

APALACHICOLA BAY, FLA.

LETTER

FROM

THE SECRETARY OF WAR

TRANSMITTING

WITH A LETTER FROM THE CHIEF OF ENGINEERS REPORTS ON
PRELIMINARY EXAMINATION AND SURVEY OF APALACHICOLA
BAY, FLA.

DECEMBER 8, 1925.—Referred to the Committee on Rivers and Harbors and
ordered to be printed, with illustration

WAR DEPARTMENT,
Washington, December 7, 1925.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

MY DEAR MR. SPEAKER: I am transmitting herewith a letter from the Chief of Engineers, United States Army, of the 4th instant, together with reports dated April 27, 1921, and February 25, 1924, with map, by Maj. J. J. Loving, Corps of Engineers, on preliminary examination and survey, respectively, of Apalachicola Bay, Fla., authorized by the river and harbor act approved June 5, 1920.

Sincerely yours,

DWIGHT F. DAVIS,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 4, 1925.

Subject: Preliminary examination and survey of Apalachicola Bay, Fla.

To: The Secretary of War.

1. There are submitted herewith, for transmission to Congress, reports dated April 27, 1921, and February 25, 1924, with map, by Maj. J. J. Loving, Corps of Engineers, on preliminary examination and survey, respectively, of Apalachicola Bay, Fla., authorized by the river and harbor act approved June 5, 1920.

2. Apalachicola Bay and St. George Sound form between them a body of water about 45 miles long and 8 miles wide on the south coast of Florida, separated from the Gulf by low narrow islands. There are three natural entrances—West Pass, East Pass, and St. Vincent Sound. The Apalachicola River enters the bay from the north, and the town of Apalachicola is situated at its main mouth. The United States has improved the locality under a project calling for a channel 18 feet deep and 150 feet wide through West Pass and Link Channel, the latter being a channel through certain shoals just inside the bay; for a channel 10 feet deep at mean low water and not less than 100 feet wide thence to the town of Apalachicola; and for a channel 9 feet deep at mean low water and 100 feet wide through Bulkhead Shoals. The latter is a short section to the east of the town tending to facilitate the movement of commerce between Apalachicola and St. George Sound. In House Document No. 860, Sixty-fourth Congress, first session, the Chief of Engineers recommended the abandonment of the West Pass and Link Channel improvements. Congress has taken no action on this recommendation. Mean range of tide is 2 feet.

3. Apalachicola and adjacent communities have a total population of about 5,000 and form the center of a considerable fishing, oyster, and shrimp industry, employing some 200 boats of light or moderate draft. Several sawmills are also located at the town. Water-borne commerce for 1924 was 26,700 tons coastwise, principally sea food and lumber products. The Apalachicola River, which in its lower section has a project depth of 6 feet, carries, together with certain tributaries, a considerable light-draft commerce.

4. In his report of preliminary examination the district engineer discussed the initial request of local interests, which was for a channel 20 or 22 feet deep from the Gulf to the town. He made an approximate estimate of 134,000 tons of new commerce which might result from this improvement, together with a saving of \$50,000 a year on existing commerce. The Board of Engineers for Rivers and Harbors, after studying the case and holding a hearing, considered that the benefits from such a channel would be too uncertain to justify its great cost. Consideration was accordingly limited to channels of 12 feet or less, on which basis a survey was made.

5. The district engineer presents estimates for three alternative 12-foot channels of 100-foot bottom width as indicated on the attached map, as follows:

Route 1.....	\$124, 000
Route 2.....	173, 000
Route 3.....	35, 000

Route 2 was the one most favored by local interests, but the district engineer, after detailed investigations, which are discussed in his report of survey and in a supplementary report, arrives at the conclusion that maintenance thereof would be extremely expensive on account of the large annual movement of silt out of certain supplementary mouths of the river. He believes that route No. 1 would be the most suitable for a 12-foot depth. He does not, however, consider that there is adequate justification for this depth. The fishing vessels, and a light-draft side-wheel steamer which operates to Carrabelle, are in general adequately served by existing depths.

The only other general commerce of importance is carried in a single small steamer known as the *Tarpon*, which has a loaded draft of 8 feet. This vessel makes regular trips between Apalachicola and points to the east and west. It is sometimes forced to underload on account of shoaling in the bay, but the cost and delay incident thereto are not, in the opinion of the district engineer, sufficient to justify the considerable expense of an increase in existing depths. He questions the claim of local interests that a deeper-draft steamer might be put on if further improvement were made, and points out, moreover, that if this occurred it would probably involve the removal of the *Tarpon*, since there does not appear to be sufficient potential commerce for two such carriers. He states, however, that the governing depth in the section of the present channel between the southern section of the bar at the mouth of the river and the inner or eastern section of Link Channel is less than the 10 feet now being provided by maintenance across the bar at the mouth of the river, and that this condition should be corrected. He also believes desirable a 10-foot channel by route No. 1 from the town to East Pass. His estimate for this work is \$55,000, with maintenance at \$24,000 on the second year after completion and \$14,000 thereafter; the latter figure being additional to the present maintenance estimate of \$15,000.

6. The division engineer does not believe that the proposed work would serve any more useful purpose than somewhat to facilitate the operations of the steamer *Tarpon*, and recommends against any modification of the existing project.

7. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith. The board discusses the serious maintenance problem in Apalachicola Bay resulting from the enormous deposits of silt from the Apalachicola River, estimated at 15,000,000 cubic yards annually. It points out that, as a result of this, the expense involved in maintaining a channel adequate for general ocean shipping would be far in excess of any probable benefits. It concurs with the division engineer that the benefits of a 10-foot channel to East Pass would not be sufficient to justify the cost involved. It believes that the economic situation at the locality does not justify anything beyond the provision of an adequate 10-foot approach to Apalachicola from the Gulf by the cheapest route, together with maintenance of the 9-foot channel through Bulkhead Shoals, which at almost no cost considerably facilitates navigation to the eastward. It prefers, however, to withdraw its previous recommendation for abandonment of the 18-foot channel through West Pass and Link Channel, substituting therefor a provision for a 10-foot channel over the same sections to correspond to the depth provided within the bay. Present natural depths in West Pass and Link Channel are in excess of 10 feet, so that this latter recommendation involves no new work and may never involve maintenance operation, but the board believes that the Chief of Engineers should have authority to undertake it if it should become necessary.

8. After due consideration of the above-mentioned reports, I concur in the views of the Board of Engineers for Rivers and Harbors. Apalachicola Bay is naturally a shallow body of water with a bottom composed largely of soft silt brought down by the Apala-

chicola River. Large quantities of this deposit are added annually. The communities involved are small, and in view of the resources of the neighboring country, the railway net and rate structure, and the existence of neighboring deep-water ports, it is unlikely that a channel for ocean vessels would result in any material commercial or economic benefits of national scope, even were the Government prepared to undertake the very large annual expense involved in maintaining it. The present project provides for an 18-foot channel into the bay, a 10-foot channel thence to the town, and a 9-foot channel over the worst shoal to the east of the town. The 10-foot and 9-foot channels are justified by the existing coastwise commerce and sea-food industry. The depth of 18 feet in the western approach channel is inappropriate to the 10-foot depth within, but instead of abandoning an improvement of this section the project should be modified to provide for the same depth of 10 feet, thus permitting the department to guarantee such a channel all the way from the Gulf in the event that future shoaling in West Pass renders it necessary. I therefore report that modification of the existing project for Apalachicola Bay, Fla., is deemed advisable to the extent of providing for a channel 10 feet deep at mean low water, 150 feet wide from the Gulf through West Pass and Link Channel, and 100 feet wide thence to the town of Apalachicola, and for a channel 9 feet deep and 100 feet wide through Bulkhead Shoals. No specific appropriation is necessary for the work, which is limited to maintenance.

H. TAYLOR,
Major General, Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

SYLLABUS

The Board of Engineers for Rivers and Harbors concurs with the district and division engineers in the opinion that a channel for ocean vessels is not now justified by the existing and prospective commerce. It recommends modification of the existing project so as to provide for a channel 10 feet deep at mean low water, 150 feet wide from the Gulf through West Pass and Link Channel, and 100 feet wide thence to the town of Apalachicola, and a channel 9 feet deep and 100 feet wide through Bulkhead Shoal. No funds will be required except for maintenance.

[Third indorsement]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., October 20, 1925.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. The following is in review of the reports on preliminary examination and survey authorized by the river and harbor act approved June 5, 1920, of Apalachicola Bay, Fla.

2. Apalachicola Bay is a generally shallow body of water about 8 miles wide and 14 miles long, lying between the mainland of Florida and a sandy key, known as St. George Island, 160 miles east of Pensacola. Extending 31 miles to the east of Apalachicola Bay is St. George Sound, which is really part of the same body of water. The Apalachicola River enters Apalachicola Bay from the north. The town of Apalachicola lies at the mouth of the river. There are

three natural entrances to the bay, St. Vincent Sound and West Pass at the western end and (via St. George Sound) East Pass, all connecting with the Gulf. Apalachicola Bay is under improvement by the Federal Government under a project providing for a channel 18 feet deep at mean low water and 150 feet wide from the Gulf through West Pass into the bay, and through certain shoals just inside the Pass, this latter section being known as Link Channel; for a channel 10 feet deep at mean low water and not less than 100 feet wide thence to the water front of the town; and for a channel 9 feet deep and 100 feet wide through Bulkhead Shoals. That portion of the project covering West Pass and Link Channel has not been maintained for some years, and in House Document No. 860, Sixty-fourth Congress, first session, it was recommended for abandonment. Congress has taken no action on this recommendation. The present governing depth through this section is 12 feet. Natural channels and the improved Bulkhead Shoals channel permit navigation from the city east, via St. George Sound, to East Pass and the Gulf or to Carrabelle Harbor. The present governing depth over this route is 7.8 feet. Mean range of tide is 2 feet.

3. Local interests have in the course of the investigation requested several alternative improvements, which are discussed below:

4. The town of Apalachicola and two smaller adjacent communities have a total population of about 5,000. The city is the center of a considerable fishing, oyster, and shrimp industry, in which are engaged approximately 200 boats, principally light draft. There are also saw-mills supplied by timber stands in the neighborhood, or by logs rafted from other points. The water-borne commerce in the past 12 years has varied from 15,000 tons to 43,000 tons, with no decided trend up or down. In 1924 it was 26,700 tons coastwise, the principal items being receipts of shrimp, fish, oysters, and rosin, and shipments of rosin and lumber, with small movements of miscellaneous commodities. In the same year the Apalachicola River and certain improved tributaries, with project depths of 6 feet or less, carried an internal commerce of 210,000 tons, of which over 80 per cent was sand, gravel, and logs.

5. The water-borne commerce of Apalachicola Bay, other than that handled by fishing boats or consisting of floated or rafted logs, was carried almost entirely in a small coastwise steamer, known as the *Tarpon*, drawing 8 feet loaded, but sometimes loading to a lesser draft. This boat makes periodical trips from Mobile to Carrabelle, thence through St. George Sound and Apalachicola Bay to Apalachicola, and out through the West Pass, calling at other Gulf points to the west before returning to Mobile. There is also a side-wheel steamer of light draft operating between Apalachicola and Carrabelle.

6. At the time of the preliminary examination, local interests desired a channel 20 or 22 feet deep from the Gulf to Apalachicola. The district engineer made a commercial survey based on this proposal, and arrived at an approximate estimate of 134,000 tons of new commerce which might be developed as a result of the improvement. The principal items were cotton, lumber, naval stores, and shell grit, from the tributary territory near to and north of Apalachicola, destined for export or coastwise shipment. He also estimated a saving of about \$50,000 a year on the cost of moving the existing commerce. The board, after making a careful study of the available data and holding

a hearing, believed the benefits too problematical to justify so expensive an improvement, and a survey was ordered with a view to considering channel depths of 12 feet or less.

7. In the report of survey, the district engineer considers three possible routes for a 12-foot channel, indicated on the attached map as routes 1, 2, and 3. His estimates for such a channel, 100 feet wide on the bottom, are as follows:

Route 1.....	\$124, 000
Route 2.....	173, 000
Route 3.....	35, 000

8. Discussing the advantages of the proposed work, he points out that the respective savings and commerce estimated in the report of preliminary examination were not applicable in the case of a 12-foot channel, which would not permit regular ocean vessels to enter; and that the benefits of such a channel would be largely restricted to the immediate vicinity of Apalachicola. The local traffic in sea food, while of considerable magnitude, is handled in boats for which, in general, the existing 10-foot depth is ample. The steamer *Tarpon* is sometimes unable to load to full draft on account of shoaling in the bay, but as it draws a maximum of only 8 feet, it does not require a 12-foot depth. There has been some talk of putting on a larger and more efficient boat in case deeper water were provided. The district engineer states, however, that there is no adequate evidence that this will be done, and believes further that, if it were done, it would probably mean the withdrawal of the *Tarpon*, as apparently there is not sufficient general commerce, present or immediately prospective, to justify two such boats.

9. The district engineer considers the merits of the alternative 12-foot channels, arriving at the conclusion that the most satisfactory of the three is route No. 1. He discusses at some length the physical conditions along No. 2, which is the most favored by the locality, and comes to the conclusion that, contrary to local belief, this channel would shoal up rapidly and require expensive maintenance. Considering, however, the commercial situation as outlined above, he feels that there is no adequate justification for a 12-foot channel by any of the routes. Nevertheless he believes that, in view of the existing traffic east of Apalachicola, some improvement of this section of the bay is desirable, and proposes a 10-foot channel from the south end of the present bar channel to East Pass, following route No. 1. He points out further that the governing depth in the section between the south end of the bar channel and the Link Channel is less than the 10 feet provided in the bar channel, and considers that this should be corrected by providing a 10-foot depth over this stretch. His estimate for the proposed work is \$55,000, with maintenance estimated at \$24,000 on the second year after completion and \$14,000 for the third and succeeding years. These figures are in addition to \$15,000 annually for maintaining the present 10-foot project.

10. The division engineer considers that, if additional facilities were required, those proposed by the district engineer would be the most advantageous. He points out, however, that the only apparent useful purpose which the proposed improvement would serve would be to facilitate the operation of the *Tarpon*. He feels that the very limited benefits which would result do not justify the con-

siderable expenditures, both for first cost and maintenance, involved in the proposed work. He therefore recommends no modification of the existing project.

