34TH CONGRESS, 1st Session. } HOUSE OF REPRESENTATIVES. { REP. COM. No. 71.

WAUKEGAN HARBOR.

[To accompany Bill H. R. 109.]

APRIL 22, 1856.—Ordered to be printed.

Mr. E. B. WASHBURNE, from the Committee on Commerce, submitted the following

REPORT.

The Committee on Commerce, to whom was referred the bill making an appropriation for improving the harbor of Waukegan, Illinois, report:

That Waukegan is the first port out from Chicago, down the lake, and at a distance of forty miles. The necessity for a harbor at that point has long been felt, not only to accommodate and foster the commerce of a large and flourishing town, but as a refuge for the vast commerce that now floats on Lake Michigan. The committee submit the following reports on the subject from the officers in charge, and also a letter from the Topographical Bureau:

CHICAGO, ILLINOIS, *January* 3, 1850.

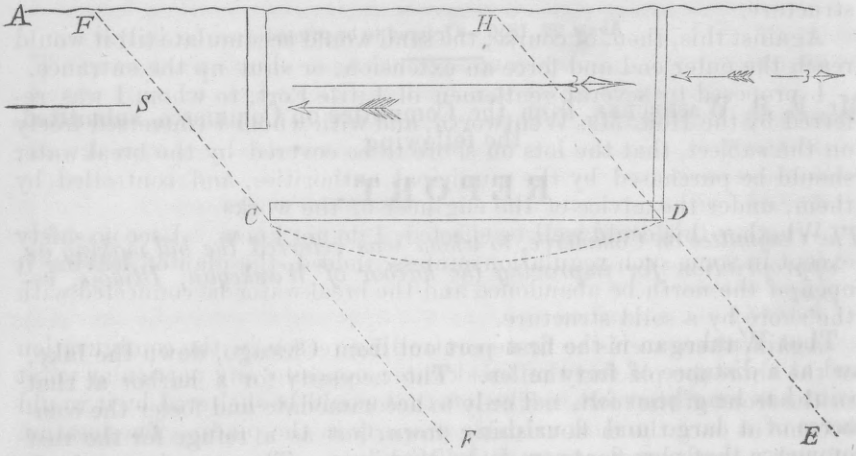
COLONEL: In obedience to your orders of the 13th October last, I proceeded to Little Fort and examined the locality in reference to the construction of a harbor.

The stream is so insignificant in the quantity of water discharged that it need not be taken into consideration. The only feasible method of giving any protection to vessels at that point is a construction of an outer harbor in the lake. Of these facts you are already aware. I conversed with several influential citizens of the place, to whom I was referred by the Hon. Mr. Wentworth. I was desirous to know their ideas and wishes, and to suit my action in the matter to them, as far as possible. They were aware that a work connected with the shore would obstruct the currents and stop the sand. Their idea as to the plan of the work was that of a solid breakwater, parallel with the shore and in a depth of eighteen or twenty feet water; this breakwater to be connected with the shore by open bridge piers except at the southeast angle, where an entrance for vessels would be left. The great danger to be guarded against is that of the accumulation of sand against, or in, any work of the kind.

The main shore currents being from north to south, it was supposed would carry the sand along as is done at present, so that the space thus enclosed would offer safe anchorage for vessels under the lee of the breakwater.

In order to cover as much space as possible, or to present their claim with as little liability as possible to objection on account of expense, they proposed to construct the breakwater of two rows of piles driven closely together and breaking joints with each other, thus dispensing with the more costly construction of cribs filled with stone.

In reference to this plan, let A B, in this diagram, be the shore; C D the breakwater.



F C and E D represents the direction of the most violent winds. The velocity of the current along shore from north to south, for any space exterior to the breakwater is due to the force impressed upon it by the wind at all points of its progress.

The breakwater cuts off the force of the great wave, and will not the current be thus lessened after passing the line D H, and so a deposit of sand take place? This objection would lie with still greater force against a breakwater curved outwards, which is, perhaps, the form which at first and most naturally suggests itself, as after passing the line D C the current would be expended, and so still more deadened. But the liability to fill up would increase with the length of the breakwater. Long observation would be necessary to determine with much accuracy the length (if any) that might be put down without any material deposite taking place behind it. It is possible that 600 to 1,200 feet would not deaden the current so as to produce any considerable deposit for a good number of years; but as the moveable sand is probably carried along by a current of say the width of 500 feet, a breakwater placed 1,000 feet from the shore, and not over 700 feet long, might not produce any sensible or material deadening of the force of the stream. I state what is the danger in the case.

Again, supposing the breakwater to be constructed, and that left to itself it would maintain a safe and convenient anchorage behind it, I fear it would not be left to itself. Persons owning lots covered by it would run out bridge piers behind it, and the harbor would be occupied with these structures to its utmost capacity, in which case I am well satisfied that these piers, notwithstanding their open structure,

would so deaden the current along shore as to throw down the sand and fill up the harbor in a few years. The effect of these piers in producing a bar to the south of them is apparent even in the case of a single one. How, then, can we suppose that a series of them placed in near succession would be otherwise than destructive to such a harbor as is proposed?

Unless this difficulty can be met and controlled, I think the breakwater should be connected with the shore on the north by a solid structure.

Against this, then, of course, the sand would accumulate till it would reach the outer end and force an extension, or shut up the entrance.

