

No comparison will now be made of the relative advantages or disadvantages of the several routes, but their careful consideration should not be omitted before a definite location is made.

Comparative distances by these three routes are given below, measured from a point in mid-channel of the Patapsco, at the city limits of Baltimore, to a common point at sea off the entrance of Delaware Bay, on the usual route of vessels from Baltimore bound for European or Northern American ports:

FERRY CREEK ROUTE.		Miles.
Baltimore to Ferry Creek.....		75
Ferry Creek to Delaware Bay.....		53½
Delaware Bay to sea.....		25
Total.....		153½

QUEENSTOWN ROUTE.		Miles.
Baltimore to Queenstown.....		35
Queenstown to Delaware Bay.....		54
Delaware Bay to sea.....		25
Total.....		114

SASSAFRAS ROUTE.		Miles.
Baltimore to Georgetown, on Sassafras River.....		50
Georgetown to Delaware Bay.....		20
Delaware Bay to sea.....		70
Total.....		140

Comparing totals, we have the following:

	Miles.
Ferry Creek route.....	153½
Queenstown route.....	114
Sassafras route.....	140
Route now used, by the capes.....	335

The estimate made in 1872, and submitted to Congress, of the expense of making these surveys, was \$20,000. The sum thus far available has been \$16,000.

The field work was commenced in August, 1878, by several energetic parties, under the immediate supervision of Mr. N. H. Hutton, engineer of the harbor board of the city of Baltimore. The preparation of maps, estimates, &c., is now actively in progress in this office.

Thanks are due and hereby given to the harbor board, presided over by the mayor, Hon. F. C. Latrobe, for granting Mr. Hutton permission to take this additional and important duty, which he has performed with his usual ability and energy.

Very respectfully, your obedient servant,

WM. P. CRAIGHILL,  
Major of Engineers.

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

## APPENDIX G.

### ANNUAL REPORT OF MR. S. T. ABERT, UNITED STATES CIVIL ENGINEER, FOR THE FISCAL YEAR ENDING JUNE 30, 1879.

UNITED STATES ENGINEER OFFICE,  
Washington, D. C., August 5, 1879.

GENERAL: I have the honor to submit herewith my annual report relating to the works of river and harbor improvement under my charge for the fiscal year ending June 30, 1879.

The following works were transferred during the year, at the dates named, to Capt. Charles B. Phillips, Corps of Engineers:

- Improvement of Norfolk Harbor, Virginia, July 11, 1878.
- Improvement of Elizabeth River, Virginia, July 11, 1878.
- Improvement of Nansemond River, Virginia, July 11, 1878.
- Improvement of Blackwater River, Virginia, May 7, 1879.
- Improvement of Pamlico River, North Carolina, May 7, 1879.

Very respectfully, your obedient servant,

S. T. ABERT,  
United States Civil Engineer.

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

## G I.

### IMPROVEMENT OF HARBORS AT WASHINGTON AND GEORGETOWN, DISTRICT OF COLUMBIA.

#### HISTORY OF OPERATIONS.

The improvement of the harbors of Washington and Georgetown has received the attention of Congress for many years.

The first appropriation was made March 2, 1833, to aid the citizens of Georgetown in removing the obstruction to navigation in the Potomac, for the purchase of the Little Falls Bridge, and the construction of a turnpike road. One hundred and fifty thousand dollars was appropriated for these three objects, but I am not informed as to the amount expended on the river. Several surveys were subsequently ordered, but it was not until July 11, 1870, that the improvement was definitely and systematically undertaken under the direction of the Chief of Engineers.

An appropriation of \$50,000 was then made for the improvement of the Potomac River between the Long Bridge and the city of Georgetown. In this part of the harbor has existed for a long period the most serious obstruction to navigation, viz, the bar which has formed where the river suddenly widens and spreads itself over the wide flats along the water-front of Washington, and which is maintained and increased



by the deposits of each recurring freshet. There were also many dangerous rocks in Georgetown Harbor, and the Washington Channel required deepening.

