U. S. DEPARTMENT OF COMMERCE
Sinclair Weeks, *Secretary*

COAST AND GEODETIC SURVEY
H. Arnold Karo, *Director*

March 22, 1958

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1958

UNITED STATES COAST PILOT 5

Gulf Coast, Puerto Rico, and Virgin Islands

Fourth (1958) Edition

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U.S. Dept. of Commerce

United States Government Printing Office, Washington : 1958

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National Oceanic and Atmospheric Administration

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Preface

This, the fourth edition of United States Coast Pilot 5, Gulf Coast, Puerto Rico, and Virgin Islands, is based on the work of the Coast and Geodetic Survey and includes the results of special field examinations of the Gulf Coast in 1955–57. Much information also has been obtained from the Weather Bureau, the Corps of Engineers, the Coast Guard, and from local port authorities.

This edition is corrected through Notice to Mariners 12 of March 22, 1958, and cancels the 1949 editions of both Coast Pilot 5, Gulf Coast, and Coast Pilot 6, West Indies.

Supplements to this Coast Pilot, containing changes from various sources, usually are issued early each year. Each supplement is complete in itself and cancels all previous issues. The latest supplement, together with Notices to Mariners subsequent to it, will correct the book to date. Supplements may be obtained from the Coast and Geodetic Survey or its sales agents.

Mariners and other interested parties are requested to send to the Director, Coast and Geodetic Survey, U. S. Department of Commerce, Washington 25, D. C., any information affecting this Coast Pilot that may come to their attention.

H. Arnold Karo, *Director*.

March 22, 1958.

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United States Coast Pilot 5

Gulf Coast, Puerto Rico, and Virgin Islands

1958

Indexes of Nautical Charts

NUMERICAL LIST OF CHARTS

No.	Price	Scale
70	$1.00	1:675,000
71	1.00	1:500,000
77	.75	1:197,250
78	.75	1:200,000
291	.75	1:10,000
413	.75	1:10,000
453	.75	1:20,000
456	.25	1:10,000
473	.75	1:40,000
474	.50	1:40,000
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489	.75	1:25,000
490	1.00	1:30,000
497	1.00	1:15,000
517	.75	1:40,000
523	1.00	1:40,000
533	.50	1:40,000
546	.75	1:5,000
547	.75	1:10,000
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592	.75	1:40,000
598/99	.75	1:50,000
685/86	.75	1:40,000
687/88	.75	1:40,000
858	.50	1:40,000
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867/68	.50	1:40,000
869/70	.50	1:40,000
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3075/76	1.00	1:220,000

Diagram No. 1

March 1955

SAILING AND GENERAL CHARTS - ATLANTIC AND GULF COASTS

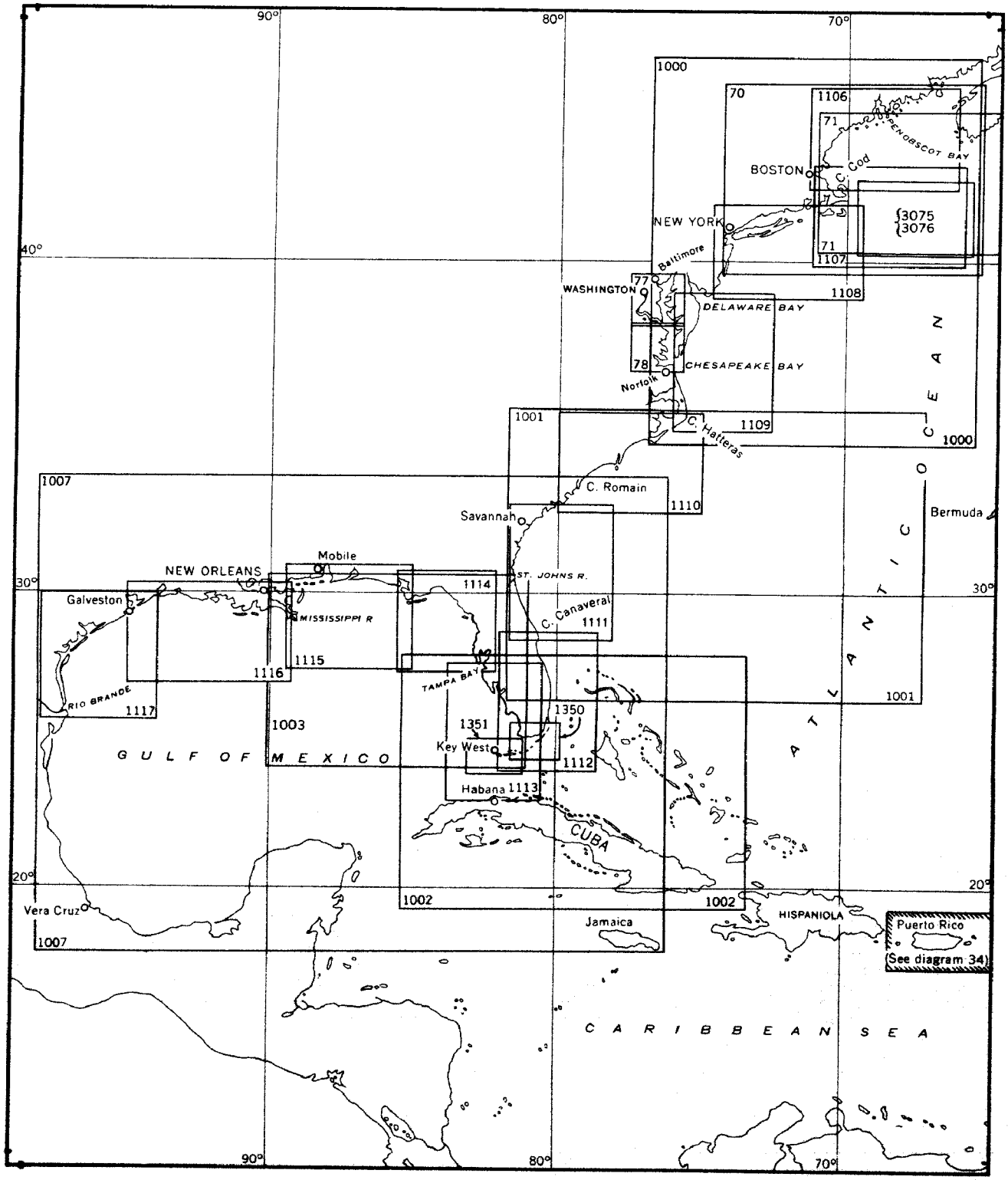


Diagram No. 10

COAST AND HARBOR CHARTS - ATLANTIC AND GULF COASTS

December 1957

JACKSONVILLE TO CAPE SAN BLAS, FLORIDA

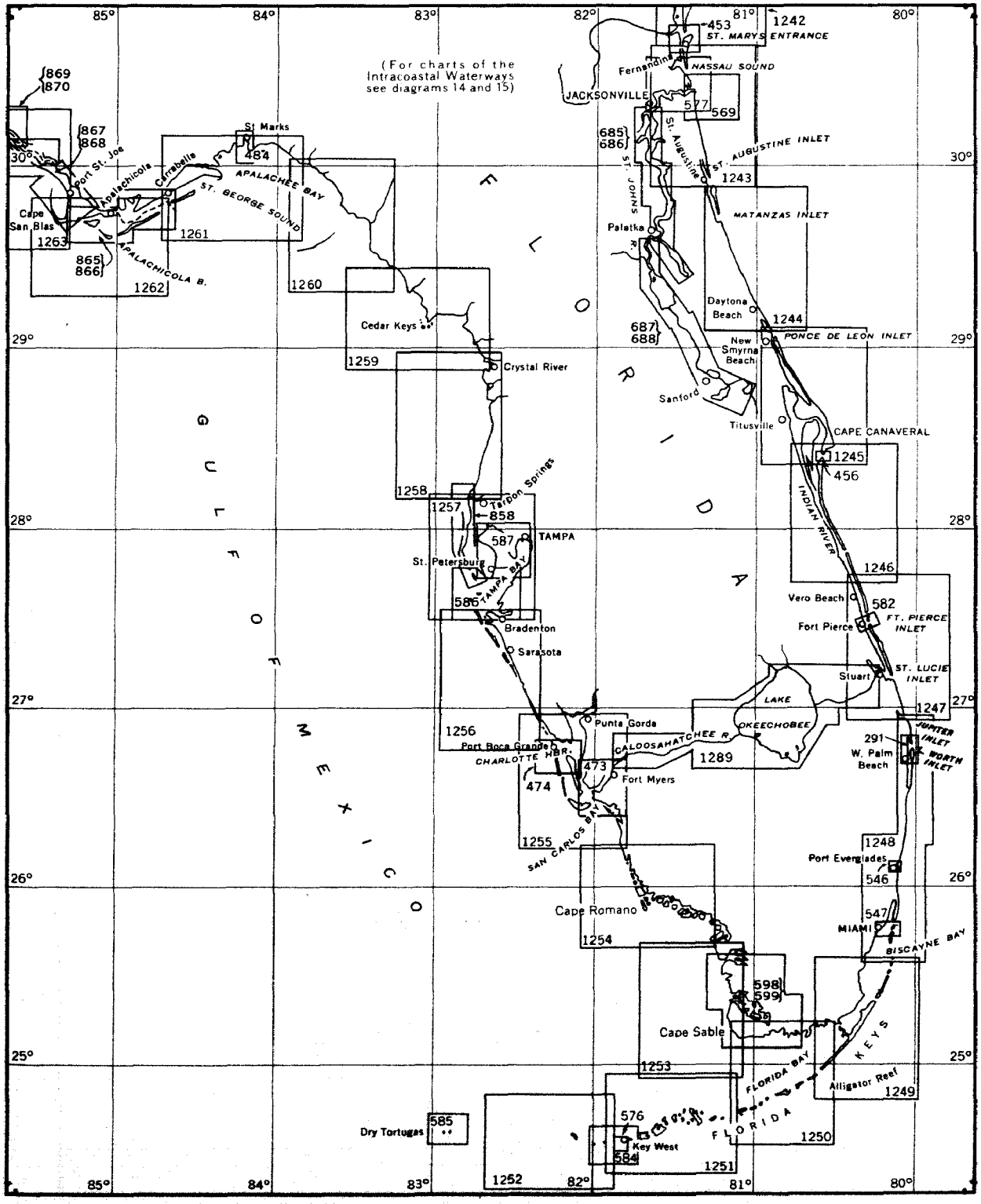
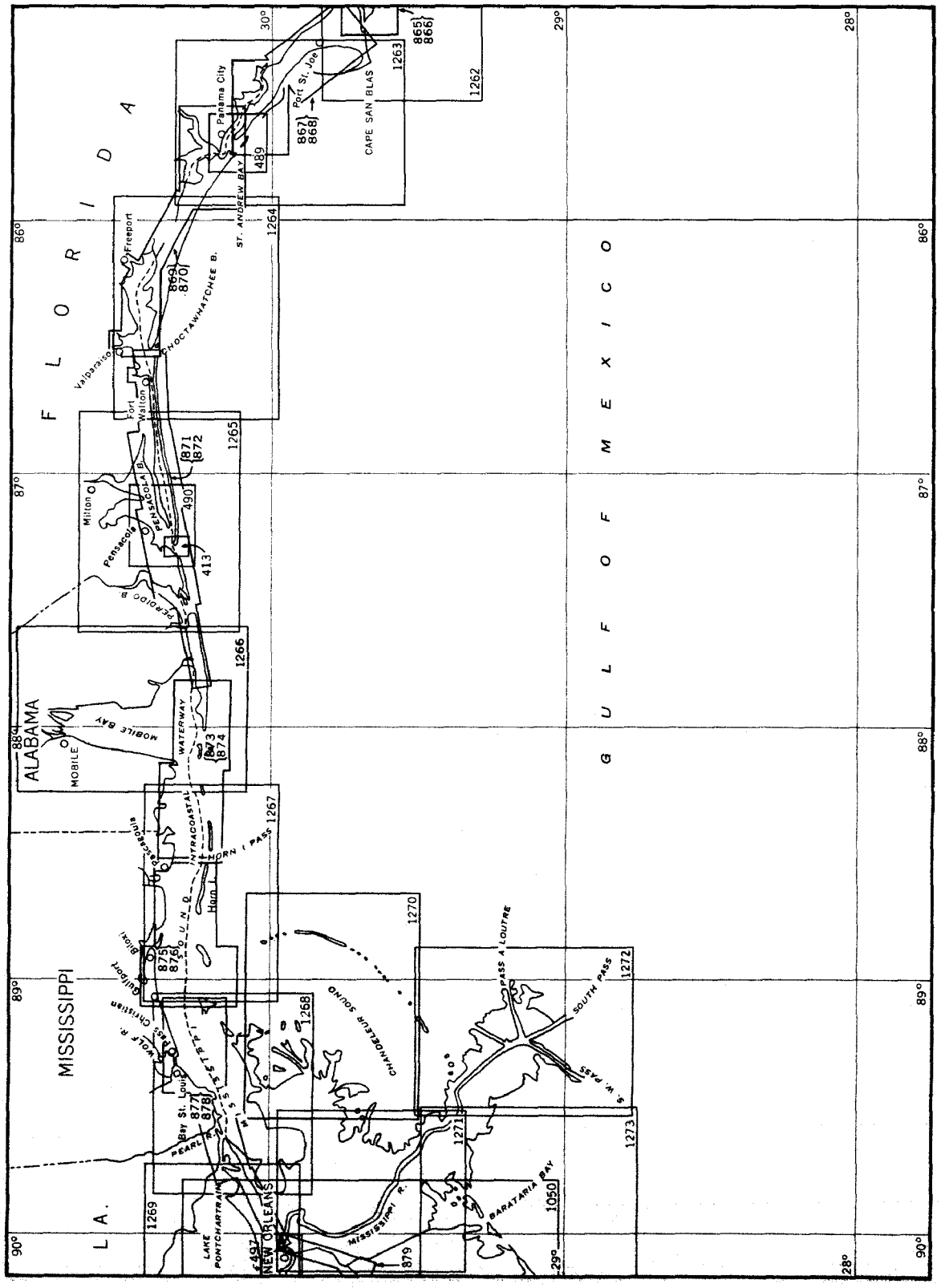


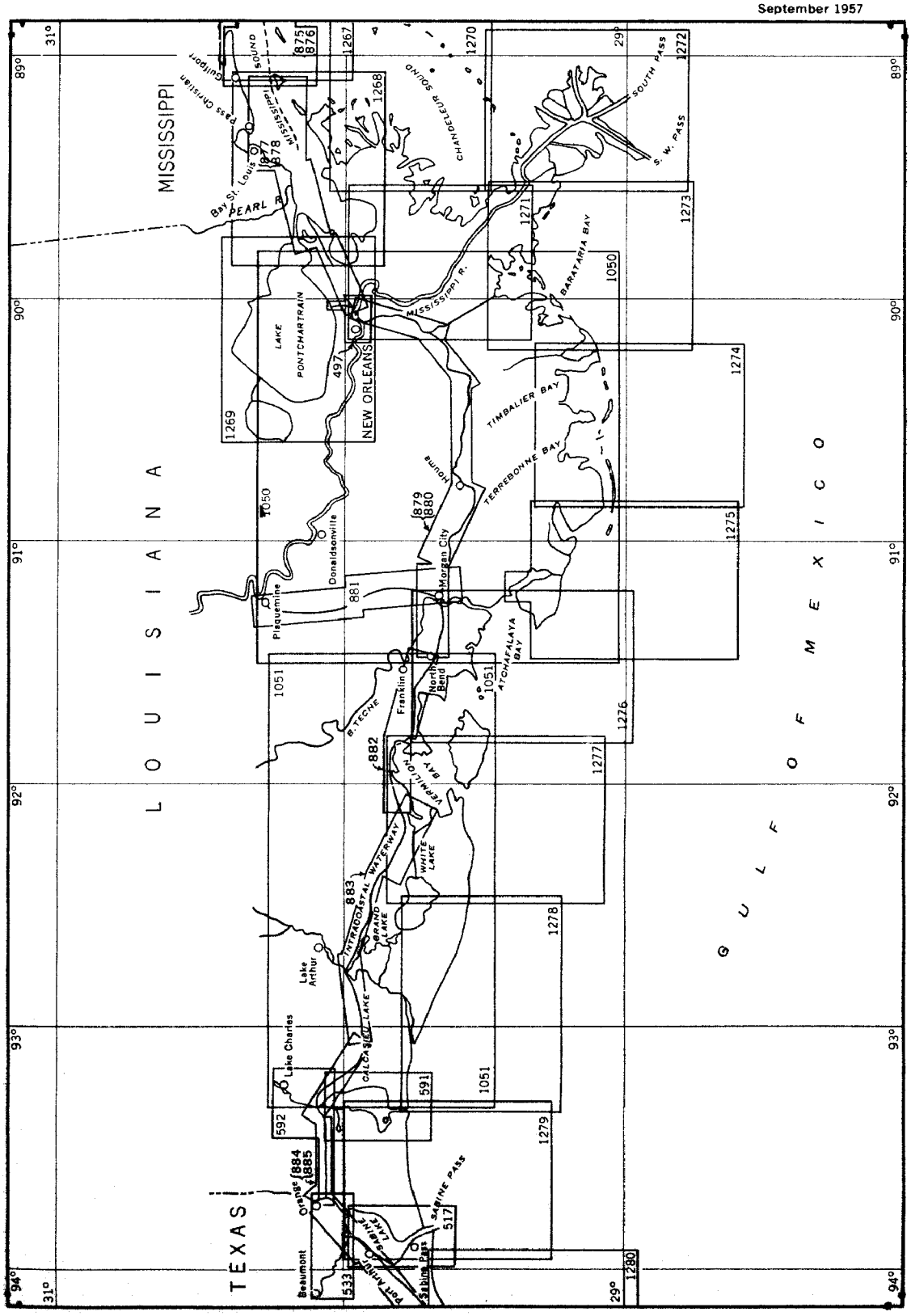
Diagram No. 11
July 1956



COAST AND HARBOR CHARTS - GULF COAST
CAPE SAN BLAS, FLA. TO NEW ORLEANS, LA.

Diagram No. 12

September 1957



COAST AND HARBOR CHARTS - GULF COAST

NEW ORLEANS, LA. TO SABINE PASS, TEXAS

COAST AND HARBOR CHARTS - GULF COAST

SABINE PASS, TEXAS TO THE RIO GRANDE

Diagram No. 13

March 1955

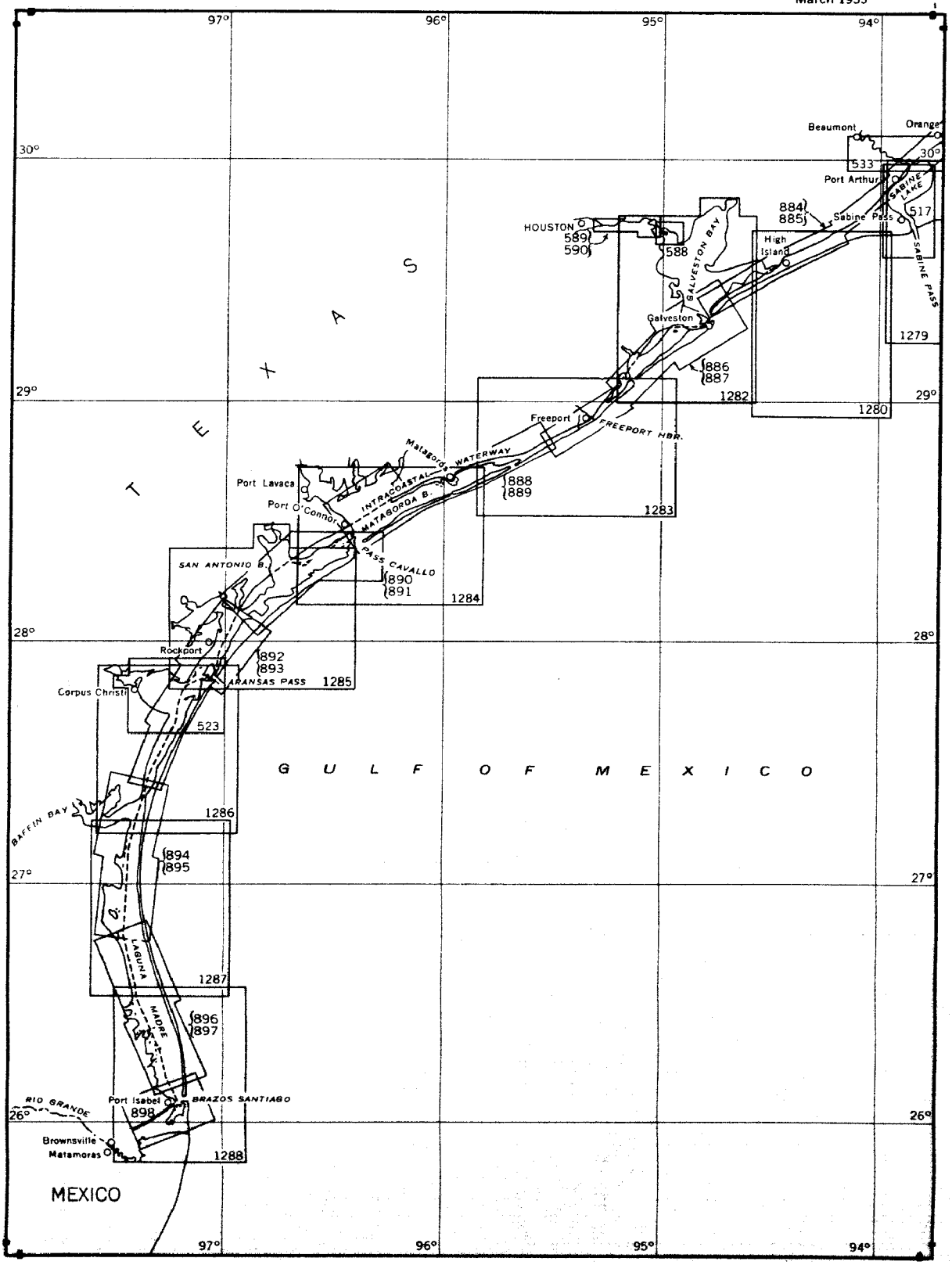
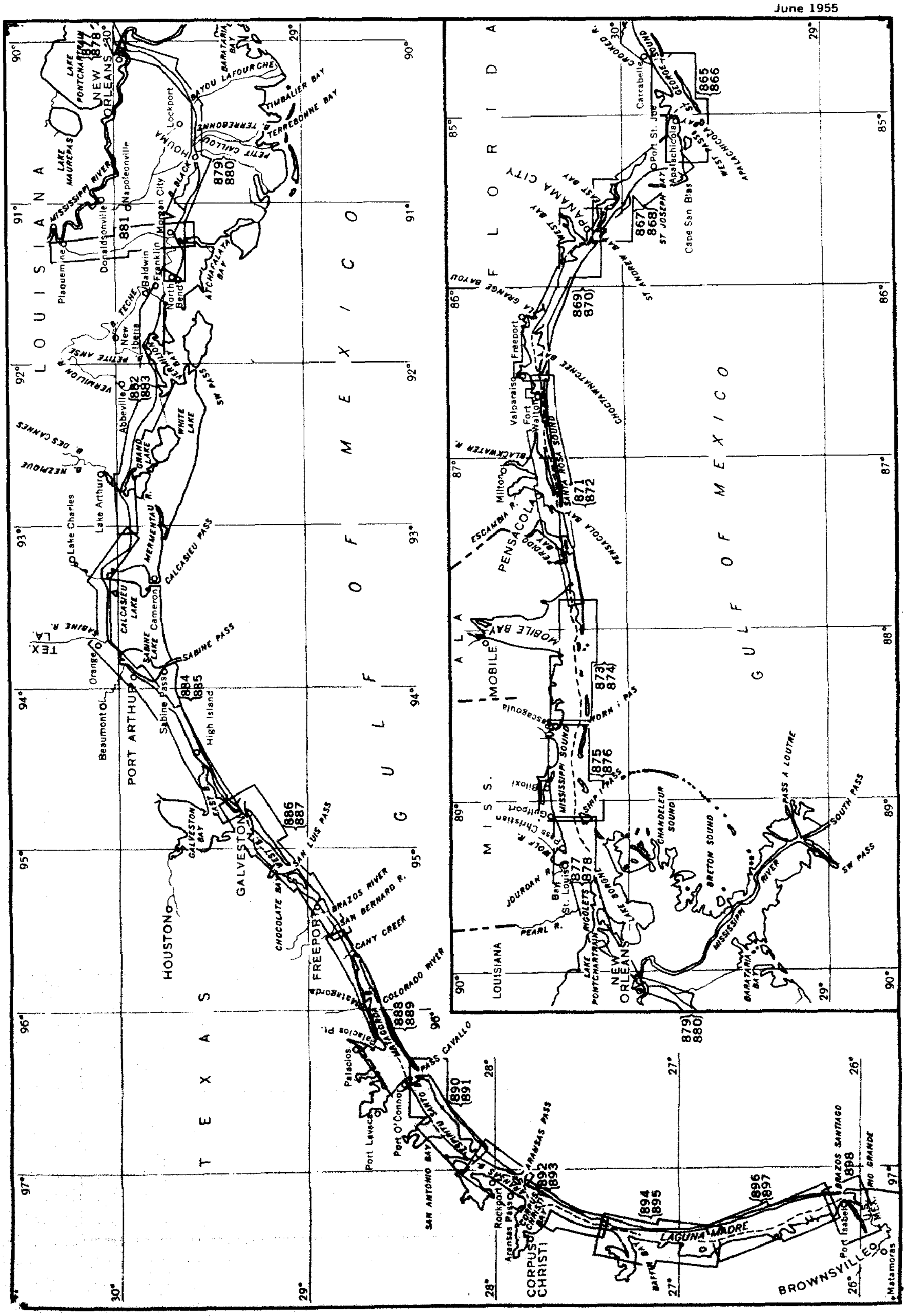


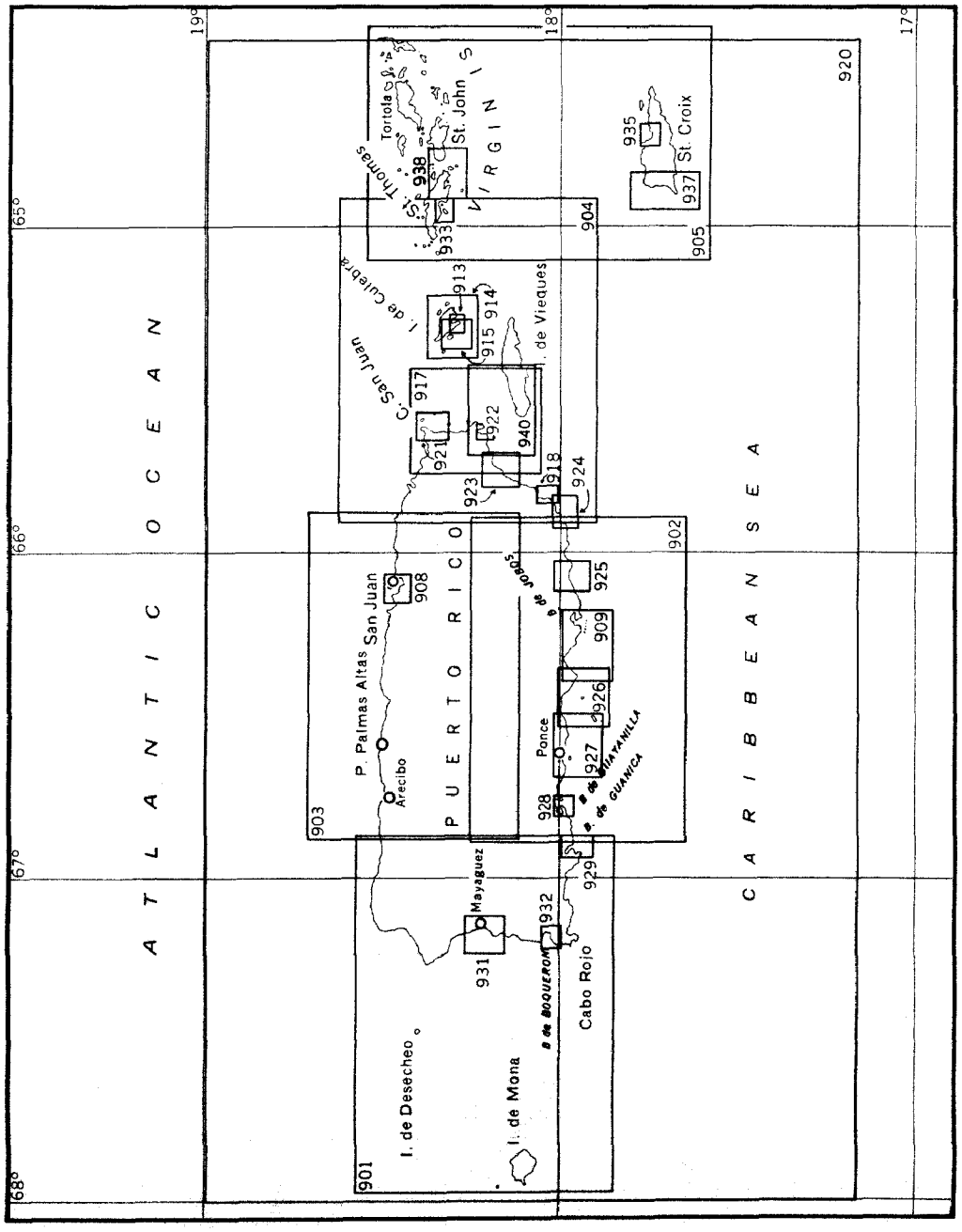
Diagram No. 15
June 1955



CHARTS OF THE GULF INTRACOASTAL WATERWAY
CARRABELLE, FLA. TO BROWNSVILLE, TEXAS

Diagram No. 34

May 1957



CHARTS OF PUERTO RICO AND THE VIRGIN ISLANDS

1. GENERAL INFORMATION

EXPLANATORY.—The **Coast Pilots** of the Coast and Geodetic Survey provide verbal description of United States coasts, harbors, and connecting waterways that is mostly impossible of presentation on the nautical charts. Subjects include landmarks, navigation regulations, channels, anchorages, dangers, routes, weather, ice, pilotage, customs, and port facilities.

Bearings are true, and when given in degrees are clockwise from 000° (north) to 359°. Light-sector bearings are toward the light.

Courses are true and are expressed in the same manner as bearings. The courses given are the courses to be made good.

Depths are in fathoms or feet below the low-water tidal datum of the charts unless otherwise stated.

Distances are in nautical miles unless otherwise stated. A nautical mile is 1 minute of latitude, or approximately 2,000 yards, and is about 1.15 statute miles.

Current velocities are in knots, which are nautical miles per hour; directions are the true directions toward which the currents set.

Wind velocities also are in knots, but directions are the true directions from which the winds blow.

Vertical clearances of bridges and overhead cables are in feet above normal high water unless otherwise stated; clearances of drawbridges are for the closed position. **Permit clearances** are the minimums authorized in the construction permits issued by the Corps of Engineers.

Light and fog-signal characteristics are not described, and light sectors are not usually defined. The Coast Guard Light lists should be consulted for complete information.

Radio navigational aids and radio weather services are not fully described. Coast Guard Light Lists and H. O. Publications 205 and 206 should be consulted.

The COAST AND GEODETIC SURVEY is charged with (1) the survey of the coasts of the United States and its possessions to insure the safe navigation of coastal and intracoastal waters; (2) the compilation and publication of **nautical charts, Coast Pilots, tables of predicted tides and currents, and tidal current charts** to meet the needs of the mariner; (3) the determination of geographical positions and elevations in the interior of the country to coordinate the coastal surveys and provide a framework for mapping and other engineering work; (4) the compilation and publication of aeronautical charts for use in air navigation; (5) observations of the earth's magnetism in all parts of the country to furnish magnetic information essential to the mariner, aviator, land surveyor, radio engineer, and others; and (6) seismological observations and investigations to supply earthquake data required in designing structures.

District Offices of the Coast and Geodetic Survey are located at some of the principal ports in the United States; see Appendix. Files of charts, Coast Pilots, and other publications are maintained at these offices for the use of mariners, who are invited to avail themselves of the facilities afforded.

Sales agents for Charts, Coast Pilots, Tide Tables, Tidal Current Tables, and Tidal Current Charts of the Coast and Geodetic Survey are located in many ports of the United States and in some foreign ports. The charts and books also may be purchased from the Washington Office or from the District Offices. Orders mailed to Washington, D. C., should be accompanied by check or money order, made payable to C&GS, Department of Commerce. Indexes of charts and books will be furnished free, upon receipt of request designating areas of interest.

Special signals for surveying vessels.—Pilot Rules for Inland Waters, § 80.33, state that by day a surveying vessel of the Coast and Geodetic Survey, under way and employed in hydrographic surveying, may carry in a vertical line, one over the other not less than 6 feet apart where they can best be seen, three shapes not less than 2 feet in diameter of which the highest and lowest shall be globular in shape and green in color and the middle one diamond in shape and white.

(a) Vessels of the Coast and Geodetic Survey shall carry the above-prescribed marks while actually engaged in hydrographic surveying and under way, including drag work. Launches and other boats shall carry the prescribed marks when necessary.

(b) It must be distinctly understood that these special signals serve only to indicate the nature of the work upon which the vessel is engaged and in no way give the surveying vessel the right-of-way over other vessels or obviate the necessity for a strict observance of the rules for preventing collisions of vessels.

(c) By night a surveying vessel of the Coast and Geodetic Survey, under way and employed in hydrographic surveying, shall carry the regular lights prescribed by the rules of the road.

(d) A vessel of the Coast and Geodetic Survey, when at anchor in a fairway on surveying operations, shall display from the mast during the daytime two black balls in a vertical line and 6 feet apart. At night two red lights shall be displayed in the same manner. In the case of a small vessel the distance between the balls and between the lights may be reduced to 3 feet if necessary.

(e) Such vessels, when at anchor in a fairway on surveying operations, shall have at hand and show, if necessary, in order to attract attention, a flare-up light in addition to the lights which are, by this section, required to be carried.

International Rules, Part B, Rule 4 (c), state that a vessel engaged in laying or in picking up a submarine cable or navigation mark, or a vessel engaged in surveying or underwater operations when from the nature of her work she is unable to get out of the way of approaching vessels, shall carry, in lieu of the lights specified in Rule 2 (a) (i) and (ii), three lights in a vertical line one over the other not less than 6 feet apart. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character as to be visible all round the horizon at a distance of at least 2 miles. By day, she shall carry in a vertical line one over the other not less than 6 feet apart, where they can best be seen, three shapes each not less than 2 feet in diameter, of which the highest and lowest shall be globular in shape and red in colour, and the middle one diamond in shape and white.

The **wire drags** used by the Coast and Geodetic Survey in sweeping for dangers to navigation may be crossed by vessels without danger of fouling at any point except between the towing launches and the large buoys near them, where the towline approaches the surface of the water. Vessels passing over the drag are requested to change course so as to cross it approximately at right angles, as a diagonal course may cause the propeller to foul the supporting buoys and attached wires. No attempt should be made to pass between the drag launches while the wire is being set out or taken in, unless it would endanger a vessel to do otherwise, because the bottom wire is slack and the floats at each 100-foot section may lift it nearly to the surface; at this time the launches usually are headed directly toward or away from each other and the operation may be clearly seen.

Nautical charts are published primarily for the use of the mariner but serve the public interest in many other ways. They are compiled principally from Coast and Geodetic Survey basic field surveys, supplemented by data from other Government organizations.

The **scales of nautical charts** range from 1:2,500 to about 1:5,000,000. Graphic scales are generally shown on charts with scales of 1:80,000 or larger, and numerical scales are given on smaller-scale charts. Coast and Geodetic Survey charts are classified according to scale as follows:

Sailing charts, scales 1:600,000 and smaller, are for use in fixing the mariner's position as he approaches the coast from the open ocean, or for sailing between distant coastwise ports. On such charts the shoreline and topography are generalized and only offshore soundings, the principal lights, outer buoys, and landmarks visible at considerable distances are shown.

General charts, scales 1:100,000 to 1:600,000, are for coastwise navigation outside of outlying reefs and shoals.

Coast charts, scales 1:50,000 to 1:100,000, are for inshore navigation leading to bays and harbors of considerable width, and for navigating large inland waterways.

Harbor charts, scales larger than 1:50,000, are for harbors, anchorage areas, and the smaller waterways.

Intracoastal Waterway charts, scale 1:40,000, are a special series covering the New Jersey inside route, the Atlantic Coast inside route from Norfolk, Virginia, to Key West, Florida, and the Gulf Coast inside route from Carrabelle, Florida, to Port Brownsville, Texas.

Mariners are urged to obtain and use the largest-scale chart available for the area to be navigated.

The **date of a chart** is of vital importance to the navigator. When charted information becomes obsolete, further use of the chart for navigation may be dangerous. Up-to-date charts should be obtained at regular intervals.

A **new edition** of a chart is printed only when corrections are so extensive or of such importance to navigation as to necessitate a replacement of all previous issues; the number and date of the current edition are printed in the lower left corner. When the edition is revised, the date of the **latest revision** is printed to the right of the edition date. Before a chart is issued by the Coast and Geodetic Survey it is corrected by hand for all important information published in the weekly Notice to Mariners since the date of printing; the number and date of the last Notice to Mariners used are **stamped** in the lower right corner. Purchasers of charts should consult the Notice to Mariners for corrections subsequent to the stamped date.

The **Mercator projection** used on most nautical charts has straight-line meridians and parallels that intersect at right angles. On any particular chart the distances between meridians are equal throughout, but distances between parallels increase progressively from the equator toward the poles, so that a straight line between any two points is a rhumb line. This unique property of the Mercator projection is one of the main reasons why it is preferred by the mariner.

Echo soundings.—Most of the various types of echo sounder are calibrated for a velocity of sound in water of 800 fathoms per second, but the actual velocity may differ from the calibrated value by as much as 5 percent, depending upon the temperature and salinity of the waters in which the vessel is operating; the highest velocities are found in warm, highly saline water, and the lowest in icy, fresh water. Variation in line voltage can also cause errors of 10 percent or more in reading. Echoes can be obtained from schools of fish; in fact, trawlers are using the sounders for that purpose. The most serious error commonly occurs where the depth is greater than the scale range of the instrument; a 400-fathom scale indicates 15 fathoms visually and graphically when the depth is 415 fathoms. Where possible, wide variations from charted depths should be checked by wire soundings.

The **plane of reference** for depths on C&GS charts is the mean of all low waters for the Atlantic coast of the United States, including the West Indies, and the mean of the lower low waters for the Pacific coast, including the Hawaiian Islands and Alaska. The plane most frequently used on foreign charts is mean low water springs. The effect of strong winds, in combination with

the regular tidal action, may at times cause the water level to fall considerably below the reference plane.

Compass roses on charts.—The annual change in variation gradually introduces an error in the magnetic compass roses on charts. The compass roses are replotted for every new edition of the chart if the error is appreciable; and the amount and date of the variation and the amount of annual change are stated for each compass rose. On some of the sailing and general charts the magnetic variation is shown by isogonic lines.

Deviation of the compass.—The magnetic effect of the ship itself combines with any instrumental error of the compass to cause the deviation, which varies with the heading of the ship and with the magnetic latitude. It is customary to counteract the deviation as far as possible with soft iron and permanent magnets, suitably placed in or on the binnacle.

Local magnetic disturbance.—The charts show areas where the compass is disturbed by magnetic masses external to the ship. Such disturbances are fairly common in shallow waters but are never encountered over oceanic depths. Magnetic force diminishes so rapidly with distance that a magnetic center on land would have to be of unprecedented intensity to affect the compass of a vessel 0.5 mile from shore.

Overhead cables are shown on the charts and described in the Coast Pilots; the clearances given are for the lowest wires at high water. Vessels with masts, stacks, booms, or aerials should allow for an additional clearance under power cables equal to the distance between adjacent cables.

Submarine cable areas are shown on the charts but are not described in the Coast Pilots. Special effort should be made to avoid anchoring or trawling in cable areas. If a vessel does foul a cable, extreme care should be used when attempting to clear. Should normal methods fail, the anchor or other gear should be slipped and abandoned rather than risk breaking or cutting the cable. The high voltages in certain cables could cause severe burns or loss of life.

Tide Tables are issued annually by the Coast and Geodetic Survey in advance of the year for which they are prepared. These tables include predicted times and heights of high and low waters for every day in the year for a number of reference stations and differences for obtaining similar predictions for numerous other places. They also include other useful information such as a method for obtaining heights of tide at any time, local civil time of sunrise and sunset for various latitudes, reduction of local civil time to standard time, and time of moonrise and moonset for various ports.

Caution.—In using the Tide Tables, slack water should not be confused with high or low water. For ocean stations there is usually little difference between the time of high or low water and the beginning of ebb or flood currents; but for places in narrow channels, landlocked harbors, or on tidal rivers, the time of slack current may differ by several hours from the time of high or low water. The relation of the times of high or low water to the turning of the current depends upon a number of factors, so that no simple general rule can be given. To obtain the times of slack water, reference should be made to the Tidal Current Tables.

Tidal Current Tables for the coasts of the United States are issued annually by the Coast and Geodetic Survey in advance of the year for which they are prepared. These tables include daily predictions of the times of slack water and the times and velocities of strength of flood and ebb currents for a number of waterways, together with differences for obtaining predictions for numerous other places. Also included is other useful information such as a method for obtaining the velocity of current at any time, duration of slack, coastal tidal currents, wind currents, combination of currents, and current diagrams. Some information on the Gulf Stream is included in the tables for the Atlantic coast.

Tidal Current Charts are published by the Coast and Geodetic Survey for various localities. These charts depict the direction and velocity of the current for each hour of the tidal cycle. They present a comprehensive view of the tidal current movement in the respective waterways as a whole and when used with the proper current tables or tide tables supply a means for readily determining for any time the direction and velocity of the current at various localities throughout the areas covered.

The COAST GUARD has among its duties (1) enforcement of the laws of the United States on the high seas, in harbors, bays, sounds, roadsteads, and other like bodies of water along the coasts of the United States, its territories and possessions; (2) enforcement of navigation laws, of neutrality laws and regulations, of rules and regulations in relation to anchorage grounds, and of the Oil Pollution Act; (3) inspection of all vessels to insure safety to passengers and crews; (4) aid to distressed mariners and saving of life and property from shipwreck; (5) issuance of marine licenses and certificates; (6) investigation of circumstances connected with shipwreck or collision at sea; (7) destruction of derelicts; (8) construction, operation, maintenance, and inspection of aids to navigation; and (9) publication of Light Lists and Local Notices to Mariners.

Light Lists.—Aids to navigation, consisting of lights, radiobeacons, fog signals, buoys, and daymarks, are described in the light lists which are for sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., and by the various sales agents in the principal seaports. Mariners should refer to these publications for detailed information regarding the characteristics, candlepower, and visibility of lights, as well as descriptions of light structures and daybeacons, buoys, radiobeacons, and fog signals.

Local Notice to Mariners.—Changes and deficiencies in aids to navigation maintained by or under the authority of the Coast Guard are published in Local Notices to Mariners issued by the district commander of the area in which the aids are located. These notices are intended for local navigation interests operating within the limits of a

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Coast Guard district. Changes in aids to navigation of the United States are also contained in the Weekly Notice to Mariners, Part I (Western Hemisphere Edition), prepared jointly by the Commandant, United States Coast Guard, and the Hydrographer, United States Navy. These notices are intended for mariners and others who have a definite need for them in connection with extended seagoing activities or those operating in several Coast Guard districts.

Lights.—The distances at which lights may be seen in clear weather, given in the Light Lists and on the charts, are the geographic ranges computed in nautical miles for a height of the observer's eye of 15 feet above sea level, unless the lights are not of sufficient candlepower to be seen to the limit of their geographic range, in which case the luminous range is given. These distances may at times be increased by abnormal atmospheric refraction and may be greatly decreased by unfavorable weather conditions, such as fog, rain, haze, or smoke. All except the most powerful lights are easily obscured by such conditions.

Buoys.—Buoyage of the United States, with color, shape, numbering, and light characteristics, is described in the introductory pages of the Light Lists. Buoys are liable to be carried away, shifted, or capsized; lighted buoys may be extinguished; or sound buoys may not function because of storm, ice, or collision. The navigator should, therefore, check his position by shore bearings, soundings, or other means.

Vessel operators are required by law to notify the nearest Coast Guard office of collisions with aids to navigation.

Fog signals.—Caution should be exercised in the use of sound fog signals for determining position or a safe course to follow. Sound travels through the air in a variable manner with or without the effects of wind and, therefore, the hearing of fog signals cannot be implicitly relied upon. Experience indicates that distances must not be judged only by the intensity of the sound; that occasionally there may be areas close to a fog signal in which it is not heard; and that fog may exist not far from a station, yet not be seen from it, so the signal may not be operating.

Radiobeacons.—A list and descriptive details of all marine radiobeacons are given in the Light Lists and H. O. Publication No. 205, Radio Navigational Aids. There is also included in these publications the procedure to follow for the use of radiobeacons for calibration of radio direction-finders as well as a list of special radio direction-finder calibration stations.

A vessel steering a course for a radiobeacon should observe the same precautions as when steering for a light or any other mark. If the radiobeacon is aboard a lightship, particular care should be exercised to avoid the possibility of collision, and sole reliance should never be placed on sighting the lightship or hearing its fog signal. If there are no dependable means by which the vessel's position may be fixed and the course changed well before reaching the lightship, a course should be selected that will insure passing the lightship at a distance, rather than close aboard, and repeated bearings of the radiobeacon should show an increasing change in the same direction.

Radio bearings.—No exact data can be given as to the accuracy to be expected in radio bearings taken by a ship, since the accuracy depends to a large extent upon the skill of the ship's operator, the condition of the ship's equipment, and the accuracy of the ship's calibration curve. Mariners are urged to obtain this information for themselves by taking frequent radio bearings, when their ship's position is accurately known, and recording the results. Bearings of aircraft ranges and standard broadcast stations should be used with particular caution due to coastal refraction and lack of calibration of their frequencies.

Radio bearings from other vessels.—Any vessel with a radio direction-finder can give a bearing to a vessel equipped with a radio transmitter. Such service will generally be furnished when requested, particularly by Government vessels. These bearings, however, should be used only as a check, as comparatively large errors may be introduced by local conditions surrounding the radio direction-finder unless known and accounted for. Any radio station, for which the position of the transmitter is definitely known, may serve as a radiobeacon for vessels equipped with a radio direction-finder. However, mariners are cautioned that stations established especially for maritime service are more reliable.

Conversion of radio bearings to Mercator bearings.—The increasing use of radio directional bearings for locations of ships' positions at sea, especially during foggy weather, has made it particularly desirable to be able to apply these radio bearings directly to the nautical chart. These radio bearings are the bearings of the great circles passing through the radio stations and the ship, and, unless in the plane of the Equator or of a meridian, would be represented on a Mercator chart as curved lines. Obviously it is impracticable for a navigator to plot such lines on a Mercator chart, so it is necessary to apply a correction to a radio bearing to convert it into a Mercator bearing, that is, the bearing of a straight line on a Mercator chart laid off from the sending station and passing through the receiving station.

A table of corrections is given in the Appendix for the conversion of a radio bearing into a Mercator bearing. It is sufficiently accurate for practical purposes for distances up to 1,000 miles.

The only data required are the latitudes and longitudes of the radiobeacons and of the ship by dead reckoning. The latter is scaled from the chart, and the former is either scaled from the chart or taken from the list of radiobeacons in the Light List or H. O. Publication No. 205, Radio Navigational Aids.

The table is entered with the differences of longitude in degrees between the ship and station (the nearest tabulated value being used), and opposite the middle latitude between the ship and station, the correction to be applied is read.

The sign of the correction (bearings read clockwise from the north) will be as follows: In north latitude,

the minus sign is used when the ship is east of the radiobeacon and the plus sign used when the ship is west of the radiobeacon. In south latitude, the plus sign is used when the ship is east of the radiobeacon, and the minus sign is used when the ship is west of the radiobeacon.

To facilitate plotting, 180 degrees should be added to or subtracted from the corrected bearing, and the result plotted from the radiobeacon.

Should the position by dead reckoning differ greatly from the true position of the ship as determined by plotting the corrected bearings, a retrial should be made, using the new value as the position of the ship.

Loran.—Instructions, tables, and charts of the Loran System are published by the Navy Hydrographic Office. Coast charts of the United States with loran lines are published by the Coast and Geodetic Survey.

Caution must be used in matching loran signals to insure that the ground wave signal of one station is not matched with a sky wave signal of the other station of the rate. Also, loran position determinations on or near the base-line extensions are subject to an error exceeding two nautical miles per microsecond and, therefore, should be avoided whenever possible.

Numbering and recording of undocumented vessels.—Certain undocumented vessels must conform to requirements of the Numbering Act. Owners may obtain the necessary information from the District Commander, United States Coast Guard, having jurisdiction over the area in which the vessel is owned.

Licensing of vessels.—Navigation laws pertaining to registry, enrollment, and licensing of vessels are administered by the **United States Bureau of Customs.** The bureau's functions also include issuing of commissions to yachts and the assignment of signal letters; the measurement of vessels, administration of tonnage duties, and the collection of tolls; the regulation of vessels in the coasting and fishing trade and limitation of the use of foreign vessels in waters under the jurisdiction of the United States; the recording of sales, conveyances, and mortgages of vessels; the protection of steerage passengers, and the remission of fines, penalties, and forfeitures incurred under the laws governing these matters. Collection districts and ports of entry located within the area covered by this Coast Pilot are tabulated in the Appendix.

Advance notice of arrival of vessels in ports.—The master or agents of certain vessels (foreign and domestic) are required to give advance notice to the Captain of the Port, United States Coast Guard, of the time of arrival in port; see § **124.10,** Chapter 2.

Danger signal.—Inland Pilot Rules, Section 80.1, state, "If, when steam vessels are approaching each other, either vessel fails to understand the course or intention of the other, from any cause, the vessel so in doubt shall immediately signify the same by giving several short and rapid blasts, not less than four, of the steam whistle, the danger signal." **International Pilot Rules,** Part D, Rule 28 (b), state, "Whenever a power-driven vessel which, under these Rules, is to keep her course and speed, is in sight of another vessel and is in doubt whether sufficient action is being taken by the other vessel to avert collision, she may indicate such doubt by giving at least five short and rapid blasts on the whistle."

Minesweeper signals.—United States vessels engaged in minesweeping operations have their maneuvering powers considerably hampered. All other vessels, whether steamers or sailing craft, should keep out of the way of the sweepers, remembering especially that it is dangerous to pass between the vessels of a pair or group sweeping together.

All vessels towing sweeps are to show a black ball at the foremasthead and at each yardarm **by day** and green lights instead of the black balls **by night**; the lights may only be exhibited when necessary to warn approaching friendly vessels. Other vessels are not to approach the sweepers nearer than 500 yards on either beam or 1,000 yards astern; under no cirmumstances is a vessel to pass through a formation of mine sweepers. The sweepers should be prepared to warn other vessels who persist in approaching too close by means of any of the appropriate signals from the International Code of Signals.

Signals to be made by vessels inconvenienced by searchlights.—When navigation of a vessel is inconvenienced by the glare from searchlights near a port, she should make the International Code Signal ZO by lamp and by whistle, siren, or foghorn. Both the light and sound signals should be employed, whenever possible, and should be repeated until the inconvenience is removed. Only real urgency should dictate the use of this signal, as it is not possible for the searchlight operator to know which projector is affected unless the vessel is actually in the rays. This signal is designed to assist mariners; no liability whatever will be admitted.

Search and rescue operations for surface vessels or aircraft in distress or overdue are coordinated by the Coast Guard. Air-Sea Rescue planes have special markings of chrome yellow on the wing tips and wing-tip floats. The cooperation of vessel operators with the Air-Sea Rescue planes may mean the difference between life and death of some seaman or aviator.

Operators of disabled wooden craft that are, or may consider themselves to be, the object of a search should hoist on a halyard or otherwise place aloft any metallic object that would assist their detection by radar. All Coast Guard patrol vessels, planes, and some buoy tenders utilize this equipment and thus can continue searches in darkness and during other periods of low visibility if it can be assumed that the object of the search can be detected through the use of this aid.

Actual observations have shown that wooden hulls or other non-metallic objects are suited as radar targets according to the size, orientation, shape, and other radar-reflecting qualities of the object. Their value as radar targets may be enhanced by the use of special radar-reflecting devices properly oriented and placed as high above the waterline as possible. The largest metallic object available should be used.

Ships in distress.—Radio-equipped vessels requiring assistance may obtain the services of the Coast Guard by transmitting a request on the international distress and calling frequency 500 kc. to "Any Coast Guard Unit" (radio call NCU), or to any shore radio station addressed to "COGARD." Shore radio stations will forward to the Coast Guard all information regarding vessels requiring assistance unless such information is contained in a message specifically addressed elsewhere.

If the following information is included in the original request for assistance it will place the responsible Coast Guard officer in a position to determine immediately the types and number of vessels required to render adequate aid, thus greatly facilitating the work of the Coast Guard and avoiding any unnecessary delay in the dispatching of assistance:

1. Name, type, and nationality of vessel; color, size, and shape.
2. Position, course, and speed (including drift).
3. Nature of trouble and condition of vessel, sea, and wind. Action taken, if any.
4. Number of persons on board.
5. State whether or not Coast Guard assistance is required.

Small craft in distress.—Under the provision of the international regulations, which permits the use of any means available to a vessel or aircraft in distress to draw attention and obtain help, small commercial and private craft equipped with radiotelegraph or radiotelephone apparatus that cannot be operated on the international distress frequency of 500 kc. (600 m.) may usually obtain United States Coast Guard assistance by transmitting the distress signal or call and the message on the 2182 kc. frequency.

Submarine emergency identification signals.—The following smoke-bomb or flare signals are made by submarines of the United States in cases of necessity:

Green indicates torpedo has been fired; will be used to simulate torpedo firing on special exercises such as convoy exercises.

Yellow indicates that submarine is about to come to periscope depth from below periscope depth. Surface craft terminate antisubmarine counterattacks and clear vicinity of submarine. Do not stop propellers!

Red indicates an emergency condition within the submarine and she will surface immediately if possible. Surface vessels clear the area and stand by to give assistance after the submarine has surfaced. In case of repeated red signals, or if the submarine fails to surface within a reasonable time, she may be assumed to be disabled. Buoy the location, look for submarine marker buoy, and attempt to establish sonar communications. Advise naval authorities.

The foregoing, all of which mark the submarine's position, are fired from a submerged signal ejector into the air to a height of about 300 feet, then float downward slowly, suspended from a small parachute, and give colored illumination for about 30 seconds.

Submarines are also equipped with messenger buoys which are about 3 feet in diameter and are painted international orange. A submarine on the bottom in distress and unable to surface, will, if possible, release this buoy. An object of this description which is sighted on the surface of the water should be investigated and naval authorities advised.

Signals for aid of aircraft in distress.—The information below is quoted from Annex 12 to International Civil Aviation Organization (S. A. R.) (Annex), Search and rescue signals.

6.1—Signals with surface craft.

6.1.1—When it is necessary for an aircraft to direct a surface craft to the place where an aircraft or a surface craft is in distress, the aircraft shall do so by transmitting precise instructions by any means at its disposal. If such precise instructions cannot be transmitted or when necessary for any other reason, the instructions shall be given by using the procedure prescribed in 6.1.2.

Note.—Current maritime signalling procedures include:

For acknowledging receipt of signals, (i) the hoisting of the Code pennant (vertical red and white stripes) close up (meaning understood); (ii) the flashing of a succession of T's by signal lamp in the Morse code; (iii) the changing of heading.

For indicating inability to comply, (i) the hoisting of the International flag N (a blue and white checkered square); (ii) the flashing of a succession of N's in the Morse Code.

6.1.2—The following procedures performed in sequence by an aircraft shall mean that an aircraft is directing a surface craft toward an aircraft or a surface craft in distress:

(a) Circling the surface craft at least once.

(b) Crossing the projected course of the vessel close ahead at a low altitude, opening and closing the throttle, or changing the propeller pitch.

(c) Heading in the direction in which the surface craft is to be directed. Repetition of such procedures shall have the same meaning.

6.1.3—The following procedure performed by an aircraft shall mean that the assistance of the surface craft to which the signal is directed is no longer required: Crossing the wake of the surface craft close astern at a low altitude, opening and closing the throttle, or changing the propeller pitch.

Mariners are advised that United States Government vessels or planes in distress may exhibit, in addition to the distress signals set forth under International Rules of the Road, an orange smoke visible by day.

The CORPS OF ENGINEERS, United States Army, has charge of the improvement of the rivers and harbors of the United States and of miscellaneous other civil works which include the administration of the Federal laws enacted for the protection and preservation of navigable waters of the United States, the establishment of regulations for the use, administration, and navigation of navigable waters, the approval of plans of bridges, the alteration of obstructive bridges, the establishment of anchorage grounds and harbor lines, the removal of sunken vessels obstructing or endangering navigation,

and the granting of permits for structures or operations in navigable waters.

Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intracoastal Waterways in the areas under their jurisdiction may be obtained direct from the District Engineer offices; see Appendix.

Anchorage areas and restricted areas in most places are defined and regulations governing them are established by the Corps of Engineers. The regulations are enforced by the United States Coast Guard, and the areas are shown on the large-scale charts of the Coast and Geodetic Survey. Copies of the regulations may be obtained at the offices of the Corps of Engineers. The regulations also are copied into the appropriate Coast Pilots.

The **Port Series,** prepared jointly by the Corps of Engineers and the Maritime Administration and sold by the Superintendent of Documents, are complete reports on the principal seaports of the United States and are primarily of interest to commercial and industrial concerns. They cover the subjects of particular interest to the shipping world, such as the physical features of each port, its organization and practices, regulations regarding the movement of ships and goods, port dues and charges, fuel and water, rail connections, and commerce.

Protection of navigable waters.—Given below are extracts from the laws of the United States for the protection and preservation of the navigable waters of the United States.

That it shall not be lawful to throw, discharge, or deposit, or cause, suffer, or procure to be thrown, discharged, or deposited either from or out of any ship, barge, or other floating craft of any kind, or from the shore, wharf, manufacturing establishment, or mill of any kind, any refuse matter of any kind or description whatever, other than that flowing from streets and sewers and passing therefrom in a liquid state, into any navigable water of the United States, or into any tributary of any navigable water from which the same shall float or be washed into such navigable waters; and it shall not be lawful to deposit, or cause, suffer or procure to be deposited material of any kind in any place on the bank of any navigable water, or on the bank of any tributary of any navigable water, where the same shall be liable to be washed into such navigable water, either by ordinary or high tides, or by storms or floods, or otherwise, whereby navigation shall or may be impeded or obstructed.

That it shall not be lawful to tie up or anchor vessels or other craft in navigable channels in such a manner as to prevent or obstruct the passage of other vessels or craft; or to voluntarily or carelessly sink, or permit or cause to be sunk, vessels or other craft in navigable channels; or to float loose timber and logs, or to float what is known as sack rafts of timber and logs in streams or channels actually navigated by steamboats in such a manner as to obstruct, impede, or endanger navigation. And whenever a vessel, raft, or other craft is wrecked and sunk in a navigable channel, accidently or otherwise, it shall be the duty of the owner of such sunken craft to immediately mark it with a buoy or beacon during the day and a lighted lantern at night, and to maintain such marks until the sunken craft is removed or abandoned, and the neglect or failure of said owner so to do shall be unlawful; and it shall be the duty of the owner of such sunken craft to commence the immediate removal of the same and prosecute such removal diligently, and failure to do so shall be considered as an abandonment of such craft, and subject the same to removal by the United States as hereinafter provided for.

That, except in case of emergency imperiling life or property, or unavoidable accident, collision, or stranding, and except as otherwise permitted by regulations prescribed by the Secretary as hereinafter authorized, it shall be unlawful for any person to discharge, or suffer, or permit the discharge of oil by any method, means, or manner into or upon the coastal navigable waters of the United States from any vessel using oil as fuel for the generation of propulsion power, or any vessel carrying or having oil thereon in excess of that necessary for its lubricating requirements and such as may be required under the laws of the United States and the rules and regulations prescribed thereunder. The Secretary is authorized and empowered to prescribe regulations permitting the discharge of oil from vessels in such quantities, under such conditions, and at such times and places as in his opinion will not be deleterious to health or sea food, or a menace to navigation, or dangerous to persons or property engaged in commerce on such waters, and for the loading, handling, and unloading of oil.

WEATHER BUREAU.—Forecasts and warnings of the approach of storms over land and ocean areas are among the services of the Weather Bureau to navigation, commerce, agriculture, and the general public. Other warnings cover cold waves, frost, forest-fire hazard, and floods.

Meteorological information is collected and transmitted at hourly, 3-hourly, and 6-hourly intervals from land stations, ships at sea, and aircraft. These reports form a basis for the forecasting service, for summarization and publication of climatological data having general value and applicability, and for research basic to improvement of the national weather service.

Weather Bureau offices are located in many ports and other places throughout the continental United States and possessions. Stations in the area of concern to this Coast Pilot, at which the public may compare barometers against Weather Bureau barometers and discuss matters of weather service with Weather Bureau officials, are listed in the Appendix. By international agreement, the Weather Bureau also bears a share in the maintenance and operation of certain weather ships on the free oceans.

Marine meteorological service.—The collection of observations from ships at sea is conducted on a purely voluntary and cooperative basis. The Weather Bureau supplies shipmasters with blank forms, printed instructions, and such other material as is essential to the making and recording of observations. In the course of an average peace-time year, more than 100,000 observations are received from vessels representing every maritime nation and reaching every quarter of the globe.

The **hurricane and storm warning service** was established primarily to aid marine interests. Storm warnings are prepared at regular district forecast centers and at special hurricane forecast centers. The warnings are distributed to the public through all neighboring Weather Bureau offices by radio, the press, and every other available means. During the West Indian hurricane season, June to November, inclusive, teletype circuits expedite the exchange of reports from the Atlantic and Gulf coasts; special reports are obtained from weather reconnaissance planes which fly near the storms and sometimes into the storm centers.

Coastal Warning Display System.—The Weather Bureau employs the following system for displaying warning signals at stations along United States coasts, including the Great Lakes, Hawaiian Islands, and Puerto Rico, when winds dangerous to navigation are forecast for any coastal section.

Small craft warning: One red pennant displayed by day and a red light above a white light at night to indicate that winds up to 33 knots and/or sea conditions dangerous to small craft operations are forecast for the area.

Gale warning: Two red pennants displayed by day and a white light above a red lght at night to indicate that winds ranging from 34 to 48 knots are forecast for the area.

Whole gale warning: A single square red flag with black center displayed by day and two red lights at night to indicate that winds ranging from 48 to 63 knots are forecast for the area.

Hurricane warning: Two square red flags with black centers displayed by day and a white light between two red lights at night to indicate that winds of 64 knots and above are forecast for the area.

The UNITED STATES HYDROGRAPHIC OFFICE exists for the improvement of the means of navigating safely the vessels of the United States Navy and the Merchant Marine by providing accurate nautical charts and related publications for foreign waters. Publications include Sailing Directions (pilots), Light Lists, Table of Distances, Radio Navigational Aids, Radio Weather Aids, International Code of Signals, the American Practical Navigator (Bowditch), and the Notice to Mariners.

The weekly **Notice to Mariners** contains corrections to Charts, Coast Pilots, Sailing Directions, Light Lists, and other publications. Part I, Western Hemisphere, covers North and South America, Greenland, and the Hawaiian Islands and includes general information of world interest. Part II, Eastern Hemisphere, covers notices to mariners and light lists for the rest of the world.

The IMMIGRATION AND NATURALIZATION SERVICE administers the laws relating to admission, exclusion, and deportation of aliens, the registration and fingerprinting of aliens, and the naturalization of aliens lawfully resident in the United States.

The designated ports of entry for aliens are divided into three classes. Class A is for all aliens. Class B is only for aliens who at the time of applying for admission are lawfully in possession of valid and unexpired resident aliens' border-crossing identification cards or valid nonresident aliens' border-crossing identification cards. Class C is only for aliens who are arriving in the United States as seamen as that term is defined in the last sentence of section 1 of the Immigration Act of 1917 (39 Stat. 874; 8 U. S. C. 173). [That the term seaman as used in this Act shall include every person signed on the ship's articles and employed in any capacity on board any vessel arriving in the United States from any foreign port or place.] No alien may enter the United States until he has been inspected by an immigration officer. A list of the ports of entry for aliens is given in the Appendix.

The PUBLIC HEALTH SERVICE administers hospitalization and outpatient treatment to legal beneficiaries of the Government; it also administers foreign and domestic quarantine laws, supervising the medical examination of immigrants and enforcing interstate laws.

Quarantine.—A vessel arriving at a port under the control of the United States shall undergo quarantine inspection prior to entry unless: (1) In the current voyage the vessel has not touched at any port other than those under the control of the United States, or in Canada, the Islands of St. Pierre and Miquelon, Iceland, Greenland, the West Coast of Lower California, Cuba, the Bahama Islands, the Canal Zone, the Bermuda Islands, and the Islands of Aruba and Curacao; or (2) in the current voyage the vessel has received pratique at a port under the control of the United States and since receiving same has not touched at a port other than those listed in (1); or (3) the vessel possesses a duplicate of a pratique issued at a port in Canada or the Canal Zone and since receiving same has not touched at ports other than those listed in (1).

A vessel otherwise exempt from quarantine inspection shall undergo such inspection prior to entering a port under the control of the United States if the vessel has aboard a person infected or suspected of being infected with certain communicable diseases, or if the vessel arrives from a port where at the time of departure there was present or suspected of being present cholera, plague, or yellow fever, or there was a significant increase in the prevalence of smallpox or typhus.

Vessels subject to quarantine inspection shall upon arrival at ports under the control of the United States fly a yellow flag, anchor in the quarantine anchorage, and await inspection. Only the quarantine officer, quarantine employees, or pilots shall be permitted to board any vessel subject to quarantine inspection until after it has been inspected by the quarantine officer and granted pratique, except with the permission of the quarantine officer. A person boarding such vessel shall be subject to the same restrictions as those imposed on the persons on the vessel.

Sanitary inspection.—Vessels arriving at a port under the control of the United States from a foreign port shall be subject to sanitary inspection to ascertain whether

there exists rodent, vermin, or insect infestation or other unsanitary condition requiring measures for the prevention of the introduction, transmission, or spread of communicable disease.

In general, where State quarantine is in force, the minimum requirements of quarantine are in accordance with the regulations of the Public Health Service. National quarantine regulations will be found at the stations of the service and at United States consulates, and will be furnished to vessels upon application to officers of the service or to the Bureau in Washington, D. C.

Medical service.—United States merchant seamen are entitled to medical relief obtainable through the Public Health Service. A United States seaman is one engaged on board in care, preservation, or navigation of any registered, enrolled, or licensed vessel of the United States, or in the service, on board, of those so engaged. **Hospitals, outpatient clinics,** and **outpatient offices** of the Public Health Service are located at the addresses given in the Appendix. Free medical advice is furnished to seamen by radio; see H. O. Publication 205, Radio Navigational Aids.

RADIO.—The **Federal Communications Commission** controls radio communications in the United States and in all possessions except the Panama Canal Zone. Commission inspectors have authority to board ships to determine whether their radio stations comply with international treaties, Federal laws, and Commission regulations. The Commission has field offices in the principal United States ports. Information concerning ship radio regulations and service documents may be obtained from the Federal Communications Commission, Washington 25, D. C., or from any of the field offices.

Marine weather broadcasts.—Information on weather over North Atlantic and North Pacific waters is issued by the Weather Bureau for broadcast by commercial and Government radio stations. Marine bulletins for the western North Atlantic are broadcast by Navy station NSS, Washington, D. C.; those for the eastern North Pacific are transmitted by KPH, Bolinas, Calif., and KTK, San Francisco, Calif. A separate bulletin for Central Pacific waters is broadcast by KHK, Kahuku, T. H. The marine bulletins include storm advisories and forecasts. Station frequencies, broadcast times, and areas affected are stated in H. O. Publication 206, Radio Weather Aids, Volume I.

Advisories and forecasts also are broadcast by Navy stations NBA, Balboa, C. Z.; NPG, San Francisco, Calif.; NHB, Kodiak, Alaska; and NPM, Honolulu, T. H. Additional surface and upper-air data for preparation of weather maps at sea is contained in the Synoptic Weather Bulletins broadcast by Civil Aeronautics Administration station WBR, Miami, Fla.

Local weather bulletins, containing coastal-area forecasts, storm advisories, and weather summaries for specific areas, are broadcast on regular schedules by many Government and commercial radio stations.

Emergency broadcasts by Navy radio stations.—Storm advisories and notices concerning the safety of navigation at sea are broadcast by Navy radio stations in accordance with the degree of urgency, as follows:

A. Notices of tidal waves, hurricanes, typhoons, and cyclones so imminent as to warrant immediate broadcasting: (1) One transmission immediately on receipt; (2) one transmission at the end of the first ensuing silent period; and (3) one transmission during the first ensuing on-watch period for ships with one operator, in case both previous transmissions were made during the off watch period.

B. Storm warnings and notices of less urgency than those specified in (A) and other than those normally included in scheduled hydrographic broadcasts: (1) One transmission at the end of the first ensuing silent period; and (2) one transmission during the on-watch period for ships with one operator in case the previous transmission was made during an off-watch period.

These broadcasts are preceded by transmission of the Urgent Signal (XXX) or the Safety Signal (TTT) and a preliminary announcement on 500 kc. of the message to follow on the station working frequency.

Emergency broadcasts by Coast Guard radio stations.—Storm and hurricane warnings, advisories and other urgent marine information are broadcast by Coast Guard radio stations:

A. By radiotelegraph on the station's medium frequency immediately following the first silent period after receipt of the message at the radio station (HH+18 or HH+48) preceded by an initial call on 500 kc. Whenever this transmission occurs outside the watch hours for single radio operator ships, the message will be repeated at the end of the next silent period falling within the radio watch hours for such vessels. If a station makes daily broadcasts of marine information, the message will also be included in its next scheduled transmission.

B. By radiotelephone on the District Voice Working frequency immediately following receipt of the message at the radio station preceded by an initial call on 2182 kc. and repeated at the station's next scheduled broadcast.

Radiotelephone broadcasts of weather information (United States).—Transmission by voice of weather information from the Weather Bureau is made through certain radio stations of the Coast Guard and of the commercial coastal radiotelephone service. These broadcasts are followed immediately by reports of dangerous obstructions and changes in aids to navigation.

This service gives to yachts, fishing craft, tugboats, and other vessels equipped with a radio receiving set having a band covering the frequency range of 2 to 3 megacycles, official weather information from the Weather Bureau in plain language and on regular schedules.

These radiotelephone broadcasts are made twice and, in some cases, four times daily at definite times and include marine forecasts, and storm warnings whenever they are issued, for coastal waters in or adjacent to the areas served by the radio stations.

Certain local radio stations in the standard broadcast band have microphones installed in nearby Weather Bureau offices. From these stations forecasts, weather summaries, and warnings are broadcast on regular schedule.

For stations and schedules in the area covered by this volume, see the Appendix.

West Indies.—Coast Guard station NMR, San Juan, P. R., broadcasts twice daily by radiotelephone and radiotelegraph a weather bulletin consisting of marine forecasts and weather summary for the Caribbean Sea area and small-craft, storm, and hurricane warnings when applicable.

Mexico and Canada.—Scheduled broadcasts of weather information affecting the coasts of Mexico and Canada are made by designated stations of those countries on marine frequencies by both radiotelegraph and radiotelephone.

Alaska.—Weather broadcasts are made by radiotelegraph by Naval station NHB, Kodiak, and Coast Guard station NMJ, Ketchikan. Radiotelephone broadcasts are made by NMJ and by various stations of the Alaska Communication System operating in the 2-megacycle band.

Reports from ships.—The master of every ship of the United States equipped with radio transmitting apparatus, on meeting with a tropical storm, dangerous ice, derelict, or any other direct danger to navigation, is required to cause to be transmitted a report of these dangers to ships in the vicinity and to the appropriate Government agencies.

During the West Indies hurricane season, June 1 to November 30, ships in the Gulf of Mexico, Caribbean Sea area, southern North Atlantic Ocean, and the Pacific waters west of Central America and Mexico are urged to cooperate with the Weather Bureau in furnishing these special reports in order that warnings to shipping and coastal areas may be issued.

TIME SIGNALS.—The **United States system** of broadcasting time signals begins at 55 minutes 0 second of some hour and continues for 5 minutes. Signals are transmitted on every second of this period except the 29th of each minute, the 51st of the first minute, the 52d of the second minute, the 53d of the third minute, the 54th of the fourth minute, the last 4 seconds of the first 4 minutes, and the last 9 seconds of the last minute. The hour signal is a 1.3-second dash, which is much longer than the others.

In all cases the beginnings of the dashes indicate the beginnings of the seconds, and the ends of the dashes are without significance. The number of dashes sounded in the group at the end of any minute indicates the number of minutes of the signal yet to be sent. In case of signal failure or error, the signal is repeated 1 hour later.

The **National Bureau of Standards** broadcasts time signals from its radio station **WWV** near Washington, D. C., on radio frequencies of 2.5, 5, 10, 15, 20, and 25 megacycles, which are on the air at all times, day and night. This insures reliable coverage of the United States and extensive coverage of other parts of the world. The services include time announcements, standard time intervals, standard audio frequencies, and radio-propagation disturbance-warning notices.

Time announcements.—The audio frequencies are interrupted at precisely 1 minute before each hour and each 5 minutes thereafter. They are resumed precisely on the hour and each 5 minutes thereafter. The beginnings of the periods, when the audio frequencies are resumed, are in agreement with the basic service of the United States Naval Observatory, and accordingly they accurately mark the hour and successive 5-minute periods.

Greenwich Mean Time is announced in telegraphic code each 5 minutes. The zero- to 24-hour system is used. This announcement refers to the end of the announcement interval. A voice announcement of eastern standard time is given following each telegraphic code announcement.

Standard time intervals.—On each carrier frequency is a pulse which occurs at intervals of precisely 1 second. The pulse is omitted at the beginning of the last second of every minute. The 1-minute, 4-minute, and 5-minute intervals, synchronized with the second pulses, are marked by the beginning or ending of the periods when the audio frequencies are off.

A **radio-propagation disturbance warning** forecast is transmitted in Morse code twice each hour at 19½ and 49½ minutes past the hour. These warnings tell users of radio transmission paths over the North Atlantic the condition of the ionosphere at the time of the announcement and how good or bad communication conditions are expected to be for the next 12 hours. During a period of radio-propagation disturbance, direction-finder observations may be unreliable; the letters "N", "U", and "W" signify that radio propagation conditions are, respectively, normal, unsettled, or disturbed.

Radio station **WWVH**, on the island of Maui, Territory of Hawaii, broadcasts on 5, 10, and 15 megacycles. The schedule of broadcasts is the same as that of station WWV for standard time intervals, time announcements in code, standard audio frequencies, and accuracy. Simultaneous reception of WWV and WWVH does not interfere with ordinary use of the standard frequency and time signals.

The WWVH broadcast is interrupted for 4 minutes following each hour and half hour and for periods of 34 minutes each day beginning at 1900 GMT.

DESTRUCTIVE WAVES.—Unusual sudden changes in water level can be caused by seismic sea waves or violent storms. These two types of destructive waves have become commonly known as **tidal waves**, a name which is technically incorrect as they are not the result of tide-producing forces.

Seismic sea waves are set up by submarine earthquakes. Many such seismic disturbances do not produce sea waves and often those produced are small, but the occasional large waves can be very damaging to shore installations and dangerous to ships in harbors.

These waves travel great distances and can cause tremendous damage on coasts far from their source. The wave of April 1, 1946, that originated in the Aleutian Trench demolished nearby Scotch Cap Lighthouse and also

caused $25,000,000 damage in the Hawaiian Islands 2,200 miles away.

The speed of seismic sea waves varies with the depth of the water, reaching 300 to 500 knots in the deep water of the open ocean. In the open sea they cannot be detected from a ship or from the air because their length is so great, sometimes a hundred miles, as compared to their height, which is usually only a few feet. Only on certain types of shelving coasts do they build up into waves of disastrous proportions.

There is usually a series of waves with crests 10 to 40 minutes apart, and the highest may occur several hours after the first wave. Sometimes the first noticeable part of the wave is the trough which causes a recession of the water from shore, and people who have gone out to investigate this unusual exposure of the beach have been engulfed by the oncoming crest. Such an unexplained withdrawal of the sea should be considered as nature's warning of an approaching wave.

Improvements have been and are being made in the quick determination and reporting of earthquake epicenters, but no method has yet been perfected for determining whether a sea wave will result from a given earthquake. The problem of detecting and reporting the existence of seismic sea waves when they do occur is being studied. A reporting system has been organized in the Pacific with its center in the Hawaiian Islands.

When an advance warning is available, water-front areas should be vacated for higher ground and ships in the vicinity of land should head for the deep water of the open sea.

Storm waves.—A considerable rise or fall in the level of the sea along a particular coast may result from strong winds and a sharp change in barometric pressure. In cases where the water level is raised, higher waves can form with greater depth and the combination can be destructive to low regions, particularly at high stages of tide. Extreme low levels can result in depths which are considerably less than those shown on nautical charts. This type of wave occurs especially in coastal regions bordering on shallow waters which are subject to tropical storms.

Seiche is a stationary vertical wave oscillation with a period varying from a few minutes to an hour or more, but somewhat less than the tidal periods. It is usually attributed to external forces such as strong winds, changes in barometric pressure, swells, or seismic sea waves disturbing the equilibrium of the water surface. Seiche is found both in enclosed bodies of water and superimposed upon the tides of the open ocean. When the external forces cause a short-period horizontal oscillation of the water, it is called **surge**.

The combined effect of seiche and surge sometimes makes it difficult to maintain a ship in its position alongside a pier even though the water may appear to be completely undisturbed, and heavy mooring lines have been parted repeatedly under such conditions. Pilots advise taut lines to reduce the effect of the surge.

2. NAVIGATION REGULATIONS

THIS chapter contains the sections of **Code of Federal Regulations, Title 33, Navigation and Navigable Waters,** that are of most importance in the areas covered by Coast Pilot 5. The sections are from Part 82, Boundary Lines of Inland Waters; Part 124, Control Over Movement of Vessels; Part 202, Anchorage Regulations; Part 203, Bridge Regulations; Part 204, Danger Zone Regulations; and Part 207, Navigation Regulations.

PART 82—BOUNDARY LINES OF INLAND WATERS.

§ 82.1 General basis and purpose of boundary lines. By virtue of the authority vested in the Commandant of the Coast Guard under section 101 of Reorganization Plan No. 3 of 1946 (3 CFR, 1946 Supp., Ch. IV), and section 2 of the act of February 19, 1895, as amended (28 Stat. 672, 33 U. S. C. 151), the regulations in this part are prescribed to establish the lines dividing the high seas from rivers, harbors, and inland waters in accordance with the intent of the statute and to obtain its correct and uniform administration. The waters inshore of the lines described in this part are "inland waters," and upon them the inland rules and pilot rules made in pursuance thereof apply. The waters outside of the lines described in this part are the high seas and upon them the international rules apply. The regulations in this part do not apply to the Great Lakes or their connecting and tributary waters.

§ 82.2 General rules for inland waters. At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not described in this part, the waters inshore of a line approximately parallel with the general trend of the shore, drawn through the outermost buoy or other aid to navigation of any system of aids, are inland waters, and upon them the inland rules and pilot rules made in pursuance thereof apply, except that Pilot Rules for Western Rivers apply to the Red River of the North, the Mississippi River and its tributaries above Huey P. Long Bridge, and that part of the Atchafalaya River above its junction with the Plaquemine-Morgan City alternate waterway.

§ 82.55 Florida Reefs and Keys from Miami to Marquesas Keys. A line drawn from the east end of the north jetty at the entrance to Miami, to Miami Lighted Whistle Buoy 2; thence to Fowey Rocks Lighthouse; thence to Pacific Reef Lighthouse; thence to Carysfort Reef Lighthouse; thence to Molasses Reef Lighthouse; thence to Alligator Reef Lighthouse; thence to Tennessee Reef Lighthouse; thence to Sombrero Key Lighthouse; thence to American Shoal Lighthouse; thence to Key West Entrance Lighted Whistle Buoy; thence to Sand Key Lighthouse; thence to Cosgrove Shoal Lighthouse; thence to westernmost extremity of Marquesas Keys.

§ 82.60 Florida Keys from Marquesas to Cape Sable. A line drawn from the northwesternmost extremity of Marquesas Keys to Northwest Channel Entrance Lighted Bell Buoy 1; thence to the southernmost extremity of East Cape, Cape Sable.

§ 82.65 San Carlos Bay and tributaries. A line drawn from the northwesternmost point of Estero Island to Caloosa Lighted Bell Buoy 2; thence to Sanibel Island Lighthouse.

§ 82.70 Charlotte Harbor, Fla., and tributaries. Eastward of Charlotte Harbor Entrance Lighted Bell Buoy off Boca Grande.

§ 82.80 Tampa Bay and tributaries. A line drawn from the southernmost extremity of Long Key, Fla., to Tampa Bay Lighted Whistle Buoy; thence to Southwest Channel Entrance Lighted Bell Buoy 1; thence to a spire on the northeast side of Anna Maria Key, bearing approximately 109°.

§ 82.89 Apalachee Bay, Fla. Those waters lying north of a line drawn from Lighthouse Point on St. James Island to Gamble Point on the east side of the entrance to the Aucilla River, Fla.

§ 82.95 Mobile Bay, Ala., to Mississippi Passes, La. Starting from a point which is located 1 mile, 90° true, from Mobile Point Lighthouse, a line drawn to a point 5.5 miles, 202° true, from Mobile Point Lighthouse; thence to Ship Island Lighthouse; thence to Chandeleur Lighthouse; thence in a curved line following the general trend of the seaward, highwater shore lines of the Chandeleur Islands to the southwesternmost extremity of Errol Shoal (lat. 29°35.8′ N., long. 89°00.8′ W.); thence to a point 5.1 miles, 107° true, from Pass a Loutre Abandoned Lighthouse.

§ 82.100 Mississippi River. The Pilot Rules for Western Rivers are to be followed in the Mississippi River and its tributaries above the Huey P. Long Bridge.

§ 82.103 Mississippi Passes, La., to Sabine Pass, Tex. A line drawn from a point 5.1 miles, 106° true, from

Pass a Loutre Abandoned Lighthouse to a point 1.7 miles, 113° true, from South Pass West Jetty Light; thence to a point 1.8 miles, 189° true, from South West Pass Entrance Light; thence to Ship Shoal Lighthouse; thence to a point 10.2 miles, 172° true, from Calcasieu Pass Entrance Range Front Light; thence to a point 2.5 miles, 163° true, from Sabine Pass East Jetty Light.

§ 82.106 Sabine Pass, Tex., to Galveston, Tex. A line drawn from Sabine Pass Lighted Whistle Buoy 1 to Galveston Bar Lighted Whistle Buoy 1.

§ 82.111 Galveston, Tex., to Brazos River, Tex. A line drawn from Galveston Bar Lighted Whistle Buoy 1 to Freeport Entrance Lighted Bell Buoy 1.

§ 82.116 Brazos River, Tex., to the Rio Grande, Tex. A line drawn from Freeport Entrance Lighted Bell Buoy 1 to a point 4,350 yards, 118° true, from Matagorda Lighthouse; thence to Aransas Pass Lighted Whistle Buoy 1A; thence to a position 10½ miles, 90° true, from the north end of Lopeno Island (Lat. 27°00.1′ N., Long. 97°15.5′ W.); thence to Brazos Santiago Entrance Lighted Whistle Buoy 1.

§ 82.200 Bahia de San Juan. A line drawn from the northwesternmost extremity of Punta del Morro to Puerto San Juan Lighted Buoy 1; thence to Puerto San Juan Lighted Buoy 2; thence to the northernmost extremity of Isla de Cabras.

§ 82.205 Puerto Arecibo. A line drawn from the westernmost extremity of the breakwater through Puerto Arecibo Buoy 1; thence through Puerto Arecibo Buoy 2; thence to shore in line with the Church tower in Arecibo.

§ 82.210 Bahia de Mayaguez. A line drawn from the southernmost extremity of Punta Algarrobo through Manchas Interior Lighted Buoy 3; thence to Manchas Grandes Lighted Buoy 2; thence to the northwesternmost extremity of Punta Guanajibo.

§ 82.215 Bahia de Guanica. A line drawn from the easternmost extremity of Punta Brea through Bajio La Laja Lighted Buoy 2; thence to the westernmost extremity of Punta Jacinto.

§ 82.220 Bahia de Guayanilla. A line drawn from the southernmost extremity of Punta Ventana through Bahia de Guayanilla entrance Lighted Buoy 2; thence to the southeasternmost extremity of Punta Guayanilla.

§ 82.225 Bahia de Ponce. A line drawn from the southeasternmost extremity of Punta Cuchara through Bahia de Ponce Lighted Buoy 1; thence to Bahia de Ponce Lighted Buoy 2; thence to the southwesternmost extremity of Punta Cabullon.

§ 82.230 Bahia de Jobos. A line drawn from Punta Arenas through Bahia de Jobos Light; thence to Bahia de Jobos entrance Lighted Buoy 2; thence to the southernmost extremity of Isla Morrillo; thence to the southernmost extremity of Isla Pajaros.

§ 82.235 St. Thomas Harbor, St. Thomas. A line drawn from the southernmost extremity of Red Point through Lindbergh Bay Buoy 1; thence to Porpoise Rocks Lighted Buoy 2; thence to the southernmost extremity of Flamingo Point; thence to The Triangles Bell Buoy 2; thence to the Green Cay.

§ 82.240 Christiansted Harbor, Island of St. Croix, Virgin Islands. A line drawn from Shoy Point to Scotch Bank Lighted Buoy No. 1; thence to Long Reef Range Rear Daybeacon; thence to shore in range with stack at Little Princess northwestward of leper settlement.

§ 82.245 Sonda de Vieques. A line drawn from the easternmost extremity of Punta Yeguas, Puerto Rico, to a point 1 mile due south of the lighthouse at the entrance to Puerto Ferro; thence eastward in a straight line to a point 1 mile southeast of Punta Este Light, Vieques; thence in a straight line to the easternmost extremity of Punta del Este, Isla Culebrita. A line from the northernmost extremity of Cayo Nordeste to Piedra Stevens Lighted Buoy 1; thence to Las Cucarachas Light; thence to Cabo San Juan Light.

PART 124—CONTROL OVER MOVEMENT OF VESSELS:

§ 124.10 Advance notice of vessel's time of arrival to Captain of the Port.—(a) The master or agents of every vessel (foreign and domestic) shall give at least 24 hours' advance notice of the time of such vessel's arrival to the Captain of the Port where the vessel is to arrive. The master or agents of every foreign vessel, as well as every documented vessel of the United States, destined from one port or place to another port or place shall give at least 24 hours' advance notice of the time of such vessel's arrival to the Captain of the Port where the vessel is to arrive. For such foreign and domestic vessels, this 24 hours' advance notice of time of arrival is applicable at every port of call. In any case where the port of arrival is not located within the geographical area assigned to a particular Captain of the Port, this advance notice of time of arrival shall be made to the Commander of the Coast Guard District in which such a port or place is located. In a case of force majeure, if it is not possible to give at least a 24 hours' advance notice of time of arrival, then an advance notice as early as practicable shall be furnished.

(b) The master and agents of a vessel entering the Great Lakes shall be exempt from the requirements of

paragraph (a) of this section, but the master or agents of such vessel if bound for a United States port shall:

(1) Immediately on the vessel's entry into Lake Ontario inbound, advise the Commander, 9th Coast Guard District, of the vessel's first intended United States port of call and estimated time of arrival in that port.

(2) Upon the vessel's arrival in the first United States port cause to be delivered to the Captain of the Port an itinerary giving the vessel's foreign ports of call during the preceding 6 months or last visit to a United States port whichever is later, the intended ports of call on the Great Lakes, and the estimated dates of arrival.

(3) Thereafter, immediately advise the Commander, 9th Coast Guard District, when the necessity of a deviation from that itinerary becomes known.

(c) The master or agents of a vessel engaged upon a scheduled route need not furnish the advance notice of arrival in individual instances if a copy of the schedule is filed with the Captain of the Port for each port of call named in the schedule and the times of arrival at each such port are adhered to.

(d) In the case of a vessel which is engaged in operations in and out of the same port, either on voyages to sea and return without having entered any other port, or on coastwise voyages within the same Coast Guard District, or from ports within the first, ninth, thirteenth or seventeenth Coast Guard Districts to adjacent Canadian ports, and where no reason exists which renders such action prejudicial to the rights and interests of the United States, the Coast Guard District Commander having jurisdiction may prescribe conditions under which Coast Guard Captains of the Ports may consider such a vessel as being in constructive compliance with the requirements of this section without the necessity for reporting each individual arrival.

(e) Failure to give advance notice will subject the master or agents of a vessel to the penalties of fine and imprisonment, as well as subject the vessel to seizure and forfeiture, as provided in section 2, title II of the act of June 15, 1917, as amended, 50 U. S. C. 192. In addition, such failure may result in delay in the movement of the vessel from the harbor entrance to her facility destination within the particular port.

(f) The requirements of this section do not apply to the following:

(1) Vessels which, during the course of their voyages, do not navigate any portion of the high seas; and

(2) Vessels which are numbered by the Coast Guard.

(g) The term "high seas", as used in this section, shall be construed to mean any portion of the open sea below the low water mark along the coasts and projections of the land across the entrances of bays, sounds and other bodies of water which join the open sea.

PART 202—ANCHORAGE REGULATIONS:

§ 202.1 General. (a) The areas described in Subpart A of this part are designated as special anchorage areas pursuant to the authority contained in an act amending laws for preventing collisions of vessels approved April 22, 1940 (54 Stat. 150). Section 1 of the act amended Article 11 of the Navigation Rules for Harbors, Rivers, and Inland Waters Generally (33 U. S. C. 180), section 2 amended Rule 9 of the Navigation Rules for Great Lakes and Their Connecting and Tributary Waters (33 U. S. C. 258), and section 3 amended Rule 10 of the Navigation Rules for Red River of the North and Rivers Emptying into Gulf of Mexico and Tributaries (33 U. S. C. 319). Vessels not more than 65 feet in length, when at an anchor in any special anchorage area, shall not be required to carry or exhibit the white anchor lights required by the Navigation Rules.

(b) The anchorage grounds for vessels described in Subpart B of this part are established, and the rules and regulations in relation thereto adopted, pursuant to the authority contained in section 7 of the River and Harbor Act approved March 4, 1915 (38 Stat. 1053; 33 U. S. C. 471).

(c) All bearings in this part are referred to true meridian.

Subpart A—Special Anchorage Areas:

§ 202.75 Corpus Christi Bay, Tex.—(a) North area. Southward and westward of the north breakwater; northward of a line bearing 276°15′, 737.9 feet, from a point marked by a lead plug in the concrete cap of said breakwater from which the Weather Service Display Tower bears 260°45′30″; and eastward of a line bearing thence 18°11′, 675.5 feet, thence due north, 725.1 feet, to a lead plug in the concrete cap of said breakwater.

(b) South area. Southward of the southernmost T-head pier at the foot of Cooper Avenue and of a line bearing 156°44′, 340.6 feet, from the southerly corner of said pier to a point on the rubble breakwater; westward and northward of said breakwater; and eastward of the Corpus Christi sea wall.

Subpart B—Anchorage Grounds:

§ 202.190 Tortugas Harbor, in vicinity of Garden Key, Dry Tortugas, Fla.—(a) The anchorage grounds. All of Bird Key Harbor, southwest of Garden Key, bounded by the surrounding reefs and shoals and, on the northeast, by a line extending from Fort Jefferson West Channel Daybeacon 2 to Fort Jefferson West Channel Daybeacon 4, thence to Fort Jefferson West Channel Daybeacon 6, and thence to Fort Jefferson West Channel Daybeacon 8.

(b) The regulations. Except in cases of emergency involving danger to life or property, no vessel engaged in commercial fishing or shrimping shall anchor in any of the channels, harbors, or lagoons in the vicinity of Garden Key, Bush Key, or the surrounding shoals, outside of Bird Key Harbor.

§ 202.193 Tampa Bay, Fla.—(a) The anchorage grounds—(1) Explosives anchorage east of Mullet Key. A rectangular area in Tampa Bay approximately 4,459 yards long and 1,419 yards wide, beginning at latitude 27°38′30″, longitude 82°39′09″, and extending northeast-

erly to latitude 27°39′48″, longitude 82°37′15″; thence southeasterly to latitude 27°39′17″, longitude 82°36′46″; thence southwesterly to latitude 27°37′52″, longitude 82°38′38″; thence northwesterly to the point of beginning.

(2) Temporary explosives anchorage south of Interbay Peninsula. Beginning at a point bearing 107° true, 1,750 yards from Cut F Range Front Light; thence to a point bearing 125° true, 2,050 yards, from Cut F Range Front Light; thence to a point bearing 180° true, 1,725 yards, from Cut F Range Front Light; thence to a point bearing 222° true, 2,180 yards, from Cut F Range Front Light; thence to a point bearing 251° true, 1,540 yards, from Cut F Range Front Light; and thence to the point of beginning.

(3) Temporary explosives anchorage off Port Tampa. A circular area with a radius of 200 yards with the point at latitude 27°50′22″, longitude 82°34′15″.

(4) Quarantine anchorage. Southeast of the temporary explosive anchorage, beginning at a point bearing 97° true, 4,370 yards, from Cut "F" Range Front Light; thence to a point bearing 113° 30′ true, 5,370 yards, from Cut "F" Range Front Light; thence to a point bearing 161° 30′ true, 3,770 yards, from Cut "F" Range Front Light; thence to a point bearing 163° 30′ true, 2,070 yards, from Cut "F" Range Front Light; thence to the point of beginning.

(b) The regulations. (1) The explosives anchorage east of Mullet Key shall be used by vessels awaiting loading or unloading at Port Tampa that have explosives actually on board and where the duration of anchorage will exceed 72 hours.

(2) The temporary explosives anchorages south of Interbay Peninsula and off Port Tampa shall be used for vessels engaged in loading explosives when the duration of the anchorage is less than 72 hours.

§ 202.193a St. Joseph Bay, Fla.—(a) The anchorage grounds—(1) Explosives Anchorage Area 1. A rectangular area 3,000 yards long by 700 yards wide beginning at a point 1,350 yards west of U. S. Highway 98 Bridge over Gulf County Canal. The area is parallel to and 450 yards northeast of the north entrance channel to Port St. Joe, Fla.

(2) Explosives Anchorage Area 2. A circular area with a 500-yard radius around a center point located at latitude 29°47′30″; longitude 85°21′30″, 3,100 yards southeast of FW South Channel Light and 5,250 yards south of FW North Channel Light, in St. Joseph Bay, Port St. Joe, Fla.

(b) The regulations. (1) The explosives anchorage areas shall be used as a temporary anchorage for vessels engaged in loading and unloading explosives at the port of Port St. Joe, Fla., when the duration of the anchorage period is less than 96 hours.

(2) No vessel shall occupy this anchorage without obtaining a permit from the Captain of the Port.

§ 202.194 Mobile Bay, Ala., at entrance—(a) The anchorage grounds. The waters within a radius of 750 yards from a point located 1,000 yards true north from Fort Morgan Light.

(b) The regulations. (1) This anchorage shall be used by vessels loading or discharging high explosives. It shall also be used by vessels carrying dangerous or inflammable cargoes requiring an anchorage. It may be used for a general anchorage when not required for vessels carrying explosives or dangerous or inflammable cargoes.

(2) No vessel shall occupy this anchorage without obtaining a permit from the Captain of the Port.

§ 202.195 Mississippi River below Baton Rouge, La., including South and Southwest Passes—(a) The anchorage grounds—(1) Pilottown anchorage. An area approximately 4.7 miles in length along the right descending bank or west side of the river, 800 feet wide, extending from a point directly opposite Pilottown Wingdam Light, about 1.7 miles upstream from Head of Passes, upstream to a point 1.0 mile downstream from Wilder Flats Light. The area is marked by large signs, "Pilottown Anchorage," located on the right bank at the lower and upper limits. This anchorage is for ships which cannot proceed to sea because of fog at the Gulf ends of South and Southwest Passes or for any other reason.

(2) Explosives anchorage. An area along the right descending bank or west side of the river, 1,000 feet wide, extending upstream and downstream from a point located 1.4 miles upstream from Oak Point Light. The Commander, Eighth Coast Guard District, will designate anchorages upstream and downstream from this point. This anchorage is reserved for vessels carrying explosives. No vessel shall occupy this anchorage without obtaining a permit from the Commander, Eighth Coast Guard District.

(3) New Orleans general anchorage. An area approximately 2.1 miles in length along the right descending bank or southwest side of the river, 800 feet wide, extending from Cutoff Light upstream to the lower limits of the quarantine anchorage, approximately 0.7 mile downstream from the United States Quarantine Station Wharf. The area is marked by large signs, "General Anchorage," located on the right bank at the lower and upper limits. Vessels anchoring alongside of each other or in fleets are permitted, but during slack or low-water periods bow and stern anchors shall be provided.

(4) Quarantine anchorage. An area approximately 4,000 feet in length along the right descending bank or southwest side of the river 800 feet wide, extending from the upper limits of the New Orleans general anchorage, approximately 0.7 mile downstream from the United States Quarantine Station Wharf, upstream to a point marked by a sign located at the lower end of the Todd-Johnson Wharf, approximately 160 feet upstream from the Quarantine Station Wharf. This anchorage must be used by vessels awaiting inspection by United States Public Health officials or under actual quarantine, and is under the supervision of the Officer in Charge of the United States Quarantine Station (section 364, Public Health Service Act, July 1, 1944, 58 Stat. 682; 42 U. S. C. 267).

(b) The regulations. (1) Except in cases of poor visi-

bility or other emergency, anchoring is prohibited in the Mississippi River below Baton Rouge outside of the established anchorages or in South and Southwest Passes. If it becomes necessary in an emergency to anchor a vessel outside of the prescribed anchorages the vessel shall be so anchored that it will not interfere with or endanger other vessels, and it shall be moved as soon as the emergency is over. If it becomes necessary in an emergency to anchor a vessel in South Pass or Southwest Pass, the vessel shall take a position as close to the east bank as possible.

(2) When tied up individually or in fleets vessels shall be moored with sufficient lines and shore fastenings to insure their remaining in place and withstanding the action of winds, currents, or the suction of passing vessels.

(3) Except in case of great emergency, no vessel or craft shall anchor over revetted banks of the river. Every precaution shall be exercised at all times to avoid damage to the revetment works. The location of mattress work in New Orleans Harbor is indicated by warning signs erected at the ends and center of each reach of mattress work. Generally, mattress work extends out into the river 600 feet from the low water line. Information as to the location of revetted areas may be obtained from, and will be published from time to time by, the District Engineer, Corps of Engineers, New Orleans, La.

(4) The masters and pilots of all seagoing steamers, tugboats, and other vessels passing the explosives anchorage shall regulate the speed of their vessels over the bed of the river so as not to exceed seven miles per hour going downstream or five miles per hour going upstream whenever any vessel in anchored or moored within the explosives anchorage and engaged in handling explosives.

§ 202.197 Galveston Harbor, Tex.—(a) The anchorage grounds—(1) Explosives anchorage. A rectangular area in Bolivar Roads bounded by a line ranging from a point bearing 180°, 250 yards, from Galveston Lighted Bell Buoy 9, 90°, 1,300 yards; and between the lines ranging 180° from each end of the northern boundary to the sand flats along the south jetty.

(2) Temporary anchorage. A triangular area in Bolivar Roads to the southward of a line connecting Galveston Lighted Bell Buoy 9 and Fort Point Lighted Bell Buoy 11; westward of a line bearing 180° from Galveston Lighted Bell Buoy 9; and eastward of Fort Point Lighted Bell Buoy 11.

(3) Permanent anchorage. An area in Bolivar Roads to the northward of the ship channel within the following lines: Northwestward of a line bearing 62° from Galveston Lighted Bell Buoy 10; north of a line bearing 271° from Galveston Lighted Bell Buoy 10; and east of a line bearing 20° from the Quarantine Station cupola on Pelican Island.

(4) Quarantine anchorage. An area in Bolivar Roads to the northward of the ship channel within the following lines: Southeastward of a line bearing 223° from the old tower on Bolivar Point; east of a line bearing 359° from Bolivar Roads Lighted Bell Buoy 14; north of a line bearing 115° from Bolivar Roads Lighted Bell Buoy 14; and west of the westerly boundary of the permanent anchorage.

(b) The regulations. (1) The temporary anchorage shall be for the general use of naval and merchant vessels, and also for the use of vessels undergoing examination by quarantine, customs, or immigration authorities. This anchorage is intended for periods of less than 30 days.

(2) The permanent anchorage is to be used by merchant vessels remaining at anchor for a period of time greater than 30 days. It may also be used by merchant vessels when the temporary anchorage is overcrowded.

(3) The quarantine anchorage is to be used by vessels awaiting quarantine inspection, and by such other vessels as the Captain of the Port may permit.

§ 202.240 San Juan Harbor, P. R.—(a) The anchorage grounds—(1) Yacht, schooner, and small craft anchorage. That part of San Antonio Channel eastward of longitude 66°05′45″.

(2) Temporary anchorage (general). Beginning at the intersection of the east line of the San Juan Harbor turning basin with the south line of San Antonio Channel, which point bears 337°18′ true, 32 yards, from Isla Grande Light; thence along the east line of the turning basin 204° 23′ true, 457 yards, to the north limit line of the west noninstrument approach zone to the San Juan Air Terminal; thence along the north limit line 268° 21′ true, 508 yards; thence 24° 23′ true, 457 yards; thence 88° 21′ true, 508 yards, to the point of beginning.

(3) Restricted anchorage. Beginning at the southwest corner of the San Juan Harbor Turning Basin, which point bears 180° true, 1,058 yards, from Puntilla Point Daybeacon, and 227° true, 1,700 yards, from Isla Grande Light; thence along the west line of the turning basin 330° 13′ true, 339 yards, to the south limit line of the west noninstrument approach zone to the San Juan Air Terminal; thence along the south limit line 77° 32′ true, 419 yards; thence 150° 13′ true, 456 yards, to the south line of the turning basin; thence along the south line 271° 23′ true, 467 yards, to the point of beginning.

(b) The regulations. (1) The anchorage described in paragraph (a) (1) of this section shall be reserved for the anchorage of yachts, schooners, and small craft.

(2) The anchorage described in pragraph (a) (2) of this section shall be a general anchorage. Vessels awaiting customs or quarantine shall use this anchorage. No vessel shall remain in this anchorage more than 12 hours without a permit from the United States Coast Guard Captain of the Port.

(3) No vessel shall anchor in the restricted anchorage without a permit from the United States Coast Guard Captain of the Port.

§ 202.245 Vieques Passage and Vieques Sound, north of Vieques Island—(a) The anchorage grounds—(1) Vieques Passage explosives anchorage and ammunition handling berth. A circular area having a radius of 2,000 yards with its center at latitude 18°11′12″, longitude 65°33′12″.

(2) Vieques Sound explosives anchorage and ammunition handling berth. A circular area having a radius of 2,000 yards with its center at latitude 18°11′48″, longitude 65°26′06″.

(b) The regulations. No vessel or craft shall enter or remain in these anchorages while occupied by vessels having on board explosives or other dangerous cargo.

§ 202.250 St. Thomas Harbor, Charlotte Amalie, Virgin Islands—(a) The anchorage grounds—(1) Inner harbor anchorage. Beginning at a point bearing 85°, 450 yards, from the center of Ballast Island; thence 146°, 800 yards; thence 70°, 860 yards; thence 340°, 500 yards; and thence to the point of beginning.

(2) Outer harbor anchorage. Beginning at Scorpion Rock Lighted Buoy No. 1; thence 180°, 860 yards; thence 253°, 1,530 yards; thence due north to the southerly tip of Sprat Point, Water Island; thence to Cowell Point, Hassel Island; and thence to the point of beginning.

(3) East Gregerie Channel anchorage (explosives). Bounded on the northeast by Hassel Island; on the southeast by the northwest boundary of the outer harbor anchorage; on the southwest by Water Island; and on the northwest by a line running from Banana Point Light, Water Island, 55° to Hassel Island.

(4) Small-craft anchorage. All the waters north of a line passing through the center of Ballast Island and ranging 85°.

(5) Deep-draft anchorage. A circular area having a radius of 250 yards with its center at latitude 18°19′13″, longitude 64°58′32″.

Note. The center of the area is 193° true, 2,050 yards from the aerobeacon located on the upland in St. Thomas Airfield.

(b) The regulations. (1) The outer harbor anchorage shall be used by vessels undergoing examination by quarantine, customs, immigration, and Coast Guard officers. Upon completion of these examinations, vessels shall move promptly to anchorage. This anchorage shall also be used by vessels having drafts too great to permit them to use the inner harbor anchorage. No vessel shall remain more than 48 hours in this anchorage without a permit from the Captain of the Port.

(2) The small-craft anchorage shall be used by small vessels undergoing examination and also by small vessels anchoring under permit from the Captain of the Port.

(3) The requirements of the Navy shall predominate in the deep-draft anchorage. When occupied by naval vessels all other vessels and craft shall remain clear of the area. When the area is not required for naval vessels, the Captain of the Port may upon application made in advance assign other vessels to the area. Vessels so assigned and occupying the area shall move promptly upon notification by the Captain of the Port.

§ 202.255 Ponce Harbor, P. R.—(a) Small-craft anchorage. On the northwest of Ponce Municipal Pier and northeast of Cayitos Reef, bounded as follows: Beginning at latitude 17°58′27″, longitude 66°37′29.5″, bearing approximately 325° true, 2,200 feet from the most southwest corner of Ponce Municipal Pier; thence 273° 30′ true, 1,800 feet; thence 15° true, 900 feet; thence 93° 30′ true, 1,800 feet; thence 195° true, 900 feet to the point of beginning.

(b) The regulations. (1) The Commonwealth Captain of the Port may authorize use of this anchorage whenever he finds such use required in safeguarding the maritime or commercial interests.

(2) No vessel shall anchor within the area until assigned a berth by the Commonwealth Captain of the Port. Application for permission to occupy the anchorage must be submitted in advance by the master or authorized representative of the vessel.

(3) Vessels occupying the anchorage will at all times keep within the limits of the area, and shall move or shift their position promptly upon notification by the Commonwealth Captain of the Port.

(4) The anchorage is reserved for all types of small-craft, including schooners, fishing vessels, yachts and pleasure craft.

(5) Floats for marking anchors in place will be allowed; stakes or mooring piles are prohibited.

PART 203—BRIDGE REGULATIONS:

§ 203.1 General. Drawbridges across navigable waters of the United States will not be opened to navigation for certain periods determined to be in the interests of public safety by the proper civil defense authorities during a major disaster or civil defense emergency indicated by the military condition of warning: Yellow (i. e., attack by enemy aircraft, probable) or Red (i. e., attack by enemy aircraft, imminent) notwithstanding any general or special regulations heretofore or hereafter prescribed for the operation of any such drawbridge or drawbridges.

§ 203.240 Navigable waters discharging into the Atlantic Ocean south of and including Chesapeake Bay and into the Gulf of Mexico (including the Lower Atchafalaya River, La.), except the Mississippi River and its tributaries and outlets; bridges. (a) Corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(b) If the weather conditions are good and sound signals can be heard when a vessel approaches a drawbridge and desires to pass through the draw, three distinct blasts of a whistle or horn shall be sounded or three calls through a megaphone shall be made from the vessel when within reasonable hearing distance of the bridge.

(1) When the draw of the bridge can be opened immediately, the drawtender shall reply by three distinct blasts of a whistle or horn, by three calls through a megaphone, or by three loud and distinct strokes of a bell.

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the drawtender shall reply by four or more

short, distinct blasts of a whistle or horn, by four or more calls through a megaphone, or by four or more loud and distinct strokes of a bell (danger signal).

(c) When weather conditions prevent hearing the sound signals when a vessel approaches a drawbridge and desires to pass through the draw, signals shall be made from the vessel by swinging in circles at arm's length a lighted lantern at night and a flag by day.

(1) When the draw of the bridge can be opened immediately, the drawtender shall reply by raising and lowering in vertical plane a number of times a lighted lantern at night and a flag by day.

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the drawtender shall reply by swinging to and fro horizontally a number of times a lighted lantern at night and a flag by day.

(d) When a vessel wishes to pass two or more bridges close together or crossing a section of the waterway less than 500 feet in length, signals as prescribed above shall be given from the vessel for opening the first bridge, followed at an interval of about 5 seconds by the same signals for the second bridge, and so on, thus giving, at intervals of about 5 seconds, separate signals for each bridge the vessel desires to pass.

(e) When two or more vessels are approaching a bridge at nearly the same time from the same or opposite directions with the draw opened or closed, each of these vessels shall signal independently for the opening of the draw, and the drawtender shall reply as prescribed and in turn to the signal of each vessel.

(f) Where bridges are less than 500 feet apart, the signals to govern the movements of the approaching vessel shall be given from the bridge nearest the vessel. If the bridge can be opened immediately, the bridgetender shall await the reply signals from the other bridges and then give the signal circumstances require. If the nearest bridge cannot be opened immediately, the prescribed signal shall be given the approaching vessel at once to be followed as soon as possible by the signal from that bridge that the draws are about to open.

(g) The draw shall be opened with the least possible delay upon receiving the prescribed signal: Provided, That the drawspan shall not be opened when a train is approaching so closely that it cannot safely be stopped before reaching the bridge, or when a passenger or mail train is approaching within sight or hearing of the operator of the drawspan.

(h) When a bridgetender is about to close a draw, he shall sound four or more short, distinct blasts of a whistle or horn, four or more calls through a megaphone, or four or more loud and distinct strokes of a bell (danger signal).

(i) Trains, wagons, and other vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening, nor shall watercraft be so manipulated as to hinder or delay the operation of a drawspan, but all passage over, through, or under a drawbridge shall be prompt, to prevent delay to either land or water traffic.

Note: The special regulations contained in §§ 203.245 to 203.535, prescribed where local conditions require to govern the operation of certain bridges, supplement the general regulations contained in § 203.240.

§ 203.241 The Intracoastal Waterway from the Virginia-North Carolina boundary to Key West, Florida, and the Gulf Intracoastal Waterway from Rigolets, Louisiana, to Apalachee Bay, Florida, and tributaries thereto; bridges. (a) Bridges over the above-captioned navigable waters will be operated in accordance with § 203.240. The regulations contained in this section shall be considered as additional to those contained in § 203.240.

(b) Drawbridges shall not be required to open for craft carrying appurtenances unessential to navigation and any vessel operator who causes a bridge to be opened in order to clear appurtenances unessential for navigation shall be considered in violation of the regulations of this section.

(c) Appurtenances unessential for navigation shall include but not be limited to fishing outriggers, radio or television antennae, false stacks, and masts purely for ornamental purposes. Appurtenances unessential to navigation will not include flying bridges, sailboat masts, pile driver leads, spud frames on hydraulic dredges, or other items of equipment clearly necessary to the intended use of the vessel.

(d) Owners of drawbridges shall report to the proper District Engineer the names of any vessels requiring bridge openings considered to be in violation of this section. The District Engineer may at any time cause an inspection to be made of any craft utilizing the above-captioned navigable waters and is empowered to decide in each case whether or not the appurtenances are unessential to navigation. If the District Engineer decides a vessel has appurtenances unessential to navigation, he shall notify the vessel owner of his decision, specifying a reasonable time for making the alterations. If the vessel owner is aggrieved by the decision of the District Engineer, he may within 30 days after receipt of the request to perform necessary alterations, appeal the decision to the District Engineer in writing. After receipt by the District Engineer, the appeal will be forwarded through channels to the Secretary of the Army. If the Secretary of the Army rules that an appurtenance is unessential to navigation, the District Engineer shall again specify to the vessel owner a reasonable time for making necessary alterations to the appurtenance, and after the expiration of the time specified, any operation of the vessel on the above-captioned navigable waters in such a manner as to require drawbridge openings shall be deemed in violation of the regulations of this section, unless the necessary alterations shall have been made.

§ 203.245 Navigable waters discharging into the Atlantic Ocean south of and including Chesapeake Bay and into the Gulf of Mexico, except the Mississippi River and its tributaries and outlets; bridges where constant attendance of draw tenders is not required. (a) The owners of or agencies controlling certain bridges will not be required to keep draw tenders in constant attendance. The bridges to which this section applies are listed, and

the special regulations applicable in each case are set forth, in paragraphs (f) to (j), inclusive, of this section. At all times not covered by the regulations in this section, and in all other respects, the regulations contained in § 203.240 shall govern the operation of these bridges.

(b) Whenever a vessel unable to pass under a closed bridge desires to pass through the draw, advance notice, as specified, of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge.

(c) Upon receipt of such advance notice, the authorized representative of the owner of or agency controlling the bridge, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(d) The owners of or agencies controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section together with a notice stating exactly how the representative specified in paragraph (b) of this section may be reached.

(e) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain the machinery is in proper order for satisfactory operation.

(f), (g), and (h) apply to waterways discharging into the Atlantic Ocean south of and including Chesapeake Bay.

(i) Waterways discharging into Gulf of Mexico east of Mississippi River. (1) Caloosahatchee Canal, Fla.; Atlantic Coast Line Railroad Company bridge at Moore Haven. Between 10:00 p. m. and 6:00 a. m., the draw need not be opened for the passage of vessels.

(2) Orange River, Fla.; State Road Department of Florida bridge 0.9 mile above mouth and Seaboard Air Line Railway Company bridge 2.25 miles above mouth, near Fort Myers. At least 24 hours' advance notice required, except during a hurricane alert issued by the United States Weather Bureau affecting the area adjacent to Caloosahatchee and Orange Rivers when a draw tender shall be constantly on duty and the bridge opened at any time for the passage of vessels giving the usual signal.

(3) Miakka River, Fla.; highway and railroad drawbridges near Charlotte Beach. At least 36 hours' advance notice required.

(4) Lemon Bay, Fla.; highway drawbridge near Englewood. At least four hours' advance notice required.

(5) Revoked.

(6) Coffee Pot Bayou, St. Petersburg, Fla.; highway bridge at foot of Poplar Street. At least one hour's advance notice required.

(7) Pithlachascotee River, Fla.; State Road Department of Florida bridge 1.3 miles above mouth at New Port Richey. At least 6 hours' advance notice required, except during a hurricane alert issued by the United States Weather Bureau affecting the area when a draw tender shall be constantly on duty and the bridge opened promptly on signal.

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(8) Suwannee River, Fla.; Atlantic Coast Line Railroad Company bridge at Old Town. At least 5 days' advance notice required.

(9) Apalachicola River, Fla.; Louisville and Nashville Railroad Company bridge at River Junction. At least 24 hours' advance notice required: Provided, That operators shall be placed in attendance on the bridge when the stage of the river rises to 14 feet on the gage, and they shall be maintained thereon for the duration of all stages above 14 feet.

(10) Flint River, Ga.; Seaboard Air Line Railway Company bridge and Atlantic Coast Line Railroad Company bridge at Bainbridge. At least 24 hours' advance notice required.

(11) Chattahoochee River, Ga. and Ala.; Atlantic Coast Line Railroad Company bridge at Alaga, Ala., Central of Georgia Railway Company bridge at Columbia, Ala., and Seaboard Air Line Railway Company bridge near Omaha, Ga. At least six hours' advance notice required.

(12) St. Andrew Bay (East Bay), Fla.; State Road Department of Florida bridge (Du Pont Bridge) on U. S. Highway No. 98 between San Blas and Long Point. Between 6:45 a. m. and 8:00 a. m., and between 4:15 p. m. and 5:15 p. m., daily, the draw need not be opened for the passage of vessels: Provided, That the draw shall be opened at any time for the passage of a tow or crash boat, or in an emergency which shall be indicated by four blasts of the signaling device.

(13) St. Andrew Bay (West Bay), Fla.; State Road Department of Florida bridge (Hathaway Bridge) on U. S. Highway No. 98 between Sulphur Point and Panama City Beach. Between 7:00 a. m. and 8:00 a. m., and between 3:30 p. m. and 4:30 p. m., daily, the draw need not be opened for the passage of vessels: Provided, That the draw shall be opened at any time for the passage of a tow or crash boat, or in an emergency which shall be indicated by four blasts of the signaling device.

(14) West Bay Creek (Intracoastal Waterway), Fla.; State Road Department of Florida bridge on State Highway No. 10 at Westbay. Between 6:45 a. m. and 7:45 a. m. daily, the draw need not be opened for the passage of vessels: Provided, That the draw shall be opened at any time for the passage of a tow or crash boat, or in an emergency which shall be indicated by four blasts of the signaling device.

(15) Choctawhatchee River, Fla.; State Road Department of Florida bridge on State Road No. 10 approximately 14 miles east of Freeport. At least 12 hours' advance notice required.

(16) Alabama River, Ala.; St. Louis-San Francisco Railway Company bridge at Yellow Bluff, near Coy. At least 48 hours' advance notice required.

(17) Coosa River, Ala.; Seaboard Air Line Railway Company bridge at Lock. At least 24 hours' advance notice required.

(18) Coosa River, Ala.; Louisville and Nashville Railroad Company bridge at Gadsden. At least 6 hours' advance notice required.

(18-a) Tombigbee River, Ala.; Southern Railway

Company bridge near Epes. At least 24 hours' advance notice required, to be given to the railroad company's station agent at Epes between 8:00 a. m. and 4:00 p. m. on any day except Saturdays and Sundays, either by telephone maintained on the bridge by the railroad company for the purpose or in any other manner convenient to the operator of the vessel.

(18-b) Tensaw River, Alabama. State of Alabama Highway Department bridge over the Tensaw River on U. S. Highway No. 90 near Mobile, Ala. At least 24 hours' advance notice required. Bridge openings restricted to week days between the hours of 9:00 a. m. and 4:00 p. m.

Notice may be given to the bridge tender by telephoning Mobile 3-1742, or in his absence by telephoning Mr. J. C. Cotton, Superintendent of Convict Camp, Loxley, Ala., telephone Loxley 831. The owner of or agency controlling the bridge shall bear the cost of such notices.

(18-c) Tensaw River, Alabama; Louisville and Nashville Railroad Company bridge near Mobile. Between 12:00 midnight and 8:00 a. m., the draw will not be required to open except in an emergency for the passage of fire boats and patrol boats operated by the Maritime Administration for security of vessels within the Mobile Reserve Fleet Anchorage extending above and below the bridge: Provided, That during periods of severe storms or hurricanes from the time the United States Weather Bureau sounds an "Alert" for the area until the "all clear" is sounded or for such period as the Fleet Superintendent, Mobile Reserve Fleet, may request, draw tenders will be constantly on duty and the draw opened on signal for the passage of vessels. The notice posted in accordance with paragraph (d) of this section shall state exactly how the draw tender may be reached.

(18-d) Bayou Sara, Ala.; Louisville and Nashville Railroad Company bridge near Satsuma. Between 6 a. m. and 10 p. m., daily, the bridge will be opened on signal for the passage of vessels. Between 10 p. m. and 6 a. m., daily, at least 4 hours' advance notice required, except during hurricane alerts for the area when a draw tender will be on duty and the bridge opened on signal for the passage of vessels. The notice posted in accordance with paragraph (d) of this section shall state exactly how the draw tender may be reached by telephone or otherwise between 10 p. m. and 6 a. m.

(19) Three Mile Creek, Ala.; State of Alabama Highway Department bridge at Mobile. Between 7:00 a. m. and 9:00 a. m. and between 4:30 p. m. and 6:30 p. m. daily the draw need not be opened for the passage of vessels. At all other times, at least 12 hours' advance notice required.

(20) Three Mile Creek, Ala.; Southern Railway Company bridge at Mobile. On Sundays and between 8:30 p. m. and 4:30 a. m. on all others days the draw need not be opened for the passage of vessels except in the event of an emergency. Whenever, in the event of an emergency, a vessel is required to pass through the drawspan on Sunday or between 8:30 p. m. and 4:30 a. m., the draw shall be opened promptly upon receipt of notice by the draw tender who is domiciled in the immediate vicinity of the bridge. The notice posted in accordance with paragraph (d) of this section shall state exactly how the draw tender may be reached.

(21) West Pearl River, La.; New Orleans and Northeastern Railroad Company bridge at Pearl River Station. At least six hours' advance notice required.

(21-a) Salt Bayou, La.; Louisiana Department of Highway bridge near Slidell. At least 24 hours' advance notice required.

(22) Bayou Lacombe, La.; Louisiana Department of Highways bridge at Lacombe. At least 48 hours' advance notice required.

(22-a) Bayou Bienvenue, La.; Louisiana Department of Highways bridge near Chalmette. At least 24 hours' advance notice required.

(23) Bayou Colyell, La.; Louisiana Department of Highways bridge near Port Vincent. At least 48 hours' advance notice required.

(j) Waterways discharging into Gulf of Mexico west of Mississippi River. (1) Bayou Lafourche, La.; Texas and New Orleans Railroad Company bridge at Lafourche. At least 48 hours' advance notice required.

(2) Bayou Lafourche, La.; Louisiana Department of Highways bridge at Labadieville. At least 48 hours' advance notice required.

(3) Bayou Lafourche, La.; Louisiana Department of Highways bridge and The Texas and Pacific Railway Company bridge near Napoleonville. At least 24 hours' advance notice required.

(3-a) Grand Bayou, La.; State of Louisiana Department of Highways bridge near Paincourtville. At least 24 hours' advance notice required.

(4) Bayou Black, La.; Morgan's Louisiana and Texas Railroad and Steamship Company bridge at Southdown. At least 24 hours' advance notice required.

(4-a) Bayou Black, La.; Louisiana Department of Highways bridge near Gibson. At least 24 hours' advance notice required.

(4-b) Little Bayou Black, La.; Texas and New Orleans Railroad Company bridge at Southdown. The draw need not be opened for the passage of vessels, and the special regulations contained in paragraphs (b) and (e), inclusive of this section shall not apply to this bridge.

(5) Bayou Grosse Tete, La.; The Texas and Pacific Railway Company bridge at Grosse Tete, and Louisiana Department of Highways bridge near Rosedale. At least 48 hours' advance notice required.

(6) Bayou Teche, La.; Louisiana Department of Highways bridge at Ruth. At least 48 hours advance notice required.

(7) Bayou Teche, La.; State of Louisiana, Department of Highways and Southern Pacific Lines (Morgan's Louisiana and Texas Railroad and Steamship Company) bridges at Breaux Bridge, at least 48 hours' advance notice required.

(8) Stumpy Bayou, La.; Louisiana Department of Highways bridge near Weeks Island. At least six days' advance notice required.

(8-a) Bayou Courtableau, La.; Texas and New Orleans Railroad Company bridge at Washington. The draw need not be opened for the passage of vessels, and paragraphs

(b) to (e), inclusive of this section shall not apply to this bridge.

(9) Vermilion River, La.; Louisiana Department of Highways bridge near Lafayette. At least 48 hours' advance notice required.

(10) Bayou Des Cannes, La.; Louisiana Department of Highways bridge near Evangeline. At least 48 hours' advance notice required.

(11) Bayou Plaquemine Brule, La.; Texas and New Orleans Railroad Company bridge near Midland. At least 24 hours' advance notice required.

(12) Bayou Nezpique, La.; Louisiana Department of Highways bridge near Jennings. At least 48 hours' advance notice required.

(13) Bayou Choupique, La.; Louisiana Department of Highways bridges near Calcasieu. At least 48 hours' advance notice required.

(13-a) Bayou Lacassine, La.; Texas and New Orleans Railroad Company bridge near Hayes. At least 24 hours' advance notice required.

(14) Bayou D'Inde, La.; Louisiana Department of Highways bridge. At least 48 hours' advance notice required.

(15) Bayou D'Inde, La.; railroad bridge of Defense Plant Corporation, Cities Service Refining Corporation, Agent. At least 72 hours' advance notice required.

(16) Contraband Bayou, La.; Police Jury of Calcasieu Parish highway bridge near Lake Charles. At least 6 hours' advance notice required.

(17) Houston River, La.; The Kansas City Southern Railway Company bridge near Lake Charles. At least 24 hours' advance notice required.

(18) English Bayou, La.; Louisiana Department of Highways bridge near Lake Charles. At least 48 hours' advance notice required.

(19) Sabine River, La. and Tex.; Texas and New Orleans Railroad Company bridge near Echo, Tex., The Kansas City Southern Railway Company bridge near Ruliff, Tex., and Texas and Louisiana Highway Departments bridge between Starks, La., and Deweyville, Tex. At least 24 hours' advance notice required.

(20) Cow Bayou, Tex.; Orange County highway bridges 7 and 17 miles, respectively, above the mouth, near Orangefield. At least 6 hours' advance notice required.

(21) Taylors Bayou, Tex.; Texas and New Orleans Railroad Company bridge and Texas Highway Department bridge at West Port Arthur. At least 48 hours' advance notice required.

(21-a) Sabine Lake, La. and Tex.; Sabine Lake Bridge and Causeway Authority bridge near Port Arthur, Tex. At least 4 hours' advance notice required, except in emergencies, when the bridge will be opened as soon as possible after receipt of notice.

(22) Buffalo Bayou, Tex.; Texas and New Orleans Railroad Company bridge 0.1 mile above Houston Turning Basin, Houston, and drawbridges upstream therefrom. At least 24 hours' advance notice required.

(23) Brays Bayou, Tex.; Harris County highway bridge at Broadway, Harrisburg. At least 12 hours' advance notice required.

(24) Brazos River, Tex.; combination highway and railroad bridge between Freeport and Velasco. At least 24 hours' advance notice required.

(25) Brazos River Diversion Channel, Tex.; highway bridge near Freeport. At least 12 hours' advance notice required.

(25-a) Lavaca River, Tex.: St. Louis, Brownsville and Mexico Railway Company and Texas Highway Department bridges near Vanderbilt. At least 48 hours' advance notice required, except in emergencies, when the bridge will be opened as soon as possible after receipt of notice.

(26) Nueces Bay, Tex.: Texas Highway Department bridge between Corpus Christi and Portland. On Sundays, Texas State holidays, and National holidays, and between 9:00 p. m. and 6:00 a. m. on all other days, advance notice required; to be given prior to 8:00 p. m. on a day a draw tender is required to be in attendance: Provided, That during a hurricane alert or in the event of a major disaster affecting the Nueces Bay area a draw tender shall be in constant attendance and the draw opened promptly on signal.

(27) Laguna Madre, Tex.: Padre Island Causeway (Nueces County) swing barge bridge across Humble Oil and Refining Company channel. Between 4:00 p. m. and 7:00 a. m., at least 1-hour advance notice required: Provided, That these regulations may be temporarily suspended by the District Engineer, Corps of Engineers, Galveston, Tex., for such periods as he may determine to be necessary upon notice to Nueces County.

(28) Arroyo Colorado, Tex.; The Texas Highway Department bridge at Rio Hondo. At least 24-hours' advance notice required.

§ 203.463 Manatee River, Fla.; State Road Department of Florida bridge near Bradenton. (a) Between 7 a. m. and 9 a. m. and between 4 p. m. and 6 p. m., the draw need not be opened for the passage of vessels, except as provided in paragraph (b) of this section.

(b) The draw shall be opened promptly on signal for the passage of (1) Government owned or operated vessels, (2) any vessel during the existence of a hurricane alert issued by the United States Weather Bureau and affecting the area, and (3) any vessel in an emergency involving danger of life or property. An emergency shall be indicated by four blasts of a whistle, horn, or megaphone blown on the vessel.

(c) At times other than those specified in paragraph (a) of this section, and all other respects the regulations contained in § 203.240 shall govern the operation of this bridge.

(d) The owner of or agency controlling the bridge shall keep conspicuously posted on both sides of the bridge, in such manner that it can easily be read at any time, a copy of the regulations of this section.

§ 203.465 Hillsboro River, Tampa, Fla.—(a) City of Tampa highway bridge at Platt Street and State Road Department of Florida highway bridge at Lafayette Street. (1) Except as otherwise provided in subparagraph (2) of this paragraph, the owners of or agencies controlling these bridges shall not be required to open the draws for the passage of vessels between 8:30 a. m. and 9:30 a. m. and between 5:00 p. m. and 6:15 p. m. on all days except Sundays.

(2) The draws shall be opened at any time to allow the passage of vessels owned or operated by the United States and vessels in distress. A vessel owned or operated by the United States or a vessel in distress desiring to pass either bridge shall so indicate by four blasts of a whistle or similar device.

(3) The owners of or agencies controlling the bridges shall keep a copy of the regulations in this paragraph conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time.

(b) City of Tampa highway bridges at Garcia Avenue and at West Columbus Drive (Michigan Avenue). (1) The owner of or agency controlling these bridges will not be required to keep draw tenders in constant attendance between 10:00 p. m. and 6:00 a. m.

(2) Persons requiring the opening of the draw of either bridge between 10:00 p. m. and 6:00 a. m. shall, except in an emergency, give one hour's advance notice of the time at which such opening will be required. Such notice may be given in person, in writing, or by telephone to the authorized representative of the owner of or agency controlling the bridge. Upon receipt of such notice, the authorized representative shall cause a draw tender to be on duty at the bridge at the time specified in the notice, and the bridge shall at such time and for a reasonable period thereafter be prepared to open promptly for the passage of vessels.

(3) The owner of or agency controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time, a copy of the regulations in this paragraph, together with a notice stating exactly how the representative specified in subparagraph (2) of this paragraph may be reached.

(c) State Road Department of Florida highway bridge at West Hillsborough Avenue. (1) The owner of or agency controlling this bridge shall not be required to keep a draw tender in constant attendance between 10:00 p. m. and 6:00 a. m.

(2) Whenever, in the event of an emergency, a vessel, unable to pass under the closed bridge, is required to pass through the drawspan between 10:00 p. m. and 6:00 a. m., at least one hour's advance notice of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge. Upon receipt of such notice, the authorized representative, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(3) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time, a copy of the regulations in this paragraph, together with a notice stating exactly how the representative specified in subparagraph (2) of this paragraph may be reached.

(d) City of Tampa highway bridge at West Sligh Avenue. (1) The owner of or agency controlling this bridge shall not be required to keep a draw tender in constant attendance between 6:00 p. m. and 7:00 a. m.

(2) Whenever, in the event of an emergency, a vessel, unable to pass under the closed bridge, is required to pass through the drawspan between 6:00 p. m. and 7:00 a. m., at least one hour's advance notice of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge. Upon receipt of such notice, the authorized representative, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(3) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time, a copy of the regulations in this paragraph, together with a notice stating exactly how the representative specified in subparagraph (2) of this paragraph may be reached.

§ 203.466 Clearwater Harbor, Fla.; the City of Clearwater bridge (Memorial Causeway), Clearwater, Fla. (a) Except as otherwise provided in paragraphs (b) and (c) of this section, the owner or agency controlling the bridge shall not be required to open the drawspan for the passage of vessels on Saturdays, Sundays, Memorial Day, Independence Day and Labor Day between the hours of 4:30 p. m. and 7:00 p. m., except that the drawspan shall be opened at 5:15 p. m., 6:00 p. m., and 6:45 p. m. to allow all accumulated vessels to pass.

(b) The regulations in this section shall not apply to vessels owned or operated by the United States. All such vessels shall be passed without delay through the draw of the bridge at any time on giving the usual signal.

(c) The draw of the bridge shall be opened at any time for the passage of a tow or of a vessel in an emergency involving danger to life or property. Such an emergency shall be indicated by four blasts of a whistle, horn, or megaphone.

(d) The owner of or agency controlling the bridge shall keep a copy of the regulations in this section conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time.

§ 203.491 Mobile River and Chickasaw Creek, Ala.; Alabama State Highway bridge across Mobile River and Louisville and Nashville Railroad Company bridge across Chickasaw Creek at Mobile, Ala.—(a) Sound signals for vessels. (1) For vessels proceeding up or down Mobile River and requiring an opening of the highway bridge only, the vessel will give a signal of three long blasts.

(2) For vessels coming down Mobile River and intend-

ing to proceed up Chickasaw Creek, requiring an opening of the railroad bridge, the vessel will give a signal of one long blast, followed after a one minute interval by three long blasts.

(3) For vessels coming up Mobile River and intending to proceed up Chickasaw Creek, requiring an opening of both bridges, the vessel will give a signal of three long blasts, a one minute interval, and one long blast followed by three long blasts.

(4) The owners of or agencies controlling the bridges shall keep a legible copy of these regulations posted conspicuously on both the upstream and downstream sides of the bridges.

§ 203.493 Pinto Pass, Ala.; Alabama Dry Dock and Shipbuilding Company railroad bridge, Mobile, Ala. (a) The owner of or agency controlling the bridge shall not be required to open the drawspan for the passage of vessels except between the hours of 12:30 a. m. and 5:30 a. m. and between the hours of 5:00 p. m. and 10:30 p. m.

(b) Requests to pass through the bridge shall be made at least two hours prior to the opening of the drawspan between 12:30 a. m. and 5:30 a. m., and at least one hour prior to the opening of the drawspan between 5:00 p. m. and 10:30 p. m.

(c) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such manner that it can easily be read at any time, a copy of the regulations in this section, together with a notice stating exactly to whom the request is to be made and how he may be reached without delay.

(d) This section is supplemental to the rules and regulations to govern the operation of drawbridges crossing "All navigable waterways of the United States discharging their waters into the Atlantic Ocean south of and including Chesapeake Bay and the Gulf of Mexico, excepting the Mississippi River and its tributaries."

§ 203.525 Clear Creek at Seabrook, Tex.; bridge of Galveston, Harrisburg & San Antonio Railroad. (a) The owner of this bridge will not be required to keep a draw tender in attendance at the bridge between the hours of 10:20 p. m. and 6:20 a. m.: Provided, That said owner shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such manner that it can easily be read at any time, a copy of the regulations in this section, together with a notice stating exactly how the bridge tender may be reached, giving his telephone number and location, and shall arrange for ready telephonic communication with him at any time between 10:20 p. m. and 6:20 a. m., either from the bridge or from its immediate vicinity.

(b) Whenever a vessel unable to pass under the closed draw desires to pass through the draw at any time between the hours of 10:20 p. m. and 6:20 a. m., notice of such intention shall be given to the bridge tender by telephone or otherwise, either at the bridge before 10:20 p. m. or at his residence thereafter. If the notice is given between the hours of 6:20 a. m. and 10:20 p. m., or if at least one-half hour has elapsed since it was given, the draw shall be promptly opened at the time specified in the notice upon the prescribed signal being given from the boat.

(c) Between the hours of 6:20 a. m. and 10:20 p. m. the draw shall be opened upon signal in accordance with the general regulations. (See § 203.240.)

§ 203.535 Dickinson Bayou, Tex.; bridge of Galveston, Harrisburg & San Antonio Railroad (Southern Pacific) at San Leon, Tex. (a) The owner of this bridge will not be required to keep a draw tender in attendance at the bridge between the hours of 4 p. m. and 8 a. m.: Provided, That said owner shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such manner that it can easily be read at any time, a copy of the regulations in this section, together with a notice stating exactly how the bridge tender may be reached, giving his telephone number and location, and shall arrange for ready telephonic communication with him at any time between 4 p. m., and 8 a. m., either from the bridge or from its immediate vicinity.

(b) Whenever a vessel unable to pass under the closed draw desires to pass through the draw at any time between the hours of 4 p. m. and 8 a. m., notice of such intention shall be given to the bridge tender by telephone or otherwise, either at the bridge before 4 p. m. or at his residence thereafter. If the notice is given between the hours of 8 a. m. and 4 p. m., or if at least 1 hour has elapsed since it was given, the draw shall be promptly opened at the time specified in the notice upon the prescribed signal being given from the boat.

(c) Between the hours of 8 a. m. and 4 p. m. the draw shall be opened within 1 hour after signal is given in accordance with the general regulations. (See § 203.240.)

§ 203.541 Intracoastal Waterway, Texas; bridge of the Texas Highway Department in new Galveston Causeway in vicinity of Galveston, Texas. (a) Between 7 a. m. and 8 a. m. and between 4 p. m. and 6 p. m. the draw of the bridge need not be opened for the passage of vessels except as provided in paragraphs (b) and (c) of this section.

(b) The draw shall be opened promptly upon the prescribed signal being given for the passage of towboats with tows and vessels owned or operated by the United States. When the draw is open for the passage of any of the above vessels, other vessels which have been waiting shall be permitted to pass through the draw.

(c) The draw shall be opened promptly for any vessel desiring passage because of an emergency. Such vessel shall sound the opening signal two or more times at intervals of 5 seconds. When weather conditions are such that sound signals may not be heard, such vessels shall signal for an opening by raising and lowering a number of times a lighted lantern by night and a flag by day.

(d) The owner of or agency controlling the bridge shall

keep conspicuously posted on both sides of the bridge, in such manner that it can easily be read at any time, a copy of these regulations.

§ 203.542 Intracoastal Waterway, Galveston, Texas; Bridge of the Texas Highway Department in new Galveston Causeway. (a) When a vessel approaches the drawbridge and signals for the opening of the draw, the draw tender shall reply by means of the sound signals prescribed in § 203.240 (b) and in addition he shall exhibit the following visual signals:

(1) A flashing green light to indicate that the bridge can be opened immediately; or

(2) A flashing red light to indicate that the draw cannot be opened immediately, or, being open, is to be closed immediately.

(b) The flashing green light shall be exhibited during the time the draw is opening and until the draw is to be closed.

(c) The flashing red light shall be exhibited during the time the draw is closing.

(d) The flashing red light shall be exhibited and the danger signal sounded if, for reasons of emergency, the draw tender shall find that the draw cannot be operated for the safe passage of vessels.

(e) The flashing red and green lights shall be mounted on the control house of the bridge, shall be visible along the channel only and shall be of sufficient intensity to be visible 600 yards from the bridge in the daytime during periods of poor visibility.

(f) In case of a power failure or other emergency making the operation of the flashing red and green lights impossible, the draw tender shall resort to such use of the visual signals prescribed in § 203.240 (c) as the situation demands.

(g) The regulations in this section supersede the requirements of § 203.240 insofar as visual signals of the draw tender are concerned, except as provided in paragraph (f) of this section. In all other respects § 203.240 shall apply to the operation of this bridge.

§ 203.555 Mississippi River and its navigable tributaries and outlets, including the Atchafalaya River, La., above Grand Lake; bridges. (a) The owner of or the agency controlling a drawbridge crossing a navigable water of the United States shall provide the appliances and the personnel necessary for the safe, prompt, and efficient operation of the draw.

(b) The draw shall be opened promptly when the signal prescribed in paragraph (d) of this section for the opening of the draw is received from an approaching vessel or other water craft which cannot pass under the closed draw, excepting when an approaching train is so close that it cannot be stopped safely before reaching the bridge or an approaching passenger or mail train is within sight or hearing of the bridge operator.

(c) Trains, vehicles, vessels, or other water craft shall not be stopped or manipulated in a manner hindering or delaying the operation of the draw, but all passage over the draw span or through the draw opening shall be in a manner to expedite both land and water traffic.

(d) Signals—(1) Call signals for opening of draw—(i) Sound signals. The general signal shall be one long blast of a whistle, horn, or siren, or one loud and distinct stroke of a bell, repeated at intervals until the acknowledging signal hereinafter prescribed is received from the bridge operator, except when a vessel or other water craft is about to leave a point between two drawbridges and within sight or hearing of them to pass through the draw downstream or in the direction of the ebb current, the signal shall be followed after a brief interval by an additional blast or distinct stroke of a bell.

(ii) Visual signal. A white flag by day, a white light by night, swung in full circles at arm's length in full sight of the bridge and facing the draw. This signal is to be used in conjunction with sound signals when conditions are such that sound signals may not be heard.

(2) Acknowledging signals by bridge operator—(i) Sound signals. Draw to be opened immediately: Same as call signal. Draw cannot be opened immediately, or if open must be closed immediately: Four or more short and rapid blasts of a whistle, horn, or siren, or four sharp and rapid strokes of a bell, to be repeated at regular intervals until acknowledged by the vessel.

(ii) Visual signals. The system of sight signals (hereinafter described) to be used in each individual case will be subject to the approval of the Division Engineer of the United States Engineer Department in charge of the locality. They will be used in conjunction with sound signals when conditions are such that sound signals alone are insufficient. Draw to be opened immediately: Green light (or a white flag during daylight hours) swung up and down vertically a number of times in full sight of the vessel, or Three flashing green lights so located as to be visible to approaching vessels, or During daylight hours three cylinders or balls so located as to be visible to approaching vessels. Draw cannot be opened immediately, of if open must be closed immediately: A red light (or a red flag during daylight hours) swung to and fro horizontally in full sight of the vessel, or During daylight hours one cylinder or ball so located as to be visible to approaching vessels.

(3) Acknowledging signals by the vessel. Vessels or other watercraft having signaled for the opening of a draw and having received a signal that the draw cannot be opened immediately, of if open must be closed immediately, will acknowledge said signal by one long blast followed by a short blast or by swinging to and fro horizontally a red flag by day or a red light at night.

(e) A vessel approaching to pass two or more bridges less than 800 feet apart shall signal the first bridge as prescribed in paragraph (d) of this section and give the same signals for the second bridge after an interval of about 10 seconds, and so on, thus giving at intervals of about 10 seconds separate signals for each bridge to be passed. The operator of each bridge shall reply as prescribed in paragraph (d) of this section.

(f) When two or more vessels are approaching to pass

a drawbridge from opposite directions, the person in charge of each vessel shall signal for the opening of the draw as prescribed in paragraph (d) of this section. The vessel running with the current shall have the right of way. At slack tide the vessel running in ebb current direction shall have right of way. The bridge operator shall reply as prescribed in paragraph (d) of this section.

(g) When vessels are approaching a bridge span or a draw from the same direction, each vessel shall signal independently for the opening of the draw and shall be navigated in accordance with the pilot rule applicable to the waterway governing such vessels.

(h) Special supplemental regulations may be prescribed to provide for closed or open periods when land or water traffic predominates and to provide for intermittent attendance of bridge operators on bridges across streams where water traffic is minor or at times nonexistent. Owners of or the agency controlling bridges for which such special supplemental regulations are prescribed will be required to keep a copy thereof posted in a conspicuous place on both the upstream and downstream sides of the bridges.

(i) This section shall be in force on and after June 1, 1933, and shall supersede all general bridge regulations previously approved for these waters.

Note: The special regulations contained in §§ 203.560 to 203.620, inclusive, prescribed where local conditions require to govern the operation of certain bridges, supplement the general regulations contained in § 203.555.

§ 203.560 Mississippi River and its tributaries and outlets; bridges where constant attendance of draw tenders is not required. (a) The owners of or agencies controlling certain bridges will not be required to keep draw tenders in constant attendance. The bridges to which this section applies are listed, and the special regulations applicable in each case are set forth, in paragraphs (f) and (g) of this section.

(b) Whenever a vessel unable to pass under a closed bridge desires to pass through the draw, advance notice as specified, of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge.

(c) Upon receipt of such advance notice, the authorized representative of the owner of or agency controlling the bridge, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(d) The owners of or agencies controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section together with a notice stating exactly how the representative specified in paragraph (b) of this section may be reached.

(e) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

(f) and (g) None of these bridges is mentioned specifically in Coast Pilot 5.

PART 204—DANGER ZONE REGULATIONS:

§ 204.84 Florida Bay northeast of Pine Islands, Fla., live firing area for strafing—(a) The danger zone. (1) Bounded on the north by latitude 24°51′08″; on the east by longitude 81°13′52″; on the south by latitude 24°48′52″; and on the west by longitude 81°16′21″.

(2) The hull of an ex-naval vessel (PE-19) is located in the center of the area and is used by United States Fleet Aircraft for live strafing.

(b) The regulations. (1) The area is closed to all vessels at all times.

(2) This section shall be enforced by the Captain of the Port, Key West, Fla.

§ 204.90 Straits of Florida; Navy restricted area surrounding Woman Key and Ballast Key—(a) The danger zone. The waters within a rectangular area, approximately 3.0 nautical miles long from east to west and 2.4 nautical miles wide from north to south, with Woman Key at or near the center, bounded on the north by latitude 24°32′37″ (approximately one nautical mile north of the north shore of Woman Key); on the east by longitude 81°56′40″ (approximately one nautical mile east of the east shore of Ballast Key); on the south by latitude 24°30′12″ (approximately one nautical mile south of the south shore of Ballast Key); and on the west by longitude 81°59′53″ (approximately one nautical mile west of the west shore of Woman Key). The danger zone will be marked by buoys located at the four corners.

(b) The regulations. (1) The danger zone is open to navigation except when naval operations are in progress, when no vessel or other craft shall enter or remain within the area.

(2) Since naval operations will take place in the area at frequent and irregular intervals throughout the year regardless of season, advance notice will be given of the date on which the first such operations will begin. At intervals of not more than three months thereafter, notice will be sent out that operations are continuing. Such notices will appear in the local newspapers and in "Notice to Mariners."

(3) Prior to the conduct of operations the area will be patrolled by naval craft which will warn navigation to leave the area. Upon receiving such warning any watercraft within the danger zone shall leave it and no craft shall enter the area until operations have ceased.

(4) This section shall be enforced by the Commandant, Sixth Naval District, Charleston, S. C., and such agencies as he may designate.

§ 204.95 Straits of Florida and Florida Bay in vicinity of Key West, Fla.; operational training area, aerial gunnery range, and bombing and strafing target areas, Naval Air Station, Key West, Fla.—(a) The danger zones—(1) Operational training area. Waters of the Straits of

Florida and Gulf of Mexico southwest, west and northwest of Key West bounded as follows: Beginning at latitude 25°45′00″, longitude 82°07′00″; thence southeast to latitude 24°49′00″, longitude 81°55′00″; thence southwest to latitude 24°37′30″, longitude 82°00′30″; thence westerly to latitude 24°37′30″, longitude 82°06′00″; thence southerly to latitude 24°28′30″, longitude 82°06′00″; thence southerly to latitude 24°25′00″, longitude 82°06′30″; thence easterly to latitude 24°25′00″, longitude 81°57′00″; thence southwesterly to latitude 23°30′00″, longitude 82°19′00″; thence westerly to latitude 23°30′00″, longitude 82°46′00″; thence northwesterly to latitude 23°52′30″, longitude 83°11′00″; thence northerly to latitude 24°25′00″, longitude 83°11′00″; thence easterly to latitude 24°25′00″, longitude 83°08′00″; thence clockwise along the arc of a circle with a radius of 92 miles centered at latitude 24°35′00″, longitude 81°41′15″ to latitude 25°45′05″, longitude 82°23′30″; thence east to point of beginning.

(2) Revoked.

(3) Bombing and strafing target areas. (i) A circular area immediately west of Marquesas Keys with a radius of two and one-half statute miles having its center at latitude 24°34′30″, longitude 82°14′00″. The target located within this area, a grounded LCI, will be used for air-to-ground gunnery exercises.

(ii) A circular area immediately north of Marquesas Keys with a radius of two nautical miles having its center at latitude 24°38′20″, longitude 82°06′25″. The target located within this area, a grounded eagle boat, will be used for bombing exercises using water-filled bombs only.

(iii) Revoked.

(iv) A circular area immediately west of Marquesas Keys with a radius of two nautical miles having its center at latitude 24°33.4′ and longitude 82°10.9′, not to include land area and area within Marquesas Keys. The target located within this area, a grounded LSIL will be used for bombing and aircraft rocket exercises.

(b) The regulations. (1) In advance of scheduled air or surface operations which, in the opinion of the enforcing agency, may be dangerous to watercraft, appropriate warnings will be issued to navigation interests through official government and civilian channels or in such other manner as the District Engineer, Corps of Engineers, Jacksonville, Fla., may direct. Such warnings will specify the location, type, time, and duration of operations, give such other pertinent information as may be required in the interests of safety, and state whether watercraft will be excluded from the zone of operations which is defined as that portion of a danger zone within which watercraft might be endangered by the operations in progress.

(2) Watercraft shall not be prohibited from passing through a danger zone except when the operations being conducted are of such a nature that the exclusion of watercraft from the zone of operations is required in the interests of safety or for accomplishment of the mission, or is considered important to the national security.

(3) When the warning to navigation interests states that watercraft will be excluded from the zone of operations, no vessel shall enter or remain in such area during the period the operations are in progress.

(4) Aircraft and naval vessels conducting operations in a danger zone will exercise caution in order not to endanger watercraft. Operations which may be dangerous to watercraft will not be conducted without first ascertaining that the zone of operations is clear. Any vessel in the zone of operations will be warned to leave, and upon being so warned the vessel shall leave the zone of operations immediately.

(5) The regulations in this section shall be enforced by the Commandant, Sixth Naval District, Charleston, S. C., and such agencies as he may designate.

