

latter could have any appreciable influence, it not having been extended far enough outward to warrant such anticipation.

During the year ending June 30, 1880, it is proposed to continue work as heretofore, subject to such modifications to be recommended by the Board of Engineers as may be approved.

The collector of the port of Galveston has kindly furnished the following commercial statistics of the port:

Entrances and clearances from June 30, 1878, to June 30, 1879.

Vessels.	Entries.		Clearances.	
	No.	Tons.	No.	Tons.
American, coast.....	287	279,570	300	257,086
American, foreign.....	48	18,027	40	15,611
Foreign.....	167	117,511	163	110,788
Total.....	502	415,108	503	383,475

Total value of exports shipped to foreign countries during the year ending December 31, 1878..... \$15,016,646 00
Total amount of revenue collected on imports..... 75,732 56

The work is located in the collection-district of Galveston.
The nearest light-house is on Bolivar Point at entrance to Galveston Bay.

Original estimated cost*..... \$1,259,446 43
Amount appropriated..... 577,000 00
Amount expended..... 459,537 20

Money statement.

July 1, 1878, amount available..... \$119,337 28
Amount appropriated by act approved March 3, 1879..... 100,000 00

\$219,337 28
July 1, 1879, amount expended during fiscal year..... 93,616 26
July 1, 1879, outstanding liabilities..... 8,258 22

101,874 48

July 1, 1879, amount available..... 117,462 80

Amount (estimated) required for completion of existing project..... 682,446 43
Amount that can be profitably expended in fiscal year ending June 30, 1881. 200,000 00

K 8.

IMPROVEMENT OF SHIP-CHANNEL IN GALVESTON BAY, TEXAS.

April 4, 1871, report of "survey at Buffalo Bayou for a channel of navigation through Buffalo Bayou and Galveston Bay to Bolivar Channel, near the outer bar in the Gulf of Mexico," was rendered and estimates for the improvement submitted.

During the fiscal year ending June 30, 1873, under act of Congress approved June 10, 1872, appropriating \$10,000, a channel was excavated, by the government dredge at Galveston, through Red Fish Bar, 1,500 feet long, 70 feet wide, and of a depth to admit vessels drawing 7 feet.

* Original estimated cost of the work, by the officer in charge, \$1,259,446.43; revised estimated cost submitted by the Board of Engineers, convened in New York City per Special Order No. 9, Headquarters Corps of Engineers, dated Washington, D. C., January 26, 1874, \$1,759,401.85.

The act of Congress approved March 3, 1875, appropriated \$25,000 "for improvement of the ship channel between the mouth of San Jacinto River and Bolivar Channel in Galveston Bay," and \$10,200 for "improvement of Red Fish Bar in Galveston Bay."

The ship channel being but a continuation, north and south of Red Fish Bar, of the channel through the latter the two works were advertised together and awarded to the same parties.

The Red Fish Bar work was completed, and a small portion of the ship channel, during the fiscal year ending June 30, 1876.

The channel dredged was 6,100 feet in length, and had a minimum depth of 14½ feet at mean low tide, and connected depths of 9 feet and 8½ feet in the upper and lower bays, and, with the private work of improvement at Morgan's Point, permits the passage of vessels of 9 feet draught to within a few miles of Houston.

By act of Congress approved August 14, 1876, an appropriation of \$72,000 was made, and by act of Congress approved June 18, 1878, an additional appropriation of \$75,000 was made, making a total of \$147,000 available for the work, but only made applicable to that portion between Red Fish Bar and Bolivar Channel.

Under date of June 26, 1878, I was directed by the Chief of Engineers to submit a project for the expenditure on the work of this amount.

Project was forwarded July 1, 1878, and approved by the Chief of Engineers under date of July 9, 1878.

July 26, 1878, copy of specifications, &c., was forwarded for approval, which was given under date of July 31, 1878.

Advertisement was published August 6, 1878. Bids were received September 9, 1878. The following is an abstract:

Abstract of bids received for improvement of ship channel in Galveston Bay, Texas, between Bolivar Channel and Red Fish Bar.

