brush is placed upon this raft so as to project 4 feet beyond the ends of the logs, and is laid in successive layers from each end of the logs toward the middle. After which the middle, or where the buts of the brush come together, is filled up and the brush tied with binders. The brush-binders are poles from 2 to 3 inches in diameter at the large end; one of these is placed directly over each log-binder and securely tied to it after the brush is compressed as much as practicable. Six additional binders are then placed across the mat, making 11 in all in this one direction. Seven other binders perpendicular to these last are then placed on the mat at equal distances from each other, and all are securely tied at their points of intersection with ½-inch tarred rope.

The arrangement of the log and brush binders differ somewhat in mats of different widths; but the same general plan is followed. Each mat is supplied with a mast fastened to the outer edge of the front log as shown in the diagram for the purpose of placing the mat in position. It is necessary to have this mast fastened with a flexible joint to permit the flats loaded with stone to pass over the mat while it is being covered. To mark the line of work after the mats are in position, permanent iron masts have been secured to several of them before sinking, so that when the mats are in place these masts will generally be 200 feet apart.

The work upon the apron was commenced in December last, and the first mat was laid on the 5th of the same month. Up to the present time 91 mats have been placed in position, together with 164 feet of the shore end of the apron, which was constructed upon the beach continuously. These together make a length of 4,095 feet 8 inches, of which 3,413 feet 3 inches have been completed. The bottom upon which this apron has been laid consists of fine sand and comminuted shell, the greater proportion being the former. This mixture forms the drift material of the bar, and is driven from place to place by the seas and tidal currents. Notwithstanding the unstable character of the bottom, frequent inspections carefully made have failed to detect any settlement of the apron. At first there seemed to be a slight scour along the sides of the work where it crosses Beach Channel, caused by the tidal currents passing over it, but this has now ceased. And the entire apron for a distance of 1,425 feet from midway between high and low water lines upon the beach, which extends beyond this channel, has become covered with drift material to such an extent that only the top of the stone covering is now exposed. This distance includes all the work laid in December, January, and a part of February; the remainder of the work of February shows considerable accumulation, but not sufficient, as yet, to cover entirely the ends of the logs. Little or no scour has been detected along the head of the work as the mats were laid.

Very respectfully, your obedient servant,

JAS. C. POST,
Captain of Engineers.

Lieut. Col. Q. A. GILLMORE,
Corps of Engineers, U. S. A.

Analysis of marls from Charleston Harbor Bar, by Mr. William Robertson.

Designation of boring.	When made.	Position.	Distance below bottom.	Color of material.	Carbonic acid.	Carbonate of lime.	Phosphoric acid.	Bone phosphate of lime.	Sulphuric acid.	Sulphate of lime.	Lime.	Sand.	Organic matter.	Total carbonate of lime, phosphate of lime, sulphate of lime.	Traces of alumina, iron, and magnesia.	Organic matter and sand.
			Feet.		*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*		
A	Feb., 1878	Neareastern end of Drunken Dick Shoal in Steamboat Channel in 14 feet low-water.	7 to 14	Light blue	2.12	4.83	0.39	0.85	0.71	1.29	4.73	80.68	7.33	94.98		
			17½	Dark green	24.64	56.00	1.71	3.73			27.56	25.20				
			18 to 23	...do	3.07	6.98	2.67	5.83	0.59	1.00	10.11	66.93	11.74	92.48		
			18 to 23	Nearly white, hard part.	30.73	76.83	0.47	1.03	0.16	0.28	44.33	19.22	0.95	98.31		
D	Feb., 1878	On bar of North Channel in 10 feet low-water.	23 to 23¾	Pale green	27.02	61.40	1.68	3.67	0.24	0.42	25.15	25.64	2.15	93.28		
			21 to 25¾	Dark green	6.75	15.34	7.64	16.68	1.07	1.82	18.09	46.70	13.68	94.22		
F	Feb., 1878	South of inner end of Swash Channel in 13¾ feet low-water.	23	Blue		00	00	00	0.55	0.94	Trace.	90.10	7.56	98.60		
2	Sept., 1878	Middle Swash Channel in 13 feet low-water.	18 to 19	Blue and gray	12.51	28.43	0.21	0.46	0.57	0.97	18.76	60.08	8.50	98.44		
3	Sept., 1878	Outer end of Swash Channel in 15 feet low-water.	20½ to 21	White	24.02	54.59	0.21	0.46	0.24	0.41	33.19	35.65	3.89	95.00		
			14 to 15	...do	21.79	49.52	0.74	1.62	0.21	0.36	29.43	43.15	2.09	96.74		
4	Sept., 1878	¼ mile south of outer end of Swash Channel in 15 feet low-water.	12	...do	21.29	48.61	0.47	1.03	0.21	0.36	27.52	46.35	2.81	90.16		
5	Sept., 1878	½ mile southeast of outer end of Swash Channel in 15¼ feet low-water.	11½ to 12	...do	21.64	49.18	0.38	0.83	0.35	0.60	26.56	47.70	1.23	99.54		
6	Sept., 1878	¾ mile southeast of outer end of Swash Channel in 21 feet low-water.	6¼ to 9	...do	20.61	46.84	0.34	0.74	0.30	0.51	27.19	47.70	1.13	96.92		
				...do	20.42	46.41	0.35	0.76	0.37	0.63	28.11	46.15	1.69	95.64		