§ 204.100 Tampa Bay south of Port Tampa, Fla.; small-arms firing range, United States Air Force, MacDill Field—(a) The danger zone. Shoreward of a line beginning at Little Mangrove Point, latitude 27°51′06″, longitude 82°32′52″; thence southwesterly approximately 2,900 yards to latitude 27°50′00″, longtitude 82°33′55″; thence southeasterly approximately 5,200 yards to latitude 27°47′27″, longitude 82°33′29″; thence northeasterly approximately 3,800 yards to latitude 27°47′46″, longtitude 82°31′25″; and thence northeasterly approximately 5,100 yards to the shore line at latitude 27°49′20″, longitude 82°29′10″. The area will be marked by suitable boundary signs or buoys.

(b) The regulations. (1) Vessels and other watercraft are prohibited from entering the danger zone at all times.

(2) Advance notice will be given of the date on which the first firing practice shall begin. At intervals of not more than three months thereafter, notice will be sent out that firing practice is continuing. Such notices will appear in local newspapers and in "Notice to Mariners."

(3) This section shall be enforced by the Commanding Officer, MacDill Field, Tampa, Fla., and such agencies as he may designate.

§ 204.105 Gulf of Mexico between Anclote Keys and Cedar Keys, Fla.; Air Force aerial gunnery target range and bombing target areas—(a) Aerial gunnery target range. [Revoked]

(b) Bombing target areas—(1) The danger zones—(i) South area. A rectangular area off the west coast of Florida between Hudson and Bayport bounded on the south by latitude 28° 23′; on the west by longitude 82° 56′; on the north by latitude 28° 33′; and one the east by longitude 82° 43′.

(ii) North area. A rectangular area off the west coast of Florida between Chassahowitzka Bay and Crystal Bay bounded on the south by latitude 28° 43′; on the west by longitude 82° 58′; on the north by latitude 28° 53′; and on the east by longitude 82° 45′.

(2) The regulations. (i) Vessels and other watercraft are prohibited from entering the danger zones at all times.

(ii) Advance notice will be given of the date on which bombing practice shall begin. Thereafter, at intervals of not more than three months, notices will be published

stating that bombing practice is continuing. Such notices will appear in local newspapers and in "Notice to Mariners" published by the United States Coast Guard.

(iii) This paragraph shall be enforced by the Commanding Officer, MacDill Field, Tampa, Fla., and such agencies as he may designate.

§ 204.111 Gulf of Mexico south of Apalachee Bay, Fla.; Air Force rocket firing range—(a) The danger zone. An area about 45 statute miles wide and 60 statute miles long, approximately parallel to and about 30 miles off the west coast of Florida, south of Apalachee Bay. The area is bounded as follows: Beginning at latitude 29°42'30", longitude 84°40'00"; thence east along latitude 29°42'30" to longitude 84°00'00"; thence southeast to latitude 28°56'00", longitude 83°31'00"; thence southwest to latitude 28°37'00", longitude 84°11'00"; thence northwest to latitude 29°17'30", longitude 84°40'00"; thence northwest to latitude 29°32'00", longitude 85°00'00"; thence northeast along a line three miles off the meanderings of the shore to the point of beginning.

(b) The regulations. (1) The fact that aerial rocket firings will be conducted over the danger zone will be advertised to the public through the usual media for the dissemination of information. Inasmuch as such firing is likely to be conducted during the day or night throughout the year without regard to season, such advertising of firing will be repeated at intervals not exceeding three months and at more frequent intervals when in the opinion of the enforcing agency, repetition is necessary in the interest of public safety.

(2) Prior to the conduct of rocket firing, the area will be patrolled by surface patrol boat and/or patrol aircraft to insure that no watercraft are within the danger zone and to warn any such watercraft seen in the vicinity that rocket firing is about to take place in the area. When aircraft is used to patrol the area, low flight of the aircraft across the bow will be used as a signal or warning.

(3) Any such watercraft shall, upon being so warned, immediately leave the area, and, until the conclusion of the firing, shall remain at such a distance that it will be safe from the fallout resulting from such rocket firing.

(4) The regulations in this section shall not deny access to or egress from harbors contiguous to the danger zone in the case of regular passenger or cargo carrying vessels proceeding to or from such harbors. In the case of the presence of any such vessel in the danger zone the officer in charge shall cause the cessation or postponement of fire until the vessel shall have cleared that part of the area in which it might be endangered by the fallout. The vessel shall proceed on its normal course and shall not delay its progress unnecessarily. Masters are requested to avoid the danger zone whenever possible so that interference with firing training may be minimized.

(c) The regulations in this section shall be enforced by the Commander, Moody Air Force Base, Valdosta, Ga., and such agencies as he may designate.

§ 204.114 Gulf of Mexico south and west of Apalachicola, San Blas, and St. Joseph Bays; air-to-air firing practice range, Tyndall Air Force Base, Fla.—(a) The danger zone. Beginning at latitude 29°40'00", longitude 85°21'30", in the vicinity of Cape San Blas; thence southeasterly to latitude 29°23'00", longitude 84°39'00"; thence southwesterly to latitude 28°39'00", longitude 84°49'00"; thence northwesterly to latitude 29°43'00", longitude 85°53'00"; thence northeasterly to latitude 29°56'30", longitude 85°38'30"; and thence southeasterly to the point of beginning.

(b) The regulations. (1) Air-to-air firing practice will ordinarily take place in the area during the hours of daylight, 7 days per week. During periods of firing, passage through the area will not be denied to cargo-carrying or passenger-carrying vessels or tows proceeding on established routes. In case any such vessel is within the danger area, the officer in charge of firing practice operations will cause the cessation or postponement of fire until the vessel has cleared that part of the area within range of the weapons being used. The vessel shall proceed on its normal course and not delay its progress.

(2) Other vessels will be warned to leave the danger area during firing practice by surface patrol boat and/or patrol aircraft. When aircraft is used to patrol the area, low flight of the aircraft across the bow will be used as a signal or warning. Upon being so warned such vessels shall clear the area immediately.

(3) The area will be open to all vessels whenever firing practice is not being conducted.

(4) The regulations in this section shall be enforced by the Commanding Officer, Tyndall Air Force Base, Fla., and such agencies as he may designate.

§ 204.115 Gulf of Mexico and St. Joseph Bay, in vicinity of St. Joseph Peninsula; air-to-ground target range, Tyndall Air Force Base, Fla.—(a) The danger zone. The waters of the Gulf of Mexico west of St. Joseph Peninsula and of St. Joseph Bay east of St. Joseph Peninsula, Florida, within an area described as follows: Beginning at St. Joseph Point, latitude 29°52'24", longitude 85°23'24"; thence southeasterly to latitude 29°50'30", longitude 85°23'12", thence 90° true to longitude 85°22'30"; thence southeasterly to latitude 29°42'00", longitude 85°20'30", thence southwesterly to latitude 29°41'48", longitude 85°21'48"; thence southeasterly to Cape San Blas, latitude 29°40'00", longitude 85°21'36"; thence southwesterly to latitude 29°38'54", longitude 85°30'42"; thence northwesterly to latitude 29°48'36", longitude 85°32'12"; thence northeasterly to the point of beginning. Firing will be in a southwesterly direction from St. Joseph Bay toward the Gulf of Mexico and across St. Joseph Peninsula.

(b) The regulations. (1) Firing will be conducted daily between sunrise and sunset, weather and ceiling permitting, and no vessel or other craft shall enter or remain within the area during such operations.

(2) The fact that aerial target practice is to take place over the area will be advertised to the public through the usual media for the dissemination of information. Inasmuch as such practice is to be conducted throughout the year, without regard to season, such advertising will

be repeated at frequent intervals not exceeding three months, and at more frequent intervals when, in the opinion of the enforcing agency, such frequent repetition is advisable in the interests of public safety.

(3) Prior to conducting each target practice the area will be patrolled by aircraft to insure that no watercraft are within the area, and any watercraft in the area will be warned by means of signals that target practice is about to take place. The patrol aircraft will employ the method of warning known as "buzzing" which consists of low flight by the aircraft and repeated opening and closing of the throttle. Any such watercraft shall, upon being so warned, immediately leave the area and shall remain outside the area until the conclusion of target practice.

(4) No marking of the area is proposed, and watercraft shall be presumed to know their location by distance and direction from landmarks or other topographical features along the shore.

(5) The regulations in this section shall be enforced by the Commanding Officer, Tyndall Air Force Base, Fla., and such agencies as he may designate.

§ 204.120 Gulf of Mexico, southeast of St. Andrew Bay East Entrance; small-arms firing range, Tyndall Air Force Base, Fla.—(a) The danger zone. The waters of the Gulf of Mexico southeast of St. Andrew Bay East Entrance within a rectangular area 1 statute mile wide, the longitudinal center line of which extends from a point on shore at latitude 30°04′30″, longitude 85°36′48″, 206° true, a distance of 4½ statute miles.

(b) The regulations. (1) Firing practice will ordinarily take place between 8:00 a. m. and 5:00 p. m. daily. No vessel or other craft shall enter or remain within the area during periods of firing. The area will be opened to vessels at all other times.

(2) Prior to conducting firing practice a red flag will be displayed from the Fire Control Tower on the range and watercraft in the vicinity will be warned by patrol boats. Any watercraft within the area shall, upon being so warned, immediately leave the area and shall remain outside the area until the conclusion of firing practice.

(3) The regulations in this section shall be enforced by the Commanding Officer, Tyndall Air Force Base, Fla., and such agencies as he may designate.

§ 204.125 Gulf of Mexico, west of St. Andrew Bay West Entrance; test operations area, Navy Mine Countermeasures Station, Panama City, Fla.—(a) The danger zone. The waters of the Gulf of Mexico west of St. Andrew Bay West Entrance within an irregular area approximately three-fourths nautical mile offshore, 1¾ nautical miles wide, and 3 nautical miles long, whose four corners are located as follows: North corner, latitude 30°09′05″, longitude 85°47′45″; east corner, latitude 30°07′35″, longitude 85°45′00″; south corner, latitude 30°06′00″, longitude 85°46′06″; west corner, latitude 30°08′01″, longitude 85°49′00″.

(b) The regulations. (1) Whenever the flag "Baker" or the standard minesweep signal is displayed from any vessel or barge operating in the danger zone, navigation in the danger zone is prohibited. The area will be open to navigation at all other times.

(2) A security patrol maintained by the operating agency will exercise full control in the interest of safety to navigation.

(3) The regulations in this section shall be enforced by the Commanding Officer, United States Navy Mine Countermeasures Station, Panama City, Fla., and such agencies as he may designate.

§ 204.130 Gulf of Mexico from St. Andrew Bay to Choctawhatchee Bay, and Choctawhatchee Bay; aerial gunnery and bombing ranges, Air Force Proving Ground Command, Eglin Field, Fla.—(a) The danger zones—(1) Aerial gunnery range in Gulf of Mexico between St. Andrew Bay West Entrance of Choctawhatchee Bay Entrance. South boundary, a line parallel to and 10 statute miles offshore; west boundary, longitude 86°28′00″; north boundary, a line parallel to and one statute mile offshore; east boundary, a straight line extending from the intersection of the north boundary and latitude 30°07′00″ to the intersection of the south boundary and latitude 30°00′45″.

(2) Aerial gunnery range in Gulf of Mexico west of Choctawhatchee Bay entrance. South boundary, a line parallel to and 10 statute miles offshore; west boundary, longitude 86°41′00″; north boundary, a line parallel to and one statute mile offshore; east boundary, longitude 86°32′00″.

(3) Aerial gunnery range in west part of Choctawhatchee Bay. The waters of Choctawhatchee Bay within an area described as follows: Beginning at a point on the west shore at latitude 30°28′30″, longitude 86°30′00″; thence southeasterly to latitude 30°25′30″, longitude 86°21′30″; thence southwesterly to a point on the south shore at latitude 30°23′30″, longitude 86°23′00″; thence northwesterly to a point on the south shore at latitude 30°24′00″, longitude 86°25′00″; and thence northwesterly to the point of beginning; excluding that part of the area included within the aerial gunnery range along the north shore of Choctawhatchee Bay (described in subparagraph (4) of this paragraph).

(4) Aerial gunnery range along north shore of Choctawhatchee Bay. The waters of Choctawhatchee Bay within an area described as follows: Beginning at a point in the waters of Choctawhatchee Bay at latitude 30°26′00″, longitude 86°25′30″; thence north to the shore at longitude 86°25′30″; thence southeasterly and northeasterly along the shore to longitude 86°15′00″; thence south to latitude 30°26′29″, longitude 86°15′00″; thence southwesterly to latitude 30°26′12″, longitude 86°20′35″; thence north to latitude 30°26′57″, longitude 86°20′35″; thence southwesterly to the point of beginning.

(5) Aerial bombing range in Choctawhatchee Bay southwest of Alaqua Point. Beginning at latitude 30°28′12″, longitude 86°14′14″, thence to latitude 30°28′06″, longitude 86°14′14″, thence to latitude

30°27′52″, longitude 86°15′00″, thence to latitude 30°28′14″, longitude 86°15′00″, thence to point of beginning.

(6) Aerial bombing range in Choctawhatchee Bay southwest of Motes Point. Beginning at latitude 30°27′22″, longitude 86°13′10″; thence to latitude 30°27′00″, longitude 86°11′14″; thence 180° true to latitude 30°26′48″; thence to latitude 30°26′25″, longitude 86°13′08″; and thence to the point of beginning.

(b) The regulations—(1) Aerial gunnery ranges. (i) The aerial gunnery ranges in the Gulf of Mexico and in the west part of Choctawhatchee Bay (described in paragraphs (a) (1) to (3), inclusive of this section) may be used by watercraft except during periods when firing is conducted. During these periods, firing will be controlled by observation posts, and watercraft will be warned by patrol boats. During periods of firing, traverse of these areas shall not be denied to regular cargo-carrying or passenger-carrying vessels or tows proceding on established routes. In case any such vessel is within one of the areas, the officer in charge of gunnery operations will cause the cessation or postponement of fire until the vessel has cleared that part of the area within the range of the weapons being used. The vessel shall proceed on its normal course and shall not delay its progress.

(ii) No vessel or other craft shall enter or remain within the aerial gunnery range along the north shore of Choctawhatchee Bay (described in paragraph (a) (4) of this section) at any time.

(2) Aerial bombing ranges. (i) The areas described in paragraphs (a) (5) and (6) of this section will be in continuous use between 6:00 a. m. and 6:00 p. m. daily, and all watercraft are prohibited from using the areas during bombing operations.

(ii) The fact that aerial bombing practice is to take place over the areas will be advertised to the public through the usual media for the dissemination of information. Inasmuch as such practice is to be engaged in throughout the year without regard to season, such advertising will be repeated at frequent intervals not exceeding three months and at more frequent intervals when, in the opinion of the enforcing agency, such frequent repetition is advisable in the interest of public safety.

(iii) Prior to conducting each bombing practice the areas will be patrolled by aircraft to insure that no watercraft are within the areas, and any watercraft in the areas will be warned by means of signals that bombing practice is about to take place. The patrol aircraft will employ the method of warning known as "buzzing" which consists of low flight by the aircraft and repeated opening and closing of the throttle. Any such watercraft shall, upon being so warned, immediately leave the danger zone and shall, until the conclusion of practice, remain at such distance that it will be safe from falling projectiles.

(iv) No marking of the areas is proposed, and watercraft shall be presumed to know their location by distance and direction from landmarks or other topographical features along the shore.

(3) Enforcing agency. The regulations in this section shall be enforced by the Commanding Officer, Air Force Proving Ground Command, Eglin Field, Fla., and such agencies as he may designate.

§ 204.131 Gulf of Mexico in vicinity of St. Andrew Bay, Florida; United States Navy Mine Defense Laboratory Mine Testing Area—(a) The danger zone. A rectangular area about 2,000 yards wide and 2,700 yards long, approximately parallel to and about 500 yards offshore in the vicinity of St. Andrew Bay, Florida. The area is bounded as follows: Beginning at latitude 30°10′00″, longitude 85°48′03″; thence southeast to latitude 30°09′27″, longitude 85°47′09″; thence southwest to latitude 30°08′21″, longitude 85°48′02.5″; thence northwest to latitude 30°08′55′, longitude 85°48′54″; thence northeast to the point of beginning. The respective corners of the test area will be marked by buoys showing a flashing white light.

(b) The regulations. (1) No vessel shall enter or remain in the danger zone at any time, excepting as authorized by the enforcing agency.

(2) The regulations in this section shall be enforced by the Commanding Officer, United States Navy Mine Defense Laboratory, Panama City, Fla., and such agencies as he may designate.

§ 204.135 Gulf of Mexico, south from Choctawhatchee Bay; guided missiles test operations area, Headquarters Air Proving Ground Command, United States Air Force, Eglin Air Force Base, Florida—(a) The danger zone. The waters of the Gulf of Mexico south from Choctawhatchee Bay within an area described as follows: Beginning at a point five nautical miles southeasterly from USC&GS Station Tuck 3, at latitude 30°23′10.074″, longitude 86°48′25.433″, three nautical miles offshore of Santa Rosa Island; thence easterly 3 nautical miles offshore and parallel to shore, to a point south of Apalachicola Bay, Florida, latitude 29°32′00″, longitude 85°00′00″; thence southeasterly to latitude 29°17′30″, longitude 84°40′00″; thence southwesterly to latitude 28°40′00″, longitude 84°49′00″; thence southeasterly to latitude 28°10′00″, longitude 84°30′00″; thence 270° true to longitude 86°48′00″; thence due north along longitude 86°48′00″ to the intersection of the line with a circle of 5 nautical miles radius centered on USC&GS Station Tuck 3, at latitude 30°23′10.074″, longitude 86°48′25.433″, thence northeasterly along the arc of the circle to the point of beginning.

(b) The regulations. (1) The area will be used intermittently during daylight hours for a week or 10 days at a time. Firing will take place once or twice a day for periods ordinarily of not more than 1 hour. Advance notice of such firings will be published in local newspapers and in such other manner as the District Engineer, Corps of Engineers, Mobile, Alabama, may direct.

(2) During periods of firing, passage through the area will not be denied to cargo-carrying or passenger-carrying vessels or tows proceeding on established routes. In case

any such vessel is within the danger area, the officer in charge of firing operations will cause the cessation or postponement of fire until the vessel shall have cleared the portion of the danger area involved. The entire area involved will be under constant observation of both surface patrol vessels and air patrol planes prior to and during periods of firing and notice will be given to vessels and tows of intention to fire by buzzing low over the vessel, upon which signal vessels and tows shall proceed on their established course promptly and clear the area as soon as possible.

(3) Other vessels will be warned to leave the immediate danger area during firing periods by surface patrol craft. Upon being so warned such vessels shall clear the area immediately. Such periods normally will not exceed 2 hours.

(4) The regulations in this section shall be enforced by the Commanding Officer, Air Force Proving Ground Command, Eglin Field, Fla., and such agencies as he may designate.

§ 204.136 Waters of Santa Rosa Sound and Gulf of Mexico adjacent to Santa Rosa Island, Air Force Proving Ground Command, Eglin Air Force Base, Florida—(a) The danger zones—(1) Prohibited area. Waters of Santa Rosa Sound and Gulf of Mexico within a circle one nautical mile in radius, centered at latitude 30°23'10.074'', longitude 86°48'17.525'' (USC&GS Station Tuck 3). The portion of the area in Santa Rosa Sound includes the Gulf Intracoastal Waterway between miles 209.6 and 211.4 from Harvey Lock, La.

(2) Restricted area. The waters of Santa Rosa Sound and Gulf of Mexico surrounding the prohibited area described in subparagraph (1) of this paragraph, within a circle five nautical miles in radius, centered at latitude 30°23'10.074'', longitude 86°48'17.525'' (USC&GS Station Tuck 3). The portion of the area in Santa Rosa Sound includes the Gulf Intracoastal Waterway between miles 204.6 and 216.4 from Harvey Lock, La.

(b) The regulations. (1) Experimental test operations will be conducted by the United States Air Force within the prohibited area on an intermittent basis. Such test operations shall not exceed one hour, and shall not occur more than twice weekly.

(2) No vessel or other watercraft shall enter the prohibited area, except to navigate the Gulf Intracoastal Waterway. Such vessels and other watercraft shall confine their movements to the waters within the limits of the Intracoastal Waterway and shall make the passage as promptly as possible under normal vessel speed.

(3) During periods when experimental test operations are underway no vessels or other watercraft shall enter or navigate the waters of the restricted area.

(4) Warning signs will be erected on the shorelines of Santa Rosa Sound and the Gulf of Mexico to mark the limits of the respective areas.

(5) The regulations in this section shall be enforced by the Commander, Headquarters Air Proving Ground Command, Eglin Air Force Base, Fla., and such agencies as he may designate.

§ 204.140 Gulf of Mexico, south of Pensacola Bay; firing range, United States Naval Air Station, Pensacola, Fla.—(a) The danger zone. The United States Navy Rifle Range is located on Santa Rosa Island between Fort Pickens and the United States Coast Guard Lighthouse. The danger area for the firing range extends 2.6 nautical miles seaward from Santa Rosa Island within the following coordinates: Beginning at a point, latitude 30°18'55'', longitude 87°15'59''; thence to latitude 30°17'33'', longitude 87°13'25''; thence to latitude 30°16'28'', longitude 87°16'57''; thence to latitude 30°19'04'', longitude 87°16'51''.

(b) The regulations. (1) Scheduled firing will take place on Tuesday of each week between sunrise and sunest. Unscheduled firing may take place daily, including Saturdays, Sundays and holidays.

(2) On days when firing is to be conducted, a large red flag will be displayed from a mast adjacent to the firing range on Santa Rosa Island and all watercraft will be restricted from the area.

(3) The regulations in this section will be enforced by the Commanding Officer, Naval Air Station, Pensacola, Fla., and such other agencies as he may designate.

§ 204.155 Gulf of Mexico and Mississippi Sound, in vicinity of Horn Island, Miss.; area for conducting of experimental field tests, Chemical Warfare Service—(a) The danger zone. An area in the Gulf of Mexico south of Horn Island, Mississippi, and in Mississippi Sound, bounded as follows: Beginning at latitude 30°14'30'', longitude 88°46'15''; thence southwesterly to latitude 30°07'21'', longitude 88°49'08''; thence southeasterly to latitude 30°03'00'', longitude 88°41'55''; thence due east to longitude 88°32'20''; thence due north to the southern shore of Horn Island; thence easterly, northerly, and westerly along the southern, eastern, and northern shore of Horn Island to longitude 88°40'00''; thence due north to latitude 30°16'00''; thence due west to longitude 88°46'15''; and thence due south to the point of beginning.

(b) The regulations. (1) Navigation in the danger zone is prohibited at all times when the area is in use. Patrol boats provided by the United States Coast Guard will exercise full control in the interest of safety to navigation.

(2) This section shall be enforced by the Commanding Officer, Chemical Warfare Service, United States Army, Horn Island, Pascagoula, Miss., and such agencies as he may designate.

§ 204.158 Gulf of Mexico off Louisiana and Texas, Air Force air-to-air gunnery range—(a) The danger zone. An area approximately 125 statute miles long and 20 statute miles wide whose longitudinal axis follows a northwest-southeast line bounded as follows: Beginning at latitude 29°05'00'', longitude 94°00'00'', thence northerly to latitude 29°25'00'', longitude 94°00'00'', thence southeasterly to latitude 28°30'00'', longitude 92°15'00'', thence southerly to latitude 28°10'00'', longitude 92°15'00'', thence northwesterly to point of beginning.

(b) The regulations. (1) Firing will be scheduled in

advance and will normally be conducted over 15 and 30 day periods. During scheduled periods firing will take place at intervals throughout each day, visibility and weather conditions permitting. No firing will be conducted during hours of darkness.

(2) The Operations Officer, England Air Force Base, Louisiana, shall schedule the firing periods at least two weeks in advance of actual firing and publicize by:

(i) A public notice issued in sufficient time to permit circularization to interested parties and posting on bulletin boards of post offices in surrounding localities.

(ii) Notice to the press in Port Arthur, Tex., Orange, Tex., Lake Charles, La., and Morgan City, La.

(iii) Notice to the Commandant, 8th Coast Guard District, New Orleans, La., for publication in local "Notice to Mariners".

(iv) Notice to the Navy Hydrographic Office, New Orleans, La., for Hydro Broadcast.

(3) (i) When firing is in progress the danger zone will be under surveillance by surface patrol vessels and air patrol planes, and no vessel shall enter or remain in the danger zone except vessels of the United States or vessels proceeding through the danger zone as provided in subdivision (ii) of this subparagraph.

(ii) Cargo and passenger carrying vessels may transit the danger zone without interruption and firing will be suspended, if necessary, to insure the safety of such vessels during their passage. Masters are requested to avoid the danger zone whenever possible so that interference with firing training may be minimized.

(4) The regulations in this section shall be enforced by the Commander, Tactical Air Command, Langley Air Force Base, Va., and such agencies as he may designate.

§ 204.162 Gulf of Mexico off Matagorda Peninsula and Matagorda Island, Tex.; Air Force practice gunnery, bombing, and rocket firing ranges—(a) The danger zones—(1) Area "A". An area off Matagorda Peninsula approximately 59 statute miles long and 29 statute miles wide, with its northwest boundary generally parallel to and about 15 miles off-shore, described as follows: Beginning at latitude 28°41′, longitude 95°17′; thence to latitude 28°21′, longitude 94°59′; thence to latitude 27°55′, longitude 95°52′; thence to latitude 28°16′, longitude 96°08′; and thence to the point of beginning.

(2) Area "B". The waters of the Gulf of Mexico off Matagorda Island encompassed by an arc of a circle having a radius of 5 statute miles centered at latitude 28°17′, longitude 96°32′.

(3) Use of areas. These areas will be used daily from sunrise to sunset. Area "A" will be used for air-to-air gunnery and as an emergency live bomb salvo area. Prior to the salvo of live bombs, aircraft will clear the area, using both radar and visual means to insure that no vessels are in the area. Area "B" will be used for air-to-ground gunnery, dive bombing, rocket firing, horizontal bombing and firing at radio controlled targets.

(b) The regulations. (1) Except in an emergency involving danger to life or property, no vessel shall enter or remain in either danger zone between sunrise and sunset unless authorized to do so in writing by the enforcing agency.

(2) Vessels making scheduled trips over prescribed routes will be given prior written permission to transit the danger zones by the enforcing agency. Vessels so authorized to transit the danger zones shall pass directly through without unnecessary delay and shall display such identification as may be required by the enforcing agency.

(3) The regulations in this section shall be enforced by the Commanding Officer, Bergstrom Air Force Base, Austin, Tex., and such agencies as he may designate.

§ 204.165 Gulf of Mexico southeast of Corpus Christi Bay; bombing, machine gunnery, and rocket firing range, Naval Air Station, Corpus Christi, Tex.—(a) The danger zones. (1) North area. An area in the Gulf of Mexico approximately 25 statute miles long from north to south and 5 statute miles wide, bounded on the north by latitude 27°45′, on the east by longitude 96°50′, on the south by latitude 27°23′, and on the west by longitude 96°55′.

(2) South area. An area in the Gulf of Mexico approximately 45 statute miles long from east to west and 11 statute miles wide, bounded on the north by latitude 27°20′, on the east by longitude 96°30′, on the south by latitude 27°10′, and on the west by longitude 97°14′.

(b) The regulations. (1) The areas will be used from sunrise to sunset daily except Sundays for bombing, machine gunnery, and rocket firing.

(2) During such operations vessels may pass through the areas at their own risk, except when warned not to enter or when warned to leave the immediate danger area by surface patrol craft or by air patrol planes buzzing low over the vessel. Upon being so warned vessels shall not enter the areas or, if they are in the areas, they shall leave as soon as possible.

(3) The boat towing a bombing or gunnery target will display a red flag during operations.

(4) This section shall be enforced by the Commanding Officer, United States Naval Air Station, Corpus Christi, Tex., and such agencies as he may designate.

§ 204.225 Mona Passage in vicinity of Monito Island, Puerto Rico; aerial bombing range, United States Air Force, Ramey Air Force Base, Puerto Rico—(a) The danger zone. (1) All waters within a circle ten miles in diameter with its center at latitude 18°09′42.5″, longitude 67°57′00″, the approximate center of Monito Island.

(2) The outer boundary of the danger zone will not be marked, but signs will be posted at conspicuous places on the shore of Monito Island to warn against trespassing on the target area. Aircraft and watercraft will be presumed to know the location of the danger zone by its principal landmarks, Monito Island at the center of the area and Mona Island lying to the southeast and partially within the area.

(b) The regulations. (1) The danger zone shall be open to navigation at all times except when bombing practice is being conducted. At such times no vessel or other craft shall enter or remain within the area.

(2) The fact that aerial bombing practice is to take place

over the designated area will be advertised to the public through the usual media for the dissemination of such information. Inasmuch as such practice is to be carried on throughout the year, without regard to season, such advertising will be repeated at intervals not exceeding three months, and at more frequent intervals when in the opinion of the Commanding Officer responsible for the use of the area, such frequent repetition is advisable in the interest of public safety.

(3) Prior to conducting each bombing practice the entire danger zone will be patrolled by aircraft to insure that no watercraft are within the danger zone. Any watercraft found in the vicinity will be warned that bombing practice is about to take place. Any such watercraft shall, upon being so warned, leave the danger zone immediately and shall not return until such practice shall have been terminated, and notification to that effect shall have been given by the patrol aircraft.

(4) The regulations in this section shall be enforced by the Commanding Officer, Ramey Air Force Base, Puerto Rico, and such agencies as he may designate.

§ 204.228 Atlantic Ocean off north coast of Puerto Rico; practice firing areas, United States Army Forces Antilles—(a) The danger zones—(1) Westerly small-arms range. The waters within the sector of a circle bounded by radii of 10,000 yards bearing 279° and 315°, respectively, from latitude 18°28′31″, longitude 66°25′37″, and the included arc.

Note: All bearings in this section are referred to true meridian.

(2) Camp Tortuguero artillery range. The waters within the quadrant of a circle bounded by radii of 20,000 yards bearing 315° and 45°, respectively, from latitude 18°28′31″, longitude 66°25′37″, and the included arc.

(3) Easterly small-arms range. The waters within the sector of a circle bounded by radii of 7,210 yards bearing 45° and 70°, respectively, from a point on the southeast boundary of the artillery range 2,790 yards from its southerly end, and the included arc.

Note: The outer boundaries of the danger zones will not be marked, but signs will be posted along shore to warn against trespassing in the firing areas.

(b) The regulations. (1) The danger zones shall be open to navigation at all times except when practice firing is being conducted. When practice firing is being conducted no vessel or other craft except those engaged in towing targets or patrolling the areas shall enter or remain within the danger zones: Provided, That any vessel propelled by mechanical power at a speed greater than five knots may proceed through the Camp Tortuguero artillery range at any time to and from points beyond, but not from one point to another in, the danger zone, between latitudes 18°31′ and 18°32′, at its regular rate of speed without stopping or altering its course, except when notified to the contrary.

(2) The fact that practice firing is to take place over the designated area will be advertised to the public through the usual media for the dissemination of such information. Factual information as to the dates, time, and characteristics of the firing will be advertised in advance of each session of firing but in no case less than 1 week nor more than 4 weeks before such firing is scheduled to take place.

(3) Prior to conducting each practice firing, the entire danger zone will be patrolled by aircraft or surface vessels to insure that no watercraft are within the danger zone. Any watercraft in the vicinity will be warned that practice firing is about to take place. Any such watercraft shall, upon being so warned, leave the danger zone immediately and shall not return until such practice shall have been terminated and notification to that effect shall have been given by the patrol craft, except that vessels proceeding on a regular course through the area will be allowed to proceed out of the area without warning, and firing will not commence until such vessels are clear of the area.

(4) This section shall be enforced by the Commanding General, United States Army Forces Antilles, and such agencies as he may designate.

§ 204.230 Atlantic Ocean and Vieques Sound, in vicinity of Culebra Island; bombing and gunnery target area—(a) The danger zone. The waters of the Atlantic Ocean and Vieques Sound within an area described as follows: Beginning at the northernmost extremity of Fungy Bowl; thence northeasterly approximately 7 miles to latitude 18°26′30″, longitude 65°16′48″; thence approximately 107°30′ true to latitude 18°25′06″; longitude 65°12′06″; thence southwesterly approximately 7 miles to Matojo Cay; thence southwesterly across Culebra Island to Scorpion Point; thence approximately 180° true to latitude 18°11′00″, longitude 65°18′42″; thence approximately 300° true to Hodgkins Shoal buoy; thence approximately 47° true to the point of beginning.

(b) The regulations. (1) The danger zone is subject to use as a target area for bombing and gunnery practice. Appropriate notices will be issued to the public in advance of this activity by the officer in charge of such activity.

(2) This section shall be enforced by the Commander, Training Group, Guantanamo Bay, Cuba, and such agencies as he may designate.

§ 204.232 Waters of Vieques Passage in the vicinity of Point Cascajo, Puerto Rico; antiaircraft artillery and waterborne target range, United States Army Forces Antilles and Military District of Puerto Rico—(a) The danger zone. (1) All waters of Vieques Passage off the east coast of Puerto Rico, within the sector of a circle, bounded by radii of 25,000 yards bearing 156°09′57″ and 226°48′46″, respectively, from latitude 18°12′24″, longitude 65°37′54″, and the included arc.

Note: All bearings are referred to true meridian.

(2) The outer boundaries of the danger zone will not be marked but signs will be posted at conspicuous places on the shore to warn against trespassing on the area. Aircraft and watercraft will be presumed to know the location of the danger zone by its principal landmark.

(b) The regulations. (1) The danger zone shall be open to navigation at all times except when antiaircraft

artillery and water-borne target practice firing or both are being conducted. At such times, no vessel or other craft except those engaged in the patrol of the area, or in antiaircraft artillery and water-borne target firing practice, shall enter or remain within the area.

(2) The fact that antiaircraft artillery and water-borne target firing practice, or both, are to take place over the designated area will be advertised to the public through the usual media for the dissemination of such information. Inasmuch as such practice is to be carried on throughout the year, without regard to season, such advertising will be repeated at intervals not exceeding three months, and at more frequent intervals when, in the opinion of the Commanding General responsible for the use of the area, such frequent repetition is advisable in the interest of the public safety.

(3) Prior to conducting each antiaircraft artillery or water-borne target firing practice, or both, the entire danger zone will be patrolled to insure that no watercraft are within the danger zone. Any watercraft found in the vicinity will be warned that such practice is about to take place. Any such watercraft shall, upon being so warned, leave the danger zone immediately and shall not return until such practice shall have been terminated and notification to that effect shall have been given by the patrol craft.

(4) This section shall be enforced by the Commanding General, United States Army Forces Antilles and Military District of Puerto Rico, and such agencies as he may designate.

PART 207—NAVIGATION REGULATIONS:

§ 207.16 All waterways tributary to the Atlantic Ocean south of Chesapeake Bay and all waterways tributary to the Gulf of Mexico east and south of St. Marks, Fla: use, administration, and navigation—(a) Description. This section applies to the following:

(1) Waterways. All navigable waters of the United States, natural or artificial, including bays, lakes, sounds, rivers, creeks, intracoastal waterways, as well as canals and channels of all types, which are tributary to or connected by other waterways with the Atlantic Ocean south of Chesapeake Bay or with the Gulf of Mexico east and south of St. Marks, Fla.

(2) Locks. All Government owned or operated locks and hurricane gate chambers and appurtenant structures in any of the waterways described in subparagraph (1) of this paragraph.

(3) United States property. All river and harbor lands owned by the United States in or along the waterways described in subparagraph (1) of this paragraph, including lock sites and all structures thereon, other sites for Government structures and for the accommodation and use of employees of the United States, and rights of way and spoil disposal areas to the extent of Federal interest therein.

(4) Vessels and rafts. The term "vessel" as used in this section includes all floating things moved over these waterways other than rafts.

(b) Authority of District Engineers. The use, administration, and navigation of these waterways, Federal locks and hurricane gate chambers shall be under the direction of the officers of the Corps of Engineers, United States Army, detailed in charge of the respective sections, and their authorized assistants. The cities in which the United States District Engineers are located are as follows:

United States District Engineer, Norfolk, Va.
United States District Engineer, Wilmington, N. C.
United States District Engineer, Charleston, S. C.
United States District Engineer, Savannah, Ga.
United States District Engineer, Jacksonville, Fla.

(c) Commercial statistics. (1) As required by section 11 of the River and Harbor Act of September 22, 1922 (42 Stat. 1043; 33 U. S. C. 555), owners, agents, masters and clerks of vessels plying upon the waterways described in paragraph (a) (1) of this section shall submit a report on such activities for statistical purposes which must contain the following information:

(i) Name of vessel.

(ii) Name and address of owner or operator.

(iii) Type of vessel—steam, motor, sail, barge, or other type.

(iv) Net registered tonnage—if not registered, approximate net tonnage.

(v) Maximum draft at time of passage.

(vi) Number of passengers.

(vii) Cargo—by commodities, expressed in short tons, or other units by which such commodities are customarily measured, giving origin and destination.

(2) All persons rafting and towing logs shall submit a report of their activities containing such information as may be called for by the District Engineer concerned.

(3) The report should be presented to the lockmaster of the federally operated locks for each trip made. Where no federally operated lock is passed, they shall be mailed promptly to the District Engineer. On written request, persons or corporations making frequent use of these waterways may be granted permission to submit monthly statements in lieu of reports by trips. Reports may be submitted on forms furnished free of charge by the District Engineer.

(d) Bridges—(1) General. As required by law, and general regulations to govern the operation of drawbridges crossing all navigable waterways of the United States discharging their waters into the Atlantic Ocean south of and including Chesapeake Bay and the Gulf of Mexico, excepting the Mississippi River and its tributaries, prescribed by the Secretary of War, all corporations or persons owning, operating and tending drawbridges shall provide the same with the necessary tenders and the proper mechanical appliances for the safe, prompt and efficient opening of the draw for the passage of vessels and other water craft. The owner shall keep the operating machinery of the draw in serviceable condition, and shall have the draw opened and closed at intervals frequent

enough to make certain that the machinery is kept in proper condition for satisfactory operation. Bridges and fender systems shall be constructed and maintained so as to afford at all times reasonably free, easy and unobstructed navigation of the draw opening or the drawspan. Any accident or damage to the bridge, the fenders or the operating mechanism, shall be promptly reported to the District Engineer, giving the cause and the probable period required for repairs. All bridges will be lighted in accordance with the rules and regulations of the United States Coast Guard. (See Part 68 of this title.)

(2) Signals for drawbridges. The signals for vessels desiring to pass bridges shall be those prescribed in the general regulations referred to in subparagraph (1) of this paragraph.

(3) Passage through drawbridges. Trains, wagons, and other vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening, nor shall water craft or vessels be so manipulated as to hinder or delay the operation of a drawspan, but all passage over, through, or under a drawbridge shall be prompt, to prevent unnecessary delay to either land or water traffic.

(e) Locks—(1) Authority. The locking of all vessels and rafts and their movements while in a lock, or in the approaches thereto, shall be under the direction of the lockmaster. The term "lockmaster" as used in this section, shall mean the lock official present who is in charge of the operation of the lock.

(2) Signals. Vessels desiring lockage in either direction shall give notice to the lockmaster at not more than three-quarters of a mile nor less than one-quarter of a mile from the lock, by two long and two short blasts of a whistle. When the lock is available, a green light, semaphore or flag will be displayed; when not available, a red light, semaphore or flag will be displayed. No vessels or rafts shall approach within 300 feet of any lock entrance unless signalled to do so by the lockmaster.

(3) Precedence at locks. Ordinarily, vessels or rafts arriving at the lock shall take precedence in order of their arrival, but in all cases, vessels belonging to the United States or employed on public work shall have precedence over all others; passenger vessels shall have precedence over freight vessels, individual vessels over tows or rafts. Small vessels will not be granted separate lockage when larger vessels are awaiting lockage, and they will be required to lock through with other vessels. When two vessels approach the lock from opposite directions at approximately the same time, preference will ordinarily be given to the one for which the lock is prepared. In all cases, the order of actual entry shall be determined by the lockmaster.

(4) Entrance to and exit from locks. No vessel or raft shall enter or leave the locks before being signalled to do so. While waiting their turns, vessels or rafts must not obstruct traffic and must remain at a safe distance from the lock. They shall take position in rear of any vessels or rafts that may precede them, and there arrange the tow for locking in sections if necessary. Masters and pilots of vessels or in charge of rafts shall cause no undue delay in entering or leaving the lock, and will be held to a strict accountability that the approaches are not at any time unnecessarily obstructed by parts of a tow awaiting lockage or already passed through. They shall provide sufficient men to move through the lock promptly without damage to the structures. Vessels or tows that fail to enter the locks with reasonable promptness after being signalled to do so will lose their turn.

(5) Lockage of vessels. (i) Vessels must enter and leave the locks carefully at slow speed, must be provided with suitable lines and fenders, must always use fenders to protect the walls and gates, and when locking at night must be provided with suitable lights and use them as directed.

(ii) Vessels which do not draw at least six inches less than the depth on miter sills or breast walls, or which have projections or sharp corners liable to damage gates or walls, shall not enter a lock or approaches.

(iii) No vessel having chains or lines either hanging over the sides or ends, or dragging on the bottom, for steering or other purposes, will be permitted to pass a lock or dam.

(iv) Power vessels must accompany tows through the locks when so directed by the lockmaster.

(v) No vessel whose cargo projects beyond its sides will be admitted to lockage.

(vi) Vessels in a sinking condition shall not enter a lock or approaches.

(vii) The passing of coal from flats or barges to steamers while in locks is prohibited.

(viii) Where special regulations for safeguarding human life and property are desirable for special situations, the same may be indicated by printed signs, and in such cases such signs will have the same force as other regulations in this section.

(ix) The lockmaster may refuse to lock vessels which, in his judgment, fail to comply with this paragraph.

(6) Lockage of rafts. Rafts shall be locked through in sections as directed by the lockmaster. No raft will be locked that is not constructed in accordance with the requirements stated in paragraph (g) of this section. The party in charge of a raft desiring lockage shall register with the lockmaster immediately upon arriving at the lock and receive instructions for locking.

(7) Number of lockages. Tows or rafts locking in sections will generally be allowed only two consecutive lockages if one or more single vessels are waiting for lockage, but may be allowed more in special cases. If tows or rafts are waiting above and below a lock for lockage, sections will be locked both ways alternately whenever practicable. When there are two or more tows or rafts awaiting lockage in the same direction, no part of one shall pass the lock until the whole of the one preceding it shall have passed.

(8) Mooring. (i) Vessels and rafts when in the lock shall be moored where directed by the lockmaster by bow, stern and spring lines to the snubbing posts or hooks provided for that purpose, and lines shall not be let go until signal is given for vessel or raft to leave. Tying boats to the lock ladders is prohibited.

(ii) The mooring of vessels or rafts near the approaches

to locks except while waiting for lockage, or at other places in the pools where such mooring interferes with general navigation of the waterway is prohibited.

(9) Maneuvering locks. The lock gates, valves, and accessories will be moved only under the direction of the lockmaster; but if required, all vessels and rafts using the locks must furnish ample help on the lock walls for handling lines and maneuvering the various parts of the lock under the direction of the lockmaster.

(f) Waterways—(1) Fairway. A clear channel shall at all times be left open to permit free and unobstructed navigation by all types of vessels and rafts that normally use the various waterways or sections thereof. The District Engineer may specify the width of the fairway required in the various waterways under his charge.

(2) Stoppage in waterway, anchorage or mooring. (i) No vessels or rafts shall anchor or moor in any of the land cuts or other narrow parts of the waterway, except in case of an emergency. Whenever it becomes necessary for a vessel or raft to stop in any such portions of the waterway it shall be securely fastened to one bank and as close to the bank as possible. This shall be done only at such a place and under such conditions as will not obstruct or prevent the passage of other vessels or craft. Stoppages shall be only for such periods as may be necessary.

(ii) No vessel or raft will be allowed to use any portion of the fairway as a mooring place except temporarily as authorized above without the written permission from the District Engineer.

(iii) When tied up, all vessels must be moored by bow and stern lines. Rafts and tows shall be secured at sufficiently close intervals to insure their not being drawn away from the bank by winds, currents or the suction of passing vessels. Tow lines shall be shortened so that the different parts of the tow shall be as close together as possible. In narrow sections, no vessel or raft shall be tied abreast of another.

(iv) Lights shall be displayed in accordance with provisions of the Federal Pilot Rules.

(v) No vessel, even if fastened to the bank as prescribed in subdivision (i) of this subparagraph, shall be left without a sufficient crew to care for it properly.

(vi) Vessels will not be permitted to load or unload in any of the land cuts except at a regular established landing or wharf without written permission secured in advance from the District Engineer.

(vii) No vessel, regardless of size, shall anchor in a dredged channel or narrow portion of a waterway for the purpose of fishing, if navigation is obstructed thereby.

(viii) Except in cases of emergency the dropping of anchors, weights, or other ground tackle, within areas occupied by submarine cable or pipe crossings, is prohibited. Such crossings will ordinarily be marked by signboards on each bank of the shore or indicated on coast charts.

(3) Speed. (i) Vessels shall proceed at a speed which will not endanger other vessels or structures and will not interfere with any work in progress incident to maintaining, improving, surveying or marking the channel.

(ii) Official signs indicating limiting speeds through critical portions of the waterways shall be strictly obeyed.

(iii) Vessels approaching and passing through a bridge shall so govern their speed as to insure passage through the bridge without damage to the bridge or its fenders.

(iv) A vessel being overtaken by another shall slacken speed sufficiently to permit the passage to be effected with safety to both vessels.

(4) Assembly and handling of tows. All vessels drawing tows not equipped with rudders shall use two tow lines or a bridle and shorten them to the greatest possible extent so as to have full control at all times. The various parts of a tow shall be securely assembled with the individual units connected by lines as short as practicable. If necessary, as in the case of lengthy or cumbersome tows or tows in restricted channels, the District Engineer may require that tows be broken up and may require the installation of a rudder, drag or other approved steering device on the tow in order to avoid obstructing navigation or damaging the property of others, including aids to navigation maintained by the United States or under its authorization, by collision or otherwise.

No tow shall be drawn by a vessel that has insufficient power or crew to permit ready maneuverability and safe handling.

Tows desiring to pass a bridge shall approach the opening along the axis of the channel so as to pass through without danger of striking the bridge or its fenders. No vessel or tow shall navigate through a drawbridge until the movable span is fully opened.

In the event that it is evident to the master of a towing vessel that a tow cannot be safely handled through a bridge, it will be brought to anchor and the towed vessels will be taken through the bridge in small units, or singly if necessary, or the tow will wait until navigation conditions have improved to such an extent that the tow can pass through the bridge without damage.

(5) Projections from vessels. No vessel carrying a deck load which overhangs or projects over the side of said vessel, or whose rigging projects over the side of the vessel so as to endanger passing vessels, wharves or other property, will enter or pass through any of the narrow parts of the waterway.

(6) Meeting and passing. Vessels, on meeting or overtaking, shall give the proper signals and pass in accordance with Federal Pilot Rules. Rafts shall give to vessels the side demanded by proper signal. All vessels approaching dredges, or other plant engaged on improvements to a waterway, shall give the signal for passing and slow down sufficiently to stop if so ordered or if no answering signal is received. On receiving the answering signal, they shall then proceed to pass at a speed sufficiently slow to insure safe navigation.

(g) Rafts, logging. (1) Rafts will be permitted to navigate a waterway only if properly and securely assembled. The passage of "bag" or "sack" rafts, "dog" rafts, or of loose logs over any portion of a waterway, is prohibited. Each section of a raft will be secured within itself in such a manner as to prevent the sinking of any log, and so fastened or tied with chains or wire rope that it cannot

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be separated or bag out so as to materially change its shape. All dogs, chains and other means used in assembling rafts shall be in good condition and of ample size and strength to accomplish their purposes.

(2) No section of a raft will be permitted to be towed over any portion of a waterway unless the logs float sufficiently high in the water to make it evident that the section will not sink en route.

(3) Frequent inspections will be made by the person in charge of each raft to insure that all fastenings remain secure, and when any one is found to have loosened, it shall be repaired at once. Should any log or section be lost from a raft, the fact must be promptly reported to the District Engineer, giving as definitely as possible the exact point at which the loss occurred. In all cases the owner of the lost log or section will take steps immediately to remove the same from the waterway.

(4) The length and width of rafts shall not exceed such maximum dimensions as may be prescribed by the District Engineer.

(5) All rafts shall carry sufficient men to enable them to be managed properly, and to keep them from being an obstruction to other craft using the waterway. To permit safe passage in a narrow channel rafts will, if necessary, stop and tie up alongside the bank. Care must be exercised both in towing and mooring rafts to avoid the possibility of damage to aids to navigation maintained by the United States or under its authorization.

(6) When rafts are left for any reason with no one in attendance, they must be securely tied at each end and at as many intermediate points as may be necessary to keep the timbers from bagging into the stream, and must be moored so as to conform to the shape of the bank. Rafts moored to the bank shall have lights at 500-foot intervals along their entire length. Rafts must not be moored at prominent projections of the bank, or at critical sections.

(7) Logs may be stored in certain tributary streams provided a clear channel at least one-half the width of the channel be left clear for navigation along the tributary. Such storage spaces must be protected by booms and, if necessary to maintain an open channel, piling should also be used. Authority for placing these booms and piling must be obtained by written permit from the District Engineer.

(8) The building, assembling, or breaking up of a raft in a waterway will be permitted only upon special authority obtained from the District Engineer, and under such conditions as he may prescribe.

(h) Dumping of refuse or oil in waterway, obstructions. Attention is invited to the provisions of sections 13 and 20 of the River and Harbor Act of March 3, 1899 (30 Stat. 1152, 1154; 33 U. S. C. 407, 415), and of sections 2, 3, and 4 of the Oil Pollution Act of June 7, 1924 (43 Stat. 604, 605; 33 U. S. C. 432–434), which prohibit the depositing of any refuse matter in these waterways or along their banks where liable to be washed into the waters; authorize the immediate removal or destruction of any sunken vessel, craft, raft, or other similar obstruction, which stops or endangers navigation; and prohibit the discharge of oil from vessels into the coastal navigable waters of the United States.

(i) Damage. Masters and owners of vessels using the waterways are responsible for any damage caused by their operations to canal revetments, lock piers and walls, bridges, hurricane gate chambers, spillways, or approaches thereto, or other Government structures, and for displacing or damaging of buoys, stakes, spars, range lights or other aids to navigation. Should any part of a revetment, lock, bridge, hurricane gate chamber, spillway or approach thereto, be damaged, they shall report the fact, and furnish a clear statement of how the damage occurred, to the nearest Government lockmaster or bridge tender, and by mail to the District Engineer, United States Engineer Office, in local charge of the waterway in which the damage occurred. Should any aid to navigation be damaged, they shall report that fact immediately to the Superintendent of Lighthouses at Norfolk, Va., if north of New River Inlet, N. C.; to the Superintendent of Lighthouses at Charleston, S. C., if between New River Inlet, N. C., and St. Lucie Inlet, Fla.; to the Superintendent of Lighthouses at Key West, Fla., if between St. Lucie Inlet and Suwanee River, Fla.; and to the Superintendent of Lighthouses, New Orleans, La., if between Suwanee River and St. Marks, Fla.

(j) Trespass on property of the United States. Trespass on waterway property or injury to the banks, locks, bridges, piers, fences, trees, houses, shops or any other property of the United States pertaining to the waterway, is strictly prohibited. No business, trading or landing of freight or baggage will be allowed on or over Government piers, bridges, or lock walls.

(k) Copies of regulations. Copies of the regulations in this section will be furnished free of charge upon application to the nearest District Engineer.

(l) Effective date. This section shall take effect and be in force on and after June 15, 1938.

§ 207.173 Key West Harbor, Fla.; dummy mine field, United States Naval Station, Key West, Fla.—(a) The area. The waters of Key West Harbor within a 500-yard square and marked by unlighted can buoys, the coordinates of which are as follows: Buoy No. 1, latitude 24°32′17″, longitude 81°48′07″; Buoy No. 2, latitude 24°32′32″, longitude 81°48′07″; Buoy No. 3, latitude 24°32′32″, longitude 81°47′50″; Buoy No. 4, latitude 24°32′17″, longitude 81°47′50″. The northerly limits of the area are about 450 yards south of Key West Island.

(b) The regulations. (1) All craft shall proceed with caution when underway in the area taking particular care to stand well clear of all navigational aids.

(2) All craft underway in this area shall stay well clear of naval craft (LCPR) displaying the Seven flag and be particularly alert to detect and obey all signals from such vessels. The display of the Seven flag is an indication that divers are operating.

(3) Anchoring, grapneling, and fishing, including the use of lobster pots, are prohibited in the area.

(c) The regulations shall be enforced by the Commanding Officer, United States Naval School Underwater

Swimmers, United States Naval Station, Key West, Fla., and such agencies as he may designate.

§ 207.174 Gulf of Mexico, seaplane restricted area, Naval Air Station, Key West, Fla.—(a) The area. An irregular area north of Key West Island, east of Fleming Key, and north and west of Dredgers Key, bounded as follows: Beginning at latitude 24°34′01″, longitude 81°47′36″; thence due north to latitude 24°35′30″; thence to latitude 24°35′55″, longitude 81°47′50″; thence to latitude 24°35′59″, longitude 81°47′41″; thence due east to longitude 81°47′24″; thence to latitude 24°35′52″, longitude 81°46′33″; thence to latitude 24°35′40″, longitude 81°46′16″; thence to latitude 24°35′26″, longitude 81°46′33″; thence due south to latitude 24°35′16″; thence due east to longitude 81°46′00″; thence due south to latitude 24°35′09″; thence due west to longitude 81°46′29″; thence to latitude 24°34′27″, longitude 81°47′14″; thence to latitude 24°33′58″, longitude 81°47′21″; and thence to the point of beginning. The area is defined by boundary markers on approximately 500-foot centers extending around and about 300 feet outside the perimeter. The boundary markers have a square pyramidal top with a four-foot base and a light with green-colored lenses mounted on 12-inch piling with a top elevation of about nine feet. The ends of the north-south, northeast-southwest east-west, and northwest-southeast takeoffs are clearly identified by runway markers with amber-colored lenses located on 100-foot centers. A navigation channel 300 feet wide around the entire perimeter of the area, contiguous to and inside the line of boundary markers, is provided for the passage of surface craft.

(b) The regulations. (1) No vessels shall cross or enter the seaplane restricted area.

(2) Vessels using the perimeter channel along the east side of Fleming Key and along the north side of the Naval Air Station shall travel at a slow speed.

(3) Vessels using the perimeter channel shall lie to as close to the boundary markers as possible during landings or take-offs of aircraft in the restricted area.

(4) Vessels using the perimeter channel past the seaplane ramp shall give wide berth to seaplane equipment located adjacent to the ramp, and shall lie to if in the vicinity of the ramp when beaching or launching operations are in progress.

(5) No object that might endanger seaplane operations shall be cut adrift or thrown overboard.

(6) This section shall be enforced by the Commanding Officer, United States Naval Air Station, Key West, Fla., and such agencies as he may designate.

§ 207.175 St. Petersburg Harbor, Fla.; restricted area for seaplanes—(a) Area. (1) Adjacent to the United States Coast Guard Air Station in the easterly portion of the turning basin known as the Port of St. Petersburg at St. Petersburg, Fla., commencing at a point being the intersection of the easterly end of the concrete bulkhead along the northerly side of the Port of St. Petersburg with the northerly end of the steel bulkhead along the easterly side of said port; thence S. 62°30′ W., 450 feet; thence S. 27°30′ E., 600 feet; thence N. 62°30′ E., 450 feet to the steel bulkhead on the east side of the said Port of St. Petersburg; thence along the said steel bulkhead N. 27°30′ W., 600 feet to the point and place of beginning.

(2) The area is marked at its northwesterly and southwesterly corners by yellow conical seaplane anchorage buoys projecting approximately 1 foot above water, and at the northeasterly and southeasterly corners at the steel bulkhead, by white signs 2′ x 3′ size, containing the word "Warning," and copies of the rules and regulations of this section. The buoys and signs will not be lighted.

(3) The ramp of the United States Coast Guard Station is located in the center of the easterly side of the area described in subparagraph (1) of this paragraph and is marked by two green lights 40 feet apart on each side, about 3 feeet above mean high water and about 20 feet westerly of and parallel to the easterly boundary of the area.

(b) Rules and regulations. (1) No vessels shall anchor within this area.

(2) No vessels of less than 5 gross tons shall come within the limits of this area, and other vessels crossing the area shall proceed with the greatest possible dispatch.

Note: Complaints arising under this section should be addressed to the Engineer in Local Charge, United States Engineer Suboffice, Tampa, Fla.

§ 207.176 Pensacola Bay, Fla.; seaplane restricted area—(a) The area. Beginning at latitude 30°22′28″, longitude 87°16′00″; thence to latitude 30°21′02″, longitude 87°14′20″; thence to latitude 30°20′02″, longitude 87°15′16″; thence to latitude 30°19′52″, longitude 87°16′12″; thence to latitude 30°20′11″, longitude 87°17′58″; and thence 250° true to the shore.

(b) The regulations. (1) This area is established as a naval seaplane landing area.

(2) Vessels and small craft, except crash boats, plane rearming boats, and similar craft ordered into the area on specific missions in connection with the servicing of planes or patrol of the area, are prohibited from entering or being in the area at any time.

(3) The regulations in this section shall be enforced by the Commander, Naval Air Training Bases, Pensacola, Fla., and such agencies as he may designate.

§ 207.177 Perdido Bay, Fla.; restricted area for seaplanes, Naval Air Training Bases, Pensacola, Fla.—(a) Area. That portion of Perdido Bay, Florida, bounded by a line beginning at latitude 30°22′30″, longitude 87°27′00″; thence to latitude 30°22′00″, longitude 87°26′55″; thence to latitude 30°20′45″, longitude 87°25′50″; thence to latitude 30°20′35″, longitude 87°25′50″; thence to latitude 30°20′10″, longitude 87°26′30″; thence to latitude 30°19′15″, longitude 87°27′20″; thence to latitude 30°19′20″, longitude 87°28′35″; thence to latitude 30°19′40″, longitude 87°29′20″; thence to latitude 30°20′15″, longitude 87°29′50″; thence to latitude 30°20′25″, longitude 87°29′45″; thence to latitude 30°20′20″, longitude 87°29′00″; thence meandering and following the

one-fathom line to latitude 30°21′50″, longitude 87°27′25″; thence to latitude 30°22′30″, longitude 87°27′25″; thence to latitude 30°22′30″, longitude 87°27′00″; thence to the point of beginning.

(b) Regulations. (1) The area will be used for seaplane operations two nights each week for periods of 3 hours beginning 15 minutes before sundown. When such operations are being conducted navigation will be warned by means of a lighted rotating beacon located on a hangar building at Bronson Field, and the area will be lighted and patrolled by Navy surface craft.

(2) When seaplane operations are being conducted, no vessel or other craft shall enter or remain in the area. At all other times navigation shall not be restricted.

(3) The regulations in this section shall be enforced by the Commander, Naval Air Training Bases, Pensacola, Fla., and such agencies as he may designate.

§ 207.180 All waterways tributary to the Gulf of Mexico (except the Mississippi River, its tributaries and outlets) from St. Marks, Fla., to the Rio Grande; use, administration, and navigation. (a) The regulations in this section shall apply to:

(1) Waterways. All navigable waters of the United States which are tributary to or connected by other waterways with the Gulf of Mexico, except the Mississippi River, its tributaries and outlets, between St. Marks, Fla., and the Rio Grande, Tex., both inclusive, and the Intracoastal Waterway from Apalachee Bay, Fla., to Brownsville, Tex.

(2) Locks and floodgates. All locks, floodgates, and appurtenant structures in the waterways described in subparagraph (1) of this paragraph.

(3) Bridges, wharves, and other structures. All bridges, wharves, and other structures in or over these waterways.

(4) Vessels and rafts. The term "vessels" as used in this section includes all floating craft other than rafts.

(b) Authority of District Engineers. The use, administration, and navigation of the waterways and structures to which this section applies shall be under the direction of the officers of the Corps of Engineers, United States Army, detailed in charge of the respective districts, and their authorized assistants. The cities in which these District Engineers are located, and the limits of their jurisdiction, are as follows:

(1) United States District Engineer, Mobile, Ala. From St. Marks River, Florida, to Pearl River, Mississippi and Louisiana, both inclusive, and the Intracoastal Waterway from Apalachee Bay, Florida, to Lighted Buoy No. 41, Lake Borgne, Louisiana, mile 36.4 east of Harvey Lock.

(2) United States District Engineer, New Orleans, La. From Pearl River, Mississippi and Louisiana, to Sabine River, Louisiana and Texas, both exclusive, and the Intracoastal Waterway from Lighted Buoy No. 41, Lake Borgne, La., mile 36.4 east of Harvey Lock, to Sabine River, mile 266 west of Harvey Lock.

(3) United States District Engineer, Galveston, Tex. From Sabine River, Louisiana and Texas, to the Rio Grande, both inclusive, and the Intracoastal Waterway from Sabine River, mile 266 west of Harvey Lock, to Brownsville, Tex.

(c) Commercial statistics. (1) As required by section 11 of the River and Harbor Act of September 22, 1922 (42 Stat. 1043; 33 U. S. C. 555), owners, agents, masters, or clerks of vessels plying upon the waterways to which this section applies shall submit a report on such activities for statistical purposes which shall contain the following information:

(i) Name of vessel.

(ii) Name and address of owner or operator.

(iii) Type of vessel: steam, motor, sail, barge, or other type.

(iv) Net registered tonnage; if not registered, cargo carrying capacity expressed in short tons.

(v) Maximum draft at time of passage.

(vi) Number of passengers.

(vii) Cargo, by commodities, expressed in short tons or other units by which such commodities are customarily measured, giving origin and destination.

(2) All persons rafting and towing logs shall submit a report giving such statistical information on their activities as may be required by the District Engineer.

(3) Reports may be submitted on forms furnished free of charge by the District Engineer. They shall be presented to the lockmaster at any of the federally operated locks, the gatetender at any of the federally operated floodgates, or the bridgetender at any of the bridges operated by the War Department, for each trip made. Where no federally operated locks, floodgates, or bridges are passed, they shall be mailed promptly to the District Engineer. On written request, persons or corporations making frequent use of these waterways may be granted permission to submit monthly statements in lieu of reports by trips.

(d) Locks and floodgates—(1) Authority. The locking of all vessels and rafts and their movements while in a lock, or in the approaches thereto, shall be under the direction of the lockmaster. The term "lockmaster" as used in this section shall mean the lock official present who is in charge of the operation of the lock. Passage through floodgates shall be under the direction of the gatetender.

(2) Sound signals. Vessels desiring passage through a lock or floodgate in either direction shall give notice to the lockmaster or gatetender by three long and distinct blasts of a horn or whistle or calls through a megaphone when within a reasonable distance from the lock or floodgate. When the lock or floodgate is ready for entrance, the lockmaster or gatetender shall reply with three long blasts of a horn or whistle or calls through a megaphone. When the lock or floodgate is not ready for entrance, the lockmaster or gatetender shall reply by four or more short, distinct blasts of a horn or whistle or calls through a megaphone (danger signal). Permission to leave the lock or floodgate shall be indicated by the lockmaster or gatetender by one long blast.

(3) Visual signals. Signal lights will be displayed from sunset to sunrise as follows:

(i) One green light to indicate that the lock or floodgate is open to approaching navigation.

(ii) One red light to indicate that the lock or floodgate is not open to approaching navigation.

(iii) In addition, at certain locks where navigation over the dam is possible during high water, one purple light, visible both upstream and downstream, will also be displayed to indicate that navigation over the dam is possible. If no purple light is displayed, navigation over the dam is not possible.

(iv) During daylight hours large balls, similar in color and number to the light signals prescribed for use at night, will be displayed from a mast on the lock wall or other convenient location and at the site of the floodgates.

(4) Precedence at locks and floodgates. Ordinarily, vessels or rafts arriving at the locks or floodgates shall take precedence in order of their arrival, but in all cases vessels belonging to the United States or employed on public work shall have precedence over all others, passenger vessels shall have precedence over freight vessels, and individual vessels over tows or rafts. Small vessels will not be granted separate lockage when larger vessels are awaiting lockage, but will be required to lock through with other vessels. When two vessels approach the lock from opposite directions at approximately the same time, preference will ordinarily be given to the one for which the lock is prepared. When two vessels approach floodgates from opposite directions at approximately the same time, the vessel approaching the gates from the river side thereof will ordinarily have the right of way. In all cases, the order of actual entry shall be determined by the lockmaster or gatetender.

(5) Entrance to and exit from locks and passage through floodgates. No vessel or raft shall enter or leave locks or, while floodgates are in operation, attempt to pass through floodgates before being signalled to do so. While waiting their turn, vessels or rafts must not obstruct navigation and must remain at a safe distance from locks or floodgates. Before entering a lock they shall take position in the rear of any vessels or rafts that precede them, and there arrange the two for locking in sections if necessary. Masters and pilots of vessels or persons in charge of rafts shall cause no undue delay in entering or leaving locks or passing through floodgates receiving the proper signal, and shall take such action as will insure that the approaches are not at any time unnecessarily obstructed by parts of a tow awaiting lockage or already passed through. They shall provide sufficient men to move through locks or floodgates promptly without damage to the structures. Vessels or tows that fail to enter locks or pass through floodgates with reasonable promptness after being signalled to do so will lose their turn.

(6) Lockage and passage of vessels. (i) Vessels shall enter and leave locks and pass through floodgates under such control as to prevent any damage to the locks, gates, gate walls, or fenders. Vessels shall be provided with suitable lines and fenders, shall always use fenders to protect the walls and gates, and when locking at night shall be provided with suitable lights and use them as directed. Vessels shall not meet or pass each other anywhere between the gate walls or fender system at the approaches to locks or floodgates.

(ii) Vessels which do not have a draft of at least three inches less than the depth over sills or breast walls, or which have projections liable to damage gates, walls, or fenders, shall not enter the approaches to or pass through locks or floodgates.

(iii) No vessel having chains, lines, or drags either hanging over the sides or ends or dragging on the bottom for steering or other purposes will be permitted to pass locks or dams or through floodgates.

(iv) Power vessels shall accompany tows through locks when so directed by the lockmaster.

(v) No vessel whose cargo projects beyond its sides will be admitted to lockage.

(vi) Vessels in a sinking condition shall not enter locks, floodgates, or approaches.

(vii) The passing of coal from flats or barges to steamers while in locks is prohibited.

(viii) The lockmaster or gatetender may refuse to lock or pass vessels which, in his judgment, fail to comply with this section.

(7) Lockage of rafts. Rafts shall be locked through in sections as directed by the lockmaster. No raft will be locked that is not constructed in accordance with the requirements stated in paragraph (f) of this section. The person in charge of a raft desiring lockage shall register with the lockmaster immediately upon arriving at the lock and receive instructions for locking.

(8) Number of lockages. Tows or rafts locking in sections will generally be allowed only two consecutive lockages if individual vessels are waiting for lockage, but may be allowed more in special cases. If tows or rafts are waiting above and below a lock for lockage, sections will be locked both ways alternately whenever practicable. When two or more tows or rafts are awaiting lockage in the same direction, no part of one shall pass the lock until the whole of the one preceding it shall have passed.

(9) Mooring. (i) Vessels and rafts when in a lock shall be moored where directed by the lockmaster by bow, stern, and spring lines to the snubbing posts or hooks provided for that purpose, and lines shall not be let go until the signal is given for the vessel or raft to leave. Tying to the lock ladders is prohibited.

(ii) The mooring of vessels or rafts near the approaches to locks except while waiting for lockage, or at other places in the pools where such mooring interferes with general navigation, is prohibited.

(10) Operating locks. The lock gates, valves, and accessories will be moved only under the direction of the lockmaster; but, if required, all vessels and rafts using the locks shall furnish ample help on the lock walls for handling lines under the direction of the lockmaster.

(e) Waterways—(1) Fairway. A clear channel shall at all times be left open to permit free and unobstructed navigation by all types of vessels and rafts that normally use the various waterways or sections thereof. The District Engineer may specify the width of the fairway required in the various waterways under his charge.

(2) Anchoring or mooring in waterway. No vessels or rafts shall anchor or moor in any of the land cuts or other narrow parts of the waterway, except in an emer-

gency. Whenever it becomes necessary for a vessel or raft to stop in any such portions of the waterway, it shall be securely fastened to one bank and as close to the bank as possible. This shall be done only at such a place and under such conditions as will not obstruct or prevent the passage of other vessels or rafts. Stoppages shall be only for such periods as may be necessary.

(i) Except temporarily, as authorized above, no vessel or raft will be allowed to use any portion of the fairway as a mooring place without written permission from the District Engineer.

(ii) When tied up individually, all vessels shall be moored by bow and stern lines. Rafts and tows shall be secured at sufficiently close intervals to insure their not being drawn away from the bank by winds, currents, or the suction of passing vessels. Tow lines shall be shortened so that the different parts of the tow will be as close together as possible. In narrow sections, no vessel or raft shall be tied abreast of another.

(iii) Lights shall be displayed in accordance with provisions of the Federal Pilot Rules.

(iv) Whenever any vessel or tow is moored to the bank, as authorized above, at least one crew member shall always remain on board to see that proper signals are displayed and that the vessel or tow is properly moored at all times.

(v) Vessels will not be permitted to load or unload in any of the land cuts, except at a regular established landing or wharf, without written permission secured in advance from the District Engineer.

(vi) No vessel, regardless of size, shall anchor in a dredged channel or narrow portion of a waterway for the purpose of fishing if navigation is obstructed thereby.

(3) Speed. Excessive speeding in narrow sections is prohibited. Official signs indicating limiting speeds through critical sections shall be strictly obeyed.

(i) When approaching and passing through a bridge, all vessels and rafts, regardless of size, shall control their speed so as to insure that no damage will be done to the bridge or its fenders.

(ii) A vessel shall reduce its speed sufficiently to prevent any damage when approaching another vessel in motion or tied up, a wharf or other structure, works under construction, plant engaged in river and harbor improvement, levees withstanding flood waters, buildings submerged or partially submerged by high waters, or any other manner of structure or improvements likely to be damaged by collision, suction, or wave action.

(4) Size, assembly, and handling of tows. On waterways 150 feet wide or less, tows will not be allowed which are longer than 1,000 feet, exclusive of the towing vessel and hawser, or wider than one-half the bottom width of the channel or 55 feet, whichever width is less, except on waterways exempted by the District Engineer or on other waterways by special permission of the District Engineer.

(i) All vessels drawing tows not equipped with rudders in restricted channels and land cuts shall use two towlines, or a bridle on one towline, shortened to the greatest possible extent so as to have maximum control at all times. The various parts of a tow shall be securely assembled with the individual units connected by lines as short as practicable. In open water, the towlines and fastenings between barges may be lengthened so as to accommodate the wave surge. In the case of lengthy or cumbersome tows, or tows in restricted channels, the District Engineer may require that tows be broken up, and may require the installation of a rudder or other approved steering device on the tow in order to avoid obstructing navigation or damaging the property of others. Pushing barges with towing vessel astern, towing barges with towing vessel alongside, or pushing and pulling barges with units of the tow made up both ahead and astern of the towing vessel is permissible provided that adequate power is employed to keep the tow under full control at all times.

(ii) No tow shall be drawn by a vessel that has insufficient power or crew to permit ready maneuverability and safe handling.

(iii) No vessel or tow shall navigate through a drawbridge until the movable span is fully opened.

(5) Projections from vessels. No vessel carrying a deck load which overhangs or projects over the side, or whose rigging projects over the side, so as to endanger passing vessels, wharves, or other property, shall enter or pass through any of the narrow parts of the waterway.

(6) Meeting and passing. Vessels on meeting or overtaking shall give the proper signals and pass in accordance with Federal Pilot Rules. Rafts shall give to vessels the side demanded by proper signal. All vessels approaching dredges or other plant engaged on improvements to a waterway shall give the signal for passing and slow down sufficiently to stop if so ordered or if no answering signal is received. On receiving the answering signal, they shall then pass at a speed sufficiently slow to insure safe navigation. Vessels approaching an intersection or bend where the view is obstructed must exercise due caution. At certain intersections where strong currents may be encountered, sailing directions may be issued from time to time through navigation bulletins or signs posted on each side of the intersections which must be observed.

(f) Rafts. Rafts will be permitted to navigate a waterway only if properly and securely assembled. The passage of "bag" or "sack" rafts, "dog" rafts, or loose logs over any portion of a waterway is prohibited. Each section of a raft shall be so secured within itself as to prevent the sinking of any log, and so fastened or tied with chains or wire rope that it cannot be separated or bag out so as to materially change its shape. All dogs, chains, and other means used in assembling rafts shall be in good condition and of ample size and strength to accomplish their purpose.

(1) No section of a raft will be permitted to be towed over any portion of a waterway unless the logs float sufficiently high in the water to make it evident that the section will not sink en route.

(2) Frequent inspections shall be made by the person in charge of each raft to insure that all fastenings remain secure, and when any one is found to have loosened it shall be repaired at once. Should any log or section be

lost from a raft, the fact must be promptly reported to the District Engineer, giving as definitely as possible the exact point at which the loss occurred. In all cases the owner of the lost log or section shall take steps immediately to remove it from the waterway.

(3) The regulations prescribed in paragraph (e) (4) of this section governing the length and width of tows shall apply also to rafts.

(4) All rafts shall carry sufficient men to enable them to be managed properly, and to keep them from being an obstruction to other craft using the waterway. To permit safe passage in a narrow channel rafts shall, if necessary, stop and tie up along side the bank. Care must be exercised both in towing and mooring rafts to avoid the possibility of damage to aids to navigation maintained by or under authority of the United States.

(5) When rafts are left for any reason with no one in attendance, they shall be securely tied at each end and at as many intermediate points as may be necessary to keep the timbers from bagging into the stream and must be moored so as to conform to the shape of the bank. From sunset to sunrise, rafts moored to the bank shall have lights at 200-foot intervals along their entire length. Rafts shall not be moored at prominent projections of the bank or at critical sections.

(6) Logs may be stored in certain tributary streams provided a clear channel at least one-half the width of the channel be left for navigation along the tributary. Such storage spaces shall be protected by booms and, if necessary to maintain an open channel, piling shall also be used. Authority for placing such booms and piling shall be obtained by written permit from the District Engineer.

(7) The building, assembling, or breaking up of a raft in a waterway will be permitted only upon special authority obtained from the District Engineer and under such conditions as he may prescribe.

(g) Damage. This section shall not affect the liability of the owners and operators of vessels for any damage caused by their operations to canal revetments, lock piers and walls, floodgates and appurtenances, bridges, and bridge fenders, or for displacing or damaging buoys, stakes, spars, range lights, or other aids to navigation. Should any part of a revetment, lock, floodgate, or bridge be damaged, the master shall report that fact, and furnish a clear statement of how the damage occurred, to the nearest Government lockmaster, gatetender, or bridgetender, and by mail to the District Engineer in charge of the section of the waterway in which the damage occurred. Should any aid to navigation be damaged, the master shall report that fact immediately to the District Coast Guard Officer, New Orleans, La.

(h) Marine accidents. Masters, mates, pilots, owners, or other persons using the waterways to which the regulations in this section apply shall report to the District Engineer or his authorized representative by the most expeditious means available all marine accidents, such as fire, collision, sinking, or stranding, where there is possible obstruction of the channel or interference with navigation, furnishing a clear statement as to the name, address, and ownership of the vessel or vessels involved, the time and place, and the action taken. In all cases, the owner of a sunken vessel shall take immediate steps to mark the wreck properly.

(i) Trespass on United States property. Trespass on waterway property or injury to the banks, locks, floodgates, bridges, piers, fences, trees, houses, shops, or any other property of the United States pertaining to the waterway is strictly prohibited. No business, trading, or landing of freight or baggage will be allowed on or over Government piers, lock walls, floodgates, or bridges.

§ 207.182 Biloxi Bay, Biloxi, Miss.; seaplane restricted area.—(a) The area. Beginning at the northeast end of the Coast Guard Air Station seaplane ramp; thence 90° true, 1,500 feet, thence due north to a point 250 feet south of the highway bridge; thence along a line parallel to the highway bridge to the dredged channel; thence following the inside of the dredged channel to a point 1,500 feet west of Channel Beacon No. 36; thence 315° true, 1,000 feet; thence 270° true to the beach; and thence along the beach to the point of beginning.

(b) The regulations. (1) No vessels except those operated by the United States Navy, United States Coast Guard, and vessels otherwise under the direct control of the United States shall moor or anchor within the seaplane restricted area at any time.

(2) No vessels except those operated by the United States Navy, United States Coast Guard, and vessels otherwise under the direct control of the United States shall enter the seaplane restricted area at any time between sunset and sunrise.

(3) No vessel shall engage in fishing, placing of fishing stakes, or similar activities at any time within the limits of the seaplane restricted area.

(4) All vessels moving within the seaplane restricted area shall immediately proceed to leave the area when warned by aircraft employing the "buzzing" method, which consists of low-flying by the airplane and repeated opening and closing of the throttle.

(5) The regulations in this section shall be enforced by the Commanding Officer, Coast Guard Air Station, Biloxi, Miss., who may grant specific exemptions from the regulations of this section and such agencies as he may designate.

§ 207.184 Sabine River at Orange Texas; restricted area in vicinity of the Texas Group, Atlantic Reserve Fleet.—(a) The area. The berthing area of the Texas Group Atlantic Reserve Fleet and the waters adjacent thereto from the mean high tide shore line to a line drawn parallel to, and 100 feet channelward from lines connecting the pier heads of Piers 1 through 12; and from a line drawn parallel to, and 200 feet upstream from, Pier 1 to a line drawn parallel to, and 100 feet downstream from Pier 12.

(b) The regulations. (1) No vessel or other craft, except vessels of the United States Government or vessels duly authorized by the Commander, Texas Group, Atlantic Reserve Fleet, shall navigate, anchor, or moor in the restricted area.

(2) The regulations of this section shall be enforced by the Commander, Texas Group, Atlantic Reserve Fleet, and such agencies as he may designate.

§ 207.185 Taylors Bayou, Tex., Beaumont Navigation District Lock; use, administration and navigation. (a) Between March 15 and September 15 each year pleasure boats, house boats, and other craft not employed for commercial purposes, will be locked through only at 6:00 and 11:45 a. m., and 6:30 p. m., except in cases of emergency; but whenever a lockage is made for a commercial boat, other craft may likewise pass through if there is room in the lock. At all other times lockages shall be made in accordance with § 207.180.

(b) The lock tender or one in charge of the lock shall be the judge as to whether the boat presenting itself for lockage is a commercial or pleasure boat.

§ 207.188 Corpus Christi Bay and Laguna Madre; seaplane restricted area, Naval Air Station, Corpus Christi, Tex.—(a) The area. The waters of Corpus Christi Bay and Laguna Madre within an area described as follows: Beginning at a point on the south shore of Corpus Christi Bay at the "North Gate" of the Naval Air Station (at approximate longitude 97°17'15"); thence to latitude 27°44'30", longitude 97°20'00"; thence due north to latitude 27°46'30"; thence to Spoil Bank Light; thence to latitude 27°43'04", longitude 97°13'12"; thence to latitude 27°40'44", longitude 97°14'12"; thence to a point on the east shore of Encinal Peninsula at latitude 27°40'00"; thence generally northerly along the shore to Flour Bluff Point; and thence westerly along the south shore of Corpus Christi Bay to the point of beginning.

(b) The regulations. (1) No vessel or watercraft of any type shall enter or remain in the area at any time, day or night, except as provided in this paragraph.

(2) Clearance for watercraft operating in the area on set schedules and on prescribed routes may be granted upon written application to the enforcing agency.

(3) Changes in schedules and routes may be made upon written application to the enforcing agency.

(4) Off schedule operations of craft or operation over unprescribed routes may be authorized, in cases of necessity, upon special application in each case. These applications shall be made in writing to the enforcing agency, except as provided in subparagraph (5) of this paragraph.

(5) Commercial fishermen, geophysical exploration crews, and personnel of oil companies holding leases within the area will not be required to operate on set schedules or over prescribed routes but, in order to enter the area, either day or night, they shall have proper identification and the approval of the enforcing agency.

(6) The regulations in this section shall be enforced by the Chief of Naval Air Advanced Training, United States Naval Air Station, Corpus Christi, Tex., and such agencies as he may designate.

§ 207.200 Mississippi River below mouth of Ohio River, including South and Southwest Passes; use, administration, and navigation.—(a) Mississippi River bank protection works provided by United States. Except in case of great emergency, no vessel or craft shall anchor over revetted banks of the river, and no floating plant other than launches and similar small craft shall land against banks protected by revetment except at regular commercial landings. In all cases, every precaution to avoid damage to the revetment works shall be exercised. The construction of log rafts along mattressed or paved banks or the tying up and landing of log rafts against such banks shall be performed in such a manner as to cause no damage to the mattress work or bank paving. Generally, mattress work extends out into the river 600 feet from the low water line. Information as to the location of revetted areas may be obtained from, and will be published from time to time by, the District Engineers, Corps of Engineers, New Orleans, La., Vicksburg, Miss., and Memphis, Tenn., and the President, Mississippi River Commission, Vicksburg, Miss.

(b) Mississippi River below Baton Rouge, La., including South and Southwest Passes—(1) Supervision. The use, administration, and navigation of the waterways to which this paragraph applies shall be under the supervision of the District Engineer, Corps of Engineers, New Orleans, Louisiana.

(2) Speed; high-water precautions. When passing another vessel (in motion, anchored, or tied up), a wharf or other structure, work under construction, plant engaged in river and harbor improvement, levees withstanding flood waters, buildings partially or wholly submerged by high water, or any other structure liable to damage by collision, suction or wave action, vessels shall give as much leeway as circumstances permit and reduce their speed sufficiently to preclude causing damage to the vessel or structure being passed. Since this subparagraph pertains directly to the manner in which vessels are operated, masters of vessels shall be held responsible for strict observance and full compliance therewith. During high river stages, floods, or other emergencies, the District Engineer may prescribe by navigation bulletins or other means the limiting speed in land miles per hour deemed necessary for the public safety for the entire section or any part of the waterways covered by this paragraph, and such limiting speed shall be strictly observed.

(3) Towing. Towing in any formation by a vessel with insufficient power to permit ready maneuverability and safe handling is prohibited.

(4) Cable and pipeline crossings. Any cable or pipeline crossing or extending into the waterways shall be marked by large signs with 12-inch black letters on a white background readable from the waterway side, placed on each side of the river near the point where the cable or pipeline enters the water, and at a sufficient height to be readable above any obstructions normally to be expected at the locality such as weeds or moored vessels.

(5) Marine accidents. Masters, mates, pilots, owners, or other persons using the waterway to which this paragraph applies shall notify the District Engineer by the most expeditious means available of all marine accidents, such as fire, collision, sinking, or stranding, where there is

possible obstruction of the channel or interference with navigation or where damage to Government property is involved, furnishing a clear statement as to the name, address, and ownership of the vessel or vessels involved, the time and place, and the action taken. In all cases, the owner of the sunken vessel shall take immediate steps properly to mark the wreck.

(c) Movement of vessels in vicinity of Algiers Point, New Orleans Harbor—(1) Control lights. When the Mississippi River reaches 10 feet on the Carrollton Gage on a rising stage, and until the gage reads 12 feet on a falling stage, the movement of all tugs with tows and all ships, whether under their own power or in tow, and excluding tugs or towboats without tows or river craft of comparable size and maneuverability operating under their own power, in the vicinity of Algiers Point shall be governed by red and green lights designated and located as follows: Governor Nicholls Light located on the left descending bank at the downstream end of Governor Nicholls Street Wharf, New Orleans, approximately 94.4 miles above Head of Passes; and Gretna Light located on the right descending bank on top of the levee at the foot of Ocean Avenue, Gretna, approximately 96.6 miles above Head of Passes. Governor Nicholls Light has lights visible from both upstream and downstream, and Gretna Light has lights visible from upstream, all indicating by proper color the direction of traffic around Algiers Point. From downstream, Gretna Light always shows green. All lights oscillate through 60°, sweeping the entire width of the river every 5 seconds. A green light displayed ahead of a vessel (in the direction of travel) indicates that Algiers Point is clear and the vessel may proceed. A red light displayed ahead of a vessel (in the direction of travel) indicates that Algiers Point is not clear and the vessel shall not proceed. Absence of lights shall be considered a danger signal and no attempt shall be made to navigate through the restricted area.

(2) Ascending vessels. Ascending vessels shall not proceed farther up the river than a line connecting the upper end of Morgans Wharf (on right descending bank) with the lower end of Desire Street Wharf (on left descending bank) when a red light is displayed. Vessels awaiting a change of signal shall keep clear of descending vessels.

(3) Descending vessels. (i) Descending vessels shall not proceed farther down the river than a line connecting the lower end of Julia Street Wharf (on left descending bank) with Diana Street (on west descending bank) when a red light is displayed. Vessels shall round to and be headed upstream before they reach that line, if the signal remains against the vessel. Vessels awaiting a change of signal shall keep clear of ascending vessels.

(ii) Vessels destined to a wharf above the lower end of Julia Street Wharf shall signal the Gretna towerman three long blasts and one short blast of a whistle or horn to indicate that the vessel is not bound below the Julia Street Wharf.

(iii) The master, pilot, or authorized representative of any vessel scheduled to depart from a wharf between Governor Nicholls Street signal tower and Louisiana Avenue, bound downstream around Algiers Point, shall communicate with the Governor Nicholls Street towerman by telephone to determine whether the channel at Algiers Point is clear before departure. When the point is clear, vessels shall then proceed promptly so that other traffic will not be unnecessarily delayed.

Note: Telephone numbers of both signal towers will be published in navigation bulletins in advance of each operating period.

(4) Minor changes. The District Engineer is authorized to waive operations or suspension of the lights whenever prospective river stages make it appear that the operation or suspension will be required for only a brief period of time or when river stages will rise or fall below the critical stage which is established for operation or suspension by only a few tenths on the Carrollton Gage.

(5) Underpowered vessels. When the Carrollton Gage reads 12 feet or higher, any vessel which is considered by the master or pilot as being underpowered or a poor handler shall not navigate around Algiers Point without the assistance of a tug or tugs.

(6) Towing. When the Carrollton Gage reads 12 feet or higher, towing on a hawser in a downstream direction between Julia Street and Desire Street is prohibited except by special permission of the District Engineer.

(d) Navigation of South and Southwest Passes. (1) No vessel, except small craft and towboats and tugs without tows, shall enter either South Pass or Southwest Pass from the Gulf until after any descending vessel which has approached within 2½ miles of the outer end of the jetties and visible to the ascending vessel shall have passed to sea.

(2) No vessel having a speed of less than 9 knots shall enter South Pass from the Gulf when the stage of the Mississippi River exceeds 15 feet on the Carrollton Gage at New Orleans. This subparagraph does not apply when Southwest Pass is closed to navigation.

(3) No vessel, except small craft and towboats and tugs without tows, ascending South Pass shall pass Franks Crossing Light until after a descending vessel shall have passed Depot Point Light.

(4) No vessel, except small craft and towboats and tugs without tows, shall enter the channel at the head of South Pass until after an ascending vessel which has reached Franks Crossing Light shall have passed through into the river.

(5) When navigating South Pass during periods of darkness no tow shall consist of more than one towed vessel other than small craft, and during daylight hours no tow shall consist of more than two towed vessels other than small craft. Tows may be in any formation. When towing on a hawser, the hawser shall be as short as practicable to provide full control at all times.

(6) When towing in Southwest Pass during periods of darkness no tow shall consist of more than two towed vessels other than small craft, and during daylight hours no tow shall consist of more than three towed vessels other than small craft.

§ 207.240 Atchafalaya River, La.; special regulations to govern navigation through the reach of the Lower

Atchafalaya River (Berwick Bay) in the vicinity of the Southern Pacific Railroad bridge at Morgan City, La. (a) Whenever the velocity of flow, either southward or northward, through the reach of the Lower Atchafalaya River (Berwick Bay) at Morgan City, La., reaches or exceeds a critical velocity as determined by the District Engineer, United States Engineer Department at Large, in charge of the locality, or whenever the District Engineer finds it necessary for the protection of life and property, the movement of vessels and the composition of tows passing through the Southern Pacific Railroad bridge shall be governed by this section. Day and night visual signals will be displayed at the center of the drawspan above the operator's house on top of the bridge structure when the regulations are in effect. During periods of foggy or inclement weather, or when for any other reason the visual signals cannot readily be seen, notice that the signals are being displayed will be given by blasts of a fog horn (located on the bridge) as follows:

(1) To indicate that signals are being displayed to govern only traffic moving southward through the bridge, one blast of 6 seconds' duration each minute.

(2) To indicate that signals are being displayed to govern only traffic moving northward through the bridge, one blast of 6 seconds' duration, followed by one short blast, each minute.

(3) To indicate that signals are being displayed to govern both southbound and northbound traffic through the bridge, one blast of 6 seconds' duration, followed by two short blasts, each minute.

(b) By day the visual signals will consist of:

(1) Two red balls displayed vertically, one above the other, from a pole, to indicate that vessels and tows southbound through the bridge shall be governed by this section.

(2) Two red cylinders displayed vertically, one above the other, from a pole, to indicate that vessels and tows northbound through the bridge shall be governed by this section.

(c) At night the visual signal will be a light displayed immediately above the usual bridge light: (1) On the north side of the bridge to indicate that this section is in effect with respect to southbound traffic; (2) on the south side of the bridge to indicate that this section is in effect with respect to northbound traffic. This light will be red when the bridge is open.

(d) When the signals in paragraphs (a) (3), (b) and (c) of this section governing southbound traffic are displayed, unless otherwise directed by the District Engineer tows moving south through the bridge shall not exceed one barge with the towing vessel in the rear or lashed securely to the side of the barge. If the river's flow is in a southward direction, the tow shall be drifted through the navigation opening of the bridge at a speed not exceeding the velocity of flow. If the river's flow is in a northward direction, the tow shall move through the navigation opening of the bridge at the minimum speed required to maintain steerageway.

(e) When the signals in paragraphs (a), (2) (b) and (c) of this section governing northbound traffic are displayed, unless otherwise directed by the District Engineer tows moving north through the bridge shall not exceed two barges arranged in tandem with the towing vessel in the rear pushing the tow with its bow made up to the stern of the rear barge, or lashed securely alongside and near the stern of the rear barge. If the river's flow is in a southward direction, the tows shall move through the navigation opening of the bridge at the minimum speed required to maintain steerageway. If the river's flow is in a northward direction, the tow shall be drifted through the navigation opening of the bridge at a speed not exceeding the velocity of flow.

(f) The regulations in paragraphs (d) and (e) of this section, except those governing speed of movement through the navigation opening, shall not apply to tows with two towing vessels of sufficient power, one ahead and one astern of the tow.

(g) Vessels and tows proceeding with the current shall have the right of way over vessels and tows proceeding against the current. When two vessels or tows are about to enter the navigation opening through the bridge from opposite directions at the same time, the vessel or tow proceeding against the current shall stop short of the opening until the vessel or tow having the right of way shall have passed through.

(h) Vessels and tows desiring to pass through the navigation opening of the bridge shall approach the opening along the axis of the channel and shall proceed with due regard for direction and velocity of the current and any tendency to drift either to the right or to the left so as to pass through without danger of striking the bridge or the fenders. No vessel or tow shall attempt passage through the navigation opening until the bridge is fully opened.

§ 207.810 Channel leading to San Juan Harbor, P. R.; use, administration, and navigation. (a) Steamers passing dredge engaged in improving the channel shall not have a speed greater than 4 miles an hour, and the propelling machinery shall be stopped when crossing the lines to the dredge anchors.

(b) Vessels using the channel shall pass the dredge on the side designated from the dredge by the signals prescribed in paragraph (c) of this section.

(c) Dredge shall display the red flag by day and four white lights hung in a vertical line by night to indicate the passing side.

(d) Vessels shall not anchor on the ranges of stakes or other marks placed for the guidance of the dredge, nor in such a manner as to obstruct the channel for passing vessels.

(e) Vessels shall not run over or disturb stake, lanterns, or other marks placed for the guidance of the dredge.

(f) Dredges working in the prosecution of the work shall not obstruct the channel unnecessarily.

(g) The dredge will slack lines running across the channel from the dredge on the passing side, for passing vessels, when notified by signal, with whistle or horn.

(h) The position of anchors of the dredge shall be marked by buoys plainly visible to passing vessels.

§ 207.812 San Juan Harbor, Puerto Rico; seaplane restricted area.—(a) The area. (1) That part of San Juan Harbor, Puerto Rico, easterly and southeasterly of a line extending from Isla Grande Light 205°, 1,280 yards; thence 270°, 2,700 yards, to a point 218°, 685 yards, from San Juan Harbor Entrance Range Front Light; thence 157°, 675 yards, to a point 8°, 180 yards, from San Juan Harbor Entrance Range Rear Light, thence 90°, 2,185 yards, to the north side of Cataño Point. The following described portions of the area are exempted:

(i) All waters west of a line tangent to, and extending 180° from, Cataño Point.

(ii) The channel and turning basin to the Graving Dock and the channel from the Graving Dock turning basin to the Caño de Martin Peña.

(iii) The channel from the Graving Dock channel near lighted buoy 2 to the Army Terminal, Pueblo Viejo Bay.

(2) The area will be used by seaplanes for takeoffs, landings, taxiing, and mooring.

(3) For protracted or regularly scheduled night seaplane operations the actual takeoff and landing lane will be marked by special seadrome buoys which will show fixed lights either yellow or green. Buoys for marking the takeoff and landing lane will be of the type seadrome buoy regularly used by the Navy, a small black and yellow striped rubber buoy equipped to show either yellow or green lights for night operations. No buoys will be used in the area which are not approved by the enforcing agencies, or which may be confused with the regular aids to navigation system of the harbor.

(b) The regulations. (1) No vessel shall lie to or anchor in or otherwise obstruct the area.

(2) All vessels passing through the area shall be alert for the approach of aircraft. Aircraft engaged in taking off or landing shall have the right of way over all vessels in the area. All vessels in the area shall proceed immediately to leave the area when warned by aircraft employing the "buzzing" method which consists of low flight by an airplane and repeated varying of the propellor speed, or when warned by a guard boat in the area.

(3) This section shall be enforced by the Commander, Naval Air Bases, Tenth Naval District, San Juan, Puerto Rico, and such agencies as he may designate.

§ 207.815 Vieques Passage and Atlantic Ocean, off east coast of Puerto Rico and coast of Vieques Island; naval restricted areas—(a) The restricted areas. (1) A strip, 1,500 yards wide, off the naval reservation shore line along the east coast of Puerto Rico extending from Point Figuera south to Point Puerca, and thence west to Point Cascajo and the mouth of the Daguada River.

(2) A strip, 1,500 yards wide, off the naval reservation shore line along the west end of Vieques Island extending from Caballo Point on the north shore, west around the breakwater to Point Arenas, and thence south and east to a point on the shore line one mile east of the site of the abandoned central at Playa Grande.

(3) A strip, 1,500 yards wide, off the naval reservation shore line along the south coast of Vieques Island extending from the entrance to Port Mosquito east to Conejo Point.

(4) An area inclosed by an arc with a radius of 3,000 yards centered on Cabras Island Lighthouse and extending from Point Puerca to Point Cascajo.

(b) The regulations. No vessel shall enter or remain within the restricted areas at any time unless on official business, except that fishing vessels are permitted to anchor in Playa Blanca, passsing through the restricted area described in paragraph (a) (1) of this section to and from anchorage on as near a north-south course as sailing conditions permit. Under no conditions will fishing be permitted in the restricted areas.

§ 207.900 Restricted areas in vicinity of Maritime Administration Reserve Fleets. (a) The regulations in this section shall govern the use and navigation of waters in the vicinity of the following National Defense Reserve Fleets of the Maritime Administration, Department of Commerce:

(1) Hudson River Reserve Fleet, Jones Point, N. Y.

(2) James River Reserve Fleet, Fort Eustis, Va.

(3) Wilmington Reserve Fleet, Brunswick River near Wilmington, N. C.

(4) Mobile Reserve Fleet, Tensaw River near Bay Minette, Ala.

(5) Beaumont Reserve Fleet, Neches River near Beaumont, Tex.

(6) Suisun Bay Reserve Fleet near Benicia, Calif.

(7) Astoria Reserve Fleet, Cathlamet Bay near John Day Point, Oreg.

(8) Olympia Reserve Fleet, Budd Inlet at Olympia, Wash.

(b) No vessels or other watercraft, except those owned or controlled by the United States Government, shall cruise or anchor between Reserve Fleet units, within 500 feet of the end vessels in each Reserve Fleet unit, or within 500 feet of the extreme units of the fleets, unless specific permission to do so has first been granted in each case by the enforcing agency.

(c) The regulations in this section shall be enforced by the respective Fleet Superintendents and such agencies as they may designate.

3. GULF COAST, KEY WEST TO RIO GRANDE

The **Gulf of Mexico** coast of the United States is low and mostly sandy, presenting no marked natural features to the mariner approaching from seaward. The principal points and harbor entrances are marked by lighthouses, which are the chief guides for approaching or standing along the coast.

From the south shore of the Florida mainland, the **Florida Keys** and **Florida Reefs** extend for about 134 miles in a southwesterly curve to Sand Key Light, and about 58 miles in a westerly direction to Loggerhead Key. These keys and reefs are of sand, shell, and coral formation. The reefs have frequent shoal patches. The keys are generally low and covered with mangrove. Together, they form the northern boundary of the **Straits of Florida,** the northern approach and entrance to the Gulf of Mexico. Toward the western end are several openings between the keys offering passage from the straits into the Gulf.

The southwestern extremity of the Florida mainland is part of the Everglades National Park and Big Cypress Swamp. Much of these areas are under water throughout the year and are nearly all covered during the rainy summer season. Fronting the swampy areas are the Ten Thousand Islands, a group of low mangrove-covered islands divided by tidal channels. North of the Ten Thousand Islands the coast is low, sandy, and generally backed by pine forests and **hammocks.** These hammocks are a jungle of tropical trees, mostly hardwood, which appear as an impenetrable green wall.

From Cape Romano to Anclote Keys the coast becomes a barrier beach of low islands separated by inlets most of which are small and cannot be distinguished from offshore. Between Anclote Keys and St. James Island, the western side of Apalachee Bay, the coast is low and marshy for 1 to 2 miles inland then backed by pine forests. The shoreline is broken by a number of unimportant rivers and creeks.

Westward of St. James Island to the South Pass of the Mississippi River the coast is mostly a barrier beach of low, wooded, sand islands. The general drift of these islands is to the west which causes an encroachment upon the channels between them. Hurricanes and heavy gales will sometimes change the shape of these islands and in some cases they have washed away leaving just shoals.

The boundary between Florida and Alabama follows the Perdido River. The Alabama-Mississippi boundary follows a marked line cutting across the eastern end of Petit Bois Island, through Batture Island and Grand Bay. Pearl River, from its most eastern junction with Lake Borgne, forms the boundary between Mississippi and Louisiana.

Westward of the Delta to Galveston Entrance the coast is a wide fringe of flat and generally treeless coastal marsh containing close growths of sedge, grass, and rushes with several deep indentations or bays separated from the Gulf by chains of long narrow islands and many shallow salt water lakes and lagoons. The islands and marshes are fringed with barrier beaches, mostly of fine sand, which rise to a crest with groves of trees on the inner slopes. Sand and shell ridges, sometimes several feet above the general level, are found throughout the marshes. These ridges, called **chênières** because of the oak groves usually found growing on them, are former barrier beaches; good examples are Grand Chênière and Pecan Island. In addition to the chênière, three other marsh features are defined. Small solitary hills are called either islands or mounds depending on their height above the level of the surrounding marsh. Islands are greater than 25 feet while mounds are less. A **bayou** is a drainage stream for a swamp area or an auxiliary outlet for a river. They flow either to the Gulf of Mexico or a large lake, rarely into a river or other bayou. The depth of water is nearly always sufficient for river-craft navigation. The current, except after a heavy rainfall, is very sluggish, but often may be reversed by a change in the direction of the wind. The highest land is found immediately adjacent to the bayous in the form of natural levees; as a rule, the larger the bayou the higher its levee.

Sabine Pass, Lake, and River form the boundary between Louisiana and Texas.

From Galveston Entrance to the mouth of the Rio Grande the coast is a barrier beach of long narrow islands and peninsulas, which are generally low and sandy, with but few distinguishing marks, enclosing a chain of shallow bays or lagoons, some of considerable size. The passes between the islands, except where improvements have been made by constructing jetties and dredging, are narrow and cannot be distinguished from offshore.

Harbors and ports.—The most important places, either commercially or as harbors of refuge, are Key West, Charlotte Harbor, Tampa Bay, Withlacoochee Anchorage, St. George Sound and Apalachicola Bay, St. Joseph Bay, St. Andrew Bay, Pensacola, Mobile, Horn Island Pass and Pascagoula, Ship Island Pass and Gulfport, South and Southwest Passes and New Orleans, Atchafalaya Bay and River, Calcasieu Pass, Sabine Pass, Galveston Bay, Freeport, Aransas Pass, and Brazos Santiago.

The entrance to every harbor along the Gulf Coast is more or less obstructed by a shifting sand bar. The more important entrances have been improved by dredging and in some cases by construction of jetties.

On the bars the buoys are moved from time to time to indicate the channel; but they are liable to be dragged out of position and cannot always be replaced immediately, so that a stranger must use the greatest caution. A stranger should, if possible, select a rising tide for entering the harbors on this coast.

The tidal currents have considerable velocity in all of the entrances and their direction is affected by the force and direction of the wind. Sailing vessels entering the harbors and sounds require a fair working breeze during the ebb.

In southerly gales the sea breaks on some of the bars, and no stranger should then attempt to enter such harbors without the assistance of a pilot.

Oil-Well Structures.—Information concerning the establishment, change, or discontinuance of oil-well structures, including appurtenances thereto, such as mooring piles, anchor and mooring buoys, etc., is not published in Notice to Mariners when the structures are located in obstruction areas shown in magenta on the latest issues of the 1200 series (1:80,000) and/or larger scale C. & G. S. nautical charts. However, a list of offshore oil-well structures in the Gulf of Mexico that have been completed and their existence made known to the Eighth Coast Guard District Office, New Orleans, La., will be published semiannually in the Notice to Mariners. Additional obstruction areas may be established as conditions warrant and will be published in Notice to Mariners. A warning note, in lieu of the obstruction areas, will be shown on C. & G. S. Charts 1050, 1051, and within the blue tint on charts 1115, and 1116, except in areas falling outside the limit of the 1200 series. The obstruction areas or individual structures will be shown on C. & G. S. Chart 1117.

In general, oil-well structures in the Gulf of Mexico can be identified at night by the display of a series of white lights extending from the platform to the top of the derrick when drilling operations are in progress, and at other times by the display of one or more fixed or quick flashing white lights, visible at least 3 nautical miles in clear weather. Those structures located in inshore waters of the Gulf Coast are lighted by one or more quick flashing red lights visible at least one nautical mile in clear weather. Normally, the structures in navigable waters are equipped with a fog signal consisting of a horn sounding one 2-second blast every 20 seconds.

Information concerning seismographic operations will, likewise, not be published in Notice to Mariners unless such operations will create a menace to navigation in waters used by general navigation. Where seismographic operations are being conducted, casings (pipes), buoys, stakes, detectors, etc., are installed. Stakes are marked with flags, and pipes are marked with flags by day and fixed red lights by night.

During the continuing program of establishing, changing, and discontinuing oil-well structures, special caution should be exercised when navigating the inshore and offshore waters of the Gulf of Mexico in order to avoid collision with any of the structures.

Boundary Lines of Inland Waters.—At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not described, **Inland Pilot Rules** apply shoreward of the outermost buoy or other aid to navigation of any system of aids; **International Pilot Rules** apply outside the aids. Specific lines are described in **Part 82, Chapter 2.**

Tides, Gulf of Mexico.—Periodic tides in the Gulf of Mexico usually are small and may, therefore, be greatly modified and sometimes obliterated by fluctuations in the water surface due to winds or other meteorological conditions.

At Key West the mean range of tide is less than 1½ feet. Extreme variations in the level from 1½ feet below the plane of reference to 4 feet above may occur in this locality.

Along the west coast of the peninsula of Florida from Cape Sable to Apalachee Bay, the mean range varies from 1 to 4 feet. Extreme tides from 3 feet below to 6 feet above the plane of reference have been observed on this coast.

Along the northern shore of the Gulf of Mexico from St. George Sound to the Rio Grande the tide is generally diurnal—that is, during a large part of each month only one high and one low water will occur each day, especially near the time of the greatest north and south declination of the moon. When the moon is near the Equator two high and two low waters each day will generally occur, but the range of tide will be smaller at this time.

The diurnal range of the tide along this shore is less than 2 feet, but fluctuations due to the wind from 3½ feet below to 4 feet above the plane of reference are not uncommon. During the severe storms that occasionally visit this region, high waters from 10 to 12 feet above the plane of reference have been reported at Galveston, Tex.

The periodic or astronomical tide, small at the mouth of the Mississippi River, gradually diminishes as it ascends the river until it finally becomes completely masked by the larger fluctuations resulting from meterological conditions. At New Orleans the diurnal range of the tide during low-river stages averages about three-fourths foot. There is no periodic tide at high-river stages. There is, however, a large fluctuation in the level due to the condition of the river. The mean annual fluctuation at New Orleans is about 14 feet, the water being highest in the spring months and lowest during the autumn and early part of the winter. An extreme fluctuation of 21 feet in the river level at this city has been reported.

For more detailed information on tides in the Gulf of Mexico, see Tide Tables, East Coast of North and South America.

Currents, Gulf of Mexico.—Under normal conditions, at all seasons of the year, the great volume of water passing northward through Yucatan Channel into the Gulf of Mexico spreads out in various directions. Surface flows set—westward across Campeche Bank, the Gulf of Campeche, and the Sigsbee Deep; northwestward toward Galveston and Port Arthur; north-northwestward toward the Mississippi Passes; and eastward into the Straits of Florida.

A straight line drawn from Buenavista Key, Western Cuba, to the Mississippi Passes forms an approximate

boundary between movements having different directions. West of this line the drift is generally northward or westward, while east of it the drift is eastward or southeastward toward the Straits of Florida.

There are northward flows along the west side of the Gulf between Tampico and Corpus Christi in the vicinity of the 100-fathom and 1,000-fathom curves, north of the Sigsbee Deep between the 2,000-fathom and the 100-fathom curves, and along the west coast of Florida.

In general, the surface circulation is the same at all seasons. There is, however, some seasonal change in velocity, the flow being generally stronger in spring and summer than in the autumn and winter.

The current near the Florida Keys is variable and uncertain.

Tidal currents are generally weak in the open Gulf, but they are strong at times near shore, in the vicinities of shoals, and in the entrances to harbors. For more detailed information, see Tidal Current Tables, Atlantic Coast of North America.

The **Gulf Stream** is the most famous of the principal ocean currents. The name was first used by Benjamin Franklin in 1769. In general, as the swift current of the Gulf Stream issues into the sea through the Straits of Florida, its waters are characterized by a deep blue color, high salinity, great clearness, high temperature in the upper stratum, and absence of phosphorescence. The eye can penetrate it to considerable depths. At its junction with ordinary sea water the edges may frequently be recognized in moderate weather by the ripples which occur as well as by the difference in color. Northward, in the cooler regions, the evaporation from its surface, when the temperature of the air is lower than that of the water, is apparent to the eye. In addition, in the lower latitudes, the stream carries with it a quantity of gulf weed, which is olive brown, branched seaweed with berrylike air vessels. Surface debris such as logs and other material with small depth tend to drift toward the eastern edge of the stream but not toward the western edge.

The region where the Gulf of Mexico narrows to form the channel between Florida Keys and Cuba may be regarded as the head of the Gulf Stream. From this region the stream sets eastward and northward through the Straits of Florida, and after passing Little Bahama Bank it continues northward and then northeastward, following the general direction of the 100-fathom curve as far as Cape Hatteras. The flow in the Straits is frequently referred to as the **Florida Current.**

Shortly after emerging from the Straits of Florida, the stream is joined by the **Antilles Current,** which flows northwesterly along the open ocean side of the West Indies before uniting with the water which has passed through the straits. The Antilles Current, like the Gulf Stream, carries warm, highly saline water of clear indigo blue. The union of the two currents gives rise to a broad current possessing about the same characteristics as the Gulf Stream within the Straits except that the velocity is much reduced. Beyond Cape Hatteras the combined current turns more and more eastward under the combined effects of the deflecting force of the earth's rotation and the eastwardly trending coastline, until the region of the Grand Banks of Newfoundland is reached.

Eastward of the Grand Banks the whole surface is slowly driven eastward and northeastward by the prevailing westerly winds to the coastal waters of northwestern Europe. For distinction, this broad and variable wind-driven surface movement is sometimes referred to as the **North Atlantic Drift** or **Gulf Stream Drift.**

On its western or inner side, the Gulf Stream is separated from the coastal waters by a zone of rapidly falling temperature, to which the term cold wall has been applied. The abrupt change in the temperature of the waters separated by the cold wall is frequently very striking and is a definite indication of the edge of the stream. It is most clearly marked north of Cape Hatteras but extends, more or less defined, from the straits to the Grand Banks. In the vicinity of the Banks of Newfoundland the cold wall represents the dividing line between the warm current of the Gulf Stream and the cold waters of the **Labrador Current** which, according to observations, turns sharply, between parallels 42 and 43 and meridians 51 and 52, and flows easterly, parallel to the Gulf Stream.

Off Cape Hatteras the wide-spreading current separates into numerous bands which are indicated by the juxtaposition of warm and cold bands of water of varying widths. This feature, though not so marked, is also noticed below Cape Hatteras.

Throughout the whole stretch of 400 miles in the Straits of Florida, the stream flows with considerably velocity. Abreast of Habana, the average surface velocity in the axis of the stream is about 2½ knots. As the cross-sectional area of the stream decreases, the velocity increases gradually, until abreast of Cape Florida, it becomes about 3½ knots. From this point within the narrows of the straits, the velocity along the axis gradually decreases to about 2 knots off St. Augustine, and 1 knot off Cape Hatteras. These values are for the axis of the stream where the current is a maximum, the velocity of the stream decreasing gradually from the axis as the edges of the stream are approached. The velocity of the stream, furthermore, is subject to fluctuations brought about by variations in winds and barometric pressure.

Crossing the Gulf Stream at Jupiter or Fowey Rocks, an average allowance of 2½ knots in a northerly direction should be made for the current.

Crossing the stream from Habana, a fair allowance for the average current between 100-fathom curves is 1 knot in an east-northeasterly direction.

A vessel bound from Cape Hatteras to Habana, or the Gulf ports, crosses the stream off Cape Hatteras. A fair allowance to make in crossing the stream is 1 to 1½ knots in a northeasterly direction for a distance of 40 miles from the 100-fathom curve.

From within the straits, the axis of the Gulf Stream runs approximately parallel to the 100-fathom curve as far as Cape Hatteras. Since this stretch of coastline sweeps northward, then eastward, in a sharper bend than does the 100-fathom curve, the stream lies at varying distances from the shore.

Earlier systematic observations on the Gulf Stream dealt

with the temperature of the water rather than its motion and the axis was taken to be along the line of highest temperature obtained. Later the axis was taken to mark the line of greatest velocity. Ordinarily it is assumed that the two axes coincide but this is by no means certain. The thermometer, although it indicates the limits of the stream in a general way, is therefore only an approximate guide to the velocity of the current, nor is it to be assumed that the northerly set will be lost when the thermometer shows a region of cold sea water.

The lateral boundaries of the current within the straits are fairly well fixed, but when the stream flows into the sea the eastern boundary becomes somewhat vague. On the western side, the limits can be defined approximately since the waters of the stream differ in color, temperature, salinity, and flow from the inshore coastal waters. On the east, however, the Antilles Current combines with the Gulf Stream, so that its waters here merge gradually with the waters of the open Atlantic. Observations of the Coast and Geodetic Survey indicate that, in general, the average position of the inner edge of the Gulf Stream as far as Cape Hatteras lies inside the 50-fathom curve. The Gulf Stream, however, shifts somewhat with the seasons, and is considerably influenced by the winds which cause fluctuations in its position, direction, and velocity; consequently, any limits which are assigned refer to mean or average positions. A further cause of fluctuation is found in the variations of the current which feed it or which, like the Labrador Current, come in conflict with it. Variations due to tidal currents are now considered as only minor in character.

At the western end of the Straits of Florida the limits of the Gulf Stream are not well defined. Between Fowey Rocks and Jupiter Inlet the inner edge is deflected westward and lies very close to the shoreline.

Along the Florida Reefs between Alligator Reef and Dry Tortugas the distance of the northerly edge of the Gulf Stream from the edge of the reefs gradually increases toward the westward. Off Alligator Reef it is quite close inshore, while off Rebecca Shoal and Dry Tortugas it is possibly 15 to 20 miles south of the 100-fathom curve. Between the reefs and the northern edge of the Gulf Stream the currents are ordinarily tidal and are subject at all times to considerable modification by local winds and barometric conditions. This neutral zone varies in both length and breadth; it may extend along the reefs a greater or less distance than stated, and its width varies as the northern edge of the Gulf Stream approaches or recedes from the reefs.

The approximate position of the axis of the Gulf Stream for various regions is shown on the following Coast and Geodetic Survey charts: No. 1002, Straits of Florida; No. 1007, South Carolina to Cuba; No. 1112, Cape Canaveral to Key West; No. 1113, Alligator Reef to Habana. Chart No. 1001 shows the axis and the position of the inner edge of the Gulf Stream from Chesapeake Bay to Straits of Florida.

Wind currents are very complicated. Their velocities and directions depend upon a number of factors such as the velocity, direction, and duration of the wind, the proximity of the coast and the direction of the coastline. Generally in the Northern Hemisphere the wind-driven current sets somewhat to the right of the wind but in coastal waters there are many exceptions to this general rule, the current often setting to the left of the wind, due to the tendency of the current to follow the direction of the coastline or to other local conditions.

Local wind-current information is not available for the Gulf of Mexico. However, the information on "Wind-driven Currents" in the Tidal Current Tables, Atlantic Coast of North America, should be useful in estimating wind currents in the Gulf.

ROUTES.—On the eastern side of the Gulf of Mexico, for a distance of possibly 100 miles outside the 100-fathom curve, southeasterly currents prevail and velocities as high as 2½ knots have been reported. The Gulf Stream investigations indicated that the strongest current into the Straits of Florida is found near the 1,000-fathom curve westward of Dry Tortugas, and that velocities of 1½ to 2 knots are frequent in that locality. Approaching Dry Tortugas from the Gulf should, therefore, be regarded as a difficult run, as a vessel will overrun her log, and observations are the principal guide; currents may be expected at all times, but variations occur both in direction and velocity, due to the season of the year and the winds. Approaching the passage westward of Rebecca Shoal from northward, a number of vessels have stranded on New Ground, indicating an easterly set.

Junction point for deep-draft vessels bound to or from Gulf Coast ports is **Straits of Florida, 24°25′ N., 83°00′ W.**, which is 14 miles south-southwest of Dry Tortugas Light. The same point is used in the C. & G. S. Distance Table in the Appendix; in H. O. Publication 117, Table of Distances; and in British Admiralty publications.

From Straits of Florida to Cape Hatteras vessels follow the Gulf Stream, pass about 14 miles southward of Rebecca Shoal Light, then follow Florida Reefs about 8 miles off and pass Fowey Rocks at a distance of 10 to 12 miles and Jupiter Inlet Light 15 miles. The velocity of the current varies greatly in different localities and is also subject to sudden changes, due to wind, differences in barometric pressure, and the like, so that no fixed hourly rate can be given. Frequently high velocities will be carried between certain points and suddenly dropping off between others. The position should, therefore, be checked whenever possible by bearings. The ship speed plus supposed rate of current should not be assumed to fix the position. The greatest velocity will be found between Carysfort Reef and Jupiter Inlet, ranging from 2 to 4½ knots.

WEATHER.—The Appendix includes climatological tables for 11 Gulf coast ports and a table of fog-signal operation. Also listed are Weather Bureau offices, coastal warning displays, and radio stations which transmit weather information.

The Gulf coast, from Key West to the Rio Grande, varies from humid and subtropical in southern Florida and southern Texas to a more changeable but generally

warm marine climate in the vicinity of Louisiana and the northeastern Texas coastal bend. Rather even humidity and temperature occur for frequent long periods, with a procession of summer and early fall thunderstorms, and with morning fog or low cloud borne coastward by prolonged southeast Gulf winds during much of the remainder of the year. There also are found many spells of clear air, which form a break between the humid spells, especially along the northern and western coastal sections. Hurricanes in the summer and fall, and northers in the fall and winter, vary in number from year to year.

The whole area lies in a zone of transition between tropical and temperate climates. While there is some land protection from the cool easterly trade winds and ocean weather conditions of the North Atlantic at these latitudes, the shelter is not so marked as if there were high or mountainous land barriers. Moreover, strong air masses of continental origin arrive periodically, especially in winter. The marked warming of the Gulf waters, together with other factors, give rise also to a warm maritime source region of moist air which largely flows shoreward, conditioning the coastal climate. Especially to the Florida Peninsula, the warm Gulf Stream brings a rather even climate over most of the year, with mild winters and without extreme summers. However, the same conditions give rise to a peak of summer thunderstorm activity over this locality.

Average temperatures at coastal cities vary with latitude and exposure, and in winter with respect also to the intensity of northers. Mean annual temperatures range from 67.3° F. at Mobile, which is the northernmost city considered, to 77.6° F. at Key West, which is the southernmost.

Along the Florida coast, wind speeds average 9 knots in March, generally the highest month, most dropping to below 7 knots in August. Along the Alabama and Louisiana coast, wind speeds average 8 or 9 knots in March, dropping to 6 knots in August. Along the Texas coast, wind speeds average 11 knots in April, dropping to 8 knots in August. Winds are most frequently from the northeast to southeast quadrant over the year along the Gulf coast as a whole. In fall and winter, winds tend to blow from the northeast and north at most stations, but spells occur in which winds blow for days at a time from a southerly to southeasterly direction, especially over the western half of the coast. In summer, winds tend to blow from the southeast or south with greater constancy, the mean speed being least in late summer. Southeasterly wind directions prevail at the Texas stations over more of the year than elsewhere. Winds generally tend to blow onshore most often in spring and summer. With daytime heating over land areas, the onshore breezes will be enhanced on sunny days, while at times a reversal of wind direction will occur at night.

Precipitation along the coast falls largely in spells during late fall, winter, and spring months, but tends to fall in showers and thunderstorms during the summer and early fall. However, the gentle coastal slopes do not give rise, in general, to persistent areas of concentrated thunderstorm activity, day after day.

From November to April, inclusive, fog may be encountered occasionally near the coast at any point between San Carlos Bay and the Rio Grande. It is most dense in the vicinity of harbor entrances and of prominent points such as Cape San Blas. Usually southerly winds bring fog, and northerly winds clear it away.

Northers.—Some 30 to 40 polar air masses penetrate from the North American continent to the Gulf of Mexico each winter. During the year some 15 or 20 of these bring forcible northerly winds to the Gulf, and are called northers. Occasionally, local usage has corrupted the term norther to apply to any wind shift to northerly, if accompanied by a temperature drop. The wind itself is of prime importance to sailing vessels and to vessels of small tonnage, and sometimes to large vessels. Seamen usually have in mind a wind of at least 20 knots when speaking of northers, and winds from 25 up to 50 knots or more may occur in severe northers over the Gulf. From 1 to 6 northers are likely to be severe over the Gulf during individual years. Northers ordinarily occur from November to March. Severe northers usually occur from December to February, but occasionally later. January or February, sometimes March, will be the month having the most northers for individual years. Northers generally last about a day and a half, but severe storms may endure for 3 or 4 days.

HURRICANES.—Severe tropical cyclones of the North Atlantic Ocean are usually called West Indian Hurricanes, but actually many of these storms form, move and die far out from the mainland and hundreds of miles from the West Indies. The storm field advances in a straight or curved track, sometimes with considerable speed, at other times at a much slower rate. The areas of the individual storms vary from less than 100 to more than 500 miles in width, with a comparatively calm center. Centers ranging from 4 to 22 miles across have been observed. This center is a region of lowest atmospheric pressure around which winds blow in a more or less circular course, spiraling inward in a counterclockwise direction. The wind at the outer edge of the storm area is light to moderate and gusty, and it often increases toward the center to speeds too high for instrument recording. Although the air movement inside the center or eye of the hurricane is usually light and fitful, the seas in this area are in most cases very heavy and confused, rendered so by the shifting violent winds which surround it. Furthermore, after the center has passed a vessel, she may expect a sharp renewal of the gales, but blowing now from a different and more or less opposite direction. The fully developed tropical cyclone, encompassing many tens of thousands of square miles, is perhaps the most destructive of all storms.

Tropical cyclones occur over all the tropical oceans except the South Atlantic. They form in or near the region of doldrums, or light to calm wind movements near the Equator. In the North Atlantic, hurricanes form over a wide range of ocean between the Cape Verde Islands and the Windward Islands, over the western part of the Caribbean Sea, and over the Gulf of Mexico. While some may

move northward in the beginning, especially those that form southeast of Bermuda, the majority take a westerly to northwesterly course. Of these, some curve gradually northward, either east of or above the larger islands of the West Indies, then turn northeastward or eastward near to or at some distance from the Atlantic Coast of the United States. Others pass over or to the south of the greater islands and enter the Gulf of Mexico, then curve northward or northeastward and strike some part of the east Gulf Coast, or else continue westward and strike the west Gulf Coast. The most common path is curved, the young storms moving generally in a westward direction at first, turning later to the northwestward and then to the northeastward. A considerable number of hurricanes, however, remain in low latitudes and do not turn appreciably to the northward. Freak movements are not uncommon, and there have been storms describing loops, hairpin-curved paths, and other irregular patterns. Movement toward the southeast is rare in the West Indian region, and when it does occur it is of short duration. The entire Caribbean area, the Gulf of Mexico, the coastal regions bordering these bodies of water, and the Atlantic Coast are in danger of disturbances during the hurricane season.

The hurricane season generally begins in June and closes with November. The months of greatest frequency are August, September, and October. Hurricanes are most likely to be severe during August, September, and October. During all the months of the season, however, the chance of encountering an intense storm is great enough to warrant a careful watch of the weather elements in these waters. The June hurricanes which form in the West Indian region usually move in a direction between west and north while they are south of 25° North Latitude. In late September, October, and November, hurricanes of this region are more likely to move in a direction between north and east, passing through the Yucatan Channel, or over Cuba, Florida, or the Bahamas. Of the hurricanes that come from the Atlantic into the West Indies, the majority occur in August and September, and move on a west-northwesterly course in low latitudes, reaching the coast before curving toward the north and northeast. Late in the season, October or November, the movement of hurricanes that form east of the West Indies is often toward the north in the open Atlantic.

The average speed of movement of West Indian hurricanes is about 10 to 13 knots. This speed, however, varies considerably according to the location of the storm, its development and surrounding meteorological conditions. The highest rates of progression usually occur when the storm is moving northward or northeastward in the middle or higher latitudes.

Signs of approach.—One of the earliest signs of a hurricane is the appearance of high cirrus clouds which converge toward a point on the horizon that indicates the direction of the center of the storm. The snow-white fibrous mares' tails appear when the center is about 300 or 400 miles distant. Another usual early indication is a long, heavy swell propagated to a considerable distance, sometimes 2 or 3 days in advance, when there is no intervening land to interrupt it. This swell comes from the general direction in which the storm is approaching. There is usually a slight rise of the barometer at the outset, followed by a continuous fall. In front of the storm, if it is advancing in some westerly direction toward the observer, the winds blow from a northerly point (northeast, north, northwest); if in some northerly direction toward the observer, they will blow from an easterly point (southeast, east, or northeast). A further indication is a rough, increasing sea. If one or more of these signs be wanting, there is little cause for anticipating a hurricane.

As the storm center approaches, the barometer continues to fall. The wind increases in speed and blows in heavy squalls, and the changes in its direction become more rapid. The wind, in general, will back to the left during this time if the center is moving toward the observer's left, or veer to the right if toward his right as he faces into the wind. Rain in showers accompanies the squalls, and when the center comes closer the rain is usually continuous and is attended by furious gusts of wind. The air is thick with rain and spume drift. Objects at a short distance are often hardly visible. If a vessel is on the line of the hurricane's advance, the wind will remain from the same direction, or nearly so, until the center is close to the vessel, or upon her.

Distance of hurricane center.—The distance from the center of a hurricane can be estimated from a consideration of the height of the barometer and the rapidity of its fall, and the velocity of the wind and the rapidity of its changes in direction. If the barometer falls slowly and the wind increases gradually, it may reasonably be supposed that the center is distant. With a rapidly falling barometer and increasing winds, it may reasonably be supposed that the center is approaching dangerously near, the more so if the winds blow closely from the direction of the increasing swell.

Bearings of center.—Facing the wind, the storm center will be 8 to 12 points to the right; when the storm is distant it will be from 10 to 12 points, and when the barometer has fallen 5 or 6 tenths of an inch it will be about 8 points.

A line drawn through the center of a hurricane in the direction in which it is moving is called the storm track, or axis of progression. The semicircle on either side of the axis is called, respectively, the right-hand or dangerous semicircle and the left-hand or navigable semicircle.

If the wind shifts to the right, the vessel will be in the right-hand or dangerous semicircle with regard to the direction in which the storm is traveling. In such case the vessel should be kept on the starboard tack and increase her distance from the center.

If the wind shifts to the left, the vessel will be in the left or navigable semicircle. The helm should be put up and the vessel run with the wind on the starboard quarter, preserving the compass course, if possible, until the barometer rises, when the vessel may be hove to on the port tack. If there is not sea room to run, the vessel can be put on the port tack at once.

Should the wind remain steady and the barometer con-

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tinue to fall, the vessel is in the path of the storm and should run with the wind on the starboard quarter into the navigable semicircle.

In all cases act so as to increase as soon as possible the distance from the center, bearing in mind that the whole storm field is advancing. In receding from the center of a hurricane the barometer will rise and the wind and sea will subside.

Practical rules.—When there are indications of a hurricane, vessels should remain in port or seek one if possible. Changes in barometer and wind should be carefully observed and recorded, and every precaution should be taken to avert damage by striking light spars, strengthening moorings, and, if a steamer, preparing steam to assist the moorings. In the ports of the southern States hurricanes are generally accompanied by very high tides, and vessels may be endangered by overriding the wharf where moored if the position is at all exposed.

Vessels in the Straits of Florida may not have sea room to maneuver so as to avoid the storm track, and should try to make a harbor, or to stand out of the straits to obtain sea room. Vessels unable to reach a port and having sea room to maneuver usually observe the following rules:

When there are indications of the near approach of a hurricane, sailing vessels may heave to on the starboard tack. The safety of the vessel often depends on heaving to in time. Steamers may remain stationary. Both should carefully observe and record changes in wind, barometer and swell so as to find the bearing of the center, and to ascertain by the shift of the wind in which semicircle the vessel is situated.

Pilots for Mobile cruise off the entrance to the Main Ship Channel, 5 miles to the southward of Fort Morgan. Pilots for Galveston and Houston cruise off Galveston entrance. Pilots for Southwest Pass and South Pass into the Mississippi River maintain lookouts at the mouth of the passes and can generally be found outside Southwest Pass. Pilots for Port Arthur, Beaumont, Orange, and Lake Charles maintain a lookout station on the south jetty of Sabine Pass and frequently cruise off the entrance. At Key West, Port Boca Grande, Tampa, Pensacola, and Aransas Pass, pilots maintain lookout stations and meet ships on signal or by previous arrangement. At Panama City, Pascagoula, and Freeport, vessels are met by previous arrangement.

Pilotage is compulsory for certain vessels entering from sea but is not compulsory for the interior waters except the Mississippi River as far as New Orleans. Pilotage is compulsory for vessels in foreign trade and generally for United States coastwise vessels if without a pilot licensed by the Federal Government. Fuller information regarding pilotage at the various ports to and from sea is given under the respective port headings. Pilots for the inside routes may be found at the larger cities and towns; in general, the charge for piloting in interior waters is by special agreement with the pilot.

Harbormasters are appointed for the principal ports and they have charge of the anchorage and berthing of vessels in their respective harbors. Harbor and anchorage regulations for certain ports are given under the respective port headings. The Port Series of publications give full information regarding port regulations. Federal laws prohibit the dumping of refuse material of any kind and of oil into the navigable waters of the United States.

Towboats are stationed at Beaumont, Brownsville, Corpus Christi, Galveston, Gulfport, Houston, Lake Charles, Mobile, New Orleans, Orange, Panama City, Pascagoula, Pensacola, Port Arthur, Port Isabel, Port St. Joe, Tampa, and Texas City.

Salvage Equipment, consisting of tugs, lighters, pumps, derricks, diving apparatus, etc., is available at Key West, Tampa, Pensacola, New Orleans, Port Arthur, and Galveston. The more extensive equipment is available at Mobile, New Orleans, and Galveston.

Repairs.—Tampa, Mobile, New Orleans, Port Arthur, Beaumont, and Galveston are the principal places at which extensive repairs to the hulls and machinery of larger ships can be made. Topside and engine repairs can be made at Pascagoula and Corpus Christi. There are facilities for repairing smaller vessels at Pensacola and Orange. Small vessels and motorboats can be hauled out, and minor repairs to machinery can be made at many other places as mentioned under the descriptions of the different ports.

Supplies.—Tampa, Pensacola, Mobile, New Orleans, Port Arthur, Galveston, Houston, and Corpus Christi are the principal ports where general supplies can be obtained; fuel oil, diesel oil, gasoline, coal, fresh water, ship chandlery, and provisions are available in suitable quantities, except no coal at Corpus Christi. Similar articles (except coal), but in more limited quantities, can be obtained at Fort Myers, Apalachicola, Panama City, Gulfport, Morgan City, Beaumont, and Freeport (quite limited). Coal can be obtained by special arrangement, at most of the other ports, but 1 to 2 weeks may be required for delivery.

Standard time.—Apalachicola, Fla., and the areas east of Apalachicola River use Eastern Standard Time, which is 5 hours slow of Greenwich Mean Time. The areas from Apalachicola River to the Rio Grande use Central Standard Time, which is 6 hours slow of Greenwich.

4. KEY WEST TO TAMPA BAY

Chart 1113.—The **Florida Keys** comprise a chain of low islands along the southeast coast of the Florida Peninsula extending westward in a wide arc to the Dry Tortugas. The keys are mostly of coral formation and are generally covered with dense mangrove, though some have stands of pine and a few have coconut groves.

On the straits side of the keys, and at an average distance of 5 miles, are the **Florida Reefs,** a dangerous line of shoals which extend along the entire length of the chain. The reefs are particularly hazardous because they do not break in smooth weather and few of them are exposed. The water shoals abruptly between the reefs and along their outer edges.

When approaching the reefs from seaward, their proximity usually is indicated by a change in color of the water from deep blue to light green, but too much reliance should not be placed on such indications. Lights and daybeacons facilitate navigation along the reefs in clear weather, but sounding should be resorted to in thick weather. Depths of 50 fathoms indicate a distance of 2 to 3 miles from the reefs, and great caution should be used in approaching closer. Fogs are infrequent in this area.

The water always becomes milky following windy weather. The usual color is bluish green on the reefs, while the rock patches are dark, shading through brown to yellow as they approach the surface. Sand patches are bright green. Grass patches at depths of 10 to 15 feet have the appearance of rocks. With the sun astern, the line marking deep water and the edges of reefs is surprisingly clear from a position aloft.

Boundary lines of Inland Waters.—The lines established for the Key West area are described in **§ 82.55,** Chapter 2.

Chart 584.—**Key West,** on the island of the same name near the western end of the Florida Keys, is a winter resort and the site of a large Navy Base. The city has small cigar and sponge industries, but commerce is mostly in crude and refined oils. The inner harbor (see also Chart 576) lies along the western front of the city and is protected on the eastern side by the island and on the other sides by submerged reefs and sand flats.

Easy to identify when standing along the keys at a distance of about 6 miles are the three 300-foot radio towers north of **Fort Taylor,** the hotel cupola, and the Naval Hospital cupola. Numerous tanks, lookout towers, and masts are prominent but difficult to identify.

Key West Light, 91 feet above the water and visible 15 miles, is shown from a buff conical tower, with green lantern, near the western end of the island. The light structure is not conspicuous.

Sand Key Light, 24°27.2′ N., 81°52.7′ W., 109 feet above the water and visible 16 miles, is shown from a brown square pyramidal structure, on pile foundation, enclosing a stair cylinder and square dwelling. **Sand Key** is on the seaward side of the reefs 7 miles southwestward from Key West Light.

Measured course.—South of Sand Key is a measured course 6,510 feet long on bearing **089°38′.** The westerly front range marker is 140 yards north of Sand Key Light, and the easterly front marker is 50 yards north of Rock Key. The rear markers are about 600 yards north of the front markers. All are slatted white daymarks with vertical black trim.

Main Ship Channel, the only deep-draft approach to Key West, leads from a southerly direction to the harbor; the channel is well marked. Federal project depth is 30 feet, which depth obtained in October 1957, to and including the turning basin at the Naval Operating Base.

Northwest Channel is a medium-draft passage between Key West Harbor and the Gulf. Vessels drawing up to 15 feet can pass directly across the reefs from the Gulf to the Straits of Florida by way of Northwest Channel and Main Ship Channel.

The jetties on either side of the Gulf entrance to Northwest Channel are 0.3 to 0.5 mile from the centerline of the channel, and only the outer part of the east jetty shows above low water. The channel is well marked, but the inner range is hard to identify until within about a mile of the front light. A good landmark for the Gulf entrance is the abandoned gray two-story lighthouse standing on piles in 4 feet of water 0.3 mile southwest of the west jetty. Smith Shoal Light (see Chart 1252), 47 feet above the water and visible 12 miles, is shown from a skeleton structure on piles 5 miles northward from the jetties.

The controlling depth in Northwest Channel was 15 feet in October, 1955. The Gulf end of the channel is shifting westward, and the range no longer leads over the deep water. Vessels should favor the western half when northward of the front range light.

Southeast Channel is marked by buoys and by the easterly edge of a red sector in Key West Light. Depths over the coral heads in the channel are 14 to 18 feet, and it is not recommended for drafts greater than 13 feet. The course through the channel is **321°** for Key West Light.

Southwest Channel, a convenient approach to Key West from southwestward, has been wire-dragged to a depth of 23 feet, and is marked by several buoys. A gen-

eral course of about 055°, along the southerly edge of a red sector in Key West Light, leads to the outer anchorage and Main Ship Channel. Strangers should not attempt passage by night.

West Channel, a passage leading westward from Key West between the keys and outer reefs, is deep and fairly well marked. It is used by small boats bound toward the Dry Tortugas.

Calda Channel leads northward from Man of War Harbor to the open waters of the Gulf. The channel is narrow and crooked, but is well marked by daybeacons and a light at the northerly end. Barges drawing 6 feet occasionally get through under favorable conditions. The channel should be used only with local knowledge and during good visibility.

Anchorages.—The best anchorage is north of the city in **Man of War Harbor** where depths are 19 to 26 feet. This, the usual quarantine anchorage, is protected against heavy seas by the coral banks on the west and **Fleming Key** on the east. Small craft usually anchor in **Key West Bight** or **Garrison Bight** on the north side of the city.

Vessels can anchor west of the city in depths of 20 to 30 feet, taking care, however, to avoid the reefs which rise abruptly in some places along the edges of the channels. The outer anchorage, southwest of Fort Taylor, is somewhat exposed, but has depths of 22 to 36 feet and is safe for vessels with good ground tackle; this is one of the best anchorages south of Chesapeake Bay for large vessels.

Tides.—The mean range of tide is 1¼ feet in Main Ship Channel and at Key West, and 2½ feet at the Northwest Channel jetties. Daily predictions of times and heights of high and low water at Key West are given in the Tide Tables.

Currents.—In the southern approaches to Key West within the 10-fathom curve the currents are weak and variable. In the channel west of Key West the flood (northerly) and the ebb (southerly) currents average 1 and 1½ knots respectively. North of Key West in Man of War Harbor the tidal currents average three-fourths knot. In Northwest Channel about 2.5 and 5.5 miles from Key West the tidal currents average 1¼ knots and one-half knot respectively. Daily current predictions for the channel west of Key West are published in Tidal Current Tables; daily predictions for several locations in nearby channels can be obtained through the use of table 2 of the same publication. However, both the time and velocity of the current are influenced by winds.

Coastal (storm) warnings are displayed at several places; see Appendix.

Pilotage.—Pilotage is compulsory for vessels in foreign trade, and also for vessels in coastwise trade except those drawing less than 6 feet or having on board a pilot licensed by the United States Coast Guard. Vessels carrying United States mails pay one-half pilotage rates. The usual procedure is to radio ahead for a pilot, but they can always be obtained by making signal from outside the reefs, and they will take a vessel in at night. Fast boats carry pilots out to waiting ships in 20 minutes. Fishermen at Key West are available as pilots for Hawk Channel.

Special service by pilot boat.—Vessels frequently find it convenient to make use of a special service performed by the pilot boat at Key West. If requested by radio or telegraph, the pilot boat will meet vessels at the bar buoy, Main Ship Channel, to deliver orders or provisions or take off persons for hospitalization at Key West. The charge for this service, day or night, is one-half pilotage rate.

Quarantine.—Vessels subject to quarantine inspection are boarded off Fort Taylor, and no vessel is permitted to dock before obtaining pratique. The quarantine anchorage is in Man of War Harbor if size and draft of vessel permits. Larger vessels anchor in the outer harbor.

The **Public Health Service** maintains an outpatient office at Key West. In addition to the municipal and Navy hospitals, one private hospital is available.

Customs.—Key West is a customs port at which marine documents are issued.

Immigration.—The office of the Immigration Service is in the Federal Building.

Harbor regulations.—The harbormaster has direct supervision of the port, of anchoring and mooring all vessels, and collection of port dues. A speed limit of 10 miles per hour is enforced in Main Ship Channel between buoy 10 and the inner harbor.

Terminal facilities.—There are 9 wharves, three of which are Government owned, with 2,000 feet of berthing space; three of six privately owned docks are in poor condition. Several warehouses and two transit sheds for petroleum products and general merchandise are near the wharves.

Supplies.—Diesel oil, gasoline, fresh water, ship chandlery, marine supplies, and good hotel accommodations can be obtained. Until an 18-inch pressure line for fresh water from the mainland was installed, Key West depended entirely on rain water for its water supply. The usual charge is 1 cent per gallon. Since Key West is less than an hour's run off the main route for ships passing the southern end of Florida, it is a convenient port of call for fuel and provisions. Local arrangements can be made for delivery of supplies and provisions to vessels in the Gulf Stream.

Repairs.—Three repair yards are located in Key West Bight. The larger can handle general repairs on boats up to 600 tons in weight, 120 feet in length, and 10 feet in draft.

Towage.—There is no commercial towboat service. Key West is the regular station for a large salvage tug. General equipment is available for heavy salvage work.

Communications.—There are no rail connections at Key West. Movement of freight in and out of the port is by vessel or truck. The Overseas Highway connects the city with Miami and points north, and there is air service to Miami and Cuba. A barge line maintains weekly freight service between Key West and Miami. An auto and passenger ferry operates between Key West and Habana.

Safe Harbor, on the south side of Stock Island, is a deep-water port with depths of 20 to 30 feet. There are shrimp-packing facilities here. Gasoline, fresh water, die-

sel fuel, ice, and general supplies are obtainable; there are transfer and storage facilities. A ferry service carrying passengers, automobiles, and freight cars operates to Habana, Cuba, where connection is made with the Palm Beach-Habana ferry. The same pilotage, customs, and similar services provided at Key West are available in Safe Harbor.

Charts 1252, 1351.—From Key West to Dry Tortugas, the section consists of the continuation of the keys, with their intervening reefs and shoals, for some 62 miles westward of Key West. The keys are low, small in extent, and, except for the Dry Tortugas, generally covered with dense growths of mangrove.

About 5 miles south of the main chain of keys and reefs is a line of reefs, shoals, and generally broken ground which rises abruptly from the deep water of the Straits of Florida. Buoys, lights, and daybeacons mark the outer reefs. Deep-draft vessels standing along the keys should avoid this broken ground and also the areas with depths less than 10 fathoms, southward and westward of Rebecca Shoal and the Dry Tortugas.

Currents are variable along the edges of the reefs, being influenced by winds, by differences of barometric pressure in the Gulf and the Straits of Florida, and by the tides. There are strong tidal currents through the passages between the keys.

Between Key West Harbor and Boca Grande Channel there is an extensive shoal area in which are several small scattered keys. The white sand beaches of the southernmost keys are easily discernible from seaward.

Boca Grande Channel, between **Boca Grande Key** and the Marquesas Keys, is about 15 miles westward from Key West. The channel has a controlling depth of about 11 feet from the Straits of Florida to the Gulf of Mexico, and is marked by buoys, but is seldom used except by local boats of 6 feet or less draft. The channels through Key West Harbor are deeper and better marked, and offer a shorter passage from the Gulf to the east coast. Good anchorage is available 1 mile northeastward of Boca Grande Key for boats drawing less than 5 feet.

Currents.—In Boca Grande Channel the average velocity of the current at strength is 1¼ knots; the flood current sets northward and the ebb southward. The velocity of the current is considerably influenced by the winds.

The **Marquesas Keys,** on the west side of Boca Grande Channel, are 4 miles by 3 miles in extent and surrounded by a large shoal area. The northernmost key is the largest and has a strip of sandy beach free of mangrove.

Mooney Harbor, a good anchorage for drafts of 4 feet or less, is inside the Marquesas. The anchorage is entered between **Gull Keys** and **Mooney Harbor Key** from a south-by-east direction, passing well to eastward of the coral heads a mile south of the opening. **Ellis Rock,** 4 miles northwest of the Marquesas, is covered 7 feet and surrounded by depths of 21 to 39 feet; the rock is marked by a daybeacon.

Danger zones of bombing areas are in the vicinity of the Marquesas Keys; limits and regulations are given in **§ 204.95, Chapter 2.**

A large shoal, the western part of which is known as the **Quicksands,** extends 18 miles westerly from the Marquesas. The shoal is about 4.5 miles wide between the 18-foot curves and has depths as little as 2 feet over its eastern part. At the western end of the Quicksands is **Halfmoon Shoal,** which has a least depth of 10 feet.

About 5 miles north of Quicksands, is **New Ground,** a narrow ridge 6 miles long in an east-west direction. The least depth of 4 feet is near the lighted whistle buoy marking the western end of the ridge. The water shoals abruptly on the north side of New Ground, and vessels should stay in depths greater than 13 fathoms to insure clearing the shoal.

Between New Ground and the Quicksands is a natural channel about 2 miles wide with depths greater than 30 feet. The channel is used by a Coast Guard supply vessel on its weekly trip from Key West to Dry Tortugas. The route should be used with caution because of the general irregularity of the bottom inside the 10-fathom curve.

A channel sometimes used by vessels drawing as much as 18 feet lies west of Halfmoon Shoal, but is not recommended. Southwest of Halfmoon Shoal several depths of 20 to 22 feet rise abruptly from depths of about 40 feet.

Isaac Shoal, 5 miles west Halfmoon Shoal and 2 miles southeast of Rebecca Shoal, has a least known depth of 14 feet. Isaac Shoal rises from depths of 36 to 60 feet.

Rebecca Shoal, 43 miles west of Key West, is a small coral bank with a least depth of 11 feet. **Rebecca Shoal Light,** 66 feet above the water and visible 14 miles, is shown from a white dwelling on a brown pile foundation on the southerly edge of the shoal.

Currents.—Between Halfmoon Shoal and Rebecca Shoal the current floods northward with a mean velocity at strength of about one knot and ebbs southwestward with a mean velocity of about one-half knot. The velocity of the current is considerably influenced by the wind.

Chart 1351.—**Rebecca Shoal Channel,** immediately westward of Rebecca Shoal Light, frequently is used by vessels bound from the Straits of Florida to points on the west coast of Florida. Vessels bound for Mobile and points west pass to the westward of the Dry Tortugas.

So far as known, Rebecca Shoal Channel is clear, but possibly there are undiscovered spots with lesser depths than those now charted. Deep-draft vessels should use the passage with great caution, and should continue about 15 miles past the lighted bell buoy marking the 28-foot shoal south of the Quicksands before turning northward. The passage is well lighted.

Chart 585.—The **Dry Tortugas** are a group of small sandy keys and reefs 58 miles westward from Key West. The group is about 10 miles long, in a northeast-southwest direction, and 5 miles wide. **Pulaski Shoal,** at the northeastern end of the group, is 12 miles northwestward of Rebecca Shoal. **Pulaski Shoal Light,** 49 feet above the water and visible 12 miles, is shown from a black skeleton tower on piles on the east side of the shoal.

The keys are low and irregular, and have a thin growth of mangrove. In general, they rise abruptly from

deep water and have fairly good channels between them. They are continually changing in size and shape.

Garden Key is the site of historic **Fort Jefferson,** a hexagonal-shaped structure with great walls 425 feet long rising from a surrounding moat. An abandoned lighthouse, 67 feet high, is behind the southeast bastion. The fortress, once a military prison, is now a National Monument administered by the National Park Service.

In 1955 the southerly and northerly of the three wharves on the eastern side of the key were in ruins. The center wharf, off the southeast front of the fort, was in good condition, with 20 feet of water alongside. No fuel, provisions, or fresh water were available for visiting craft.

Fort Jefferson National Monument.—Garden Key and the surrounding waters of the Dry Tortugas have been reserved as Fort Jefferson National Monument, and are subject to rules and regulations prescribed by the Secretary of the Interior.

Loggerhead Key, the other of the two principal keys in the Dry Tortugas, is 2.5 miles westward of Garden Key. **Dry Tortugas Light, 24°38.0′ N., 82°55.2′ W.,** 151 feet above the water and visible 19 miles, is shown from a conical tower, lower half white and upper half black, near the center of Loggerhead Key. A radiobeacon is at the light. **Coastal (storm) warnings** are displayed daytime only.

Fort Jefferson and Dry Tortugas Light are good landmarks and can be seen at a distance of 10 to 12 miles on a clear day. Fort Jefferson has the appearance of a bare rocky island.

When approaching the Dry Tortugas from eastward or southeastward, soundings give little warning of danger, as depths of 10 to 15 fathoms are found close to the reefs in many places. The water shoals more gradually in the approaches from northwestward or southwestward, but an approaching vessel should stay in depths greater than 15 fathoms if uncertain of her position.

Southeast and Southwest Channels are the principal approaches; both are buoyed and the shoals can be identified on a clear day by the difference in color of the water. Northwest Channel is unmarked.

Southeast Channel skirts the reefs south of **East Key** and **Middle Key,** and passes between **Hospital Key** and **Iowa Rock** off **Bush Key Shoal.** The reefs south of Middle Key can be cleared by keeping south of a line through the abandoned lighthouse on Fort Jefferson and Dry Tortugas Light. The channel has depths of 30 feet or more, but it should be used with caution by vessels drawing more than 18 feet.

Southwest Channel leads between the reefs westward and southwestward of Garden Key and those off Loggerhead Key. The least depth found along the buoyed channel is 34 feet, but the same caution is advised as with Southeast Channel. A lighted whistle buoy marks the entrance to Southwest Channel.

Among the reefs and keys are numerous places where vessels can anchor and find shelter from seas from various quarters. The best shelter, although somewhat open to the northward, is northward and northwestward of Garden Key. The holding ground is good and the depths range from 8 to 10 fathoms.

Excellent anchorage for small craft is found in the deep water of Bird Key Harbor, reached through the narrow channel encircling Garden Key, which is well marked. The entrance to **Bird Key Harbor** is narrow and care is required to avoid the shoals on either side. The main entrance channel is marked with buoys.

Anchorage **regulations** for Tortugas Harbor are stated in **§ 202.190,** Chapter 2.

In Southwest Channel one mile south of Loggerhead Key, the **current** floods northward and ebbs southwestward with an average velocity at strength of about one-half knot.

Pilots are not available at the Dry Tortugas, but fishermen at Key West will pilot vessels between the two places.

Chart 1351.—For 10 miles westward from the Dry Tortugas the bottom is broken and irregular, and consists of coral rock with patches of sand and broken shell. **Tortugas Bank,** the shoalest part of this area, is 7 miles west of Loggerhead Key and has a least known depth of 38 feet. Depths less than 10 fathoms are found for a distance of 2.5 miles in all directions. Between Tortugas Bank and the Dry Tortugas the depths range from 10 to 19 fathoms. Deep-draft vessels should avoid Tortugas Bank, especially in heavy weather.

Chart 1113.—From Cape Sable to San Carlos Bay the west coast of Florida is low, sandy, and generally wooded, and has few distinguishing features. Back of the coast is an extensive swampy region, thinly settled, known as the Everglades. Off the coast the water is generally shoal, and the 10-fathom curve roughly approaches a line drawn north-northwestward from Key West to Tampa Bay. This part of the coast is seldom approached by deep-draft vessels.

Moderate-draft vessels bound up the coast from Key West can lay a straight course from Northwest Channel to Sanibel Island Light at the entrance to San Carlos Bay, a distance of 118 miles from Key West. This course is well clear of all dangers, and the light on Sanibel Island is a good landmark either day or night. On account of the frequency of northers during the winter months, this track is not recommended for small craft, and the route across Florida Bay is to be preferred.