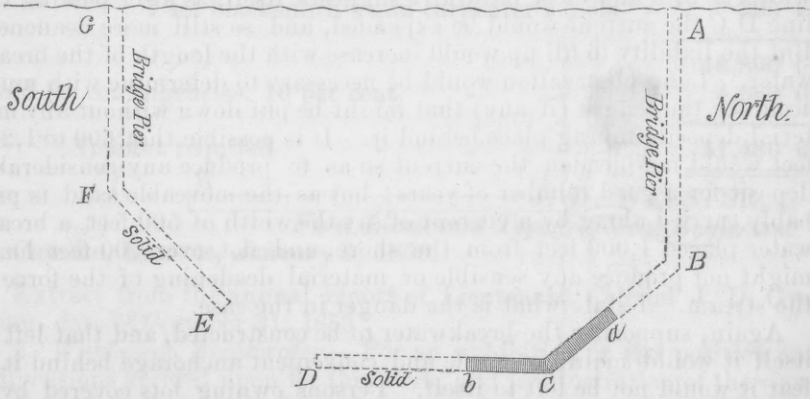
I proposed to several gentlemen of Little Fort, to whom I was referred by the Hon. Mr. Wentworth, and with whom I conversed freely on the subject, that the lots on shore to be covered by the breakwater should be purchased by the municipal authorities, and controlled by them, under the advice of the engineer of the works.

Whether this could well be effected, I do not know. I see no safety except in some such regulation, unless, indeed, the plan of leaving it open at the north be abandoned and the breakwater be connected with the shore by a solid structure.

Again, there seems to be no controlling reason in the configuration of the shore for placing the breakwater opposite any particular point in the front of the town. The lots that would be sheltered by it would become at once the most valuable property in the place. The location of such a work becomes a very delicate duty.

In the absence of natural features indicating its proper position, how shall the engineer answer the complaints of individuals who may deem themselves slighted or aggrieved by his action? This seems to me another reason why the property to be thus protected and enhanced should belong to the municipal authorities as such, and so the action of the government in the case be for the benefit of the whole.

These preliminary questions being settled, I would propose to commence the work at or near the northeastern angle.



Let A, B, C, D, E, F, G, be a general plan, depending, of course, for its proportions or full development upon the amount of means at the disposal of the engineer.

I would propose to commence with the portion a, c, b. This portion, so soon as executed, would be of material service, as vessels loading at the bridge piers might take shelter under it at the approach of a storm, instead of being compelled, as now, to seek refuge in this (Chicago) harbor, at a great loss of time and money.

The work should be carried on from this beginning slowly and cautiously, the most careful soundings being constantly taken to determine the effect of the structure as it goes on. These might develop reasons for material changes in the proceedings. The entrance D E should be left at least 300 feet wide.

The pier work should be in an average depth of 18 feet water, and I accordingly forward an estimate for 1,200 feet of such work, which would enclose a harbor of sufficient capacity for the trade of Waukegan. I have not been able to satisfy myself that the cheap system proposed, of driving two rows of piles contiguous to each other would be sufficiently strong to resist the great force of the sea, and have accordingly felt obliged to adhere to the well-tried method of cribs filled with stone and secured with piles.

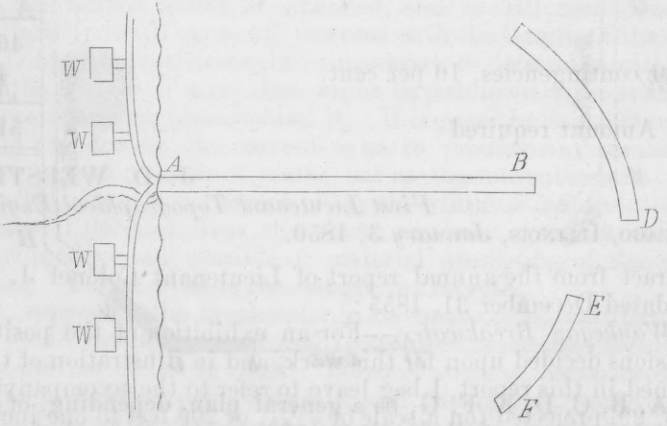
A plan consisting of curved lines instead of straight ones might be preferred. I adopt the straight lines because of the greater simplicity and facility of construction; and I deviate, also, from the line parallel with the shore, which on some accounts would be better, in order to get more shelter, the various directions of the wind considered, with the same amount of pier work, than the line parallel with the shore would give.

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

J. D. WEBSTER,
First Lieutenant, Topographical Engineers.

Col. J. J. ABERT,
United States Topographical Engineers,
Washington, D. C.

P. S. A simple plan occurs to me, which it may be worth while to submit:



Let A B be a capacious bridge pier, say the one now existing near

the mouth of the creek. To shelter the landing on this, construct the breakwaters C, D, 350 feet long, and E, F, 250 feet. The former will protect the pier in the northeastern storms, which are longest and most dangerous; the latter will do the same in gales from the southeast. Let the bridge pier be owned, and its use regulated by the authorities; the warehouses to be built along the shore, as W, W, W, W. These two breakwaters, put down in 18 feet water, would cost about twenty-five thousand dollars, ($25,000.)

J. D. W.

LITTLE FORT, OR WAUKEGAN—OUTER HARBOR.

Estimate for constructing an outer harbor or breakwater.

Length of pier work 1,200 feet, 20 feet wide, and 23 feet high; depth of water 18 feet.

Siding.—55,200 feet oak and pine timber, 12x12 inches, at 12½ cents per foot	$6,900 00
Ties.—2,760 round oak ties, 20 feet long, at $1 each	2,760 00
Piles.—260 oak piles, 36 feet long, 12x12 inches, equal to 9,360 feet, at 12½ cents per foot	1,170 00
Clamps.—9,000 feet board measure oak clamps, 3x7 inches, at $10 per M	90 00
Spikes.—3,200 pounds 9 inch spikes, for clamps, at 8 cents	256 00
Iron.—29,200 pounds inch square iron for bolts, at 4½ cents per pound	1,314 00
Stone.—3,375 cords of stone, at $6 per cord	20,250 00
Workmanship.—Framing and putting in place 1200 feet of pier work as above	12,000 00
Machinery.—1 pile driver complete	1,000 00
1 crane scow	300 00
1 yawl boat	60 00
4 horses, 1 lumber wagon, and harness	400 00
1 set blacksmith's and carpenter's tools	300 00
	46,800 00
Add for contingencies, 10 per cent.	4,680 00
Amount required	51,480 00

J. D. WEBSTER,
First Lieutenant Topographical Engineers.

CHICAGO, ILLINOIS, *January* 3, 1850.