Number.	Bidders.	Residence.	Guarantors.	For excavation carried off on scow, per cubic yard.	Time of commencing work.		Number of dredges, tugboats, scows, &c., to be furnished.
					1878.	1879.	
1	Morris F. Brainard	Albany, N. Y.	E. Brainard, Jr., Henry R. Chm.	24½	Dec. 15	1878.	Two dredges, five or more scows, two tugboats.
2	Brott & Norris	Washington, D. C.	J. J. Hinds, U. E. Fisher, and G. L. McDonough.	17	Nov. 1	1878.	Two dredges, four scows, two tugboats.
3	Wm. H. Brainard, Geo. D. Rice	do	G. W. Dweinger, C. P. Grandell	43	Oct. 25	1878.	Five dredges, ten scows, three tugboats; two dredges at Washington, D. C.; three dredges at Baltimore, Md., and three at New York.
4	A. C. Hutchinson, agent Buffalo Bayou S. C. Co.	New Orleans, La.	Albert Baldwin, George Pandely	22	Oct. 15	1878.	Three to five dredges, five scows, two to three tugboats; vessels at Buffalo Bayou, Texas.
5	George C. Fobes & Co.	Baltimore, Md.	G. W. Wells, E. J. Cobb & Co.	15½	Dec. 1	1878.	One or more dredges, two or more scows, one or more tugboats, to use machinery of dredges now at Baltimore, Md., ship and set up on dredge.
6	Charles Fobes	Portland, Me.	J. C. Chamberlain, J. R. Edwards	24½	Dec. 1	1878.	Three dredges, 6 scows, two tugboats.
7	L. J. Fobes	Baltimore, Md.	D. R. Dunlap, L. Seranton	21½	Nov. 30	1878.	Two or more dredges, four or more scows, two or more tugboats, two dredges, two tugs, four scows—nearly all at Port Eads, La.
	James E. Slaughter	Mobile, Ala.					
	S. N. Kimball	do					

* * * * *
 Under date of September 19, 1878, I was directed by the Chief of Engineers to award the contract to George C. Fobes & Co., as being the lowest bidders, and known to the department as responsible parties.

Under date of October 1, 1878, George C. Fobes & Co. were notified that the contract had been awarded them, and articles of agreement and bond sent to Col. William P. Craighill, Corps of Engineers, at Baltimore, Md., on whom Fobes & Co. were requested to call, with their bondsmen, to sign.

* * * * *
 December 17, 1878, I was notified by letter from the Chief of Engineers that the contract had been approved, and Fobes & Co. were notified of approval December 20, 1878.

* * * * *
 December 25, 1878, Fobes & Co. acknowledged receipt of notification of approval of contract, and state:

The dredge is on the ways at Wilmington, N. C., being sheathed. The tug and scows are also under way, and will be ready in a few days.

January 7, 1879, I addressed a letter to Fobes & Co. requesting them to inform me, at the close of each week, what progress had been made toward carrying out their contract, that I might have an inspector on hand and the line marked in time, so as not to delay the work.

In their reply, of January 11, 1879, they state: "Shall be ready (should the weather be favorable) to start by the time it arrives" (referring to copy of contract, which had not at that time been sent them, after being completed). Contract was sent them January 14, 1879, receipt of which they acknowledged January 29, and stated that they proposed to leave Wilmington with tugs, &c., "the first of next week."

February 7, 1879, I telegraphed to Colonel Craighill, Corps of Engineers, asking if he could inform me what Fobes & Co. had done towards dispatching a dredge and scows from Wilmington to Galveston, to which Colonel Craighill replied, February 9, that dredge had not left Wilmington, but was preparing to leave.

February 10, 1879, Fobes & Co. report:

The tow is now ready to leave Wilmington, only waiting the coal, which was shipped from New York Wednesday last. * * * It should be there (Smithville?) now.

Under date of March 26, 1879, I telegraphed to Fobes & Co. as follows:

Has dredge left Smithville for Galveston? What arrangements have been made for placing a second dredge upon the work by April 1?

Which, under date of March 29, they answered as follows by telegraph:

Telegram just received via Baltimore. Since Monday until to-day storm-signal at Smithville; making up tow; leave to-night or morning; will write.

On receipt of this, I immediately telegraphed them as follows:

Wait for action of Chief of Engineers on a recommendation to annul, which will be forwarded to-day.

Following is a copy of the letter to Chief of Engineers recommending annulment of contract:

NEW ORLEANS, March 29, 1879.