I 2.

IMPROVEMENT OF SAVANNAH RIVER AND HARBOR, GEORGIA.

The work of improving this river and harbor, as now being carried on, was commenced upon the adoption of the project submitted August 28, 1873.

Previous to this time, and after the close of the civil war, a number of wrecks, cribs, and other obstructions, were removed by Mr. H. S. Welles, under contracts with the Treasury Department, and a considerable amount of dredging had been done by the city of Savannah.

During the fiscal years 1873 and 1874, the work being then in charge of the Engineer Department, 16 cribs and the wrecks of 6 vessels and a lighter were removed from the channels below the city, and 166,500 cubic yards of material was dredged from the shoalest portions of these channels, at a cost of $100,000.

Since the commencement of work in 1874, under the project of August 28, 1873, the demands of commerce have seemed to require the speedy amelioration of existing evils, to remedy which, the appropriations made for the past five years have been expended almost wholly in dredging, and nearly 700,000 cubic yards of material has been removed.

As indicated below, it is proposed to devote the funds at present available to the execution of such project for works of permanent improvement as may be approved.

OPERATIONS DURING THE LAST FISCAL YEAR.

The work done during the past fiscal year for this improvement is briefly stated below.

1. The partial construction of a submerged dam at the Cross Tides, designed to increase the volume of down-stream flow along the front of Savannah City.
2. Deepening the water-way between the Cross Tides and the city for the double purpose of aiding the entrance of the flood-tide and facilitating the discharge of the increased outward flow.
3. Completing the work of gauging the stream at several points, which was commenced toward the close of the previous fiscal year.

THE DAM AT CROSS TIDES.

With the approval of the Chief of Engineers it was decided to expend a portion of the appropriation in constructing at the Cross Tides a submerged dam, consisting of a riprap superstructure, resting upon a mattress of fascines, or upon a platform of logs, overlaid with fascines or brush. The total cost of the work was not estimated in advance, since its ultimate height would depend on the effects produced in Front River. Under date of August 5, 1878, proposals were invited for constructing the dam. The following extracts from the specifications exhibit the most essential features of the work required:

