

Abstract of proposals for dredging in the South Branch, Elizabeth River, Virginia, opened at 12 m., August 30, 1878.

Number	Name.	Address.	Time.		Machinery.	Daily amount expected.	Price per cubic yard.
			Commence—	Complete—			
1	American Dredging Company.....	Philadelphia, Pa.....	Nov. 1, 1878	Mar. 31, 1879	1 dipper dredge.....	500	45
2	Brott & Norris.....	Washington, D. C.....	Oct. 20, 1878	Mar. 31, 1879	1 dipper or clam-shell.....	1,000	40
3	G. H. Ferris.....	Baltimore, Md.....	Jan. 1, 1879	Apr. 1, 1879	Dipper machine.....	400	27 1/2
4	H. E. Culpepper.....	Portsmouth, Va.....	Sept. 16, 1878	Mar. 31, 1879	1 or more Osgood dredges.....	200	27

NOTE.—Contractor H. E. Culpepper, at 27 cents per cubic yard.

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

NORFOLK, VA., June 30, 1879.

CAPTAIN: I have the honor to submit annual report of operations improving South Branch of Elizabeth River, Virginia.

The act of Congress of June 18, 1878, appropriated \$5,000 for this river, the improvement of which has been continued for several years, and has been, in brief, the dredging of a channel 60 feet wide and 8 feet deep, from the lock of the Albemarle and Chesapeake Canal Company to Park's Gap; a similar channel through several bars in the river below the gap; the widening of the gap itself from 50 to 70 feet, and the excavation of a cut-off near the lock named, for details of which reference is requested to the reports of the Chief of Engineers for the years 1873 to 1878. Examination showed that the dredged channels had shoaled to some extent, and needed redredging. It was, therefore, proposed to expend the appropriation of June 18, 1878, in deepening the channel from the Albemarle and Chesapeake Canal lock down the river to 7 1/2 feet, with a width of 80 feet, as far as the funds would permit.

This project having received the approval of the Chief of Engineers, a contract was entered into with Mr. H. E. Culpepper, of Portsmouth, Va., for the dredging of 15,000 yards of material, more or less, at 27 cents per cubic yard. This high price was due to the necessity of rehandling the material due to the scarcity of dumping-grounds.

Under this contract work was commenced near the lock on the 18th of September last, and continued until December 10, above Park's Gap; after that date until January 3, 1879, below the gap, when it was suspended on account of ice, the river being entirely frozen over. This lasted until the 13th of January, when work was resumed and continued until the 17th of the month, when the funds being exhausted the dredge was taken off.

During the continuance of work under this contract 14,914 cubic yards of material were removed and deposited on the banks of the river not less than 25 feet from the water. The material removed is hard sand. In dredging off a point immediately above Park's Gap the wreck of a small schooner was struck; this was removed, as were also four large snags in the same vicinity. It is very likely that the point named was due to the presence of the wreck referred to.

An examination of the work was made in March last, and a chart prepared which shows that a channel not less than 7 1/2 feet deep and from 60 to 80 feet wide now exists from the canal lock down to the point immediately below Park's Gap.

Respectfully submitted.

GEO. H. ELLIOTT,
Assistant Engineer.

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

H 3.

IMPROVEMENT OF NANSEMOND RIVER, VIRGINIA.

Nothing has been done upon this improvement during the past fiscal year.

An appropriation of \$2,000 was made for the work by act approved June 18, 1878. It was intended to devote this entire amount to the repair of the dikes at the mouth of the Western Branch, no further dredging being required.

An examination of these dikes and of the channel opposite and immediately below was made during the month of November last. It was found that the dredged channel had increased in depth since the construction of the dikes and that the dikes themselves were in such condition that repairs might well be delayed until after one more summer, especially as the water is salt and infested with the teredo. Accordingly, with the sanction of the Chief of Engineers, the appropriation has remained unexpended and will continue so until the coming fall.