GENERAL: I have to-day notified Geo. C. Fobes & Co. (by telegraph) of my purpose to recommend annulment of their contract for dredging in Galveston Bay, Texas. In my letter of March 13 I gave a short history of this contract, showing how the

contractors from time to time gave me unreliable information as to progress made in the matter of preparation for the work. To this I now add the following, viz:

It will be observed that the contractors, while yet setting a future date for dispatch from Wilmington, N. C., of their (1) dredge-boat and appurtenances, evade my request to be informed as to progress made toward compliance with that portion of contract requiring a second dredge-boat, &c., to be placed upon the work on or before the 1st of April, 1879. As I have no information to show that they have so far taken a single step in this direction, and as the evasion of the contractors satisfies me that they have not, I have thought it best to stop them at Wilmington until action may be taken on my recommendation to annul contract.

I beg leave to charge an inexcusable delay on the part of the contractors in preparing to comply with the first term of their contract, and also with an obvious intent to not comply with the second term.

By their trifling conduct the work has already lost two months of the best season for dredging, and must lose another if they are permitted to proceed with a plant entirely inadequate, the magnitude of the work and the great importance of its early completion, considered.

Very respectfully, your obedient servant,

C. W. HOWELL,
Captain of Engineers.

Brig. Gen. A. A. HUMPHREYS,
Chief of Engineers, U. S. A.

In reply to which the following letter was received from the Chief of Engineers:

OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., April 7, 1879.

SIR: Your letter of March 29, reporting that you had notified Geo. C. Fobes & Co. (by telegraph) of your purpose to recommend annulment of their contract for dredging in Galveston Bay, Texas, was duly received.

Prior to the receipt of your letter one of the contracting firm called at this office, and from representations made by him as to the condition of his plant, and to the preparations then in hand for the faithful execution of his contract, it was concluded to defer action in regard to annulling the contract. Prior to the receipt of your letter he notified this office by telegraph that the plant had left Smithville on March 31.

By letter received this day it is reported that the plant reached Fernandina, Florida, on the 4th instant.

By command of the Acting Chief of Engineers:

Very respectfully, your obedient servant,

JOHN G. PARKE,
Major of Engineers.

Capt. C. W. HOWELL,
Corps of Engineers, U. S. A.

Capt. C. E. L. B. Davis, Corps of Engineers, was then placed in supervision of the work, with full instructions as to inspection of work, and an inspector appointed to assist him.

The following report from Captain Davis gives particulars relating to the work after arrival at Galveston of contractors' plant.

REPORT OF CAPTAIN CHARLES E. L. B. DAVIS, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Galveston, Texas, July 5, 1879.

CAPTAIN: I have the honor to submit the following report of operations for improving the ship channel in Galveston Bay, Texas, for the year ending June 30, 1879.

On May 6 the dredging fleet arrived off the bar, and after one day's detention at the quarantine station came to the city. After waiting some days for Mr. Fobes, the contractor, who was expected to be in Galveston to superintend the work, but who failed to put in an appearance, Captain Lord, the man in immediate charge, reported that he would be ready to commence work on the 14th of May, on which date operations were begun.

The appliances for carrying on the work consist of the tug boat John Bacon, of wood, built by the Portland Company in 1876; length, 71.8 feet; breadth, 17.8 feet;

depth, 8.2 feet; tonnage, 61.61; diameter of cylinder, 21 inches; stroke, 22 inches; ordinary working pressure, 45 pounds; she is coppered, burns about 1 ton of coal per diem, and is in good order. She has one return tubular boiler, 14 feet long, 7 feet in diameter, made in 1876, and is allowed to carry 73 pounds steam. The dredgeboat Charles Fobes, 87 by 37 feet, draught $4\frac{1}{2}$ feet, with a pair of engines of 150 horse-power combined; diameter of cylinders $15\frac{1}{2}$ inches; stroke, 36 inches; burns from $1\frac{1}{2}$ to 2 tons of coal per diem; carries a dipper of 4.22 cubic yards capacity, and can discharge in scows alongside 200 cubic yards per hour. She is of the Morris & Cumings pattern.

Two dump-scows, Nos. 1 and 3. No. 1 is 70.7 feet long by 22.4 feet wide, containing 4 wells, each of a capacity of 50,104 cubic yards, making total capacity of scow 200,416 cubic yards. No. 3 is 76.5 feet long by 23.7 feet wide, each of the 4 wells containing 59,439 cubic yards; the total capacity being 237,756 cubic yards. Each well has double folding-doors at the bottom, which, being opened, allow the material to drop through.

The following force is employed.

Crew of dredge Charles Fobes: 2 men to handle dipper, 2 engineers, 2 cooks, 2 black-smiths, 1 carpenter, 2 scow-men, 10 deck-hands; 21 total.

Crew of tugboat John Bacon: 2 pilots, 2 engineers, 2 firemen, 1 cook, 5 deck-hands; 12 total.