11. In its consideration of the case, the board has held two hearings, and has sent a representative to make a personal inspection of the locality. It also called for a supplementary report covering in greater detail the possible shoaling along route No. 2, and other aspects of the case. This report, dated July 2, 1925, contains detailed data which, in the opinion of the board, substantiate the previous views of the district engineer that route No. 2, if dredged, would require expensive maintenance, on account of sediment from the St. Marks and Little St. Marks Rivers, secondary mouths of the Apalachicola, and also from the Apalachicola proper. Diversion of the flow of the two first-named rivers appears impracticable at a reasonable cost. In the supplementary report, the district engineer also states that there is no route alternative to the ones previously discussed, either along the north shore of St. George Sound or due south from the present 10-foot channel through St. George Island to the Gulf, which would be more efficient and economical than those previously proposed. He considers further the possibility of constructing a dike on the east side of the present 10-foot channel with a view to reducing maintenance costs, but believes that a pile and timber dike at this locality, which would cost at least \$45,000, would probably be soon destroyed by wave action as was a former one, while the expense of a rock dike would be prohibitive.

12. The Apalachicola River discharges annually an immense quantity of silt, which has been estimated at more than 15,000,000 cubic yards. A channel adequate for ocean carriers, no matter how located, would be subject to continuous shoaling from this source, and its maintenance would be extremely expensive. While the territory north of the bay or along the Apalachicola and Chattahoochee Rivers produces a considerable quantity of agricultural and forest products, there is no adequate evidence that the movement of these is not reasonably well served by facilities now existing here or at convenient deep-water ports; or that the establishment of a port for ocean vessels at Apalachicola would result in the economic diversion of any material amount of the commerce of this tributary territory.

13. No channel of less depth than 20 feet can be expected to provide for seagoing vessels of a size which would be adequate for general commerce. Such lesser depths must therefore be considered as affecting solely the town of Apalachicola and the immediately adjacent territory. As stated by the district engineer, the fish and lumber trade of the port appears to be served with reasonable adequacy by the existing channels. The only remaining movement of importance is the coastwise traffic in the small steamer *Tarpon*. It does not appear that the delays which the boat sometimes meets, or the underloading which it must sometimes practice, involve a loss commensurate with the cost of providing a 12-foot channel, or even of providing a 10-foot channel, east from Apalachicola. Neither is there sufficient evidence that the deeper channel would result in a larger boat being put on, or that, if it were put on, any important general benefits would result.

14. The board concludes that there is no justification for any further improvement of Apalachicola Bay than one which will furnish

a 10-foot channel from the Gulf to the city by the most economical route, together with a channel 9 feet deep through Bulkhead Shoal to the east. This is provided for under the existing project. The department has, however, recommended the abandonment of West Pass and Link Channel. As these have depths in excess of 10 feet, their abandonment would have no immediate practical effect on navigation. Nevertheless, shoaling may occur in them at a later date, and the department should have authority, in such an event, to maintain them to the same depth as the inner channels to which they are an approach. The board therefore withdraws its previous recommendation for abandonment of West Pass and Link Channel, and recommends that the existing project for Apalachicola Bay, Fla., be modified to provide for a channel 10 feet deep at mean low water, 150 feet wide through West Pass and Link Channel, and 100 feet wide thence to the town of Apalachicola, and for a channel 9 feet deep and 100 feet wide through Bulkhead Shoal. No initial appropriation to meet first cost is necessary, as the work involved falls within the scope of maintenance of the existing project.

15. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects which could be coordinated with the project proposed in such manner as to render the improvement advisable in the interests of commerce and navigation.

For the board:

HERBERT DEAKYNE,
Colonel, Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF APALACHICOLA BAY, FLA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Montgomery, Ala., April 27, 1921.

From: The District Engineer.

To: The Chief of Engineers, United States Army.

(Through the Division Engineer.)

Subject: Preliminary examination of Apalachicola Bay, Fla.

1. The following report on preliminary examination of Apalachicola Bay, Fla., is submitted in compliance with instructions contained in a letter¹ from the Chief of Engineers, dated June 30, 1920. The authority for this examination is contained in section 2 of the river and harbor act approved June 5, 1920, which contains a provision as follows:

The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following named localities, and a sufficient sum to pay the cost thereof may be allotted from the amount provided in this section:

*	*	*	*	*	*	*
Apalachicola Bay, Fla.						
*	*	*	*	*	*	*

2. Apalachicola Bay is situated on the coast of northwest Florida, in latitude 29° 40' north, and longitude 85° west, 160 miles east of

¹ Not printed.

Pensacola Harbor. The nearest ports are St. Andrews and St. Josephs Bays to the west and, Carrabelle Harbor to the east. The entrance into St. Andrews Bay is 76 miles west of East Pass, which is the main commercial entrance to the waters under consideration. East Pass is also the entrance to Carrabelle Harbor. From the town of St. Andrews to Apalachicola via East Pass is 175 miles. The distance from Apalachicola to Carrabelle is $27\frac{1}{2}$ miles. From Port St. Joe, on St. Josephs Bay, to Apalachicola via East Pass is 87 miles.

3. Apalachicola Bay is 14 miles in length, extending easterly and westerly, and has an average width of $8\frac{1}{2}$ miles, embracing 119 square miles of area. The town of Apalachicola, situated on the northern shore at the mouth of the Apalachicola River, is 14 miles from the Gulf of Mexico by way of West Pass. The map¹ accompanying this report was traced from United States Coast and Geodetic Survey Charts Nos. 182 and 183, and shows the locality under consideration. This bay is prolonged to the eastward by St. George Sound, the two constituting a single body of water, separated from the Gulf of Mexico throughout most of its length by a low, narrow, and sandy island known as St. George Island. St. George Sound includes the waters to the east of Bulkhead Shoals, which are 6 miles southeast of the principal mouth of the Apalachicola River. The sound has a length of 31 miles, a width of $4\frac{1}{2}$ miles, and an area of approximately 132 square miles. Included within the tidal basin of Apalachicola Bay are St. Vincent Sound and East Bay. St. Vincent Sound lies to the west, separated from the Gulf of Mexico by St. Vincent Island, while East Bay extends to the northeast and receives the discharge from several mouths of the Apalachicola River.

4. In Apalachicola Bay the depths are generally shallow, varying from 3 to 12 feet. Here the bottom is composed of mud, with the exception of numerous and extensive oyster bars, which vary in thickness from 4 to 7 feet. The bay and connecting sounds are tidal throughout, with a normal tidal oscillation of $2\frac{1}{2}$ feet, very much affected by the winds. Apalachicola River, with its various mouths emptying into the bay, discharges an enormous quantity of sediment, which during the action of past years has shoaled what was probably at one time a rather deep water area. In St. George Sound the depths vary from 3 to 16 feet, with a bottom composed of fine, hard sand.

5. Apalachicola Bay has two entrances from the Gulf of Mexico. Indian Pass, at the extreme west end of St. Vincents Sound, is a narrow, shallow opening, which has little or no influence on the waters of the bay. West Pass, lying between Sand Island and St. Vincent Island, is the commercial entrance from the west, and governs the tidal flow. Experience has shown that the channel through this entrance is unfixed, with a strong shoaling tendency below a depth of 12 feet. The natural conditions have for many years maintained this depth. In 1838 the channel depth through this pass was 12 feet.

6. St. George Sound also has two entrances from the Gulf. The most easterly of these entrances is wide and shallow, extending from Dog Island on the west to Southwest Cape on the east. This entrance is $12\frac{3}{4}$ miles wide and is unsuited and unused for commercial purposes except by shallow-draft vessels. The controlling depth is about 12 feet. East Pass, the main and commercial entrance, lies

¹ Not printed.

between Dog Island on the east and St. George Island on the west. This entrance is nearly 3 miles wide. From East Pass to the wharves at Apalachicola the distance by channel is 23 miles, and from West Pass to Apalachicola the distance by channel is 14 miles.

7. Previous reports with reference to this locality have been rendered as follows:

(a) In 1871, by Capt. A. N. Damrell (House Ex. Doc. No. 241, 42d Cong., 2d sess.), recommending the dredging of a channel 100 feet wide and 10 feet deep through the shoal at the mouth of the Apalachicola River, at an estimated cost of \$100,000. No appropriation was made pursuant to this report.

(b) In 1879, by Capt. A. N. Damrell (House Ex. Doc. No. 82, 45th Cong., 3d sess.), containing the report of a survey to determine what changes, if any, had taken place since the previous survey of 1871. The same estimate was submitted as given above. Subsequent river and harbor acts contained appropriations to prosecute the work as recommended.

(c) In 1896, by Maj. F. A. Mahan (House Doc. No. 129, 54th Cong., 2d sess.), favorable to the dredging of a channel 100 feet wide and 18 feet deep from Apalachicola through Link Channel and West Pass to the Gulf of Mexico, at an estimated cost of \$350,000 and from \$20,000 to \$30,000 annually for maintenance. This project was adopted by river and harbor act of March 2, 1899, and continued in force until 1907, when it was superseded by the present project.

(d) In 1899, by Capt. C. A. F. Flagler (House Doc. No. 63, 56th Cong., 1st sess.), recommending dredging a channel 20½ feet deep and 150 feet wide at East Pass entrance to Carrabelle Harbor, Fla., at an estimated cost of \$27,450. This project was adopted by act of June 13, 1902, and is the existing project for East Pass.

(e) In 1905, by Capt. J. B. Cavanaugh (House Doc. No. 422, 59th Cong., 1st sess.), recommending modification of the project for Apalachicola Bay so as to provide for a channel across the bar at the mouth of the Apalachicola River not less than 100 feet wide and 10 feet deep at mean low water; and for a channel not less than 150 feet wide and 18 feet deep through Link Channel and West Pass to the Gulf of Mexico, at an estimated cost of \$85,000, and \$17,000 annually for maintenance. This modification was adopted by the act of March 2, 1907, and constitutes the present project for Apalachicola Bay. No change in the project for East Pass was recommended.

(f) In 1911, by a special board of engineers (House Doc. No. 1057, 62d Cong., 3d sess.). This report was made in compliance with an item of the river and harbor act approved June 25, 1910, as follows:

Apalachicola Bay and St. George Sound, with view to determining best location for a deep-water harbor with entrance channel from the Gulf by way of East Pass, New Inlet, or by an artificial cut across St. George Island, consideration being given to the respective needs of the cities of Apalachicola and Carrabelle for increased harbor facilities.

The conclusions of the board are stated in the following extract:

Deep water to Apalachicola can be secured by several routes: By the present East Pass route, a distance of 21 miles; by the present West Pass route, a distance of 17.8 miles; by a direct route via West Pass, a distance of 15.7 miles; and by a direct route via New Inlet, a distance of 10.6 miles. From information presented to the board it seems certain that the improvement will cost from a million and a half to three million dollars, according to the route selected, and that the cost of maintenance will be at least 5 per cent per annum of the initial cost—ex-

penditures that are far greater than justified by present or immediately prospective commerce. Moreover, as Congress has approved a project for improving St. Andrews Bay, Fla., and constructing a canal connecting the Chattahoochee-Flint-Apalachicola-Chipola River system with that bay (see H. Doc. No. 12, 61st Cong., 1st sess., and H. Doc. No. 670, 61st Cong., 2d sess.), and it is supposed that this canal and harbor will satisfy the demands of the river system, it does not appear, in the opinion of the board, advisable to undertake the construction of any other channels at this locality prior to the completion of the canal from Apalachicola River to St. Andrews Bay and a demonstration of the results of the above projected improvement upon river commerce. It is thought advisable, however, that the projected dimensions of the canal connecting this river system with St. Andrews Bay should be increased so that a least depth of 7 feet and ample width be available to make certain that boats from the river may be able to proceed uninterruptedly to deep water, and the new conditions brought about by the canal may be given a fair test.

(g) In 1913, by Maj. Earl I. Brown (House Doc. No. 816, 63d Cong., 2d sess.), unfavorable to the proposal to abandon the project for the maintenance of the present main channel and to open a new channel through Crooked Channel.

(h) In 1913, by Maj. Earl I. Brown (House Doc. No. 834, 63d Cong., 2d sess.), unfavorable for a channel to East Pass from the Apalachicola River, Fla., by way of Crooked Channel, with a view to providing a suitable ship channel. Crooked Channel is a minor channel through the bar at the mouth of the river, extending eastward from the present dredged channel. The report states that this route and others which have been considered are not suitable for a ship channel, as "they are all open to the insuperable objection that they lie in the exposed waters of an open bay, whose bottom is covered with soft silt to an unknown depth."

(i) In 1915, by Maj. Earl I. Brown (House Doc. No. 860, 64th Cong., 1st sess.), containing a report of preliminary examination of West Pass, with a view to providing a depth of 22 feet through the pass and up to the town of Apalachicola. The report was unfavorable to this proposed improvement, and furthermore recommended the abandonment of the existing project through West Pass and Link Channel. In this document stress was laid upon the fact that an outlet to deep water for the commerce of the Apalachicola system would be afforded by the inland waterway connecting the Apalachicola River with St. Andrews Bay.

(j) In 1917, by Capt. C. L. Sturdevant (House Doc. No. 316, 65th Cong., 1st sess.), unfavorable for a channel to East Pass from the docks at Apalachicola, Fla., through St. George Sound to the Gulf of Mexico, on such route as may be most desirable for the demands of commerce.

8. West Pass is connected with a contracted anchorage by Link Channel which has a navigable depth of 16 feet. From this anchorage to the city of Apalachicola the controlling depth is 10 feet. East Pass is connected at its harbor end with two anchorages, one to the eastward and one to the westward. The depth in the eastern anchorage is about 24 feet and in the western 19 feet. The latter extends some 2 miles farther to the west, where vessels drawing 16 feet may be anchored.

9. The existing project for Apalachicola Bay was adopted by the river and harbor act of March 2, 1907. (H. Doc. No. 422, 59th Cong., 1st sess.) This provides for a channel from the Gulf of Mexico not less than 150 feet wide and 18 feet deep at mean low water through West

Pass and Link Channel, and a channel across the bar at the mouth of the Apalachicola River not less than 100 feet wide and 10 feet deep at mean low water. The length of the 18-foot channel to be dredged was 5,280 feet at West Pass and 5,000 feet in Link Channel; and of the 10-foot channel, 10,300 feet. The 18-foot channel has been 20 per cent completed, while the 10-foot channel at the mouth of the river has been completed. At the end of the fiscal year 1920 the United States had expended a net total of \$559,256.59 on these improvements, exclusive of the channel through East Pass, which has been dredged and maintained in connection with the improvement of Carrabelle Bar and Harbor. The project for the improvement of East Pass provides for a channel $20\frac{1}{2}$ feet deep and 150 feet wide. This channel has been easy to maintain. The present controlling depths over the route from East Pass to Apalachicola are: In East Pass 22 feet, thence to the anchorage 19.5 feet; from the anchorage to the river bar channel 9 feet; in the river bar channel, 10 feet. The controlling depths from West Pass to the town are: In West Pass, 12 feet; in Link Channel, 16 feet; between Link Channel and the river bar channel, 10 feet.