Examinations of the other dredged portions of the channel have been made during the year, the results having been very satisfactory. The dikes at the Western Branch have been standing over five years, and after being thoroughly repaired during the coming fall, it is probable that nothing will be required at this improvement for several years to come.

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	2,000
Total	37,000

This total exceeds the original estimate by the amount of \$7,000 due to repairs, and the limited amount appropriated yearly.

The commerce of this river has been greatly benefited by this work. The following official statement from the keeper of the light-house, Mr. Potter, will be of interest:

Months.	Schooners.	Sloops.	Steamers.	Total number of vessels.
1878.				
November	287	441	33	761
December	240	398	44	682
1879.				
January	218	448	25	691
February	297	584	28	909
March	458	607	21	1,086
April	393	663	31	1,087
May	413	610	52	1,075

Money statement.

July 1, 1878, amount available	\$2,100 73
July 1, 1879, amount available	2,100 73

H 4.

IMPROVEMENT OF BLACKWATER RIVER, VIRGINIA.

Mr. S. T. Abert, United States civil engineer, was in charge of this work until May 7, 1879, when he was relieved by Capt. Charles B. Phillips, Corps of Engineers.

The act approved June 18, 1878, appropriated \$5,000 for this improvement. As this amount was not sufficient to undertake dredging it was proposed in the project submitted to the Chief of Engineers June 27, 1878, to apply the appropriation to the removal of snags, logs, and overhanging trees, and to do this work by hired labor, and the purchase of material in open market. This project having been approved, preparations for the work were made early in the fiscal year. As the work of removing snags would only last through one season, it was not deemed advisable to build a derrick-boat, and authority was therefore asked to hire one for such a period as these operations might last. An examination of the lighters of this class about Norfolk and Portsmouth was made, and the only one adapted to the purpose which could be procured at a moderate rate was a steam-derrick lighter, which was hired at the rate of \$250 per month including the services of an engineer. This was towed to Blackwater River in August, a force organized, and active operations commenced August 30, 1878, at Franklin. Only such snags as were in the channel of the river were removed, so as to meet the immediate wants of navigation at the least cost. The work progressed favorably until September 5, when the boom was broken in raising a large

snag 52 feet long and 4 feet in diameter, which had been in the same place for 15 years. A new boom was made, and the work resumed on the 7th. At the close of work, September 12, the lighter grounded on a cypress knee; the bottom planking, as appeared from subsequent examination, had become very rotten so that a hole was broken through by the knee, and the derrick-boat immediately sank. The owner was notified, and after some delay a wrecking firm in Norfolk sent a vessel and appliances and raised the boat, which was repaired.

Operations were resumed September 25, and continued until the completion of the snagging on the 18th of December last. The snag-boat went over the entire length of the river, from Franklin to the mouth, and all snags found in the channel were removed. The number of snags removed was 1,223. The number of overhanging trees removed was 144. Since the close of operations in December last no work has been done upon this improvement.

The work remaining to be done upon the river is to trim off points at a few abrupt bends, the most notable one being known as George's Bend, about 5 miles below Franklin, and to remove any snags that may have been overlooked during the late operations.

By act of Congress approved March 3, 1879, an additional appropriation of \$2,500 was made for this work. This amount (when available) together with the balance of the old appropriation will be devoted, as far as it will go, to the accomplishment of the work above indicated.

The two appropriations referred to above (\$7,500 in all) are the only ones that have been made for this work.

The Blackwater is in the collection-district of Norfolk and Portsmouth, Va. Commercial statistics are appended hereto.

Money statement.

July 1, 1878, amount available	\$5,000 00
Amount appropriated by act approved March 3, 1879	2,500 00
	\$7,500 00
July 1, 1879, amount expended during fiscal year	3,363 43
July 1, 1879, amount available	4 136 57
	7,350 00
Amount (estimated) required for completion of existing project	7,350 00
Amount that can be profitably expended in fiscal year ending June 30, 1881	7,350 00

Statement of shipments by Albemarle Steam-Navigation Company on Blackwater River from June 1, 1878, to June 1, 1879.