The work was in charge of Maj. N. Michler, Corps of Engineers, until November, 1870, when it was transferred to Maj. William P. Craighill. This first appropriation was expended in dredging a channel through the bar above the Long Bridge, by contract, 200 feet wide and 15 feet deep at low-water.

The work was completed in December, 1871. Under the act of Congress approved March 5, 1872, a Board of Survey was created for the purpose of devising a plan for the permanent improvement of Washington and Georgetown Harbors. Their report will be found in Mis. Doc. No. 15, Senate, Forty-second Congress, third session. The various plans discussed by the Board have been fully referred to in previous annual reports, to which reference is also respectfully made. The plan recommended provided, in brief, for the improvement of the Virginia Channel with a depth of 23 feet and the future establishment of the wharf front along it, the reclamation of the flats in front of the city, and the rectification of the curvature of the river at Anolostan Island and Easby's Point.

An appropriation of \$50,000 was made March 3, 1873, for the further improvement of the harbors, but was not expended during that year. In the act approved June 23, 1874, it was provided that the Virginia Channel above and below the Long Bridge be dredged, and that the earth excavated therefrom be deposited so as to carry out as far as practicable the plan of the Board of Survey.

The work was transferred to my charge in July, 1874, and a plan for the temporary relief of navigation, by dredging the channel and the deposition of the material according to the provisions of the act, was submitted to the Chief of Engineers. This plan having been approved, the work was advertised and a contract made. Operations were commenced September 15, 1874, on the channel above the bridge, and continued until December 22, 1874, when the cold weather necessitated a suspension until March 9, 1875. The channel above the bridge was finished April 27, 200 feet wide, and 15 to 16 feet deep at low-water. A channel of the same dimensions was dredged below the bridge near Giesboro' Point, and finished June 24, 1875.

The contract having been let at favorable prices, a balance of the appropriation remained after its completion, which, with the approval of the Chief of Engineers, was applied to the removal of some of the most dangerous rocks in Georgetown Harbor. Bids were invited for the work, but, being too high, were rejected. An examination of the machinery and methods employed for similar work in James River, Virginia, showed that this work could be done more cheaply by hired labor than by contract.

Colonel Craighill having offered the use of the machinery, it was transferred to Georgetown Harbor, and the removal of the rocks commenced March 20, 1876. Three rocks were removed. Rock A, near the Aqueduct Bridge; rock B, nearly opposite the foot of High street; and rock G, at the foot of G street, Washington. The diamond drill was used, and the blasting material was nitro-glycerine. The work was suspended August 15, 1876, and the machinery returned to Richmond. For a detailed description of this work, with the cost, I would respectfully refer to my annual report for the year ending June 30, 1877. (Report of Chief of Engineers for 1877, part 1, page 351.)

In the spring of 1878 the channel between the Long Bridge and Easby's Point had gradually deteriorated under the action of the annual

freshets, that of November 25, 1877, the highest ever known, having been especially injurious. The low-water depth had become reduced to 9 feet over the bar, and serious obstruction to the coal trade of Georgetown was only obviated by the action of the merchants and shippers, who, at their own expense, dredged a narrow channel through the shoalest part. The small balance then available for the improvement was only sufficient to widen the cut thus made, and was so applied.

#### WORK OF THE PAST FISCAL YEAR.

The river and harbor act approved June 18, 1878, appropriated \$50,000 for the continuation of the improvement, of which sum \$20,000 was to be expended in Washington Harbor and channel below the Long Bridge, and \$30,000 in Georgetown Harbor and channel.

Proposals for dredging channels at the two localities specified in the act were invited by public advertisement, and the following bids received and opened July 22, 1879:

38 E



Abstract of proposals for dredging in Washington and Georgetown Harbors, District of Columbia, opened at 12 m. on Monday, July 22, 1878.