Extract from the annual report of Lieutenant Colonel J. D. Graham, dated December 31, 1855:

2. *Waukegan Breakwater.*—For an exhibition of the position and dimensions decided upon for this work, and in illustration of the views contained in this report, I beg leave to refer to the accompanying map G, No. 29, projected (on a scale of $\frac{1}{2400}$, or 200 feet to one inch,) from an accurate triangulation and survey, made under my direction in July, 1855.

The position, D E, upon the map, is that which was recommended by the board of engineers in their report of May 16, 1853, giving to it a length of 1,365 feet, and placing it in 20 feet depth of water. The cost of the work was estimated by Mr. William Gamble, then United States agent, at $99,938 90.

Under the instructions of the War Department to present a plan for the work which would bring its cost of construction within the estimate originally presented to Congress, its contemplated length was reduced to 700 feet, and the position A C, shown upon the map, was assigned to it.

The leading conditions were, that the breakwater was to be placed in a depth of 20 feet of water which would bring its direction nearly parallel with the lake shore, and give for it a width at base of 25 feet, and a height of 25 feet from top to bottom. According to the maps then extant, its distance lakeward from the outer or eastern extremity of Dickinson's bridge wharf was given as 350 feet, but according to the map herewith presented, and a careful determination of the position of triangulation, this distance is 425 feet, thus giving a little more room for anchorage of vessels behind the breakwater.

In my general report, No. 73, to the bureau, dated the 29th of April last, it was stated that the working season of 1854 was occupied in obtaining, hauling in, and dressing oak timber sufficient to construct five cribs, each 30 to 32 feet long, 25 feet wide, and 25 feet high, for this breakwater. This oak timber could be obtained in no other way, at a reasonable price, than by making contracts for it as it stood in the forest, and cutting and hauling it as we required it, and having it dressed in our own yard. It cost, in this way, less by about two cents per lineal foot, of one foot square, (or per cubic foot,) than it could have been obtained for under the usual mode of contract, nor has it cost more than pine could have been contracted for at this locality. For this reason, oak has been used for the portions of this work both above and below the water surface. The mode of construction adopted for this work is that shown by the several drawings in the accompanying sheet marked G, No. 21, or case 3d of crib work. The bolts used are all of round wrought iron, one and a half inches in diameter, and the timber for the body of each crib is white oak dressed, one foot square.

On the 18th of May, 1855, which was the earliest practicable period for resuming the work at this place, the requisite party was organized, and the work was commenced of putting the machine in order, and of framing together the timbers, previously dressed, into cribs, and sinking those cribs in position to form the desired breakwater.

Had the summer and autumn of this year been as favorable to this sort of work, on this lake, as the previous season was, or, indeed, as the average of seasons, we should have been enabled, with the means remaining on hand, to have completed the framing together, and sinking in position, five cribs, and thus to have formed 154 feet of the breakwater. But, unfortunately, the season proved to be one of a continual succession of severe and destructive storms, causing a loss of property, by shipwrecks and damages on the great western lakes,

to an amount of about $2,800,000 within the year 1855,* and causing an unavoidable expenditure of time and money in contending against their violence at this place, instead of progressing with a regular pace in the erection of the breakwater.

This locality, as a reference to the map will show, affords no shelter against the action of the sea during the process of putting the timbers together in framing the cribs. After laying the latticed bottom and building up two or three tiers of timbers above it, it became necessary to launch this much of the work into the lake, and secure it afloat by means of the requisite anchor and cables.

As the draught of water increased, by the process of building up, the frame was removed and anchored further out into the lake. In ordinary seasons there are periods of weather sufficiently calm or moderate to allow of the completion of one of these cribs, and of sinking it in position by means of the stone ballast used for this purpose.

In the meantime, should an ordinary gale of wind occur, such as is usual in the summer season, it can be rode out by the security afforded by the anchors and cables, and upon these we must depend in such localities. On the 16th of July, the first crib was launched into the lake, and the work of raising the frame was pushed as fast as possible all of that and the following day. A severe gale then occurred which continued for three days, during which the work had to be suspended, and attention given to the security of the floating crib, pile-driver, and other machinery. For a detailed account of the progress of the work, and of the storms which interrupted it during the usual working season, I would refer to the accompanying report of Custodian Agent Reuben Emerson, marked B 1.

It will be seen, by that report, that after a laborious season, chiefly spent in contending against the violence of storms, one crib was secured in position, (marked B on the accompanying map,) and a second one, when nearly completed and nearly ready to be sunk in position, was lost by the violent gale from the northeast, which commenced on the 25th of August and continued for three days with unabated force. Two days more of moderate weather would have enabled us to complete this crib and to have secured it, filled with stone ballast, in its proper position.

The crib B (see map) has maintained its position, unmoved, throughout several severe storms, and seems fully to confirm the efficiency of the plan of construction, shown in detail in sheet G, No. 21.

The appropriation for this work is now exhausted, but it leaves on hand oak timber, dressed and ready to be framed, sufficient for forming three cribs, each 32 feet long, 25 feet wide, and 25 feet high; also, machinery and other property which is estimated to be worth say $2,000.