Direction.	Merchan- disc.	Guano.	Corn.	Salt.	Cotton.	Truck.	Fresh fish.	Salt fish.	Ice.	Tar.
	Pounds.	Pounds.	Pounds.	Pounds.	Bales.	Pks.	Pks.	Pks.	Lbs.	Bbls.
Inward	11,693,042	2,599,949	125,525	429,749	12,551	18,306	9,781	3,827	540	515
Outward	920,527									
Total	12,613,569	2,599,949	125,525	429,749	12,551	18,306	9,781	3,827	540	515

H 5.

IMPROVEMENT OF NORTH LANDING RIVER, VIRGINIA AND NORTH CAROLINA.

A survey of this river was directed by the river and harbor appropriation act approved June 18, 1878. The survey was undertaken in con-

nection with the survey of water routes south from the harbor of Norfolk, Va. It was commenced on the 7th of November and was completed on the 1st of December last; and a report upon same, accompanied by a plan and estimate of the cost of improvement proposed, was submitted on the 27th January, 1879, and was printed in House Ex. Doc. No. 68, Forty-fifth Congress, third session.

The improvement proposed consists in excavating a channel 80 feet in width at bottom and 9 feet in depth at an ordinary stage of water, at those points in the river where the above dimensions of channel are not to be found; in straightening the river at certain places where the bends are too abrupt for safe and easy navigation; and in removing about 70 logs and stumps which are found to obstruct the channel.

The estimated cost of the whole improvement proposed amounts to about \$88,000. This after omitting the estimates for cut-offs Nos. 3 and 5, at first proposed, but since abandoned. The act of March 3, 1879, appropriated \$25,000 for this work.

A project for the expenditure of this amount was submitted to the Chief of Engineers on the 5th of May, 1879, and was by him approved. It is proposed to devote the appropriation (when available) to carrying out the work above indicated as far as funds will permit. About 100,000 cubic yards of material will be dredged from the Blackwater Flats at the lower portion of the river, and the balance of funds that may then remain will be devoted to the removal of the worst of the obstructions in the upper river.

The appropriation referred to above is the only one that has been made for this work.

To complete the work proposed will require a further appropriation of \$53,000.

North Landing River is in the collection-district of Norfolk and Portsmouth, Va. Commercial statistics are appended hereto.

Money statement.

Amount appropriated by act approved March 3, 1879	\$25,000 00
July 1, 1879, amount available	\$2,000 00
Amount (estimated) required for completion of existing project	63,000 00
Amount that can be profitably expended in fiscal year ending June 30, 1881.	69,000 00

Number and class of vessels passed through the Albemarle and Chesapeake Canal from October 1, 1878, to July 1, 1879—nine months.

Months.	Steamers.	Schooners.	Sloops.	Barges.	Lighters.	Boats.	Rafts.	Total.
1878.								
October	262	113	44	17	51	11	11	500
November	257	101	54	24	50	1	12	499
December	263	106	51	23	41	7	13	504
1879.								
January	176	91	40	29	27			373
February	214	117	44	27	42	2	8	469
March	250	151	45	31	54	14	21	570
April	270	153	31	24	69	14	23	584
May	228	124	36	31	50	18	21	508
June	228	105	47	37	32	13	18	480
Total	2,148	1,061	392	243	416	98	138	4,496
North	1,072	530	197	123	208	49	138	2,317
South	1,076	531	195	120	208	49		2,179

Statement of inward receipts of leading items of produce received through the Albemarle and Chesapeake Canal from October 1, 1878, to July 1, 1879—nine months.