> At a point where the dam is to be located the low-water width of the Cross Tides Channel between Hutchinson's and Argyle Islands is about 780 feet, the greatest depth being 19 feet, and the average depth 9 feet.
>
> At high-tide the water flows over the low marshy ground up to the rice-dikes on either side, giving a high-water width between the dikes of about 995 feet.
>
> *Work for which bids are invited.*—With the funds now available it is the intention to construct in the Cross Tides a low dam reaching to and forming a connection with the rice-dikes on either side, and consisting of a continuous *apron foundation* and a *superstructure*, substantially as shown in the design prepared in this office.
>
> The *apron foundation* consists essentially of a platform of logs from 10 to 14 inches in diameter, placed and held close together side by side at right angles to the axis of the dam. The logs are to be as straight as can be procured, and those of about the same size must be selected to go together. This log platform is to be overlaid by a compact layer of brush to a depth of 12 to 14 inches, projecting from 8 to 10 feet beyond the end of the logs on either side, the projecting portion being closely confined and bound together so as to form a kind of mattress. As much brush should be used as the logs will bear up and float. Marsh cane may be advantageously mixed with the projecting mattress on the up-stream side. Upon this wooden substructure, which will be about 2 feet thick, good, sound riprap stone of random sizes will be placed as compactly as possible. The stone must be of such shape and in such proportions of the several sizes that they will pack closely together. They may vary in weight from 25 pounds upward.
>
> The *superstructure*, which will be placed upon such portions of the apron foundation and to such heights as the engineer in charge shall direct, will consist of alternate layers of logs and brush and of riprap stone. The brush will be well compacted by suitable binders, and each layer of timber, composed of logs and brush, will be overlaid by compact riprap stone to the depth of 2 feet.

Bidders were notified that they might submit designs of their own should they desire to do so, and on opening the proposals it was found that the lowest bid was that of Messrs. Phillip and M. Eder on their own design, Mr. D. V. Howell being the lowest bidder on the official plan. The design submitted by the Messrs. Eder was not satisfactory in all particulars, and it was deemed best under the circumstances to invite new proposals under specifications entirely like those originally adopted, with the additional clause only that the superstructure might consist of riprap stone only at the option of the engineer-in-charge.

Under this second call Mr. Howell was again the lowest bidder. In accordance with his proposal, which was finally accepted, a compact mattress of brush and cane was substituted for the logs and brush of the apron, this change having been authorized by a clause in the specifications, while the superstructure was to be formed of riprap stone exclusively.

Under the terms of the contract made with Mr. Howell he receives $9.47 per linear foot of apron of an average width at bottom of 25½ feet and a height of 4 feet after settlement, and $2.41 per cubic yard for the riprap superstructure. Although the contract was awarded September 30, the work on the dam was not commenced until the latter part of December, and since that time progress has been very slow, owing, the contractor claims, to circumstances beyond his control. His reasons for previous delays having been deemed satisfactory an extension of time in which to complete the work has been granted him. At the close of the fiscal year, 553 linear feet of that portion of the apron between the low-water lines on either shore had been finished, leaving 227 feet to be laid. No work has yet been done on the shore ends, that is, on those portions of the dam above mean low-water and joining the rice-dikes of Hutchinson's and Argyle Islands.

In consequence of the incomplete condition of this work no appreciable effect upon the volume of water flowing through the Front River has yet been produced.

DEEPENING THE WATER-WAY BETWEEN CROSS TIDES AND THE CITY OF SAVANNAH.

A contract for dredging from 65,000 to 85,000 cubic yards was entered into on November 26, 1878, with the American Dredging Company of Philadelphia, Pa., who were the lowest bidders for the work. The time having arrived for the adoption of a scheme for completing the improve-

ment of the river to supplement the partial plan of August 28, 1873, contained in the Annual Report of the Chief of Engineers for 1873, a project was submitted under date March 19, 1878. Final action on this plan is still pending, and consequently dredging at points below the city has not yet begun, as it was thought desirable that such work should form an integral part of any general plan of improvement that may ultimately be adopted.

Above the city between the Cross Tides and the Central Railroad wharves dredging was begun toward the end of the fiscal year and was continued into the new year.

The quantity of material removed amounted to 27,131 cubic yards.

COMPLETING THE WORK OF GAUGING THE STREAM.

The field-work connected with these operations was finished toward the end of August, 1878. Captain Post's report, dated March 5, 1879, with its accompanying drawings and tables, is now before the Board of Engineers having under consideration the project for the improvement of the river. Additional gaugings required by the Board were made in the months of April and May, 1879, under the immediate supervision of Capt. James C. Post, Corps of Engineers, and Assistant Engineer S. L. Fremont.

WORK CONTEMPLATED DURING THE PRESENT FISCAL YEAR.

It is proposed to expend the appropriation of $100,000 made by the act approved March 3, 1879, and the balance of the former appropriation, in closing the channels between the islands from Elba to Cockspur, in throwing a low dam across the upper end of the South Channel, and in dredging in such places as may be necessary, in accordance with project submitted March 19, 1879, in the event of that project being approved; otherwise in the execution of such plan of improvement as shall be finally adopted.