Unless another appropriation be made for continuing the work, this property will have to be sold or transferred to some other public work on this lake, under the regulation of the department, to meet arrearages, which now amount to the sum of $1,600.

---

* See the published annual report of Captain D. C. Dobbins to the convention of lake underwriters, held at Buffalo the present season.

The importance of the Waukegan breakwater is not limited to the accommodation required for the trade of this particular locality. It extends to that of the general commerce of our great western lakes, owing to the great facility it would afford to all vessels for reaching a safe anchorage behind it during the violence of the northerly, northeasterly or southeasterly gales, which are so frequent upon this lake.

In illustration of this point, I beg leave to quote from my general report, No. 73, to the bureau, of the 19th of April last, the following remarks, viz:

"The rivers which enter this lake from the west, nearly all do so upon a course nearly east, or somewhat south of east. They are all so narrow at their mouths that vessels attempting to enter them from the northward in a strong northerly gale are frequently unable to luff quick enough for doubling the windward pier, and for want of sufficient sea-room between the piers are often carried entirely to leeward of the harbor entrance, and stranded on the lake shore."

"Under the same circumstances these vessels would experience no difficulty in reaching a safe anchorage behind such a breakwater as this. The ample room between it and the shore would enable them, by an easy course, to reach the anchorage affording the desired shelter. Equal facilities are afforded by the breakwater to vessels seeking shelter under a gale from the southward. A single glance at the map will demonstrate this."

To the above remarks I feel called upon to add, from a close observation since I took my station here, upon the general effect of severe gales upon the shipping, that sufficient protection cannot, under these circumstances, be secured to it without the construction of several such breakwaters at different points on the coast of Lake Michigan.

These points should be selected, not so much with regard to the favoring of particular localities as to affording harbors of refuge of easiest access to shipping generally. If once constructed, their usefulness would soon be demonstrated by the security they would afford to many a vessel, which, after having failed in a storm to luff to quick enough to make a harbor within the narrow-mouthed rivers on the coast, and being driven to leeward of them, would by a leading wind, or upon an easy course afforded by the same wind, be enabled to come to a safe anchorage behind those works. The accommodation they would afford would not be confined to the commerce of Lake Michigan alone, but would extend, in an equal degree, to that of all the great western lakes with which there is intercommunication during the season of navigation.

I herewith submit an estimate, marked B 2, of the cost of completing this breakwater to a length of seven hundred and twenty feet* up the plan of construction shown by the drawings upon sheet C, No. 21, amounting to $67,851.

Also another estimate, marked B 3, of the cost of constructing the work to a length of 1,380 feet,* as originally designed, amounting to the sum of $137,966.

* It will be seen by the estimates, that in order to avoid a fraction of a crib, in construction, we arrive at the lengths of 720 feet and 1,380 feet for the breakwater, under the two conditions, in lieu of 700 and 1,365 feet.

J. D. G.

The greater length of breakwater is evidently necessary to afford the necessary protection to shipping, and the necessary extent of roadstead; and I would therefore respectfully recommend that it be adopted, and that the amount of estimate, B 3, (viz: $137,966) be adopted in the appropriations to be asked for this work. Its excess over the estimate of Mr. William Gamble, late agent for the work, submitted in May, 1853, arises from two causes.

First. The cost of timber and the labor of carpenters are greater now than they were then.

Second. The plan proposed for the construction is different. The middle longitudinal wall, shown in the plan on sheet C, No. 21, was not contemplated in Mr. Gamble's estimate, nor was the latticed bottom for the cribs then contemplated, as drawn in figure 1 of that sheet. He estimates only 864 pounds, or thereabout, of iron bolts for each crib of 30 feet long, 25 feet wide, and 25 feet high, whereas our estimate of this item for such a crib is for seven thousand two hundred and twelve pounds, (7,212 pounds.) Experience has fully shown, I think, that unless the timbers for such a breakwater are thus firmly bolted together, the work would be inadequate to resist the action of the sea waves in times of severe storms, in the exposed position which a breakwater must always occupy.

Waukegan is a port of entry for foreign importations, and belongs to the district of Chicago. A deputy collector is stationed here.

There is a light-house here, situated within the town, on a commanding bluff, at the intersection of Broad and Lake streets.

The enrolled tonnage belonging to this port, on the 31st of December, 1855, consisted of three schooners, measuring 401$\frac{4}{95}$ tons. Statement B 8 shows that the number of arrivals and departures of vessels during the navigable season, say from March 1, to December 31, 1855, was 1840; the average number during that period, was, per day, 6; the amount of tonnage of vessels arriving and departing during the same period, was 1,119,116 tons; the average daily tonnage arriving and departing during that period, was 3,657 tons.

No revenue from foreign importations was collected at this port during the year 1855.

The amount and value of the commerce of this place during the year 1855 is shown by the accompanying tabular statements, B 4, B 5, B 6, and B 7, to have been as follows, viz:

IMPORTS.

1. By lake shipments—see statement B 4, - - -	$529,415 94
2. By railroad—see statement B 5, - - -	220,935 32
Total value of imports, at Waukegan, Illinois, in the year 1855, - - - - - - -	750,351 26

EXPORTS.

1. By lake shipments—see statement B 6, - - -	$491,408 00
2. By railroad—see B 7, - - - -	169,892 69
Total value of exports from Waukegan, Illinois, in the year 1855, - - - - -	661,300 69
Aggregate value of the commerce of the port of Waukegan, Illinois, in the year 1855, - -	$1,411,651 95

That is to say, one million four hundred and eleven thousand, six hundred and fifty-one dollars and ninety-five one-hundredths.

A branch railroad is determined on from Waukegan, to connect with the Fox River Valley and Wisonsin Central Railroad.