10. A more detailed description of existing navigation facilities is here given. Through East Pass the depth at mean low water is 22 feet, width 200 feet; thence to the western limits of the upper anchorage, a distance of 4 miles, 19.5 feet, with a varying width of one-half to three-fourths mile; for the next $5\frac{3}{8}$ miles, 9 feet deep, width 600 feet; for the next $1\frac{3}{4}$ miles, 14 feet depth with a width of 300 feet; for the next $10\frac{1}{8}$ miles or to the dredged channel leading direct to Apalachicola, 10 feet. Of last portion, or through the Bulkhead Channel where the width is 100 feet, the length is 1,300 feet. Entering the dredged channel the depth for the first 2 miles is 10 feet and width 100 feet; for the next mile the depth is 15 feet and width 100 feet. By way of West Pass entrance to Apalachicola the channel facilities are: For the first 3,520 feet, 12 feet, width 800 feet; for the next $1\frac{1}{2}$ miles, 16 feet, width 2,640 feet; for the next mile, 19 feet, width 600 feet; for the next mile, 21 feet, width 1,000 feet; for the next $2\frac{1}{2}$ miles, depth 25 feet, width more than 900 feet; for the next mile, 16 feet, width 100 feet. This last distance $7\frac{1}{8}$ miles from the Gulf reaches the Lower Anchorage, which area is $2\frac{1}{8}$ miles long by nearly one-fourth mile in width, having depths varying from 19 to 25 feet. From the Lower Anchorage to the south end of the dredged channel leading to Apalachicola is $6\frac{1}{2}$ miles, with a depth of 10 feet, width one-half mile. Over the last named distance the bottom material is soft mud; from the Lower Anchorage to the sea the material is sand.

11. The existing terminals at Apalachicola consist of small landings for river and coastwise steamboats and fishing boats. They are built along the water front on piles, bulkheaded, and filled in. There are no public wharves, but two of the existing terminals are open to all on equal terms; and these have rail connections with the Apalachicola Northern Railway. None of these terminals have any special freight-handling appliances. The present facilities are considered ample for existing commerce. There is a site owned by the municipality suitable for the construction of a public wharf. Its location is indicated on the accompanying map.

12. The only port that can be considered competitive is St. Andrews, on the west. The existing improved channel at the entrance

to St. Andrews Bay has a mean low-water depth of 22 feet and width of 200 feet. This bay is deep, spacious, and protected against storms. From the anchorage to the gulf is 9 miles; from the gulf to sheltered water, 2 miles. The length of the anchorage east and west having a depth of 30 feet and over is 15 miles. The controlling depth of 22 feet obtains to the town of St. Andrews. The distance from this town to Apalachicola by way of East Pass is 175 miles. The normal tidal range in St. Andrews Bay is 2.5 feet.

13. St. Andrews Bay is connected with the Chattahoochee River system by a canal the project dimensions of which are 5 by 65 feet. These dimensions, with a slight narrowing in a few places, now obtain. The length of the canal actually constructed was about 15 miles. The remaining $21\frac{1}{2}$ miles was natural waterways. The distance from St. Andrews to the Apalachicola River by way of the canal is $59\frac{1}{2}$ miles; from the 25-foot contour in St. Andrews Bay to the Apalachicola River is $45\frac{1}{2}$ miles; from this point to Apalachicola is 6 miles.

14. Existing terminals of St. Andrews Bay consist of a timber wharf at Panama City extending to 24 feet of water. It is provided with a warehouse but no mechanical handling devices. This wharf is the property of the Atlanta & St. Andrews Bay Railroad, whose tracks connect therewith and is open to all carriers on equal terms. It is at present in an unserviceable condition due to destruction of piling by teredo. In addition to the above, there are nine other smaller wharves located at the various towns on St. Andrews Bay and owned by the lumber companies and other private enterprises in connection with their business. These facilities appear to be adequate for present commerce.

15. The population of Apalachicola is 3,500. The combined banking facilities of the two banks is \$800,000. The combined population of St. Andrews, Panama City, and Millville is 5,000, the three being practically one town. The banking facilities of St. Andrews and Panama City are \$1,900,000.

16. The manufacturing activities of Apalachicola consists in sawmills, oyster and shrimp canning factories, shell grit (chicken feed) factories, electric lighting plant, waterworks and ice plant. The business activities consist in the support of these. In addition there are turpentine stills in the contiguous territory. These industries are classified as follows:

Four saw mills, annual output estimated at 35,000,000 feet board measure, or 70,000 tons, valued at-----	\$2, 100, 000
Naval stores, approximate annual output 8,000 barrels, or 2,000 tons, valued at-----	156, 400
210,000 cases of oysters and shrimp, or 252 tons, valued at-----	780, 000
16,000 tons of shell grit, valued at-----	352, 000

In addition there is a considerable amount of fish and oysters shipped in bulk, all by express. The other business of the port consists in ordinary trading to support these activities.

17. The manufacturing activities of the towns of St. Andrews and Panama City, and immediate vicinity, consist of lumber alone. In the immediate vicinity there are three large sawmills of large capacity with modern equipment. Panama City has waterworks and St. Andrews an ice and electric plant. Food fish in bulk is shipped in large quantities. A moderate amount of naval stores is produced in the contiguous territory. Considering the present existing commerce at Apalachicola and St. Andrews Bay, there is no competition

between these ports, each being a local proposition measured by geographical limits, with no combining nor conflicting interests. Lumber and naval stores are shipped by sea routes; fish by rail.

18. Existing lines of communication, Apalachicola, Fla.: Running north from this town is the Apalachicola Northern Railroad, having physical connection with Port St. Joe over the same line, distance 26 miles, and at River Junction, Fla., distance 79 miles, with the Louisville & Nashville Railroad, with the Seaboard Air Line, and with the Atlantic Coast Line. By river it is connected with the Apalachicola River, which has a depth of 6 feet for 106 miles, at which point water connection is united with the Chattahoochee and Flint Rivers, a combined navigable distance of 268 miles. It also is connected with the Chipola River, having a navigable length of 55 miles, making in all a navigable distance of 428 miles.

19. By way of the Apalachicola River and St. Andrews Bay Canal, a distance of 65½ miles, Apalachicola is connected with the towns of Panama City and St. Andrews and with the existing improvements of St. Andrews Bay, having an outlet to the sea. The entrance to this canal is in the Apalachicola River, 6 miles above the city. At the close of the fiscal year 1920 the controlling depth in this canal was 4.6 feet. The canal was completed in 1915. The following table shows the commerce carried thereon since completion:

Calendar year	Short tons	Value	Calendar year	Short tons	Value
1915.....	775	\$4,588	1918.....	8,612	\$74,996
1916.....	25,811	154,368	1919.....	206	2,063
1917.....	1,142	58,208			

The commercial effect of this waterway has been very small. Referring to the report of a special board of engineers hereinbefore quoted (par. 7, item *f*), it will be noted that it was anticipated that this canal, when constructed, would satisfy the demands of the river system; the board, however, stating that it would be advisable to provide a least depth of 7 feet, in order that boats from the river might proceed uninterruptedly to deep water. There does not seem to be any immediate prospect of any decided increase of commerce on this waterway with its present project dimensions.

20. There are no oversea steamship line terminals at this port. Inside of East Pass there are two anchorages, the westerly 20 miles distant and the easterly 25 miles. Lumber when shipped coastwise is towed to these points and there loaded onto vessels. The only connecting vessel traffic is the coastwise steamer *Tarpon*, with the upstream river boats. The *Tarpon* is a small steamer of 449 gross tons, having an extreme loaded draft of 8 feet. The river steamers, three in number, having a combined registered tonnage of 463, are of the river type. A small side-wheel steamer plies between Apalachicola and Carrabelle, having a loaded draft of 5½ feet. The imports by the *Tarpon* consist of general merchandise, the main articles being fertilizer, grain, feed supplies, hardware supplies, and miscellaneous merchandise. Of each, some is intended for local consumption, the remainder being shipped upstream by river steamers to various points, as shown by the following tables:

TABLE 1.—*Commodities delivered at Apalachicola, Fla., by coastwise steamers, destined for upstream river shipments for the year 1919*

POINTS OF ORIGIN, MOBILE AND PENSACOLA

Articles	Amount in short tons	Value	Average miles hailed	Rate per ton- mile	Total freight
Brick.....	56	\$400.00	55	\$0.05	\$154.00
Cement.....	35	700.00	60	.05	105.00
Fertilizer.....	200	8,000.00	20	.05	200.00
Fruit, crates.....	389	27,195.00	70	.026	707.98
Grain.....	1,208	56,885.00	70	.02	1,601.20
Hay and feed.....	68	2,700.00	65	.29	128.18
Hardware supplies.....	364	25,940.00	70	.04	946.40
Miscellaneous merchandise.....	8,960	1,254,400.00	70	.03	25,088.00
Oil.....	64	3,990.00	65	.03	124.80
Salt.....	75	1,500.00	60	.04	180.00
Sugar.....	159	51,785.00	65	.03	310.05
Total.....	11,578	1,432,903.00	-----	-----	29,635.61

POINT OF ORIGIN, APALACHICOLA, FLA.

Shingles.....	142	\$19,600.00	90	\$0.04	\$511.20
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Number of passengers up and down throughout this river system, 8,145.

TABLE 2.—*Commodities delivered at Apalachicola, Fla., by river steamers, destined for coastwise shipment, for the year 1919*

[Points of origin, various]

Articles	Amount in short tons	Value	Average miles hailed	Rate per ton-mile	Total freight
Resin.....	1,550	\$186,000.00	65	\$0.025	\$2,518.75
Turpentine.....	410	143,500.00	65	.025	666.25
Total.....	1,960	329,500.00	-----	-----	3,185.00

There is no rail competition in shipment of articles given under Table 2.

The following is a statement of the total commerce of the port for the past five years:

	Short tons		Short tons
1915.....	22,947	1918.....	34,129
1916.....	26,674	1919.....	28,112
1917.....	25,592		

The decrease in 1919 was due to the unusually small shipment of lumber and timber during that year. The traffic by the side-wheel steamer plying between Apalachicola and Carrabelle handles a small quantity of local freight and oysters during certain portions of the year, and a passenger service of about 5,800 per annum. As to rail traffic to and from the port, repeated efforts failed to obtain any information.

21. The territory to be considered as tributary to the port for the purpose of discussing the possible water-borne commerce that might result following the provision of increased navigation facilities includes those areas in the States of Florida, Georgia, and Alabama adjacent to the system of rivers having their final outlet to the Gulf of Mexico through the Apalachicola River. These rivers are the Apalachicola, Chipola, Chattahoochee, and Flint, with heads of navigation at Marianna, Fla., on the Chipola; Columbus, Ga., on the Chattahoochee; and Albany, Ga., on the Flint. The total navigable length

of the river system is approximately 425 miles. The tributary territory within the limits of water control may be divided into two general classes. The first is that known as Florida pine land, extending from 30 to 50 miles northward from the coast. This is low, sparsely timbered, and unsuited for extensive agricultural purposes. North of this section and extending throughout the river system the lands are higher, in sections well timbered and productive, and susceptible of improvement by modern intensive farming methods. Within the section under consideration there are large quantities of southern oaks, gum, including the valuable black gum, cottonwood, poplar, ash, and a fair quantity of cypress. This territory produces lumber, naval stores, cotton, cottonseed meal, cottonseed oil, tobacco, corn, oats, hay, peanuts, honey and sirup, canned shrimp and oysters, and shell grit. Imports for consumption within this territory that might seek a water route would include possibly the following classes of commodities: Sugar, oil, cement, cans, foodstuffs, grain, iron, coal, salt, jute bags, fertilizer, brick, hardware supplies, and miscellaneous merchandise.

22. The improvement desired is the provision of a ship channel having a depth of from 20 to 22 feet, a suitable width, and extending by the most feasible route from the Gulf to the docks at Apalachicola, thus establishing the latter as an open port, such as Mobile and Pensacola. The results of such improvement would be threefold: (1) Reduction in present freight rates; (2) greater convenience in handling freight; (3) increased commerce. These will be discussed in the order named.

23. The competing rail lines cross the rivers under consideration, hence their territories of distribution are limited; likewise their competition. Such points, however, as are within the limits of this competing influence receive the benefits of established water rates.

24. Regarding the influence of water rates affecting Apalachicola, the following table is submitted:

TABLE 3.—Table of comparative rates, including transfers

Classification	From—	To—	Rate per ton
Grain and feed.....	Kansas City.....	Mobile and Pensacola.....	\$3. 60
Do.....	do.....	Apalachicola, Fla.....	9. 80
Do ¹	do.....	Bainbridge, Ga.....	2. 25
Do ¹	do.....	Eufaula, Ala.....	2. 25
Do ¹	do.....	Columbus, Ga.....	2. 25
Do ²	do.....	Apalachicola, Fla.....	4. 50
Salt.....	Louisiana mines.....	Pensacola, Fla.....	3. 30
Do.....	do.....	Apalachicola, Fla.....	9. 60
Sugar.....	New Orleans, La.....	Columbus, Ga.....	3. 00
Do.....	do.....	Pensacola, Fla.....	3. 00
Do.....	do.....	Apalachicola, Fla.....	9. 00
Do.....	Savannah, Ga.....	Columbus, Ga.....	4. 00
Do.....	do.....	Pensacola, Fla.....	4. 00
Do.....	do.....	Apalachicola, Fla.....	13. 00
Hay.....	West St. Louis, Mo.....	Mobile, Ala.....	3. 60
Do.....	do.....	Pensacola, Fla.....	3. 60
Do.....	do.....	Apalachicola, Fla.....	9. 80
Flour.....	Memphis, Tenn.....	Mobile, Ala.....	2. 00
Do.....	do.....	Pensacola, Fla.....	2. 00
Do.....	do.....	Apalachicola, Fla.....	11. 60
Canned goods.....	Baltimore, Md.....	Pensacola, Fla.....	7. 00
Do.....	do.....	Apalachicola, Fla.....	16. 20
Feed supplies.....	Omaha, Nebr.....	Pensacola, Fla.....	5. 00
Do.....	do.....	Apalachicola, Fla.....	14. 40

¹ Routed via Mobile; thence Mobile to Apalachicola by steamer *Tarpon*; thence to distribution by river steamers.

