

GENERAL CONCLUSIONS.

Whether the Dan River should be improved above Danville, so as to afford steam navigation as far as Danbury, or whether the operations should be limited to improving the facilities for bateau navigation is a question for Congress to decide. The distance is $77\frac{29}{100}$ miles and the cost of the improvement for steam navigation will be \$658,579.20.

If this work is carried for a distance of 30 miles above Danville, or as far as the Leaksville Landing, the cost will then be \$110,500.00.

The agricultural products of the lands bordering the river have been given in another part of this report. The valuable deposits of coal and iron have been described. The fine water-power which drives the flour and cotton mills has been mentioned. Special mention has been made of the Leaksville cotton-mill, with its 80 looms, which can turn out 4,000 yards of sheeting daily. The foundry, tobacco factories, and distilleries deserve notice. I have endeavored to state all the resources likely to be benefited by the introduction of steam navigation. But the first cost of a lock and dam improvement is but a part of the ultimate cost which will result from the necessity for an annual appropriation for maintenance and superintendence, and for this reason Congress has never authorized this method of improvement, except in cases of national importance.

It must be admitted, however, that this method of improvement will alone afford a sufficient highway for the present and prospective trade of the river. But for the reasons above stated I have thought proper to submit another estimate for improving the present bateau navigation as far as Hairston's Ford, a distance of about 63 or 64 miles above Danville. The bateaux now employed carry from 12,000 to 13,000 pounds, but cannot make the trip at extreme low-water, and in ordinary stages the boats hang sometimes on the rocks.

The cost of this method of improvement for the distance just mentioned will be \$32,718. Should Congress make an appropriation for this river I should commence the improvement upon the last-mentioned method unless otherwise instructed.

The survey of the river between Danville and Clarkville was not made on account of the want of funds. An appropriation was made by the last Congress for this object, and a survey will be made as soon as authority therefor is granted.

The following maps accompany this report:

General map of Dan River; scale 4,000 feet to an inch.
Section I. From Danbury, N. C., to Madison, N. C.
Section II. From Madison, N. C., to Danville, Va.
Profile of Dan River; section I.
Profile of Dan River; section II.

Detailed maps of the entire river have been made in the office for use in the preparation of estimates and plans of improvement.

Very respectfully, your obedient servant,

S. T. ABERT,

United States Civil Engineer.

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

APPENDIX H.

ANNUAL REPORT OF CAPTAIN CHARLES B. PHILLIPS,
CORPS OF ENGINEERS, FOR THE FISCAL YEAR ENDING
JUNE 30, 1879.

UNITED STATES ENGINEER OFFICE,
Norfolk, Va., July 16, 1879.

GENERAL: I have the honor to transmit herewith annual reports for the fiscal year ending June 30, 1879, for works of improvement of rivers and harbors which have been in my charge during that period.

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

CHAS. B. PHILLIPS,
Captain of Engineers.

The CHIEF OF ENGINEERS, U. S. A.

H I.

IMPROVEMENT OF NORFOLK HARBOR, VIRGINIA, AND ITS APPROACHES.

The object of this important improvement has been fully set forth in previous annual reports. Briefly, it consists in securing, by dredging, a channel 500 feet in width and 25 feet in depth at ordinary low-water from the deep water of Hampton Roads to Norfolk Harbor, so as to afford access to the largest class of merchantmen, as well as to men-of-war on their way to and from the Gosport navy-yard; and to improve the inner harbor by dredging through the bar at the eastern branch of the Elizabeth River; by deepening and widening the channel at the mouth of the southern branch (the latter work particularly for the benefit of the navy-yard above), and by dredging off the fore slopes of the Berkely and the Portsmouth Flats to afford more room for anchorage, and to restore in a measure the cross-sectional area which has been lost between these flats during the last twenty years.

As stated in the last annual report, the appropriation (\$35,000) of August 14, 1876, was entirely devoted to dredging at the mouth of the Eastern Branch. This proved of great advantage to the valuable portion of the harbor situated upon this branch.

The act of June 18, 1878, appropriated \$50,000 for continuing this improvement. A project for the expenditure of this amount was submitted to the Chief of Engineers on the 18th of July, 1878.

The project contemplated some further dredging at the Eastern Branch to secure a greater width of channel, by removing about 45,000 cubic yards of material; to dredge about 130,000 cubic yards at the mouth of the Southern Branch to improve the channel leading to the Gosport navy-yard, and to devote the balance of the appropriation to dredging

at the approaches to the harbor, commencing at the bar off the mouth of the Western Branch.

It was estimated that the appropriation would provide for the dredging of about 350,000 cubic yards of material in all.