Month.	Bales of cotton.	Barrels of fish.	Barrels of naval stores.	Barrels of spirits turpentine.	Pounds of rags.	Pounds of iron.	Pounds of bacon.	Bushels of corn.	Cords of wood.	Bushels of peas and beans.	Railroad ties.	Bushels of potatoes.	Feet of lumber.	Shingles.	Staves.	Cords of juniper logs.	Passengers.
1878—October	14,656	109	1,155	71	7,450	3,200	920	6,450	193	561	2,735	9,156	2,062,264	3,363,550	55,730	202½	105
November	16,743	431	1,358	63	9,900	1,000	800	4,175	242	3,109	2,102	10,131	2,578,776	3,500,500	81,477	359	140
December	17,921	211	1,784	155	6,575	10,100	700	58,458	194	1,630	1,788	2,166	2,317,561	2,899,475	48,127	322	183
1879—January	11,724	338	1,062	99	8,000	1,600	900	58,897	201	748	2,641	1,267	1,439,308	1,204,600	62,644	133	126
February	7,694	264	2,533	168	10,000	6,300	10,900	73,226	214	818	2,641	4,875	2,220,756	1,978,000	83,143	136	136
March	2,607	543	3,633	413	25,428	23,450	12,550	62,698	361½	1,779	2,530	4,990	3,579,677	3,606,600	156,788	248	141
April	7,766	1,458	3,078	172	27,377	42,090	15,010	10,273	292½	730	4,779	3,911	5,116,363	4,528,375	122,405	174	146
May	3,372	6,872	2,386	86	30,600	52,210	1,570	3,473	231½	5,745	10,410	3,256	4,539,597	4,478,800	28,000	167	161
June	103	128	2,585	157	11,370	7,500	6,670	3,875	88	725	18,707	27,952	3,940,147	3,976,256	45,500	365½	121
Total	78,928	10,254	19,594	1,384	136,700	147,450	78,490	259,531	1,939	29,845	45,692	59,684	27,784,749	29,536,156	684,414	1,961	1,269

EXAMINATION AND SURVEY OF NORTH LANDING RIVER, VIRGINIA.

UNITED STATES ENGINEER OFFICE,
Norfolk, Va., January 29, 1879.

GENERAL: An act of Congress approved June 18, 1878, provided for an examination or survey of North Landing River, Va. The same act provided also for a survey of water routes leading south from the harbor of Norfolk, Va., specifying that one of the lines to be surveyed should be "the line known as the Albemarle and Chesapeake Canal line."

On the 13th of August last I had the honor to report to you that as the North Landing River formed a portion of the route of the Albemarle and Chesapeake Canal, it would necessarily have to be surveyed, in connection with the survey of water routes.

The field-work was undertaken by one of the two parties organized for the water-route survey, and was commenced as soon as the surveys of Currituck Sound and Pasquotank River could be completed; it being deemed prudent to defer North Landing until the last, the other localities being considered more healthy during warm weather. The party was in immediate charge of Mr. F. W. Frost, who was diligently assisted by Messrs. Burgwyn and Goode. The party was under the supervision of Major J. B. Shinn, my principal assistant upon the survey of water routes, who, in addition to this duty, had the supervision of the other party and various other duties to perform. The survey was commenced on the 7th of November and was completed on the 1st of December last.

Major Shinn's report upon the survey, accompanied by four tracings from the sixteen original field-sheets, is transmitted herewith.

Each tracing represents one of the 4 sections into which for convenience the river has been divided. Section D, showing the lower portion of the river, is on a scale of $\frac{1}{12000}$. The remaining sections, A, B, and C, showing the upper and more narrow portions of the river, are on a scale of $\frac{1}{1200}$.

Major Shinn, in his report, has described the manner of conducting the survey, stating the amount of triangulation required, number of soundings taken, &c. The greater part of the plotting was done in the field as the work progressed. The maps have been completed, and the tracings made at this office during the present month.

The southern terminus of the principal section of the Albemarle and Chesapeake Canal is at a point which is practically the head of North Landing River, as here the stream is formed by the junction of several small forks, which have their origin but a short distance above, in the swamp through which the canal passes.