² Penalty for way point delivery, 100 per cent.

There are other commodities with a like discrimination in freight rates.

The most marked and unjust rates are those on commodities for upstream river points destination, shipped to Apalachicola via *Tarpon*, unloaded and transferred, again loaded on river steamers, yet the rate from the same source, by the *Tarpon*, destination Apalachicola, has an increased rate of 100 per cent and more.

25. It is claimed by the Chamber of Commerce of the City of Apalachicola that the saving in freight rates on existing commerce would amount to approximately \$97,000 annually, according to the following figures presented:

Lumber (9,240,000 feet lighterage, at \$2 per M)-----	\$18, 480
Canned goods (34,000 cases)-----	3, 660
Shell grit (25,000 tons)-----	7, 125
Naval stores (57,943 barrels)-----	68, 155
Total-----	97, 420

Sufficient information has not been furnished to afford a check of these figures, but it is believed the estimated saving is much too large. The saving in lighterage would be reduced by the cost of pilotage; the estimated quantities are excessive, and the expected reduction in freight rates are apparently based on the assumption that the new rates to Apalachicola would be no higher than the corresponding rates to Pensacola. It is believed that \$50,000 per annum would be a very liberal estimate of the saving that might follow improvement as proposed.

26. The convenience of handling existing freight would not be added to in any marked degree. The classification of present commerce admits of ready transfer and such transfer would in any event for upstream shipment have to be made. This, however does not apply to lumber, which when shipped by sea routes is loaded in barges and towed to vessels in the anchorage, to which it is then transferred. This method involves delay and extra expense; the delay being obviated by the proposed improvement and the expense of handling considerably reduced.

27. A deeper channel, with a depth of from 20 to 22 feet, would unquestionably create new commerce, though to what extent it is difficult to reliably estimate. As a local proposition the plan has no commensurate results. An improvement of the nature and extent proposed can only be justified upon the reasonable expectation that the port of Apalachicola would develop into a port approaching in importance to Pensacola or Mobile, and further that such development must largely ensue due to its position as an outlet to the system of rivers previously mentioned in this report. In other words, that the increased commerce must be due largely to an increase in traffic on the rivers in question, by a diversion thereto of tonnage that now follows other routes, and by an increase in production and consumption in the territory adjacent to these rivers. In reaching a conclusion on this point, it would appear that commerce of an upbuilding nature should be given the controlling weight.

28. The Chamber of Commerce of Apalachicola at a public hearing held on March 5, 1921, and subsequent thereto, offered considerable information as to probable commerce. The information presented,

however, was not complete and the figures given were, in many respects, conflicting. A study of these data was undertaken and effort made to reach a logical conclusion as to the various claims advanced and to summarize the results. These are set forth in the following table:

TABLE 4.—*Probable commerce at port of Apalachicola, Fla.*

EXPORTS

Article	Tons	Value
Cotton (200,000 bales)	50,000	\$15,000,000
Shell grit	25,000	300,000
Naval stores	25,000	1,500,000
Lumber	150,000	3,000,000
Tobacco	1,000	2,000,000
Honey	6	(¹)
Cottonseed meal	3,750	(¹)
Cottonseed oil	7,500	(¹)
Shrimp and oysters, canned	2,500	(¹)
Miscellaneous merchandise	12,000	1,000,000
Total	276,756	22,800,000
Existing exports, coastwise	10,595	722,390

¹ Not given.

In addition to the exports named above there would be quantities of sirup, peanuts, corn, and oats, for which no figures were given.

IMPORTS

Article	Tons	Value
Raw sugar	10,000	\$600,000
Oil	4,200	197,400
Tin cans	225	-----
Total	14,425	797,400
Existing imports, coastwise	23,535	1,255,601

Other articles of possible imports are mentioned, such as cement, grain, hay, iron, coal, salt, etc., but no figures are given.

29. Taking these items up in the order in which enumerated in the preceding tables, the following discussion is offered:

(a) *Cotton (200,000 bales; 50,000 tons).*—From a map¹ of the counties bordering the Chattahoochee system of rivers, and those counties and parts of counties adjacent thereto, it is found that of all the cotton raised in the section as outlined, and reducing this amount by the quantity required for cotton manufacturing consumption now existing, there remains approximately 170,000 bales to be considered as applied to transportation and export overseas. In order that a large portion of this reaches the river banks of the streams for water transportation to Apalachicola it must first be carried by rail, owing to distances from the river banks. Here the matter of short and long haul would apply, and of this amount the actual quantity that would reach Apalachicola is indeterminate, and would depend upon the friendly attitude of the various rail lines. In this the only safe conclusion is that sharp competition would exist, and that undoubtedly a large portion of the 170,000 bales would reach the seaboard by rail as is now the case, and a small quantity by rail to Montgomery, Ala. It is impossible to predeter-

¹ Not printed.

mine the quantity that might reach Apalachicola. To give the downstream movement the benefit of all doubts in the matter reduces the 170,000 bales to 90,000 bales, or 22,500 tons, as overseas freight. In previous discussions upon this matter it has been stated that at one time Apalachicola was one of the leading cotton shipping ports of the country. This is true, but when these conditions existed there were no rail lines traversing the cotton belt of the system of rivers under consideration, nor were there any cotton manufacturing industries within this section, which now consume annually large quantities. Therefore, former conditions will never again obtain no matter to what extent Apalachicola is improved.

In the transportation of cotton overseas other commodities than that of cotton must be considered. Owing to the space occupied by a bale of cotton, which in case of high density press requires 21 cubic feet of storage space, or 84 cubic feet per ton, to justify an overseas vessel to call at a port for freight, other commodities than cotton must be offered in order that a profitable tonnage may be secured. If this can not be secured at a single port, the vessel is obliged to visit a second port to complete cargo. Between Pensacola and Mobile there are frequent calls for freight to fill out, which commercially is called "emergency space." This between the ports named is generally transferred by rail. Dispatch here enters into the matter, which in turn calls for good rail service. It can not be said that the Apalachicola Northern Railroad could render this required service, and vessels having emergency space at Apalachicola would be required to enter a second port, since the required mixed tonnage could not be obtained there. This condition would mitigate against such a port as Apalachicola.

The return to downstream shipments of cotton has always been considered very doubtful under past ownership of river steamers plying the Chattahoochee River system. This has now changed hands, and it may be that the allied interests previously existing will no longer exist and that an independent and logical movement of cotton will follow, and that the 22,500 tons of cotton will become an overseas commodity.

(b) *Shell grit (25,000 tons).*—This is a new industry for which two plants are now being erected. The estimated quantity is large, compared with present production, but considerable increase may be reasonably expected.

(c) *Naval stores (25,000 tons).*—This seems to be a fairly reasonable estimate, based upon present production and plans on foot looking to an increase thereof.

(d) *Lumber (150,000 tons).*—This estimate is believed to be much too large. The total estimated amount of lumber still available within the territory embraced within the area of the system of rivers under consideration is given as 8,000,000,000 feet. It is also estimated, in an offhand manner, that 4,000,000,000 feet would pass through Apalachicola with improvement extended to 22 feet. This can not be accepted nor contradicted, but when the lumber trade becomes active there is no reason to doubt that a large part of this will clear from Port St. Joe, where the Apalachicola Northern Railroad has rail connection, docking facilities, and deep water. Thomas Graves Bros. exported during the past year 19,933 tons of lumber through Port St. Joe. This and other mills are located along the

Apalachicola Northern Railroad. The lumber exported by these various companies would have to reach Apalachicola also by the Apalachicola Northern Railroad, and it is unreasonable to conclude that it would be switched from a point where similar facilities now exist, and where the difference in rail haul is so small. Owing to the unstable condition of the lumber market during the past several years, it is quite impossible to estimate the annual output under future normal conditions, but it is safe to state that the output of this commodity that may pass through Apalachicola will not exceed 35,000 tons per annum. Even a part of this is dependent upon a mill not yet built. Port St. Joe has been improved by the United States in cooperation with the Apalachicola Northern Railroad, and no public commercial advantage would result by the diversion of tonnage from this port to Apalachicola.

(e) *Tobacco (1,000 tons).*—This is of high grade and is grown in Gadsden County, Fla. Gadsden County lies along the Apalachicola River. The larger portion of this is raised about Quincy, Fla., as a center, 19 miles from the river. This is now shipped by rail to eastern localities. If moved by river it would have to be transferred from cars to boats at Chattahoochee, from boats to storage at Apalachicola, then from storage to coastwise vessels, and again be transferred at destination. In this routing there would be a short rail haul, with a discriminating rate no doubt, and would in all probability be delayed in Apalachicola waiting for coastwise shipment. This tonnage may be eliminated from consideration.

(f) *Honey (6 tons).*—This is produced on the lower Apalachicola River and might follow coastwise shipment.

(g) *Cottonseed meal and cottonseed oil combined (11,250 tons).*—This would originate at points where industries of this nature are located. Comparative large quantities of cottonseed are now moved upstream from river points to Columbus, Ga., and there converted into meal and oil. The water rate on these commodities from Columbus to Apalachicola is \$4.12 per ton. Coastwise rates and storage must be added to this, which would be at least as much more. From this it does not appear these would be moved by water, and therefore this 11,250 tons should not be considered.

(h) *Shrimp and oysters, canned (2,500 tons).*—The manufacturers claim this could be more profitably shipped by water route instead of rail, as is now the case. Since this tonnage originates at Apalachicola, the statement seems reasonable. Therefore this amount of tonnage—2,500—should be retained.

(i) *Tin cans (225 tons).*—The tin cans for "canned food," amounting to 225 tons, origin Baltimore, Md., is a very small quantity when considered commercially, and since Baltimore would probably not furnish any tonnage outside of this, it is doubtful if this would seek water transportation. Admitting it would, the 225 tons are included.

(j) *Grain and feed.*—These are imported coastwise, would so continue, and should be eliminated. Improvement such as contemplated would reduce rail rates and there would be a corresponding saving, which, however, would apply to that portion consumed locally, since delivery at all river points now receive benefit of water rates. Therefore it is thought these commodities have little bearing upon the subject of enlarged improvement.

(k) *Oil*.—The amount stated, viz, 840,000 gallons, is imported by rail, and it is assumed the quantity thus imported satisfies the demand. It is claimed, however, with increased improvement that tank steamers would enter, since at least one oil company would establish a distribution station at Apalachicola. The project is so indefinite at this time that it is impossible to draw conclusions therefrom and consequently should not now be seriously considered. Nor is it known how further improvement would effect the oil now imported.

(l) *Sugar (10,000 tons)*.—This amount is based on the proposal to ship by water sugar from Cuba to the Chero Cola Works at Columbus, Ga., should the improved channel be provided. That such a shipment would follow seems a reasonable proposition.

(m) The total existing coastwise tonnage as presented, viz, 34,129 tons, would continue as at present, and should not be considered as an argument in favor of an enlarged improvement.

30. The following table is a recapitulation of what appears to be a more reasonable estimate of the probable commerce resulting from the proposed improvement:

TABLE 5.—Recapitulation of probable commerce

Exports:	Tons
Cotton.....	22, 500
Shell grit.....	25, 000
Naval stores.....	25, 000
Lumber.....	35, 000
Canned shrimp and oysters.....	2, 500
Miscellaneous merchandise.....	10, 000
	<hr/> 119, 500
Imports:	
Sugar.....	10, 000
Oil.....	4, 200
Tin cans.....	225
	<hr/> 14, 425
Total exports and imports.....	133, 925

31. The foregoing figure, 134,000 tons (approximately), is believed to be a not too conservative estimate of the probable commerce that might follow should the increased navigation facilities be provided. The information presented by interested parties, particularly by the Chamber of Commerce of Apalachicola, does not afford any conclusive evidence as to a larger tonnage, while, on the other hand, there is some doubt that commerce to the extent of 134,000 tons annually would be developed. The territory affected is crossed by numerous railway lines, and existing commerce follows well-established routes. There is reason to believe that tonnage to the extent indicated might seek the water route to secure the advantage of the lower rates. Such an assumption contemplates the building up of traffic on the rivers to take care of the increased commerce. No matter what the improvement of Apalachicola may be, its success is dependent upon the commerce that might follow upon the rivers having termini at that point. If this commerce does not follow, an extended improvement would eventually fail, for there seems to be no convincing argument in favor of the possible development of Apalachicola into an important port, independent of the system of rivers of which it forms the terminus. With increased navigation facilities provided, other items of commerce would probably develop,

but it is not believed there would ever be any considerable increase in the commodities mentioned over the figures given, and in this connection it should be considered that lumber and naval stores are declining products.

32. To sum up, the arguments in favor of the proposed improvement are, first, a possible saving in freight on existing commerce of approximately \$50,000 annually; second, greater convenience in handling shipments, by the elimination of lighterage; and, third, a possible commerce directly resulting from the improvement of approximately 134,000 tons. With reference to the last-mentioned figure it has not been possible to arrive at any logical conclusion as to the saving in freightage by diversion of this tonnage from existing routes to the water route; such information as was offered or obtained on this point was too meager and vague to form the basis of discussion. The facts presented and the discussion based thereon are not conclusive, but it is believed that the benefits enumerated are sufficiently established within the realm of probability as to justify some enlargement of the improvement of Apalachicola Bay within reasonable cost limits.

33. The improvement desired by interested parties is a ship channel, having a depth of at least 20 feet, extending from East Pass to the docks at Apalachicola. Owing to the character of the bottom material, soft mud over a length of 6 to 8 miles, depending upon location, it is considered that the economical bottom width of such a channel would be 250 feet, with slopes 1 on 6. This channel, no matter where located, would lead to the upper anchorage involving some 18 miles of dredging.

34. On the map¹ accompanying this report are shown five possible locations for the proposed channel; these are indicated as lines A, B, C, D, and E. Lines A, B, and C, were discussed in a previous report, printed in House Document No. 316, Sixty-fifth Congress, First session. The new lines D and E are proposed for consideration in connection with the others.