Number.	Name.	Address.	Georgetown channel.		Washington channel.		Total.	Number and kind of machines.	Daily work, cubic yards.
			Price per cubic yard.	For 150,000 cubic yards.	Price per cubic yard.	For 115,000 cubic yards.			
1	Thomas P. Morgan, jr.	Cumberland, Md.	\$0 13 $\frac{1}{2}$	\$20,250 00	\$0 13 $\frac{1}{2}$	\$15,625 00	\$35,875 00	Clam-shell or dipper	1,000.
2	George C. Fobes & Co.	Baltimore, Md.	14 $\frac{1}{2}$	21,000 00	14 $\frac{1}{2}$	16,100 00	37,100 00	One or more grapple and scoop dredges	2,000.
3	Franklin B. Colton	Philadelphia, Pa.	17	13,687 50	17	12,875 00	26,562 50	Two to four Osgood	1,200 to 2,400.
4	Daniel Constantino	Baltimore, Md.	17	23,500 00	17 $\frac{1}{2}$	13,837 50	37,337 50	One or more dipper	700.
5	American Dredging Company	Philadelphia, Pa.	20 $\frac{1}{2}$	30,750 00	17 $\frac{1}{2}$	20,125 00	50,875 00	One or more grapple	800.
6	G. H. Ferris	Baltimore, Md.	15	22,500 00	13	14,950 00	37,450 00	One dipper	1,000.
7	George F. Broth.	Washington, D. C.	14	21,000 00	14	16,100 00	37,100 00	Two dipper	500 each.
8	Channey D. Spalds	do	9 $\frac{1}{2}$	13,687 50	12 $\frac{1}{2}$	14,062 50	27,750 00	Clam-shell	2,500.*
9	William H. Brainard and G. D. Rice.	do	8 $\frac{1}{2}$	12,750 00	9 $\frac{1}{2}$	10,925 00	23,675 00	Two dredges and eight scows	(1)
10	Dennison & Rayner	Syracuse, N. Y.	20	30,000 00	20	23,000 00	53,000 00	New Jersey shore dredges, clam-scoops, and buckets	1,000 each.
11	Morris F. Brainard, agent.	Albany, N. Y.	17	25,500 00	17 $\frac{1}{2}$	20,125 00	45,625 00	Two Osgood and one clam-shell. One dipper	800.

\* Commence September 1.

† Complete on December 31, 1878.

The lowest bidders were Messrs. Brainard & Rice, of Washington, D. C. As these bidders were not known to me, inquiry was made as to their responsibility, and the result submitted. The contract was awarded to them and entered into August 9, 1878. Work was commenced August 22 on the Georgetown channel, above the Long Bridge with one dredge, and subsequently two other dredges were put on the work. These dredges were hired by the contractors. The tug and scows employed by the contractors were not adapted to the specified dumping ground, and this together with repairs to the dredges caused much delay. After the work had been in progress a month, the contractors were notified that the amount of dredging was entirely inadequate, and their operations must be expedited. On October 19 the clam-shell dredge which they had hired was moved to the Washington channel, with the view of completing this part of the contract by the close of the calendar year. The contractors, however, provided no scows for this dredge for some time, and no work was done. The dredges and scows employed on the Georgetown channel were withdrawn by the owners, at this date, for non-payment for their hire.

On October 31 the contractors were again notified to proceed with their work so as to complete the Washington channel by January, 1879. A few days later several scows were brought on the work, but drew too much water to reach the dumping ground, and the dredging then came to a stand-still. The money due under the contract had been drawn by J. A. Walsh, under a power of attorney duly approved.

The contractors appear to have been entirely without means to carry out the work which they had undertaken, and were heavily in debt for the hire of appliances. Having failed to prosecute the work in accordance with the terms of their contract, it was, with the authority of the Chief of Engineers, annulled November 16, 1878.

The sureties on the contract requested that they be allowed to go on and finish the same, but failed to do so. Under the provisions of section 3709 of the Revised Statutes, bids for the dredging were invited from five responsible parties owning dredging machinery. The following bids were received and opened January 5, 1879:

Abstract of bids for dredging in Washington and Georgetown Harbors, opened at 12 m. on Wednesday, January 15, 1879.