This force is sufficient to allow of day and night work.

The terms of the contract requiring that the quantity of material excavated shall be determined by displacement, the following method was devised: On the center line of each scow and near each end a hollow iron cylinder, about 5 inches in diameter, is placed; this cylinder is reduced at its lower end and screwed into the bottom of the scow. In the bottom of the tube is a small hole $\frac{3}{8}$ of an inch in diameter, to allow the water to enter. This hole is made small so as to avoid the oscillations due to swell or the pitching of the dump-scow. In order to determine the depth of water drawn by the scow, a galvanized iron float, with a rod attached graduated to hundredths of a foot, and reading by means of a Vernier to thousandths, is inserted in the cylinder, and, after coming to rest, is read. A mean of the readings at each end is taken as the draught of the scow. By this means the actual displacement, and hence the amount of the load, can be very accurately determined.

Were it not for incomplete dumping and leakage of the dump-scows, the readings of the gauge-rods would be pretty nearly the same, and a uniform draught would give a uniform load. But experience shows that the readings vary between considerable limits; hence it is necessary to take the readings at each end of each scow, both empty and loaded, for each load.

Experience also shows that the specific gravities of the materials excavated vary somewhat, and observations to determine this amount have to be made at intervals. To facilitate the computations tables have been made, giving the volumes corresponding to the different gauge-readings for each scow, so that, by reference to the tables, the volumes corresponding to any given gauge-readings can be taken at once. The accuracy of the gauges was tested by filling the scows and leveling off as accurately as could be done without hand labor, and the amount determined by gauge-readings. Regarding the scows as accurately filled, the amounts as determined by computation came out within a small percentage of the true capacity of the scows.

WORK DONE.

The contract calls for a channel 12 feet deep and 100 feet wide at bottom through lower Galveston Bay, Texas, from the head of Bolivar Channel to Red Fish Bar. The dredgeboat being $37\frac{1}{2}$ feet beam, it will take three cuts of the dredge to excavate to the full width. It was thought best to make one cut the width of the boat the whole length of the channel, so as to get the advantage of the scour of the water through the cut and to obtain deep water as soon as possible. On June 30 the dredge had reached the end of the third mile. Up to this point the dumping-ground had been to the westward of the cut, varying in distance from $\frac{3}{4}$ to $\frac{1}{2}$ of a mile, the distance lessening as the line of the cut approached the channel at present used by the Morgan steamers, care being taken not to run any risk of dumping in their channel. From the third mile onward the dumping-ground is to be to the eastward of the cut about $\frac{3}{4}$ of a mile. Up to and including the 4th week, the gauges not having been put in working order nor the tables computed, the amounts excavated were estimated roughly, and aggregated 29,050 cubic yards. The total quantity excavated up to June 30, 1879, is 74,768.6 cubic yards.

The work is situated in the collection-district of Galveston, and is in the vicinity of the light-houses at Bolivar Point, Red Fish Bar, and Half-Moon Shoal.

Very respectfully, your obedient servant,

CHAS. E. L. B. DAVIS,
Captain of Engineers.

Capt. C. W. HOWELL,
Corps of Engineers, U. S. A.

At the close of the year the work was progressing as well as could be expected from the employment of but one dredgeboat. The second dredgeboat, &c., which it was agreed should be placed upon the work on or before the 1st of April, 1879, has not been so placed up to this (August 16), nor can I learn that any steps have been taken for providing it. On this point the contractors have either evaded or ignored my requests for information, and I am of opinion that they intend to continue the work to its close without addition to the plant now employed.

The appropriation now available will complete the work in the lower bay.

The work cannot be considered as one of a permanent character. Inasmuch as it is quite certain that filling of the dredged channel will, sooner or later, take place at points or throughout its entire length from the effects of wave action induced by storms, it is, therefore, manifestly impossible to estimate for maintenance, during years following completion of the work as projected, until observation may be made to furnish the data.

The work is located in the collection-district of Galveston.

Commercial statistics for this district are given in my report on work for improvement of Galveston Harbor and entrance.

This work is designed to accommodate a large portion of the commerce of the district.

The light-houses on or near the line of the work are, (1) near Clopper's Bar, at the mouth of the San Jacinto River; (2) in Red Fish Bar; and (3) at Bolivar Point.

* Original estimated cost	\$446,326 42
Amount appropriated	252,000 00
Amount expended	39,131 67

Money statement.