35. Soundings taken during the preliminary examination revealed the fact that the actual depths are nearly 1 foot less than those shown on United States Coast and Geodetic Survey Charts Nos. 182 and 183. Information gained during the previous examinations, reported in House Documents, relative to the character of the bottom is as follows:

From Apalachicola to the Bulkhead Shoal Channel, a distance of 6 to 8 miles, depending upon location of channel, the bottom material is composed of soft mud or silt. This was ascertained by borings. On the Crooked Channel line, with the exception of two oyster bars encountered, it was not difficult for one man to push a 1-inch pipe from 12 to 14 feet into the material composing the bottom. The information gained by these borings was that the mud extended to an unknown depth below the 12 and 14 feet. The oyster bars were from 4 to 6 feet deep and very compact. After these had been penetrated it was found that the underlying material was soft mud. Borings along the existing channel, Apalachicola to the Bulkhead Channel, disclosed the same bottom conditions, except the mud was softer. This condition is accounted for, since the locality is more distant from the source of supply. From the Bulkhead Shoal

¹Not printed.

Channel to the eastward the bottom is composed of hard fine sand, with occasional oyster bars.

36. Further study of the locality suggests the retention for consideration of line B and the abandonment of lines A and C, each of these being more expensive than the other locations and having other unfavorable features. Lines D and E are suggested for the following reasons: First, to get away from the mouth of the river, the source of shoaling, as soon as possible; second, to reach the shelter of St. Georges Island as soon as possible, thus avoiding to a great extent the shoaling influences from southerly winds; third, to enter the inner harbor in a manner more convenient to the proposed location for municipal docks; fourth, to avoid the probable result incident to the adoption of either line A or B, either of which if adopted would lead to the shoaling of the present bar channel to its normal depth of about $3\frac{1}{2}$ feet; in this case the river discharge, or most of it, following the course of the new channel (A or B), would be forced with considerable velocity against the angle between the old and new channel, forcing this point gradually harborward, and the result would be an entrance into the inner harbor of gradually increasing difficulty.

37. *Line B.*—This line passes from the mouth of Apalachicola River through Crooked Channel direct to Bulkhead Shoals; passes through this shoal and then turns eastward, practically along the location of the present channel line. From the mouth of the river to Bulkhead Shoals, the location is subject to the discharge from the river mouths emptying into East Bay, likewise to a shoaling from these streams. Also during severe northerly winter winds, wave action from East Bay would materially increase this shoaling. Beyond Bulkhead Shoals the channel would lie in the direction of all currents, hence would be favorably located with reference to wave action. The length of the cut of this line would be 17 miles.

Line D.—This line leaves the present bar channel at a point three-fourths of a mile below the town of Apalachicola, thence southeasterly for a distance of 3 miles, then turns easterly to the anchorage, the total distance being 18 miles.

Line E.—This line follows practically the same course as line D, the entire distance being $18\frac{3}{4}$ miles.

38. It is thought the cost of maintenance of lines D or E would be less than on line B, outside of that required to take care of the sediment or deposit from the river, which in any channel location will be about the same and will in any event have to be dealt with. It is also thought that maintenance due to currents and wave action will be less for lines D or E than it would be for line B. Channel along either line D or E will be more expensive to construct, owing to a greater quantity of material to be removed, but the location of these lines have advantages which seem to justify this extra cost. These advantages are chiefly, first, they leave the river source of deposit on the shortest possible lines; second, they eliminate the very objectionable intersection of line B with the river channel; and, third, they afford an easy approach to the city-owned site for the necessary wharves. For the lines named the first cost would be in favor of line B. However, it crosses a much greater length of shallow depths within the probable zone of shoaling. For lines D and E the cost would be practically the same. The least cost would prob-

ably be several millions of dollars. It is impossible to determine, with accuracy, the annual cost of maintenance, but it is safe to state it would be very large.

39. For the existing traffic the terminal facilities at Apalachicola are sufficient and no development in this respect need be added, but with the advent of seagoing vessels reaching Apalachicola, new and extensive terminal facilities would be required. Information supplied by the Chamber of Commerce is here quoted:

To meet Federal requirements, the city authorities will provide adequate terminals upon suitable water front now owned municipally. Such requirements to be indicated by the department.

The municipally-owned site referred to lies south of the town, shown on the accompanying map. This lies parallel with the present bar channel, almost in existing water alongside of which the channel depth, viz, 20 feet, would have to be secured and maintained. The scheme would also call for a spacious turning basin. This would be a catch basin for the river deposit, which is large. This would not be a disadvantage, since to a certain extent it would concentrate maintenance. Should the channel be constructed the dock, with all required freight-handling devices, should be completed within four years from approval of the project. Local interests should cooperate freely in the provision of adequate terminal facilities.

40. From a consideration of the facts hereinbefore set forth, it is concluded that the port of Apalachicola is worthy of some further improvement. It seems hardly possible, however, that there can ever be found sufficient justification for the adoption of such a project as has been discussed—a channel of 20 feet depth, 250 feet width, and approximately 18 miles in length, with a corresponding cost for construction of several million dollars, and maintenance cost extremely high for the first five years and remaining at a high figure thereafter.

41. In order that the cost of such a project and its maintenance may be definitely determined an accurate survey will be necessary. Such a survey should be made with the further purpose of determining a definite location of the proposed channel, and it should also include a further investigation and more accurate determination of the probable commerce that would ensue, with the corresponding saving in freightage and other advantages. If such a survey is made it should not be limited to the particular project discussed herein, which is the improvement desired by interested parties, but should be extended to an investigation, including estimates of cost, of any plan of increasing or improving existing facilities as may be considered to be justified by the advantages that may result therefrom. It should also include an investigation of the advantages and cost of enlarging the canal between Apalachicola River and St. Andrews Bay. It is recommended that such a survey be authorized.

42. There are no water-power questions involved, nor any questions of land reclamation or flood protection to be considered.

43. The minutes of the public hearing held in Apalachicola, Fla., on March 15, 1921, with the numerous papers submitted at that time, are not forwarded with this report, but are on file in this office.

J. J. LOVING,
*Major, Corps of Engineers,
District Engineer.*

[First indorsement]

OFFICE, DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., May 6, 1921.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. Cotton constitutes nearly two-thirds in value (though considerably less in tonnage) of the products which the Apalachicola Chamber of Commerce estimates would probably be shipped through that port if it were given a channel to the sea of sufficient depth. The district engineer considers 134,000 tons as a not too conservative estimate of the probable commerce that might follow the desired improvement, and of this tonnage cotton forms about the same proportion as that stated above. Considering the various disadvantages enumerated by the district engineer under which Apalachicola would labor as a cotton shipping port, it is hard to believe that any large amount of this staple would leave existing trade routes for shipment through Apalachicola. Even if the full 134,000 tons did seek this port, it would not be a sufficient commerce to justify an improvement, the first cost of which would amount to several million dollars, and which would require constant and expensive maintenance.

2. A safe deep-water harbor for the boats navigating the system of rivers that empty into Apalachicola Bay can be obtained at much less cost through St. Andrews Bay, which is only about 50 miles from Apalachicola in a straight line, and which is spacious, is protected against storms, and has an improved entrance channel with a depth of 22 feet at mean low water, a greater depth than the 20 feet which it would cost so much to obtain in Apalachicola Bay. St. Andrews Bay is now connected with the Apalachicola River by a waterway whose project dimensions are 5 feet in depth and 65 feet in width, and whose length from the river to the 25-foot contour in the bay is $45\frac{1}{2}$ miles. The actual limiting dimensions are slightly less, as there are places where the depth is only 4.6 feet and the width about 45 feet.

3. The available navigable depth of the channels in the Chatahoochee, Flint, and Chipola Rivers does not exceed 4 feet at ordinary low water. The river boats operating on these streams have a draft of less than 4 feet and could, therefore, if necessary, use the Apalachicola River and St. Andrews Bay Canal, even in its present deteriorated condition. It is true that its shallowness and narrowness would make this use somewhat difficult and possibly uneconomical under ordinary conditions, but if there were urgent necessity for the river boats to reach a deep-water harbor at any time, or if this would afford a substantial saving in the disposal of their cargoes, the present canal could be made use of. The fact that it is not so used and that there seems little present demand for the further improvement of the canal to facilitate its use by river boats, gives additional coloring to the belief that the prospective river commerce is not now sufficient to justify further expenditures for a deep-water outlet.

4. Since the adoption of the present project by the river and harbor act of March 2, 1907, five reports have been made to Congress concerning proposed further improvement of Apalachicola Bay; not only were all unfavorable, but the report published in House Document No. 860, Sixty-fourth Congress, first session, recommended the abandonment of that part of the existing project that calls for a

channel 18 feet deep from the Gulf of Mexico through West Pass and Link Channel. No material change in conditions is known to have taken place since the reports were made, and the conclusions reached by them are believed to be valid now.

5. The division engineer is not of the opinion that Apalachicola Bay is worthy at this time of further improvement by the United States, and can not concur in recommendation for a survey.

SPENCER COSBY,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., March 27, 1923.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. On February 27, 1923, the board held a hearing on this case, a transcript of which is transmitted herewith.¹ From the information presented, the board is of the opinion that further investigation is desirable, as the data now on hand indicate a lack of sufficient engineering information to make possible a correct estimate of the cost of providing and maintaining a satisfactory channel to Apalachicola. It therefore recommends that a survey be authorized, the estimates of cost to be limited to channel depths not exceeding 12 feet at mean low water.

For the board:

H. TAYLOR,
Senior Member of the Board.

SURVEY OF APALACHICOLA BAY, FLA.

SYLLABUS

Three separate routes suitable for a 12-foot channel from Apalachicola to the Gulf of Mexico were surveyed, and estimates of cost prepared. The district engineer concludes, however, that the provision of a channel of this depth is not justified at this time. A depth of 10 feet now exists in the river bar channel, but this depth does not obtain throughout the bay. The district engineer recommends a modification of the existing project for Apalachicola Bay to provide a channel 10 feet deep and 100 feet wide from Apalachicola through the river bar, thence through the bay both to the east and southeast, at an estimated cost of \$55,000 for new work, \$39,000 for one year's maintenance, and \$29,000 per annum thereafter.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Montgomery, Ala., February 25, 1924.

Subject: Survey of Apalachicola Bay, Fla.

To: The Chief of Engineers, United States Army.
(Through the Division Engineer.)

1. The Chief of Engineers by letter¹ dated April 16, 1923, directed the district engineer to make a survey of Apalachicola Bay as recommended by the Board of Engineers. The Board of Engineers recommended that a survey be authorized, the estimates of cost to be limited to channel depths not exceeding 12 feet at mean low water.

2. A reference to the preliminary examination report of April 27, 1921, submitted by the district engineer, will show that the investi-

¹Not printed.

gation was based upon the desire of interested parties for a ship channel having a depth of from 20 to 22 feet. Data as to prospective commerce presented in that report was therefore predicated upon the provision of such a channel. These data are not applicable to a channel with a depth of 12 feet or less. There was also presented with the report a map¹ of Apalachicola Bay, upon which were drawn certain lines indicating alternative routes for a deep channel. These routes are not appropriate for the consideration of a 12-foot channel. This map has been retraced, the former lines omitted, and new lines drawn indicating possible routes for a 12-foot channel. This map is forwarded herewith, and for purposes of identification has been marked "A." In addition to the foregoing map, the following maps,¹ marked as indicated, are forwarded with this report showing the results of the survey and the proposed channel lines:

Map marked "B": This map is prepared to the scale of one-half inch = 1,000 feet. It includes the more essential features to be considered, and is suitable for publication.

Map marked "C": Sheet 1 shows that portion of the bay and proposed channel lines between the town of Apalachicola and the Bulkhead Shoals. Sheet 2 shows the Bulkhead Shoals Channel, and the proposed channel line extending to the east. Sheet 3 shows the St. George Channel, extending to the southwest from Apalachicola.

3. Knowledge of local conditions, of the wishes of local interests, and a study of available information lead to the selection of three possible routes for a 12-foot channel. These are shown on map marked "A," and indicated as follows: Route 1, lines A-B-C-D-E-F-G; route 2, lines A-C-D-E-F-G; route 3, lines A-B-H. Point C is located at the western extremity of an existing channel through the Bulkhead Shoals. These shoals, as will be noted, extend across the bay separating areas of deeper water east and west. The controlling depth through this channel known as the Bulkhead Shoals Channel is a little less than 8 feet. This minimum depth extends for only a short distance; elsewhere in the channel the depths vary from 9 to 13 feet. Existing traffic through the bay uses this channel, and its utilization in any project such as is now under consideration is predetermined. The point C would therefore be common to all proposed lines from Apalachicola eastward. Passing through the Bulkhead Shoals Channel to the point D, existing traffic follows the line of greatest depth to E, thence to F and G, reaching near the latter point water having depths of 17 feet or more. After passing the point D the depth of water is generally greater than 10 feet, and it is evident that this line is the logical route for the proposed channel eastward of the point C. The line C-D-E-F-G is therefore common to all proposed routes from Apalachicola to the east. From Apalachicola to the Bulkhead Shoals Channel, or to the point C, there are two possible routes to be considered: Route 1, from A to B, thence to C, utilizing over the portion A-B the existing 10-foot channel; route 2, on a direct line from A to C, passing through what is known as the Crooked Channel, near the town of Apalachicola. Route 2 is selected for consideration primarily because its adoption is strongly urged by local interests. In addition to the foregoing, a third route, A-B-H, has been selected for consideration, leading from Apalachicola to the

¹Not printed.

southwestward along the lines of the existing project. The channel along the line B-H is locally known as St. George Channel.

4. The survey was limited to the three lines described in the preceding paragraph. Soundings have been plotted on three separate sheets, marked "C," sheets 1, 2, and 3, as indicated in paragraph 2. The proposed channel lines have been indicated on all maps by the same symbols.

5. Based upon the results of the survey the following estimates have been prepared for a 12-foot channel at mean low water, bottom width 100 feet, side slopes 1 to 6, allowing 1 foot overcut:

(a) *Route 1, line A-B-C-D-E-F-G*

A to B, excavation	cubic yards	64, 000
B to C, excavation	do	473, 000
C to G, excavation	do	329, 000
Total excavation, route 1	do	866, 000

Estimate of cost:

Dredging 866,000 cubic yards, at 13 cents	\$112, 580
Engineering, superintendence, and contingencies	11, 420

Total cost	124, 000
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(b) *Route 2, line A-C-D-E-F-G*

A to C, excavation	cubic yards	882, 000
C to G, excavation	do	329, 000
Total excavation, route 2	do	1, 211, 000

Estimate of cost:

Dredging 1,211,000 cubic yards, at 13 cents	\$157, 430
Engineering, superintendence, and contingencies	15, 570

Total cost	173, 000
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(c) *Route 3, line A-B-H*

A to B, excavation	cubic yards	64, 000
B to H, excavation	do	180, 000
Total excavation, route 3	do	244, 000

Estimate of cost:

Dredging 244,000 cubic yards, at 13 cents	\$31, 720
Engineering, superintendence, and contingencies	3, 280

Total cost	35, 000
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6. Arranged in the order of initial costs, these estimates are therefore:

Route 3	\$35, 000
Route 1	124, 000
Route 2	173, 000

The relative advantages of these three routes, having in view the present and prospective commerce, will be first discussed.