The above project having met with the approval of the Chief of Engineers, proposals were invited for dredging the above quantity (more or less) at the three localities mentioned. After due advertisement, proposals were opened on the 30th of August last, and a contract was awarded to Mr. F. B. Colton, of Philadelphia (the lowest bidder), at the rate of 7.7 cents per cubic yard. This is believed to be the lowest rate at which dredging was ever done in the United States.

The contract required work to be commenced by October 1, 1878, and to be completed by June 30, 1879. The average length of tow to the dumping ground has been a little less than 6 miles.

Work was commenced early in October at the bar off the mouth of the Western Branch; but the dipper-dredge in use proving to be inadequate, it was soon withdrawn. On the 4th of November a large and powerful "clam-shell" dredge was put on the work, and has remained through the balance of the fiscal year. On March 22, 1879, the dredge was moved to the mouth of the Eastern Branch, and on the 23d of April had completed all the contemplated work at this point. From that date until the 28th of June the dredge was employed at the mouth of the Southern Branch, completing in this time all the work required there. The dredge then resumed her work at the Western Branch. The following is a summary of the amounts of material removed during the fiscal year:

	Cubic yards.
Of Western Branch.....	127,635
Mouth of Eastern Branch.....	59,512
Below mouth of Southern Branch.....	115,343
Total.....	302,490

By the above excavations the channel at Eastern Branch has been widened 160 feet; total present width 690 feet; depth 22 feet. At the southern branch 240 feet have been added to the available width of channel; depth 25 feet.

Off the Western Branch 3 cuts have been made, aggregating 115 feet in width, the entire length of the bar, a distance of 1,900 feet; depth 25 feet.

It will be observed that the total amount of material excavated up to the 30th of June was about 48,000 cubic yards less than the amount called for by the contract during the same period.

As this delinquency on the part of the contractor was mainly due to the unusual severity of the winter of 1878 and 1879, he was, upon his application, granted an extension of the time for the completion of his contract until July 31, 1879; this under the authority of the Chief of Engineers, dated June 27, 1879. The act of March 3, 1879, appropriated \$75,000 for continuing this work.

A project for the expenditure of this amount was submitted to the Chief of Engineers on the 21st of April last, and was by him approved.

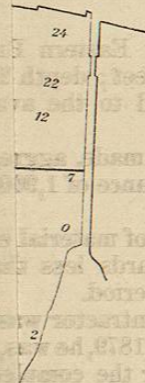
The project contemplates the continuing of dredging at the bar off the mouth of the Western Branch until a width of 400 feet shall have been attained. This will require the excavation of not far from 120,000 cubic yards, after the exhaustion of the appropriation of June 18, 1878. The next locality that will be dredged (as per approved project) is at the

approaches

U. S. A.

June 30th 1879.

water.



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flats on the Portsmouth side of the inner harbor. I quote from the project of April 21, last, as follows:

These flats have been constantly encroaching upon the harbor for many years, due largely, no doubt, to the faulty construction and improper position of the wharves immediately above. These faults, which were pointed out by an advisory board to the harbor commissioners of Norfolk and Portsmouth, are about to be corrected. I recommend, if these wharves in question be drawn back to conform as nearly as practicable to the port-warden's line recommended by the advisory board, that the dredging of the flats be undertaken with the present appropriation.

The advisory board, in its report, states that about 550,000 cubic yards of material should be removed at this point. * * * The dredging of the flats will, in conjunction with the rectification of the port-warden's line, cause a great improvement in the harbor, and one that will be likely to be permanent.

The amount of dredging contemplated at both the Portsmouth Flats and at the Western Branch amounts therefore to about 670,000 cubic yards. This is all that can probably be undertaken with the new appropriation, judging from the present ruling prices for dredging. Should a surplus remain, however, after providing for the above, it will be devoted to dredging in the approaches to the harbor.

The channel at Western Branch, as well as the proposed cut above Sewell's Point, should ultimately be made 500 feet in width.

This work has been in the immediate charge of Mr. George H. Elliott, assistant engineer, who has constantly discharged this as well as other duties intrusted to him with energy and care. His report upon the work for the year is appended hereto, as well as commercial statistics relating to the port.

A chart also accompanies this report, showing the location of the areas already dredged as well as the position of the work proposed in the future.

The appropriations for this improvement have been:

August 14, 1876.....	\$35,000 00
June 18, 1878.....	50,000 00
March 3, 1879.....	75,000 00
Total.....	160,000 00

Money statement.

July 1, 1878, amount available.....	\$53,305 78
Amount appropriated by act approved March 3, 1879.....	75,000 00
	\$128,305 78
July 1, 1879, amount expended during fiscal year.....	28,272 63
July 1, 1879, outstanding liabilities.....	2,329 14
	30,601 77
July 1, 1879, amount available.....	97,704 01
Amount (estimated) required for completion of existing project.....	218,000 00
Amount that can be profitably expended in fiscal year ending June 30, 1881.....	100,000 00

Abstract of proposals for dredging in Norfolk Harbor, Virginia, and its approaches, opened at 12 m. August 30, 1878.

