

REPORT OF THE CHIEF OF ENGINEERS  
OFFICE OF THE CHIEF OF ENGINEERS  
Washington, D. C., October 25, 1869

Page 33

9. *Saugatuck Harbor, Michigan, (Mouth of Kalamazoo River.)* - Nothing was done at this harbor during the fiscal year. In the present working season it is proposed to revet the left bank of the river for a distance of 2,700 feet, as recommended by a board of engineer officers convened for the consideration of the project for this harbor. The present piers at the mouth of the river were built by the local authorities, and they have contracted the stream so much that at high water in the river the piers are much endangered. To obviate this it is proposed to build a north pier and interior revetment and to remove the present slab revetment. These improvements would cost \$75,000.

Allotted from appropriation of 1868. ....	\$23,900.00
Allotted from appropriation of 1869 .....	6,100.00
	\$30,000.00

Additional amount required and which can be profitably expended during the fiscal year ending June 30, 1871 .....	\$75,000.00
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(See Appendix B 9 and B 13.)

Page 85

Surveys have been made of the mouth of the Aux Becs Scies River, mouth of White River, and the mouth of the Kalamazoo River. The of these surveys are shown on the sketches attached to the re on each of the localities. A party is now engaged on the surveys the other harbors under my charge, and as soon as maps can be made will be forwarded.

Under the authority of the Chief of Engineers, a dredge and dump are being built at a cost of \$15,500 and a tug will be bought at a cost of \$6,000. The cost of this dredging machinery will be distributed as follows:

From amount allotted to improvement of White River Harbor. ....	\$8,000
From amount allotted to improvement of Pére Marquette Harbor. ....	4,000
From amount allotted to improvement of Pentwater Harbor .....	4,000
From amount allotted to improvement of Black Lake Harbor .....	4,000
From amount allotted to improvement of Saugatuck Harbor. ....	1,500
Total .....	21,500

I have the honor to be, very respectfully, your obedient servant,

F. U. FARQUHAR,  
*Captain US Engineers and Bvt. Lieut. Col. U. S. Army*

## B 9.

## MOUTH OF KALAMAZOO RIVER (SAUGATUCK.)

No work was done at this harbor as it was not until an accurate survey could be made that proper plans and estimates could be made. They were laid before a board of engineers, convened by virtue of paragraph 2, Special Orders No 70, dated Headquarters Corps of Engineers Washington DC July 16, 1869.

The board of engineers approved the plans and estimates, and under the further approval of the Chief of Engineers, steps were taken at once to commence the work.

The work proposed for the present season's work is to revet the left bank of the river, as shown on the accompanying sketch, from A to B. It is hoped that this will be completed by the 1st of November.

The improvements, shown in red, on the north side of the entrance to the river, should be made to complete the improvement of the mouth of the river.

The present piers at the mouth of the river were built by the local authorities, and in building them they contracted the stream so much that at high water in the river the piers are much endangered.

To obviate the danger it is proposed to build a north pier and interior revetment as shown on the accompanying sketch, and remove the present slab revetment.

These improvements will cost \$75,000 which amount can be profitably spent during the fiscal year ending June 30, 1871.

Saugatuck is in the collection district of Grand Haven. It is not a port of entry. There is a light-house of the sixth order on the north bank of the river, situated on a rise of 18 feet.

*Statement of vessels entered and cleared Saugatuck Harbor, in the district of Michigan during the year 1868, showing the number tonnage crews and cargoes.*

Articles.	Entered.	Articles.	Cleared.
Number of vessels .....	131	Number of vessels .....	315
Number of tons .....	37,545	Number of tons .....	19,726
Number of crews .....	2,161	Number of crews .....	2,287
Tons of hay .....	70	M lumber .....	18,911
Tons of feed .....	3,310	M laths .....	933
Barrels flour .....	220	M shingles .....	14,395
Barrels pork and beef .....	700	M pickets .....	110
Hides .....	1,350	Railroad ties .....	2,000
Packages merchandise .....	8,068	Cords wood .....	9,884
		Pounds leather .....	83,100
		Packages merchandise .....	811

**B 13.**

***Proceedings of a board of engineers convened at Milwaukee, Wisconsin.  
in obedience to the following order:***

[Special Orders No. 70. - Extract. ]

HEADQUARTERS CORPS OF ENGINEERS,  
*Washington, D. C., July 16, 1869*

2. A board of engineers, to consist of Lieutenant Colonel I. C. Woodruff, brevet brigadier general United States Army; Major J. B. Wheeler, brevet colonel United States Army; Captain F. U. Farquhar, brevet lieutenant colonel United States Army, will convene at Milwaukee, Wisconsin on the 23d instant, or as soon thereafter as practicable, for the consideration of the project for the improvement of Saugatuck Harbor, Michigan.

By command of Brigadier General Humphreys.

THOMAS LINCOLN CASEY,  
*Major of Engineers and Brevet Colonel United States Army.*

MILWAUKEE, WISCONSIN, July 23, 1869.

The board met in pursuance of the above order.