7. As stated in paragraph 9 of the preliminary examination report, the existing project for Apalachicola Bay provides for a channel from the Gulf of Mexico with a depth of 18 feet at mean low water through West Pass and Link Channel, and a channel across the bar at the mouth of the river with a depth of 10 feet at mean low water. The abandonment of that portion of the existing project pertaining

to West Pass and Link Channel has been recommended to Congress (House Doc. No. 860, 64th Cong. 1st Sess.). While this recommendation has not been adopted by Congress, no work has been done on the 18-foot channel since the recommendation was made. The present controlling depth through West Pass is 12 feet and in Link Channel 18 feet. The project depth of 10 feet exists throughout the river bar channel over the length of 10,800 feet as originally adopted. However, from the mouth of this channel to the Link Channel, or through what is known as St. George Channel, the controlling depth is 8 feet.

8. From the mouth of the present river bar channel eastward to the Bulkhead Shoals Channel, or to the point C indicated on the maps, the controlling depth is 8 feet. Through the Bulkhead Shoals Channel the controlling depth is 7.8 feet. Eastward of this point, along the proposed line for a 12-foot channel, the controlling depth is 9 feet. The controlling depth along the line A-C, included in proposed route 2, is 3 feet. The existing project through East Pass provides a channel of $20\frac{1}{2}$ feet depth, connecting with an anchorage where the controlling depth is 19.5 feet.

9. Existing facilities, as briefly summarized in paragraphs 7 and 8, should be borne in mind in considering the relative advantages of the proposed routes for a 12-foot channel. Under existing conditions the town of Apalachicola is not provided with a 10-foot channel either to the east or west.

10. Local interests at Apalachicola are united in urging that any increase in the existing navigation facilities be provided by a channel eastward from the town toward East Pass. The district engineer concurs in this view, and it is believed that the preliminary examination report justifies the conclusion that any new project adopted should extend toward the east rather than toward the west. The adoption of this view eliminates route No. 3, as hereinbefore described, from independent consideration for a 12-foot channel.

11. Route No. 2—through the Crooked Channel—is favored by local interests. In support of this view it is urged that there will be a material advantage in the shorter distance, a safer entrance from the bay to the town wharves, and less periodical shoaling, consequently a less maintenance cost. These will be discussed in the order stated.

12. The distance from Apalachicola to the Bulkhead Shoals Channel by way of the present channel, or from A to B to C, is greater by 2.4 miles than the distance direct from A to C along the line of the Crooked Channel. This fact would favor route 2 if navigation to and from the east is alone considered. The adoption of route No. 2 would lead to the abandonment of the existing 10-foot channel, which would eventually shoal to its normal depth at least, or to $3\frac{1}{2}$ feet, and practically all boats would then be compelled to use the new channel. The chief industry of Apalachicola is the sea-food industry, consisting largely of packing and shipping of oysters and shrimps. Shrimping boats use West Pass, and the present location of the 10-foot channel is favorable to them. Of the areas from which oysters are taken, 55 per cent are located to the west of the entrance to the present river channel, and 45 per cent to the east of that channel. Based upon the number of boats engaged in shell fishing and the periods of the year during which this fishing is prosecuted, it has

been estimated that only about 35 per cent of the boats engaged in this industry would profit by a relocation of the present channel as proposed, while, on the other hand, the abandonment of the present channel and its subsequent shoaling would work to the disadvantage of about 65 per cent of these boats.

At the present time there is only one boat engaged in coastwise trade that touches at Apalachicola; this is the *Tarpon*. This boat, now enters at East Pass, proceeding to Carrabelle, thence west to Apalachicola, thence out West Pass to St. Andrews and Pensacola. The proposed relocation of the river bar channel would not be advantageous to this boat. In fact it is probable that the abandonment of the present channel would eventually necessitate the *Tarpon* leaving the bay by way of East Pass, thus adding about 45 miles to her return trip.

Of the naval stores brought from bay points to Apalachicola for shipment, 25 per cent comes from the west and 75 per cent from the east. These stores are transported on small barges towed by launches. Those stores coming from the east now enter through Crooked Channel without difficulty or delay. There seems to be no reason to conclude that the present production of this commodity will be greatly increased, nor that additional facilities should be provided.

Based upon existing commerce, and from the standpoint of convenience to vessels engaged therein, route No. 1, including the present river bar channel, seems to offer the greater advantage.

13. It is claimed by local interests that the approach to Apalachicola by way of Crooked Channel would be safer for such small boats as are now employed, particularly during the winter season with the prevailing strong northwest gales. This claim is thought to be, generally speaking, sound, but where there are so many boats employed accidents may arise regardless of channel location. It is difficult to state with assurance that accidents would not occur if conditions were different, and this claim is not considered of sufficient importance to warrant serious consideration in the matter of channel location.

14. The third claim advanced by local interests in favor of the Crooked Channel, is that this channel would be less subject to shoaling and its maintenance cost would be less. In the opinion of the district engineer this claim is not substantiated by observation nor investigation. An examination of the bottom of the bay extending from points near the mouths of the various streams for a distance of several miles shows the material to be similar throughout to that now being deposited—a very soft, light mud. It is believed to be a logical assumption that the points of entrance of these streams were at one time much farther inland, and they have by shoaling, due to deposits, been advanced to their present location. At some previous time there probably was a deeper entrance into the river through the so-called Crooked Channel than now exists. In the advance, due to river deposits, this deeper area has suffered as did all other areas, until Crooked Channel has been practically obliterated. The greater bulk of transported sediment follows the deeper channels, and the shoaling due to that carried nearest the surface is very slow, due to the lighter character of the sediment and the swifter currents near the surface. These combined produce a spreading influence rather than shoaling in a defined locality. Crooked Channel has for years been used daily by launches of sufficient draft to stir up the light mud, which then drifts outside this narrow area. These causes

and conditions lead to the claim that this channel does not shoal. When slopes are very flat and uniform over large areas, the building up due to sediment is not particularly noticeable to casual investigation, but when narrow areas are deepened, such as channel construction, the shoaling within this narrow area is greatly increased.

Investigations have been made as to the amount of sediment carried in suspension in the discharge from the Apalachicola River, the St. Marks, and the Little St. Marks Rivers. Based upon observations and studies made, it has been calculated that approximately 15,000,000 cubic yards of sediment are annually discharged into the bay from the Apalachicola River, approximately 1,800,000 cubic yards from the St. Marks, and 1,900,000 cubic yards from the Little St. Marks—or a total of approximately 18,700,000 cubic yards from the three rivers named. With the shoaling of the present 10-foot channel subsequent to its abandonment, it is evident that the proposed Crooked Channel, due to its location, would be subject to rapid shoaling. Should a channel having a depth of 12 or 13 feet be opened through this locality, a greater volume of sediment-laden water from the Apalachicola River would pass through, and likewise a much greater quantity of sediment be drawn into it, from which it would not escape, and shoaling would be certain to follow. In addition, a considerable amount of sediment discharged by the St. Marks and Little St. Marks Rivers would assuredly find lodgement in a channel constructed along the lines of Crooked Channel. Wave action would increase this shoaling. In brief, where there is so much sediment moving, and where currents have surrendered areas to shoaling influences, marked shoaling is certain to follow if existing conditions be disturbed.

15. Considering therefore the factors of first cost, convenience to navigation, and practicability as well as cost of maintenance, route 1 is favored over route 2 for a 12-foot channel. As previously stated, a route for such a channel leading to the east from the town is not only strongly favored by local interests, but is also the logical plan of development, thus eliminating route 3 from independent consideration. However, the adoption of route 1, including the existing 10-foot channel, which also forms a part of the proposed route 3, leads to a consideration of the desirability of including that portion of route 3 from B to H in the proposed 12-foot project. This would add but little to the cost, while greatly adding to facilities for navigation throughout the bay, and affording the use of West Pass as well as East Pass for coastwise navigation. If adopted the project would, in effect, include both routes 1 and 3, but adding to the former only the portion between B and H.

16. Should a 12-foot project be adopted for Apalachicola Bay, the district engineer would therefore recommend that it extend from Apalachicola along the line of the existing river bar channel to the point B, as shown on the maps, thence eastward to C, and thence continue east along the line D, E, F, and G to a depth of 12 feet; also, from the point B, southwest along the line B-H through St. George Channel to a depth of 12 feet. The additional cost, by reason of including the portion B-H, would be:

For excavation, 180,000 cubic yards, at 13 cents.....	\$23, 400
For engineering, superintendence, contingencies.....	2, 600
Total.....	26, 000

Adding this amount to the estimated cost of a 12-foot channel along route 1, \$124,000, as given in paragraph 5, would make the total first cost of a 12-foot project as proposed, \$150,000. The annual cost of maintenance for such a project is estimated at \$49,000 for the second year after completion and \$35,000 for the third and succeeding years. Experience and examination indicate that from the inner end of the Bulkhead Shoals eastward the channel would remain permanent, requiring little if any maintenance.

17. It is next in order to consider the advantages that would accrue from the provision of a 12-foot project and whether these advantages are sufficient to justify the cost of construction and maintenance. Data as to prospective commerce presented in the preliminary examination report were based upon the provision of a ship channel from East Pass to Apalachicola, thus offering an outlet for commerce originating on the Apalachicola-Chattahoochee-Flint and Chipola system of rivers. Limiting the channel through the bay to a depth of 12 feet changes the aspect of the situation in so far as the river tonnage is concerned, offering no material advantage over the facilities now existing at Apalachicola for handling that tonnage. With no prospect of a deep channel from Apalachicola to the Gulf, it is believed that the logical destination for river commerce seeking deep water is St. Andrews Bay, which is reached by way of the canal connecting this bay with the Apalachicola River. Furthermore, commerce on these rivers has not reached a stage of development justifying the provision of increased port facilities. Justification for a 12-foot project in Apalachicola Bay must be based entirely on local industries and resources.

18. The principal industry of the town of Apalachicola is what is locally termed the "sea-food industry." This consists largely of fishing, gathering of oysters and shrimp, packing and canning. Statistics gathered indicated that the total number of vessels at present engaged in fishing is 178, although it is claimed by local interests that more than 200 boats are so engaged. These boats are mostly of shallow draft, very well provided for by existing facilities. Recently there has been some expansion of this industry, but the stage of development has by no means reached the maximum possible under existing navigation facilities. It is claimed that channels of 12 feet depth, if available, would allow the introduction of deeper-draft vessels more suitable for deep-sea fishing, and thus lead to a material increase in this phase of the industry. This would probably follow, but no specific plan for expansion of the industry is known, and no prediction as to the probable development can be made, bearing in mind that the fishing industry at Apalachicola has not been developed to the point warranted by existing available depths, which are less than 10 feet.

19. There has been a recent stimulation of the lumber industry in the territory adjacent to Apalachicola Bay to the north, east, and west of Apalachicola. A number of new mills are being placed in operation, or preparation therefor is under way. The output of lumber from this territory will undoubtedly be largely increased for several years. However, even with a deep-ship channel from Apalachicola direct to the Gulf, only a portion of this output would find an outlet at Apalachicola. This question is discussed in paragraph

29 of the preliminary examination report. A number of new mills have been located on rail lines leading to Port St. Joe, where there are facilities for loading from cars to vessels, and where there exists a 24-foot channel from a deep harbor to the gulf. Lumber developments farther to the west would find an outlet to deep water by way of St. Andrews Bay and to the east through Carrabelle and the East Pass entrance to Apalachicola Bay. At Apalachicola in the past lumber has been barged from the town to vessels in the anchorage inside of East Pass. A 12-foot channel might allow some vessels to come direct to Apalachicola for part cargoes, but a portion of each load would have to be barged as at present, and the advantages to the lumber industry would be very restricted. There is no information at hand as to the establishment of any new lumber mills at Apalachicola, where there is at present but one, having a daily capacity of about 40,000 feet board measure. It is believed that other mills that may be established in this territory will, as in the case of new mills recently built, be located with a view to reaching deep water by way of Port St. Joe, St. Andrews Bay, or through Carrabelle to East Pass. Apalachicola offers no peculiar or special advantages as a shipping port for the lumber industry, aside from the question of navigation facilities.

20. In addition to the fishing and lumber industries, the shipments of naval stores from Apalachicola and tonnage of general merchandise handled through this port may be considered. Statistics for the calendar year 1922 show that some 4,600 tons of naval stores were brought to Apalachicola from various points on the bay and rivers, and approximately 2,800 tons were exported to coastwise points. For the same year the total tonnage of the port, imports and exports, was approximately 31,000 tons. Deducting the tonnage of fish, shell fish, lumber, and naval stores, leaves a balance of general merchandise for that year amounting only to 5,000 tons, mostly imports coastwise. Coastwise commerce is now handled almost entirely by one steamer, the *Tarpon*. The *Tarpon* is a small steamer of 449 gross tons, having a full-loaded draft of 9 feet. This vessel makes weekly round trips between Mobile, Pensacola, Panama City, Carrabelle, and Apalachicola, entering Apalachicola Bay through East Pass and going out by West Pass. The controlling depths in the present channels to the east and west is 8 feet, sometimes reduced during periods of northerly winter weather and during low tide to 7 feet and less. Owing to these variations in depth, there are times when freight offered to the *Tarpon* remains in storage for some future trip. Adjusting the draft of the vessel in this manner, the schedule of the *Tarpon* is not interrupted. This steamer now enters Apalachicola Bay by way of East Pass, proceeding first to Carrabelle, discharging part of her cargo, thence with lightened load to Apalachicola. There would be no material advantage in entering the bay by West Pass, which the vessel could do were greater depths available between West Pass and Apalachicola. The *Tarpon* renders fair service at the present time, though, as stated, adjustments in cargo must be made at various times to meet the reduction in available depth. This makes for delays and inconvenience, which can be corrected by slight increase in depths east and west of the existing river bar channel. For this

purpose, however, an increase of 2 feet, making the project 10 feet throughout, would suffice.