This improvement would greatly increase the commerce of Waukegan, for a large region of very fertile land lies immediately west of this town, and the facilities for transportation are only needed to increase cultivation, and thus augment the great source of commerce here.

B 1.

Mr. Emerson's report to Colonel Graham.

OFFICE OF UNITED STATES CUSTODIAN,
Waukegan, October 31, 1855.

SIR: In compliance with the requirements contained in your letter of 22d instant, I proceed to lay before you the following annual report on the harbor improvements under my charge, as custodian agent during the past season. The work of sinking cribs in the lake this season has been prosecuted under great disadvantages, in consequence of extremely rough and stormy weather during the entire season. The work was resumed on the 18th day of May last, and the time was occupied from that day up to July 16, following, in getting the scows, pile driver, and the necessary tools in order and working position, and in framing crib work, and also in building one bridge wharf of sixteen feet in width, and extending ninety-five feet from the shore into the lake, and one pile driver dock of sixteen feet in width and thirty-five feet long.

Our pile driver being constructed separate from the scow, it became necessary to construct a dock for its safe depository when not in use, and for readily shipping off and unto the scow when required.

My note book, to which I refer for dates and circumstances, says, July 16, launched the first crib into the lake; 17th, continued the work of building up the crib in the lake; 18th, at 12 o'clock, noon, crib built ten feet high and anchored in fourteen feet water; 18th, half past one o'clock, p. m., wind commenced blowing a heavy gale from northeast; 18th, at 7 o'clock, p. m., lake very rough, all things belonging to the public works considered safe.

July 19, 6 o'clock, a. m. One scow parted her chain cable and was driven on shore, leaving her anchor in the lake, crib ashore also, and resting against the south bridge wharf, causing damage to the wharf. This day occupied in getting crib afloat again; the storm continued through the day.

20th, 6 o'clock, a. m. Storm considerably abated; the day occupied in getting the scow off from the beach and back to anchor again.

21st. The work of building up the crib in the lake was resumed; neither scow nor crib sustained injury in going ashore. From July 21st up to August 9th, the weather being tolerably favorable for the advancement of the work, it had progressed so far as to have built up the crib to 21 feet high and placed it in position, and containing twenty cords of stone, the stone having been put in the crib the day previous.

On the 9th, 10th, and 11th days of August, the work on the water was suspended in consequence of another heavy gale of wind from the southeast, causing damages by raising the south end of the crib from the ground about three feet, allowing the stone to escape from underneath the bottom timbers.

August 13. Resumed the work of filling up crib with stone and commenced the foundation of a second crib by putting together the timber on land. From the 13th to 25th August, the work progressed without any serious interruption. On Saturday, August 25th, the work has so far advanced as to have completed the filling of the first crib, and the second crib was built up to nineteen feet high and nearly ready for filling up with stones, and was held in its position where it was designed to be sunk, by a three-fourth inch iron chain cable, fastening the two cribs together.

Early on Sunday morning, August 26, in a violent gale, the second crib was broken loose from the first, by parting the chain cable with which it was held and driven on shore.

At the same time both the scows went on shore dragging both their anchors, and causing one scow to sink in nine feet water, and the other scow was driven on to the beach.

On the night of the 25th commenced the most severe gale of this season, continuing for three days, and causing the greatest portion of damage to the work. This was a northeast gale, and one that is seldom equalled for its severity, and one that has caused more damage and loss of life and property than any other this season. The extent of damage done to the harbor work here by this storm can hardly be estimated less than the loss of one crib, the crib being driven high on the bar, and having to remain there until the scow, which was sunk, could be raised and repaired, in order to enable us to use the scow in lighting up the crib so as to be able to move it, which occupied the time from August 27th to September 15, at which time we had succeeded in getting the crib back to its place again, without apparently having suffered much damage, but, in reality, it proved to have been damaged more than we were aware of, as it afterward appeared.

After having ascertained the full extent of damage done on the crib, the bottom portion or grillage being broken off, and another section, comprising six or seven tiers of timbers in height, having become

partly detached, and that the repairs could not be made without taking the whole out of the water, I was induced to offer, as my opinion, that it would not be practicable to attempt to repair and sink the second crib this season, and, as the weather has proved from that time up to this present very boisterous, I think it cannot be considered otherwise than fortunate that you determined to close the work at once.

Immediately after receiving your instructions of the 15th instant, authorizing the work to be closed, I proceeded to secure portions of the second crib that were then exposed in the lake by hauling them on the beach, and also both scows and the pile-driver, and placing them in safe position from the effect of the lake waves, and in re-piling a considerable quantity of timber that was hauled to the beach preparatory to being used in the cribs. There is a portion of the crib, comprising three tiers of timbers in height, lying on the beach, which has lain in its present position since the 27th August, and is now in a very bad position to move, it being entirely under water and nearly buried in sand. I have thought it advisable not to meddle with or disturb it unless at your special directions, as I am satisfied it will cost quite as much, or more, to get it upon land than it will be worth. The work was brought to a close and all the men discharged on the 29th instant, with the exception of one man that I have retained for the purpose of assisting me in keeping a light upon the crib at night, until the close of navigation.

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

REUBEN EMERSON,
United States Custodian and Agent.

J. D. GRAHAM, *Lieut. Col.*,
Superintending Engineers Lake Michigan Works,
Chicago, Illinois.

B 2.