Chart 1251.—**Moser Channel,** 36 miles eastward of Key West, affords passage between the keys from the Gulf of Mexico to Hawk Channel for vessels of 7 to 8 feet in draft. The highway bridge over Moser Channel has a swing span with a horizontal clearance of 107 feet and a vertical clearance of 24 feet.

The tidal current at the Moser Channel bridge has an average velocity at strength of about 1½ knots. Wind effects modify the current velocities considerably at times; easterly winds tend to increase the northward flow and

westerly winds the southward flow. Overfalls that may swamp a small boat are said to occur near the bridge at times of large tides.

Chart 1250.—Florida Bay, a triangular-shaped body of water between the Florida Keys and the south coast of the mainland, extends in a general east-west direction from Barnes Sound to Cape Sable. Depths are shallow and irregular; the bottom is mostly coral, with a thin covering of silt in the eastern part. From April to October the waters of the bay are clear and the shoals plainly discernible, but during the winter months the water frequently turns milky and renders the shoals indistinguishable.

In the eastern part of the bay are numerous ridges and reefs which are bare, or nearly bare, at low water. The western part of the bay has depths ranging from 7 to 13 feet, and the bottom is covered with loggerhead sponges and small coral heads.

Flamingo, on the mainland about 9 miles east of East Cape, is a settlement at the entrance of the **Flamingo-Coot Bay Canal.** An entrance channel, dredged from the 7-foot contour in the bay to the canal entrance, in 1954 had a controlling depth of 5½ feet. The channel is marked by a light and daybeacons. The fixed bridge about 0.5 mile above the mouth of the canal has a horizontal clearance of 45 feet and vertical clearance of 7½ feet.

Charts 1253, 1254.—Cape Sable, the low and wooded southwestern tip of the Florida Mainland, has three points known as **East Cape, Middle Cape,** and **Northwest Cape.** These are relatively steep-to and are partially cleared.

Boundary lines of inland waters.—Lines from the Marquesas to Cape Sable are described in **§ 82.60,** Chapter 2.

Small vessels can find good anchorage 1.5 miles southeast of East Cape in 8 to 10 feet of water. The even marl bottom is good holding ground, and the anchorage is well protected from northerly winds. A drainage canal opening into Florida Bay 1 mile east of East Cape offers good protection for any boat that can enter. A depth of 2 to 3 feet can be carried into the canal at low water by approaching from due south. Only trappers and fishermen frequent this area.

From Northwest Cape the coast trends north for 20 miles, then northwestward about 30 miles to Cape Romano. Along this stretch of coast are the **Ten Thousand Islands,** innumerable small islands and keys interlaced by a network of small rivers and bayous leading to the interior. The islands and keys are generally lumps of mud, low and densely wooded, and almost impossible for a stranger to identify. Small in size, they are mostly awash at high water and fringed with oyster reefs.

Nothing stands out prominently along this section of the coast, but Shark River Island, Shark Point, and Highland Point can be identified by their slightly higher growths of timber. The water is shallow for a distance of 10 miles from the coast, depths of 7 feet being found as much as 3 miles offshore. With local knowledge, drafts of 3 to 6 feet can be carried into many of the rivers.

The rivers and inland lakes to the north of Northwest Cape are frequented mostly by hunting and fishing parties, particularly during the winter season. Strangers are advised to hire guides at Marco or Everglades. The rivers afford good anchorage for craft able to cross the bars off the entrances.

Charts 598, 599.—Ponce de Leon Bay, known locally as **Shark River Bight,** is a nearly rectangular bight, 2 miles wide and 1.5 miles in depth, 7 miles north of Northwest Cape. **Shark Point,** on the north side of the bight, and **Shark River Island,** on the south side, are heavily wooded to the water's edge, and stand out in bold relief against the tree line at the head of the bight. The northern part of the bight is shallow, but fair anchorage is available for vessels up to 6 feet in draft off Shark River Island. The anchorage is sheltered from winds east of north or south, and the shoal on the northwest affords considerable protection from that direction. Several narrow streams empty into the head of the bight. Boats drawing up to 5 feet can continue into the southernmost of these streams.

The area for some 10 miles east and southeast of Ponce de Leon Bay is a complicated network of tidal channels around thousands of mangrove islands. These channels lead or enlarge into Oyster, Whitewater, and Tarpon Bays, from which, in turn, shallow rivers lead back into the Everglades. Generally, a depth of 5 feet can be carried through the various passes into Oyster and Tarpon Bays by giving a good berth to the points, which often have tidal bars projecting out from them.

Oyster Bay, about 2 miles inland from the southeast corner of Ponce de Leon Bay, is 1.5 miles wide east to west, and 4 miles long north to south. At the southern end of Oyster Bay is the entrance to **Joe River,** a tidal channel extending some 10 miles in a southeasterly direction to the southern end of Whitewater Bay. A depth of 5 feet can be carried through Oyster Bay and Joe River by avoiding occasional bars.

A small-boat route, marked by daybeacons, leads from Oyster Bay through **Cormorant Pass** and Whitewater Bay to Coot Bay.

Numerous channels lead easterly from Oyster Bay through a belt of mangrove about 2 miles wide into **Whitewater Bay.** The latter is about 10 miles long and 5 miles wide, has numerous low mangrove islands, and its salt water is from 2 to 6 feet deep. At the southern end of Whitewater Bay **Tarpon Creek** leads into **Coot Bay,** which is about 1 mile in diameter and 3 feet deep. Boats going to and from Whitewater and Coot Bays use Joe River, which is the southernmost passage, is easy to follow, and is deep enough for all boats that can navigate the bays.

Shark River is the channel emptying into the middle of the east side of Ponce de Leon Bay. Some 8 miles northeastward, the channel enlarges into **Tarpon Bay,** which is about 0.3 mile wide and 3 miles long. A depth of about 5 feet can be carried through Shark River and Tarpon Bay. Shallow rivers lead north and east from Tarpon Bay into the Everglades.

Harney River, emptying into the Gulf about 2 miles

north of Shark Point, is a good passage to Tarpon Bay. Numerous bars at the entrance limit the practicable depth to 2½ feet at low water.

Broad River and **Rodgers River** enter the Gulf about 5 miles north of Shark Point. About 3½ feet can be taken over the bar 1.5 miles southwest of the entrance to Broad River. Vessels of that draft can anchor just outside the mouths of the rivers and be protected from the sea by the bars outside. These rivers extend back into the Everglades for about 15 miles. About 6 miles from the coast they connect with a chain of shallow bays and creeks which extend northward along the coast for some 60 miles. Launches drawing up to 1½ feet can traverse these inside passages from Broad River to Naples.

Little Shark River, which empties into the Gulf on the south side of Shark River Island, is a good channel to Oyster Bay for vessels drawing 4 feet or less. The river also provides anchorage of limited extent but well protected. The entrance to the river is marked by a light and daybeacons.

Lostmans River is entered through **First Bay,** which is about 10 miles northward of Ponce de Leon Bay. Local boatmen use the north entrance to the river. A depth of about 3 feet can be carried some 10 miles back into this river, which drains a large area of shallow bays.

Chart 1253.—Seminole Point (Plover Point), 24 miles northward from Northwest Cape, is fairly prominent when standing up the coast at a distance of 2 to 3 miles off. The point is the southwest end of **Plover Key**, and is the most westerly land seen until Pavilion Key is picked up to the northwestward.

Limited anchorage, protected in all weather, is available for boats drawing up to 4 feet between the keys of the group northwest of **Snake Key.** Approach the south end of the group on an easterly course and follow the shore at a distance of about 50 yards until in the landlocked harbor between the keys.

Chart 1254.—Pavilion Key, 30 miles northward of Northwest Cape, is the first prominent land seen after leaving Seminole Point. Anchorage is available for drafts of 4 to 5 feet off the easterly point of the southern end of Pavilion Key. The approach to the anchorage passes close to westward of the small key 0.3 mile southeast of Pavilion Key.

Chatham River and **Huston River** empty into the Gulf opposite Pavilion Key. These rivers offer a connection to the system of shallow bays which parallel the coast. A draft of about 2 feet can be taken up these rivers, but local knowledge is necessary to avoid the numerous bars.

Jewel Key, 6 miles north-northwestward from Pavilion Key, marks the entrance to **Chokoloskee Pass,** the approach to the town of Chokoloskee. Jewel Key is a small flat island, easily identified by two prominent clumps of trees.

Chokoloskee (P. O.), about 3 miles east-northeastward from Jewel Key, is a small settlement where gasoline, oil, water, and ice can be obtained; general supplies are trucked in from Everglades. A small repair yard on the east side of the island has a marine railway which can haul out craft 30 to 40 feet in length; facilities are available for hull and minor engine repairs.

With local knowledge, a draft of 3 feet can be taken at high water through **Chokoloskee Bay** from Chokoloskee to the town of Everglades. The channel is not marked.

To enter Chokoloskee Pass, pass 200 yards southeast of Jewel Key on a northeasterly course. The channel also can be entered from the north side of Jewel Key. Leave the small island east of Jewel Key about 200 yards to starboard, and continue in an east-northeasterly direction for 1.7 miles. The channel then turns southeasterly for 0.5 mile, then generally northeasterly to Chokoloskee. The upper part of the channel is very crooked, and is sometimes marked by stakes on piles with pointers. Vessels should proceed carefully to avoid the numerous oyster bars. A draft of about 2½ feet can be carried to Chokoloskee.

Rabbit Key Pass, 1.5 miles south of Chokoloskee Pass, is sometimes used by local fishermen to enter Chokoloskee Bay. A depth of about 4 feet can be carried at high water into this pass and about 3 feet to Chokoloskee. This pass is not marked, and local knowledge is necessary.

Indian Key Pass, 8 miles northwest of Pavilion Key, is the approach to the town of Everglades. The channel is marked by a light off the south end of Indian Key and by numerous daybeacons between Indian Key and the town. Local knowledge is required to avoid the bars along the channel. In November 1955 the controlling depth in Indian Key Pass was 5 feet, and 4½ feet to Everglades.

Indian Key, on the west side of the entrance to the pass, is about 0.6 mile long and 200 yards wide, and lies with its major axis in a north-northeast and south-southwest direction; it is wooded and, except for its shape, resembles the neighboring keys. Good anchorage is available in Indian Key Pass about 700 yards northeast of Indian Key in depths of 8 to 13 feet, and about 1 mile northeast of the key in 12 to 15 feet, gravel bottom. The anchorage is well protected from all winds, is suitable for drafts up to 7 feet, and is easily entered day or night.

To enter Indian Key Pass, steer **030°** from the buoy 3.5 miles off Indian Key and pass 100 yards southeastward of the light at the entrance. The channel extends 2 miles in a northeastward direction from the light, then eastward for about a mile. From here the channel turns northeastward and is very crooked to the point where it emerges from the mangrove into the straight dredged cut across Chokoloskee Bay to the entrance to **Barron River.** A small rock shoal has been reported to be in the dredged cut northeastward of Daybeacon 25.

Everglades (P. O.), about 0.5 mile above the mouth of Barron River, is a small town which is the center of a commercial and sport-fishing industry, and for the truck farming of the nearby interior. It is the southern terminus of a branch of the Atlantic Coast Line Railroad, and is 3 miles by connecting highway from the Tamiami Trail, the State highway between Tampa and Miami. The town has a telegraph office, several stores, a hospital, a theater, and two hotels. Gasoline, diesel oil, fresh water, and ice

are available at the waterfront, which is bulkheaded and affords excellent berthage to vessels able to enter the river. Marine hardware and supplies can be secured in town. The shipyard has a railway which can haul out boats up to 45 feet in length and 4 feet in draft; some engine repairs can be made. Pilots and guides are available in Everglades. **Costal storm warnings** are displayed, daytime only, from the post office.

West Pass, 2.8 miles northwestward from Indian Key, extends generally northeastward for 3 miles from the north side of **Tiger Key** to **West Pass Bay.** A draft of 2 feet can be taken to West Pass Bay, thence westward into Chokoloskee Bay and southwestward to Barron River and Everglades. West Pass is unmarked.

Fakahatchee Pass, 4 miles northwestward from Indian Key, extends northeastward for 3 miles from the west side of **Round Key** to **Fakahatchee Bay. Fakahatchee** is a small settlement on an island on the south side of the bay. No supplies are available at the settlement.

Cape Romano is the south end of a large island 78 miles northward from Key West. Here the coast changes its trend from northwest by west to north-northwest.

Northward of Cape Romano deep water approaches the coast much more closely than it does south of the cape, and the coast is quite regular in outline although broken by many small inlets. The 12-foot curve is less than 0.5 mile offshore except at the entrances to some of the passes. The mouths of the passes are usually small and difficult to recognize unless close to shore. A white gabled house and a brown school building, both on high ground in Collier City, are conspicuous from the southwest. Readily identifiable are the lights at Caxambas and Big Marco Passes, and the pier, buildings and water tank at Naples.

Cape Romano Shoals, extending 10 miles southward from the cape, are a series of irregular patches that bare in places near shore and have depths of 1 to 10 feet over them farther off. A lighted whistle buoy marks the south end of the shoals. There is a strong current around the shoals, particularly on the seaward side and during spring tides. The flood current sets southward and the ebb northward.

Gullivan Bay is between Cape Romano and the islands to the eastward. At the head of the bay is **Coon Key** which marks the southern approach to Big Marco River and also the route westward to Caxambas Pass. On the approach from southeastward, Coon Key can be seen from the deck of a launch 7 miles off. At that distance, it stands clear of adjacent keys, and only a few detached spots on the west side of Cape Romano are visible. As Coon Key is neared, the land behind becomes visible, but the key stands well above everything in the vicinity. When nearly up to the key, the entrance to Big Marco River is seen to eastward as a narrow gap between the more distant keys. There is a light off the southern end of Coon Key.

Caxambas Pass, 4 miles northwestward from Cape Romano, is the entrance to a passage which leads eastward through **Caxambas Bay** to Gullivan Bay and Big Marco River. The distance from the pass to Coon Key is about 6 miles. The controlling depth over the shifting bar at the entrance to the pass and through the inside passage was 3½ feet in November 1955. A light marks the pass, and the inside passage is marked by daybeacons. Guides for Caxambas Pass and other passes in the vicinity can be obtained at Everglades or Marco.

Collier City is a small village on the north shore of Caxambas Bay. The wharves and piers are in ruins.

Goodland (P. O.) is a small fishing village on Big Marco River where groceries and some marine supplies, gasoline, ice, and bottled drinking water may be obtained. A small marina has storage facilities for boats up to 30 feet in length, and craft slightly longer than that can be handled on the marine railway for hull and minor engine repairs. Telephone and telegraph services are available; there are guides and boats for fishing parties.

Big Marco Pass, 8 miles northward from Cape Romano, is marked by a light. The channel over the bar is subject to change, and the buoys marking it are shifted from time to time. Shoals extend a mile seaward on either side of the channel; these usually are indicated by breakers or discolored water. A shoal which uncovers at low water extends about 250 yards northwest from the light. The controlling depth over the bar was 6½ feet in November 1955.

Big Marco River trends eastward and then southward for about 11 miles from Big Marco Pass to Gullivan Bay, and affords a through passage behind Cape Romano for a draft of 4 feet. The channel, though narrow and crooked, is well marked by daybeacons. The approach from Gullivan Bay is over a shoal with a depth of 4 feet and is marked by the light off Coon Key. This approach is protected from all directions except southeast to southwest, and any sea from those directions is reduced by the wide expanse of gradually shoaling water. Local knowledge of conditions is necessary to carry the best water through the channel.

The highway bridge over Big Marco River 3 miles north of Coon Key has a swing span with a horizonal clearance of 50 feet and a vertical clearance of 7½ feet. Two overhead cables cross the river, the one just below the bridge having a permit clearance of 40 feet, and the one above, 61 feet.

Marco (P. O.) is a small settlement on the south bank of Big Marco River 1 mile in from the light in Big Marco Pass. The town, a distributing point for the surrounding area, has hotels and a general store where gasoline, bottled drinking water, ice, groceries, and some marine supplies can be obtained. Telephone and telegraph services are available. Marco is connected with the Tamiami Trail highway some 11 miles inland.

Guides may be engaged for fishing parties or passing yachts. A marine railway has facilities for hull and minor engine repairs, and can haul out craft up to 45 feet in length and 6 feet in draft. A small auto ferry operates across Big Marco River between Marco and The Isles of Capri.

Directions.—Approaching Big Marco River from Gullivan Bay, a course of **325°** from a position 0.3 mile northeast of the light off Coon Key leads between the north

end of Coon Key and Big Marco River daybeacon 2. Then follow the daybeacons. A 4-foot shoal immediately north of the highway draw is one of the shallowest parts of the passage. After passing through the draw, head north-northeast for 100 yards before heading north along the main channel. Another shoal is along the line of the razed railroad bridge between Daybeacons 11 and 22; cross this area on a **270°** course to a position 100 feet north of Daybeacon 22. From the light in Big Marco Pass, follow the channel buoys to the lighted buoy off the pass, but be guided by breakers and discolored water.

An inside passage extends about 11 miles northerly from Marco to Naples through creeks and dredged channels. Federal project depth is 6 feet, which obtained in November 1955; the waterway is well marked.

Hurricane Pass, 1.5 miles northward from Big Marco Pass, was cut through the barrier beach by a hurricane. The controlling depth in the pass is 7 feet, but the channels inside have shoaled to less than 2 feet and the pass is seldom used.

Little Marco Pass, 3 miles northward from Big Marco Pass, had a depth of 2 feet over the bar in November 1955. The pass is unmarked and is little used.

Gordon Pass, 8 miles northward from Big Marco Pass and 2.5 miles south of Naples, is unmarked. A bar extends off the pass beyond a line of old piling which are broken off and submerged. In November 1955 the controlling depth over the bar was about 2 feet. The pass is used only by very small boats. An overhead power cable over the pass has a permit clearance of 65 feet.

Naples (P. O.), a town on the outer coast 11 miles north of Big Marco Pass, has a telegraph office, hotels, several general stores, and an ice plant. It is on the Tamiami Trail and the Atlantic Coast Line Railroad.

A tall water tank in Naples and a radio tower on the eastern edge of town can be seen for a considerable distance offshore; on a clear night the radio tower light is visible 18 miles off. The municipal fishing pier extends 1,000 feet out into the Gulf from the beach at Naples.

Three shipyards on **Naples Bay,** the head of the inland passage from Marco to Naples, can make hull and engine repairs. Boats up to 50 feet in length and 6 feet in draft can be hauled on the largest marine railway. The Municipal Dock at **Crayton Cove** provides wharfage for pleasure craft. Gasoline, diesel oil, fresh water, ice, and general supplies are available at Naples.

Coastal (storm) warnings are displayed, daytime only, at Crayton Cove.

Chart 473.—San Carlos Bay, 41 miles north-northwestward from Cape Romano, is largely filled with shoals on which the depths vary between 1 and 6 feet, and is of importance chiefly as the approach to Caloosahatchee River. The bay and adjacent waters are frequented mostly by small vessels and yachts, and are popular with tourists and fishermen during the winter months.

Sanibel Island Light, 98 feet above the water and visible 16 miles, marks the westerly side of the entrance to San Carlos Bay. The light is shown from a brown square pyramidal skeleton structure, inclosing a stair cylinder, on **Point Ybel,** the eastern end of **Sanibel Island.**

Boundary Lines of Inland Waters.—The lines established for San Carlos Bay and tributaries are described in § **82.65,** Chapter 2.

Federal project depth in San Carlos Bay is 12 feet from the Gulf to Punta Rasa and the mouth of Caloosahatchee River. In November 1955 the controlling depth was 10½ feet. The channel is marked by a lighted range and several daybeacons.

Estero Pass opens into the eastern end of San Carlos Bay 2.6 miles from Sanibel Island Light. Small vessels can find secure anchorage just inside the pass. The narrow entrance channel is buoyed. Beyond the buoys, the channel widens and is easy to follow for a considerable distance into the pass.

A concrete highway bridge over Estero Pass connects **Estero Island** with Fort Myers and the Tamiami Trail. The bridge has a swing span with a horizontal clearance of 57 feet and vertical clearance of 7½ feet. The nearby power cable over the pass has a permit clearance of 69 feet.

A draft of 10 feet can be taken to safe anchorage inside the entrance to Estero Pass, and it is reported that a draft of 4½ feet can be taken back of Estero Island through **Matanzas Pass** and **Estero Bay** and out **Big Carlos Inlet,** at the southeast end of the island, by way of a channel marked by privately maintained daybeacons. Caution should be observed in making through passage as Matanzas Pass and Estero Bay are unsurveyed and the daybeacons are uncharted. In entering over the bar at Big Carlos Inlet, the deepest water is found by keeping the channel daybeacons 200 feet to port.

Fort Myers Beach (P. O.) on Estero Island has several general stores and three repair yards equipped to do hull and engine repairs. The largest marine railway can haul out craft up to 125 feet in length and 10 feet in draft. Wet storage and wharfage are available at the yards and marinas. Gasoline, diesel oil, fresh water, ice, and supplies are available. A highway leads to Fort Myers.

Punta Rasa, 2 miles northward of Sanibel Island Light, is a small settlement on the point. A marine ways at the fish camp can haul out small craft up to 20 feet in length for minor hull repairs. Gasoline, oil, and limited supplies and provisions are available. Highways lead to Fort Myers and Estero Island, and an automobile ferry operates daily to Sanibel Island, where the ferry landing is just west of the light.

The channel to Pine Island Sound along the northeast side of Sanibel Island has a least depth of about 11 feet and is marked by daybeacons and lights. The cable between Woodrings Point and St. James City is submerged where it crosses the main channel and the channel to Tarpon Bay.

St. James City (P. O.) is a small fishing and residential community on the southern end of Pine Island, about 4 miles northwest of Sanibel Island Light. Gasoline can be obtained at a small pier which has depths of only 2 feet alongside and can be approached only by small craft.

Ruins of an old pier extend 200 yards offshore and are a danger for boats approaching the present pier; the piling is broken off below the water surface. A road leads from St. James City to the northern end of Pine Island and connects with a road across Little Pine Island and Matlacha Pass to Fort Myers.

There are two fishing camps on **Henley Canal** where gasoline, drinking water, and some food supplies can be obtained. In December 1955 the controlling depth was 3 feet in the privately marked channel.

Anchorage.—For drafts too deep to enter San Carlos Bay, there is good anchorage in depths of 15 to 25 feet, sticky bottom, 3 to 4 miles southeastward of Sanibel Island Light. With northerly winds there is good anchorage in depths of 16 to 24 feet under the southern end of Sanibel Island, with the light bearing anywhere between northeast and north-by-west. The anchorage off Punta Rasa is good, but the tidal currents have considerable velocity at times. There is good anchorage along the north shore of Sanibel Island west of the light; the currents have considerable velocity, but spots of good holding ground can be found. Excellent anchorage is available off St. James City in depths of 12 to 18 feet, good holding ground; the tidal currents have less velocity at this anchorage than at any of the others in San Carlos Bay. Fishing craft find storm anchorage in Tarpon Bay which, however, is unsurveyed and caution must be exercised in using it.

Currents.—The average velocity of the current at strength in San Carlos Bay is three-fourths knot.

Caloosahatchee River flows generally southwesterly from its source in Lake Okeechobee and empties into San Carlos Bay at Punta Rasa. The river has an average width of about a mile to a point 3 miles above Fort Myers, and then narrows to little more than the width of the channel which has been dredged to Lake Okeechobee.

Federal project depth is 10 feet in Caloosahatchee River from Punta Rasa to Fort Myers. In November 1955 the controlling depth was 9½ feet. The channel is well marked by lights and daybeacons.

The mean range of tide in Calooshatchee River is 1¾ feet at Punta Rasa and three-fourths foot at Fort Myers.

Port Comfort in Punta Rasa Cove has a marina with wet storage and wharfage for 60 boats. Gasoline, oil, water, ice, and some general supplies are available. A marine railway can haul out boats up to 40 feet in length for minor hull and engine repairs. The controlling depth was 4 feet in December 1956 in the privately marked channel.

Iona Cove, on the south side of the river and 1 mile above Shell Point, is the site of a small repair yard and boat basin with wet storage accommodations for 50 boats. The marine railway can haul out vessels up to 40 feet in length and 3 feet in draft for hull and minor engine repairs. Gasoline, oil, fresh water, ice, and groceries are available at the yard. A draft of 3 feet can reach the yard. A private daybeacon marks the entrance to the channel. Local knowledge is required to carry the best water.

A small repair yard on **Hancock Creek,** on the north bank of Caloosahatchee River across from Fort Myers, has a marine railway which can haul out craft up to 40 feet in length and 4½ feet in draft for hull and minor engine repairs. In December 1955 the controlling depth was 4 feet; the channel is well marked by privately maintained daybeacons.

Fort Myers, on the south bank of Caloosahatchee River 14 miles above the mouth, is the commercial center for this part of the State. The city is served by the Atlantic Coast Line and Seaboard Air Line Railroads, and is on the Tamiami Trail which connects Tampa and Miami. Other State highways lead to West Palm Beach and to Punta Rasa. Fort Myers has numerous stores, a municipal airport, a hospital, and seasonal and year-round hotels. **Coastal (storm) warnings** are displayed, day and night, on the waterfront.

Gasoline, diesel oil, water, ice, provisions, and ship chandlery are available at Fort Myers. The largest marine railway has a capacity of 120 tons and can haul out vessels up to 100 feet in length and 7 feet in draft. Machine shops are in operation.

The municipal yacht basin at Fort Myers is one block from the business center. The basin has excellent berthing facilities for 75 boats; controlling depth into the basin is 7 feet. A dockmaster is in attendance. Hot showers are available in the civic center, which is operated in connection with the yacht basin. Charter boats and guides can be engaged through the dockmaster.

The highway bridge over Caloosahatchee River at Fort Myers has a bascule span with a horizontal clearance of 79 feet and a vertical clearance of 7½ feet. Above this bridge there are two overhead cables with permit clearances of 80 and 88 feet.

The **Okeechobee Waterway** is a shallow-draft passage across Florida by way of Caloosahatchee River, Lake Okeechobee, St. Lucie River, and the connecting canals. The Federal project for the waterway provides for a channel 8 feet deep and 80 to 100 feet wide from Fort Myers to the Intracoastal Waterway near Stuart. Controlling depths are given in every issue of the weekly Notice to Mariners. See **United States Coast Pilot 4, Atlantic Coast, Cape Henry to Key West,** for detailed description of the waterway.

Charts 474, 1255, 1256.—The coast between Charlotte Harbor and Tampa Bay trends about northwest by north, and has a nearly straight sand beach which is broken in places by small inlets. Back of the barrier islands are shallow bays and lagoons which can be entered from the Gulf of Mexico, but there is no continuous inside passage, even for the lightest draft, and boats use the open waters of the Gulf between Gasparilla Pass and Venice Inlet. The low shore is wooded nearly to the water's edge and has few prominent features except in the vicinity of Boca Grande and Sarasota.

A modified Federal project provides for an inland waterway 9 feet deep from Caloosahatchee River to Anclote River, but no work had been done on this route

up to 1956. Controlling depths for the existing improved channels in Pine Island Sound from Punta Rasa to Charlotte Harbor, in Little Sarasota Bay and Sarasota Bay from Nokomis to Tampa Bay, and in Boca Ciega Bay from Tampa Bay to Clearwater Harbor, are given in this and the next chapter.

Chart 1255.—Matlacha Pass is a shallow body of water extending northward from San Carlos Bay to Charlotte Harbor between Pine Island and the mainland. The pass is navigable for drafts of 2 to 3 feet, but the channel is narrow and crooked and has numerous oyster bars. Privately maintained daybeacons mark the best water. A highway bridge over Matlacha Pass from Pine Island and Little Pine Island to the mainland has a swing span with a horizontal clearance of 29 feet and a vertical clearance of 8 feet; the overhead cable at the bridge has a permit clearance of 64 feet. Gasoline, oil, and small charter boats can be obtained at the small docks near the bridge.

Pine Island Sound, between Pine Island and the outer islands, is the main thoroughfare between San Carlos Bay and Charlotte Harbor, a distance of about 15 miles. The sound is full of shoals and low islands, through which there is a crooked but well marked channel. The controlling depth through the channel was 5½ feet in December 1955.

Blind Pass separates Sanibel Island from **Captiva Island.** The pass is not marked and has a controlling depth of only about 2 feet. A fixed highway bridge over the pass has a horizontal clearance of 29 feet and a vertical clearance of 8½ feet.

Captiva (P. O.) is a fishing village on Captiva Island about 3 miles north of Blind Pass. The village has a hotel and store. Gasoline, fresh water, ice, and some general supplies are obtainable at Captiva.

Redfish Pass is about 2 miles north of Captiva. This channel is little used, as it is winding and difficult, with frequent changes in depth and position.

Captiva Pass, leading from the Gulf into Pine Island Sound about 5 miles north of Captiva, is used to some extent by small fishing boats. The channel is unmarked, and local knowledge is required to carry the best water. Fair anchorage is available for small boats in **Safety Harbor,** which is 0.5 miles south of Captiva Pass and on the inner side of the barrier island. The depth inside the harbor is about 5 feet, but only small craft drawing 2 feet or less can enter. The holding ground is good and the anchorage is well protected from all directions except east to southeast.

Useppa Island, a winter resort near the north end of Pine Island Sound, has a large hotel. On the northwest side of the island is a natural small-boat basin. A depth of about 6 feet can be taken to the wharves on the eastern side of the island.

Lacosta Island is on the south side of the entrance to Charlotte Harbor. **Pelican Bay,** on the northeast side of the island, affords well protected anchorage in depths of 5 to 7 feet. The entrance to Pelican Bay is about 1 mile from the north end of the island; the controlling depth is about 4 feet. The cable over the entrance has clearance of 26 feet. A small circular basin at the northern end of Pelican Bay offers excellent protection to small craft.

Charlotte Harbor, about 60 miles south-southeastward from Tampa Bay, is the approach to Port Boca Grande, Boca Grande, Punta Gorda, and several smaller settlements. On the south side, Charlotte Harbor opens into Pine Island Sound and Matlacha Pass, already described, and on the north side into Gasparilla Sound.

When approaching the entrance to Charlotte Harbor from the southward or southwestward, the first object sighted in daytime will be **Boca Grande Rear Range Light,** 1.6 miles from the south end of **Gasparilla Island.** The light, 105 feet above the water, is shown from a white hexagonal pyramidal skeleton tower, inclosing a stair cylinder. The light is visible on the range line only. Upon closer approach, a yellow tower and a black tank, both about 0.4 mile north of the end of the island, will be seen. Two silver-colored water tanks at the town of Boca Grande also are prominent. **Gasparilla Island Light,** 41 feet above the water and visible 12 miles, is shown from a white frame dwelling on the south end of the island.

Boundary Line of Inland Waters.—The line established for Charlotte Harbor is described in **§ 82.70,** Chapter 2.

Charlotte Harbor is entered from the Gulf by way of the maintained Boca Grande Channel. The inner channel range is marked by a directional light and a daybeacon rear range. A break on the north side of the channel near the south end of Gasparilla Island forms a swash channel which had a controlling depth of 7½ feet in August 1956. The best water in this swash channel is about 500 feet off of the beach, on a course of **332°–152°.** Local craft also cross the shoal on the north side of the channel between Boca Grande front range light and the inner channel directional light.

Federal project depths are 32 feet from the Gulf to Port Boca Grande, and thence 10 feet to the municipal terminal at Punta Gorda. In November–December 1955 the controlling depths were 30½ feet to Port Boca Grande and thence 10 feet to the highway bridge at Punta Gorda.

Anchorage.—The best anchorage in Charlotte Harbor for large vessels is in depths of 20 to 40 feet at the inner end of the entrance channel; the holding bottom is good. This is the anchorage used by vessels while waiting for loading berths at Port Boca Grande. Vessels using this anchorage should avoid the submerged cable which crosses the narrowest part of the entrance. The anchorage affords excellent shelter from all winds, and is used as a harbor of refuge by coasting vessels and others. Small vessels can anchor almost anywhere in Charlotte Harbor. Good depths for small craft can be found close inshore between Port Boca Grande and Boca Grande. Small craft also can use the lagoon at Boca Grande.

Tides and currents.—The mean range of tide in the harbor varies from 1 to 1½ feet, but the variations in the water surface due to the force and direction of the wind are as much as 4 to 5 feet, at times. The tidal currents in the entrance channel have considerable strength.

especially the ebb current, which is said to attain occasionally an extreme velocity of 3 to 4 knots, dependent also upon the force and direction of the wind. In the harbor channel between Cape Haze and the north end of Pine Island, the average velocity of the current at strength is one-half knot. In Matlacha Pass at Little Pine Island bridge the current floods to the southeast with a mean velocity at strength of about one-half knot; the ebb current is weak and variable. To the north at the Myakka River bridge the current floods to the northwest and ebbs to the east with a mean velocity at strength of about one-half knot. In Peace River the current floods to the northeast and ebbs to the southwest with a mean velocity at strength of about one-fourth knot. Daily predictions of the current at several places in Charlotte Harbor may be obtained through the differences and ratios in table 2 of the Tidal Current Tables.

Port Boca Grande, on the inner side of the south end of Gasparilla Island, is an important phosphate shipping port. Phosphate rock can be loaded aboard vessels at the rate of 960 tons per hour by means of power conveyors. The loading pier has depths of 31 feet or more along the face. Caution should be observed in coming alongside the dock because of possible currents. **Coastal (storm) warnings** are displayed, daytime only, at Port Boca Grande.

Pilotage.—Pilotage is compulsory except in the case of American vessels under enrollment whose masters or mates are licensed as pilots by the Federal Government. Pilots board vessels at the entrance buoy on signal or on notice by radio, and will take vessels in at night.

Towage.—The pilots have a small towboat available for light towing jobs. Rates are by agreement.

Quarantine.—There is no quarantine station at Port Boca Grande. Medical inspection is performed by a health officer who meets ships in port by special arrangement.

Customs.—The Customs Service maintains an office and a deputy collector of customs at the port.

Immigration.—Immigration inspection is handled from Tampa by special arrangement.

Supplies.—Facilities for oil bunkering are provided at the pier, but 24 hours' notice is required to obtain a supply. Bunker coal is not available. Fresh water is piped to the pier, but 24 hours' notice is necessary if more than 40 tons are required. Any amount of ice can be had on short notice. Small stocks of gasoline, provisions, and ship chandlery are available locally; large orders require advance notice.

Repairs.—Small machine-shop repairs can be had locally; large jobs are taken care of with portable equipment from the mainland. About 4 hours' notice is required. Divers are available on a few hours' notice.

Communications.—The Seaboard Air Line Railroad operates freight and passenger service in and out of Port Boca Grande. An automobile ferry operates between Boca Grande and the mainland.

Boca Grande (P. O.) is a winter resort about 2 miles north of the south end of Gasparilla Island. The town has seasonal and year-round hotels, telegraph and telephone communications, and rail service to the mainland. The automobile and passenger ferry operates between Boca Grande and the mainland town of Placida.

A landlocked lagoon at Boca Grande provides shelter for small craft. There are boat landings and a marina has berthing facilities for vessels up to 112 feet in length and 9 feet in draft. The dredged channel into the lagoon is marked by daybeacons, lights, and a range. The channel had a controlling depth of 5½ feet in October 1956. Two fixed bridges limit the height of vessels which can go northward in the lagoon, but entry from the northward is possible through a privately marked channel.

There is a boatyard with marine ways capable of hauling out vessels up to 55 feet in length and 6 feet in draft for general repairs. Another railway can haul out vessels up to 50 feet in length; owners must arrange for their own repairs.

Diesel fuel, gasoline, water, and ice are available at the marina, and provisions and limited supplies can be obtained in Boca Grande. The business district is about 0.5 mile from the wharves.

Gasparilla Sound extends northward from Charlotte Harbor for about 7 miles between Gasparilla and Little Gasparilla Islands and the mainland. The sound is navigable for vessels up to 6 feet in draft but there is no through channel to Lemon Bay. The railroad trestle which crosses the sound from Placida to the north end of Gasparilla Island has two swing spans 0.6 mile apart. The southwesterly span has a horizontal clearance of 47 feet and a vertical clearance of 4 feet; the northeasterly opening has a horizontal clearance of 49 feet and a vertical clearance of 6 feet. A new highway bridge was under construction in 1957 just westerly of, and parallel with, the railroad trestleway. A power cable with overhead clearance of about 40 feet extends across the sound alongside the railroad trestle, but this cable is submerged where it crosses the two channels.

Gasparilla Pass, between Gasparilla Island and **Little Gasparilla Island,** affords passage from the sound to the Gulf. The channel is well marked but its depth and position are subject to frequent change. Local knowledge is needed to carry the deepest water. The controlling depth over the bar was 5 feet in August 1956. An overhead power cable crossing the pass has a permit clearance of 68 feet.

Gasparilla Sound and Pass are frequented only by local fishermen. Good small-boat anchorage is available inside the north point of the pass between Little Gasparilla Island and **Bird Key.** The deep water is along the shore of the island.

Bokeelia (P. O.) is a small settlement on **Bokeelia Island,** at the northerly end of Pine Island on the southern side of Charlotte Harbor. Drafts up to about 5 feet can be taken to the wharf at Bokeelia. Gasoline and some supplies, but no fresh water, are obtainable. At the marina on **Jug Creek** there are storage facilities for boats up to 28 feet in length; minor repairs can be made. The controlling depth was 2½ feet in Jug Creek, in November 1955. A road connects with the southern end of Pine Island and with the bridge over Matlacha Pass

to the mainland. Boats on the fish runs out of Punta Gorda provide service to Punta Gorda and the settlements on Pine Island Sound.

Myakka River empties into the head of Charlotte Harbor from northwestward. A depth of 9 feet can be taken into the mouth of the river, but the river is used only occasionally by small vessels 4 to 5 feet in draft. A railroad bridge and a highway bridge cross the river 3 miles above the mouth. The highway bridge has a horizontal clearance of 40 feet and a vertical clearance of 10 feet, and the railroad bridge has a horizontal clearance of 30 feet and a vertical clearance of 6 feet; drawspan regulations are stated in § **203.245,** Chapter 2. The telephone and telegraph cables just westward of the bridges have a permit clearance of 28 feet. **El Jobean** (P. O.), at the north end of the bridges, is the only settlement along the river. It has a hotel and a store, but only limited supplies are available.

Peace River empties into the head of Charlotte Harbor from northeastward. Above Punta Gorda the river is navigable for a draft of about 5 feet as far as Hull, 15 miles above the mouth, but caution is necessary to avoid the snags in the upper reaches. Heavy growth of hyacinth also is found in the upper reaches, which completely blocks many of the small inlets, bayous, and lakes.

Punta Gorda, a town on the south bank of Peace River 2 miles above the mouth, has rail and highway connections with points to the north and south, as well as to the interior of the State. Punta Gorda is a commercial fishing port and boats on fish runs connect with various points on Charlotte Harbor and Pine Island Sound for delivery of supplies. Gasoline, diesel oil, fresh water, ice, provisions, and marine supplies are available at Punta Gorda, and the town has a private hospital. **Coastal (storm) warnings** are displayed, day and night, from a tower on the waterfront.

Vessels can anchor off Punta Gorda in depths of 6 to 10 feet. The dredged channel to the municipal pier is well marked by a light and several daybeacons. The controlling depth in this channel was 10 feet in December 1955.

A repair yard at Punta Gorda has a marine railway capable of hauling out vessels up to 35 feet in length and 4 feet in draft for hull and engine repairs; storage facilities are available. A fish company has a larger marine railway for repairing its own boats, but private boats up to 75 feet in length and 7 feet in draft will be hauled out in emergencies.

The highway bridge over Peace River, about 3 miles above the mouth, is a conspicuous concrete structure. Its bascule span has a horizontal clearance of 75 feet and a vertical clearance of 10 feet. On the upstream side of the bridge is an overhead power cable with a permit clearance of 80 feet. Nearby are the ruins of an abandoned concrete bridge.

Cleveland is a small village on the south bank of Peace River 3 miles above Punta Gorda. The only dock along the waterfront is for small boats only and is privately owned. No supplies are available. The natural channel above the high bridge at Punta Gorda is marked by daybeacons as far as Cleveland. The controlling depth was 5 feet in December 1955.

Lemon Bay is a shallow lagoon that extends 15 miles northwestward behind the barrier beach from the head of Gasparilla Sound. Access to the bay is difficult for any but the shallowest-draft boats. **Stump Pass,** near the south end of the bay, had a controlling depth of 4 feet in 1955. The highway bridge 14 miles northwestward from Port Boca Grande has a bascule span with a horizontal clearance of 26 feet and a vertical clearance of 8½ feet; drawspan regulations are given in § **203.245,** Chapter 2. On the northwest side of the bridge is an overhead power cable with a permit clearance of 65 feet.

There is a boat basin at Englewood with a marine railway that can haul out vessels up to 40 feet in length and 4 feet in draft, for general repairs. Berthing facilities, gasoline, water, provisions, and some supplies are available.

Chart 1256.—A fixed bridge across Lemon Bay, about 6 miles northward from Punta Gorda Beach, has a horizontal clearance of 27 feet and a vertical clearance of 6½ feet. The nearby overhead power cable has a permit clearance of 65 feet.

Venice Inlet, about 26 miles northwestward from Port Boca Grande, has been dredged and jetties have been constructed. A light on the outer end of the north jetty and several daybeacons mark the inlet. Federal project depth is 9 feet through the inlet channel. The controlling depth was 7½ feet in November 1955.

The towns of Venice, Nokomis, and Laurel are on the shores of the small bays inside and to the north of Venice Inlet. A high water tank at Venice is prominent. Drafts of about 2½ feet can be taken to the landings at these towns. A boatyard at Nokomis has a marine railway that can haul out craft up to 50 feet in length and 4½ feet in draft, for hull and minor engine repairs. Diesel oil, gasoline, water, ice, provisions, and limited supplies are available in all three towns.

Blackburn Bay, Dryman Bay, Little Sarasota Bay, Sarasota Bay, and Sarasota Pass are connecting bodies of water which extend from Venice Inlet to the lower part of Tampa Bay, and are separated from the gulf by a line of narrow keys. The projected route of the Inland Waterway is through these waters, which vary in width from a few hundred feet to 3 miles. The channel is marked by numerous daybeacons between Venice Inlet and Sarasota, and by daybeacons and lights from Sarasota to Tampa Bay. In December 1956 a least depth of 5 feet in midchannel was available from Venice Inlet to Sarasota except for a controlling depth of 2½ feet in the channel at Nokomis and in the channel opposite Midnight Pass; thence 7 feet to Tampa Bay.

An overhead power cable north of Venice Inlet has a permit clearance of 40 feet. A highway bridge crosses the south end of **Blackburn Bay** 0.7 mile north of Venice Inlet; the swing span has a horizontal clearance of 47 feet, in the east draw, and a vertical clearance of 7 feet.

Blackburn Point Bridge is a highway bridge crossing the north end of **Dryman Bay** 4.5 miles north of Venice

Inlet; this bridge has a swing span with a horizontal clearance of 54 feet and a vertical clearance of 9 feet. The nearby overhead power cable has a permit clearance of 65 feet.

Midnight Pass, 6 miles northward from Venice Inlet, gives access to the gulf from **Little Sarasota Bay.** The pass is narrow and has a controlling depth of about 3 feet; strangers should not attempt passage. **Osprey** (P. O.) is a small settlement on the east side of Little Sarasota Bay. Some supplies can be obtained here.

A highway bridge at **Stickney Point,** at the north end of Little Sarasota Bay, has a swing span with a horizontal clearance of 57 feet in the east draw and 55 feet in the west draw, and a vertical clearance of 9 feet. The nearby overhead cable has clearance of 74 feet.

A boatyard on Siesta Key has marine ways and a boat hoist capable of hauling out vessels up to 60 feet in length and 6 feet in draft, for general repairs. Open and covered wet storage, and berthing facilities for vessels up to 55 feet in length, are available. Diesel fuel, gasoline, water, ice, and marine supplies are available.

Big Sarasota Pass, 12 miles north-northwestward from Venice Inlet, is an inlet from the Gulf of Mexico to the southern end of Sarasota Bay. The pass lies between **Siesta Key** and the **Cerol Isles,** and is marked by a light and several daybeacons; the buoys at the entrance are shifted frequently to mark the changing channel. The pass had a controlling depth of 7½ feet over the bar in January 1956.

The highway bridge over the south end of Sarasota Bay from the mainland to the north end of Siesta Key has a bascule span with a horizontal clearance of 55 feet and a vertical clearance of 10 feet. The nearby overhead power cable has a permit clearance of 45 feet. The bridge crossing from Sarasota to **Cerol Isles (St. Armand Key)** has a bascule span with a horizontal clearance of 60 feet and vertical clearance of 9 feet.

Sarasota, near the south end of the Sarasota Bay eastern shore, is one of the popular winter resorts of the Florida west coast, and is winter quarters for circus performers. The cupola on the abandoned uncompleted hotel just northward of New Pass and several buildings, water tanks, and radio towers show prominently from offshore. The city has rail and highway communication to points north and south and to the interior of the State. The Sarasota-Bradenton Municipal Airport is north of the city. Oil storage plants, fish packing plants, and a general warehouse are at Payne Terminal, a mile north of the bridge to Cerol Isles. The municipal pier is in the basin east of the bridge.

There are good hotels and stores in Sarasota. Gasoline, diesel oil, fresh water, ice, provisions, and marine supplies are available at Payne Terminal and at the municipal pier. Boatyards here can haul out craft up to 60 feet in length and 6 feet in draft for general repairs. **Coastal (storm) warnings** are displayed, daytime only, at the municipal pier.

A draft of about 7 feet can be taken to the municipal pier, which has extensive berthing space for small yachts; anchorage room is available near the pier. **Whitaker Bayou,** north of Payne Terminal, and **Hudson Bayou,** south of the municipal pier, provide excellent shelter for small craft. A power cable over Hudson Bayou has a permit clearance of 65 feet. The bridge over Hudson Bayou has a bascule span with a horizontal clearance of 30 feet and a vertical clearance of 7 feet; the permit clearance is 65 feet for the nearby overhead power cable. The dredged channels into these bayous have controlling depths of about 5 feet.

New Pass is 2 miles northwestward from Big Sarasota Pass and at the opposite end of Cerol Isles. The entrance is marked by buoys, which are shifted frequently to conform with the changing channel, and the dredged channel from the pass to Payne Terminal is marked by daybeacons and ranges. Currents attain considerable velocity through the pass. The highway bridge over the pass has a bascule span with a horizontal clearance of 111 feet and a vertical clearance of 14 feet. A power cable over the pass near the bridge has a permit clearance of 80 feet. Controlling depths in January 1956 were 5 feet over the bar, thence 12 feet to Payne Terminal, where the depth in the basin was 7 feet.

Longboat Pass, 11 miles northwestward of Big Sarasota Pass, is used by boats drawing up to 4 feet. In 1956 the channel was marked only by a buoy at the southern end of a shoal extending west and south in an arc from Anna Maria Key. **Longbeach** is a small fishing village and resort town on the south side of the inlet.

A highway bridge was under construction across Longboat Pass, in 1957. The structure, scheduled for completion late that year, was to be a single-leaf bascule bridge with horizontal clearance of 45 feet and a vertical clearance of 17½ feet. A rock jetty was to be built on the north side of the entrance and rock groins along the beach north of the jetty.

Cortez (P. O.) is a small fishing and resort village on the eastern side of the narrows between Sarasota Bay and Sarasota Pass. Gasoline, fresh water, ice, and general supplies are available. Drafts of 5 to 7 feet can be carried to the Cortez wharves, just south of the bridge over the narrows to Bradenton Beach on Anna Maria Key. At **Bradenton Beach** there is a boatyard with a vertical lift capable of hauling out vessels up to 38 feet in length and 4 feet in draft, for general repairs. Diesel fuel, gasoline, water, and some provisions are available. The highway bridge connecting Cortez and Bradenton Beach has a double-leaf bascule span with a horizontal clearance of 90 feet and a vertical clearance of 17 feet.

Currents, Venice Inlet to Cortez.—In Venice Inlet the average velocity at strength of flood and ebb is about 1 knot. At the bridge at the south end of Blackburn Bay the current floods to the north and ebbs to the south with an average velocity at strength of about three-fourth knot. At the bridge at the south end of Little Sarasota Bay the current floods northward and ebbs southward with mean velocities at strength of about 1¼ knots and three-fourth knot, respectively. In Midnight Pass the mean velocity at strength is about 1½

knots. One day's observation off the bridge at the north end of Little Sarasota Bay showed very weak currents. In Big Sarasota Pass the flood current averages 1½ knots and the ebb 1 knot. In Sarasota Bay at the entrance to Roberts Bay, the current averages only one-fourth knot at strength. At the bridge off Cedar Point the average velocity at strength is about one-half knot. In New Pass the average velocities at strengths of flood and ebb are about 1¾ knots and 1 knot, respectively.

In Longboat Pass the current averages about 1¾ knots at strength. In Sarasota Pass off Cortez, the flood current to the north averages about one-half knot at strength; the ebb current is weak. Daily predictions of the current at many of these places may be obtained through the differences and ratios in table 2 of the Tidal Current Tables.

5. TAMPA BAY TO APALACHEE BAY

Chart 1114.—Depths of 18 feet extend nearly 5 miles from shore on either side of the dredged channel into Tampa Bay. On the approach the conspicuous landmarks include Egmont Key Light, a low aluminum water tank at Pass-a-Grille Beach, and a large hotel north of the beach. On each side of this hotel are water tanks which stand considerably higher than the hotel itself.

From Tampa Bay 35 miles northward to Anclote Keys, the bottom is broken, and depths of 18 feet or less are sometimes found more than 4 miles offshore. The coast is bordered by a line of long narrow islands which overlap at the ends. The Gulf sides of the islands are straight or gently curving sand beaches, backed by dense growth. Between the islands and the mainland is a chain of shallow bays and passages. Prominent north of Tampa Bay are water tanks northwest of Johns Pass and south of Indian Rocks Beach; a large hotel in Clearwater and a water tank near the center of Clearwater Beach Island; a high radio tower southwest of Largo which displays a prominent red light at night, and Anclote Keys Light.

Between Anclote Keys and Cedar Keys, 60 miles to the northward, the low coast is fringed with marsh broken by shallow rivers and creeks that can be entered only by small craft. Small keys and islets border the coast, and broken ground extends as much as 15 miles from shore. The bottom slopes gradually shoreward, but there are many rocks and shoals in the deeper water. Between Anclote Keys and Cedar Keys there are no prominent landmarks.

Bird racks, consisting of square platforms on piles about 10 feet above water, have been built on the outermost shoals between Tampa and Apalachee Bays; some have been shot up in aerial gunnery practice, leaving broken piling which constitute a hazard. Not all of the racks are charted.

The coast extends in a general northwesterly direction from Cedar Keys for about 75 miles to Apalachee Bay. The low marsh along the shoreline is 1 to 2 miles wide and is backed by pine forests. The coast is broken by several unimportant rivers and creeks, some of which are navigable for drafts of 4 to 5 feet. The bottom is broken and irregular for a distance of about 10 miles from shore, and coral heads and reefs are numerous. This stretch of coast is frequented mostly by spongers and fishermen, who can assist strangers to enter any of the rivers or creeks. The shoal water affords fair anchorage, with considerable protection from heavy seas, for light-draft boats.

Chart 1257.—Tampa Bay, a large natural indentation about midway along the west coast of Florida, is one of the important harbors of the Gulf coast and is easily accessible day or night. The bay extends northeasterly for about 20 miles, and is 6 to 7 miles in width. It is the approach to Old Tampa and Hillsboro Bays, and to the cities of St. Petersburg, Port Tampa, and Tampa.

Sailing directions.—The channels are well marked with lights, lighted ranges, and lighted and unlighted buoys. Detailed tabular courses and directions are not necessary.

Boundary Line of Inland Waters.—The line established for Tampa Bay and tributaries is described in **§ 82.80,** Chapter 2.

Channels.—Tampa Bay has general depths of 18 to 30 feet between broad shoals that extend far from shore on all sides. Federal dredging depths for the main channels are 32 feet in the entrance from the Gulf, thence 30 feet to Tampa and Port Tampa. The channels are maintained at or near dredging depths.

Anchorages.—Vessels with good ground tackle can anchor anywhere outside Egmont Bar in depths of 35 to 50 feet and ride out any gale short of a hurricane. The usual inside anchorages are southward of Mullet Key in depths of 30 to 35 feet; below and above the docks at Port Tampa in depths of 20 to 26 feet, and southwestward of Gadsden Point in natural depths of 29 to 36 feet.

Explosives and quarantine anchorages are east of Mullet Key and south of Interbay Peninsula; limits of the areas are given in **§ 202.193,** Chapter 2.

Bridges.—The Sunshine Skyway causeway connecting Tampa with the southerly shore of the bay has four bridges crossing the bay proper. The northernmost span, a bascule drawbridge over the main channel cut about 0.8 mile south of Maximo Point, has a horizontal clearance of 90 feet and a vertical clearance, at the center, of 21 feet. The high-level fixed span over Mullet Key Channel has horizontal clearance of 800 feet and vertical clearance of 140 feet between the fenders and 149 feet at the center. The low-level structure over Bunces Pass is a fixed bridge with horizontal clearance of 50 feet and vertical clearance of 16 feet. Over the southern part of the bay crossing is a fixed bridge with horizontal clearance of 45 feet and vertical clearance of 10 feet. Bridges in Old Tampa Bay and over the waterways in Tampa City are described later in connection with the features of those places.

Tides.—The mean range of tide in Tampa Bay is about 1½ feet. Daily tide predictions are given in the Tide Tables. A strong offshore wind sometimes lowers the water surface at Tampa and in the dredged channels

as much as 4 feet, and retards the time of high water by as much as 3 hours. A continued southwest wind raises the water by nearly the same amount and advances the time of high water by as much as 1 hour.

Currents.—Daily predictions of the current in Egmont Channel are given in the Atlantic Coast Tidal Current Tables, and similar predictions for several places in Tampa Bay and vicinity may be obtained from data in those tables. There is a large daily inequality in the ebb, and velocities of 3 knots or more may be expected at the strength of the greater ebb of the day in Egmont Channel, Passage Key Inlet, and off Port Tampa. Flood velocities seldom exceed 2 knots. Winds have considerable effect in modifying the tidal current. The direction and velocity of the current throughout the Tampa Bay area are shown in the Tidal Current Charts, Tampa Bay.

At a location 6.8 miles west of Egmont Key Light, the tidal current is rotary, turning clockwise, and has considerable daily inequality. The strengths of the greater floods and ebbs set northward and southward, respectively, with velocities usually less than one-half knot. Four days of current observations at this location during a period of moderate northerly winds showed a resultant nontidal current of nearly one-half knot setting southward.

Chart 586.—Mullet Key, on the north side of the entrance to Tampa Bay, is low and wooded. The wharf on the southeast side of the key has a depth of about 16 feet at the face. A large pile of rocks covered by 2 feet, to the north and nearly in line with the face of the wharf, is a danger for vessels landing with a strong flood current, but is usually marked by tide rips except at slack water. A channel with a controlling depth of 3 feet, marked by daybeacons, leads from **Bunces Pass** to the pier at the south end of **Mullet Key Bayou.** Small craft can anchor in the bayou.

Egmont Channel, the main channel, which extends between Mullet Key and Egmont Key, is used by all deep-draft vessels entering Tampa Bay. A lighted range marks the dredged cut over the bar.

Egmont Key, about 1.5 miles southwest of Mullet Key, is about 1.6 miles long in a north-south direction, and is low and wooded. Shoal areas extend seaward from Egmont Key as far as **Palatine Shoal,** which is 5 miles westward of the key and on the south side of Egmont Channel entrance. Palatine Shoal consists of several small lumps with depths of 19 to 22 feet over them. **Egmont Key Light,** 85 feet above the water and visible 15 miles, is shown from a white tower on the north end of the key. A fog signal and a radiobeacon are at the light. A pilot station and lookout tower are on Egmont Key. A draft of about 15 feet can be taken to the small pier just inside the north end of the key.

Southwest Channel, a buoyed natural passage on the south side of Egmont Key, has a controlling depth of about 16 feet, but is subject to shoaling. **Passage Key,** on the south side of Southwest Channel, is a low sand island about 0.3 mile long and showing about 4 feet above high water. The key is covered with grass and low brush, and is used as a bird refuge. **Passage Key Inlet,** between Passage Key and Anna Maria Key, has a controlling depth of about 9 feet in an unmarked shifting channel; it is used only by small local craft.

Anna Maria Key, south of the Tampa Bay entrance, is separated from the mainland by Sarasota Pass, discussed previously. **Anna Maria** (P. O.) is a small village north of Bradenton Beach.

A highway from Anna Maria Key to the mainland crosses Sarasota Pass, **Palma Sola Bay,** and **Perico Bay.** The two bays are crossed by fixed bridges, each with horizontal clearance of 25 feet and vertical clearance of 10 feet. The bridge over Sarasota Pass has a double-leaf bascule span with a horizontal clearance of 90 feet and a vertical clearance of 17 feet.

The route of the inland waterway from Caloosahatchee River to Anclote River is across lower Tampa Bay from Sarasota Pass to Boca Ciega Bay. A course of **026°** for 11 miles from the light at the entrance to Sarasota Pass leads to the light at the east end of the dredged cut into Boca Ciega Bay, described later. Small craft use the dredged channel which extends parallel with, and about 600 yards westward of, the Sunshine Skyway between Maximo Point and Mullet Key shoal. The channel is marked by daybeacons. In February 1956 the controlling depth was 11 feet, but a 5-foot shoal was making across this channel north of Daybeacon 2.

Manatee River empties into the south side of Tampa Bay just east of Sarasota Pass. The river width varies from 0.5 mile to nearly a mile for about 10 miles above the mouth, thence from 80 to 600 feet for some 8 miles to Rye, and is well marked as far as Rocky Bluff. The river is well protected from all directions and affords good storm anchorage for small boats.

The tidal current in the entrance averages about three-fourths knot at strength. Off Bradenton, it averages about one-half knot.

A Federal project for Manatee River provides for a channel 13 feet deep from Tampa Bay to McNeil Point, thence 9 feet deep to Rocky Bluff, and thence 4 feet deep to Mitchellville Bridge, 21 miles above the mouth. In February 1956 the controlling depths were 9 feet to McNeil Point, thence 8 feet to Bradenton, thence 7 feet to Rocky Bluff, and thence a reported 3 feet to Rye.

Bradenton, a winter resort on the south side of the river 4.5 miles above the mouth, is the seat of Manatee County and the largest town on the river. Bradenton has a large city pier with berthing space for larger vessels along the end and numerous berths for small craft inside the pierhead. The large building at the end of the pier has an auditorium and is headquarters for the local Chamber of Commerce. The town has numerous stores, several hotels, two hospitals, and a municipal airport about 6 miles south of the city. Gasoline, diesel oil, water, ice, provisions, and small-boat supplies are available, and local guides can be obtained. **Coastal (storm) warnings** are displayed, daytime only.

A repair yard at **Shaw Point,** near the mouth of the

river, has a marine railway capable of hauling out vessels up to 18 tons in weight, 50 feet in length, and 6 feet in draft for engine and hull repairs. Another shipyard at **McKay Point,** 1 mile above Shaw Point and on the north side of the river, has two railways capable of hauling out vessels up to 125 tons in weight, 120 feet in length, and 7 feet in draft, for hull and engine repairs. This yard has facilities for covered storage, in fresh water, for vessels up to 125 feet in length and 7 feet in draft; gasoline, fresh water, and marine supplies are available. A paved highway connects with Palmetto. Good anchorage can be had in depths of 15 feet, soft bottom, off the McKay Point yard.

Three drawbridges and a fixed bridge cross Manatee River at Bradenton. The first, a highway bridge just east of the city pier, has a bascule span with a horizontal clearance of 75 feet and a vertical clearance of 8½ feet; drawspan regulations are stated in **§ 203.463,** Chapter 2. The Atlantic Coast Line Railroad bridge, 500 yards above the highway bridge, has a bascule span with a horizontal clearance of 75 feet and a vertical clearance of 5½ feet. The fixed highway bridge 0.25 mile upstream has a horizontal clearance of 75 feet and a vertical clearance of 40 feet. The Seaboard Air Line Railroad bridge, 0.25 mile farther upstream, has a swing span with a horizontal clearance of 56 feet and a vertical clearance of 6½ feet.

Palmetto is on the opposite side of Manatee River from Bradenton. **Ellenton** is on the north bank of the river 2 miles above the Seaboard Air Line Railroad bridge. All three towns have rail and highway connection to all parts of the State. Manatee County is an important center for the raising of citrus fruits and vegetables. The Palmetto pier has slips for yachts and small boats drawing up to 7½ feet. A restaurant is in the large building on the end of the pier. Piling of a ruined pier extend outward to the channel west of the city pier. The landing at Ellenton is small.

Braden River, which empties in to Manatee River about 2 miles above the highway bridge at Bradenton, has a controlling depth of 3 feet for about 2 miles above the highway bridge, but there are many shoals and the channel is unmarked. The highway bridge over Braden River has a horizontal clearance of 36 feet and vertical clearance of 10 feet. About 0.4 mile above the bridge there is an overhead cable with a clearance of 34 feet.

Terra Ceia Bay, just north of Manatee River on the southeastern side of Tampa Bay, may be entered from Manatee River through the Federal improvement project at the eastern end of **Snead Island** which provides for a cut-off channel 6 feet deep. Daybeacons mark each end of the cut-off channel. The controlling depth was 6 feet in January 1956. A fixed bridge over the cut-off has a horizontal clearance of 31 feet and a vertical clearance of 13 feet. The entrance to Terra Ceia Bay from Tampa Bay is the narrow and generally crooked channel between Snead Island and **McGill Island.** The channel is marked by daybeacons and has a controlling depth of about 5 feet. At the upper end of the bay is the southern unit of Sunshine Skyway causeway, a fixed bridge having horizontal clearance of 45 feet and vertical clearance of 10 feet.

Piney Point is a small projection on the southeast side of Tampa Bay about 11 miles above Egmont Key. An abandoned ferry slip is on the point.

Little Manatee River empties into the southeast side of Tampa Bay opposite St. Petersburg. A Federal project provides for a channel 6 feet deep from Tampa Bay to a point 2,700 feet above the railroad bridge at Ruskin, and in Marsh Branch to a turning basin at the highway bridge at Ruskin. The crooked channel across the bar at the mouth of the river is marked by daybeacons. The controlling depth to the railroad bridge was 6 feet in February 1956 through a privately maintained channel. In Marsh Branch another privately maintained channel had a depth of 14 feet from its junction with Little Manatee River to the highway bridge at Ruskin.

At **Shell Point,** on the north side of the entrance to Little Manatee River, are two small wharves and a protected yacht basin. At the railroad bridge, 2 miles above the mouth, are stores, garages, restaurants, two fish houses, and a small wharf used by excursion boats. Gasoline, oil, fresh water, and provisions are available. At the highway bridge crossing Marsh Branch is the agricultural community of **Ruskin.** The railroad bridge has a swing span with a horizontal clearance of 40 feet and a vertical clearance of 3 feet. The highway bridge has a swing span with a horizonal clearance of 50 feet and a vertical clearance of 5½ feet; overhead cables at the bridges have a minimum permit clearance of 58 feet.

Chart 587.—Hillsboro (Hillsborough) Bay, the northeastern arm of Tampa Bay, is 8 miles long and 4 to 5 miles wide. The main ship channel follows a dredged cut up the middle of the bay to Tampa. Spoil banks border the east side of the channel for most of its length. Good anchorage is available for shallow-draft vessels in the central part of the bay westward of the main channel.

Two miles northward from the sharp turn in the main channel, a dredged channel leads eastward to **Alafia River.** The Federal improvement project provides for a channel 30 feet deep from the ship channel in Hillsboro Bay to and including the turning basin in Alafia River. **East Tampa,** site of a large phosphate plant, is on the north side of Alafia River 0.5 mile above the mouth. The channel is well marked. The controlling depth to the turning basin was 16 feet in December 1955.

A draft of about 5 feet can be taken several miles up Alafia River at high water. The southern entrance is closed. A fixed highway bridge 1 mile above the mouth of the river has a horizontal clearance of 44 feet and a vertical clearance of 28 feet; the nearby overhead power cable has a permit clearance of 29 feet. The railroad bridge just above the highway bridge has a swing span with a horizontal clearance of 40 feet and a vertical clearance of 6 feet. About 2.5 miles above these bridges there is an overhead power cable with permit clearance of 35 feet.

The boat basin for MacDill Field is about 2 miles north of **Gadsden Point,** on the west side of Hillsboro Bay.

The channel into the basin is well marked. The controlling depth in the channel and basin was 12 feet in December 1955.

Black Point is on the east side of Hillsboro Bay opposite the south end of Davis Islands. A privately dredged channel leads northeastward from the main ship channel to a turning basin and slipway at Black Point, the site of a large power plant. The stack atop the building is flood-lighted at night. A marginal wharf and facilities for unloading coal are at the north slipway. Controlling depths in the channel and turning basin were 30 feet in March 1956.

McKay Bay, about 1.3 miles north of Black Point, is a shallow bay about 1 mile wide and 1.5 miles long. The 22d Street causeway across the bay entrance has a fixed bridge with a horizontal clearance of about 64 feet and a vertical clearance of about 16 feet. About 0.3 mile beyond the bridge is an overhead power cable with permit clearance of 40 feet.

The main ship channel leads into Tampa along the east side of **Davis Islands.** The channel divides off the south end of **Seddon Island; Seddon Channel** continues northwestward to a turning basin at the mouth of Hillsboro River, and **Sparkman Channel** leads northward to another turning basin at the south end of **Ybor Channel. Garrison Channel,** an east-west channel between Seddon Island and the Tampa water front, connects the two turning basins. The Seaboard Air Line Railroad bridge over Garrison Channel has a bascule span with a horizontal clearance of 110 feet and a vertical clearance of 4½ feet.

Only small boats can pass around the north end of Davis Islands, which are connected with Tampa by a fixed bridge having a horizontal clearance of 34 feet and a vertical clearance of 10 feet.

Hillsboro (Hillsborough) River flows southward through the city of Tampa into the turning basin at the north end of Seddon Channel. The river channel is staked for a short distance above the mouth. The stream is narrow above Tampa and relatively deep, except for several shoals with depths of about 6 feet. The head of navigation is the dam at Sulphur Springs, 8 miles above the mouth.

A Federal project for Hillsboro River provides for a channel 12 feet deep from the turning basin at the mouth to a point 100 feet south of Lafayette Street bridge, thence 9 feet deep to a point 2,000 feet upstream from Columbus Drive bridge, 2.5 miles above the mouth. The controlling depth to the boatyard above Columbus Drive bridge was 3½ feet in March 1956.

Nine drawbridges cross Hillsboro River between the mouth and Sligh Avenue, 6 miles above. The minimum horizontal clearance is 50 feet and the minimum vertical clearance is 5 feet; the Hillsborough Avenue bridge, 4.3 miles above the mouth, has a vertical-lift span with vertical clearance of 53 feet, up. The five fixed bridges between Sligh Avenue and Sulphur Springs have a minimum horizontal clearance of 38 feet and minimum vertical clearance of 5 feet. An overhead power cable with permit clearance of 60 feet crosses the river at 26th Avenue. **Drawspan regulations** are stated in **§ 203.465,** Chapter 2.

Tampa is an important manufacturing and shipping center. The city has numerous wharves, the majority of which are on Garrison and Ybor Channels along the south and east sides of the business district. Tampa has considerable foreign and coastwise trade in phosphate rock, lumber, tobacco, bananas, and general merchandise.

Pilotage.—Pilotage is compulsory for vessels in foreign trade, and for other vessels except when the masters or mates are licensed as pilots by the Federal Government. Pilotage is optional for vessels drawing 6 feet or less if such vessels have a coastwise license. Pilots can always be obtained by radio or by making signal outside the bar. The pilots have a lookout station on Egmont Key and use fast motorboats with a large P painted on the sides. Vessels entering by Egmont Channel are boarded near lighted bell buoy 2; those entering by Southwest Channel are boarded outside the bell buoy at that channel's entrance.

Towage.—Vessels usually proceed from the Gulf to Tampa under their own power. Towboats are available at Tampa and Port Tampa.

Quarantine.—The quarantine station is on Davis Islands. The quarantine anchorage is south of Gadsden Point, but vessels are boarded after docking. An outpatient clinic is maintained at the quarantine station. Tampa has several public and private hospitals with ample facilities. The nearest marine hospitals are at Savannah and Mobile.

Customs and Immigration.—Tampa is the district headquarters customs port of entry; marine documents are issued. The offices of both the customs and immigration services are in the Federal Building.

Harbor regulations.—The port of Tampa includes Tampa proper, Port Tampa, and the mouth of the Alafia River. The governing body is the Hillsborough County Port Authority. Decisions of the harbormaster are final in all disputes involving shipmasters and dock owners.

Terminal facilities.—Most of the wharf and terminal facilities at Tampa are privately owned and operated. The Seaboard Air Line Railroad phosphate elevator and termminals are on Seddon Island. North of the elevator is a terminal especially equipped for discharging, handling, and storing fertilizer and bulk materials, as well as general cargo. On the north side of Seddon Island, facing Garrison Channel, is a lumber terminal. On the mainland side of Garrison Channel are several terminals with long-established facilities for handling general cargo. On Ybor Channel is the Tampa Municipal Terminal which includes a slip about 900 feet long and 200 feet wide, and dock space of about 2,500 feet; many small vessels in the banana trade berth here. On the east shore of Sparkman Channel are two shipyards, a cement plant, and the terminals of the petroleum distributors. Most of Tampa's terminals have rail connections with the two trunk lines serving the port.

Supplies.—Fuel oil is available at Tampa, and fresh water, ice, provisions, and ship chandlery can be obtained in quantity.

Repairs.—At the head of Ybor Channel is a shipyard with facilities for new construction and repairs; its marine railway can haul out vessels 2,800 tons in weight, 300 feet in length, and 20 feet in draft. At the southern end of Sparkman Channel is a graving dock 526 feet long and 80 feet wide with depths of 18 to 20 feet over the keel blocks. Alongside the graving dock is a slip 1,200 feet long, 85 feet wide, and 20 feet deep for topside repairs. An outfitting wharf has a slip 200 feet long and 26 feet deep. Facilities at both yards include machine, foundry, pattern, carpenter, and electric shops.

Communications.—Tampa is served by the Seaboard Air Line Railroad and the Atlantic Coast Line Railroad. Regular scheduled steamship service is maintained between Tampa and Caribbean and West Indies ports, and also coastwise and intercoastal ports. Major airlines offer passenger and express service on regular schedules.

Radio.—WPD, a privately owned radio station adjoining the Municipal Terminal on Ybor Channel, is used locally for communication with ships. Operating hours are from 8:00 a. m. to 5:00 p. m. Radio station WFA transmits coastal warnings and emergency marine information.

Small-craft facilities.—The municipal boat landing is on the west side of the entrance to Hillsboro River. A yacht basin is on the Seddon Channel side of Davis Islands. There are several boatyards along Hillsboro River.

Old Tampa Bay, the northwestern arm of Tampa Bay, is separated from Hillsboro Bay by **Interbay Peninsula.** Old Tampa Bay is 12 miles long and ranges in width from 2.5 miles, at the entrance, to 6 miles; about three-fourths of the bay area has depths ranging from 6 to 17 feet. A branch of the main ship channel leads through the shoals at the entrance to Old Tampa Bay to the wharves and turning basin at Port Tampa. The channel is well marked by buoys and lighted ranges. Spoil banks border the east side of the north-south reaches of the channel; several spoil islands 5 to 10 feet high are just south of Port Tampa.

Port Tampa is an important shipping terminus on the easterly shore of Old Tampa Bay just inside the entrance. The elevators, oil tanks, and the long docks are conspicuous from Tampa Bay. The terminal facilities at Port Tampa are at the entrance and along both sides of a long dredged slip. A pier at the entrance is used for foreign and domestic general cargo. A wharf on the north side of the entrance is equipped with a traveling crane for handling sulfur and other bulk commodities. Two wharves on the north side of the slip are used for loading phosphate. On the south side of the slip are several small wharves, one of which is the base for a large tug, while the others are used by various oil companies for receiving petroleum products, and in some instances, for supplying bunker oil to vessels. Port Tampa is served by the Atlantic Coast Line Railroad.

A swash channel from Port Tampa parallels the southwest shore of interbay Peninsula at a distance of about 0.6 mile. The channel is marked by daybeacons and has a controlling depth of 7 to 8 feet.

A **danger zone** of a small-arms firing range for aircraft is southwesterly of Interbay Peninsula; limits of the area and regulations governing it are stated in **§ 204.100,** Chapter 2.

A municipal boat basin, with controlling depths of 4 feet in February 1956, is about 500 yards north of the Port Tampa terminals. A fish camp there has boats for hire.

Gandy Bridge, crossing Old Tampa Bay about 1.5 miles north of Port Tampa, has an opening with two parallel spans, about a mile west of the Interbay Peninsula shore. Each span has a horizontal clearance of 65 feet. The northerly one is a fixed span with vertical clearance of 40 feet; the southerly one is a bascule span with a vertical clearance of 13 feet.

There are two yacht basins, one on either side of the bridge at **Rattlesnake,** at the east end of Gandy Bridge. Marked channels lead to the basins. The north basin has covered storage facilities for boats up to 35 feet in length. A vertical hoist can lift boats up to 20 tons in weight and 35 feet in length. Repair facilities are limited. The south basin has facilities for vessels up to 6 feet in draft, and a hoist that can lift boats up to 10 tons in weight and 40 feet in length. A small marine railway can haul out smaller boats for hull and engine repairs. Gasoline, fresh water, ice, and provisions are available at both basins.

South Gandy Channel leads along the south side of the fill at the west end of Gandy Bridge to **Snug Harbor,** where small craft can find good protection from storms. Dock facilities are available at the head of the harbor. At the west end of the highway fill are several fishing camps and a small repair yard with a railway that can haul out boats up to 10 tons in weight and 50 feet in length for hull and engine repairs. The controlling depth into Snug Harbor was 12 feet in March 1956.

The approach to South Gandy Channel is from southward, between shoals which can be avoided with a little care. When about 100 yards from the outer end of the highway fill, turn westward and steer parallel with the fill, following the channel markers.

Along the east shore of Old Tampa Bay, north of Gandy Bridge, are several shallow basins suitable only for small craft. Most of these are privately marked.

Courtney Campbell Parkway crosses Old Tampa Bay about 6 miles above Gandy Bridge. This is a causeway, mostly fill, of a total length of 8 miles. Near the middle is a bascule span with a horizontal clearance of 55 feet and a vertical clearance of 13 feet. Near the westerly end is a fixed bridge with horizontal clearance of 10 feet and vertical clearance of 8 feet.

Safety Harbor is a health resort on the northwest shore of Old Tampa Bay 2 miles north of the Parkway. A tank 219 feet high is a prominent landmark. Safety Harbor has rail and highway connections with Tampa and St. Petersburg. Gasoline, water, ice, and some supplies are available at the resort.

A draft of 8 feet can be taken within 0.5 mile of the landing at Safety Harbor. A small basin on the south side of the large waterfront fill can accommodate boats

up to about 4 feet in draft, but the controlling depth into the basin is only about 3 feet.

From the Port Tampa dock, a course of **004°** for 1.6 miles leads to the draw in Gandy Bridge. Beyond the draw, a course of **322°** for 6.3 miles leads to the draw in Courtney Campbell Parkway. Beyond this second draw, a course of **290°** for 3 miles leads to a position 0.5 mile off the Safety Harbor landing.

At the head of Old Tampa Bay about 1 mile north of the town of Safety Harbor is the entrance to a large bight also known as **Safety Harbor** A draft of 6 feet can be taken into the bight. An overhead power cable crossing the bight entrance from Booth Point to Phillipi Point has a permit clearance of 98 feet. The town of **Oldsmar** is on the northeast shore of the bight.

St. Petersburg, a large winter resort on the west side of Tampa Bay 6 miles south of Gandy Bridge, is the terminus of two railroads, and major highways connect it with all parts of the State. The Gandy Bridge offers a short route to Tampa, and the Sunshine Skyway, a toll bridge, connects with points to the south.

St. Petersburg has numerous stores and hotels, two hospitals, and two airports. Gasoline, diesel oil, fresh water, ice, provisions, and yacht supplies are available in quantity. Boats can be chartered and guides engaged.

A draft of 25 feet can be taken within 0.5 mile of St. Petersburg by following the main ship channel in Tampa Bay through the westward reach leading to Port Tampa, then turning southwestward into the natural deep-water area extending toward St. Petersburg.

The channel from southerly in Tampa Bay is no longer maintained. In 1954 the controlling depth was 19 feet in the north-south reach.

Pilotage.—Pilots for St. Petersburg go to Tampa Bay entrance only by previous arrangement. Shipmasters can communicate with the pilots by radio or telegram. Ships approaching the bar, and bound for St. Petersburg, should fly the International Code flags SP. The pilot boat flies a red-and-white pilot flag. Vessels entering by Egmont Channel are boarded near lighted bell buoy 2; those coming in by Southwest Channel are boarded outside lighted bell buoy 1 at that channel's entrance.

Customs, quarantine, immigration.—Vessels can arrange for customs, quarantine, and immigration inspection by telephoning the officials concerned in Tampa.

Port of St. Petersburg, the deepest and southernmost basin along the city waterfront, is about 500 yards long and 400 yards wide. A concrete wharf, with warehouse, along the north side of the basin provides berthing space for several vessels. The Coast Guard operates a buoy depot and air-sea rescue base at the outer end. A **restricted area** for seaplanes is off the base; limits and regulations are stated in **§ 207.175,** Chapter 2.

Bayboro Harbor, which is entered from the inner end of the ship basin, is used by numerous fishing boats and other small commercial craft. The average depth of the harbor is about 13 feet, but there are numerous shoal spots. The largest of five boatyards in the harbor and in Salt Creek can haul out vessels of 200 tons in weight, 124 feet in length, and 10 feet in draft, for hull and engine repairs.

Oil stations and small commercial landings are along the banks of **Salt Creek,** which empties into the south side of Bayboro Harbor. Controlling depths in the creek are 10 feet to the first bend, thence 6 feet to the bridge at Third Street, South, which is the head of navigation.

Northward along the St. Petersburg waterfront from the ship basin are the municipal pier and three yacht basins. The pier is a long concrete structure with a 2-story pavilion on its outer end. North Yacht Basin and Central Yacht Basin are on either side of the inner half of the pier. Both basins are enclosed by sea walls and provide excellent protection for vessels up to about 100 feet in length and 8 feet in draft. South Yacht Basin, the second basin south of the pier, is used by small sailing vessels.

Central Yacht Basin has a lighted entrance range, and lights mark the ends of the moles on either side of the entrance. Numerous slips are on the north and west sides of the basin, and a public landing is on the west side. The St. Petersburg Yacht Club is adjacent to Central Yacht Basin.

Coffeepot Bayou, 1 mile north of the municipal pier, affords good anchorage for small craft that can pass under the fixed bridge with a vertical clearance of 4 feet. The marked channel had a controlling depth of 4 feet in March 1956, but it was reported to be shoaling.

Smacks Bayou, about a mile northeast of Coffeepot Bayou, had a controlling depth of 1½ feet in March 1956. Inside, there is deeper water resulting from recent dredging to provide land fill. Any vessel able to enter and pass under the fixed bridge with its vertical clearance of 7½ feet will find good shelter.

The basins on the south side of **Papys Bayou,** midway between Coffeepot Bayou and the Gandy Bridge, offer good protection for small boats during periods of very bad weather. The controlling depth into the bayou is about 2½ feet. Local knowledge is needed to find the best water.

Chart 586.—Big Bayou is a mile south of the St. Petersburg ship basin. The privately marked channel into the bayou had a controlling depth of 4 feet in March 1956.

Recent dredging and filling around Lewis Island has created a good small-boat channel connecting Big and Little Bayous, but the channel is crossed by 2 fixed bridges with vertical clearance of 10 feet.

Little Bayou is 2.5 miles south of the ship basin. A privately owned yacht basin in the southern part of the bayou has a depth of about 10 feet. A dredged channel extends southward from Little Bayou to deep water in the bay. The controlling depth in the channel is 9 feet, but the channel is shoaling across its southern end.

Boca Ciega Bay extends 13 miles northwestward from the lower part of Tampa Bay. The bay is generally shoal, but a dredged channel affords passage from Tampa Bay to Clearwater Harbor by way of the Narrows for shallow-draft boats. This channel is a link in the inland

waterway from Caloosahatchee River to Anclote River. The dredged cuts are marked with finger daybeacons, indicating the side on which they should be passed. Tidal currents in the bay seldom exceed one-half knot, but in Pass-a-Grille Channel and Johns Pass the average velocities at strength are, respectively, 1¼ and 1¾ knots.

The controlling depth through Boca Ciega Bay to Clearwater Harbor was 5 feet in March 1956.

Pass-a-Grille Channel, between **Pine Key** and **Long Key,** is a passage from the gulf to the southerly section of Boca Ciega Bay. **North Channel** and **South Channel** are the two entrances. Local knowledge is essential to get through North Channel; controlling depth was 6 feet in March 1956. South Channel is blocked off by a shoal 1 mile southwest of **Shell Key.** Both channels are marked.

Pass-a-Grille Beach is a residential and resort town on the south end of **Long Key.** Depths of 8 to 10 feet can be taken to the small wharves along the east side of the key. That portion of the channel between the town and Vina Del Mar offers good protection for small craft. A fixed bridge across the channel has a horizontal clearance of 30 feet and a vertical clearance of 14 feet. The town has hotels and stores, and gasoline, water, ice, and some yacht supplies are obtainable. Of the two boatyards equipped to do hull and engine repair, the larger has a marine railway capable of hauling up a boat 50 feet in length and 22 tons in weight.

About 2 miles from the south end of Long Key is **Don Ce Sar Beach,** site of a large and ornate hotel building now used as a Veterans Administration headquarters. High water tanks are on the north and southeast sides of it. At **St. Petersburg Beach,** 2 miles north of the hotel, **Corey Causeway** crosses Boca Ciega Bay from Long Key to the mainland. The causeway has a bascule span with a horizontal clearance of 60 feet and a vertical clearance of 8 feet.

Gulfport, on the north shore of Boca Ciega Bay opposite Long Key, is a suburb of St. Petersburg. A draft of about 6 feet can be taken to the pier. A water tank in Gulfport and a cupola 1 mile to the northwest can be seen from seaward.

In **Clam Bayou,** a mile east of Gulfport, there are two small boatyards and a yacht basin. The larger marine railway can haul up a boat 60 feet in length, 15 tons in weight, and 6 feet in draft. Both yards do hull and engine work. Gasoline, water, and some marine supplies are available. The dredged channel into Clam Bayou, marked by privately maintained daybeacons, has a reported depth of 6 feet.

At **Frenchman Creek,** about 1.7 miles southerly from Clam Bayou, there is covered storage for over 200 craft up to 60 feet in length. A vertical hoist can lift out boats up to 12 tons in weight and 40 feet in length, for general repairs. Gasoline, water, and marine supplies can be obtained. The creek is crossed near the basin by a fixed highway bridge with a horizontal clearance of 26 feet and a vertical clearance of 16 feet. The controlling depth in Frenchman Creek was 6 feet to the basin, in March 1956.

Chart 858.—Treasure Island Causeway crosses Boca Ciega Bay from the island to the mainland. The causeway has a bascule span with a horizontal clearance of 80 feet and a vertical clearnce of 8½ feet. The east and west fixed openings have horizontal clearances of 52 feet and vertical clearances, respectively, of 4 and 5 feet.

Blind Pass, between Long Key and **Treasure Island,** is used by local fishing boats up to 3 feet in draft. The pass is unmarked and is not recommended for strangers because of the rocks which have been dumped offshore to stop beach erosion. A fixed highway bridge over the inner part of Blind Pass has a horizontal clearance of 22 feet and a vertical clearance of 9½ feet. Dock facilities, gasoline, water, and some provisions can be obtained near the bridge. The overhead power cable about 0.5 mile south of the bridge, over the channel east of Long Key, has a permit clearance of 50 feet.

Johns Pass, between Treasure Island and **Sand Key,** affords passage for small craft between the Gulf and the northern part of Boca Ciega Bay. The channel is well marked, and passage is not difficult if the sea is smooth. The channel shifts frequently and the buoys are moved accordingly. The highway bridge over the pass has a bascule span with a horizontal clearance of 59 feet and a vertical clearance of 7 feet; at the bridge is an overhead power cable with a permit clearance of 66 feet. The controlling depth through the pass was 4 feet in March 1956.

Numerous fishing piers and bait houses are near Johns Pass bridge. Gasoline and water are available. **Madeira** is a small community at the northwest end of the bridge. Two boatyards at Madeira have marine railways, the largest of which can haul out craft up to 65 feet in length and 7 feet in draft for hull and engine repairs. The northerly of the two yards is in a cove known locally as Snug Harbor.

Welch Causeway crosses Boca Ciega Bay from Sand Key to the mainland at a point 1.5 miles northwest of Johns Pass. The causeway has a bascule span with a horizontal clearance of 49 feet and a vertical clearance of 8 feet. A water tank at the Sand Key end of the bridge is prominent. An overhead cable at the bridge has a permit clearance of 62 feet. The shallow cove just east of the mainland end of the bridge has been dredged to form a small-boat basin adjacent to the Veterans Hospital. A draft of about 3 feet can be taken into the basin, but the channel is reported to be shoaling.

The Narrows, which connect the northwest end of Boca Ciega Bay with the south end of Clearwater Harbor, are about 4 miles long and are marked by daybeacons. On the west side of the Narrows near the south end are rocks which are covered at high tide; to avoid them, mariners should favor the east bank. The bridge over The Narrows from the mainland to **Indian Rocks Beach,** on Sand Key, has a swing span with horizontal clearance of 57 feet and a vertical clearance of 6½ feet. Nearby is an overhead power cable with a permit clearance of 63 feet.

Clearwater Harbor extends about 7 miles northward from The Narrows to Big Pass and has an average width of about 1 mile. The harbor is mostly shoal, but there

are narrow natural channels varying in depth from 5 to 14 feet. **Belleair Beach Causeway** crosses the harbor from Sand Key to the mainland at a point 2.6 miles north of the bridge over The Narrows; the causeway has a bascule span with a horizontal clearance of 81 feet and a vertical clearance of 20 feet. **Belleair,** about 1 mile north of the mainland end of the causeway, has a large hotel with a private yacht basin into which a draft of about 4 feet can be taken. Berthing facilities, gasoline, water, ice, and provisions are available.

The several channels in Clearwater Harbor are marked by numerous aids which should be followed closely as some sections of the channels are quite crooked. **Little Pass,** 11 miles northward from Johns Pass, is between the north end of Sand Key and **Clearwater Beach Island.** The channel inside the pass, which formerly led southward around the north tip of Sand Key, has shoaled and its markers have been removed. Passage to Clearwater Channel for craft bound either north or south now is made by way of the causeway channel and city pier on the mainland. The controlling depth is about 4 feet to Clearwater. In 1953 it was reported that the current in the east-west portion of the channel runs about 1½ knots at strength.

Big Pass is 3 miles north of Little Pass and at the opposite end of Clearwater Beach Island. A channel inside the pass leads along the inner side of the island southeasterly to the Clearwater Harbor channel. **Mandalay Channel** continues along the inner side of the island to the causeway, passing the Clearwater Yacht Club near the middle of the island. The depth over the bar at Big Pass was 3½ feet in March 1956. A marina south of the causeway in Clearwater Beach has docking facilities for over 100 boats up to 50 feet in length. Little Pass was preferable to Big Pass, in March 1956.

In Big Pass and Little Pass the currents average, respectively, about 1 and 1¼ knots at strength; in the harbor off Clearwater the current averages about one-half knot at strength.

Because the bars are subject to change, the chart cannot be relied upon to show the latest condition, but inside the passes the channels are fairly stable, and the chart is a good guide. When the sea is smooth, which is the only time that a stranger can enter, the channels usually can be discerned by the difference in color of the water.

Clearwater Harbor is a link in the inland waterway from Caloosahatchee River to Anclote River. The channel through the harbor passes close alongshore opposite Clearwater. A causeway crosses Clearwater Harbor from Clearwater to Clearwater Beach Island. The bascule span in the causeway has a horizontal clearance of 48 feet and a vertical clearance of 6 feet; the fixed span to the west has horizontal clearance of 54 feet and vertical clearance of 6 feet; drawspan regulations are stated in § 203.466, Chapter 2. A channel leads along the south side of the causeway from the city pier to a junction with the Little Pass channel at the south end of Clearwater Beach Island; a branch continues westward to a small-boat anchorage at the west end of the causeway.

Clearwater, the seat of Pinellas County, is a city on the east shore of Clearwater Harbor opposite Little Pass. Two railroads connect with St. Petersburg, Tampa, and all points north, and paved highways connect with all parts of the State. The city has two yacht clubs and a city pier with protected basins, and there are several coves offering safe anchorage. A draft of 4 to 5 feet can be carried to the yacht clubs and the city pier. A marine railway can handle boats up to 70 feet in length and 4 feet in draft for general hull and engine repairs. Gasoline, diesel oil, water, ice, provisions, and some yacht supplies are obtainable. Boats can be chartered and local guides can be engaged. The large hotel in Clearwater is the most prominent object in the general area. **Coastal (storm) warnings** are displayed here.

St. Joseph Sound extends northward from Clearwater Harbor nearly to Anclote Keys, and is separated from the Gulf for a part of the distance by a narrow strip of beach known as **Caladesi Island** and **Honeymoon Island. Hurricane Pass** extends between them and, though subject to change, is good for from 3 to 5 feet with local knowledge. On a favorable tide a draft of a little more than 3 feet can be carried to the sound, but 3 feet is all that a stranger should attempt, and that only on a rising tide. Finger daybeacons mark the pass.

Five miles off St. Joseph Sound the **current** floods northward and ebbs southward with a mean velocity at strength of one-half knot.

Dunedin is 3 miles north of Clearwater and directly opposite Big Pass. A railroad and a State highway provide communication with the interior. A small-boat basin is behind a bulkhead just south of the city wharf. Gasoline, provisions, and some yacht supplies are available. A channel branches eastward from Big Pass and leads to the wharves. A draft of 3 feet can be taken to the wharves by following this channel, which is marked but difficult to navigate without local knowledge.

In **Minnow Creek,** 3 miles north of Dunedin, there are two boatyards with marine railways that can haul out craft up to 35 feet in length and 4½ feet in draft for general repairs. Gasoline, water, and provisions are available. A dredged channel with a depth of 3 feet leads to the yard from just north of a small island in the center of **Smith Bayou.** The channel is privately marked.

A boiling spring is close to shore about 5 miles north of Dunedin and just south of **Crystal Beach.** The boiling water is visible above the surrounding waters in calm weather. Depths of 15 to 20 feet were found in the spring of 1924.

A public pier at Crystal Beach can accommodate small craft. Gasoline, water, ice, and provisions can be obtained. The controlling depth in the privately maintained channel was 3 feet in March 1956.

Anclote Keys, several in number, are about 13 miles

northward from Clearwater. **Anclote Keys Light,** 101 feet above the water and visible 16 miles, is shown from a brown square pyramidal skeleton tower inclosing a stair cylinder, on the south end of **Anclote Key,** the largest of the group. The trees on the south end of Anclote Key are rather tall and can be made out from well offshore.

A **danger zone** for aerial gunnery and bombing is in the Gulf between Anclote Keys and Cedar Keys; limits and regulations are stated in **§ 204.105,** Chapter 2.

Anclote Anchorage, between the keys and the mainland, offers good protection from westerly gales for vessels up to 7 feet in draft. The anchorage can be reached by passing either northward or southward of the keys, both passages being well marked. Vessels drawing more than 7 feet can anchor westward of the keys where, though more exposed to westerly winds, the water shoals so gradually that the seas are never very heavy, and vessels with good ground tackle can ride out anything but a hurricane. Off Anclote the current has a mean velocity at strength of about three-fourths knot.

Anclote River empties into Anclote Anchorage over a broad shoal area. Federal project depth is 9 feet from the Gulf to a turning basin at Tarpon Springs; project depth obtained in March 1956. The channel is marked by numerous lights and daybeacons. Above Tarpon Springs the river is navigable for drafts of no more than 2 or 3 feet.

Anclote is a small settlement on the north bank of Anclote River about 1 mile above the mouth. No supplies of any kind are available. A large elevator and a nearby water tank can be seen for 10 miles; the tank has a light on top.

Tarpon Springs is a winter resort and commercial fishing center on the south bank of Anclote River, 3 miles above the mouth. Two water tanks in the town are visible from several miles offshore. Tarpon Springs, headquarters for the sponge fishing fleet on the west coast of Florida, has a municipal hospital, several hotels, and rail and highway connections to all parts of the State. The municipal landing is a marginal wharf 330 feet long at the Sponge Exchange, just below the bridge. Gasoline, diesel oil, water, ice, provisions, and marine supplies are obtainable. Several yards along the river have facilities for hauling, repairing, and storing boats; the largest railway can haul out boats up to 65 feet in length, 20 tons in weight, and 6½ feet in draft. **Coastal (storm) warnings** are displayed on the waterfront.

The fixed highway bridge over Anclote River at Tarpon Springs has a horizontal clearance of 40 feet and a vertical clearance of 10 feet.

Kreamer Bayou and **Whitcomb Bay** empty into Anclote River along the west side of Tarpon Springs. The junction is at the north end of a small island; the river passes to the east of the island and the common channel to the bayous passes to the west. The entrance channel branches at **Chesapeake Point** into Kreamer Bayou on the west and Whitcomb Bay on the east. The channel to Kreamer Bayou has shoaled and only small skiffs can enter. The highway bridge over Tarpon Bayou has a bascule span with horizontal clearance of 26 feet and vertical clearance of 8 feet; the permit clearance of the nearby overhead power cable is 38 feet. The bridge could not be opened in March 1956. A public wharf is south of the entrance to the second arm to the east in Whitcomb Bay, and another public wharf is at the yacht basin at the head. A draft of 3 feet can be carried from Anclote River through Whitcomb Bay to the yacht basin, which is centrally located in the town of Tarpon Springs.

Chart 1258.—The shoals that extend over 10 miles offshore along the coast for 40 miles northward from Anclote Keys are known under the general name of **St. Martins Reef.** The outer limit of shallow water and detached shoals is marked by a light 16 miles north by west from Anclote Keys Light.

Strangers should approach the coast with care, and deep-draft vessels should stay in depths of 30 to 35 feet. Small craft of 3 to 4 feet in draft usually follow the coast more closely, especially during windy weather, and find comparatively smooth water by keeping about 7 miles offshore. Hazy atmosphere frequently obscures this section of the coast, and the vessels standing inshore close enough to sight land are mostly spongers and fishermen, who sometimes anchor in shoal water, soft bottom, behind shell reefs and ride out the heaviest gales.

Pithlachascotee River, widely known as the **Cotee River,** empties into the Gulf 7 miles northward from Anclote River. The river has an extensive shoal area off the mouth and numerous oyster reefs just inside. Local fishing boats up to 4 feet in draft navigate the river to the upper highway bridge. The Federal project provides for a channel 6 feet deep from the Gulf to a basin of the same depth just downstream from the highway bridge at Port Richey. In March 1956 no work had been done on the project, and the controlling depth was 2 feet across the shoals off the mouth of the river. A privately maintained light marked the entrance.

Port Richey (P. O.) is a small town at the entrance to the river. A local boatyard has marine ways that can haul out small craft up to 40 feet in length and 4 feet in draft, for hull repairs.

New Port Richey (P. O.) is a small town about 2.5 miles above the mouth of Pithlachascotee River. The municipal water tank at the town is 110 feet high and prominent from offshore. There is a small public wharf in town. Gasoline, oil, water, ice, and provisions are available.

Three bridges cross the Pithlachascotee. The first 1.2 miles above the mouth, is a bascule span with a horizontal clearance of 49 feet and a vertical clearance of 10 feet. The other two bridges have fixed spans with minimum horizontal clearance of 16 feet and minimum vertical clearance of 5 feet. Operating regulations for the drawbridge are given in **§ 203.245,** Chapter 2.

Hudson (P. O.) is a small settlement on **Hudson Creek** which empties into the Gulf 12 miles northward from Anclote River. A Federal project provides for a channel 6 feet deep from the Gulf to the head of the creek;

in March 1956 no work had been done on the project, and a draft of only 1½ feet could be carried into the creek with local knowledge.

Aripeka (P. O.) is a village, on **Hammock Creek,** 17 miles northward from Anclote River. There are numerous deep springs and shoals in the creek, which has a controlling depth of about 1½ feet. The highway bridges over the channels around the north and south sides of the island in midcreek have fixed spans with a vertical clearance of 2 to 3 feet at high water. Aripeka is on a State highway.

Bayport (P. O.), on **Weekiwachee River** 23 miles northward from Anclote River, consists of a few houses. On a favorable tide a draft of about 2 feet can be taken to the village. The channel begins close southward of **Beacon Rock,** which is 2 miles offshore and covers at high tide, and continues in a generally east-by-south direction through the oyster reefs and into the river.

Chassahowitzka River empties into **Chassahowitzka Bay** 31 miles north of Anclote River. On a favoring tide, a draft of about 3 feet can be taken to a small fishing camp on **Johns Island,** at the entrance to the river; the channel is difficult for strangers. From Johns Island to the settlement of **Chassahowitzka,** the river is shallow and partly blocked by hyacinths and grass; the controlling depth is about 1½ feet. Chassahowitzka is a small fishing village with a lodge and a store; a road connects with the State highway.

Bird Island is prominent in the entrance to Chassahowitzka Bay. **Black Rock,** 1.3 miles seaward from the key, bares at half tide. **Chassahowitzka Point,** on the north side of the bay, is a high and conspicuous mangrove key.

Homosassa River empties into **Homosassa Bay** 37 miles northward from Anclote Keys Light. **St. Martins Keys** are prominent mangrove islets on the north side of the bay entrance. **Homosassa** (P. O.), a small fishing community 4 miles above the mouth of the river, has a hotel, stores, and commercial fish houses, and telephone and telegraph connections with the town of Crystal River. Gasoline, oil, ice, and provisions are available. A draft of 4 feet can be taken to Homosassa on a favorable tide. The river entrance is marked by lighted buoys and daybeacons. Shoals on either side of the channel are discernible by their lighter color.

Crystal River empties into the north side of **Crystal Bay** 46 miles northward from Anclote Keys Light and 23 miles southeastward from the town of Cedar Keys. **Mangrove Point,** on the south side of the entrance to the bay, is prominent in the approach from the southwest. The white shell of **Shell Island,** on the south side of the river's entrance, is prominent when approached from the channel across Crystal Reefs.

The Federal project for Crystal River provides for a channel 6 feet deep from the Gulf to the town of Crystal River. The entrance is across a large shoal area, thence across **Crystal Reefs** through the dredged channel. The channel, well marked by daybeacons, had a controlling depth of 6 feet in March 1956. Some shoaling has occurred westward of the entrance light.

The town of **Crystal River,** at the head of the river 6 miles above the mouth, has rail, highway, telegraph, and telephone connections. Several commercial fish and oyster houses are here. Gasoline, oil, water, and provisions are obtainable and some repairs can be made to small boats. There is fresh water in the upper section of the river, which has its source in numerous springs. The mean tidal range at the mouth of the river is about 2½ feet.

To enter Crystal River, stay at least 5 miles offshore until the light and daybeacons at the entrance bear about east by north. Follow the daybeacons through the numerous oyster bars on Crystal Reefs. The river is entered at the north side of Shell Island where there is a shoal area with a depth of 6 feet, which is the controlling depth that can be taken upriver. Midchannel courses should be followed and a lookout kept for shoals. A draft of about 6 feet can be carried into the basin at the head of the river, but only 3 to 4 feet can be taken into the inner basin and to the fish house wharf. Keep close to the west end of a small island when entering the inner basin. An overhead power cable with a permit clearance of 35 feet crosses the river about 0.7 mile below the wharf.

Chart 1259.—Withlacoochee River rises in the central part of the peninsula of Florida and empties into the Gulf about 17 miles southeast of Cedar Keys. A Federal project for the river provides for a channel 10 feet deep from the Gulf to Port Inglis, just within the river entrance; maintenance of the channel between the river mouth and Inglis to a depth of 10 feet; and 2 feet available for about half the year as far as Croom, 74 miles above the mouth. Controlling depths were 7 feet from the Gulf to the power plant at Inglis in March 1956, and thence 4 feet to the dam 11 miles above the mouth. Oil barges drawing better than 8 feet were being taken upriver to the power plant without too much difficulty. The lock in the dam is 133 feet long and 36 feet wide, but in 1956 the gate was not in working order; it had not been used since June 1952, and only 13 times in the previous 6 years. The pool created by the dam extends nearly to Dunnellon, 24 miles above the mouth. The channel into the river is well marked.

Port Inglis, at the mouth of the river is virtually abandoned. **Yankeetown,** the principal settlement on the river, is a small winter resort and fishing village 3 miles above Port Inglis. Yankeetown has a hotel and store; gasoline, oil, and provisions are obtainable. **Inglis** (P. O.) is a small settlement 7 miles above the mouth of the river; gasoline, oil, fresh water, and provisions are obtainable. A large electric plant is located at Inglis. An overhead power cable with a permit clearance of 70 feet crosses the river here. A fixed highway bridge just above Inglis has a horizontal clearance of 35 feet and vertical clearance of 10 feet.

Tides and currents.—The mean range of tide is 2½ feet. Off the mouth of the river a tidal current sets easterly during the flood and westerly during the ebb. The ebb is said to attain a velocity of 3 knots some-

times, and this must be taken into account by vessels coming in from the entrance buoy. A strong northeasterly wind may increase the velocity of the ebb current and a southwesterly wind may decrease it.

Waccasassa River, 10 miles northward from Withlacoochee River, is of little navigational importance because of the extensive **Waccasassa Reefs** off its mouth.

Cedar Keys, 95 miles northward from Tampa Bay, are a group of low sandy islets covered with mangrove trees. Prominent from offshore is the white tower of the abandoned lighthouse on **Seahorse Key,** the outermost of the group. The tower, which is flanked by two white-roofed buildings, shows to seaward among the trees; the tower is 30 feet high and stands on a 45-foot mound on the south side of the key. **Seahorse Reef,** a dangerous shoal with little depth over it, extends 11 miles southwestward from Seahorse Key. The outer end of the reef is marked by a whistle buoy and a light.

Cedar Key is a small town on **Way Key.** The most prominent object in the town is the municipal water tank, 140 feet high. A draft of 8½ feet can be taken through the main channel to the city dock which has depths of 8 to 15 feet alongside. Gasoline, diesel oil, water, ice, some provisions, and supplies for small boats are available. A small boatyard can handle boats up to 28 feet long and 4 feet in draft. Two other marine railways in the town can haul up craft 52 feet in length and 4 feet in draft. **Coastal (storm) warnings** are displayed.

In **Main Ship Channel,** east of Seahorse Key, the controlling depth was 8½ feet in March 1956. The channel is quite crooked, but is marked by lights and daybeacons. Extreme caution must be exercised at two hairpin curves. **Northwest Channel** in March 1956 had a controlling depth of 4 feet; the channel is marked by lights and daybeacons. Small craft bound up the coast should enter by Main Ship Channel and leave by Northwest Channel rather than cross Seahorse Reef. Local fishing boats report a controlling depth of 4 feet in **Deadmans Channel,** which is unmarked and should not be used without local knowledge. **Cedar Key South Bar Channel** had a controlling depth of 3 feet in March 1956. It is not well marked, and should be used with caution.

Fog.—This area has considerable fog during the winter months; southerly winds bring it in and northerly winds clear it away.

Tides and currents.—The mean range of tide at Cedar Keys is 2½ feet. Outside the entrance channel the current sets eastward on the flood and westward on the ebb. Inside, the currents generally follow the channels. Currents are strong in the vicinity of the city dock, and caution must be observed when docking with a fair current.

Suwannee Sound, 7 miles northward from Cedar Keys, has a long line of narrow shoals on the seaward side known as **Suwannee Reef.** The sound is about 8 miles long and has an average width of about 3 miles. The principal entrance to Suwannee Sound is through **Derrick Key Gap,** 4 miles northwestward from Cedar Keys. The dredged channel through Derrick Key Gap is well marked by daybeacons. The controlling depth was 4 feet in March 1956.

Steamboat Gap, Ranch Bar Gap, and **West Gap** are unmarked secondary channels with depths of 4 feet or less, and should not be entered without local knowledge. **Shell Bar Channel,** about 1 mile northwest of Ranch Bar Gap, has a controlling depth of about 3 feet through an unmarked channel.

The passage through Suwannee Sound from Derrick Key Gap is west of **Lone Cabbage Reef,** which extends northwesterly from **Lone Cabbage Island** to East Pass; the reef bares in spots at low water and is to be avoided.

Suwannee River empties into the sound through the two mouths known as **East Pass and West Pass.** The dredged channel through the shoals at the entrance to East Pass is marked by daybeacons and had a controlling depth of 5 feet in March 1956, but south of the entrance daybeacon it had shoaled to about 2 feet. East Pass is the main entrance; West Pass is little used and good only for shallow-draft boats.

A draft of about 3 feet can be carried up Suwannee River to **Branford,** 65 miles above the mouth; a draft of 2 to 3 feet can be carried to the rapids 2 miles below **Ellaville,** 110 miles above the mouth; and at high stages small boats can go to **White Springs,** 150 miles above the mouth.

The mean range of tide at the mouth of the river is about 2½ feet. Extreme fluctuations occur due to freshets. Low river stage occurs in the winter and high river stage in the fall months. There is little commerce on the river. Gasoline, water, and provisions are obtainable at **Suwannee Gables** and at U. S. Highway 19 bridge, 21 miles above the mouth of the river. This bridge, the first above the mouth, has a fixed span with a horizontal clearance of 110 feet and a vertical clearance of about 30 feet.

Boiler Gap, 2 miles northwestward from Suwannee River, is a staked channel with a controlling depth of about 5 feet in the approaches. The Gap is used by local boats going up **Salt Creek** to **Suwannee** (P. O.), a village 1 mile above the mouth of the creek. The village has several dwellings, fish houses, and a store where limited supplies are available. A State highway extends to **Old Town.**

Shired Island is a village at the mouth of **Shired Creek,** which is about 18 miles northwestward from Cedar Keys. The village can be reached from the south by a winding, staked channel which has a controlling depth of about 3 feet. Shired Island has several dwellings, fish houses, and a store where limited supplies are available.

Horseshoe is a village on **Horseshoe Point,** which is 5 miles west-northwestward from Shired Creek. Gasoline, oil, and limited supplies are available. A paved road connects Horseshoe with **Cross City** and U. S. Highway 19. A Federal project provides for a channel 6 feet deep from the Gulf to the Horseshoe turning basin. The staked channel has a controlling depth of about 2 feet.

Chart 1260.—Pepperfish Keys, 29 miles northwestward from Cedar Keys, are the only features that a stranger can recognize between Cedar Keys and St. Marks River. Pepperfish Keys are 0.3 to 1 mile off the mainland, and can be made out at a distance of 5 to 6 miles. The white sand beach on the northwesternmost key is easily identified. Protected anchorage is available for small craft behind the same key where depths are 6 to 8 feet and the bottom is sand with patches of boulders. The approach to the anchorage is through an unmarked channel which extends in an east-southeast direction. Boats of less than 4 feet in draft can enter by keeping in dark water; the shoals are discernible by their lighter color.

Steinhatchee River empties into **Deadman Bay** 37 miles northwestward from Cedar Keys. A Federal project provides for a channel 6 feet deep in Deadman Bay from the Gulf to Steinhatchee. The channel is marked by lights and daybeacons; boats drawing 4 feet were using this channel in 1956.

Steinhatchee (P. O.), a small settlement on the north side of the river, connects with U. S. Highway 19. Gasoline, diesel oil, water, and provisions are obtainable. A boatyard can haul up craft 40 feet in length and 5 feet in draft, for hull repairs. A highway bridge at Steinhatchee has a swingspan with a horizontal clearance of 54 feet and a vertical clearance of 7 feet. The overhead power cable about 2 miles east of the town has a permit clearance of 43 feet.

Dallus Creek, 5 miles northwestward from Steinhatchee River, has a bar across its mouth that bares at low water. Small boats of not more than 2 feet in draft use the creek as far as **Dallus Creek Landing,** a mile above the mouth, where a second-class road connects with the main highway.

The high pine trees on **Piney Point,** 10 miles northwestward from Steinhatchee River, are visible from well offshore on a clear day. Several small settlements northward of Piney Point have roads connecting with the main coastal highway, but offer no supplies. **Fish Creek Landing** is 0.5 mile above the mouth of **Fish Creek,** 2 miles northward from Piney Point. **Keaton Beach,** a fishing settlement 4 miles from the point, has small docks. **Jug Island,** a summer resort 5 miles from the point, has a small-boat wharf and about a dozen houses. **Adams Beach** is a small-boat landing 8 miles from Piney Point. **Yates Creek Landing** and **Spring Warrior** are small landings on the creeks of the same names 9 and 11 miles north-northwestward from the point.

Fenholloway River empties into the Gulf of Mexico eastward of Apalachee Bay and 64 miles northwestward from Cedar Keys. A draft of 3 feet can be taken into the river on a favorable tide, but a knowledge of local conditions is needed. The river is navigable for only a few miles above the mouth. **Fenholloway Clubhouse,** 2 miles above the river's mouth, has a small-boat landing but no supplies are available. A second-class road connects the clubhouse with the coastal highway.

6. APALACHEE BAY TO MOBILE BAY

Charts 1114, 1115.—The coast, consisting of a chain of generally narrow and wooded sand islands, trends southwestward for about 40 miles from Apalachee Bay to Cape St. George, thence northwestward for 95 miles to Choctawhatchee Bay, and thence about 80 miles westward and southwestward to Mobile Bay.

From Apalachee Bay to St. Andrew Bay, the 10-fathom curve extends as much as 19 miles offshore, and shoals with as little as 3 feet over them extend several miles from the eastern end of St. James Island, from Cape St. George, and from Cape San Blas. From St. Andrew Bay to Pensacola Bay the 10-fathom curve is close inshore and the beach is steep-to. The 10-fathom curve gradually extends farther offshore beyond Pensacola Bay until off Mobile Bay where it is about 11 miles offshore.

The coral formation which characterizes the coast from the Florida Keys to Apalachee Bay begins to give way in the vicinity of Cape St. George and Cape San Blas to the sand formation westward.

Chart 1261.—Apalachee Bay, about 170 miles northwest of Tampa Bay, is formed by the bend in the coastline from a northwesterly to a southwesterly direction. Depths range from 6 to 20 feet with numerous shoals and rocks, some bare at low water. The bay is the approach to St. Marks River.

Boundary Line of Inland Waters.—The line established for Apalachee Bay is described in **§ 82.89,** Chapter 2.

Danger Zone.—An Air Force rocket-firing range has been established in the Gulf south of Apalachee Bay; limits and regulations are stated in **§ 204.111,** Chapter 2.

Econfina River, entering the eastern part of Apalachee Bay, is used mostly by local fishermen as an anchorage. The river channel is rocky, and should be used with caution. **Econfina Landing,** about 2 miles above the mouth, has facilities for small craft. Gasoline, oil, ice, water, and fishing tackle are available at the fish camp. A state highway joins the main coastal highway.

Aucilla River empties into Apalachee Bay 4.5 miles northwestward of Econfina River. A draft of 5 feet can be taken into the river on a favorable tide, but the approach for a distance of 3 miles is a narrow winding channel, unmarked and difficult for strangers.

St. Marks National Wildlife Refuge covers the coastal area between Aucilla River and Shell Point, about 5 miles west of St. Marks River.

Chart 484.—St. Marks River flows into the head of Apalachee Bay 83 miles northwestward of Cedar Keys and 54 miles northeastward of Cape St. George. The river is the approach to the town of St. Marks about 5.5 miles above the mouth. Fishing is the principal industry, but considerable oil is brought in by barges with drafts up to 9 feet.

Currents.—The tidal current in St. Marks River averages about one-half knot at strength. Daily current predictions for the area may be obtained from the Tidal Current Tables.

St. Marks Light is the most prominent object in the approach to St. Marks River. The light, 82 feet above the water and visible 15 miles, is shown from a white conical tower adjoining a one-story dwelling. The light also serves as the rear range light.

Federal project depth is 10 feet into the turning basin at the town; the project also calls for removal of snags and similar obstructions in the existing channel from St. Marks to Newport. In March 1956 the controlling depth was 7 feet to **Newport,** 4 miles above St. Marks. The overhead power cable at St. Marks has a clearance of 74 feet. The highway bridge at Newport has a bascule span with a horizontal clearance of 39 feet and a vertical clearance of 13 feet. The channel from Apalachee Bay is marked by St. Marks Lighted Range, lights and buoys; in the river the channel is well marked.

A land cut about 30 yards wide, 500 yards long, and 6 feet deep has been dredged from the east side of Spanish Hole, northwest of St. Marks Light, for the St. Marks Bird Refuge boat anchorage. In 1952 the controlling depth was 2½ feet.

Wakulla River enters St. Marks River about 5 miles north of St. Marks Light. A draft of 7 feet can be taken upriver for about 0.4 mile above the confluence, and 3 feet to Wakulla Springs, 7 miles above St. Marks.

Spanish Hole is an anchorage between the oyster bars in the mouth of St. Marks River, 0.5 mile westward of St. Marks Light. Depths of 10 to 19 feet are found in the anchorage with shallow water close-to on all sides. A conspicuous wreck is on the northeast side of Spanish Hole. Arrangements can be made for having supplies delivered to vessels at the anchorage.

The mean range of **tide** is about 2½ feet. Daytime **coastal (storm) warnings** are displayed.

There are several privately owned wharves in St. Marks which are open to the public. Gasoline, diesel oil, ice, provisions, and water are available. Other supplies can be obtained on short notice from Tallahassee. The larger of the two marine ways can haul out boats up to 60 feet in length and 6 feet in draft for hull and engine repairs. The marine railway at Newport can haul out boats up to 90 feet in length, 100 tons in weight, and 7

feet in draft by special arrangement. Machine-shop jobs are taken to Tallahassee. Boats can be chartered and local fishing guides hired.

Chart 1261.—A beach resort is at **Shell Point,** about 5 miles west of St. Marks. Boats up to 40 feet in length and 7 feet in draft can be accommodated at the pier. Gasoline, water, ice, and fishing tackle are available. The facility is closed during the 3 months of winter.

The mean range of **tide** is about 2½ feet. Daytime **coastal (storm) warnings** are displayed.

Ochlockonee Bay, on the west side of Apalachee Bay, is a shallow bay 5 miles long and a mile wide. The approach from Apalachee Bay is obstructed by shoals which probably shift from time to time. The southern half of the mouth is closed entirely by oyster bars. The entrance is between **Ochlockonee Point** on the north and **Bald Point** on the south. A narrow channel good for about 4 feet, leads into the bay near the northern point of the mouth.

The fixed highway bridge about 2.3 miles above the entrance has a horizontal clearance of 36 feet and a vertical clearance of 12 feet.

A depth of 4 feet can be carried through **Buckhorn Creek** into **Sopchoppy River** to the fixed highway bridge about 7 miles from the bay. The bridge has a horizontal clearance of 30 feet and a vertical clearance of 6 feet.

Ochlockonee River, emptying into the head of Ochlockonee Bay, leads westward to the junction of Crooked River and then turns northward and finally eastward. A depth of 5 feet or more can be found for a distance of 29 miles. The highway bridge about 6 miles above the mouth has a horizontal clearance of 29 feet and a vertical clearance of 8 feet.

Crooked River, a narrow, crooked, tidal stream 22 miles long, connects Ochlockonee River with Carabelle River. Depths range from 5 to 20 feet except in a few short stretches where the depths are about 3 feet. The channel is not marked, and local knowledge is necessary to find the best water. The highway bridge has a horizontal clearance of 13 feet and a vertical clearance of 5 feet.

Ochlockonee Shoal, lying about 8 miles southeastward of Ochlockonee Point, has depths ranging from 3 to 15 feet. Although separated from St. James Island by lanes of moderate depths, there is no safe passage between the shoal and the island except for small craft. A lighted bell buoy is about 0.8 mile southeast of the shoal.

Charts 1261, 1262.—St. George Sound and **Apalachicola Bay** are adjoining bodies of water, 40 miles long and 3 to 6 miles wide, separated from the Gulf by Dog, St. George, and St. Vincent Islands. Both the sound and the bay are generally shallow with numerous oyster reefs and shoals which are dangers to navigation. East Pass and West Pass are the principal entrances to the sound and the bay from the Gulf. The sound and the bay are the approaches to the towns of Carrabelle and Apalachicola.

St. James Island, the northeastern shore of St. George Sound, is about 20 miles long and 1.5 to 4.5 miles wide. The island is separated from the mainland by Ochlockonee Bay and Ochlockonee, Crooked, and Carrabelle Rivers. **Lighthouse Point,** the southeastern point of St. James Island, may be seen from well offshore. About 11.4 miles west of the point is a conspicuous radio tower about 669 feet high, marked by obstruction lights.

South Shoal extends southward from the east end of St. James Island for about 6 miles. The sea breaks on portions of the shoal even in good weather. A buoy marks the southern end of the shoal.

Duer Channel, unmarked and subject to frequent change, lies at the eastern end of St. George Sound between South Shoal and Dog Island Reef. The channel is used occasionally by light-draft vessels with local knowledge, but is difficult for strangers.

Alligator Harbor, a shallow, unimportant body of water at the easterly end of St. George Sound, is formed by a long, narrow spit of land which extends westward from Lighthouse Point. There is good anchorage north of **Peninsula Point** in depths of 5 to 7 feet, hard sand bottom. A crooked and unmarked channel with a depth of 7 feet leads to the anchorage from Duer Channel; local knowledge is essential to follow this channel. **St. Teresa,** a settlement west of the harbor, has a fish camp which can berth craft up to 46 feet in length. Gasoline, oil, water, ice, and some provisions can be obtained here. At high water a depth of about 5 feet can be taken to the pier.

Dog Island Reef, lying 5 to 6 miles off the shore of St. James Island, extends from a point about 5 miles west-southwestward of Lighthouse Point to the eastern end of Dog Island. There are depths of 2 to 6 feet over a considerable part of the reef. Local fishermen sometimes enter St. George Sound through the shoals close to the eastern side of Dog Island.

Dog Island, a narrow, sparsely wooded island 5 miles long, is the first land sighted in approaching East Pass from southeastward. Several houses and a hotel are near the ferry landing. In April 1956 the controlling depth was 6 feet to the ferry slip.

East Pass, the principal entrance to St. George Sound, lies between Dog and St. George Islands about 31 miles southwestward of St. Marks Light.

Approaching East Pass from southeastward on a clear day, the first objects to be seen are the sand dunes on Dog and St. George Islands. On closer approach, the trees on the mainland can be seen over the islands and a few pine trees will be noticed near the west end of Dog Island.

Crooked River Light, 115 feet above the water and visible 17 miles, is shown from a square skeleton pyramidal structure enclosing a stair cylinder, lower half white, upper half red, on the north shore of St. George Sound about 3 miles northwest of the west end of Dog Island.

Federal project depth is 27 feet in East Pass to Dog Island, and thence 25 feet through St. George Sound and Carabelle River into the turning basin at the town. In April 1956 the controlling depth was 19 feet through the

entrance channel, 20 feet through St. George Sound and Carrabelle River, and 17 feet in the turning basin. The edges of the basin are subject to rapid shoaling. The channels are well marked by lighted ranges, and lighted and unlighted buoys.

In heavy seas, deep-draft vessels should stay in depths of 30 to 40 feet until Carabelle Channel lighted whistle buoy 1 is picked up.

Vessels may anchor in St. George Sound behind the western end of Dog Island in depths of about 20 feet and to the northwestward of the east end of St. George Island in depths of 18 to 20 feet. At these anchorages, vessels with good ground tackle can safely ride out any gale except a hurricane. Small boats can anchor closer inshore behind the hook at the east end of St. George Island or at various points in the sound where depths are suitable.

Tides and currents.—At East Pass the mean tidal range is about 1½ feet. The tidal currents are strong, sometimes having a velocity of 3 to 4 knots, and ordinarily at least 1 knot. They usually set across the shoals at an angle with the channel, and great care should be taken not to be set toward the shoals on either hand.

Carrabelle River flows into St. George Sound 5 miles northeastward of East Pass, and is connected to the pass by a dredged channel. The river currents are rather strong on the ebb. A highway bridge about 0.4 mile above the basin has a swing span with a horizontal clearance of 40½ feet and a vertical clearance of 11 feet; the nearby overhead power cable has a permit clearance of 78 feet.

Carrabelle (P. O.) is a small fishing village on the east bank of Carrabelle River about 0.5 mile above the mouth. Arrangements can be made for pilots to take yachts from Carrabelle to Tampa Bay or vicinity. **Coastal (storm) warnings** are displayed day and night. Diesel oil, gasoline, and fresh water are available. The larger of the two marine ways can haul out boats up to 65 feet in length and 6½ feet in draft. A ferry operates to Dog Island. Carrabelle has hotels, stores, and telephone and telegraph communications.

Chart 1262.—St. George Island extends about 24 miles westward from East Pass. The island is densely wooded except at its eastern end, which is a low and barren spit. The landing for the ferry from **Eastpoint,** a small town on **East Point,** is in **McKeins Bayou;** a privately maintained channel to the ferry slip in April 1956 had a controlling depth of 6 feet. Privately maintained daybeacons marked the ferry route from **Cat Point** westward of Bulkhead Shoal to the bayou. There are marine ways at Eastpoint.

Bulkhead Shoal extends in a northerly direction from St. George Island to the mainland and forms the dividing line between St. George Sound and Apalachicola Bay. The channel of the Intracoastal Waterway has been dredged through the shoal. A channel through the shoal had a controlling depth of 6 feet in April 1956, but local knowledge is needed to navigate it.

A channel has been cut through St. George Island about 4.9 miles east of Cape St. George Light. Federal project depth is 10 feet. In November 1957 the controlling depth was 7½ feet.

Cape St. George Shoal extends 9 miles southward from **Cape St. George,** the southwestern tip of St. George Island. The shoal consists of several detached spots with moderate depths between them. A buoy marks the southern end of the shoal.

West Pass enters Apalachicola Bay between **Sand Island,** the northwestern tip of St. George Island, and **St. Vincent Island.** The pass is an approach to Apalachicola Bay and the town of Apalachicola.

Apalachicola is on the north shore of Apalachicola Bay at the mouth of the Apalachicola River. The principal industry is fishing.

In the vicinity of West Pass, **Cape St. George Light (29°35.2′ N., 85°02.8′ W.)** is the most conspicuous object. The light, 72 feet above the water and visible 14 miles, is shown from a white conical tower on the west end of the island. From inside the pass on the approach to Apalachicola, the water tank and highway bridge show prominently.

Federal project depth is 10 feet from the Gulf through West Pass and Apalachicola Bay to Apalachicola. The channel through West Pass is subject to frequent change and should be used with caution. Shoals extend more than 3 miles offshore. The approach is marked by a bell buoy and several other buoys which are shifted to conform to changes in the channel. A daybeacon, several buoys, and three ranges mark the channel through Apalachicola Bay to the Intracoastal Waterway and the town of Apalachicola. In October 1953 the controlling depth through West Pass was 9 feet.

A swash channel, used considerably by local fishermen, lies inside **East Bank** and Sand Island. The channel has a depth of about 3 feet and is passable in all but very severe weather.

Directions.—The channel across the bar is subject to such frequent changes that no definite course can be given. Strangers are advised not to attempt to enter during unfavorable weather. The best water over the bar is marked by West Pass lighted buoy 2 and other buoys which are shifted to conform with the channel. Follow the buoys to West Pass buoy 8. Mariners are cautioned to not pass between West Pass Cut daybeacon 2 and buoy 8 because of shoaling. Come on West Pass Cut lighted range on a course of **070°**; thence on Sand Island Cut lighted range on a course of **133°**. When 0.2 mile from Sand Island Cut Range front light, steer **090°** until on St. George Lighted Range; thence steer **032°** until abeam Higgins Shoal buoy 4; thence **047°** for 3.3 miles to Apalachicola River Entrance Light 2; thence follow the Intracoastal Waterway to Apalachicola, the channel being marked by Apalachicola River Entrance lighted range.

Caution.—The Apalachicola River Entrance lighted range is partly obstructed by the highway bridge. The front range is a flashing light suspended below the bridge deck in the third bent west of the swing span and is difficult to see from the channel entrance. The

rear range shows above the bridge deck but may be difficult to identify in the daytime if vessels with tall masts are docked at the wharves north of the bridge. On the east side of the channel are ruins of a wooden jetty extending 2 miles southward of the highway bridge.

Vessels may anchor anywhere in Apalachicola Bay where depths are suitable. Good anchorage in depths of 12 to 15 feet may be found in **Lower Anchorage,** eastward of Sand Island. Another good anchorage is about 1 mile south of the channel leading to Apalachicola.

Tides and currents.—The mean range of tide at West Pass is about 1 foot. The currents are influenced by the winds and by freshets, and at times are very strong, especially the ebb; at flood they are generally weak. A velocity of 3 knots has been observed in the channel at a point inside the bar about 1.2 miles eastward of the bell buoy. The ebb current runs out through West Pass and divides, part going to the southward over the breakers and part following the deeper water to the bar, the latter being the stronger.

In Apalachicola River, the mean range of tide is about 1 foot at Apalachicola and the current is principally ebb. With strong winds from the north and east there will be little or no flood current or even slack water and the height of the water in the bay and river will be reduced a foot or more. The tides meet somewhat to the westward of Bulkhead Shoal, the ebb current flowing eastward through the cut.

Coastal (storm) warnings are displayed, day and night. There are no pilots at Apalachicola. Local guides for yachts can be employed at Carrabelle. A 400-horsepower towboat is available at Carabelle. An **outpatient office** of the Public Health Service is in the town. A county hospital is here. **Customs** officers are stationed in the Post Office Building.

The John Gorrie Memorial Bridge, a highway causeway, crosses the bay from **East Point** to Apalachicola. The bridge has a swing span across the channel at Apalachicola; clearances are stated in Chapter 12. About 2.7 miles east of the draw opening is a small-boat opening with a horizontal clearance of 38 feet and a vertical clearance of 17 feet. North and south of the bridge are numerous private docks where passing yachts can berth.

Supplies are limited generally to the needs of fishing craft and small yachts. Diesel oil, distillate, gasoline, oil, provisions, and water are available. Hotels, numerous stores, and a small machine shop are located in the town. Good facilities for making repairs to small craft are available. The largest marine ways can haul out boats up to 65 feet in length and 6-foot draft for hull and engine repairs.

Apalachicola is served by the Apalachicola Northern Railroad and is situated on the Tallahassee-Pensacola highway. Telephone and telegraph communications are available.

Apalachicola River, formed by the junction of Flint and Chattahoochee Rivers, flows south for about 98 miles into the northern part of Apalachicola Bay. The Gulf Intracoastal Waterway extends through the lower part of Apalachicola River, branching westward through **Jackson River** at its confluence with Apalachicola River about 5 miles above the latter's mouth. Federal project depth is 9 feet for the channel in Apalachicola River to its junction with Flint and Chattahoochee Rivers.

The **Jim Woodruff Dam,** about 0.2 mile below the confluence of the Chattahoochee and Flint Rivers, has a navigation lock 82 feet wide and 450 feet long; the depth over the sills is 14 feet, and the maximum lift is 33 feet.

Above the city of Apalachicola four bridges cross the river. A railroad bridge is 3.7 miles above the entrance; clearances are stated in Chapter 12. A railroad swing bridge with a horizontal clearance of 115 feet and a vertical clearance of 4½ feet at extreme high water, 35 feet at low water, crosses 96 miles above the mouth at **River Junction,** Florida; drawspan regulations are stated in **§ 203.245,** Chapter 2. A fixed highway bridge at **Chattahoochee,** Florida, has horizontal clearance of 125 feet and a vertical clearance of 22 feet. A fixed highway bridge with a horizontal clearance of 280 feet and a vertical clearance of 50 feet at high water, 63 feet at low water, crosses at **Blountstown,** Florida, 73 miles above the mouth.

A landing is at Blountstown, and a private wharf is at River Junction. Principal traffic on the Apalachicola, Chattahoochee, and Flint Rivers is petroleum products, gravel, and logs.

About 23 miles above the mouth the Apalachicola River is joined on the west side by the **Lower Chipola River** which extends north through **Lee Slough** to **Dead Lake.** From the lake **The Cutoff** enters Apalachicola River about 35 miles above the mouth. The project provides for a channel 5 feet deep and 60 feet wide through The Cutoff, Dead Lake, Lee Slough, and **Little Chipola River.** In May 1956 the controlling depth was 5 feet.

The **Upper Chipola River** flows into the upper end of Dead Lake. The river is navigable for a draft of 3 feet about 22 miles above the mouth. A fixed bridge at **Clarksville** has a horizontal clearance of 66 feet and a vertical clearance of 15 feet at high water, 25 feet at low water. Below this bridge two drawbridges with a minimum horizontal clearance of 40 feet cross the river.

Styx River enters the Apalachicola River from the east about 31 miles above the mouth. The project provides for a channel 6 feet deep in the lower 830 yards of the river. In May 1957 the controlling depth in the mouth was 6 feet.

Florida River enters the Apalachicola River from the east about 39 miles above the mouth. The project provides for a channel 6 feet deep and 80 feet wide in the mouth of the river. In May 1957 the controlling depth in the mouth was 6 feet.

Flint River, about 285 miles long, flows southwesterly to a junction with Chattahoochee River to form Apalachicola River. Federal project depth is 9 feet to Bainbridge, Ga.; the controlling depth from Bainbridge for 89 miles to the head of navigation at Albany, Ga., is about 2 feet. The average variation between low and high water is about 21½ feet; extreme fluctuation of stage is 40 feet.

Between the mouth of Flint River and Albany are two swing, one bascule, one vertical-lift, and three fixed

bridges; their minimum horizontal clearance is 77 feet, and minimum vertical clearance is 7 feet at high water, 43 feet at low water. Drawspan regulations for the swing bridges at Bainbridge are stated in § **203.245,** Chapter 2. Natural landings are at Bainbridge and Albany.

Chattahoochee River, 363 miles long, flows southerly to its junction with Flint River to form Apalachicola River. Federal project depth is 9 feet to Columbus, Georgia, about 142 miles above the mouth. In May 1956 the controlling depth was 3 feet. From December to June a draft of 5 feet can ordinarily be carried on the river. The variation between average low and high water was about 20 feet; the extreme fluctuation at **Eufaula,** Alabama, was 65 feet.

Between the mouth and Columbus are five swing bridges and seven fixed bridges with minimum horizonal clearance of 45 feet and minimum vertical clearance of 1½ feet at extreme high water, 53 feet at low water; drawspan regulations are stated in § **203.245,** Chapter 2. Terminals consist of natural landings at Columbus, Ga., and Eufaula, Ala., and a masonry marginal landing at Columbus.

On Chattahoochee River two dams with navigational locks will provide a 9-foot depth to Columbia, Ala. One is to be at Columbia, and the other at Fort Gaines, Ga. In 1956 the Fort Gaines lock and dam were under construction. Project dimensions are 82 feet wide, 450 feet long, and 13 feet over the sill.

St. Vincent Sound is a shallow and unimportant extension of Apalachicola Bay at its northwestern end. The sound can be entered from eastward through Apalachicola Bay or from the westward through **Indian Pass,** a narrow, shifting, unmarked channel. Strangers should not attempt the pass, which is shallow and used only by local fishing vessels.

Cape San Blas, 16.5 miles west-northwestward of Cape St. George, is low and wooded. **Cape San Blas Light (29°40.3′ N., 85°21.4′ W.),** 101 feet above the water and visible 16 miles, is shown from a brown skeleton structure enclosing a stair cylinder. A radiobeacon is near the light.

Cape San Blas Shoals, with depths of 18 feet or less, extends 4 miles southward from the cape. Depths of 24 to 30 feet are found 10 miles south and southwestward of the cape. A lighted bell buoy is moored about 13.5 miles south-southwest of the cape. The waters inshore from the buoy should be avoided by all except light-draft vessels.

With a fresh breeze from any quarter south of east and northwest, rough water may be expected at the cape and a breaking sea may run far offshore. Between December and March fog is frequently encountered off Cape San Blas.

A swash channel with depths of 12 to 14 feet crosses the shoals about 2 miles south of the light. The channel is marked by two buoys. Local boats use the channel when the sea is smooth, but it is not recommended for strangers. Close inshore the foundation of an old lighthouse, covered 5 feet, is marked by a buoy.

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A **danger zone** of an air-to-air firing practice range is in the Gulf south and west of Apalachicola; limits and regulations are stated in § **204.114,** Chapter 2.

Chart 1263.—St. Joseph Bay, northward of Cape San Blas, is separated from the Gulf by a long narrow strip of land and a succession of low sand hills, wooded in places, extending northward from the cape. The bay is 11.5 miles long and varies in width from 2 miles at its entrance to 5.5 miles at its widest part. St. Joseph Bay is one of the best harbors on the Gulf coast and is easily entered at any time.

Port St. Joe is a town on the eastern shore of St. Joseph Bay. A large paper mill and an adjoining oil storage depot along the waterfront furnish the main industry for the town. Fumes from the paper mill may discolor paint overnight if docked or anchored on the windward side of the stack. Shipping consists mainly of paper and petroleum products.

Prominent objects.—The stack and buildings of the paper mill are the most prominent objects visible from the Gulf. Several water tanks are conspicuous at a closer distance inshore.

Channels.—The entrance from the Gulf is across shoals of about 18 feet in depth, through which a channel has been dredged to the deeper water on each side. Federal project depths are 37 feet from the Gulf to North Channel inside St. Joseph Point; thence 35 feet to the turning basin; 32 feet in the basin, and 27 feet in the South Channel. The channels are maintained at, or near, project dimensions.

The channels are well marked. St. Joseph Point Range A front light, 16 feet above water, is shown from a white box on a square pile structure; the rear light, 78 feet above water, is on top of a steel tower on shore. Port St. Joe Entrance Channel lighted range on top of the paper mill is visible on the range line only. Smoke and fumes from the paper mill often make it difficult to see the range in the daytime.

A swash channel with a depth of 14 feet follows the shore of **St. Joseph Point** at a distance of 0.2 mile and passes between the shore and a shoal. The shoal has a depth of 8 feet; a daybeacon marks St. Joseph Point.

Gulf County Canal connects St. Joseph Bay with the Intracoastal Waterway. The entrance is marked by a lighted buoy and buoys. The controlling depth in the canal was 9 feet in March 1957. A bridge over the canal at the bay entrance has a bascule span with a horizontal clearance of 80 feet and a vertical clearance of 10 feet. Permit clearance is 85 feet for the overhead power cable at Highland View.

Danger zone.—An air-to-ground gunnery range has been established in St. Joseph Bay and in the Gulf; limits and regulations are stated in § **204.115,** Chapter 2.

Anchorages.—The entire bay, except for the southern third and a narrow shelf along the sides, is free from shoals and has depths of 24 to 37 feet, hard sand or hard mud bottom. Explosives anchorage areas and regulations are given in § **202.193a,** Chapter 2.

The **tides** in St. Joseph Bay have a mean range of about 1½ feet.

Coastal (storm) warnings are displayed, day and night.

Pilotage.—Pilotage is compulsory for vessels in foreign and coasting trades drawing more than 6 feet of water, except coasting vessels having on board a pilot licensed by the United States Coast Guard. Masters desiring a pilot should wire the Port St. Joe Pilots Association at least 18 hours in advance, as telegraph service is not available at night. Pilots board incoming vessels in the vicinity of St. Joseph Bay Entrance lighted whistle buoy 2A.

Towboats are available in Port St. Joe.

Quarantine.—There is no quarantine station, but vessels subject to visitation are boarded for inspection anywhere in the harbor by an officer of the United States Public Health Service. A hospital is in the city.

Time.—Port St. Joe is on Eastern Standard Time, but **Beacon Hill**, site of the St. Joseph Point Lighted range, marks the dividing line between the Eastern and Central Standard Time zones.

Customs.—Vessels bound for Port St. Joe notify the customs officer at Pensacola of their arrival. The customs officer comes to the vessel at the first opportunity. The records for St. Joe are maintained at Panama City.

Immigration service is handled by the Immigration Office at Pensacola, Florida.

Terminal facilities.—A large paper mill and an adjoining oil storage depot have a dock 0.5 mile long with depths of 32 feet alongside on the waterfront. Dock space for small boats is limited.

Supplies.—Gasoline, bunker oil, provisions, water, and ice are available.

Repairs.—A marine way at the lumber mill can haul out boats up to 40 feet in length and 4 feet in draft, for minor engine and hull repairs.

Communications.—Port St. Joe is served by the Apalachicola Northern Railroad and is on the Tallahassee-Pensacola highway. Telephone and telegraph connections are available.

Bell Shoal is the broken ground north of the entrance channel making off from **St. Andrew Point**, 6.5 miles northwest of St. Joseph Point.

Crooked Island is a narrow island extending 7 miles northward from St. Andrew Point. The island encloses **St. Andrew Sound**, a shallow, unimportant body of water.

Chart 489.—St. Andrew Bay, a narrow irregularly shaped harbor, lies 27 miles northwestward of Cape San Blas. Excellent anchorage and protection during hurricanes can be found in this nearly landlocked harbor and its tributary inlets, West, North, and East Bays. A ship channel, protected by jetties, forms a passage from the Gulf to St. Andrew Bay.

Panama City is the seat of Bay County. One of the largest paper mills in the world is located at **Bay Harbor**. Shipping consists mainly of paper and petroleum products, fertilizers, and small amounts of fish.

Prominent features.—Approaching the entrance to St. Andrew Bay from seaward, the shore first appears as a low unbroken line of woods. Closer approach shows the sand beach in an unbroken white line, with the exception of East Entrance which shows as dark breaks in the white expanse. The dredged cut will not show unless the vessel is on or near the line of the cut. The first landmarks to be seen are the smoke and tall stacks of the upper mill at Bay Harbor and two 130-foot water tanks at **Tyndall Field** about 5 miles south-southeastward of the stacks. An aviation light is atop the black-and-white checked easterly tank. Next seen are the tall, yellow Hotel Dixie Sherman and the elevated water tank at St. Andrew, a subdivision of Panama City. **St. Andrew Bay Entrance Light**, 41 feet above the water and visible 12 miles, is shown on the easterly side of the cut.

A Navy-constructed submerged obstruction is about 3.7 miles northwest by west of St. Andrew Bay entrance channel. The obstruction is marked by a light on a 15-foot skeleton tower and by five barrel-shaped buoys near the light. Mariners are warned to stay clear of the buoys and avoid anchoring near them, or between them and the shore, as they are within the limits of a restricted area.

Channels.—A channel has been dredged into St. Andrew Bay from the Gulf by a land cut through **Hurricane Island** into deep water in the bay. Project depth is 34 feet in the approach from the Gulf, and thence 32 feet to deep water in the bay. In October 1956 the controlling depth was 34 feet. The project is maintained.

East Entrance, southeastward of Hurricane Island, was formerly the main entrance to St. Andrew Bay. The channel is not marked, is constantly shifting, and is now considered unsafe for navigation.

Anchorages.—Excellent anchorage can be found almost anywhere in the bay where the depth is suitable. The usual anchorage for large vessels is off the wharves at Panama City to the westward of **Redfish Point** in depths of 35 to 40 feet.

Tides.—The average rise and fall is about 1½ feet. Winds greatly affect the tide. Long-continued southerly winds raise the water level in the bay and northerly winds lower it.

Currents.—A strong ebb current sets outward through the dredged cut and causes heavy tide rips if the wind is southerly and of moderate strength. Small vessels bound in or out, when there is a moderate southerly or westerly breeze, should endeavor to reach the entrance during flood current.

Coastal (storm) warnings are displayed day and night from the elevated municipal water tank at St. Andrew.

Three **danger zones** are in the vicinity of St. Andrew Bay; the small-arms firing range in the Gulf southeast of the east entrance, the test operations area of the Navy Mine Countermeasures station west of the west entrance, and the testing area of the Navy Mine Defense Laboraory in the Gulf near St. Andrew Bay. Limits and regulations are stated, respectively, in, **§§ 204.120, 204.125,** and **204.131**, Chapter 2.

Pilots.—Licensed pilots are stationed at Panama City. Pilotage is compulsory for vessels in foreign trade draw-

ing more than 6 feet of water, except coastwise vessels having on board a pilot licensed by the Coast Guard. The taking of a pilot for pleasure craft and Government-owned vessels is optional with the master of the vessel.

Pilots may be obtained by radioing the St. Andrew Bay Pilots Association, Panama City. Vessels are boarded at the sea buoy off the dredged entrance cut.

Towage.—Towboats may be had at Millville or Bay Harbor. These are small towboats used for towing barges and assisting large vessels in docking, in daytime only.

Quarantine.—There is no quarantine station, but vessels subject to visitation are boarded for inspection at the docks by a surgeon of the United States Public Health Service who also provides medical relief for seamen. Panama City has private hospitals.

Customs.—The customhouse landing is at Bay Harbor. The customs officer is on part-time duty, 10 a. m. to 12 noon, Mondays through Fridays. The office is in the Post Office Building.

Immigration.—The Immigration Service has no offices at Panama City. Vessel agents are required to notify the immigration office at Pensacola and the service is handled by that office.

Harbormaster.—The harbormaster assigns anchorages and berths and enforces the rules and regulations of the port.

Facilities.—The principal wharves at the port are at Bay Harbor, on the southeast side of the city proper. These wharves have rail connections and ample warehouse facilities, and can accommodate deep-draft vessels.

Along **Watson Bayou,** 0.5 mile west of Bay Harbor, are several piers for lighter-draft vessels. The bayou is an irregular body of water with depths of 10 to 17 feet. Federal project depth is 10 feet in the channel to the fixed highway bridge 1.7 miles above the mouth. At **Millville,** about midway of the eastern arm, there is a fixed highway bridge with horizontal clearance of 13½ feet and vertical clearance of 4 feet. The channel is unmarked except at the mouth.

In **Massalina Bayou,** north of Bunkers Point, are many landings for small craft. The bayou has depths of 5 to 10 feet. A highway bridge over the entrance has a bascule span with a horizontal clearance of 39 feet and a vertical clearance of 8 feet.

A submerged jetty extends along the northwest side of the channel into Massalina Bayou; a light is at the outer end. The drawspan of the bridge and the prominent tank 1 mile to the northeastward form a good range for the channel. A depth of 9 feet can be carried to the pier of a marine service station just south of the bridge.

About 400 yards northwest of Massalina Bayou is a long pier which is municipally owned and is used as a public landing for sport-fishing boats and recreational craft. Depths on either side of the pier range from 7½ to 3 feet. It is exposed to wind and seas from the southwest through the northwest. Northwest of the municipal pier is a pier used for receiving petroleum products; depths at the face are more than 15 feet. Another municipally owned long pier, north of **Buena Vista Point,** is used as a public landing for sport fishermen.

Supplies.—Gasoline and fuel oil can be obtained at Panama City, and water, ice, and provisions are available in large quantities. Ship chandlery in limited amounts, and yacht supplies, are obtainable.

Repairs.—The largest boatyard, in Watson Bayou, has a railway which can haul out vessels up to 110 feet in length, 10 feet in draft, and 350 tons in weight, for hull and engine repairs; another yard has a railway and machine shop in Massalina Bayou. Both yards have slips for yachts.

Communications.—Panama City is served by the Atlanta and St. Andrew Bay Railway and has bus connections to all points. A freight steamer makes weekly trips to New Orleans, Panama City, and Tampa. There is some foreign and coastwise shipping. A maritime radio service is in operation.

Chart 1263.—Grand Lagoon, which extends about 5 miles northwestward from just within the dredged entrance to St. Andrew Bay, is of little importance and is seldom used. A depth of 6 feet can be carried to within 0.5 mile of the fixed highway bridge 1.6 miles above the mouth; it has a horizontal clearance of 23 feet and a vertical clearance of 10 feet.

East Bay, an arm of St. Andrew Bay extending in a general east-southeasterly direction, is about 18 miles long and 0.5 to 2.5 miles wide. The several small settlements on East Bay are of little commercial importance.

West Bay, the northwesterly arm of St. Andrew Bay, is generally free from dangers except for several oyster bars with depths of 5 to 8 feet over them.

Panama City Beach, Long Beach, Edgewater Gulf Beach, Florida Beach, Gulf Resort Beach, and **Laguna Beach** are sections of the residential and resort areas. **St. Andrews State Park** is just northwest of St. Andrew Bay entrance.

The route of the Intracoastal Waterway is through East Bay, St. Andrew Bay, and West Bay. East Bay, West Bay, and North Bay, the latter extending in a northeasterly direction from West Bay, are discussed in Chapter 12 in connection with the waterway.

Chart 1115.—From St. Andrew Bay westward 85 miles to Pensacola Bay, the shoreline is a gently curving sand beach, unbroken except at the entrance to Choctawhatchee Bay, 50 miles westward of St. Andrew Bay entrance. Except at the entrances to the bays, the beach is steep-to and can be approached closely. Depths of less than 30 feet are rarely over 0.3 mile offshore. For this reason the sea rolls in with undiminished strength and breaks heavily on the shore when driven by southerly winds. Small craft bound westward from St. Andrew Bay should use the Intracoastal Waterway.

Chart 1264.—Sunnyside (P. O.) is a small residential section of the beach area 13.5 miles westward of St. Andrew Bay entrance.

Topsail Bluff, a slightly elevated wooded knoll, stands 8 miles eastward of the entrance to Choctawhatchee Bay and can be seen for several miles.

Choctawhatchee Bay Entrance, about 48 miles west-northwest of St. Andrew Bay entrance, extends into the western part of Choctawhatchee Bay between Moreno Point and Santa Rosa Island. Federal project depths are 12 feet in the channel from the Gulf into the bay, and 6 feet in the channel to the harbor at Destin.

From the close offshore the entrance is easily identified by the tall fixed highway bridge crossing the channel just inside the east end of Santa Rosa Island. The bridge has a horizontal clearance of 78 feet and a vertical clearance of 38 feet. Seaward of the bridge the channel is marked by a lighted range and a lighted buoy. The channel shoals rapidly across the bar after each dredging, and shifts frequently. To carry the best depths, mariners should be guided by the color of the water, rather than the range. Passage should not be attempted in rough weather. In April 1956 the controlling depth over the bar was 6 feet, and controlling depth into the harbor at Destin was 4 feet.

Choctawhatchee Bay is 25 miles long and averages 3 miles in width. It is nearly parallel to the coast and is separated from the Gulf by land varying in width from 0.3 to 4.0 miles. Depths in the bay decrease gradually from west to east with 18 to 38 feet in the western two-thirds, except near the shores, and 9 to 12 feet in the eastern third. Traffic in Choctawhatchee Bay consists principally of travel along the Intracoastal Waterway and oil deliveries to Freeport. A small amount of pulpwood is hauled from Black Creek to Panama City. There are good highway connections to Pensacola and Panama City on both the north and south shores of the bay.

A causeway over the bay at **Wheeler Point** has a draw opening at the Intracoastal Waterway channel; clearances are stated in Chapter 12. A fixed span, near the point, has a horizontal clearance of 22 feet and a vertical clearance of 9½ feet.

The **danger zone** of an aerial gunnery and bombing range is in the Gulf between St. Andrew Bay and Choctawhatchee Bay; limits and regulations are stated in **§ 204.130,** Chapter 2. The **danger zone** of a guided-missiles test operations area is in the Gulf south of Choctawhatchee Bay; limits and regulations are stated in **§ 204.135,** Chapter 2.

Choctawhatchee River empties into the eastern end of Choctawhatchee Bay. **Cypress, Indian,** and **Mitchell Rivers** are branch outlets northward of the main river. Federal project depth is 3 feet from the outlet in the bay through the river to **Geneva,** Ala., and thence 3 feet to **Newton,** Ala. The mouth of Choctawhatchee River is very shoal and boats enter from Choctawhatchee Bay either through Cypress River or through Mitchell River, the latter route being in more general use. Cypress River entrance is marked by a light and a row of piling on each side of the channel which had a controlling depth of 2 feet in June 1952. The river extends inland 1.5 miles to a junction with the Choctawhatchee River and from here the controlling depth in 1952 was 2 feet to Holmes River which is considered the head of navigation. Mitchell River extends inland about 5 miles to a junction with Choctawhatchee River, and a depth of about 4 feet is available from **Jolly Bay** through **Gardner Canal** into Mitchell River and thence to the junction of the two rivers. A highway swing bridge crosses the river at **Ebro,** about 17 miles above the mouth. The draw opening has a horizontal clearance of 100 feet and a vertical clearance of 30 feet; drawspan regulations are stated in **§ 203.245,** Chapter 2.

Holmes River, which empties into the Choctawatchee River 24 miles above its mouth, is navigable about 22 miles to **Vernon,** Fla. The controlling depth is about 3 feet. Two ferries cross the river between the mouth and Vernon.