Interested parties claim that with depths of 12 feet available, there would be sufficient increase of traffic to induce a freight carrier of greater tonnage and draft to enter into the coast trade, thereby adjusting in a measure the present freight rates. This might happen, but should it occur, in all probability the *Tarpon* would be forced to withdraw and the freight rates remain as now fixed. The introduction of a larger boat, dependent upon an increase of traffic, is purely speculative, since this would be dependent upon introduction of commodities not now being carried, or an extended classification of freight. It is not at all clear that under the commercial needs of Apalachicola such an increase would follow.

21. A project of 12 feet throughout would naturally afford greater advantages than one of lesser depth and provide greater facilities for developments, should they arise. But since prospective developments are remote and uncertain, since material improvements are possible with existing depths, which as shown are less than 10 feet, it is not believed that the time has yet arrived requiring a project depth of 12 feet, and such a project is not recommended.

22. While a project depth of 10 feet exists in the river bar channel, this does not obtain to the east toward East Pass and Carrabelle, nor to the southwest toward West Pass. Here the controlling depths are 8 feet, still further reduced in periods of stormy weather and low tides. From a careful review of the commercial necessities of Apalachicola as they exist at the present time, it is concluded that there is a lack of freedom of movement in those portions of the used channels throughout the bay outside of the project channel through the river bar. Should the project depth of 10 feet now applying to the river bar channel be extended to the channels leading both to the east and west, a material increase of tonnage could be carried by the *Tarpon*, and traffic in general throughout the bay would move more freely.

23. The existing project, as previously stated, provides for a 10-foot channel through the river bar and 18 feet through West Pass and Link Channel. Should this project be modified as heretofore recommended in House Document No. 860, Sixty-fourth Congress, first session, there would remain only the 10-foot channel through the river bar. Between the mouth of this channel and West Pass, where the controlling depth is now 8 feet, there would be no project, and as there has never been any project to the east, the result would be a project depth in the river channel greater than the controlling depths to the east and west through the bay. It is believed that this condition should be corrected, and that a project depth of 10 feet throughout is justified.

24. To secure a project depth of 10 feet throughout the existing project should be modified as follows:

First. Abandon that portion of the project applying to West Pass and Link Channel.

Second. Extend the 10-foot project from the mouth of the present river bar channel to the southwest through St. Georges Channel, to the point of 10-foot depth, along the line B-H shown on accompanying maps.

Third. Extend the 10-foot project from the mouth of the present river bar channel to the east through Bulkhead Shoals Channel, thence eastward to the point of 10-foot depth, along the line B-C-D-E-F-G, as shown on the accompanying maps.

25. The following estimates are submitted of the new work required to extend the 10-foot channel as suggested. These estimates are based on a channel with depth of 10 feet at mean low water, allowing 1 foot overcut and a bottom width of 100 feet.

For channel to the southwest, line B-H, excavation.....	cubic yards--	75, 000
For channel to the east, line B-C-D-E-F-G, excavation.....	do-----	300, 000
Total excavation.....	do-----	375, 000
For dredging 375,000 cubic yards, at 13 cents.....		\$48, 750
For engineering, superintendence, and contingencies.....		6, 250
Total cost.....		55, 000

26. It is estimated that the annual maintenance cost for that portion of the 10-foot project included in the preceding paragraph would be \$24,000 for the second year after completion and \$14,000 for the third and succeeding years. For the entire 10-foot project, including the existing river bar channel, there should be added the cost of maintenance of the latter, which is \$15,000 per annum. The annual maintenance cost for the complete 10-foot project as proposed would then be \$39,000 for the second year after completion and \$29,000 for the third and succeeding years.

27. The district engineer is of the opinion that the modification of the existing project outlined in paragraph 24 preceding is justified and should be made. However, in this connection, attention is invited to communications¹ received from local interests, a petition,¹ dated August 6, 1923, a letter¹ from Mr. J. H. Cook, dated August 11, 1923, and a resolution¹ adopted by the town council of Carrabelle on August 17, 1923. These communications¹ are forwarded with this report. An examination of these papers will show that the modification of the existing project herein proposed by the district engineer is not in accord with the apparent wishes of local interests. Public opinion seems to be strongly in favor of the so-called crooked channel route, elsewhere described in this report as route No. 2, even should the adoption of this route lead to the abandonment of the present channel. The district engineer can not concur in this opinion. To summarize the disadvantages of the Crooked Channel route, elsewhere in this report stated in detail; first, the cost of the Crooked Channel route would be approximately one-third greater than the cost of the route proposed; second, the Crooked Channel would shoal fully as rapidly as the proposed channel, probably more rapidly, and maintenance would be more difficult and more costly; third, the abandonment of the present river bar channel would increase the mileage of the only coastwise vessel now touching at Apalachicola; fourth, the abandonment of the river bar channel would ultimately be to the disadvantage of the oyster and shrimp industry; fifth, the Crooked Channel would no better insure the safety of a majority of the boats now operating.

¹ Not printed.

28. While the district engineer favors a 10-foot project along the lines indicated in paragraph 24, and believes that the modification of the existing project as proposed is justified, it may be considered inadvisable, in view of the purely local application of the benefits expected from the proposed improvement, to adopt additional channel lines apparently so opposed by local interests. However, as the uses and benefits of an improvement can only be definitely determined after the fact, and as it is believed that the advantages of the improvements proposed by the district engineer will eventually become apparent to local interests, the adoption of these improvements will be recommended.

29. It is accordingly recommended that the existing project for Apalachicola Bay be modified by the abandonment of that portion pertaining to West Pass and Link Channel, by the extension of the existing 10-foot channel from its present mouth southwestward in St. George Channel to the point of 10 feet depth, and by the addition of a new 10-foot channel from the mouth of the river bar channel eastward to Bulkhead Shoals Channel, through this channel, and thence eastward to the point of 10 feet depth. The depth of the extension and of the new channel to be 10 feet at mean low water and the bottom width 100 feet. The proposed channels are shown on the accompanying maps, the extension by the line B-H, and the addition by the lines B-C-D-E-F-G. The estimated cost of new work is \$55,000, and the estimated annual cost of maintenance of the entire modified project is \$39,000 for the second year after completion and \$29,000 for the third and succeeding years. Due to the limited amount of new work involved, it can most advantageously and economically be performed by continuous operation. The initial appropriation should, therefore, equal the estimated cost of new work—\$55,000.

30. While the benefits to be derived are largely local, their application is general to many small interests, and no plan for local cooperation is considered practicable or necessary.

31. There are no questions of water power, flood prevention, irrigation, or other related subjects to be considered.

J. J. LOVING,
*Major, Corps of Engineers,
District Engineer.*

[First indorsement]

OFFICE OF DIVISION ENGINEER, GULF DIVISION,
New Orleans, La., March 5, 1924.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. If additional navigation facilities were warranted, the work recommended by the district engineer would provide them in the most advantageous and logical manner. The total commerce to be benefited, however, amounts to only 31,000 tons per annum, and the great bulk of this is transported on boats of shallow draft for which additional depths are not required.

2. Apalachicola is provided with rail connection to the near-by deep-water port of St. Joe and to the interior. It also has water connection by an intracoastal canal to the deep-water port of St. Andrews

Bay and to the interior by river. It seems plain that the improvement proposed can have but one useful purpose; that is, to enable a single coastwise steamer, a small one, to load to full draft in the exceptional periods when freight offers and tides are low. The present method of loading, in accordance with depths available, enable regular trips to be made and freight to be handled in a quite satisfactory manner. If trade builds up, the next economical step would be to introduce another boat in the service, adapting its draft to existing depths, rather than increasing such depths at great proportionate cost for initial dredging and constant maintenance.

3. Therefore no justification is seen for any additional expenditure by the general Government over that required by the existing project; i. e., an annual maintenance cost of \$15,000 for a river bar channel 10 feet deep and 100 feet wide. On account of rapid shoaling from enormous quantities of silt brought down by floods in the Apalachicola River or stirred up from the bottom of the bay by storms, a channel of this depth is needed to conform with the 8 to 9 foot depths generally available in the open-water approaches to the port.

4. The proposed modification of the existing project can not be concurred in by the division engineer, and is recommended for disapproval.

G. M. HOFFMAN,
Colonel, Corps of Engineers,
Division Engineer.

SUPPLEMENTAL REPORT ON APALACHICOLA BAY, FLA.

WAR DEPARTMENT,
BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., March 24, 1925.

Subject: Apalachicola Bay, Fla.

To: The Chief of Engineers, United States Army.

1. Reference is had to the report of the district engineer, Montgomery district, on survey of Apalachicola Bay, Fla., dated February 25, 1924. A hearing was held before the board on this case on February 25, 1925, of which a transcript is attached.¹ It is requested that the district engineer be directed to submit a supplementary report covering the following:

(a) Further remarks on the probability of shoaling of route No. 2 between point A and point C. It will be noted from the record of hearing that the opinion of some of those present was that this shoaling would be comparatively slight, as the main mass of sediment brought by the Apalachicola River would flow down channel A-B. On the other hand, it is noted from your report that a considerable volume of sediment in times of flood comes out of the St. Marks and Little St. Marks Rivers, which would be likely to find its way into a channel A-C. A valuable measure of the amount of such sediment could be obtained from the depth of deposits in the bay as indicated by difference in soundings taken during past years, if a series of surveys is available for study. The possibility of diverting, at reasonable expense, the flow of these two streams to East River or to the main river should be considered, if check calculations show that they carry a large burden of silt.

(b) Report on the first cost and maintenance cost of an alternative route to the one marked "C-D-E-F-G," following more closely the north shore of St. Georges Sound and utilizing existing deep water wherever possible.

¹ Not printed.

(c) The probable cost of a brush and pile dike covered with shell, or some other comparatively inexpensive type of structure, following the line of the bulkhead along the dredged channel, and the probable effect of such a work on channel maintenance.

(d) A full discussion of bay currents, particularly as affected by prevailing winds. If sufficient data are not available in the district office, current observations should be taken.

2. It may be stated that it is the present view of the board that no improvement of this harbor is justified, beyond that provided by the existing project, unless a route can be found, alternative to the present route, utilizing either West Pass or East Pass, and which, considering both first cost and maintenance cost, would in the long run be more economical to the Government than the existing project, and equally satisfactory from a commercial point of view. It is further the view of the board that no project dimensions should be adopted greater than those of the existing project.

3. A wind chart added to the map would aid the board in its study of the case, as would also a careful delineation of the position of the sand spits and islands on the east side of the mouth of the main river.

4. The transcript of hearing should be returned to this office after it has served the needs of the district engineer.

For the board:

EDGAR JADWIN,
*Brigadier General, Corps of Engineers,
Senior Member of the Board.*

[First indorsement]

OFFICE, CHIEF OF ENGINEERS, *March 28, 1925.*

To the DISTRICT ENGINEER,
United States Engineer Office, Montgomery, Ala.

1. For a supplemental report containing the information desired by the Board of Engineers for Rivers and Harbors as indicated in the above letter.

2. The transcript ¹ of hearing should be returned to this office after it has served the needs of the district engineer.

By order of the Chief of Engineers:

EDGAR JADWIN,
*Brigadier General, Corps of Engineers,
Assistant Chief of Engineers.*

[Second indorsement]

UNITED STATES ENGINEER OFFICE,
Montgomery, Ala., July 2, 1925.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer.)

1. In compliance with first indorsement above the following supplemental report containing information on Apalachicola Bay is submitted.

2. It was not practicable to visit this locality until May, owing to the fact that the U. S. S. *Santa Rosa*, which was used in making the

¹ Not printed.

required examination, was not available before that time. The undersigned and Assistant Engineer J. E. Turtle spent several days inspecting and studying the project, conferring with interested parties, etc.

3. The following paragraphs take up in order the points raised by the Board of Engineers for Rivers and Harbors in the basic letter of March 24, 1925. There is also attached hereto as an inclosure a report submitted to this office by Assistant Engineer J. E. Turtle, under date of June 4, 1925, which goes into considerable detail on the subject.

4. *Shoaling of route No. 2 between points A and C.*—From a study of the transcript of the hearing which was held before the board on February 25, 1925, it is noted that interested parties are strong in their opinion that there would be comparatively little shoaling were a channel dredged between points A and C of route 2, known as the Crooked Channel.

Shoaling in Apalachicola Bay is caused mainly by sediment brought down by the Apalachicola River and also by the streams branching therefrom, Little St. Marks River, St. Marks River, and East River. The question of shoaling caused by these smaller rivers will first be discussed and then the question as to what shoaling would be caused by the Apalachicola River itself, were a large part of its discharge diverted through the Crooked Channel. East River was not inspected at the time of our recent visit. It flows into East Bay about 3 miles north of Crooked Channel. Owing to its relatively small discharge and to the fact that there is a large bay intervening, it is believed that shoaling caused by East River is negligible and may be disregarded. The St. Marks and Little St. Marks Rivers were inspected in May. These are real rivers, varying in width from 200 to 400 feet and in depth from 6 to 20 feet, with fairly swift current. At the time of our visit these rivers and also the Apalachicola River were comparatively clear, so that it was not practicable to attempt to determine the amount of sediment carried.

Calculations were made in 1923 from samples obtained by Mr. Turtle, and it was found that the amount of sediment per unit of volume of water was the same in the Apalachicola, Little St. Marks, and St. Marks Rivers. This is what might reasonably have been expected, as the two smaller rivers are branches of the main river, the Apalachicola (see inclosed map marked "Sheet Z")¹. A calculation of the annual amount of sediment carried in the St. Marks and Little St. Marks Rivers was stated in the previous report on the survey to be 1,853,140 and 1,908,816 cubic yards, respectively. A recheck of these calculations shows that the original figures were in error; they should be 1,396,180 and 1,427,476 cubic yards, respectively. Though less than at first reported, these figures do not change the original conclusion—that a large amount of silt is brought down by these two rivers.

At the time of our inspection, in May, it was noted that there were large deposits of sand several feet in depth along the banks of the St Marks and Little St. Marks Rivers, undoubtedly deposited during the period of extreme high water in January, 1925. Judging from the amount of this deposit, which was several feet above the normal level of the rivers, the total volume of sediment carried by these streams during this flood must have been enormous.

¹ Not printed.

Reference is made to attached map (sheet Y),¹ "Direction of ebb currents and wind chart." It will be noted that opposite the mouth of the Little St. Marks River there is an area marked "Very shoal," which is evidently where the slackening river currents dropped their sediment when the water spread out into the bay. The water was so shoal that it was impossible to run a small motor launch drawing about 15 inches of water.