No.	Name.	Address.	Time.		Machinery.	Daily amount expected.	Price per cubic yard.
			Commence.	Complete.			
1	F. B. Colton	Philadelphia, Pa.	Oct. 1, 1878	June 30, 1879	One or more grapple-dredges	2,000	7 7/8
2	American Dredging Company	do	Oct. 1, 1878	June 30, 1879	One or more grapple-dredges	2,000	16 7/8
3	George C. Forbes & Co.	Baltimore, Md.	Oct. 1, 1878	July 1, 1879	One or more clam-shells	2,000	7 7/8
4	James Cummings, president Morris & Cummings Dredging Company.	New York City	Nov. 1, 1878	June 30, 1879	One clam-shell	2,000	8 1/8
5	Brig. G. Norris	Washington, D. C.	Oct. 1, 1878	June 30, 1879	One clam-shell	2,000 to 3,000	9 7/8
6	C. H. Harris	Baltimore, Md.	Oct. 1, 1878	June 30, 1879	Two or more dredges	1,500	14 1/8
7	M. E. Braumard, agent	Albany, N. Y.	Oct. 1, 1878	June 30, 1879	Two or more dredges	1,500	9 7/8
8	H. E. Culpepper	Portsmouth, Va.	Oct. 1, 1878	June 30, 1879	Two or more dredges	1,500	14 1/8

Note.—Contractor, F. B. Colton, at 7.7 cents per cubic yard.

REPORT OF MR. GEORGE H. ELLIOTT, ASSISTANT ENGINEER.

NORFOLK, VA., July 8, 1879.

CAPTAIN: I have the honor to submit annual report of operations for improving harbor at Norfolk, Va., and its approaches for the fiscal year ending June 30, 1879.

Operations have been confined entirely to dredging under an appropriation of \$50,000, made in river and harbor act approved June 18, 1878.

A project for the expenditure of this sum, submitted July 18, being approved by the Chief of Engineers, proposals were invited for dredging at three localities, viz, at the mouth of the Eastern Branch of the Elizabeth River, below the mouth of the Southern Branch, and at the bar off the mouth of the Western Branch of the same river.

The lowest bidder was Mr. F. B. Colton, at 7.7 cents per cubic yard, with whom a contract was entered into to dredge 350,000 cubic yards, more or less. Owing to the prevalence of the teredo the commencement of the work was fixed for October 1, the contract to be finished by June 30, 1879. The work was commenced October 10, 1878, with one dipper-dredge in the bar off the Western Branch, which proving inadequate to a proper performance of the work was withdrawn at the end of that month and on November 4 a large clam-shell dredge substituted, and the work continued at this bar until March 22, 1879, when the dredge was moved up to the Eastern Branch. Previous to this the dipper-dredge had worked 6 days in November and 9 days in December in the Eastern Branch. The work was continued at this locality until April 23, 1879, when the dredge was moved over to the South Branch, where it was engaged in cutting off a portion of Berkley Point until June 14, when it was moved over to the Portsmouth side (the channel proper) of the South Branch. Three short cuts were made here from June 16 to 28, when the dredge was moved back to Western Branch bar and the work there recommenced.

The amount of material removed from the several localities under this contract is—

	Cubic yards.
From bar off Western Branch	127,635
From mouth of Eastern Branch	59,512
From below mouth of South Branch—	
Berkley Point	94,364
Portsmouth Channel	20,979
Total	302,490

All of which has been deposited on the flats near and to the west of Craney Island. During June an examination was made of the channel excavated at the mouth of the Eastern Branch and of the dredging done below the mouth of the Southern Branch, and the results plotted; these are embodied in a sketch of the harbor herewith, which shows the work done in the fiscal year ending June 30, 1878, that done in the present fiscal year, and also work proposed to be done.

The channel in the Eastern Branch was excavated during fiscal year ending June 30, 1878, to a depth of 22 feet at ordinary low-water, and 530 feet wide; during the present year this width has been increased 160 feet, the length of the cuts were about 1,900 feet. Four cuts, equal to 140 feet in width, have been made across Berkley Point, the dredging there being to a depth of 25 feet at ordinary low-water; the length of these cuts is about 1,700 feet. Three cuts in all, 100 feet wide and 650 feet long, were made in the Portsmouth Channel. Three cuts were also made in the bar off Western Branch, and a fourth one commenced. These cuts are 1,900 feet long.

The work was frequently interrupted by the breaking of machinery, and in January for some two weeks by ice, an unusual occurrence in this harbor. These delays and the inability of the contractor (as stated by him) to procure additional machinery prevented the completion of the contract at the time specified, and at his request he was granted an extension until July 31, 1879, under authority of the Chief of Engineers, dated June 27, 1879.