Black Creek, leading off Mitchell River, has a depth of 8 feet inside the mouth to the village of **Black Creek.** A fixed highway bridge, with a horizontal clearance of 99 feet and a vertical clearance of 6 feet, crosses the creek at the village. Bars obstruct the mouth of the river and have only 1 to 2 feet of water over them. Black Creek is used as a shelter for local craft during tropical storms.

Freeport (P. O.), is a small town on Fourmile Creek which empties into **LaGrange Bayou,** is a distribution point for diesel oil, gasoline, fuel oil, and molasses which are brought in by barge and taken out by tank truck. There are no facilities for docking, but vessels may obtain diesel oil, gasoline, fuel, water, ice, and provisions at the oil company's landing. Federal project depth in the channel is 12 feet from Choctawhatchee Bay to the fixed highway bridge which has a horizontal clearance of 18 feet and a vertical clearance of 6½ feet. In April 1956 the controlling depth was 9 feet. The deepest water passes close to the sandspit at the east side of the entrance. The channel is well marked by lights, buoys, and daybeacons to the mouth of Fourmile Creek.

Niceville (P. O.) is a small town at the head of **Boggy Bayou,** about 8 miles north-northeast of the bay entrance. The entrance to the bayou is marked by two lights south and east of **Boggy Point,** above which the channel is marked by buoys. The bayou is deep, and a draft of 8 feet can be carried easily through the middle of the bayou to the wharves at Niceville. Petroleum products are brought in by barge and distributed by tank truck. Diesel oil, gasoline, water, ice, and provisions can be obtained, but berthing facilities are limited. There are telephone, telegraph, and State highway connections with the rest of the State.

Valparaiso (P. O.), a small town at the intersection of Toms Bayou and Boggy Bayou, is on the State highway, and has telephone and telegraph service. Diesel oil, gasoline, water, ice, and provisions are available. A boatyard has marine ways capable of hauling out boats up to 65 feet in length and 7 feet in draft, for hull repairs. A draft of 10 to 12 feet can be taken to the wharves. **Coastal (storm) warnings,** daytime only, are displayed here.

Joes Bayou, 2 miles northeast of Choctawhatchee Bay Entrance, is entered through a channel marked by buoys.

In April 1956 the controlling depth was 8 feet. The bayou affords good anchorage for small boats.

Fort Walton Beach (P. O.), at the western end of Choctawhatchee Bay, has telephone and telegraph connections, hotels, and several stores. The town is on U. S. Highway 98 and State highways, and there is bus service. Gasoline, water, and provisions can be obtained; diesel oil is delivered by tank truck. No facilities for boat repairs are available. **Coastal (storm) warnings** are displayed, daytime only, near the waterfront.

Portland on **Alagua Bayou** and **Santa Rosa** on **Hogtown Bayou** are small fishing villages. **Destin** is a small fishing village on **Moreno Point.** Facilities for yachts are limited but diesel oil, gasoline, water, ice, and provisions are available.

Chart 1115.—Santa Rosa Sound and its eastern continuation, **The Narrows,** parallel the coast between Choctawhatchee Bay and Pensacola Bay and are separated from the Gulf by **Santa Rosa Island,** a narrow strip of beach. Santa Rosa Sound and The Narrows have a combined length of 33 miles and a width varying from 1.8 miles in the widest part of the sound to 200 yards in the narrowest part of The Narrows. The western part of the sound has a depth of 15 feet or more; the central part and The Narrows have been dredged where necessary to provide a channel for the Intracoastal Waterway. The Narrows and Santa Rosa Sound are discussed further in Chapter 12 in connection with the waterway.

The **danger zone** of an Air Force proving ground has been established in Santa Rosa Sound; limits and regulations are stated in **§ 204.136,** Chapter 2.

Chart 490.—Pensacola Bay lies 110 miles west-northwestward of Cape San Blas, 85 miles westward of St. Andrew Bay entrance, 125 miles northeastward of South Pass, Mississippi River, and 40 miles eastward of Mobile Bay entrance. The bay is about 12.5 miles long and 2.5 miles wide, and has depths of 20 to 50 feet. Excellent shelter and anchorage are available in the bay and it is frequently used as a harbor of refuge. The bay is the approach to several towns and to the city of Pensacola; to Escambia and East Bays, extending northward and eastward, respectively, from its eastern end; and to Santa Rosa Sound.

Vessels approaching Pensacola Bay by day can verify their positions by the appearance of the land. For 40 miles eastward of the entrance, Santa Rosa Island presents a white sand beach and low white sand hills with scattered clumps of trees and bushes; back of this on the mainland are thick woods. For 40 miles westward of the entrance, the shore is low and thickly wooded nearly to the water, showing no breaks and very few hillocks. Soundings will indicate whether a vessel is east or west of the entrance, the 10-fathom curve approaching the coast much more closely eastward of the entrance. Depths of 10 fathoms less than 3 miles off the beach indicate the vessel is eastward of the entrance.

At night or in thick weather it is well for a vessel uncertain of its position to stay in depths of at least 12 fathoms until the light is sighted or the position is otherwise determined.

Pensacola, 7 miles above the entrance to Pensacola Bay, is a commercial city and the site of a United States Naval Air Station. The port has good facilities for coastwise and foreign shipping. The principal articles of coastwise trade are petroleum products, chemicals, and naval stores; the principal articles of foreign trade are coal, lumber, naval stores, chemicals, and fertilizer.

Prominent features.—The mast of a wreck 28 miles east of the entrance, the water tank at Pensacola Beach and nearby buildings 9 miles east of the entrance, and an uncompleted hotel 6.5 miles west of the entrance show prominently from seaward. The wreck of the old battleship Massachusetts on the point of Caucus Shoal west of the entrance can be seen for several miles.

Near the Naval Air Station are several prominent objects which can easily be identified from the chart. In Pensacola, the large water tank, a church steeple, the radio mast atop the telephone building, and the Florida National Bank Building, the highest building in town which has a small square elevator house on top, can be identified from offshore. At night the numerous radio towers with occulting red lights on top and the aviation lights are easily seen.

Pensacola Light, 191 feet above the water and visible 20 miles, is shown from a conical brick tower, upper two-thirds black and the lower third white, on the beach north of the entrance.

Chart 413.—Channels.—The entrance to Pensacola Bay is 0.6 mile wide and is obstructed by shoals extending about 1.5 miles seaward. **East Bank,** with depths of 15 to 18 feet, extends 1 mile southward from the western part of Santa Rosa Island. **Caucus Shoal,** with depths of 2 to 18 feet, extends 1.5 miles from the western side of the entrance. **Middle Ground,** between the two, has depths of 8 to 18 feet. A lighted whistle buoy, marking the northwestern extremity of Middle Ground Shoal, is about 1.2 miles southward of Pensacola Light.

Caucus Channel, between Middle Ground and Caucus Shoal, is the entrance channel from the Gulf to Pensacola Bay. Federal project depth is 32 feet from the Gulf to deep water in the bay. The channel is maintained by frequent dredging.

Fort Barrancas lighted range is on an azimuth of 000°. The front range light, 30 feet above the water, is shown from a white square pyramidal structure about 350 yards 180° from Pensacola Light. The rear light, 54 feet above the water, is shown from the dwelling of the light station, in line with and about one-third the height of the tower proper. The light is visible 3° each side of the channel centerline.

Chart 490.—From the deep water of Pensacola Bay, three approach channels lead to the principal piers and wharves at Pensacola. Federal project depths are 30 feet in the channels. The easternmost channel leads to the old Muscogee Wharf, which has been partially removed; the outer end of the channel is marked by a lighted buoy.

The central and western channels lead to the Tarragona Street piers of the railroad lines. The central channel is marked by a privately maintained lighted range and the western channel by an unlighted range consisting of white targets on the pier warehouse. The central and western channels are maintained at or near project dimensions.

A spur channel extends from the western channel to an oil dock. The controlling depth was 12 feet in 1956.

Federal project depth is 21 feet into Bayou Chico, and thence 20 feet into the turning basin. The channel is marked by lights and daybeacons. The controlling depth was 13 feet to the boatyard above the bridges, and thence 11 feet to the basin, in May 1957.

Anchorages.—Good anchorage can be found in any part of the bay except southward of the Naval Air Station. The usual anchorage is off the city of Pensacola where the holding ground is good.

Tides.—Daily predictions of the times and heights of high and low waters are given in the Tide Tables. Northerly winds sometimes lower the water surface 1½ feet. Hurricanes may raise the water surface 2 to 9 feet. The normal range of tide at Pensacola waterfront is 1¼ feet.

Currents.—The currents have considerable velocity on the bar at the entrance. In Caucus Cut, for 2 hours at the strongest of the ebb, the normal current has a velocity of 2 to 2½ knots, setting southward somewhat across the channel. The flood has less velocity and sets along the channels. The flood has greater velocity following a norther than at other times. Daily current predictions for a location in mid-channel, southeast of Pensacola Light, may be obtained from the Tidal Current Tables.

Weather.—Northers blow occasionally during the winter, but have little effect on shipping at anchor in the harbor, except to lower the water. From January to April considerable hazy or misty weather is brought in by southerly winds and cleared away by northerly winds.

Coastal (storm) warnings are displayed day and night.

The **danger zone** of a Navy firing range is on Santa Rosa Island; limits and regulations are stated in **§ 204.140,** Chapter 2. A seaplane **restricted area** is in Pensacola Bay; limits and regulations are stated in **§ 207.176,** Chapter 2.

Pilotage.—Pilotage is compulsory for vessels in foreign trade and for other vessels, except when having on board a pilot licensed by the Coast Guard. For Government-owned vessels and pleasure craft the taking of a pilot is optional with the master. Pilotage is also optional for vessels drawing 6 feet of water or less, if such vessels have a coastwise license.

Pilots can always be procured by making signals outside the bar or by radio or telegram to the Pensacola Bar Pilots. The pilots have a lookout station about 1 mile east of Pensacola Light and use a small cabin cruiser to meet vessels off Caucus Cut lighted whistle buoy 1A. Vessels are taken in day or night.

Towage.—Towboats are available at Pensacola for towing over the bar, up any of the bays, for assistance in docking, and assistance to vessels in distress. Towboats are not available for towing between ports.

Quarantine.—Vessels subject to quarantine must make prior arrangements with the Public Health Service at Mobile, Ala., for inspection.

Hospitals.—There are several good hospitals in Pensacola. The Public Health Service maintains an outpatient office.

Customs and Immigration.—The offices of both the Customs and Immigration Services are located in the Post Office Building.

Harbormaster.—The harbormaster assigns anchorages and berths and enforces the rules and regulations of the port. The pilots are deputies of the harbormaster.

Bridges.—No bridges cross Pensacola Bay between the entrance and Pensacola. A highway causeway over the bay between the eastern part of the city and **Town Point** has a bascule span with a horizontal clearance of 75 feet and a vertical clearance of 13 feet.

Terminal facilities.—The piers and wharves at Pensacola have depths alongside ranging from 10 to 30 feet. With the exception of the fish wharves, all have rail connections, four have transit sheds, and most cargo is handled directly from or to cars or sheds.

The principal piers and wharves are owned by the Louisville and Nashville Railroad and the St. Louis-San Francisco Railway. Both lines have some mechanical facilities for handling lumber and general cargo. The Municipal Recreation Pier is just west of the Louisville and Nashville Railroad wharves.

The main slip at the Naval Air Station has a general depth of 29 feet. A smaller slip has a depth of 9 to 15 feet. Between the two is a long wharf with a depth of about 40 feet off its face.

Supplies.—An unlimited supply of fresh water, suitable for drinking or for boiler use, is available at all the piers. The oil bunkering facilities have a capacity of 600 barrels per hour. Coal, ice, gasoline, diesel oil, provisions, and ship chandlery can be obtained.

Repairs.—Facilities for making hull and machinery repairs are available. The largest marine railway, located in Bayou Chico, can haul out vessels up to 700 tons in weight, barges up to 220 feet in length and 45 feet in width, and molded vessels up to 175 feet in length and 14 feet in draft.

Communications.—Pensacola is a seaport terminal of both the Louisville and Nashville Railroad and the St. Louis-San Francisco Railway. Sailings are made to Atlantic coast, European, Mediterranean, South American, Central American, and Caribbean ports, and intracoastal barge service is available to Gulf ports. A United States Naval radio station, call letters NAS, and three commercial radio stations, operate in Pensacola. Air transportation is available.

Small-boat facilities.—For short stops, small boats usually berth at the smaller wharves between the railroad piers, particularly between Baylen and Palafox Streets. There are several yacht storage basins in **Bayou Chico,** on the southwest side of the city. Gasoline is available at numerous marine service pumps, and diesel oil is delivered by tank truck. The two bridges over the

entrance to Bayou Chico have bascule spans with minimum clearances of 80 feet horizontally and 1½ feet vertically. The two repair yards west of the bridges have good facilities for hauling out and repairing small boats.

Warrington is a suburb of Pensacola on Bayou Grande, which is 3 miles southwest of the center of the city. A dredged channel for seaplanes leads westward through the shoals at the entrance to the bayou and then southward to a turning basin at the Naval Air Station. The controlling depth was 3½ feet in April 1956.

A fixed bridge over Bayou Grande at **Jones Point** restricts navigation westward to small craft. The bridge has a horizontal clearance of 20 feet and a vertical clearance of 6 feet.

Chart 1265.—Escambia Bay extends 9 miles northward from Pensacola Bay. About 5 miles above its mouth the bay is crossed by a railroad causeway with a swing bridge having a horizontal clearance of 85 feet and a vertical clearance of 4 feet. The channel is through the west draw. The depths in the bay shoal gradually from 15 feet at the mouth to 7 feet in the upper reaches. A depth of 7 feet can be carried through the bridge.

North of **Devil Point** are shoals and submerged obstructions along the western shore of Escambia Bay. This shore should not be approached closer than 0.5 mile. Above the bridge draw, in line with the Escambia River, are a 5-foot shoal and a pile awash at low water. These can be avoided by proceeding north from the bridge for a distance of 0.6 mile. **Mulat, Floridatown, Escambia, Yniestra,** and **Bohemia** are small settlements on the bay.

Escambia River empties into Escambia Bay from the northwestward. A Federal project provides for a channel 5½ feet deep through the bar at the mouth of the river, and a navigable channel from the mouth to **River Falls,** Alabama. The river is known as the **Conecuh River** in Alabama; the State line is 49 miles above the mouth. The project is periodically maintained.

Inside the entrance to Escambia River a depth of 12 feet can be carried to the highway bridge 1.5 miles above the mouth. This bridge has a fixed span with a horizontal clearance of 89 feet and a vertical clearance of 44 feet. There is some commerce in cypress logs and gasoline on this river, the latter barged to a pumping plant about 5 miles above the bridge.

East Bay, an eastward extension of Pensacola Bay, is entered by way of a passage 1 mile wide between the shoals off **Garcon Point** and **Redfish Point.** Depths in the bay vary from 8 to 13 feet, with several small scattered shoals of 6 feet or less. The channel through the bay is marked.

Blackwater River empties into **Blackwater Bay,** the northern arm of East Bay. A Federal project provides for a channel 9 feet deep and 100 feet wide from the mouth to Milton, 8 miles above East Bay. The channel through Blackwater Bay is narrow and vessels drawing close to the maximum draft must keep on the ranges. The controlling depth to Milton was 8 feet in April 1956.

Numerous wrecks, submerged piling, and other obstructions are close inshore along the Blackwater River. **Wright** and **Marquis Basins** are filled with such obstructions.

Milton, a small town on Blackwater River, has rail and highway connections. A railroad bridge and a highway bridge cross Blackwater River at Milton. The railroad bridge has a swing span with a horizontal clearance of 85 feet and a vertical clearance of 4 feet; the highway bridge has a bascule span with a horizontal clearance of 78 feet and a vertical clearance of 9 feet. Dock facilities are limited in Milton. Gasoline, fresh water and provisions are available. Diesel oil is delivered in barrel lots upon advance order.

Chart 1115.—The coast between Pensacola Bay and Mobile Bay appears as a low, thickly wooded, unbroken beach. The openings at Perdido Pass and Little Lagoon are not distinguishable from offshore unless approached closely. Depths of 5 fathoms or less extend as much as 4 miles offshore between the two bays.

Chart 1265.—Big Lagoon, extending westward from Pensacola Bay, is about 5 miles long and 0.2 to 1 mile wide. The lagoon, separated from the Gulf by a narrow strip of sand beach, is traversed by the Intracoastal Waterway.

Perdido Bay, an irregularly shaped body of water, lies 13 miles west of Pensacola Bay entrance and 26 miles east of Mobile Bay entrance. Depths of 7 to 20 feet are found in the bay and **Perdido River,** which forms part of the boundary between Florida and Alabama. **Arnica Bay** and **Bay La Launch** connect Perdido Bay with **Wolf Bay** on the westward. Bayou St. John and Perdido Pass connect the bay with the Gulf to the southward. The Intracoastal Waterway passes through the lower part of Perdido Bay and connects the bay with Big Lagoon on the eastward.

A highway causeway over Perdido Bay at **Cummings Point** has a fixed span with a horizontal clearance of 39 feet and a vertical clearance of 13 feet.

A seaplane **restricted area** is in Perdido Bay; limits and regulations are stated in **§ 207.177,** Chapter 2.

Perdido Pass, lying between **Florida Point** and **Alabama Point,** is not easily distinguishable from 1 mile offshore. The natural channel through Perdido Pass is subject to change and should be used only with local knowledge as the buoys do not always mark the best water. In May 1956 there was a depth of 5 feet over the bar at the entrance. The channel extends in an approximately northeast-southwest direction with breakers on each side, and should be easy to navigate in fair weather. A depth of 4 feet can be carried from the pass to the Intracoastal Waterway in the lower part of Perdido Bay thorough a marked channel in **Bayou St. John.** A depth of 4 feet can be carried into **Terry Cove** and **Johnson Cove** through a narrow channel which turns sharply at Alabama Point and passes close to westward of the daybeacon south of **Robinson Island.** In Terry Cove is a small shipyard with ways capable of hauling out vessels up to 40 feet in length and 5-foot draft for general repairs. Gasoline,

ice, and water are available and facilities for berthing several yachts are available. In Johnson Cove is a marine service station where gasoline can be obtained. Good anchorage is available in both coves.

A depth of about 3 feet can be taken into **Cotton Bayou** to a marine service station where gasoline and ice are available.

Old River enters Perdido Pass from eastward between Florida Point and **Ono Island.** The mouth of the river is shoal and cannot be entered from the pass.

Chart 1266.—Little Lagoon is a shallow, unimportant body of water about 6 miles in length and 0.5 mile in width lying just back of the beach between Perdido and Mobile Bays. The lagoon is connected to the Gulf by a small opening, 15 miles east of Mobile Point, through which it is reported that small craft up to 4 feet in draft can enter at high tide during periods of good weather. On the north shore of the lagoon, and near the eastern end, is a boatyard that can haul out small craft for hull repairs.

7. MOBILE BAY TO MISSISSIPPI RIVER

Chart 1266.—Mobile Bay, 40 miles west of Pensacola Bay and 90 miles northeast of South Pass, Mississippi River, is the approach to the city of Mobile and to the Alabama and Tombigbee Rivers. The bay has depths of 9 to 12 feet outside the dredged channels. The entrance is 3 miles wide between Mobile Point on the east and Dauphin Island on the west, but most vessels will prefer to follow the dredged ship channel rather than chance passage between the breakers and shoals that extend 4 miles southward on both sides.

Prominent features.—The general appearance of the land is a guide to finding the entrance to Mobile Bay. For a distance of 40 miles eastward of the entrance, the shore, although low, is wooded and unbroken. For 50 miles westward of the entrance there is a chain of islands which, although wooded in places, is generally low and bare.

The most conspicuous landmark near the entrance is **Sand Island Light (30°11.3′ N., 88°03.0′ W)**, 131 feet above the water and visible 17 miles; the light is shown from a black conical tower just west of the bar channel. A two-story white house is on the northwest side of light.

Boundary lines of inland waters.—The lines established from Mobile Bay to Mississippi Passes are described in **§ 82.95**, Chapter 2.

Channels.—**Main Ship Channel** leads between **Southeast Shoal** and **Mobile Point** on the east and **Sand Island Shoal** and **West Bank** on the west. Federal project depth is 38 feet over the bar. The project is maintained, and controlling depths are given from time to time in the Notice to Mariners. In addition to the dredged channel across the bar the natural channel has depths of 21 feet or more. Inside the bar the depths in the channel increase to as much as 60 feet, with a least width of 500 yards between the shoals which rise abruptly from the deep water of the channel. The wreck of the Magnolia, on the eastern side of the channel 0.7 mile southwest of Mobile Point, is marked by a lighted buoy; the masts extend about 20 feet above the water. The channel is marked by lighted buoys, buoys, Sand Island Light, and a lighted range on Morgan Point. The rear range target is difficult to identify by day because nearby objects on **Fort Morgan** are similar in appearance. The radiobeacon at the rear range will broadcast especially upon request to enable vessels to calibrate their radio direction-finders; see the Light List for alerting whistle signals and operational information.

From the westward, boats drawing up to 6 feet can enter **Mobile Bay via Pelican Passage and Pelican Bay.** The channel passes between Pelican Island and Dauphin Island; thence eastward into Pelican Bay. The best water is obtained by passing to the south of the southern end of **Dauphin Island Spit** before shaping a course northward into Mobile Bay.

From the eastward, only about 4 feet can be taken across Southeast Shoal around Mobile Point. It is necessary to pass very close to shore and should only be attempted under most favorable weather conditions and with local knowledge. These channels shift frequently.

Mobile Bay Channel extends from the lower anchorage off Fort Morgan to the Mobile River. A Federal project provides for a channel 36 feet deep. Although the channel is subject to shoaling, the project depth is generally maintained. The channel is well marked by lights and buoys.

Anchorages.—The best anchorages in the lower bay for deep-draft vessels is found northward and northwestward of Mobile Point and southward of Middle Ground, where depths range from 20 to 45 feet with excellent holding ground. This anchorage is secure, but during a norther a short heavy choppy sea is raised which may be uncomfortable for small vessels. A circular explosives anchorage has been established just north of Mobile Point; limits and regulations are stated in **§202.194**, Chapter 2.

Small boats sometimes anchor north and east of Fort Morgan in **Navy Cove.** Several rock piles are reported in this locality.

Dangers.—**Middle Ground**, a tongue-shaped shoal with a least depth of 12 feet, extends into the channel from the eastward 1.5 miles north of Fort Morgan. A nearly continuous spoil bank extends along either side of the bay channel from Middle Ground to the mouth of Mobile River. Through these spoil banks are several openings for passage to various points in Mobile Bay. These openings are charted.

Tides and currents.—The tides are chiefly diurnal and the rise and fall is very small, averaging about 1 foot at the entrance and 1½ feet at Mobile. During the winter months northers may depress the water surface as much as 1½ feet below mean low water, while hurricanes have been known to raise the level as much as 11½ feet.

Daily predictions of the current in Mobile Bay Entrance are contained in the Tidal Current Tables, and similar predictions for a number of locations in Mobile Bay vicinity may be obtained from data given in those tables. In this area strong winds have considerable effect in modifying the times and velocities of the current, and in using the tables allowance should be made for such effects.

The tidal current near the outer end of the Main Ship Channel is rotary. Both the flood and ebb current set

somewhat to the left of the channel direction before reaching their strengths, along the channel at strength and to the right of the channel direction after the times of strength. During 3 days of current observations at this location there was an outflow of half a knot average velocity combined with the tidal current.

Weather.—Considerable fog occurs during the early spring months with southerly breezes; northerly breezes clear it away.

The prevailing winds are southerly and southeasterly in spring, southerly in summer, northerly in fall, and northerly and easterly in winter. The strongest winds are southerly in summer and northerly in winter. Severe northers, which blow occasionally during the winter, lower the water in the bay so as to interfere with the deeper-draft vessels bound through the dredged channel. During heavy southerly gales it is not always safe for vessels of over 25-foot draft to attempt to cross the bar.

Pilotage—Pilotage is compulsory for vessels in foreign trade but not for vessels in coastwise trade having on board a licensed pilot. The pilot boats will be found cruising outside the bar in rough weather or at anchor in smooth weather, near the entrance buoy. The boats are equipped with radiotelephone. Vessels drawing up to 32 feet are taken in or out at any time, day or night.

Bon Secour Bay, extending about 14 miles eastward of Mobile Bay Entrance, has depths of 8 to 10 feet. The bay is the route of the Intracoastal Waterway which crosses Mobile Bay Channel at a point 2.6 miles north of the latter's entrance. The waterway is described in Chapter 12.

Bon Secour River empties into the eastern end of Bon Secour Bay. The river is shoal at its mouth with an unmarked channel leading along the northern shore to the deep water in the upper river. In May 1956 the channel had a controlling depth of 5 feet. Small boats go up the river as far as **Coopers Lodge,** about 5 miles above the mouth.

The town of **Bon Secour** is located on the north bank of the river. The post office is about 1.5 miles above the mouth where several oyster and fish houses are located. Gasoline, water, and provisions are available. In the vicinity are two small boatyards. The larger, located in the bayou leading to Oyster Bay, can haul out boats up to 50 feet in length and 6-foot draft for hull and engine repairs.

A fixed bridge limits navigation to skiffs between Bon Secour River and **Oyster Bay,** a shallow bay south of Bon Secour.

Weeks Bay, on the east bank about 6.8 miles northwest of Bon Secour River, has an average depth of 2 to 5 feet. A staked channel with a depth of about 5 feet leads through the entrance and across the bay to **Fish River.** About the same depth can be carried into **Magnolia River.** Pulpwood is cut on both rivers and carried to Mobile by barges. Small boats go to **Marlow** on Fish River and **Magnolia Springs** on Magnolia River. A fixed highway bridge over Fish River north of Yupon has a horizontal clearance of 80 feet and a vertical clearance of 35 feet.

Pass aux Herons, between Cedar Point and Dauphin Island, is described later in this chapter.

Fowl River, on the west bank about 13.8 miles northward of the bay entrance, is a stream that extends southwest from Mobile Bay to Fowl River Bay. Shallow depths limit through passage to skiffs and rowboats. A branch leads to **Theodore.** A fixed bridge with horizontal clearance of 43 feet and a vertical clearance of 24 feet crosses Fowl River 0.5 mile inside the mouth. Below the bridge is a boatyard with marine ways that can haul out craft up to 53 feet in length and 4 feet in draft, for general repairs.

Great Point Clear is on the east side about 16 miles northward of the entrance; the shoals extending westerly from the point are marked by a light.

Point Clear, Battles Wharf, Seacliff, and **Daphne** are summer resorts along the eastern shore. Many of the numerous boat landings are in ruins and constitute a danger to small boats navigating close inshore. Small boats up to 30 feet in length and 2½ feet in draft can be hauled out at the marina and boatyard at Battles Wharf, for hull repairs. Gasoline and fresh water are available.

Hollingers Island Channel leds westward from a point in Mobile Bay Channel, 18 miles north of the entrance, to a dock and turning basin on the western shore of Mobile Bay. The channel is well marked by lights and daybeacons. It is not maintained, and in May 1956 the controlling depth was 24 feet.

Fairhope (P. O.), on the eastern side of the bay about 17.6 miles above the entrance, is a town with telephone, highway, and bus connections. A depth of 9 feet is off the municipal pier. Provisions, fresh water, and some small-boat supplies are available. The yacht club is located in **Volanta Bayou,** known locally as **Fly Creek.** A staked channel with a depth of 5 feet leads to the basin anchorage and docks. Small craft use the basin as a refuge during tropical storms and the facilities of the club are open to the public. Gasoline, water, and ice can be obtained.

Dog River, emptying into the western side of Mobile Bay at a point about 20.3 miles north of the entrance, is used considerably by yachts and small boats. Boats approaching Dog River generally leave Mobile Bay Channel at Light 36 where 5 feet can be carried between the spoil banks. This depth can be carried from the bay, into the river, and for about 7 miles upriver to a fixed railroad bridge. The entrance is marked by lights and a daybeacon. A highway bascule bridge crosses the mouth of Dog River with a draw opening having a horizontal clearance of 60 feet and a vertical clearance of 11 feet. An overhead cable crosses at the bridge with a clearance of 80 feet. Gasoline, oil, water, and some provisions can be obtained just inside the bridge and at a marine service station up the river. Hull and engine repairs can be made at two shipyards on Dog River. The larger yard can haul out boats up to 42 feet in length and 5-foot draft. Numerous basins for yacht storage are available throughout the river. Along the western shore of the bay, north and south of Dog River, there are numerous small-boat landings; many, however, are in ruins.

Mobile, 28 miles north of the bay entrance, is one of the largest and most important seaports on the Gulf of Mexico. A fully equipped ocean terminal, excellent transportation facilities, large shipyards, and all kinds of marine supplies can be obtained at Mobile. Principal foreign exports are naval stores, paper products, lumber, coal and bunker oil, iron and steel products, and fertilizer. The principal foreign imports are bauxite, mahogany, crude rubber, sugar, ores, bananas, and molasses. The coastwise trade consists mainly of petroleum products, lumber, iron, and steel products, chemicals, and food products. Inland waterway transportation facilities for handling iron and steel products, ore, sugar, and coal serve the Warrior, Tombigbee, and Alabama River systems with connections to the Mississippi River.

Prominent features.—From about the center of the bay, a white water tank at Great Point Clear and a water tank on the skyline at Fairhope are conspicuous. On nearing the city, two tall buildings near the waterfront are first seen. The easterly building, which is the higher one, has a pointed finial. Next are seen the water tanks west of Garrows Bend. At night, the aviation light shown from the easterly of the two buildings in Mobile can be seen from almost all points in the bay. The fixed red light on the water tank at Great Point Clear and the fixed white light from the tank at Fairhope are visible from the ship channel. An aviation light at Brookley Field, south of Mobile, and the occulting red lights on the radio towers at the mouth of Tensaw River, are prominent.

Channels.—From a point 25.7 miles north of the main entrance, **Arlington Channel** leads west-northwestward into a turning basin in the westerly part of Garrows Bend. Federal project depth is 27 feet. The channel is marked by lights, buoys, and daybeacons. **Mobile River Channel** extends from the bay channel for 4 miles to the bridge at **St. Louis Point.** Federal project depth is 36 feet from the mouth of the river to, and inside, a turning basin opposite the Alabama State Docks, and thence 25 feet to the mouth of **Chickasaw Creek.** In the latter creek, project depth is 25 feet for about 2 miles to just below **Shell Bayou** entrance. Lighted ranges mark the channel. Depths at, or near, project dimensions are maintained in these channels and turning basins, but not in the channels above the basins. Changes in controlling depths are published in Notice to Mariners.

Threemile Creek, which leads westward from **Magazine Point,** in May 1956 had a controlling depth of 15 feet into the Industrial Canal and 10 feet to the sawmill at the second highway bridge.

The old ship channel around the south end of **Pinto Island,** which leads to Tensaw River, had a controlling depth of 10 feet in May 1956. The channel is marked by buoys. **Pinto Pass** had a depth of 7 feet in an unmarked channel from the Mobile River to about 0.5 mile southeast of the fixed bridge and culvert which have a horizontal clearance of 20 feet and a vertical clearance of 6 feet. Beyond this point the depths shoaled to 2 feet.

Anchorages.—With the extensive berthing space available in Mobile there is little need for anchoring in the harbor. Vessels may anchor abreast the city eastward of the dredged channel, but must maintain position parallel with the channel; not more than one vessel can be anchored abreast.

Bridges.—There are no bridges over the main channel from the Gulf to the State docks. Above the docks, at St. Louis Point, Mobile River is crossed by a vertical-lift bridge with a horizontal clearance of 300 feet and vertical clearances of 23 feet, down, and 135 feet, up. Just above this bridge, at the mouth of Chickasaw Creek, is a railroad swing bridge with a horizontal clearance of 131 feet and a vertical clearance of 5½ feet; the channel is through the south draw. Drawspan regulations for both bridges are stated in **§ 203.491,** Chapter 2.

Across Threemile Creek there are five bridges to a fixed highway bridge at the head of navigation. The first, a railroad swing bridge, has a draw opening with a horizontal clearance of 56 feet and a vertical clearance of 10 feet. The channel is through the north draw. The second, a railroad swing bridge, has a draw opening with a horizontal clearance of 54 feet and a vertical clearance of 4 feet. The channel is through the north draw. Beyond the Industrial Canal are a highway and a railway swing bridge with draw openings having a minimum horizontal clearance of 57 feet and a minimum vertical clearance of 1 foot. The channel is through the north draws, drawspan regulations are stated in **§ 203.245,** Chapter 2. About 0.3 mile above these bridges is a fixed railroad bridge with a horizontal clearance of 52 feet and a vertical clearance of 10 feet.

The **Bankhead Tunnel** crosses under Mobile River between Government Street and **Blakeley Island.**

Coastal (storm) warnings are displayed, day and night, at the First National Bank Building in Mobile. Day signals are displayed at Fort Morgan.

Towage.—Tugboat and ocean-going tugs are available at Mobile.

Quarantine.—The quarantine station is in the Courthouse and Customhouse Building. Vessels subject to quarantine are boarded at the dock from 6 a. m. to 6 p. m. There is a **Public Health Service** outpatient clinic in the Courthouse and Customhouse Building. Mobile has several hospitals.

Customs and Immigration.—The offices of both the Customs and Immigration Services are in the Courthouse and Customhouse Building.

Other Federal Offices.—The Coast Guard maintains offices in the Courthouse and Customhouse Building. The Corps of Engineers has a district office. The Weather Bureau has offices at the Municipal Airport.

Harbor regulations.—The Alabama State Docks Board has jurisdiction over the bay, harbor, and all tributary streams. It has supervision over harbor pilotage, State wharves and shipping, as well as authority in all matters relating to the arrival, departure, loading, and discharging of all vessels at State wharves. Most routine functions are administered through the harbormaster.

The **harbormaster** assigns berths and enforces the rules and regulations of the port. Ships are handled between the sea and the docks only; the harbormaster and his deputies have charge of shifting between berths in the

harbor. The harbormaster's office is in the Administration Building at the State docks.

Prescribed speed limits from Chickasaw Creek to the mouth of Mobile River are 6 miles per hour for all vessels of 500 tons gross and under (except launches) and 4 miles per hour for all vessels over 500 tons gross.

Terminal facilities.—The Port of Mobile has terminal facilities for 39 general cargo berths and 5 oil docks. Most piers and wharves, which extend along the west bank of Mobile River, have depths of 26 to 34 feet alongside. A depth of 16 feet can be carried into Industrial Canal.

The **Alabama State Docks** comprise a modern port terminal, open to all users alike. The facilities include many concrete wharves, fireproof shipside transit sheds and covered warehouse space, bulk material-handling plant, bonded general cargo warehousing, terminal rail connections, cold storage and quick-freeze plants, and numerous auxiliary facilities including a 75-ton electric derrick, locomotive cranes, lift trucks, tractors and conveyors.

A municipal wharf 1,500 feet long is centrally located on the waterfront. At the bay entrance, just inside Mobile Point, is a small wharf with about 12 feet off its end. A small-boat basin at Fort Morgan, which is a State park, has gasoline and water available.

Supplies.—Full stocks of deck and engineer's supplies are carried in the city. Water almost chemically pure is piped to the principal facilities. Oil companies provide oil-bunkering facilities with capacities up to 1,000 barrels per hour and some State docks are piped for fuel oil with a loading capacity of 1,000 barrels per hour. The State coal-handling plant has a bunkering capacity of 600 tons per hour. Floating equipment is available for delivering bunker coal and bunker fuel oil to ships anywhere in the harbor.

Repairs.—Excellent facilities for practically any class of repair work to the hull or machinery of steel or wooden vessels are available at Mobile. There are three large shipyards. The shipyard located on Pinto Island has drydocks with capacities of 2,500 to 18,000 tons; the largest can accommodate ships 650 feet in length and 23 feet in draft. There are ways for building commercial freighters, and many repair berths. Another shipyard is on Blakeley Island, and the repair yard at the State docks makes topside repairs only, but has berths for several large ships. Smaller shipyards with marine ways are located in the Industrial Canal, at the mouth of Blakeley River, south of Fairhope, and in Dog River.

Salvage tugs, seagoing and equipped for heavy work, are available. Barges, derricks, pumps, and diving outfits may be procured for virtually any type of work.

Small-boat facilities.—The principal basins for yachts and small boats are in Dog River and the Industrial Canal. Limited facilities for berthing may be obtained in the west part of Pinto Pass and the smaller docks along the waterfront. All types of supplies and repairs are available.

Communications.—Mobile is served by trunk-line railroads, several airlines, and highway connections. Regular steamer communication with most major ports in the world and all the important Gulf, Atlantic, and Pacific ports are made from Mobile. Inland boats and barges serve the river ports in the interior of the State and also connect with Gulf ports. Radio Station WLO at Mobile handles general commercial radio business.

Mobile River and **Tensaw River** are formed by the confluence of Alabama River and Tombigbee River about 39 miles above Mobile. The controlling depth to the confluence is about 14 feet.

Tensaw River is crossed at its mouth by a fixed bridge and a vertical-lift bridge which does not open; the minimum horizontal clearance is 142 feet and vertical clearance is 23 feet, down, and 60 feet, up. Drawspan regulations are stated in **§ 203.245,** Chapter 2.

The **Mobile-Tensaw Rivers Cutoff** connects the two rivers about 8 miles above Mobile. Depths in the cutoff are 20 to 26 feet. From the cutoff the channel into Tensaw River is marked by an unlighted range on the east bank of the river.

A railroad swing bridge over Mobile River, 8.3 miles above the city, has a horizontal clearance of 146 feet and a vertical clearance of 11 feet at high water and 5½ feet at low water.

Tensaw River, for several miles north and south of the cutoff, is a United States Maritime berthing area; limits and regulations are stated in **§ 207.900,** Chapter 2.

Light-draft boats can reach Tensaw River either by going up Mobile River to Spanish River and thence down that stream, or from the main channel through the channel south of Pinto Island.

Fixed bridges cross the **Blakeley River** and **Apalachee River** at their mouths with horizontal clearances of 31 feet and vertical clearances of 12 feet. About 0.4 mile south of **Vessel Point** is a small boatyard with marine ways. Boats up to 35 feet in length and 4-foot draft can be hauled out for hull and engine repairs.

Chart 1115.—Mississippi Sound extends 70 miles west of Mobile Bay between a chain of narrow, low, sand islands and the mainland, providing a sheltered route for the Gulf Intracoastal Waterway from Mobile to New Orleans. Natural depths of 12 to 18 feet are throughout the sound, and a channel 12 feet deep has been dredged where necessary from Mobile Bay to New Orleans. Mississippi Sound can be entered from Mobile Bay through Pass aux Herons or Grants Pass; from the Gulf through Petit Bois, Horn Island, Dog Keys, and Ship Island Passes, and Cat Island Channel; from Lake Borgne through Grand Island Pass.

Chart 1266.—Pass aux Herons connects the southwestern corner of Mobile Bay with the eastern end of Mississippi Sound and is a part of the Intracoastal Waterway. The channel is well marked by lighted ranges, lights, and buoys.

Controlling depths are given in the weekly Notice to Mariners. The tidal current averages about 1¼ knots at strength.

A vertical-lift bridge connects Dauphin Island with the mainland over the Intracoastal Waterway here; clear-

ances are stated in Chapter 12. The bottom in the channel at the western end is soft, and hard at the eastern end.

Grants Pass, 0.3 mile north of Pass aux Herons, connects Mobile Bay and Mississippi Sound. The channel is unmarked and is used only by small boats.

Dauphin Island (P. O.) is a fishing village and summer resort on Dauphin Island. A draft of 7 feet can be carried through the dredged channel into Bayou Aloe. The channel is marked with daybeacons. Gasoline, water, and some provisions are available, and gasoline, oil, water, and limited amounts of provisions can be obtained at the fish camps at **Cedar Point** and at the bridge 1.8 miles north, known locally as **The Cutoff.** Tidal currents of considerable velocity run through this pass, which is used only by small boats.

Heron Bay is a shallow bay used mainly by crabbing and oyster boats. A small boatyard at the north end of the bay can haul out small craft up to 35 feet in length and 3 feet in draft for general repairs.

Coden (P. O.) is a small fishing village on the north shore of **Portersville Bay,** northeast of Isle aux Herbes. It has highway and telephone connections. Federal project depth in the Bayou Coden channel is 4 feet to the fixed highway bridge. Project depth obtained in May 1956. The channel is marked by lights and daybeacons. There is a small marine railway capable of hauling out boats up to 40 feet in length, for hull repairs. Gasoline, diesel oil, ice, water, and provisions are available.

Chart 1267.—Bayou la Batre, a tidal stream about 9 miles long, empties into Mississippi Sound 1 mile northwest of Isle aux Herbes. Federal project depth is 9 feet to the highway bridge at the town of Bayou la Batre. In May 1956 project depth obtained. The channel is marked by a lighted range, lights, and daybeacons. A fishing and party-boat fleet operates out of Bayou la Batre, and several large canneries are located in the town. Bus and highway connections lead to Mobile and Pascagoula. The nearest railroad connection is at **Irvington,** Ala. Gasoline, diesel oil, water, ice, and small-boat supplies are available. Along the bayou are four boatyards with marine ways. The largest has facilities for hauling out vessels up to 75 feet in length and 8 feet in draft, for general repairs. Machine shop facilities are available.

Coastal (storm) warnings are displayed by day on the waterfront.

Petit Bois Pass, an entrance from the Gulf between Dauphin Island and Petit Bois Island, is used primarily by fishing vessels of not more than 7- to 8-foot draft. The channel is marked but changes frequently; it can generally be followed by the deep green water during calm weather and by breakers during rough weather.

Horn Island Pass, a deep-draft pass into Mississippi Sound, leads between **Petit Bois Island** and **Horn Island.** The pass is the approach to Pascagoula.

Pascagoula is a shipbuilding port on the north shore of Mississippi Sound, at the mouth of Pascagoula River, 9 miles northwestward of Horn Island Pass. By water route, the port is 72 miles west of Mobile and 51 miles east of Gulfport. In 1956 the commerce of the port was almost exclusively shipbuilding and repair, but plans were being considered to construct a terminal for deep-draft vessels. Preliminary work has been started. Exports consist mainly of steel products and imports of pulpwood and logs. The principal industry of Pascagoula is shipbuilding and ship repair.

Prominent features.—The cranes of the shipyard, a tall elevated tank 0.5 mile eastward of the mouth of the river, and the twin tanks in Pascagoula are prominent from the sound. The abandoned light on **Round Island** can be seen from the pass.

Horn Island Light, 47 feet above the water and visible 12 miles, is shown from a white wooden dwelling on black piles, 1 mile northeasterly of the western tip of Petit Bois Island.

Channels.—Horn Island Pass and **Pascagoula Channel** connect **Pascagoula Harbor** with the Gulf. Federal project depths are 25 feet across the outer bar at Horn Island Pass, thence 22 feet to the highway bridge at Moss Point, and thence 12 feet through Robertson and Bounds Lakes and for 3.5 miles up Escatawpa River. Depths are generally maintained and are reported from time to time in the Notice to Mariners.

Anchorage for vessels up to 15-foot draft is available in Mississippi Sound on either side of the channel. The spoil bank is generally to the west of the channel. Deeper-draft vessels may anchor outside the bar, weather permitting.

The **danger zone** of a chemical warfare experimental test area is in the Gulf in the vicinity of Horn Island; limits and regulations are stated in **§ 204.155,** Chapter 2.

Tides and currents.—The mean range of tide at Horn Island Pass and at the mouth of the river is about 1¾ feet. In Horn Island Pass the tidal current floods northward and ebbs southward. In the dredged cut across the bar the ebb and flood follow the directions of the cut. Winds greatly affect the velocity and direction of the currents, as well as the rise and fall of the tides.

Winds.—Northers occur occasionally during the winter months but do not greatly affect vessels at anchor if provided with good ground tackle.

Coastal (storm) warnings are displayed day and night from a Weather bureau tower.

Pilotage is compulsory for all foreign vessels and for United States vessels of over 250 tons unless having a licensed pilot aboard. Pilots meet vessels by previous arrangements and go aboard vessels outside the bar in the vicinity of the sea buoy.

Towboats are stationed at Pascagoula.

Quarantine.—Vessels subject to inspection must make arrangements through the Quarantine Station at Mobile.

Hospitals.—The nearest marine hospital is at New Orleans. There are outpatient offices at Biloxi and Gulfport. The Jackson County Hospital is at Pascagoula.

Customs officers are stationed at Pascagoula.

Harbormaster.—The movement of all vessels is handled through the harbormaster.

Bridges.—No bridges cross the channel from the Gulf to the municipal wharf. A railroad and a highway bridge

cross Pascagoula River about 1.3 miles above the mouth. The railroad swing bridge has a horizontal clearance of 82 feet and a vertical clearance of 6 feet. The highway bascule bridge has a horizontal clearance of 140 feet and a vertical clearance of 30 feet.

Terminal facilities.—The wharves and repair yards are on the east bank of the river. The municipal wharf, just below the bridges, is 1,000 feet long. A large fish cannery is on the southern part of the wharf; ice and water are available on the wharf. At the northerly end the depths are 20 feet, shoaling gradually to 15 feet at the southerly end. A small-boat basin is entered from the east side of Pascagoula River by an unmarked channel 0.5 mile long. In May 1956, the controlling depth was 9 feet to the Coast Guard wharf and 8 feet to the harbor.

Supplies.—Gasoline, diesel oil, water, ice, marine supplies, and provisions can be obtained in Pascagoula.

Repairs.—The **Ingalls Shipyard** has facilities on its 10 ways for building ships up to 630 feet in length, 86-foot beam and 18,000 tons. The shipyard has 9 berths of about 600-foot length each for any kind of engine room and topside repairs.

Several smaller shipbuilding and repair yards are in Pascagoula where numerous tugs, barges, and small craft are built. The largest of these has marine ways with facilities for hauling out vessels up to 500 tons, 200 feet in length, and 13 feet in draft for general repairs. Machine shops are in operation.

Communications.—Pascagoula is served with air, railroad, and highway communications. Telephone and telegraph connections are available.

The Coast Guard and the Fish and Wildlife Service maintain stations in Pascagoula.

Pascagoula (Singing) River, and its tributary, **Escatawpa (Dog) River,** are navigable for 9 miles above Pascagoula to a paper mill, two fish-meal factories, and a tuna-processing plant beyond Moss Point. In May 1956 it was reported that 5 feet could be carried up Pascagoula River above its junction with Escatawpa River to **Dead Lake,** and thence 3 feet to the junction of **Leaf** and **Chickasawhay Rivers.** Escatawpa River is crossed by two swing bridges in the vicinity of Moss Point with draw openings having a minimum horizontal clearance of 82 feet and a minimum vertical clearance of 7½ feet. The power cable near Ford has overhead clearance of 82 feet, and the one north of Moss Point, 80 feet.

About 3 miles above Pascagoula the channel is marked by lights and lighted ranges. Lights mark the cutoff route through Escatawpa River.

Moss Point is about 2 miles above the junction of Escatawpa River with Pascagoula River, about 7 miles above the town of Pascagoula. Gasoline, diesel oil, water, and provisions are available. A shipyard with a marine ways capable of hauling out vessels up to 40 feet in length and 4 feet in draft for general repairs is at Moss Point.

Dog Keys Pass forms a connection between Mississippi Sound and the Gulf at the west end of Horn Island. In 1956 the pass had a depth of 10 feet over the bar and was used primarily by local fishing craft. Most vessels entering from the Gulf use Ship or Horn Island Pass in preference to Dog Keys Pass. The entrance is marked by a lighted buoy, and a light near the western end of Horn Island.

Isle of Caprice formerly existed midway between Horn Island and Ship Island. A large casino was on the island. The island and casino were destroyed by hurricane about 1917, leaving only a pipe from an artesian well. In 1956 this pipe was reported still intact and discharging fresh water.

Biloxi, a resort on the north shore of Mississippi Sound, is 40 miles west of Mobile Bay and 11 miles east of Gulfport. The city has an excellent beach and a number of large hotels. Biloxi is the center of a large sea-food industry with hundreds of shrimp and oyster boats operating during the season. Numerous large shrimp and oyster canneries are along the eastern length of the waterfront and in Back Bay.

Prominent objects.—The tank and radio tower at Ocean Springs, five checkered tanks at **Keesler Field,** the lighthouse, and several large hotels in and west of Biloxi are prominent from offshore. At night the aviation light at Keesler Field, the red lights on the radio tower, and the red neon sign on the hotel at **Beauvoir,** are conspicuous. **Biloxi Light,** 61 feet above the water and visible 13 miles is shown from a white conical tower with a black balustrade on the shore north of the channel.

Channels.—Boats bound for Biloxi usually approach via the dredged channel west of **Deer Island.**

Federal project depths are 10 feet to the south waterfront of Biloxi and to deep water in Back Bay of Biloxi. 6 feet in the Coast Guard channel, 6 feet in the channel on the northerly side of U. S. Highway 90 bridge, 6 feet to Old Fort Bayou, and 8 feet through Big Lake into Bernard Bayou. In general, project depths are maintained, but in May 1956 shoaling was reported in the channel at the turn south of Biloxi Light and at the turn north of the railroad bridge. A depth of 10 feet could be carried into Old Fort Bayou and 8 feet through Cranes Neck Channel.

A draft of 5 feet can be carried to Biloxi through **Biloxi Bay,** east of Deer Island. The best water is found on a course which carries Light 48 and the highway bridge draw in range. The bottom is soft but solid obstructions have been reported in this area.

A side channel leads to a small-boat basin at **Ocean Springs.** The channel is marked by a range, lights, and daybeacons. In May 1956 the controlling depths in the basin were 8 feet and 5 feet in the approach channel from the main channel in Biloxi Bay.

Back Bay of Biloxi is crossed at Deep Point by a highway swing bridge with a horizontal clearance of 69 feet and a vertical clearance at the center of 10 feet; submerged cables are on both sides of the bridge.

Tchouticabouffa River empties into Big Lake from the northeast. The river is reported navigable for drafts up to 5 feet to **New Bridge,** about 7 miles above the mouth, and for drafts of 3 feet for an additional 6 miles. Cedar Lake bridge, about 4 miles from the mouth, has a swing span with a horizontal clearance of 65 feet and a vertical clearance of 9½ feet. New Bridge has a fixed span with a horizontal clearance of 82 feet and a vertical clearance

of 42 feet. Lamey Bridge, about 3 miles above New Bridge, has a swing span which was inoperative in October 1950; the channel is on the north side of the pivot pier; the horizontal clearance is 70 feet and the vertical clearance is 14 feet.

Biloxi River empties into the northeast side of Big Lake and is reported navigable for a draft of 6 feet for 6 miles and for a draft of 3 feet for an additional 5 miles. Chumbula Bridge, about 4 miles above the mouth, has a swing span with a horizontal clearance of 70 feet and a vertical clearance of 9 feet; the channel is on the west side of the pivot pier.

Bernard Bayou, which empties into Big Lake from westward, is reported good for a draft of 12 feet through a buoyed channel to the artificial lake at Gulfport Field. With local knowledge, a reported draft of 3 feet can be carried 1.5 miles farther to the head of navigation. The bridge at Handsboro has a bascule span with a horizontal clearance of 68 feet and a vertical clearance of 11 feet.

The larger of the two shipyards on Bernard Bayou, just to the northeast of Handsboro bridge, has a vertical lift which can handle craft 8 feet in draft, 65 feet in length, and 50 tons in displacement. A good machine shop is available.

Taylor Lake, 10 feet deep, just below the larger shipyard, and a small basin of the same depth just above Handsboro bridge, are used as harbors of refuge during storms.

Anchorages.—Small craft can anchor off the waterfront north of Deer Island, or in Back Bay where there is excellent anchorage in depths of 5 to 15 feet, soft bottom, and good protection from all directions.

A seaplane **restricted area** is in Biloxi Bay; limits and regulations are stated in **§ 207.182,** Chapter 2.

Tides.—The tides are chiefly daily; the mean range at Biloxi is about 1¾ feet.

Coastal (storm) warnings are displayed, day and night, at Biloxi.

Pilots.—No regular pilots are stationed at Biloxi.

Hospitals.—A Public Health Service outpatient office and a municipal hospital are available.

Customs officers are stationed in Biloxi.

Bridges.—A highway and railroad bridge cross Biloxi Bay and a highway bridge crosses Back Bay. The highway swing bridge, connecting **Plummer Point** and Biloxi, has a horizontal clearance of 119 feet and a vertical clearance of 14 feet. The railroad swing bridge has a horizontal clearance of 88 feet and vertical clearance of 4½ feet.

The channel is through the west draw. The highway swing bridge over Back Bay, at **Shipyard Point,** has a horizontal clearance of 79 feet and a vertical clearance of 13 feet. The fender is through the north span. There is an overhead cable with clearance of 89 feet at the channel on the west side of the bridge.

Terminal facilities.—There are many docks along the southern waterfront. Some of these are private facilities for fishing companies but several are open to the public. The city dock is located north of the west end of Deer Island.

Supplies.—Water, ice, provisions and marine supplies are available. Diesel oil, gasoline, and oil are available at marine service stations.

Repairs.—Several shipyards are located in Back Bay. The largest has marine ways capable of hauling out vessels up to 80 feet in length and 6-foot draft for general repairs.

Communications.—Biloxi is served by rail and highway communications. Telephone and telegraph service are available.

Ship Island Pass lies immediately westward of **Ship Island,** 47 miles westward of Sand Island Light, and 11 miles northward of the northernmost of the Chandeleur Islands. The pass is the approach from the Gulf to Gulfport and adjoining towns.

Gulfport, the seat of Harrison County, is a growing port and tourist center. It is about midway between Mobile and New Orleans by rail, is on U. S. Highways 49 and 90, and is served by the Louisville and Nashville and Illinois Central Railroads, and by airlines. The city has hotels, motels, and tourist courts.

Gulfport Harbor is a rectangular ship basin between two moles about 0.3 mile apart and extending 0.8 mile offshore. The basin had a depth of 30 feet in May 1956. A light marks the outer end of the mole on the west side of the channel.

Prominent objects.—On a clear day vessels from eastward, bound for Ship Island Pass, usually sight first the trees on the western part of Ship Island, then the light and **Fort Massachusetts,** a semicircular brick fort with sodded parapet, located on the western part of Ship Island. Vessels approaching from southward may see Chandeleur Light first. Near the northeastern end of **Cat Island** is a high white sand dune, which can be seen at some distance on a clear day.

Ship Island was cut in half by the September 1947 hurricane and the break-through, about 0.6 mile in width, can be observed from the channel entrance.

Ship Island (Gulfport Channel Outer Range Rear) Light, 70 feet above the water and visible 14 miles, is shown from the structure of the former rear range light. The front range light remains unchanged, but the former Ship Island Light structure is now a daybeacon.

Gulfport Channel Entrance Leading light, located at the turn from Ship Island Pass Channel, shows white on the centerline bearing **006°**, and red to the east and green to the west, of that line. The passing light is visible around the horizon.

Chandeleur Light, 99 feet above the water and visible 16 miles, is shown from a square, pyramidal, skeleton tower, brown below the gallery and black above, on the northwest end of the northernmost of Chandeleur Islands. A lighted buoy is about 2 miles north-northwest of the light.

On the approach to Gulfport, the conspicuous objects are a large hotel halfway between Gulfport and Biloxi; two water tanks, and the large buildings in Gulfport. At night a red neon sign on top of the easterly large building in Gulfport and the occulting red lights on the tops of two radio towers can be seen from the sound.

An aviation light is shown from a 62-foot tower at the municipal airport.

Channels.—Federal project depth is 32 feet in the channel through Mississippi Sound to Gulfport, and 30 feet in the ship basin. Spoil banks border both sides of the channel except in the northern part where the bottom is soft mud and the spoil has disintegrated and leveled out. The channels are well marked. The entrance leading light is visible to small vessels when abeam of the channel lighted buoy 52. The Gulfport range daymarks are difficult to make out in the daytime. Controlling depths are reported from time to time in the Notice to Mariners.

The Intracoastal Waterway crosses Gulfport Channel north of Gulfport Channel Light 52. Small craft up to 6-foot draft leaving Gulfport, may leave the channel 100 yards southeast of Gulfport Harbor Breakwater Light and shape course in a southwesterly direction until to the Intracoastal Waterway route.

In May 1956 the controlling depth into the yacht basin east of Gulfport Harbor was 6½ feet. Two lights are on the east side of the channel. Berthing facilities are available, and a dockmaster is on duty.

Anchorages.—Large vessels can anchor outside the bay anywhere westward of a line between Chandeleur and Ship Island Lights and have rather smooth water. An especially good anchorage in stormy weather is west of Chandeleur Light in 4 to 5 fathoms. Just south of the bar the holding ground is good and bar pilots report good anchorage 0.5 mile south of Ship Island Pass lighted bell buoy 26.

Ship Island Harbor, northward of Ship Island, is one of the best natural harbors on the Gulf coast and is easily accessible at all times for vessels with drafts up to 20 feet. Depths in the harbor range from 20 to 30 feet, soft bottom.

Tides and currents.—The mean range of tide is about 1¾ feet but the tides are greatly affected by the winds. Northeast to south winds raise the level of the water and southwest to north winds lower the level. A continued norther makes a current on Ship Island Bar of as much as 4 knots. Current velocities up to 1½ knots have been measured in Ship Island Pass under normal weather conditions.

Coastal (storm) warnings are displayed day and night at Gulfport.

Dangers.—The shoal making off from the western end of Ship Island at **West Point** is moving westward. The channel is dredged frequently and when shoal water occurs the buoy is moved westward to mark the channel. Mariners should exercise caution to keep to the westward of this buoy. About 200 yards southeast of Gulfport Channel Entrance Leading Light is a 9-foot shoal on the eastern side of the channel. Mariners are warned not to cut corners at the bend.

Pilotage is compulsory for all vessels in foreign trade and for coastwise vessels of over 250 tons unless having a licensed pilot aboard. Arrangements for pilots are made through the shipping agents. Pilots meet vessels outside the bar in a small powerboat. Ships are taken in or out, day or night.

Towage.—Towboats are not stationed permanently at Gulfport, but arrangements can be made with the harbormaster for towage. Vessels usually enter and leave under their own power and use tugs only for docking, undocking, and shifting berths.

Quarantine.—Vessels subject to quarantine must make arrangements through Mobile.

Hospitals.—A Public Health Service outpatient office is at Gulfport and there are private hospitals. The nearest marine hospital is at New Orleans.

Customs and **immigration** officers are stationed at Gulfport.

Harbor Regulations.—The following are extracts from regulations for Gulfport Harbor:

Item 30, Display Lights.—All vessels or barges shall display lights from sunset to sunrise while lying at any wharf or dock owned and/or operated by the Port Commission; vessels to conform with navigation rules applying when anchored in the waterways; and barges to display white light visible all around the horizon located at least 8 feet above the water line on their outside or channel corners, provided that said regulation shall not apply to pleasure crafts and other small vessels and barges.

Item 35, Speed Limit.—The maximum speed for all ocean-going vessels shall not exceed 8 miles per hour through the channel between Ship Island Bar and the entrance to the Gulfport Harbor, and shall not exceed 5 miles per hour while passing any wharf, dock, or moored craft.

All crafts passing other vessels, boats, barges, scows, etc., in motion, moored or anchored, shall slow down and take every necessary precaution to avoid collision.

Item 45, Discharging of Oils, etc., into Waterways.—It shall be unlawful for any person, persons, firm or corporation to deposit, place or discharge into the waterways, either directly or through private or public sewers, any sanitary sewage, butcher's offal, garbage, dead animals, gaseous, liquid or solid matter, oil, gasoline, residuum of gas, calcium carbide, trade waste, tar or refuse, or any other matter which is capable of producing floating matter or scum on the surface of the water, sediment in the bottom of the waterways, or the odors and gases of putrefaction.

Item 50, Discharging of Ballast, etc., in the Water.—Throwing ballast, rubbish, dunnage, or anything into the waterways is strictly prohibited. No vessel will be permitted to discharge ballast at the wharves, unless authority is obtained from the Port Commission, and no vessel shall be placed at a berth to discharge ballast when any other vessel or vessels are ready to berth for cargo purposes.

Item 55, No Smoking.—Smoking in the warehouses or on the wharves of the Port Commission is strictly prohibited and is punishable by law. Smoking on such ves-

sels as the Harbor Master may designate will not be permitted while vessel is berthed at any of the wharves of the Port Commission.

Item 60, Handling of Explosives, Acids, Etc.—Gunpowder or other explosives shall not be discharged on or loaded upon any wharves, structures or vessels, except by permission of the Port Commission and must be handled in accordance with directions and must be immediately removed. Acids, coal oils and empty gasoline or distillate drums must be removed from the wharves at once. The storage, keeping or use of gasoline, distillate, or other liquid petroleum products on the property under the control of the Port Commission, except at such localities as may be specifically designated therefor, is strictly prohibited and at such localities as may be designated therefor the same shall not be handled, except between sunrise and sunset, and vessels will be allowed to take on board gasoline or distillate only between 8 a. m., and 5 p. m. and when vessel is otherwise ready to depart.

The **harbormaster** at Gulfport has control of anchoring and berthing all vessels at Ship Island and at Gulfport.

Bridges.—No bridges cross the channel in Gulfport.

Terminal facilities.—Port facilities at Gulfport mostly are on or near the two moles enclosing the harbor proper. Along the west mole is a reinforced concrete pier nearly 2,000 feet long on which are several steel warehouses. The east mole has a reinforced concrete wharf 925 feet in length with steel warehouses. The harbor is serviced by railroad. A high-density cotton compress is in service.

A commercial small-boat harbor is northwest of Gulfport Harbor. The controlling depth in May 1956 was 12 feet.

Supplies.—Numerous stores in Gulfport have ordinary ship chandlery and provisions of all kinds. Fresh water suitable for drinking or for boiler use is piped direct to the docks. Bunker oil can be obtained from tank cars. Coal is available only in small quantities.

Repairs.—A small-boat shipyard is in the harbor. Marine ways capable of hauling out vessels up to 200 tons, 100 feet in length, and 8 feet in draft are available for general repairs.

Small-boat facilities.—The Burt Jones Yacht Basin, on the east side of the harbor, has berthing facilities for yachts and launching facilities for outboard-motor craft. Diesel oil, gasoline, ice, and fresh water are available.

Communications.—Gulfport has regular steamer connections with Europe, South America, and Far East Ports. The city is served by two railroads, air, and highway communications.

Chart 1268.—Cat Island Channel and its extension, **South Pass,** lying between Cat Island, and Isle au Pitre, form the most westerly connection between the Gulf and Mississippi Sound. The buoyed channel has a depth of 14 feet but leads to depths of 7 and 8 feet in the sound. The passage is little used, except by small local craft. The current has an ordinary maximum velocity of 1½ knots in the channel. **Cat Island** is wooded nearly its whole length east and west. The eastern shore of the island extends in a south-southwesterly direction for 4.5 miles with **Great Sand Hill** on the north and a low, narrow sandspit on the south.

Isle au Pitre, on the south side of Cat Island Channel, is low and marshy with scattered clumps of bushes.

The former Cat Island Light, near the western part of the island, is abandoned. The structure is a white square house on piles, 48 feet above the water.

Pass Marianne is an alternate passage through the shoals extending across the western end of Mississippi Sound; natural depths are 9 to 14 feet. The pass is south of **Tail of the Square Handkerchief Shoal** and **Square Handkerchief Shoal** and is frequently used by tugs and barges. The channel is marked by lights and buoys.

Long Beach, a summer resort midway between Gulfport and Pass Christian, has a small-boat harbor which is protected on its east side by a breakwater about 1,000 feet long. A draft of about 3 feet can be carried into the harbor. There is no protection from the southwest.

Pass Christian is a summer resort 8 miles west of Gulfport on the north shore of Mississippi Sound. Federal project depth is 7 feet in the entrance and harbor. There is a marine service station in the harbor. Berthing space is available for small craft but there is little protection from seas from the southwest. Supplies can be obtained. **Coastal (storm) warnings** are displayed, daytime only. The channel is marked by lights. In May 1956 project depths obtained.

Henderson Point is at the western extremity of Pass Christian and on the east side of the entrance to St. Louis Bay. Just north of the point, and between the bridges over the bay, is a small-boat basin which is the base for many shrimp and oyster boats. A seafood processing plant is along the entrance channel, which is marked by stakes. In May 1956 the controlling depth into the basin was 2½ feet. Shrimpers entering from Mississippi Sound steer by the water tank at the United States Navy School Facility on Henderson Point until Square Handkerchief Shoal Light is made out.

St. Louis Bay is an indentation in the north shore of Mississippi Sound, 11 miles west of Gulfport. Depths in the bay vary from 5 to 7 feet and decrease gradually toward the shore. The bottom is soft. Two bridges cross St. Louis Bay, the first a railroad swing bridge with a horizontal clearance of 74 feet and a vertical clearance of 3 feet, and the four-lane highway bridge which has a bascule span with a horizontal clearance of 100 feet and a vertical clearance of 17 feet. An overhead power cable about 25 yards north of the highway bridge has a permit clearance of 60 feet except at the drawspan where the permit clearance is 80 feet.

Bayou Portage, which empties into the eastern side of St. Louis Bay, is used by small craft as a harbor of refuge during minor storms. The bridge about 1 mile above the mouth has a single-leaf bascule span with a horizontal clearance of 69 feet and a vertical clearance

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of 10 feet. It is reported that a draft of about 6 feet can be carried from St. Louis Bay to a point 1 mile above the bridge.

Wolf River empties into the east side of St. Louis Bay just above Bayou Portage. Federal project depth is 7 feet from the bay into the river; in June 1956 the channel was at project depth.

De Lisle, a small village on **Bayou de Lisle,** near the mouth of Wolf River, has a boatyard that provides fresh-water storage for small craft and can haul out boats up to 50 feet in length and 4 feet in draft. In May 1956, the controlling depth from Wolf River to the yard was 4 feet.

The dome of a private school at **Shell Beach,** about 3 miles westward of De Lisle, is prominent from seaward.

The highway bridge over Wolf River near De Lisle has a bascule span with a horizontal clearance of 70 feet and a vertical clearance of 10 feet. An overhead power cable west of the bridge has a permit clearance of 98 feet.

The highway bridge crossing Wolf River about 4.8 miles upstream has a swing span with a horizontal clearance of 68 feet and a vertical clearance of 9 feet. The channel is through the right draw.

Jourdan River flows from westward into St. Louis Bay. Federal project depth is 7 feet; in May 1956 the channel was at project depth. There are three boatyards on Jourdan River near Joes Bayou. Boats up to 60 feet in length and 6 feet in draft can be hauled out for general repairs. Water can be obtained and gasoline and diesel oil can be delivered by truck.

Bayou Galere (Watts Bayou) empties into Jourdan River about 1 mile above the latter's mouth. Federal project depth in the bayou is 6 feet to a turning basin near a boatyard, but up to May 1956 no work had been done; the controlling depth was reported to be 3 feet. The yard can haul out boats up to 35 feet in length and 3 feet in draft for general repairs and some parts are available. Water is available, and gasoline and diesel oil are trucked in.

Bay St. Louis is a summer resort on the west side of St. Louis Bay. A depth of 6 feet can be carried to within 0.3 mile of the town. **Coastal (storm) warnings** are displayed, day and night, from a tower at **St. Stanislaus College.**

Bayou Caddy empties into Mississippi Sound 7 miles southwest of St. Louis Bay. A draft of 3 feet can be carried into the bayou and about 1 mile upstream to a shrimp factory. The channel leading into the bayou is marked by bush stakes. Inside the entrance is a landing and a small store where gasoline and limited supplies can be obtained. Two marine ways are located in the bayou. The first, just inside the entrance, can haul out craft up to 85 feet in length and 4-foot draft.

Small craft about 2 feet in draft can make passage from Mississippi Sound to Heron Bay or East Pearl River via Bayou Caddy or Three Oaks Bayou and Redfish Bayou to Heron Bay and via Bayou Caddy or Three Oaks Bayou and Campbell Inside Bayou to East Pearl River. This passage is used by fishermen and sportsmen when there are choppy seas in Mississippi Sound.

Three Mile Pass and **Blind Pass** lead to Bay Boudreau from the southern part of the extreme western end of Mississippi Sound. The channels are little used; each is marked by a light. **Bay Boudreau** is a shallow body of water enclosed by irregularly shaped, low, swampy islands and other shallow bays.

Chart 1270.—Chandeleur and **Breton Sounds** lie southward of Mississippi Sound and northward of the Mississippi River Delta; no clear line of demarcation lies between them—Chandeleur is the northerly and Breton the southerly of the two sounds.

Chandeleur Islands, forming the eastern boundary of Chandeleur Sound, comprise a narrow, crescent-shaped chain of low islands starting 10 miles southward of Ship Island and continuing in a general south-by-west direction for a distance of 23 miles. Southwestward from these islands are **Errol Shoal,** at a distance of 2 miles, and **Breton Island,** 10 miles beyond Errol Shoal, marking the eastern limit of Breton Sound. A radio tower 91 feet high, marked by red obstruction lights, is on Breton Island. The sound offers smoother water than the passage eastward of the islands to vessels of less than 10-foot draft bound from Mississippi Sound to Mississippi River.

A dangerous shoal extends from the south end of Grand Gosier Island to a point about 2.8 miles eastward from Breton Island Light.

North Islands, Fremason Islands, New Harbor Island, and **Old Harbor Island Shoal,** are on the eastern side of Chandeleur Sound. Only fishermen and trappers frequent these, which are separated from each other by unmarked channels good for drafts of 8 feet or more. Protected anchorage for small boats in stormy weather can be found in **Shoalwater Bay, Smack Channel,** and other passages.

The western side of the sounds is marked by lights, one near **Door Point,** another at the east end of the shoal off **Mitchell Key,** and one off **Point Chicot.** Door Point Daybeacon, 1.5 miles east of Door Point Light, should be left to the eastward when proceeding from Chandeleur Sound to Mississippi Sound by way of Oyster Bay and Grand Pass. This route is used mostly by fishermen bringing their catch in from Louisiana waters. **Grand Pass,** connecting **Oyster Bay** with Mississippi Sound, is marked by Grand Pass Oyster Bay Light.

Chart 1272.—Ostrica Canal leads into Mississippi River at the village of **Ostrica,** 21.5 miles above Head of Passes. The canal locks are 250 feet long, 40 feet wide, and 22 feet deep. Controlling depth into the lock from the river is 12 feet at low-river stage. The canal affords passage through **Quarantine Bay** and **Bayou Tortillon** to Mississippi River. In June 1956 controlling depth was 8 feet through Quarantine Bay.

A privately maintained channel is in Grand Coquille Bay.

The western shore of the sound consists of a network of marshy islands separated by shallow bayous and bays. The land is so low that extremely high tides will sub-

merge it, in some sections nearly to the banks of the Mississippi River. Of the several shallow canals leading from the southern part of Breton Sound to the river bank, only the Ostrica Canal leads into the river. These canals are used by the large fleet of oyster boats operating in the sound to deliver their catch to canneries and packing houses on the river bank or to highways for trucking to New Orleans, and by oil companies for the development of oil fields. Oil drilling equipment will be found throughout the area. There are numerous unlighted oil well structures in Chandeleur and Breton Sounds and the waters to the westward.

The waterway connecting Lake Borgne and Chandeleur Sound via Lake Eloi is discussed under Lake Borgne.

Charts 1270, 1271.—Mozambique Point Light marks the north side of the entrance to Black Bay from Breton Sound. A highway runs along the upper portion of **Bayou la Loutre** from Poydras to Hopedale with a branch going to Shell Beach. A light is on the north side of Black Bay at the entrance to **Bayou Terre aux Boeufs.** A draft of 6 feet can be carried up to the junction with Bayou la Loutre at Delacroix, a small settlement about 8 miles south of Lake Borgne. There are marine ways capable of hauling out vessels up to 60 feet in length and 6 feet in draft. Vessels can berth at the wharf. Gasoline, diesel oil, water, ice, provisions, and limited supplies may be obtained. From Delacroix, a highway extends to Poydras on the Mississippi, and thence to New Orleans. The marsh lands about Black Bay are used extensively for hunting, trapping, and oil development.

Chart 1268.—Lake Borgne, the westward extension of Mississippi Sound, is partly separated from Mississippi Sound by **Grassy, Grand,** and **Le Petit Pass Islands** and their outlying shoals. Between the islands and shoals are several navigable passages including Grand Island and Le Petit Passes. On the northeast shore, Lake Borgne is separated from Lake Pontchartrain by a low marsh through which the Rigolets and Chef Menteur Pass are the principal passages. Lake Borgne is about 23 miles in length, 5 to 10 miles in width, and 6 to 10 feet in depth. The shores of the lake are low, marshy and sparsely populated. The lake is of importance chiefly as a connecting link for the Intracoastal Waterway. **Lake Borgne is tidal,** but the tides are small and are greatly modified by the winds. The tidal currents through Grand Island Pass have velocities exceeding 1½ knots at times.

Vessels coming from eastward generally enter Lake Borgne through **Grand Island Pass,** which leads between Grand Island and **Lower Point Clear.** The channel is marked and is a portion of the Intracoastal Waterway.

Le Petit Pass, between Le Petit Pass Island and **Malheureux Point,** is little used.

East Pearl River, the principal mouth of **Pearl River,** empties into Lake Borgne from northward. Principal commerce on the river is gravel, sand, and pulpwood. A Federal project provides for a channel 9 feet deep from Lake Borgne into East Pearl River. Dredging will be done as needed to maintain project depths. The channel is marked by a light, a daybeacon, and buoys. It is reported that a depth of 8 feet can be carried to Logtown, 12 miles upriver. A railroad swing bridge with a horizontal clearance of 87 feet and a vertical clearance of 9½ feet crosses the river at **Baldwin Lodge,** about 1 mile from the mouth. The channel is through the east draw. A highway swing bridge at Pearlington, 7½ miles above the mouth, has a horizontal clearance of 100 feet (east draw) and a vertical clearance of 10 feet.

About 3.5 miles above the mouth, East Pearl River connects with West Pearl River and the Rigolets through **Little Lake Pass, North Pass, East Mouth,** and **West Mouth.** In 1956 a depth of 6 feet could be carried through the buoyed channel in Little Lake Pass. A depth of 4 feet can be carried from Little Lake Pass to Rigolets through **Little Lake** and **East Pass.** The channel is generally marked by brush states.

West Pearl River empties through West Mouth into the eastern end of the Rigolets. A Federal project provides for a channel 7 feet deep from the mouth of West Pearl River to **Bogalusa,** La., a distance of about 50 miles; three locks, each 65 feet wide and 310 feet long, with 10 feet over the sill, control the depth in the channel. About 5 miles above the junction of East Mouth and West Mouth there is a vertical-lift bridge with a horizontal clearance of 90 feet and a vertical clearance of 10 feet down and 50 feet up. Twin bridges near the town of Pearl River have swingspans with minimum horizontal clearance of 90 feet and vertical clearance of 3½ feet; drawspan **regulations** are stated in **§ 203.245,** Chapter 2. The nearby overhead cable has a permit clearance of 60 feet.

The **Rigolets** is a deep passage 7 miles long and about 0.4 mile wide connecting Lakes Borgne and Pontchartrain. Depths range from 20 to 60 feet in the passage bound by low and marshy shores. The entrance from Lake Borgne is 8 miles west of Grand Island Pass. Two swing bridges cross the Rigolets. The first, a railroad bridge about 0.4 mile west of **Catfish Point** in Lake Borgne, has a draw opening with a horizontal clearance of 150 feet and a vertical clearance of 12 feet. The second, about a mile eastward of Lake Pontchartrain, is a highway bridge that has a horizontal clearance of 146 feet in the west draw and a vertical clearance of 16 feet.

Currents are very irregular and greatly influenced by winds. They set with great velocity through the Rigolets at times, and especially through the draws of the bridges. Velocities of 2½ knots off West Rigolets Light and 3¾ knots at the railroad bridge have been observed. At the railroad bridge westerly currents set west-southwest onto the fender on the southwesterly side of the draw, and easterly currents set east by north on to the fender on the northeasterly side. The ordinary maximum velocity is 0.6 knot. The bridge should not be approached closely until the draw is opened, and then only with caution.

Rigolets is a small settlement and railroad station on **Rabbit Island.** A draft of 12 feet can be carried to the landing on **Little Rigolets** by entering via the Intracoastal Waterway. Good anchorage for small craft is available in Little Rigolets either north or south of the waterway crossing. There is a small boatyard at Rigolets capable of hauling out vessels up to 35 feet in length for general repairs. A power cable over Little Rigolets 250 feet north of the railroad bridge has a permit clearance of 25 feet.

Fort Pike, an old circular brick fort with sodded top, is just inside the western entrance to Rigolets. An aviation light close by is a prominent mark. To the south of the old fort are several small-boat slips. Gasoline, diesel oil, ice, and water are available. To the north of the bridge is a boat basin and a marine railway capable of hauling out vessels up to 38 feet in length and 4 feet in draft, for hull and engine repairs. Water, ice, gasoline, diesel oil, provisions, and some boat supplies are available.

On the east side of Rigolets, south of the highway bridge on Geogheagan Canal, there is a marina and boatyard with covered storage for boats up to 40 feet in length. A vertical lift can handle boats up to 43 feet in length and 10 tons in displacement, and complete boatyard facilities are available. Provisions and marine supplies are available, also diesel oil, gasoline, water, and ice.

Chef Menteur Pass, a connecting passage between Lake Borgne and Lake Pontchartrain, is located about 9 miles south of the Rigolets. The pass is about 6 miles long and 0.2 mile wide. Considerable depths range in the pass with shallow water off the entrances. The pass, used by pleasure craft and fishing boats, is usually entered through the Intracoastal Waterway. A light marks the entrance from Lake Borgne and two lights mark the Intracoastal Waterway crossing. Chef Menteur Pass is crossed by two swing bridges. The railroad bridge has a drawspan with a horizontal clearance of 107 feet and a vertical clearance of 13 feet. The highway bridge has a horizontal clearance of 97 feet and a vertical clearance of 14 feet. Gasoline, diesel oil, water, and some supplies are available at the settlement of Chef Menteur between the bridges. The largest marine way can haul out vessels up to 35 feet in length and 3½ feet in draft for hull and engine repairs. There are several small-boat slips. **Coastal (storm) warnings** are displayed, day and night, at Chef Menteur from a Weather Bureau signal tower near the waterway.

Chart 1271.—Bayou Dupre empties into the southwestern end of lake Borgne at **Martello Castle.** Petroleum products and fish are the principal commerce on the bayou. A Federal project provides for a channel 6 feet deep from Lake Borgne into Bayou Dupre and thence a channel 6 feet deep through Bayou Dupre and **Lake Borgne Canal** to the highway bridge at **Violet.** A levee has been built through the abandoned lock which connected the Mississippi with Lake Borgne Canal at violet. Controlling depth into Bayou Dupre was 6 feet in June 1956. The upper end of Lake Borgne Canal is shoaled to about 3 feet and has many stumps and snags. It is used principally by shrimp fishermen who report that it is difficult to navigate during winter low water. Lights and daybeacons mark the entrance to the bayou.

From their common head at the small settlement of **Yscloskey,** Bayou la Loutre flows southeasterly for 25 miles to **Eloi Bay** (Chart 1270), and **Bayou Yscloskey** northeasterly for 2 miles to Lake Borgne. **Bayou St. Malo** leaves Bayou la Loutre 8 miles eastward of Yscloskey and flows northwesterly 5 miles to Lake Borgne. Principal waterway cargoes are crude petroleum and steel-mill products.

A Federal project provides for a channel 5 feet deep from deep water in Lake Borgne to the shoreline at the mouth of Bayou Yscloskey; a channel 6 feet deep from deep water in Lake Borgne through Bayou St. Malo, Bayou la Loutre, and **Bayou Eloi** (Chart 1270) to deep water in **Lake Eloi**; and a channel 5 feet deep in Bayou la Loutre between Hopedale and Bayou St. Malo. The entrances to Bayou Yscloskey and Bayou Eloi are marked by lights. In October 1956, controlling depths over the bars were 3 feet into Bayou Yscloskey, 5 feet into Bayou St. Malo, and 4½ feet into Bayou Eloi; otherwise, project depths obtained.

The marine ways at Yscloskey can handle boats up to 40 feet in length and 6 feet in draft. Gasoline, diesel oil, water, ice, provisions, and limited quantities of other supplies are available. The bridge over Bayou la Loutre at Yscloskey has a vertical-lift span with a horizontal clearance of 45 feet and vertical clearances of 2½ feet down and 50 feet up.

Hopedale, 3 miles southeastward along Bayou la Loutre from Yscloskey, has a 150-foot wharf. Gasoline, diesel oil, water, ice, and provisions are available.

Chart 1269.—Lake Pontchartrain, a fresh-water lake roughly elliptical in shape, is 36 miles long, 22 miles wide at the widest part, 10 to 16 feet deep, and lies northward of the Mississippi River at New Orleans. The lake connects with the Mississippi River through the Inner Harbor Navigation Canal, with Lake Borgne through the Rigolets and Chef Menteur Pass, and with Lake Maurepas through Pass Manchac. Considerable commerce is carried on Lake Pontchartrain, the principal items being sand and gravel, shell, stone, petroleum products, lumber and foodstuffs.

The periodic tide is negligible but the variation in the water level due to winds may have an extreme range of 3½ to 4 feet. It is reported that the surface of the lake is lowered at least 2 feet during the winter when northwest winds prevail.

A highway and a railroad causeway cross the eastern end of Lake Pontchartrain. On the highway causeway are two bascule bridges; one about 1 mile south of **North Shore** has a horizontal clearance of 151 feet and a vertical clearance of 14 feet; the other, about 0.5 mile north of Point Aux Herbes, has a horizontal clearance of 107 feet and a vertical clearance of 12 feet. On the railroad causeway are two swing bridges; one about 1

mile south of North Shore has a horizontal clearance of 105 feet and a vertical clearance of 3 feet; the other about 1.5 miles north of **South Point** has a horizontal clearance of 106 feet and a vertical clearance of 2 feet. An overhead cable crosses at both highway bridges with a permit clearance of 131 feet at each place. The towers on each side of the draw openings show red lights on top.

The **Greater New Orleans Expressway** extends 20.9 miles across Lake Pontchartrain from Indian Beach Shore to Lewisburg. Five bridge openings, alternately fixed and bascule, are spaced at intervals of about 3.4 miles along the causeway, the first one north from Indian Beach Shore being a fixed structure. The authorized horizontal clearance is 56 feet for each fixed span and 75 feet for each bascule span; the authorized vertical clearance is 22 feet for all bridges except the southerly bascule opening which is 21 feet; the Expressway commission has ruled that the latter bridge be in operation 24 hours a day.

A pipeline crosses the lake beginning at a point in the vicinity of **Bayou Piquant** and extending in a northeasterly direction to Mandeville. Lights mark the pipeline.

Middle Ground is the shoal portion of Lake Pontchartrain near the Rigolets. A dredged channel extends across the northeastern part of Middle Ground between the Rigolets and deeper water in the vicinity of the northeasterly pair of drawbridges. Lighted ranges and buoys mark the channel which in May 1948 had a controlling depth of 8 feet.

Bayou Bonfouca, which empties into Lake Pontchartrain 3 miles northwest of the north railroad swing bridge, is the approach to the town of Slidell. Federal project depth is 10 feet from deep water in Lake Pontchartrain to Slidell. In July 1957 the controlling depth over the bar was 7 feet. The highway bridge at Slidell has a swingspan with a horizontal clearance of 50 feet in the west draw and a vertical clearance of 3 feet. The bridgetender lives near the bridge and will open on signal, but there may be a slight delay. The overhead power cable at the bridge has a permit clearance of 60 feet.

Slidell, a town on a main highway and railroad to New Orleans, has a well equipped shipyard. The facilities for construction or repair of steel or wooden vessels include several marine ways and a commercial graving dock 327 feet long, 56 feet wide, with 12 feet over the sill. Tugs, barges, and diving equipment are available for towing or salvage work. Gasoline, diesel oil, water, ice, provisions, and some boat supplies are available. Ship supplies can be obtained through the shipyard. Other facilities include three loading slips and one wharf with a tramtrack connection.

Lacombe Bayou empties into Lake Pontchartrain 4.5 miles westward of Bayou Bonfouca. A Federal project provides for a channel 8 feet deep through the entrance bar in Lake Pontchartrain and the removal of snags and overhanging trees in Lacombe Bayou as far as the fish hatchery. The bar channel was dredged to project dimensions in November 1955, and the controlling depth in the bayou to the railroad bridge 4.4 miles above the mouth was 9 feet in April 1950. The entrance channel is marked by a light. A railroad and a highway swing bridge cross the bayou with a minimum horizontal clearance of 45 feet and a minimum vertical clearance of 5 feet; drawspan regulations are stated in **§ 203.245,** Chapter 2.

An overhead power cable over Lacombe Bayou has a permit clearance of 70 feet. Commerce on the bayou includes scrap iron, petroleum products, and drilling equipment.

Mandeville is a summer resort on the north shore of Lake Pontchartrain 20 miles north of New Orleans. Many of the boat landings on the north shore are in ruins. A protected landing is in Bayou Castine. In June 1956 the controlling depth over the bar was 7 feet. To enter the bayou, pass 30 feet from the buoy at the east jetty. There are berthing facilities, and engine repairs can be obtained. Gasoline and provisions are obtainable by truck.

Tchefuncta River flows into Lake Pontchartrain about 21 miles northward of New Orleans. Federal project depth is 8 feet from that depth in Lake Pontchartrain via Tchefuncta River and a tributary, **Bogue Falaya River,** to **Covington, Louisiana.** In July 1957 the controlling depth was 10 feet over the bar and for 11 miles in Tchefuncta and Bogue Falaya Rivers, and thence 3 feet for 3 miles. The entrance is marked by a lighted range and daybeacons. A highway swing bridge crosses Tchefuncta River at Madisonville; the bridge has a horizontal clearance of 59 feet in the west draw, 79 feet in the east draw, and a vertical clearance of 1 foot. The overhead power cable at the bridge has a permit clearance of 70 feet. Commerce on the river includes fish, lumber, and vessels for repair.

Tows through this bridge are limited to 1 barge. The towing vessel must be made up rigid, astern of the barge, and the barge shall be pushed through the draw at dead slow speed and under full control.

Madisonville, a town 1.5 miles up Tchefuncta River, has public landings at either side of the bridge. Diesel oil and gasoline are available by truck, and water and provisions can be procured. The shipyard on the south side of town has marine ways capable of hauling out craft up to 85 feet in length and 6 feet in draft, for hull repairs. There is one tug of 165 horsepower available for towing.

An overhead power cable extends generally around the perimeter of the western part of Lake Pontchartrain, from the shore near Madisonville to a point about 6.4 miles west of New Orleans. Permit clearance is 40 feet throughout except at the entrances of Pass Manchac, where the permit clearance is 90 feet, and Tangipahoa River, where the permit clearance is 60 feet.

Tangipahoa River, flowing into Lake Pontchartrain 6 miles southwestward of Tchefuncta River, is a narrow but comparatively deep stream. In July 1956 the controlling depth on the bar was 4 feet. Lights mark the entrance channel. Gasoline is available 12 miles above the mouth.

Pass Manchac is a passage 5.5 miles long connecting

Lake Pontchartrain with Lake Maurepas. Depths in the pass range from 26 to 50 feet, but the approaches in both lakes, across long bars, restrict navigation to drafts of about 6 feet. From Lake Pontchartrain there are two approach channels, **North Channel** and **South Channel,** the east side of the entrance to each being marked by a light. Both lead to Pass Manchac Light on the north point at the westerly end of the pass. In July 1956 controlling depths were, over the bar in Lake Pontchartrain in South Channel, 8½ feet; in North Channel 7½ feet, and in the pass in June 1956, 19 feet. The west approach channel in Lake Maurepas has a controlling depth of 6½ feet. It leads along the north shore; there is an extensive shoal along the south shore. The west end is crossed by two bridges, rail and highway; the railroad swing bridge has a horizontal clearance of 61 feet and a vertical clearance of 5 feet, and the fixed highway bridge has a horizontal clearance of 85 feet and a vertical clearance of 50 feet. A new fixed highway bridge was under construction in 1957. On the north side of the pass is a wharf where boats up to 40 feet in length and 4 feet in draft may berth. Water, ice, provisions and gasoline are available, but diesel oil must be trucked in.

Lake Maurepas, lying west of Lake Pontchartrain, is 11.5 miles long in a northeast and southwest direction, and from 4 to 8 miles in width. Depths range between 10 and 12 feet. No cities or towns are along the lake shores which are low and thickly wooded. The lake is of little commercial importance except as the approach to Tickfaw and Amite Rivers, which have some trade to New Orleans.

To enter Lake Maurepas from Lake Pontchartrain, pass 125 feet west of South Channel Light and head for Pass Manchac Light. Haul around the point at a distance of 150 to 200 yards, and steer mid-channel courses through the pass to the bridges. Then follow the north shore at a distance of 200 to 300 yards for 1.5 miles to avoid the middle ground in the lake entrance.

To go to Tickfaw River, steer **310°** for 3 miles until the light opens well clear of the east side of the entrance, then steer for the light on a **000°** course. Give a berth of 100 yards to the east side of the entrance. To get to Amite River, steer **270°** for 6 miles, keeping the light a little on the port bow. Leave the entrance markers and the light to the southward and take a mid-channel course into the river.

Tickfaw River flows into the northerly end of Lake Maurepas over a bar with a controlling depth of 8 feet in July 1956. On the north side of the entrance are stumps, and on the south side, a large shoal. The tributaries of this river, **Natalbany** and **Blood Rivers,** join it 1.7 and 7 miles, respectively, above its mouth. There is a swing bridge 7 miles above the mouth, just south of the junction of Blood River, which has a horizontal clearance of 43 feet in the north draw and a vertical clearance of 7 feet. An overhead power cable over the river has a permit clearance of 70 feet. **Pontachoula River** is a tributary of Natalbany River, 3.5 miles above its junction with the Tickfaw. All of these streams are navigable in part for any draft that can be taken across the outer bar. Principal shipments on the rivers are lumber and shells. A light marks the west side of the mouth of Tickfaw River at the shore of the lake.

Amite River empties into Lake Maurepas 8 miles westward of Pass Manchac. The entrance is marked by two single-pile daybeacons and by Amite River Light. Principal shipments on the river are shells.

To enter Amite River, pass northward of the two entrance daybeacons with the light nearly ahead, and when past the second daybeacon head for the river entrance. Pass well to the eastward of the light. In July 1956 the controlling depth on the bar was 6½ feet at the entrance; thence, in April 1951, 12 feet for 27 miles; thence 8 feet to 4 miles below the entrance to **Bayou Manchac;** in Bayou Manchac, in 1950, the controlling depth was 3 feet on the bar at the mouth and 7 feet to the highway bridge, the head of navigation. There is a swing bridge 7 miles above the mouth of the river which has a horizontal clearance of 40 feet in the north draw and a vertical clearance of 7 feet. At the bridge there is a wharf with berthing facilities for boats up to 40 feet in length. Water, electricity, gasoline, and provisions are available.

Blind River, with a controlling depth in July 1956 of 7 feet, enters Lake Maurepas 5.7 miles south of Amite River. The southern side of the entrance is marked by a light.

The **Bonnet Carre Floodway** is located on the southwestern side of Lake Pontchartrain. When the spillway is in operation, as a result of high stages of the Mississippi River, vessels in the vicinity of the discharge end are cautioned to be on the lookout for possible logs or stumps which may be deposited into the lake due to the operations and should give that end a wide berth.

The city limits of New Orleans extend from Lake Pontchartrain to the Mississippi River. Pleasure resorts and suburbs are on the lake front. A concrete sea wall has been built along the south shore of the lake from West End Park eastward to New Orleans Airport.

At **West End Park** is a protected yacht harbor which is entered from eastward. Gasoline, diesel oil, water, small-boat supplies, and dock facilities are available in the harbor. **Coastal (storm) warnings** are displayed, daytime only, at the yacht club. Controlling depth into the harbor was 8 feet in June 1956.

Lights mark the north and south sides of the entrance to the yacht harbor; they are privately maintained. The light on the south side, 52 feet above the water and visible 13 miles, is shown from a white square tower on a square dwelling; a fog signal is at the light.

Pontchartrain Beach, a pleasure resort, is east of Spanish Fort. Two 130-foot floodlight towers make good landmarks.

Measured Course.—The westerly range of a measured course of 5,272 feet, on the bearing **084°30′–264°30′**, is about 0.2 mile west of Pontchartrain Beach.

The Lake Pontchartrain entrance to the Inner Harbor Navigation Canal is marked by two lights which are not conspicuous at night. Floodlighted towers at Lincoln Beach Park, 4 miles northeastward from the airport, are good landmarks.

8. MISSISSIPPI RIVER

Charts 1115, 1116.—Mississippi River empties into the north central part of the Gulf of Mexico through several mouths or passes which, taken together, form the delta of the river. The shape of the delta is somewhat like the foot of a bird, with its four toelike extensions protruding into the Gulf. The passes consist of narrow-banked deposits of sand and clay brought down by the river current which continuously adds them to the seaward margins of the delta. In this manner the delta is being built seaward at an estimated average rate of 300 feet a year. Numerous bays between the passes are changing through wave and tidal action and filling up with the immense amounts of material carried down by the river. The upper half of **Garden Island Bay** has been filled in so that now it is a marsh.

The passes begin to diverge at Head of Passes, a point 12 to 17 miles, respectively, above the mouths of South and Southwest Passes. The perimeter of the delta around the most widely divergent passes is about 35 miles.

The improved ship channels into Mississippi River are through South Pass and Southwest Pass. Several minor passes can be used only by small boats.

Landmarks.—The discolored water discharged from Mississippi River usually provides mariners with their first indication that they are approaching land. However, this is not a sure indication; during high-river stages and with northerly winds the discolored water will be encountered in some directions 60 miles or more from land, and at times the water will appear broken from 15 to 20 miles from the passes. The land near the entrances to the passes is low marsh covered with tall, coarse grass and weeds.

On the approach to either South Pass or Southwest Pass, the lights are the most prominent and easily recognized landmarks. An elevated water tank east of South Pass Range Rear Light and two tanks southeast of Southwest Pass Light are the next objects recognized. Smoke from steamers in the passes also is a guide.

Directions, Mississippi River.—Approaching the mouth of the river from Florida Straits, deep-draft vessels usually set a course direct to the passes from a position about 10 or 12 miles southwestward of Dry Tortugas Light on Loggerhead Key. Low-powered vessels of moderate draft sometimes pass northward from Florida Straits through Rebecca Channel, to the westward of Rebecca Shoal Light, and for 200 miles set a course 10° to 20° northward of the course to the passes of the river, and then change course for the passes. This keeps them out of the strongest part of the Gulf current.

Going to the Straits of Florida, a course usually is set for a point 10 or 12 miles southwestward of Dry Tortugas.

Since in either direction soundings are of little value in determining position, observations should be relied upon. The currents vary considerably, so that even with the closest navigation a vessel bound for South Pass may make a landfall at Pass a Loutre, or Southwest Pass.

Approaching South Pass, a vessel uncertain of her position can set a course so as to pick up the 20-fathom curve from 5 to 20 miles northeastward of South Pass lighted whistle buoy, and then follow the curve southwestward until the buoy is located. During thick weather, vessels frequently ground northeastward of South Pass and northward of Southwest Pass, because of infrequent sounding. Due consideration should be given to the possible occurrence of mud lumps.

Vessels approaching South Pass or Southwest Pass should become fairly certain of their positions in any weather by using radio-compass bearings in conjunction with soundings. A radiobeacon is at the entrance to each pass. The radiobeacons are synchronized with fog signals for distance-finding.

In thick or foggy weather, Southwest Pass is more accessible and more easily navigated than South Pass because the former's channel is marked better, has greater width, and is nearly straight. Furthermore, a vessel is not set off course to the same extent by currents at the entrance.

Currents off Mississippi River Passes.—Currents in the Gulf of Mexico are discussed in Chapter 2. The currents are variable in direction and velocity depending to a great extent upon the velocity and direction of the wind, and near the entrance to the passes upon the stage of the river.

A vessel on the course from Dry Tortugas to the Mississippi River generally will encounter an opposing or southeastward current for a distance of about 300 miles after leaving Dry Tortugas. For the last 125 miles before reaching the mouth of the river the current will usually set between north and east.

During a light southerly wind a northeasterly set of 2¼ knots has been observed 13 miles southeast of South Pass entrance, and at the same time there was an easterly set of one-half knot at the lighted whistle buoy off the entrance.

At Southwest Pass lighted buoy the current is due chiefly to the discharge of the river. In general it sets southwestward and its velocity varies from 0 to 4 knots, the average being about 1.7 knots. At times, however,

there is said to be a southeastward current of nearly a knot at this location.

Tides and currents, Mississippi River.—In the passes the tide has generally but one high and one low water in 24 hours, the extreme range being less than 1½ feet. At New Orleans the range of tide during low-river stages averages about three-fourths foot. There is no periodic tide at high-river stages. The current due to the tide is not strong at any point, and for purposes of navigation it is rarely taken into account. The average date of high-river stage occurs in April and of low-river stage in October. At New Orleans the extreme difference between high and low stages of the river is 21 feet, the mean difference is about 14 feet. Zero on the Carrollton gage is 0.13 foot below Mean Gulf Level. The current velocity in the river varies greatly from time to time, depending upon the stage of the river; at New Orleans, the cross-sectional velocity may be as much as 5 knots at high stages and less than 1 knot at low stages.

At several places in the lower part of the river countercurrents or eddies often are found near the banks and, if taken advantage of, can greatly assist vessels bound up the river.

At South Pass outside the jetties the current from the river frequently has an eastward set. At Southwest Pass it sets straight out from between the jetties, thence spreading out fan shaped, with slightly greater velocity to westward.

Fogs.—From December to June, fog may be encountered anywhere from 60 miles off the passes to the city of New Orleans. Southerly and easterly winds bring it in, and northerly and westerly winds clear it away.

Dangers.—An area bounded by latitude 28°20′ N., to latitude 28°30′ N., between longitude 88°50′ W. and longitude 89°00′ W., has been established as a dumping ground for ammunition and explosives.

Sand waves.—During low stages of the Mississippi a jellied material, or muck, is deposited in the lower part of the river. Known as **flocculation,** it consists of the suspended material which, after being carried downstream by the current, comes into contact with the relatively still salt water which backs into the passes. This muck has been observed to be as much as 10 to 15 feet deep. It remains where deposited until flushed out during high-water stages of the river. Although slowed down by this muck, deep-draft vesels are able to pass through it. Accordingly, and because it will be flushed out during high-water stages, the Corps of Engineers do not consider it necessary to remove the material during low stages.

The material brought down during high stages, on the contrary, is of a sandy nature such that, if not removed, builds up bars and reduces controlling depths. These sand bars or waves are dredged out during high stages.

Mud lumps are the small oval-shaped mounds or islands no more than 8 feet high which are peculiar to the Mississippi River delta. They are caused by upward forces of the static pressure exerted by sedimentary deposits accumulating underneath: most of them never rise above the surface but remain as subsurface mounds. Their cores of plastic clay may arise from depths as much as 300 to 500 feet. Fissures or cracks develop in the islands, through which mud, gas, and salt water discharge and often build up low flat cones. In South and Southwest Passes, which have been jettied, there are arcs of mud lumps outside of and parallel with the peripheries of the bar deposits. In natural passes, the mud lumps are affected by submerged natural levees as well as by the bar deposits. Generally, the lumps appear within only a few weeks' time and, unless affected by succeeding periods of uplift, will wash away within a few years or be over-run by the encroaching marshland.

Pilotage.—The port of New Orleans has three associations of pilots: The Branch Pilots for the bar, the Crescent River Port Pilots for the river between Pilottown and New Orleans, and the New Orleans-Baton Rouge Steamship Pilots for the river between New Orleans and Baton Rouge. The bar pilots will generally be found outside the entrances to South and Southwest Passes or they can be signaled for from the lighted buoys outside the entrance to the passes. They use motor boats for boarding outside the bar and take vessels up to Pilottown, 2 miles above the Head of Passes. The river pilots take vessels from Pilottown up the river to New Orleans and if continuing upstream, will notify the upper river pilots for pilotage to destinations above New Orleans.

At the bar, pilotage is compulsory for vessels in foreign trade and also for vessels in domestic trade except those under 100 tons lawfully engaged in coasting trade, and coastwise steam vessels having on board a pilot licensed by the United States Coast Guard. Pilotage on the river is also compulsory with the above exceptions and also with the exception of sailing vessels, and barges in tow of river or harbor towboats.

Boundary lines of inland waters.—The lines established from Mobile Bay to Mississippi Passes, Mississippi River, and Mississippi Passes to Sabine Pass, are described in §§ **82.95, 82.100,** and **82.103,** Chapter 2.

Federal regulations for navigation of the river are stated in § **207.200,** Chapter 2.

Chart 1272.—South Pass, one of the two important commercial entrances to Mississippi River from the gulf lies 425 miles northwestward of Dry Tortugas and 90 miles southwestward of Mobile Bay entrance. The pass has been improved by the construction of jetties on both sides of the entrance. A Federal project provides for a channel 30 feet deep from the gulf across the bar to the jetty, thence 30 feet deep to Head of Passes. The project is under constant maintenance, and controlling depths are given at frequent intervals in the Notice to Mariners. Immediately outside the entrance the depths are subject to considerable change, due to the large amount of sediment brought down by the strong river currents; but at a distance of 1.5 miles out from the end of the jetties the depths are more dependable, and 10 fathoms can be found in any easterly or southerly direction.

The entrance approach is marked by a lighted whistle buoy, 1.5 miles southeastward of the end of the jetties, and by a lighted bell buoy marking the shoal ground to

the southwestward. **South Pass West Jetty Lighted Range** and **South Pass Lighted Range** mark the approach channel and the channel through the entrance. A light is near the outer end of the east jetty; a fog signal there is operated continuously from November 1 to April 30, and at other times during foggy weather. The west jetty front light, 35 feet above the water and visible 11 miles, is shown from a white house on black piles near the outer end of the jetty; a fog signal and radiobeacon, synchronized for distance-finding, are at this light. The radiobeacon will broadcast specially upon request to enable vessels to calibrate their radio direction-finders; see Light List for alerting whistle signals and operational information.

South Pass Range Rear Light, 108 feet above the water and visible 16 miles, is shown from a white skeleton structure enclosing a cylindrical stairway, on the west bank 2.2 miles above the outer end of the jetties.

Pilot Station is a small settlement on the west bank 0.5 mile above the end of the jetties.

At the north end, the entrance into the pass from the Mississippi River is marked by Head of Passes West Jetty Light and Head of Passes East Jetty Light, on the west and east points, respectively, of the entrance, and by Cypress Lighted Range marking the entrance channel.

Directions, South Pass.—Depths in the channel at the entrance to South Pass are subject to frequent change. Strangers are advised to take a pilot. The current has considerable velocity, which tends to carry a vessel upon the shoal lying straight out from the end of the jetties on the west side of the channel.

Stand in for the lighted whistle buoy and bring the South Pass West Jetty Lighted Range on the bearing **297°**. Steer this range, passing to the northeastward of the lighted bell buoy and about 250 feet to the westward of the end of the east jetty. The current will strike the vessel on the starboard bow as the end of the east jetty is approached. The vessel should be headed to meet the current, and by the time she is abreast the east jetty she should be heading fair between the jetties. The South Pass Range bearing 315° marks the western edge of deep water along the entrance channel and between the ends of the jetties.

When in the pass the banks are a sufficient guide, care being taken to keep about midway between them. Several lights are on the east and west banks and a lighted range for entering the pass is at its head.

Anchorages.—In heavy weather all craft in the vicinity of South Pass seek refuge in the pass, and in emergencies boats may tie up to the Coast Guard wharf at South Pass Light. Anchorage areas at Pilottown and New Orleans are described in **§ 202.195,** Chapter 2.

Dangers.—Lying between 0.2 and 0.5 mile off the end of the jetties on the west side of the channel is a dangerous shoal with depths of 3 to 17 feet over it. West Bank lighted bell buoy 1 marks the eastern portion of the shoal. Except for changes during and after high-river stages, the position of this shoal and depths on it are fairly constant. This shoal, coupled with strong river currents, makes navigation of South Pass difficult for strangers. A bend in the channel near Head of Passes also adds to the difficulty.

Southwest Pass, the westernmost of the passes of the Mississippi, is 18 miles west-southwestward of South Pass entrance and 280 miles eastward of Galveston entrance. The pass has been improved by the construction of jetties on both sides at the entrance.

A Federal project provides for a channel 40 feet deep from the Gulf to the jetties, thence 40 feet deep to Head of Passes. The project is under constant maintenance, and controlling depths are given at frequent intervals in the Notice to Mariners.

Near the ends of the jetties the depths are somewhat changeable, although there appears to be deep water in the Gulf from nearly every direction up to within 2 miles of the entrance.

The approach to Southwest Pass is marked by Southwest Pass Entrance mid-channel lighted whistle buoy, 1.7 miles southward from the jetty ends. From the buoy to abreast of Southwest Pass East Entrance Light Station, the channel is marked by lighted buoys on the west side of the channel and by a lighted range. Another lighted range continues from the first range. Lights marking the channel are off some of the spur dikes extending channel-ward from along the inner bulkhead of the jetties.

Southwest Pass Entrance Light, 51 feet above the water and visible 13 miles, is shown from the lookout tower on the roof of the dwelling of the light station.

Burrwood is on the southeast bank 5 miles above the jetties. Gasoline and provisions in limited quantities are available here. **Coastal (storm) warnings** are displayed, daytime only, at the warehouse on the wharf.

Southwest Pass Head Lighted Range, at the north end of the pass, marks the entrance into the pass from Mississippi River.

Directions, Southwest Pass.—Vessels bound to Southwest Pass sometimes fall westward of the Mississippi River delta, a situation which the mariner can quickly ascertain by watching the lead. The water shoals much more gradually along this part of the coast than off the delta.

Depths in Southwest Pass entrance are subject to some change, but the current, so far as is known, can be depended upon to set nearly straight out from between the jetties.

From Southwest Pass Entrance midchannel lighted whistle buoy, steer **000°** on the Southwest Pass Entrance West Jetty Lighted Range for about 1.7 miles. When in the entrance and on Southwest Pass Inner Lighted Range bearing **023°**, head up between the jetties. Spur dikes have been constructed channel-ward from the jetties.

In the pass the banks are a sufficient guide. Lights are on the east and west banks and a lighted range for entering the pass is at its head.

Anchorages.—Designated areas of anchorage at Pilottown and New Orleans are described in **§ 202.195,** Chapter 2.

Dangers.—A shoal with depths of 9 to 16 feet extends along the west side of the approach channel for about a mile beyond the end of the west jetty. The position of

this shoal and its depths are rather constant except for changes during and after high-river stages in the spring.

At **Head of Passes,** three of the river's important passes come together: South Pass, Southwest Pass, and Pass a Loutre. This point of confluence is the point from which measurement is made of all distances on the river southward or below to the mouth of the passes, and northward or above to Cairo, Ill.

Pass a Loutre and its branches, **Southeast Pass, North Pass,** and **Northeast Pass,** flow easterly into the Gulf. These passes are deep from the Head of Passes to within a short distance of the Gulf, but the mouths are obstructed by bars. Small local craft occasionally use these passes but strangers should avoid them. Pass a Loutre and North Pass have depths of about 7 feet over the bars; the others are much shallower. North Pass is marked by lighted buoys.

An abandoned lighthouse 76 feet high, a black and white spirally-banded tower, is on the north side of Pass a Loutre, 2 miles inside the entrance. Another abandoned lighthouse, a grayish-white tower, is about 0.5 mile north of Northeast Pass and 2 miles west of the entrance to the pass.

The marsh lands south of Main Pass are used extensively for hunting, oil operations, and some oyster camps are located in the **Redfish Bay** area.

From Head of Passes to New Orleans, the river has a least width of 600 yards and a clear unobstructed channel with depths of from 36 to 230 feet. There are a few shoals along the river banks, the outer limits of which are marked by buoys. On both sides of the river the land is dry, and in the lower reaches it is covered mostly with coarse grass and willows.

Above Bohemia on the east side and The Jump on the west, levees prevent overflow at high water. Below Bohemia a 10-mile break in the levee permits flood waters to move eastward into the Gulf. On both sides of this break are levees extending from the river to the Gulf, to prevent the flooding of adjacent land. Below this break the levee continues to Baptiste Collette Bayou.

The land back of the levees on the east side, formerly laid out in sugar and rice plantations, now is given over to pasturage and market gardens. Extensive orange groves are back of the levees on the west side. New Orleans is reached by river boats and also by railroads and highways which extend down the west bank to Venice (The Jump) and down the east bank to Pointe a la Hache, 9 and 37 miles, respectively, above Head of Passes. There is a private road from Pointe a la Hache to Huling.

Caution during high stages of the river.—Vessels navigating the Mississippi River at flood stages, when passing habitations or other structures, partially or wholly submerged and subject to damage from wave action, shall proceed slowly and keep as far away from such structures as circumstances permit, and shall also proceed slowly when passing close to levees.

Under these conditions, between the Standard Oil plant immediately above Baton Rouge and The Jump, mariners are directed to steer a course as close as possible to the center of the river and to proceed at a speed sufficiently slow so that levees and revetments will not be endangered by wave wash. Careful observation by mariners of the effects of the vessel's wash is a vital element in this control.

Strong currents and shifting eddies in the vicinity of Algiers Point, will be encountered during high stages of the river. These conditions may make hazardous the operation of a tow which could normally be handled with ease. It is accordingly requested that operators and masters exercise every precaution when operating in the area controlled by the New Orleans Harbor traffic lights. Size of tows and tugs should be considered in view of conditions which may be expected.

Directions, Head of Passes to New Orleans.—The river is well marked with lights and for the most part the banks are sufficient guide. Lighted buoys mark shoal areas or obstructions in the river. The distance from Head of Passes to New Orleans is 82.5 miles.

Anchorages.—Anchorage areas at Pilottown and New Orleans are described in **§ 202.195,** Chapter 2.

Coastal (storm) warnings are displayed, day and night, at Pilottown, just above Head of Passes.

Cubits Gap is an opening in the east bank 3 miles above Head of Passes, at which **Raphael,** Main, and **Octave Passes** meet and connect with the river. These passes are navigable for small craft, but Main Pass is the only one having navigable connection with the Gulf. A sill of willow brush weighted down by rocks has been laid across the entrance to each of these passes; at certain spots these may be crossed by drafts of 5 to 9 feet, with local knowledge.

Cubits Gap Light, on the southeast side of the gap, is a fog light of 2,000,000 candlepower. It flashes white from an 80-foot tower during fog or periods of low visibility; at other times it shows flashing red. A fog signal is at the light.

Main Pass has a depth of about 4 feet over the bar, at the Gulf entrance, and about 9 feet over the sill at the river entrance at Cubits Gap. The passage over the sill is marked by a daybeacon and an unlighted range. The Gulf entrance to Main Pass is marked by a light. This pass is used considerably by fishing vessels and oil companies operating in Chandeleur and Breton Sounds.

The Jump is an opening in the west bank 9 miles above Head of Passes, where Grand Pass and several smaller passes connect with the river. There is a sill across the entrance at a depth of about 15 feet and a depth of about 4 feet can be carried through the pass into the Gulf.

Pilottown, Venice, and **Boothville** are small settlements 2, 10, and 14 miles, respectively, above Head of Passes. Pilottown has a few piers where small vessels may tie up for gasoline, oil, or provisions which are available in limited amounts. At Venice there is a marine ways capable of hauling out vessels up to 65 feet in length and 5½ feet in draft, for general repairs. Diesel oil, gasoline, fresh water, ice, and provisions are available; there is a 200-foot wharf. A bus connection is maintained to New Orleans.

At Boothville there is a wharf 100 feet long where fresh

water and provisions may be procured. Gasoline is available by truck.

Coastal (storm) warnings, day and night, are displayed at Pilottown.

At **Olga**, across the river from Boothville, a small machine shop and boatyard are in operation. Marine ways there can haul out boats up to about 90 feet in length and 5 feet in draft, for general repairs. Some supplies may be obtained. From behind the levee, a canal leads to **Grand Bay** where there are numerous oyster camps.

The Ostrica Canal, described in Chapter 7, has its Mississippi River entrance at Ostrica, a small settlement opposite Buras.

Chart 1271.—Buras, 21.5 miles above Head of Passes; Empire and connecting canal and lock, and Myrtle Grove are discussed in the next chapter.

Docking facilities for ocean-going vessels are available at **Port Sulphur**, 33 miles above Head of Passes. The wharf has a face of 5,000 feet along the river, with dolphins and mooring clusters providing berthing space of about 6,000 feet. Depths alongside are 30 feet or more.

The wharf is equipped with sulphur-handling machinery. **Coastal (storm) warnings** are displayed, daytime only, at the wharf.

Pointe a la Hache, 41.3 miles above Head of Passes and 40 miles below New Orleans, is the seat of Plaquemines Parish which embraces most of the lower Mississippi River. Gasoline, fresh water, and some provisions can be obtained. There is 4 feet of water at the old ferry wharf, north of the new ferry float, but at low water boats must anchor out and get supplies by skiff. A ferry crosses the river here.

Harvey Canal, at Harvey opposite New Orleans, and the Algiers Lock opposite Chalmette, connect Mississippi River with an extensive network of inland waterways west of New Orleans.

Charts 1269, 497.—**New Orleans** is the largest city on the Gulf and one of the largest ports in the United States. Located on both banks of the river 96 and 102 miles, respectively, above the entrances to South and Southwest Passes, it is a natural gateway to and from the vast central and southern portions of the Nation, and particularly to the entire Mississippi Valley with which it is connected by numerous inland water routes. From New Orleans, main-route air and rail lines fan out to all parts of the country. Foreign and coastwise trade both are extensive. The chief imports are sugar, molasses, bananas, coffee, sodium nitrate, creosote oil, jute, vegetable oils, logs, sisal, paper, and chemicals. The chief exports are petroleum products, lumber, grain and flour, cotton and other textiles, iron and steel products, paper, lard, tobacco, carbon black, molasses, syrup, rosin, salt, sulphur, and chemicals.

New Orleans is a popular winter resort with many fine hotels, theaters, restaurants, parks, and places of historical interest. Among the latter is the famous French Quarter which is kept in as near its original state as possible. For the convenience of representative citizens of foreign countries who arrive or depart via New Orleans, an international club known as the **International House** is in a 9-story building at the corner of Gravier and Camp Streets.

The city proper is bounded on three sides by the Mississippi River. The city limits extend northward to Lake Pontchartrain which is connected to the river by the Inner Harbor Navigation Canal along the eastern side of the city. Strong levees protect the city from flood waters of the Mississippi River, which at times rise to a level higher than that of the city streets.

Abreast of New Orleans on the opposite bank of the river are **Algiers**, which is a part of New Orleans; **Gretna**, **Harvey**, and **Westwego**. All are connected with New Orleans by ferries. Several shipyards, including a United States Naval Shipyard, are at Algiers.

A special **radio direction-finder calibration station** is at the Naval Station; see Light List for operational information. The antenna is located 200 feet 305° from the easternmost radio tower at the station.

Chalmette, about 5 miles below Canal Street on the same side of the river, has extensive terminal and cargo-handling facilities.

Municipal Yacht Harbor and other features along the Lake Pontchartrain shore are described in the previous chapter.

New Orleans Harbor extends for nearly 15 miles along Mississippi River, from Westwego and Southport on the northwest to Chalmette, 5 miles below Canal Street. Virtually all wharves parallel the river bank, and for 10 miles along the bank of the river there is an almost continuous quay. Transit sheds cover most of the wharf area. Modern handling devices suitable for the varied commodities entering the port are provided on the wharves and in the sheds. Almost all wharves have rail connections. Depths at the wharves range from 10 to 49 feet at low water, with about 30 feet alongside most wharves. It is the Dock Board's responsibility to keep sufficient depths alongside the wharves for ships to berth. The board controls the area from the faces of the wharves to 100 feet into the stream. The dock areas silt up rapidly and change from day to day. The Dock Board's dredge is working continually to keep the docks open.

Anchorages.—Within the port limits, vessels may anchor or berth only as directed by the Superintendent of Docks.

Bridges.—A high-level fixed highway bridge connecting Algiers and New Orleans, about 0.8 mile above Canal Street, has a vertical clearance of 150 feet over a 750-foot width of the 1,400-foot channel span. The Huey P. Long Bridge across the river, 9.9 miles above Canal Street, has a horizontal clearance of 750 feet and a vertical clearance of 135 feet. These are the only bridges over the Mississippi in the New Orleans vicinity.

Tides and Currents.—A description of Tides and Currents is given under the general discussion of the Mississippi River.

Coastal (storm) warnings, day and night, are displayed at the Inner Harbor Navigation Canal lock. For other displays in the area, see Appendix.

Pilotage.—Pilotage for New Orleans and Mississippi River is discussed previously in this chapter.

Towboats.—Tugs, ranging up to 2,000 horsepower, are available for assisting in docking and undocking, towing in the harbor and canal, and towing to sea. At the Port of New Orleans the public berthing facilities are of the marginal wharf type, and vessels are usually able to dock and undock without the aid of a tug. Two tugs must be employed on all towing to and from the drydocks and should be employed on all ships towed around Algiers Point when the traffic lights are operating, and by large vessels going through the Inner Harbor Navigation Canal.

Quarantine.—The quarantine station is on the west bank of the river about 0.5 mile above Chalmette Slip. Vessels come to anchor in front of the station where they are boarded by quarantine officers. The anchorage site is 3,000 feet long. The upper end is indicated by a quarantine anchorage sign. Service is maintained from 6 a. m. to 10 p. m., but may be extended throughout the night under emergency conditions.

Hospitals.—A United States Marine Hospital and numerous public and private hospitals are in New Orleans.

Customs.—Vessels are generally boarded by customs officers at berth, however, arrangements can be made for the officers to board vessels at any point within the port limits. New Orleans is a customs port of entry and marine documents are issued. The customhouse is at 423 Canal Street.

Immigration.—Immigration inspectors board vessels at the quarantine station or alongside wharves.

Federal Offices.—The following Federal Government Bureaus have offices in the Customhouse, 423 Canal Street: Custom Service; Coast Guard, District Headquarters, and Marine Inspection; Coast and Geodetic Survey; and Hydrographic Office.

The customs district of New Orleans includes the cities of New Orleans, Baton Rouge, and Morgan City, all of which are in Louisiana. The Corps of Engineers has offices on the levee at the foot of Prytania Street. The Federal Communications Commission has offices in the Federal Building.

At the **Coast and Geodetic Survey Office** complete files of charts, Coast Pilots, tide tables, and other publications relating to navigation may be consulted and other information affecting navigation obtained without charge.

At the **Branch Hydrographic Office** bulletins are posted giving information of value to mariners who may also avail themselves of publications there pertaining to navigation, and to correct their charts from standards, without charge.

Harbor Regulations.—Traffic control in the river in the vicinity of Algiers Point is subject to regulations stated in **§ 207.200,** Chapter 2. In addition, at a conference of representatives of navigation interests in New Orleans it was agreed that high stages on the Mississippi River require special precautionary measures in the operation of vessels in New Orleans Harbor, particularly in the vicinity of Algiers Point where high-river stages produce strong currents and powerful shifting eddies.

The following recommendations were made for the operation of vessels and other craft when the stage of the river is 15 feet or above on the Carrollton Gage. All underpowered vessels should be assisted by a tug around Algiers Point; and further, underpowered vessels should not leave the harbor unless they can clear Algiers Point during daylight hours. Tows should not proceed downstream with more than seven tons per horsepower; and further, terminal-operators and fleet-owners should observe extra precautions in the mooring of barges to prevent the possible breaking loose of such craft to the danger of all installations downstream.

The attention of all navigation interests, masters, pilots, and operators is invited to the urgent necessity for observance of these policies and meticulous adherence to good seamanship and sound operating practice in order to minimize navigational hazards during the period of high stages of the river.

The Board of Commissioners of the Port of New Orleans, a State agency generally known as the **Dock Board,** has full control of the port except for matters pertaining to levees or to the municipal belt-line railroad. About two-thirds of the improved wharf frontage is owned by the State of Louisiana and operated by the board. The office of the Superintendent of Docks is on Canal Street near the river.

Extracts from the rules and regulations for the Inner Harbor Navigation Canal are as follows:

General.—No vessels shall berth at any wharf, landing or mooring, or move from one point to another in the Canal, or load or unload cargo elsewhere than at a regularly established wharf, except by authority of the Superintendent.

Obstructing Navigation—Anchoring and Mooring.—No vessel shall anchor in the channel of the Canal or in the approaches thereto, except in case of distress or emergency or while waiting the opening of a drawbridge, and such stoppages shall be only for such periods as may be absolutely necessary by reasons of such causes. Vessels moored at wharves, landings, clusters, etc., shall be so placed and tied up as not to interfere with safe passage of other vessels navigating the Canal. No warp line shall be passed across the channel, wharf or landing, so as to obstruct passage or to cause interference with the discharging of cargoes.

Vessels shall not be berthed two abreast alongside any wharves, bulkheads, or clusters, except that small barges or other small craft may be moored two or more abreast when necessary clearances for proper operation of the Canal can be maintained, and permission of the Superintendent shall have been obtained.

Vessels, lighters, barges, launches, other watercraft, timbers, rafts, or similar floating objects moored or tied to and alongside vessels, wharves, bulkheads or clusters, shall be placed so as not to obstruct the channel, and shall be made fast securely at both ends to prevent swinging out or breaking loose, and shall display conspicuously suitable lights at night.

Under no circumstances shall vessels or other watercraft be anchored or moored within 100 feet of the centerline of the Inner-Harbor Navigation Canal channel as determined by the Engineering Department of the Board.

In the event any vessel or other floating equipment, including any logs or lumber assembled in rafts or separated therefrom, or any large sinkable object on any such vessel shall sink, or in any manner obstruct navigation in the Canal, the owner or agent of said vessel shall promptly remove same. In case the owner or agent fails for any cause to remove any such obstruction promptly upon demand, the Board may remove it or cause it to be removed at the cost, risk and expense of said vessel, its owner or agent.

Responsibility for Vessels.—Masters of vessels in Canal waters shall be responsible for safe handling and proper navigation of vessels under their charge. Masters of vessels shall abide by the rules and regulations of the Canal, as interpreted by the Superintendent.

No vessel, even if moored and tied up, shall be left without a sufficient crew to care for it properly. Lights shall be displayed at all times, both when tied up and navigating the Canal, in accordance with the provisions of the Inland Rules.

The dropping of anchors, weights, or other ground tackle, within the areas occupied by submarine cables or pipe crossings, is prohibited. Such crossings will be marked ordinarily by signboards on each bank.

The master or other party in charge of the movement of an ocean-going vessel or craft of unusual height, including piledrivers, derricks, etc., shall before passing through the Canal bridge openings, make certain that such craft and every part of the superstructure or any equipment or cargo beyond the gunwales will clear all parts of the bridge structure.

As it may see fit, the Board reserves the right to place its own pilot on any vessel passing through the Canal. The Canal Pilot will serve only in an advisory capacity. . . .

Vessels shall exercise due care in navigating the Canal, as to speed and otherwise, in order to avoid damage to the Canal structures or equipment, or to other vessels.

The making of trial runs in the Canal by speed boats and other such motorcraft, is prohibited. Under no circumstances shall any watercraft navigate in the Canal at a speed exceeding 10 miles per hour. . . .

Vessels shall be liable for any damage to Canal structures, equipment and/or appurtenances while passing through the Canal.

The board has noted that some masters ground their vessels bow-on while waiting lockage in the forebay of the lock. As such contact endangers the levees, mariners are directed to discontinue the practice.

Terminal facilities.—More than 7 of the 10 miles of wharves are covered by steel sheds. Floating derricks, locomotive cranes, and most other handling devices are available as needed. There are more than seven miles of wharves, most of them with transit sheds, under control of the Board of Commissioners. There are also some privately owned and operated wharves. These facilities are located along the Mississippi River and the shores of the Harvey Canal and Inner-Harbor Navigation Canal. Most of the facilities, including the Public Cotton Warehouse Wharf and the Foreign Trade Zones Wharf, are used for handling general cargo. In addition, at one terminal, trailers loaded with general cargo are run onto end-loading vessels. Another terminal handles the loading of rail cars onto sea-going carriers. Ten wharves are used for handling oil-field supplies and equipment, four for loading logs, two for bananas, and two for bunkering coal.

About 6,000,000 square feet of covered warehouse space is available for storage of coffee, sugar, and general merchandise. Several wharves are equipped with portable sectional conveyors for handling and stacking coffee, rice, sugar, and cement bags; coils of wire, boxes, and miscellaneous packages. There are special conveyors for moving molasses and alcohol in barrels, cottonseed products, and mahogany logs. The sugar refinery at Chalmette has a well-equipped telpher system for moving and storing raw sugar.

The two cold storage plants are privately operated.

The terminal for the inland barge lines to the Mississippi and Warrior, Alabama, Rivers is on the Inner-Harbor Navigation Canal just above the locks.

All port facilities are served by paved roadways and also by belt-line rail connections to the trunk line railroads entering New Orleans.

The **Inner-Harbor Navigation Canal,** also known as the **Industrial Canal,** offers deep-water connection between Mississippi River and Lake Pontchartrain, a distance of about 5 miles. The lock is 0.5 mile north of the Mississippi River Levee; inside dimensions are 640 feet long, 75 feet wide, and 31 feet over the sills at low water in the Mississippi River. Approaching craft are directed by loud-speaker controls. The lock is closed to water traffic from 6:45 a. m. to 8:15 a. m., and from 4 p. m. to 6 p. m., Mondays through Fridays. North from the lock, the depths in January–March 1957 were 27 feet to just south of the Southern Railroad bridge, and thence, in October 1956, 12 feet into Lake Pontchartrain.

About 0.5 mile inside the lock is a turning basin. Several bascule drawbridges cross the canal, with minimum horizontal clearances of 75 feet and minimum vertical clearance of 1 foot. A vertical-lift bridge over the canal, about 0.7 mile above Mississippi River, has a horizontal clearance of 305 feet and vertical clearances of 40 feet, down, and 156 feet, up. Minimum clearances of the overhead power cables crossing the canal is 132 feet. Canal tolls are collected at the Louisville & Nashville Railroad bridge.

The river entrance to the canal is marked by lights on both sides and by a lighted range. The lake entrance is marked by a light and buoys along the east side. The canal provides an additional 10 miles of waterfront to the port of New Orleans with virtually constant water level. This affords additional facilities as well as sites for industrial development.

Repair yards on the canal are equipped to repair hulls above the waterline, deck equipment, and machinery.

The Inner-Harbor Navigation Canal public wharves are open to commerce on the same terms as those on the river front. The canal locks are toll free.

Port Charges.—About two-thirds of the improved waterfront at the port is operated by the Dock Board. A copy of the rules and regulations giving the port charges can be obtained from the board.

Supplies.—An unlimited supply of purified river water is available at all piers and wharves. This water, while excellent for drinking purposes, contains a small percentage of sulphate which causes some scale when used in stationary boilers. Six concerns furnish fuel oil either directly from piers or by pumping from oil barges. The bunkering capacity ranges from 1,000 to 3,500 barrels per hour. One private coal plant has a loading capacity of 350 tons per hour.

Ship chandler's stores of all kinds are obtainable and provisions are plentiful.

Repairs.—New Orleans has numerous commercial plants which can haul out vessels for underwater repairs. Most plants have equipment at wharves for making repairs above the waterline, or portable equipment for working on vessels anywhere in the harbor. The largest drydock has a capacity of 18,000 tons, a length of 552 feet, a width of 124 feet at the entrance, and can handle vessels drawing up to 25 feet at low-river stage and 30 feet at high-river stage. Also available are numerous floating docks, graving docks, and marine railways. Marine repair plants are operated in connection with the drydocks, the larger plants having well equipped shops and all other facilities necessary for complete repairs to wood or steel vessels.

Salvage facilities.—Practically any equipment necessary for heavy salvage work at sea or in port is procurable at New Orleans. This includes floating derricks, dredges, barges, pumps, diving equipment and tackle.

Small-boat facilities.—Most small-boat facilities are on the canals inside the locks from the river and at the yacht basin at West End Park on Lake Pontchartrain. Gasoline, diesel oil, water, provisions, supplies, and repair facilities are available along the Inner-Harbor Navigation Canal and at Harvey.

Communications.—New Orleans is the terminus of numerous trunk-line railroads to all parts of the United States. Improved highways lead in all directions along the Gulf coast and to the interior.

Nearly 70 steamship companies operate on regular schedules out of New Orleans. Coastwise service reaches all important Gulf, Atlantic, and Pacific coast ports, and foreign service includes all world ports, particularly West Indian, South American, and European.

Inland barge lines operate on the Mississippi River and its tributaries as far as Minneapolis and St. Paul on the Mississippi, and Chicago on the Illinois River, Kansas City on the Missouri River, and Pittsburgh on the Ohio River. There is also barge-line service to Mobile and to Port Birmingham, the port for Birmingham, Ala., on the Warrior River. The barge-line terminals are on the Inner-Harbor Navigation Canal, just above the locks. There are inside freight routes out of New Orleans eastward to Mobile, Pensacola, Panama City, and Apalachicola, and westward to New Iberia, Port Arthur, Galveston, and Houston. Small steamers handle passengers and freight to the several small towns on the lower Mississippi River—Buras, Boothville, Venice, Pilottown, Burrwood, and Port Eads.

Three airports serve New Orleans, the principal one being Moisant International Airport located about 11 miles northwest of the city.

Two commercial radio communication stations are located in New Orleans; the Tropical Radio Company offers radio-telegraph connection with marine and other units; the Southern Bell Telephone Company offers ship-to-shore telephone connection through its marine exchange.

A Federal project provides for a channel 35 feet deep from the port limits of New Orleans to Baton Rouge, a distance of 115 miles. In June 1956 the depths exceeded 35 feet.

Chart 1269 covers the river as far up as Lions, La., 31 miles above New Orleans. **Chart 1050** includes the river up to Plaquemine, La., 91 miles above New Orleans, but does not show soundings in the river. The Mississippi River Commission publishes a volume of maps titled **Maps of the Mississippi River** covering the river from Cairo, Ill., to the Gulf of Mexico, Scale 1 : 62,500.

Caution.—Logs and other floating debris are likely to be encountered in the river at all times. Operators of small craft are advised to maintain alert lookouts. Night travel by yacht is not recommended because of the hazard of floating obstructions.

Boundary line of inland waters.—**§ 82.100,** Chapter 2, states that the Pilot Rules for Western Rivers are to be followed in the Mississippi River and its tributaries above the Huey P. Long Bridge.

Bridges.—The next upriver bridge above the Huey P. Long Bridge is the fixed highway bridge about 4.5 miles above Baton Rouge. Between these two bridges are five vehicular ferries connecting the following places: Destrehan to Luling; Lutcher to 2.7 miles east of Vacherie; Darrow to Donaldsonville; Plaquemine Point to Plaquemine, and Baton Rouge to Port Allen.

There are three overhead power cables, each having a permit clearance of 150 feet, crossing Mississippi River within the limits of Chart 1269.

Private terminals for handling oil and other products are located at points on both sides of the river between New Orleans and Baton Rouge. For the most part, unless otherwise noted, bankside landings only are available.

Chart 1269.—**Harahan,** on the east bank, 10.8 miles above Canal Street, has facilities for dry barge cleaning. Fuel and some supplies may be obtained on call. **Kenner,** on the east bank 4.8 miles above Harahan, is the shipping center for a vegetable-growing community and has several small manufacturing plants. **St. Rose,** 4.5 miles above

Kenner, has a large oil company depot. **Destrehan,** 1.9 miles above St. Rose, is an oil refinery town. A wharf with 5 berths is available. Diesel oil is available for commercial boats.

At **Avondale,** on the west bank 11.9 miles above Canal Street, are the storage tanks and offices of an oil exporting company, the Southern Pacific Railroad yards, and a large shipyard. There is a marine ways capable of hauling out vessels up to 300 feet in length with a draft of 13 feet at high-river stage and 8 feet at low-river stage, 56 feet in width, and a maximum capacity of 1,000 tons. At the shipyard are machine and fabrication shops. **Luling,** 22.3 miles above Canal Street, has several small industrial enterprises. At **Taft,** 6.8 miles above Luling, there is a tower for the overhead power lines which cross the river to the Bonnet Carre Spillway.

Good Hope, on the east bank 26.5 miles above New Orleans, is the site of an abandoned oil refinery; the large oil tanks are used for storage purposes. About a mile above Good Hope is the site of a large oil refinery.

The **Bonnet Carre Spillway,** 2 miles above Good Hope, is on the north bank of the river. When the spillway is in operation due to high stages of the river, all vessels and particularly heavily loaded tows passing the site are directed to steer a course sufficiently close to the south bank to avoid possible cross-currents or draw resulting from water being diverted through the spillway and flowing toward and into Lake Pontchartrain.

Laplace, 5 miles above the spillway, is a truck-farming center and prosperous sugar section. In this vicinity, along a 2-mile stretch, the river has been eating away the south bank rather than the north.

Reserve, on the north bank about 3.5 miles above the spillway, is the trading center and shipping point for a very productive sugarcane region. In 1957 the sugarcane plantations were being subdivided for residential and industrial development.

Chart 1050.—Garyville, 40 miles above New Orleans, is a lumber town. **Lutcher,** 46.5 miles above New Orleans, has a lumber mill and a factory for processing perique tobacco.

Donaldsonville, 70 miles above New Orleans, is a large town at the former junction of the river and Bayou Lafourche. Just south of the ferry landing is a barge where boats may tie up to take on fuel and provisions which are trucked in. There are numerous settlements and villages along the banks of the river in this section.

An important town is **Plaquemine,** 98 miles above New Orleans, located at the junction of the Mississippi and Bayou Plaquemine. This town is discussed in detail in Chapter 12.

Baton Rouge, the capital of Louisiana, 116 miles above New Orleans, is a river port of considerable importance at which seagoing vessels, mostly tankers, discharge and receive cargo consisting principally of petroleum and petroleum products. Facilities include a grain elevator and a municipal wharf for general cargo.

Port Allen, opposite Baton Rouge, is the terminal of the Texas and Pacific Railroad.

The principal industries are oil refining, petroleum products, synthetic rubber, chemicals, lumber and wood products, stone and clay products, food and staples, furniture and fixtures, primary metals, fabricated metal items, machinery, and transportation equipment.

Prominent features.—The most conspicuous object in the city is the State Capitol Building, a tall white structure.

Just below the ferry landing on the east side of the river is a bulletin board on the levee, which shows the river stage. The highest stage ever recorded was 47 feet in 1927. A fixed bridge across the river 4.5 miles above Baton Rouge has a horizontal clearance of 620 feet and a vertical clearance of 65 feet.

Customs.—The Custom Offices are located at the gate of the Standard Oil Company of New Jersey.

Terminal facilities.—Facilities of the port include the municipal docks and terminals, private docks and facilities of an oil company, and a processing concern. The municipal dock, in the southern part of the city, has waterfrontage of 305 feet. It is used mostly by barges. In June 1956 the depth off the dock was 20 feet at low-river stage. Three railroads serve the port.

Repair facilities and supplies.—There are neither drydocks nor shipyards at Baton Rouge, but on the east side of the river and just above the ferry landing is a barge dock where top-side repairs can be made. A machine shop is in operation. Gasoline, diesel oil, provisions, ice, and fresh water can be procured.

Small-boat facilities are limited; no docks suitable for small craft are available. Temporary berths may be had along one of the several barges moored alongside the river bank.

The Mississippi River and its tributaries form the largest network of navigable waterways in the world. A depth of 9 feet is available by way of the river and the Illinois Waterway to Chicago and Lake Michigan, 1,228 nautical miles from Canal Street, New Orleans. Limiting clearances of bridges over the Illinois Waterway are 17 feet vertical and 75 feet horizontal; locks are 110 feet wide and 600 feet long.

Navigation maps of the route to Chicago are published by the Corps of Engineers.

9. MISSISSIPPI RIVER TO SABINE PASS

Chart 1116.—From the delta of the Mississippi River to Sabine Pass, a distance of 250 miles, the coast has a general westerly trend with several deep indentations or bays somewhat separated from the Gulf by chains of long narrow islands. It is characterized by a fringe of low sandy beaches backed for many miles by vast stretches of marshy ground.

The off-lying water is shoal for long distances from the beach and, except for the first 50 miles west of Southwest Pass, the 10-fathom curve is 20 to 35 miles offshore. Numerous shallow areas, irregular in outline and well out of sight of land, are serious menaces to navigation of vessels of even moderate draft.

With the exception of Barataria Pass, the numerous shallow passes to the eastward of Atchafalaya Bay are dangerous to enter except during fair weather. The channels change frequently due to storms, and local knowledge is generally necessary.

Calcasieu Pass is the first and only deep-draft channel from the Mississippi River westward to Sabine Pass. An extensive network of bayous and canals with depths of 2 to 9 feet covers the country for about 50 to 75 miles back from the coast. The waterway from Empire to the Gulf, about midway between New Orleans and Southwest Pass, is the only canal below New Orleans entering the Mississippi from westward.

The low swampy coastal country is but sparsely settled and is frequented principally by fishermen and muskrat trappers. Through the canals and bayous the bottom is deep mud, usually so soft that it is often possible to push through with drafts of about 1 foot in excess of the depths.

Between Atchafalaya Bay and Vermilion River are several salt mounds, or islands, from which commercial salt is produced.

Extensive oil exploration is going on along the coast, inland in the lakes and swamps as well as to seaward. The offshore development is expanding rapidly. The offshore derricks and structures are required to be well marked and lighted.

Inside the 100-fathom curve from Southwest Pass to Sabine Pass the current sets westerly with an average velocity of about one-fourth knot. A clockwise eddy having a measured velocity of about one-fourth knot covers most of the bay formed by the curving coastline between Southwest Pass and Timbalier Bay.

The **danger zone** of an Air Force air-to-air gunnery range is in the Gulf of Mexico off Louisiana and Texas; limits and regulations are stated in **§ 204.158,** Chapter 2.

Chart 1272.—From Southwest Pass to Barataria Pass, at the entrance of Barataria Bay, the shoreline is broken by numerous small and unimportant passes and shallow bays, seldom frequented except by small craft and canoes, and never approached by seagoing vessels.

Chart 1273.—**Buras,** a town on the Mississippi River south of New Orleans, has several stores where gasoline, distillate, fuel oil, provisions, and some supplies are available. As at most river towns, the only water is rain or distilled river water, inasmuch as the well water is brackish. Hull and engine repairs are available at a repair yard which has a machine shop and marine ways capable of hauling out boats up to 65 feet in length and 6 feet in draft. Numerous fishing boats operate in the water to the westward of the river, bringing their catch to the fish canneries at Buras. The only passage through the levee is the Empire Waterway at Empire. Rail, highway, and telephone communications extend to New Orleans.

Empire is a small settlement 3.5 miles north of Buras and on the same side of the river. There are stores, a machine shop, and a shipyard with three marine ways, the largest of which can haul out boats up to 60 feet in length and 8 feet in draft for general repairs. Gasoline, diesel oil, butane, water, ice, provisions, and general supplies may be obtained.

The State-owned Empire Waterway lock through the Mississippi River levee at Empire is 225 feet long, 40 feet wide, and 10 feet deep. A canal extends westward from Empire lock to Adams Bay.

Federal project depth is 9 feet for the Empire Waterway through **Bayou Long, Bayou Fontanelle,** and the cut through Pelican Island to the Gulf of Mexico. Stone jetties protect the Gulf entrance. The controlling depth was 6 feet from Empire to the Gulf in August 1954.

This waterway, in conjunction with the Ostrica Canal, offers a water route for drafts of about 3 feet across the Mississippi Delta between Barataria Bay and Breton Sound.

The canal has a depth of about 3 to 4 feet which can be taken to the Gulf or to Barataria Bay. The route to the Gulf is across **Adams Bay,** which usually is marked by stakes, and thence through **Meyers Canal** and **Grand Bayou.** Somewhat less draft can be carried by way of Bayou Cook and Bastian Bay. To reach Barataria Bay, Grand Bayou is followed to the northward to its junction with the Port Sulphur Canal, which connects with Lake Grand Ecaille, and then with Barataria Bay.

Port Sulphur (P. O.), is a small town about 11 miles above Buras on the west bank of the river. **Freeport Sulphur Company Canal** extends from the river to **Lake Washington** and **Lake Grande Ecaille,** a distance of about 8 miles. Boats up to 3-foot draft can pass through these lakes into Barataria Bay and adjacent waters, but there is no connection with the Mississippi River.

Several other canals, having depths of about 3 feet, lead from behind the levees to adjacent waters and to the canneries and the highway on each side of the river, but do not connect with the river. **Socola Canal** at **Socola** leads to **Bayou Vacherie** and Grand Bayou, and thence either to the Gulf or to Barataria Bay. **Wilkinson Canal** at **Myrtle Grove** leads to Barataria Bay.

Scofield Bayou, 7 miles eastward of Bastian Bay, provides an entrance from the Gulf to the lakes and bayous to the southward of Buras. An entrance channel was dredged in 1957 and marked with daybeacons. A schooner wreck is just west of the channel.

Bastian Bay, 26 miles northwestward of Southwest Pass, is 2.5 miles long and 1.5 miles wide, and 1 to 2 feet deep. The bay is separated from the Gulf by **Bastian Island. Bastian Pass,** east of the island, is not navigable. The pass west of the island is the main entrance to Bastian Bay and also to Grand Bayou.

Federal project depth is 6 feet for the channel through the entrance bar of the western pass, **Grand Bayou Pass;** the controlling depth is about 4 feet. A daybeacon marks the west side of the outer end of the channel. The daybeacon marking the west side of the passage leading into Bastian Bay also marks the east side of the passage to Grand Bayou.

Grand Bayou flows into the western pass at the entrance to Bastian Bay. Bastian Bay Light marks the east side of the entrance. This bayou is used considerably by local fishing boats. On a favorable tide, about 3 feet can be carried through Grand Bayou and Meyers Canal and thence across Adams Bay to the Doullut Canal connecting with the Mississippi River at Empire, a distance of 9 miles. Three feet can be carried to the canals north of Empire which lead to the river levee and to the New Orleans-Buras Highway. This depth likewise can be taken to Barataria Bay via the Port Sulphur Canal and Lake Grande Ecaille.

Bayou Cook, emptying into the north end of Bastian Bay, leads to Adams Bay. Doullut Canal connects Adams Bay with the Mississippi River. The shallow depths across the southern portion of Bastian Bay limit this route to about 2 feet on a favorable tide.

Chaland Pass is a shallow, unfrequented pass 3 miles west of Bastian Bay.

Quatre Bayous Pass, 5.5 miles east of Barataria Bay Light, is the entrance to **Bay Ronquille** and **Cat Bay.** On the west side of the pass a light, on a red triangular slatted structure on piles, shows most brilliant on the bearing 315° and diminishes around the rest of the horizon. A lighted bell buoy is moored 2.4 miles southeast of the light. This pass and Grand Bayou Pass to Grand Bayou are the only passes east of Barataria Bay used extensively by local fishermen. Bay Ronquille is separated from Cat Bay by a group of islands through which is a pass known as **Four Bayous Cutoff.** At the north end of this pass, on the west side of the entrance to Cat Bay, is Four Bayous Cutoff Light. Bay Ronquille and Cat Bay are shallow. On a favorable tide, a depth of about 3 feet can be carried to Barataria Bay through Four Bayous Cutoff and Cat Bay. This same depth can also be taken across Bay Ronquille to Lake Grande Ecaille and to the Port Sulphur Canal which connects with the Doullut Canal into the Mississippi River and other canals leading to the river levee and to the highway to New Orleans.

To enter Quatre Bayous Pass, approach the light from southeastward. Barataria Bay is entered by passing the light and following the southwest shore of Bay Ronquille for 1 mile to Four Bayous Cutoff. Go through this cutoff into Cat Bay, leaving the light and some small reefs to westward. The passage from Cat Bay into Barataria Bay is about 1 mile northwestward of Four Bayous Cutoff Light. The tidal currents in Quatre Bayous Pass and in Pass Abel average about 1¼ knots at strength.

Barataria Bay is a large marsh-fringed, shallow lake, separated from the Gulf by a low, narrow sand island known as **Grand Terre Island.** The bay has general depths of 4 to 6 feet and is frequented chiefly by oilmen, fishermen, and oystermen who use launches of 3 to 4 feet in draft. Except for fishing camps, the only settlements on the bay are Grand Isle and Manila Village.

Barataria Pass (Grand Pass), is the main entrance to Barataria Bay. It is marked on the easterly side by a light. A privately maintained channel leading into Barataria Pass had a controlling depth of 8½ feet in July 1956, and was marked at each end by a light on the northeast side. A fairway lighted bell buoy is moored in 22 feet of water about 0.7 mile south of the channel entrance.

A leading light for entering the pass is shown from a square, pyramidal-slatted structure on piles and shows most brilliant on the bearing 312° along the centerline of the privately dredged channel over the bar and diminishing around the remainder of the horizon. To carry the best water into Barataria Pass, enter the dredged channel and then follow the leading light the rest of the way into Barataria Pass.

Hard sand bars with from 2 to 5 feet over them extend for about a mile offshore on each side of the channel. The bar off the entrance channel shows in heavy winds. Inside the bar, depths up to 12 feet extend northward as far as **Independence Island.** The tidal currents in Barataria Pass average about 1½ knots at strength.

Barataria Bay Light, 65 feet above the water and visible 8 miles, is shown from a white skeleton structure. Oil derricks are conspicuous in the general vicinity of Barataria Pass, in 5 to 10 fathoms of water.

Bayou Rigaud, on the north side of Grand Isle, is the approach to the town of Grand Isle, 4 miles west of Barataria Pass, and had a controlling depth of 6 feet in July 1956. A light marks the east side of the entrance at the northeast end. An oil company has dredged a 12-foot channel from Barataria Pass into Bayou Rigaud via **Bayou Fifi** to the privately owned docks and the turning basin.

Grand Isle (P. O.), the largest town in the Barataria Bay area, is in the center of a long, narrow island of the same name. Its residents, most of whom speak French, either work for the oil industry or engage in fishing. The town has several small hotels, stores, and restaurants. An improved highway connects with New Orleans via Bayou Lafourche. The local airport is owned by a pri-

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vate company which flies passengers to New Orleans and nearby points. The only docks are in Bayou Rigaud.

Coastal (storm) warnings, day only, are displayed at the Coast Guard station.

Pilots.—There are no licensed pilots at Grand Isle, but local fishermen may be engaged as guides for fishing and hunting parties.

Supplies.—Gasoline, diesel oil, fresh water, ice, provisions and some marine hardware items are available.

Repairs.—A small boatyard on Bayou Rigaud has marine ways capable of hauling out vessels up to 45 feet in length and 5 feet in draft, for painting and minor hull repairs.

Small-craft route to New Orleans.—In July 1956, controlling depths from Grand Isle to Harvey Lock were 6 feet through Barataria Bay, 10 feet through Bayou St. Denis, 7 feet through **Bayou Cutler**, 5½ feet through **Dupre Cut**, 8 feet through **Bayou Dupont**, and 14 feet through **Bayou Barataria** to the Intracoastal Waterway, thence via the waterway to Harvey Lock.

The overhead power cable that crosses Barataria bayou north of **Lafitte Village** has a permit clearance of 60 feet, and the highway swing bridge at **Barataria** has a horizontal clearance of 60 feet in the east draw, and a vertical clearance of 7 feet.

Manilla Village is on the north side of the entrance to Grand Bayou near the northwest end of Barataria Bay. Gasoline and small quantities of some provisions can be obtained.

Note.—In the Barataria Bay area the name Grand Bayou appears on two bodies of water. The first is to the westward of Bastian Bay, and the second is off the northwest side of Barataria Bay.

Bay des Ilettes, Bay Joyeux, Bay Tambour, and Caminada Bay are on the westerly side of Barataria Bay from which they are partially separated by low, marshy islands. These are shallow bodies of water of 2 to 4 feet in depth and of the same characteristics as Barataria Bay. These bays provide approaches to the Southwestern Louisiana Canal, which connects Barataria Bay with Bayou Lafourche and Timbalier Bay.

Caminada Pass, about 7 miles southwestward of Barataria Bay, connects Caminada Bay with the Gulf. The pass is little used, as every storm shifts the entrance channel. Usually a depth of 4 to 5 feet can be taken into the pass, but only 2 or 3 feet into the bay. Just inside the pass is a fixed highway bridge with a horizontal clearance of 33 feet and a vertical clearance of 14 feet. On the east side of the bridge there is an overhead cable strung on poles spaced about 300 feet apart. The tidal current in Caminada Pass averages about 1½ knots at strength.

Inside routes from Barataria Bay.—The channel northward through Barataria Bay had a controlling depth of 5 feet in July 1956. It leads between **Queen Bess Island** and Independence Island, and close to the westward of Shell Island Light.