From samples showing that the amount of sediment per unit of volume of the St. Marks, Little St. Marks, and Apalachicola Rivers were approximately the same, from observation of recent large deposits of sand along their banks and very shoal water in the bay opposite the mouths of the two first-named rivers, it is concluded that the St. Marks and Little St. Marks Rivers carry large amounts of silt. Current observation shows that the flow from these rivers into the bay is toward the Crooked Channel.

The question as to whether sediment carried by the Apalachicola River would be deposited into the Crooked Channel provided a dredged cut was made there will now be considered (see inclosed map "X").¹ It is true that at present most of the discharge of the river goes out of the River Bar Channel with its corresponding amount of sediment. Current observations at the west end of the Crooked Channel show that the direction of flow is to the south-eastward; that is, that a portion of the discharge of the river at present enters the Crooked Channel and flows in the same general direction, though a little to the south. It is believed that this current carries its proper proportion of sediment and that by enlarging the Crooked Channel and the approach thereto there would be a corresponding increase in the amount of water and sediment entering that channel. The Crooked Channel is about 5 miles long. The force of the current from the river would diminish as it entered the bay through a dredged channel there, and eventually would deposit its sediment, just as it does now, in the river bar channel. The present cut in the river bar channel acts as a catch basin for sediment discharged therein. Assuming that the Crooked Channel route were dredged, no further work would be done on the river bar channel and in a shorter or longer period it may be assumed that the river bar channel would shoal to its natural and former depth, 3 feet. Conditions would then be reversed from what they are now. The 10 or 11 foot cut in the Crooked Channel would act as a settling basin for a large part of the sediment brought down by the river, and it is believed that maintenance would be just as costly as in the case of the present channel. The idea presented at the hearing that the river would flow by the Crooked Channel entrance and suck water out of it is believed to be erroneous. A similar situation was observed in May in the case of a cut-off connecting the Apalachicola River with the Little St. Marks River (see point marked "P" on sheet Z attached).¹ This cut-off branches off from the Apalachicola River at an angle of over 100°; in fact, it is believed to bend more upstream than shown on the map. It is about 5 or 6 feet deep and about 50 to 60 feet wide. According to the theory advanced by the promoters in the case of Crooked Channel, it might be expected that the Apalachicola River, with a discharge many times that of the small cut-off,

¹ Not printed.

would suck water out of it. The contrary was found to be the case. A strong current was found to be flowing from the Apalachicola River through the cut-off to the Little St. Marks River. On account of the upward bend of the cut-off it gave the impression of the water flowing back upstream. It was simply a case of a proportionate amount of water seeking a lower level through the cut-off and Little St. Marks River to the bay. Conditions would be even more favorable for currents entering Crooked Channel, for in that case the Crooked Channel is more in prolongation of the main river; the river bar channel going off at an angle to the right.

Another similar example may be cited in the case of the "arrow-head," which is a V-shaped bulkhead that was placed about 25 feet above the inner end of the timber bulkhead along the river bar channel, to protect it against drift (see sheet Y).¹ Instead of the current in the channel all going by, a portion of it turned upstream and went around the end of the bulkhead and between it and the V-shaped arrowhead, causing considerable scour at that point and shoaling to the eastward in the bay.

There is only one sure way to determine absolutely how much Crooked Channel would shoal and what it would cost to maintain it, and that is to actually construct such a channel, abandoning the river bar channel and allowing it to shoal to its former original depth of 3 feet. Assume that this was done and that it was then found that Crooked Channel was more expensive to maintain and no more satisfactory than the present channel. There would then be two things that could be done—continue to maintain Crooked Channel at greater expense or go back to the river bar channel. The whole proposition is a question of giving up a channel whose maintenance is known in favor of one whose maintenance may be greater and is not believed would be any less. It appears that the adoption of Crooked Channel might be found to be an expensive experiment, which is not justified under existing conditions.

5. *Diverting the flow of St. Marks and Little St. Marks Rivers.*—Reference is made to pages 26 to 28 of the transcript of the hearing,¹ which contained a statement about the smaller branches of the Apalachicola River being nearly closed up, especially where the Apalachicola Northern Railway crosses. From a reading of the transcript it was not clear just what streams were referred to—East River, St. Marks River, or both. Soundings were taken in the St. Marks River at the Apalachicola Northern Railway bridge in May during a period of low water. It was found that the river was from 10 to 20 feet deep and about 350 feet wide, with swift current. There was absolutely no indication whatever of any closing up of this stream, so it is concluded that the remarks referred to above applied to the East River only. As it is admitted that sediment from that river would have little effect on channels in Apalachicola Bay, that stream may be eliminated from further discussion.

As the Little St. Marks River branches off from the St. Marks River below the Apalachicola Northern Railway bridge, diverting the flow of the St. Marks River would also divert that of the Little St. Marks River. The banks along the St. Marks River are generally low and swampy and are subject to overflow in time of flood.

¹ Not printed.

To divert the flow of this stream would require not only building a dam across the main river, but also the building of some kind of embankment or dike on the swampy land on both sides for a considerable distance, probably a half a mile in each direction. A detailed study of the cost of such a proposition was not made as a casual inspection showed that it would be tremendously expensive and out of all proportion to any possible benefits that might result.

6. *Route along north shore of St. Georges Sound.*—The route along the north shore of St. Georges Sound is at present used at times by the *Jessie May*, a small passenger and freight boat drawing 4½ feet and making one daily trip from Apalachicola to Carrabelle and return. It is generally necessary for this boat to take soundings when going over oyster bars along this route. Some dredging along this route across the various oyster bars would give 7 or 8 feet and would be of advantage to this one boat and would probably be of benefit in the case of rafts towed from Carrabelle to Apalachicola. A channel 10 feet deep, with bottom width of 110 feet and slopes of 1 on 4, and with 1 foot overdepth, would require dredging over a distance of about 10 miles and the removal of over 1,000,000 cubic yards of material. The first cost would be over \$100,000. Maintenance cost would probably be small unless storms washed some of the excavated material back into the channel. The present route through Bulkhead Shoals Channel and then following the route C-D-E-F-G (see map A, dated February 25, 1924) has not required any dredging whatever, except a cut through Bulkhead Shoals made in 1891-92. The present depth through Bulkhead Shoals is less than 8 feet for a length of about 200 feet. The dredge *Blackwater* can restore this channel in one or two days. The saving of distance of the northern route over the present route would be about 2 miles, and at times it would be more sheltered than the present route. Owing to the limited benefit that would result, the expenditure of over \$100,000 is not believed justified.

7. *Dike along dredged channel.*—A timber bulkhead nearly 10,000 feet long was constructed in 1908 along the eastern side of the 10-foot channel at the mouth of the Apalachicola River. This bulkhead was practically destroyed by storms in 1916. Its purpose was to reduce the cost of maintenance of the channel. The desired results were not obtained, and the experiment may be considered a failure. It is not believed that the construction of a brush and pile dike covered with shell would have any better effect on channel maintenance, and it is fairly certain that storms and wave action would destroy such a structure in a comparatively short period. Similar but lighter structures, using concrete blocks instead of shell, built as spur dikes in certain rivers of this district cost over \$6 a linear foot. Using shell, a stronger dike built in the bay would certainly cost more. It is estimated that a pile and timber dike similar to the old one would cost at this time at least \$45,000. The cost of a rock dike would be prohibitive. Considering first cost, uncertain life, and doubtful value of a dike, its construction is not believed justified.

8. *Bay currents.*—Current observations were taken in May at various times and in all such localities as were believed necessary to consider their effect on present or proposed channels. A detailed description is given in Mr. Turtle's report¹ attached hereto. The

¹Not printed.

results are shown on a map marked "Sheet Y"¹ forwarded herewith. The observations were taken on ebb tides and at a time when the discharge of the rivers was very low. The observations show that there is some drift of the current to westward below the town of Apalachicola, but not more than could be expected considering the bend that the Apalachicola River takes opposite the town. It will be noted that along the line of the bulkhead the direction of flow is approximately southeast. At the entrance of Crooked Channel the current flowed somewhat to the south of the line of the channel, but near enough to its general direction to show that if such a channel were dredged the currents would certainly enter it from the river. At the mouth of the Little St. Marks River the current continued to flow in the same direction as the river and toward the Crooked Channel. The currents between Bulkhead Shoals and the river bar channel are known from past experience to alternate easterly and westerly throughout this locality, so no current observations were taken in that vicinity. At the time of the observation the wind was light from the southeast and had but little effect on the currents. Except for storm winds, it is believed that in the area under consideration the currents are influenced more by the effect of the flow of the rivers and tides than by the winds, so far as the deposit of sediment is concerned.

It is noted that interested parties place great stress on the fact that trees and drift are lodged to the west of the river bar channel. In May it was observed that there was as much, if not more, drift lodged on shoal places to the east of the river bar channel and south of the mouths of the St. Marks and Little St. Marks Rivers than there was to the west of the river bar channel. Interested parties state that previous to the flood of January, 1925, there was little drift to the east, but that these trees, drift, etc., were brought down by that flood. It was also observed that during this flood much drift went out through the river bar channel without lodging on either side. Flood conditions must be taken into account, and there is no doubt that this flood brought down quantities of sediment as well as drift which was deposited both eastward and westward of the river channel, as well as in the channel itself. During this flood a small skiff got aground to the eastward of the Apalachicola River about point S (see sheet "Y"¹). A small boat from the lighthouse tender *Camellia* attempted to rescue the skiff, but the currents were so strong that it also got aground, and both open boats with their occupants were forced to spend the night aground. The following morning a gasoline-operated oyster boat went to the rescue, but it was also forced aground to the east by the currents. I personally saw these three boats aground. There was certainly a strong current to the eastward away from the main river to cause the boats to get aground. It was stated by H. D. Marks, who frequently uses the present shallow route through Crooked Channel, that this flood caused considerable shoaling in the existing Crooked Channel, and actually changed its location. I made the trip by boat from Apalachicola to Carrabelle during the period of the flood in January, 1925, and it was noted that the whole of Apalachicola Bay was a mass of muddy flood water, extending eastward well into St. Georges Sound. About 5 or 6 miles

¹ Not printed.

from Carrabelle the water began to get somewhat clearer and greener, and when opposite Carrabelle River the water had the usual blackish color of that river.

9. *Alternative routes.*—Paragraph 2 of basic letter raises the question of a route alternative to the present route, utilizing either West Pass or East Pass, which considering both first cost and maintenance cost would in the long run be more economical to the Government than the existing project and equally satisfactory from a commercial point of view. See map A, submitted with report of survey under date of February 25, 1924. The routes may be listed as follows:

(a) Route 1: A-B-C-D-E-F-G.

(b) Route 2: A-C-D-E-F-G (Crooked Channel route).

(c) Route 3: A-B-H, and thence through Link Channel and West Pass.

The above three routes were discussed in detail in the original survey report dated February 25, 1924.

(d) A fourth route, following the direction A-C and thence along the north shore of St. George Sound, is discussed in this report, paragraph 6.

(e) The only other possible route that can be conceived of would be to extend the project for the River Bar Channel directly to St. Georges Island and make a cut across the island. This would be the shortest route to deep water in the Gulf, but on account of the expense of cutting and maintaining a channel across the island and owing to the fact that this would not be of benefit to navigation between Apalachicola and Carrabelle, it will not be considered further.

The route described in subparagraph (d), which would have to be combined with the Crooked Channel route, is discussed elsewhere in this report and is believed to possess few advantages over routes 1 or 2, besides having a considerable higher first cost and no lower maintenance cost.

Route No. 3 would not be sufficient by itself. It would have to be used in conjunction with route 1 or route 2.

The proposition narrows down to a choice between routes 1 and 2. As noted elsewhere, route 2 would be of advantage to certain navigation interests, but considering the interests of the port of Apalachicola as a whole it is believed to be no better than route 1. The maintenance costs of the two routes are believed to be about the same. Route 1 is already constructed; and though a project exists for only a portion of it, it is at present serving the needs of navigation, though perhaps not to the entire satisfaction of local interests. The part A-C of route 2 (Crooked Channel) would require a large initial expenditure for dredging before it could be used.

The conclusion is that there is no other route that can be secured at a less first cost and maintenance cost to the Government. The situation presented, of a large silt-bearing river system, flowing into a wide and shallow bay, and of a port of minor importance whose commerce does not justify large expenditures, is unfortunate for the port of Apalachicola, but it is a situation that exists. Under these conditions it is not believed that Apalachicola will ever develop into more of a port than at present nor is it believed that the expenditure of funds in excess of the present is justified.

10. *Wind chart.*—A wind chart for the year 1924 is shown on a map forwarded herewith marked "Sheet Y."¹ The data were obtained from tables prepared in the meteorological office in Apalachicola. It was possible to obtain average velocities only of the wind in the different directions; as specific velocities and periods were not available. It is noted that the data are not entirely accurate in certain respects. For example, in the duration of wind in hours the total number of hours accounted for is 10 less than the number of hours in the year. The product of the average velocity in a given direction by the number of hours the wind blew in that direction should give the number of miles. In most cases these products do not check exactly. The chart is believed to be sufficiently accurate, however, to show the prevailing direction and velocity of the wind.

12. *Conclusions.*—(1) It is believed that the Crooked Channel route will be subject to shoaling from sediment from the St. Marks River, Little St. Marks River, and from the Apalachicola River itself.

(2) It is not believed possible nor advisable to divert the flow of the St. Marks or Little St. Marks rivers within reasonable limits of cost.

(3) A route following the north shore of St. Georges Sound is not believed justified when the cost is compared with the benefits to navigation.

(4) A dike along the dredged channel is not believed advisable on account of the first cost and improbability of reducing cost of maintenance.

(5) It is believed that a study of bay currents shows that the Crooked Channel route would be subject to shoaling about the same as the present river bar channel.

(6) No better route is believed possible so far as first and maintenance costs and benefits to commerce than that covered by the existing project.

EDWIN A. BETHEL,
Major, Corps of Engineers,
District Engineer.

[Third indorsement]

OFFICE OF DIVISION ENGINEER, GULF DIVISION,
New Orleans, La., July 6, 1925.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

Concurring in the conclusions of the district engineer.

G. M. HOFFMAN,
Colonel, Corps of Engineers,
Division Engineer.

¹ Not printed.

LINK TRANSFERRED TO GRA.