The following papers are transmitted herewith:

1. A sheet giving sections of the dam at Cross Tides.
2. The report of Assistant Engineer S. L. Fremont.

This work is in the collection-district of Savannah.

Savannah is the nearest port of entry.

The amount of revenue collected for the last fiscal year was $59,152.05.

The estimated cost of the improvement of the Savannah River upon the plan submitted August 28, 1873, not including the cost of the necessary bulkhead along the amended water-way and the jetties and bulkheads elsewhere, was $481,320.

The dates and amounts of the appropriations made since the adoption of the present project are as follows:

By act of Congress approved June 23, 1874	$50,000
By act of Congress approved March 3, 1875	70,000
By act of Congress approved August 14, 1876	62,000
By act of Congress approved June 18, 1878	70,000
By act of Congress approved March 3, 1879	100,000
Total	352,000

Of this amount there had been expended up to the close of the fiscal year ending June 30, 1879 (including outstanding liabilities), $198,867.64.

Money statement.

July 1, 1878, amount available	$70,683 49	
Amount appropriated by act approved March 3, 1879	100,000 00	
		$170,683 49
July 1, 1879, amount expended during fiscal year	13,926 69	
July 1, 1879, outstanding liabilities	3,624 44	
		17,551 13
July 1, 1879, amount available		153,132 36
Amount (estimated) required for completion of existing project		$129,320
Amount that can be profitably expended in fiscal year ending June 30, 1881		129,320

Abstract of proposals for constructing a submerged dam at the Cross Tides, Savannah River, Georgia, opened September 5, 1878.

Bidders.	Apron foundation.		Superstructure.	
	Guaranteeing stability of structure for twelve months after completion.	Without guarantee.	Timber and brush.	Riprap stone.
	Per lin. ft.	*Per lin. ft.*	*Per cu. yd.*	*Per cu. yd.*
Francis A. Page, New York City	$11 86	$9 86	(*)	(*)
Cassidy & Ross, Wilmington, N. C	15 84	14 52	.....	.....
David V. Howell, New York City	10 82	9 67	$3 27	$2 50
John H. Russell, Brooklyn, N. Y	†19 40	14 70	.....	3 99
	‡21 00	16 00	1 64	4 49
Brady & Doran, Brooklyn, N. Y	11 25	10 25	1 20	4 90
David Sutherland, Savannah, Ga	.....	.....	.....	.....
Thomas Houlihan, Savannah, Ga	.....	35 00	2 25	11 75
Brott & Norris, Washington, D. C	15 00	11 00	1 90	2 95
Ingerson & Molthrop, New London, Conn	.....	12 40	4 00	3 00
P. & M. Eder, Bridgewater, N. J	9 70	9 68	§2 50	3 75
Walter Doty, Fort Edwards, N. Y	14 73	13 73	2 43	3 47
Franklin B. Colton, Philadelphia, Pa	19 75	14 75	2 50	3 00
F. D. Van Wagenen, Fulton, N. Y	24 00	20 00	(*)	(*)
J. L. Johnson, Fulton, N. Y	20 00	17 00	.....	.....

* At same rates per linear foot. † Harlem stone. ‡ Palisade stone. § For cane and brush.

NOTE.—Bid of David Sutherland was informal. Bid of P. & M. Eder was on a plan submitted by themselves. Bids of F. D. Van Wagenen and J. L. Johnson received after other bids were opened. All of the above bids were rejected, and new proposals invited by advertisement.

Abstract of proposals for constructing a submerged dam at the Cross Tides, Savannah River, Georgia, opened September 30, 1878.