The main route north is through **Bayou St. Denis** and connecting waterways to the Intracoastal Waterway at the village of Barataria on Bayou Barataria. The entrance to the bayou is marked by lights. Four miles above the inner light the route branches to the northeast into Bayou Cutler, the west side of this entrance being marked by Bayou Cutler Entrance Light. Thence Dupre Cut, Bayou Dupont, and Big Barataria Bayou lead to the Intracoastal Waterway at the junction of Big Barataria Bayou and Bayou Villars.

Former routes northward through **Grand Bayou, Little Lake, Lake Villere, Harvey Cutoff**, and **Bayou Rigolettes** are little used as shoaling has occurred. The south entrance to Grand Bayou is marked by Grand Bayou Light at Manilla Village on the east side of the entrance. Both Grand Bayou and Bayou St. Denis lead into Little Lake with a depth of about 3 feet. This depth can also be carried across the lake.

A channel from the junction of Dupre Cut with Bayou Cutler that leads eastward across **Round Lake** and **Lake Laurier** into **Lake Hermitage** is marked by privately maintained buoys; the controlling depth was 6 feet in July 1956. There is passage to **Myrtle Grove** through Wilkinson Canal.

Wilkinson Canal enters Barataria Bay about 1.5 miles eastward of Bayou St. Denis. Eleven miles in length, the canal leads to Myrtle Grove on the Mississippi River, but does not enter the river. The canal depth is about 3 feet. To the eastward, a depth of 3 feet can be carried into the Mississippi River through the Doullut Canal at Empire. The route follows Lake Grande Ecaille, Port Sulphur Canal, Grand Bayou, Meyers Canal, and Adams Bay to Doullut Canal. The Port Sulphur Canal leads to Port Sulphur on the Mississippi River, but not into it. Other similar canals north of Port Sulphur can be reached via Grand Bayou.

From Barataria Bay westward a succession of shallow passes leads to the bays inside Atchafalaya Bay. The islands separating the bays from the Gulf, as well as the entrance channels between the islands, are undergoing continual changes. In recent times the easterly end of Timbalier Island has been washed away for about 3 miles. Grand Pass Timbalier has moved about a mile to the westward, and a new channel has broken through 2 miles west of Grand Pass Timbalier. There are few aids to navigation, and local knowledge is necessary.

Pass Fourchon was formerly the easterly of two entrances to Bayou Lafourche from the Gulf. It is now closed.

Charts 1050, 1274.—Belle Pass was formerly the westerly and is now the only direct entrance into Bayou Lafourche from the Gulf of Mexico. The mouth of the pass is protected by stone jetties, and a light is shown from a pile cluster off the outer end of the east jetty. The controlling depth was 8 feet between the jetties and in the pass in July 1956.

Bayou Lafourche was formerly an outlet of the Mississippi River at Donaldsonville, 68 miles above New Orleans, but for purposes of flood prevention it was blocked off from the river by levee construction. From Donaldson-

ville, Bayou Lafourche extends in a southeasterly direction for 93 miles, emptying into the Gulf at Belle Pass, 19 miles southwestward of Barataria Bay Light.

The bayou varies in width from 75 to 150 feet. The project depth is 6 feet from the Gulf via Belle Pass to Napoleonville. The Intracoastal Waterway crosses the bayou at Larose. In July 1956 the controlling depths were 8 feet over the bar, and 7 feet through Belle Pass to Lockport; thence in July 1956, 4 feet to Thibodaux, where navigation is restricted by dead vegetation.

Many bridges cross the bayou. The controlling horizontal clearance is 50 feet at the vertical-lift bridge at Thibodaux, and the controlling vertical clearance is 59 feet, up, for the vertical-lift bridge at Raceland. Draw-span regulations for the bridges crossing Bayou Lafourche are stated in **§ 203.245,** Chapter 2.

A highway swing bridge having a horizontal clearance of 51 feet and a vertical clearance of 8½ feet crosses the bayou at Leeville. The channel is through the west draw. The overhead power cable on the south side of the bridge has a permit clearance of 60 feet. At Leeville, a covered slip can berth two boats up to 40 feet in length and 5 feet in draft. Gasoline, diesel oil, provisions, water, and limited supplies are available.

Galliano, 3.3 miles above Golden Meadow, has a pontoon bridge having a horizontal clearance of 73 feet. Gasoline, diesel oil, and provisions are available.

At **Cutoff,** 2.4 miles below Larose, a pontoon bridge has a horizontal clearance of 83 feet. A marine way can haul out vessels up to 60 feet in length and 6 feet in draft for general repairs. Gasoline, diesel oil, provisions, water, ice, and limited supplies are available.

At **Larose** a pontoon bridge with a horizontal clearance of 83 feet crosses Bayou Lafourche. There is a shipyard with marine ways that can haul out boats up to 80 feet in length and 7 feet in draft for general repairs. Machine shop facilities and complete marine radio service are available. Fuels, water, provisions, and marine supplies can be obtained.

At **Valentine,** 4.9 miles above Larose, is a pontoon bridge with a horizontal clearance of 84 feet.

The swing bridge at **Lockport** has a horizontal clearance of 86 feet and a vertical clearance of 11 feet. The larger of two boatyards has marine ways able to haul out vessels up to 80 feet in length and 6 feet in draft for general repairs. Fuels, water, ice, and provisions are available. A pontoon bridge with a horizontal clearance of 82 feet crosses the Company Canal. Lockport has rail connections to New Orleans.

The pontoon bridge at **Mathews,** 3 miles above Lockport, has a horizontal clearance of 80 feet.

Along the bayou are numerous private warehouses, wharves, and stiff-leg derricks for handling sugar cane. The banks of Bayou Lafourche are thickly settled throughout the greater part of its length. **Larose, Lockport, Raceland,** and **Thibodaux** are principally agricultural towns. **Golden Meadow** is the principal fishing settlement. On the lower part of the bayou there is considerable commerce in oil barges.

Chart 1274.—Southwestern Louisiana Canal connects Barataria Bay with Timbalier Bay, and affords a protected inside passage for small boats. The canal crosses Bayou Lafourche at **Leeville,** 12.5 miles above the bayou mouth. The section of the canal east of the bayou is known as **East Louisiana Canal,** and the section west, **West Louisiana Canal.** The canal is about 10 miles long and 5 feet deep, with shoaler depths at the western approach. With a favorable tide about 3½ feet can be carried through Caminada Bay, the eastern approach, and about 3 feet across **Little Lake,** the westerly approach. **Deep Bayou** and **Bayou Blue** connect Little Lake with **Lake Raccourci.** These approaches sometimes are staked, but generally are difficult for a stranger. The main route to the canal from Barataria Bay is through **Bayou Fifi, Bay des Ilettes, Bayou Andre,** or **Bay Joyeux** and **Caminada Bay.** Another route is through **East Champagne Bay,** Bay des Ilettes, and **Bay Tambour** via a cut between the last named bays. Because the channels are not marked, strangers should hire fishermen as pilots.

A fixed highway bridge crosses the eastern end of the West Louisiana Canal, making it necessary to enter the canal from Bayou Lafourche through a short cutoff.

Greys Canal, 3 miles south of Leeville, with a connecting channel through Bayou Blue, offers the deepest and most used route from Bayou Lafourche to Lake Raccourci and Timbalier Bay. On a favorable tide, 8 feet can be taken through a locally marked channel. Bayou Blue also joins Little Lake.

Havoline Canal, 7 miles south of Leeville, is a dredged cut with a reported controlling depth of 7 feet. It leads westward across Timbalier and Terrebonne Bays to Cat Island Pass.

Troiscent Picquets Bay Channel Entrance Light marks the western end, and intermediate buoys the north side of the approach channel from Timbalier Bay to Havoline Canal. Aids are privately maintained except the llights that mark each end of the approach channel. Havoline Canal is open to the public without charge.

Timbalier and **Terrebonne Bays** are large shoal-water bays separated from the Gulf by a chain of low sand islands. These waters are accessible from the Gulf through several passes having depths of 6 to 14 feet; however, the depths in Timbalier and Terrebonne Bays range from 4 to 9 feet. There are no settlements of importance in the area, but the bays are frequented by large numbers of fishing and oystering craft which carry their catch through the inside passages to New Orleans and Houma. Numerous oil well structures are located within this area.

Grand Pass Timbalier, locally known as **Timbalier Pass,** 50 miles westward from Southwest Pass and 40 miles east-northeastward from Ship Shoal Light, has been filling up and is little used. The channel is narrow and winding, and difficult to navigate; with local knowledge about 4 feet can be taken through the pass into Timbalier Bay. An abandoned lighthouse, a white square tower about 56 feet high on a wooden dwelling on piles, is on the west side of the pass. About 800 yards east-northeast of the abandoned lighthouse, part of the steel

framework of a wrecked lighthouse projects about 10 feet above water.

Two miles westward from Grand Pass Timbalier is a wider and straighter channel frequently used to enter Timbalier Bay. The new pass has a depth of 6 feet on the outer bar and 4 feet on the inner bar. The channel branches at the inner end, the western branch being considered the safer and more generally used. It is reported that this pass is working westward.

Caillou Pass, 9 miles westward of Timbalier Light, has a depth of 5 feet in the channel over the bar and good anchorage inside in 10 feet of water between **Timbalier Island** and **Caillou Island.** This pass is continually changing with storm and tide; soundings should be taken when entering.

Cat Island Pass, 11 miles westward of Timbalier Light, connects the deepest part of Terrebonne Bay with the Gulf and is the principal entrance into the bay. The pass is marked by several buoys, three of which are lighted. A dredged channel across the bar to Cat Island Pass had a reported controlling depth of 14 feet in July 1956 to the pass and a large anchorage area inside the bay, with depths of 12 to 21 feet. Farther inside, the depth gradually shoals to the general bay depth of 7 feet or less. The current in Cat Island Pass averages about 1 knot at strength.

There are numerous oil well structures in and about Timbalier and Terrebonne Bays. Privately marked channels lead from Cat Island Pass to Bayou Terrebonne and Bayou Lafourche. Drilling operations are in progress in the vicinity of Caillou Island, **Brush Island,** and East Timbalier Island. Mariners should use the waters in this area only with local knowledge.

Lake Barre is northward of Terrebonne Bay. The general depths are 4 to 6 feet. **Seabreeze Pass** provides a passage into Bayou Terrebonne and to **Lake la Graisse** at the northwest end of Terrebonne Bay; **Pass Barre** connects with Terrebonne Bay; and at the northeast corner of the bay, several passages lead to Lake Felicity.

Old Lady Lake is a shoal body of water between Lake Raccourci and Lake Barre and southward of Lake Felicity. Numerous passages connect with these lakes and with Timbalier Bay. The lake has depths of 3 to 4 feet but the passes are very shallow and restrict entry to boats of 1 or 2 feet in draft.

Lake Felicity, with depths of 5 to 6 feet, is north of Old Lady Lake. Many bayous and passes connect with adjacent bays and lakes. Most of the bayous to the east and north of Lake Felicity are used as oyster bedding grounds and, accordingly, contain numerous oyster reefs. The water in the bayous shoals rapidly where the bayous widen, and the channels are difficult to follow without local knowledge. An inside route between Bayou Terrebonne and Bayou Lafourche passes through Lake Felicity.

Lake Raccourci is a shoal body of water lying northward of Timbalier Bay. The general depths are 4 to 5 feet. The area around **Philo Brice Islands** and **Jacko Camp Bay** contains many oyster beds and fish traps. The oyster beds are marked by iron or brush stakes. Deep Bayou and Bayou Blue lead to Little Lake, and **Grand Pass Felicity** leads to Lake Felicity.

Chart 1050.—Bayou Terrebonne is navigable for a depth of 7 feet to Bourg and 3 feet to the town of Houma, 33 miles above its southern mouth. For the lower 4 miles of its course, the bayou flows through a long, narrow delta separating Lake Barre and **Lakes Jean Pierre** and **Saint Jean Baptiste.** From each of these are several entrances into the bayou. Seabreeze Pass, connecting Lake Barre and Lake la Graisse, crosses the northern end of the delta and provides the main entrance into the bayou from both Lake Barre and Terrebonne Bay.

The Federal project provides for a channel 6 feet deep from Bush Canal to St. Louis Canal at Houma.

In July 1956, the controlling depth was 7 feet to **Bourg,** and thence 3 feet to Houma. The head of navigation is at St. Louis Canal. Below Seabreeze Pass the Bayou is shallow and not navigable. Across this section, **Bayou Jose** and another opening form a connection between Lake Barre and Lake Jean Pierre which can be used by boats up to 2½ feet in draft. At its southern end, Bayou Terrebonne empties into Pass Barre.

Tides.—The tide effect is 1 foot at the mouth of the bayou and ½ foot at Houma. Wind will vary the tide 1 to 3 feet at the mouth and floods may raise the water level 3 to 4 feet in the upper section.

Seabreeze Light, at the northwest point of the intersection of Seabreeze Pass and Bayou Terrebonne, marks the entrances to the bayou from Lake la Graisse and from Lake Barre. Lake Barre Pass Light marks the approach from Lake Barre.

Bayou Terrebonne crosses the Intracoastal Waterway at Houma and is joined by the Bayou Petit Caillou 4 miles below Houma. At Bourg, 8 miles below Houma, a section of the old Company Canal furnishes a cutoff between the bayou and the waterway, good for about 8 feet. Several other canals enter Bayou Terrebonne and are used by small boats. A highway swing bridge at Montegut has a horizontal clearance of 42 feet and a vertical clearance of 5 feet.

The banks of Bayou Terrebonne are thickly settled throughout the upper half, in which section mariners may find numerous settlements selling gasoline, oil, and provisions. A State highway extends south along the east bank of the bayou for 6 miles below Montegut to Lapeyrouse. At **Montegut** there are two boatyards with marine ways capable of hauling out boats up to 40 feet in length and 4 feet in draft for general repairs. Gasoline, diesel oil, fresh water, provisions, and limited marine supplies are available. There is a large sugar mill at Montegut.

At **Port Barre** there are facilities for launching outboard motor boats.

At **Lapeyrouse** an oil company has a repair yard and construction camp. Marine ways and repair facilities are restricted to company and chartered vessels.

Bayou Terrebonne is crossed by several drawbridges with ample openings, and by numerous overhead cables

with permit clearance of 60 feet. A road connects Montegut with Bayou Petit Caillou.

Chart 1274.—Bayou Petit Caillou empties into **Troiscent Picquets Bay** on the west side of Terrebonne Bay, about 5 miles north of Wine Pass. A daybeacon marks the south side of the passage between Terrebonne and Troiscent Picquets Bays. Off the mouth of the bayou the controlling depth is 4½ feet. In July 1956 the controlling depth was 5 feet from the mouth to Boudreaux Canal, thence 4 feet to Bayou Terrebonne. Bayou Petit Caillou is 29 miles in length to its junction with Bayou Terrebonne 4 miles east of Houma. Several canals enter the bayou, Bush Canal leading to Bayou Terrebonne, and Boudreaux and **Robinson Canals** connecting with Bayou Grand Caillou. Two miles above Cocodrie is a connecting route to Bayou Terrebonne through Sevin Canal, Bay Negresse, and Lake la Graisse, good for 3 feet on a favorable tide.

The lower portion of Bayou Petit Caillou is used considerably by local oystermen and fishermen. A highway extends south along the west shore to **Cocodrie,** 6 miles above the mouth of the bayou. Launching facilities for outboard boats are at Cocodrie and Rabbit Bayou. At **Boudreaux Canal,** 15 miles above the mouth, is a shrimp and oyster cannery. There are three boatyards in the vicinity of **Chauvin.** Boats up to 45 feet in length and 5 feet in draft can be hauled out for general repairs. The largest set of marine ways can haul out vessels up to 60 feet in length and 6 feet in draft, but the owner must make his own repairs. Gasoline, diesel oil, lubricants, water, ice, and provisions can be obtained at several places along the bayou. The highway swing drawbridge at Chauvin has a horizontal clearance of 46 feet and a vertical clearance of 4½ feet.

Channels and routes, Timbalier and Terrebonne Bays.—From inside Cat Island Pass, a channel extends northward across the central portion of Terrebonne Bay to Pass Barre, which connects with Lake Barre. A depth of about 7 feet can be carried to Lake Barre.

The shortest and best marked route extends from inside Cat Island Pass to Lake la Graisse Light; and across Lake la Graisse into Bayou Terrebone. This route is good for a draft of about 5 feet.

From the east and west channel crossing Terrebonne and Timbalier Bays a channel extends northeastward into Lake Raccourci passing through Philo Brice Islands northwest of Philo Brice Island Light and thence continuing eastward to the southwest entrance to Bayou Blue leading to Bayou Lafourche. On a favorable tide a depth of about 5 feet can be carried into Lake Raccourci and about 4 feet into Bayou Blue.

A route leads from Seabreeze Pass across Lake Barre, which is marked by a privately maintained buoy into Lake Felicity, thence to Grand Pass Felicity and across Lake Raccourci to Bayou Blue or Deep Bayou to Bayou Lafourche. A privately marked channel leads through Lake Chien to Bayou Jean Lacroix.

The main route to Bayou Terrebonne is through the southern entrance to Lake la Graisse. The Texas Company maintains a marked channel through the lake and a depth of 5 feet can be carried into the bayou. A second route to Bayou Terrbonne from Lake Barre through Seabreeze Pass is good for 4.5 feet.

The entrance to Bayou Petit Caillou through Troiscent Picquets Bay has been described earlier in this chapter.

A channel from Bayou Petit Caillou through Boudreaux Canal, Lake Boudreaux, and Bayou Dulac to Bayou Grand Caillou is well marked with lights, daybeacons, and buoys. The controlling depth was 4½ feet, soft bottom, in July 1956.

The tidal **current** in Wine Island Pass averages about 1¼ knots at strength. In Caillou Boca the current at strength of flood averages about 1 knot and at strength of ebb averages about one-half knot.

The main passage from Terrebonne Bay to Lake Pelto lies between **Wine Island** and **Point Mast** and has a general depth of 6 to 7 feet. Another passage is through **Pass la Poule** which is good for a draft of 3 to 4 feet.

Lake Pelto, west of Terrebonne Bay and north of **Isles Dernieres,** has general depths of 5 to 7 feet. A protected inside route is afforded small craft of 4 to 5 feet in draft from Timbalier and Terrebonne Bays westward through Lake Pelto and **Caillou Boca** to Caillou Bay.

Wine Island Pass is 3.5 miles west of Cat Island Pass, and forms a passage between Wine Island and Isles Dernieres from the Gulf to Lake Pelto and Terrebonne Bay. The pass has depths of 7 to 9 feet over the bar and 7 to 8 feet inside where good anchorage is available. The channel lies close to Isles Dernieres and when any sea is running, breakers clearly outline the edges of the channel.

Whiskey Pass forms another passage from the Gulf to Lake Pelto through Isles Dernieres. The depths are 4 to 5 feet at the north end of the pass.

Chart 1275.—Caillou Bay, a large bight with general depths of 5 feet, is north and east of **Raccoon Point** at the western end of Isles Dernieres. An anchorage site with a depth of 7 to 8 feet is close inside Raccoon Point.

Coupe Colin (Western Pass), 3 miles east of Raccoon Point, is shallow, changeable, difficult to follow, and is not used even by local fishermen.

An extensive network of lakes, bayous, and canals extends inland between Terrebonne Bay and Atchafalaya Bay. Though sparsely populated, this area is frequented by local fishermen, trappers, and oil development personnel. The principal entrances from the Gulf are described as follows:

Bayou Grand Caillou empties into Caillou Bay 6.5 miles north of Raccoon Point. Grand Caillou Light is 0.3 mile west of the entrance. Depths of 5 to 6 feet are off the entrance and in July 1956 the controlling depth was 8 feet from the mouth of Bayou Grand Caillou to **Dulac,** about 20 miles above the mouth; then 5 feet via Bayou la Carpe to the Intracoastal Waterway at Houma. The pontoon bridge southeast of Houma, over Bayou la Carpe, has a horizontal clearance of 61 feet. Overhead cables crossing this bayou have minimum clearance of 50 feet. These cables will be removed, upon 24 hours advance

notice, to permit passage of vessels requiring higher clearance. **Bayou Dulac** connects with **Bayou Petit Caillou.** A draft of 4 feet can be taken through the **Ashland Canal.** A highway extends south along the east bank of Bayou Grand Caillou to below Dulac and connects with the road along Bayou Petit Caillou about 1.7 miles below Robinson Canal. The highway swing bridge at **Boudreaux** has a horizontal clearance of 46 feet and a vertical clearance of 2 feet. The highway swing bridge over Bayou Dulac, at Dulac, has a horizontal clearance of 41 feet and a vertical clearance of 2 feet.

There are two boatyards between Dulac and Boudreaux. The larger has marine ways capable of hauling out vessels up to 75 tons, 65 feet in length, and 8 feet in draft for hull repairs. There are canneries, ice plants, and several places where gasoline, diesel oil, water, provisions, and some marine supplies are available. Dulac has a post office.

A Federal project provides for a channel 5 feet deep from the Intracoastal Waterway at Houma through Bayou la Carpe, Bayou Pelton, and Bayou Grand Caillou to Bayou Dulac, a distance of 14 miles.

A vertical-lift highway bridge over Bayou Petit Caillou near Presquile has a horizontal clearance of 45 feet and a vertical clearance of 3½ feet, down, and 49 feet, up.

Grand Bayou du Large extends between **Caillou Lake** and Caillou Bay. Depths of 5 to 6 feet are off the south entrance, and 3 to 4 feet across Caillou Lake to **Grand Pass** connecting with **Bayou du Large** and with **Lake Mechant.** A draft of 3 to 4 feet can be carried up Bayou du Large to **Falgout Canal** and thence into **Lake de Cade.** Lesser drafts can go to **Theriot** and thence to **Lake Theriot** through **Marmande Canal** or to Bayou Grand Caillou via **Bayou Provost.** The swing highway bridge across Bayou Provost at Theriot can be opened by prior arrangement with the State Road Department.

Bayou du Large is often dry in several spots above Theriot during the winter months. There are several overhead cables crossing the bayou south of Theriot; the permit clearance is 35 feet. Any of the cables can be removed, upon advance notice of 24 hours, for vessels requiring greater clearance. A highway extends south along the east side of the bayou for about 7 miles below Falgout Canal. This section of the bayou is thickly populated and there are several places where gasoline and provisions are available. There are three small boatyards with marine ways capable of hauling out vessels up to 40 feet in length for hull and minor engine repairs, and several facilities for launching outboard motor craft. There is a post office at Theriot. Two swing highway bridges cross Bayou du Large below Theriot. Each has a horizontal clearance of 33 feet; the first has a vertical clearance of 3½ feet, the second a vertical clearance of 1½ feet. Both bridges are usually left open. Bayou du Large empties into **Taylors Bayou** which flows into the Gulf 4 miles west of Grand Caillou Light. A privately maintained daybeacon marks the mouth of Taylors Bayou.

Oyster Bayou, 13 miles northwestward of Raccoon Point, connects the Gulf with Fourleague Bay, an arm of Atchafalaya Bay. This bayou affords a protected route for craft 3 to 3½ feet in draft going to Atchafalaya Bay from Caillou Bay or waters to the eastward. Through the bayou are several oyster reefs which usually are marked by pipes.

Oyster Bayou Light, 47 feet above the water and visible 8 miles, is shown from a white house on pile foundation at the east side of the entrance.

The route across the south end of Fourleague Bay is marked by Oyster Bayou Inner End Light off Oyster Bayou and Mosquito Point Light off **Mosquito Point** and by a line of closely-spaced daybeacons. Boats follow close along the east side of the daybeacons in a channel slightly deeper than the general bay depths. Halters Island Point Light marks the entrance to Fourleague Bay from Atchafalaya Bay. **Blue Hammock Bayou** on the east side of Fourleague Bay is another entrance to the network of shallow inside waters in this vicinity. Boats drawing 2 to 3 feet can reach the Intracoastal Waterway on a favorable tide by way of **Lost Lake, Bayou de Cade,** Lake de Cade, and **Minors Canal.** Blue Hammock Bayou also connects with Lake Mechant.

Ship Shoal, lying about 10 miles southward of Raccoon Point, is about 25 miles long in a general east-and-west direction, 1 to 3 miles wide, and has depths ranging from 5 to 18 feet. For 6.5 miles of its length it has a depth of less than 12 feet. In stormy weather the shoal may be distinguished at some distance off by a choppy or breaking sea. In calm weather its position is not indicated by natural phenomena, and can be avoided best by using the lead or fathometer. Heavy rips have been reported about 15 miles southwest of Ship Shoal.

Oil drilling structures, from which privately-maintained fixed red lights are shown, have been established northward of Ship Shoal and throughout the delta section. Mariners should always be on the lookout for them.

Ship Shoal Light, 105 feet above the water and visible 16 miles, is shown from a brown skeleton structure inclosing a stair cylinder and cylindrical dwelling. It is in 14 feet of water, 86 miles 271° from Southwest Pass Entrance lighted whistle buoy. A lighted whistle buoy is moored on the 10-fathom curve 18.5 miles south of the light.

Currents.—Daily current predictions for four passes into Barataria Bay, two passes into Terrebonne Bay and several inside stations may be obtained from the Tidal Current Tables. Winds and weather conditions often modify considerably the tidal currents in these passes.

Chart 1276.—Atchafalaya Bay is a large indentation in the coast of Louisiana 112 miles westward of Southwest Pass, Mississippi River, and 37 miles northwestward of Ship Shoal Light. The bay is about 28 miles long in nearly an east-and-west direction, averages 7 miles in width, is full of shoals and oyster reefs, and has general depths ranging from 3 to 9 feet. A fringe of reefs partially separates the bay from the Gulf, the eastern end being known as Point au Fer Shell Reef. The bay is the approach to Lower Atchafalaya River and Morgan City, with depths of 25 feet or less extending 25 miles off the channel entrance. The usual draft of vessels navigating the bay is 3 to 10 feet.

Prominent features.—The lighthouse on Eugene Island and the abandoned lighthouse on Southwest Reef are the only conspicuous objects in the Point au Fer Shell Reef area. **Belle Isle,** on the north shore of the bay northward of the light, is 75 feet high and conspicuous from some distance offshore. Oil well structures and obstructions are throughout the area.

A Federal project provides for a dredged channel 20 feet deep from the 20-foot curve at the mouth of the Lower Atchafalaya River to the 20-foot curve in the Gulf. In January 1958 the controlling depths were 14 feet in the channel over the bar and through the bay, thence 32 feet to Morgan City.

Fog is most frequent during January, February, and March. Southerly winds bring it in and northerly winds clear it away.

Tides, currents, and freshets.—The level of the water surface and the velocity of the current depend to a considerable extent upon the force and direction of the wind. At the entrance to the bay, the mean range of tide is about 1 foot. Normal tide action is not perceptible at Morgan City. Northerly winds lower the water surface at Morgan City as much as 1 foot, and southeasterly winds raise it 1½ to 2 feet.

Freshets occur frequently during May and June, at which times the river overflows its banks and the current has considerable velocity, making it difficult to keep in the channel. During ordinary stages of the river, the current has a velocity of about one-half knot. When there are freshets in the rivers, the water in Atchafalaya Bay is quite fresh and that in the Cote Blanche Bays is nearly so. The discolored water coming out of the mouth of the river will be encountered well offshore, the distance depending much upon the direction of the wind.

Point au Fer Reef Light, 54 feet above water and visible 13 miles, is shown from a white wooden house on pile foundation on **Eugene Island** on the westerly side of the dredged channel. A radiobeacon has been established at the light.

Southwest Reef Daybeacon, 6.5 miles west of Point au Fer Reef Light, is a black square pyramidal tower, connected to a square house on piles with a pyramidal tower on the roof. The structure is an abandoned lighthouse and makes a prominent landmark for vessels approaching close inshore from westward.

Lights mark the northwesterly side and buoys the southeasterly side of the Atchafalaya Bay ship channel. Point au Fer Reef Light marks the cut through Point au Fer Shell Reef and buoys mark the northwesterly side of the ship channel to seaward. Strong currents will be encountered in the channel through Point au Fer Reef, especially during northerly winds and extreme low tides.

A cut-off channel from the mouth of Lower Atchafalaya River westward through the bay, to the entrance to East Cote Blanche Bay, has been abandoned. Some of the pile daybeacons marking it have broken off and are covered by high tide, and accordingly constitute a danger to navigation.

Deer Island, on the east side of the Lower Atchafalaya River entrance, can be approached through a short dredged channel just southwest of the island. The channel has a depth of 4 feet.

Lower Atchafalaya River flows southward into the northeastern corner of Atchafalaya Bay; it is the outlet for an extensive system of southern Louisiana lakes and bayous known as the Atchafalaya navigation system, an inside passage to the Mississippi River about 180 miles above New Orleans.

The Lower Atchafalaya River extends northward from Atchafalaya Bay about 20 miles to Sixmile Lake, and has a crooked channel with depths from 35 to 125 feet over widths from 300 to 600 yards with deepest water usually in midstream.

Bayou Shaffer is a deep water passage branching northeastward to Bayou Boeuf from Sweetbay Lake in the Lower Atchafalaya. An overhead power cable with permit clearance of 130 feet crosses Bayou Shaffer near the junction with Bayou Boeuf.

Little Wax Bayou branches westward from the Lower Atchafalaya about 13.5 miles above the mouth, is part of the Intracoastal Waterway, and is described later in this chapter.

Bayou Boeuf, also part of the Intracoastal Waterway and described in another chapter, joins the Lower Atchafalaya from eastward at Morgan City. The Intracoastal Waterway follows Lower Atchafalaya southward for 2.5 miles to Little Wax Bayou.

An alternate route of the Intracoastal Waterway, from Morgan City northward to Plaquemine on the Mississippi River, and Bayou Grosse Tete, is described in Chapter 12.

Berwick Bay is the section of the Lower Atchafalaya from Bayou Boeuf northward to Sixmile Lake. Morgan City is on the east bank of the bay and Berwick on the west bank.

Two bridges across Berwick Bay link Morgan City and Berwick. The railroad drawbridge has a swing span with a horizontal clearance of 113 feet and a vertical clearance of 13 feet. A fixed highway bridge has three spans with a horizontal clearance of 583 feet each and a vertical clearance of 53 feet in the center span and 50 feet in the two adjacent spans. The centers of these spans are marked by green lights at night. Special regulations to govern navigation through Berwick Bay in the vicinity of the railroad bridge are stated in **§ 207.240,** Chapter 2.

Morgan City, on the east bank of Berwick Bay, has several landings with ample depths for river boats; vessels generally go alongside, because of the depths and currents in the river. Numerous inland waterways that radiate from the city make it a center for offshore oil exploration and development, and the center for a considerable local commerce in oil, fishing, shell dredging, and sugar cane raising. Gasoline, fuel oil, fresh water, provisions, and boat supplies are available. Ice is sold from a dock between the two bridges and put aboard with a mechanical loading device.

Berwick, a small town opposite Morgan City on the west bank of Berwick Bay, has several seafood plants, and gasoline, diesel oil, water, ice, provisions and marine supplies are available.

In Morgan City, Berwick, and on Bayou Boeuf there are nine shipyards with marine ways and one with floating drydocks. Vessels up to 135 feet in length (wooden up to 120 feet in length) 700 tons in weight, and 9 feet in draft can be hauled out for general repairs. Barges up to 180 feet in length and 40 feet in width can be hauled out. There are machine shops and shops specializing in engine repairs. Marine supplies are available.

There are towboats of 1,000 h. p. and 600 h. p. operating out of Morgan City. The nearest Marine hospital is at New Orleans, but there is a private hospital in Morgan City. The Quarantine Officer boards vessels alongside the wharf.

Coastal (storm) warning signals are displayed both day and night near the waterfront between the bridges.

The Morgan City Harbor and Terminal District has been established covering St. Mary Parish east of R 11 E (longitude 91°17.4′ W). The Board of Commissioners will issue regulations governing the commerce and traffic in the district.

Charts 1050, 1051.—Bayou Teche is a navigable waterway in southern Louisiana parallel to and 35 miles westward of the Mississippi River, meandering for about 120 miles northwesterly from its eastern end at Berwick Lock to its source in St. Landrys Parish. Bayou Teche has been dammed off from Berwick Bay at Berwick Lock, about 1.5 miles above Morgan City. The lock has a length of 300 feet, width of 45 feet, and depth over the sill of 9 feet at mean low water.

There is little through traffic on the bayou. Shell barges are the principal users; shrimp boats operate to Patterson and logs are shipped as far as Garden City.

The main State highway between New Orleans and Lake Charles follows the bayou and passes through the principal towns.

A Federal project for improving Bayou Teche provides for a channel 8 feet deep from Berwick Lock to New Iberia, 53.5 miles, thence 6 feet for 16 miles to Keystone Lock, thence 6 feet for 30 miles to Arnaudville, and for construction of lock, dam, and regulating works.

In January 1958, controlling depths were 11 feet at Berwick Lock, 7 feet to Calumet Flood Gate, 4 feet to Wax Lake Outlet, thence 5 feet to Arnaudville.

A shipbuilding yard about one mile above the lock has marine ways capable of hauling out steel vessels up to 50 feet in length for hull repairs.

An overhead power cable with permit clearance of 60 feet crosses the bayou at **Idlewild** about 5 miles above Berwick Lock. **Patterson,** 6 miles above the lock, has two boatyards with machine shops and marine ways; one is able to haul out vessels up to 140 feet in length and 9 feet in draft for general repairs. Fuel oil and ice are available.

A swing bridge about 7 miles above Berwick Lock has a horizontal clearance of 61 feet and a vertical clearance of 6 feet. A pontoon bridge that has a horizontal clearance of 112 feet is at **Avalon,** about 10 miles above the lock.

Bayou Teche crosses the Wax Lake Outlet channel at **Calumet,** about 12 miles above Berwick Lock. Floodgates closed on both sides of Wax Lake Outlet during high water stages also close the bayou to through traffic; opened, horizontal clearance is 45 feet through the floodgates.

About 14 miles above Berwick Lock a swing bridge has a horizontal clearance of 71 feet and a vertical clearance of 4½ feet, and about 17 miles above the lock there is a swing bridge with a horizontal clearance of 62 feet and a vertical clearance of 5 feet.

Garden City, 18.5 miles above Berwick Lock, is the site of a large lumber mill. A swing bridge about 20 miles above the lock has a horizontal clearance of 70 feet and a vertical clearance of 7 feet.

Hanson Canal, leading from Bayou Teche at Garden City in **Bayou Portage,** connects with the Intracoastal Waterway at Mile 105.0 west along **Bayou Bartholomew** about 1.5 miles east of The Jaws. From the waterway, the entrance to Bayou Portage is the northerly of two passes which enter the waterway just east of Mud Lake. The controlling depth in this waterway is about 2 feet. The lock just inside the canal is 937 feet long and 30 feet wide and 5 feet deep. It is crossed by three fixed bridges having minimum horizontal clearance of 26½ feet and minimum vertical clearance of 9 feet at low water. This canal is little used for navigation. Overhead pipelines with minimum clearance of 7 feet and overhead power cables having a permit clearance of 37 feet cross this canal.

Franklin, the seat of St. Mary Parish, is an agricultural center and has several small industries. **Franklin Canal,** southwest of Franklin, connects with the Intracoastal Waterway at Bayou Bartholomew and had a controlling depth of 10 feet in July 1956. There is a swing highway bridge crossing the canal with a horizontal clearance of 39 feet and vertical clearance of 5 feet. Overhead power cables crossing the canal have a permit clearance of 60 feet.

A swing highway bridge crosses Bayou Teche 22.5 miles above Berwick Lock; it has a horizontal clearance of 61 feet and a vertical clearance of 8½ feet. The swing railroad bridge that crosses the bayou 26.5 miles above the lock has a horizontal clearance of 49½ feet and a vertical clearance of 4 feet. A swing highway bridge crosses the bayou 27.0 miles above the lock and has a horizontal clearance of 60 feet and a vertical clearance of 6½ feet. Eight more swing bridges cross the bayou at 31.1, 35.5, 35.9, 39.8, 43.4, 43.9, 45.7, and 48.1 miles above the lock; minimum clearances are 56 feet horizontal and 5 feet vertical.

Jeanerette is chiefly a market town; its principal products are sugar, oil, pecans, and peppers.

A guy cable near **Olivier,** with a minimum clearance of 68 feet, will be removed for vessels requiring higher clearance upon 24 hours advance notice to Orange Grove Sugar Co., Inc., New Iberia. The swing highway bridge that crosses the bayou 50 miles above Berwick Lock has a horizontal clearance of 60 feet and a vertical clearance of 5½ feet.

New Iberia, the seat of Iberia Parish, lies on the banks of Bayou Teche 54 miles above Berwick Lock. The town is the center of an extensive agricultural area and has

food processing plants, dairies, condiment factories, several small manufacturing industries, and is a supply center for the oil development of the surrounding area. There are three highway bridges across the bayou at New Iberia, a swing bridge at 52.8, a bascule bridge at 53.7, and a swing bridge at 54 miles above the mouth. The minimum horizontal clearance is 60 feet and the minimum vertical clearance is 4½ feet.

There are five swing highway bridges and a swing railroad bridge at 56.9, 58.0, 60.4, 60.6, 61.9, and 67.6 miles above the mouth of the bayou with a minimum horizontal clearance of 50 feet and a minimum vertical clearance of 4½ feet.

There is a shipbuilding plant at **Loreauville** which constructs steel hull boats up to 65 feet in length. In an emergency they can haul out boats up to 40 feet in length for hull repairs. Gasoline, diesel oil, lubricants, water, ice, and provisions are available. Marine supplies can be obtained at the yard.

Keystone Lock, 160 feet long and 36 feet wide, is 16 miles above New Iberia and 70 miles above Morgan City and half way, by highway, between New Iberia and St. Martinville. A project provides for rebuilding the dam at the locks and raising the crest 1½ feet.

St. Martinville, on Bayou Teche between New Iberia and Breaux Bridge, is a town of interest because of the early French settlers and Evangeline, the heroine of Longfellow's famous poem. A swing highway bridge over the bayou 73.1 miles above Berwick Lock has a horizontal clearance of 40 feet and a vertical clearance of 4 feet. A combination railroad and highway swing bridge at **Levert,** 75.2 miles above the lock, has a horizontal clearance of 68 feet and a vertical clearance of 8½ feet.

A vertical-lift highway bridge at **Parks,** 78.8 miles above Berwick Lock, has a horizontal clearance of 41 feet and a vertical clearance of 5 feet down and 50 feet up. Bayou Teche is filled with many snags and trees above this point and navigation, even for outboard motor craft, is difficult.

A highway swing bridge, crossing the bayou at **Ruth,** 83.6 miles above Berwick Lock, has a horizontal clearance of 42 feet and a vertical clearance of 8½ feet. The vertical-lift bridge at **Breaux Bridge** has a horizontal clearance of 40 feet and a vertical clearance of 1 foot down and 51 feet up. This bridge until 1956 had never been opened for water traffic since its completion in 1951. Drawspan regulations for these bridges are stated in **§ 203.245,** Chapter 2.

A swing railroad bridge 86.7 miles above the mouth of the bayou has a horizontal clearance of 60 feet and a vertical clearance of 15 feet. (In 1956 it was reported that the last attempt to open this bridge, about 1949, failed, and the vessel turned back.) A removable span bridge at 90.6 miles above the mouth of the bayou (**Poche Bridge**), and a removable span bridge at **Cecelia,** 94.1 miles above Berwick Lock, have a horizontal clearance of 46 and 47½ feet, respectively, and a vertical clearance of 5 feet. The bridge at Cecelia has never been opened since it was completed in 1949. A fixed bridge at **Arnaudville,** 99.7 miles above the lock, has a horizontal clearance of 20 feet and a vertical clearance of 7½ feet. Numerous overhead power and telephone cables crossing Bayou Teche have permit clearances of 50 to 58 feet.

The Lower Atchafalaya River leads northward from Berwick Bay through Stouts Pass to Sixmile Lake. The marked channel northward through **Sixmile Lake** and **Grand Lake** is part of the Atchafalaya River navigation project, which is discussed further in Chapter 12.

The deep drainage canal dredged south-southwestward from Sixmile Lake to Atchafalaya Bay crosses Bayou Teche near Calumet, the Intercoastal Waterway in the vicinity of Possum Point Bayou, thence through Wax Lake into the bay. Two fixed bridges with minimum vertical clearance of 13 feet restrict navigation in the canal southward of Bayou Teche. An overhead power cable about 150 yards south of these bridges has a permit clearance of 60 feet.

Chart 1276.—Little Wax Bayou, branching westward from Atchafalaya River 2.5 miles below Morgan City, empties into **Wax Lake** and through **Wax Lake Pass** into the Gulf. The northern end of the bayou has been straightened by dredged cuts to form the extension westward of the Intracoastal Waterway from Atchafalaya River. **Big Wax Bayou** flows into Atchafalaya Bay at the entrance to Wax Lake Pass. These bayous form an inside route from Morgan City to the western part of the bay.

The former inside route westward from Morgan City led through these bayous, thence along the north shore of Atchafalaya Bay and through East Cote Blanche Bay, West Cote Blanche Bay, and Vermilion Bay to Schooner Bayou and White Lake. A depth of about 2 to 3 feet can be carried over this route, the limiting depth being westward of Schooner Bayou. About 5 feet can be carried through Schooner Bayou.

Charts 1051, 1277.—East Cote Blanche, West Cote Blanche, and **Vermilion Bays** together make up a large body of water extending west-northwestward from the northwestern side of Atchafalaya Bay, and separated from the Gulf by Marsh Island. This water area has a length of about 32 miles, with widths varying from 5 to 15 miles, and depths averaging from 5 to 9 feet. With the exception of Cote Blanche Island, Weeks Island, and Avery Island, the shores of these bays and Marsh Island are low and marshy. In recent years oil exploration has been extensively develop in the bays. An oil field is offshore from **Burns,** another off **South Bend** in East Cote Blanche Bay, and in West Cote Blanche Bay is a field along the northwest shore and one on **Terrapin Reef.**

Boats bound from Atchafalaya Bay to East Cote Blanche Bay generally use **Morrison Cutoff,** which is between **Point Chevreuil** on the east and **Rabbit Island** on the west. Under favorable conditions a draft of 4 to 5 feet can be carried through the cutoff into East Cote Blanche Bay and thence through West Cote Blanche Bay to Vermilion Bay. Local knowledge is needed to carry the best water.

Marsh Island, on the south side of Vermilion Bay and west of Atchafalaya Bay, is low and marshy. The entire

Gulf shore of the island is a foul area with numerous oyster reefs, some of which uncover at low water, extending to about 4½ miles off the south point of the island. The foul area should not be entered without local knowledge.

Shell Keys are a group of small islands 4 miles south-southwest of **Mound Point,** the southernmost point of Marsh Island. These keys are low and project only about 2 feet above high water.

Trinity Shoal lies about 25 miles southward of Southwest Pass, Vermilion Bay, and 60 miles 285° from Ship Shoal Light. The shoal is about 20 miles long in a west-southwesterly and east-northeasterly direction, and has depths of 11 to 18 feet. It is fairly steep-to on its southern side, the 5- and 10-fathom curves being distant only about 1 and 5 miles, respectively. In calm weather Trinity Shoal can be discerned by a difference in the color of the water; in stormy weather it is indicated by a choppy sea. Owing to its greater depth, the sea does not break so heavily on Trinity Shoal as on Ship Shoal. Trinity Shoal is marked off the south end of its southwesterly part by Trinity Shoal lighted whistle buoy 4, moored in 10 fathoms.

Vermilion Bay has a regular bottom with depths from 7 to 9 feet. Boats can reach the Intracoastal Waterway through either Weeks Bay, Avery Canal, or the Vermilion River Cutoff. **Cypremort Point** is the site of a large summer resort. There are several private slips dredged into the banks. A boatyard has marine ways capable of hauling out vessels up to 65 feet in length and 6 feet in draft for hull and minor engine repairs. Gasoline, diesel oil, water, and ice are available. (Note: ways under construction in August 1956, to be completed in September.) Private mooring slips are available. A state road connects the point with the town of **Cypremort.**

Southwest Pass extends between the western end of Marsh Island and the mainland and is the entrance to Vermilion Bay from the Gulf. The pass is marked by lights and daybeacons and had a controlling depth of 6 feet over the bar in August 1956. Although not difficult to enter, the pass may be difficult to recognize and local assistance is advisable.

Directions, Southwest Pass, Vermilion Bay.—Examine Chart 1277 before making the approach. From eastward, keep about 4 miles offshore, and from westward about 2 miles off, until **Lighthouse Point** bears 040°. There is a sand beach on this point and a small, dome-shaped rock about 250 yards westward. Steer toward Lighthouse Point on course **040°** and when Light 1 is abeam 300 yards on the port side change course to **028°.** Steer this course 1.5 miles to 200 yards west of Light 2. Come east slowly so as to pass about the same distance to the north of the light and then follow mid-channel courses into Vermilion Bay.

The Jaws, at the northeast corner of West Cote Blanche Bay, is a short channel having a least depth of about 4½ feet connecting the bay with the Intracoastal Waterway and with **Charenton Canal.** The entrance from the bay is marked by a light.

Cote Blanche Island, on the northerly side of West Cote Blanche Bay, is about 70 feet high, presenting on the bay side a reddish-yellow steep bluff. **Ivanhoe Canal,** westward of the island, connects West Cote Blanche Bay with the Intracoastal Waterway. The canal is marked by aids, some being privately maintained.

Weeks Island, 204 feet high, is west of **Weeks Bay,** the northeasterly extension of Vermilion Bay. Two water tanks and the mine buildings make prominent landmarks from the bays. The Intracoastal Waterway passes close along the west side of the island. Salt is mined on the island which has rail and highway connections to **Baldwin** on the Teche. There is a large oil field on the north side of Weeks Island.

Bayou Carlin and **Weeks Bayou,** at the northeast corner of Weeks Bay, offer passage for drafts of not more than 3 feet from Vermilion Bay to the Intracoastal Waterway.

The **Port of New Iberia** is located 4 miles south of New Iberia, on the Commercial Canal which connects with the Intracoastal Waterway through **Rodere Canal,** the **New Iberia Southern Drainage Canal, Wilkins Canal,** and Bayou Carlin. The canal is 80 feet wide and in August 1956 had a controlling depth of 12 feet. The port is 7 miles north of the Intracoastal Waterway and is about 8 miles from Weeks Bay. The canal and Port are governed by the Board of Directors of the Port Commission, New Iberia Port District. There are loading and docking facilities, with electric power lines, and a telephone at the Public Dock and at the Public Boat Slip about 0.5 mile south of the public dock. Boat stalls and sheds are available. Gasoline, fresh water, and power are obtainable at the port. A shipyard has marine ways capable of hauling out vessels up to 70 feet in length, and 7 feet in draft, and 80 tons in weight, for general repairs. There are highway and railroad connections to the port area. Overhead power cables with permit clearance of 65 feet cross the canal at two places.

Avery Island is 7.5 miles northwest of Weeks Island. A water tank and several mine buildings show prominently from Vermilion Bay. Salt is mined on the island which has rail and highway connections to New Iberia.

Bayou Petite Anse has a project depth of 9 feet from the Intracoastal Waterway to the fixed highway bridge north of Avery Island. Project depth obtained in August 1956. A private canal 9 feet deep extends from the bayou to the salt mine. **Avery Canal,** extending southeast into Vermilion Bay from the intersection of Bayou Petite Anse and the Intracoastal Waterway, had a controlling depth of 5 feet in August 1956. There are stumps and tree trunks near the mouth of the canal. The entrance to Avery Canal from Vermilion Bay is marked by lights.

Delcambre, the fishing center for Iberia Parish, 2 miles south of **Lake Peigneur** on the **Delcambre Canal,** has public wharves and several seafood processing plants. There are two shipyards, the largest having marine ways capable of hauling out vessels up to 50 tons in weight, 75 feet in length, and 10 feet in draft, for general repairs. Gasoline, diesel oil, lubricants, fresh water, ice, provisions, and marine supplies are available. The canal connecting Bayou Petite Anse and Lake Peigneur has a project depth of 9 feet, which obtained in August 1956. Highway and

railroad vertical-lift bridges cross the canal at Delcambre. Each bridge has a horizontal clearance of 40 feet; the railroad bridge has a vertical clearance of zero feet down and the highway bridge has a vertical clearance of 44 feet, up.

Jefferson Island, on Lake Peigneur, is the site of a large salt mine. It is the head of navigation on the canal. The lake is filled with old piling and other obstructions.

Bayou Tigre is a tortuous and shallow waterway extending from Bayou Petite Anse to Erath, navigated only by small craft at high tide. Four bridges cross the Bayou; the minimum horizontal clearance is 15 feet, and the fixed bridge has a vertical clearance of 3 feet.

Vermilion River, flowing from the northward, crosses the Intracostal Waterway and enters Vermilion Bay. The river entrance has a depth of only 6 feet on a favorable tide as the channel from the mouth of the river to deeper water in Vermilion Bay has been abandoned as a Federal project and is no longer maintained. From the intersection of the Vermilion River with the Intracoastal Waterway, the **Vermilion River Cutoff** leads in a south-southeast direction 4 miles to Vermilion Bay and had a controlling depth of 8 feet in June 1957. The entrance shoals rather rapidly after each dredging and may be difficult to enter during the winter months when strong winds from the north lower the water in the bay. The project dimensions are 8 feet deep and 80 feet wide. About 2.7 miles north of the junction with the Intracoastal Waterway, an overhead power cable with permit clearance of 60 feet crosses the channel. A light marks the entrance from Vermilion Bay. Vermilion River is also known as **Bayou Vermilion** and is so marked at bridge crossings. (Note: Dredging to 10 feet was under way in August 1956.)

The Intracoastal Waterway follows the river for a short distance, and a dredged canal 7 feet deep to Schooner Bayou provides a connection between Grand and White Lakes and the waterway. In August 1956, the river had a controlling depth of 9 feet for 21 miles above the waterway to **Abbeville,** thence 8 feet to **Milton,** and 6 feet to **Pinhook Bridge,** about 2 miles below Lafayette, the head of navigation. New cutoffs have been dredged and some of the bends eased in the section of the river between the waterway and Abbeville to provide a bottom width of 100 feet. Mariners may expect strong currents in the river.

A cable ferry crosses the river at **Bancker,** a small village about halfway between the Intracoastal Waterway and Abbeville. About 2 miles above Bancker, an overhead power cable having a permit clearance of 65 feet crosses the river near the town of Rose Hill.

Perry is a small village 2 miles southwest of Abbeville. The highway vertical-lift bridge at Perry has a horizontal clearance of 60 feet and a vertical clearance of 10 feet down and 55 feet up. Gasoline, diesel oil, water, and provisions are available. A shipyard has marine ways capable of hauling out vessels up to 200 tons, 85 feet in length, and 7 feet in draft, for general repairs. There is a wood shop at the shipyard.

There are three vertical-lift bridges and two swing bridges across the river between Perry and the Pinhook Bridge at the outskirts of Lafayette; minimum horizontal clearance is 50 feet, minimum vertical clearance is 4 feet down and 50 feet up.

Abbeville, the seat of Vermilion Parish, is the center of an agricultural area. Gasoline, diesel oil, water, ice, and provisions are available but there are no mooring facilities. A shipyard has marine ways capable of hauling out vessels up to 100 feet in length, 3 feet in draft forward and 7 feet aft, for general repairs.

Lafayette, the seat of Lafayette Parish, is 22 miles above Abbeville and is the oil center of the area. Unlimited supplies and provisions are obtainable in Lafayette but there are no mooring facilities. The Pinhook Bridge has a swing draw opening with a horizontal clearance of 53 feet and a vertical clearance of 12 feet. Drawspan regulations are stated in § **203.245,** Chapter 2.

Schooner Bayou, emptying into the extreme western extension of Vermilion Bay, forms a part of the former inside route to Mermentau River through White and Grand Lakes and connecting passages. The controlling depth is 4 feet. The best approach to Schooner Bayou is through the dredged canal which takes off from the Intracoastal Waterway near Intracoastal City. The canal project depth is 5 feet over a 40-foot width. **Warren Canal, Isle Marrone Canal,** and **North Prong** connect Schooner Bayou with the waterway to the westward of Vermilion Lock.

The entrance channel to the bayou from Vermilion Bay via Mud Point is no longer maintained, and in 1956 its general depth was 4 feet. To enter by this route, follow the old Vermilion River Entrance Channel to the second turn west of Mud Point, then leave the channel, continuing on the same course to the mouth of the bayou which is marked by a light.

Schooner Bayou Control Structure, constructed 4 miles inside the bayou to prevent salt water from flowing through the canal into White Lake, has flood gates 75 feet wide and 12 feet deep over the sill at mean low water. During high water, the gates will be opened to permit passage of any vessel that can navigate against the current, which attains velocities up to 5 knots. Vessels can by-pass the floodgate by going through North Prong Schooner Bayou into the Intracoastal Waterway southeastward of Forked Island at **Mile 195.5 W.** This route carries about the same water as the one through Schooner Bayou and Schooner Bayou Cutoff.

From Schooner Bayou Canal, the route crosses White, Turtle, Alligator, Collicon, and Grand Lakes. Several lights and daybeacons mark this route. During dry summer months when farmers are pumping water for irrigation of their rice fields, the level of the water in the lakes becomes low enougth to hamper navigation. Controlling depths in July 1957 in various sections of the route were:

Intracoastal Waterway to Schooner Bayou, 7 feet; 5 feet to Schooner Bayou Control Structure, (12 feet at low water over sill of floodgate), thence 12 feet to White Lake, thence 4 feet to and through Grand Lake.

White Lake is 12 miles long, 6 miles wide, and has depths of 4 feet or more over a mud bottom. The east entrance from the lake is marked by a light and the west

entrance is marked by a daybeacon, both aids being on the north side of the channel. The course across the lake passes about 0.5 mile off the point in the middle of the north shore of the lake. The channel is not marked.

Approach the east entrance with the line of the Schooner Bayou Canal in range ahead. The channel is narrow and the spoil bank on the south side is marked by stakes. At the west end of the lake, pass about 10 to 15 yards south of the daybeacon just off the canal entrance.

A canal has been dredged in the southern bank of the lake to **Pecan Island.** The project dimensions are 5 feet over a width of 40 feet. A small cattle-loading pen and ramp are near the head of the canal. A light shown from a black triangular slatted pile structure marks the northern entrance of the canal. The controlling depth in the canal in August 1956 was 1 foot.

Turtle Lake is nearly round, with a diameter of about 0.75 mile, and is shallow. **Alligator Lake** is about the same size and depth. **Collicon Lake** is 3 miles long, 1 mile wide, and from 2 to 3 feet in depth. On the west side of this lake an earth dike extends along the north side of the channel. Keep close to this dyke, within 5 to 10 yards of it.

Grand Lake is from 5 to 7 feet deep, but the entrances are subject to shoaling. At the southeast end of the lake, the entrance to the canal to Collicon Lake leads within 5 to 10 yards along the south side of an earthern dyke. There is a beacon just north of the outer end of the dyke and a light about 100 yards beyond the beacon. There are lights on **Grassy Point** and on the easterly point at the entrance to the Mermentau River. From the Collicon Lake canal entrance, steer to pass about 0.5 mile off the first point to the northward, and about the same distance off **Umbrella Point,** the second point to northward From Umbrella Point, pass about 0.25 mile east of Grassy Point, and when beyond this point haul to westward and pass well off the easterly point at the entrance to the Mermentau River, which is marked by a light. About 0.5 mile up the Mermentau River, the Intracoastal Waterway leads eastward and a mile farther leads to the westward. The river channel is deep. The Mermentau River flows from Grand Lake west of **Tebo Point.**

A network of canals south from Schooner Bayou to Cheniere le Tigre and west to Pecan Island have been dredged through the marsh. The widest and deepest of these canals is **Sixmile Canal,** connecting to the south side of Pecan Island. Sixmile Canal leaves Schooner Bayou about 1.5 miles east of Schooner Bayou locks and extends in a southerly direction 6 miles to **Belle Isle Bayou,** near the northwest end of Belle Isle. The main canal then follows **Belle Island Bayou** southward about 2 miles to **Belle Island Canal,** thence southwest through Belle Island Canal about 3 miles to **Freshwater Bayou** and the **Louisiana Fur Company Canal,** thence northwest 1.7 miles in Louisiana Fur Company Canal to **Humble Canal,** thence about 5 miles west and north to Pecan Island. These canals are maintained by the Humble Oil Company, which operates a large oil field south of Pecan Island. A draft of at least 4 feet can be carried through these canals from Schooner Bayou to Pecan Island.

Access to this network of canals is through Schooner Bayou and Sixmile Canal, or **Deepwater Bayou,** which enters Vermilion Bay about 1.5 miles south of Schooner Bayou, or through **Fearman Lake** with outlets to Vermilion Bay on either side of **Redfish Point.** Fearman Lake is shallow and local knowledge is necessary to carry the best water.

Belle Isle, westward of Vermilion Bay, is a low ridge with most of the area under cultivation. The elevation is only slightly above that of the marsh. The headquarters of the Audubon Society Game Preserve is at **Audubon** on **McIlhenny Canal** at its junction with Belle Isle Bayou at the west end of Belle Isle Lake.

Cheniere le Tigre, 4 miles south of Belle Isle, is a wooded ridge about 3 miles long with the east end on the Gulf coast. The elevation on the ridge is about 12 feet which is the highest natural elevation in the locality.

Pecan Island, south of White Lake, is a long, wooded ridge about 10 feet high. **Pecan Island,** a village on the south end of **Pecan Island Canal,** has a few stores with limited supplies. Gasoline may be obtained by portage. A Federal project provides for a channel 5 feet deep from White Lake to Pecan Island. The controlling depth across the bar was 1 foot in August 1956.

Charts 1051, 1278.—Mermentau River empties into the Gulf of Mexico 86 miles westward of Atchafalaya Bay Entrance and 12.5 miles eastward of Calcasieu Pass. The entrance channel shifts frequently and should be approached with caution. From the Gulf, the Mermentau leads northward through **Lower Mud Lake** and **Upper Mud Lake** into the southwesterly side of **Grand Lake,** out of the north end of Grand Lake to the Intracoastal Waterway and continuing on 32 miles through **Lake Arthur** to the head of navigation at the junction of Bayous Nezpique and des Cannes, where the river is formed.

Controlling depths in June 1957 were 4 feet from the Gulf to the Intracoastal Waterway, thence 9 feet to the head of navigation.

The Federal project provides for a channel 9 feet deep from the waterway to the junction of Bayous Nezpique and des Cannes, and for clearing the natural channel throughout the entire Mermentau River length.

Mermentau River is crossed by a cable ferry and three bridges: the cable ferry at Grande Cheniere which replaces a former swing bridge that was destroyed; a fixed bridge at Lake Arthur, and two bridges at Mermentau, one swing and the other fixed. At Lake Arthur, the fixed bridge has a horizontal clearance of 235 feet in the center span and a vertical clearance of 28 feet. The swing bridge at Mermentau has a draw opening with a horizontal clearance of 52 feet and a vertical clearance of 10 feet. In view of the possibility of collison, mariners are directed to exercise extreme caution when approaching and navigating through the drawspan. Tows navigating through this bridge shall not exceed one barge. The towing vessel shall be made up rigid abreast or astern of the barge. The fixed bridge has a horizontal clearance of 315 feet and a vertical clearance of 30 feet.

In the lower Mermentau River below Grand Lake, a channel 13 to 15 feet deep and 100 to 170 feet wide was dredged in 1947 for drainage purposes. At **Catfish Point** dikes control the intrusion of salt water, but the gates are opened for passing boats. The old lock was abandoned in 1951.

Numerous aids mark the channel in the Mermentau River north of the Intracoastal Waterway. Daybeacons mark a cut-off 1 mile above the Intracoastal Waterway. Ranges and daybeacons mark the lower part of Lake Arthur and buoys mark the upper part. Near the center of the lake, the channel passes through a constriction known as **The Narrows.**

Grande Cheniere (P. O.), a small settlement on the east bank of the river between Lower and Upper Mud Lakes, has highway connections to Lake Charles. Gasoline, water, and limited quantities of provisions are available.

Lake Arthur, a small town on the northwest side of Lake Arthur 13 miles above the Intracoastal Waterway, has highway and rail connections to Lake Charles. A depth of about 6 feet can be taken to the many piers at Lake Arthur. A boatyard and machine shop has marine ways that can haul out vessels up to 45 feet in length and 4 feet in draft for general repairs. Gasoline, diesel oil, lubricants, water, ice, and provisions are available.

Mermentau, on the upper river 16 miles above Lake Arthur, is a rice milling center on the main railroad and highways between New Orleans and Lake Charles.

From the head of Mermentau River, Bayous Nezpique and des Cannes were navigable in June 1957 for depths and distances as follows: **Bayou Nezpique,** 10 feet to the Jahncke Bridge; **Bayou des Cannes,** 11 feet for 8.5 miles. A swing bridge having a horizontal clearance of 40 feet and a vertical clearance of 8 feet crosses Bayou Nezpique northeast of **Jennings.** On Bayou des Cannes, a fixed bridge with a horizontal clearance of 45 feet and a vertical clearance of 1½ feet crosses at **Evangeline.** Drawspan regulations for these bridges are stated in **§ 203.245,** Chapter 2.

Bayou Plaquemine Brule empties into Bayou des Cannes about 1 mile above Mermentau River. Controlling depths in Bayou Plaquemine Brule in September 1956 were 8½ feet for about 5 miles, thence 3½ feet to the head of the improvement about 16.5 miles above the mouth. A railroad bridge with a swing span that has a horizontal clearance of 47 feet and a vertical clearance of 7 feet crosses the bayou north of **Midland.** Drawspan regulations are stated in **§ 203.245,** Chapter 2. A cable ferry crosses the bayou north of **Estherwood.**

Bayou Queue de Tortue empties into the Mermentau River 4.5 miles above the head of Lake Arthur. A depth of about 5 feet can be carried to **Riceville,** a distance of 12 miles, but in August 1956 numerous submerged logs and overhanging trees made the stream nearly impassible.

Chart 591.—Calcasieu Pass, the outlet of Calcasieu Lake, is about 98 miles westward of Atchafalaya Bay entrance and 78 miles eastward of Galveston entrance. It is the first and only deep-draft channel from the Mississippi River westward to Sabine Pass.

Prominent features.—The prominent features in the vicinity of Calcasieu Pass are the range and jetties and, at night, the occulting red obstruction lights on the many radio towers in the area. The yellow courthouse building at Cameron, with a small radio tower atop, and a church spire 7.5 miles east of the jetties, are distinguishable among the trees but are not conspicuous.

The Calcasieu entrance has been improved by jetties and a deepwater channel. The east jetty extends seaward from the shoreline approximately 2,275 yards, and the west jetty 2,265 yards. For the most part the jetties are above normal high tide. The Federal project provides for a channel 37 feet deep from that depth in the Gulf to the sea end of the jetties; thence 35 to 37 feet deep between the jetties; thence 35 feet deep through a cut to Calcasieu Lake; thence along the west shore of the lake by a land and water cut to the confluence of Choupique Cutoff and Calcasieu River; thence by the river channel, including Clooney Island Loop, to the wharves at the Port of Lake Charles. In January 1957 the controlling depth in the ship channel was 31 feet.

A lighted whistle sea buoy marks the outer end of the dredged channel. A lighted range leads across the bar between the jetties and into the pass.

Anchorages.—Large vessels usually anchor off Calcasieu Pass. Vessels up to 12 feet in draft can obtain excellent anchorage in the bend in the river at Cameron. While waiting for daylight or fog to lift, ships can anchor anywhere in the Calcasieu River out of the fairway. No anchorages exist in the land cuts and ships are expected to complete any passage after once entering such cuts.

Tides and Currents.—The normal range of tide in Calcasieu Pass is 1.3 feet; in Calcasieu Lake and River it is less than 0.5 foot. Flood waters may increase the normal river level at Lake Charles 1.5 feet. There is little current in the river except during freshets.

Dangers.—Seaward of the jetties, a moderate to strong current sweeps across the channel, normally setting in a western direction. Mariners should exercise caution and be on the alert. Frequently a mud slush lying on the bottom and extending approximately 6 feet above the hard bottom will be found in the channel seaward of the jetties and at various places above the pass. This material can barely be detected by the lead line. Deep-draft vessels can go through this slush, but it will retard the ship's speed and may affect the steering. A slush or soupy material slightly thinner than the bottom slush occasionally is encountered in a layer 1 to 4 feet thick some 8 to 10 feet above the hard bottom and 20 to 23 feet below the surface in the same localities as the bottom slush. Both have the same effect on the handling of a vessel.

Pilotage.—Pilotage is required for all vessels engaged in foreign trade, but not for vessels in coastwise trade whose masters are licensed by the Coast Guard. The pilot boat, Calcasieu Pilot, flies the flag **P** and is stationed at Cameron. Pilots take ships to and from Lake Charles

day or night. The usual procedure is to notify the Lake Charles Pilots through the ship agent or direct, stating time of arrival off the sea buoy. If no prior arrangements have been made, 4 long blasts in the vicinity of the sea buoy is the customary signal for a pilot.

Vessels occasionally come to Lake Charles from the Sabine River or vice versa. In such cases, the Lake Charles Pilots will take the ship from or to the State line at Orange. Vessels having a maximum draft of 16 feet will be taken through this route during daylight hours only.

Cameron (P. O.), the seat of Cameron Parish, is a fishing village on the eastern shore of Calcasieu Pass 2.5 miles above its entrance, and has stores, several shrimp-packing houses, and two large fish-oil plants. Gasoline, diesel oil, water, ice, provisions, and some marine supplies are available. A small shipyard has a floating dry dock capable of hauling out vessels up to 100 tons, 110 feet in length, and 8 feet in draft for general repairs. Small craft may find dock space or can anchor in the bend of the river near Cameron in depths from 12 to 30 feet. An auto ferry crosses the ship channel northwest of Cameron. Another smaller auto ferry connects Cameron with the island formed by the river and the ship channel, crossing the river at Cameron.

Calcasieu Lake, at the head of Calcasieu Pass, 6 miles from the Gulf, is 15 miles long, 3 to 5 miles wide, and 5 to 7 feet deep. The controlling depth off the entrances at either end is 5 feet, but the bottom is so soft that slightly greater draft generally can drag through. A row of piles marks the west side of the channel across the lake. Along the southern end of the lake is an old revetment, partly submerged, extending about 1.5 miles.

Grand Lake, a summer resort on the northeast side of Calcasieu Lake, has boat landings with depths of 2 to 4 feet alongside.

Hackberry, on the northwest side of the lake, is an oil drilling center. Both towns have highway connection to Lake Charles.

Chart 592.—Calcasieu River and Ship Channel.—Northward of Calcasieu Pass, the ship channel cuts across points of land along the west side of Calcasieu Lake to a junction with the Calcasieu River at **Choupique Island.** The channel is straight and is well marked by lights, buoys, daybeacons, and lighted range at the northern end.

Calcasieu River empties into the northern part of Calcasieu Lake. Three miles above the mouth of the river, the Intracoastal Waterway leads to the eastward, and 2 miles farther, at the west end of **Devils Elbow**, the ship channel connects with the river and at the same place, the Intracoastal Waterway leads to the westward through **Choupique Cutoff.**

Northward of the intersection with the Intracoastal Waterway, the ship channel follows the natural channel of Calcasieu River to the north side of **Moss Lake**, thence by-passing the river through a land cut about 1 mile long to the westerly bend of the river just above Haymark Terminal, thence in the natural channel to Rose Bluff, thence through **Rose Bluff Cutoff** and continuing on the same course through a cut across the south end of **Coon Island**; thence, the eastern or right fork for about 1.5 miles to the port docks at Lake Charles. Deep water is along mid-channel but unlike most rivers, the deeper water often favors the points rather than the bends.

Calcasieu Landing on the west side of the Calcasieu River just north of its junction with the ship channel, is the site of a shipbuilding company which has marine ways capable of hauling out vessels up to 500 tons, 200 feet in length, and 9 feet in draft for general repairs. The yard has a machine shop and wood shop.

Haymark Terminal, Vincent Landing, and **Rose Bluff** are sites of extensive oil refining, storage, and shipping on the Calcasieu River below the Port of Lake Charles.

Note.—Considerable damage, including bank erosion, is being suffered by residences along the river, particularly in the vicinity of Vincent Landing and the south or lower portion of Moss Lake. The damage results principally from wave action of light tugs and light or partially loaded ships. Attention is directed to the regulations stated in § **207.180,** Chapter 2.

Mariners are directed to exercise every caution and to proceed at slow speed.

Bayou d'Inde, branching westward from Rose Bluff Cutoff, is crossed by a removable span highway bridge 1.9 miles above the cutoff. This bridge has a horizontal clearance of 37 feet and a vertical clearance of 2 feet. Two more removable span bridges and several overhead cables cross the bayou above this point. Drawspan regulations are stated in § **203.245,** Chapter 2. The head of navigation is 6.6 miles above the cutoff, which is 0.3 mile below Sulphur.

Contraband Bayou branches eastward from Calcasieu River just south of Lake Charles deep-water terminals. A highway bridge having a horizontal clearance of 35 feet and a vertical clearance of 4 feet crosses the bayou 2.6 miles above its mouth. Drawspan regulations are stated in § **203.245,** Chapter 2. There are two boatyards on the bayou with marine ways. The larger is capable of hauling out vessels up to 150 tons, 100 feet in length and 10 feet in draft, for general repairs. The controlling depth to the bridge was 9 feet in August 1956.

The port docks are on the east side of the river on a point formed by cutting through a narrow neck of land across a bend. The bend extends about a mile to the northwest and forms a complete loop around **Clooney Island**, enabling vessels to use this loop to turn around and head downstream. The controlling depth in the loop was 34 feet in June 1952. A large alkali plant is on a dredged

channel leading off the northwest side of the bend. In June 1948, a draft of 18 feet could be taken to the first wharf in the channel, and 10 feet beyond.

About a mile above the port docks, the river widens into **Lake Charles.** The lake is fairly circular and more than a mile in diameter. The city of Lake Charles fronts on the eastern shore. The river channel extends along the western side of the lake.

Westlake is an industrial suburb of the city of Lake Charles on the west bank of the Calcasieu River 2 miles above the port.

Bridges and cables.—No bridges or overhead cables cross Calcasieu River between the Gulf and the deep-water terminals at Port of Lake Charles. The highway bridge cross the river and the northern part of Lake Charles near Westlake has a fixed cantilever center span with vertical clearance of 95 feet for a horizontal width of 380 feet and a vertical clearance of 135 feet for the middle 200 feet of span. Just north of the highway bridge are two railroad swing bridges having a minimum west draw horizontal clearance of 93 feet and minimum vertical clearance of 1½ feet. The prescribed navigable west draw openings are protected with fender systems; any craft navigating the east draw opening does so at its own risk. About 0.2 mile above these bridges there is an overhead power cable with authorized minimum clearance of 110 feet. About 6.6 miles above Westlake is an overhead power cable with clearance of 152 feet, and about 7.5 miles above Westlake there is a railroad swing bridge with horizontal clearance of 90 feet in the north draw and 95 feet in the south draw, and vertical clearance of 7 feet.

At Moss Bluff, about 10 miles above Westlake, a highway bridge has a vertical-lift opening with a horizontal clearance of 94 feet and a vertical clearance of 10 feet down and 45 feet up.

The west fork of Calcasieu River empties into the Calcasieu River about 6.5 miles above Westlake. A ferry crosses the west fork about 4 miles west of the junction.

Houston River branches westward from the west fork of Calcasieu River. A ferry and railroad bridge cross the river 5 miles above its mouth. The swing railroad bridge has a horizontal clearance of 27 feet and a vertical clearance of 6 feet. Drawspan regulations are stated in **§ 203.245,** Chapter 2.

English Bayou branches eastward from the Calcasieu River above Westlake. A highway swing bridge having a horizontal clearance of 45 feet and a vertical clearance of 2 feet crosses the bayou about 1 mile above its mouth. Drawspan regulations are stated in **§ 203.245,** Chapter 2.

In October 1955 Calcasieu River had a controlling depth of 21 feet to **West Fork,** thence 17 feet to mile 43.4, thence 5 feet to **Old Town Ferry** and thence 7 feet to **Hecker.** Snags and trees made it nonnavigable above mile 61.

Lake Charles, the seat of Calcasieu Parish, is the only major port in western Louisiana. The city is on the main State highway westward from New Orleans, and is served by three trunk line railroads and two airlines. There are frequent sailings to coastwise and foreign ports. The principal exports are petroleum, agricultural and dairy products, lumber, fish oil, and chemical products. The major imports are Chilean nitrate of soda and barite ore. The public terminals are owned by the Lake Charles Harbor and Terminal District and operated by a board of commissioners, an agency of the State of Louisiana.

Towage.—Two towing companies maintain offices at the Port of Lake Charles. Tugboats are available for harbor, intracoastal, coastwise, and ocean towing. Divers are available.

Quarantine.—Vessels are boarded by quarantine officers at any of the docks within the port limits.

Hospitals.—Private hospital facilities are available at Lake Charles. The nearest United States Public Health Service outpatient clinic is at Port Arthur, Tex.

Customs.—Vessels are boarded by customs officers at the dock. The Customs Service maintains an office at the Port of Lake Charles.

Immigration.—Immigration officials board vessels at any dock within the port limits. The Immigration Office is in the Gayle Building.

Harbor regulations.—There are no Federal regulations applicable to Lake Charles except those that are usually in force at most seaports in the United States. Local regulations can be obtained from the Port Director.

Harbormaster.—The Port of Lake Charles does not have a harbormaster. The usual harbormaster's duties are conducted by the office of the Port Director.

Terminal Facilities.—The public facilities are on a point on the east side of Calcasieu River, 31 miles from the Gulf and near the southern limits of the City of Lake Charles. There are two wharves, each 1,600 feet long, one on either side of the point, with 31 to 34 feet of water alongside. The transit sheds on the wharves have more than 400,000 square feet of covered area and are equipped with modern fire-fighting apparatus. Double railroad tracks serve both front and rear of the transit sheds. Between the wharves are several warehouses and a high-density cotton compress and several storage warehouses. There are storage facilities for nitrate of soda, creosote, cotton, and general cargo.

Small-boat facilities.—There are numerous boat landings along the lake shore at the city of Lake Charles. Gasoline, diesel oil, and water can be secured at several of these landings. Good anchorage is available in the lake which has depths of 8 to 10 feet.

Supplies.—Fresh water is piped to the public wharves. Gasoline, diesel oil, provisions, and marine supplies are available. Large ships can take on fuel oil at the oil docks on Calcasieu River southward of Lake Charles, provided arrangements are made in advance.

Repairs.—There are three shipyards in the Port of Lake Charles area. The largest of these, at Calcasieu Landing, can haul out vessels up to 500 tons in weight, 200 feet in length, and 9 feet in draft, for general repairs. The

larger of the two yards in Contraband Bayou can haul out vessels up to 150 tons in weight, 100 feet in length, and 10 feet in draft, for general repairs.

Communications.—Lake Charles is served by three railroads and two scheduled airlines.

Chart 1279.—Sabine Bank is a succession of detached shoal spots, 38 miles in length east and west, paralleling the coast about 17 miles off Sabine Pass. The depths on the bank range from 16 to 30 feet, and are subject to change. The bank is marked by Sabine Bank Light near the middle and by Sabine Bank East End lighted whistle buoy 1 at its eastern extremity. Sabine Bank Light, 72 feet above the water and visible 14 miles, shows from a red conical tower on a cylindrical pier 16 miles 155° from Sabine Pass Light.

Several passages are between the shoal spots. The one generally used by vessels lies 3 miles eastward of Sabine Bank Light and is 1.7 miles wide between the 30-foot curve. It is known locally as the **Hole in the Wall.** This passage is marked by buoys and is good for a depth of 32 feet, but this may be reduced by as much as 3 feet during northers.

To the southward of Sabine Bank and about 6 miles inside of the 10-fathom curve, the bottom is somewhat irregular and broken, and several spots with depths of 35 feet or less are found with surrounding depths 10 to 20 feet greater. A 26-foot spot 12 miles 143° from Sabine Bank Light is the least depth found on a ridge extending out from Sabine Bank. Two shoal spots of 31 feet each are about 1,000 yards 106°, and 1,800 yards 287° from the 26-foot shoal, with deeper water between the three shoals. A 31-foot spot lies 7.3 miles 105° from the 26-foot spot. These shoals lie in the direct track of vessels making the passage through Sabine Bank from the southeastward. Northward of Sabine Bank the general depths are from 36 to 40 feet.

Approaching Sabine Pass from eastward, deep-draft vessels should avoid Ship Shoal, Trinity Shoal, Sabine Bank, and the extensive area of broken ground between them. The lighted whistle buoys off Ship Shoal, Trinity Shoal, and the easterly end of Sabine Bank are useful and dependable marks. Vessels usually lay their courses for Sabine Bank East End lighted whistle buoy 1 or Sabine Pass Approach lighted gong buoy 6. Comparatively few vessels from Dry Tortugas or points north approach Sabine Pass through the Hole in the Wall. However, many vessels departing from Sabine Pass use this passage through the bank.

Vessels coming to Sabine Pass from Dry Tortugas should hold up to the north in order to make their landfall course approximately parallel to the 10-fathom curve, and incidentally, parallel to a line connecting Ship Shoal lighted whistle buoy 2 and Trinity Shoal lighted whistle buoy 4. If Ship Shoal buoy is missed, they can continue on approximately the same course, and using the 10-fathom curve as a guide, invariably pick up Trinity Shoal buoy. As the run from the latter to the Sabine Bank East End buoy or Sabine Pass Approach lighted gong buoy 6 is comparatively short, there is little chance of missing the buoys.

This approach is superior for deep-draft vessels to that of setting the course directly from Dry Tortugas to Sabine Bank Light. By the latter method the landfall must be made in the vicinity of several dangerous shoals and in a locality where the bottom is more or less uneven and where soundings taken do not assist materially in fixing a position.

After passing Sabine Bank East End lighted whistle buoy 1, vessels should haul to northward to avoid a shoal with a least depth of 18 feet, lying 8 miles 296° from the buoy. Then set a course for Sabine Pass lighted whistle buoy 1.

Light-draft vessels coming from eastward can follow along the coast westward of Trinity Shoal, keeping 2 to 3 miles offshore or south of the 3-fathom curve until the lighted whistle buoy off the Sabine Pass entrance is sighted.

Approaching Sabine Pass from southwestward, deep-draft vessels should make landfall off Galveston, taking care to pass northward of Heald Bank, and then set a course for the lighted whistle buoy off Sabine Pass.

Light-draft vessels, when eastward of Galveston entrance, can follow the coast at a distance of about 2 miles, but must increase this distance to 5 miles when within 7 miles of Sabine Pass staying offshore from lighted whistle buoy 2.

10. SABINE PASS TO SAN LUIS PASS

Chart 1116.—Sabine Pass and its connecting channels comprise an extensive system of deepwater routes leading inland as far as Beaumont, Tex., and Lake Charles, La. From Sabine Pass the coast follows a general west-southwest direction for 50 miles to Galveston Entrance. Except in the eastern part, deep water extends fairly close inshore. The coast is low and devoid of prominent features, with the exception of High Island. Off the coast, Heald Bank has depths of 25 to 35 feet and constitutes a danger to deep-draft vessels.

Galveston Entrance is the approach to the cities of Galveston, Texas City, and Houston. Galveston Bay and tributaries form one of the larger commercial ports in the United States, having an extensive foreign and coastwise trade.

Chart 517.—Sabine Pass, 244 miles westward of Southwest Pass, Mississippi River, and 50 miles east-northeastward of Galveston Entrance, is the approach from the Gulf to Sabine Lake, Sabine and Neches Rivers, and the cities of Port Arthur, Beaumont, and Orange.

Sabine Pass, Lake, and River together form the boundary between the States of Louisiana and Texas for a distance of 275 miles northward from the Gulf.

Prominent features.—The most prominent object approaching Sabine Pass by day is the pilot station on the west jetty. It is a white building on a steel skeleton foundation visible for considerable distance off. The east jetty light and entrance range lights are also conspicuous objects, as are the dredging-range towers, the abandoned Sabine Pass Lighthouse, the radio towers near Sabine, the oil tanks west of Sabine Pass, the tall hotel buildings, and a 400-foot stack at Port Arthur.

Sabine Pass East Jetty Light, 67 feet above the water and visible 14 miles, is shown from a red square skeleton structure on piles on a concrete block at the south end of the jetty. A fog signal is at the light; also a marker radiobeacon of low power, for local use only.

Sabine Pass radiobeacon is on the west side of the pass at the site of the former Coast Guard lifeboat station about 1.5 miles from the shore end of the jetty. About 0.5 mile above the radiobeacon on the opposite side of the pass is the abandoned Sabine Pass Lighthouse, a black-and-white horizontally banded 81-foot tower. Sabine Pass Coast Guard station, the lifeboat station, and the Captain of the Port are at the site of the old Quarantine Station on the west bank of the pass about 3.5 miles above the jetty.

The entrance is obstructed by a bar which has been improved by the construction of two jetties, nearly parallel, extending about 3.5 miles in a southerly direction from shore. There is a clear width of 550 yards between them. The general depths between jetties, outside the channel, are 8 to 16 feet. Federal project depth on the outer bar channel is 37 feet, decreasing to 36 feet at the inner end. Inside the jetties, the project provides for a channel 36 feet deep through the pass and in the Port Arthur Ship Canal. These depths are maintained.

The channel through Sabine Pass is marked by three lighted ranges and numerous other aids. Sabine Pass Outer Range marks the approach channel to the entrance between the jetties. About 2.5 miles off the end of the jetties, Sabine Pass lighted whistle buoy 1 marks the west side of this channel and nearer the jetties Sabine Pass lighted buoys 2 and 4 mark the east side of the channel. The channel between the jetties is marked by Sabine Pass Jetty Range, and the first reach inside the jetties is marked by the Inner Range. Dredging ranges mark the sides of the channel; these are maintained by the Corps of Engineers.

Inside the jetties the pass extends northwesterly about 6 miles to Sabine Lake. The bottom outside the channel for the most part is soft, and vessels can touch without injury; but there are occasional patches of oyster bars dangerous to vessels striking them. An extensive oyster bar exists on the east side of the channel opposite Sabine, and a smaller one on the same side opposite the village of Sabine Pass.

The channels are under constant maintenance, and controlling depths are reported from time to time in the Notice to Mariners.

Anchorages.—Deep-draft vessels usually anchor outside of the pass entrance. Vessels of light draft can find good holding ground 7 to 8 miles westward of the jetties as close inshore as drafts will permit. Anchorage can be provided for a number of vessels in Sabine Pass opposite the quarantine station; the area is 800 feet wide and 3,000 feet long, with a depth of 34 feet. The pass affords excellent anchorage for small vessels and is used as a harbor of refuge by all coasting vessels during the winter months.

Boundary Lines of inland waters.—The lines established for Sabine Pass are described in **§ 82.103, § 82.106,** Chapter 2.

Tides and currents.—The mean range of tide at the entrance of Sabine Pass is about 1½ feet and 1 foot at Port Arthur. The currents off the entrance of Sabine Pass are dependent upon the direction and velocity of the wind. Following continued north to easterly winds, a southwesterly to westerly current will be found off the entrance, sometimes with a velocity of as much as 2 knots and frequently of 1 knot. Following southerly and south-

westerly winds, the currents will be in the opposite direction, but with less velocity. Current velocities up to 2½ knots have been observed in Sabine Pass. Information upon which to base current predictions is lacking.

Weather.—The waters are navigable throughout the year. The prevailing wind direction is north in December and January, east in September, October, and November, southerly direction throughout the spring and summer. Gulf storms may occur from July to October.

Coastal (storm) warnings.—Day and night signals are displayed at the Coast Guard station in Sabine Pass. They are also displayed at Port Arthur.

Pilotage.—Pilotage is compulsory for vessels in foreign trade. It is also compulsory for vessels in coastwise trade as required under the laws of the State of Texas. However, it is not compulsory for coastwise vessels having on board pilots licensed by the United States Coast Guard.

The Sabine Pilots have a station on the west breakwater at Sabine Pass. A pilot boat is usually on watch near the end of the jetties or will come out to a vessel making signal.

Towage.—Vessels usually proceed through the pass to Port Arthur without assistance. Towboats and ocean-going tugs are available at Port Arthur. The towboat companies are equipped to perform wrecking and salvage operations.

Quarantine.—The Quarantine station is at Port Arthur, Tex., and vessels subject to visitation are boarded at the docks.

Hospitals.—An outpatient clinic of the Public Health Service is located in the Postoffice and Customhouse at Port Arthur. There are private hospitals in the city.

Customs.—Vessels are boarded upon arrival at berth. Headquarters of the Customs Service is in the Postoffice and Customhouse.

Immigration.—Inspectors board vessels upon arrival at berth. The Immigration Office is in the Postoffice and Customhouse.

Texas Bayou, on the west side opposite the abandoned Sabine Pass lighthouse, has facilities for small craft to dock and obtain gasoline, diesel oil, water, and ice.

Sabine (P. O.) is a village on the west shore of the pass, about 5 miles above the outer end of the jetties. The southerly of the two old slips is used as a small-boat harbor where gasoline, diesel oil, water, and ice are available. A boatyard in the north slip builds and repairs barges.

Sabine Pass (P. O.) is a village on the west shore of the pass about 1.5 miles north of Sabine. The town is a shipping point for crude petroleum. A boatyard has marine ways that can haul out vessels up to 65 feet in length and 15 feet in draft, but in August 1956 the tracks were silted over and the ways could not be used.

Sabine Lake has an average depth of about 6 feet in its 15-mile length. At the southern end, where it empties into Sabine Pass, the depth is 4 feet. In 1958 a new bridge was under construction across the southern end. The lake is of little commercial importance and can be entered also from the Sabine-Neches Canal or through Sabine River. The depth through **East Pass** is about 3 feet.

Off the waterfront at Port Arthur is a bulkhead 1.5 miles long through which a narrow opening leads to a yacht basin for small boats of 2 to 3 feet in draft.

Johnson Bayou, in the extreme southwestern part of Louisiana, empties into the southeastern part of Sabine Lake, directly east of Port Arthur. The entrance to the bayou is marked by a pile. The dredged channel leading to the entrance has filled to the lake bottom level. The controlling depth was 2½ feet into the mouth of the bayou in August 1956. Inside the entrance, the bayou is deeper and is navigable for about 4.5 miles to the settlement of **Johnsons Bayou, La.** A highway connects the settlement with **Sulphur.**

Port Arthur Ship Canal extends for about 6 miles from Sabine Pass to the entrance to Taylor Bayou. A narrow strip of land separates the canal from the western shore of Sabine Lake. The canal entrance is marked by a light on the west side of the pass, about 500 yards south of the entrance. Lights and lighted ranges mark the channel to Taylor Bayou.

Port Arthur, an important oil-shipping center, is on the west shore of Sabine Lake 17 miles above the Sabine Pass entrance. The principal industrial development is on Taylor Bayou, at the southwestern outskirts of the city, sometimes known as **West Port Arthur.** The port has extensive domestic and foreign trade in crude petroleum and its refined products. There is some commerce in wheat, chemicals, lumber, iron and steel products, and general merchandise.

Terminal facilities.—Port Arthur has several wharves with depths ranging from 10 to 38 feet. Just inside Taylor Bayou are two adjoining turning basins, the easterly being 420 feet wide and 1,800 feet long. The basins are maintained at, or near, project depth of 36 feet. An oil company has 3,000 feet of docking space on the east side of the easterly basin. At the upper end of the basin are general cargo facilities, including extensive warehouses and sheds, and a total docking space of 6,500 feet in two slips. The grain elevator has a capacity of 1,500,000 bushels. Along the north side of the western basin is a lumber wharf 1,765 feet long.

A third turning basin is about a mile farther up the bayou; it is 2,900 feet long and 1,200 feet wide at the outer end. The basin and connecting channel are maintained at, or near, project depths. The port is served by adequate rail and highway connections. All facilities are privately owned, and the oil terminals are used only for company business.

Small-boat facilities.—Small boats can secure gasoline, oil, water, and supplies along the waterfront of the city from the Sabine-Neches Canal. A mooring basin is on the west side of the canal just above the bascule bridge, and docks are on the west side of the canal just below the bridge.

Supplies.—Provisions and general supplies can be obtained at the numerous stores in Port Arthur. Fresh water of good quality is available alongside the wharves or can be delivered in barges. Oil bunkering facilities with a loading rate of 4,000 to 5,000 barrels per hour are available.

Repairs.—There are two shipyards at Port Arthur. The yard on the west bank of Sabine-Neches Canal 0.6 mile southwest of the highway bridge has two floating drydocks with a maximum capacity of 1,800 tons, 250 feet in length, 54-foot beam, and 16-foot draft. The second yard on the west bank, 4 miles northeast of the highway bridge, can haul out vessels up to 1,000 tons in weight, 150 feet in length, and 12 feet in draft. Barges up to 260 feet in length can be hauled. Both yards have machine, electrical, and carpenter shops, and make general repairs.

Communications.—Radio station WPA of the Radiomarine Corporation provides ship-to-shore service. The port is served by two railroads and by commercial airlines.

Taylor Bayou has a navigable depth of about 4 feet for 30 miles above the upper turning basin at West Port Arthur. Some traffic, mostly barge tows loaded with oil and rice, plies the bayou. Across Taylor Bayou above the turning basin are two adjacent drawbridges with a minimum horizontal clearance of 40 feet and a vertical clearance of 4 feet; drawspan regulations are stated in **§ 203.245,** Chapter 2. Overhead power cables crossing the bayou have a minimum permit clearance of 60 feet. About 1.7 miles above the bridges is a lock with a length of 200 feet, width of 30 feet, and a depth of 10 feet over the sills; navigation regulations are stated in **§ 207.185,** Chapter 2.

The Sabine-Neches Canal is a continuation of the Port Arthur Ship Canal above the mouth of Taylor Bayou. It extends parallel with the shore of Sabine Lake, from which it is divided by a narrow strip of land, northeasterly to the mouth of Neches River. Beyond this river, the canal crosses a narrow neck of land through a 0.5-mile cut, thence through the open water of the northerly part of Sabine Lake to the mouth of Sabine River. Federal project depths are 36 feet to the mouths of these rivers. Controlling depths are published in Notice to Mariners.

A highway drawbridge crossing the canal at Port Arthur has a bascule span with a horizontal clearance of 200 feet and a vertical clearance of 11 feet. Sabine-Neches Canal Front Range Light 27 marks the point where the canal enters Neches River from the south. That part of the canal crossing the upper end of Sabine Lake is marked by lighted ranges and buoys.

During the high-river stages on Neches River, usually from January to the last of April, a vessel may encounter an athwartship current crossing Neches River along the canal route, which may prove dangerous if not guarded against.

Chart 533.—Neches River, emptying into Sabine Lake from the northwestward, extends in a ship canal 18.5 miles to Beaumont. The Federal project provides for a channel 36 feet deep to a turning basin at Beaumont 34 feet deep. Depths are several feet greater during high-river stages which occur usually from January to the last of April. Lights, ranges, and buoys mark the improved section of the river.

A fixed highway bridge over the river, about 1.5 miles above its mouth, has a horizontal clearance of 600 feet and a vertical clearance of 174 feet. This bridge and the one at Port Arthur are the only bridges crossing the channel between the Gulf and the turning basin at Beaumont. An overhead cable with a permit clearance of 190 feet crosses the river 3 miles south of Beaumont.

The marsh island north of McFadden Bend Cutoff has been dredged away except for a strip 300 feet wide. The dredged area forms an anchorage for decommissioned ships under jurisdiction of the United States Maritime Administration and has a controlling depth of 18 feet; navigation regulations are stated in **§ 207.900,** Chapter 2.

A log boom blocks the entrance at the south end.

Above Beaumont, a depth of perhaps 10 feet can be carried for about 12 miles up the river, but there is no commerce in this section and probably many snags now obstruct the channel.

Port Neches, on the river 6 miles above Sabine Lake, is an important oil refining center. Three private oil-handling terminals have a total berthing space sufficient for five ships. A dry cargo terminal has a transit shed with rail connections for the movement of general cargo. Petroleum products, asphalt, and roofing materials are exported. There are rail and highway connections with Port Arthur and Beaumont.

Beaumont, on Neches River 18.5 miles above Sabine Lake and 43 miles from the Gulf, is the largest city in eastern Texas. Numerous rail lines and improved highways radiate to all parts of the country. Steamship companies maintain freight service out of Beaumont to coastwise and foreign ports, and petroleum interests operate fleets of tankers to carry their products all over the world. The principal commerce is in oil and petroleum products. Other commodities are flour, rice, cotton, iron and steel, and chemical products.

Anchorages.—There are no anchorages at Beaumont and anchorage is permitted in Neches River only in emergencies. Vessels may be tied up to the banks of the river for a limited period provided permission is obtained from the Corps of Engineers.

Tides and currents.—Periodical tides are practically negligible in Neches River. The rise and fall of the water depends upon meteorological conditions. During high-river stages, the velocity of the current in the river is around 2½ knots.

A highway and two railroad bridges cross the improved channel above the turning basin at Beaumont. The first railroad bridge is a vertical-lift structure with a horizontal clearance of 200 feet and a vertical clearance of 8½ feet down, and 140 feet up. The second railroad bridge has a bascule span with a horizontal clearance of 200 feet and a vertical clearance of 2½ feet. The fixed highway bridge has a horizontal clearance of 190 feet and a vertical clearance of 50 feet.

Towage.—Towboats are available at Beaumont.

Quarantine.—Vessels subject to visitation are boarded at the docks.

Hospitals.—The nearest United States Public Health Service outpatient clinic is at Port Arthur. Private hospital facilities are available at Beaumont.

Customs.—The Customs Service maintains an office in the Federal Building.

Immigration.—The Immigration Service maintains an office in Port Arthur.

Harbor regulations.—The harbor regulations are administered and enforced by the Port Commission.

Terminal facilities.—The municipal wharves and warehouses are on the south side of the city, on the protruding point just north of the turning basin. Virtually all of the general shipping of the port is handled at this terminal. Extending along both sides of the point, the wharves have a total berthing space of 3,750 feet. The transit sheds have a total floor space of 255,000 square feet, and there are 200,000 square feet of open-storage space. The port has railroad and highway connections. The Superintendent of Docks has an office at the terminal.

Along the river below Beaumont are extensive petroleum-handling terminals, the larger ones being facilities of the Magnolia Petroleum Corporation and the Sun Oil Company, 1 and 5 miles, respectively, below the turning basin.

Warehouse facilities at the port provide ample storage for general cargo, cotton, and cold storage. There are no grain elevators.

Small-boat facilities.—Landings for small craft are in the bend below the turning basin and along the river above the railroad bridges. A boatyard at the mouth of **Brakes Bayou** can haul out craft up to 50 feet in length and 3½ feet in draft, for general repairs. Gasoline, oil and water can be secured along the waterfront.

Supplies.—Numerous stores in Beaumont stock provisions and general supplies. Ship chandler's stores are available. Fresh water of good quality can be procured at the municipal wharves as well as at most of the wharves along the river. Bunker oil is available at four of the oil terminals along the river; the maximum rate is 7,000 barrels per hour. There are no coal bunkering facilities.

Repairs.—A shipyard on the west side of the river above the railroad bridges has a marine railway capable of hauling out vessels of 2,500 tons, 345 feet in length, and 13 feet in draft. There are 4,000 feet of dock space available for topside repairs. The yard has a floating drydock with a capacity of 15,000 tons, 600 feet in length, 22 feet in draft, and 87 feet in width. The yard's equipment can handle almost any repair work on wood or steel vessels; equipment includes a derrick barge with a capacity of 75 tons.

An iron works can handle any kind of foundry or machine work.

Communications.—The radio station WPA of the Radiomarine Corporation at Port Arthur provides ship-to-shore service. The port is served by four railway systems and one terminal line.

Pine Island Bayou, emptying into Neches River 9 miles above Beaumont, has a navigable depth of about 8 feet for about 10 miles to the pumping plant of the Neches Water Company. The only commerce on the bayou is the transportation of fuel oil to this plant.

Sabine River, emptying into Sabine Lake from the northward, has an improved channel from the Sabine-Neches Canal to Orange, a distance of 8 miles. Federal project depth is 30 feet to the municipal wharf, thence 25 feet through the cut-off to the site of the old highway bridge at Orange.

A draft of about 10 feet can be taken 10 to 15 miles above Orange, but there is no commerce in this section and the upper river probably is obstructed by snags. An overhead power cable with a permit clearance of 150 feet crosses about 0.6 mile above the Orange waterfront, and a fixed highway bridge, about 1.5 miles farther up, has a horizontal clearance of 150 feet and a vertical clearance of 42 feet. Below Orange the river is well marked by lights and buoys.

Orange is a city of some commercial importance 8 miles above Sabine Lake and 36 miles from the Gulf. The city is on the main coast highway between Lake Charles and Beaumont.

Channels.—The shoal sections of the river channel between the Sabine-Neches Canal and the municipal wharf have been dredged to a project depth of 30 feet, and the channel around **Orange Harbor Island** from the municipal wharf to the turning basin and to the site of the old highway bridge east of the city have been dredged to 25 feet. Channels and basin are maintained at, or near, project depths.

A **restricted area** for vessels of a Navy reserve fleet has been established in the river at Orange; limits of the area are described in § **207.184,** Chapter 2.

Anchorage.—There is no anchorage area in the vicinity of the port. Vessels may tie up to the banks of the river for limited periods if permission is obtained from the Corps of Engineers.

Tides and currents.—Practically no periodic tides occur. The rise and fall of the water depends upon meteorological conditions. Currents in the Sabine River are about 2½ knots during high stages.

Coastal (storm) warnings are displayed, daytime only, at Orange.

Towage.—Towboats are available.

Quarantine.—Vessels subject to visitation are boarded at the docks.

Hospitals.—The nearest United States Public Health Service outpatient clinic is at Port Arthur. Local hospital facilities are available.

Harbor regulations.—The local regulations are administered by the Orange County Navigation and Port District of the Port of Orange.

Bridges.—A fixed highway bridge over the river above Orange has a horizontal clearance of 150 feet and a vertical clearance of 42 feet. Near Echo the river is crossed by a railway swing bridge with a horizontal clearance of 168 feet and a vertical clearance of 1½ feet; drawspan regulations are stated in § **203.245,** Chapter 2.

Terminal facilities.—The municipal terminal, located on a slip 2 miles below the city, has a wharf 1,200 feet long and transit sheds with a total floor area of over 90,000 square feet. Rail and highway connections are available. The harbormaster has an office on the wharf. In August 1956 a depth of 32 feet was along the face of the wharf. Along the waterfront of the city are several smaller wharves.

Supplies.—Provisions and some marine hardware are available. Fresh water of good quality can be obtained either at the municipal wharf or along the river front in town. There are no fuel bunkering facilities. Small boats can obtain gasoline, diesel oil, water, and provisions at wharves in Orange.

Repairs.—Orange has two marine repair yards with facilities for building, hauling, and repairing moderate-size vessels. The larger yard has a floating drydock which can accommodate vessels of 3,500 tons, 350 feet in length, and 25 feet in draft. This yard also has marine ways. The second shipyard has marine ways capable of hauling out vessels up to 200 feet in length and 9 feet in draft. Both yards have machine shop facilities.

Communications.—The port is served by two railway systems.

Cow Bayou is a crooked stream flowing into Sabine River 4 miles above Sabine Lake. A Federal project provides for a dredged channel 13 feet deep from Sabine River to the turning basin at the highway swing bridge near Orangefield. The midchannel controlling depth was 11 feet in August 1956. A draft of 4½ feet can be carried about 15 miles above the turning basin. Three highway swing bridges over the bayou have a minimum horizontal clearance of 45 feet and zero feet vertical clearance; drawspan regulations are stated in § **203.245,** Chapter 2. Overhead power cables below Orangefield turning basin have a permit clearance of 72 feet. About 0.5 mile above the turning basin there is an overhead power cable with a permit clearance of 54 feet.

Adams Bayou empties into Sabine River 1.5 miles above Cow Bayou. A Federal project provides for a channel 12 feet deep to the first fixed bridge. The controlling midchannel depth in the improved portion was 13 feet in August 1956. The highway fixed bridge has a horizontal clearance of 76 feet and vertical clearance of 7 feet. Just below the bridge is a shipyard with two marine ways capable of hauling out vessels up to 85 feet in length and 9 feet in draft, for general repairs. Also below the bridge is a yacht basin with covered-storage facilities for yachts up to 45 feet long. Diesel oil, gasoline, and water are available. Halfway between the Sabine River and the fixed bridge is a large plant of the Dupont Chemical Company; its docks are not available to the public.

Crossing Sabine River at **Ruliff,** Tex., 14.6 miles above Echo, is a railway bridge with a horizontal clearance of 60 feet and a vertical clearance of 19 feet at low water and 4 feet at extreme high water. Between **Starks,** La., and **Deweyville,** Tex., 18.7 miles above Echo, is a highway bridge with a horizontal clearance of 60 feet and a vertical clearance of 20 feet at low water and 7 feet at extreme high water; drawspan regulations are stated in § **203.245,** Chapter 2.

Chart 592.—Lake Charles Deepwater Channel, a part of the Intracoastal Waterway, enters Sabine River 0.7 mile above Adams Bayou and extends eastward 22 miles to the Calcasieu River at a point 13 miles below Lake Charles. This affords an inside passage between Port Arthur and Lake Charles for vessels with drafts up to 16 feet.

The Intracoastal Waterway route continues along Sabine River and the Sabine-Neches Canal.

Chart 1280.—High Island, about 30 miles westward of Sabine Pass, is a mound about 1 mile in diameter and 40 feet high, the highest land on the coast between Sabine Pass and Galveston. It constitutes a conspicuous landmark for vessels making, or standing along, the coast. Numerous oil derricks are on the mound and, about 1.5 miles northward, are two 132-foot towers for a transmission line crossing the Gulf Intracoastal Waterway.

Heald Bank, lying 34 miles eastward of Galveston and 27 miles offshore, is nearly 5 miles long in a northeast and southwest direction. Depths of 25 to 35 feet extend over the bank, and depths of 50 to 60 feet are found as close as 1.5 to 2 miles to the southeastward. In a heavy sea Heald Bank should be avoided by all vessels, including those of moderate draft which could pass over in smooth water. A 33-foot spot about 8.5 miles southwest of Heald Bank lighted whistle buoy 2 is marked by a lighted whistle buoy.

The currents at Heald Bank are due largely to winds. In calm weather or with light breezes, little current is experienced. Wind velocities of 25 to 40 miles produce currents of about 0.5 to 1 knot, setting in a direction approximately fair with the wind. In February 1919 a velocity of 2.6 knots in a southwestward direction was observed. A northerly wind of about 50 miles an hour was blowing at this time. From observations made during the first 6 months of 1915, the average drift was one-fourth knot, setting in a westward direction.

Chart 1282.—Bolivar Peninsula, southwest of High Island, extends to the Galveston Bay Entrance. The land is low with few prominent features. Bolivar Point Daybeacon, on the southern end of the peninsula, is a white and black horizontally banded conical tower, standing 116 feet in height. Numerous wrecks lie in the shoal water along the Gulf coast off Bolivar Peninsula. It is reported that several fishing vessels have been wrecked by these obstructions.

Directions, Galveston Entrance.—Approaching from northeastward, vessels should make High Island and then follow alongshore, taking care to be off far enough to clear the jetty. The bottom is fairly regular and there are no known dangers within 15 miles of the coast outside of the 3-fathom curve.

Approaching from southwestward, keep in 5 to 6 fathoms in winter and deeper in summer, because of the prevailing southerly winds and swell.

During the winter months when northers are frequent, it is well for westbound vessels to keep a little northward of the 295° course from Dry Tortugas to Heald Bank lighted whistle buoy, but go southward of it in passing. In either direction, verify position as often as possible, for no sailing directions can be given which will suffice for all of the varying conditions of current encountered. For

300 miles before reaching Heald Bank, westbound craft frequently overrun, especially during the winter months, and eastbound vessels overrun for the last 300 miles before reaching Dry Tortugas. Depend upon soundings westbound, but upon observations eastbound.

The following statements regarding currents apply to general conditions which may be looked for at all seasons. They are based mainly upon the Central American Waters Current Charts, issued by the Hydrographic Office, which were compiled from many current observations.

Along the course from Dry Tortugas to Galveston for 200 miles after leaving Dry Tortugas, a southeastward current of about one-half knot may be expected. For the next 100 miles the current generally sets eastward with a velocity of one-half knot. For the next 200 miles the set is about north-northeast and the velocity is one-fourth knot. For nearly 200 miles before reaching Galveston the set is approximately west-northwest and the velocity one-fourth knot.

Winds and storms frequently modify normal conditions, and their effects must be taken into account.

Charts 1282, 886.—Galveston Bay is a large irregularly shaped shallow body of water on the coast of Texas about 285 miles westward from Southwest Pass and 688 miles westward from Dry Tortugas. The bay is about 30 miles long in a general north-northeast and south-southwest direction, about 17 miles wide at its widest part, and has general depths of 7 to 9 feet. About midway of its length it is nearly divided into two parts by **Red Fish Bar,** a chain of small islets and shoals, through which the Houston Ship Channel has been dredged. Northward of Red Fish Bar the bay is known as the Upper Bay and southward as the Lower Bay. The northeastern end of the upper bay is Trinity Bay.

Galveston Bay is the approach to East and West Bays, Houston Ship Channel, and the cities of Galveston, Texas City, and Houston, as well as to numerous smaller towns and bayous.

Galveston Entrance, the approach to Galveston Bay, lies between two converging stone-rubble jetties about 4 miles long and 1.3 miles apart at the outer ends. From deep water in the Gulf, the north jetty extends to Bolivar Peninsula and the south jetty extends to the north end of Galveston Island.

Galveston Jetty Light, 91 feet above the water and visible 15 miles, is shown from a cream-colored cylindrical brick structure with black pilasters near the outer end of the south jetty. The fog signal and radiobeacon station are synchronized for distance-finding. A special radio direction-finder calibration station has been established on the Galveston Jetty Light Station.

Prominent features.—Approaching the entrance to Galveston Bay on a clear day, among the first objects sighted will be the grain elevator 240 feet high on the Galveston Channel at 28th Street, the Buccaneer Hotel near the sea wall, and Galveston Jetty Light on the south jetty. Bolivar Point unused lighthouse, the Santa Fe Building, and the hospital of the University of Texas show conspicuously on closer approach, and are easily identified. Vessels approaching from eastward near the coast will first sight High Island, and those approaching from southwestward will probably first sight the hotel near the sea wall and then the grain elevator.

Boundary lines of inland waters.—Lines established off Galveston are described in **§ 82.106, § 82.111,** Chapter 2.

Channels.—Federal project depth is 38 feet over the outer bar and 36 feet over the inner bar. The project is under constant maintenance and controlling depths are given from time to time in the Notice to Mariners. Galveston Bar lighted whistle buoy 1, about 2 miles off the jetties, marks the channel entrance. A light is shown near the end of each jetty. Inside the jetties, the channel first passes close by the north jetty, and then crosses to the south side. The channel is well marked with lighted buoys and a lighted range.

Galveston Harbor is the name generally applied to the larger deep-water area between the jetties extending westward between Bolivar Peninsula on the north and Pelican Island and Galveston Island on the south. On the south and west it connects with the ship channels to Galveston, Texas City, and Houston. **Bolivar Roads** is the western part of the harbor.

Galveston Channel extends from Bolivar Roads off Fort Point to and along the wharf front at Galveston with a length of about 4 miles and a width of 1,200 feet.

Anchorage.—Vessels prevented from entering due to northers can anchor in about 5 fathoms with the abandoned lighthouse bearing about northwest. The holding ground is good with little sea. Bolivar Roads affords good anchorage in depths from 22 to 41 feet, with good holding bottom, at all seasons except during hurricanes, when refuge is taken at Houston.

Because of heavy traffic, Galveston Channel can be used only for temporary anchorage by steamers preparing to haul into berths at the wharves or after leaving the wharves before going to sea. Small craft anchoring in the designated areas should find the shoaler water so as to leave the deeper areas clear for larger vessels.

In Galveston Bay small craft can anchor anywhere outside of the dredged channels where the depth is sufficient. The water in the bay may be lowered as much as 3 feet by a norther, and vessels should anticipate this when selecting anchorage during the winter.

An **explosives anchorage area** has been established in the harbor; limits and regulations are stated in **§ 202.197,** Chapter 2.

Bridges.—A rail and highway causeway with a bascule bridge crosses Galveston Channel between the westerly end of Pelican Island and Galveston. The drawspan has a horizontal clearance of 125 feet and a vertical clearance of about 10 feet; when open, the bascule leaf overhangs the channel, and caution is necessary. Galveston is connected with the mainland by two causeways 1.75 miles long, crossing the northeast end of West Bay. The northeasterly causeway is for rail and highway and the southwesterly for highway traffic. Both have bascule draws. The rail span has a horizontal clearance of 100 feet and a vertical clearance of 10 feet. The highway

span has a horizontal clearance of 105 feet and a vertical clearance of 5 feet; drawspan regulations are stated in **§ 203.541, § 203.542,** Chapter 2. The power cable over the bay at the bridges has a permit clearance of 99 feet.

Tides and currents.—Near the time when the moon's declination is greatest north or south, there is but one high and one low tide daily. When the moon is near the equator, however, there are two high and two low waters daily. Predictions of the times and heights of the tide at Galveston for every day in the year are given in the Tide Tables. Both the times and heights of the tide are considerably affected by the winds. It is not uncommon for the wind to blow from the east and southeast for a number of days, banking the water up in this part of the Gulf and filling the bays to from 2 to 4 feet above mean low tide. The wind then suddenly changes to the north and blows steadily and with considerable violence for several days, blowing the water out of the bay and reducing the level of the Gulf and the bay to 2 or 3 feet below mean low water.

The currents are also modified frequently by the winds. Easterly or southeasterly winds may cause a continuous flood current between the jetties at the entrance for a period of a day or more, and westerly or northwesterly winds sometimes set up a continuously outgoing current for a similar period.

The current outside the jetties frequently has a velocity exceeding 1 knot. The set may be in any direction under the combined influence of the entrance currents and currents setting along the coast.

Daily current predictions for Galveston Bay Entrance, between jetties, are published in Tidal Current Tables, Atlantic Coast. Daily predictions for a number of other places in Galveston Bay can be obtained through the use of table 2 of the same publication.

Weather.—The prevailing winds are northerly from November to March, throughout which time northers occur frequently. These gales, although occasionally blowing with a velocity of over 40 miles, are not dangerous to vessels anywhere close to the coast, as they blow offshore and the sea is not heavy; the Weather Bureau warning of their approach gives vessels ample time for preparation. From April to October the prevailing winds are southerly, and hurricanes occur occasionally; these are dangerous to shipping near the coast because the wind is onshore. Hurricanes of marked violence at Galveston have occurred as follows: September 1875, September 1877, September 1900, and August 1915. The wind attained 100 miles per hour velocity in August 1915.

Coastal (storm) warnings.—Signals are displayed, day and night, at the Coast Guard station at Fort Point.

Pilotage.—Pilotage is compulsory for foreign vessels and for American vessels in foreign trade. Pilotage is not compulsory for coastwise vessels having on board a pilot licensed by the United States Coast Guard.

The Galveston-Texas City and Houston pilot boats will be found cruising off the bar and anchored near the end of the jetties, providing vessels are due. There are separate pilot boats for the two destinations; the signal for a Galveston-Texas City pilot is four long blasts or light flashes, and two long and three short for a Houston pilot. Ships are taken outbound day or night in normal weather. Enrolled coastwise vessels, and registered and foreign-flag vessels not required to pass quarantine inspection, will be taken in at night provided the agent makes the request to the pilot's office. Vessels obliged to pass quarantine inspection usually anchor on the bar until daybreak, but these vessels too will be brought into quarantine if requested by the agent.

All pilot boats go directly alongside the vessel to be boarded. A speed of 4 to 7 knots by the vessel, offering a good lee to the pilot boat approaching from the ship's quarter, will facilitate the boarding operation. This method is mandatory unless wind and sea are calm. Vessels under way near the sea buoy are given priority over vessels at anchor, which usually have to get under way before the pilot can be boarded. All pilot boats are equipped with radiotelephones.

Galveston occupies the entire width of the eastern end of **Galveston Island.** The wharves are built along Galveston Channel on the north side of the city, and the south side fronts upon the Gulf from which the city is protected by a concrete seawall 17 feet high. Though widely known as the major seashore resort in the southwest, Galveston is essentially and primarily a place of maritime commerce and industry. The short route to the sea, together with the deep and easily navigated channel and excellent port facilities, enable Galveston to handle cargo most expeditiously and economically.

Both foreign and domestic commerce are extensive, the principal exports are cotton, grain, flour, rice, sulphur, and metals. The main imports are bagging, bananas, creosote, and raw sugar.

Port Bolivar has been abandoned as a port. The pier slips have shoaled, and in 1956 the only marine activity was an auto ferry operating between Galveston and Port Bolivar. The maintained ferry channel had a controlling depth of 13 feet and the turning basin, 7 feet.

Pelican Island, an artificial island with a dike along the southern side, protects Galveston Channel from northers. A Coast Guard Buoy Depot and a large shipyard are on the island. A bridge connects the island with Galveston and the island is being developed for industrial sites.

Towage.—Towboats and seagoing tugs are available at Galveston.

Quarantine.—The national quarantine station is located in the Customhouse. Vessels are boarded at the docks between the hours of 6 a. m. and 5 p. m., but may be boarded at anchorage if the vessel remains at anchor more than 24 hours.

Hospitals.—A Public Health Service hospital is located in Galveston. The medical school and hospital of the University of Texas, and other hospitals, are in the city.

Customs.—Vessels are usually boarded at the docks, but may be boarded at anchorage if a vessel remains at anchor more than 24 hours. The Customs Service maintains an office in the customhouse.

Immigration.—Vessels are usually boarded at the dock, but may be boarded at anchorage if the vessel remains at

anchor more than 24 hours. The Immigration Office is in the Post Office Building.

Harbor regulations.—A Captain of the Port, designated from the United States Coast Guard, exercises jurisdiction over all matters covering the movement and mooring of vessels and enforces the provisions of the anchorage regulations for the port.

Terminal facilities.—All shipping terminal facilities are located on the city waterfront along the south side of Galveston Channel, and are privately owned.

Most facilities are owned and operated by the Board of Trustees of the Galveston Wharves whose properties extend along the central portion of the city waterfront for about 2 miles. These properties include 32 piers and wharves with total berthing space for 40 ships. The three piers of the Southern Pacific Terminal Company, just to the westward, have total berthing space of about 6,000 feet. Depths up to 35 feet could be carried to all these terminals, in September 1956.

Practically all piers and wharves have transit sheds, there being 30 waterfront warehouses with a total storage space of about 4,350,000 square feet. All have both rail and highway connections, and nearly all have shipside tracks. The port has a total storage capacity of 10,000,000 square feet.

The port facilities have been especially developed for the efficient handling of cotton, grain, sulfur, and bananas, as well as general merchandise. Numerous cotton warehouses with compresses are located near or on the waterfront. A concrete electrically operated grain elevator has a capacity of 6,000,000 bushels, with a sacking plant in connection, and two other grain elevators have capacities of 500,000 and 1,000,000 bushels; one of these has pneumatic electrically operated unloading equipment with a capacity of 6,000 to 15,000 bushels per hour. On one pier there are three electrically operated banana conveyors, and there are special facilities for handling sulfur.

The properties of the terminal companies are administered directly by the respective companies.

Dockage.—No dockage charges are made at the railroad piers except when vessels occupy berths while being fitted for loading grain. Dockage charges are made at all other piers.

Supplies.—Provisions and supplies including ship chandlery are available. Ample supply of fresh water, good for boiler use and for drinking, may be obtained at all piers.

Several companies furnish fuel oil either directly from piers or by pumping from oil barges. The maximum capacity is about 3,000 barrels per hour.

Repairs.—On Pelican Island a drydock firm has four drydocks, one with a rated lifting capacity of 15,000 tons, two of 10,000 tons, and one of 3,000 tons. Vessels up to 600 feet in length and 25 feet in draft can be hauled out. A derrick boat of 50-ton capacity can be engaged. There is berthing space where topside repairs can be made to 20 vessels at one time. This yard has complete shops for all types of marine repairs to steel or wooden vessels.

The port of Galveston is well equipped with numerous marine repair shops and foundries capable of making repairs to the hull or machinery of steel or wooden vessels. A company has facilities to repair refrigerator equipment.

Salvage facilities.—Tugs, lighters, pumps, derricks, diving equipment, and other facilities are available for wrecking and salvage operations.

Small-boat facilities.—The slips between piers 15 and 22 are used by small craft. A yacht basin with a depth of 8 feet in the entrance channel is located just east of the Gulf Service Station east of pier 10. Gasoline, oil, and provisions can be secured in the basin. Fresh water is piped to the piers and there are berths under sheds. Just to the westward of the Gulf Station are three shipyards with marine ways, the largest of which can haul out vessels up to 350 tons, 140 feet in length, and 14 feet in draft, for general repairs. A machine and carpenter shop operates in connection with the shipyard.

Communications.—The radio station of Mackay Radio and Telephone Company provides ship-to-shore service. Weather broadcasts are made. Galveston is served by six railway systems. Commercial air lines provide service to all parts of the country.

Government offices.—A branch Hydrographic Office is in the Post Office Building, where bulletins are posted giving information of value to mariners who may also inspect navigation publications here and correct their charts from standards. No charge is made for this service.

The District Office of the Corps of Engineers is in the Santa Fe Building.

Texas City, on the west side of Galveston Bay about 7 miles northwestward from Galveston, is a port of considerable commercial importance. It has extensive foreign and coastwise trade in petroleum and iron products. There are connections with the railroads entering Galveston and with the State highway between Galveston and Houston.

Channels.—Texas City Channel extends from deep water in Galveston Harbor through the lower end of Galveston Bay to an artificial harbor off the wharves at Texas City. The Federal project provides for a channel 36 feet deep to and inside a harbor 4,250 feet long. The channel is maintained.

On its northerly side for about 4.5 miles out from the mainland, the channel is protected by a double dike (a pile dike with a rubble-mound dike along the south side); the dike is about 900 feet north of the channel at the eastern end and about 2,300 feet at the western end. The harbor is further protected by a large spoil bank, named **Snake Island,** extending along the eastern side, and by a narrow strip of land at the south end which is pierced by a barge canal.

A small-boat channel with a depth of about 6 feet leads northwestward from just inside the front range light to the inshore end of the channel dike where there is a landing and a small basin used by fishing and pleasure boats.

A natural small-boat channel about 5 to 7 feet deep, marked by daybeacons and buoys, leads southward from

the Texas City channel to the Intracoastal Waterway through the lower Galveston Bay.

Coastal (storm) warnings are displayed at Texas City.

Towage.—Steam vessels usually proceed from the bar to Bolivar Roads without assistance. Tugboats are available at Texas City for docking, undocking, and shifting.

Quarantine.—The Quarantine Station is located in the Customhouse at Galveston. Vessels are boarded at the dock.

Hospital.—The nearest Public Health Service hospital is at Galveston.

Customs.—The customhouse is located at Galveston.

Immigration.—Immigration Service is provided by the Immigration office at Galveston.

Terminal facilities.—The Texas City Terminal Railway Company owns and operates all Texas City port facilities. There is a wharf for a seatrain (railroad car ferry) and wharves with berthing space for six oil tankers. Only liquid cargo is handled by ship, other than the seatrain. There are additional berthing facilities for barges.

Chart 1282.—East Bay is a large and shallow bay extending eastward about 16 miles from the southern end of Galveston Bay and lying northward of Bolivar Peninsula. The depths in the bay range from 2 to 7 feet. **Hanna Reef,** a chain of low sand islands and shoals, lies east of the Houston Ship Channel and partially separates Galveston Bay from East Bay. There is no passage through Hanna Reef, but small craft of about 3-foot draft can pilot their way between the bays at either end of the reef.

East Bay Bayou (Chart 1280) empties into the northeastern end of East Bay. **Oyster Bayou** is a shallow stream westward of East Bay Bayou also emptying into the northeast end of East Bay. **Robinson Bayou** has a depth of only 1 foot at the entrance and is little used except by hunters.

Trinity Bay is a large body of water northeast of the upper part of Galveston Bay. Depths in the bay proper range from 7 to 9 feet. Extensive oil-drilling operations are in progress in the Red Fish Bar, Houston Point, and Trinity Bay areas. Numerous oil well structures and derricks are visible to the eastward of the Houston Ship Channel. The derricks are not fixed objects, or even stationary for long, as they are moved as soon as their wells are brought in or abandoned.

Lone Oak Bayou, 5.5 miles northeast of **Smith Point,** empties into Trinity Bay. A light marks the entrance and daybeacons mark the privately maintained channel which had a depth of 2½ feet in September 1956. Several oil wells are off the bayou.

Double Bayou, 8 miles northeast of Smith Point, flows into Trinity Bay and is used mainly by oil and fishing interests. The entrance channel is marked by two lights along the south side of the channel. Project depth is 6 feet; in July 1956 the available depth was 4½ feet. At a point 0.5 mile above its mouth, the bayou divides into **East** and **West Forks** and is navigable for distances of, respectively, about 12 and 4 miles. **Double Bayou** and **Eagle** are settlements along the west fork between the mouth and the fixed highway bridge, 3 miles from Trinity Bay; the bridge has a horizontal clearance of 10 feet and a vertical clearance of 14½ feet. A small marine ways at Double Bayou can haul out boats up to 30 feet in length. Owners must arrange for their own repairs. A county bridge crosses the bayou at Jackson's store on East Fork, 5 miles from the junction of the bayou.

Anahuac is a town at the northeastern end of Trinity Bay, opposite the mouth of Trinity River. A Federal project provides for a depth of 6 feet through the shoals from deep water in the bay, past Anahuac, and into the mouth of Browns Pass. The channel is marked by lights and intermediate aids. Controlling depth was 8 feet in February 1956. Mariners should be on the lookout for floating logs. A depth of 5 feet can be taken to a small landing used mainly for loading shells. There are no facilities for small boats. Gasoline is available at automobile service stations in the town. The **Chamber-Liberty Counties Navigation District Canal** is used for irrigation purposes only. A highway connects Anahuac with Goose Creek and Houston.

Lake Anahuac (Turtle Bay) is separated from Trinity Bay by an earth dike which obstructs all navigation.

Trinity River, which empties into the northeastern end of Trinity Bay, is one of the largest rivers in Texas. The entrance to the river is through **Anahuac Channel** and **Browns Pass.** A depth of 6 feet is maintained through the Anahuac Channel and Trinity River to the sulfur plant docks at Moss Bluff. From there a draft of 2½ feet can be carried upriver to **Liberty,** except where snags and sand bars obstruct traffic. Sulfur is moved by barge from Moss Bluff to Galveston Bay. A fixed highway bridge with a horizontal clearance of 150 feet and vertical clearance of 65 feet crosses the river about 6 miles above Anahuac.

A Federal project authorizes a channel 9 feet deep for Trinity River. The channel extends from near Light 34 in the Houston Ship Channel to just below the town of Anahuac, crossing Smith Point and thence following in general the contours of the easterly shore to Anahuac. By 1956 the channel had shoaled southwest of Smith Point, and was unusable below that point. The spoil bank forms a protective bank on the west of the channel. There are openings to the east of Smith Point, at the privately maintained channel at Lone Oak Bayou, and at the channel into Double Bayou. The spoil bank closes off to the mainland at the north end of the channel near Anahuac.

The portion of Trinity River project from Anahuac to Liberty provides for a channel 9 feet deep. In 1956 no work had been done on this section.

Between Trinity River and Umbrella Point there are numerous pipes, piles, and abandoned oil wells, which constitute a menace to navigation. Mariners are advised to keep clear.

Off **Point Barrow** a privately maintained channel with depth of 6 feet in 1956 leads to an oil-company loading terminal. On the north side of this channel there is an overhead power cable with permit clearance of 19 feet strung on poles having horizontal clearance of 250 feet

which extends southeastward about 1,200 feet from shore, where the cable is submerged.

Off **Houston Point,** a small dredged channel with a depth of 6 feet in 1956 leads to an oil company dock.

Cedar Bayou is a crooked stream flowing in a southerly direction into the northwestern corner of Galveston Bay, 2.5 miles east of Morgan Point and 25 miles north of Galveston.

The principal commerce is in crude oil and shells, handled mostly in barges. A channel with project depth of 10 feet, protected by submerged jetties at the entrance to the bayou, has been dredged across the flats from Houston Ship Channel to the first bend above the mouth of the bayou; in July 1956 this channel had a depth of 7½ feet. The controlling depth was 5½ feet in August 1954 from the bend to 1.7 miles above the mouth, thence 7½ feet for 7.8 miles. **Cedar Bayou** is a small town 8 miles above the mouth of the bayou.

The entrance channel across the flats is marked by two lights and intermediate aids. Light 31 marks the offshore end of the submerged jetty on the north side of the entrance to Cedar Bayou. About 0.5 mile inside the mouth, the bayou is crossed by a bascule bridge with a horizontal clearance of 80 feet and vertical clearance of 12 feet.

Goose Creek, which empties into **Tabbs Bay** 1.5 miles north of Morgan Point, is connected with Houston Ship Channel by a dredged channel along the northwest side of **Hog Island.** An overhead power cable across Tabbs Bay has a permit clearance of 27 feet. A depth of 5 to 6 feet can be carried through this channel for about 1 mile up Goose Creek, thence 3 to 4 feet for about 5 miles farther. A large oil field is located east of the creek. Traffic consists mainly of crude oil and shell handled in barges. Several fixed bridges cross the creek; the first about 0.4 mile above the mouth has a horizontal clearance of 55 feet and a vertical clearance of 18 feet. **Baytown** is on the north shore of Tabbs Bay. The area just east of the creek, is the center of the oil industry in the vicinity; there are highway and rail connections to Houston.

Morgan Point is on the northwest end of Galveston Bay, at the entrance to San Jacinto River, on the western side of Houston Ship Channel. **La Porte,** a town 2 miles southwest of Morgan Point, has rail and highway connections with other parts of the state.

Barbour Cut, extending about 1.2 miles westward along the north side of Morgan Point, had a controlling depth of 6½ feet in October 1956 and depths up to 30 feet in the basin at the head. It provides excellent shelter for vessels up to 150 feet in length. The channel is narrower and shoal water extends right up to its edge at the entrance.

There are several private commercial wharves in the cut. Two yacht basins have covered and open-storage facilities for yachts up to 75 feet in length. The larger marine railway can haul out vessels up to 100 tons in weight, 90 feet in length, and 9 feet in draft. Both yards do general repairs; the larger yard has machine and carpenter shops. Diesel oil, gasoline, water, and ice are available.

From Morgan Point southward to **Red Bluff** are resort hotels and summer homes with numerous boat landings along the shore. The Houston Yacht Club is 1.5 miles north of Red Bluff. The club maintains a range leading to the yacht basin. A wrecked barge awash at low water lies 1.5 miles off Red Bluff.

Clear Creek empties into upper Galveston Bay on the west side, about 20 miles northwestward from Galveston. About 2 miles above its mouth it broadens into a shallow body of water 2.5 miles long known as **Clear Lake.** The Federal project provides for a channel 7 feet deep from Galveston Bay to the county highway bridge at **League City.** Near the entrance is a power cable with overhead permit clearance of 99 feet. About 6 miles above the entrance a power cable over the creek has permit clearance of 55 feet. The channel is marked by lights and a lighted range. The range rear light is obscured for a considerable portion of the entrance channel by a building, but both range lights are still visible from the seaward end of the channel. In August 1956 vessels drawing up to 9 feet could pass on an average tide to the yacht basin above the bridges. A controlling depth of 4½ feet across the lake section was found in July 1956.

Seabrook Light marks the north side of the offshore entrance to the channel. **Seabrook,** on the north side of the entrance, is headquarters for fishing and pleasure boats. **Kemah** is a town on the south side. Gasoline, water, and provisions can be obtained at both towns.

Adjacent highway and railroad bridges cross Clear Creek 0.5 mile above its mouth. One is a bascule and the other a swing bridge. The minimum horizontal clearance is 40 feet and the vertical clearance is 7 feet; drawspan regulations are stated in **§ 203.525,** Chapter 2.

There are five boatyards in Seabrook and Kemah. One yard is below, and the others are above, the bridges. Three yards have marine ways, three yards have stiff-leg cranes, and one yard has a travel lift. The largest marine ways can haul out vessels up to 300 tons, 136 feet in length, and 11 feet in draft. Two of the yards do hull repairs and the other yards do general repairs. The larger yard has machine and carpenter shops. There are storage facilities for yachts up to 80 feet in length under cover, and up to 150 feet in length in the open.

Coastal (storm) warnings, day and night, are displayed at the Kemah Yacht Basin.

A privately maintained channel 3 miles west of **Eagle (Edwards) Point** leads to a small dock at the headquarters of an oil company. The entrance is marked by two fixed lights and a lighted range. In October 1956 the controlling depth was 6 feet.

Dickinson Bayou empties into **Dickinson Bay,** a small indentation in the western side of lower Galveston Bay, between **April Fool Point** and **Miller Point,** about 13 miles northward of Galveston. The Federal project provides for a channel 6 feet deep through Dickinson Bay and Dickinson Bayou to the railroad bridge at Dickinson. The entrance channel is marked by three lights and intermediate aids, and in September 1956 the controlling depth was 6 feet to Dickinson, a small settlement about 7 miles up the bayou.

Adjacent rail and highway bridges cross the bayou 1 mile above its mouth. The highway bridge has a bascule span with a horizontal clearance of 50 feet and a vertical clearance of 12 feet. The railroad bridge has a swing span with a horizontal clearance of 61 feet and a vertical clearance of 8 feet; drawspan regulations are stated in § **203.535**, Chapter 2. The overhead power cable at the bridges has a permit clearance of 79 feet. A small boatyard above the bridges has a marine ways capable of hauling out boats up to 35 feet in length and 3 feet in draft. At Dickinson two fixed bridges cross the bayou. The railroad bridge has a horizontal clearance of 27 feet and a vertical clearance of 14 feet; the highway span has a horizontal clearance of 30 feet and a vertical clearance of 10 feet. The permit clearance of cables over the bayou is 42 feet except for the one at Clifton By The Sea where a power cable running parallel with a small channel has clearances ranging from 14 to 29 feet.

Moses Lake is a shallow unimportant lagoon south of Dickinson Bay.

Houston Ship Channel extends from Galveston Harbor across Galveston Bay and through parts of San Jacinto River and Buffalo Bayou to the city of Houston, a distance of 44 miles. The entrance to the channel is at the northwest end of Bolivar Roads, between Port Bolivar and Texas City channels. The entrance is marked by Galveston Bay Channel entrance lighted range, and by a lighted buoy on the northeast side of the channel. The channel through the bay is marked by numerous lights and buoys in pairs.

The Federal project provides for a channel 36 feet deep from the bay to and including the Houston Turning Basin. The project is maintained and controlling depths are given from time to time in Notice to Mariners.

South of Red Fish Bar, spoil banks extend on both sides of the channel as far as buoy 6. Just north of Light 29, a narrow channel with a depth of 8 feet leads westward to Dickinson Bayou. It is marked by stakes and an oil drum. Another gap, 500 feet wide and 6 feet in depth, opens westward just north of Light 39. Northward of Light 43 the channel is open on the west side as far as Morgan Point. Along the east side of the channel north of Red Fish Bar is a virtually continuous spoil bank with two gaps for entering the northwest portions of the bay. One gap is between buoy 38 and Light 40 with a depth of 9 feet, and the other is north of Light 56 with a depth of 5 feet. Part of the spoil material shows above water and forms a dike protection to the channel. For several miles south of Morgan Point this dike is relatively high and continuous.

From Morgan Point to Lynchburg, a distance of 8 miles, the ship channel is marked by numerous lighted ranges and other aids. Above Lynchburg to a point near Vince Bayou there are lights on the outsides of curves.

A ferry operates across the Houston Ship Channel at Lynchburg. There are no bridges across the ship channel, but overhead power cables near Galena Park and Mitchell Bay have permit clearances of 187 feet. There is a vehicular tunnel under the channel 2.4 miles from the upper end of Morgan Point Cut and another one between Pasadena and Galena Park.

Chart 588.—Morgan Point, 23 miles northwestward of Bolivar Roads at the entrance to San Jacinto River, marks the beginning of an extensive industrial area of oil refineries, cotton compresses, and other industrial plants lining the ship channel to Houston.

Lay-by moorings.—Suitable anchor chain moorings secured to deadmen on shore have been provided by the Port Commission on the west side of **Morgan Cut** at intervals of about 300 feet, to which vessels delayed by accident or fog may be made fast while lying against the clay bank of the channel.

Baytown, 4 miles above Morgan Point, is the site of the Humble Oil Refineries and is the shipping port for their products. The oil company has two concrete wharves 600 and 400 feet long, respectively, and a barge wharf 250 feet long. A Deputy Collector of Customs is stationed here to facilitate entries and clearances.

Chart 589.—San Jacinto River, branching northward from the ship channel at Lynchburg 8 miles above Morgan Point, has a navigable depth of 5 to 6 feet for about 11 miles above Lynchburg to the fixed bridge on the Beaumont-Houston highway. The overhead power cable near the entrance has a permit clearance of 54 feet. The bridge has a horizontal clearance of 130 feet and a vertical clearance of 26½ feet at low water and 3 feet at high water. **Highlands** and **Sheldon** are villages 4.5 and 10.5 miles, respectively, above Lynchburg.

San Jacinto Battlefield, a Texas State park on the south side of the channel 9 miles above Morgan Point, is the site of the battle by which the Republic of Texas won its independence. Landings are provided for small craft and vessels should slow down to prevent wave wash and damage to boats.

A monument 605 feet high is the most prominent object in the area. On and around its top are fixed red lights visible from Galveston Bay entrance on clear nights. The U. S. S. TEXAS, historic battleship veteran of two World Wars, is moored permanently in the park area along the ship channel.

Lynchburg is a town at the junction of Buffalo Bayou and San Jacinto River.

Chart 590.—Boggy Bayou is an unimportant bayou about 3 miles upstream from Lynchburg. Boggy Bayou Basin is a tanker loading terminal.

Greens Bayou, entering Buffalo Bayou from northward at a point 5.2 miles above Lynchburg, is navigable for a draft of 8 to 10 feet for about 5 miles, at which point it is crossed by three fixed bridges having a minimum horizontal clearance of 50 feet and a minimum vertical clearance of 13 feet. A draft of 4 to 5 feet can be taken 5 miles farther up the bayou. A shipyard and floating drydock are at the mouth of the bayou.

Harrisburg, about 2 miles below the turning basin, comprises the industrial section of the city of Houston.

Harrisburg Bend, a light-draft channel around **Brady Island,** has landings for pleasure craft, unloading rigs for sand and shell, boat repair yards, machine shops, material yards, and other facilities. A marine service station is just inside the west entrance to this channel. Depths of 10 feet can be carried in the channel. A fixed highway bridge over the bend, 0.2 mile south of Brays Bayou, has a horizontal clearance of 40 feet and a vertical clearance of 7 feet. The bend is crossed by an overhead power cable with permit clearance of 67 feet, about 150 yards south of the bridge.

Brays Bayou, branching off the western entrance to Harrisburg Bend, is a center for laying up and repairing pleasure craft and tugs. There are storage yards and a shipyard with marine ways. Another shipyard, on Brady Island, has marine ways capable of hauling out vessels up to 1,200 tons in weight, 270 feet in length, 60 feet in width, and 18 feet in draft. General repairs are made on all types of vessels, but the yard specializes in work on towboats and barges. Machine shops are nearby. Diesel oil, gasoline, water, and provisions are available.

The drawbridges crossing the bayou a short distance above the mouth have vertical-lift spans with a minimum horizontal clearance of 40 feet and a minimum vertical clearance of 8 feet, down, and 24 feet, up; drawspan regulations are stated in **§ 203.245,** Chapter 2. Two power cables over the bayou, above these bridges, have minimum permit clearance of 47 feet. There are five fixed bridges in the next 2 miles; the minimum horizontal clearance is 13 feet and minimum vertical clearance is 4½ feet.

Buffalo Bayou, above the turning basin, has a depth of about 7 feet for 6 miles to Main Street in Houston. This channel is used considerably by barges. The upper light-draft channel through the bayou is crossed by 15 bridges between the turning basin and Franklin Avenue. The first six of these are drawbridges with a minimum horizontal clearance of 85 feet and a minimum vertical clearance of 31 feet; the vertical-lift bridge minimum vertical clearance, up, is 65 feet. The next two are fixed bridges, then one drawbridge, and the remaining six are fixed structures with a minimum horizontal clearance of 48 feet and a minimum vertical clearance of 15 feet; drawspan regulations are stated in **§ 203.245,** Chapter 2. Numerous overhead cables cross the bayou; the minimum permit clearance is 67 feet.

Houston is the largest city in the State of Texas and the second largest port on the Gulf. The port is 22 miles above the head of Galveston Bay and 44 miles above Galveston entrance with which it has deep-water connection through Houston Ship Channel. The city is the principal distributing point for Texas and one of the main distributing points for the southwestern part of the United States.

Numerous trunkline railroads and improved highways radiate from the city throughout the State and connect with all parts of the United States. Regular steamboat service is maintained to the principal Gulf and Atlantic ports as well as most of the important world ports. Of Houston's extensive foreign and domestic commerce, its principal exports are petroleum products, cotton and cottonseed products, chemicals, grain and grain products. Major imports are crude oil, iron and steel products, sugar, bagging material, molasses, coffee, and general merchandise.

The turning basin at the head of the ship channel is on the southeast side of the city. The commercial terminals are on and just below the turning basin, and many industrial plants extend along each side of the channel for several miles below the basin. Between Morgan Point and Houston are numerous oil terminals along the ship channel.

Control of the public wharves and the belt line railroad is vested in a Board of Navigation and Canal Commissioners of the Harris County Houston Ship Channel Navigation District. The General Manager of the Port of Houston has offices in the Port Commission Building on Crawford and Capitol Streets. The **Director of Port Operations** is in charge of the public terminals, and vessels must be moved, shifted, and assigned to berths under his direction. He also has supervision over the dockside-to-cars handling of cargo.

Anchorages.—Vessels are prohibited from anchoring in the Houston Ship Channel or turning basin except in cases of emergency, in which circumstances they shall anchor as near to the channel edge or turning basin as possible so as not to interfere with free navigation or obstruct the approach to any pier.

Tides.—The mean range of tide in the Houston Ship Channel is less than 1 foot.

Towage.—Towboats are available at Morgan Point and Houston.

Quarantine.—Vessels subject to quarantine inspection are boarded at the dock.

Hospitals.—A Public Health Service outpatient clinic is in Houston, and a Public Health Service hospital is in Galveston. Several public and private hospitals are in Houston, also a large medical center for treatment and research.

Customs.— A deputy Collector of Customs has an office in the Federal Office Building and suboffices in the United States Appraisers Stores, 7300 Wingate Street, and at Baytown. Vessels are boarded at the dock.

Immigration.—The Immigration Service maintains offices in the Federal Office Building.

The Weather Bureau has an office in the Federal Office Building.

General harbor regulations.—The following are extracts from the local regulations for the port:

Speed limit.—The maximum speed for all vessels shall not exceed 8 miles per hour through the channel between Bolivar Roads and Port Houston turning basin and shall not exceed 5 miles per hour while passing any wharf, dock, or moored craft. The maximum speed of all craft over 10 tons shall not exceed 5 miles per hour through Buffalo Bayou between the turning basin and the foot of Main Street in Houston. All craft passing other boats, barges, scows, etc., in motion, moored or anchored, shall slow down and take every necessary precaution to avoid damage. Whenever a tanker is loading or unloading at

a wharf on the ship channel, the passing of two vessels in the ship channel opposite the tanker is prohibited.

Discharging of oils, etc., into channel.—It shall hereafter be unlawful for any person, persons, firm or corporation to deposit, place or discharge into the Houston Ship Channel, between Main Street Viaduct and Morgan's Point, or into Buffalo Bayou or White Oak Bayou or the tributaries of either within or without the limits of the City of Houston, either directly or through private or public sewers, any sanitary sewage, butcher's offal, garbage, dead animals, gaseous, liquid or solid matter, oil, gasoline, residium of gas, calcium carbide, trade waste, tar or refuse or any other matter which is capable of producing floating matter or scum on the surface of the water, sediment in the bottom of the channel or the odors and gases of putrefaction. Vessels discharging oil from bilges or tanks into navigable waters will be reported to the United States District Attorney and prosecuted under Federal Laws.

Lights.—All vessels or barges shall display lights from sunset to sunrise while lying at any wharf or dock; vessels to conform to navigation rules applying when anchored in the channel; and barges to display white lights visible all around the horizon located at least 8 feet above the water line on their outside or channel corners, provided that said regulation shall not apply to pleasure craft and other small vessels and barges which may be located in the old channels or other small waterways which are not a part of the Houston Ship Channel.

Terminal facilities.—The public terminals surrounding the turning basin are operated by the Board of Navigation and Canal Commissioners of the Harris County Houston Ship Channel Navigation District. There are 17 wharves with 9,585 feet of berthing space which can accommodate about 20 vessels; 1,236,000 square feet of covered storage space in transit sheds and warehouses, and 783,000 square feet of open storage. Most wharves handle general merchandise, and several are equipped with mechanical conveyors, escalators, cranes, and other devices. Behind one of the wharves is a grain elevator with a capacity of 3,500,000 bushels and equipped with two automatic freight car unloaders and six power shovels. Grain berths are available at two of the wharves. All wharves have pipe-line connections for oil bunkering.

In addition to the public wharves, there are 40 private wharves or slips with berthing space for 65 vessels and from 37 to 42 barges. These are located below the public terminals at the following places: **Long Reach, Manchester, Clinton, Clarian, Sinco, Galena, Pasadena, Calloufateb Bayou, Norsworthy, Boggy Bayou Basin, Ordnance Depot, Baytown, Lynchburg, Shell, and Barbour Cut.**

Supplies.—Provisions and general supplies of practically any kind can be obtained at Houston. Fresh water is piped to all wharves and piers; it is good for drinking and boiler use.

Vessels can secure bunker oil through pipelines on the public wharves at the turning basin, and at Houston compress wharves while loading or discharging cargo, or at wharves of oil companies on Houston Ship Channel. Numerous companies furnishing fuel oil in or near Houston have oil barges for bunkering. The Port Commission has provided coal-bunkering facilities at Manchester wharf, where coal can be delivered direct from car to ship, but these facilities have not been used for several years.

Repairs.—A shipyard at Greens Bayou has a drydock with a lifting capacity of 12,500 tons. The marine ways at the port are used for repairs to barges, small towboats, and such craft, up to 1,200 tons in weight. These ways are located in Brays Bayou, on Brady Island, and in Barbour Cut, described previously. Houston has good machine shops, foundries, and welding plants capable of handling most repairs to hull or machinery above the waterline.

Salvage facilities.—No firms in Houston make an exclusive business of wrecking and salvage, but harbor tugs, derricks, and barges are available when required. Divers and other equipment can be obtained on short notice from Galveston or Beaumont.

Small-boat facilities.—The principal small-boat facilities are on Harrisburg Bend, Brays Bayou, and Barbour Cut. Diesel oil, gasoline, water, provisions, and supplies are available at Brays Bayou, Barbour Cut, and Houston.

Communications.—The port is served by six trunk railway systems that serve all parts of the southwest. Numerous commercial airlines provide passenger, mail, and freight service to all coastwise and inland cities.

Chart 1282.—From Galveston Entrance to San Luis Pass, a distance of 27 miles, the coast trends in a general southwest-by-west direction. The southwestern end of Galveston Island is low and sandy, with no natural conspicuous marks. Except in the vicinity of the Galveston Bay Entrance, the coast has fairly uniform depth with few outlying dangers, and can be approached to within about 3 miles by deep-draft vessels.

West Bay is a shallow body of water which extends 16 miles southwestward from the southwestern part of Galveston Bay, between Galveston Island and the mainland. The bay proper is of no commercial importance.

Offatt Bayou extends from off the south side of West Bay to the southwest limits of Galveston. The entrance channel leaves the inland waterway about 0.3 mile west of the causeway and leads close around Teichman Point. Off the point the channel divides, one channel leading to the Galveston Airport and the other into the bayou. The channels are marked by daybeacons. The bayou is frequented by small pleasure and fishing boats out of Galveston.

In 1956 the controlling depth in the dredged channel was 6 feet from the waterway to the fork at Teichman Point. From here the channel depths leading to the airport range from 7 to 14 feet. In the turning basin near the airport are several slips for small craft. Daybeacons mark the channel into Offatt Bayou which has been dredged to depths of 22 to 30 feet. A fill for Sixty-first Street, Galveston, forms the upper limit of the basin. It is about 2.5 miles above the mouth of the bayou.

Chocolate Bay and **Chocolate Bayou** form a tributary of West Bay on the north side at its southwestern end.

A Federal project provides for a channel 4 feet deep through Chocolate Bay to a connection with the Intracoastal Waterway. In September 1956 shell barges drawing up to 7 feet were going about 10 miles above the waterway. The channel is marked with buoys. Six miles above the mouth of the bayou there are several boatyards with storage facilities for vessels up to 35 feet in length. Two of the yards have marine ways, the larger of which is capable of hauling out vessels up to 44 feet in length and 4½ feet in draft, for general repairs. Gasoline, water, and ice are available. A fixed highway bridge near **Liverpool,** about 13.5 miles above the waterway, is the head of navigation.

A channel extending between **Mud Island** and **Bastrop Bay** connects West Bay and **Oyster Bay.** Formerly a section of the inland waterway, this channel has been abandoned and is no longer maintained. It has a depth of only 2 to 3 feet. **Jones Lake, Greens Lake, Carancahua Lake,** and **Halls Lake** are shallow, unimportant bodies of water on the northern side of West Bay.

Hoskins Mound is an oil and sulfur field about 3 miles northwest of Bastrop Bay. A tall concrete stack and two water tanks show prominently from offshore.

San Luis Pass leads from the Gulf to the southwestern end of West Bay. It is obstructed by a bar across which is an unmarked channel 0.2 mile wide and 9 feet deep. The entrance leads in a westerly direction, passing between the shoals extending southward from Galveston Island and eastward from **San Luis Island.** Inside are equal or greater depths to the north end of San Luis Island and thence in a north-northeasterly direction for about 1 mile farther, where the depths shoal to 2 feet or less. A depth of 7 feet can be carried from San Luis Pass through **Cold Pass** south of **Moodys Island,** and a short distance into Oyster Bay. Privately maintained aids mark the channel through Cold Pass to Christmas Point. A privately marked channel crosses Bastrop Bay to the Intracoastal Waterway. A draft of 4 feet can be carried across Bastrop and Oyster Bays from the waterway into Cold Pass. Off the northeast side of San Luis Island are depths up to 25 feet. This deeper area offers protected anchorage for small craft, but the bottom is hard sand. The best anchorage can be found in Cold Pass off the east side of Mud and Moodys Islands. Fishermen acquainted with the pass sometimes can be found to pilot vessels in, but the shoal waters of West Bay and Oyster Bay prevent passage for other than very shallow craft. San Luis Pass is unmarked and not recommended for strangers.

11. SAN LUIS PASS TO THE RIO GRANDE

Chart 1117.—From San Luis Pass to the entrance to Matagorda Bay at Pass Cavallo, the coast trends for 82 miles in a general southwest-by-west direction. From Pass Cavallo it curves gently southwestward for 100 miles to latitude 27° N., where the trend is south; thence it curves gently a little east of south for 64 miles to the mouth of the Rio Grande. Throughout its whole distance the coast encloses a chain of shallow bays or lagoons, some of considerable size. These are separated from the Gulf by long, narrow islands and peninsulas which are generally low and sandy, with few natural distinguishing marks. Some of the bays and lagoons may be entered from the Gulf through small passes partly obstructed by bars with little depths on them, except those which have been improved by dredging and construction of jetties.

Boundary lines of inland waters.—The lines established from Galveston to the Rio Grande are described in §§ **82.111, 82.116,** Chapter 2.

Dangers.—The coast has fairly uniform depths with few outlying dangers except in the vicinity of the passes and off the mouth of the Brazos River where shoaling to 18 feet is reported as far as 5 miles offshore; otherwise, vessels of any draft can approach to within 2.5 miles of the shore. Other reported dangers are about 20 miles southwestward of the entrance to the Brazos River and consist of occasional ridges of soft mud having as little as 4 fathoms over them, with general surrounding depths of 5 to 5½ fathoms. Several oil wells may be encountered offshore especially in the vicinity of Freeport Harbor. Mariners are cautioned to give them a wide berth, especially when drilling operations are in progress.

The **danger zones** of Air Force gunnery, bombing, and rocket ranges are in the Gulf of Mexico off Matagorda Peninsula and Matagorda Island, and southeast of Corpus Christi Bay, Tex.; limits and regulations are stated in §§ **204.162, 204.165,** Chapter 2.

Currents.—Along the west side of the Gulf of Mexico between Tampico and Corpus Christi is a northward flow which in the vicinity of the 100-fathom curve off the mouth of the Rio Grande has an average velocity of nearly one-half knot.