Number.	Name.	Address.	Georgetown channel. Price per cubic yard.	Washington channel.	Number and kind of machines.	Daily work.
1	George C. Fobes & Co	Baltimore, Md.	\$0 13 $\frac{1}{2}$	\$0 13 $\frac{1}{2}$	One clam-shell, two or more dipper dredges.	C. yds. 2,000
2	Thomas P. Morgan, jr.	Cumberland, Md.	14 $\frac{1}{2}$	14 $\frac{1}{2}$	3 dipper dredges.	2,000

The work was awarded to the lowest bidders, Messrs. Geo. C. Fobes & Co., of Baltimore, Md., with whom a contract was entered into April 3, 1879.

GEORGETOWN CHANNEL.

The specifications provided for a channel through a bar above the Long Bridge 200 feet wide and 16 feet deep at low-water. Work was commenced April 21 with two dipper dredges. The material found is sand, which is deposited on the Washington flats within the proposed line of wharves. A channel 60 feet wide has been dredged and the work is now actively progressing.



## WASHINGTON CHANNEL.

The channel along the Washington wharves is to be 200 feet wide and 12 feet deep at low-water. It was commenced April 24 with one grapple-dredge; a large dipper-dredge was put on the work May 6. The material found is mud, which is deposited on the flats of the Eastern Branch and of the Potomac near Alexandria. Rapid progress has been made, and the work will probably be completed during July, 1879.

An appropriation of \$50,000 was made March 3, 1879, for the continuation of the work, as follows:

For improving the harbors and channels at Washington and Georgetown, District of Columbia, \$50,000; of which sum \$20,000 shall be expended in dredging the channel of the Potomac River between the Long Bridge and the United States Arsenal, and \$30,000 shall be expended in Georgetown Harbor and Channel; and the whole of said sum of \$50,000 is hereby directed to be so expended as to produce the greatest immediate benefit to navigation and commerce.

When these funds shall be made available, it is proposed to continue the work on the Washington Channel by widening and deepening the same between the Long Bridge and the Arsenal and to continue the Georgetown Channel, either upon the completion of the present contract or after the subsidence of the annual freshets, if the deposit made by it shall have been found to have filled up the cut so as to impede the navigation.

## PERMANENT IMPROVEMENT.

In my annual report for the years 1875 and 1876 I submitted estimates for the gradual execution of the plans of the Board of Survey, in parts, proposing first the rectification of the line and curvature of the river between the Aqueduct and Easby's Point. These estimates will be found in the report of the Chief of Engineers for 1875, Part II, page 119, and in the report for 1876, Part I, page 346. A report on riparian rights upon that portion of the river which lies between the G-street wharf and Easby's Point will be found in the report for 1875.

A bill was introduced by Senator Gordon, May 8, 1878, in which it was proposed to execute the plan of the Board of Survey as far as the Long Bridge. The bill was referred to me for remark, and was returned with my general recommendation December 18, 1878, and was returned to the Senate with the approval of the Chief of Engineers and the Secretary of War January 15, 1879. (Senate Ex. Doc. No. 32, Forty-fifth Congress, third session.)

No action was taken by Congress, however, towards the execution of this work. The flats above and below the Long Bridge had, however, in the mean time been gradually shoaling by the deposits of silt and sediment, and serious results to the health of the city were feared in consequence. It, therefore, seemed of the greatest importance to complete that part of the plan which provided for filling the flats, and I accordingly submitted, in the annual report of June 30, 1878, a modified plan providing for the completion of the essential features of the original project of improvement. The cost of the work would be \$2,592,000. I would respectfully refer to this report for the details of the plan. (Report of Chief of Engineers for 1878, Part I, page 501.)