July 1, 1878, amount available	\$147,000 00	
† Amount appropriated by act approved March 3, 1879	80,000 00	\$227,000 00
July 1, 1879, amount expended during fiscal year	2,606 88	
July 1, 1879, outstanding liabilities	11,524 79	
		14,131 67
July 1, 1879, amount available	212,868 33	
Amount (estimated) required for completion of existing project	194,326 42	
Amount that can be profitably expended in fiscal year ending June 30, 1881	80,994 92	

K 9.

IMPROVEMENT OF TRINITY RIVER, TEXAS.

In act of Congress approved July 11, 1870, provision was made for a survey at the mouth of this river, report of which was submitted to the

* It should be observed that the original estimates were for channels of various widths and depths, and that the item "Original estimated cost" refers only to a depth of 12 feet and width of 100 feet, and, besides, does not include amount that may be decided upon for purchase of the franchises of the Buffalo Bayou Ship Channel Company and reimbursement for valuable work done by that company, as contemplated in act of Congress approved March 3, 1879, appropriating, on conditions specified, \$80,000.

† This amount was made applicable on a direct line between the cut through Red Fish Bar and the cut through Morgan's Point, subject to conditions that have not yet been placed in the form of legal documents required by the United States before application of the money appropriated.

Chief of Engineers April 29, 1871, with plan and estimate for improvement.

A survey of the "Trinity River from its mouth to Magnolia, Texas," provided for by act of Congress approved June 10, 1872, was made under my direction in 1872 and 1873, report of which was rendered with my annual reports for 1873, with recommendation and estimate for improvement.

Under the river and harbor act approved June 18, 1878, appropriating \$10,000, this work, as in the case of the Neches and Sabine Rivers, was advertised, inviting proposals for dredging on the bar at its mouth.

As already stated in my reports for the above-named works, the first contractors failed to carry out their agreement, when the work was re-advertised and contract awarded as reported for the Sabine and Neches rivers.

The work has for its object the dredging of a channel 5 feet deep at mean low-tide, with a width of 100 feet across the bar at the mouth of the river, or so much thereof as the appropriation will permit.

With the \$2,500 appropriated by act of Congress approved March 3, 1879, it is proposed to continue the work of dredging a channel across the bar at the mouth of the river, the work to be advertised for contract.

Abstracts of proposals and contracts appear in my report for the Neches River.

The work is located in the collection-district of Galveston.

Nearest light-house, Red Fish Bar, Galveston Harbor.

No commercial statistics on file since 1873.

The work is not considered permanent, because it appears quite certain that the cut through the bar will gradually fill, but there is no basis for estimates as to the length of time it will remain sufficiently open for navigation or as to cost of maintaining its navigability.

Original estimated cost	\$46,000 00
Amount appropriated	12,500 00
Amount expended	150 08

Money statement.

July 1, 1878, amount available	\$10,000 00	
Amount appropriated by act approved March 3, 1879	2 500 00	\$12,500 00
July 1, 1879, amount expended during fiscal year	150 08	
July 1, 1879, amount available	12,349 92	
Amount (estimated) required for completion of existing project	33,500 00	
Amount that can be profitably expended in fiscal year ending June 30, 1881	33,500 00	

K 10.

REMOVING OBSTRUCTIONS TO NAVIGATION AT BRAZOS SANTIAGO, TEXAS.

Act of Congress approved July 11, 1870, provided for a survey or examination at this place.

A survey was made in February, 1871, report of which was rendered to the Chief of Engineers April 7, 1871, submitting plan and estimates for improvement.

This work was advertised August 15, 1878, under appropriation approved June 18, 1878. Bids were received September 16, 1878. But one bid was received, and contract awarded to the bidder presenting it.

Abstract of bids for removal of wreck Réne des Mers from harbor at Brazos Santiago, Tex., placing same on shore and burning wooden portion of wreck.

Number.	Bidders.	Residence.	Guarantors.	Amount of bid.	Time of commencing work.
1	New Orleans Wrecking Company, Greenleaf Andrews, president.	New Orleans, La.	E. A. Yorke, Walter S. Crawford.	\$5,400	Dec. 15, 1878.

ABSTRACT OF CONTRACT.

Name of contractor: New Orleans Wrecking Company, Greenleaf Andrews, president.

Residence: New Orleans, La.

Bondsmen: Moses Schwartz and Walter S. Crawford.

Amount of contract: \$5,400.

The contract was signed October 3, 1878, and duly approved October 8, 1878.