Strong currents caused by winds would be expected to set somewhat to the right of the wind direction or, near the coast, in a direction parallel to the shoreline, current velocities of ½ to 1 knot being produced by wind velocities of 20 to 40 miles per hour.

However, it has been reported that strong currents set westward toward the coast at times and the possibility of being carried inshore by such a current should be guarded against. The grounding of a vessel at a location 9 miles southwest of Aransas Pass was reported due to strong westward currents which accompanied winds from the north and northeast.

Chart 887—Freeport Harbor, lying 40 miles southwestward of Galveston entrance, is the harbor for the towns of **Freeport**, **Brazosport,** and **Velasco**. The principal industry is the Dow Chemical Corporation which operates two large plants. Other industries are oil, sulfur, and shrimp. Oil and chemical products are the principal exports. The Brazos River has been dammed about 7 miles above the jettied entrance and now flows into the Gulf through a diversion channel with its mouth about 4 miles southwest of the entrance to Freeport Harbor. Below the dam, the old river channel is now a tidal estuary and the harbor is protected against flood conditions in the river.

Prominent features.—The buildings of the large chemical plant at Brazosport and the smoke rising from the stacks are prominent. A tall stack and two water tanks 12 miles northeast of Freeport show distinctly on a clear day. On closer approach, the Brazos River Light and the water tanks in Freeport and Velasco can be identified. At night the glow from the many lights at the chemical plant and the obstruction lights on the radio towers at Freeport and Velasco are conspicuous.

Brazos River Light, 98 feet above the water and visible 16 miles, is shown from a pyramidal skeleton structure painted brown below the gallery and black above.

Channels.—The ship channel has been improved by construction of jetties on either side of the entrance. Federal dredging depths are 32 feet in the channel from the Gulf through the jetties to a turning basin at Brazosport about 1.5 miles inside the entrance, and to the upper turning basin about 1 mile below Freeport.

The channels are maintained, and controlling depths are published from time to time in Notice to Mariners. A depth of 10 to 12 feet can be carried to the docks at Freeport and Velasco.

Anchorage can be found in the river anywhere the depth is suitable; however, swinging room for large vessels is limited.

Dangers.—The new mouth of the Brazos River has generated a shoal extending into the Gulf about 5 miles. This area is foul and should be given a wide berth. It is reported that several vessels have stranded in this vicinity and that the depths are considerably less than charted. The bottom is soft mud, indicating that silting from the river has occurred. A lighted whistle buoy marks the southeastern end of the shoal.

Several new oil drilling structures have been erected in the Gulf near the approach to Freeport Harbor. Mariners should be on the lookout for the red lights marking these structures and give them wide berth.

Bridges.—No bridges cross the channel from the entrance to the upper turning basin. A combined highway and railroad drawbridge crosses the river at Freeport about 1 mile above the head of the project. The swing span has a horizontal clearance of 108 feet and a vertical clearance of 13 feet. Drawspan regulations are stated in **§ 203.245,** Chapter 2. A fixed highway bridge that has a horizontal clearance of 36 feet and a vertical clearance of 20 feet is about 0.3 mile above the combination bridge.

An overhead power cable at Velasco has a permit clearance of 58 feet.

Tides and currents.—The mean range of tide at Brazosport is about 1½ feet. The current off the entrance generally sets to the westward, with a counter-current near the beach, which is largely influenced by the direction of the wind. The bar is very rough with an easterly breeze.

Strong cross winds and currents at the jetty entrance make navigation difficult for larger vessels. Difficulty in navigation is experienced with larger vessels at the junction with the Intracoastal Waterway when strong currents are flowing from the canal, and in the comparatively sharp curve at the Brazosport turning basin. Large vessels are difficult to turn in the smaller upper turning basin.

Coastal (storm) warnings are displayed by day at the Freeport Coast Guard Station, about 1 mile inside the entrance on the north side, and from a signal tower near the railroad station.

Pilotage is compulsory for all coastwise and foreign trade vessels; those having on board pilots licensed by the United States Coast Guard are excepted. Pilots in small power boats will meet vessels when previous arrangements have been made through the agents.

Quarantine inspection is made at the dock by Public Health Service officials from Galveston.

Hospitals.—The nearest Public Health Service Hospital is in Galveston. In Freeport there are two private hospitals.

Customs and immigration.—Customs inspectors maintain an office at Freeport. Immigration officials come from Houston when needed.

Terminal facilities.—A dock with rail connection is on the south side of the basin at Brazosport with a shuttle chute for loading coal and sulfur. The berthing space is about 500 feet with 30 feet depths alongside. In the **Big Bend,** an oil dock on the southwest side has berthing space for two large tankers, and a chemical plant on the northeast side has berthing space for two ships and for barges. These facilities are not open to the public.

Brazos Harbor and terminal is on the west side of Big Bend and, except for two private holdings on the south side, is under the jurisdiction of the Brazos River Harbor Navigation District. Berthing space in 1956 could accommodate two fairly large ships. There is more than 50,000 square feet of covered storage space in transit sheds for general cargo and 5 acres of improved open storage space. Construction of an additional wharf and transit sheds are planned.

Small-boat facilities.—Small craft can find excellent protection in the river at Freeport. Numerous small docks are along the waterfront. Just downstream from the highway bridge is a yacht basin with accommodations for boats up to 100 feet in length.

Supplies and repairs.—Gasoline, diesel oil, fresh water, ice, provisions, and supplies are available, but no bunkering facilities for large ships. Three shipyards have marine ways, machine and carpenter shops, and the largest is capable of hauling out vessels up to 300 tons, 115 feet in length, and 10 feet in draft. All yards make general repairs. There are two small boatyards on the Intracoastal Waterway near the entrance to the channel.

Communications.—Highway and rail connections extend to Angleton and Houston.

Chart 1283.—Brazos River enters the Gulf through the diversion channel about 4 miles southwest of Freeport Harbor Entrance. Due to logs, shoaling, and general foul ground, the mouth of the river is not used as an entrance. The Intracoastal Waterway crosses the river 1 mile above the mouth. The river extends inland 820 miles, and during high-river stages light-draft vessels have ascended as far as **Old Washington,** 184 miles above the mouth. A depth of 8 feet at ordinary river stage is available to **Bolivar Landing,** 36 miles upriver from the waterway. There are some shell barge operations to below the Freeport highway bridge.

An overhead cable that has a permit clearance of 44 feet, and several other cables having a minimum clearance of 49 feet, cross the Brazos River between the Intracoastal Waterway and the highway drawbridge about 4 miles above the waterway. The bridge has a swing span with a horizontal clearance of 103 feet and a vertical clearance of 14 feet. Drawspan regulations are stated in **§ 203.245,** Chapter 2. A railway drawbridge and a highway bridge cross the river at **Brazoria,** about 20 miles above the river mouth, and a fixed highway bridge crosses at **East Columbia,** about 26 miles above the mouth. Minimum clearances are horizontal 85 feet and vertical 36 feet at low-river stages, 7 feet at high-river stages.

About 5.5 miles northeastward of Freeport Harbor Entrance are **Christmas** and **Drum Bays,** shallow bodies of water extending southwestward of Bastrop Bay. A shallow dredged canal leading southwesterly from Drum Bay to a connection with the Intracoastal Waterway is used only by small fishing craft up to 2 to 3 feet in draft.

Oyster Creek is a tortuous stream of no importance emptying into the waterway about 2.5 miles northeastward of Brazos River Light. It is used as a storm refuge by small craft, but has a fixed highway bridge about 3 miles above its mouth.

Chart 1283.—San Bernard River flows into the Gulf 3.5 miles southwestward from the mouth of Brazos River. San Bernard River is obstructed at the mouth by a shifting sand bar over which the channel depths vary from 3 to 5 feet. The channel has been improved by dredging

from the Intracoastal Waterway, 0.8 mile above the mouth, to a point near the West Columbia Highway bridge, 25.6 miles above the waterway. The project depth is 9 feet, and in 1957 the controlling depth was 8 feet to mile 22.5, and thence 2½ feet to the head of the improvement.

Some critical reaches in the river are caused by narrow widths or sharp bends. Complaints have been made that tows navigating the river have damaged wharves and the vessels moored to them. Vessel operators are advised to exercise every precaution to avoid damaging boats and structures along the shores of the river. When towing two or more barges in tandem, operators are advised to be particularly careful in critical places in the river to prevent any part of the tow striking the banks or damaging any structure, and to reduce speed to prevent damage by wave action to wharves or small boats.

Between the waterway and the upstream limits of the improvement, San Bernard River is crossed by two draw and two pontoon bridges; the minimum horizontal clearance is 50 feet and the minimum vertical clearance of the drawbridges is 16 feet. The limiting vertical clearance of overhead cables is 38 feet at the first, about 7 miles above the mouth. High river stages decrease the vertical clearances 19 feet near West Columbia and 13 feet at Hinkle Crossing.

Cedar Lakes are shallow bodies of water having a total length of about 5 miles, lying 0.5 mile westward of San Bernard River and connected to it by **Longs Bayou**.

Chart 1284.—Matagorda and **East Matagorda Bays** are irregularly shaped bodies of water totaling 45 miles in length in a general northeasterly and southwesterly direction, 1 to 10 miles in width, and separated from the Gulf by **Matagorda Peninsula.** The principal entrance from the Gulf is Pass Cavallo. The bays are divided by the isthmus formed by the channel of the Colorado River. The only navigable connection between the two bays is via the Intracoastal Waterway. East Matagorda Bay is a shallow lagoon, about 17 miles long, with greatest depth of 5 feet, soft mud or silt bottom. In Matagorda Bay the depths range from 5 to 13 feet, averaging 10 to 12 feet over the greater part. Considerable oil development and fishing are carried on in the bay.

Matagorda Light, 85 feet above the water and visible 15 miles, is shown from a black conical tower about 1.5 miles west of the pass.

Entrance channel.—Pass Cavallo, 108 miles southwestward of Galveston entrance, is an entrance from the Gulf to the southwestern corner of Matagorda Bay. The pass is 1.3 miles wide between **Matagorda Peninsula** on the east and **Matagorda Island** on the west and is of little commercial importance. The pass is marked by a lighted whistle buoy off the bar and lights along the channel.

The entrance is obstructed by a bar subject to frequent change in both location and depth, and the bar buoy cannot be depended upon to indicate the best water. The depths over the bar vary from 3 to 8 feet. With a swell or sea outside, there is virtually a continuous line of breakers over the bar.

The channel across the bar is not maintained and local knowledge should be used. Beyond the entrance the channel extends along the eastern shore of Matagorda Island, passing about 0.5 mile east of Saluria and Big Bayous, and thence off the Port O'Connor jetties into the open waters of the bay.

Fishing and shrimping craft up to 5 feet in draft use the pass during periods of light seas only. It is reported that the bar shifts from day to day at times, and every year several craft are wrecked in attempting passage. Also, it is much easier to get out of the pass than to enter; strangers are warned to enter only with local assistance.

Pelican Island and generally shoal areas lie along the east side of the pass. There formerly was a passage with a depth of 9 feet or more through these shoals in a northeasterly direction, from off Saluria Bayou to about 0.5 mile inside the north shore of Matagorda Peninsula. This channel is particularly subject to change. The ruins of West Shoal Lighthouse along the south side of this passage are submerged and marked on the north side by a lighted buoy. The ruins of old East Shoal Lighthouse, about 1,300 yards to the north-northeastward, are submerged and charted as a sunken rock. These obstructions are to be avoided.

Anchorages.—With northerly winds or smooth sea, fair anchorage may be had outside the bar in 4 to 6 fathoms. Good anchorage for small craft may be found in **Saluria (McHenry) Bayou** in 7 to 10 feet. The entrance to the bayou is marked by a light.

The usual storm anchorages for small boats in Matagorda Bay are: **Chocolate Bay,** with depths of 3 feet; Lavaca Bay, on the east side to the north of the causeway, with depths of 4 to 5 feet; Lavaca River, with depths of about 2½ feet across the bar; Carancahua Bay, with depths of 3 feet across the bar; and Tres Palacios Bay, off Palacios, with depths of 4 to 5 feet.

Tides.—The periodic tide in Matagorda Bay is small and the water surface is dependent largely on the wind. During strong northers the water surface may be depressed 2 feet.

The tidal current in Pass Cavallo is believed to attain a velocity of 2 knots at times.

Pilots.—As there are no licensed pilots for Cavallo Pass, vessels desiring assistance to enter usually signal the Port O'Connor Coast Guard Station by radio. If practical to enter, Coast Guard personnel will come out and guide the vessel in over the bar. The station is on Saluria Bayou 3.8 miles north-northeast of the light.

Chart 1283.—Caney Creek empties into the extreme northeastern part of East Matagorda Bay through a canal 0.5 mile long. A depth of 3 to 4 feet can be taken up the creek to a county bridge about 25 miles above East Matagorda Bay. A fixed bridge 2 miles south of **Sargent** has a vertical clearance of only 6½ feet. Sargent, **Hawkinsville, Gainesmore** and **Cedar Lane** (P. O.) are small settlements on the creek.

Live Oak Bay and **Live Oak Bayou,** tributaries to East Matagorda Bay, are shallow and of no importance.

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Chart 1284.—Old Gulf, an abandoned company town, is 35 miles northeastward of Pass Cavallo. The twin stacks and water tank are prominent from offshore.

The **Colorado River** flows into the Gulf 25 miles northeastward of Pass Cavallo. A flood discharge channel has been dredged in the river from the Intracoastal Waterway to the Gulf, forming an isthmus dividing Matagorda Bay and East Matagorda Bay. The controlling depth was 1 foot in September 1956. Strangers should not attempt passage. A light marks the eastern side of the entrance from the Gulf. A project provides for a channel 9 feet deep in the Colorado River from the Intracoastal Waterway to a turning basin 9 feet deep 15 miles above the waterway. The available depths in the river above the waterway in February 1957 were 8 feet for 1.7 miles, thence 3 feet for 5.2 miles. Above that point the channel is not navigable because of snags and sand bars.

Matagorda, a small town on the Intracoastal Waterway 5.5 miles above the mouth of the Colorado River, is headquarters for a small fleet of fishermen and oystermen. The town is fully described in Chapter 12.

Halfmoon Reef extends about 3 miles off **Palacios Point,** the southwest point of the tongue of land extending between the eastern and northern portions of Matagorda Bay. This is a shell reef 100 to 500 yards wide, covered about 1 foot at low tide over the greater portion of its length. Halfmoon Reef Light is at the outer end of the reef. Palacios Point Light is at the inshore end; it marks the inshore side of Palacios Channel across the inner end of the reef. **Palacios Channel** has a depth of 4 to 5 feet.

Tres Palacios Bay, on the north side of the western portion of Matagorda Bay, is the approach to Palacios and to the small town of **Collegeport.** Federal project depth is 9 feet from deep water in Matagorda Bay to the turning basins on the southern shore of Palacios. Lights and daybeacons mark the easterly side of the channel. The waters are shoal inside the daybeacon off **Well Point** and between the dredged channel and **Oliver Point.** In February 1957 the controlling depth in the channel was 8 feet.

Tres Palacios River empties into the northern extremity of Tres Palacios Bay. The river has depths of about 2 feet at the entrance and 6 to 10 feet for 10 to 15 miles above the mouth. A fixed highway bridge across the river about 3.5 miles above Collegeport has a horizontal clearance of 100 feet and a vertical clearance of 6½ feet.

Palacios, a fishing and farming community, is on the west side of Tres Palacios Bay. An elevated water tank in the town, a similar tank at Camp Hulen, and a smaller tank at the airport show prominently from the bay. **Coastal (storm) warnings** are displayed day and night from a Weather Bureau signal tower near the public pleasure pier in town. Two turning basins are at the head of the channel into Palacios. Board of Directors of Navigation District No. 1 of Matagorda County operates the turning basins through a **harbormaster** who has offices at the harbor.

In September 1956, controlling depths were 6 feet into the west turning basin and 9 feet into the east turning basin. Berthing facilities are available. A private channel with controlling depth of 8 feet leads to the boat landings at the shrimp and oyster canneries on the south shores of the town. A slip for small pleasure boats is on the north side of town. Gasoline, diesel oil, water, ice, and provisions are available. The largest of three shipyards can haul out vessels up to 150 tons, 105 feet in length, and 8½ feet in draft for general repairs. Two of the yards have marine ways and the third a vertical lift. Machine shop facilities are available. Highway and railroad connections lead to inland points.

Carancahua Bay, 6 miles west of Tres Palacios Bay, is a shallow, unimportant body of water frequented only by a few small boats. Depths of 3 feet are in the entrance with somewhat greater depths inside. A fixed highway bridge crossing the bay 7 miles above the entrance has a horizontal clearance of 18 feet and a vertical clearance of 13 feet.

Lavaca Bay, an arm of Matagorda Bay at its northwestern corner, has a general depth of 5 to 7 feet. A dredged channel extends from the deep water of Matagorda Bay across **Sand Point** and **Gallinipper Reefs** to the town of Port Lavaca on the western shore. The channel project depth is 9 feet. Lights, daybeacons, buoys, and a lighted range mark the channel to Port Lavaca. The channel was dredged to project depth in February 1957. A highway causeway crosses the upper end of the bay at **Noble Point.** Near the center of the causeway is a drawbridge having a bascule span with a horizontal clearance of 41 feet and a vertical clearance of 9 feet. A power cable northwest of the causeway has a permit clearance of 69 feet. Several reefs are near the head of the bay.

A large aluminum plant is on **Point Comfort.** A channel takes off from the channel to Port Lavaca to a turning basin where terminal facilities are available. The controlling depth in October 1956 was 8½ feet.

Keller Bay, an arm on the east shore of Lavaca Bay, is the site of oil exploration and development. Shell is barged through a privately maintained and marked channel to **Olivia,** a small farming community on the east side of the bay. Barges drawing 6 feet were being brought in to Olivia in October 1956.

A Federal project provides for a channel 6 feet deep from the junction with the channel to Port Lavaca across the upper end of Lavaca Bay, into the **Lavaca River** to the junction with the **Navidad River,** and to the town of Red Bluff. In March 1957 project depths obtained. A highway bridge and a railroad bridge cross the river ner the junction in the vicinity of the towns of **Vanderbilt** and **Lolita.** The railroad bridge is a swing bridge with a horizontal clearance of 36 feet and a vertical clearance of 13 feet. Drawspan regulations are stated in **§ 203.245,** Chapter 2. The highway bridge is a removable span bridge with a horizontal clearance of 59 feet and a vertical clearance of 23 feet.

Garcitas Creek, emptying in to the head of Lavaca Bay, has a privately maintained and marked channel to the town of **La Salle.** Shell barges drawing 6 feet are brought in from Port Lavaca.

Port Lavaca, on the western shore of Lavaca Bay, is a

city in a fishing, farming, and growing industrial area. **Coastal (storm) warnings** are displayed, day and night, from a Weather Bureau signal tower near the harbor. The municipal harbor is under the jurisdiction of the Port Commission and a **harbormaster** administers the local regulations. Several small boat basins with depths from 6 to 9 feet are maintained along the waterfront by local fishing, dredging, and oil companies. Gasoline, diesel oil, water, ice, provisions, and some marine supplies are available. Three shipyards, two with marine ways, are equipped to do general repairs. The larger yard has ways capable of hauling out vessels up to 80 tons, 85 feet in length, and 4 feet in draft forward and 12 feet aft. A fourth shipyard at Point Comfort, owned by a dredging company, is closed to the public except in emergencies. Highway and railroad connections lead to all parts of the state.

Port O'Connor is a small settlement with post office and telephone service at the southwestern end of Matagorda Bay north of Pass Cavallo. The town is approached via the Intracoastal Waterway route between two jetties which extend into the bay. The outer ends of the jetties are marked with lights. Mariners are cautioned to keep in the channel between the jetties; shoal areas with rocky bottom lie outside the channel. Along the Matagorda Bay shore 0.4 mile northwest of the jetties are the piles of an old pier. **Coastal (storm) warnings** by day are displayed at the Port O'Connor Coast Guard Station on Saluria Bayou 2.5 miles southward of the town. Numerous docks and slips for shrimp boats and pleasure craft are along the north side of the waterway at Port O'Connor. Gasoline, diesel oil, water, ice, and provisions are available. An improved highway leads to Port Lavaca and Seadrift.

Barroom Cut, 0.3 mile south of the jetties of the Intracoastal Waterway, is the abandoned route of the original inland waterway. Jetties extend about 0.3 mile off the east end of the cut. In 1956 depths through the cut into Barroom Bay had shoaled to about 3 feet.

Chart 1285.—Espiritu Santo, San Antonio, Mesquite, and Aransas Bays are a series of shallow bodies of water extending southwesterly along the coast for a distance of 50 miles from Pass Cavallo to Aransas Pass, and separated from the Gulf by **Matagorda** and **St. Joseph Islands.** The bays are filled with islands, reefs, and shoals, and are of little commercial importance except as a link in the Intracoastal Waterway.

Espiritu Santo Bay has depths up to 8 feet. In the eastern part of the bay a dredged ferry channel extends from the waterway southward to a military base on Matagorda Island. The channel is marked by lights and daybeacons, and in October 1956 had a controlling depth of 7 feet. The bay is entered from Matagorda Bay through the Intracoastal Waterway and the ferry channel.

San Antonio Bay has depths up to 5 and 6 feet. It is separated from Espiritu Santo Bay by the **First Chain of Islands,** through which are South Pass and Steamboat Pass. **South Pass,** an old unmarked dredged cut, had a depth of 4 feet in September 1956. The channel extends between two islands and close to the privately maintained markers on the north side of the south island. **Steamboat Pass,** 1.5 miles to the north, had less than 3 feet of water in September 1956.

Numerous reefs, some of which bare at low water, are in and about the bay, particularly in the upper end. They make navigation difficult and local information essential. The Intracoastal Waterway crosses San Antonio Bay from the vicinity of **Grass Island** to **False Live Oak Point.** The spoil banks on both sides of the channel have several openings. Numerous small islets are in the spoil bank area.

Seadrift is a small fishing and farming community on the northeast shore of San Antonio Bay. The village has highway and rail connections. A Federal project provides for a channel 9 feet deep from the Guadalupe Channel to Seadrift. At present, a privately maintained and marked channel permits barges drawing 6 feet to reach Seadrift. Gasoline, oil, water, and some provisions as well as diesel oil by tank truck are available. There are two sets of marine ways capable of hauling out vessels up to 40 feet in length. Owners must arrange for their own repairs. **Coastal (storm) warnings** are posted at Seadrift.

Northward of Seadrift and **McDowell Point** the delta of Guadalupe River divides the head of San Antonio Bay into **Guadalupe Bay** and **Mission Lake** on the east, and **Hynes Bay** on the west. **Goff** and **Schwings Bayous** flow into Mission Lake.

A Federal project provides for a channel 9 feet deep to **Victoria. Gaudalupe Channel,** a privately maintained and marked channel to **Long Mott** (North Seadrift), leaves the Intracoastal Waterway near **Turnstake Island.** A large chemical plant is at the head of the channel. The channel had a controlling depth of 8 feet in September 1956. Long Mott, on Mission Lake, is a small town that has railroad and highway connections to the interior. **Austwell** is a small town on Hynes Bay. Shell barges drawing 6 feet are brought to Hoppers Landing, about 2 miles southeast of Austwell. Both towns have post offices.

Guadalupe River empties into the northern end of San Antonio Bay. A depth of about 2 feet can be carried from the bay into the north fork of the river. Snags and driftwood make navigation almost impossible, but there are navigable depths as far as the **San Antonio River,** about 10 miles above the mouth.

A privately maintained and marked channel across the lower end of San Antonio Bay permitted the movement of shell barges drawing 6 feet, in September 1956.

Mesquite Bay lies between the **Second** and **Third Chain of Islands,** and is of no commercial importance except for its fish and oysters. A large hunting club is located on Matagorda Island opposite the southeast corner of the bay. A small water tank about 35 feet high shows prominently from the Gulf.

A marked channel leads from the Intracoastal Waterway across Carlos Bay into Mesquite Bay.

Cedar Bayou, separating Matagorda Island from St. Joseph Island, leads in a southerly direction from the southeast corner of Mesquite Bay toward the Gulf. A bar has closed the outlet to the Gulf.

Aransas Bay, 15 miles in length and 3 to 4 miles in width, is used extensively as a shrimping ground. The Intracoastal Waterway crosses the bay from **Dunham Island** to Lydia Ann Channel. A privately maintained channel near Blind Pass is marked by a lighted range. The periodic **tide** throughout the bay is negligible, the variation in water level depending principally on the wind.

St. Charles Bay, an arm of Aransas Bay extending northward, is the site of considerable hunting and sport fishing, but commercial fishing is prohibited. There are no communities on the bay. A depth of 2 to 3 feet is found through the entrance with somewhat greater depths and numerous reefs inside. The bay is used by small craft as a refuge during tropical storms.

A privately maintained channel, marked by daybeacons on the south side, leads to an oil loading dock about 0.8 mile south of the east end of the Copano Bay causeway. The channel was dredged to 12 feet in 1955.

A small-boat basin at Lamar has storage facilities for boats up to 36 feet in length. There is a marine way capable of hauling out vessels up to 30 feet in length and 3 feet in draft. Owners must arrange for their own repairs. A privately maintained and marked channel to the basin had a controlling depth of 4 feet in October 1956. Gasoline, water, and ice are available.

Copano Bay, a northwesterly extension of Aransas Bay, is used principally as a center for hunting and sport fishing. No commercial fishing, except oystering, is permitted. Extreme caution is required to navigate the bay because of the numerous unmarked reefs. Depths up to 8 feet are found in the bay with 6 to 7 feet in the narrow sloughs or channels between the reefs. Numerous oil wells and pipelines fill the bay.

Good anchorage for small craft is available in the bight south of **Redfish (Fish) Point.** Storm anchorages for drafts up to 3 or 4 feet may be had in the small bight at the northeast corner of **Port (Puerto) Bay.** Slightly greater draft can find good protection in the extreme northeast corner of Copano Bay and in the bight off Fish Point. Soft mud bottoms are at these anchorages.

A highway causeway across the entrance to Copano Bay has a bascule span with a horizontal clearance of 42 feet and a vertical clearance of 11 feet.

Mission Bay, on the north shore of Copano Bay, is of no importance; only small skiffs can enter.

Bayside is a small resort town on the northwestern shore of Copano Bay. A large hotel shows prominently from the bay. Depths of 3 to 4 feet can be carried to a small landing. Highway and telephone communications are available.

Aransas River, emptying into the northwestern end of Copano Bay, is shallow and navigable only for small craft of 1 foot draft or less.

Fulton is a small village on the west shore of Aransas Bay. A Federal project provides for a basin 8 feet deep protected by a dike and breakwater, and a channel 8 feet deep from the basin to that depth in Aransas Bay. The Aransas County Navigation District No. 1 has constructed a yacht basin with a protecting seawall and depths to accommodate drafts of 10 feet. Berthing and storage facilities are available. The **harbormaster,** who has charge of berth assignments and ship movements, has offices at the harbor and in Rockport. Gasoline, diesel oil, water, ice, provisions, and some marine supplies are available. A small shipyard has marine ways which can haul out craft up to 37 feet in length and 5 feet in draft for general repairs.

Rockport is a commercial fishing and resort town on the west shore of Aransas Bay. A water tank shows prominently from Aransas Bay. The basin in Rockport is approached from the Intracoastal Waterway which passes 1.5 miles south of the town. The spoil bank area extends along the northwest side of the waterway, through which are several openings marked by daybeacons. Natural depths of 10 to 13 feet lead to Rockport Channel Light 1, marking the entrance to the basin. In October 1956 a draft of 10 feet could be taken into the basin, with depths of 10 feet inside. To enter, pass about 50 yards east of Rockport Channel Light 1 and head directly toward the light on the seawall at the basin entrance. When within about 200 feet of this light, turn left a little so as to pass to the west and close to this light and into the yacht basin. This course will clear a submerged rocky ledge extending offshore and marked at its outer limits by a buoy.

Coastal (storm) warnings by day are displayed from a weather tower near the entrance to the yacht basin.

In the yacht basin are excellent facilities for yachts and other craft. The basin is about 0.3 mile in length and protected by a concrete sea wall. Inside is berthing space for more than 100 yachts of all sizes, several private covered piers, and two shipyards. The **harbormaster,** who has charge of berth assignments and ship movements, has his office at the northeastern end of the basin.

Gasoline, diesel oil, water, ice, provisions, and marine supplies are available. There are three repair yards in Rockport. Two have marine ways and one has a vertical lift; the largest ways can haul out vessels up to 275 ton in weight, 110 feet in length, and 9 feet in draft, for general repairs. A machine shop is at the yard. About 1 mile south of Rockport is another shipyard, privately owned, operated only for repairing of company tugs and barges. However, this shipyard will haul out other craft in emergencies provided the ways are open. The ways can haul up to 100 feet in length and 7½-foot draft.

Rockport has highway connection with Port Lavaca and Corpus Christi and railroad connections to the interior.

Lydia Ann Channel, along the northwest side of Harbor Island, connects the south end of Aransas Bay with Aransas Pass. The entrance from Aransas Bay is via the Intracoastal Waterway. Depths of 12 feet or more are found in the channel. The stranded wreck of the **S. S. John Worthington** lies on the east side of the channel east of the light. This ship was torpedoed during World War II, and then towed into Lydia Ann Channel for salvage. Barges and other craft tie up alongside the wreck. A wreck with 8 feet of water over it lies outside the buoy east-southeast of Aransas Light.

Chart 523.—Aransas Pass, 154 miles southwestward of Galveston Entrance and 113 miles northward of the

mouth of the Rio Grande, is the principal approach from the Gulf to Aransas and Corpus Christi Bays and their tributaries. The pass lies between St. Joseph Island on the north and Mustang Island on the south. Directly opposite the inner end of the pass is **Harbor Island,** which separates Aransas Bay from Corpus Christi Bay.

Prominent features.—In approaching Aransas Pass in daytime, the first objects sighted are the structures of the Carbon Black plant, about 3 miles north of the village of Aransas Pass. The old lighthouse on Harbor Island and the buildings at Port Aransas will be sighted as the pass is approached. The 78-foot tower of the Corpus Christi Channel Cut A East Range Rear Light, toward the south end of St. Joseph Island, shows prominently from the Gulf. At night a bright white light in Port Aransas shows conspicuously for a few miles off Aransas Pass.

Aransas Pass Light, 85 feet above the water and visible 15 miles, is shown from a skeleton steel tower at the Aransas Pass Coast Guard Station. A radiobeacon is at the light. The abandoned lighthouse structure, a red-brick octagonal tower 60 feet high, stands on the east side of Harbor Island 1.6 miles north of the present light.

Channels.—The entrance to Aransas Pass is protected by two jetties between which is a dredged channel. A Federal project provides for an outer bar channel 38 feet deep, a jetty channel 38 feet deep decreasing to 36 feet in the inner part, and an inner basin at Harbor Island with a depth of 36 feet in the main part and 30 feet in the northern section. Depths are maintained by dredging operations when necessary.

The jetties which extend into the Gulf from St. Joseph and Mustang Islands are about 11,200 and 8,650 feet in length, respectively. In the bend in the northeast jetty are several spurs, now submerged, whose ends are marked by three buoys. Small craft are cautioned not to pass between these buoys and the northeast jetty. There are three submerged spurs in the south jetty. A submerged wreck lies to the south of the channel inside of the jetties.

The entrance channel is marked by a lighted whistle buoy nearly 5 miles off the jetties; by a lighted bell buoy which marks the submerged outer end of the north jetty; Harbor Island Lighted Range, and lighted buoys and lights.

To Corpus Christi.—Corpus Christi Channel extends from Aransas Pass to Corpus Christi on the west side of Corpus Christi Bay. For about 4 miles, at the eastern end, it extends through Turtle Cove between Harbor Island on the north and Mustang Island on the south; thence across Corpus Christi Bay to Corpus Christi. The channel is straight except for a 15° bend at about its midway point just south of Ingleside Cove.

Federal dredging depths are 36 feet from Port Aransas to and in the Humble Oil Basin, thence 34 feet to the Corpus Christi Turning Basin and through the Industrial Canal to Avery Point Turning Basin; 34 feet inside the Avery Point Turning Basin, thence the same depth to and inside the turning basin near Tule Lake. The project is maintained and controlling depths are given from time to time in the Notice to Mariners. The channels are well marked by lighted ranges, daybeacons, and buoys.

To Port Aransas.—The project provides for a channel 12 feet deep from the inner basin off Harbor Island to and in the turning basin at Port Aransas. In October 1956 project depths obtained. A light and daybeacons mark the channel.

To the town of Aransas Pass.—Federal project depth is 12 feet from the inner basin off Harbor Island to a basin of the same depth off the town of Aransas Pass. In October 1956 the controlling depth was 10 feet. Lights and daybeacons mark the channel.

To Encinal Peninsula.—Encinal Channel bears off in a southwesterly direction from Corpus Christi Channel near **McGloin Bluff** and continues to a turning basin at **Encinal Peninsula.** A project provides for a channel 30 feet deep from Corpus Christi Channel to a turning basin of the same depth. In June 1954 the controlling depth in the center of the channel was 13 feet.

The Intracoastal Waterway passes through the inner basin off Harbor Island.

Anchorages.—Deep-draft vessels can anchor in the Gulf near the jetties wherever the draft is suitable. Inside Aransas Pass, the only available anchorage is in the turning basin east of Harbor Island and north of the channel. The space here is restricted and subject to shoaling, and caution is necessary. Though holding ground is good, there is no protection from north and east winds. Light-draft vessels up to about 12 feet can anchor in Lydia Ann Channel north of this turning basin. Also, lighter-draft vessels can anchor in Corpus Christi Bay in depths up to 13 feet and behind the breakwater off Corpus Christi in depths up to 15 feet. Under certain conditions, ships are anchored to short scope in the turning basins.

Special anchorage areas, wherein vessels not more than 65 feet in length when at anchor are not required to carry or exhibit anchor lights, have been established in Corpus Christi Bay; limits and regulations are stated in § **202.75,** Chapter 2.

Dangers.—Mariners should avoid the danger zones in the approach to Aransas Pass from southward, described in the first part of this chapter.

Tides.—At Port Aransas the range of the tide from lower low water to higher high water averages about 1½ feet. In Corpus Christi and Redfish Bays the periodic tide is too small to be of any practicable importance.

The **currents** in Aransas Pass have velocities exceeding 2 knots at times and are greatly influenced by winds. Daily predictions of the tidal current may be obtained from the **Tidal Current Tables.**

Winds from any easterly direction make a rough bar and raise the water inside as much as 2 feet above normal. Winds from any westerly direction have an opposite tendency. A sudden shift of the wind from south to north makes an especially rough bar for a short time. During summer months, southerly winds prevail, becoming moderate to fresh in the afternoon.

Coastal (storm) warnings are displayed during the day from a steel tower at the Corps of Engineers Reservation on the south side of the entrance to the turning basin at Corpus Christi; the signals remain up during dark-

ness. Day displays are made at the City Yacht Basin, Corpus Christi; Padre Island Causeway Toll House; Port Aransas Coast Guard Station, and Aransas Pass.

Pilotage.—Pilotage is compulsory for foreign vessels, vessels in foreign trade, and coastwise vessels unless having on board a pilot licensed by the United States Coast Guard. The pilots maintain a lookout at Port Aransas and meet vessels near the bell buoy in a motor pilot boat. Arrangements are usually made through the ship's agents. The pilot boat has radio communication, call WB 5796. There is 24-hour pilot service to Harbor Island, La Quinta, and Corpus Christi.

Towboats.—Towboats are available at Harbor Island and Corpus Christi. Divers and salvage equipment may be engaged.

Corpus Christi, on the western side of Corpus Christi Bay and 18 miles from Aransas Pass, is the most important city commercially on the coast of Texas southwestward of Galveston. The principal commerce is in petroleum and petroleum products, cotton and cottonseed products. Other commodities include bauxite ore and aluminum, grain and grain products, canned beef, and other products.

The harbor on the north side of the city consists of three inland basins connected by an industrial canal. The basins and connecting canal are landlocked and well protected. An overhead power cable across the industrial canal west of the Avery Point Turning Basin has a permit clearance of 59 feet. The principal basin is entered through a dredged cut crossed by a bascule bridge.

A Captain of the Port, designated from the United States Coast Guard, has offices in the Jones Building.

Bridges.—A combination highway and railroad bridge crosses the channel at the entrance to Corpus Christi Harbor. The bascule span has a horizontal clearance of 90 feet and a vertical clearance of 10 feet.

A high-level fixed highway bridge and a vertical-lift combination highway and railroad bridge will replace the existing structure at the entrance. The highway bridge, under construction in 1956, will have a horizontal clearance of 300 feet and a vertical clearance of 139 feet. A new entrance channel will lead through the bridge.

Numerous serious accidents to the fender system of the bascule bridge have been caused by failure of the towboat operator to line up craft on the ranges before approaching the bridge. Vessels are cautioned to be on the ranges well before reaching the bridge as there is a curve on either side of the bridge. Outbound tows cannot successfully negotiate the opening between the fenders of the bridge if they leave the south side docks and proceed directly to the bridge. Tows should move to the north and align with the ranges before proceeding to the bridge.

The following regulations governing passage of vessels through the bridge were published in the harbor regulations for the Port of Corpus Christi, dated January 1, 1955, issued by the Nueces County Navigation District.

A. Any vessel inbound after passing Beacon No. 80 shall have the right-of-way over any vessel outbound and any vessel in the Main Turning basin shall remain there until the inbound vessel is safely through the Bridge.

B. Two flashing red lights, operated by the bridge operator, shall serve as a **Warning** for all vessels in the harbor to remain there until the inbound vessels clear the bridge.

C. Any operator of vessels or tugs giving **THREE** long blasts and in turn receiving **FOUR** blasts from the bridge operator shall bring the vessel or tug under control and stop until the bridge operator signals that the bridge can be raised.

A pontoon bridge crosses the industrial canal just west of the Avery Point Turning Basin. It has a horizontal clearance of 212 feet.

The new vertical-lift combination highway and railroad bridge across the Industrial Canal, about 1 mile west of the pontoon bridge, was under construction in 1957. It will have a horizontal clearance of 300 feet and a vertical clearance of 137 feet up and 8 feet down. The present bridge will be removed upon completion of the new bridges.

Quarantine.—Ships subject to inspection are boarded alongside the dock at Harbor Island, Port Ingleside, La Quinta, and Corpus Christi.

Hospitals.—The nearest United States Public Health Service Hospital is at Galveston. Several private hospitals and a United States Public Health Service outpatient clinic are at Corpus Christi.

Customs and Immigration.—The Customs Service maintains offices in the Post Office Building and the Immigration Service maintains offices in the Federal Building in Corpus Christi. Vessels are boarded at the dock. Officials are on 24-hour call.

Terminal facilities.—At the Port of Corpus Christi there is 6,000 feet of public and private dry cargo docks and oil docks that have extensive fire-fighting equipment, warehouses having 500,000 square feet of floor space, a grain elevator with 2,000,000 bushels storage capacity and 125,000 bushels per hour loading capacity, three 30-ton diesel locomotives, two 25-ton steam locomotives, and one 30-ton diesel crawler hoisting crane, 11.9 miles of railroad, 4 miles of roadway, and 1 track scale.

Supplies.—Fresh water, suitable for drinking and boiler use, is available at all docks. Oil bunkering facilities are available at oil docks and by oil barge. There are no coal bunkering facilities. General supplies and provisions are available at the numerous stores, and more unusual items can generally be secured quickly from Galveston or Houston.

Repairs, repair regulations.—There is no shipyard with drydocks or marine ways for hauling out large ships, but an excellent machine shop is equipped to make any kind of top-side repairs to any size vessel. This concern has a large portable generator, both a.c. and d.c., available for large ships. The nearest drydock for large vessels is at Galveston.

Regulations have been established by the Nueces County Navigation Commission governing the repairing of ships, particularly "hot work." Copies of these regulations can be obtained from the port officials.

Small-boat facilities.—The entire water front at Corpus Christi is protected by a breakwater nearly 2 miles long. Depths over the area behind the breakwater range from 7 to 16 feet, not including the ship channel crossing the

north end. The main entrance is through the ship channel to the north of the yacht basin. A draft of 7 to 8 feet can be carried southward inside the breakwater to the three large yacht piers. The best water is at the center of the protected waterway. There are five openings in the breakwater south of the ship channel. The first is shallow with a depth of 3 feet in the middle; the other four have depths of 8 to 11 feet, the most southerly being the deepest.

The yacht basin is opposite the center of the city and has excellent accommodations for yachts and small vessels. Protected berths for 300 yachts are available in depths of 7 to 11 feet.

Just east of the bascule bridge are two shipyards for small craft. One has marine ways capable of hauling out craft up to 60 feet in length and 5 feet in draft for general repairs. A third yard on the Industrial Canal has a vertical lift capable of hauling out vessels up to 85 feet in length and 8 feet in draft for general repairs.

Communications.—The city is served by three railroad systems, and improved highways connect with all parts of the State. Over 100 shipping companies serve the port and provide water transportation to ports on the Gulf, Atlantic, and Pacific coasts, and all world ports.

Port Aransas is a small commercial fishing and resort town on the north end of **Mustang Island** at the inner end of Aransas Pass. A channel leads to a turning basin just inside the pass; in May 1956 the controlling depth was 13 feet in the channel and basin. Gasoline, diesel oil, water, ice and provisions in limited quantities can be obtained. An automobile ferry operates between Port Aransas and Harbor Island. A Coast Guard Station and Lifeboat Station are at Port Aransas. **Coastal (storm) warnings,** daytime only, are displayed at the Coast Guard Station.

Harbor Island lies at the head of Aransas Pass. There are large oil-handling plants on the east end of the island. A turning basin has been dredged for nearly 2,000 feet along the north side of the ship channel. Berthing space for three large vessels is available at the three open piers. A wharf with a transit shed is about 1,000 feet long. The terminals have highway connection with the town of Aransas Pass on the mainland about 5.5 miles distant over a toll highway.

Corpus Christi Bayou, to the northward of Harbor Island, connects Aransas Bay with Corpus Christi Bay via **Morris and Cummings Cut** providing a short cut for small craft. The entrance from Aransas Bay is marked by a beacon on the south side of the channel, and had a controlling depth of 4 to 5 feet. Inside the entrance the channel is deep but crooked and somewhat difficult to follow, as only a few daybeacons remain. In 1956 the controlling depth through Morris and Cummings Cut was 4 feet. A privately maintained and marked channel that leads to the south end of the town of Aransas Pass had a controlling depth of 7 feet in October 1956.

The highway causeway between Harbor Island and the town of Aransas Pass crosses Corpus Christi Bayou near its mid-point. The drawbridge has a hand-operated bascule span with a horizontal clearance of 24 feet and a vertical clearance of 2 feet. The overhead power cable at the bridge has clearance of 56 feet.

Redfish Bay, extending along the mainland north of Corpus Christi Bay, is shallow and of little importance.

The town of **Aransas Pass** is situated on the mainland about 1.5 miles to the westward of Corpus Christi Bayou and 6 miles northwestward of Aransas Pass. A canal crossing the west end of Aransas Pass Channel extends along the east side of the town, sheltered from Redfish Bay by a spoil bank. South of the causeway the canal offers good protection to small boats. The channel and harbor to the north of the causeway have several seafood processing plants. A large fishing fleet operates out of the town.

There are three shipyards with marine ways, the largest capable of hauling out vessels up to 300 tons, 130 feet in length, and 10 feet in draft, for general repairs. Gasoline, diesel oil, water, ice, provisions, and supplies are available.

A speed limit of 4 miles per hour is enforced in the channel and harbor from Harbor Island to Aransas Pass.

The town has both highway and railroad connections to all parts of the State.

Corpus Christi Bay is a large body of water, roughly elliptical in shape, lying to the westward of Mustang Island and connected with Aransas Pass by the Corpus Christi Channel. The bay is about 15 miles long in an east-and-west direction and 11 miles wide at its widest part. About the eastern end of the bay the depths are 8 to 11 feet, and most of the rest of the bay has depths of 12 to 13 feet.

A **seaplane restricted area** is in Corpus Christi Bay and Laguna Madre; limits and regulations are stated in **§ 207.188,** Chapter 2.

La Quinta Channel, connecting with the town of La Quinta at the northerly part of the bay, had a controlling depth of 32 feet in July 1957 to the turning basin, and in February 1957 the controlling depth in the basin was 32 feet. The channel serves Ingleside Cove and the petroleum and commercial interests of the east side of the bay. The channel is marked by ranges, lights, and buoys.

Port Ingleside consists of privately owned oil terminals on the north shore of the Corpus Christi Bay about 2 miles east of Ingleside Cove. The oil piers are about 1,000 feet north of the ship channel. Bunkering facilities are available. At **Ingleside,** about 3.5 miles to the northward, is a large oil refinery.

Ingleside Cove has good anchorage for small boats in depths of 9 to 10 feet, south of **Donnel Reef;** the latter reef has been cut through by La Quinta Channel. **Ingleside on the Bay,** on the east shore of Ingleside Cove, is a fishing community. **Portland** is a small resort settlement about 5 miles northeast of Corpus Christi.

Nueces Bay is a tributary of Corpus Christi Bay, partially separated from it by sandspits and a railway and a highway causeway. The causeways have bridges with bascule spans off **Rincon Point,** with horizontal clearances of 32 feet and minimum vertical clearances of 4½ feet. Drawspan regulations are stated in **§ 203.245,** Chapter 2. Nueces Bay has depths of only 1 to 2 feet, and is of little importance. **Nueces River,** emptying into the western part of Nueces Bay, is navigable for shallow draft

boats for a distance of 9 miles to a dam. The river is of no commercial importance.

Shamrock Cove, on the east side of Corpus Christi Bay, affords good anchorage for small boats in depths of 7 to 8 feet, soft mud bottom. A light marks the shoal water extending southward from **Shamrock Point.**

Laguna Madre is a shallow body of water extending southward from Corpus Christi Bay for a distance of 100 miles. Depths range from zero to 9 feet with reefs and mud flats throughout. **Padre Island,** a low, barren, storm-swept strip of sand beach, separates Laguna Madre from the Gulf. Padre Island Causeway crosses the north end of Laguna Madre between Flour Bluff and Padre Island. About 1 mile east of Flour Bluff is a pontoon bridge which has horizontal clearance of 65 feet; operating regulations are stated in § **203.245,** Chapter 2.

A causeway at the south end of Laguna Madre, between Padre Island and Port Isabel, has a fixed bridge with horizontal clearance of about 37 feet and vertical clearance of 19 feet.

A small marine way at the east end of the causeway near Padre Island Park No. 2 is capable of hauling out boats up to 30 feet in length. Repair facilities are limited.

Chart 1286.—The former **Corpus Christi Pass,** 17 miles southwestward of Aransas Pass, is now completely closed. A new channel separating Mustang and Padre Islands was dredged about 3 miles northeastward of the old pass but is now closed.

Coastal (storm) warnings are displayed, daytime only, from Padre Island Park.

Chart 1287.—Port Mansfield, about 70 miles southward of Corpus Christi Bay, is a popular sport fishing and recreational center and a base for oil exploration in Laguna Madre. A Federal project provides for a channel 12 feet deep from the Intracoastal Waterway to a turning basin 12 feet deep at Port Mansfield; the controlling depth in the channel was 10½ feet in February 1957. The Willacy County Navigation District dredged the turning basin to a depth of 12 feet and a length of 1,200 feet, and have dredged to a depth of 12 feet the Port Mansfield channel eastward from the Intracoastal Waterway across the Laguna Madre and through Padre Island, thence 18 feet through the jetty channel to deep water in the Gulf. The Port Mansfield channel, marked and maintained by the Willacy County Navigation District, is the only one through Padre Island. A **director of the port** has charge of management of the port and a **harbormaster** at the wharves has charge of assigning berths. There are berthing facilites, a transit shed with covered storage space, and open storage space. Several wooden-pile wharves and finger piers have berthing facilities for vessels up to 50 feet in length. Gasoline, diesel oil, water, ice by truck, and a limited amount of provisions are available.

A small-craft basin and a shrimp basin were under construction in October 1956. The Port Mansfield turning basin will be extended and enlarged to connect with these basins. Berthing and storage facilities will be provided in the small craft and shrimp basins, seafood processing plants, and icing facilities in the shrimp basin.

Telephone and bus services are available. An improved highway connects with **San Perlita,** 14 miles distant and the nearest railroad shipping point, and with **Raymondville,** 28 miles distant, the nearest town of any size. Raymondville has a hospital, hotels, supplies, telegraph communications, and rail and highway connections.

Chart 1288.—Arroyo Colorado enters the laguna 90 miles southward from Corpus Christi. A Federal project provides for a channel 12 feet deep from the Intracoastal Waterway through a cutoff and the arroyo to a turning basin at Port Harlingen, about 22 miles from the mouth. In May–June 1957 the controlling depth was 10 feet.

Rio Hondo is a small town on the Arroyo Colorado about 20 miles above its mouth. There are privately operated wharves for the unloading of petroleum products and chemicals, and limited berthing facilities for pleasure craft. Water is available at a small pier. Gasoline, diesel oil, water, ice by truck, and provisions are available. A shipyard for hull repairs to steel vessels has marine ways capable of hauling out vessels up to 60 tons, 85 feet in length, and 7 feet in draft. There are railroad and highway connections to the northern part of the State.

The highway vertical-lift bridge at Rio Hondo has a horizontal clearance of 125 feet and vertical clearance of 27 feet, down, and 73 feet, up. Drawspan regulations are stated in § **203.245,** Chapter 2.

Port Harlingen, under the jurisdiction of the Arroyo Colorado Navigation District, is east of Harlingen and about 2 miles above Rio Hondo. There are two reinforced concrete wharves with berthing space, two oil unloading docks, and an adjustable ramp for the offloading and loading of truck trailers to barges. A transit shed on the west wharf has covered storage space. Water is available at the west wharf. Gasoline and diesel oil are available by truck. The principal imports are petroleum products, steel products, and chemicals. The principal export is grain. There are railroad and highway connections to **Harlingen** and the interior. At Harlingen and **San Benito** there are hospitals, supplies, transportation and communication facilities.

Brazos Santiago, the approach to Port Isabel and Brownsville, is a narrow pass from the Gulf to the lower end of Laguna Madre, between the south end of Padre Island and the north end of **Brazos Island.** It lies 236 miles south-southwestward from Galveston entrance, 106 miles southward from Aransas Pass, and 7 miles northward from the mouth of the Rio Grande.

Prominent features.—In approaching Brazos Santiago on a clear day, the water tanks and Port Isabel Light are the first objects sighted. Soon thereafter the mariner will pick up Brazos Santiago Light and the Coast Guard station inside the entrance on the north side. A few miles northward from the entrance, a succession of large sand hills 20 to 25 feet high, known as **The Tanks,** are conspicuous marks.

Port Isabel Light, 91 feet above the water, is shown from the white conical brick tower; the light is maintained by the State.

Brazos Santiago North Jetty Light, 44 feet above water, marks the outer visible end of the jetty. A fog signal at the light is operated from November 1 to April 30.

Brazos Santiago Light, 52 feet above the water and visible 13 miles, is shown from the dwelling of the Coast Guard Lifeboat Station at the north side of the entrance to Laguna Madre. The radiobeacon antenna is near the light.

Channels.—The pass has been improved by the construction of two rubble mound jetties extending nearly 1 mile into the Gulf and by dredging a channel between them from deep water in the Gulf. Federal dredging depths are 38 feet through Brazos Santiago, 36 feet across Laguna Madre to the junction of the channels leading to Brownsville and Port Isabel, 36 feet to Port Isabel turning basin, and 32 feet from the junction to the Brownsville turning basin.

Depths are maintained, and are published from time to time in Notice to Mariners.

In the 12-mile channel to the Brownsville turning basin, **Boca Chica Cutoff Passing Basin** is at about mile 3.2 and **Goose Island Passing Basin** at about mile 8 from the junction channel.

The entrance to the pass is marked by a lighted whistle buoy 2 miles off, a lighted buoy off the south jetty, and a lighted range. The range lights are visible only on the range line, but an auxiliary light is visible around the horizon; the bearing is **269°** The remains of a wreck lie inside the end of the south jetty and are marked by a lighted buoy.

Anchorages.—Directly off the entrance to the pass the bottom is soft and affords fair anchorage with good holding ground; farther north and south the bottom is harder. After entering the pass, ships must proceed to the wharves. Temporary anchorage can be made in the turning basin in Brownsville while waiting for dock.

Tides.—Inside the pass the periodic tide is negligible, the variation in water level depending principally on the wind.

Coastal (storm) warnings are displayed by day at the Coast Guard station on Padre Island and are posted in Brownsville, Port Brownsville, and the Shrimp Basin.

Pilotage.—Pilotage on the Port Isabel and Brownsville ship channels between the bar and the respective turning basins is compulsory for foreign vessels and American vessels under register. The pilots use motor launches to meet vessels. A lookout station is manned at the former lighthouse site on Padre Island near the Coast Guard station.

Towboats.—Towboats are available for Port Brownsville or Port Isabel or for coastwise towing and salvage work.

Customs.—A deputy Collector of Customs has an office in the Federal Building in Brownsville and suboffices at each port. Vessels are boarded at the dock.

Quarantine and Immigration.—These services maintain offices at the Gateway International Bridge. Vessels are boarded at the docks.

Hospitals.—The nearest Public Health Hospital is in Galveston. A private hospital and a Public Health Service outpatient clinic are in Brownsville.

The Weather Bureau and the Border Patrol have offices at the International Airport. The Fish and Wildlife Service has a statistical office at the Port Brownsville Shrimp Basin. The Corps of Engineers area offices are in the Federal Building in Brownsville.

Port Isabel, about 2.5 miles westward from Brazos Santiago, is an important point for the shipping of petroleum products, cotton, and metals. It has a large fishing fleet, and the town is widely patronized as a resort for sport fishing and recreation. There are several hotels, motels, and stores.

Terminal facilities.—The deepwater facilities at the turning basin in Port Isabel are controlled by the Port Isabel-San Benito Navigation District, and managed by a **port director.** A **harbormaster** at the wharves assigns berths and controls the movement of ships. There are two general cargo wharves with more than 1,000 feet of berthing space on the west side of the basin and an oil dock equipped for receiving and loading oil cargoes is on the north side. A transit shed on the north wharf has more than 30,000 square feet of covered storage space, and additional covered storage space is available. There is a precooler plant on the wharf. The open wharf was designed for the handling of fruit. The wharves have facilities for bunkering ships and servicing them with fresh water and electricity. The entire terminal system is served by railroad, highway, and pipeline.

Small-boat facilities.—A Federal project provides for a side channel from the Intracoastal Waterway along the southern part of Port Isabel, 12 feet deep and 125 feet wide and 6 feet deep and 60 feet wide for the use of small craft. The 125-foot channel had a controlling depth of 11 feet in February 1957 and the smaller channel had a controlling depth of 8 feet. This is known as the **Industrial Channel** and is used principally by fishing boats.

Local interests dredged a shallow-draft channel on the northwest side of Port Isabel to a yacht basin, 1,100 feet long and 200 to 600 feet wide, but in 1956 the channel had shoaled to the general depth of Laguna Madre. Gasoline, diesel oil, water, ice, provisions, and supplies are available.

Two of three shipyards have marine ways, the largest being capable of hauling out vessels up to 1,000 tons in weight, 150 feet in length, and 14 feet in draft, for general repairs. The third yard has a floating drydock capable of hauling out vessels up to 78 feet in length and 7 feet in draft for hull repairs.

Communications.—Rail and highway connections with San Benito and Rio Grande are available.

Brownsville is a fast growing metropolis of the Rio Grande Valley, a rich agricultural section extending along the north side of the Rio Grande for about 100 miles above its mouth. In addition to its agricultural interest, Brownsville is noted as a summer and winter resort and a port of entry into Mexico. Less than 100 miles west of the city is a considerable area of new oil

field development. **Matamoros** is opposite Brownsville on the Mexican side of the Rio Grande. Exports from the port of Brownsville include cotton, cotton products, lead, agricultural implements, zinc, sulfate, ore, chemicals, and citrus fruit. Imports are bananas, pineapples, steel products, and general merchandise.

Terminal facilities.—The harbor facilities at Port Brownsville are owned and controlled by the Brownsville Navigation District. A **director of the port** has charge of management of the port, and a **harbormaster** at the wharves has charge of the movement of ships and the assignment of berths. The turning basin has several thousand feet of berthing space, and there are several hundred-thousand square feet of covered storage space in the transit sheds. Fenced bonded open space also is available. All docks and wharves have water and electric current; bunkering facilities and diesel oil are available at two of the oil docks. The banana wharf has sheds with unloading conveyers. There are high-density cotton compresses in the port area and warehouse storage capacity for more than 100,000 bales of cotton; additional compresses and warehouses in Brownsville have storage capacity for another 100,000 bales. The port has oil-storage capacity of 500,000 barrels. Vegetable and fish oil are handled at one oil dock. A steam crane of 30-ton capacity and a mobile boom of 15-ton capacity are available.

Small-boat facilities.—The Port Brownsville Shrimp Basin has berthing facilities for 500 small boats and fishing craft. There are seafood processing plants, marine supply outlets and marine engine repair facilities. A shipyard has marine ways capable of hauling out vessels up to 100 tons in weight, 110 feet in length, and 11 feet in draft for hull repairs. Gasoline, diesel oil, water, ice, and supplies are available. Provisions can be obtained from Brownsville. There is bus and taxi service from the basin to Brownsville.

Communications.—Brownsville is connected with points in both the United States and Mexico by three trunk rail lines. Excellent highways extend throughout the valley area as well as to the northern and northwestern part of Texas. The Rio Grande Valley International Airport, about 5 miles east of the city, has airport facilities of every kind, including customs, immigration, and health officers of the United States and Mexican Governments. Daily scheduled flights reach all parts of the United States and to Mexico City where connections can be made for Central and South American points.

Del Mar (Boca Chica) Beach, on Brazos Island, is a swimming and fishing resort.

The **Rio Grande** empties into the Gulf of Mexico 7 miles southward of Brazos Santiago. The International Boundary and Water Commission states (December 28, 1953) that the river forms the international boundary between the United States and Mexico for 1,241 statute miles; further, that the total length of the boundary is 1,935 statute miles from the Gulf of Mexico to the Pacific Ocean. No survey of the river has been made recently, but it is reported that about 4 feet can be carried across the bar off the entrance to the river. Inside, the channel is changeable and not dependable. The International Boundary Commission has several dams on the Rio Grande to prevent fresh water from wasting into the Gulf.

The east coast of Mexico is described in H. O. Publication 130.

12. GULF INTRACOASTAL WATERWAY

The Federal project for the Gulf section of the **Intracoastal Waterway** provides for a protected waterway with a least depth of 12 feet along the Gulf coast from Apalachee Bay, Florida, to the Mexican border at Brownsville, Texas. Navigation throughout the entire waterway is toll-free. Controlling depths are not given in this volume but are published each week in Notice to Mariners.

Charts.—Navigation of the Gulf section of the Intracoastal Waterway can be facilitated by use of the series of nautical charts published on a scale of 1 : 40,000 by the Coast and Geodetic Survey especially for that purpose.

Navigational aids.—The United States Coast Guard has adopted a uniform method of marking the Intracoastal Waterway and other connecting coastal waterways along the Atlantic coast south of Norfolk and along the Gulf coast. This method is illustrated in Chart 1.

Bridges and locks.—General Federal regulations governing bridges are stated in § **203.240, 203.241,** Chapter 2; several regulations governing locks and handling of tows are also in that chapter. Several cable ferries cross the waterway; vessels must not attempt to pass until the ferries have docked as the cable remains suspended during crossings.

Distances.—In the following text, distances are in nautical miles east or west along the waterway from Harvey Lock at New Orleans. These distances should not be confused with distances shown on markers placed along some portions of the waterway by the Corps of Engineers, as the latter distances, although referenced to Harvey Lock, are given in statute miles. A table for converting statute miles to nautical miles, and vice versa, will be found in the back of this volume.

Tides.—Under ordinary conditions the mean tidal range in the waterway is from 1 to 2 feet. In most sections the tide is largely dependent on the force and direction of the wind. Strong northerly winds that occur principally during the winter depress the water surface as much as 3½ feet below mean low water; southerly winds have the opposite effect. Severe hurricanes have raised the water surface 10 feet or more above low water in some localities.

Chart 1261.—The authorized route of the waterway between Apalachee Bay and Carrabelle is by way of Ochlockonee Bay, Ochlockonee River, Crooked River, and Carrabelle River. Construction of this reach awaits appropriation of the necessary funds by Congress. The various parts of the reach are discussed in Chapter 6. Through navigation is restricted to a controlling depth of about 3 feet at low water. The alternative route between Apalachee Bay and Carrabelle is outside in the Gulf of Mexico, thence through St. George Sound.

Chart 865.—St. George Sound to Apalachicola Bay.—Carrabelle (P. O.), **Mile 330.4E,** is a small fishing village on the east bank of Carrabelle River about 0.5 mile above the mouth. Diesel oil, gasoline, and fresh water are available; see Chapter 6.

From Carrabelle River the waterway follows the ship channel almost to East Pass, then turns southwestward and follows a well marked route through **St. George Sound** to **Apalachicola Bay.**

Chart 866.—Apalachicola Bay to Lake Wimico.—At Mile 308.8E, the waterway turns sharply to the northward. **Apalachicola, Mile 305.2E,** is at the mouth of **Apalachicola River.** Diesel oil, distillate, gasoline, oil, provisions, and water are available. Hotels, numerous stores, and a small machine shop are in the town. Good facilities are available for making small-craft repairs; see Chapter 6.

The John Gorrie Memorial Bridge, a highway causeway at **Mile 305.2E,** crosses the bay from East Point to Apalachicola. The swing span over the waterway has a horizontal clearance of 119 feet and a vertical clearance of 29 feet.

The railroad bridge over Apalachicola River at **Mile 301.3E** has a swing span with a horizontal clearance of 120 feet and a vertical clearance of 7 feet at high water, 13 feet at low water. Extreme care is advised in the vicinity of this bridge.

At Mile 300.2E the waterway leaves Apalachicola River and proceeds by way of **Jackson River** to Lake Wimico, at **Mile 296.0E.**

Chart 867.—Lake Wimico to Overstreet.—The waterway leaves **Lake Wimico** at **Mile 291.4E** and proceeds by way of **Searcy Creek** to a long land cut. There is a submerged fresh-water syphon at Mile 286.6E.

The highway bridge over the waterway at **White City, Mile 286.0E,** has a vertical-lift span with a horizontal clearance of 86 feet and vertical clearance of 10 feet, down, and 80 feet, up. An overhead cable at the bridge has the same vertical clearance as the lifted span. A filling station has gasoline and some provisions at White City, but there are no berthing facilities.

The **Gulf County Canal,** which joins the waterway at **Mile 284.6E,** extends 5 miles southwestward to St. Joseph Bay. The canal has been discussed in Chapter 6.

Chart 868.—Overstreet to St. Andrew Bay.—Overstreet

(P. O.) is a small village at **Mile 273.9E.** The village has no supply or repair facilities for yachts. The pontoon bridge over the waterway at Overstreet has horizontal clearance of 90 feet. An overhead power cable is south of the bridge.

From Overstreet the waterway follows **Wetappo Creek** and enters **East Bay** at **Mile 271.8E. Wetappo** consists of a school and few scattered houses on the north side of the bay at **Mile 269.2E. Allanton** has a few houses on the north side of the bay at **Mile 267.0E. Belle Isle,** with a few summer cottages, is on the south side of the bay at **Mile 264.3E.**

Dupont Bridge, also known as **East Bay Bridge,** crosses East Bay at **Mile 256.6E.** The bridge has a swing span with a horizontal clearance of 98 feet and vertical clearance of 14 feet; drawspan regulations are stated in **§ 203.245,** Chapter 2. During the ebb the strong currents east of the bridge have a tendency to carry westbound vessels in a southerly direction. All westbound vessels are cautioned to exercise extreme care.

Chart 869.—St. Andrew Bay to West Bay Creek.—The Intracoastal Waterway leaves East Bay at **Mile 252.0E** and enters **St. Andrew Bay.**

Panama City is a summer resort on the northeast side of St. Andrew Bay at **Mile 251.8E.** Passing yachts usually tie up in Massalina Bayou or at the municipal pier 400 yards to the northwest. Hotel accommodations, supplies, and repair facilities are available at Panama City; see Chapter 6.

The waterway passes from St. Andrew Bay proper into **West Bay** at **Mile 249.7E. Hathaway Bridge,** which crosses West Bay at **Mile 247.1E,** has a swing span with a horizontal clearance of 78 feet and a vertical clearance of 14 feet. The east draw is closed to navigation. In 1957 a new bridge was under construction just north of the existing structure.

North Bay extends in a northeasterly direction from a point at **Mile 245.0E** on the route of the waterway through West Bay. Several oyster bars in the middle of North Bay have depths of 3 to 6 feet over them. A depth of 12 feet can be carried to the bridge at **Lynn Haven,** 5 miles above the waterway, and thence a depth of 4½ feet can be carried to **Bayhead,** a summer resort 5 miles above the bridge.

The fixed highway bridge over North Bay at Lynn Haven has a center span with a horizontal clearance of 68 feet and a vertical clearance of 20 feet.

Several bayous along North Bay afford anchorage for small craft. **Fanning Bayou** empties into the bay from northward on the west side of the highway bridge. **Southport,** at the head of the bayou, is a small village. A depth of about 6 feet can be carried to the wharf at the village.

The route of the waterway continues in a northwesterly direction through West Bay and enters **West Bay Creek** at **Mile 237.1E. Westbay** (P. O.), a small settlement on the southwest side of the creek at **Mile 236.1E,** has no docks or other facilities for passing craft. The highway bridge over the creek at Westbay has a vertical-lift span with a horizontal clearance of 86 feet and vertical clearance of 9½ feet, down, and 80 feet, up; drawspan regulations are stated in **§ 203.245,** Chapter 2.

Chart 870.—West Bay Creek to Choctawhatchee Bay Entrance.—From West Bay Creek the waterway follows a long land cut westward. A cable ferry crosses the cut at Mile 221.3E.

The waterway enters **Choctawhatchee Bay** at **Mile 220.2E.** A causeway crosses the bay at Mile 217.4E; the bascule span over the waterway has a horizontal clearance of 98 feet and a vertical clearance of 16 feet.

The waterway continues westward through Choctawhatchee Bay and passes **Choctawhatchee Bay Entrance** at **Mile 197.7E.** The bay is discussed at length in Chapter 6.

Chart 871.—Choctawhatchee Bay Entrance to Pensacola.—The waterway leaves Choctawhatchee Bay at Mile 194.1E and proceeds westward through **The Narrows.** The highway bridge over The Narrows at **Mile 193.6E** has a swing span with a horizontal clearance of 91 feet and a vertical clearance of 17 feet. The channel is north of the pivot pier; the south draw is not open to navigation.

Fort Walton Beach (P. O.), on the north side of The Narrows at **Mile 193.0E,** has telephone and telegraph connections, hotels, and several stores, and is on Federal and State highways; there is bus service. Gasoline, water, and provisions can be obtained; diesel oil is trucked in. No facilities for boat repairs are available; see Chapter 6.

Mary Esther (P. O.) is a small residential and summer resort on the north side of The Narrows at **Mile 190.2E.** A small private yacht basin has berthing facilities for boats up to 40 feet in length and 3 feet in draft.

The waterway continues westward through The Narrows into **Santa Rosa Sound.** The sound and The Narrows have a combined length of about 33 miles.

A highway bridge over the western end of Santa Rosa Sound at **Mile 164.2E** connects the mainland on the north with **Pensacola Beach** on **Santa Rosa Island.** The bridge has a bascule span with a horizontal clearance of 125 feet and a vertical clearance of 25 feet.

Chart 872.—Pensacola to Bon Secour Bay.—The Intracoastal Waterway passes from Santa Rosa Sound to the lower part of **Pensacola Bay.** The city of **Pensacola** is 4 miles north of a point at Mile 160.0E on the route of the waterway. Hotel accommodations, supplies, and repair facilities are available at Pensacola. The city is discussed at length in Chapter 6.

The waterway passes from Pensacola Bay into **Big Lagoon at Mile 155.8E.** There are no facilities along the shores of the lagoon, but good anchorage is available in the eastern part. The bridge over the western end of the lagoon at Mile 149.3E has a bascule span with a horizontal clearance of 80 feet and a vertical clearance of 10 feet. An overhead cable near the bridge has a permit clearance of 90 feet. Vessels are cautioned to approach the bridge at slow speed as the draw is slow to open. The highway leads to **Gulf Beach** on the outer coast about 1 mile to the south.

The waterway extends through the lower part of **Perdido Bay**, thence through **Arnica Bay, Bay La Launch,** and **Wolf Bay.** Perdido Bay is discussed in Chapter 6. Good anchorage for small craft is available in Wolf Bay. A privately maintained small-boat basin is in Arnica Bay; berthing facilities are available.

Orange Beach is a small settlement on the south side of Wolf Bay at **Mile 141.0E.** A small repair yard at the settlement has a railway that can haul out craft up to 40 feet in length and 3½ feet in draft. The yard is used mostly by local fishermen who do their own repair work after hauling out, but passing craft may have work done in emergencies.

The waterway passes westward from Wolf Bay into a long land cut. **Gulf Shores** (P. O.) is a town on the south side of the cut at **Mile 134.8E.** The highway bridge over the cut has a swing span with a horizontal clearance of 90 feet and a vertical clearance of 12 feet. An overhead cable west of the bridge has a clearance of 110 feet. The highway leads southward to the beaches and Fort Morgan.

Passing yachts may tie up at the municipal dock west of the bridge. Gasoline, diesel oil, ice, water, provisions, and some yacht supplies are available at Gulf Shores, and the village has telephone and telegraph connections. **Coastal (storm) warnings** are displayed, day and night, at the bridge.

The waterway follows the land cut to and across **Oyster Bay** and emerges into Bon Secour Bay at **Mile 131.1E.**

Chart 873.—Bon Secour Bay to Pass aux Herons.—Bon Secour Bay, on the southeast side of Mobile Bay, has general depths of 8 to 10 feet except close inshore. The Intracoastal Waterway crosses the bay in a dredged cut to Mile 119.0E where it enters the natural waters of Mobile Bay.

The **Mobile Bay Channel** crosses the waterway at **Mile 116.0E.** The city of Mobile, 25 miles northward of the intersection, is fully described in Chapter 7.

At Mile 113.2E the waterway enters the dredged channel leading to the eastern end of **Pass aux Herons, Mile 111.4E,** where there is a vertical-lift bridge with a horizontal clearance of 200 feet and a vertical clearance of 19 feet, down, and 79 feet, up; the bridge connects Dauphin Island with the mainland. Tidal currents run through Pass aux Herons with considerable velocity. The bottom in the channel at the eastern end of the pass is hard and at the western end, soft. The channel through Pass aux Herons is well marked.

Dauphin Island (P. O.) is a fishing village and summer resort on Dauphin Island. A draft of 7 feet can be carried through the dredged channel into Bayou Aloe. The channel is marked with daybeacons. Gasoline, water, and some provisions are available.

Chart 874.—Pass aux Herons Channel to Pascagoula Channel.—The waterway leaves the Pass aux Herons Channel at Mile 103.5E and enters the open water of **Mississippi Sound.**

When bound for **Bayou La Batre,** leave the waterway at Mile 102.5E and proceed northward to the channel and thence to the town, a distance of about 10 miles. Diesel oil, gasoline, water, ice, and small-boat supplies are available. The largest of the four boatyards has marine ways capable of hauling out vessels up to 75 feet in length and 8 feet in draft for general repairs. Machine shop facilities are available.

Petit Bois Pass is 2 miles south of **Mile 100.6E.** The Alabama-Mississippi boundary crosses the waterway at Mile 96.9E.

At Mile 94.8E a fairway lighted buoy is 4.4 miles south of the western end of the westernmost part of **Grande Batture Island.** The edge of a 6-foot shoal is 1.5 miles northward of the buoy.

Chart 875.—Pascagoula Channel to Biloxi.—At Mile 90.9E the Intracoastal Waterway crosses the ship channel between Horn Island Pass and Pascagoula. Horn Island Pass is 3.0 miles south of the waterway. **Pascagoula,** 7 miles north of the waterway, is a large shipbuilding and repair port; supplies and repairs of all kinds are available. A small-boat basin at the south end of the city has berthing facilities for craft up to 40 feet in length. **Coastal (storm) warnings** are displayed, day and night, from a weather bureau tower.

A lighted fairway buoy marks the route at Mile 77.7E. The buoy is 3.4 miles southward of **Belle Fontaine Point,** which is low and rounded.

Dog Key Pass is 2.8 miles south of the route at **Mile 76.4E.**

Chart 876.—Biloxi to Gulfport.—A lighted fairway buoy marks the Intracostal Waterway route at Mile 70.6E. **Biloxi Channel** is 5.0 miles north of the waterway at **Mile 69.4E.** Fresh water, provisions, and a fairly complete line of deck and engine supplies for small vessels are available in Biloxi, 8.2 miles north of the waterway. Diesel oil and gasoline are available from marine service stations on the Mississippi Sound waterfront and on Back Bay. Several shipyards are located in Back Bay; the largest marine ways can haul out vessels up to 80 feet in length and 6 feet in draft, for general repairs. **Coastal (storm) warnings** are displayed, day and night, at Biloxi.

At **Mile 63.8E** the waterway crosses the **Gulfport Ship Channel. Gulfport** is a shipping port 6 miles northward of the waterway; it is described in detail in Chapter 7. The municipal yacht basin on the east side of Gulfport Harbor has berthing facilities for yachts. Diesel oil, gasoline, ice, and water are available. A commercial small-boat harbor is northwest of Gulfport Harbor with berthing facilities for fishing and other commerical craft.

A small-boat shipyard is in the harbor. Marine ways capable of hauling out vessels up to 200 tons in weight, 100 feet in length, and 8-foot drafts are available for general repairs. Ordinary ship chandlery and provisions of all kinds are available. **Coastal (storm) warnings** are displayed, day and night, at Gulfport.

Chart 877.—Gulfport to Grand Island Pass.—At Mile 56.9E the route turns southwestward at a lighted buoy. If bound for Pass Christian turn northwest at the buoy and continue for 5.5 miles. **Pass Christian** has a boat basin protected by concrete and timber bulkheads, with an entrance in the south bulkhead. Berthing space for small craft is available. A marine service station is in the basin. **Coastal (storm) warnings** are displayed day only at the yacht club. In May 1956 the controlling depths were 8 feet in the entrance and 10 feet in the basin.

Pass Marianne is an alternate passage through the shoals extending across the western end of Mississippi Sound with natural depths of 9 to 14 feet. The pass, south of **Tail of the Square Handerchief Shoal** and **Square Handerchief Shoal,** is frequently used by tugs and barges. The channel is marked by lights and buoys. Caution must be exercised when navigating this channel as it is subject to change.

At **Mile 50.8E** the Intracoastal Waterway enters **Marianne Channel,** a dredged cut which intersects **Merrill Coquille** at **Mile 49.2E.** At Mile 47.1E the dredged cut turns westward and becomes **Grand Island Channel.** The route enters the natural depths of the sound at Mile 41.7E.

The route turns southwestward at Mile 40.5E and enters Grand Island Pass.

Chart 878.—Grand Island Pass to New Orleans.—The boundary between Mississippi and Louisiana follows **Grand Island Pass** to East Pearl River. At Mile 35.5E the waterway enters a dredged channel. The channel to **East Pearl River** enters the waterway at Mile 35.3E.

At Mile 30.3E the channel to the **Rigolets** turns west-northwestward. The Rigolets is a deep passage 7 miles long and about 0.4 mile wide connecting Lake Borgne and Lake Pontchartrain.

The Intracoastal Waterway enters the **Rigolets-New Orleans Cut** at **Catfish Point, Mile 29.6E,** on **Rabbit Island,** which is at the eastern end of the Rigolets.

Caution.—Whenever the Intracoastal Waterway crosses rivers or passes, cross currents are to be expected and pilots negotiating these crossings should be alert to keep their vessels under control. With northerly winds these cross currents flow with considerable strength but with proper care on the part of the pilot, safe crossing may be made without difficulty. Vessels with tows should maintain only such headway as is necessary to control the tows. Little Rigolets, Unknown Pass, and Chef Menteur Pass are especially bad.

The waterway crosses **Little Rigolets** at **Mile 29.3E** and then through a cut-off for another 0.3 mile and rejoins the stream at Mile 29.0E. **Unknown Pass** crosses the waterway at **Mile 25.6E.** Vessels should observe caution when navigating this crossing. The following small bayous cross the waterway: **Bobs Bayou, Mile 24.2E; Bayou Platte, Mile 23.2E;** and **Bayou Dupont, Mile 20.8E.**

The waterway crosses **Chef Menteur Pass** at **Mile 20.3E.** This is a connecting passage between Lake Borgne and Lake Pontchartrain. The pass is about 6 miles long and 0.2 mile wide. The currents are strong and mariners should be alert.

At **Mile 13.0E, Michoud Canal** extends northward about 1.5 miles; it has a controlling depth of about 12 feet. The canal is privately owned, and permission to enter is required. The settlement of **Michoud** is near the head of the canal on the railroad. At Mile 11.8E is another canal, extending northward, which has depths of 17 to 27 feet. Between these two canals the channel has been widened on the north side.

A highway pontoon bridge with horizontal clearance of 100 feet crosses the waterway at Mile 11.3E. Gasoline is available at a small boatyard just southwest of the bridge.

An overhead cable with a permit clearance of 126 feet crosses at Mile 6.9E.

The Rigolets-New Orleans Cut enters the **Inner-Harbor Navigation Canal (Industrial Canal)** at **Mile 6.7E.** In the canal north of this intersection special regulations are enforced. See Chapter 8 for information on that portion of the canal, also for dimensions and clearances of the canal lock, and for the bridges over the canal.

Handling tows through locks. Mariners are advised that considerable difficulty has been encountered in the past at the various locks caused by drift being brought into the lock chambers. Delays to navigation and breakage of operating machinery have resulted. Mariners are requested to dump the drift from the head of their tow prior to entering the forebay from the river. Any tow entering the forebay from the river with excessive drift may be required to back out into the river and dump the drift prior to entering the lock chamber.

Push-and-pull tows (i. e., tows with barges made up both ahead and astern of the towboat simultaneously) longer than 1,000 feet exclusive of the towing vessel and hawser, or wider than one-half the bottom width of the channel or wider than 55 feet, whichever width is less, are not allowed in channels 150 feet wide or narrower except on waterways exempted by the District Engineer of the Corps of Engineers or on other waterways by special permission of the District Engineer.

Of the many collisions at various structures along the waterway, a majority have involved barges measuring approximately 240 feet by 50 feet with extremely long rakes which, when light, extend about 10 feet above the water surface. It is believed that these accidents would be reduced to a minimum if such barges were made up in a **pusher-type** tow instead of being towed on a hawser when passing through navigation structures. Mariners are directed at all times to be especially careful when moving these modern-type tows through all waterway structures.

The Inner-Harbor Navigation Canal enters **Mississippi River** at Mile 4.9E.

Most small-boat facilities at **New Orleans** are on the canals inside the locks from the river and at the yacht basin at West End Park on Lake Ponchartrain. Diesel oil, gasoline, water, provisions, supplies, and repair facilities are available along the Inner-Harbor Navigation

Canal and at Harvey. New Orleans is fully described in Chapter 8.

Chart 879.—New Orleans to Houma.—The Harvey Canal Route begins at the town of **Harvey,** Mile 0.0, on the southwest bank of the Mississippi River opposite New Orleans. Regular ferry service connects the two municipalities. The **Harvey Lock, Mile 0.0,** through the levee, is 425 feet long, 75 feet wide, and 12 feet deep. At Mile 0.1W, just inside the lock, are a railroad bridge and a highway bridge. The railroad bridge has a bascule span with a horizontal clearance of 75 feet and a vertical clearance of 10 feet. The highway bascule bridge has a horizontal clearance of 75 feet and a vertical clearance of 13 feet. The nearby overhead power cable has a permit clearance of 90 feet.

The Corps of Engineers has assigned a radio-equipped patrol boat (operating on Channel 4, 2738 kc., call letters WUM 2442) to assist in expediting movement of traffic through Harvey Lock. The boat operates only when the backlog of traffic requires such service to relieve congestion. At these times the boat is located in the Mississippi River near Harvey Lock and on the waterway between the lock and Mile 4.5W (Hero Cutoff).

Vessels desiring information on lockage should contact the patrol boat which in turn will contact the lock on the assigned frequency. In some instances, radio receivers will block when the vessel desiring contact is too close to the patrol boat, which means the message then must be relayed through another vessel in the vicinity.

To assure full benefit from this service, it is suggested that the following be observed when the patrol boat is operating: 1. When desiring lockage, maintain watch on receiver at all times so that movement may be made when called to do so. 2. Keep radio traffic in vicinity of Harvey Lock at a minimum to avoid interference with official traffic. 3. The lockmaster will set the pattern for lockage, which information the patrol boat will broadcast to vessels seeking lockage and will direct the movement of tows moving up to the lock. 4. Tows will take position in the river or tailbay according to the locking pattern.

There are three shipyards at Harvey with floating docks. The largest has 4 floating docks accommodating vessels up to 2,000 tons in weight, 340 feet in length, 72 feet beam, and 11 feet in draft. One of the yards, in addition to the floating dock, has marine ways capable of hauling out vessels up to 85 feet in length and 7½ feet in draft. General repairs are made; all yards operate machine shops.

The waterway continues in **Harvey Canal No. 1.** At Mile 0.2W is an overhead cable which has a permit clearance of 90 feet. Just south of the lock are wharves and facilities where motor fuels and fresh water are available. Provisions and supplies are available at Harvey or New Orleans. An overhead cable at Mile 1.5W has a permit clearance of 90 feet.

At Mile 4.2W the route swings westward into **Hero Cutoff.** The easterly channel leads to a drainage pumping station. **Bayou Barataria** joins the cut-off at Mile 5.1W. The route follows this bayou for 8.6 miles. Several cutoffs have been dug along this bayou to straighten the channel; they are easily recognized. **Hole in Wall Cutoff** is the largest.

The **Algiers Alternate Route** is down the Mississippi for 4.0 miles from the Inner Harbor Navigation Canal, Mile 4.9E, thence southwestward by land cut for 8.0 miles to rejoin the main route at Mile 5.5W. Algiers Lock, 0.5 mile from the Mississippi, is 760 feet long, 75 feet wide, and 13 feet deep. Project depth is 12 feet for the land cut.

Permit clearance is 90 feet for the overhead power cable 0.9 mile from Algiers Lock. The vertical-lift highway bridge 1.2 miles from the lock has a horizontal clearance of 125 feet and vertical clearances of 8 feet down and 101 feet up. The vertical-lift railroad bridge 3.2 miles from the lock has a horizontal clearance of 125 feet and vertical clearances of 5 feet down and 103 feet up. At 3.3 miles from the lock a highway tunnel goes under the channel.

At the village of **Crown Point, Mile 9.2W,** is an overhead cable with a permit clearance of 90 feet. A shipyard here has a floating dock accommodating vessels up to 85 tons, 75 feet in length, and 6½ feet draft. General repairs are made. The **Wagner Bridge** crosses the waterway at **Mile 10.8W**; the swing span has a horizontal clearance of 75 feet and a vertical clearance of 9 feet. Use the south opening.

The waterway swings southwest leaving Bayou Barataria and entering a land cut at **Jones Point Cutoff, Mile 12.8W.** Southeastward from this junction a depth of 6 feet can be carried through Bayou Barataria and Bayou Dupont into Dupre Cut leading to Barataria Bay. Barataria Bay is described in Chapter 9. About 0.7 mile south of **Lafitte Village** Bayou Barataria divides and forms Bayou Rigolettes and Bayou Dupont. **Bayou Rigolettes,** a former route to Barataria Bay, is now shallow. Two miles below Lafitte Village, **Dupre Cutoff Canal** branches to the southward from **Bayou Dupont.** Beyond this point Bayou Dupont is shallow.

Lafitte (P. O.) is on the east bank of Bayou Barataria just below the junction. A shipyard here can haul out vessels up to 90 tons, 75 feet in length, and 5 feet in draft. for hull and engine repairs. Diesel fuel, gasoline, oil, water, ice, and provisions are available. An improved highway runs from Harvey to Lafitte.

The village of **Barataria** (P. O.) is on the west bank of Bayou Barataria opposite Lafitte.

At **Mile 13.1W, Bayou Villars** crosses the waterway. This bayou connects the waterway with Lake Salvador on the west and Bayou Barataria on the east. **Lake Salvador** has depths of 5 to 7 feet. A depth of 4 feet can be taken from the waterway through Bayou Villars, Lake Salvador, **Bayou des Allemands, Petit Lac des Allemands, Lac des Allemands, Bayou Chevreuil,** and into **Grand Bayou.**

Bayou Couba connects **Lakes Cataouatche** and Salvador. The dredged channel in the bayou is marked on its southwest side by a light at the Lake Salvador and two daybeacons inside the bayou. **Bayou Segnette** connects the eastern side of Lake Cataouatche with a Company

Canal to Westwego about 3 miles upstream from Harvey. Near Westwego the Company Canal has shoaled.

At **Mile 17.4W** the Intracoastal Waterway crosses **Bayou Perot** which joins Lake Salvador and **Little Lake**. A light is at the intersection of the waterway with Bayou Perot. The waterway enters **Harvey Canal No. 2** at **Mile 25.4W.** The northern portion of the canal connects with **Catahoula Bay,** the southernmost portion of Lake Salvador. At Mile 29.9W there is an overhead power cable with permit clearance of 90 feet.

At **Larose, Mile 30.4W,** are a pontoon bridge with a horizontal clearance of 82 feet and overhead cables with permit clearance of 90 feet. There is a shipyard with a marine ways capable of hauling out boats up to 80 feet in length and 7 feet in draft, for general repairs. There is a complete marine radio service available and machine shop facilities. Fuels, water, provisions, and supplies can be obtained.

Mile 30.7W is the junction of the Harvey Canal No. 2, Bayou Lafourche, and Larose-Bourg Cutoff. Bayou Lafourche is described in Chapter 9. The Intracoastal Waterway route continues through **Larose-Bourg Cutoff.** A pontoon bridge with horizontal clearance of 104 feet crosses at Mile 30.9W, and an overhead cable with permit clearance of 90 feet is at Mile 31.0W.

At **Mile 42.4W Company Canal** crosses the waterway. Company Canal, connecting Lockport and **Bourg** on Bayou Terrebonne, was part of the former route of the Intracoastal Waterway.

At Mile 43.2W the waterway is crossed by a cable ferry and an overhead cable with a permit clearance of 90 feet. A portion of the former route leads southeast at Mile 43.7W. This channel is now closed by the construction of the highway leading to Bourg. At Mile 46.8W is an overhead cable with a permit clearance of 90 feet, which is the same clearance authorized for the overhead power cable crossing at Mile 48.4W. At Mile 49.9W the waterway is crossed by a pontoon bridge with horizontal clearance of 123 feet.

Houma, Mile 50.0W, the seat of Terrebonne Parish, is a petroleum production center and a commercial fishing headquarters. It is also an agricultural and industrial town which is on the New Orleans-Lake Charles highway and a branch line of the Southern Pacific Railroad. Houma has numerous stores, seafood canneries, a sugar mill, an ice and cold storage plant, theaters and hotels. Provisions and general supplies are available. Diesel oil, gasoline, lubricants, water, and ice are available.

The larger of two boatyards has marine ways capable of hauling out vessels up to 65 feet in length and 6½ feet draft, for general repairs. Both yards have machine shops. There are several places along the waterways where topside repairs can be made. A machine shop in Bayou la Carpe has a large crane which can hoist craft out for minor repairs. Numerous overhead power cables near Houma have minimum permit clearances of 60 feet.

Bayou Terrebonne, described in Chapter 9, intersects the waterway at Houma. The waterway is crossed on each side of the intersection by an overhead power cable with a permit clearance of 90 feet. Just southward of Bayou Terrebonne the waterway is crossed by a bascule highway bridge with a horizontal clearance of 79 feet and vertical clearance of 6 feet.

At Mile 51.1W the waterway is crossed by a railroad swing bridge with a horizontal clearance of 86 feet but only 75 feet, effectively, if turning into Bayou Black; the vertical clearance is 4 feet. The span is usually kept open. Just south of the bridge, **Bayou Black** branches southwestward and **Bayou la Carpe** leads southeastward. About 0.5 mile below the junction there is a pontoon bridge over Bayou la Carpe with a horizontal clearance of 61 feet. An overhead power cable at the bridge has a permit clearance of 50 feet. A second cable 0.3 mile below the bridge has a permit clearance of 60 feet. Either of these cables can and will be removed upon 24 hours' advance notice to permit passage of vessels requiring higher clearance. There is little through traffic in Bayou Black, but many barges and vessels are moored in the bayou and passage may be difficult at times because of these. The controlling depth through Bayou Black is about 4½ feet. There are numerous overhead cables across the bayou and there are seven swing and one vertical-lift bridges between Houma and where the waterway re-enters Bayou Black at Mile 72.5W. The minimum horizontal clearance is 36 feet; the vertical clearance of the lift bridge at Gibson is 54 feet, up. The minimum vertical clearance of the other bridges is 1 foot.

Little Bayou Black swings northwest from Bayou Black. Three bridges cross this bayou between **Southdown** and Houma. They have not been opened in years and there are no bridge tenders stationed at any of them. The railroad swing bridge has a horizontal clearance of 40½ feet and a vertical clearance of 5 feet; drawspan regulations are stated in **§ 203.245,** Chapter 2; as amended, they state that this bridge need not be opened for the passage of vessels. The highway swing bridge has a horizontal clearance of 41 feet and a vertical clearance of 6 feet; and the removable span bridge has a horizontal clearance of 40 feet and a vertical clearance of 9½ feet.

At Mile 51.9W, the waterway is crossed by a swing highway bridge with a horizontal clearance of 123 feet and a vertical clearance of 6 feet. An overhead power cable has a permit clearance of 90 feet.

Chart 880.—Houma to Morgan City.—There are numerous submerged pipelines and cables across the waterway between Houma and Morgan City. Signs on either bank mark their location.

Minors Canal crosses the waterway at **Mile 57.0W.** This canal connects with Bayou Black on the north and **Lake Hatch, Marmande Canal, Bayou Mauvais Bois,** and **Lake de Cade** on the south.

The waterway crosses the lower portion of **Lake Hackberry** at **Mile 64.1W.** Hyacinth booms are on both sides of the waterway where it crosses the lake. **Copasaw Canal** leads south at **Mile 65.6W** to join **Bayou Copasaw.**

At Mile 65.8W there is a five-way intersection; the cutoff channel of the waterway goes north-northwest.

The waterway enters **Lake Cocodrie** at **Mile 66.9W.** Between this point and the mouth of **Bay Wallace, Mile 69.8W,** the channel is marked by buoys, lights, and ranges. The waterway continues through **Bayou Cocodrie** and meets Bayou Black at Mile 72.5W. **Lily Boom Cutoff** at **Mile 73.9W** connects Bayou Black and **Bayou Chene** at **Mile 74.3W.** Bayou Chene connects with Atchafalaya River via a cut which has a controlling depth of about 13 feet.

At **Mile 75.7W** the waterway enters **Bayou Boeuf.** The Plaquemine-Morgan City Landside Route follows Bayou Boeuf to the northward; the latter route is described following the description of Morgan City.

Bayou Ramos enters the main route of the waterway from the north at **Mile 78.9W.** The village of **Ramos** is at the junction; the overhead power cable here has a permit clearance of 130 feet. Another village, **Wyandotte,** is at **Mile 80.0W,** on the north bank. The bayou has been stopped by a dam; the waterway passes through Bayou Boeuf Lock at Mile 81.0W. The lock is 1,160 feet long, 75 feet wide, and 12 feet deep over the sill. The village of **Rhoda** is on the north bank of the bayou. A cable ferry and an overhead power cable with a permit clearance of 90 feet cross the waterway at the village of **Pharr** on the south bank at **Mile 81.8W.** A small shoal makes off the northern side of Bayou Boeuf in the vicinity of Pharr; the southern limit is marked by a buoy. **Bayou Shaffer** flows south from Bayou Boeuf on the western side of Pharr at **Mile 82.1W.**

Bayou Boeuf enters the Lower Atchafalaya River at Mile 82.8W. **Morgan City** is on the northeast side of the junction. Supplies and repairs are available at Morgan City; for details see Chapter 9.

The 12-by-125 foot **Atchafalaya River Project** channel from the Intracoastal Waterway at Morgan City to the Mississippi River at a point 63 miles above Baton Rouge was completed in February 1956. The route is by way of Atchafalaya River for 101 miles to its confluence with the Red and Old Rivers, thence 6 miles along Old River to the Mississippi. In Grand and Sixmile Lakes, the channel is marked by buoys. Navigation maps of the Atchafalaya River, with listings of bridge and cable crossings, are published by the Mississippi River Commission, Vicksburg, Mississippi.

Chart 881.—Morgan City-Plaquemine Route.—Between Morgan Cty and Plaquemine on the Mississippi River are two alternate routes of the Intracoastal Waterway. The project depth is 9 feet. Mileages on these routes are from the center of the lock at Plaquemine, and below the junction of the two routes the letters L (for Landside) and A (for main alternate) will be used to distinguish between them. During the dry season little current will be found in either route, but during high water in the spring the current often attains a velocity of 2 to 3 knots in the western route. Several overhead cables with a minimum permit clearance of 70 feet cross the routes. On the west route, the limiting vertical clearance, determined by the fixed highway bridge at Morgan City, is 53 feet.

Both routes are easy to follow. Steer mid-channel courses in the land cuts, be guided by the various aids, and keep a sharp lookout for partially submerged logs and stumps.

Plaquemine, Mile 0.0, is a sizable town on the Mississippi at the north end of the waterway from Morgan City. Small craft can tie up to load provisions and supplies between the bridges and locks for short periods, but not for overnight. Fuels may be pumped direct from the trucks which make delivery.

Plaquemine Lock, Mile 0.0, between the Mississippi River and **Bayou Plaquemine,** has the following dimensions: length, 260 feet; width, 55 feet; low-water depth over sills, 10 feet. At Mile 0.2 there are two bridges; the first, a highway bridge, is a vertical-lift structure with a horizontal clearance of 85 feet and a vertical clearance of 16 feet, down, and 51 feet, up. The second, a railroad bridge, has a bascule span with a horizontal clearance of 110 feet and a vertical clearance of 14 feet.

Crescent, a village at **Mile 3.8** has a shipyard with marine ways capable of hauling out vessels up to 100 tons in weight, 80 feet in length, and 4 feet in draft at low-water stages, for general repairs; a machine shop is in operation. Gasoline and diesel oil are available. **Bayou Jacob** enters from the north at **Mile 4.1.**

Bayou Grosse Tete, which flows into Bayou Plaquemine at **Mile 6.7,** is little used at present. The improved channel to Port Allen will follow the lower reaches of the bayou. A project provides for improving the stream for a distance of 25.2 miles from its mouth to a point 4.3 miles above **Maringouin** by removing snags and trees and dredging a channel 5 feet deep. The variation of water surface due to flood conditions may be from 2 to 8 feet. In July 1956 the controlling depth to **Grosse Tete** was 4 feet but there were many snags and overhanging trees beyond Mile 8.0.

Eight drawbridges cross the bayou; the minimum clearances are 43 feet horizontal and 9 feet vertical. Drawspan regulations are stated in **§ 203.245,** Chapter 2.

At Mile 7.2, about 0.5 mile south of Indian Village, there is a small boatyard with marine ways capable of hauling out vessels up to 40 feet in length and 5 feet in draft, for hull repairs. At Mile 8.5 is a shipyard with marine ways that can haul out vessels up to 150 feet in length and 14 feet in draft and barges up to 300 feet in length and 54 feet in width, for general repairs. There are dock facilities for loading and unloading barges. Diesel fuel, gasoline, water, and limited marine supplies are available.

Caving is occurring to such an extent along the north bank of the waterway at Indian Village that the highway in that vicinity is being endangered. The caving is caused by tows striking the bank and by wave wash from tows maneuvering around the bend at that point. Mariners are requested to reduce their speed where practicable and exercise extreme caution when navigating the area in order to prevent unnecessary contact and reduce further sloughing of the bank to an absolute minimum.

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There is a boatyard at **Jack Miller Store, Mile 9.1,** which can haul out vessels up to 30 tons in weight, 65 feet in length, and 6 feet in draft, for general repairs. Diesel oil, gasoline, water, and some marine supplies are available.

Bayou Plaquemine flows into **Lower Grand River** at **Mile 9.1. Upper Grand River** enters the junction from the west. At Mile 10.0 the channel in 1956 was being straightened and widened to about Mile 13.0. **Bayou Sorrel** is a village at **Mile 13.4.** A toll ferry cable crossing is at Mile 13.6.

At Mile 15.2 the two routes divide. The landside route continues on the eastern side of the **East Atchafalaya Basin Protection Levee,** while the main alternate route passes through the levee in the Bayou Sorrel Lock and continues in a channel alongside the levee to Morgan City. The landside route will be described first, followed by the description of the alternate route.

At **Mile 22.0L** the waterway enters **Chopin Chute.** The former **Bayou Pigeon Navigation Gap** at this point has been permanently closed. At **Mile 26.0L** the route enters **Lake Natchez Pass** which flows into Bay Natchez. The waterway follows **Big Goddel Bayou, Mile 29.8L,** and **Belle River, Mile 36.7L,** to the junction with **Bayous Magazille** and **Long** at **Mile 43.7L.** A marine railway at Mile 37.3L can haul out boats up to 30 feet in length. Gasoline and diesel oil can be obtained in **Belle River, Mile 37.4L,** by portage. A cable ferry crosses the waterway at **Mile 37.5L.** Bayou Magazille flows eastward to the southern end of **Lake Verret** and the northern end of **Four Mile Bayou.**

The waterway follows Bayou Long to its junction with **Bayou Milhomme** at **Mile 47.8L.** Bayou Long is blocked off southwestward by the protection levee. A cable ferry crosses Bayou Milhomme at Mile 48.1L. At **Mile 57.6L,** Bayou Milhomme enters **Lake Palourde** and the waterway continues through a land cut. **Persimmon Pass** crosses at **Mile 58.9L** and **Simon Pass** crosses at **Mile 59.1L;** both of these passes connect **Grassy Lake** with Lake Palourde.

At **Mile 55.1L,** the land cut enters the junction of **Bayous L'Ourse** and Boeuf, and then continues in Bayou Boeuf. Between **Amelia,** on the west bank, and **Boeuf,** on the east bank, at Mile 56.9L, is a railway swing bridge with a horizontal clearance of 56 feet and a vertical clearance of 6 feet. The overhead power cable about 0.4 mile north of this bridge has a permit clearance of 120 feet. A highway swing bridge over the waterway at Mile 57.3E has a horizontal clearance of 60 feet and a vertical clearance of 8 feet; in 1957 a new bridge was under construction just north of this bridge.

At **Mile 58.4L** the landside route of the Morgan City-Plaquemine Route enters the main route of the Intracoastal Waterway at Mile 75.7W (of Harvey).

At **Mile 15.7A** along the main alternate route, the **Bayou Sorrel Lock** pierces the protection levee. The dimensions of the lock are 769 feet locking length, 56 feet wide, and 14 feet deep. South of the lock to **Solar Pass** at **Mile 44.7A,** the waterway follows a canal alongside the protection levee. At **Belle River, Mile 33.6A,** diesel oil, gasoline, and ice are available. Some provisions can be obtained and water can be hauled by tank truck. There is a small machine shop that can handle minor engine repairs. Between Solar Pass and **Croesus Pass** at **Mile 45.5A** the levee takes a curve in Lake Palourde which the canal follows. There is a land cut from Croesus Pass to **Drew Pass, Mile 46.5A.** At the junction of Drew Pass and the waterway the route enters **Berwick Bay.**

Two bridges cross Berwick Bay between Berwick on the west bank and Morgan City. A fixed highway bridge is at Mile 48.8A and a railroad drawbridge is at Mile 49.1A; clearances are given in Chapter 9.

The waterway joins the Intracoastal Waterway at Mile 49.3A, which is Mile 82.8W of Harvey Lock.

Chart 880.—Morgan City to North Bend.—From Morgan City the waterway follows the Lower Atchafalaya River to the intersection of **Little Wax Bayou** at **Mile 85.2W.** At Mile 83.4W there is an overhead power cable with a permit clearance of 130 feet. The entrance to the bayou is marked by a light on a small island. The channel north of the light is maintained. The southern channel is gradually shoaling and caution should be exercised in using it. This bayou has been straightened by several cutoffs.

At Mile 87.7W the waterway enters a landcut. Hyacinth booms block the various bayou crossings along the reach. A mooring basin is at Mile 92.5W. Between Mile 93.2W and Mile 94.0W the route crosses the **Wax Lake Outlet Canal.** Strong currents may be encountered when crossing the canal. Alternate channels to the north and south of the main channel are provided for passing craft during periods of strong currents; westbound traffic uses the north channel and eastbound traffic the south channel. During ordinary quiet periods the center channel is used by craft going in either direction. A mooring basin is at Mile 94.4W.

Chart 882.—North Bend to Vermilion River. Near **North Bend** at **Mile 98.2W** there is a vertical-lift highway bridge over the waterway. The bridge has a horizontal clearance of 125 feet and a vertical clearance of 5 feet, down, and 80 feet, up. **Bayou Sale** crosses the route 0.1 mile west of the bridge. Overhead power cables crossing the waterway, one east of the bridge and the other at Bayou Sale, have permit clearances of 90 feet.

The route continues in a land cut to **Mile 102.3W** where it enters **Bayou Bartholomew. Portage Cutoff** extends from **Mile 104.6W** to Mile 105.0W. The channels leading off the waterway at these two points connect with **Bayou Portage.** From this bayou Hanson Canal leads to Bayou Teche.

Hyacinth booms separate the waterway from **Mud Lake** at **Mile 105.4W** and **Mile 106.4W.** At Mile 106.0W the waterway leaves Bayou Bartholomew and enters a land cut. The easterly branch at Mile 106.2W leads through The Jaws to West Cote Blanche, described previously.

Charenton Drainage and Navigation Canal crosses the waterway at **Mile 106.8W.** Project depth is 15 feet deep from the waterway to Baldwin on Bayou Teche. Two bridges cross the channel at Baldwin. The first, mile 5.0

above the waterway, is a railway swing bridge with a horizontal clearance of 75 feet and a vertical clearance of 5 feet. The second, mile 5.3, is a fixed highway bridge with a horizontal clearance of 230 feet and a vertical clearance of 50 feet.

A cable ferry crosses the waterway at Mile 112.6W.

At **Mile 116.1W**, the waterway is crossed by **Bayou Cypremort**, an overhead cable with a permit clearance of 90 feet, and a highway swing bridge with a horizontal clearance of 75 feet and a vertical clearance of 8 feet. The village of **Cypremort** is on the north bank.

Weeks is a village on **Weeks Island** at **Mile 119.0W.** The largest salt mine in Louisiana is on the island. **Weeks Bayou** crosses the waterway at **Mile 120.4W** and **Bayou Carlin** crosses at **Mile 120.8W. Wilkins Canal** has been cut through at **Mile 121.9W.** These waterways flow into Weeks Bay. The overhead power cable across Weeks Bayou has a permit clearance of 60 feet.

Bayou Petite Anse crosses the waterway at **Mile 126.6W.** Northward the bayou leads to Bayou Tigre, Delcambre Canal, and to Avery Island. Southward the bayou leads to Avery Canal and thence to Vermilion Bay, described previously.

At **Mile 133.0W Boston Bayou** crosses the waterway.

The waterway enters **Vermilion River** at **Mile 138.2W.** Because of strong currents in Vermilion River, mariners are warned that tows moving along the Intracoastal Waterway must use extreme caution in the vicinity. During flood stages, loaded tows from the east should not attempt to cross the river after dark or during the day without assistance. Tows from the west should hold close to the north bank well before entering the river and until past the junction.

There are boatyards at Perry and Abbeville on Vermilion River, 19 and 21 miles, respectively, above the waterway; general repairs can be made. Vermilion River and the Vermilion River and Bay Cutoff are described in Chapter 9.

Chart 883.—Vermilion River to Gibbstown.—Intracoastal City, Mile 138.9W, is a small settlement on the north bank of Vermilion River near its junction with the waterway. It is a base for oil-field exploration and development. There are several boat slips good for drafts of 7 feet. Diesel oil, gasoline, water, ice, bottled gas, and limited amounts of provisions are available. There are telephone and highway connections to other parts of the State.

The waterway enters a land cut at Mile 139.3W. At **Mile 139.9W** is the junction of the Intracoastal Waterway and the **Inland Waterway** via Schooner Bayou. This waterway is described in Chapter 9.

Vermilion Lock, Mile 141.3W, has an available length of 1,182 feet, a width of 56 feet, and 12 feet depth over the sill. It is operated to prevent salt water from entering the rice fields to the westward. Small boats may anchor or tie up alongside the banks in a small dredged slip at each end of the lock.

North Prong Schooner Bayou leads south, and **Seventh Ward Canal** leads north, at **Mile 145.5W.**

At **Forked Island, Mile 147.4W,** is a pontoon bridge with horizontal clearance of 125 feet. There is an oil company slip and wharves at Mile 147.6W. A cable ferry is at mile 149.5W. The overhead power cable at Mile 160.1W, west of **Florence Canal,** has a permit clearance of 90 feet.

One oil company dock and tanks are at **Mile 170.8W** and another at **Mile 174.0W.**

The waterway follows the **Mermentau River** from **Mile 175.2W** to **Mile 175.9W.** This river is described in Chapter 9. Westward of the river the route is in a land cut. **Bayou Lacassine** crosses at **Mile 178.2W.** Northward of the waterway three bridges cross the bayou. The first, a fixed highway bridge, has a horizontal clearance of 65 feet and a vertical clearance of 25 feet. The second, a railroad bridge at **Hayes,** is a swing bridge with a horizontal clearance of 66 feet and vertical clearance of 3½ feet; drawspan regulations are stated in **§ 203.245,** Chapter 2. The third, a highway bridge, has a bascule span with a horizontal clearance of 29 feet and a vertical clearance of 3½ feet. Many cutoffs have been made between the waterway and the fixed bridge. Southward of the waterway, Bayou Lacassine flows through **Mud Lake** into Grand Lake. **Bayou Misere** connects Mud Lake and **Lake Misere. Latania Lake** is separated from Mud Lake by a narrows, and **Latania Bayou** connects this lake with Grand Lake.

At Mile 183.8W the route jogs westward. The channel which continues straight ahead at this point leads to **Little Lake Misere. The Narrows** connects Little Lake Misere and Lake Misere.

Bell City Drainage Canal crosses the waterway at **Mile 184.4W** and then flows into Little Lake Misere.

Chart 884.—Gibbstown to Port Arthur.—At **Gibbstown, Mile 190.9W,** is a pontoon bridge with a horizontal clearance of 150 feet and an overhead cable with a permit clearance of 90 feet.

An oil company has loading docks, oil tanks, and a canal to **Sweet Lake,** at **Mile 194.1W. Grand Lake Ridge, Mile 200.8W,** has a loading dock, a cable ferry, and an overhead cable with permit clearance of 90 feet.

At Mile 205.7W a straight canal leads through **Calcasieu Lock** to Calcasieu River. The lock, at **Mile 206.9W,** has an available length of 1,180 feet, is 75 feet wide, and 13 feet deep over the sill. The lock is used to prevent salt water from entering the rice fields to the eastward.

The waterway enters **Calcasieu River** at **Mile 207.4W.** Vessels and tows in the waterway should use caution in approaching this junction. The route follows the river around **Devils Elbow** to **Mile 209.5W** where it enters **Lake Charles Deep-Water Channel.** This entrance is marked by a light.

There is a shipyard at Calcasieu Landing with a marine ways capable of hauling out vessels up to 500 tons in weight, 200 feet in length, and 9 feet in draft, for general repairs. The yard has machine and wood shops.

Lake Charles, (Chart 592) **Mile 219.5W,** the seat of Calcasieu Parish, is the only major port in western Louisiana. The city is on Calcasieu River at **Lake Charles,**

10.0 miles northward of the waterway. There are public wharves at the Port of Lake Charles and numerous boat landings along the lake shore. Diesel oil, gasoline, water, ice, provisions and marine supplies can be obtained. Good anchorage is available in the lake which has depths of 8 to 10 feet. The larger of two repair yards on Contraband Bayou has marine ways capable of hauling out vessels up to 150 tons, 100 feet in length, and 10 feet in draft, for general repairs. Lake Charles is more fully described in Chapter 9.

Choupique Cutoff extends from the entrance of Lake Charles Deep-Water Channel to Mile 211.9W. At **Mile 210.1W, Bayou Choupique** leads southeasterly to the ship channel and Calcasieu River. An overhead power cable across the bayou has a permit clearance of 60 feet. A depth of about 9 feet can be carried to the ship channel. The western arm of this bayou enters the waterway at **Mile 210.5W.** A depth of 8 feet can be carried up the bayou about 2.5 miles to a highway bridge having a swing span with a horizontal clearance of 45 feet and a vertical clearance of 2 feet; drawspan regulations are stated in **§ 203.245,** Chapter 2.

At **Mile 211.3W** a canal leads eastward across the ship channel to Mud Lake. In 1956 the controlling depth was 4 feet. At **Mile 211.6W** there is a pontoon bridge with a horizontal clearance of 150 feet. The entrance to **Goose Lake** is at **Mile 219.1W.** A cable ferry crosses at **Gum Cove Ridge, Mile 220.7W.** The **Vinton Drainage and Navigation Canal,** crossing the waterway at **Mile 224.0W,** had a controlling depth of 10 feet in May 1956 from the waterway for about 6 miles, and thence 6 feet to the highway bridge, above which the canal is unnavigable due to a bar across the stream. Southward of the waterway, the canal connects with **Black Bayou,** which is crossed by several overhead cables with minimum permit clearances of 60 feet.

At **Mile 231.0W** the waterway enters the channel of **Sabine River.** The city of Orange is described in Chapter 10.

Adams Bayou, Mile 231.6W, and Cow Bayou, Mile 233.4W, are both described in Chapter 10. The route follows the river and Sabine-Neches Canal to the mouth of **Neches River** at **Mile 240.4W.** Neches River is described in Chapter 10. Southward of the mouth of the Neches River the waterway enters a land cut which is parallel to Sabine Lake.

Chart 885.—Port Arthur to Galveston Bay.—Port Arthur, Mile 247.1W, has shipyards, fuel, supplies and provisions of all kinds. A bascule highway bridge over the waterway at Mile 247.7W has a horizontal clearance of 200 feet and a vertical clearance of 11 feet. In September 1956 the span was left in the open position from 11 p. m. to 5 a. m. Small craft may obtain space at the docks on the west side of the Intracoastal Waterway just southwest of the highway bridge, or in Taylor Bayou. Day and night **coastal (storm) warnings** are displayed from a signal tower near the bridge. Port Arthur is described in Chapter 10.

The Intracoastal Waterway leaves the Port Arthur Canal at **Mile 250.7W.** A bascule highway bridge with a horizontal clearance of 100 feet and a vertical clearance of 16 feet crosses at Mile 251.0W. The nearby overhead cable has a permit clearance of 125 feet. A newly dredged boat basin is at Mile 251.1W and the eastern end of the **Port Arthur Passing Basin** is at **Mile 251.5W.**

Salt Bayou, Mile 252.3W, and **Eagle Lake Channel, Mile 252.4W,** enter the waterway from the north.

A spillway separates **Shell Lake** from the waterway at **Mile 254.2W.** Shell Lake is connected with **Johnson, Keith, Salt, Round, Clam,** and **Star Lakes,** and **Salt Bayou,** all south of the waterway.

A short channel leads northward at Mile 254.3W. The channel leading northwest from the waterway at Mile 256.8W is dammed off.

A channel leading northward from Star Lake crosses the waterway at Mile 265.1W; floodgates protect the waterway. At Mile 272.9W are dirt ramps of a cattle crossing on either side of the waterway. Ruins of concrete ramps are on the banks.

A channel connecting the waterway with **Mud Bayou** and thence to **Mud Lake** is at Mile 276.0W.

Two swing bridges, railroad and highway, cross the waterway at Mile 277.4W; each has a horizontal clearance of 100 feet and vertical clearance of 10 feet. An oil-loading terminal is just eastward of the railroad bridge. Operating hours for this bridge are 6 a. m. to 6 p. m. Mondays through Fridays; at all other times it is left in the open position, and radio contact can be made with the bridge only during the operating hours. The nearby overhead power cable has a permit clearance of 110 feet.

The waterway follows a channel which cuts across the various bends of **East Bay Bayou** from Mile 278.8W to Mile 282.2W.

The town of **High Island,** on the hill of that name about a mile north of the coast, is an oil-producing center which can be identified by the numerous oil derricks visible for a considerable distance. There are no facilities at High Island for passing craft except that shallow-draft boats can come to a landing in a bend off the waterway northwest of the town at Mile 279.6W.

Gilchrist, Mile 285.0W, is a small settlement between the Gulf and East Bay, 5.5 miles west-southwest of High Island. The waterway passes 0.7 mile northward of the settlement through a channel over a short section of **East Bay.** Overnight dockage, gasoline, and a limited supply of provisions are available for shallow-draft boats in slips at each side of the bay, Mile 285.0W and Mile 286.6W.

An oil-loading terminal is at Mile 289.6W. **Bolivar Yacht Basin,** at **Mile 298.3W,** has facilities for yachts drawing up to 9 feet; covered storage is available. The boatyard has marine ways and a lift that can handle craft up to 50 feet in length and 5 feet in draft, for general repairs; diesel oil, gasoline, and water are available. Port Bolivar Basin is at Mile 298.7W. The eastern end of the Port Bolivar assembling basin is at Mile 300.5W.

Port Bolivar, Mile 302.2W, is a small town on the southwestern end of **Bolivar Peninsula.** Facilities and accommodations for passing craft are limited.

At Mile 303.4W the waterway leaves the land cut and

enters Galveston Bay, crossing the lower end of the Houston Ship Channel at Mile 304.5W, and the Texas City Channel at Mile 304.8W. **Houston, Mile 348.1W** and **Texas City, Mile 310.4W** are fully described in Chapter 10.

Chart 886.—Galveston, Mile 307.7W, is fully described in Chapter 10. Docks, repair facilities, fuel, and all kinds of supplies are available in the city. **Coastal (storm) warnings** are displayed, day and night, on Fort Point.

The alternate route across lower Galveston Bay leaves the dredged cut on Bolivar Peninsula at Mile 303.6W and, continuing for 6.3 miles southwestward through a land cut over the northwesterly part of Pelican Island, rejoins the old route at Mile 312.3W. Project depth is 12 feet. Mariners not calling at Galveston who wish to continue directly westward can save about 2.4 miles by following the new bypass route.

At Mile 309.6W a highway and railroad bridge connects Galveston and Pelican Island; clearances are given in Chapter 10.

The waterway leaves Galveston Channel at Mile 310.0W and makes an S-curve approach to the two parallel bridges between **Teichman Point** and **Virginia Point.** The clearances of these bridges, at **Mile 312.9W,** are given in Chapter 10.

At Mile 313.3W a channel leads southeasterly from the waterway to **Offatt Bayou.** This bayou, frequented by pleasure and fishing boats, is described in Chapter 10. The waterway passes north of **North Deer Island** and between **West Bay** and **Jones Lake** to enter a land cut at Mile 317.8W.

Greens Bayou which connects **Greens Lake** and West Bay crosses the waterway at **Mile 319.3W.**

Carancahua Bayou crosses the route at **Mile 321.7W.** There is a small-boat basin with storage facilities in the bayou.

Chart 887.—At **Alligator Head, Mile 328.2W,** the waterway leaves the land cut and crosses the lower end of **Chocolate Bayou.** At Mile 330.9W the route enters a land cut and cuts across the northwestern end of **Oyster Lake, Mile 332.6W. Alligator Slough** is at **Mile 334.1W. Bastrop Bayou,** which flows through **Lost Lake** and **Cox Lake** on the west and then into Bastrop Bay on the east, crosses at **Mile 334.6W.** The channel from Cox Lake and across Bastrop Bay has a depth of 4 feet in a privately marked channel.

Nicks Bayou, Mile 339.3W., flows from **Salt Lake** and **Nicks Lake,** on the northwest, to **Drum Bay** on the southeast.

At Mile 344.7W, a fixed highway bridge over the waterway has horizontal clearance of 201 feet and vertical clearance of 73 feet; the overhead power cable has a permit clearance of 97 feet. At Mile 344.8W a small-boat basin and boatyard are on the northwest side of the waterway. The marine railway can haul out pleasure craft up to 45 feet in length and 4 feet in draft for general repairs. There are berthing facilities for craft up to 6 feet in draft. Diesel oil, gasoline, water, ice, and some marine supplies are available.

At Mile 345.2W a channel leads southwest to a marina with covered storage facilities for vessels up to 50 feet in length, and open storage for boats drawing up to 6 feet. A marine railway can haul out vessels up to 35 feet in length, for general repairs. Diesel oil, gasoline, water, and ice are available. At Mile 345.7W a private canal enters the waterway. This canal is not open to the public; a gate across it is just north of the entrance.

To reach Brazosport and Freeport, turn upstream at **Mile 345.9W** and follow the ship channel in the old river bed of the Brazos River. **Brazosport,** just upstream from the waterway, is the site of the Dow Chemical Corporation. If windward of this factory, the mariner may experience chemical fumes irritating to the eyes. There are no facilities for yachts at Brazosport.

Freeport, 3.5 miles above the Intracoastal Waterway crossing, has three shipyards; dockage, gasoline, diesel oil, fresh water, provisions, and marine supplies are available. Small craft may anchor in the river anywhere except in the ship channel. Freeport and Brazosport are described in Chapter 11.

The pontoon highway bridge at Mile 346.3W has a 104-foot opening; the overhead power cable just eastward has a permit clearance of 108 feet. The pontoon highway bridge at Mile 348.7W has a 101-foot opening.

Floodgates with horizontal clearances of 75 feet are located on both sides of the **Brazos River** crossing at **Mile 350.8W. Galveston District Engineer's notice of November 18, 1955, prescribes the following local regulations to govern operation of the Brazos River Floodgates and the Colorado River Locks:**

(a) **Scope of regulations:** These regulations govern the operation of the Brazos River Floodgates and Colorado River Locks and are supplemental to the Navigation Regulations, 33–CFR–207.180, which govern the use, administration, and navigation of the waterways in which these floodgates and locks are located. Wherever there is a conflict between these regulations and the Navigation Regulations, the Navigation Regulations shall govern.

(b) **Current velocities and head differentials.** Rises on the Brazos and Colorado Rivers cause current velocities and/or head differentials which may render passage across those rivers and through the floodgates or locks hazardous. When the river current velocity exceeds a predetermined rate and/or the difference between the water stage in the river and that in canal (head differential) exceeds the predetermined amount, traffic through the floodgates or locks will be regulated or the floodgates or locks will be closed for the protection of navigation as provided herein. Generally, the current velocity will govern at the Brazos River Crossing but the head differential may govern at times. The current velocity only will govern at the Colorado River Crossing since the effect of any head differential will be nullified in the locking process.

(c) **Limited passage.** When the current velocity in the Brazos River or Colorado River is between the limits of 1½ miles per hour and 3½ miles per hour, both inclusive, or when the head differential at the Brazos River only is between the limits of 0.7 foot and 1.7 feet, both inclusive, passage will be afforded only for single vessels or tows of

one barge day or night. When the current velocity exceeds 3½ miles per hour during the daytime, single vessels or tows of one barge only may pass through the floodgates or locks. The daytime hours during which such passage will be afforded will be governed by the following procedure: The lockman on duty will take a current velocity reading as soon after daylight as practicable and will post the reading for the information of vessel operators. As soon thereafter as possible the gates will be opened for traffic. The gates will be closed to traffic just prior to darkness so that the last passage across the river can be completed during daylight.

(d) **Gate closures.** The Brazos River Floodgates and the Colorado River Locks will be closed to traffic when the current velocity in the river exceeds 3½ miles per hour during the nighttime. The Brazos River Floodgates only will be closed to traffic at all hours when the head differential exceeds 1.7 feet.

(e) **Unlimited passage.** The Brazos River Floodgates and the Colorado River Locks will be opened to all traffic when the current velocity in the river is less than 1½ miles per hour and the head differential at the floodgates or locks is less than 0.7 foot. When the head differential is less than 0.7 foot, the Colorado River Locks will be operated as floodgates using the riverside gate of each lock only.

(f) **Mooring facilities.** Mooring piles are located on both banks of the Gulf Intracoastal Waterway on the canal side of the floodgates and locks for the mooring of vessels when the floodgates or locks are closed or when tows are limited to one barge. Vessels not underway at such locations must be secured. Beaching of vessels in lieu of mooring them is prohibited.

(g) **Information.** (1) **Signs.** Signs are located three-fourths of a mile from each floodgate or lock structure for the information of navigators. These signs will either indicate that traffic is unlimited, that tows are limited to one barge, or that the floodgates or locks are closed to navigation. Between the hours of 8 a. m. and 5 p. m. the current velocity in the river will be posted on the signs.

(2) **Radio.** The floodgates and locks are equipped with short-wave receivers tuned to a frequency of 2738 kc. to receive incoming calls on ship-to-ship frequency. The transmitting equipment located at the floodgates and locks, however, is tuned to the Corps of Engineers broadcast frequency of 2350 kc. Navigators must tune their transmitters to ship-to-ship frequency and their receivers to Corps of Engineers frequency to communicate with the lockman on duty at the floodgates or locks. Call letters for the station at the Brazos River Floodgates are WUI 411 and call letters for the station at the Colorado River Locks are WUI 412. These stations are in operation 24 hours a day and their operators will give information about the floodgates or locks and river crossings upon request.

(3) **Telephone.** The floodgates and locks are equipped with telephones and shipping interests may communicate with the Lockmaster at the Brazos River Floodgates by calling Freeport, Tex., No. 3–1251. They may communicate with the Lockmaster at the Colorado River Locks by calling Matagorda, Tex., UN–37842 through the Bay City, Tex., telephone exchange.

(h) **Fenders.** Vessels shall be equipped with adequate fenders and shall always use fenders to protect the floodgates, locks and appurtenant structures. Rope fenders should be thoroughly soaked in water before use so that ignition from friction may be prevented.

(i) **Authority.** Passage through the floodgates and locks shall be under the direction of the Lockmaster. Vessels shall approach the floodgates and locks at reduced speed and be prepared to stop if not cleared for passage by the Lockman on duty. Passage through the floodgates or locks shall not be attempted until the proper signals are exchanged in accordance with the Navigation Regulations. The Lockmaster is authorized to refuse passage to any vessel operated in violation of these regulations.

Note: The term "Lockmaster" as used in these regulations is synonymous with the term "Gate-tender" as used in the Navigation Regulations. The term "Lockman" as used herein designates the operator at each floodgate or lock structure who is under the direct supervision of the Lockmaster.

The mouth of the Brazos River is generally foul due to shoaling and logs, and for this reason is not used as an entrance from the Gulf. The river is tidal to **Bolivar Landing,** 41 miles above the mouth, which is the head of navigation at ordinary river stage. A depth of 6 feet is available to here, but snags and various obstructions are likely to be encountered as no maintenance work has been done since 1923.

Four bridges cross the river below Bolivar Landing; clearances are given in Chapter 11.

There are many logs and floating debris in the waterway between the Brazos and San Bernard Rivers; operators of small craft are advised to proceed with caution.

The Intracoastal Waterway crosses **San Bernard River** at **Mile 354.6W,** 3.8 miles westward of Brazos River. The mouth of San Bernard River is obstructed by a shifting sand bar over which the channel depths vary from about 3 to 5 feet. Above the waterway, the river has been improved by a dredged channel 9 feet deep to the vicinity of **Sweeney.**

The abandoned route of the inland waterway extends through **Cedar Lakes.** The channel has shoaled to lake depths in most places and the southwestern exit is completely filled.

Chart 888.—Matagorda Bay, Cedar Lakes to Oyster Lake.—The pontoon highway bridge at Mile 365.8W has a 100-foot opening; the two overhead power cables on the east side of the bridge have a permit clearance of 73 feet. Gasoline is available at a marine station at the bridge.

Caney Creek crosses the Intracoastal Waterway at **Mile 367.8W** and empties into the extreme northeastern part of **East Matagorda Bay.**

Live Oak Bayou, crossing the waterway at **Mile 374.1W** about 5 miles west of Caney Creek, is shallow. Northwestward of the waterway the bayou connects with **Lake**

Austin and **Canoe Creek.** An overhead cable crosses Live Oak Bayou just north of the waterway.

Old Gulf, an abandoned company town, is at **Mile 381.2W.** There is a private boat basin with 8 feet of water alongside the bulkhead.

There is an oil-loading terminal at Mile 383.9W. The pontoon highway bridge at Mile 385.6W has a 100-foot opening; the overhead power cable has a permit clearance of 71 feet.

Matagorda, Mile 385.7W, is 4.5 miles westward of Old Gulf. Just east of the pontoon bridge is a small-boat slip with 6 feet of water leading to a marine service station where gasoline, diesel oil, water, and some provisions are available. There is another slip on the west side of the bridge. Controlling depth in each slip was 4 feet in September 1956. Storage facilities are available for about 100 boats. There are two repair yards; the larger marine railway can haul out vessels up to 75 tons in weight, 50 feet in length, and 4 feet in draft. **Coastal (storm) warnings** are displayed, day and night, from a Weather Bureau signal tower north of the bridge.

The Intracoastal Waterway crosses Colorado River at Mile 386.2W. Galveston District regulations governing operation of the river locks were given previously in this chapter.

Colorado River enters the Gulf 5.5 miles south of Matagorda through a flood discharge channel constructed across Matagorda Bay. This new channel forms an isthmus which divides the eastern part of the bay and is used by local fishermen to gain access to the Gulf. The controlling depth was 1 foot in September 1956. Strangers should not attempt passage. The river and the waterway in this vicinity contain many logs and floating debris, and operators of small craft are advised to proceed with caution.

Colorado River northward of the waterway eventually will be improved to the vicinity of **Buckeye.** The river is described in Chapter 11.

The earlier route of the inland waterway, now abandoned, extended from Caney Creek southwestward through the entire length of Matagorda Bay. Since the eastern part of the bay has been divided by construction of the **Colorado River Flood Discharge Channel,** the only navigable connection between the two parts of the bay is via the Intracoastal Waterway. Prolonged east winds will create a difference in water level between the two parts of the bay and cause a strong westerly current in the waterway. Small-craft operators may request to be locked through the locks if they think this current is too strong for safe control of their craft.

Culver Cut crosses the Waterway at **Mile 388.7W.**

Chart 889.—Oyster Lake to Port O'Connor.—The waterway leaves the land cut and enters **Matagorda Bay** at **Mile 398.4W.** The route across Matagorda Bay is mostly through dredged channels. From the dredged sections of the channel, marked openings are provided through the spoil banks for passage through Palacios Channel, and to Pass Cavallo. **Palacios Channel, Mile 403.8W,** passes between Palacios Point and the inner end of Halfmoon Reef. A light marks the inshore side of the channel.

Halfmoon Reef, extending about 3 miles off **Palacios Point,** is marked by a light. The reef is a shell formation 100 to 500 yards wide, and has about 1 foot of water over it. **Pass Cavallo** is described in Chapter 11.

Tres Palacios Bay and **Lavaca Bay** are arms of Matagorda Bay extending northeastward and northwestward, respectively, from the western part of the bay. Through these two bays, dredged channels lead to **Palacios** and **Port Lavaca;** they are described in Chapter 11.

Chart 890.—At mile 413.4W the Intracoastal Waterway enters a land cut through a jettied entrance. **Port O'Connor, Mile 414.1W,** is a small town at the southwestern end of Matagorda Bay. Numerous docks and slips for shrimp boats are along the northern side of the Intracoastal Waterway, but overnight dockage accommodations for passing yachts are limited. Diesel oil, gasoline, water, ice, and provisions can be obtained. **Coastal (storm) warnings,** daytime only, are displayed at the Port O'Connor Coast Guard station on **Saluria Bayou.**

Four miles southwest of the town, at Mile 418.4W, a dredged channel leads from the waterway across **Espiritu Santo Bay** to an Air Force base on Matagorda Island.

The old inland waterway route through Espiritu Santo and San Antonio Bays has been abandoned. An unmarked channel connects the two bays at the **First Chain of Islands.** These places are more fully described in Chapter 11.

A small-boat basin where gasoline is available is at Mile 424.2W. There is a launching ramp for boats carried by trailer. A privately maintained channel leads to Espiritu Santo Bay.

Chart 891.—At **Mile 429.9W** the waterway enters **San Antonio Bay** in the vicinity of Grass Island. The bay is shallow, with depths of 5 to 6 feet. There are numerous reefs, some baring at low water, which make navigation difficult when outside the waterway channel. Spoil bank areas are on both sides of the channel through which are several charted openings. San Antonio Bay is fully described in Chapter 11.

Guadalupe Channel leaves the waterway to the north at **Mile 430.1W. Seadrift,** a small fishing and farming community on the northeast shore about 6.6 miles northwest of the waterway, is the largest settlement on San Antonio Bay. These features are fully described in Chapter 11.

A privately maintained channel leads southward from the waterway at Mile 437.6W. The controlling depth was 7 feet in 1956.

The waterway leaves San Antonio Bay and enters a land cut through **Live Oak Point** at **Mile 437.7W.** The route follows along the southern part of **Mustang Lake** and enters **Mullet (Sundown) Bay** at **Mile 441.2W.** From **Mile 443.3W** to **Mile 446.8W** the route is in a land cut through **Bludworth Island.** The land side of this

section of the waterway is part of the **Aransas Migratory National Waterfowl Refuge.**

Chart 892.—From the end of the Bludworth Island land cut the waterway extends through the southeastern part of **Dunham Bay** to **Mile 447.7W** where it enters **Aransas Bay.** The bay is 15 miles in length, 3 to 4 miles in width, and has depths ranging from 8 to 12 feet. The northeastern end of the very shallow bay is an extensive shrimping ground. The bay is described more fully in Chapter 11.

Spoil banks extend along the southeast side of the channel through Aransas Bay from **Dunham Island, Mile 448.1W,** to the light at Mile 452.9W; then along the northwest and west sides to the light at Mile 462.2W; and then along the east side to Mile 463.0W. Four openings, marked by daybeacons, are between the lights at Mile 455.6W and Mile 459.3W, to provide passage to Rockport and vicinity.

Rockport is a commercial fishing and resort town on the west shore of Aransas Bay. The town has an excellent yacht basin about 0.3 mile in length and protected by a concrete seawall. Inside is berthing space for more than 100 yachts of all sizes, several private covered piers, and three shipyards; the town is fully described in Chapter 11.

At **Mile 463.7W** the Intracoastal Waterway enters **Lydia Ann Channel.** It runs along the northwest side of Harbor Island and connects the south end of Aransas Bay with Aransas Pass; the channel is described in Chapter 11.

At Mile 466.8W is the junction of four channels: the Intracostal Waterway from the northeast, the Aransas Pass Entrance Channel from the southeast, the Port Aransas-Corpus Christi Waterway, and the Intracoastal Waterway from the southwest; and the channel to Aransas Pass from the northwest.

Chart 893.—Corpus Christi, Mile 485.0W, on the western side of **Corpus Christi Bay,** is the most important city commercially on the coast of Texas southwestward of Galveston. In addition to the harbor and port facilities, the city has an excellent yacht basin with 300 yacht berths.

Corpus Christi, **Rockport,** Aransas Bay, and Corpus Christi Bay, together with adjacent waters, channels, and bordering towns, are described in detail in Chapter 11.

At Mile 475.9W the Intracoastal Waterway swings southward from the Port Aransas-Corpus Christi Waterway and enters the channel to Encinal Peninsula. At Mile 477.6W the route leaves the channel and follows the open water of Corpus Christi Bay to Mile 483.4W where it enters the dredged channel in Laguna Madre, which is well marked by lights, daybeacons, and buoys.

A causeway with a pontoon span is at Mile 487.3W. The horizontal clearance is 150 feet. At Mile 494.5W, a privately marked channel extends to the northwestward through an area obstructed by oil wells and pipelines.

Laguna Madre is separated from the Gulf by a long narrow strip of land known as **Padre Island.** The laguna is shallow and mostly unsurveyed.

Chart 894.—Dagger Hill to Potrero Grande.—At **Mile 509.0W, Baffin Bay,** extending westward from Laguna Madre, is a commercial and sports fishing area and site of oil exploration and drilling work. A natural channel with depths of from 8 to 10 feet, privately marked, leaves the waterway north of buoy 121. The channel is marked for about 14.9 miles from the Intracoastal Waterway into Laguna de los Olmos, about 7 miles from **Riviera.** The controlling depth in October 1956 was 4 feet. A boatyard at the end of the marked channel has a storage basin for boats up to 40 feet in length. It has a marine trailer and ramp capable of hauling out vessels up to 20 tons, 50 feet in length, and 5 feet in draft, for general repairs. Diesel oil, gasoline, and water are available. In the bay the water is relatively deep but is dangerous because of numerous rocks both across the mouth and within the bay. Strangers should not leave the marked channel.

Yarborough Pass, Mile 515.2W, leads from the waterway across Padre Island to the Gulf. It has been dredged several times, but in October 1956 it was closed. **Coastal (storm) warnings,** daytime only, are displayed at Yarborough Pass.

The waterway enters a cut at Mile 519.4W. **The Hole** has depths of about 2½ feet.

Chart 895.—Potrero Grande to Rincon de San Jose.—Laguna Madre from Mile 519.4W to Mile 538.9W consists of mud and sand subject to inundation. The southern portion of The Hole is from 0.4 to 1.0 mile eastward of the canal. Oil companies have dredged short side channels from the waterway. At Mile 539.4W the waterway turns at Rincon de San Jose.

Chart 896.—Rincon de San Jose to Chubby Island.—At Mile 554.5W, 70 miles southward of Corpus Christi Bay, a side channel leads to a turning basin at Port Mansfield, a popular sport fishing and recreational center. There are facilities for vessels; diesel fuel, gasoline, water, ice by truck, and a limited amount of provisions are available. Port Mansfield is fully described in Chapter 11.

Chart 897.—Chubby Island to Stover Point.—In the southern part of Laguna Madre, at Mile 565.8W, just north of **Horse Island,** a connection is made to **Rio Hondo** and **Port Harlingen** via the **Arroyo Colorado Cutoff** and the **Arroyo Colorado.** Rio Hondo and Port Harlingen are described in Chapter 11.

Chart 898.—Stover Point to Port Brownsville.—Port Isabel, Mile 585.0W, at the southern end of Laguna Madre about 2.5 miles westward from Brazos Santiago, is an important shipping point for petroleum products, cotton, and metals. It has a large fishing fleet, and the town is a resort for sport fishing and recreation. There are several hotels, motels, and stores. The waterway enters a land cut just southeast of the town which leads to a connection

with the Brownsville Ship Channel. A barge swing bridge crossing the waterway has a horizontal clearance of 150 feet, and connects Port Isabel to the causeway over the southern end of Laguna Madre. Diesel oil, gasoline, water, ice, provisions, and supplies are available. There are three shipyards. The largest marine railway can haul out vessels up to 1,000 tons in weight, 150 feet in length, and 14 feet in draft, for general repairs. Another yard has a floating drydock capable of hauling out vessels up to 78 feet in length and 7 feet in draft, for hull repairs.

Port Brownsville, Mile 598.8W, is at the west end of the Intracoastal Waterway. A boat basin has berthing facilities for 500 boats. There are marine supply outlets and marine engine repair facilities, and a shipyard with marine ways can haul out vessels up to 100 tons in weight, 110 feet in length, and 11 feet in draft, for hull repairs. Diesel oil, gasoline, water, ice, and supplies are available.

Brownsville, the largest city in the lower Rio Grande Valley, is a supply center and resort area, and gateway to Matamoros, Mexico. The city, 5 miles west-southwest of Port Brownsville, is the center of a rich agricultural section.

Brazos Santiago, Port Isabel, Port Brownsville, Brownsville, and the Port Isabel-Brownsville Ship Channel are described in more detail in Chapter 11.

13. PUERTO RICO

Nine hundred miles east-southeast of Key West, Fla., is the island of **Puerto Rico,** which was ceded to the United States in 1898. Puerto Rico is the smallest and easternmost of the **West Indies** group known as the **Greater Antilles;** the larger islands are Cuba, Jamaica, and Hispaniola. To the north of Puerto Rico is the Atlantic Ocean, and on the south is the **Caribbean Sea.**

Puerto Rico formerly was administered under the Jones Act of March 2, 1917, which extended United States citizenship to all Puerto Ricans. On July 25, 1952, the island was formally proclaimed a free Commonwealth, voluntarily associated with the United States. Under the Constitution of Puerto Rico, the people of the Commonwealth elect a governor and a legislature for 4-year terms. The Legislature has an upper house, or senate, and a house of representatives. The people also elect a Resident Commissioner who speaks in the U. S. House of Representatives but does not vote.

The island Commonwealth includes the smaller islands of Mona, Culebra, and Vieques. The big island is about 96 miles long, west to east, and about 35 miles wide. The interior of Puerto Rico is mountainous and very rugged. The highest mountains are nearer the south and east coasts and have elevations up to 4,400 feet. There are many fertile valleys, and along the coasts are more or less narrow strips of lowland from which the higher land rises abruptly.

The sea bottom is similar to the land. Close to the island are narrow banks from which the bottom pitches off rapidly to great depths. Under favorable conditions, the shoals frequently are marked by a difference in the color of the water.

Puerto Rico has several hundred streams, some of good size, but none are navigable for anything but small boats. The mouths of the streams generally are closed by bars except during short periods of heavy rainfall. From the location of the mountain divides, the streams on the south and east sides of the island are short and fall rapidly to the sea, while those on the north and west sides are longer and slope more gently.

Boundary Lines of Inland Waters.—At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries of Puerto Rico for which specific lines are not described, Inland Pilot Rules apply shoreward of the outermost buoy or other aid to navigation of any system of aids; International Pilot Rules apply outside the aids. Specific lines are described in **Part 82, Chapter 2.**

Anchorages.—Under ordinary conditions, the first requirement for anchorage is shelter from the easterly trade winds. Anchorages are numerous except along the north coast. Strong northerly winds and heavy seas may occur from November to April. During the hurricane season gales may strike from any direction. The best hurricane harbors are San Juan, Guanica, Guayanilla, Jobos, and Ensenada Honda (on Isla de Culebra).

Routes.—Vessels bound from Straits of Florida (24°25′ N., 83°00′ W.) to San Juan can proceed by rhumb lines through the following positions:

23°34′ N., 80°26′ W.
22°34′ N., 78°00′ W.
22°07′ N., 77°24′ W.
20°50′ N., 73°43′ W.
19°45′ N., 69°50′ W.
18°29′ N., 66°08′ W.

From the east coast of the United States, the route to San Juan is direct by great circle. Distances from San Juan are 1,017 miles to Straits of Florida, 1,252 miles to Norfolk, 1,399 miles to New York, and 1,486 miles to Boston. See H. O. Publication 117, Table of Distances Between Ports.

Tides.—The periodic tides around Puerto Rico are very small, the average rise and fall being about 1 foot. The actual fluctuations in the water level consequently depend largely upon the winds and other meteorological conditions. Along the northern and western coasts of Puerto Rico the tide is chiefly semidiurnal, while along the Caribbean coast it is more or less diurnal.

Currents.—Along the Atlantic and Caribbean coasts of Puerto Rico, the currents are greatly influenced by the trade winds. In general, there is a westward drift caused by prevailing easterly trade winds; the velocity averages about one-fourth knot and is said to be strongest near the island. A decided westerly set has been noted near the 100-fathom curve along the Caribbean coast from Isla Caja de Muertos to Cabo Rojo. With variable winds or light trade winds it is probable that tidal currents are felt at times along the Atlantic and Caribbean coast of Puerto Rico. Currents are weak in the passage northward of Isla Caja de Muertos and Cayo Berberia.

Predictions of the tidal current in Canal Guanajibo and at three locations off the east coast of Puerto Rico may be obtained from the Tidal Current Tables, Atlantic Coast of North America. The times of slack water and of maximums of flood and ebb in the middle of Mona Passage are 2 to 3 hours later than in Canal Guanajibo. The times of southward and northward curents in the passages eastward of Puerto Rico, as far as Isla Culebrita, are believed to be about the same as the times of westward and eastward currents, respectively, in Pasaje de Vieques, information for which is contained in the Current Tables.

In Mona Passage, on the northwest end of the bank about 13 miles westward of Punta Guanajibo, there is a velocity of about 1 knot at strength of the tidal current; slacks and strengths occur about 15 minutes later than in Canal Guanajibo.

In Sonda de Vieques, there are strong tidal currents over the shoals in the western part and around Isla Cabeza de Perro. In Pasaje de San Juan and Pasaje de Cucaracha, estimated velocities of about 2 knots at strength have been reported. In the wider passages between Cayo Icacos and Cayo de Luis Peña, it is estimated that the tidal-current velocity is less than 1 knot. From Isla de Culebra the southward current sets toward Punta Este, Isla de Vieques, around which tidal currents are strong.

In Canal de Luis Peña the southeastward current is deflected northward of Bahía Tarja and thence set toward the south end of Cayo de Luis Peña; the current is weak off the entrance to Bahía de Sardinas. The northwestward current sets directly through the channel. The velocity of the tidal current at strength is about 2 knots.

WEATHER.—The Appendix lists coastal warning displays and radio stations which transmit weather information. Also included are climatological tables for San Juan and Santa Isabel.

Puerto Rico lies in the tropical zone, well out at sea, and in the path of the cool easterly trade winds. At San Juan, the average annual temperature is 78° F. The coolest months, January and February, average 74.9° F., and the warmest months, August and Septem !ber, average 80.5° F. The extremes of temperature recorded at San Juan are 94° F. and 62° F.

Rainfall.—The topography of Puerto Rico greatly affects the rainfall in different localities. Places on the windward side of the mountains receive more rain than those on the lee. Thus San Juan, on the north side of the island, is exposed to northeast winds and receives about 60 inches of rain a year. Santa Isabel, on the south, or lee side of the mountains, receives only 32 inches a year. San Juan has many nighttime and early-morning showers which is characteristic of many marine locations. The cool land breeze underruns warm moist air over the ocean causing it to rise and, under favorable circumstances, produce showers and thunderstorms at night.

Fog is almost unknown in Puerto Rico, and there is no thick weather except for rain squalls, mists, and haze. However, the mountains are very often obscured by clouds.

Winds.—Puerto Rico lies within the limits of strong easterly trades and, except when disturbed by some neighboring atmospheric depression, these winds blow with great regularity throughout the year. They vary, however, in direction on the different coasts, easterly winds prevailing on the east and north coasts, northeasterly winds on the west coast, and southeasterly winds on the south coast. The land-modified trade wind at San Juan varies from an average of 7 or 8 knots during the autumn to an average of 11 or 12 knots in midsummer.

During the course of the year, occasional cold air masses move south over the Gulf of Mexico from the continental United States and approach or penetrate the Caribbean Sea. These excursions of cold air are known widely as **northers** and occur mostly from November to February. Sometimes northers attain whole-gale force in the Gulf of Mexico, but as they travel southward and eastward in the Caribbean their strength greatly diminishes, so that few are noticeable in the vicinity of Puerto Rico. The wind direction, if noticed near Puerto Rico, is likely to be east of north, and the strength sometimes may be enough to affect small-craft navigation. The cold front may bring a gusty, showery period to Puerto Rico if the norther penetrates so far. After passage of the cold front there should be a period of clear weather with lower humidity.

Tropical cyclones of the North Atlantic are usually called West Indian Hurricanes, but many of these storms form, move, and die hundreds of miles from the West Indies. The hurricane season generally begins in June and closes with November. See Chapter 3 for more detailed discussion of hurricanes.

Pilotage.—All foreign vessels and United States vessels engaged in foreign trade are required to take a licensed pilot when entering or leaving the harbors of Puerto Rico. Coastwise vessels, vessels owned or controlled by the United States or foreign governments, and all pleasure yachts are exempt from pilotage unless a pilot is actually engaged. The pilot service at each port is under the supervision and direction of the captain of the port.

Towboats are available at all times at San Juan. At some of the other ports small towboats are available for lighterage.

Quarantine.—National quarantine laws are enforced in Puerto Rico by officers of the U. S. Public Health Service. Vessels subject to quarantine inspection include all vessels from foreign ports, vessels with sickness on board, and vessels from domestic ports where certain quarantinable diseases prevail. Detention and fumigation facilities are available at San Juan.

Customs.—Puerto Rico collects no customs duties on merchandise entering the island from continental United States or its dependencies. Merchandise entering from foreign countries is subject to the duties of the United States, which are collected at the ports of Puerto Rico by the U. S. Bureau of Customs. Ports of entry are listed in the Appendix.

Immigration.—The United States immigration laws apply in Puerto Rico. Passports and visas are required.

Harbor control.—The control of all the ports of Puerto Rico is vested in the Commonwealth Government whose authority is exercised through the Puerto Rico Transportation Authority. Appointed port captains have administrative charge of the harbors; they collect the port dues and assign vessels to anchorages or to berths alongside wharves.

Terminal facilities.—San Juan, Bahía de Jobos, Ponce, Bahía de Guanica, and Mayagüez have wharves alongside which vessels can tie up to load and discharge cargo. Guayanilla has mooring dolphins and buoys off the end of a narrow finger pier. At the other ports, vessels discharge and load by means of lighters.

Supplies.—San Juan has complete bunkering facilities for oil-burning, coal-burning, and diesel-operated vessels; Ponce and Mayagüez also have bunkering facilities. Oil is available at Guayanilla.

Water, ice, provisions, and ship chandlery can be obtained at San Juan, Ponce, and Mayagüez. Some provisions and ice usually are available at most of the other ports, and supplies can be trucked from San Juan in a few hours.

Repairs.—San Juan has a graving dock more than 600 feet long and a machine shop and foundry that can handle any ship-repair job. Complete salvage equipment is available. Ordinary repairs to machinery can be made at Ponce, Mayagüez, and Bahía de Guánica.

Communications.—Puerto Rico has a railroad system that follows the coast and serves all of the island's ports. The several lines that comprise the system are all interconnected and have a gage of 3 feet 3⅜ inches (1 meter). There are good highways to all the principal towns and to most of the smaller towns.

All the municipalities of Puerto Rico are connected by telephone and telegraph. The island also has direct radio and cable service to all parts of the world.

Currency.—The monetary unit is the United States dollar.

Standard time.—Puerto Rico uses Atlantic standard time, which is 4 hours slow of Greenwich mean time.

Language.—English is taught in the schools of Puerto Rico and is preferred for business purposes by a large part of the commercial community. But Spanish is still the popular tongue, and most of the island's geographic features have Spanish names.

Spanish-English Geographic Glossary:

Agua—Water
Amarillo—Yellow
Anclaje, Ancladero—Anchorage
Arena—Sand
Arrecife—Reef
Arroyo—Small stream
Bahía—Bay
Bajo—Shoal
Banco—Bank
Barra—Bar
Blanco—White
Boca—Mouth, entrance
Boquerón—Wide mouth
Cabeza—Shoal head
Cabezo—Summit of hill
Cabo—Cape
Caleta—Cove
Canal—Channel
Caño—Creek
Castillo—Castle
Cayo—Key
Cerro—Hill
Ciénaga—Marsh
Cordillera—Mountain chain
Costa—Coast
Desembarcadero—Landing
Embarcadero—Warf, quay
Ensenada—Bay, cove
Escollo—Shelf, reef
Este—East
Estero—Creek, inlet
Estrecho—Strait
Exterior—Exterior
Farallon—Rocky islet
Golfo—Gulf
Gran, Grande—Great
Interior—Interior
Isla—Island
Isleta—Islet
Istmo—Isthmus
Lago—Lake
Laguna—Lagoon
Laja—Flat rock
Largo—Long
Mar—Sea
Medio—Middle
Meridional—Southern
Monte, Montaña—Mountain
Morro—Headland, bluff
Negro—Black
Norte—North
Nuevo—New
Occidental—Western
Oeste—West
Oriental—Eastern
Pantano—Marsh
Pasaje—Passage
Peninsula—Peninsula
Pico—Peak
Piedra—Stone, rock
Playa—Beach
Pueblo—Town
Puerto—Port, harbor
Punta—Point
Rada—Roadstead
Rincón—Inside corner
Río—River
Roca—Rock
Rojo—Red
Septentrional—Northern
Sierra—Mountain range
Sonda—Sound
Sud—South
Tierra—Land
Verde—Green
Viejo—Old

Chart 920.—Mona Passage, 61 miles wide between the western end of Puerto Rico and the eastern end of Hispaniola, is one of the principal entrances to the Carribbean Sea. Three small islands are located in the passage: Isla Mona and Isla Monito about midway in the southern part, and Isla Desecheo about 12 miles westward of the extremity of Puerto Rico in the northern part.

