts had already reached, before the work was suspended, a terminus some 300 feet distant from a line drawn between the outer extremities of the two railroad docks, and thus completed a channel-way of the proper depth, 15 feet at an average low stage of water,

from the water-front of the city at the foot of Columbus avenue out to deep water in the lake.

The dredging was discontinued on the last day of November in consequence of the inclemency of the weather. Under the contract with the Messrs. Davis at 12 cents per yard there was removed up to that date 26,562 cubic yards of clay and sand. The report of the officer who succeeded me will furnish an account of the progress made during the last months of the fiscal year, as well as submit such information as is usually required in connection with such works.

## GG 5.

## IMPROVEMENT OF HURON HARBOR, OHIO.

The nature of this improvement has been stated in a previous report. The repairs to the piers of this harbor were commenced about the middle and completed on the last day of October. They consisted in replacing the planks of the flooring wherever they had become decayed by exposure to atmospheric changes or damaged by accidental causes.

As mentioned in the monthly report for October, the superstructure will probably have to be renewed in the course of a year or two, but has been placed in comparatively good repair considering the small amount of the appropriation. Attention was called to the condition of the break-water at the inner extremity of the west pier, which was originally built by some railroad company, and afterwards extended and kept in order by the general government. It has been very considerably damaged by storms. It still answers the purposes for which it was intended, to prevent the lake from breaking through into the river at the end of the pier during northwest storms. It may have to be renewed in course of time, or some other substitute as a protection be adopted. A revetment of piling, some 300 feet in length, may better answer the purpose than the old crib-work. This subject will, however, receive proper attention in the report of the officer who has relieved me. Such other information as may be required will also be furnished by him.

## GG 6.

## IMPROVEMENT OF VERMILLION HARBOR, OHIO.

The plan adopted for this improvement has already been set forth in a previous report. To complete the work according to it, the channel-way between and along the entire length of the piers, also beyond the pier-heads into the lake until the 14-foot curve was reached, had still to be enlarged at some places to the required depth of 14 feet and the proper width of 100 feet, by blasting and displacement of solid rock upon the bottom and by the dredging and removal of the sand and gravel which had accumulated by deposits from the lake and river. The work was commenced during the early part of July and completed on the 7th of September. The total quantities of the different material removed during the season are as follows:

Earth, 2,026 cubic yards.  
Loose rock, 659 cubic yards.  
Solid rock, 3,468 cubic yards.

The east and west piers were also thoroughly repaired. This harbor improvement is now completed as far as the present needs of commerce seem to require.

Owing to a reduction of 50 per centum in the cost of blasting and dredging, the appropriation for the fiscal year, together with the balance of funds remaining on hand from the previous one, the latter having been only partially used in consequence of the former high prices demanded for labor, proved sufficient. An excellent channel-way has been provided; the solid rock has been blasted and displaced to a depth of 14 feet below the place of average low-water, and a depth of not less than 12 feet has been obtained along the entire length of the artificial harbor and out into the lake. The width of the channel at that stage of water is at no place less than 70 feet, and then only for a cable's length; from that it widens out to one of 100 feet for the remaining distance between the piers.

The report of my successor for the remainder of the fiscal year will no doubt furnish such additional information as may be required.

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GG 7.

IMPROVEMENT OF BLACK RIVER HARBOR, OHIO.

The history of this work has already been published in the last annual report. The work of repairing the east and west piers of the harbor was commenced about the 1st and completed on the 16th of October. It consisted principally in renewing the decayed planking of the flooring and sides of the cribs, and in restoring any injured part of the latter wherever needed; also, in replacing such stone in the crib-work as had been removed by various causes.

The piers will probably not require any additional work for two years, unless they receive damage from extraordinary gales, or by some vessel colliding with them upon entering or leaving the port. The report of the officer who succeeded me in charge of this work will furnish such other information as may be desired.

APPENDIX GG.—Continued.