The work was commenced about November 29, 1878, and completed the latter part of December.

The following is a copy of the report of Assistant-Engineer H. S. Douglas, who was detailed from this office to make the inspection:

REPORT OF MR. H. S. DOUGLAS, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
New Orleans, January 8, 1879.

CAPTAIN: In obedience to your special order No. 11, I left New Orleans on December 24, 1878, and proceeded to Brazos Santiago, Tex., there to inspect the work of the contractor in removing from the harbor the obstruction occasioned by the wreck of the bark Réne des Mers, and have the honor to make the following report:

Arrived at Brazos the evening of the 27th, and found that the work was not yet completed, the contractor having been delayed by unfavorable weather.

December 30, the contractor informed me he had completed his work, and that it was ready for inspection.

The wreck lay on a sand spit, on the edge of the channel leading into the harbor, her bow in 6 feet and her stern in 18 feet of water.

As soon as portions of the wreck were removed sand filled in the space, making it almost impossible to conduct the examination by sounding. A chain dragged over the bottom on the locality of the wreck encountered no obstruction. I, therefore, had to rely to a great extent upon an inspection of the *débris* that had been removed, and upon information derived from pilots and other persons in the vicinity who were interested in the removal of the obstruction from the harbor. The *débris* has not been burned. The contractor informed me that it was too wet and water-logged to burn, and the weather had been such that it would not dry.

About two-thirds of the material removed from the wreck has been placed on Brazos Island, about 50 feet back from high-water mark. The balance was carried out over the bar to sea on the contractor's schooner.

Relying upon my own examination and the information obtained, I certify that, with the foregoing exception, to the best of my belief Greenleaf Andrews, president New Orleans Wrecking Company, has fulfilled his contract in removing from the harbor of Brazos Santiago, Texas, the obstruction occasioned by the wreck of the bark Réne des Mers.

Very respectfully, your obedient servant,

H. S. DOUGLAS,
Assistant Engineer.

Capt. C. W. HOWELL,
Corps of Engineers, U. S. A.

It appears from this that the work was faithfully and thoroughly performed to the satisfaction of all parties concerned, the burning of material placed on shore not being considered of sufficient importance to warrant detention of contractor until it became dry enough to burn.

The work is located in the collection-district of Brownsville, Texas, near the port of Brazos Santiago and the light-house on Brazos Island, Texas.
No commercial statistics.

Money statement.

July 1, 1878, amount available \$6,000 00
July 1, 1879, amount expended during fiscal year 6,000 00

K II.

IMPROVEMENT OF PASS CAVALLO INLET TO MATAGORDA BAY, TEXAS.

Survey of this pass was made in 1871, report of which was rendered by me May 2, 1871. (See Report of Chief of Engineers for 1871, Appendix N 4, pages 531 to 533.)

The act of Congress approved March 3, 1873, provided for a survey "at the entrance of Matagorda Bay and the channel to Indianola, Texas."

This survey was made and report rendered to the Chief of Engineers February 4, 1874, in which plan and estimates for improving Pass Cavallo were submitted. (See Report of Chief of Engineers for 1874, Appendix R 12, pages 760 to 765.)

As stated in my last annual report for this work, the amount appropriated by the river and harbor act approved August 14, 1876 (\$20,000), was too small for commencement of operations, and expenditure of the money was therefore suspended, by proper authority, to await further action of Congress.

By act of Congress approved June 18, 1878, an additional appropriation of \$25,000 for the work was made, making \$45,000, the total amount available. Before submitting project for applying this amount it was deemed necessary to make an examination of the pass to ascertain what changes had taken place since last survey.

Upon receipt of authority from the Chief of Engineers, the examination was ordered, the results of which are given in my report to the Chief of Engineers dated December 17, 1878.

This survey developed the fact that the small amount available would not justify a commencement of the work, and, as in the case of the first appropriation, it was recommended that the money be withheld to await the further action of Congress.

By act of Congress approved March 3, 1879, \$25,000 was appropriated for the work, making \$70,000 the total amount available, less cost of survey. This is less than one-half the amount represented in my report of survey of 1873, as, in my opinion, required to justify commencement under the project then submitted.

In my report to the Chief of Engineers dated April 12, 1879, I stated:

It is possible that the plan of improvement may be so modified as to warrant commencement with \$70,000, but I am not able to suggest the modification.

In the same report I requested that the matter be laid before a Board of Engineers. The work is now under consideration by a Board of Engineers convened in New York City on July 1, 1879.