The statistics of the port of Norfolk and Portsmouth, kindly furnished by the collector of customs, Hon. John S. Braxton, as also the cotton statistics, furnished by the Norfolk Cotton Exchange, are appended hereto.

Very respectfully, your obedient servant,

GEO. H. ELLIOTT,
Assistant Engineer.

Capt. CHAS. B. PHILLIPS,
Corps of Engineers, U. S. A.

COMMERCIAL STATISTICS.

Statement of the principal articles of produce shipped to foreign ports from Norfolk, Virginia, during the fiscal year ending June 30, 1879, as compiled from the records of office of customs.

Cotton	..... bales	203,536
Corn	..... bushels	280,930
Staves	.....	5,370,575
Cattle, live	..... head	784
Sheep, live	..... do	655
Shingles	.....	1,126,700
Treenails	.....	55,027
Timber	..... cubic feet	90,448
Flour	..... barrels	2,987
Lard	..... pounds	150,000
Rosin	..... barrels	8,498
Tar	..... do	77
Oil-meal	..... pounds	15,000
Black-eye peas	..... bushels	664
Bark	..... bags	500
Cotton-seed cake	..... do	14,377
Tobacco	..... hogsheads	59
Tobacco	..... boxes	47
Manganese	..... tons	1,635
Lumber	..... feet	36,000
Sugar-shooks	.....	200
Hoop-poles	.....	8,920
Wood	..... cords	38
Railroad-ties	.....	4,801
Spar	..... barrels	50
Furniture	..... cases	8
Ox-bows	..... dozen	10
Glassware	..... barrels	419
Glassware	..... boxes	104
Duties on imports, year ending June 30, 1879		\$15,030 71
Tonnage duty collected year ending June 30, 1879		\$27,020 10

Entrances from foreign ports:

	Vessels.	Tons.
American vessels	15	15,323
Foreign vessels	52	53,145
Total	67	68,468

Clearances to foreign ports:

American vessels	47	27,139
Foreign vessels	66	65,952
Total	113	93,091

Coastwise entrances:

Vessels	.....	1,022
Tons	.....	932,149

Coastwise clearances:

Vessels	.....	1,011
Tons	.....	936,731

Bales of cotton shipped during 12 months ending August 31, 1878, 429,207.
 Bales of cotton shipped during 10 months ending June 30, 1879, 440,524.
 Statements of the shipments of cotton, both foreign and coastwise, are taken from the records of the Cotton Exchange.

H 2.

IMPROVEMENT OF SOUTH BRANCH OF ELIZABETH RIVER, VIRGINIA.

Operations during the past fiscal year have been conducted in furtherance of the original project for the work and with a view to its completion. The river and harbor act of June 18, 1878, provided \$5,000 for this work. This appropriation was intended to be used in deepening the approaches to Park's Gap, both from above and below, but as it was found upon examination that the channel between the gap and the lock of the Albemarle and Chesapeake Canal Company had shoaled somewhat, and as available funds were ample, the project was so extended as to include also the redredging of this portion of the river.

Dredging, under contract with Mr. H. E. Culpepper, of Portsmouth, Va., was commenced on the 18th of September, 1878, and continued with but slight interruptions until the 17th of January, 1879, when the work was brought to a close.

During this period 14,914 cubic yards of material were removed and deposited upon the banks of the river. The wreck of a small schooner and four large snags were also encountered and removed from the channel. The result of this dredging (as shown by an examination of the work made and plotted in March last) has been to secure a channel 7½ feet in depth and from 60 to 80 feet in width, from the canal lock to the point below Park's Gap. No further dredging seems to be necessary at present, although the experience of the past upon this river seems to lead to the expectation that the dredged portions of the channel will in many places gradually shoal again. The appropriations for this work have been:

March 3, 1873	.....	\$15,000
June 23, 1874	.....	10,000
March 3, 1875	.....	5,000
August 14, 1876	.....	5,000
June 18, 1878	.....	5,000
Total	.....	40,000

The original estimate for this work was \$25,000, but a more extensive plan of improvement than was first proposed having been afterwards adopted, the estimate was increased to \$40,000. This amount has now been appropriated and no further expenditure is required at present.

Mr. Geo. H. Elliott, assistant engineer, has had the immediate supervision of this work during the past year, and he has constantly shown fidelity and efficiency in the discharge of his duties. His detailed report of the operations of the year is appended hereto:

The Elizabeth River is in the collection-district of Norfolk and Portsmouth, Va. For commercial statistical information in regard to the river, reference is made to the statistics appended to the annual report of this year upon North Landing River, Virginia, and North Carolina, the shipments via each river being identical, with the exception of some trifling local traffic.

Money statement.

July 1, 1878, amount available	.....	\$5,267 95
July 1, 1879, amount expended during fiscal year	.....	5,267 95