Bidders.	Apron foundation.		Superstructure.	
	Guaranteeing stability of structure for twelve months after completion.	Without guarantee.	Timber and brush.	Riprap stone.
	Per lin. ft.	*Per lin. ft.*	*Per cu. yd.*	*Per cu. yd.*
Brady & Doran, Brooklyn, N. Y	$11 34	$10 21	$1 23	$5 49
David V. Howell, New York City	*9 87	.....	1 97	2 41
	†9 47	.....	1 97	2 41
Walter Doty, Fort Edwards, N. Y	11 92	.....	‡1 00	3 47
D. Sutherland, Savannah, Ga	.....	.....	.....	(§)
J. L. Johnson, Fulton, N. Y	20 00	16 90	2 00	3 40
P. & M. Eder, Bound Brook, N. J	9 58	.....	2 35	2 35
H. D. B. Norris, Salem, Va	14 00	11 00	1 50	3 00
Cassidy & Ross, Wilmington, N. C	13 45	12 50	2 09	2 45

* Apron of logs, brush, and stone. † Apron of brush and stone. ‡ Per superficial yard.
§ Informal bid on a design of his own.

Abstract of contract for constructing submerged dam at Cross Tides, Savannah River, Georgia.

Contractor.	Date of contract.	Nature of work.	Price per linear foot of apron foundation.	Price per cubic yard of superstructure.	Date of completion.
David V. Howell, New York City..	Oct. 10, 1878	Constructing submerged dam.	$9 47	$2 41	May 10, 1879

Abstract of proposals for dredging the Savannah River, Georgia, opened November 26, 1878.

Bidders.	Price per cubic yard at—		
	Head of Elba Island.	New channel at the wrecks.	Between King's Island and city of Savannah.
George C. Fobes & Co., Baltimore, Md	$0 26	$0 18	$0 18
John F. Garner, Manlius, N. Y	32	33	33
American Dredging Company, Philadelphia, Pa	14⅜	14⅜	14⅜

Abstract of contract for dredging in the Savannah River, Georgia.

Contractor.	Date of contract.	Nature of work.	Price per cubic yard.	Date of completion.
American Dredging Co., Philadelphia, Pa....	Dec. 16, 1878	Dredging ...	14⅜ cents....	Aug. 31, 1879

COMMERCIAL STATISTICS.

[From the annual report of the mayor of Savannah.]

Imports port of Savannah January 1, 1878, *to December* 31, 1878.

Articles.	Quantity.	Value.
Salt ..... pounds..	11,545,875	$21,079
Coffee ..... do...	2,852,784	401,940
Coal ..... tons..	2,723	6,139
Muriate of potash ..... pounds..	121,723	2,712
Earthenware	.....	3,747
Sponge	.....	2,634
Silver coin	.....	4,849
Gold coin	.....	3,194
Superphosphate and manure salt ..... tons..	2,946	38,700
Molasses ..... gallons..	24,930	4,658
Fruits of all kinds	.....	8,911
All other articles not specified above	.....	7,033
Total value	.....	505,596

Duties on imports	$23,364 35
Value of imports, 1877	564,937 00
Duties on imports, 1877	34,959 93

Foreign exports port of Savannah, 1878.

Articles.	Quantity.	Value.
Cotton, upland, bales, 482,273 ..... pounds..	229,532,227	$22,935,111
Cotton, sea island, bales 4,110 ..... do....	1,522,388	224,437
Naval-stores	.....	196,129
Lumber ..... million feet..	19,068,000	261,569
Timber ..... cubic feet..	23,851,500	44,622
All other articles not specified above	.....	352,757
Total value	.....	24,014,625

Total value of foreign exports 1877, $16,244,081.

Coastwise exports port of Savannah, 1878.

Articles.	Quantity.	Value.
Cotton, upland ..... bales..	220,956	$9,390,630 00
Cotton, sea island ..... do...	4,846	353,450 00
Domestic } Yarn } ..... do...	17,109	10,265 40
Wool ..... do...	1,316	105,608 00
Moss ..... do...	35	875 00
Rice ..... tierces..	19,334	625,025 00
Lumber ..... superficial feet..	2,666,500	373,310 00
Shingles ..... number..	144,000	5,760 00
Old iron ..... tons..	674	20,220 00
Naval stores ..... barrels..	77,072	154,144 00
Spirits of turpentine ..... do...	15,303	183,636 00
Hides (baled) ..... bales..	2,052	71,820 00
Hides (single) ..... number..	12,028	16,839 00
Fruit ..... packages..	29,210	87,630 00
Paper stock ..... bales..	136	4,080 00
Vegetables ..... packages..	27,946	83,838 00
Melons ..... number..	21,662	5,415 00
Clay (kaolin) ..... casks..	1,225	13,475 00
Merchandise ..... miscellaneous packages..	24,655	562,433 00
Total value	.....	12,068,453 40

NOTE.—This statement includes but a small proportion of the lumber exports, a large number of vessels taking cargoes under coasting licenses, which permits them to sail without clearing at the custom-house.