Estimate of the cost of completing the Waukegan breakwater to a length of 700 *feet, as per traces A C, on the accompanying map, marked G No.* 29, *to width and height above the bottom, being each* 25 *feet.*

1. For a single crib, 30 feet long, 25 feet wide, and 25 feet high; for 4,391 lineal feet of white oak timber, one foot, at 20 cents per lineal foot - -	$878 20
1,728 feet, board measure, of 3-inch oak plank, for flooring, at $20 per M - - - -	34 56
7,212 pounds $1\frac{1}{2}$-inch round wrought iron, for bolts, at 4 cents per pound - - - -	288 48
127 pounds of wrought iron spikes, $\frac{3}{8} \times \frac{3}{8}$ of an inch square, at $7\frac{1}{2}$ cents per pound - - -	9 52
$98\frac{82}{100}$ cords of hard boulders stone, at $8 per cord, of 128 cubic feet - - - - -	790 56
Estimated cost of materials - - - -	2,001 32
For carpenter's work, in dressing timber, cutting dove-tails and gains - - - -	376 00

For putting together and filling with stone -	$220	00
For hauling timber and stone to pier - -	50	00
For superintendence by local agent - - -	250	00
	2,897	32
Add 10 per cent. for contingencies, such as office rent, fuel, transportation, pay of draughtsman, and unforeseen expenses - - - - -	289	73
Estimated cost of one crib - - - - -	3,187	05
For 700 feet of breakwater there will be required 20 cribs, each 30 feet long,* in addition to the one now placed in position, and the three others, the timbers for which are now dressed and ready to be framed.		
20 cribs, at $3,187 05 each - - - - -	$63,751	00
200 cords of stone, (in addition to what is on hand,) required for these three cribe, at $8 per cord -	1,600	00
For workmanship and superintendence in finishing and sinking in position these three cribs, at $300 each - - - - - - -	900	00
For arrearages now due - - - - -	1,600	00
Estimated amount required to complete the Waukegan breakwater to a length of 700* feet - -	67,851	00

J. D. GRAHAM,
Brevet Lieut. Col., Sup't Eng'r.

OFFICE GENERAL SUPERINTENDENCE, &c.,
Chicago, December 31, 1855.

B 3.

Estimate of the cost of completing the Waukegan breakwater to a length of 1,365 *feet, as per the trace of position B, E, on the accompanying map G, No.* 29, *the width and height being each* 25 *feet.*

1. For completing to a length of 720 feet, as per preceding estimate, marked B 2 - - -	$67,851	00
2. For 22† additional cribs, at $3,187 05 each -	70,115	10
Estimated amount required - - -	137,966	10

J. D. GRAHAM,
Brevet Lieutenant Colonel Topographical Engineers.

OFFICE GENERAL SUPERINTENDENCE, &c.,
Chicago, December 31, 1855.

---

* As the small fraction of a crib must be avoided in the construction, these 20 additional cribs will cause the length of the breakwater to be 720 feet.

† Again, to avoid the fraction of a crib in construction, we shall have a total length of 1,380 feet for the breakwater, instead of 1,365, which will be better for the work, and would scarcely cost more than the lesser length.

B 4.

Statement of the quantity and value of articles of merchandise received by lake shipment at the port of Waukegan, Illinois, during the year ending December 31, 1855.

Articles.	Quantity.	Price for each.	Value.
Lumber.....M feet..	6,514¾	$15 00	$98,819 92
Laths.....do....	1,217	3 00	3,651 00
Shingles.....do....	827,000	3 50	2,894 50
Fence pickets.....do....	175,000	14 00	2,450 00
Shingle bolts.....cords..	156	14 00	2,184 00
Tan bark.....do....	150	8 00	1,200 00
Merchandise.....tons...	500	500 00	250,000 00
Bar iron.....do....	171	100 00	17,100 00
Coal.....do....	310	6 00	1,860 00
Stoves.....do....	81	100 00	8,100 00
Pig iron.....do....	38	40 00	1,520 00
Sugar.....barrels..	742	20 00	14,820 00
Molasses.....do....	219	17 00	3,723 00
Merchandise.....boxes..	1,769	20 00	35,380 00
Merchandise.....barrels..	241	40 00	9,640 00
Merchandise.....bags...	362	6 00	2,172 00
Liquor.....barrels..	803	20 00	16,060 00
Vinegar.....do....	123	5 00	615 00
Oil.....do....	82	50 00	4,100 00
Salt.....do....	1,800	2 00	3,600 00
Salt.....bags...	2,168	14	303 52
Apples.....barrels..	853	2 50	2,132 50
Nails.....kegs...	1,331	5 00	6,655 00
White lead.....do....	766	2 25	1,723 50
Water lime.....do....	215	2 00	430 00
Malt.....bags...	177	2 00	354 00
Grindstones.....tons...	15	120 00	1,800 00
Marble.....pieces..	132	8 00	1,056 00
Scythes.....dozen..	74	10 00	740 00
Snathes.....do....	68	7 00	476 00
Pitchforks.....do....	106	7 00	742 00
Shovels.....do....	83	11 00	913 00
Hoes.....do....	40	6 00	240 00
Rakes.....do....	50	2 00	100 00
Pails.....do....	320	2 00	640 00
Wagons.....number..	100	100 00	10,000 00
Chair stuff.....bundles..	97	3 00	291 00
Leather.....rolls...	147	35 00	5,145 00
Threshing machines.....number..	28	350 00	9,800 00
Grass cutting machines.....do....	11	130 00	1,430 00
Horse rakes.....do....	119	7 00	833 00
Corn shellers.....do....	75	10 00	750 00
Corn mills.....do....	3	50 00	150 00
Hay presses.....do....	3	200 00	600 00
Ploughs.....do....	22	12 00	262 00
Live cattle.....do....	25	40 00	1,000 00
Household goods.....tons...	101	150 00	15,150 00
Empty barrels.....number..	1,400	45	630 00
Total.....			529,415 94

J. D. GRAHAM,
Brevet Lieutenant Colonel Superintending Engineer.

OFFICE GENERAL SUPERINTENDENCE,
Chicago, December 31, 1855.