I am satisfied that however the details of the work therein recommended may be modified in order to secure an economical completion of the improvement, the main features are best adapted to secure the improvement of navigation and thorough sanitary conditions necessary for the health of the city. It may be a question whether for reasons of econ-

omy the filling and raising of the area now occupied by the flats should be at once carried to the height proposed, or whether the embankment should be raised to only 1 foot above the level of flood-tide. But permanent sanitary improvement can only be effected by raising the reclaimed ground to 1 foot above the freshets.

The work could be completed more rapidly if \$500,000 was annually appropriated; but as efficient progress can be made with an annual appropriation of \$200,000, that sum was asked for in my last report to commence this work, and the same sum is included in the financial statement as the amount which can be profitably expended in the fiscal year ending June 30, 1881.

## REMOVAL OF ROCKS.

With the last annual report there was submitted an estimate for the removal of rocks, at the new outlet lock of the Chesapeake and Ohio Canal, to the depth of 9 feet at low-water, amounting to \$44,000.

There are still in the immediate harbor of Georgetown between the Aqueduct Bridge and Easby's Point several rocks, which should be removed, as their existence greatly increases the danger of navigation, especially during storms and high winds.

The estimated cost of this work is \$24,000, and I would recommend an appropriation of this amount.

The rock at G-street wharf should be at once removed, but the one near Analostan boat-house is not so much of an obstruction at the present time. The cost of its removal would be \$60,000.

To summarize the recommendations of these reports it may be re-stated that—

The estimate for the improvement is \$2,592,000; of this an appropriation of \$200,000 was asked; to which may be added for removing rock at the mouth of the new outlet lock of the Chesapeake and Ohio Canal, \$44,000, and for removing dangerous rock in the harbor of Georgetown, \$24,000; making the total of this appropriation asked for the year ending June 30, 1881, \$268,000.

The work is in the collection-district of Georgetown, which is the nearest port of entry. The collections during the last fiscal year were \$11,304.85.

## STATISTICS OF TRADE.

*Statistics of marine and other products received in the ports of Washington and Georgetown during the year ending June 30, 1879.*

Bituminous coal received and shipped .....	tons..	575,000
Bituminous coal received and consumed .....	do....	63,500
Bituminous gas-coal used (part foreign) .....	do....	27,000
Bituminous gas retorts, pipe, and fire-brick .....	do....	1,520
Hard coal received and consumed .....	do....	170,000
Lumber, yellow pine .....	feet, B. M..	26,000,000
Lumber, laths (plastering), and pickets .....	do....	18,000,000
Lumber, shingles .....	do....	7,000,000
Lumber, cedar posts .....	do....	17,000
Wood, pine and oak .....	cords..	28,750
Grain, by canal, wheat .....	bushels..	1,200,000
Grain, by canal, corn .....	do....	150,000
Grain, by canal, flour .....	barrels..	20,000
Potatoes, by river, in barrels .....	do....	22,000
By river, empty barrels shipped .....	do....	125,000
Ice, received by several companies .....	tons..	75,500
Stone, granite and building .....	do....	28,770
Stone, paving-blocks .....	do....	14,031
Oil (crude) in barrels .....	barrels..	12,016
Salt, in sacks .....	sacks..	30,000
Cement, in barrels (part foreign) .....	barrels..	44,280
Fertilizers, guano and plaster .....	tons..	26,500
Asphalt, foreign .....	tons..	2,474



New York steamers, flour and miscellaneous freight.....	tons..	56,250
Philadelphia steamers, flour and miscellaneous freight.....	do....	37,812
Norfolk steamers, flour and miscellaneous freight.....	do....	14,250
River steamers, miscellaneous freight.....	do....	31,150
Fish (salt) in barrels.....	barrels..	3,000
Fish, shad.....		150,000
Fish, herring.....		3,134,375
Fish, tailors.....		50,537
Fish, sturgeon.....		1,225
Clams.....		1,032,047
Crabs.....		458,062
Oysters.....	bushels..	439,146

There is a quantity of rock and other fish; also melons, other fruits and vegetables that are brought up in small boats not included in the steamboat freight.