The North Landing empties into Currituck Sound. The river is very wide as it nears the sound; and, in fact, the dividing line between river and sound is an entirely arbitrary one; but it is generally considered that the southwestern extremity of Faraby's Island is at the head of the sound, as the sheet of water is so much wider immediately below than above. The river to this point, from the terminus of the canal before referred to, is, by following the mid-channel line, almost exactly 17 miles in length, exceeding that distance by about 100 feet. The commercial importance of North Landing River arises almost altogether from the fact that it is a link in the chain of water communication between Norfolk Harbor and Albemarle Sound, via Albemarle and Chesapeake Canal Company's route. This gives rise to a very extensive through traffic, statistics in regard to which are appended.

The local traffic and the mechanical and agricultural interests of the river and adjacent country are small (except the lumber business, which is extensive), and are all referred to in detail in the accompanying report. The through traffic, however, is so extensive that it seems to warrant a liberal outlay for the removal of the numerous obstructions to navigation. These obstructions consist mainly of sand bars, an extensive mud flat above Faraby's Island, several abrupt bends that should be cut off, and a number of submerged stumps and logs at various points on the river. Major Shinn, in his report, goes into detail in regard to these obstructions, and gives a very careful and, as near as possible, an accurate estimate of their extent and cost of removal.

The estimates for the improvement are based upon a channel of the same dimensions as those adopted for Currituck Sound, viz, 80 feet in width at bottom and 9 feet in depth at mean low-water. The total cost of the improvement proposed amounts, as per accompanying estimate, to \$115,061.76. Major Shinn has prepared this estimate with much care, and it may be depended upon as reliable.

In my opinion, the importance of the through traffic fully warrants the expenditure of the above amount in order to effect the desired improvement. Should Congress see fit to provide funds for this improvement, the whole amount can be profitably expended in a single fiscal year; and it will be greatly to the interests of the work if the whole amount be given in one appropriation.

North Landing River is in the collection-district of Norfolk, Va.

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

CHAS. B. PHILLIPS,
Captain of Engineers.

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

REPORT OF MAJOR J. B. SHINN, ASSISTANT ENGINEER.

NORFOLK, VA., January 28, 1879.

In compliance with the requirements of section 2, act of Congress approved June 18, 1878, and in obedience to your verbal orders, I have the honor to report as follows upon an examination and survey of North Landing River, Virginia, and estimate of cost of improvements proper to be made.

The sources of North Landing River are to be sought for on both sides of the Virginia cut of the Albemarle and Chesapeake Canal, and the river flows in a southeasterly direction along the dividing line of Princess Anne and Norfolk Counties, entering the head of Currituck Sound on or about the boundary-line between the States of Virginia and North Carolina, a total distance on the channel-line of 17 miles.

Early in November, 1878, a party under my immediate direction, engaged in a survey of Currituck Sound, was directed to survey North Landing River; but in consequence of having to make other examinations and surveys under your orders was withdrawn, and another party employed elsewhere substituted for it.

This party, on the 7th of November, commenced a careful trigonometrical survey. Carrying a chain of triangulation, and recording about 8,000 soundings from Munden's Point, North Landing, the southern terminus of the Virginia cut of the Albemarle and Chesapeake Canal, of which North Landing River forms an intermediate link of slack-water navigation, and completed the field-work December 1, 1878.

During the progress of this work seven check bases were carefully measured as a test of accuracy of the triangulation, the reading of tides-gauges daily noted, and all the flags for terminal points of sounding-lines located by angular measurements from the triangulating stations, and about 8,000 soundings located in such favorable positions as to show, with the requisite degree of exactness, the channel as it now exists and the configuration of the river bed.

The results of the survey are graphically exhibited on tracings from the original maps executed in the field, which were necessarily on a large scale, in order that a large percentage of the soundings taken might be shown.

For convenience and description the river will be considered in four divisions, designated on the map as sections A, B, C, D; the first three of which are drawn on a scale of $\frac{1}{12500}$, and the last one, D, on a scale of $\frac{1}{12000}$.

SECTION A.