B 5.

Statement of the quantity and value of articles of merchandise received at the port of Waukegan by railroad during the year ending December 31, 1855.

Articles.	Quantity.	Price of each.	Value.
Lumber ..... M feet..	73,295	$15 00	$1,098 07
Merchandise ..... tons...	119	500 00	59,500 00
Bar iron ..... do....	35	100 00	3,500 00
Stoves ..... do....	15	100 00	1,500 00
Sugar ..... barrels..	266	20 00	5,320 00
Molasses ..... do....	70	17 00	1,190 00
Merchandise ..... boxes..	1,550	20 00	31,000 00
Merchandise ..... barrels..	618	40 00	24,730 00
Merchandise ..... bales...	1,493	30 00	44,790 00
Merchandise ..... bags...	155	6 00	930 00
Liquor ..... barrels..	435	20 00	8,700 00
Vinegar ..... do....	80	5 00	400 00
Salt ..... do....	307	2 00	614 00
Salt ..... bags...	350	14	49 00
Apples ..... barrels..	1,047	2 50	2,617 50
Nails ..... kegs...	50	5 00	250 00
White lead ..... do....	489	2 25	1,100 25
Water lime ..... do....	265	2 00	530 00
Marble ..... pieces..	275	8 00	2,200 00
Stone ware ..... do....	1,625	50	812 50
Scythes ..... dozen..	65	10 00	650 00
Snathes ..... do....	50	7 00	350 00
Pitchforks ..... do....	75	7 00	525 00
Shovels ..... do....	55	11 00	605 00
Hoes ..... do....	35	6 00	210 00
Rakes ..... do....	25	2 00	50 00
Pails ..... do....	180	2 00	360 00
Wagons ..... number..	35	100 00	3,500 00
Chair stuff ..... bales...	228	3 00	684 00
Leather ..... rolls...	96	35 00	3,360 00
Corn planters ..... number..	78	4 00	312 00
Corn shellers ..... do....	30	10 00	300 00
Ploughs ..... do....	9	12 00	108 00
Live cattle ..... do....	128	40 00	5,120 00
Sheep ..... do....	229	2 50	572 50
Household goods ..... lots...	59	50 00	2,950 00
Seed wheat ..... bushels..	165	1 50	247 50
Pianos ..... number..	10	200 00	2,000 00
Iron planing machine	1	500 00	500 00
Engine lathe	1	800 00	800 00
Steam engine	1	800 00	800 00
Dried apples ..... barrels..	300	15 00	4,500 00
Dried peaches ..... do....	100	16 00	1,600 00
Total	.....	.....	220,935 32

J. D. GRAHAM,
Brevet Lieutenant Colonel, &c.

OFFICE, &c., *Chicago, December* 31, 1855.

B 6.

Statement of the quantity and value of articles of merchandise shipped by lake vessels from the port of Waukegan, Illinois, during the year ending December 31, 1855.

Articles.	Quantity.	Price of each.	Value.
Wheat.....bushels..	168,350	$1 30	$218,855 00
Corn.....do....	34,069	55	18,737 95
Oats.....do....	183,058	35	64,070 30
Rye.....do....	1,417	60	850 20
Barley.....do....	5,711	80	4,568 80
Potatoes.....do....	590	75	427 50
Grass seed.....do....	2,690	2 25	6,052 50
Flax seed.....do....	85	1 25	106 25
Beans.....do....	200	1 50	300 00
Flour.....barrels..	3,333	8 00	26,664 00
Corn meal.....do....	210	3 00	630 00
Pork.....do....	1,962	15 00	29,430 00
Beef.....do....	75	10 00	750 00
Fish.....do....	516	9 00	4,644 00
Lard.....do....	221	20 00	4,420 00
Eggs.....do....	7	10 00	70 00
Butter.....firkins..	360	15 00	5,400 00
Hams.....casks..	121	28 00	3,388 00
Merchandise.....tons...	21	500 00	10,500 00
Merchandise.....barrels..	183	40 00	7,320 00
Wool.....tons...	83	650 00	53,950 00
Flax.....do....	28	100 00	2,800 00
Pressed hay.....do....	123	12 00	1,476 00
Hides.....do....	112	200 00	22,400 00
Leather.....rolls...	15	35 00	525 00
Brooms.....dozen..	77	2 50	192 50
Empty barrels.....number..	544	1 25	680 00
Live cattle.....do....	25	40 00	1,000 00
Reapers.....do....	3	100 00	300 00
Wood.....cords..	300	3 00	900 00
Total.....	.....	.....	491,408 00

J. D. GRAHAM,
Brevet Lieutenant Colonel, Superintending Engineer.

Office General Superintendence, &c., *Chicago, December* 31, 1855.

B 7.

Statement of the quantity and value of articles of merchandise shipped from the port of Waukegan, Illinois, by railroad, during the year ending December 31, 1855.