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ANNUAL REPORT OF MAJOR JOHN M. WILSON, CORPS OF ENGINEERS, FOR PART OF THE FISCAL YEAR ENDING JUNE 30, 1879.

UNITED STATES ENGINEER OFFICE,  
Cleveland, Ohio, July 8, 1879.

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

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

JOHN M. WILSON,

Major of Engineers, Brevet Col., U. S. A.

Brig. Gen. H. G. WRIGHT,

Chief of Engineers, U. S. A.

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GG 8.

IMPROVEMENT OF MONROE HARBOR, MICHIGAN.

The harbor of Monroe, Mich., is formed by piers running out into Lake Erie, about 1½ miles north of the mouth of the Raisin River, and is connected with that river by a channel about 4,000 feet long and 100 feet wide, known as the United States Canal; about 3,000 feet above the head of the canal, by the river, a similar one, known as the Monroe City Canal, has been constructed in order to straighten the Raisin River, making the total distance from Monroe to the lake about 3½ miles.

OPERATIONS DURING THE FISCAL YEAR.

The opening of the fiscal year found the sum of \$2,500 available for this work, and it was determined to apply it to the repair of the piers and to rebuilding a portion of the revetment of the United States Canal, which had become badly decayed and injured by ice and storms.

Authority was granted to do the work by hired labor and purchase of materials in open market, and operations were commenced early in November, 1878.

The necessary materials were purchased and the greater portion of them delivered on the ground; the south pier was repaired and work was commenced on the north pier; the old dilapidated revetment was torn out for a length of about 550 feet, and piles for new revetment were driven over a length of about 400 feet, when it was found necessary to suspend operations for the season on account of the inclemency of the weather. Soundings were made during November from the docks at Monroe, through the river and canals, to a point about 1,000 feet beyond the outer ends of the piers; these soundings were plotted on a chart in

the spring of 1879, and the result will be described in another part of this report.

Operations were resumed repairing piers and revetment early in March, and were suspended April 17, 1879, on account of funds being exhausted.

During the months of March and April the north pier was thoroughly repaired, and 612 linear feet of the revetment of the United States Ship Canal was entirely renewed.

In the repairs of the piers and revetment the following materials were used:

1,948 linear feet of piles.  
32,969 feet, board-measure, oak timber and plank.  
10,444 feet, board-measure, pine timber and plank.  
1,540 pounds screw and washer bolts.  
2,400 pounds wrought spikes.

There still remains about 1,000 linear feet of revetment to be renewed in the United States Canal, and about 1,850 linear feet in the Monroe City Canal; in the latter, a portion of the revetment built in 1874 has been undermined, and has torn away from the banks and is lying in the bed of the canal; it must be removed and renewed.

The piers are now in a tolerably good condition, but the superstructure will require entire renewal in a few years.

#### PLAN OF THE HARBOR.

The original plan for this harbor, which was proposed in 1835, was, as far as I can learn, to carry the piers out to a depth of 10-foot water in the lake, and by means of the canals and river Raisin to carry this depth up to the town of Monroe.

The survey made in November, 1878, developed the following facts:

On the outer bar and between the piers there is a depth of from 10 to 12 feet at low-water; the north pier is 1,350 feet long and the south pier 925 feet; at their inner ends they are 100 feet apart, and they run parallel to each other until a point is reached about 500 feet from the beginning of the south pier, when they commence to flare, and are 200 feet apart at the outer end of the south pier; the depth between the piers begins to decrease as soon as the flaring commences, being about 14 feet at the end of the parallel portion, 12 feet opposite the outer end of the south pier, and from 10 to 11 feet 200 feet beyond.