This section shows about 3 miles of river south from North Landing. The general direction of this portion of the river is southeast. North Landing (where a road leading to Norfolk crosses the canal by a wooden drawbridge) is a collection of some seven or eight houses, including one store, and is a place of no very great commercial importance, being simply a suburb of Roper City, which last takes its name from its proprietor, and lies on the left bank about one-third of a mile below. This is the only place of manufacturing industry on the river.

Here is found a large steam saw-mill, with a capacity for sawing 30,000 feet of timber per day, all of which is shipped North via the Albemarle and Chesapeake Canal, the logs being brought from the swamp on the right bank by rail or towed by steam-tugs through North Landing River.

The only other settlement on this section is at West Landing, $2\frac{1}{4}$ miles from North Landing, on the east or left bank, on what is known as Starvation Farm. About 50 acres of land, elevated 3 feet above the swamp, is cleared and partly cultivated, corn and sweet-potatoes being the staple products.

This section of the river flows through a swamp, the timber on which consists principally of gum and pine, with some scattering oak and ash. Three-fourths of a mile above West Landing is an abrupt bend known as the "Double S." This is treated of further on under the head of improvements, &c. No streams enter the river on this section.

SECTION B.

This section exhibits 5 miles of the river from the third to the eighth mile points. The general direction of this portion is south by east. West Neck Creek enters the river at the $3\frac{1}{4}$ mile point, a tributary of considerable importance, and now navigable for vessels drawing $5\frac{1}{2}$ feet for two miles from its mouth. At the fifth mile is Stumpy Tree Reach, extending south for 1,000 feet toward Etheridge's Wharf, a dilapidated and now abandoned landing. The general character of the river banks shown in this section is the same as in the preceding one, viz, low and swampy up to the $6\frac{1}{2}$ mile point, where the marsh begins, the swamps continuing on the left 1 mile farther. Beyond these points and extending throughout this section is one nearly unbroken fresh-water marsh. Here and there we find oak and pine trees skirting the shore at a distance of from 1 to 300 feet.

On the 5 miles of river represented on this section there are neither landings, towns, nor settlements.

SECTION C.

Four and three-quarter miles are represented on this section. On the left, at 8 miles, is Lawrence's Wharf, a landing for the regular mail-steamer, and is a place of but little commercial importance.

Pungo Ferry, at $9\frac{1}{4}$ miles, provides for the traffic on the county road, which crosses North Landing River at this place.

A small settlement of two or three houses sufficiently describes its importance. At $\frac{1}{2}$ a mile below Pungo Ferry a straight but shoal portion of the river is known as Gordon's Wood Yard Reach.

At 11 miles a grove of tall pines on the left bank, familiarly known as the Devil's Half Acre, is a prominent landmark, visible for miles both up and down the river. One-quarter of a mile below Devil's Half Acre the river turns abruptly to the south and for $\frac{1}{4}$ of a mile is known as Deep Bend, which terminates at the mouth of Blackwater Creek, a tributary of considerable importance, and navigable for vessels drawing 6 feet for a distance of $2\frac{1}{2}$ miles.

At Blackwater Creek the river increases in width and its direction changes from south to east and continues in an easterly course to Horse Point. The general character of the banks of this section is fresh-water marsh. On the west side of the river south of Blackwater Creek the marsh is known as Blackwater Flats.

This section properly terminates at Horse Point, $12\frac{1}{4}$ miles from the initial point.

SECTION D.

This section exhibits the river for $4\frac{1}{4}$ miles from Horse Point to the southernmost point of Farraby Island, which is at the mouth of North Landing River. The river increases in width from $\frac{1}{2}$ of a mile at Horse Point to nearly $1\frac{1}{2}$ miles at its mouth.

The same general character of banks continues. On the west side the Blackwater Flats are without settlement or cultivation. On the east side, a large percentage of the surface is in swamp, and covered with oak, pine, and gum trees. Occasionally we find a small patch of cultivated ground producing corn. Old Fairview Wharf, near to Munden's Point, was at one time a landing for vessels, but is now abandoned. The principal points on that section are Mill Dam, Green and Gibb's Points on the west side of the river, and Munden's and Wauk's Points on the east side.