Appropriations have been made as follows:

July 11, 1870.....	\$50,000
March 3, 1873.....	50,000
June 18, 1878.....	50,000
March 3, 1879.....	50,000

*Money statement.*

July 1, 1878, amount available.....	\$50,078 22	
Amount appropriated by act approved March 3, 1879.....	50,000 00	
		\$100,078 22
July 1, 1879, amount expended during fiscal year.....	23,363 71	
July 1, 1879, outstanding liabilities.....	2,019 11	
		25,382 82
July 1, 1879, amount available.....	74,695 40	
Amount (estimated) required for completion of existing project.....	2,592,000 00	
Amount that can be profitably expended in fiscal year ending June 30, 1881.....	268,000 00	

G 2.

IMPROVEMENT OF CHANNEL AT MOUNT VERNON, VIRGINIA.

An appropriation of \$4,000 was made March 3, 1879, for the improvement of the channel at Mount Vernon, Va. Mount Vernon is situated on the Virginia shore of the Potomac, 14 miles from Washington; is visited annually by many thousands of the citizens of the United States, and has long been a place of national interest. There is a wide flat between the wharf and the main channel of the Potomac, upon which there is a depth of but 4 feet at low-water. The steamer which runs between Mount Vernon and Washington is, in consequence, often unable to reach the wharf, and the passengers are obliged to land in boats. This is especially the case during the prevalence of northwest winds, which cause extremely low tides, and during which a boat landing is attended with great discomfort and inconvenience.

The plan of improvement approved by the Chief of Engineers consists in dredging a channel 150 feet wide and 6 to 7 feet deep at low-water between the wharf and the Potomac Channel, and a suitable turning ground at the wharf. With the most favorable location of the channel possible, its direction will cross that of the tidal currents of the river, and a considerable width will be essential to the preservation of the depth, inasmuch as the flats are composed of soft mud. The dredged

material will be deposited at a point 2 miles below. The cost of dredging a channel in the line of the tide's current would be so great and so disproportionate to the uses to which it would be applied that no estimate is submitted.

The estimated cost of the entire work will be as follows:

60,000 cubic yards dredging, at 20 cents.....	\$12,000 00
Contingencies.....	1,800 00
	13,800 00

This estimate is approximate, having been prepared from a survey made some years since.

The present appropriation has not yet been made available, so that a new survey could not be undertaken.

For the continuation of the improvement the sum of \$10,000 is recommended.

This work commends itself as of such general national and public interest, that it seems unnecessary to present any arguments for its prompt completion. The ladies of the Mount Vernon Association have at a great expense restored and improved the grounds, and it is proper that the government should by this improvement facilitate the access of its citizens to the former home of Washington.

The subjoined letter from the superintendent, Mr. J. McH. Hollingsworth, gives the number of visitors during the year and other facts of interest.

The work is in the collection-district of Alexandria, which is the nearest port of entry.

The collections during the fiscal year ending June 30, 1879, were \$2,631.69.

*Money statement.*

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

LETTER OF MR. J. M'H. HOLLINGSWORTH.

MOUNT VERNON,  
June 10, 1879.

SIR: The entire number of visitors to Mount Vernon for the year ending June 1, 1879, was about 15,000. The Ladies' Mount Vernon Association have built a good and substantial wharf in front of the property at an expense of \$9,000, and made other valuable improvements to the property to the amount of several thousand dollars.

Insufficiency of water at low tide has resulted in great loss to the association, as many hundreds are deterred from visiting Mount Vernon from the uncertainty of getting to and away from the place; during the prevalence of north winds the mail steamer, although of very light draught, can neither enter nor depart. The farmers and business men in the vicinity of Mount Vernon are subjected to the same inconvenience as visitors, and without certain times for shipping produce or receiving merchandise, coupled with irregular mails.

The dredging of the channel through the flats is urgent and will be a great public benefit.

Yours, respectfully,

J. MCH. HOLLINGSWORTH,  
Superintendent.

Mr. S. T. ABERT,  
U. S. Civil Engineer.