The United States Ship Canal is about 4,000 feet long, 100 feet wide, and presents a depth of from 9 to 12 feet, the shoalest portion being at the upper end, where it receives the water from the Raisin River; the section of the Raisin River between the United States Canal and Monroe City Canal is about 3,000 feet long, with a depth of from 8 to 20 feet, the deepest part being near the Monroe Canal. In a portion of this, however, the channel is very narrow, in one place being only 20 feet wide, with a depth of 8 feet, and rapidly shoaling up to 7 feet on one side and 5 feet on the other.

The Monroe City Canal is about 1,300 feet long and 100 feet wide, with a depth of from 13 to 16 feet; from the upper end of this canal to the docks at Monroe the river Raisin presents a depth of from 8 to 10 feet, but at one place the channel is only about 50 feet wide, with a depth of 8 feet, and shoals rapidly to 7 feet on each side. It will thus be seen that at present vessels drawing more than 7 feet will find difficulty in reaching the docks at Monroe, but those drawing 9 feet can find refuge inside the piers.

As this work was projected many years since, it is impossible for me

to give the original estimate of its cost; the project has long been completed, and all appropriations hereafter requested are for the necessary repairs caused by decay of timber by freshets, ice, and storms.

The following appropriations have been made for Monroe Harbor:

March 3, 1835 .....	\$30,000 00	March 3, 1873 .....	\$15,000 00
July 2, 1836 .....	15,000 00	June 23, 1874 .....	10,000 00
March 3, 1837 .....	30,000 00	March 3, 1875 .....	10,000 00
July 7, 1838 .....	15,000 00	August 14, 1876 .....	5,000 00
June 15, 1844 .....	20,000 00	June 18, 1878 .....	2,500 00
August 3, 1852 .....	14,000 00	March 3, 1879 .....	2,000 00
June 23, 1866 .....	31,015 27		
June 10, 1872 .....	10,000 00	Making in all .....	209,515 27

Of this amount \$207,503.83 has been expended up to June 30, 1879.

During the present season it is proposed, provided the appropriation of March 3, 1879, is available, to dredge the channel in the Raisin River so that vessels drawing 8½ feet can reach the docks at Monroe.

To complete the repairs of the revetment and to secure a depth of 9 feet to the docks at Monroe, the following will be necessary:

Renewing 1,000 linear feet of revetment of United States Canal, at \$2.50 per foot .....	\$2,500
Renewing 1,850 linear feet of revetment of Monroe City Canal, at \$2.50 per foot .....	4,625
Dredging 10,000 cubic yards of mud, at 20 cents per yard .....	2,000
Contingencies, 10 per cent. ....	912
Total .....	10,037

More or less repairs, requiring an annual appropriation of \$1,000, will be necessary after the work now projected is completed.

Ten thousand dollars can be profitably expended during the next fiscal year, provided it is desired to maintain a depth of 9 feet up to the docks at Monroe.

No accurate estimate can be presented of the amount of commerce to be benefited by the completion of this work.

The harbor of Monroe is in the collection-district of Detroit, Mich. The amount of revenue collected during the fiscal year ending June 30, 1879, was \$26.35. Thirty vessels, with an aggregate tonnage of 2,414 tons, entered, and 33 vessels, with an aggregate tonnage of 2,617 tons, cleared during the fiscal year.

The deputy collector of the port, under date of July 1, informed me that he had kept no record of the value of the imports and exports, and that "there was nothing doing at this port this season excepting the arrival of 2 or 3 vessel loads of lumber per month."

There is a fixed white light of the fourth order on the outer end of the west pier. The nearest work of defense is Fort Wayne, which is 30 miles distant.

A money statement is transmitted herewith.

#### Money statement.

July 1, 1878, amount available .....	\$2,500 00
Amount appropriated by act approved March 3, 1879 .....	2,000 00
July 1, 1879, amount expended during fiscal year .....	4,500 00
July 1, 1879, amount available .....	2,488 56
July 1, 1879, amount available .....	2 011 44
Amount (estimated) required for completion of existing project .....	10,037 00
Amount that can be profitably expended in fiscal year ending June 30, 1881 ..	10,037 00