Faraby Island extends in a northeasterly direction from the mouth of the river, with an average width of about 500 feet, and is nearly 1 mile in length. It is one unbroken marsh throughout.

COMMERCIAL STATISTICS, AND CHARACTER OF THE RIVER AND PROPOSED PLAN OF IMPROVEMENT.

Hereto is appended three tabular statements from the twenty-third annual report of the president and directors of the Albemarle and Chesapeake Canal Company for the fiscal year ending September 30, 1878. An examination of these tables will give a general idea of the commercial importance of North Landing River, regarded as an inland water-route.

To accommodate the largest class of vessels navigating this river, not only is a channel of sufficient depth required, but its width must be such as to enable any two to pass each other at any point of the channel. There are no lunar tides in Currituck Sound, and consequently none in North Landing River.

The water level is variable and governed by the wind, being elevated when it blows from southerly quarters and depressed by northerly winds.

The current is at all times gentle. The greatest rise and fall observed during the survey was 1 foot.

During heavy gales from northeast to northwest, the water is sometimes lowered as much as 2 feet, or even more. The river bed is for the most part composed of soft mud, with here and there small areas of sand and occasional obstructions in the form of logs and stumps.

The plan of improvement is to dredge the channel to a width of 80 feet at the bottom and to a depth of 9 feet throughout the entire length of the river wherever the same may be necessary. Beginning at the initial point near North Landing, a *full green line* marks the adopted mid-channel line throughout sections A, B, and C, and a *full red line* shows the same on section D.

Section A.—On this section the dredging required (which is continuous for 3 miles) amounts to 46,912 cubic yards, of which only 27 per cent. is sand, and the remaining 73 per cent. is soft mud. Although this provides for a channel 80 feet wide at the bottom and 9 feet deep throughout the entire section, it does not give the directness of water-way so imperatively demanded for the safe and easy navigation of the river.

Other improvements will be mentioned further on under the head of cut-offs.

Section B.—Five miles of the river is represented on this section, and the general direction of the channel is remarkably good, with a present average depth of water of 10 feet, and near the 8th-mile mark is found the maximum depth of the river, which is 30 feet. Near the 5th-mile mark is an abrupt bend and numerous stumps. Its improvement will be provided for under the head of cut-offs. No dredging is required in the channel on this section.

Section C.—The channel, with soft mud bottom, continues good in this section to a point about $1\frac{1}{2}$ miles below Pungo Ferry, with the exception of a narrow water-way immediately below the 9-mile mark. The material is soft mud, and the dredging required is too small in amount to demand an estimate. Half a mile below Pungo Ferry we enter Gordon's Wood Yard Reach, where some dredging is required through very hard sand and clay. Beyond the bend, and beginning at the 11-mile point (Devil's Half Acre), another shoal of hard sand will have to be cut through; and, taken together, these two reaches are justly regarded as the worst part of the river. Steamers frequently get aground in Gordon's Wood Yard Reach and remain there until a southerly wind raises the water sufficiently high to float them off. The total amount of dredging required is 19,702 cubic yards, hard sand and clay. There is also another obstruction between these 2 bars and opposite Devil's Half Acre. A large dredge was captured here during the civil war, and sunk after the upper work had been burned. It is not known whether the engines and boilers have been removed or not. Very hard sand now covers the wreck, and as it would not sink in such material, the presumption is that the wreck has caused the formation of the bar.

This obstruction should be removed if the channel is dredged as above indicated. The cost of removal is estimated at \$1,800. More will be said on this subject under the head of cut-offs.

At $11\frac{1}{2}$ miles from the initial point we enter "Deep Bend," the straightest and best reach on the river. This reach terminates at Blackwater Creek, at the mouth of which begins the Blackwater Flats, through which, and extending to Farraby Island,