Articles.	Quantity.	Price of each.	Value.
Corn.....bushels..	569	$0 55	$312 95
Oats.....do....	4,965	35	1,737 75
Rye.....do....	75	60	45 00
Barley.....do....	575	80	460 00
Potatoes.....do....	5,183	75	3,887 25
Grass seed.....do....	509	2 25	1,145 25
Flax seed.....do....	106	1 25	132 50
Beans.....do....	197	1 50	295 50
Malt.....bags....	128	2 00	256 00
Flour.....barrels..	875	8 00	7,000 00
Corn meal.....do....	5	3 00	15 00
Pork.....do....	165	15 00	2,475 00
Beef.....do....	53	10 00	530 00
Fish.....do....	574	9 00	5,166 00
Lard.....do....	27	20 00	540 00
Eggs.....do....	229	10 00	2,290 00
Butter.....firkins ..	1,637	15 00	14,555 00
Hams.....casks ...	25	28 00	700 00
Poultry, dressed.....cwt.....	1,500	10 00	1,500 00
Merchandise.....tons	15	500 00	7,500 00
Merchandise.....barrels..	275	40 00	11,000 00
Merchandise.....boxes...	386	80 00	30,880 00
Wool.....tons	5	650 00	3,250 00
Flax.....do....	19	100 00	1,900 00
Broom corn.....do....	4	100 00	400 00
Shorts.....do....	26	10 00	260 00
Rags.....do....	12	60 00	720 00
Leather.....rolls....	25	40 00	1,000 00
Brooms.....dozen ..	100	2 50	375 00
Empty barrels.....number.	4,922	1 25	6,122 50
Live cattle.....do....	40	40 00	1,600 00
Horses.....do....	30	125 00	3,750 00
Sheep.....do....	74	2 50	185 00
Hogs.....do....	175	10 00	1,750 00
Poultry.....coops...	163	4 00	652 00
Reapers.....number.	147	100 00	14,700 00
Hoop poles.....M....	20	10 00	200 00
Brick.....do....	40,127	6 00	240 76
Lumber.....M feet..	24,282	15 00	364 23
Wagons.....number.	300	80 00	24,000 00
Window sash.....number of lights.	15,000	26	900 00
Doors.....number.	800	150 00	1,200 00
Window blinds.....do....	600	4 00	2,400 00
Hides, green.....tons....	100	100 00	10,000 00
Pelts.....number.	3,000	50	1,500 00
Total.....	.....	.....	169,892 69

J. D. GRAHAM,
Brevet Lieutenant Colonel, &c.

OFFICE GENERAL SUPERINTENDENCE, &c., *Chicago, December* 31, 1855.

Statement of the amount of duties collected at the port of Waukegan, State of Illinois, on foreign merchandise from January 1, 1855, *to December* 31, 1855, *showing also the enrolled tonnage of this port on December* 31, 1855, *as appears on the records of the custom-house, and showing the number of arrivals and departures at the port of Waukegan from March* 1, 1855, *to December* 31, 1855.

Amount of duties received each month from January 1, 1855, to December 31, 1855.	Enrolled tonnage, Dec. 31, 1855.	No. of barques enrolled.	No. of brigs enrolled.	No. of schooners enrolled.	No. of sloops, &c., enrolled.	No. of steamers enrolled.	No. of arrivals and departures at the port of Waukegan from March 1 to Dec. 31, 1855.	Tonnage of vessels arriving and departing in said period.	Average No. of arrivals and departures in said period.	Average amount of tonnage daily arriving and departing in said period.	Remarks.
	Tons 95*ths.*										
January	405 45			3		1	1,840	1,119,116	6	3,657	
February											
March											
April											
May											
June											
July											
August											
September											
October											
November											
December											

Submitted with my annual report for 1855.

JAMES H. WHITE, *Deputy Collector, Waukegan, Illinois.*

J. D. GRAHAM, *Brevet Lieutenant Colonel, &c.*

OFFICE GENERAL SUPERINTENDENCE, *Chicago, December* 31, 1855.

BUREAU OF TOPOGRAPHICAL ENGINEERS,
Washington, March 12, 1856.

SIR: I have the honor to acknowledge your direction to report upon a letter of the 4th instant from the Honorable Mr. Washburne, desiring to know "the various amounts of appropriations which have been made for the harbors of Waukegan and Chicago; the time such appropriations were made; how they have been expended, and what further appropriations may be necessary to carry out the present plans of improvement, or to make such other and further improvements as the requirements of the commerce of that region may demand."

1st. In relation to Chicago there has been appropriated, (see Senate Doc. 44, 2d Sess., 29th Congress:)

In 1833 - - - - - -	$25,000
In 1834 - - - - - -	32,801
In 1835 - - - - - -	32,800
In 1836 - - - - - -	32,000
In 1837 - - - - - -	40,000
In 1838 - - - - - -	30,000
In 1843 - - - - - -	25,000
In 1844 - - - - - -	30,000
In 1852 - - - - - -	20,000

These appropriations have been expended in the construction, extension, and repairs of piers; in the building (some years since) of a dredge boat, and in dredging.

Of the appropriation of 1852, there remained unexpended, on the 30th September last, $9,151 04.

Present views are limited (in reference to this place) to the repair of the piers, to the keeping of them in good order, and to dredging, for which a sum of 10,000 dollars will probably be required during the next fiscal year.

In relation to Waukegan (formerly called Little Fort) there has been appropriated, in 1852, $15,000.

By the last statement of Lieutenant Colonel Graham's accounts, up to the close of the third quarter of 1855, the whole amount appears to have been expended for materials, machinery, and in the work of erecting the breakwater pier. In fact, this statement rather brings the work in debt; the debt to be liquidated by sales, &c.

By our statement in June last, there was in the treasury (unexpended) $2,426 40, which was then drawn out and placed in the hands of Lieutenant Colonel Graham. It is supposed from the accounts referred to that this balance has been expended.

The plan for the work by the board of engineers, at this place, was laid before Congress, and is printed. The estimate of the board is $99,983, from which, deducting the $15,000 appropriated in 1852, there will yet be required to complete this work 84,983 dollars, as per Ex. Doc. No. 1, 1st Sess., 33d Congress.

Probably $20,000 will be wanted for the next fiscal year to carry on the work. Respectfully, sir, your obedient servant,

J. J. ABERT,
Colonel Corps Topographical Engineers.

Hon. JEFFERSON DAVIS, *Secretary of War.*