On the western side of Mona Passage, a bank extends from Cabo Engaño, the eastern extremity of Hispaniola, for 23 miles, with a least depth of 27 fathoms. Strong tide rips and heavy swell, caused by the meeting of contrary currents, are visible for many miles and mark the position of this bank. On the eastern side of the passage, an extensive bank makes off from the west coast of Puerto Rico extending up to 15 miles offshore. The west coast of Puerto Rico is described later in this chapter.

Tidal **currents** set generally southward and northward through Mona Passage. Varying nontidal flows, depending to a great extent upon the velocity and direction of the wind, combine with the tidal current. An average nontidal current of about one-fourth knot setting approximately north-northwest is generally experienced during all seasons. In summer, when the trade wind has slackened and blows more from the east and east-southeast, a strong countercurrent sets eastward off the south coast of Hispaniola. This countercurrent occasionally induces a northerly set in the passage.

In July 1946, a 3½-knot current, setting approximately west-southwest, was reported in the passage northward of Isla Mona. Observations made on the northwest edge of the bank about 13 miles westward of Punta Guanajibo, Puerto Rico, gave a velocity of about 1 knot for both southward and northward strengths.

The tidal currents also set with considerable velocity, especially near the shore south of Cabo Engaño, where they have been reported to set with a velocity of 3½ knots during the month of May, with ebb currents setting northeastward for 3 hours and flood currents setting southwestward for 9 hours. The duration of these currents has also been reported to be the reverse, and at other times to be of the usual duration of 6 hours.

The passage presents little difficulty in navigation, except that caution must be used in the vicinity of Isla Saona off the southeast coast of Hispaniola, which is low and foul. This island should be given a berth of

at least 6 miles. Heavy squalls which resemble tornadoes, and generally give sufficient warning of their approach, may be expected in the passage, particularly in the summertime.

Chart 901.—Isla Mona (18°05′ N., 67°54′ W.), about 6 miles long east to west and about 4 miles wide, lies in the middle of the southern part of Mona Passage. Temporary anchorage and landing can be made in places on the south and west sides of the island during good weather, but on many days anchorage and landing are impracticable. The attendants for the light station on Cabo Este are the only inhabitants of the island, which is an insular forest preserve.

The island is composed of limestone and from eastward appears perfectly flat on top, breaking off abruptly at the water in a vertical whitish cliff about 175 feet high. On the northwestern and northeastern coasts there are extensive caves which run in every direction, but are so obstructed by stalactites and stalagmites in places that it is almost impossible to pass. They were used as hideouts by pirates for nearly three centuries. The western, southern, and southeastern sides of the island are fringed with detached coral reefs through which boat passages lead.

The 100-fathom curve lies about 1 mile offshore, except at Playa Pajaro, where it is about 1.7 miles off, and on the southwest side, where it is only about 0.3 mile off. With a strong wind from any direction, the sea draws around the island and generally into all the anchorages. **Anclaje Sardinero,** on the west coast, is the best anchorage during southeast winds, and **Anclaje Isabella,** just south of Punta Oeste, is good during northeast winds. Boat landings can be made at Anclaje Sardinero and Playa Pajaro.

Currents.—In Anclaje Sardinero the tidal current sets northward and southward with a velocity at strength of about one-half knot. A northerly current with a velocity of one-half knot has been experienced off Playa Pajaro.

Isla Mona Light (18°05.3′ N., 67°50.8′ W.), 231 feet above the water and visible 22 miles, is shown from a black hexagonal pyramidal skeleton tower on a white dwelling with red roof, on the west point of Cabo Este. A radiobeacon is at the light; **coastal (storm) warnings** are displayed, daytime only, at the light. Deep water extends directly to the base of the cliff from Cabo Este to Cabo Barrionuevo.

Cabo Barrionuevo, the northwest cape of the island, is a vertical cliff, from the base of which projects a mass of rock shaped like two saw teeth on top, the inner and higher one nearly half as high as the cape. This feature can be observed from northward and southwestward.

Cabo Noroeste, Cabo Norte, and **Cabo Este** are capes consisting of vertical cliffs 279, 220, and 175 feet high, respectively.

Playa Pajaro, about 1.5 miles southward of Isla Mona Light, has a boat harbor with 3 to 8 feet of water inside the reefs. The southern and main entrance, with depths of 7 to 20 feet, is marked by a range maintained by the light attendant for use of the Coast Guard supply vessel. The landing place has 7 to 8 feet alongside, but with southerly winds a swell sets into the landing.

Punta Caigo ó no Caigo, about 3.5 miles southeastward of Isla Mona Light, is surmounted by a large balanced rock. **Punta Oeste,** at the western end of the island, is a low, narrow ridge, covered with brush, which projects nearly 1 mile westward of the cliffs. A reef extends about 0.3 mile westward from the point.

Isla Monito, about 3 miles north-northwestward of Isla Mona, is a bare rock 0.2 mile in diameter and 213 feet high. The passage between the two islands is deep and clear. A **danger zone** for aerial bombing is centered on Isla Monito; regulations are stated in **§ 204.225,** Chapter 2.

Isla Desecheo, 27 miles northeastward of Isla Mona and 12 miles westward of Punta Higuero, is a wooded island a mile in diameter and 715 feet high. The island is visible more than 30 miles in clear weather and is one of the best landmarks for Mona Passage and the west coast of Puerto Rico. Isla Desecheo is a forest reserve and a native-bird reserve; it is uninhabited and there are no anchorages along its shores.

Punta Higuero (Jiguero), the most westerly point of Puerto Rico, is projecting and prominent. The land back of the point rises abruptly to rolling hills 135 to 270 feet high, and these in turn ascend gradually to Pico Atalaya.

Punta Higuero Light (18°21.8′ N., 67°16.3′ W), 90 feet above the water and visible 11 miles, is shown from a gray cylindrical tower at the end of the point.

Rincon is a village and railroad station on a slight indentation 1.8 miles southeastward from the light. Reefs, with 5 to 12 feet of water over them and steep-to at their outer edges, make out nearly 0.4 mile from the shore.

Bahía de Aguadilla, the bay about 7.2 miles east-northeast of Punta Higuero Light, is exposed northward and westward, but with ordinary easterly trade winds the anchorage off Aguadilla is smooth. There are frequent rough spells during the winter when the wind is from northward.

A narrow bank, very steep-to, skirts the shore of the bay; the only dangers are the sand bars which extend about 0.2 mile off the mouths of the streams on its south side.

At the north end of the city is a cemetery, the vaults of which are conspicuous. South of it are the red roofs of schools on the site of the old barracks. The city hall clock tower and the northern and taller one of the twin gray towers of the cathedral are located at the plaza and are the tallest objects in the town. The municipal hospital, a large modern concrete building near the beach at the south end of town, shows well to seaward.

A rounded hill shows up on the skyline when west of the town. Columbus Monument is located close to the shore about 1 mile south of the town. It is a small white shaft.

The usual anchorage is in 9 to 20 fathoms, with the cathedral spire in range with the high rounded hill on the skyline. Select anchorage according to size and swinging area. To avoid overrunning the anchorage, which

shoals rapidly, some masters back out 15 fathoms of chain when near it and let go when the anchor touches bottom. The nearest hurricane anchorages are Bahía Boqueron and Bahía de Guánica, preferably the latter.

A pilot may be obtained from Mayagüez. **Quarantine, customs and immigration** services are handled at Mayagüez. Aguadilla has both a municipal and district hospital.

Aguadilla is a city on the east shore of the bay. Both the insular railroad system and coastal highway pass through the town. An improved highway also leads to the interior. Telephone, telegraph, and postal facilities are available.

The city has a small hotel, a waterworks, electric lights, and a sewer system. There are no large stores, the principal sources of supplies being Mayagüez and San Juan.

Coastal (storm) warnings, are displayed, daytime only, near the harbor on the grounds of the Insular Fire Service.

Punta Borinquen, 10 miles northeast of Punta Higuero, is steep-to and may be rounded at a distance of 0.8 mile. The extreme western part is low but is backed by steep wooded slopes about 0.5 mile inland. A rocky bluff over 200 feet high begins about 0.8 mile southwestward of **Punta Borinquen Light** and extends northeast and eastward along the north coast of Puerto Rico. The light, 292 feet above the water and visible 24 miles, is shown from a gray cylindrical tower 60 feet high, about 1.3 miles northeast of the point. A brown scar in the cliff just beneath the light is conspicuous. **Coastal (storm) warnings** are displayed, daytime only, at the light.

The **north coast** of Puerto Rico trends eastward about 27 miles from Punta Borinquen to Puerto Arecibo. In this section there are numerous rocky cliffs with sand beaches and dunes between them. The prominent features are the high hills in the interior and high cliffs along the coast. The hills which terminate about 1 mile west of Arecibo are mostly smooth grassy slopes backed by conical wooded hills from 100 to 800 feet high. Rocky cliffs, 150 to 300 feet high, extend along the coast from Punta Borinquen to about Río Camuy. These cliffs terminate at the water in places and are nowhere more than 0.5 mile inland.

Isabela, a village about 7 miles east of Punta Borinquen Light, is on a high bluff close to the coast and is clearly visible from seaward. The town street lights lead in straight rows back from the bluff; a road slopes down to the waterfront. Prominent features include a large church, with a dome surmounted by a spire, at the western end and two square turretlike towers at the eastern end.

Punta Sardina, 0.6 mile northward of Isabela, is a low and rocky point. On its west side is a sandy cove where a boat landing may be made at times.

Río Guajataca, about 11 miles eastward of Punta Borinquen Light, is a deep gulch which shows when off it. **Quebradillas** is a town in the highlands 1.5 miles southeastward of the river mouth.

Chart 903.—Punta Peñon, the point about 16 miles eastward of Punta Borinquen, is a slight projection, with lower land between it and the foothills about 0.3 mile inland; **Peñon de Afuera,** a rocky islet, lies westward of the point. To the eastward of the point is a chain of bare rocks and a small islet about 0.8 mile distant.

Camuy and **Hatillo** are adjacent towns near the mouth of **Río Camuy** about 18 miles eastward of Punta Borinquen Light. The railroad and coastal highway both pass through the towns. A tall concrete stack is at Camuy.

Puerto Arecibo, the port about 26 miles eastward of Punta Borinquen Light and 33 miles west of San Juan, is an open bight protected by the headland of **Punta Morrillos** on the east side, with a 1,200-foot breakwater extending southwesterly from that point to **Roca Cocinera.**

Arecibo Light (18°29.0′ N., 66°41.9′ W.), 120 feet above the water and visible 17 miles, is shown from a white hexagonal tower on **Lighthouse Hill,** close to the shore near the western end of the point. **Coastal (storm) warnings** are displayed, daytime only, at the light.

A radio tower 225 feet high, with a flashing red light on top, is about 2 miles east of Arecibo. Other prominent objects in the vicinity are the cathedral and a nearby large building in Arecibo, a tall concrete stack at Ron Rico, about 1.5 miles west of the town, and another tall concrete stack with a shorter one close by about a mile south of the town.

Channel.—Federal project depth is 25 feet in a channel to a maneuvering area of the same depth fronting a proposed marginal wharf 1,000 feet in length. In April 1952 controlling depths were 25 feet in the ocean entrance channel, thence 23 feet in the channel, and thence 18 feet to the terminal.

Rio Grande de Arecibo is the river that enters at the eastern end of the bight along the bluff near the south side of Signal Hill. The depth is generally 2 to 3 feet on the bar.

Dangers.—A reef with three rocks known as **Tres Hermanos** showing above water extends northerly of the breakwater, about 0.2 mile southwestward of Punta Morrillos. The 2 outer rocks, 150 yards northeastward of Roca Cocinera, are close together and about 3 feet high, while the inner rock is a small ledge showing just above high water.

Roca Resuello, a rock awash at high water, is about 0.2 mile offshore, northerly of Arecibo. Vessels should not attempt to pass between the rock and shore, but due to the shoaling should pass well to seaward.

Pilotage.—Ships generally take a pilot at San Juan. Pilotage regulations and charges are the same as at all other Puerto Rican ports.

Boundary lines of inland waters.—The lines established for Puerto Arecibo are described in **§ 82.205,** Chapter 3.

Towage.—Only small motorboats used for towing lighters are available.

Quarantine, customs, immigration.—There is a representative of the quarantine service who enforces national quarantine laws. The customhouse and customs warehouse are located near the beach at the eastern end of town. Arecibo is not a port of entry.

Hospitals.—Arecibo has a municipal hospital and a district hospital.

Anchorage.—Anchor 400 to 500 yards outside Roca Cocinera with the rock on range with the bluff at the north point of the river entrance. The depth here is 8 to 9 fathoms, sandy bottom. For 0.2 mile west and northwest of this position there is anchorage area in 9 to 12 fathoms.

At 500 yards distant, the light will bear 089°; Roca Cocinera and bluff at the river mouth, 118°; the tall stack south of town, 168°; and the church tower, 216°. The anchorage can be approached heading either for Roca Cocinera, the tall stacks south of town, or the church tower in Arecibo on the respective bearings given above, and anchor on the other cross bearings. When heading for the tall stack south of town on 168°, the shorter stack close by will be about in range. Smaller vessels can anchor about 150 yards from Roca Cocinera with the rock in line with Arecibo Light bearing 070°, in 6 fathoms. There is little current at these anchorages and vessels lie head to the wind, tailing away from the rocks in the daytime.

Tides.—The mean tidal range is 1 foot and the extreme varies between about 1 foot below and about 2¾ feet above mean low water.

Directions.—Approaching from either direction, give the coast a berth of 3 miles until off the port. From a position about 1 mile northwest of the light, head in for the anchorage as indicated in the preceding paragraphs.

Harbor facilities.—A concrete bulkhead pier about 550 feet long is on the south side of the breakwater. The depth along the face is about 23 feet.

Arecibo, a city along the shore southwestward of the light, has considerable commerce consisting chiefly of the receipt of foodstuffs, building material, and fertilizer, and the exporting of sugar, alcoholic products, and miscellaneous merchandise. The city is on the mainline railroad and the insular coastal highway to points east and west; two other highways lead south. There are numerous stores, several small hotels, and telephone, telegraph, and postal facilities. The stores carry some food supplies and general hardware, but the principal source of supplies is San Juan.

Between Puerto Arecibo and Bahía de San Juan, about 33 miles eastward, the coast is indented by several coves and bights, none of which afford sheltered anchorage. The western part of this section for a distance of about 17 miles consists of sandy beaches and dunes with occasional rocky bluffs extending nearly to Punta Puerto Nuevo. Thence the coast consists of numerous hummocks and rocky bluffs, varying in elevation up to 130 feet with short beaches between them. A line of breakers enclosing numerous rocks lies as close as 0.5 mile offshore. There is a range of conical hills westward of San Juan.

Punta Caracoles, about 1.5 miles eastward of Arecibo Light, is a rocky bluff 70 feet high, with 2 islets close westward of it.

Punta las Tunas, about 3.3 miles eastward of Arecibo Light, is the westernmost of numerous high bluff hummocks which form the coast for 1.3 miles. Some prominent high rocks are near the coast 2 miles eastward of the point.

Punta Palmas Altas, about 8 miles eastward of Arecibo Light, is a bare rocky point 35 feet high. Numerous rocks lie between the point and the outer rocks, which are known as **Tres Hermanas,** 0.7 mile westward.

In the bight westward of the point is a small concrete wharf in poor condition. The anchorage is about 0.4 mile offshore in 42 to 48 feet. A swell and rather strong current are always found at the anchorage.

Palmas Altas is the port district of Barceloneta. Near the wharf is a sugar warehouse and a railroad to the central at Barceloneta about 2 miles to the southeastward. Custom facilities are not available here. Vessels in coastwise trade are permitted to load sugar. Clearance, when required, is obtained from the collector of customs at San Juan.

Barceloneta, about 1 mile inland, is a town on the west bank of Río Grande de Manatí. The central buildings and stacks show from offshore intermittently between the hills and tall trees. The railroad bridge at Barceloneta has a fixed span with a horizontal clearance of 128 feet and a vertical clearance of 13 feet at low water. **Manatí,** about 3.5 miles southeastward of Barceloneta and 3 miles inland, is a city on the railroad line.

Río Grande de Manatí is a river with its entrance between 2 hills which rise on either side to heights of 130 feet. Several houses at **La Boca** show on its slope. There is a strong current off the mouth of the river.

Punta Manatí, about 10 miles eastward of Arecibo Light, is prolonged westward for 0.2 mile by 2 rock islets, named **Los Muertos.** Numerous rocky islets are close to shore for 0.6 mile eastward of the point.

Between Punta Manatí and **Punta Chivato,** a distance of about 5 miles, the coast recedes about 1 mile, forming Puerto del Tortuguero, an open bay. The shore of the eastern part of the bay is low and marshy in places; the western part is a ridge 130 to 170 feet high backed by conical hills. A rock lies awash about 0.3 mile northward of Punta Chivato.

Danger zones.—Artillery and small-arms ranges have been established off the coast in this area; see **§204.228,** Chapter 2.

Punta Puerto Nuevo, about 17 miles east of Arecibo Light, is a low point and not distinctive. Rocky islets extend about 1 mile westward from the point, 0.3 mile offshore. A boat landing can be made at times inside the rocks west of the point. A tall concrete stack, about 2.8 miles southeastward of the point, shows prominently. Strong floodlights are frequently shown near the stack and are visible offshore.

Vega Baja, about 3 miles south of Punta Puerto Nuevo, is a town on the railroad line. **Isletas de Garzas,** about 1.3 miles east of Punta Puerto Nuevo, are bare rocky islets visible only when close to shore. The point behind the islets is a grassy hill terminating westward in a prominent bluff.

Punta Cerro Gordo, about 21 miles eastward of Arecibo Light, is a prominent ridge about 130 feet high that extends eastward about 1 mile. There are bushes and trees on the ridge, and bluffs at the water. Some houses show in the cove west of the point.

Río de la Plata (Guaynabo), the river about 5 miles eastward of Punta Cerro Gordo, is marked by a break in the foothills. **Dorado** is a town on the west bank of the river 1.2 miles above its mouth; some of the houses show from seaward. The height of the water in the river depends on the rainfall and the operation of the hydroelectric plant upstream. **Toa Baja** is a town on the east bank of the river 1 mile above Dorado. A steel stack located about 0.4 mile northward is visible from seaward.

Punta Salinas, about 30 miles east of Arecibo Light, is a low, narrow point about 1 mile long. A hill about 65 feet high with a bluff on the seaward side is located at the northern end of the point. **Isla Palomas** is an island close to the western side of the point; an islet is near the eastern side.

Chart 908.—Bahía de San Juan, the most important commercial harbor in Puerto Rico, is about 60 miles eastward of Punta Borinquen and 30 miles westward of Cabo San Juan. It is the only harbor on the north coast which affords protection in all weather. It is protected on the north by the relatively high land of Isla San Juan, and on the south, east, and west by the adjacent low mangrove swamps of the Puerto Rico mainland.

The bay is about 3 miles long in a southeasterly direction and varies in width from 0.6 to 1.6 miles, but the entire southwestern side is shoal. The southwest shore is divided into 2 large bights by **Punta Cataño,** the point which extends about 0.6 mile northeastward into the harbor.

A range of prominent conical wooded hills, giving a bold appearance to parts of the south shore, extends westward about 1 mile inland from the southern side of the bay.

Isla de Cabras, on the western side of the entrance, is low with cliffs 32 to 36 feet high at its northern end. There are 3 small islands and rocks, about 0.1 mile northeast of the island, named **Las Cabritas.** Several large bare rocks lie close to the east end of the island, and a reef extends 250 yards eastward of them. The island is connected with Punta Palo Seco by a causeway. **El Canuelo,** a small stone structure, is on the southern extremity of Isla de Cabras and about 75 yards east of the causeway.

Punta Palo Seco, the point 0.2 mile southwest of Isla de Cabras, is the northern extension of the lowland forming the southwest side of the harbor. **Isla San Juan,** on the eastern side of the entrance to the harbor, is generally bold and rocky, with a ridge 100 feet high extending along its northern side. It is 2.2 miles long, east to west, and is connected to the mainland by 3 bridges between Laguna del Condado and Caño de San Antonio. The principal commercial facilities are located on the southern side of the island.

San Juan, the capital and principal port of Puerto Rico, is located on the western part of Isla San Juan. At each end of the city are large stone forts connected by a continuous high wall and some minor works which rise abruptly from the sea. **San Cristobal** is on the summit of the ridge in the easterly part of the city. **Castillo del Morro** is on the extreme western point of the island, at the entrance to the harbor. The city wall extends from Castillo del Morro along the channel side of the island to the Palace, which is large and prominent, and then eastward toward the northwest corner of the inner harbor.

The commerce of San Juan consists principally of the receipt of foodstuffs, textiles, building materials, machinery, fertilizers, and petroleum products. The principal exports are sugar, molasses, fruit, tobacco, coffee, and alcoholic products. Nearly half the commerce of the island passes through the city. All commercial and governmental activities are located here.

Puerta de Tierra is the eastern part of Isla San Juan. The larger piers are in this section.

Santurce, on the mainland southeastward of Isla San Juan, is the principal suburb of San Juan and connected with it by good highways and transportation service. **Isla Grande** projects westward into the eastern part of the bay. A large airport and naval station are located here. **Cataño** is a small residential and fishing community on the south side of the bay, westward of Punta Cataño. A ferry connects with San Juan.

Prominent features.—Principal landmarks are Castillo del Morro, with Puerto San Juan Light on top, at the eastern side of the entrance to the harbor; the white marble dome of the capitol building, about 1 mile eastward; and a white church 0.4 mile farther eastward. Several prominent hotels are located near the eastern end of the island. Inside the bay, the tanks on Isla Grande and the concrete stack of the cement plant south of Cataño are prominent.

Puerto San Juan Light (18°28.4′ N., 66°07.4′ W.), 181 feet above the water and visible 20 miles, is shown from a square brick tower on an octagonal base on the summit of Castillo del Morro. A radiobeacon is about 0.4 mile east-southeast of the light. A **lighted range** marks the entrance to the harbor on bearing **188°.**

Boundary line of inland waters.—The line established for Bahía de San Juan is described in **§ 82.200,** Chapter 2.

Channels.—The Federal project provides for an entrance channel 38 feet deep across the outer bar to the bend in the channel, then 30 feet deep to Caño de San Antonio; a channel 30 feet deep from the anchorage area to and including a turning basin at the navy terminal on the south side of Isla Grande; and a channel 30 feet deep from the anchorage area to the army terminal at Bahía de Puerto Nuevo. The channels are maintained at, or near, project dimensions.

The entrance channel extends southerly west of Punta del Morro, passing between Bajo Colnas and Bajo Santa Elena; thence eastward and northeastward to the piers at San Juan and Puerta de Tierra.

An unmarked channel has been dredged through **Arrecife Bajios** to a wharf on the inner side of the cause-

way about 75 yards westward of El Canuelo. Depths are about 16 feet along the centerline of the channel, shoaling to about 14 feet in places along the edges. The reef has general depths of 2 to 5 feet over it.

The mouth of **Río de Bayamón** is inside Punta Palo Seco. In March 1953 this river was reported shoaled to about 1 foot. **Palo Seco,** a fishing community amid a growth of palm trees, lies along the banks of the river inside the mouth. Río de Bayamón is crossed by three fixed bridges.

A channel with depths of 4 to 6 feet has been dredged on the south side of Punta Cataño and north of **Isla Chivos** from **Escollo Grande** to the railroad pier at Cataño. In March 1953, the entrance to the channel was reported shoaled to about 1 foot.

Caño de San Fernando empties into the bay south of Cataño. **Río Puerto Nuevo** flows into the bay east of Bahía de Puerto Nuevo.

Caño de Martin Peña flows into the eastern end of the bay about 1 mile southeast of Isla Grande. It is a narrow slough and is the entrance to a system of connecting lakes and lagoons which extends eastward for about 7 miles. The entrance is crossed by a fixed bridge with horizontal clearance of 100 feet and vertical clearances of 22 feet at the center and 19 feet at the fenders. A channel 12 feet deep has been dredged to the first of 4 fixed bridges about 1.5 miles above the entrance. The minimum clearances of this group of bridges are 44 feet horizontal and 7½ feet vertical. Another fixed bridge 2.4 miles above the mouth has a horizontal clearance of 27 feet and a vertical clearance of 10 feet. A small branch channel with a dredged depth of about 6 feet leads southward to two fertilizer plants about 1.5 miles above the mouth. Lighters with fertilizer materials are towed to these plants.

Caño de San Antonio, the eastern extension of the dredged inner harbor, connects with **Laguna del Condado,** a small-boat harbor; the latter passage is seldom used. One fixed railroad and two fixed highway bridges cross Caño de San Antonio at this point; the minimum clearances are 30 feet horizontal and 5½ feet vertical. Another fixed bridge with a horizontal clearance of 20 feet and a vertical clearance of 4½ feet is in the causeway connecting Isla San Juan with the long narrow peninsula on the north side of the laguna.

Anchorages.—Anchorage areas in the harbor are described in **§ 202.240,** Chapter 2.

The dock and harbor law provides that no vessel shall anchor within 150 yards of the shore, without the consent of the captain of the port, or in such a position as to impede the movements of the ferry to Cataño, or to prevent ready access of any vessel to or from a pier. Also, no vessel, whether lying at anchor or alongside, shall shift her berth without permission from the captain of the port or the Puerto Rico Transportation Authority.

As a hurricane anchorage the harbor is fairly well protected. It is advisable, when taking shelter in any of the hurricane harbors of Puerto Rico, to select anchorage when possible in such a way that if the ship is blown ashore she will go aground on soft bottom. Bilges should be flooded to increase draft 2 to 3 feet, thus affording an easy method of lightening the ship when salvaging operations are begun.

A **restricted area** for seaplane operation in Bahía de San Juan is described in **§ 207.812,** Chapter 2.

Regulations for **navigation** in the channel of Bahía de San Juan are stated in **§ 207.810,** Chapter 2.

Dangers.—**Bajo Colnas** extends 250 yards eastward and 500 yards southeastward from the rocks on the east side of Isla de Cabras, and is a shoal usually defined by breakers. From the northeastern end of the shoal, a ledge with a least depth of 18 feet extends 250 yards eastward. The end of the ledge is marked by a lighted buoy.

Bajo Santa Elena extends about 200 yards from shore on the east side of the entrance channel. The depths over the shoal area are 7 to 18 feet. The western point of the southern end of the shoal is marked by a lighted buoy.

Bajo San Agustin is a part of the shoal area on the northeast side of the channel from Bajo Santa Elena to northerly of La Puntilla. It has depths of 4 to 12 feet, and extends in places about 300 yards from shore. The westerly side of the shoal area is marked by a lighted buoy. The shoal area northwestward of **La Puntilla** is covered by 1 to 3 feet. The southwesterly side of the shoal area is marked by a lighted buoy. A daybeacon on the south corner of the Coast Guard wharf marks the southern end of La Puntilla.

Bajo Tablazo, a shoal with 10 to 12 feet of water over it, lies southwest of the channel abreast of La Puntilla. Here the dredged channel narrows to 1,000 feet. The edge of the shoal is marked by a lighted buoy. **Bajo Anegado** is a shoal lying 0.4 mile north-northeastward from Punta Cataño. It is marked by a lighted buoy.

Directions.—From a position about 0.5 mile northward of Punta del Morro, enter the harbor on the entrance range bearing **188°**; thence proceed into the harbor, being guided by the aids. From westward Punta Salinas will appear as an island when first sighted and must not be mistaken for Isla de Cabras.

The harbor is easy of access in ordinary weather, but it should not be entered at night without local knowledge. During winter northers, dangerous conditions may prevent entering the harbor. The sharp bend inside the entrance can be difficult when the northeast trades are blowing strongly, as they may force a vessel almost broadside to the swells. Vessels outbound should avoid getting too close to Bajo Colnas; this is particularly so with long vessels in a strong northerly breeze.

Tides.—The tides are chiefly semidiurnal and have an average rise and fall of about 1 foot. Because of the small tidal range, the variation in the water level depends considerably on the wind.

Currents.—The currents along the north shore of the island are greatly influenced by the direction and strength of the winds. In general, there is a westerly drift due to the prevailing easterly trade winds. At San Juan a slight westerly flow prevails at all times in the harbor from this cause.

When northerly seas set into the entrance of the harbor, an undertow has been felt as far inside the harbor as

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the Porto Rico Coal Co.'s wharf. In some places, as at the San Antonio dock, the undertow and the surging have been so bad at times as to part the mooring lines.

Winds.—The prevailing winds are the easterly trades, which generally blow fresh during the day. The lowland eastward of the city permits the cool trades to be felt throughout the harbor. At night the trade wind generally dies down and a light southerly breeze comes off the land. Except for hurricanes, which occur at irregular and, as a rule, long intervals, heavy northerly winds are the most troublesome, piling up heavy seas and breakers in the harbor mouth.

Coastal (storm) warnings are displayed, daytime only, from the coast guard base at La Puntilla.

Pilotage is compulsory for foreign vessels and for American vessels in foreign trade. Coastwise vessels, vessels owned or controlled by the United States or by a foreign government, and all pleasure yachts are exempt from pilotage, unless a pilot is actually engaged.

Pilot boats are painted black, with a large white letter "P" on either bow, and display a square blue flag with a white letter "P". The pilots maintain a signal station on the heights of San Cristobal; vessels can communicate with this station by International Code signals. The usual watch is during daylight only unless a vessel is expected at night.

Vessels usually are boarded by pilots in motorboats inside the harbor entrance; pilots take vessels in or out at night. Pilots generally are notified by ships' agents of expected time of arrival.

Traffic signals.—The alphabet flag **N**, when displayed as indicated from either yardarm of the signal mast on San Cristobal, will govern entry and departure of vessels at Bahía de San Juan:

(a) On the northwestern yardarm shall indicate that all incoming vessels must remain at a safe distance outside the bar.

(b) On the southeastern yardarm shall indicate that all outgoing vessels must remain at a safe distance inside the bar or at the dock.

Towage.—Towboats are available for docking and undocking. A 1,350-horsepower tugboat can be obtained for long towing and salvage. Advance arrangements may be made by radio, if desired. The company's telegraphic code address is "Porilite, San Juan."

Quarantine.—The quarantine station and clinic are on Fernandez Juncos Avenue, 0.25 mile west of San Antonio Bridge. Vessels subject to visitation are boarded in the anchorage area. Fumigation facilities are available under supervision of the quarantine officers.

Customs.—The United States customhouse is located in the marina on the northwest side of the harbor. The office of the district collector and the warehouse are located here. The customhouse is open daily, except Sundays and holidays; inspectors are on duty from 8 a. m. to 5 p. m. Special arrangements can be made for work outside regular hours. Goods going to the customs warehouse cannot be landed directly but are hauled from the general cargo piers. Marine documents are issued.

Immigration.—The United States Immigration and Naturalization Service has an office in the Federal Building.

Hospitals.—The Public Health Service outpatient clinic is on Fernandez Juncos Avenue. Hospital cases are cared for at the Presbyterian Hospital. San Juan has a municipal hospital and the Presbyterian Hospital maintains a large and well-equipped establishment. Several private clinics and hospitals are also in the city.

The **Coast Guard Base** is on La Puntilla. Other Federal activities are listed in the Appendix.

Terminal facilities.—The berthing facilities consist of private and public piers and bulkheads occupying about 1.5 miles of waterfront on the north side of the harbor. The depths alongside range from 20 to 30 feet. Three of the piers and the three wharves of the insular government are open to the public on equal terms.

The Pan-American bulkhead pier, on the north side of Isla Grande, is used for open stowage and loading of cargo. Large cruise ships also berth here. Pier 15, on the southeast side of Isla Grande, is used for loading and discharging general cargo. Just eastward of pier 15 is the Alcoa Steamship Co. wharf with 29-foot depths alongside. The wharf has a covered transit shed, a 5-ton mobile crane, and modern cargo-handling equipment.

All piers and wharves have railroad and highway connections, and pipeline connections for water; all but the coal wharf have pipeline connections for bunkering fuel oil. With the exception of two wharves used for open storage, all piers and wharves have transit sheds. Several landings for lighter draft vessels are along the western side of the harbor to the northward of La Puntilla; this section of the harbor is known as the Marina.

Arrangements for docking and mooring are made through the captain of the port. Dockage charges are assessed not only upon vessels actually making fast to piers, wharves, and bulkheads, but also upon vessels lying alongside or outside of vessels so making fast and also upon vessels in the stream which unload cargoes at public wharves and bulkheads by means of lighters. The Government makes no charges against vessels calling solely for coal, water, or provisions, but the usual charges apply for the use of private facilities.

Pier 1 is equipped with 2 movable fruit conveyors and a movable 2-ton winch. Pier 3 has two electrically operated elevators. The San Antonio dock has several movable conveyers and an electric half-ton winch. The Porto Rico Coal Co. dock has a 2½-ton crane capable of handling 100 tons per hour. The Porto Rico Lighterage Co. has a tank barge equipped with a 3-ton crane which can handle 60 tons per hour; this concern also has a floating derrick of 25-ton capacity.

Storage.—Portions of the sheds on the Insular and Puerta de Tierra bulkheads and on pier 6 are used for general cargo storage. Outbound sugar is stored in the sheds of the steamship companies. There are two large cold-storage plants for handling foodstuffs and a precooling plant for fruit awaiting shipment. There are two bonded warehouses, one of which is a cold-storage plant.

Lumber is handled on the Insular and Puerta de Tierra bulkheads and on pier 6; on the latter pier there is a traveling unloading bridge for handling lumber and coal.

Pier 5, the San Antonio dock, the Porto Rico Coal Co. wharf, and the Puerta de Tierra bulkhead all have pipeline connections for handling molasses in several large storage tanks with a total capacity of about 4,800,000 gallons. Molasses can be loaded at the rate of 55,000 gallons per hour.

Most of the molasses is brought to San Juan by the tug and tank barge of the Porto Rico Lighterage Co. which can discharge at the rate of 45,000 gallons per hour. Some is brought in by railroad tank cars and some by trucks. There are bonded tanks for fuel-oil storage.

Supplies.—Provisions, ice, lumber, sand ballast, and ship chandlers' stores can be obtained in San Juan. An ample supply of good water, for drinking and boiler use, is available at all piers and wharves and a pump barge delivers water to vessels in the stream. Fuel oil can be obtained from pipelines on the piers from any of 3 companies at rates of from 300 to 1,000 barrels per hour. Gas oil distillate is available. Coal can be obtained only from the Porto Rico Coal Co. The berthing space is 450 feet at the coal wharf. There are two loading cranes with capacities of 100 tons and 90 tons per hour, respectively. Vessels can be bunkered in the stream by means of a decked lighter of 250-ton capacity and capable of bunkering about 30 tons per hour. There is usually a supply of 6,000 tons of coal available.

Floating equipment.—The Porto Rico Lighterage Co. has lighters of from 50- to 1,100-ton capacity, and 2 power launches. It has one water barge of 84,000-gallon capacity which can deliver water aboard as fast as it can be received. For ocean and coastwise lighterage service, it has 2 oceangoing tugs, equipped for firefighting and salvage work, and a 1,100-ton capacity barge for transporting molasses or fuel oil.

Salvage.—The Porto Rico Lighterage Co. has complete salvage equipment. The Merritt, Chapman, & Scott Co. of New York has complete wrecking outfits at Key West, Fla., and Kingston, Jamaica, British West Indies. Electric current is available at most wharves, a. c., 110–440 volts, 1-, 2-, or 3-phase, 60-cycle.

Repairs.—The graving dock and floating drydock of the Puerto Rico Dry Dock and Marine Terminals are at the southeast side of Isla Grande. The inside dimensions of this graving dock are as follows: Length, 649 feet at level of keel blocks; width, 83 feet at level of keel blocks; draft, 29 feet over the sill at the entrance. The floating drydock has a capacity of 1,000 tons, with 15 feet over the sill. The most extensive repairs to hull and machinery can be made.

The largest machine shop and foundry in Puerto Rico is at San Juan. This plant can make all hull and engine repairs. The foundry can make iron and semisteel castings up to 20 tons in weight, also castings of brass, aluminum, copper, babbitt metal, and similar alloys. The machine shop can work pieces up to 16 feet in diameter and 21 feet long. There is a plate and boiler shop and portable machinery for ship repair work. The equipment also includes oxyacetylene and electric welding outfits, and a cadmium electroplating plant. The plant, near the waterfront in Santurce on the southeast side of Isla Grande, has track connections to the American Railroad Co.; all kinds of materials and equipment for powerplants and other industries are carried in stock.

Small-boat facilities.—The principal sites for mooring small boats are northwestward of La Puntilla inside the entrance channel, and off the San Juan Yacht Club. A marine railway at Punta Cataño can haul out craft up to 85 feet in length and 6 to 7 feet in draft, for minor repairs. Small boats can be hauled out at the San Juan Yacht Club which is at the extreme eastern end of Caño de San Antonio. The anchorage is well protected and can accommodate small craft up to about 65 feet long and 8 feet in draft.

Communications.—The island's railways follow the coastline, in general, and serve all the ports. Auto highways touch all major parts of the island, and are mostly surfaced. The airport is located on the north side of Isla Grande, along the Caño de San Antonio. Passenger and mail service are available to principal United States and South American cities, with several West Indian stops en route in either direction. Local plane service is available between San Juan, St. Thomas, St. Croix, and the Dominican Republic. Cable communication is available through several companies with cables out of San Juan and Ponce. Commercial radio communication to all points, including ships at sea, is available through the RCA system. The insular government maintains radio telegraphic service between San Juan and the islands of Vieques and Culebra.

The port is administered by the insular government through the Puerto Rico Transportation Authority. The captain of the port, who is appointed by that authority, has charge of the enforcement of all rules and regulations pertaining to the port. His office is on the waterfront.

Chart 903.—From Punta del Morro eastward to Punta Cangrejos there are about 7.3 miles of bold and rugged coast, with outlying rocks and reefs. A shallow inlet with depths of 2 to 3 feet is westward of the reef off **Punta Cangrejos.** A small pleasure resort and yacht club are on the shore of the inlet. Gasoline and water are available here. **Laguna La Torrecilla (Cangrejos)** is drained through the inlet. A small stream enters the southeastern corner of this lake from **Laguna de Piñones**; a boat landing is on the southern shore of the latter lake.

About 1.5 miles southwestward of Punta Cangrejos and 0.3 mile southward of the shoreline are two radio towers of station WNEL, which are lighted at night. Approximately 2 miles farther southward are 2 lighted radio towers of station WKAQ.

A reef extends from **Punta Maldonado** to 0.4 mile northward and nearly 0.6 mile northwestward from Punta Cangrejos. Several bare rocky islets near the edge of the reef are rather prominent when approaching from the eastward.

Chart 904.—Punta Vacia Talega, about 12 miles east of Punta del Morro and 17 miles westward of Cabo San Juan, is a brush-covered ridge 40 to 60 feet high with low

bluffs at the water. The point drops abruptly to the interior lower land, and is readily seen from eastward and westward.

Rio Grande de Loiza, 1.7 miles eastward of Punta Vacia Talega, shows as a wide gap in the trees. It is the largest river in Puerto Rico. Though 3 to 4 feet deep as far as Canovanas, it is not used for navigation as the mouth is generally blocked by a sand bar. The river is subject to flood stage during spring and fall.

Punta Miguillo, about 7 miles eastward of Punta Vacia Talega, is marked at its end by a small cluster of coconut trees; the rest of the point is covered with brush.

Río Grande empties into the head of the deep bight on the west side of Punta Miguillo. The river is small, but is navigable for small craft for 3 miles to the town of Rio Grande. It can be entered only with a smooth sea.

Punta Picúa, 7.8 miles eastward of Punta Vacia Talega, is covered by an extensive grove of coconut trees. Reefs bare at low water, extend 0.4 mile off the point. A rock with a least depth of 15 feet lies 1.6 miles north-northeast from the point and is marked on its north side by a lighted buoy. The rock breaks in a moderate swell.

Punta San Diego, 1.5 miles westward of Cabo San Juan, is a sharply projecting point, having several knolls and bare bluffs on its eastern side and a lagoon westward of the knolls. The depths 0.6 mile off the point are 4 to 10 fathoms.

Sierra de Luquillo, the mountains in the northeast part of the island, comprise the great prominent feature in clear weather for this part of the coast. They are three high closely connected peaks, 5 miles inland and 10 miles from the eastern end of the island. The highest is **El Yunque,** 3,484 feet; **Pico del Este,** 3,458 feet, and **Pico del Oeste,** 3,346 feet high.

Chart 921.—Cabo San Juan, the northeastern point of Puerto Rico, is a bluff hill 220 feet high. Its 2 clifflike heads about 100 feet high, fronting the northern part, are named **Cabezas de San Juan. Cabo San Juan Light (18°23.0′ N., 65°37.1′ W.),** 260 feet above the water and visible 23 miles, is shown from a cylindrical tower on the front of a white rectangular dwelling on the highest part of the cape. **Coastal (storm) warnings** are displayed, daytime only, at the light.

Chart 904.—La Cordillera, Arrecife Hermanos, and Arrecife Barriles comprise a chain of islets, rocks, and reefs extending for 13 miles east-southeastward from a position 1 mile northward of Cabo San Juan. The chain is nearly steep-to on the north and south sides, especially the eastern part. Westward of Pasaje de Hermanos, all dangers will be avoided by giving the islets and bare rocks a berth of 0.5 mile when northward or southward of them.

Chart 921.—Las Cucarachas, a group of rocks up to 15 feet high, about 1 mile northerly of Cabo San Juan, lie at the northwestern end of the chain. A light 32 feet above the water and visible 11 miles is shown from a gray cylindrical concrete tower on one of the rocks. A shoal extends about 0.9 mile northwestward of the light with depths of 15 to 26 feet. A rock is awash about 0.2 mile northwest of the light.

Pasaje de San Juan, the passage between Cabo San Juan and Las Cucarachas, is about 0.7 mile wide, and is one of the principal channels leading into Sonda de Vieques. The depths in the passage are 6 to 11 fathoms.

Pasaje Cucaracha, the passage between Las Cucarachas and Los Farallones, is 0.3 mile wide between the 5-fathom curves. The channel has been wire dragged to a depth of 40 feet, except in a small area where a 21-foot depth was cleared. It is the best passage for sailing vessels to enter the northwest end of Sonda de Vieques with the usual easterly trade winds. On the west side, the 5-fathom curve is found about 360 yards east-southeastward from the light on Las Cucarachas, shoaling thence to 22 feet about 125 yards from the light. A **218°** course for Cabo San Juan Light will lead through the passage over a least depth of about 40 feet.

Los Farallones, consisting of a group of rugged bare rocks about 30 feet high, are 0.8 mile eastward of Las Cucarachas. Deep water is close to the north and west sides of the rocks, but a shoal with several bare rocks extends to Cayo Icacos. A reef on which the sea breaks is 0.2 mile southward of Los Farallones and continues about 0.4 mile westward from the northwest end of Cayo Icacos. The western end of the reef should be given a berth of 300 yards or more.

Cayo Icacos, the largest island of the chain, lies 1.3 miles eastward of Cabo San Juan. About 0.7 mile long and 0.4 mile wide, the island is about 40 feet high, is hummocky in appearance and covered with a scrubby growth. Near the southwest point is a small concrete wharf with about 6 to 8 feet at the end. Inside the wharf are several small red-roofed buildings. Farther inland there is a large and conspicuous white mound of limestone.

Cayo Ratónes, 250 yards eastward of Cayo Icacos, is 250 by 400 yards in extent and about 60 feet high. The eastern summit of the island is a large bare ledge. A number of bare rocks are off its north side, and a reef awash is between it and Cayo Icacos. A channel 400 yards wide, with depths of 16 to 20 feet, is between Cayo Ratónes and the bare rocks northwestward of Cayo Lobos.

Cayo Lobos, 0.5 mile east-southeastward from Cayo Ratónes, is an island 25 to 30 feet high. Off its north side are several high bare rocks and islets, the highest 75 to 80 feet. From Cayo Lobos to Cayo Diablo, a distance of 2.2 miles, is a chain of numerous bare rocks and islets, some as much as 30 feet high.

Chart 917.—Cayo Diablo, 2.2 miles east-southeastward from Cayo Lobos, is an island 600 yards long and generally low, but its eastern end is a grassy hummock about 40 feet high. White beaches are on its north and south sides.

Arrecife Hermanos, a reef 1.4 to 2.3 miles east-southeastward from Cayo Diablo, consists of 4 small bare rocks: The western one about 2 feet high, the eastern one about 6 feet high, and 2 rocks, close together, about 4 or 5 feet high, nearly midway between the end rocks.

Pasaje de Hermanos, is a passage 2 miles wide between the bare rocks of Arrecife Hermanos and Arrecife Barriles.

The passage has shoals of 15 to 30 feet and is not recommended for passage by strangers.

Chart 904.—Arrecife Barriles, 2 miles long east and west, is a chain of bare rocks, mostly 2 to 4 feet high. A rock about 10 feet high is near the middle of the reef, and another about 15 feet high is at the eastern end of the bare rocks. The easternmost rock awash lies 0.3 mile eastward of the bare rocks.

Pasaje de Barriles, a passage 2 miles wide between the easternmost rock awash of Arrecife Barriles and Cayo Lobito, may be used by vessels of any draft, the deepest water favoring the eastern side. A buoy marks the center of the passage. The eastern part of the passage, between 0.3 and 1.2 miles westward of Cayo Lobito, has depths of 8 to 9 fathoms. A depth of 31 feet is 400 yards westward from Roca Columna on Cayo Lobito. On the west side, depths of 5½ to 6½ fathoms were found between 650 yards and 0.7 mile eastward of the rock awash at the eastern end of Arrecife Barriles, and a depth of 28 feet is about 0.3 mile southeastward from it. Cayo Lobito is discussed later in the chapter.

Chart 914.—A shoal area consisting of several rocks is about 2.2 miles northwestward from Punta Noroeste on the northwest end of Isla de Culebra. **Cayo Botijuela,** about 2 feet high, is the northwesterly rock, and **Roca Lavador,** awash at high water, is the southeasterly one. **Pasaje Lavador,** between Roca Lavador and Alcarraza, is clear and has depths of 12 to 14 fathoms.

Alcarraza, a bare round rock 144 feet high with perpendicular sides, is about 0.6 mile southeastward of Roca Lavador. The height and whitish appearance of this rock made it prominent. **La Pasa de la Alcarraza,** the pass between Alcarraza and Los Gemelos, has a depth of 6½ to 8 fathoms, with the deepest water in the eastern side of the passage.

Los Gemelos consist of a rock about 50 yards in diameter and 20 feet high, with a small low rock close to its southwest side and another small rock 100 yards northwest. They are about 0.4 mile southeastward of Alcarraza.

El Ancón, a rock with 7 feet of water over it, lies 0.3 mile southeastward of Los Gemelos; it breaks when there is considerable sea. A buoy is 150 yards east of the rock. The safest and best channel is between El Ancón and Piedra Stevens; it has depths of 10 to 12 fathoms.

La Pasa de los Gemelos is between Los Gemelos and Piedra Stevens.

Piedra Stevens, a rock 0.6 mile north-northwest of Punta Noroeste, is 100 yards in diameter and 30 feet high; its south end should be given a berth of more than 100 yards. A lighted buoy is moored about 100 yards northwestward of the rock.

Isla de Culebra, 16 miles eastward of Puerto Rico, is an island about 6 miles in length east and west. It is fairly high, with broken and ragged terrain. **Monte Resaca,** a mountain about in the center, rises to 650 feet, and **Cerro Balcón,** about 1.5 miles east-southeast of it, is 551 feet high. The island is rather barren, and decidedly brown in appearance. The northern shore is steep-to, with the 20-fathom curve extending about 1.5 miles off and approximately parallel to it.

The island is a **Naval Defensive Sea Area and Airspace Reservation.** Navigation by vessels other than those authorized by the Secretary of the Navy is prohibited within the 3-mile limit.

The principal product of the island is cattle. Vegetables and some tropical fruits are grown in quantities sufficient only for local consumption. The rainy season lasts from June to October, but the rainfall is much lighter than in Puerto Rico. There are no fresh-water streams, and rain water stored in cisterns forms the principal water supply. No fresh water is available for vessels. The principal harbor is Ensenada Honda, one of the mose secure in the Leeward Islands.

Canal Piedra Stevens, between Punta Noroeste and Piedra Stevens, is a passage with a clear width of about 0.4 mile, and a depth of 12 fathoms. A reef extends 200 yards north-northwestward from the high bare rock close to Punta Noroeste.

Punta Noroeste is the end of the prominent ridge projecting at the northwest end of Isla de Culebra.

From Punta Noroeste 2 miles southeastward to Punta Flamenco, the coastline consists of sandy beaches between rocky bluffs. A 17-foot shoal was reported to be 0.7 mile eastward of **Punta de Molinos,** and another shoal covered by 23 feet, is about the same distance east-northeastward from that point.

The entrance to **Bahía Flamenco,** eastward of Punta de Molinos, is constricted by reefs. **Punta Flamenco** is marked by an observation tower about 0.3 mile south of the extremity of the point. From Punta Flamenco to Punta Anade the shoreline is generally bold and rocky, with sand beaches in the coves and with occasional coral reefs fringing the shore.

Cayo Matojo, an island 20 feet high, is off **Punta Resaca,** the projecting point separating **Bahía de Marejada** from **Bahía de Oleaje. Punta Pavimento,** 4 miles southeast of Punta Noroeste, is the eastern point of Bahía de Oleaje. **Roca Speck,** a rock off **Punta Manchita** and midway between Punta Pavimento and **Punta Anade,** is low and bare. **Playa Larga** is identified by a coconut grove along the beach and a boat landing. Between Punta Anade and Cabeza de Perro a fringing coral reef extends offshore about 100 yards. Two breaks in the reef form boat landings to the beach. **Cabeza de Perro,** the eastern point of Isla de Culebra, is a pointed rocky bluff.

Canal de Culebrita is the protected water area between Isla de Culebra and the cays and shoals to the northeastward and eastward. The approaches to the sound are: Canal de Cayo Norte from westward, Canal Tiempo from northeastward, and Canal del Sur from southwestward.

Cayo Norte, the cay about 0.6 mile from the northeastern shore of Isla de Culebra, is somewhat oval shaped, 1.2 miles long, and covered with a thick scrubby growth. Its highest peak is 338 feet high. A protected boat landing is on the south shore west of **Punta Trulla,** the eastern point. About 300 yards to the northward of the eastern point is **Cayo Sombrerito,** a rocky islet 59 feet high. About

0.7 mile to the northeastward of Cayo Sombrerito are **Cayo Tiburón** and **Cayo Ballena,** 2 small rocky islets. **Cayos Geniquí,** 2 rocky islands, 79 and 82 feet high, lie 0.4 mile southeast of Cayo Tiburón. The western island is flat and grass covered on top; the eastern island is pointed on top and has little grass.

Isla Culebrita, the island about a mile southeastward of Cayo Norte and 0.7 mile eastward of Isla de Culebra, is of irregular shape and about a mile in length. It is formed by three hills with low land between them, and is covered with a scrubby forest growth. The southern hill is 230 feet high. **Isla Culebrita Light (18°18.9′ N., 65°13.7′ W.),** 305 feet above the water and visible 24 miles, is shown from a cylindrical tower 43 feet high on a flat-roofed dwelling on the summit of the hill.

A boathouse and concrete landing are on the west side of the island near **Punta Arenisca,** the southerly point. **Cabo del Pasaje,** its eastern end, is a bare high cliff. **Cayo Botella,** 1.1 miles west-northwest of Cabo del Pasaje, is on an extensive coral reef that makes off from Isla Culebrita. It is 30 feet high and grass covered.

Cayo Norte, Isla Culebrita, and the adjacent cays and reefs form a protected passage around the eastern end of Isla de Culebra and several well-protected anchorages.

Canal de Cayo Norte is 0.5 mile wide between Cayo Norte and Isla de Culebra. The passage has depths of 28 to 87 feet in the fairway. **Tierra á Medio,** a shoal with several 17-foot spots, extends about 0.5 mile southward and southwestward from the northwestern end of Isla Culebrita on the northeastern side of the fairway. The shoal is marked on its southwestern side by a buoy.

Canal Tiempo, north of Isla Culebrita, is the most direct channel into Canal de Culebrita, but should not be attempted by strangers. It is only 180 yards wide and has 7- and 12-foot spots south of it, and 12 to 22 feet north of it. **Middle Passage** and **Western Passage** are approaches to Canal Tiempo from northward. Middle Passage extends between Cayos Geniquí on the south side and Tiburón and Ballena on the north; it has a clear width of about 0.3 mile and a least depth of 30 feet lying 200 yards to the southward of Cayo Tiburón. Western Passage is a deep, clear passage between Cayo Tiburón and Cayo Norte.

Canal de Culebrita is the sheltered anchorage southward of Tierra á Medio, with depths of 38 to 80 feet. **Canal del Sur,** the channel leading southwestward from Canal de Culebrita, is well protected by **Arrecife Culebrita,** the reef to the eastward. Except for several shoals of 26, 30, and 32 feet about 0.3 mile southeast of Punta Vaca, the channel is 0.2 mile wide between the 30-foot curves.

Cabezas Puercas consist of several shoals lying parallel to and in the fairway of Canal del Sur; they are about 0.8 mile in length and nearly awash in places. Two buoys mark the westerly edge of Cabezas Puercas. **Cabezas Crespas,** a group of small shoals about 500 yards in extent, with a least depth of 7 feet, are the continuation southwestward of Cabezas Puercas; the northeastern extremity is marked by a buoy.

Directions to Canal de Culebrita.—To enter by Canal de Cayo Norte, steer course **132°** between Cayo Norte and Isla de Culebra until 280 yards off Punta Anade. Then draw in toward the Culebra side to avoid the middle ground, heading **146°** midway between Tierra á Medio and Isla de Culebra.

The fringing reef off from Cabeza de Perro may be avoided by giving the shoal a berth of more than 300 yards. This reef can be seen distinctly. The best anchorage is with the extreme western end of Cayo Botella in line with the eastern side of Cayo Sombrerito, and the southeastern extremity of Culebrita bearing about east-northeast. Vessels can anchor closer under the lee of Isla Culebrita, according to draft.

To enter by Canal Tiempo from northward, steer toward Cayo Norte and, having passed Cayo Tiburón and Cayo Ballena at a distance of 150 yards, bring the western extremity of Cayo Botella in line with Cabeza de Perro and steer **186°** until Cerro Balcón on Isla de Culebra bears 240°, then make a sharp turn and head for Cerro Balcón on **241°**, passing midway between the 23-foot spot on the north side and the 12-foot spot on the south side of the channel; continue southwesterly, swinging to get on course **146°** passing Punta Anade 300 yards off, and continue as in the preceding paragraph.

To enter by Canal Tiempo from eastward, steer toward Cayo Norte, on course **269°** with the south shore of the cay in range with the bluff at Punta Pavimento. When Cerro Balcón bears **241°**, steer for it and continue as in preceding paragraph.

If going through Canal del Sur, vessels leaving Canal de Culebrita should steer **224°** with Isla Culebrita Light astern, passing 150 to 200 yards off Cabezas Puercas buoys until west-northwest of buoy 5; then either swing left to pass midway between buoys 1 and 5 and thence to Sonda de Vieques, or continue on out Canal del Sur on a **237°** course with buoy 3 astern. The channel has been wire dragged to a clear depth of 34 feet but, because of frequently heavy swells in it, vessels drawing more than 31 feet should attempt it only in calm weather.

Currents.—Between Cayo Norte and Cayos Geniquí the tidal current sets southward and northward, with a velocity of 1½ knots at strength. In Canal del Sur the sets are southwestward and northeastward and the velocity about 2 knots at strength.

Bajos Grampus comprises a group of small coral heads rising from a bank of 60 feet lying 2 to 4 miles from the southeastern extremity of Isla de Culebra. The southern head, on which there is a depth of 23 feet, lies with Punta del Soldado in range with the southern extremity of Cayo de Luis Peña bearing 293°. A lighted buoy is on the southern side of Bajos Grampus. A buoy marks the northern edge of the innermost or western head of these shoals. A 23-foot spot lies 0.3 mile northeast of this buoy. Virgin Passage is discussed in Chapter 14.

Canal de Grampus is a channel between this western knoll and Arrecife Culebrita; it is a clear navigable channel about 0.6 mile wide, and is marked by buoys. The tidal current sets diagonally across Canal de Grampus southwestward and northeastward.

To pass southward of Bajos Grampus, keep on or southward of the line of Sail Rock and Signal Hill on St. Thomas Island until Cayos Geniquí show eastward of Cabo de

Pasaje, the northeast point of Isla Culebrita. Bajos Grampus will then be cleared and the course can be shaped as desired.

Puerto del Manglar is a small but well-sheltered bay about 0.7 mile long and 0.2 mile wide, lying between Cabeza de Perro on the north and Pelá on the south. The entrance is constricted by reefs on both sides, there being only 130 yards between the 24-foot curves. The depth in the entrance is 40 to 46 feet, which gradually decreases within the harbor to 24 feet, sand and mud bottom; the head of the harbor is shallow.

Directions.—To enter this harbor, bring Cerro Balcón to bear **312°** and on this course pass about midway between the south side of Cabeza de Perro and the north side of Pelá; clear the reef on the south side by almost 125 yards. When past Pelaíta, round to an anchorage.

Bahía de Almodóvar, on the southern side of Puerto del Manglar westward of Pelá and **Bajo de Almodóvar,** is a bight about 600 yards long and 200 yards wide, with 24 feet of water, and is entered by a narrow opening westward of **Pelaíta,** a cay across which is a bar with a depth of 10 feet; it is well sheltered from all winds.

Pelá is a cay 30 feet high, wooded, and presents a prominent bluff facing southeast.

Chart 913.—Playa Manzanilla is in the bight between **Punta del Viento,** the point on the south end of **Bajo de Almodóvar,** and **Punta Brisa,** the eastern point of Punta Vaca. **Punta Vaca,** the eastern point of Bahía Mosquito, terminates in a prominent bluff.

Bahía Mosquito is a bay about 0.4 mile broad with a width of about 0.5 mile at its entrance. Inside Bajo Snapper, which partly blocks the entrance, the depths are 32 to 40 feet. Its northwestern side is bordered by coral reefs, dry at low water, extending more than 200 yards from the shore. Being open to the southward, a heavy swell frequently sets in from that quarter.

Ensenada Honda, the most secure anchorage in the vicinity of Isla de Culebra, has its entrance between **Punta Carenero** and **Punta Colorada.** It is about 1.5 miles in length and in some parts 0.5 mile in breadth, but of irregular shape and with several small bays indenting its shore. The shores of the harbor are hilly and partly covered with a scrubby forest growth except where cleared for houses or planting.

The channel between the entrance reefs is about 100 yards wide with a least depth of 28 feet on the Inner Harbor Range. A 19-foot spot is near the inner range on the south side of the channel south of Punta Carenero. Unlighted ranges and buoys mark Canal del Este and the channel to the Inner Harbor.

Bajo Amarillo, about a mile south of Punta Carenero, is about 0.3 mile long and has a least depth of 7 feet. It is marked by buoys.

Bajo Grouper, the shoal about 0.2 mile northward of Bajo Amarillo, has 4 feet least depth and is about 0.3 mile in length. Its eastern extremity is marked by a buoy. About 200 yards westward of its outer limit is another shoal with 18 feet of water. **Bajo Camarón,** about 0.2 mile long, is a shoal with least depth of 9 feet, 300 yards southward from Punta Vaca. A buoy marks the southern edge.

Bajo Snapper, a shoal 0.3 mile westward of Punta Vaca, has 6 feet of water near its south side and 8 feet near the north. A shoal with a depth of 19 feet, westward of Bajo Snapper, is marked by a buoy.

A shoal, with 17 feet least water, is 0.3 mile west-southwestward from Bajo Snapper. A buoy marks its eastern edge.

Directions.—Vessels approaching from southward should bring the left tangent of Punta Vaca to bear **008°** before the southern end of Cayo de Luis Peña closes behind Punta del Soldado and steer for Punta Vaca close up to Bajo Camarón. Then swing on to Punta Colorada Range, course **296°**. When nearly up to the buoy marking the 17-foot shoal, steer in on the Inner Harbor Range, course **323°**.

A depth of 23 feet is close northeastward of the range and northward of the entrance buoys.

When **Punta Carenero** bears about east, open the range to the westward and anchor according to draft. Approaching Punta Cabras, pass westward of buoy 10, which itself is westward of the range. From southeastward, bring Punta Vaca in range with Monte Resaca, bearing about **322°**, and continue on this course past Cabezas Crespas buoy until Punta Colorada Range comes on; then follow as directed in the preceding paragraph. Approaching from westward: From a position 0.5 mile south of Punta del Soldado Light, steer **063°** for 1.3 miles. When the left tangent of Punta Vaca bears **008°**, steer for the tangent on this course and follow directions above.

Roosevelt is the community name for the few scattered houses on the hill back of **Punta Cabras.** A small-boat landing is near the head of **Ensenada Santiago,** the cove southeastward of the settlement.

San Ildefonso, on the northeast side of Ensenada Honda to the eastward of **Ensenada del Cementerio,** is a naval reservation. A prominent house stands on the small hill above the wharf and is used as the residence of the naval custodian. The wharf is a concrete L-shaped boat landing pier extending about 100 feet offshore. Depths of about 12 feet are alongside.

Culebra, located on the neck of land between Bahía de Sardinas on the outer coast and the head of Ensenada Honda, is the only village on Isla de Culebra. It has several small stores and a post office. A motorboat carries mail and passengers from Fajardo, via Isla de Vieques (Isabel Segunda). The insular telegraph system maintains radio communication between Culebra and Fajardo. Small amounts of supplies, such as fruits, vegetables, and eggs, are available. There are no facilities for obtaining water.

Punta del Soldado, the southern point of Isla de Culebra, is wooded and terminates in a rocky bluff about 35 feet high. It is prominent when seen from eastward or westward, and appears as a ridge. From the southward a whitewashed area is conspicuous. **Punta del Solado Light,** 65 feet above the water and visible 8 miles, is shown from a white 18-foot tower on the west side of the point.

Punta de Maguey is the point 1.3 miles northwestward of Punta Soldado. **Bahía Linda,** on the northern side of Punta de Maguey, is a well-sheltered boat harbor. A conspicuous white mark is on **Punta Tampico,** between Bahía Linda and Bahía de Sardinas.

Bahía de Sardinas, 1.5 miles northwest of Punta del Solado, is the harbor for Culebra. It has a good beach which, though open, is well protected from prevailing winds. By night the houses and lights are conspicuous on approach. The concrete boat landing at **Playa de Sardinas** has a depth of about 8 feet at the end from which a road leads up through the village. Fishing boats work out of this harbor.

Chart 915.—Punta Melones, the northwestern point of Bahía de Sardinas, is low and narrow, terminating in a small pinnacle rock. A light, 45 feet above the water and visible 8 miles, is shown from a white tower on the tip of the point.

Between Punta Melones and Punta Tamarindo Grande, a distance of 1.7 miles, the coast is uneven. **Bahía Tarja, Bahía Tamarindo,** and another bay north of Canal de Luis Peña are open bights, and are well sheltered to seaward by Cayo de Luis Peña.

Punta Tamarindo Grande, 0.5 mile northwest of Punta Tamarindo, consists of a hill 75 feet high with reddish bluffs at the end and a low neck behind it. Two low detached rocks are off its end.

Cayo de Luis Peña is an island 1.3 miles long north and south, and its wooded peak, Cerro de Luis Peña, is 476 feet high. Its north and south ends are high and joined to the island by low necks. The face of the cliff on **Punta Cruz,** the southwesterly point of the island, has been whitewashed or painted white and makes a good landmark; the cliff appears to be a white tower or daybeacon when approaching from the northwest.

Except when the trade wind is northward of northeast, a fairly smooth anchorage can be had in 8 or 9 fathoms about 0.3 mile off the northwest side of Cayo de Luis Peña.

A good anchorage, with ordinary trade winds, is between Cayo de Luis Peña and Isla de Culebra, or farther southeastward, and there are no dangers if the shore between Punta del Soldado and Punta Melones be given a berth of 0.3 mile. A rocky patch with 7 fathoms is 0.6 mile westward of Punta Melones; it should be avoided in anchoring. A good berth will be found in 13 fathoms with Alcarraza in line with the north end of Cayo de Luis Peña, and Punta Melones bearing 098°, distant 700 yards. Small steamers will find a more comfortable anchorage nearer Isla de Culebra between Puntas Melones and Tamarindo Grande; one of the best is in 5 to 7 fathoms in the middle of the entrance to Bahía Tamarindo, eastward from the north point of Cayo de Luis Peña.

Approaching the anchorage between Cayo de Luis Peña and Isla de Culebra from northwestward, the best route for deep-draft vessels is to pass westward of Roca Lavador, enter Sonda de Vieques either between Cayos Lobo and Lobito or through Pasaje de Barriles, and pass southward of Cayo de Luis Peña. The best channels for sailing vessels are those westward of Las Hermanas, on account of the variable winds, narrow passages, and greater velocity of the tidal currents between Las Hermanas and Isla de Culebra.

Canal de Luis Peña, the channel between the north end of Cayo de Luis Peña and Punta Tamarindo Grande, is 0.3 mile wide. At the northern end are a coral head covered by 21 feet southward of the middle of the passage and 2 other heads with 27 and 29 feet of water. The strong currents and baffling winds render the passage harzardous for sailing vessels.

Currents.—In Canal de Luis Peña the southeastward current is deflected northward of Bahía Tarja and thence sets toward the south end of Cayo de Luis Peña; it is weak at the entrance to Bahía de Sardinas. The northwestward current sets directly through the channel. The velocity of the tidal current at strength is about 2 knots.

The channels between Punta Noroeste of Isla de Culebra and the islets and rocks westward of it are safe and easy to navigate in the daytime, as most of the dangers show above water.

Chart 914.—Las Hermanas, from 0.4 to 1 mile northwestward of Cayo de Luis Peña, consist of three islets. **Cayo Yerba,** the northernmost, 66 feet high, has a smooth grassy slope on the east side, and rocky bluffs on the west side. **Cayo Ratón,** the southwesternmost and smallest of Las Hermanas, is 46 feet high, grassy on top, and rocky on the sides; a low rock is close to its southeast side. The passage between Cayo Ratón and Cayo del Agua should be avoided. **Cayo del Agua,** the southeasternmost of Las Hermanas, is low in the middle and 39 feet high at its eastern part. A gray tower on Cayo del Agua, about 50 feet high, is a radar calibration target. The cay is rocky, with many large boulders scattered over and near it. A shoal with 5 feet at its end extends nearly 0.1 mile westward toward Cayo Ratón, and the passage between these islands should be avoided. The passage between Cayos del Agua and de Luis Peña has depths of 38 to 60 feet.

El Mono, 0.8 mile west of Cayo Yerba and 0.4 mile southwestward from Cayo Lobo, is a small irregular ledge with several heads, the highest 15 feet. The passage between El Mono and Las Hermanas has 34 to 59 feet depths.

Cayo Lobo, 2.3 miles west-northwest of Cayo de Luis Peña, is triangular in shape, 0.5 to 0.3 mile in extent, 135 feet high at its west end, and covered with scrub grass. The three points of the island are high with rocky bluffs. Cayo Lobo daybeacon is a white 18-foot wooden tower on the hill about 142 feet above the water on the north side of the island. The passage between Cayo Lobo and El Mono is clear and 0.4 mile wide, with 13 to 14 fathoms in the middle.

La Pasa de los Cayos Lobos, the passage between Cayo Lobito and Cayo Lobo, nearly 0.7 mile wide, is clear and deep. **Cayo Lobito,** the westernmost of the chain of islands which extends 3.3 miles west-northwestward from Cayo de Luis Peña, is about 400 yards wide and 95 feet high. Close to its northwest end are a bare ledge and **Cayo Tuna. Roca Columna** is a detached bare pinnacle rock, 75 feet high, on the south end of Cayo Lobito.

Chart 904.—Sonda de Vieques is the sound which extends from the east coast of Puerto Rico to Virgin Passage, between La Cordillera, Arrecife Hermanos, Arrecife Barriles, and Isla de Culebra on the north and Isla de Vieques on the south. The sound is about 20 to 22 miles long and from 8 to 15 miles wide. Except for Bajos Grampus, the eastern part is clear, with general depths of 10 to 17 fathoms. In the western part there are numerous shoals and reefs, some of which are considerable distance offshore.

When a heavy sea is running outside, vessels bound from San Juan to Isla de Culebra and eastward frequently take a route through the sound to gain comparatively smooth water, entering by way of Pasaje de San Juan. The north-south route along the east coast of Puerto Rico, through the sound, is used by craft drawing up to 22 feet. Large deep-draft vessels, however, when bound from San Juan to the southerly coasts of Puerto Rico, usually enter by Pasaje de San Juan and continue around the east coast of Isla de Vieques. Vessels from northeasterly points bound for the southerly Puerto Rico coast generally go through Virgin Passage and south of Isla de Vieques.

A danger zone for aerial gunnery and bombing has been established southwesterly of Isla de Culebra; regulations are stated in **§ 204.230,** Chapter 2.

Explosives anchorage areas have been established in the sound north of Isla de Vieques; regulations are stated in **§ 202.245,** Chapter 2.

Boundary line of inland waters.—The line established for Sonda de Vieques is described in **§ 82.245,** Chapter 2.

Chart 917.—Isla Palominos, 3.5 miles southeastward of Cabo San Juan, is 0.6 mile long, and 165 feet high, with a rounded grassy summit somewhat flat on top. The northwest point of the island is narrow, rocky, and low where it joins the island. A reef, partly bare at low water, extends 250 yards off the north side of the point, and a shoal extends to a distance of about 500 yards north from the point. Reefs extend 600 yards westward from the south end of the island, and southward to Isla Palominitos. **Isla Palominitos** is low, sandy, and party covered with a scrubby growth. It is surrounded with shoals to a distance of about 400 yards. Dangerous shoals, the edges of which are steep-to, lie within 0.5 mile eastward of these islands. Small vessels with local knowledge can obtain anchorage, during calm weather, on the western side of the northern part of Isla Palominos.

Bajo Blake is a shoal about 2 miles eastward of Isla Palominos, with a least depth of 20 feet. It is marked on its southern side by a buoy.

Cayo Largo, about 1.2 miles southwesterly of Isla Palominos, consists of narrow ridges 1.8 miles long and steep-to on all sides. A buoy marks the northern end of the shoal. The southern half is awash at low water, and the sea always breaks on it; the northern half has depths of 5 to 15 feet, and over this the sea rarely breaks. A daybeacon about 1.6 miles east of Isla de Ramos is fairly conspicuous; it consists of a black pipe tripod about 16 feet high on a concrete base. At night the breakers show as a line of white, and are easily distinguished.

Numerous shoal spots are immediately westward of Cayo Largo and an extensive series of them extends southward to Rocas Lavanderas. A lighted buoy marks the group of shoals with 22 to 28 feet over them lying about 0.4 mile and less westward of Cayo Largo.

Currents.—West of Cayo Largo the current floods southward and ebbs northwestward with a mean velocity at strength of about one-half knot. Daily predictions can be obtained through the use of table 2 of Tidal Current Tables.

Bajo Hodgkins, about 7 miles southeasterly of Isla Palominos, is a narrow ridge 0.8 mile long north and south, and has a least depth of 28 feet. A buoy is off the eastern side of the shoal.

Roca Piraguas Exterior, about 2 miles westward of Bajo Hodgkins, is a pinnacle 15 feet high, with a rock awash about 60 yards southeastward of it. Vessels should pass 200 yards eastward and northward of the rock.

Roca Piraguas Interior, about 1.3 miles westerly of Roca Piraguas Exterior, is an irregular rock 15 feet high, which shows as 2 rocks close together and connected by a ledge above water. Vessels should keep 300 yards northward of the rock.

Roca Lavandera del Este, a rock awash at low water on which the sea always breaks, lies about 0.5 mile westward of Roca Piraguas Interior. A shoal with 17 to 23 feet of water extends 0.3 mile northward. **Roca Lavandera del Oeste,** about 1.2 miles northeastward from the eastern end of Isla Cabeza de Perro, consists of 2 rocks about 1 foot high, on which the sea always breaks. It is near the middle of the west side of a shoal about 0.7 mile long and 0.2 to 0.3 mile wide, with depths of 14 to 17 feet, except for a rock covered by 4½ feet, 400 yards northward. A narrow shoal with 21 feet of water over it, marked by a buoy, lies 0.3 to 0.7 mile northwestward of Roca Lavandera del Oeste.

Bajo Chinchorro del Norte is a narrow shoal ridge with a least depth of 10 feet about 2 miles southwestward of Bajo Hodgkins. **Roca Descubridor** is the rock 1.5 miles eastward of Isla Cabeza de Perro. The shoal area around it, 0.4 mile long, has a least depth of 13 feet. Several shoals lie southwestward with least depths of 7 feet.

Bajo Chinchorro del Sur is a shoal about 3.2 miles east-southeastward of Isla Cabeza de Perro. Near the middle of the shoal is a patch awash at low water on which the sea always breaks. A light 19 feet above water is shown from a structure on the midwestern extremity of the shoal. A small patch with 24 feet of water lies 1.8 miles south-southeastward from the eastern end of Isla Cabras.

Chart 904.—Isla de Vieques, the island about 6 miles off the nearest point of the east coast of Puerto Rico, forms the south side of Sonda de Vieques. It is 18 miles long east and west and 3.5 miles wide near its middle. A range of hills extends the entire length of the island, and there is a prominent hill at each end—**Monte Pirata,** 981 feet high, near its western end, and **Cerro Matias (Monte) Jalobre,** 450 feet high, 3 miles from Punta Este. The island is wooded in places, especially its eastern half and Monte Pirata, but some of the hills are cultivated with sugarcane to their summits.

Principal products are sugarcane, horses, and cattle. Vegetables and tropical fruits are grown for local consumption. The rainy season lasts from May to October, but the rainfall is less than in adjacent parts of Puerto Rico. The island is subject to drought; the principal water source is rainfall stored in cisterns. During normal rain conditions, both the north and south sides of the island westward of Bahía de Mulas have springs and streams, but there is no fresh water convenient for vessels.

Isla de Vieques has no harbor. Sugarcane is shipped from Puerto Real, and only occasionally do ships call at Bahía de Mulas. On the north coast when the trade wind is northward of east, a heavy surf runs and landing is impossible on the open coast. Boats generally can land at: The west end of the island; Desembarcadero Mosquito, Bahía de Mulas, Puerto Negro, Caño Hondo, Bahía Salinas, and Punta Este, on the north coast; and all the boat harbors and sand beaches on the south coast when the wind is northward of east. As there is no customhouse on the island, entry usually is made at Fajardo or Humacao.

Naval restricted areas have been established in sections around the island; regulations are stated in **§ 207.815,** Chapter 2.

Chart 940.—Pasaje de Vieques is the strait lying between Puerto Rico and Isla de Vieques. **Radas Roosevelt** is the open-water portion of the passage lying within the shoals and banks north of the western end of Isla de Vieques and between that island and Puerto Rico.

In Pasaje de Vieques the **current** floods southwestward and ebbs eastward with a mean velocity at strength of about 1¼ knots. Daily predictions can be obtained through table 2 of the Tidal Current Tables.

Punta Arenas, the northern point at the western end of the island, is low and covered with a scrubby growth, with a white spit at its end. Four salt-water ponds are on the point which consists of sand and small shells. The point changes shape continually; at times the outer coconut trees are in the water.

At the west end of Isla de Vieques, southward of Punta Arenas, there is a smooth anchorage with easterly winds but exposed to the south and west.

Escollo de Arenas is a continuation northwestward of a shoal which fringes the north side of Isla de Vieques to a distance of about 1 mile and extends eastward nearly to Punta Mulas. The western edge of the shoaler part of the bank extends 3.3 miles north-northwestward from Punta Arenas to its outer end, where it is marked by a lighted buoy. Spots with depths of 5 feet are on the bank for 0.8 mile northward of Punta Arenas, and thence to the lighted buoy, the bank is steep-to with about 40 feet on each side. The bank sometimes shows by discolored water and rips.

Currents.—A strong southwesterly set is noted frequently north of Escolla de Arenas. The bank itself is generally indicated by the tide rips.

Punta Boca Quebrada, 1 mile southward of Punta Arenas, is a low wooded point which terminates in a dry ledge outside of a white sand beach.

To anchor westward of Punta Arenas, steer for the twin tanks on a **064°** course, and anchor when about 0.5 mile off. The anchorage and wharves are exposed to the southward.

From Punta Arenas the northern coast of the island trends eastward for 8 miles, where it bends sharply to the northward for about 0.5 mile, forming Bahía de Mulas.

At **Desembarcadero Mosquito,** 3.9 miles eastward of Punta Arenas, there is a causeway 1.2 miles long extending from shore. Off its outer end there are several spots covered by about 13 feet. The beach 0.6 mile westward of the causeway is hard sand, and boats generally can land. For 0.5 mile off the landing the bottom is irregular with depths of 6 to 12 feet.

Arrecife Mosquito, a reef awash, is 1.2 miles to the northeastward of Desembarcadero Mosquito. The reef is steep-to, and the sea always breaks on it. A shoal with a depth of 17 feet is about 0.5 mile west-northwestward from the reef. During ordinary weather a fairly smooth anchorage is 0.3 mile south of Arrecife Mosquito, in 40 feet, sandy bottom. Several spots with 14 to 17 feet are in the approaches to the anchorage, and vessels drawing more than 12 feet should use it only with local knowledge.

Arrecife Corona, a reef awash, is about 0.3 mile long and about 0.2 mile eastward of Arrecife Mosquito. Several shoals are around the reef, including a 9-foot spot 0.2 mile southward. **Bajo Merail,** a shoal with least depth of 6 feet, lies 0.6 mile southward of Arrecife Corona.

Caballo Blanco, a low grassy islet, is 1.8 miles northwestward of Punta Mulas. Several shoals surround the islet, the outer of which are 0.6 mile northerly and 0.2 mile southerly. **Bajo Comandante,** a shoal about 600 yards in extent and covered by 10 to 17 feet, lies about midway between Caballo Blanco and the shore. There are 24-, 26-, and 27-foot spots in the channel between Caballo Blanco and Bajo Comandante.

Bahía de Mulas is an open bight on the west side of Punta Mulas, 8 miles eastward of Punta Arenas and 10 miles westward of Punta Este. It is a poor anchorage, with little or no shelter. For nearly 0.3 mile off Isabel Segunda, the port is shoal and has spots with 5 to 9 feet. Practically no ships now call at Bahía de Mulas. Some trade in foodstuffs and general merchandise is carried on by coasting schooners between San Juan and Isla de Vieques.

Punta Mulas is a low bluff point surmounted by a light and numerous small dwellings eastward and southward of the light. An old Spanish brick fort with a conspicuous rectangular building stands on top of a small hill, 0.5 mile southeastward of the light. **Cerro Martineau,** a prominent wooded dome 594 feet high, is near the north coast, 2.3 miles southwestward from the light.

Punta Mulas Light (18°09.4′, 65°26.6′), 68 feet above the water and visible 10 miles in the white sector and 7 miles in the red sectors, is shown from a white octagonal tower. The red sectors cover Arrecifes Mosquito and Corona, and Bajo Comandante, in the area from 068° to 107°; and Caballo Blanco from 122° to 141°. The light and the fort are the most prominent objects near Punta Mulas and make a good range for approaching the island from about 5 miles offshore.

Dangers.—The approach to Bahía de Mulas from the westward and northwestward is obstructed by the several small shoals about 1.5 miles off shore. A shoal ridge with depths of 21 to 32 feet lies 1 mile eastward of Caballo Blanco, and a detached 29-foot spot is 0.3 mile southwestward of the ridge. A 26-foot spot is about 0.4 mile northward of the ridge.

Anchorage.—Larger vessels can anchor 0.2 to 0.8 mile offshore in the white sector. Coasting vessels up to 12 feet in draft can anchor about 350 yards from the light with the light bearing 100°, in 22 to 24 feet of water. Small schooners of 6 to 8 feet in draft can anchor in the deeper water 200 to 300 yards west-southwestward of the light. The ship anchorage is exposed but the schooner anchorage affords fairly good shelter during ordinary weather. With northerly winds, a heavy sea makes into the port, and small craft anchored here are sometimes driven ashore. The nearest hurricane anchorages are Ensenada Honda on Isla de Culebra and Ensenada Honda on the east coast of Puerto Rico.

Isabel Segunda (P. O. **Vieques**) is the principal town of the island. Mail is brought daily by passenger motorboat from Fajardo; three times a week the boat continues to Isla de Culebra. The Insular Telegraph System maintains radio communication between the town and San Juan. The town has grocery and drug stores, several small hotels, and a small municipal hospital. Some cattle are exported. The nearest customhouses are Fajardo and Humacao.

Chart 904.—Punta Cabellos Colorados, 3.1 miles eastward of Punta Mulas, is rocky and steep-to. **Puerto Negro** is a boat landing 4.8 miles east of Punta Mulas Light. It can be entered only by small craft with local knowledge. The entrance through the reefs is about 100 yards wide, with depths of 6 to 18 feet, and is generally indicated by breakers on either side. Anchorage space is limited; most of it is foul. **Punta Brigadier,** 0.6 mile westward of the entrance is marked by **Roca Roja,** a large bare rock close-in. **Punta Goleta** is the eastern entrance point.

Roca Cucaracha, 3.4 miles west-northwestward of Punta Este Light, consists of 2 small rocks, close together, about 3 feet high. The rocks are about 0.3 mile from shore and the depths inside them are 6 to 14 feet.

Caño Hondo extends 0.6 mile eastward of Roca Cucaracha to the reefs forming Bahía Salinas. It is open northward and has depths of 18 to 42 feet. It has no sheltered anchorage except for small craft, which can anchor at its southeast end. A narrow channel with a depth of 8 feet south of an islet about 15 feet high and 250 yards from shore leads from Caño Hondo to Bahía Salinas.

Bahía Salinas, 1.6 miles westward of Punta Este, has an anchorage with depths of 12 to 24 feet. It is the best landing along the north coast eastward of Bahía de Mulas. It affords good shelter for small craft with local knowledge, but should not be attempted by strangers. The bay is protected on the north by a reef 0.6 mile long, the highest part of which is awash at high water. The entrance from eastward is between the reef and those reefs which fringe the shore. About 1.5 miles northwestward of Punta Este is a high bluff point with bare white cliffs to eastward.

Punta Este, the eastern point of the island, is moderately low and grassy, with rocky bluffs at the water. A light, 60 feet above the water and visible 8 miles, is shown from a red skeleton tower on the point.

The south coast of Isla de Vieques is irregular and indented by sandy bays. **Bahía Salina del Sur,** 2 miles westward of Punta Este, is a bay about 0.5 mile in diameter which affords a boat landing with the wind northward of east. **Roca Alcatraz** consists of several rocks 10 to 15 feet high, 0.4 mile from the points at the entrance. A larger islet about 40 feet high, wooded on top and with a large bare rock close to its southeast end, lies 0.3 mile off the western entrance point. Anchorage is in the western half of the bay in 18 to 24 feet, sheltered from winds northward of east. The clearer entrance is between Roca Alcatraz and the island off the western point of the bay. For 1 mile westward of the island, shoals with 18 feet and less extend nearly 0.5 mile from shore.

Ensenada Honda, about 6 miles westward of Punta Este is a bay about 1.2 miles wide, in which there are several bare rocks and reefs awash. The bay is rough with southeasterly winds, but with the wind northward of east it affords a good boat landing. Owing to the foul ground in the bay, it should be avoided by strangers. A reef bare at low water is off the entrance 0.8 mile east-northeastward from **Punta Conejo,** the western entrance point. **Cayo Jalovita** and **Cayo Jalova** are small islands on the eastern side of the harbor.

Bahía de la Chiva is a shallow bight on the west side of Punta Conejo. **Isla Chiva,** about 30 feet high, is a cay in the entrance to the bight. A reef with 2 to 18 feet of water over it extends nearly 0.5 mile from shore 1.5 to 2.1 miles westward of Punta Conejo. **Bahía Tapon** is a bight northward of the reef, with depths of 2 to 3 feet.

Puerto Ferro, 9 miles westward of Punta Este, is a boat harbor with 6 to 8 feet of water at the entrance and 7 to 15 feet inside. Its entrance is 250 yards wide, with high land on both sides, and is prominent. A light, 68 feet above the water and visible 11 miles, is shown from a white octagonal tower 44 feet high on the center of a square flat-roofed dwelling on the summit of a rocky bluff 0.3 mile southward of the entrance.

Chart 940.—Puerto Mosquito, about 10 miles westward of Puerto Ferro Light, is a boat harbor. Least depths in the narrow entrance are 2 to 3 feet.

Ensenada Sun Bay (Sombe), 2.3 miles westward of Puerto Ferro Light, is about 0.6 mile wide. It offers anchorage in 18 to 24 feet exposed to winds from southeast to southwest. A shoal extends 200 yards westward from the eastern point of the bay and a shoal with 16 feet over it lies westward from the middle of the entrance. The depths in the southern half of the bay are 18 to 27 feet.

Puerto Real, on the south coast 3 miles westward of Puerto Ferro Light, provides good anchorage with the wind eastward of southeast. Lights are shown from a radio tower northerly of **Esperanza. Cayo de Tierra**

formerly was the outer end of a peninsula separating Ensenada Sun Bay and Puerto Real. It is about 65 feet high. **Cayo de Afuera (Real)**, 300 yards westward of Cayo de Tierra, is about 65 feet high. Puerto Real has depths of 18 to 24 feet.

The principal outlying danger is a shoal covered by 13 to 17 feet, with 30 to 50 feet around it, lying 0.7 mile from shore and 0.9 to 1.3 miles west-southwestward from the south end of Cayo de Afuera; its eastern and western ends are each marked by a buoy. A spot with 23 feet is about 0.4 mile southwestward from the southern end of Cayo de Afuera. A shoal with 15 feet of water is 0.2 mile from shore and 0.6 mile west from the north point of Cayo de Afuera.

Vessels drawing up to 20 feet can anchor about 550 yards westward of Cayo de Afuera in 5 fathoms. Other vessels should stay farther offshore. The approach to the anchorage is between the buoy marking the east end of the principal offshore danger and a 23-foot spot nearly 0.4 mile southwestward of Cayo de Afuera.

Punta Vaca, 3 miles westward of Puerto Real, is the southernmost point of the island. Outlying rocks are a short distance off it. Thence the coast trends westward and turns northward past **Punta Boca Quebrada** to Punta Arenas.

Chart 904.—The **eastern coast** of Puerto Rico trends about 10 miles southward from Cabo San Juan to Punta Puerca and thence about 22 miles southwestward to Punta Tuna. This coast is very irregular and indented by small shallow coves and bays with numerous shoals offshore.

Charts 917, 921.—Playa Canalejo, a shallow indentation about 1.1 miles south-southeastward of Cabo San Juan Light, is the site of an oilhouse and a coast guard pier. Boats can land here in good weather.

Radas de Fajardo is the roads in the northwestern end of Sonda de Vieques between Cabo San Juan and Isla Palominos. Vessels of the deepest draft can find good anchorage here during ordinary weather. The general depths are 7 to 10 fathoms, except for numerous spots with 24 to 30 feet which are westward of the line of Monte Pirata and the summit of Isla Cabeza de Perro, and southward of a 298° line from the south end of Isla Palominos to the broad low hill, 0.6 mile southward of Cabo San Juan Light.

Punta Gorda, 1.4 miles southward from Cabo San Juan, is a conspicuous high head. A hill 360 feet high, 0.4 mile west-northwest from the point, is the northern end and highest part of a high ridge, mostly cleared, which extends southwestward nearly to Playa de Fajardo.

Punta Bateria, the point about 2.2 miles south-southeastward of Cabo San Juan, is a black rocky cliff 70 feet high, from which a grassy ridge makes inland. Inside the point is **Playa Sardinera.**

Bahía de Fajardo is between **Punta Fajardo** and Punta Bateria, and about 3 miles southward of Cabo San Juan. The harbor affords good shelter for vessels drawing 17 feet or less; drafts as much as 27 feet have come in, and deeper-draft vessels can anchor at the entrance or to the northward of the harbor, selecting depth according to draft. Good holding bottom and fairly good protection for larger vessels are in the northern portion of the outer harbor. There is not much sea during ordinary weather.

The inner harbor, about 0.5 mile in width, is formed on the east by Cayos Obispo and Zancudo, and the reefs surrounding them.

Prominent features.—Cabo San Juan Light is the principal landmark on the approach. At the Fajardo Sugar Central, just east of Fajardo, are two concrete stacks which show prominently off the east coast as well as across Cabo San Juan off the north coast.

The customhouse, just south of the road leading to Fajardo, is a two-story concrete building, the largest and most prominent house on the beach. Several large warehouses are to the southward. The twin-tank limekiln at the rear of the lime wharf is tall and conspicuous.

Approach Channels.—Approaching from westward along the north coast of Puerto Rico, vessels of any draft usually enter through Pasaje de San Juan. From eastward, the best passage is on either side of Bajo Blake and between La Cordillera and Isla Palominos. From southward, the passage around Isla Cabeza de Perro and eastward of Isla de Ramos has a depth of 28 feet. From Bahía de Mulas, larger vessels follow the deeper water to the northward, passing either side of Bajos Hodgkins and Blake, but northward of Isla Palominos. The passage between Isla Palominitos and Cayo Largo has spots with 27 feet. Small boats cross directly to the light on Isla Cabeza de Perro, but they must watch the bottom en route.

The principal entrance is from northward, passing northwestward of Bajo Laja bell buoy. The channel south of Bajo Laja is seldom used and only by vessels of less than 15-foot draft. A good range for this channel is the line of trees running westward from Playa Sardinera.

Directions.—Entering from the northward, from a position about 0.5 mile eastward of Cabo San Juan, head for the reddish bluff to the westward of the town on course **210°**, until westward of Bajo Laja bell buoy, and then head for the customhouse on course **200°**, selecting anchorage as noted. If proceeding inside the lighted buoy, northwesterly of Cayo Obispo, pass about 100 yards westward of the buoy and thence toward the customhouse to desired anchorage depth.

From southward, local pilots have brought vessels drawing up to 10 feet into the harbor but ordinarily only smaller vessels of about 7-foot draft or less should attempt it. The channel is inside Isla de Ramos and the reefs between it and Cayo Zancudo, and passes off Bajo Río which should be carefully avoided. The channel can also be entered from westward of Arrecife Corona Carrillo, passing south of Arrecife Mata Caballos. A Federal project provides for an approach channel 28 feet deep, and for a turning basin of the same depth in front of the terminal Playa de Fajardo. No work has been done on this project.

Anchorage.—The anchorage ground is off Punta Bateria and westward of the lighted buoy, northwesterly of Cayo Obispo, according to draft. Vessels up to 12-foot draft

can anchor 0.3 mile southwestward of the lighted buoy. An inner anchorage area is available southwestward of Cayos Obispo and Zancudo for vessels drawing up to 12 feet.

During ordinary weather, the protection is fair and holding bottom good. The hurricane anchorages for large vessels are the Ensenada Honda on Isla de Culebra and harbor of the same name about 10 miles south of Fajardo on the east coast. The deeper water southerly of Cayo Obispo is used as a hurricane anchorage by smaller vessels up to about 12-foot draft.

Dangers.—**Cayo Zancudo** is the southern and **Cayo Obispo** the northern of the two islands forming the east side of Bahía de Fajardo. Each cayo is low and covered with mangrove and palm trees. They are about 200 yards apart, and are surrounded with reefs to a distance of 250 yards or more. **Arrecife Mata Caballos** extends 0.2 mile southwestward from Cayo Zancudo; **Arrecife Corona Carrillo,** 0.3 mile southeastward from the south point of Cayo Zancudo, is a reef 200 yards in diameter. From this a shoal with 11 to 18 feet extends about 0.3 mile southeastward. **Arrecife Roncador** lies 0.3 mile east-northeastward from Cayo Obispo. These reefs have a few bare heads in places, and the sea always breaks on them.

A reef between Isla de Ramos and Cayo Zancudo, from 0.6 to 0.4 mile from shore, is 0.8 mile long. There is a passage into Bahía de Fajardo from southward, passing westward of Isla de Ramos and this reef, but as it is obstructed by 16-foot spots northwestward of this cay and by a 9-foot spot in the channel off Bajo Río, it should not be attempted except by shallow-draft vessels having local knowledge.

Bajo Río is a bank with little water which makes off 0.2 mile from Punta Fajardo, **Río Fajardo,** and the shore to the southward. The water deepens very gradually northward of the shoal, but its eastern side is nearly steep-to in places. A shoal with 10 feet of water lies 250 yards eastward of Arrecife Roncador and another with 9 feet is 250 yards to the northward and nearly 0.4 mile northeastward from the northwest end of Cayo Obispo. A buoy marks a 15-foot spot 75 yards westward of the 9-foot spot. A reef extends about 0.2 mile northward and westward of Cayo Obispo. A small spot with 11 feet lies 300 yards from the southwest point of Cayo Obispo. A lighted buoy marks another shoal spot with 11 feet about 0.2 mile northwest of Cayo Obispo.

Bajo Laja, a shoal with depths of 7 to 10 feet, is 0.6 mile northward of Cayo Obispo and 0.6 mile southeastward from Punta Gorda. It is marked by two buoys. A shoal with 25 to 28 feet of water over it extends nearly half a mile northward of Bajo Laja.

Pilotage.—A local pilot is available; ships are taken in and out at night. Pilotage regulations and charges are the same as at all other Puerto Rican ports. The pilot is the acting captain of the port (capitan).

Towage.—A small towboat generally used for towing lighters is available.

Quarantine, customs, immigration.—A representative of the quarantine service enforces the national quarantine laws. The customhouse and customs warehouse is the prominent concrete building on the beach, about half a mile south of Punta Bateria. The deputy collector in charge acts as immigration inspector and shipping officer.

Hospitals.—One of the new district hospitals and a municipal hospital are in Fajardo. Another hospital is at Central Fajardo.

Playa de Fajardo, the town on the south side of the harbor, is a subport of entry. It is one of the larger sugar ports of Puerto Rico. Importations consist principally of building materials and general merchandise. A motorboat, carrying mail and passengers, makes trips to Bahía de Mulas, Isla de Vieques, and to Isla de Culebra. An improved highway leads to Fajardo, about 1.5 miles inland.

Harbor facilities.—Two well-built wharves are at Playa de Fajardo. The westerly one is concrete, 285 feet long, 65 feet wide, and with 9 feet of water at the end. A molasses pipeline trestle extends 100 feet seaward from the outer end of this pier. Only lighters and small molasses tankers go alongside. There are railroad tracks, unloading derricks, and pipelines for fresh water and molasses. The easterly wharf, 280 feet long, with about 5 feet at the end, is used exclusively for handling lime for the limekiln, and is not open to the public. It has rail tracks and an unloading derrick. All cargo is handled by lighters, which range up to 80 tons in capacity. Tanks for molasses storage and two large sugar-storage warehouses are at the Playa, and several additional warehouses at the central near Fajardo.

Small-boat facilities.—Many fishing boats and other small craft are in Bahía de Fajardo; limited facilities are available for repairs. Arrangements can be made to have gasoline delivered in drums at the main wharf.

Currents.—In the channel in Bahía de Fajardo the current floods south-southeastward with an average velocity at strength of about one-fourth knot and ebbs north-northwestward with an average velocity at strength of about 1 knot. Daily predictions can be obtained through table 2 of Tidal Current Tables, Atlantic Coast.

Coastal (storm) warnings are displayed at Central Fajardo.

Fajardo is the principal city in the northeastern part of Puerto Rico. Central Fajardo, one of the larger sugar centrals, is located here. The town is on the main insular highway about the coast of the island, and also on the main railroad line between San Juan and Humacao. There are numerous stores, several small hotels, and telephone, telegraph, and postal facilities. The stores carry a fair supply of food and general hardware. The principal source of ship supplies is San Juan, which is 38 miles distant via an improved highway.

Chart 917.—**Isla de Ramos,** 08 mile eastward from Punta Barrancas, is 0.2 mile in diameter and covered with palm trees except on its summit which is a grassy knoll 35 feet high. A small house is on the summit. A reef surrounds the cay to distances of 200 to 300 yards. A shoal with least depths of 17 feet, marked by a buoy, lies 0.6 mile east-southeastward from the cay.

Punta Barrancas, the point 1.4 miles southward of Punta Fajardo, is a small but conspicuous red bluff. The

hills westward of the point are mostly grass covered, 426 to 460 feet high. A reef bare at low water extends 0.4 mile eastward from the point, and thence northward to Punta Fajardo a shoal makes out about 0.2 mile from shore.

Punta Mata Redonda, 4.7 miles south of Cabo San Juan Light and southward of Punta Barrancas, is low and covered with mangrove. A brush-covered bluff lies 0.2 to 0.5 mile southward of it; behind the bluff the land rises sharply to a hill 400 feet high and wooded on top. A reef bare at low water extends 0.3 mile eastward from the point.

The waters south and westerly from Punta Figueras are within a danger zone; limits and regulations are stated in **§ 204.232,** Chapter 2.

Bahía de Majagua, between Punta Mata Redonda and Punta Figueras, is shoal and open to the eastward. Spots of 12, 15, and 17 feet lie in the bay, and a narrow spit with spots of 16 and 18 feet makes off about 1.4 miles to the eastward from the center of the bay.

Punta Figueras and **Punta Figuerita,** just southward of Bahía de Majagua, are low and covered with mangroves and a few palms. Reefs extend 0.3 and 0.5 mile, respectively, off these points with shoal spots of 16 to 22 feet between the reefs and the buoy about 2 miles east-northeastward of Punta Figueras.

Puerto Medio Mundo, between Puntas Figuerita and Medio Mundo, is shoal, open northward and eastward, and affords no shelter for vessels. Ceiba is a small settlement a mile westward of the port.

Punta Medio Mundo, 1.5 miles southeastward of Punta Figueras, is a prominent hill 133 feet high, with a bluff at the water and lowland behind it. A shoal with 8 feet at its end extends 0.6 mile northward from the point.

Pasaje Medio Mundo, between Isla Piñeros and the shore from Punta Medio Mundo to Punta Puerca, is a foul passage, but there is a narrow crooked channel with a depth of 15 feet suitable only for small craft with local knowledge. Cayo Piñerito is a grass-covered rock 0.3 mile southward of Isla Piñeros.

Isla Piñeros, an island, about 0.4 mile southeastward of Punta Medio Mundo, is wooded and 1.1 mile long. A wooded hill 249 feet high is near its middle, with a regular slope on its eastern end. An elevated water tank is prominent on this hill. A rocky bluff is on the northeast point. On the west and north sides of the island are several hummocks. A 9-foot spot lies 550 yards north of the island.

Isla Cabeza de Perro, a prominent grassy island close eastward of Isla Piñeros, is 0.3 mile long, and 100 feet high in its southwest part. Its northeast end is a rocky bluff, with a large detached bare rock close-to. A light, 90 feet above the water and visible 10 miles in the white sector and 7 miles in the red sector, is shown from a red skeleton structure on the east point of the island.

Punta Puerca, 1.2 miles south of Isla Piñeros, is a prominent bold wooded head, with a high rocky bluff at the water. It is about 0.6 mile long, with low land behind it; the point is formed by 2 hills, the eastern one 205 feet high and wooded, the western one lower and grass covered. The 2 hills appear as 1 from southward.

Chart 922.—Bahía de Puerca, makes westward about 0.6 mile on the south side of Punta Puerca, and is about 0.5 mile wide. An area about 0.3 mile wide has been dredged to a depth of 40 feet. The channel leads to a graving dock at the head of the bay. A series of dolphins connected by walkways, 1,000 feet long with depths of 40 feet alongside, is at the head of the bay. **Cayo Cabritas,** an island on the southerly side of the bay, is rounded, rocky, and covered with brush.

Isla Cabras, an island 0.3 mile eastward of Cabra de Tierra, is about 0.4 mile long. It is 70 feet high toward its southwestern end and low in the middle, and a rocky bluff is at its eastern end. The island is connected to the mainland by a causeway. A light, 77 feet above the water and visible 11 miles, is shown from a gray square stone tower on the southeastern point of the island.

Dangers.—A shoal with 12 feet near its end extends 0.8 mile southeastward from Punta Cascajo. A dry reef is about 250 yards from the point; the general depths on the shoal outside the reef are 12 to 16 feet. A detached shoal with 17 feet, outside this shoal, is unmarked.

A shoal surrounds Cabra de Tierra to a distance of 350 yards and extends the same distance off the western side of the point. Northward of the bight, Cabra de Tierra is shoal to 0.4 mile from its head, and shoals extend about 0.2 mile from the shore.

A shoal with 10 to 12 feet of water on its outer part extends 0.5 mile northeastward from Punta Cascajo. A buoy marks the eastern edge of a detached rock with 17 feet outside this shoal. An 18-foot spot about 0.2 mile northeastward is marked by a buoy.

Cabra de Tierra is the southernmost point of a low neck, 1 mile long and covered with mangroves and numerous palms, which separates Ensenada Honda from Bahía de Puerca. The point is rocky, 35 feet high, and has a few scrubby trees.

Ensenada Honda, the United States Naval Station in Radas Roosevelt, is closed to the public. The entrance is between Cabra de Tierra on the east and Punta Cascajo on the west, a distance of 1 mile. It is about a mile in extent and is protected by reefs which restrict the entrance to about 0.3 mile in width, with an entrance depth of 27 to 33 feet. The harbor is easy of access.

On the northeastern side of the bay are 2 piers, about 400 and 450 feet in length, with depths of about 30 feet alongside. Inside the entrance channel depths of 32 feet can be taken to the piers, except for shoal spots of 27 and 28 feet about 500 yards east of the front range light.

A prominent landmark is the radio tower about 0.4 mile north-northeast of the end of the longer pier.

The entrance channel lighted range leads through the deeper channel south of Cabra de Tierra; the lights are visible only on the range line. The range bears 315°. An aviation light, 119 feet above the water, is at the head of the bay.

The holding ground in the harbor is soft mud and ves-

sels have dragged anchor during hurricanes; when using the harbor as a hurricane anchorage the engines should be used as necessary.

An improved road leads from the head of the harbor, connecting with the insular highway system.

Punta Cascajo, the western point at the entrance to Ensenada Honda, is 69 feet high. Its top is clear of growth, but trees fringe the shoreline. Rocky cliffs are on the south side of the point, and a bare reef is about 250 yards off its southeast side.

Chart 917.—Punta Algodones, the point west of Punta Cascajo, is high and partly wooded. **Bahía Algodones,** 2.6 miles wide between Puntas Algodones and Lima, is a bay of no importance, either commercially or as an anchorage, and should be avoided. A sunken rock is over 0.3 mile offshore on the southwest side of the bay. **Cayo Algodones,** the island near the middle of the north side of Bahía Algodones, is small and grass covered. Its southeast side is a rocky bluff, 40 feet high. In the center of the cay are some buildings and a fresh-water spring which is good for drinking. **Arrecife Lima,** a reef 0.5 mile eastward of Punta Lima, is 300 yards in diameter. There is little water over it, and the sea often breaks on it.

Chart 923.—Punta Lima, the point 3.5 miles west-southwestward of Punta Cascajo, is projecting and prominent. It is a rounded wooded hill, 262 feet high.

Puerto de Naguabo, is the northern part of the open bay included between Punta Lima and Cayo Santiago. It is easily entered and affords good anchorage for vessels drawing up to 18 feet, except with southeasterly or southerly winds. Small boats anchor well up in the northeast part of the bay. The depths in the bay range from 30 feet in the entrance to 15 feet about 0.4 mile off Playa de Naguabo. An 11-foot spot is about 0.4 mile south of the town.

Puerto de Naguabo is mostly a summer resort. Commercial vessels no longer call at this port.

Playa de Naguabo, 1.3 miles northwestward of Punta Lima, is a small town on the northeast shore of Puerto de Naguabo. The buildings of the town show up well to seaward. The coastal highway leads through the village, and a road leads inland to **Naguabo,** a village 1.5 miles northwestward. Telegraph and postal facilities are available.

Puerto de Humacao, about 19 miles southward of Cabo San Juan and westward of Cayo Santiago, is one of the sugar ports of Puerto Rico. It affords a good anchorage for vessels of 16-foot draft or less except with southeasterly or southerly winds. The port is exposed southeastward and southward, and a heavy sea sometimes makes in with southeasterly winds. The deepest draft calling at the port is 23 feet, with a usual draft of about 20 feet.

Prominent features.—Cayo Santiago identifies Puerto de Humacao. The best marks when approaching the port are the customhouse at the shore end of the long wharf and the warehouses and tanks to the southward. A white mark on the rocks at El Morillo is also prominent. A stack is about 2.7 miles westward of Playa de Humacao.

Cayo Santiago, an island which lies 2.6 miles southwestward from Punta Lima and 0.7 mile southeastward of Playa de Humacao, is about 0.3 mile long and 162 feet high near its southern end. The north end of the island is low. The water is deep fairly close to the cay off the eastern side, but surrounding it at a distance of 1 mile or more are several spots with 12 to 18 feet. A shoal extends from the cay to Playa de Humacao; it has 10 feet of water over it near the playa, and very little near the cay.

The University of Puerto Rico maintains a monkey colony for experimental purposes on Cayo Santiago. No visitors are permitted.

Playa de Humacao is a small village on the beach at **Punta Santiago,** 2.9 miles west-southwestward of Punta Lima. It is the subport of entry for Naguabo, Humacao, Yabucoa, and Isla de Vieques. Two sugar centrals are near here. The coastal highway and the railroad run through the village.

Humacao is the largest city along the east coast of Puerto Rico. The coastal highway runs through the city and another highway leads inland to the road across the island from San Juan to Ponce. There is no railroad connection from Humacao to Guayama. Humacao has numerous stores, several small hotels, and telephone, telegraph, and postal facilities. The stores carry a fair supply of food and general hardware, but the principal source of ship supplies is San Juan, which is 40 miles distant via an improved highway.

Dangers.—Bajo Evelyn, a small shoal with a depth of 14 feet, is marked on its southwestern side by a buoy lying about 0.4 mile off the southwest point of Cayo Santiago. A buoy marks the southeastern point of another shoal, with depths of 12 feet, 0.4 mile south-southwest of Bajo Evelyn. **Bajo Parse,** a shoal with a depth of 13 feet, lies 0.9 mile southward from Cayo Santiago. It is marked by buoys. A buoy about 1.2 miles east of Cayo Santiago marks the western end of a shoal with 12 feet.

Pilotage.—A local pilot meets ships off Humacao bell buoy 6, about 2.3 miles southerly of Cayo Santiago and will take vessels in or out at night. Pilotage regulations and charges are the same as for all other Puerto Rican ports. The local pilot also takes ships to Yabucoa. A **captain of the port** is on duty.

Harbor facilities.—The wharf at Playa de Humacao extends about 725 feet offshore directly in front of the customhouse. It has railroad tracks, pipelines for water, fuel oil, and molasses. Small tugs and barges come alongside the wharf which has about 12 feet of water at the end.

All cargo is handled by lighters of which there is an ample supply. Cane is brought from Puerto Real in large steel barges, and large molasses barges are loaded at the dock through a 12-inch pipeline. Two small tugboats are available. A large sugar warehouse, several large tanks for molasses storage, and smaller tanks for fuel-oil storage are at the playa.

Small-boat facilities.—The anchorage is rather exposed for small boats but they can come alongside the wharf for supplies.

Hospitals.—Several hospitals are in Humacao.

Directions to anchorage.—To enter from southward, vessels of light draft bring Cayo Santiago in range with a round-topped peak to the northward, which is the second high point on the skyline from eastward. The bearing will be about **206°**. This range leads directly to Bajo Parse lighted buoy 4. Head between Bajo Evelyn buoy 6 and Humacao obstruction buoy, and anchor in 24 feet about midway between the latter buoys. Deeper-draft vessels can anchor west or southwest of Bajo Parse lighted buoy 4. Vessels usually anchor as close inshore as possible and shift offshore as they are loaded deeper. Deep-draft vessels should pass eastward and northward of bell buoy 6, and anchor according to charted depths.

Approaching from the northward, pass north of Humacao bell buoy 6 and head for the conspicuous white mark on El Morillo until the customhouse shows well clear of Bajo Parse lighted buoy 4, then continue to anchorage as above. Numerous shoal spots are to the east and northeast of Humacao bell buoy 6.

Ensenada Honda, Puerto Rico, is the nearest hurricane anchorage.

Quarantine, customs, immigration.—A representative of the quarantine service enforces national quarantine laws. The customhouse, with customs warehouse, is the prominent building at the inshore end of the long wharf. The deputy collector in charge acts as immigration inspector and shipping officer.

El Morillo, about 2 miles west-southwestward of Cayo Santiago, is a prominent small hill 107 feet high, which rises abruptly from the water and the lowland around it. It is distinguished by a large white mark on the rocks.

Morro de Humacao, 3.5 miles southwestward of Cayo Santiago, is a prominent rocky point 100 feet high, with higher land a short distance westward. **Cayo Batata,** a grass-covered island about 40 feet high, lies 0.4 mile eastward of Morro de Humacao, with depths of 13 to 19 feet between. It is marked by a white skeleton tower. **Caballo Blanco,** a bare ledge with five rocks of which the largest is 6 feet high, lies 250 yards eastward of the cay, and a reef, awash and steep-to, extends nearly 0.4 mile southward from the ledge.

Chart 904.—Punta Candelero, the point about 5 miles southwest of Cayo Santiago, is low and covered with brush and a few palm trees. The point is surrounded by a sunken reef and breakers.

Punta Icacos, 6.2 miles southwest of Cayo Santiago, has a high grass-covered rock which shows detached from the point from southward.

Chart 918.—Punta Guayanés, the point about 7 miles southwest of Cayo Santiago, marks the north entrance of Puerto Yabucoa. The point is 361 feet high, covered with growth, and has rocky bluffs at the water's edge.

Puerto Yabucoa is an open bay with numerous reefs and sunken rocks, on the southeast coast of Puerto Rico, 7 miles north of Punta Tuna and 53 miles east of Ponce. The bay is about 2 miles wide, extending from Punta Guayanés on the north to Punta Quebrada Honda on the south; the harbor is in the northern part.

Playa de Guayanés is a small town on the north shore of Puerto Yabucoa. The terminal facilities, located here, consist of storage tanks and a pipeline trestle for transferring molasses and gasoline. A depth of about 8 feet can be taken to the trestle.

The most prominent offshore objects are the storage tanks. No supplies are available.

Yabucoa is an important town, about 4 miles inland, served by the port. A large sugar central is located here. The town is on the insular highway around the coast. A privately owned narrow-gage railroad, from the sugar central, connects with Puerto Yabucoa but not with the railroad system of Puerto Rico. San Juan is 49 miles distant by highway. Yabucoa has general stores, two small hotels, a municipal hospital, and telephone and telegraph facilities.

The entrance channel, just south of Punta Guayanés, is marked by buoys and by an unlighted range, bearing **286°**, on a conspicuous grassy hill just south of Playa de Guayanés. The channel has a least depth of 18 feet over a width of 160 yards.

The usual anchorage, southwest by south of a 361-foot hill, is both small and exposed, and should be used with caution. Only vessels drawing up to about 14 feet enter the harbor. A stranger should not attempt to enter. It is preferable to enter during the early morning when the prevailing easterly breeze is light, and to proceed at a very slow speed to facilitate maneuvering and anchoring. In the afternoon the breeze usually is so strong that the resultant headway may cause the chain to part when anchoring. The usual practice is to enter early in the morning and to remain at anchor only during the daytime, anchoring outside for the night and returning in the morning. Two anchors are generally used.

When leaving it is advisable to head the ship out the channel and break the anchors loose under headway, so as to pass with considerable speed through the narrow entrance. Off Punta Guayanés the easterly to northeasterly winds are felt suddenly.

A Federal project provides for dredging a short approach channel 23 feet deep and an anchorage area of the same depth. In 1957 no work had been done.

Dangers.—The outer end of the reefs extending southeasterly from Punta Guayanés is marked by a buoy. The entrance reef is about 350 yards in diameter, and its northern point is marked by a buoy. A small patch, nearly awash and on which the sea often breaks, is 150 yards southward of the buoy. A detached shoal with a depth of 16 feet lies 0.5 mile south-southeastward of the buoy. A 17-foot spot lies in the northern entrance channel. A 12-foot spot marks the eastern extension of the entrance reef just south of the entrance channel; it is marked by a buoy.

Pilotage.—The pilot at Puerto de Humacao takes ships into Puerto Yabucoa. He requires advance notice to meet ships off Yabucoa or he can be picked up at Humacao. Ships should not enter at night.

Quarantine, customs, and immigration.—The nearest officials are at Puerto de Humacao. Special authority from the collector of the district is required to unload foreign goods.

Hospitals.—The nearest hospital is in Yabucoa.

Punta Quebrada Honda, the point about 2 miles, southwestward of Punta Guayanés, is the south point of Puerto Yabucao. At 0.5 mile west-northwestward of the point is a prominent hill, 483 feet high, the surface of which is strewn with large white boulders.

Chart 924.—Punta Yeguas, 1.2 miles south of Punta Quebrada Honda, is a low point with a rocky bluff at the end, which rises gradually in a smooth grassy ridge that joins the eastern end of Cuchilla de Panduras.

Punta Toro, the point 1.4 miles west-southwestward of Punta Yeguas, is a spur 500 feet high from **Cuchilla de Panduras,** which is 1 mile northward of the point and has elevations of 1,400 feet.

Punta Tuna, the point 3.2 miles west-southwest of Punta Yeguas, ranges from 70 to 100 feet high, with cliffs dropping to the water. A light, 110 feet above the water and visible 16 miles, is shown from a white octagonal tower on a square flat-roofed dwelling, near the end of the point. A radiobeacon is at the light; **coastal (storm) warning signals** are displayed daytime only. Back of the point is high ground, rising to a prominent hill 400 feet high.

Arrecife Sargent is a reef about 1.8 miles long and 0.3 mile wide at its widest point. Because it breaks the force of the southeast swell, the reef affords some protection from the southeast for vessels anchored well in by Punta Tuna where the reef is from 0.3 to 0.2 mile from shore. **Two-Foot Rock,** a bare portion about 0.7 mile eastward of the light, has the appearance of a rowboat and black can buoy. From the rock the reef gradually deepens to 12 feet near its eastern end. The depths on the southwestern part range from 12 to 17 feet. The reef is steep-to on its seaward side. The break on the reef does not show well except when there is considerable sea, and on parts of it the sea rarely breaks. The natural channel between the reef and the shore is not recommended for strangers.

From the easterly edge of the reef a ridge covered by 22 feet extends about 2.6 miles east-northeastward, and is marked by a buoy.

The valley of **Río Maunabo** is a low depression which makes northwestward from Puerto Maunabo between the mountain ridge of Cuchilla de Panduras and Cabo Mala Pascua. The former mountain range terminates at the coast between Punta Toro and Puerto Yabucoa.

Puerto Maunabo, a small cove just inside Punta Tuna, affords little shelter from the prevailing southeast wind and sea, and is a poor anchorage. There is no traffic at this port.

Cabo Mala Pascua, the cape about 2 miles west of Punta Tuna, is the most prominent high headland on the south coast. From the water the cape rises with a steep slope to **Monte Mala Pascua,** 1.060 feet high; other peaks up to 1,610 feet high are westward of it.

Chart 920.—Off the **south coast** of Puerto Rico there are two banks with deep water between them and the island. **Escollo Grappler,** with a least found depth of 38 fathoms in latitude 17°48.2′ N., longitude 65°54.8′ W., is about 10 miles south of Cabo Mala Pascua. **Escollo Investigator,** with a least found depth of 235 fathoms in latitude 17°44.9′ N., longitude 66°10.0′ W., is about 11 miles south of Punta Ola Grande.

At night no difficulty should be experienced along the south coast as the lights are numerous and can be readily distinguished. From Punta Tuna westward to Cabo Rojo the 100-fathom curve extends close to the reefs and the coast in places, and soundings are of little use at night to indicate danger or distance from shore. Safety will be insured in the daytime by giving a berth of 3 miles to the coast and to Isla Caja de Muertos.

On approaching or standing along the coast there are numerous points which can be recognized and used for cross bearings. The best are: Isla de Vieques, including its prominent features, Cerro Matias Jalobre and Monte Pirata; Punta Yeguas and Cabo Mala Pascua on the southeastern coast of Puerto Rico; Punta Figuras, Punta Ola Grande, the twin hills inland from Central Aguirre, Cayos de Barca, Punta Petrona, Isla Caja de Muertos and its light, the tanks at Ponce, Cayo (Isla) Cardona Light, a cliff 3.3 miles eastward of Punta Guayanilla, Cerro Toro, Punta Ventana, Guánica entrance and Guánica Light, and Punta Brea on the south coast; and Cerro Mariquita and Cabo Rojo on the southwestern end of the island.

Chart 902.—From **Punta Tuna** to Punta Viento the coast has fringing reefs close-to, and landing is difficult and often dangerous. A ridge, with depths of 6¼ to 8½ fathoms and deeper water inside, follows the coast a distance of 1 to 1.3 miles from Arrecifes Sargent to Guayama. This ridge forms the southern edge of the bank and is close to the 100-fathom curve. Vessels familiar with the coast, when bound east against wind and sea, usually hug the coast and pass inside the reef.

Punta Viento, the point 3.4 miles west of Cabo Mala Pascua, is low cane land with a fringe of coconut trees and mangroves near the water. A reef extends 0.6 mile off the southwest side of the point; it is awash and nearly steep-to on its southern and western sides, and the sea generally breaks on it.

Puerto Patillas, between Puntas Viento and Figuras, is an open bay 3.1 miles wide. It is not a good anchorage, of no commercial importance, and vessels rarely have occasion to enter. Considerable sea generally makes into the bay, and there is little shelter. A lump with 10 feet over it is 0.3 mile south-southwestward from the red bluff. **Patillas** is a village 1.5 miles inland northward of the bay.

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A shoal covered by 3½ fathoms is in the entrance nearly midway between the east end of Arrecife Guayama and Punta Viento. It is marked by a buoy.

Punta Guilarte is on the west side of Puerto Patillas nearly 1 mile northeastward of Punta Figuras. **Bajo Guilarte,** a shoal consisting of lumps with 11 to 15 feet, extends 0.8 mile east-southeastward from Punta Guilarte.

Punta Figuras, is marked by a light on the point just inside the shoreline. The light, 43 feet above the water and visible 11 miles, is shown from a white pyramidal skeleton tower on concrete piers.

Chart 925.—Puerto Arroyo is an open bay on the west side of Punta Figuras and about 10.3 miles west of Punta Tuna. It is the anchorage for Arroyo, the port of Guayama, which is one of the sugar ports of Puerto Rico. The port is exposed to all southerly winds. The prevailing southeast sea is always felt in the anchorage, although its force is somewhat broken by the outlying reef southward and southeastward of Punta Figuras. Under ordinary conditions vessels can discharge and load from lighters at the anchorage. Ships drawing up to 25 feet enter the port.

Prominent features.—The city of Guayama is high, and can be seen for some distance offshore. The large church in the city has two square towers at its western end, a cupola on its eastern end, and is prominent. To the south of Guayama the stacks of **Central Machete** at Punta Barrancas are conspicuous. At night the lights of Guayama form a group above the lights along shore. **Cerro Range** is a distinct sharp conical hill, 920 feet high, 3 miles northward from Punta Figuras Light.

Entrance.—The principal entrance is from southwestward, passing westward of Arrecife Guayama. Several spots with 26 to 30 feet over them are in this approach, and the bottom is irregular. The passage from eastward between Punta Figuras and Arrecife Guayama is used by smaller vessels, but is not recommended for strangers. At its narrowest point southward of the light the channel is about 0.3 mile wide, and is marked by buoys.

Anchorage.—The best anchorage is eastward of lighted buoy 3 as close to Arroyo as a vessel's draft permits. An anchorage area with a depth of 26 feet lies on a line between buoys 4 and 5 with the stack at Central Lafayette in line with the church tower at Arroyo. Depths of 23 and 24 feet are up to 0.2 mile southwesterly of this area.

The nearest hurricane anchorage is Bahía de Jobos.

Dangers.—Arrecife Guayama is from 1 to 1.5 miles off Punta Figuras, and is nearly 3 miles long. The 100-fathom curve is close to the south side; the reef is dangerous to approach. Its eastern part is awash and the sea generally breaks on it; a shoal with depths of 25 to 28 feet extends 0.5 mile east from its eastern end and is marked by a buoy. The middle part of the reef has little water on it, with patches awash on which the sea generally breaks. A buoy marks the northwestern extension of the reef.

A 17-foot spot 1.2 miles westerly of Punta Figuras is marked by a buoy. **Arrecife Corona,** a reef under 5½ feet of water, is about 0.7 mile offshore, 1.3 miles west of Punta Figuras. A 16-foot spot lies between the buoy and Arrecife Corona. **Arrecife Algarrobo,** with 1 foot of water, is about 2.3 miles west of Punta Figuras.

Several shoals about 1 to 1.5 miles south of **Punta Barrancas** are marked by a bell buoy which is 2 miles south of the point.

Pilotage.—A pilot may be obtained from Central Aguirre or San Juan. Pilotage regulations and rates are the same as at all other Puerto Rican ports.

Quarantine, customs, immigration.—These services are provided at Ponce. Arroyo is not a port of entry.

Hospitals.—There is a municipal hospital at Arroyo and other hospitals at Guayama.

Directions.—Approach the anchorage with Cerro Range in line with the stack at Central Lafayette, passing to the eastward of lighted buoy 3 to avoid the 20-foot spot marked by it.

Arroyo is on the coast about 1 mile west-northwest of Punta Figuras. It is the port for Guayama with which it is connected by the insular coastal highway. Provisions, gasoline, and water are available in small quantities. There are telephone and telegraph facilities.

Guayama, 3.5 miles northwestward of Arroyo, is the principal town in southeastern Puerto Rico. It is the eastern terminus of the railroad along the south coast. There is no railroad connection between Guayama and Humacao. Machine shops are here and small repairs to machinery can be made in case of necessity. It is on the insular coastal highway. The city has numerous stores and several small hotels. The stores carry a fair supply of food and general hardware, but the principal source of ship supplies is San Juan.

Harbor facilities.—All cargo is handled by lighters. The two small lighterage wharves are both privately owned. The larger has about 6 feet of water at the end. Power launches are available for handling lighters. Several warehouses are near the wharves. A **Captain of the Port** is at Arroyo.

Coastal (storm) warnings are displayed daytime only, at the warehouse near the westerly one of two wharves.

Chart 902.—Punta Ola Grande, a low and rounded point, is 6.2 miles westward of Punta Figuras Light. From Arroyo to Punta Ola Grande the shore is fringed with reefs and shoals to a distance of 0.8 to 1 mile in places. **Arrecife Mareas** is a reef that extends 1.7 miles eastward from Punta Ola Grande.

Chart 909.—Cayos Caribes, islands about 3 miles west of Punta Ola Grande, extend nearly 1 mile southwestward from Punta Pozuelo. They consist of numerous wooded islands separated by narrow strips of water. A reef awash extends along the southeast side of these islands, its western end lying about 0.3 mile south-southwestward from the western end of the group.

Boca del Infierno, a small-boat entrance into Bahía de Jobos, between Cayos Caribes and de Barca, is about 400 yards wide between the reefs on each side. The depth over the bar is about 11 feet, but it breaks with a heavy sea. Only small craft should attempt this entrance.

Cayos de Barca are the southern group of the chain of islands on the south side of Bahía de Jobos. They extend 1.6 miles long in a west-northwesterly direction, and are separated by narrow strips of water. A reef, awash and steep-to, extends along the southern side of the islands and 0.2 mile eastward of them. The western end of these islands is separated from Cayos de Pájaros by a passage 300 yards wide with depths of 14 to 15 feet.

Cayos de Pájaros is a wooded island over 0.3 mile long. A reef, awash and steep-to, fringes its southern side and extends 200 yards westward of it. The passage between this island and Cayo Morrillo, about 350 yards wide between the reefs, has depths of 17 to 33 feet.

Cayo Morrillo, a small and wooded island, lies 0.7 mile east-southeastward from Bahía de Jobos Light and about 0.5 mile west-northwestward from the the west end of Cayos de Pájaros. A reef awash surrounds the islet and extends 300 yards northeastward from it.

Bahía de Jobos, 14 miles westward of Punta Figuras Light, is a good anchorage in a hurricane, but considerable dragging may be expected as the bottom is soft. One of the largest sugar centrals on the island is at Aguirre and another at Jobos, about 2 miles east of Aguirre. Vessels drawing up to 23 feet have been taken out of the harbor.

The harbor is formed by **Punta Pozuelo** and the several groups of islands 0.5 to 1 mile from shore. The main entrance, between Cayo Morrillo and the eastern end of Cayos de Ratones, is nearly 0.7 mile wide. From its entrance the harbor bends sharply to about east-southeast for 2 miles, narrowing gradually in this distance to a width of about 0.5 mile between Cayo Puerca and the middle of Cayos de Barca. Beyond this point the harbor has an average width of about 1 mile, and extends about 2 miles to **Punta Rodeo** and Central Aguirre. Here the harbor again bends eastward, and extends about 2 miles to its head.

The shores and islands are low, but are covered with thick brush and mangroves which show well. The north shore from a point abreast of the entrance to **Punta Colchones,** is formed by numerous islands the southernmost of which is **Cayo Puerca.**

Prominent features.—A yellow brick chimney and a taller white chimney at the central are very conspicuous. The main buildings of the mill can be seen 6 to 8 miles offshore, and at night from February through June the lights of the mill are prominent. An elevated tank is near Salinas and a black stack at Jobos. Bahía de Jobos Light shows up well from off the entrance. Two wooded hills near Aguirre are prominent and readily identified from eastward or westward but not from southward.

Boundary lines of inland waters.—Lines established for Bahía de Jobos are described in **§ 82.230,** Chapter 2.

Cayos de Ratones are islands about 0.4 mile southward of Punta Arenas and on the western side of the entrance to the harbor. Two in number, the islets are about 0.2 mile apart and extend about a mile east and west. A narrow channel northward of the islands connects Bahías de Rincon and Jobos; it is deep but very narrow, and is used only by craft of 8- to 10-foot draft. **Bahía de Jobos Light (17°56.2′, 66°17.0′),** 45 feet above the water and visible 8 miles, is shown from a white rectangular skeleton tower on the easternmost point of Cayos de Ratones.

Channels.—The principal entrance, between Cayo Morrillo and Cayos de Ratones, has a clear width of about 0.5 mile. The western side of the entrance is marked by Bahía de Jobos Light. Inside the entrance the channel leads across a ridge with depths of 23 to 29 feet northward from Cayos de Pájaros. A lighted buoy, 0.3 mile northward of Cayo Morrillo, marks the east side of the entrance channel and the turn to the general southeast-by-east direction.

The channel at Punta Colchones leading to the anchorage off Central Aguirre is close to the point and leads between a sand shoal on the southeast and a coral reef fringing the northwest shore. This channel is marked by buoys. At its narrowest part the channel, with a depth of over 20 feet, is only about 100 yards wide. The deepest draft taken through the channel is 22½ feet, but this requires local knowledge.

Anchorages.—Vessels sometimes anchor just inside the entrance between Cayo Morrillo and Bahía de Jobos Light to await daylight. There is a good anchorage in the channel from abreast Cayos de Pájaros to Cayos de Barca, with depths of 28 to 36 feet in the middle. Grassy bottom is reported in this area, which is better holding ground than the mud bottom farther eastward; however, the protection is not quite as good.

The anchorage off Central Aguirre is about 0.7 mile in diameter, and depths are 19 to 20 feet on the east side, increasing to 23 to 26 feet on the west side. A little swell makes in through Boca del Infierno with southerly winds; this is felt alongside the wharf. The bottom is soft mud off Central Aguirre. If anchoring here during a hurricane, engines should be kept at full speed ahead to prevent dragging. The usual anchorage is off Punta Rodeo and on range with the steamship pier.

The harbor east of Punta Rodeo is landlocked but rarely used. It has a depth of about 17 feet at its western end, decreasing to about 10 feet southwesterly of Puerto Jobos.

Central Aguirre, on the north side of the harbor northwestward of Punta Rodeo, is the second largest central in Puerto Rico.

Pilotage.—The pilot at Central Aguirre will bring ships in or out, day or night; he meets ships off Cayos de Ratones in a motorboat.

Puerto Jobos is a landing and small settlement on the north side at the eastern end of the harbor.

Port facilities.—All cargo is handled over the pier and the use of lighters has been discontinued. Freight and passenger vessels call here. A 1,300-foot pier at the Central extends directly south from the main building; vessels drawing up to 23 feet can berth on either side. To take this draft out sometimes requires dragging through soft mud for short distances. The pier has shipside railroad connections; also pipelines for water, molasses, and fuel oil (used for receipt only). Inshore there are numerous warehouses and tanks for storing sugar, molasses, and fuel oil.

Small-boat facilities.—Very few small boats frequent the harbor. Berths are available along the pier approach. Gasoline from drums and water are available at the pier and general supplies at the Central store.

Quarantine, customs.—A representative of the quarantine service enforces national quarantine laws. Customs are cleared by the deputy collector from Ponce.

Hospitals.—An excellent hospital is operated by the Central.

An improved highway connects with the insular highway between Guayama and Ponce. Central Aguirre is on the Ponce and Guayama Railroad which connects with the American Railroad at Ponce. The Central operates a large general store and a good hotel. Some emergency repairs, including welding and foundry work, can be made by the Central machine shop. There are telephone, telegraph, and postal facilities. San Juan is 67 miles distant over improved highways.

Bahía de Rincon, the large indentation between Cayos de Ratones and Cayos Cabezazos, is a bay about 5 miles wide. It is of no commercial importance, but on its eastern side there is good anchorage during ordinary weather; it is easily entered in the daytime. The general depths in the bay are 48 feet, irregular bottom, at the southern end, decreasing to about 30 feet 1 mile from the northern shore. **Punta Arenas,** the point north of Cayos de Ratones, is low and covered with mangrove. Its western side should be given a berth of over 600 yards.

Arrecife Media Luna, a reef partly bare on which the sea breaks, is a mile west-southwestward from the western end of Cayos de Ratones. It is about 0.3 mile long. There is deep water fairly close-to. A deep channel into the bay extends between this reef and Cayos de Ratones on either side of a shoal which has a least depth of 11 feet.

A shoal with 2 to 6 feet extends about 250 yards northward from the western Ratones, the 18-foot curve lying about 350 yards northward of the island. The best anchorage in Bahía de Rincon is north of the western Cayos de Ratones, where the depths are 25 to 28 feet, affording good shelter in ordinary weather.

A good anchorage also may be had about 0.4 mile from the east side near the northern end of the bay, in 4 fathoms, sandy bottom. Avoid the 14-foot spot and the shoal point making out from the shore to westward. The northwest shore should be given a berth of over 0.8 mile; the 18-foot curve is nearly 0.6 mile off Playa Salinas.

Jauca, is a village on the eastern side of Bahía de Rincon. **Salinas,** a village about 2.5 miles northward of Cayos de Ratones and 1 mile inland, is on the highway and railroad which leads eastward from Ponce, and has communication by telegraph. A road leads to **Playa Salinas** which is a fishing community on **Punta Salinas,** the point 1.5 miles northward of Cayos de Ratones. Anchorage can be made from 0.6 to 0.8 mile off the landing in 3 to 5 fathoms.

Arrecife Alfenique, the reef 2.8 miles west of Cayos de Ratones, is awash, and the sea breaks on it. The reef is 0.4 mile long, steep-to, and a clump of bushes is on its southern end. A good passage 1.5 miles wide is east of this reef, between it and Arrecife Media Luna, which leads into the bay. The depths are 5 to 11 fathoms, irregular bottom. A spot with 26 feet lies 0.8 mile northwestward from Arrecife Media Luna, and one of 23 feet lies 0.4 mile westward of it.

Cayos de Caracoles, the island 0.7 mile west of Arrecife Alfenique, is low and wooded, and about 0.3 mile long. A reef awash extends 0.2 mile east from the island, and between this reef and Arrecife Alfenique there is a channel 0.3 mile wide. Between the island and the shore northward of it are shoals. **Cayos Cabezazos (Jauca),** the 3 islets lying 1.3 miles southward of Punta Petrona, are low, and covered with brush and mangrove. The islands are near the western end of a reef which extends about a mile northeastward, nearly to Cayo de Caracoles. This reef is bare or awash at low water, nearly steep-to, and the sea always breaks on its southern side. The western end of the reef awash should be given a berth of 0.2 mile or more.

Punta Petrona, the point about 5 miles west of Cayos de Ratones, is low and covered with brush; it is prominent from eastward or westward, but not from southward. Several conspicuous sugar mill stacks are northward of the point near Santa Isabel. Foul ground with depths of 3 to 8 feet extends southward of the point to Cayos Cabezazos. North of the latter islands is a narrow crooked channel, but it is not marked and should not be attempted without local knowledge. An aviation light is 0.8 mile northward of the southern tip of Punta Petrona.

Chart 926.—Santa Isabel, a village about 2 miles northwestward of Punta Petrona, is on the highway to Ponce, and has rail and telegraph communication. A road leads to **Playa Santa Isabel,** a small settlement on the beach 1.4 miles northwestward of Punta Petrona.

Playa Cortada, is on the shore about 4 miles northwestward of Punta Petrona. A road leads to Central Cortada.

Cayo Berberia, the island 4 miles west-southwestward of Punta Petrona, is 0.6 mile long, low, and covered with brush and mangrove. A shoal with 6 to 12 feet of water extends nearly a mile westward to the bar joining Isla Caja de Muertos. The northern edge of the shoal, marked by a buoy, is steep-to, and lies about 0.3 mile northward of the island. A shoal with 14 to 24 feet extends 1.7 miles southward of the island. There is a fringing reef on the eastern side of the island on which the sea breaks, and a detached spot of 23 feet 0.4 mile east of the south end of the island. A shoal with 22 feet lies 2 miles southward of the island.

Punta Pastillo is a low rounded point 6 miles northwestward of Punta Petrona. **Pastillo,** 0.5 mile west-northwestward of the point, is a village on the coastal highway.

The passage between the coast and Isla Caja de Muertos and Cayo Berberia on the south has usually smooth water, and generally is used in the daytime by the smaller coasting vessels bound east or westward from Ponce. Several shoals with depths of 17 to 20 feet, and one with 14 feet, are in the passage. Vessels drawing more than 17 feet should pass outside of Isla Caja de Muertos.

From Santa Isabel to Cayos Frios, the only marked features are the stacks of numerous sugar mills. Anchorage with comparatively smooth water may be found in 24 to 30 feet along this shore during ordinary weather for vessels drawing up to 15 feet if the shore be given a berth of 0.5 mile. Shoals with depths of 17 to 27 feet lie northward and northwestward of Cayo Berberia.

Bar.—From Isla Caja de Muertos a bar trends northeastward and, curving gradually eastward, joins the shoaler water making westward from Cayo Berberia. The bar has general depths of about 15 feet on its crest. The sea rarely breaks on it, and it is dangerous to approach. Southeastward of the bar the water deepens gradually. The bottom is irregular, but on its western and northern sides the bar is steep-to.

Chart 927.—Isla Caja de Muertos, 3.5 miles southwestward of Cayo Berberia and 4.5 miles south of the middle of the south coast of Puerto Rico, is 1.5 miles long, 243 feet high near its middle, and covered with tangled scrub. The southwest end of the island is low except for the extreme southwesterly point which is a round steep hill 170 feet high. Landings can be made on the western side of the island, in ordinary weather.

Isla Caja de Muertos Light, (17°53.7′ N., 66°31.3′ W.), 297 feet above the water and visible 24 miles, is shown from a gray cylindrical tower on the center of a flat-roofed dwelling, on the summit of the island. The light is the outstanding landmark along the south coast.

Isla Morrillito, 200 yards off the southwest point of Isla Caja de Muertos, is a flat-topped island 0.2 mile long and 31 feet high. Its southern side should be given a berth or more than 0.4 mile.

The water is shoal for some distance eastward of Isla Caja de Muertos, the 30-foot curve lying about 1.8 miles from its northeast point, decreasing to about 0.6 mile off its southwest point. A reef lies 0.7 mile eastward from the light.

Anchorage.—The western side of Isla Caja de Muertos is free of dangers, and affords anchorage during ordinary weather with less swell than in Bahía de Ponce. The best anchorage is from 0.4 to 0.5 mile westward of the southern half of the island in 36 to 72 feet, according to swinging area required. The slope of the bottom is somewhat steep, and the anchorage should be approached with care.

The mouth of **Río Jacaguas** is 1.1 miles northeast of Cayos Frios. **Central Fortuna,** marked by a single stack, is 1.3 miles north of Río Jacaguas mouth.

Cayos Frios, the island 0.5 mile offshore and 1.8 miles east of Punta Cabullón, are covered with brush. The surrounding reef is 0.4 mile long east and west, and its southern edge is steep-to.

Punta Cabullón, about 5.5 miles northwestward of Isla Caja de Muertos Light, marks the eastern point of Caleta de Cabullón. A reef with three islets extends 0.4 mile west-southwestward from the shore. The reef is steep-to, and the sea breaks on the southern side.

Caleta de Cabullón, a bight between Punta Cabullón and Punta Carenero, offers a comfortable anchorage with little swell during ordinary weather for vessels drawing 17 feet or less. The anchorage is about 0.5 mile in extent with depths of 18 feet or more. **Roca Ahogado,** a small and bare rock, lies in the middle of the entrance; a shoal with 15 to 22 feet of water extends about 0.2 mile southeastward of it.

Punta Carenero, the eastern point at the entrance, is low and covered with mangrove. **Cayo Gata** are islets that extend 0.3 mile westward from the point. A yacht club is on the westernmost of the islets.

Cayo Cardona, the small island about 1 mile west-southwest of Cayo Gata, is marked near its middle by a light. The island is one of the main guides when entering. The light, 46 feet above the water and visible 11 miles, is shown from a white cylindrical tower on a flat-roofed dwelling. Two radio towers, 1.9 miles north by east of the light, can be seen beyond the visibility limit of the light.

Bahía de Ponce is a harbor on the south coast of Puerto Rico, 32 miles eastward of Cabo Rojo and 7 miles northwestward of Isla Caja de Muertos. One of the three leading commercial ports of the island, the harbor is protected from the prevailing easterly trade winds by Punta Penoncillo and the Cayo Gata islets with their surrounding reefs, but generally a swell is found in the anchorage. To the southward the harbor is exposed and for this reason is not safe in a hurricane. The nearest hurricane anchorages are at Bahía de Guayanilla and Bahía de Guanica westward, and Bahía de Jobos eastward. Vessels with drafts up to 29 feet have entered the harbor, but the usual draft entering is 18 feet or less.

The harbor is in the eastern part of an open bay, 3.4 miles wide between Punta Carenero on the east and Punta Cuchara on the west. Its southwestern side is formed by Cayo Cardona with its surrounding reefs, and Arrecife Cayito. The harbor is nearly a mile in extent, and averages about 0.6 mile wide, with depths of 50 feet at the southern part and decreasing gradually toward the northern end. The high land is 2 to 3 miles inland.

Playa de Ponce, the town on the northeasterly side of the bay, is the port for Ponce, the city about 1.5 miles to the northward, and the site of the customhouse. Most cargo is landed at the bulkheaded wharf and pier on Punta Penoncillo. Imports consist of foodstuffs, textiles, building materials, and machinery, and exports include sugar and cement. A good highway connects with Ponce and the railroad system of the island.

Ponce is the second city of Puerto Rico in population and commercial importance. The urban section is nearly continuous with Playa de Ponce. Numerous improved highways radiate from Ponce, both along the coast and inland; one leads 81 miles across the island to San Juan. The railroad goes eastward to Guayama and westward around the island to San Juan. Ponce has several good hotels.

Prominent features.—Isla Caja de Muertos, with the light on its summit, is the most prominent feature in the approach. A tall concrete stack, about 3 miles east of Ponce, shows up very prominently from offshore.

Numerous tanks on Punta Penoncillo east of the municipal pier as well as the shed on the municipal pier can be seen at a considerable distance offshore. A large conspicuous house is on a hill less than a mile northwest of Ponce. A lighted range marks the entrance channel from outside Bajo Tasmanian bell buoy, but cannot be seen in the daytime until inside the harbor. The range bears **015°**.

Punta Penoncillo, the site of the municipal pier, is a low projecting point on the east side of the harbor, about 600 yards northward of Cayo Gata.

Boundary lines of inland waters.—The lines established for Bahía de Ponce are described in **§ 82.225,** Chapter 2.

Channels.—Deep-draft vessels enter the harbor through a channel nearly 0.5 mile wide and 1.5 miles long, which can accommodate the largest vessels. This channel, commencing just west of Bajo Tasmanian, is well marked. It leads northward for the light on Cayo Cardona, passing between banks with depths of 21 to 42 feet at the edges, but dropping off abruptly to great depths in the channel. The deep channel from eastward leads between Bajo Tasmanian and Cayo Gata, which is frequently used in the daytime by vessels drawing 17 feet or less, passing northward of Cayo Berberia. In the approaches are several detached shoals with depths of 20 to 24 feet.

Coasting vessels up to 21 feet in draft frequently enter over the southern part of the bank on the west side of the channel, shaping the course for Bajo Tasmanian bell buoy and passing over 0.3 mile westward of it.

The channel between Cayo Cardona and Arrecife Cayito, 0.2 mile wide, is used to some extent by vessels drawing 12 feet or less, with local knowledge.

Anchorage.—The usual anchorage is inside Cayo Cardona, about 200 yards westward of the range and from 0.4 to 0.6 mile offshore in 18 to 33 feet, according to draft. The positions northward of the municipal pier are fairly well protected from the prevailing winds and ground swells. Large deep-draft vessels sometimes anchor farther southward in 36 to 42 feet. A large additional anchorage area is available northwest of Arrecife Cayito.

A small-craft anchorage area is northwest of Muelle de Ponce; limits and regulations are stated in **§ 202.255,** Chapter 2.

Small vessels can anchor east of the range northward of the maneuvering and berthing basin off the new bulkhead wharf, staying inside the red sector of Ponce Anchorage Light. A buoy marks the north side of the basin. A well-protected anchorage for small boats is off the Ponce Yacht Club in depths of about 16 feet or less.

Dangers.—**Bajo Tasmanian** is the northern and shoaler part of an extensive bank on the eastern side of the harbor entrance. It is about 1 mile long, and has several spots of 16 to 18 feet. A bell buoy marking its western limit is 1 mile south-southeastward from the light on Cayo Cardona; vessels should pass 200 yards or more westward of the buoy. A detached rock, with 17 feet of water in a surrounding depth of 70 feet, lies 0.9 mile east-southeastward of the light.

The bank on the western side off the entrance extends about 1.5 miles southward of Cayo Cardona. In general, depths of 36 to 48 feet are on it, but spots with 28 to 30 feet are near its southern and eastern edges, which drop off abruptly to great depths. The northern and shoaler part extends west and southwestward from the island, with depths of 18 to 23 feet in spots. Depths of 25 and 26 feet were found 0.5 miles south-southwestward from the light. **Escollo Hojas,** the bank lying 0.8 mile westward of the light, is about 0.3 mile in diameter and awash at its shoalest point.

Bajo Cayo Cardona is a shoal that extends 600 yards east-southeastward from the islet, with depths of 12 to 17 feet, and is marked at its eastern end by a buoy. A reef bare in places, on which the sea always breaks, extends 300 yards northeastward from the island, and depths of 11 to 14 feet are 200 yards farther in the same direction. A reef bare at low water and steep-to extends about 300 yards westward and southwestward from Cayo Gata, and is marked at its western edge by a buoy. The sea always breaks on the outer side of this reef.

Arrecife Cayito, a reef northwestward and northward of Cayo Cardona, is 0.8 mile long in a northeasterly direction. A small patch awash is near its southwest end. Eastward and northward of this spot the reef has depths of 4 to 11 feet, and is steep-to. Its northeastern point is marked by a buoy. A detached rock covered by 11 feet with 30 feet close-to lies 0.2 mile from the north shore of the harbor and 0.5 mile northward from Arrecife Cayito. The 18-foot curve is about 0.4 mile from the shore at the port and the depths decrease uniformly toward the beach.

Directions.—From eastward, leave Isla Caja de Muertos Light distant 3 miles 000°, and steer **303°** for 8 miles, which will bring the light on Cayo Cardona distant 2.5 miles 005°. From this position the lighted range on bearing **015°** can be picked up. From westward after leaving Guánica Light distant 5 miles 000°, steer **079°** for 15.4 miles to the above position off the light on Cayo Cardona.

Tides.—The periodic tides are chiefly diurnal but are too small to be of practical importance.

Winds.—The prevailing winds are the easterly trades, which vary from northeast to southeast, the most common being about east-southeast; these are generally fresh during the day. At night the trade wind generally dies down and a light northerly breeze comes off the land. The heaviest gales are to be expected in the summer and fall; southerly gales do the most damage and are dangerous.

Coastal (storm) warnings, are displayed daytime only, at the customhouse near the playa.

Pilotage.—Pilots maintain a lookout at the port. The pilot boat meets vessels about a mile outside Bajo Tasmanian. Ships are taken in or out, day or night.

Towboats.—Vessels enter and clear the harbor under their own power. No towboats or launches are available for towing.

Quarantine.—An office of the Public Health Service is here. The port is under jurisdiction of the chief quarantine officer at San Juan, and all vessels subject to detention, under United States quarantine regulations, are sent there.

Immigration.—The Immigration and Naturalization Service does not maintain an office at Ponce. The deputy collector of customs is officially authorized to act as immigration inspector when such services are necessary.

Hospitals.—The Public Health Service maintains an outpatient office in Ponce. The city has several hospitals.

Customs.—Ponce is a port of entry and marine documents are issued. Customs warehouses are at the waterfront.

Terminal facilities.—The facilities consist of a municipal pier and a bulkhead wharf 1,890 feet long. Other facilities are a yacht club pier and several smaller piers with depths up to about 10 feet. The municipal pier, at Punta Penoncillo, is of concrete and steel construction, 430 feet long by 110 feet wide, and almost entirely covered by an iron transit shed. Cargo is handled by ship tackle. Pipelines for fuel oil, water, and molasses are on the pier, and railroad tracks extend the entire length of the pier on the western side. A highway and railroad connect with the city. Ships berth on the west side of the pier, where depths range from 20 to 29 feet.

Additional terminal facilities have been constructed inside the municipal pier. The municipality has built a concrete bulkhead wharf, extending eastwardly from the pier. To the northward of the bulkhead wharf there is a maneuvering basin 30 feet deep. A buoy marks the northern side of the dredged area. An anchorage light with a red sector is about 0.4 mile southeast of the front range light. Four transit sheds are along the bulkhead wharf. The spur track to the municipal pier is within 120 yards of the wharf.

Storage.—Several general warehouses and ample tank storage are available.

Port administration.—The captain of the port is in charge of the harbor administration; his office is in the capitanía. The affairs of the municipal pier are administered by a board.

Supplies.—Provisions, ice, lumber, and ship chandler's stores can be obtained. Supplies can be brought in from San Juan by rail or truck. There is an ample supply of fresh water at the main piers. Two companies have pipeline connections for oil-bunkering vessels at the piers; the rate is about 350 barrels per hour. There are also pipeline connections for gasoline.

Repairs.—The Porto Rico Iron Works, the only firm doing marine repair work, can repair wooden or steel ships above the waterline. The largest shaft produced is 24 inches and the largest casting 12 tons. There is no marine railway or drydock at the port.

Small-boat facilities.—Numerous small boats frequent Ponce, both commercial and pleasure craft. **The Ponce Yacht Club** is eastward of the tankfarms on Punta Penoncillo; the boat landing here for pleasure craft has 6 to 8 feet alongside.

Punta Cuchara, the point 2.3 miles westward of Cayo Cardona, is low for 0.5 mile inland to the railroad which skirts the foot of the higher land.

Cayo Arenas, the island between Cayo Ratones and Punta Cuchara, is small. A crooked channel with 10 to 15 feet of water extends between Cayos Arenas and Ratones, and another with 10 to 11 feet of water is between Cayo Arenas and Punta Cuchara, but these channels are exposed to the prevailing southeast sea and are used only by small local craft.

Cayo Ratones, the island 1 mile south-southwestward from Punta Cuchara, is low, covered with brush and mangroves, but is prominent. A bank extends 3 miles westward of the islet and about 2 miles offshore; the least depth found on it is 29 feet, and it is steep-to on its south and west sides. A reef, **Arrecife Ratones,** extends 1 mile east-southeastward from Cayo Ratones. It is bare at low water, and has a few scattered mangrove bushes for 0.5 mile from the islet.

Chart 902.—From Ponce to Punta Guayanilla, about 7.5 miles, there are several outlying low islets and reefs, inside of which is a passage for small craft with local knowledge. Close to shore in places are narrow fringing reefs which make it difficult to land. About 3.3 miles eastward of Punta Guayanilla is a prominent cliff about 100 feet high. **Cayo Parguera** is an island about 2.3 miles eastward of Punta Guayanilla and about 0.4 mile offshore. From northeastward of this island the highway and railroad follow the shoreline.