Coastwise exports, port of Savannah, not entered at custom-house, 1878.

[Compiled by Frank E. Rebarer, clerk of council.]

Articles.	Quantity.	Value.
Cotton, upland ..... bales..	18,617	$792,222 50
Cotton, sea island ..... bags..	943	73,725 00
Domestic ..... bales..	8,325	4,916 00
Wool ..... bundles..	1,919	153,320 00
Moss ..... bales..	130	3,250 00
Rice ..... casks..	1,052	39,450 00
Timber ..... cubic feet..	1,901,562	161,628 77
Lumber ..... superficial feet..	19,991,461	2,798,804 54
Shingles ..... number..	821,000	3,284 00
Staves ..... do....	550,000	5,500 00
Rosin ..... barrels..	20,421	40,822 00
Turpentine ..... do....	838	9,936 00
Hides ..... bundles..	5,705	199,675 00
Hides ..... single..	4,230	5,920 00
Leather ..... bundles..	96	1,448 00
Paper stock ..... bales..	1,115	33,450 00
Vegetables ..... packages..	60,133	180,399 00
Melons ..... number..	27,842	6,965 50
Clay ..... casks..	849	12,745 00
Fruit ..... packages..	36,254	108,882 00
Cotton-seed oil-cake ..... sacks..	38,438	3,800 00
Old iron ..... hogsheads..	1,260	49,500 00
Merchandise, miscellaneous ..... packages..	50,673	1,020,756 00
Total value	.....	5,710,399 31

Tonnage of the port of Savannah, vessels cleared at custom-house, 1878.

	Tonnage.	Men.
American vessels entered	45,208	1,576
American vessels cleared	40,128	1,255
Foreign vessels entered	235,787	5,814
Foreign vessels cleared	183,757	5,375
Total foreign	504,880	16,020
Coastwise arrivals	385,532	10,688
Coastwise clearances	418,958	10,475
Total coastwise	804,490	21,163
Total foreign	504,880	16,020
Total	1,309,370	37,183
Add tonnage of coastwise vessels not cleared at custom-house	429,884	10,235
Grand total	1,739,254	47,418

REPORT OF MR. S. L. FREMONT, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
Savannah, Ga., June 30, 1879.

GENERAL: I have the honor to submit the following brief report of the operations of and progress made in improving the navigation of the Savannah River, both above and below the city of Savannah, during the last eight months of the present fiscal year. Late in October last I had the honor to receive from you the appointment of assistant to aid in the execution of your duties as engineer in charge of the works for improving the Savannah River.

On the morning of the 2d day of November I arrived here and relieved Capt. James C. Post, Corps of Engineers, as assistant at this station. From that date to the present I have been upon this work when not employed elsewhere in Georgia or in Florida.

The principal work to which my attention was directed was the contract for a submerged dam at the Cross Tides. The contractor for this work did not appear until the 9th of November, and then only remained a few days, making, as he informed me, some preliminary arrangements for material for the work, when he left for New York to bring out (as he said) a vessel with machinery and mechanics. He did not again appear here until about the middle of December, and without appliances or mechanics for executing his contract. His progress from the first has been slow and feeble, and with the exception of a slight exhibition of more activity in March and April, the work has dragged instead of being pushed by active and efficient management.

There has been laid down in the execution of this contract 553 feet of apron (mattresses and stone covering), leaving about 180 feet more to be laid, to complete the submerged portion of the dam.

No work has been done on the shore-ends on that portion above mean low-water. When the remaining portion of this work will be completed by this contractor, I am unable to conjecture.

There has yet been no visible effect produced by this incomplete work in the volume of water discharged by Front River; there can, however, be no doubt of the ultimate effect, and the increased volume of water that will be discharged through Front River, when the dam shall have been completed and that elevation given to it that future experience shall fix as the proper one.