Present: Lieutenant Colonel I. C. Woodruff, brevet brigadier general United States Army; Major J. B. Wheeler, brevet colonel United States Army; Captain F. U. Farquhar, brevet lieutenant colonel United States Army.

The board then proceeded to the consideration of the project for the of Saugatuck Harbor, as given to the Chief of Engineers Brevet Lieutenant Colonel F. U. Farquhar, captain United States engineers, in his letter dated "Milwaukee Wisconsin July 5, 1869," as follows:

UNITED STATES ENGINEER OFFICE,  
*Milwaukee Wisconsin July 5 1869.*

GENERAL: I have the honor to inclose a tracing showing the mouth of Kalamazoo River and the proposed improvements.

In the spring of 1868 occurred a freshet which carried away a large portion of the east end of the south pier. Since then those interested have lengthened the north pier to the westward and built a wing to protect the present east end of the south pier.

The width between the piers is only 200 feet. This width is too small by at least 100 feet. This becomes manifest by referring to the width of the river at the furthest point inland, shown on the inclosed tracing.

The Kalamazoo River is navigable for small steamers for nearly sixty miles from its mouth, and at all times discharges a considerable amount of water.

The point, however, that requires immediate work is the left bank of the river at the bend above the mouth. A large shifting bank of sand on the right bank of the river just above this bend has been for years steadily moving southward, forcing the mouth of the stream in the same direction. By revetting the left bank at the bend, as shown in red from A to B on the tracing, this southerly progress of the river bed can be arrested. This will require about 975 feet of revetting.

The river after leaving the point B widens out, and in consequence is much shallower. By continuing the pile revetment from B to the east end of the south pier the stream will be

confined, and very soon a good deep channel will result. This will require 1,725 feet of pier. This pile revetting is built on the plan approved by the board of engineers for revetting inside work at Black Lake Harbor. I inclose a tracing showing the work .

The following is the estimate for the above 2,700 feet of work:

214,800 feet board measure pine timber at \$10 per M. ....	\$2,148.00
7,200 feet board measure oak timber at \$30 per M .....	216.00
2,498 piles at \$3 .....	7,494.00
2,538 cords of brush at \$1.50 .....	3,807.00
378 cords of stone at \$11. ....	4,158.00
26,174 pounds of drift bolts at 4 cents .....	1,046.96
9,281 pounds of screw bolts and washers at 51 cents .....	510.46
Driving 2,498 piles at \$2 .....	4,996.00
Framing 20,932 lineal feet of timber at 13 cents .....	2,721.16
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	\$27,097.58
Amount of allotment .....	- 30,000.00
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	2,902.42
Deduct amount authorized for price of dredge .....	- 2,000.00
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	\$902.42

The improvements on the north side of the mouth of the river will be much more expensive, and if done will have to be paid for from some future appropriations. The following is an estimate of the cost of constructing this work:

1,660 feet of revetment on north side of river to lake shore line .....	\$16,045.18
770 feet of close piling from shore line to inner end of proposed crib work .....	20,032.44
6 cribs 32 by 20 by 17 feet on outer end of pier .....	8,038.36
60,740 cubic yards of dredging at 25 cents .....	15,185.00
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Total .....	\$59,300.98

All I propose to do this season is to improve by revetting the left bank as before described, leaving the north side improvements for some future period.

Hoping this may meet with your approval, I have the honor to be, very respectfully your obedient servant,

F. U. FARQUHAR,  
*Captain US Engineers and Brevet Lieut Col US Army*

Brevet Maj Gen A. A. HUMPHREYS,  
*Chief of Engineers US Army Washington, D. C.*

The board having carefully examined the maps of surveys of this harbor made during the years of 1867, 1868, and 1869, find that the right bank of the river, at the bend near the entrance, has encroached upon the channel, and that the left bank has been worn away. This action is still going on and threatens to entirely change the entrance to the harbor and materially affect the present improvements, unless stopped. They also find that the system of improvement devised and built by the local authorities of Saugatuck contracts too much the width of the water-way, and, in consequence a large amount of the piering has been carried away by the water during freshets.

The board are therefore of the opinion that the left bank of the river, from A to B, as shown on the attached sketch, should be defended from the abrasion of the current which impinges against it, and that the current should be forced to flow out on the north side of the present south pier.

They therefore approve and recommend the plan proposed by Brevet Lieutenant Colonel F. U. Farquhar, captain United States engineers, as the best that can be done with the amount of money in his hands allotted to this harbor to effect these purposes and preserve the entrance to the harbor.

All of which is respectfully submitted.

I. C. WOODRUFF,  
*Lieut Col and Brevet Brigadier General US Army*

J. B. WHEELER,  
*Major and Brevet Colonel US Army*

F. U. FARQUHAR,  
*Captain and Brevet Lieutenant Colonel US Army*

There being no other business before it the board adjourned sine die.

I. C. WOODRUFF,  
*Lieut Col and Brevet Brigadier General US Army*

F. U. FARQUHAR,  
*Captain and Brevet Lieut Col US Army Recorder.*