Dredging as a work auxiliary to this dam in diverting the water from Back to Front River, was commenced on the 1st day of May by deepening a channel, beginning near the lower end of King's Island and continuing in nearly a straight line along the Georgia (south) shore to within about 400 yards (at this date) of the Central Railroad wharves, where there is at present about 20 feet of water at low tide. This channel, as stated above, deflects but a little from a right line for the entire distance from King's Island to the Central Railroad wharves, continuing along and within about 100 yards of the Georgia shore.

The old channel on the north side of Marsh Island, in which considerable dredging has been done during the past two or three years (I am informed) has decreased in depth from 10 to less than 5 feet.

At King's Island this new channel connects with the deep-water channel on the south side of that island, and as soon as practicable it will by dredging be united with the deep-water channel on the north side of the island. With this favorable location receiving the united waters from both sides of King's Island which includes that of

the Cross Tides River, and discharging into the deep-water channel at the Central Railroad wharves, we have every reason for believing it will enable the new channel not only to maintain itself, but materially increase the water-way and the volume of water that will be discharged by it both at ebb and flood tide, thereby largely increasing the volume of water in front of the city of Savannah and along the new ship-channel to Fort Jackson.

The work of examining the channels and measuring the distances between the islands from Elba to Cockspur, forming together the broken shore-line between the North and South Channels, was done in December, and a report with the estimated cost for closing the openings between them was submitted in that month.

The rivers were gauged at four places during the month of December, viz, at two places near Dr. Reed's, between Marsh and King's Islands 100 yards apart, and at the Cross Tides above and below the new dam.

Under your instructions of the 17th of March and the 16th of April, very important work has been done already in obtaining the volumes of water discharged at both ebb and flood tide at the following places: Front River, between W. H. Gibbon's house and Argyle Island (above Cross Tides); at the Cross Tide River, below the dam; at Dr. Reed's house, between Marsh and King's Islands; Front and Back Rivers; across the lower end of Hutchenson Island; North and South Channels across Elba and the middle of Spirit Islands; Saint Augustine Creek; and North and South Channels across the upper end of Long Island.

The report of the result of this work, prepared by Capt. J. C. Post, Corps of Engineers, who superintended the details, was transmitted to you on the 9th of June, and which I respectfully refer to as illustrating this part of my report.

The leveling which was suspended in May, will soon be completed to Fort Pulaski and across "Cockspur" to the light-house wharf, when the work of observing the rate at which the tidal wave is propagated will be commenced, and when the desired information is obtained it will be transmitted to you.

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

S. L. FREMONT, *Assistant Engineer.*

Maj. Gen. Q. A. GILLMORE,
Lieutenant-Colonel, Corps of Engineers.

EXAMINATION OF SAVANNAH RIVER ABOVE AUGUSTA, GEORGIA.

UNITED STATES ENGINEER OFFICE,
Savannah, Ga., February 8, 1879.

GENERAL: I have the honor to report that the "examination of the Savannah above Augusta, Ga.," provided for by the act of Congress approved June 18, 1878, and assigned to me by the instructions of the Chief of Engineers, dated July 8, 1878, has been completed.

The examination was made with a view to ascertaining the present condition of the river from Augusta to the head of pole-boat navigation, a distance by river of about 154 miles; the practicability of improving it for craft proper to those localities; the approximate cost of such improvements, and the expediency of making them, in regard to the importance, present and prospective, of the commercial interest involved.

The head of the Savannah River proper is the junction of the Tugaloo and Seneca rivers, 107½ miles above Augusta. These rivers combined form the Savannah. From the point of junction to the head of pole-boat navigation near Tallulah Falls, 154 miles above Augusta, the Tugaloo forms the navigable branch of the Savannah River.

The examination was intrusted to Mr. J. P. Carson, assistant engineer.

The field-work was commenced on November 9, 1878, and completed December 17. Mr. Carson secured the services of an experienced pilot, with a crew of 4 men, and used one of the pole-boats employed in the trade of the river and well adapted to pass the rapids. The examination was made during an exceptionally low stage of the river, favorable for observing the rocks and other obstructions to the fullest possible extent.