Bahía de Tallaboa is a bay that extends about 3 miles westward of Punta Cuchara. It is formed on the south by **Cayo Caribe** and **Cayo María Langa** and the extensive reefs surrounding them. It is of no commercial importance and should be avoided by strangers.

Chart 928.—Bahía de Guayanilla, 7.5 miles westward of Ponce, is the largest hurricane harbor, and one of the best, in Puerto Rico. It is available for vessels of any draft. The reefs and islands to the southeastward break the sea but not the wind; some dragging should be expected. The harbor, between Punta Guayanilla on the east and Punta Verraco on the west, is protected at its entrance by extensive reefs which extend a mile or more offshore. The entrance channel between these reefs is about 1.5 miles long, about 0.4 mile wide, and has general depths of over 90 feet at its southern end, decreasing to 50 feet abreast Cayo Mata.

A little surf is usually at the north end of the harbor; the best boat landing is beyond the rocky cliff 0.3 mile north of Punta Pepillo.

Punta Guayanilla, low and wooded, is the point which forms the eastern side of the harbor. **Punta Gotay** is the western end of Punta Guayanilla. Several low islands, covered with mangrove and brush, are southward and eastward of Punta Guayanilla, the southwestern one of which is Cayo María Langa. In approaching from southward and westward, these islands and the point are difficult to identify until near them.

Punta Verraco is the point which forms the west side of the entrance to Bahía de Guayanilla, and is included between a shallow arm of the harbor and the sea. From northeast of Cerro Toro, the point extends about northeastward for 1 mile, and has a nearly level ridge about 80 feet high near its north end. On its southeast side are

numerous low bluffs. Reefs extend over 1 mile southeastward of the point.

Punta Pepillo, the point on the northeast side of the harbor, is the western end of a hill 130 feet high; there are higher hills close northward of it, and the railroad and highway run between. About 0.3 mile north of the point the cuts for the railroad and highway show as a prominent rocky bluff on the east side at the head of the harbor.

Prominent features.—About 0.5 mile to the northward of the hill on Punta Pepillo is a very prominent residence on the top of a considerably higher hill; this is a very prominent mark from offshore. On the western slope of the hill at Punta Pepillo are three tanks, and a fourth is at the toe of the slope. The most easterly tank, the largest, is painted black; it serves as a good landmark from off the harbor entrance. The other tanks are painted aluminum.

Monte Membrillo (Calderon), a mountain 3,583 feet high, and **Cerro La Tuna (Calichosa),** a hill 787 feet high, northwestward of the harbor, are easily recognized. From inside the harbor two black steel stacks south of Guayanilla are conspicuous; also the molasses tanks at the extreme northern end of the harbor and about 0.5 mile north of Punta Pepillo.

Playa de Guayanilla is the only community directly on the harbor front; it consists of a few small dwellings to the eastward of the sugar dock.

Guayanilla, a small town about 2 miles inland, has practically no urban facilities, and no supplies are available other than fuel oil products at the Texas Co. plant. Both the insular railroad system and the coastal highway pass close alongshore at the north end of the harbor.

Boundary line of inland waters.—The line established for Bahía de Guayanilla is described in § **82.220,** Chapter 2.

Anchorage.—From westward of lighted buoy 2 a straight course can be taken, heading for a small sugar dock at the northwest end of the harbor and passing 150 to 200 yards westward of the buoys marking the shoals along the eastern side of the harbor; course **347°.** Select an anchorage as desired when northwesterly of Cayo Mata, but stay over 0.5 mile northeastward of Punta Verraco. Give the north shore a berth of about 0.3 mile.

With the end of the oil wharf well clear of the south shore of Punta Pepillo, the depths are about 33 feet, and 24 feet can be carried 0.2 mile northwestward of the buoy. There is a good holding bottom of thick mud. Deep-draft vessels can anchor in the central portion of the harbor between Cayo Mata and Punta Pepillo. There is no current in the harbor; vessels swing to the wind.

Dangers.—Cayo María Langa is surrounded by reefs on which the sea breaks. The 30-foot curve is about 0.3 mile southward and about 0.6 mile east-southeastward from the island, descending abruptly to great depths.

Arrecife Fanduco is the southwest end of the shoals which extend 0.6 mile southward of Punta Guayanilla and 0.4 mile westward of Cayo María Langa. It is partly bare at low water, and the sea always breaks on it. A shoal with a depth of 13 feet extends 0.2 mile southwestward from Punta Gotay. **Arrecife Guayanilla,** the reef on the west side of the entrance, forms the south side of the reefs which extend 1.1 miles southeastward from the shore between Cerro Toro and Punta Verraco. The reef is 1.3 miles long, mostly bare at low water, and the sea always breaks on it. The 30-foot curve is about 0.2 mile from its south side, and the slope is abrupt to great depths. The principal dangers are marked by buoys.

Arrecife Unitas is a reef that extends about 1 mile northeastward from the north side of Arrecife Guayanilla to the west side of the channel about 0.4 mile west-northwestward from the lighted entrance buoy. Most of it is bare at low water, and the sea always breaks on it. Detached shoals with 10 to 18 feet of water extend over 0.5 mile southward from the eastern end of the reef Patches of 27 to 30 feet lie westward of the fairway. The north end of the reefs on the west side of the channel is partly bare at low water, and there is generally a break on it. It is about 0.5 mile westward of Punta Gotay.

A shoal with little water on it extends from Punta Gotay to **Cayo Mata.** The bay is shoal eastward of a line from Cayo Mata to Punta Pepillo, and westward of a line from Punta Verraco to the playa. Shoals extend 0.5 mile eastward of the point. Lumps with 12 to 14 feet of water extend 0.2 mile westward from Punta Pepillo, and one with 18 feet of water, marked by a buoy, is nearly 0.4 mile from the point on the same line.

Directions.—Vessels approaching from either direction by daytime can follow the coast at a distance of 2.5 miles, when between Ponce and Guánica, until the entrance of Bahía de Guayanilla is recognized. Bring the black oil tank on Punta Pepillo to bear **003°** and steer for it, which will lead to a position a little westward of the entrance lighted buoy. When about 400 yards past lighted buoy 3 on the port hand, come around to a **347°** heading and pass about 150 to 200 yards westward of the buoys marking the eastern side of the channel.

At night vessels should keep well off shore to avoid the reefs, especially off Bahía de Guayanilla, until the lighted entrance buoy of Arrecife Fanduco can be seen. Steer for the entrance buoy on course **003°,** changing course when near it to pass 100 to 300 yards westward; then bring the buoy astern on course **338°** and run 1.8 miles to an anchorage in about 40 feet.

Winds.—The prevailing winds are the southeasterly trades, which are generally fresh during the day. At night the trade wind usually dies down near the coast and a light breeze comes off the land.

Pilotage.—Pilots come from Guánica. Ships are taken in or out, day or night. Incoming ships are met about a mile outside the entrance buoy.

Customs and quarantine.—The customs and quarantine officers come from Ponce. Vessels in foreign trade may enter and clear at Guayanilla upon sending advance notice to the deputy collector in charge at Ponce.

Terminal facilities.—An oil company distributing plant is on Punta Pepillo. Diesel oil, gasoline, kerosene, and other oil products are kept in large tanks and in a large warehouse for handling petroleum products in drums and

cases. A wharf, 525 feet long with a depth of 24 feet at the end, extends out from the point; it is equipped with pipe lines. Mooring buoys and dolphins are off the dock. Tankers call to supply the plant and numerous coasting vessels call to distribute the products. The latter vessels are of shallow draft and can berth either alongside or at the end of the dock. Another large oil facility, consisting of a causeway and dock with a light at the end, extends into the bay from the point about 0.5 mile southeast of Punta Pepillo.

At the north end of the harbor, less than 0.5 mile northwestward of the Punta Pepillo oil wharf, are 3 molasses tanks and 2 molasses-loading piers, each with depths of about 8 feet at the end. At Playa de Guayanilla there is a small sugar-loading wharf belonging to the Rufina Central; it has a depth of only 5 feet at the end, and is used by small lighters. A narrow-gage railroad runs to the mill about 0.5 mile south of Guayanilla.

Chart 902.—Punta Ventana is the point which lies 2.8 miles westward of the entrance to Bahía de Guayanilla. From Guánica a high brush-covered ridge follows the coast to the point where it ends in a high and prominent rocky bluff. A low break separates the point from Cerro Toro, 0.3 mile northeastward.

Cerro Toro is a hill with a bluff head, about 100 feet high, at its western end, and a gentle slope northeastward to the low part of Punta Verraco. On the southeast side there is a bright yellow spot in the bluffs. This hill and Punta Ventana usually show well.

Bahía de Ballena, is a bight extending about 1.3 miles to westward of **Punta Vaquero.**

Chart 929.—Bahía de Guánica, the harbor 8 miles westward of Bahía de Guayanilla, is small, but is one of the best hurricane harbors in Puerto Rico. The inner harbor has depths of 20 to 25 feet; the critical points are buoyed. The entrance, between Punta Pescadores on the west and Punta Meseta on the east, is 2.3 miles westward of Punta Criollo, and about 0.2 mile wide. From the entrance the harbor extends in a north-northwesterly direction for about 0.6 mile and then curves northwestward and westward for about a mile farther. The shores are steep, high, and wooded, except for the north shore which is low from the playa to Bahía Noroeste.

Cayos de Caña Gorda, the islets lying 2 miles eastward of Bahía de Guánica, extend 0.8 mile southwestward from **Punta Criollo.** They are low, covered with mangrove, and do not show well from seaward. Reefs partly bare at low water surround them to a distance of 0.3 mile.

Punta Brea, is the southeast end of the high peninsula included between Bahía Montalva and Bahía de Guánica. From the point the land rises by uniform slope to 260 feet. A shoal with 11 feet near its outer end extends about 0.2 mile southeastward from Punta Brea.

Ensenada las Pardas, the bay on the north side of Punta Brea, is open to the prevailing southeast wind and sea. The shore of this bay westward of Punta Pescadores is fringed with reefs, mostly bare at low water, which make out as much as 0.4 mile. Keeping Guánica Light bearing northward of 038° will clear the reefs. Reefs, partly bare at low water and on which the sea breaks, extend 0.7 mile from the north shore.

Prominent features.—The entrance to the harbor is easily identified by the points Punta Brea, on the west, and by **Punta Meseta,** on the east side. The latter point, which rises to an elevation of 463 feet in 0.7 mile, is marked by a light. **Punta Pescadores,** the western side of the entrance, has a bluff at the water.

Guánica Light (17°57.2′ N., 66°54.3′ W.), 132 feet above the water and visible 11 miles, is shown from a white skeleton tower on Punta Meseta. The approach to the harbor also is marked by a lighted range and lighted and unlighted buoys. The range bears **354½°.**

Boundary line of inland waters.—The line established for Bahía de Guánica is described in **§ 82.215,** Chapter 2.

Anchorage may be had throughout the harbor, according to draft; the bottom is soft and holding ground good except in the entrance. There is no current, and vessels swing to the wind. The usual anchorage, when waiting for a berth, is in depths of 22 to 25 feet a mile southeastward of the wharves.

Bahía Noroeste, the bay on the north side of **Punta Pera,** is about 0.5 mile in diameter, and affords anchorage for vessels drawing up to 15 feet.

Along the shore near Playa de Guánica there is a lighted promenade boulevard which is quite conspicuous upon entering the harbor. There is a drive and park along the east shore.

Dangers.—Arrecife Coral is an extensive coral reef, partly bare at low water, eastward of the entrance, about 0.9 mile from shore, and 0.5 to 1 mile westward from Cayos de Caña Gorda. The west end of the reef is nearly 1 mile southeastward from Guánica Light. Foul ground is between it and the north shore and Cayos de Caña Gorda.

Bajo La Laja, the shoal 0.9 mile southward from Guánica Light, is about 0.2 mile in diameter, and has 8 to 17 feet of water over it and 54 to 72 feet close to its south side. The sea seldom breaks, and there are usually no surface indications over it. From the shoal a ridge with depths of 22 to 24 feet extends over 0.3 mile westward, its west end lying 192° from the light. A deep channel extends between the western end of this ridge and a detached shoal, 0.6 mile east-northeastward from Punta Brea, with 20 to 26 feet over it.

A series of ridges, with depths of 28 to 30 feet, lie 0.6 mile southward of Punta Brea, and extends eastward to an extensive shoal on the eastern side of the approach. This shoal is 1 to 2 miles offshore, and has depths of 20 to 24 feet on its northern part to 28 to 30 feet on its southern part.

Directions.—Sailing vessels can enter the harbor at almost any time during the day as the trades draw in. The entrance is too narrow for a vessel to beat out, and sailing vessels can leave only during the early morning when there is usually a light land breeze. It is advisable to get underway at daylight, and get as far offshore as possible with the land breeze. If it falls calm after the

land breeze dies out before obtaining an offing, it is better to anchor than drift, as the sea sets almost continuously on the reefs and rocks on the Punta Brea side of the approach.

Vessels approaching from either direction bring Guánica Light to bear 000° when 2.5 miles off, and steer 354½° on the lighted range. A 23-foot spot north of Bajo La Laja lighted buoy can be avoided by giving the buoy a berth of about 150 yards on the starboard hand and then resuming the range course.

Winds.—The prevailing winds are the southeasterly trades, which are generally fresh during the day and draw into the entrance. At night the trade wind usually dies down near the coast, and a light breeze comes off the land.

Pilotage.—A local pilot is at Guánica; a lookout is generally maintained at the playa during daylight hours. The pilot meets ships beyond Bajo La Laja lighted buoy, and will take ships in or out at night.

The office of the captain of the port is on the southeast side of Playa de Guánica.

Quarantine, customs, immigration.—In the port is a representative of the Public Health Service who enforces national quarantine laws. Ships requiring quarantine inspection anchor inside the upper buoys southeastward of the long pier. Customs and immigration services are furnished by Ponce.

Hospitals.—A hospital is at the central at Ensenada, and a municipal hospital is in Guánica. Seamen requiring medical attention are sent to Ponce or San Juan.

Facilities.—Steamer wharves are located on Punta Pera. The 2 small wharves on the south side of the point together provide 1 steamer berth; a vessel goes alongside both when docking. There are pipeline connections for water, fuel oil, and molasses. The wharf extending off the east end of the point is equipped for handling sugarcane, has a 10-ton crane, a winch for handling cars, and a water pipeline. Both wharves have railroad connections and depths of about 22 feet alongside.

On the east side of the entrance is a reinforced concrete bulkhead wharf 440 feet long, an apron of about 30 feet, and a reported depth of about 25 feet alongside. A large factory building is on the north end of the wharf and alongside is a conveyor for loading bulk cargo. Neither lighters nor towboats are available.

At the mill there is ample warehouse storage for sugar, tank storage for molasses, fuel oil, water, and a bonded warehouse. A railroad (freight only) runs to Santa Rita, near Yauco, connecting there with the main line.

Small-craft landings and facilities are along the boulevard fronting the bight off Playa de Guánica. Some provisions and supplies can be obtained at Guánica and Ensenada.

Repairs.—In case of necessity, repairs to machinery can be made at the machine shops at the central.

Guánica, 0.3 mile northward of the playa, is a town of some commercial importance, with a few small stores. An improved highway leads westward to Ensenada and northward to Yauco.

Ensenada, a town built around the activities of Central Guánica, the largest sugar central in Puerto Rico, is on the western shore of Bahía Noroeste. The central has a store, hotel, and hospital which are for company use, but sometimes are made available to outsiders. Ice can be procured in limited quantities. Ensenada has telephone, telegraph, postal, and radio facilities.

Chart 901.—The 13.5-mile stretch of coast between Punta Jorobado and Cabo Rojo includes numerous cays, islets, and reefs, some of which extend as much as 4 miles offshore. The area is important as a commercial fishing ground; many small fishing boats base in the coves and fishing villages, principally **Parguera** at **Caleta Parguera** about 6.5 miles west of Punta Jorobado.

A range of high hills shows up inland for virtually the whole distance. The highest points are **Cerro Vertero,** 465 feet high, about 4.4 miles northwest of Punta Jorobado, and **Cerro Mariquita,** 990 feet high, about 6 miles northeastward of Cabo Rojo.

Punta Jorobado, about 2 miles westward of Punta Brea, is a small projecting point with a hummock 92 feet high. **Arrecife Baul** is a reef lying about 0.7 mile southeast of the point. **Cayo Terremoto,** about a mile westward of Punta Jorobado, is a sandy islet about 300 yards wide, surrounded by reefs. **Bahía Montalva,** the bay about 2.8 miles northwest of Punta Jorobado, offers some protection behind **Arrecife Romero** and **Arrecife Enmedio** for craft drawing up to 12 feet, but care is required in entering. **Cayo Corral,** an islet about 3.6 miles west of Punta Jorobado, is small and sandy, with shoals of 16 to 21 feet deep extending southeastward and southwestward.

Arrecife Margarita, about 9 miles west of Punta Jorobado, is about 1.5 miles south of **Punta Tocon,** and its western end is about 2 miles southeast of Cabo Rojo. Rocks awash and depths up to 28 feet are on this reef which extends nearly 4.5 miles in an east-west direction.

Cabo Rojo, the southwest point of Puerto Rico, is a low neck 1.5 miles long, at the southern end of which are two hills with yellow bluff faces. The eastern hill is 118 feet high. The western hill, 75 feet high, is marked on its summit by **Cabo Rojo Light (17°56.1′ N., 67°11.5′ W.).** The light, 121 feet above the water and visible 17 miles, is shown from a gray hexagonal tower on a flat-roofed dwelling on the southeast point of the cape. **Coastal (storm) warnings** are displayed, daytime only, at the light.

Punta Aguila, 1.7 miles northwest of Cabo Rojo Light, consists of 2 small bluff heads with lower land behind them. A shoal with depths of 12 to 16 feet extends 1 mile westward from the point. A windmill and some buildings of saltworks are about 0.4 mile northward of the point, and nearby is a boat landing for lighters and small craft to load salt.

Bajo Casabe is a shoal that makes off between Punta Aguila and Punta Melones. The 18-foot curve is about 0.4 mile from shore at Punta Melones. Depths of 24 to 42 feet are near the western edge, which is fairly steep-to; a buoy marks the western limit. A shoal with 22 to 28 feet extends westward from the southern part of Bajo Casabe, its western end lying about 2.7 miles west-northwestward from Punta Aguila.

Chart 932.—Bahía de Boqueron, about 6 miles northward of Cabo Rojo, is a good harbor for vessels passing through Canal Guanajibo. It is easily entered but is rarely used, except by small local boats. The better hurricane anchorage is at Guánica. The bay is 2.6 miles wide at the entrance between Punta Melones and Punta Guaniquilla, and extends 2 miles to its head where it is a mile wide. There are two entrances, north and south of **Bajo Enmedio,** the latter a shoal with depths of 5 to 17 feet which lies across the middle of the bay. A buoy marks its southern edge.

Punta Melones, the southerly point, is a bluff at the water's edge, backed by a hill 230 feet high. Punta Guaniquilla, the northerly point, is sharply projecting and prominent.

For 0.6 mile inside Bajo Enmedio the depths range from 27 to 35 feet. A ridge with depths of 19 to 23 feet extends in a north-and-south direction near the middle of the bay between Bajos Roman and Ramito. The depths east of the ridge decrease gradually from 26 to 12 feet.

Canal Norte is the channel leading into the bay between Punta Guaniquilla and the north end of Bajo Enmedio. It has a least width of about 350 yards, with depths of 21 to 28 feet. Owing to its nearness to the shore, this channel is easily followed and is the better one for strangers. **Canal Sur,** the south channel, leads between Bajos Enmedio and Palo. It is 350 yards wide between the 30-foot curves, with depths of 36 to 40 feet in the middle.

Anchorage can be had with soft bottom anywhere in the bay, except on the shoals where the bottom is hard.

Bajo Palo is a shoal that extends nearly 0.7 mile northward from the south shore of the bay, between 0.4 and 0.8 mile northeastward of Punta Melones. A depth of 5 feet is found about 0.3 mile from shore, and north of this the water deepens gradually from 8 to 13 feet at its north end. The west side of the shoal is steep-to.

Bajo Ramito is a small shoal with a depth of 8 feet and 20 to 24 feet close-to, about 0.5 mile from the south side of the bay, and 1.7 miles northeastward from Punta Melones. It is marked by a buoy. **Roca Velasquez,** a rock which should be avoided by all vessels, lies nearly 0.2 mile westward from the village of Boqueron. **Bajo Roman** is a small patch on which the least depth found is 18 feet, with a surrounding depth of 27 feet. It lies about 0.4 mile from the north shore and 1 mile southeasterly from Punta Guaniquilla.

Boqueron, a small settlement on the north side at the head of the bay, is principally a bathing resort for Mayagüez, and has a small fishing industry. The salt works are on the bay to the southward of the town. An improved highway extends eastward to Lajas and San German and northward to Cabo Rojo and Mayagüez, and a railroad extends to Lajas, there connecting with the main line.

Chart 901.—Canal Guanajibo, a buoyed passage inside the reefs between Punta Aguila and Bahía de Mayagüez, has a least depth of 18 feet at its northern end on the ridge extending northeastward from Escollo Negro. The least depth at the southern end of the channel is 23 to 24 feet on a bank making westward from Bajo Casabe. It is generally smooth in the channel.

The current in the channel floods southward and ebbs northward with a mean velocity at strength of about 1 knot. Daily predictions can be obtained through the use of table 2 of Tidal Current Tables.

Bajos Resuello, the shoals off the entrance to Bahía de Boqueron, consist of three shoals separated by channels having depths of 24 to 36 feet; the southern extremity of the shoals is westward from Punta Melones and is marked by a buoy.

Bajo Corona Larga consists of 2 shoals with depths of 25 to 54 feet between them. The northwest shoal, 1.3 miles long, is 4.5 miles westward from Punta Guaniquilla; it has a least depth of 12 feet at its north end. The southeast shoal is 1 mile long and has depths on the coral heads of 16 to 18 feet.

Punta Carenero, the north point at the entrance to Puerto Real, is low with many coconut trees, and at the water is a fringe of mangrove. **Punta Fuerte,** the south point of Puerta Real, is low and covered with coconut trees which extend southward to Punta Boca Prieta. A good anchorage in 36 feet is 0.5 mile westward of Punta Fuerte.

Puerto Real, a small fishing community, is on the north shore of the harbor; an improved highway leads to the town of Cabo Rojo, about 2.5 miles east-northeastward. A marine railway at Puerto Real can haul out small boats for minor repairs. Some provisions are obtainable; gasoline is supplied from Cabo Rojo.

Cerro Buena Vista, a hill 850 feet high, 4 miles eastward of Puerto Real, is a prominent and useful landmark for many miles, especially from westward. From that direction it shows a knob at the summit, with a steep convex slope on its north side.

Puerto Real, is a nearly circular basin about 0.7 mile in diameter. It is used almost exclusively by local fishing vessels, and affords a good harbor for vessels drawing up to 8 feet, with local knowledge. Depths are 10 to 15 feet, except toward its eastern end. A spot with 6½ feet lies in the middle 775 yards northeastward from Punta Fuerte. A village is on the north side.

Escollo Media Luna, a rocky patch with a least depth of 25 feet, is 7 miles northwest of Punta Guaniquilla. **Las Coronas** consists of a shoal of numerous heads with depths of 9 to 14 feet, the south end of which is 3.2 miles northwest of Punta Guaniquilla. The shoal extends 1 mile northward and 2.5 miles east-northeastward toward Punta Ostiones and, together with the shoals extending off that point, forms a ridge across Canal Guanajibo. The depths are 9 to 15 feet on the shoalest section of this ridge 3 miles west-southwestward from Punta Ostiones, and depths of 13 to 17 feet are along the center portion of the ridge.

Escollo Negro is the northern shoal on the west side of Canal Guanajibo. It is about 2.2 miles long in a northeasterly direction and about 1.3 miles wide. Depths are 7 to 12 feet. A buoy marks an 18-foot passage across this ridge into Canal Guanajibo.

Arrecife Tourmaline extends 5 miles westward from

Escollo Negro, with a width of 2.7 miles, its northwest end lying 9.2 miles westward from Punta Guanajibo. On the western and southern parts of the reef are depths of 30 to 42 feet, decreasing to 18 and 24 feet on its northeast part. A 30-foot spot off the northwestern end of the reef is marked by a lighted buoy.

Punta Ostiones, the point 9.5 miles northward of Cabo Rojo and 1.3 miles northward of the entrance to Puerto Real, is projecting and prominent, especially as seen from southward. **Cayo Fanduca,** 0.8 mile southwestward from Punta Ostiones and about 0.5 mile from shore, consists of a few bare rocks which seldom show water. A narrow channel between it and the shore has a depth of about 7 feet, but it should not be attempted by strangers.

Punta Guanajibo, 14 miles northward of Cabo Rojo, is a flat-topped short ridge, 165 feet high. A detached clump of trees is on the point as seen from southward. A reform school, located on the point, is surrounded by Australian pine and shows well from the southward only.

Chart 931.—Bahía de Mayagüez is an open roadstead about 17 miles northward of Cabo Rojo and about 10 miles southeastward of Punta Higuero. One of the three important commercial places of the island, the bay is easily entered day or night, and is a good harbor in any weather except a hurricane. Vessels of most of the trading lines call here, coming alongside the shipping terminal to load and discharge.

The harbor is 3.8 miles wide between Punta Guanajibo on the south and Punta Algarrobo on the north. Offshore it is protected by shoals extending across the mouth of the harbor in a general north-by-west direction from Punta Guanajibo. The distance inside these shoals to the beach at Mayagüez is about 2 miles. Several channels lead through these shoals. Inside the shoals the depths are 8 to 12 fathoms. The southern part of the harbor is shoal. The shore of the bay is a sand beach, and in its southern part there are lagoons and marshes.

Prominent features.—Cerro Anterior, 433 feet high, is a rather conspicuous saddle-shaped hill about 0.5 mile east of Mayagüez. **Pico Montuoso,** 2,297 feet high, is a conspicuous dome-shaped peak about 9 miles east of the beach, and is readily identified from westward. The clock tower at Mayagüez City Hall, which shows above the other buildings, is on the west side of the city plaza, opposite the church on the east side; both can be seen from the harbor.

Punta Algarrobo is a low point which projects but little. One of the large rocks off the point has been painted white and is conspicuous. A range of wooded hills extends eastward from the point, attaining an elevation of 265 feet at 0.7 mile from it.

Punta Algarrobito is the little point about a mile southeastward of Punta Algarrobo, at the north end of the town of Mayagüez. The light on top of the transit shed at Mayagüez Shipping Terminal marks the entrance channel into the ship basin. The light is 53 feet above the water. A red sector extends from 088° to 133° and the light is obscured from 133° to 313°. The dividing line of red and white sectors marks the centerline of the channel. The harbor and terminal channel are marked by a lighted range, and lighted and unlighted buoys. The range course is **109°.**

Boundary lines of inland waters.—The lines established for Bahía de Mayagüez are described in § **82.210,** Chapter 2.

Channels.—The principal channel entrance between Manchas Interiores and Manchas Grandes is about 0.4 mile wide with depths of 47 to 120 feet. It is marked by lighted buoys and the range. A natural channel leads into the bay from northward east of Manchas. It has a least width of a mile between Arrecife Algarrobo and Manchas Interiores, and depths of 18 feet or more. These channels into Bahía de Mayagüez are the only ones that should be used.

The Federal project for the inner channel provides for a channel 30 feet deep. In April 1956, project depths obtained except for 2 or 3 minor shoal spots at the edges.

Anchorage can be made in the bay anywhere off the line of the range with the rear light bearing between 122° and 064¼°, in depths over 20 feet. The usual anchorage for commercial vessels is southward of the range line, and from 0.5 to 1 mile offshore, in 20 to 30 feet, according to draft.

During ordinary weather, the harbor affords good protection. The anchorage area is considerably larger than in other harbors of Puerto Rico and the holding bottom is good. For hurricane anchorage, larger vessels prefer Guánica. Smaller boats can go to Puerto Real just north of Bahía de Boqueron.

Numerous small craft, both pleasure and commercial, frequent Bahía de Mayagüez. The usual anchorage is about 0.3 mile offshore and 0.5 to 0.8 mile south of the customhouse. Usual supplies can be obtained from the stores in Mayagüez and gasoline can be taken aboard alongside the shipping terminal wharf.

Dangers.—Manchas Exteriores, 2.2 miles west-northwestward from Punta Algarrobo, comprise a ridge 0.6 mile long in a north-northwesterly direction, and steep-to on its western side. The general depths on it are 16 to 17 feet, but a least depth of 12 feet is found near its southern end. The shoal is marked on its western side by a buoy. Broken ground, with general depths less than 36 feet, extends southeastward from the shoal to within 1 mile of the shore and then trends southward to Manchas Interiores. On this broken ground are numerous heads, some of which have depths of 12 to 21 feet.

Manchas Interiores, the shoals on the north side of the main entrance to the bay, are about 0.4 mile long, north and south, with depths of 15 to 18 feet. Heads with as little as 18 feet are northward of the shoal, the western and southern sides of which are steep-to. It is marked by the entrance lighted buoy.

Manchas Grandes, on the south side of the main entrance, are about 1.5 miles long in a southwesterly direc-

tion, and extend southward to Escollo Rodriguez. Least depths on the east, north, and west sides are 13 to 15 feet, but a depth of 12 feet is 0.25 mile southeastward of the lighted buoy, and 11 feet about 0.7 mile southeastward of this buoy. A lighted buoy marks the north end where depths are 19 to 21 feet.

Escollo Rodriguez, about 1.5 miles northward from Punta Guanajibo, is a bank about 0.4 mile in diameter. At its western end is a reef about 400 yards wide, which is awash and always breaks. The part of the bank east of the reef awash has depths of 6 to 9 feet, but at its north end is a small patch with 3 feet of water. A shoal with 9 to 14 feet of water in places extends northward to Manchas Grandes.

Arrecife Algarrobo, a reef 0.3 mile southwestward from Punta Algarrobo, is small, and has a few heads which show at low water. The sea frequently breaks on this reef. It is marked by a buoy.

Roca Blanca, is a small rock, has a depth of 9 feet over it with 40 to 60 feet close-to, and lies about 0.7 mile north-northeastward from the center of the reef awash on Escollo Rodriguez.

Bajo Mondongo, small and partly awash, lies from 300 to 600 yards westward of Punta Algarrobito.

Directions.—(Chart 901.) From southward, at a point 0.5 mile off Canal de la Mona east shoal lighted buoy 6, bearing 075°, steer **044°** for 6.7 miles, to abeam of Arrecife Tourmaline lighted buoy 8; then steer **060°** for about 8 miles to the lighted range bearing **109°**. Select anchorage according to draft. From northward, round Punta Higuero distant 2.3 miles until the light bears 120°, then steer **153°** for 10.1 miles. This will bring the vessel on the lighted range. If proceeding to the shipping terminal, leave the range when Manchas Grandes lighted buoy 2 bears about 252°, and when on the dividing line of the red and white sectors of the light, steer **088°** for the terminal light on the wharf.

Tides.—The tides are chiefly semidiurnal and have an average rise and fall of about 1 foot. Because of the small tidal range, the variation in the water level depends considerably upon the wind.

Currents.—The tidal currents set northward and southward across the entrance with an estimated velocity of about 1 knot at strength. These are not felt at the anchorage. Ships running from Bahía de Mayagüez to pass north of Arrecife Tourmaline lighted buoy 8 sometimes have been set down dangerously near the reef.

Coastal (storm) warnings are displayed, daytime only, at the customhouse.

Pilotage.—Local pilots are available. They meet the ship about a mile outside Manchas Grandes lighted buoy 2 and will take ships in or out at night.

No **towboats** are available in the port.

Quarantine, customs, and immigration.—A representative of the quarantine service enforces national quarantine laws. Vessels subject to inspection are boarded at anchor.

The customhouse and customs warehouse are at Mayagüez Playa. The deputy collector in charge acts as immigration inspector and shipping officer. Marine documents are issued at Mayagüez.

Hospitals.—At Mayagüez there are the municipal hospital, a new district hospital, and several private hospitals, but no marine hospital. The nearest Public Health facilities are at Ponce and San Juan.

Port facilities.—The Mayagüez Shipping Terminal, a public service corporation, is located in the northern part of the harbor; it is the only place in Mayagüez where vessels can come alongside; vessels drawing up to 30 feet can dock here. Twenty-four hours' notice should be given.

The bulkhead wharf is of reinforced concrete over 1,200 feet long with a 20-foot apron; it affords berthing space for three vessels of the type ordinarily using the port. The transit shed is 800 feet by 60 feet. There are pipelines for water, fuel oil, molasses, and gasoline. Truck tractors, trailers, finger-lift tow motors, and conveyor belts are the mechanical facilities for handling cargo. Tank storage for molasses, fuel oil, and gasoline is available close by the terminal.

Port administration.—The **Captain of the Port (Capitan)** has charge of the enforcement of all rules and regulations pertaining to the port. The Mayagüez Shipping Terminal is administered by a manager.

Supplies and repairs.—Diesel oil, fuel oils, gasoline, lubricants, provisions, ice, lumber, and some ship chandlers' stores can be obtained. Machine shops in Mayagüez are equipped to do foundry work and electric welding.

Mayagüez extends nearly 2 miles inland from the eastern end of the bay; the city plaza is about 0.8 mile east-southeastward from the customhouse. The commerce of the port consists principally of the receipt of foodstuffs, building materials, petroleum products, machinery, fertilizers, and textiles, and the shipment of sugar, molasses, clothing, embroidery and needlework, fruit, and vegetables. Both the insular railroad system and the coastal highway pass through Mayagüez; improved highways also lead to Maricao and San Sebastian. San Juan is 118 miles distant by the coastal highway. Mayagüez has numerous stores, several good hotels, telephone, telegraph, and postal facilities.

Chart 901.—Bahía de Añasco, about 3 miles north-northwest of Punta Algarrobo, is somewhat foul in the northern part for about a mile from shore. There are shoals with 16 to 17 feet over them inside the 10-fathom curve. A tall concrete stack at Central Igualdad, about 1.8 miles inland, is prominent. Several rivers empty into Bahía de Añasco, the largest of which is **Rio Grande de Añasco**; the entrances of these rivers show as breaks in the coconut groves.

Punta Cadena, together with the **Cerros de San Francisco** extending eastward, is quite prominent. The hills are dome-shaped, sloping upward to **Pico Atalaya**, a peak 1,187 feet high, the western knob of the highest part of a short ridge which is about the same height as the peak.

Arrecife Peregrina, a reef with least depths of 8 to 14 feet, makes out obliquely from the shore southward of Corcega to about 0.6 mile southwestward of Punta Cadena. The reef is in the form of a ridge, and its edge is steep-to; the lead cannot be depended on to keep clear of it.

From Punta Cadena to Punta Higuero, a distance of about 4.3 miles, the coast consists of a narrow strip of lowland fringed with coconut trees and backed by rolling hills. Many rocks and coral reefs extend 0.4 mile offshore. When approaching the coast the depths change suddenly from 100 fathoms to 5 fathoms and less within 0.5 mile. The water is clear, and shoal spots can generally be seen in the daytime by a change in the color of the water. A surf is always on the beach; places for boat landings can be found in ordinary weather, but it is dangerous in rough weather.

14. VIRGIN ISLANDS

The **Virgin Islands of the United States,** separated from the easternmost island of the Puerto Rico group by 8-mile-wide Virgin Passage, include the islands of St. Thomas, St. John, and St. Croix and about 40 small islets or keys. The islands were purchased from Denmark in 1917, and United States citizenship was conferred upon the islanders in 1927. Under the revised Organic Act of 1954, legislative powers are vested in a Senate, whose members are elected by the islanders for 2-year terms. The Governor, who has certain veto powers, is appointed by the President of the United States. The capital is Charlotte Amalie, on the island of St. Thomas.

The **British Virgin Islands** are north and east of the United States group. The United States-Great Britain boundary extends southeastward between Hans Lollik and Little Tobago Islands, thence through the narrows between St. John and Tortola Islands, and thence southward through Flanagan Passage between Flanagan and Norman Islands.

Making the Virgin Islands from the north, Virgin Gorda (British) will be seen on the extreme left, rising in a clear, well-defined peak about 1,400 feet high. Next to Virgin Gorda, Tortola (also British) will appear most conspicuous; the highest mountain appears flattened and elongated from northward but rises to an elevation of about 1,800 feet. Immediately westward of Tortola will be seen the rugged, pointed peaks of Jost Van Dyke (British), rising to about 1,100 feet, and behind them the irregular small peaks rising from the tableland of St. John (U. S.) to heights of 800 to 1,300 feet.

From about 20 miles northward of the islands, a separation will be observed between St. Thomas and St. John, but St. John, Jost Van Dyke, Tortola, and Virgin Gorda will appear to be one large island. St. Thomas is less rugged in outline than the other islands, but it may be recognized from its large midisland saddle which has horns nearly 1,600 feet high; the saddle is equally conspicuous from the south.

Boundary lines of inland waters.—Specific lines are described in **Part 82, Chapter 2.**

Routes.—From Charlotte Amalie to Straits of Florida, proceed through Virgin Passage and thence as direct as safe navigation permits along the north coasts of Puerto Rico and Hispaniola, and then along the north coast of Cuba through Old Bahama and Nicholas Channels to destination. The distance is 1,086 miles.

Bound to Baltimore, New York, or Boston, pass westward of Sail Rock and, when clear of Virgin Passage, take a great circle course direct to destination. Distances from Charlotte Amalie are 1,418 miles to Baltimore, 1,435 miles to New York, and 1,517 miles to Boston.

Tides.—The periodic tides around the Virgin Islands are very small, the average rise and fall being about 1 foot. Along the coasts bordering the Atlantic Ocean the tide is chiefly semidiurnal, and along the Caribbean shores it is mostly diurnal.

Currents.—The currents among the Virgin Islands, although of considerable importance to navigators, are not well established by observations. The tidal current is said to set southeastward for 6 hours before the local transit of the moon and northwestward for 6 hours after the transit. In the general vicinity of the islands there is, at all seasons of the year, an oceanic current which has an average velocity of about one-fourth knot and a direction varying from northwestward to westward.

Weather.—The weather of the Virgin Islands is similar to that of Puerto Rico; see Chapter 13. A climatological table for St. Croix is included in the Appendix.

Pilotage.—At Charlotte Amalie, vessels of and above 100 gross register tons must engage or pay for the services of a Government pilot in order to enter, leave, or shift berth in the harbor. Public vessels duly commissioned by the United States or foreign governments are exempt.

Quarantine.—As in Puerto Rico, national quarantine laws are enforced in the Virgin Islands of the United States by officers of the United States Public Health Service; see Chapter 13.

Customs.—The customs collection district of the Virgin Islands is under the jurisdiction of the United States Department of the Treasury but has its own customs laws. An import duty of 6 percent, ad valorem, is imposed on all foreign goods coming into the islands. Imports from the States enter free of duty. There are no trade barriers between the islands and the States.

Terminal facilities.—Charlotte Amalie has a bulkhead wharf that can accommodate large vessels. Cargoes usually are lightered ashore in the other ports.

Supplies.—Coal, fuel oil, water, ice, provisions, and some ship chandlery are available at Charlotte Amalie.

Repairs.—Charlotte Amalie has machine shops and a small marine railway.

Communications.—The three big islands have highways and local telephone systems. These islands also are served by cable and radiotelephone.

Currency.—The monetary unit is the United States dollar.

Standard time.—The Virgin Islands of the United States use Atlantic standard time, which is 4 hours slow of Greenwich mean time.

Chart 920.—Most of the Virgin Islands are situated on the southern side of **Virgin Bank** which extends in an east and east-northeasterly direction for 86 miles from

the eastern end of Puerto Rico. For about 50 miles the bank trends eastward, averaging 25 miles in width, and then swings slightly east-northeastward, increasing in width to 32 miles. It terminates close beyond the southeastern extremity of Anegada Island in a point several miles wide.

The bank is an ocean shelf, with abrupt drops in depths near its edges. On the northern side of the island group, westward of 64°40′ W. and within half a mile of the islands, the general depths range from 18 to 40 fathoms except for the outlying banks. Eastward of this line, the depths gradually decrease until soundings of 6 fathoms are found about 0.8 mile off the western end of Anegada Island. On the southerly side of the island group, the depths differ considerably from those on the northern side. The southerly side is bold and wall sided, and lies from 1 to 7 miles off the islands; general depths of 8 to 33 fathoms are found in this area. Close within the outer edge of the bank is a narrow ledge of coral that extends almost unbroken from Horse Shoe Reef, at Anegada Island, to Isla de Vieques. This ledge, about 200 yards wide, has depths of 11 to 19 fathoms.

Turtle Head, a coral reef covered by 6 fathoms, is about 10 miles northward of Jost Van Dyke Island and 13 miles northwestward of Tortola Island. **Whale Banks,** about 13 miles northward of Tortola Island and 15 miles westward of Anegada Island, are two patches with depths of 12 to 20 fathoms on the northern bank and a least depth of 10 fathoms on the southern bank. **Barracouta Banks,** about 8 miles northwestward of Jost Van Dyke, consist of several patches covered by 11 to 20 fathoms. **Kingfish Banks,** about 5 miles north-northeastward of Jost Van Dyke Island, are 2 coral patches with 8 fathoms over them.

Chart 904.—Virgin Passage is 8 miles wide between Savana Island and Isla Culebrita, with depths of from 11 to 17 fathoms in the southern part and up to 27 fathoms in the northern. It is clear except for Bajos Grampus on the southwestern side and Sail Rock on the southeastern side.

Tidal currents.—In the middle of the passage the tidal current sets southward and northward with a velocity at strength of about one-half knot. On the eastern side of the passage near Savana Island the velocity increases to about 2 knots.

Chart 905.—Sail Rock, on the easterly side of Virgin Passage about 7.6 miles east-southeastward of Isla Culebrita, is so called from its resemblance to a vessel under sail. It rises precipitously from the sea to a height of 125 feet. It is about 100 yards in diameter, quite barren, and light gray in color. It is steep-to on all sides, but a rock awash is about 200 yards westward of the islet. A light, 125 feet above the water and visible 10 miles, is shown from the summit on a gray stone foundation.

St. Thomas Island, commercially the most important of the Virgin Islands of the United States, is 34 miles east of Puerto Rico. It is 12 miles long and from 1 to 3 miles in width. A lofty ridge extends along its whole length. **Signal Hill,** nearly in the center of the island, is 1,504 feet high, and **Crown Mountain,** 1.7 miles to the westward, is 1,550 feet high. On the summit of Crown Mountain is a square steel tower 60 feet high; 2 fixed red lights are on top.

The western half of St. Thomas presents the appearance of a steep ridge sloping precipitously to the north and the south, with numerous ravines widening at their lower ends into small tracts of level land on the seacoast. Between these level tracts the coast is usually bold with rocky promontories of considerable height. Crown Mountain, **Hawk Hill,** 1,370 feet high, and **Fortuna Hill,** 910 feet high, the principal hills, are flat-topped and plateaulike, while the minor hills are for the most part dome shaped. The country is almost entirely wooded, the region west of Perseverance Bay presenting a forestlike appearance of a thick growth of trees, shrubs, and vines.

The eastern end of St. Thomas has the appearance of two main ridges, separated by a large basin, which slope to the northward and southward with numerous smaller ridges and spurs making off from them. St. Thomas is almost surrounded by small islands and cays, in general bold and steep-to, with very few hidden dangers to guard against.

Savana Island, 2 miles west-southwestward from the western end of St. Thomas, is nearly a mile in length and 0.5 mile in width. The island is covered with a dense growth of vines, small trees, and underbrush. The entire northwest shore is bold and precipitous with rock cliffs rising abruptly from the water's edge to as much as 120 feet. **Din Point** is a bold dark headland, with cliffs 80 to 100 feet high, at the northwest extremity of the island. The southeastern shore of the island is generally rocky with short stretches of gravel beach in the bights. A depth of 26 feet is south of the southeastern point of Savana Island and a depth of 34 feet is off the northeastern side of the island. Just north of **Virgin Point,** the southwestern extremity of the island, the cliffs are of a crushed rock and sandstone formation and from offshore appear as red cliffs. Detached rocks extend 200 yards southward of Virgin Point. **Domkirk Rock,** a crag with twin steeple-shaped pinnacles which resemble a cathedral, is 100 yards southeast of Virgin Point. Some rocks 8 to 10 feet high and steep-to are on a sunken ledge which extends about 700 yards off the northeastern point.

The currents in the vicinity of the northeastern point are very strong and small boats should give the reef a wide berth. Boat landings may be made only in smooth weather.

Kalkun Cay, in the middle of **Savana Passage,** is a narrow islet, 275 yards long and about 20 to 30 yards wide, which is covered with grass and small underbrush. About 0.5 mile southeastward of the cay is **Saltwater Money Rock,** 8 feet high, steep-to, with a clear channel between.

Little St. Thomas is a low grass-covered peninsula connected with the west end of the island of St. Thomas by a sandspit. A hill 50 feet high is near the northeast point and a bluff 21 feet high is at the southern end.

Little St. Thomas Bay is a small gravelly cove on the south shore of Westend of St. Thomas, just south of Little

St. Thomas. Small boats stay here when the sea is too rough to land at Sandy Bay or Botany Bay. **Mermaids Chair,** 15 feet high, is a conspicuous rock, and has the shape of a chair at the apex of a triangular coral reef projecting from the southwest point of Little St. Thomas. An islet, 42 feet high, lies 100 yards northward of and is separated from Little St. Thomas by **Little Current Hole,** a boat passage.

Big Current Hole is a passage separating West Cay from Little St. Thomas. There are rocks awash extending easterly from West Cay; the outer one, **Drum Rock,** 2 feet high, constricts the channel, and strong currents and heavy tide rips render the passage difficult. Small boats using this passage, when passing through from southward, head for Drum Rock and leave it close-to on the port hand.

West Cay, 0.2 mile northwestward of Little St. Thomas, consists of 2 hills, 121 and 114 feet high, connected by a neck of low land. The small stretch on the eastern side of the cay is gravel. Landing may be made in the bight on the southern side.

Salt Cay, 242 feet high and 0.6 mile northwestward of Little St. Thomas, is generally rocky and rugged, particularly on the north coast where cliffs rise precipitously to 100 and 150 feet high. Many rocks awash are close-to on the southwest, west, and east sides of the cay. The channel between Salt Cay and West Cay is shallow and breakers extend across it.

Salt Cay Passage is about a mile wide, with deep water in the channel, and is free of dangers.

Dutchcap Cay, a mile northwestward of Salt Cay, rises abruptly from the sea to 278 feet high, with cliffs 100 feet high on the north shore.

Cockroach Island, 3.3 miles north-northwestward from the west end of St. Thomas Island, and **Cricket Rock,** 0.5 mile east-northeastward from Cockroach Island, are the northernmost features lying to the northwest of St. Thomas. Cricket Rock is 46 feet high, bold, and steep-to, with sharp pinnacle rocks on top. Cockroach Island, 151 feet high, is of irregular shape; the south shore is bold and precipitous, with white rocky cliffs rising abruptly from the water's edge to a height of 100 to 120 feet. The north shore is rocky, with cliffs back from the shore rising to a height of 70 to 80 feet, and indented by numerous small bights and crevices.

Dutchcap Passage, just southward of these islands, is free of dangers.

Currents.—In navigating the passages between this group of islands it is necessary to guard against the tidal currents, which in Savana Passage run with a velocity of 3 knots and in the others about 1 knot. Sailing vessels beating up against the northgoing current should stand well to southward of Savana Island, so as to avoid the strength of the inshore current.

North Coast of St. Thomas.—The shoreline of Little St. Thomas is generally low, with gravel and broken coral rocks in the bights and rock and sandstone bluffs at the points. **Sandy Bay** and **Botany Bay** are shallow bights separated by a rocky point on the westerly point of St. Thomas. A large banana plantation is at the head of Botany Bay. Sandy Bay has a fine sand beach while Botany Bay has a fringing coral reef, bare at low water.

Stumpy Point is about 2 miles east of Botany Bay, along a shore which is rocky at the points with bights of sandy beaches. **Santa Maria Bay,** nearly a mile wide between Vluck Point and Stumpy Point, has depths of 4 to 7 fathoms; it affords fair shelter, but is seldom visited being exposed to the rollers.

From **Vluck Point** to Dorothea Point, the coast trends eastward for 1.8 miles, with no prominent points or bays, the points for the most part being rocky and rounding and the bays shallow. Almost the entire length of beach is fringed with a coral reef, usually bare at low water. Landings through breaks in the reef may be made in **Caret Bay** and **Neltjeberg Bay.**

Lizard Rocks are about 0.7 mile off the north shore of St. Thomas and about 0.8 mile north of Vluck Point. There are 6 rocks bare at high water, the largest being 14 feet high.

Brass Islands are off the northern side of St. Thomas, about 4 miles from its western end. The 2 islands are each about 0.8 mile long and 700 yards wide; Inner Brass is 256 feet and Outer Brass 412 feet high. Between Inner Brass and St. Thomas there is a 3¾-fathom channel, and between the 2 islands are 8 fathoms of water.

Inner Brass Island has a generally rocky shore, with reefs extending off as much as 300 yards on the eastern side. There are detached rocks and rocks awash within that area. Northwestward of **Boulder Point,** the southern tip, is a fine sand beach with a fringing coral reef. There are several breaks in the reef through which small-boat landings can be made. A well-sheltered anchorage for local boats is about 0.5 mile from shore, with **Fish Point,** the northwest tip of the island, bearing about 008°.

The eastern shore of **Outer Brass Island** is bold and precipitous with rocky cliffs rising vertically from the water. From **Grasklip Point,** the southeastern end, westward and northwestward the shore is rocky and slopes up uniformly. **Cave Cove,** on the rocky irregular western shore, has a large cave opening into it. **Rough Point,** the northern extremity, is sharp and jagged. A 16-foot spot lies 330 yards west of Rough Point.

Ornen Rock, with about 6 feet of water on it, is a mile eastward of Inner Brass Island and 0.5 mile from Picara Point. **Hull Bay,** between **Dorothea Point** and **Tropaco Point,** is shoal. It is used to some extent by fishermen.

Magens Bay is the only important bight on the north shore of St. Thomas. It is 1.6 miles in length and 0.6 mile wide. Its eastern side is formed by a long, narrow tongue of land, which terminates to the northwestward at **Picara Point,** nearly midway between Hans Lollik and the Brass Islands. However, it is open to the northwestward, and consequently exposed to the rollers. It is safe only for small vessels. In entering care must be taken to avoid Ornen Rock.

The depth in the bay varies from 5 to 12 fathoms, but in the southern portion there is a bank of 1¼ fathoms, extending 0.3 miles from the shore, surrounded by depths of 2 to 3 fathoms. A fine sand beach is at the head of

Magens Bay. **Reseau Bay** and **Lerken Bay,** small bights on the west shore of Magens Bay, are used by fishermen to beach their boats.

Hans Lollik Island, 713 feet high, 1.3 miles long and about 0.8 mile wide, is 1.8 miles northeastward of Picara Point. The western side of the island is precipitous and rocky, except in a bay on the west which has a gravel beach. **Camp Bay,** on the southeast face, is protected by outlying reefs, through which small boats make the beach. **Hansa Rock,** close inshore at the south point, is 19 feet high. **Hans Lollik Rock,** awash and on which the sea always breaks, is over 0.3 mile east-southeastward of the southern point of Hans Lollik Island.

Little Hans Lollik Island is 0.2 mile northward of Hans Lollik Island and connected with it by a coral ledge over which the sea breaks. There is an opening in the reef. The shoreline consists mostly of rocky cliffs from 20 to 60 feet high. **Steep Rock,** the only detached rock on the eastern shore of the island, is 25 feet high.

Pelican Cay, 200 yards northward of Little Hans Lollik Island, is a grassy islet 20 feet high. Between the two are several rocks awash, and a reef over which the sea breaks is close northeastward of Little Hans Lollik Island. With the exception of those dangers, the channels on either side of the Hans Lollik group are clear.

From Picara Point the shore trends east-southeastward for 7 miles to Cabrita Point, the eastern point of St. Thomas. There are several small bays along this coast all open to the prevailing easterly winds.

Chart 938.—Mandal Bay, 3 miles eastward of Picara Point, is shoal, with a sandy beach at its head. In the interior is a large salt pond, separated from the beach by mangroves. The shoreline between Picara Point and Mandal Bay is precipitous, with vertical cliffs, in some places 200 feet high. **Mandal Point,** just eastward of the bay, is 277 feet high, with cliffs 100 to 120 feet high at the water's edge. A reef which generally breaks is close northeastward. A 23-foot spot is 0.3 mile eastward from Mandal Point.

Coki Point, 1.9 miles east-southeast of Mandal Point, is 47 feet high. It forms the northern shore of **Water Bay.** A conspicuous cone-shaped hill 235 feet high is just south of Water Bay. **Thatch Cay,** about half a mile northward of Coki Point, is 1.6 miles long. The island is in the form of a ridge, 482 feet high near the eastern end. **Bull Point** and **Mother East Point** are prominent projecting points on the north side. **Lee Point** is the western point and **Grouper Point** the eastern point of the island. **Grass Cay,** 0.5 mile eastward of Thatch Cay, is 0.8 mile long. The north shore consists of rocky cliffs in places 150 feet in height. A narrow rocky ledge, 12 feet at its eastern end, is close to shore near the west end, and a rock awash is 150 yards westward of the same point.

Turtleback Rock, 2 feet high, is off the entrance to Water Bay, on St. Thomas Island. **Cabes Point** is a low rocky hook 1 mile southeast of Coki Point. **Shark Island,** 32 feet high, is about 0.3 mile east-southeastward of Cabes Point. Northeastward of it are several rocks, the highest being 11 feet. Foul ground encircles the island.

Redhook Bay, between Cabrita Point and **Redhook Point,** consists of a southern arm called **Muller Bay** and the western arm **Vessup Bay.** A concrete wharf about 60 feet long with a depth of about 9 feet at its end is on the north side of Redhook Bay. It is a terminal for boats going to St. John. Gasoline, lubricating oil, water, and some provisions are available. Repairs to small-boat hulls and engines can be made.

Cabrita Point, the eastern end of St. Thomas, rises to a height of 210 feet. A neck of land joins the remainder of St. Thomas. A 24-foot spot lies 0.6 mile east-southeast of Cabrita Point.

Mingo Cay, about 2.1 miles northward of Cabrita Point, is 186 feet high. Between Mingo and Grass Cays there is a narrow shoal passage with a bare rock 15 feet high close to the middle. **Lovango Cay** is eastward of Mingo Cay, and separated from it by a shoal passage 300 yards wide. Several houses are in a bight along the south shore between **Murder Rock** and the southwestern point. **Blunder Rocks,** 250 yards eastward of Lovango Cay, are 4 feet high. **Congo Cay,** a narrow pointed cay northward of Lovango Cay, is separated from it by a channel with depths of 14 feet. **Carval Rock** is 0.3 mile eastward of Congo Cay. There are several smaller rocks between it and the cay.

Pillsbury Sound is the body of water between St. Thomas, St. John and the Cays previously described, which bound the sound on the northern side, forming an excellent roadstead about 2 miles in extent east and west and 1.5 miles north and south. This area is quite secure against rollers and all winds except from the southward which blow only in the hurricane months. The current in it, however, attains a velocity of 2 knots.

The depths in the sound are somewhat irregular, varying from 48 to 100 feet. All the main passages leading to it are deeper than the mean depth of the sound itself.

Two Brothers are 2 small barren rocks, 10 feet high, lying in the middle of the sound. A ledge extends off their northeastern side, deepening to 30 feet at a distance of 250 yards.

About 0.8 mile westward of Cruz Bay is an anchorage in the southern part of the sound in 66 feet, sand and mud, with the center of Two Brothers in range with the western point of Grass Cay, and Dog Rocks open westward of Steven Cay; also in about 60 feet 0.5 mile northeastward of Two Brothers.

A vessel may approach the anchorages in Pillsbury Sound by the Southern Passage between Steven Cay and St. John Island, but it cannot be recommended to sailing vessels on account of the baffling winds under the high land. Current velocities up to 4 knots have been reported in the vicinity of Dog Island. The passage westward of the cay is a mile or more in width, with depths of not less than 85 feet.

Windward Passage extends between Lovango and Durloe Cays; it is 0.3 mile wide. **Durloe Cays,** within the entrance, cannot be mistaken. On the western side of the channel are Carval Rock and Blunder Rocks. Vessels of deep draft may take the passage between Lovango and Durloe Cays. The pilotage is simple; every danger can

be seen. If the wind dies, sailing craft may anchor at any time; the bottom is rocky in less than 60 feet. In this channel, with the northeastward current running against the wind, there is a race which appears like broken water. Through Durloe Cays and between them and Hawksnest Point on St. John Island are deep and clear passages, but these are not recommended.

Between Lovango and Mingo Cays is an 18-foot boat channel; it is narrow and the tidal current in it is strong.

Middle Passage, between Grass and Thatch Cays, is about 0.3 mile wide, and presents no difficulties to steamers, the only danger being a small rock awash nearly 200 yards westward from the west end of Grass Cay, which is easily seen. Sailing vessels generally use this passage in leaving the sound. It may be entered from the northward even on the ebb, provided the trades have not too much of a southerly slant.

Leeward Passage, between Thatch Cay and the northern side of St. Thomas, is about 0.4 mile wide, with depths of 70 feet or more.

Currents.—Tidal currents with velocities up to 4 knots in Middle Passage and Windward Passage, and weaker currents in Leeward Passage, have been reported.

Water Point is the end of a moderately high peninsula separating Great Bay from Cowpet Bay, the two bays which indent the coast of St. Thomas between Cabrita Point and Deck Point. **Great Bay** has depths of 30 to 60 feet. **Cowpet Bay,** an arm of St. James Bay, is shoal, but well protected. **Deck Point** terminates in rocky cliffs, 40 to 60 feet high, north of which is a hill 142 feet in height.

Great St. James Island is about 0.6 mile southerly of Cabrita Point, and **Little St. James Island** lies off the southerly part of Greater St. James. A third and smaller island is **Dog Island,** southeasterly of Little St. James. All three are rugged, with cliffs fronting much of the shores. **Welk Rocks,** with maximum height of 10 feet, are about 0.3 mile east of Great St. James. **Dog Rocks,** about 9 feet high, are close off the easterly point of Dog Island. **The Stragglers** are rocks off the southwest point of Great St. James Island. **Fish Cay,** a small islet 21 feet high with 2 adjacent boulders, is about 300 yards west of Great St. James Island.

Current (Passage) Hole, between Water Point and Great St. James Island, has least depth of only 9 feet on the Water Point side of **Current Rock,** 13 feet high, but a draft of 23 feet can be carried through a channel not quite 100 yards wide east of the rock. The rock is marked by a light.

Currents.—The tidal current sets southward and northward through Current Hole with a velocity of 3 knots or more at strength.

St. James Bay, between the eastern end of St. Thomas Island and Great St. James Island, provides secure anchorage, except in hurricanes, in depths of 36 to 50 feet, sheltered from all points but southwest. **Cow Rock,** 9 feet high, is the western one of a group of rocks in the southern approach to the bay. Close eastward on the same reef is **Calf Rock,** 3 feet high.

From northward, vessels entering St. James Bay should pass 0.3 mile southeastward of Cabrita Point, and then steer **222°** until up to Current Rock; it is best to pass westward of the rock through the deeper water. From southward, give The Stragglers a berth of 100 yards. Anchor where convenient. Sailing vessels when using the pass should await a northward current and a steady breeze to enable them to stem the current.

Dog Island Cut extends between Dog Island and Little St. James Island. There is 6 to 10 feet available except for a 7-foot spot in the northern approach; only small boats or launches should use this cut. A depth of 20 feet may be carried through **St. James Cut** between Great and Little St. James Islands.

Jersey Bay, westward of St. James Bay, indents the coast between **Compass Point** and **Patrick Point,** the southeastern extremity of **Patrick Cay. Rotto Cay,** 0.1 mile southward of Compass Point, is 33 feet high and covered with a scrubby growth. **Coculus Rock,** a group of bare rocks, is 350 yards eastward of Rotto Cay, and a small detached mangrove swamp is the same distance northwestward. **Cas Cay (Cas Island),** in the southern approach, is 0.2 mile northeastward of Patrick Point. It is 0.4 mile long, narrow, and 99 feet high at its eastern end.

Long Point, the terminus of a high prominent ridge westward of Jersey Bay, consists of rocky cliffs 40 to 50 feet high. **Bolongo Bay,** 1.2 miles west-northwestward of Long Point and close to **Coculus Point,** is a small shoal bay at the head of which is a coconut grove and a valley reaching inland.

Packet Rock, a coral shoal about 100 yards in extent with a depth of about 5 feet, lies 0.7 mile west-southwestward of Long Point. The sea breaks over the rock only in heavy weather, and it cannot be seen until close-to. A buoy is 300 yards south-southeast of the rock. Another rock, with a depth of 8 feet, lies 0.2 mile offshore and about 0.3 mile southwestward of Coculus Point.

Capella Islands, of which the westernmost is **Buck Island,** lie 2 miles southward of Coculus Point, and constitute a prominent landfall for making St. Thomas Harbor. The two small islands, of irregular outline, are partially covered with a scrubby growth and separated by a narrow channel almost closed by numerous uncovering rocks. A light, 125 feet above the water and visible 12 miles, is shown from a white tower on the highest point of Buck Island, near its easterly end. A shallow ledge extends 100 yards off the western end, and off the northern side the depth is 30 feet. At the head of the southwest bight is a small wharf and boat landing.

Between Capella Island and St. Thomas Island the currents are weak.

Chart 905.—Frenchcap Cay is about 3.6 miles southeastward of Buck Island, and, like Buck Island, is a useful landfall for making St. Thomas Harbor. It is 350 yards long and 183 feet high, and is covered with grass and steep-to. The shoreline for the most part consists of high rocky cliffs.

Chart 933.—St. Thomas Harbor, the most important harbor and one of the best in the Leeward Islands, is the

only sheltered harbor in the Virgin Islands that can be entered by deep-draft vessels. Located on the south coast of St. Thomas Island, 10 miles eastward of Sail Rock and 7 miles northwestward of Frenchcap Cay, it is the harbor for the town of Charlotte Amalie. Because of its strategic location on the direct steamer lanes between Europe and Central and South America, and between North and South America, St. Thomas Harbor is one of the important Atlantic fueling stations.

The harbor is open to the south and surrounded on its other three sides by high hills. It is entered between Muhlenfels Point on the east and Cowell Point on the west. **Scorpion Rock,** a submerged shoal with a least depth of 23 feet midway between these headlands, is marked by a buoy.

The entrance range leads on a straight reach from the sea to the inner harbor, passing close eastward of Scorpion Rock. Between Rupert Rock and Frederik Point, the entrance is scarcely 500 yards wide; thence it spreads out on either side into a basin about 0.7 mile in diameter. Although of small extent, the harbor is well protected and perfectly safe except during a hurricane. As it is open to southward, it provides convenient access in the prevailing northeast trade winds.

Prominent features.—Signal Hill, 1,504 feet high, the second highest peak on the island, is about a mile northwest of the harbor. From it the main ridge extends east-southeastward, passing less than 0.5 mile northward of Charlotte Amalie. From this ridge three spurs extend southward toward the harbor. The town is built around these spurs, and from off the entrance they appear quite conspicuous. **Frenchman Hill,** the western spur, is 165 feet high. The center one, **Berg Hill,** is 295 feet high and has a square white building on its southern slope near the top. On the eastern spur, **Government Hill,** 205 feet high, stands **Blackbeard Castle,** a remarkable stone tower 47 feet high. To the eastward of the town, **Bluebeard Hill** rises abruptly from the shore at **Frederiksberg Point** to a height of 224 feet; on its summit is **Bluebeard Castle,** an old stone tower 34 feet high.

Berg Hill Range marks the entrance channel. The prominent white catchment area on the west side of the hill helps in picking up the range in the daytime. The range lights, powerful and high above the water, can be seen on the range line only, but have been seen as much as 19 miles seaward. The course is **344°**.

Muhlenfels Point, the easterly entrance point, is the site of a light and the former quarantine station. **Muhlenfels Point Light (18°19.3′ N., 64°55.4′ W.),** 121 feet above the water and visible 7 miles, is shown from a cylindrical tower painted orange. A group of brown buildings on a ridge back of Frenchman Bay are sometimes mistaken for the old quarantine station which they somewhat resemble.

Hassel Island, 0.8 mile long with an average width of 0.2 mile, is high and prominent, and forms the westerly side of the harbor. Along its northeast side are old docks, now mostly in ruins. **Careening Cove** indents the eastern shore. An old fort is on **Frederik Point,** the easterly point of the island. **Cowell Point** is the southern end of a ridge sloping up to Cowell Battery, the highest point on the island. On **Gallows Hill,** at the west end of Charlotte Amalie, there is a conspicuous white church which shows up well from West Gregerie Channel.

Boundary lines of inland waters.—The lines established for St. Thomas Harbor are stated in **§ 82.235,** Chapter 2.

Channel.—The entrance channel into St. Thomas Harbor passes westward of Muhlenfels Point and close eastward of Scorpion Rock. A buoy marks a 17-foot shoal about 300 yards east-northeastward of Scorpion Rock and about 450 yards northwest of Muhlenfels Point. The controlling depth is 33 feet through a natural channel. The harbor is roughly oval in shape. The northerly part of the harbor, adjacent to Charlotte Amalie, is generally shoal, a depth of 30 feet being from 0.2 to 0.4 mile offshore.

A dredged channel with depths reported to be over 32 feet leads eastward alongside the West Indian dock on the south side of Long Bay.

Anchorage areas are described in **§ 202.250,** Chapter 2.

A Federal project for St. Thomas Harbor, on which no work had been done up to June 1956, provides for the removal of Scorpion Rock to a depth of 36 feet, an entrance channel 36 feet deep, and the enlarging of the existing anchorage and maneuvering area to a depth of 33 feet. The project also provides for a breakwater between Rupert Rock and the eastern shore.

Haulover Cut (The Sticks), a narrow passage between St. Thomas and Hassel Islands, connects Cay Bay in the western end of the harbor with East Gregerie channel. In June 1953 it was reported that the controlling depth through this passage was 11 feet in the southwestern entrance which is the shallowest part. A daybeacon is on the eastern side of the channel, in Cay Bay.

Dangers.—Green Cay, a small islet about a mile southeast of Muhlenfels Point, is 24 feet high and covered with a low underbrush. A reef partly awash extends to the nearest point on St. Thomas and partially shelters **Frenchman Bay.** Several bare rocks and rocks awash lie up to 100 yards southward of the cay.

Barrel of Beef, 2 feet high, is the easterly one of a group of rocks named **Triangle Rocks,** lying about midway between Green Cay and Muhlenfels Point. The northerly one is partly awash and frequently breaks, and the southwestern and outer rock group consists of rocks which dry in places. A detached coral rock about 35 yards in diameter, and covered by 16 feet, is nearly 0.7 mile south-southeast of Muhlenfels Point Light. A buoy marks its southerly side.

Scorpion Rock, in the entrance fairway between Muhlenfels and Cowell Points, is a small coral rock with a least depth of 23 feet. It is surrounded by depths of 24 to 28 feet. **Point Knoll,** a coral head covered by 3 feet, extends southwesterly about 175 yards from Muhlenfels Point Light. **Rhode Bank,** about 0.2 mile northwestward from Muhlenfels Point Light, has a least depth of 17 feet. The western side is marked by a buoy. **Rupert Rock,** 12 feet high and white on top, lies about 0.5 mile northward of Muhlenfels Point Light, at the narrowest part of the

channel. A drying reef and foul ground with less than 6 feet over it extends about 100 yards westward from the rock.

Between Frederik Point and Careening Cove the 18-foot curve is 100 to 150 yards offshore.

Tides and Currents.—The tide at Charlotte Amalie is chiefly diurnal. The rise and fall is very small, the mean range being about one-half foot and the daily range less than 1 foot. The surface of the water in St. Thomas Harbor has been known to drop several feet after the passing of a severe tropical storm. The tidal current in the entrance to St. Thomas Harbor is noticeable.

A **reporting station** is maintained on Cowell Battery, Hassel Island, and all approaching vessels are reported to the harbormaster. **Coastal (storm) warnings** are displayed here, daytime only, and also at Fort Christian and Bluebeard Castle.

Pilotage.—Vessels of 100 gross register tons and above must engage or pay for the services of a Government pilot. Vessels of less tonnage and vessels of the United States or of foreign governments are exempt from pilotage unless a pilot is actually employed. Pilots board vessels off The Triangles bell buoy or beyond, and take ships in or out at night. Ships should await pilots well off the entrance and westward of the range; dangerous conditions have developed in the narrow entrance channel when ships have proceeded in without previous arrangements.

Towboats.—No towboats are available in St. Thomas Harbor. The West Indian Co., Ltd., has a launch capable of doing light towing in the harbor.

Quarantine.—Vessels subject to visitation are boarded at the West Indian dock.

Customs.—The Customs offices and warehouses are in the new Federal building north of Kings Wharf. With few changes, the customs regulations in force during Danish sovereignty have been continued. The import duty on foreign goods is 6 percent.

Immigration.—The office of the United States Immigration and Naturalization Service is near the Federal Building. This office has immediate charge of all matters pertaining to immigration and naturalization in the Virgin Islands.

Hospitals.—The Public Health Service maintains an outpatient office in the Federal Building. Seamen requiring emergency hospital attention are taken to the municipal hospital.

Terminal facilities.—The West Indian Co. dock, along the south side of **Long Bay**, is the only deep-water terminal. It commences at **Havensight Point** as a bulkhead wharf about 550 yards long, with a controlling depth of about 32 feet except at the extreme easterly end where the depths are 15 to 28 feet. The dredged slip off the wharf ranges in width from about 300 feet near the easterly end to about 900 feet off the western end. The edge of the dredged area is marked by maneuvering buoys maintained by the dock company. The terminal has spacious warehouses and a large area for open storage. There are 2 electric gantry cranes for handling coal and bulk cargo, and a floating crane of 20-ton capacity. Small lighters and towing launches are available if needed. An adequate supply of coal and fuel oil is on hand at all times for bunkers, and fresh water is piped to the wharf. Electric light and power are available at the dock. St. Thomas Harbor is a convenient port for small boats, and there are numerous berths along the north shore west of Kings Wharf where general supplies can be obtained. Just north of the east corner of the West Indian Co. dock is a yacht harbor with a dock having depths of 10 to 12 feet. Gasoline, diesel oil, water, electricity, and phone service are available at the yacht dock.

None of the wharves on Hassel Island are in use; all are in poor condition, and two, the Danish wharf and the larger wharf on the north side of Careening Cove, are in ruins.

The waterfront of Charlotte Amalie is a concrete bulkhead used by small sailing vessels and motor launches trading with the nearby islands. It is owned by the municipality. Depths are about 11 feet along the bulkhead which is connected to the island highway system by well-paved roads.

Dockage.—Dockage is charged at the West Indian Co., Ltd., wharf. Vessels taking coal bunkers are allowed 24 hours free dockage, and oil bunkers 2 hours after fueling.

Harbor dues.—Ships entering and clearing the harbor are charged harbor dues.

Supplies.—Coal can be loaded at the West Indian dock at a rate of 300 tons per hour. Usually from 10,000 to 30,000 tons is kept on hand. Fuel oils and water can be furnished in large quantities, through pipelines on the wharf or by barge.

Repairs.—Repairs can be made to vessels at the West Indian dock; there is a good machine shop with welding facilities. A marine railway on the north end of Hassel Island can handle vessels up to 125 feet in length, 1,000 tons in weight, and 9 feet in draft. General repairs can be made.

The nearest drydocks for large vessels are at San Juan (up to 649 feet) and the Panama Canal (up to 1,000 feet).

Communications.—Charlotte Amalie is a port of call for steamship lines between the United States and Europe. A mail-and-passenger vessel maintains a schedule between Fajardo, P. R., and Christiansted. There is frequent plane service to San Juan, Miami, and New York.

Charlotte Amalie has worldwide cable connections. There is a radiophone connection (insular government) between Charlotte Amalie and Christiansted, St. Croix.

Port administration.—The port is administered by a harbormaster. His office is just west of Kings Wharf.

Charlotte Amalie, the principal town of the Virgin Islands, is along the north shore of St. Thomas Harbor. Bunkering of vessels constitutes the principal industrial activity. The town has considerable tourist trade during the winter. Other commerce includes the manufacture of rum, bay rum, and handicraft articles, the latter from raw materials imported from the nearby islands. Bluebeard Castle Hotel, a tourist hotel owned by the Government, is prominently placed on Bluebeard Hill. There are several other hotels.

The port facilities are on Long Bay, about 0.5 mile southwest of the town. Commerce consists of the receipt

of foodstuffs, textiles, clothing, building materials, machinery, coal, and fuel oil, and the shipment of bay rum, rum, cattle, hides, and sundry articles.

East Gregerie Channel, curving into West Gregerie Channel, is immediately westward of St. Thomas Harbor. The two channels are formed by Water Island to the south and St. Thomas Island on the north.

Water Island, just westward of Hassel Island, is 1.6 miles long and 294 feet high. It is indented by several small bays and covered by small trees and dense underbrush. **Flamingo Point,** the southern end, consists of brown rocky cliffs 100 feet high, upon which the sea continually breaks. **Flamingo Hill,** 235 feet high, is close northward of Flamingo Point. A conspicuous water tower is about 0.2 mile northeastward of Flamingo Point, on a 203-foot hill. **Providence Point,** with a rocky ledge and foul ground extending about 100 yards offshore from it, is about 0.8 mile northward of Flamingo Point. **Providence Hill,** 256 feet high, is about 0.3 mile east of Providence Point.

Banana Point, the northern end, is low and rocky. Between it and **Druif Point,** to the southward, the sandy bays and beaches are used by fishermen for seining. **Banana Bay** and **Sand Bay** are two shallow bights on the east side of the island. Sand Bay is foul. **Sprat Point** is the southeastern point. Foul ground, which dries in places, extends about 150 yards southward from the eastern entrance point of **Sprat Bay,** which is a small bight with a fine sand beach at its head.

Limestone Rock, 4 feet high, lies on an extensive coral reef, 175 yards southward of Carol Point, the point which forms the eastern shore of Limestone Bay.

East Gregerie Channel, which extends between Water and Hassel Islands, is free from danger in the fairway. At its entrance it is 0.5 mile wide, and at the elbow, or northwestern end between **Careen Hill** and Banana Point, 0.2 mile wide. Depths are 36 to 48 feet.

West Gregerie Channel is 0.3 mile wide. Opposite Sandy Point it opens into a well-sheltered basin 0.5 mile in diameter; **Crown Bay** is the northeast corner of this basin. Depths are 29 to 60 feet in the fairway and 31 to 60 feet on the northwestern side. The shore bank, with depths of less than 36 feet, extends between 300 to 500 yards offshore in places along the northwestern side of Water Island.

At the junction of the 2 channels, northward of Water Island, there is a bar which has been dredged to a depth of 30 feet.

Sandy Point Rock is an elongated shoal, with 3 feet least depth, extending about 500 yards westward of Banana Point. A lighted buoy is about 50 yards northwestward of the rock.

Currents.—The tidal current in Gregerie Channel sometimes attains a velocity of one-half knot.

Water Island Anchorage is an excellent anchorage westward of Water Island for deep-draft vessels. To make this anchorage vessels can pass on either side of Porpoise Rocks and come to anchor in 50 to 60 feet of water. If passing eastward of Porpoise Rocks, keep about 0.3 mile off Water Island to avoid a 22-foot spot 0.5 mile westward of Flamingo Point. A good berth can also be found north of Banana Point. Both Krum and Little Krum Bays afford excellent anchorage for small vessels during hurricanes.

Krum Bay is an inlet lying between two high peninsulas at the western side of West Gregerie Channel. It is about 0.4 mile in length and 150 yards wide at its narrowest part. This channel has an entrance depth of 42 feet shoaling to 18 feet near the head.

Lindbergh Bay (Mosquito Bay), close westward of Krum Bay, is about 0.4 mile wide between Mosquito Point and Red Point, and 0.5 mile in length. The bay, which is open to the southward, is used by small sloops and motorboats. An airfield is nearby. At the entrance the depths are 30 feet, gradually decreasing toward the head.

Mosquito Point is the sonthern end of the peninsula separating Krum Bay from Mosquito Bay. **Grambokola Hill,** 275 feet high, thickly wooded and prominent, is the highest point.

Red Point, a rugged red cliff 40 to 80 feet high, is the southern end of a peninsula formed by **Cabritaberg Ridge,** a flat-topped crest 218 feet high. An aviation light is on the northern end of the summit. Off Red Point a rocky ledge extends 0.3 mile southward to **Red Point Shoal,** which has a least depth of 2 feet and is steep-to.

A detached rock 25 feet high lies close to the western shore, 0.2 mile north-northeastward from Red Point. At the head of Lindbergh Bay is a fine sand beach and two small piers.

Porpoise Rocks, a mile westward of Flamingo Point and 1.3 miles southward of Red Point, consist of three reefs connected by shallow ledges. The eastern reef is the larger, about 200 yards wide; the highest part bares 3 feet, with smaller rocks that bare or are awash. The southwest side of the reefs is marked by a buoy.

Chart 905.—Saba Island, 202 feet high and triangular in shape, is 2.4 miles west of Flamingo Point. The northern part of the island is low, but the southern part has precipitous red cliffs 150 feet high along the south shore. Two small lagoons surrounded by mangroves are near the north end. A landing can be made on the sand beach along the northwest shore. About 150 yards east of the island is a reef with a bare rock 5 feet high, and numerous rocks awash over which the sea always breaks. Another reef awash lies 100 yards southward of the western end of the island.

Turtledove Cay, 50 feet high, 100 yards northward of Saba Island, is connected with Saba Island by a reef bare at low water. About 0.1 mile westward of the cay is a cluster of rocks awash. Between these rocks and the cay is a boat channel. **Dry Rock,** about 0.5 mile southwestward of Saba Island, comprises a group of rocks bare and awash, with the highest rock baring 2 feet. **Flat Cays,** 0.8 mile northeastward from Saba Island and 1.3 miles southwestward from Red Point, consist of 2 small islets, 32 and 11 feet high, respectively. About 300 yards eastward of Big Flat Cay is a rock awash, surrounded by a breaking reef.

Currents.—Inshore the current is weak, but between Flat Cays and Saba Island, a tidal current sets east-southeastward and west-northwestward with velocities up to 1 knot.

Southwest Road, between Flat Cays and Perseverance Bay, affords an excellent anchorage with the wind as far southward as east-southeast.

Steamers may anchor as convenient after entering through any of the channels between the islands and shoals southward. Sailing vessels should enter from the eastward between Water Island and Porpoise Rocks, favoring Water Island, and pass between Flat Cays and Red Point Shoal.

From Red Point, the coast trends northwestward for about 1.2 miles to Black Point. **Range Cay,** an islet 21 feet high, lies close to the shore 0.7 mile from Red Point. **Black Point** terminates in rocky cliffs 40 to 50 feet high.

Perseverance Bay, between Black Point and Lucas Point to the westward, has depths of 13 fathoms, about 0.4 mile from the shore. Coral reefs, bare at low water, fringe the beach. Westward to Lucas Point the shore is generally rocky with cliffs 60 to 70 feet high. **Lucas Point,** rounding and rocky, is marked by 60-foot cliffs.

Fortuna Bay, between Lucas Point and David Point, consists of two small bays, **Backefall Bay** on the east and **Nattepan Bay** on the west, separated from each other by **Krabbepan Point.** This broad point is high and faced by precipitous cliffs 200 feet high. **David Point,** a bluff angle, is 1.3 miles southeast of the west end of St. Thomas.

St. John Island, about 2 miles eastward of St. Thomas Island, is 8 miles long, and up to 4 miles wide. Its eastern end for 3 miles is formed by a narrow neck of land from 1 mile to less than 0.5 mile across, and from its inner end the coast turns sharply southward, forming a deep bight which terminates at Ram Head, the southern point of the island. The central and western portions are composed of irregular hills, the highest of which is **Bordeaux Mountain,** 1,277 feet altitude. The hills and mountains are mostly covered with trees and brush, and some patches of grass.

Two small settlements, Cruz Bay and Coral Bay, at the west and east ends respectively, account for more than half of the island's population. The community on Coral Bay is scattered among several points along the shore. The Government administration is located at Cruz Bay.

The mode of life of the natives is quite primitive. Communication between St. John and St. Thomas is by small sailing vessels and by a motorboat carrying mail and passengers to Cruz and Caneel Bays. Interior communication is difficult.

Chart 938.—Moravian Point, on the end of a peninsula about 0.4 mile east-southeast of Steven Cay, is the westernmost part of the island. **Mingo Rock,** which is awash and breaks, is 175 yards west-southwest of Moravian Point. A group of 4 rocks awash, with surrounding depths of 17 to 30 feet, is about 0.1 mile west-southwest of Mingo Rock.

Steven Cay, 0.4 mile west of Moravian Point, is 28 feet high. **May Rock,** 31 feet high, is just south of May Point, the southern extremity of Steven Cay. **Skipper Jacob Rock** is about 0.1 mile east of May Rock.

Cruz Bay, a cove north of Moravian Point between **Galge Point** and **Lind Point,** is small and used only by local vessels. A prominent landmark is the Government House for the island of St. John, on **Battery Point,** a small peninsula in the bay.

Caneel Bay, 0.7 mile northeastward of Lind Point, is the site of the Caneel Bay Plantation, a resort developed by the Virgin Island Tourist Company. A motorboat provides inter-island transportation to St. Thomas. A small pier is in the bay. **Durloe Point** is a small rounded neck on the north side of the bay.

Durloe Cays are three islets westward of Hawksnest Point. **Henley Cay,** the largest, is 70 feet high and about 300 yards wide. **Ramgoat Cay,** 310 yards northeast of Henley, is 30 feet high, and Rata Cay, the smallest, is 0.2 mile west-northwestward of Henley Cay.

Hawksnest Point, a projecting point forming the western shore of Hawksnest Bay, is wooded. In the northern part is a circular hill 130 feet high. Off the extreme point is **Hawksnest Rock,** bare and 25 feet high. **Hawksnest Bay,** eastward of the point, is small and of no commercial importance. Off its southern shore are numerous rocks.

Perkins Cay is an islet close to the eastern point of Hawksnest Bay. **Trunk Cay,** a grass-covered islet 48 feet high, is about 0.5 mile east of Perkins Cay.

Johnson Reef, a coral formation 0.4 mile northeastward of Perkins Cay, is 500 yards long and over 0.1 mile wide; it breaks except in very smooth weather. A ledge, over which is a 30-foot passage, connects this reef with the mainland to the southeast. The reef is marked by a buoy on its northerly end.

Cinnamon Cay, 32 feet high and covered with tall grass and cactus, is about 0.7 mile east of Trunk Cay. **America Point** is 2 miles east of Hawksnest Point; back of America Point rises **America Hill,** 526 feet high, which separates Cinnamon Bay from **Maho Bay.** The head of Maho Bay is shoal and has a fine sand beach. **Maho Point** is the tip of a short peninsula between Maho and Francis Bays, formed by the spur of a 198-foot hill 300 yards east.

Francis Bay, southward of Mary Point, is somewhat protected to the northward by Whistling Cay, and affords good anchorage in 50 feet, sandy bottom.

Whistling Cay, the 202-foot islet 300 yards west of Mary Point, is covered with trees. Its north shore is precipitous, with cliffs 130 feet high. A gravel beach is along the southeast side. **Fungi Passage,** between the cay and Mary Point, has a least depth of 21 feet, but on account of the baffling winds from the adjacent high land it is difficult for sailing vessels.

Mary Peninsula is a remarkable headland in the form of a ridge, 578 feet high. This ridge is connected with St. John by a low divide, separating Francis Bay from Mary Creek. **Mary Point,** the western end of the peninsula, has bluffs 135 feet high.

Chart 905.—Mary Bluff, the north shore of the Peninsula from Fungi Passage eastward to Firewood Beach,

consists of high weatherbeaten cliffs with large boulders along the waterline. **Firewood Beach** is of gravel and sand, fringed by coral reefs.

The Narrows, a channel about 0.3 mile wide between the 10-fathom curves, is the western entrance to the passage between the northern coast of St. John and the southwestern coast of Tortola. This passage leads into Flanagan Passage and Sir Francis Drake Channel. **Tidal currents** in The Narrows and the passage eastward attain velocities of from 2 to 4 knots.

Leinster Bay is a double indentation between Mary Peninsula on the west and Leinster Point, 48 feet high, on the east; it is about 0.8 mile in length. **Mary Creek,** the western part of this bight, makes well in behind the high land to northward. The eastern part is partially protected by **Waterlemon Cay,** 30 feet high, 250 yards westward of Leinster Point. The cay is bold, and is separated from St. John Island by a channel 200 yards wide with 12 feet of water. Vessels may anchor under the cay about 200 yards from shore. **Annaberg Point,** 96 feet high, westward of Waterlemon Bay, is faced by a conspicuous landslide.

Threadneedle Point, 0.5 mile eastward of Leinster Point, is precipitous, with cliffs up to 70 feet high. From Threadneedle Point the coast trends in a general east-southeasterly direction for 3.5 miles to **Eastend Point,** the eastern extremity of the island. **Brown, Mennebeck, Haulover,** and **Newfound Bays** are small bights along this coast. Haulover Bay probably offers the best anchorage.

Privateer Point, 0.4 mile south of Eastend Point, is a projecting point 164 feet high, separating **Eastend Bay** from **Privateer Bay,** 2 small bights open to the southeastward. **Red Point,** a remarkable headland westward of Privateer Bay, is the southern end of a high ridge.

Flanagan Island, 127 feet high, lies 0.7 mile southeast of Privateer Point. A rock off the west side is 45 feet high.

Flanagan Passage, the westernmost of the passages leading into Sir Francis Drake Channel from southward, consists of a group of channels separating St. John and Norman Islands. The channel between Privateer Point and Flanagan Island is 0.7 mile wide; that between Flanagan Island and The Indians is about 1.2 miles wide; and that between Flanagan and Norman Islands is 1.4 miles wide.

Approaching Flanagan Passage from eastward, haul close around the western side of Norman Island, inside Santa Monica Rock, which may be done without fear at a distance of 300 yards. Entering from westward, follow this range leading westward of Santa Monica Rock: Mount Bellevue, the highest hill on the eastern end of Tortola, in range with The Indians bearing **016°**.

Coral Bay, the large bay extending northward into St. John between Red Point and Ram Head, is open to the southeastward. The narrowest part of the entrance, between Moor Point and Lagoon Point, is 1.2 miles wide. **Leduck Island,** 85 feet high, lies in the entrance to Coral Bay, midway between Red Point and Ram Head.

Currents.—A tidal current of about ¾ knot velocity sets southwestward and northeastward across the entrance to Coral Bay; between Flanagan Island and Privateer Point its velocity is reported to be 1½ knots. In the bay there is no current, and the range of tide is about 1 foot.

Moor Point is the thin rocky southwestern extremity of Eastend Peninsula. **Turner Point** is the knob at the end of the peninsula separating Round Bay and Hurricane Hole. **Fortberg Hill,** north of Harbor Point, is nearly circular in shape, 426 feet high, covered with trees, and very prominent. **Lagoon Point,** the southern entrance point of Coral Harbor, is fringed by a coral reef 200 yards wide and bare at low water. **Sabbat Point,** 0.5 mile southward of Lagoon Point, is the end of a long high rock forming the buttress of **Sabbat Hill,** 101 feet high.

Ram Head, the southern point of St. John, is a conspicuous bold headland, on which are 2 hills: **Ram Hill,** the northerly and higher, is 288 feet. The eastern side of the point consists of rocky cliffs 100 to 150 feet in height. A heavy sea generally runs off the point.

The only danger in the approach to Coral Bay for vessels drawing less than 18 feet is **Eagle Shoal,** about 0.7 mile southward of Leduck Island. The shoal consists of 3 round patches of coral; the least depth is 1½ feet. Close to and around them the depths are 6 to 7 fathoms, and 13 fathoms a little over 100 yards to the southward.

There are no towns in Coral Bay. The natives live in rural communities scattered around the bay.

Round Bay, the northeastern of the 3 arms of Coral Bay, is 0.9 mile wide at the entrance. The several shoal patches of about 2¼ fathoms should be avoided. **Pelican Rock,** 7 feet high, lies 100 yards off the southern entrance point of Hansen Bay. The best anchorage in Round Bay is about 0.3 mile from Moor Point with the point bearing 115°, in 13 fathoms; a 2½-fathom spot lies less than 0.2 mile northeastward of this position. Should the wind come southward of east, a vessel should be ready to move.

Hurricane Hole, the northern arm of Coral Bay, is 0.6 mile wide at the entrance westward of Turner Point. The shoreline is indented by several small bays that afford protection from almost any direction for small vessels. The **School of Fish** is a shoal awash that makes off 100 yards from shore southeastward from Fortberg Hill, the western side of Hurricane Hole. **Harbor Point** is the southern extremity of Fortberg Hill.

Coral Harbor, the northwestern arm of Coral Bay, is narrow and the deep part of the bay is restricted to a width of 100 yards or less by encroaching shoals from the side and head of the harbor. The anchorage ground, although smooth with ordinary winds, is narrow, and being on a lee shore it is available only for small, handy vessels.

Fresh water may be obtained from a well at the head of Coral Bay, near a small-boat wharf, at which is a depth of 3 feet.

Freeze Bay and **Johns Folly Bay** are northward and southward, respectively, of Sabbat Point. The latter is almost filled with coral reefs but a narrow boat channel leads to the beach.

Directions.—From westward, when 0.5 mile southward of Ram Head, steer **070°** until Turner Point opens eastward of the eastern end of Leduck Island. Then make

good a **004°** course, heading for Moor Point, to a position 0.4 mile eastward of Leduck Island, from which point a course may be shaped for the anchorages in Round Bay or Hurricane Hole, avoiding the 3½- and 3¾-fathom spots southward of Turner Point.

Leaving the bay, a sailing vessel may pass between Sabbat Point and Leduck Island and to the leeward of Eagle Shoal, if advisable. In doing so, however, do not bring Sage Mountain on Tortola open eastward of the western hummock on Leduck Island till southward of Eagle Shoal.

Between Ram Head and Cabrithorn Point, 1.2 miles west-northwestward, the shore is indented by several small bays. **Booby Rock,** 35 feet high, is 0.3 mile south-southeastward of **Kiddle Point,** which ends in a 125-foot bluff. **Cabrithorn Point** is a well-defined projecting point, faced by high cliffs, back of which the land rises to a height of 280 feet.

Lameshur Bay, between Cabrithorn and White Points, is divided into three smaller bays by projecting points. **Great Lameshur Bay,** the easterly one, affords good shelter for small vessels in about 6 fathoms of water under the lee of Cabrithorn Point and about 0.2 mile offshore. **Little Lameshur Bay,** the middle bay, has a good anchorage, generaly used by sail boats, and a sand beach. **Europa Bay** is the west cove of Lameshur Bay.

White Point is a knob 78 feet high between Lameshur and Reef Bays. Westward of White Point for 0.6 mile the shore consists of white cliffs 150 feet high which, owing to the white volcanic ash in them, are quite conspicuous.

Chart 938.—Reef Bay, westward of the White Cliffs, is a large open bight. The shores are fringed by coral reefs through which a passage leads to **Genti Bay,** a small-boat harbor protected by the outlying reefs.

Fish Bay, westward of Reef Bay, is only 200 yards wide between the reefs at the entrance, but nearly 0.4 mile in length. The head is sandy with sea grass bottom. The northeastern shoreline is mangrove. **Cocoloba Cay,** 36 feet high, lies off **Oyen Point,** the eastern point of the bay, but is connected to the shore by a submerged reef. **Rendezvous Point,** 152 feet high, is a bold promontory between Fish Bay and Rendezvous Bay. It terminates in rocky cliffs up to 100 feet in height.

Rendezvous Bay, 0.7 mile wide, has depths of 40 to 14 feet and is open to southward. The bay is divided into four coves. **Monte** is a hamlet on the ridge 500 yards northward of **Boatman Point** and 200 yards from the shore of the bay. **Buhvun Point** is a headland with a 269-foot hill west of Rendezvous Bay; this is the southwestern extremity of St. John Island. **Devers Bay** is a small cove between Buhvun Point and Sam Point.

Chocolate Hole, westward of Buhvun Point, is a small shallow bight. Maria Bluff, the end of a projecting high point, southerly from Blasbalg Point and between Chocolate Hole and Calvary Bay, is the most southwesterly point of the island. The cliffs are 100 feet high along the southern face of the bluff.

Calvary Bay, north of **Blasbalg Point,** affords good shelter for small vessels; it is about 350 yards wide at the entrance and about 0.4 mile in length. The depth is 24 feet in the entrance, decreasing to less than 10 feet in the middle of the bay. **Contant Point** is at the northwestern entrance to Calvary Bay. **Turner Bay,** a small shoal bight, is about 0.4 mile northwest of Contant Point.

Chart 905.—St. Croix Island, about 30 miles southerly from St. Thomas and St. John Islands, is the largest of the American Virgin Islands. It is 19 miles long and averages about 3.5 miles wide. The southern side is nearly straight and generally low, particularly toward the western end. The island is more elevated on the northern side. **Mount Eagle,** the highest point on the island, 3.5 miles eastward of Hams Bluff, is 1.165 feet high, Southward from the mountains, St. Croix is composed of fertile undulating valleys.

The cultivation of sugarcane and the manufacture of sugar and rum are the principal industrial activities of the island. A large acreage of the island is devoted to the raising of cattle for export to Puerto Rico. As the rainfall of the island is irregular, droughts occur at times, causing much distress to sugarcane growers. Over a period of 37 years total rainfall varied from 26 to 70 inches.

St. Croix is traversed by a network of roads, most of which are kept in very good condition.

Winds.—There is no regular land breeze at St. Croix, but when the trade wind is light during the day it generally falls calm in the night. From June to September, when the trade wind is usually light, occasionally strong winds from the southwestward blow across the island, with much rain. Northers, with the accompanying heavy ground swell, do not appear to reach this island.

Tides and current.—The tides are chiefly diurnal and are small, the mean range being about one-half foot and the diurnal range less than a foot. Between this island and St. Thomas is usually a slight westerly current. No perceptible current has been observed at Christiansted Harbor, but a moderate westward flow is reported outside Fort Louise Augusta Light.

Coast and Geodetic Survey parties have reported that off East Point tidal currents of about 1 knot velocity set northwestward and southeastward in calm weather. Close to East Point strong currents set north and south. Trade winds increase the northwestward flow and decrease the southeastward flow. A very strong westward current setting around East Point and through Buck Island Channel was noted when the trade wind was blowing. A strong northwestward current was noted off Southwest Cape.

Communications.—A mail-and-passenger steamer operates twice weekly between Fajardo, P. R., St. Thomas, and Christiansted. Steamships to and from the United States and Canada call regularly at Fredericksted. There is cable communication to St. Thomas and to Ponce, P. R.; also to St. Lucia and thence to Trinidad and other neighboring British Islands. There is a municipally owned radiophone between St. Thomas and St. Croix and an airport about 6 miles southwest of Christiansted. A

local telephone system connects all points of the island and buses and taxicabs run frequently between Christiansted and Fredericksted. Small schooners run rather frequently to the British Virgin Islands, to St. Thomas, and Puerto Rico.

Hams Bluff, the northwestern extremity of the island, is a conspicuous cliff 100 feet high, back of which the land rises to elevations of 600 to 900 feet. **Hams Bluff Light (17°46.3′ N., 64°52.3′ W.),** 394 feet above the water and visible 27 miles, is shown from a white cylindrical tower. **Coastal (storm) warnings,** daytime only, are shown at the light.

From Hams Bluff the coast trends in a general easterly direction for 5.5 miles to Baron Bluff, and consists of slightly jutting rocky points with sandy beaches between. The 100-fathom curve is not more than 0.5 mile offshore.

Baron Bluff is the sea front of the triple spurs of a 395-foot hill. From Baron Bluff eastward to Salt River, the shore consists of low rocky cliffs. Westward of Saltriver Point is a narrow passage, with a depth of about 10 feet, leading through the reef to **Saltriver Bay.** The shores of the inlet are mostly mangrove swamps through which are several openings to higher ground. They are used as boat landings.

Saltriver Point is 1.7 miles eastward of Baron Bluff. **White Horse,** 400 yards northward of Saltriver Point, is a rock over which the sea always breaks. There is a boat channel, with a depth of about 12 feet, between the rock and the point. From Saltriver Point the coast turns abruptly southeast for 3 miles to Christiansted. In this area the hills near the coast are covered with grass and low bushes. A projecting point 99 feet high is about 0.8 mile southeast of Saltriver Point. Several conspicuous chimneys are along this section. The shoreline to Christiansted is low and grassy, with a narrow sand beach.

Chart 935.—Christiansted Harbor, on the north coast of St. Croix 10 miles east of Hams Bluff and 7.7 miles west of East Point, is a major port of the island. The anchorage is in a basin protected from the sea by Long Reef and Scotch Bank through which a tortuous channel leads to anchorage. Most of the harbor is shoal. The available anchorage space for vessels of about 17-foot draft is small, and the channels are so intricate that local information is essential. A stranger should take a pilot.

Prominent features.—The high hills back of the town show up prominently from seaward. The brick stack of the sugar central, 0.8 mile northwest of town, is tall and conspicuous. A prominent clock tower is on the plaza, and in town are several conspicuous church spires.

Mount Welcome, just eastward of the town, is 125 feet high and heavily wooded, with a stone tower and the ruins of a sugar mill on top. Protestant Cay, 38 feet high, is an islet in the harbor surmounted by an old stone building. The ruins of Fort Sofia Frederika are at the north end of Protestant Cay.

On the approach from northward, a prominent V-shaped saddle can be seen along the ridge line south of the town. **Fort Louise Augusta** is an old battery on a projecting rock point, at the east side of the harbor. A light, 65 feet above the water and visible 9 miles, is shown from a white skeleton tower at the point. The light is the front mark of a day range for entering between Long Reef and Scotch Bank. The bearing is about **164°**. A radio tower adjacent to the light shows three fixed red lights which are prominent at night.

Boundary lines of inland waters.—The lines established for Christiansted Harbor are described in § **82.240,** Chapter 2.

Channels.—The principal entrance to the harbor, the channel between Scotch Bank and Long Reef, is well marked. A depth of 19 feet can be carried to within 150 yards of the old fort on the waterfront. Long Reef Range bears **268°**.

Federal project depth is 25 feet to a turning basin of that depth, but no work has been done on the project.

A passage, with a depth of 15 feet over the southern portion of Scotch Bank, is used by small vessels coming from eastward. **Schooner Channel,** between Round Reef and Fort Louise Augusta, has 13 feet least depth; vessels drawing up to 10 feet sometimes use this channel instead of going westward of Round Reef.

Anchorage.—Vessels drawing over 15 feet usually anchor in the outer harbor in the deeper water westward of Little Middle Ground. If going to the inner harbor, anchor on line between the southern end of Protestant Cay and the entrance to Altona Lagoon, leaving open the street past Government House. At this anchorage the stern should be swung around to westward and mooring lines run ashore from the stern. Local vessels drawing less than 9 feet generally go alongside the stone quay or anchor southwestward of Protestant Cay.

Altona Lagoon, with an entrance depth of less than 2 feet, is a shallow arm of the harbor. **Gallows Bay** is a bowl-shaped cove 0.2 mile wide, on the east side of town and west of Mount Welcome.

Dangers.—Scotch Bank, which makes northeastward from Fort Louise Augusta, is a sand shoal 1.8 miles in length, with as little as 4 feet of water in places, and is easily seen except with the sun ahead. It forms the eastern side of the harbor and approaches.

Long Reef, a narrow strip of reef about 2 miles long and nearly awash in places, forms the northwesterly side of the harbor. **Barracuda Ground** is the northeastern extremity of Long Reef. **Great Middle Ground** is a shoal area extending eastward from the east end of Long Reef. **Round Reef** lies directly south of Great Middle Ground, and is almost circular in shape; near the center is a spot bare at low water, and several depths of 1 foot are on it. The entrance channel is a narrow passage between these dangers and is well marked.

Lagoon Bank is an extensive shoal making offshore northeastward of Gallows Bay. A buoy marks the northwestern extension of the 12-foot curve. **Little Middle Ground,** a small spot with depths of 8 to 11 feet, is over 0.2 mile north-northeastward of Protestant Cay. It restricts the deep anchorage area in this part of the harbor. **Sorensen Ground,** with depths of 5 to 8 feet, is the

southeasterly extension of Long Reef; its southeast edge is marked by a buoy. Shoal water makes northward from Protestant Cay.

Directions.—The channel into the harbor is so intricate that strangers are advised to take a pilot, and should never attempt to enter at night without one. The turns are sharp and a vessel may have to drop anchor to assist in making them.

It is dangerous for larger vessels to enter Christiansted Harbor during squally weather. If heavy squalls break while entering, the ship may be caught in a dangerous position and if forced to anchor in a very narrow channel will encounter shoals on either side. Approaching from northeastward, vessels should keep Hams Bluff open well northward of Baron Bluff, bearing less than 256°, in passing Buck Island, which will avoid Buck Island Bar. When the western point of Buck Island bears 160° distant 2.3 miles, make good a **238°** course for 4.2 miles, when the entrance range will be in line.

Approaching from westward, give the north coast a berth of a mile. From 1 mile northward of Saltriver Point, steer **117°** for 3 miles, when the entrance range will be on. As Scotch Bank is ahead on this course, care must be taken not to overrun. Vessels approaching from offshore should bring the entrance range on before Baron Bluff is shut out by Saltriver Point, to avoid running down on Scotch Bank.

When on range the entrance buoy will be passed about 50 yards to port. Continue for about 0.3 mile on course **164½°**, then make the sharp right turn onto Long Reef range. Keep on course **268°** for less than 0.2 mile, then swing gradually left. Follow the chart, and select appropriate anchorage.

To enter across **Scotch Bank,** vessels from eastward drawing less than 10 feet steer for Green Cay on a southerly course. When the north end of Protestant Cay bears **237°**, on range with Point Fort Louise Augusta, steer this course until nearly up with Long Reef Range; then steer **268°**, keeping a little north of this range until up to the entrance range. Continue as above to an anchorage off Protestant Cay, avoiding the 8-foot spot 140 yards northwest of Lagoon Bank buoy.

Pilotage.—Christiansted has no licensed pilot, but pilot services are furnished by a man with local knowledge. No pilot station is maintained, but the usual pilot signal will be heeded. Vessels are generally met about a mile off the entrance.

Quarantine, customs, immigration.—A representative of the quarantine service enforces the quarantine laws. The customhouse is in the Post Office Building; a deputy collector is in charge. A representative of the immigration service is in the Post Office Building.

Hospitals.—Christiansted has a municipal hospital.

Terminal facilities.—Only vessels of limited size can enter the harbor and only small vessels drawing less than 9 feet can go alongside the stone quay. Vessels up to 300 feet in length and 17 feet in draft have anchored in the inner harbor, but careful mooring was necessary.

Along the town waterfront south of Protestant Cay there is a stone quay with 5 to 9 feet of water alongside, used as a loading pier. A commercial warehouse is near the waterfront. The area south and southwestward of Protestant Cay is a fairly well-protected small-boat harbor; along the stone quay are berths for several smaller craft. A railway can haul out craft up to about 50 feet in length and 5 feet in draft.

Supplies.—Ship chandlery is available for small boats only. Fresh meat, some vegetables, and ice can be obtained. Only rain water from cisterns is available; the supply is very limited.

Repairs.—There are practically no facilities for repairs. Some machine work can be done at the powerplant or at the sugar mill.

Christiansted, the largest town on St. Croix, is not commerically as important a port as Frederiksted, owing to the inability of larger vessels to enter the harbor. It is picturesquely situated within an amphitheater of high hills. It has two small hotels, and a municipal hospital. Commerce consists of the receipt of food, building materials, gasoline and fuel oils, and clothing; and the shipment of sugar and rum. A good highway leads to Frederiksted.

The wharf area and its buildings and the park area known as the D. Hamilton Jackson Park and the Government House and grounds have been established as the **Virgin Islands National Historic Site.**

Chart 905.—Beyond Fort Louise Augusta, the coast trends easterly for 7.3 miles to East Point, the easterly end of the island. The coast is fringed by coral reefs, behind which in several places small vessels may find protection.

Punnett Point, 1.4 miles east of Fort Louise Augusta, forms the eastern side of **Punnett Bay,** a semicircular cove 0.2 mile wide. Northeastward of Punnett Point, at a distance of about 0.4 mile, is **Green Cay,** an islet 55 feet high. Southward to the beach and between Green Cay and Pull Point, the area has depths of only 6 to 18 feet, with numerous coral heads.

Pull Point, 2.3 miles east-northeastward of Fort Louise Augusta, is a small projecting point, terminating in cliffs 35 feet high. **Chenay Bay** is the bight westward of the point.

Buck Island, 340 feet high, is 4.3 miles east-northeastward of Fort Louise Augusta and about 1.5 miles off St. Croix. The island is on the southern edge of a coral bank which extends westward about 0.8 mile, then sweeps around a mile north of the island. This forms **Buck Island Bar,** 1.5 miles in length. Shoals extend about 1.8 miles eastward of Buck Island. The island lies on the route from eastward to Christiansted Harbor. On the summit of Buck Island is a light 360 feet above the water and visible 9 miles, which is shown from a red pyramidal skeleton tower.

Diedricks Point, the southern extremity of the island, is low. Several spots with 13, 17, and 20 feet lie from 1 mile east of Buck Island to 1.7 miles east-southeast of it. **Buck Island Channel** lies between Buck Island and the adjacent reefs and St. Croix. Moderate-draft vessels may approach it from either northward or east-

ward. **Channel Rock,** awash, lies 1.8 miles westward of East Point.

The coast of St. Croix from Pull Point to East Point is fringed by a coral reef. Behind this reef are several anchorages for small boats, but local knowledge is necessary to use them. Entrance is made at **Coakley Bay,** a bight 0.8 mile eastward of Pull Point. The opening in the end of the reef can be entered by steering **180°** with Coakley Mill directly ahead.

Pow Point, 1.5 miles eastward of Pull Point, is rocky with a 130-foot hill 250 yards south. **Tague Point,** 1.1 miles eastward of Pow Point, is sharp and rocky with a 155-foot hill 0.2 mile south-southwestward. **Tague Bay** is 0.7 mile wide between the bluffs at Tague Point and Romney Point and has a curving beach of sand and shingle. The bay provides anchorage for light-draft vessels entering behind the reef through a break 1 mile west.

Cottongarden Point, a prominent rocky point with a 55-foot knoll, is 1.6 miles eastward of Tague Point and opposite the eastern end of the long reef paralleling the coast.

East Point, the eastern extremity of St. Croix, is a bluff. A 225-foot hill is 100 yards west-northwest, and **Morne Ronde,** 380 feet high, is a conspicuous round hill near the point.

Lang Bank, an extensive bank from 3 to 5 miles in extent, stretches 9 miles northeastward from the east end of St. Croix Island. Along its edge is a wall-sided narrow coral ledge which, commencing about 3 miles eastward of Buck Island, sweeps around in a convex form for about 14 miles, terminating 2 miles southward from East Point. Its northern part is from half a mile to 1 mile broad, with depths of 5½ to 10 fathoms. The southern portion is about 100 to 600 yards broad, with 7 to 10 fathoms on it.

The shoalest part of Lang Bank breaks in heavy weather, and should be given a wide berth.

From East Point, the coast trends west-southwestward for 20 miles to Southwest Cape. This coast is bordered by a dangerous broken coral reef which extends from East Point to nearly abreast of Long Point, 3.6 miles eastward of Southwest Cape. Behind this reef are several anchorages suitable for small local boats. Along the coast are many small bights and indentations, but all are shallow and do not afford anchorage except for small craft.

Point Cudejarre, a sharp point with a 25-foot bluff and a 120-foot hill north-northwest, is 0.3 mile southwest of East Point. **Grass Point,** 3 miles west-southwest of East Point, is a long narrow point marked by a 43-foot knob.

Mount Fancy, about 4.7 miles westward of East Point, is a conspicuous double hill, 245 feet high, which forms the east point of **Great Pond Bay.** Good anchorage for vessels of 10-foot draft, in hard sand bottom, can be had in this bay. An entrance range is the east tangent of Milord Point in line with Sight Mill; when about 100 yards off the point haul around to **064°,** pass west of a 7-foot shoal 200 yards east of Milord Point, and run for 0.3 mile, anchoring in 13 to 14 feet. **Milord Point,** the west entrance point of the bay, is a promontory of **Fareham Hill,** 192 feet high and prominent.

Vagthus Point, sharp and rocky, is 9.4 miles west-southwestward of East Point. **Canegarden Bay,** 1.2 miles wide, forms an irregular crescent to the west of Vagthus Point. **Limetree Bay,** 1 mile wide, is a semicircle indentation west of Canegarden Bay. Good anchorage is in the center of the bay in 12 to 18 feet.

Krause Point, 12.3 miles west-southwest of East Point, is a point covered by mangrove. Although the ground in which the mangrove is rooted is submerged, the point is conspicuous. One of the best small-craft anchorages is found south of Krause Point. **Long Reef,** lying to the southward, affords protection from the sea. The anchorage can be approached through an opening in the reef, with local knowledge of ranges, or in good visibility.

Krause Lagoon, northward of the point, is an extensive mangrove swamp with areas of shoal open water. An aviation light, 2 miles northwestward of Krause Point in latitude 17°42.7′ N., longitude 64°47.7′ W., is visible from seaward.

Chart 937.—Long Point, 3.6 miles eastward of Southwest Cape, is a low projecting point covered with grass. Westward of the point is **Long Point Bay,** which is shoal. **Southwest Shoal,** 1.2 miles southward of Long Point, has only 6 feet of water over it, and eastward to Krause Point the outlying reefs are the most dangerous along the south coast. They generally break, but as several shoal spots are southward, the area should be approached with caution.

Southwest Anchorage, between Long Point and Southwest Cape, offers temporary anchorage in 7 fathoms, and for small vessels farther in, about 1 mile from the beach, in 4 fathoms.

Southwest Cape, the southwestern extremity of the island, is a low point projecting 1.2 miles in a southwesterly direction. The point is covered by low bushes and trees. A coral reef extends southward, with a least depth of 18 feet, at a distance of 0.8 mile from the shore. A buoy marks the southwest extremity of this shoal. The 5-fathom curve is 1.6 miles southward of Long Point and nearly a mile south of Southwest Cape, but westward of the point it is only 200 yards off. The 100-fathom curve lies nearly 3 miles southwest of Southwest Cape.

Southwest Cape Light (17°40.8′ N., 64°54.0′ W.), 50 feet above the water and visible 11 miles, is shown from a red skeleton tower near the tip of the cape.

Caution is necessary in approaching Southwest Cape. The point, fringed by shoals, is low for some 3 or 4 miles to the high land of the interior. This may cause the mariner to overestimate his distance from the coast, especially at night. Several wrecks, presumably from this cause, have occurred near here.

The west coast of St. Croix Island forms an open bay about 4 miles in extent. From Southwest Cape the coast, which trends north-northeastward for 2.4 miles to Frederiksted, consists mostly of a sand beach back of which the land slopes gently upward. The slopes are covered by grass and bushes. The beach is steep-to, the 5-fathom

curve lying about 0.1 mile off Southwest Cape and about the same distance along the coast to a little southward of Frederiksted, where it trends slightly offshore.

Sandy Point, the westernmost extremity of the island, is about 0.5 mile north-northwest of Southwest Cape.

Frederiksted, 2.4 miles northward of Southwest Cape and 3.7 miles southward of Hams Bluff, is on an open roadstead; it is a port of call for numerous vessels and the chief commercial town of St. Croix. It extends along the shore for 0.5 mile on low level ground, and is easily identified for some distance offshore. A sugar central is about 0.7 mile north of the town and old **Fort Frederik** is immediately north of the landing. Deep-draft vessels can anchor off Frederiksted; it is the only island port where such vessels can call. Most of the island's sugar is shipped from here. The principal imports are foodstuffs.

Frederiksted Harbor Light (17°43.0′ N., 64°53.1′ W.), 42 feet above the water and visible 12 miles in the white sector, is shown from a red skeleton tower on a wharf at the northerly part of the waterfront. There are two red sectors; the white sector gives a clear approach to anchorage.

Anchorage.—The usual anchorage is just off the town on line with the street passing the customhouse, in 5 fathoms. The best anchorage is with the fort bearing 099° and Southwest Cape Light bearing 194°, in 6 to 7 fathoms. A white buoy 160 yards 270° from the light marks the inner limit of the anchorage. There is no pilotage at this port; vessels of any draft can make port at any time, day or night.

Quarantine, customs, immigration.—A representative of the quarantine service enforces national quarantine regulations. The customhouse, with customs warehouse, is on the waterfront; it is easily identified on the northern edge of the town just above the wharf.

Hospital.—Frederiksted has a municipal hospital.

Directions.—No directions are needed, except that when rounding Southwest Cape care must be taken to avoid depths less than 15 fathoms. In front of the town the 10-fathom curve is less than 0.5 mile offshore. At night, keep in the white sector of the light on the approach.

Terminal facilities.—All cargo is handled by small lighters. Boats and lighters can come alongside a stone landing pier which has a loading crane. Some provisions and ship chandlery are available. There is telephone service to all parts of the island. Several hotels are available. No regular mail-and-passenger steamer calls at this port, but there are buses and taxis to Christiansted which is served by a twice-a-week steamer that carries mail and passengers.

Beyond Frederiksted, the coast trends northward for 2.5 miles and curves eastward for 1 mile to Hams Bluff. The hills gradually work westward, meeting the shore near Butler Bay.

Charts 905 and H. O. 3904.—The British Virgin Islands are briefly described herein for the convenience of navigators interested in the entire island group. The material and information have been taken from publications of the United States Hydrographic Office and the British Admiralty.

Little Tobago Island, 3.5 miles northeast of Hans Lollik Island, is nearly 0.5 mile in length and 279 feet high. It is steep-to except on its southeast side. **Tobago Island,** 1 mile northeast of Little Tobago Island, is 0.8 mile in extent and about 538 feet in height. A small rock, awash and steep-to, is about 100 yards off the northern point. The southeastern side of the island is fringed with coral, but elsewhere the coastal cliffs are steep-to. A few rocks lie close off the northwestern point.

Watson Rock, steep-to and 89 feet high, is about 0.3 mile westward of the southwestern point of Tobago Island. **King Rock,** 0.6 mile south of the southwest point, is awash and steep-to. It is near the southern end of a bank, over which are general depths of 6 to 9 fathoms, extending about 0.7 mile southward of Tobago Island.

Mercurius Rock, 0.8 mile east of the northern end of Tobago Island and the only danger between that island and Jost Van Dyke Island, is small and steep-to. It is covered by 7 feet. Depths of 7 to 9 fathoms are found between Tobago Island and these dangers. When using the passage between Tobago and Jost Van Dyke Islands, the eastern side should be favored.

Jost Van Dyke Island, about 2 miles east of Tobago, is 3.5 miles long, lofty, rugged, and steep-to. Near the middle of the northern part a summit rises to 1,070 feet. **Great Harbour** and **Little Harbour,** on the southern side of the island, are suitable only for small vessels. Great Harbour is about 0.5 mile in extent, with depths of 4 fathoms to about 0.2 mile from its head, and Little Harbour has about 8 fathoms depths inside the entrance.

Little Jost Van Dyke Island, connected by a shallow ledge to the northeastern end of Jost Van Dyke Island, is 367 feet high. **Green Cay,** 108 feet high, is a small islet close east of Little Jost Van Dyke Island. **Sandy Cay,** nearly 1 mile south of Green Cay, is 66 feet high at its eastern end. It is surrounded by shoal water, and foul ground extends 200 yards from the eastern and western ends. The channel between it and Jost Van Dyke Island is 0.6 mile wide; the island shore must be favored.

Tortola, the largest of the British Virgin Islands, is 10 miles in length and 3.5 miles wide. **The West End,** the western extremity, is about 2 miles northeastward of Mary Point, St. John. **Mount Sage,** on the western part, has a height of 1,780 feet; rugged hills rise somewhat abruptly from the shores on all sides.

Great Thatch Island, about 0.6 mile north of Mary Point from which it is separated by The Narrows, is 1.7 miles in length, and near its center rises to a peak 613 feet high. The eastern point is bold and steep-to. **Thatch Island Cut,** the channel between Great Thatch Island and The West End, is deep. Sailing vessels should not attempt Thatch Island Cut from the northward except with a southward current, as the eddies and currents are very strong.

The Narrows, between St. John Island and Great Thatch Island, give access to the channel which extends between Tortola and St. John and leads to Sir Francis Drake

Channel and Flanagan Passage. **Tidal currents** in The Narrows and the passage eastward attain velocities of from 2 to 4 knots.

Little Thatch Islet, 0.4 mile southward of The West End, is about 0.5 mile long. **Frenchman Cay,** about 0.3 mile eastward of Little Thatch Island, is 400 feet high. Between the cay and Tortola there is a narrow passage encumbered by shoals. **Sopers Hole** is a deep little basin, 1 mile in length and about 0.3 mile in breadth, between Frenchman Cay and Little Thatch Island, on the south, and the western end of Tortola, on the northern side. At the eastern end of Sopers Hole the muddy bottom is the best holding ground.

In the center of Sopers Hole is a depth of 13 fathoms which gradually decreases to 6 fathoms at 100 yards from the shore; the bottom is sandy. The passage between Little Thatch Island and Frenchman Cay is from 6 to 7 fathoms deep.

Steamers from southward may enter Sopers Hole by the passage between Frenchman Cay and Little Thatch Island, or by that between the latter island and the western end of Tortola. These passages are not difficult, but the western ends of Tortola and Little Thatch Island must be given berth of more than 200 yards.

Sailing vessels taking Thatch Island Cut should approach it with a southward current, which will shoot a vessel into it. A vessel coming from the eastward will find the passage eastward of Little Thatch Island the best, as she will have a leading wind, can luff up closer under the western end of Frenchman Cay, which is steep-to, and shoot into Sopers Hole with either a southward or northward current. When leaving, pass out to the northward through Thatch Island Cut, or, if bound into Sir Francis Drake Channel, round the western end of Little Thatch Island at a distance of somewhat more than 200 yards and haul to the wind, when, with the eastward tidal current on the lee beam, she will be set through between St. John and Tortola with a velocity of 3 or 4 knots. The westward tidal current has a similar velocity. There is no danger on either shore.

A vessel must be prepared to meet the gusts and baffling winds which rush out from the valleys of Tortola.

On the northwestern side of Tortola there are numerous small bays or bights, of which Canegarden Bay, the largest, is the only one on the northern side of the island that affords anchorage even for small vessels. Across its entrance is a bar with 12 feet of water, inside of which are depths of 18 to 24 feet. A 5-fathom shoal lies in the approach to the bay, about 0.4 mile northward of the southern entrance point. **Du Bois Point** separates Canegarden Bay and **Brewers Bay.** **Rough Point** is the northwestern point of the island.

H. O. Chart 0137.—Road Harbour, on the southern side of Tortola 6 miles east of its western extremity, is the only port of entry in the British Virgin Islands, though yachts are permitted to enter at Sopers Hole, Jost Van Dyke, Virgin Gorda, and Anegada. Completely exposed to the southeastward, the harbor is about 1.3 miles in extent, 0.8 mile wide. It is surrounded by high hills, the spurs of which reach the shores. **Mount Sage** and **Todman Peak** are on the west and **Mount Bellevue** on the east; these hills have heights of 1,780, 1,225, and 1,289 feet, respectively.

On **Burt Point,** the western inner entrance point, the Fort Burt Hotel is conspicuous as is the customhouse, a white flat-roofed building at Road Town. The Commissioner's House, midway between the customhouse and the hotel, is a prominent concrete building, abreast of which is a small pier.

Wickham Cay and **Little Wickham Cay,** in the northwestern corner of the harbor, are low and covered with mangrove, but they show up well against the cultivated land behind them.

A lighted range, bearing **290°–110°**, leads to the customhouse pier.

Anchorage.—Deep-draft vessels will find anchorage in depths of 50 to 70 feet just inside the entrance, between Lark and Scotch Banks and with Fort Burt Hotel bearing between 256° and 234°.

Anchorage also may be had in 48 feet northward of Harbour Rock, with Fort George (ruins) at the northeast end of the harbor bearing about 035° and the Commissioner's House bearing 238°. Vessels anchoring southward of Harbour Spit will find a depth of 54 feet between Harbour Spit and Burt Point. The best anchorage is close south of the range line with Fort Burt Hotel bearing about 202°, distant about 0.2 mile.

Careening Cove, in the lee of the dry reef off Burt Point, is small but well sheltered, with depths of 4 and 5 feet.

Dangers.—Although a depth of not less than 48 feet can be carried right up to the anchorage, irregular soundings and coral patches 18 to 30 feet deep lie up to 1.5 miles off the entrance. At the anchorage the bottom is very uneven, the depths varying from 24 to 72 feet. The northern part of the bay shoals rapidly from 30 to 12 feet, and in the northwest portion coral reefs extend 0.2 to 0.4 mile from shore. **Denmark Banks,** the eastern end of which lies nearly midway between **Hog Point** and **Slaney Point,** the 2 outer entrance points of the harbor, are covered by least depths of 13 feet. **Lark Bank,** 0.2 mile eastward of the dry reef off Burt Point, has 15 feet least water on it.

Scotch Bank, on the northern side of the fairway, lies between 0.2 and 0.4 mile from the eastern shore at Kingston, and has 12 feet over it. The 967-foot hill and the hotel on Burt Point in range, **278°**, leads southward of it. A buoy is close southward of Scotch Bank.

Harbour Spit, with depths of from 7 to 17 feet, on which lies a rocky patch with depths of less than 6 feet, etxends about 0.3 mile southeastward of Wickham Cay. It is marked by a buoy. **Harbour Rock,** with a least depth of 21 feet and marked by a buoy, is 250 yards southeastward of the end of Harbour Spit.

Directions.—For powered vessels: shape a course for a position 0.5 mile south of **Nora Hazel Point,** 0.8 mile eastward of Hog Point. When the 967-foot hill comes in range with the southern edge of the hotel, steer for them on a **278°** course, which will lead about 0.1 mile south of Hog Point in depths of more than 36 feet. When the ruins of Fort George bear about 344°, steer **326°**, which will

lead between Lark and Scotch Banks and up to the anchorage for deep-draft vessels. If it is desired to anchor southward of Harbour Spit, a vessel should proceed as directed above until the hotel bears about 261°, whence she should steer the lighted range, course **290°**, which will lead to an anchorage in a depth of about 50 feet, between Burt Point and Harbour Spit.

Sailing vessels from northward had better keep westward of Anegada; from eastward they may pass either northward of Virgin Gorda or through Round Rock Passage, and from southward through any opening eastward of Peter Island. In leaving the harbor, if bound northward, sailing vessels will find little difficulty in beating up Sir Francis Drake Channel and so pass out eastward of Scrub Island, especially if they take the right time of the inshore current, or they may run to leeward through St. John Channel. If proceeding southward, they had better take Flanagan Passage.

Road Town, the only port of entry in the British Virgin Islands, is a straggling town along the western shore of the harbor.

Tides.—The tides at Road Harbour are chiefly diurnal and the range is small.

Pilotage.—There are no licensed pilots, but reliable captains are available to act in that capacity.

Piers.—Near the customhouse is a concrete pier, 162 feet in length, with a depth of 9 feet at its head. A small pier extends from the shore near the Commissioner's House. Other landing places are available.

Supplies.—Meat, bread, vegetables, and water can be obtained.

Lighters.—Canoes of 3- to 5-ton capacities are used for lighters.

Repairs.—A small marine railway in Careening Cove, near the hotel, is capable of hauling out craft about 40 feet in length and 6 feet in draft.

Communication is maintained by sailboat and commercial motor launches which carry the mails, freight, and passengers. There are no telephones or cables, but there is radiotelephone service within the British Virgin Islands and between Road Town and Antigua. Emergency messages can also be sent by radiotelephone between Road Town and St. Thomas.

H. O. Chart 3904.—Guana Island, 810 feet high and 1.7 miles long, is about 0.3 mile northward of Tortola. The channel between these islands has a depth of about 28 feet in the fairway. On the western headland separating White Bay and **Muskmelon Bay** is a large rock shaped like an iguana's head, known locally as **Lizard Head Rock.** A safe anchorage in 7 fathoms is at the western end of **White Bay.** This anchorage has been used by yachts up to 180 feet in length. Another anchorage is off White Bay with the extremity of Lizard Head Rock Point bearing about 347°, and **Monkey Point,** the southern point of the island, bearing about 112°.

Great Camanoe Island, about a mile east of Guana Island, is about 2.5 miles long. It consists of two parts connected by a low narrow neck of land between **Lee Bay** and **Cam Bay. Scrub Island** is close east of Great Camanoe Island, from which it is separated by a narrow channel with many shoals and rocks.

Little Camanoe and **Marina Cay** are southwest and southeast, respectively, of the southern end of Great Camanoe Island. They are all connected to the northern side of Beef Island by a shoal bank on which are several rocks and reefs. The channel north of Beef Island is quite open and easily navigated by large yachts. **Shallow Rock** is a 3-foot shoal off the western point of **Trellis Bay** on Beef Island.

Beef Island, about 2.4 miles in length and 660 feet high in its eastern part, is separated from the eastern end of Tortola by a narrow shoal channel which should be used only with local knowledge. **The Bluff,** its southern extremity, is a good landmark for vessels bound to Road Harbour. During strong northeasterly winds excellent anchorage will be found in the lee of Beef Island, about 0.7 mile westward of The Bluff. **Buck Island,** 1.1 miles southwest of Beef Island and close off the southeastern side of Tortola, is 170 feet high at its southeastern end.

Sir Francis Drake Channel is a passage bounded on the northwest by Tortola and the islands off its eastern end, and on the southeast by the chain of islands extending between Virgin Gorda and St. John. It can be entered by most vessels through any of the passages in the latter chain of islands or the passages on either side of Dog Islets.

Eastward of Buck Island the depths are regular, about 13 to 14 fathoms, but westward of that island the bottom is very irregular, especially in the approach to Road Harbour. In the southern portion of the western part, the general depths are 17 to 27 fathoms, but there are several coral patches with depths of 5½ to 10 fathoms. Anchorage is found anywhere in this channel eastward of Buck Island, but the bottom is hard, being a thin bed of sand over coral, and therefore requires a good scope of cable. To the westward are many rocky knolls.

In Sir Francis Drake Channel there is scarcely any current except close inshore, where small vessels may gain some advantage from it when beating to windward during the northeastward flow.

C&GS Chart 905.—Flanagan Passage, the westernmost of the passages leading into Sir Francis Drake Channel from the southward, is a group of channels between St. John and Norman Islands. It and connecting passages have been described previously in this chapter.

Norman Island, 1.6 miles eastward of Flanagan Island, is about 2.3 miles long and 440 feet high at **West Hill,** near its southwestern extremity. Foul ground is close off its northeastern and southwestern ends. **Ringdove Rock,** covered by 2 fathoms, is about 300 yards westward of the northwestern point of Norman Island.

Santa Monica Rock, 0.7 mile southwest of Norman Island, is a small patch 1¾ fathoms deep. The 967-foot hill west of Road Harbour, in range with the highest of The Indians bearing **003°,** leads close eastward of it. The southern peak of Cooper Island bearing **056°,** and just open southward of Peter Island, leads about 0.5 mile southward of Santa Monica Rock.

Pelican Islet, 180 feet high, is about 0.5 mile north of Ringdove Rock. About 200 yards westward of it are **The Indians,** 4 remarkable small pinnacle rocks, 50 feet high. **Treasure Point,** the southern entrance point of The Bight, in line with West Hill, bearing **158°**, leads close westward of The Indians and Ringdove Rock. A 6¾ fathom shoal lies 0.7 mile north-northwest of Pelican Islet.

The Bight, a small inlet in the western side of Norman Island, provides excellent anchorage. The shores are steep-to, and Ringdove Rock is the only danger when entering. The wind in the lee of the island, however, is so baffling that sailing vessels may have to anchor at the entrance and warp in. Although the bight is open to the northwestward, St. John Island prevents any sea from setting in, and holding ground is good. Safe anchorage with the regular trade wind may also be found in **Privateer Bay,** on the western side of Treasure Point.

H. O. Chart 3904.—Peter Island, northeast of Norman Island, is in the form of an elbow, 440 feet high at its western part. **Carrot Rock,** 84 feet high, lies about 0.3 mile off the southern end of the island, and **Carrot Shoal,** covered by about 11 feet, is about 0.4 mile southwest of the rock. Some 6-fathom patches lie within 0.5 mile of the northern side of the island.

Great Harbour, a small bight on the northern side of Peter Island, is about 0.5 mile in extent. It may be entered easily at any time. Deep water is close to shore, and the holding ground is excellent. **Little Harbour,** a short distance westward of Great Harbour, is smaller and more exposed, but has characteristics very similar to the latter.

Owing to the shape of Peter Island, the passage between it and Norman Island is rather crooked, but has a least depth of 12 fathoms over a width of 0.8 mile. It is seldom taken by sailing vessels, but is easily navigated by steamers. Carrot Shoal can be avoided by keeping Norman Island aboard.

Dead Chest, nearly 0.5 mile off the northeastern end of Peter Island, is an islet 200 feet high; a group of rocks extends about 0.2 mile southward from its eastern end. A 32-foot patch lies about 0.7 mile northwestward of the islet.

Blonde Rock, 12 feet deep, is about 0.6 mile east-northeastward of Dead Chest. **Salt Island Passage,** 1.5 miles wide between Dead Chest and Salt Island, is generally smooth. Blonde Rock can be avoided by keeping 0.5 mile from the eastern side of the passage.

Salt Island, about 2 miles northeast of Peter Island, rises to a height of 380 feet in its northern part. A rock awash lies close off its northeastern end. The passage between Salt and Cooper Islands is constricted to a width of about 0.3 mile by the rocks and an islet off the nearest point of Cooper Island. This passage should never be attempted by a sailing vessel. **Cooper Island,** northeast of Salt Island, is 1.7 miles in length and 530 feet high at its southern end. **Dry Rocks** are 300 yards off the northeastern side of Cooper Island, and **Carval Rock,** 110 feet high and steep-to, is 0.8 mile east-northeastward of **Markoe Point,** the southern point of Cooper Island.

Ginger Island, about 1 mile eastward of Cooper Island, is 500 feet high, and steep-to at its northeastern and southeastern ends. Some rocks lie close off its western end. The passage between Ginger and Cooper Islands may be taken by steamers, but sailing vessels may meet trouble.

Round Rock, 220 feet high, is the southernmost of a chain of islets and rocks extending south-southwestward from the southwestern end of Virgin Gorda. **Round Rock Passage,** between Ginger Island and Round Rock, is the easternmost of the passages leading into Sir Francis Drake Channel from southward. It is the best for vessels coming from southward. The passage is about 0.7 mile wide and easily located from its position in relation to Fallen Jerusalem, 1.2 miles to the northeastward. Sailing vessels will find it advantageous to use this passage as the islets on the weather side offer no obstruction to the prevailing winds. The southeast and northwest tidal currents attain a rate of about 1 knot.

Virgin Gorda is easily distinguished on making the land, as it rises gradually to the distinct summit of **Virgin Peak,** 1,370 feet high.

The island, extremely irregular in outline, consists of a central portion from which there are peninsulas extending eastward and south-southwestward. The eastern peninsula consists of irregular rugged hills which terminate at **Pajaros Point** in an astounding pinnacle rock 120 feet in height. The southwestern peninsula is more regular in outline and 250 to 450 feet high, but is joined to the central portion by an isthmus only 200 yards wide.

The west side of the southwestern peninsula consists of immense granite blocks which lie scattered about on the shore. The islets and rocks to the southward as far as Round Rock, 2 miles distant, are also of granite; the largest, about 140 feet high, nearly 0.5 mile from the southern end of the island, is named **Fallen Jerusalem** because of its resemblance to a town in ruins. Great, George, and West Dogs are 3 islets 1.5 miles northwest of **Colison Point,** the northwestern point of the southwestern peninsula.

Great Dog, the southeasternmost, is 270 feet high and steep-to at its western end; rocks fringe its northern and southern sides. **George Dog,** the northernmost, is 250 feet high and has some detached rocks about 0.2 mile north of it. **Cockroach Rock** lies about 0.2 mile westward of it. **West Dog,** the westernmost, is 150 feet high, with its western side bold and steep-to.

Tow Rock, 1.2 miles west-northwest of West Dog, has a depth of 2½ fathoms over it but is steep-to; it may be avoided by passing close to West Dog or Scrub Island.

Seal Dogs, 1.3 miles northeast of George Dog and 1 mile westward of **Mountain Point,** the northwestern extremity of Virgin Gorda, are a cluster of 3 small islets. The northern islet is the smallest and only 6 feet high, the southeasternmost is 74 feet high, and the westernmost and largest is 100 feet high. The passage is clear on either side of the group.

In **Western Roads,** off the western side of Virgin Gorda, are two excellent anchorages for vessels of any draft. The northern is situated in the bight between Mountain and Colison Points, and is partially protected to the

northwestward by Dog Islets. It seldom, however, blows hard to the westward of north, and the only thing to be prepared for is the ground swell in the winter months, at which season it is better to anchor in about 13 fathoms of water, midway between Great Dog and Virgin Gorda. Here, with good ground tackle and a long scope of cable, there will be nothing to fear, as the rollers seldom are accompanied by much wind.

The southern anchorage, in 13 fathoms, between Colison Point and Fallen Jerusalem, is the best for sailing vessels because, if necessary, they can weigh and run out to westward with more ease than from the northern anchorage. The holding ground is good at both places, and the water is usually smooth. A small patch of 4¼ fathoms lies 0.4 mile west of Colison Point, and **Burrow Rock,** with 1½ fathoms, is 1 mile south of Colison Point. The anchorages may be approached from either north or south as the passages are clear except between West Dog and Scrub Island, where Tow Rock lies. On the northern side of Virgin Gorda are several small slightly wooded islets and cays.

H. O. Chart 0569.—Mosquito Island, about 0.6 mile long and 290 feet high, the highest of the islets off the northern side of Virgin Gorda, is 1 mile east-northeastward of Mountain Point. The channel separating it from **Anguilla Point,** on Virgin Gorda, is shoal and only 175 yards wide. The northeastern end is fringed by a reef, and a chain of small detached rocks extends 300 yards north-northeastward. **Mosquito Rock,** the outermost, is 23 feet high.

Colquhoun Reef, which dries in patches, extends nearly 0.6 mile southeastward from Mosquito Rock, and is steep-to on its northeastern side. On the southwestern side there is a small sandy islet, about 2 feet high and sparsely covered with coarse grass. **Prickly Pear Island,** the largest of the islets off the northern side of Virgin Gorda, is about 0.8 mile east of Mosquito Island. It is 1 mile in length and 237 feet high. **Asbestos Point,** its eastern end, is 0.2 mile from the nearest part of a small peninsula of the eastern arm of Virgin Gorda, and the channel between is shallow and foul. In the middle of it is **Saba Rock,** 15 feet high.

Cactus Reef, extending 300 yards westward of Cactus Point, the northwestern end of Prickly Pear Island, is steep-to on its northern side; the sea breaks heavily on it even with a slight swell.

Gorda Sound is an excellent and roomy harbor between Virgin Gorda on the south and Mosquito Island, Colquhoun Reef, and Prickly Pear Island on the north. It is sheltered from all winds and protected from rollers. As there is no health officer or other Government representative, vessels before visiting it should obtain pratique at Road Harbour, Tortola.

The entrance between the 3-fathom curves of Colquhoun and Cactus Reefs is 200 yards wide, and the least depth is 35 feet. In the approach are uniform depths of 9 to 12 fathoms. Within the entrance there is deeper water.

The western portion of the sound is foul, with several shoals of 2 to 3 fathoms and some coral patches of less than a fathom. **Gorda Rock,** 0.3 mile southeast of Colquhoun Reef, has a least depth of 5 fathoms. **Creek Shoal,** off the southern side of the entrance to **Gun Creek,** is of coral sand with a least depth of 3¾ fathoms.

Oyster Rock, about 150 yards off the southern shore in the approach to Biras Creek, is a pinnacle rock with only 2 feet of water on it, surrounded by a shallow patch. **Biras Creek** is in the southeastern corner of Gorda Sound.

The **tide** in Gorda Sound is chiefly diurnal; the higher high-water interval, referred to the upper transit at north declination and to the lower transit at south declination, is about 8½ hours.

The **tidal currents** at the entrance seldom run more than one-half knot, but the inward current sets toward Prickly Pear Island. Between Mosquito Island and Anguilla Point, the eastgoing current has a velocity of from 1 to 1½ knots.

Directions.—Steamers coming from the eastward approach Gorda Sound by Necker Island Passage, which lies between Virgin Gorda and Herman Reefs. The approach is dangerous at night. Bring Virgin Peak to bear **262°** and steer for it on that bearing until Necker Island can be steered for on a **278°** bearing. When Pajaros Point bears 222°, a course of **291°** will pass to the northward of The Invisibles and Necker Island. When Virgin Peak bears **211°**, steer for it until Gnat Point bears 177° and Mosquito Rock bears 255°, then steer for the center of the entrance channel between Cactus and Colquhoun Reefs, which should be entered on a **170°** course; no marks can be given for this channel which, with depths of more than 5 fathoms, is only 45 yards wide; but with a favorable light no difficulty should be experienced in passing safely through it.

Coming from the northward it is better to pass westward of Anegada and approach with Virgin Peak on a bearing between 132° and 155°.

Sailing vessels can follow the directions for steamers, but if coming from the northward and passing eastward of Anegada, they should not attempt to pass close to windward of Horse Shoe Reef. This has caused many disasters. Pajaros Point may be rounded at a distance of 0.2 mile, if necessary.

Eustatia Island, on the shoal bank east of Prickly Pear Island, is 172 feet high and 0.3 mile long. Its northern side is foul for 300 yards off, from which a barrier reef extends to Pajaros Point. Outside this foul ground there are 2 detached patches with depths less than 3 fathoms, one about 0.6 mile east-northeastward and the other about 0.5 mile eastward of the eastern extremity of Eustatia Island. These patches lie on an extensive bank with depths of from 3 to 5 fathoms.

In the lee of this barrier reef is **Eustatia Sound,** in which small vessels will find safe anchorage. The main entrance is through a small cut in the reef about 0.5 mile eastward of Eustatia Island; there are also several other small passages through the reefs which can be used, but these should be avoided by strangers because the ground is foul for some distance outside the entrance. Several rocks and shoals are in the sound.

Virgin Sound, a channel 0.2 mile wide, extends between the reefs and shoals northward of Prickly Pear and

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Eustatia Islands and those southward of Necker Island. It affords good temporary anchorage in 7 or 8 fathoms, but care must be taken to avoid the reefs on either side. The tidal currents set eastward and westward with a velocity of about one-half knot at strength.

Necker Island, 0.7 mile north of Eustatia Island, is nearly 0.5 mile in extent and 107 feet high at its northern part. The northeastern side is fairly bold and steep-to, with depths of 6 to 10 fathoms within 300 yards. The southeastern and western sides are foul and dangerous up to 0.5 mile offshore. Foul ground, near which is a reef that dries, extends about 0.3 mile southward of Necker Island.

The Invisibles, about 0.8 mile eastward of Necker Island, are 3 small rocky heads with only 4 to 5 feet of water on them. They do not always break. Between them and the reefs on the eastern side of Necker Island there are depths of 5 to 8 fathoms, but greater depths are a short distance off the eastern end. The rocks are not easy to see, and therefore care should be exercised when approaching from eastward.

H. O. Chart 3904.—Anegada, the northeasternmost island of the Virgin Group, lies with **East Point,** its southeastern end, about 12 miles north-northeastward of Pajaros Point. Anegada is 9 miles in length, about 30 feet high, and covered with brushwood except at a few places cleared for cultivation of corn and vegetables. Numerous salt-water lagoons are in the westerly interior. The principal settlement is on the southern side, 2.5 miles from East Point.

The island is about 1.5 miles within the edge of the Virgin Bank, but the depths decrease so rapidly that sounding is of little help. The island is low, and owing to the strength and irregularity of the tidal currents in the vicinity, it is extremely dangerous to approach at night unless the mariner is very sure of the vessel's position. By day, however, and in clear weather, the approach is not so dangerous; Virgin Peak is an excellent guide.

Anegada is skirted on its northern side by a narrow barrier reef which is about 0.1 mile off at **Soldier Point,** the northerly point, and 1.5 miles eastward at East Point. Thence **Horse Shoe Reef,** a most dangerous reef upon which many vessels have been lost, extends southeastward for nearly 8 miles. From its southeastern end detached coral heads and shoal ledges extend 4.5 miles southwestward, where they terminate in **Herman Reefs,** which break only with a swell or a strong breeze. Horse Shoe Reef breaks in any weather.

The White Horse is a heap of dead-white coral, 3 feet high, 2 miles westward of the elbow of Horse Shoe Reef.

The edge of the bank is 2.5 miles eastward of the elbow of Horse Shoe Reef. Here are depths of 34 fathoms close within the 100-fathom curve, and 10 fathoms about 1 mile farther in. Abreast Herman Reefs, the edge of the bank is little more than a mile distant. The southern end lies 5.5 miles east-northeast of Pajaros Point. A detached 5-fathom patch is 0.7 mile southward of the reefs.

Robert Reef, 3.5 miles westward of Herman Reefs, is a small rocky patch with 4½ fathoms on it. Another small rocky head, with 3¾ fathoms, is 1.2 miles north-northeastward of this reef. **Hawks Bill Bank,** about 2 miles north-northwestward of Robert Reef, is a small rocky ledge with 3 to 5½ fathoms.

The reef skirting the northern side of Anegada terminates about 300 yards off **West End,** but the southern side of the island is foul with detached coral patches lying up to 3.5 miles offshore. A 5-fathom patch is 3.3 miles west of West End.

Good temporary anchorage may be found in 5 to 6 fathoms about 1 mile off West End. During the period of rollers, October to May, however, it is advisable to anchor south of the island. The best anchorage is in about 6 fathoms with West End bearing 328° and East Point 050°. However, care must be taken after rounding the western end. The bank westward of Anegada is chiefly fine sand, and in good weather vessels may anchor on it in safety, taking care to avoid the dangers already described.

APPENDIX

COAST AND GEODETIC SURVEY.—United States Coast Pilots, Tide Tables, Tidal Current Tables, and Tidal Current Charts. For sale by United States Coast and Geodetic Survey, Washington 25, D. C., also at its district offices and sales agencies, which are listed quarterly in the Notice to Mariners.

United States Coast Pilots:

1. Atlantic Coast, St. Croix River to Cape Cod, 1950.
2. Atlantic Coast, Cape Cod to Sandy Hook, 1950.
3. Atlantic Coast, Sandy Hook to Cape Henry, 1953.
4. Atlantic Coast, Cape Henry to Key West, 1948.
5. Gulf Coast, Puerto Rico, and Virgin Islands, 1958.
7. Pacific Coast, California, Oregon, and Washington, 1951.
8. Southeast Alaska, Dixon Entrance to Yakutat Bay, 1952.
9. Alaska, Cape Spencer to Arctic Ocean, 1954

Distances Between United States Ports, 1938.

A Coast Pilot for which a supplement has been issued should not be used except with reference to the latest issue of the supplement. Supplements may be obtained from the United States Coast and Geodetic Survey, Washington 25, D. C., or any of its district offices.

Tide Tables:

Europe and West Coast of Africa.
East Coast, North and South America.
West Coast, North and South America.
Central and Western Pacific Ocean and Indian Ocean.

Tidal Current Tables:

Atlantic Coast, North America.
Pacific Coast, North America and Asia.

Tidal Current Charts:

Boston Harbor (1949).
Narragansett Bay to Nantucket Sound (1955).
Long Island Sound and Block Island Sound (1954).
New York Harbor (1956).
Delaware Bay and River (1948).
Tampa Bay (1951).
San Francisco Bay (1947).
Puget Sound, Northern Part (1952).
Puget Sound, Southern Part (1948).

District Offices.—New Orleans District, United States Customhouse, 423 Canal Street, New Orleans, La. The New Orleans district includes all of the States of Alabama, Mississippi, Louisiana, Arkansas, the parts of Kentucky and Tennessee west of the Tennessee River, and the coastal area of Texas south and east of and including the following counties: Bowie, Red River, Franklin, Wood, Smith, Cherokee, Angelina, Polk, San Jacinto, Walker, Madison, Robertson, Milam, Bell, Lanpasas, San Saba, McCulloch, Menard, Kimble, Edwards, and Valverde.

The state of Florida and the possessions Puerto Rico and Virgin Islands are included in the area assigned to the Tampa district office which, however, does not sell coast pilots, charts, or other publications.

Coast and Geodetic Survey Sales Agents.—Agents marked with an (*) asterisk also handle certain U. S. Navy Hydrographic Office publications, and those marked with a (†) dagger also handle certain U. S. Coast Guard publications.

Washington, D. C.:

Coast and Geodetic Survey, Department of Commerce, 14th St. and Constitution Ave. NW. Coast Guard publications are handled by Superintendent of Documents, Government Printing Office, North Capitol and G Sts. NW.

Florida:

Anna Maria Island: †Dobbe's Island Hardware & Marine Supply.
Apalachicola: C. W. Randolph, Agent, Standard Oil Co. Bulk Plant.
Boca Grande: Millers Marina, Box 447.
Bradenton: †Turner's Marine Supply, corner 9th Ave. and 13th St.
Clearwater Beach: †Clearwater Marine Sales, 4 Marina Bldg.
Dania: De Padro Yacht Basin, Post Office Box 155.
Daytona Beach: John S. Robins Yacht Sales, 306 South Beach St.
Flamingo: Everglades Park Co., Inc.
Fort Lauderdale:
Starn & Bennett, Inc., 2434 East Las Olas Blvd.
†Vogel's Marine Supply, 601 South Andrews Ave.
*†Herold Boat Co., 1112 East Las Olas Blvd.
Bahia-Mar Yachting Center.
Phillips Petroleum Co., Post Office Box 1700, Pier 66.
Fort Myers: Parker's Book Store.
Fort Pierce: Horton's, Inc.
Homestead:
Overseas Bait & Tackle Shop, Inc.
Don's Bait & Tackle.
Islamorada: The Four Winds, Overseas Highway at Ocean Lane.
Jacksonville:
†The H. & W. B. Drew Co., 22–30 West Bay St.
*†The Nautical Supply Co., 15 North Newnan St.
Key West: Capt. Red's, 517 Fleming St.

Florida—Continued
Marathon: Ye Ole Fishin'.
Merritt Island: Banana River Marine Service.
Miami:
*†Hopkins-Carter Hardware Co., 135–139 South Miami Ave.
†Phillips Hardware Co., 490 Northwest, South River Dr.
*†Florida Precision Instrument Co., 1221 Biscayne Blvd.
L. B. Harvey, Marine Instruments, 628 Southwest Second Ave.
†Santana Marine Service, Dinner Key.
Everglades Park Co., Inc., 2980 Coral Way.
Orlando: *Florida Marine Equipment Co., 1104–06 North Mills St.
Panama City: Tarpon Dock Marina, 127 East Beach Dr.
Pensacola: *†McKenzie Oerting Supply Co., 603 South Palafox St.
Pompano Beach: Lighthouse Marine Center, 2507 North Ocean Blvd.
St. Petersburg: St. Petersburg Shipbuilding & Supply Co., 200 Seventh Ave., South
Sarasota:
Hansen Chris Craft Sales, 1506 Third St.
†Tucker's Sporting Goods, Sportman's Corner.
Tallahassee: Jon S. Beazley, 1903 North Monroe St.
Tampa: *†Poston Marine Hardware & Supply Co., Inc., 1012 East Cass Ct.
Tarpon Springs: Leist Engineering Co., Box 603, Roosevelt Ave.
West Palm Beach: *Hopkins Marine Hardware Co., 207 Sixth St.
Alabama:
Mobile: *†Mobile Ship Chandlery Co., corner Dauphin, Commerce, and Front Sts.
Mississippi:
Pascagoula: Nelson Office Supply, 407 South Front St.
Louisiana:
Morgan City: Shannon Hardware Co., Ltd.
New Orleans:
Coast and Geodetic Survey District Office, 315 Customhouse, 423 Canal St.
*†Baker, Lyman & Co., 308 Magazine St.
New Orleans Map Co., 134 Chartres St.
Texas:
Corpus Christi: L. K. Gunderland & Son, 1920 North Water St.
Galveston: *†R. H. John, Inc., 2218 Market St.
Houston: *†Texas Nautical Co., Cotton Exchange Bldg.
Port Arthur: †N. M. Nielson, 532 Fifth St.
Puerto Rico:
San Juan: Fred Imbert, Inc., Ochoa Bldg., Post Office Box 2265.
Virgin Islands:
St. Thomas: *Capt. E. L. Simmons, Harbormaster.
Cuba:
Habana: George H. Moore, Aguacate No. 106.
Panama:
Colon: *J. Cain & Co., Inc., Post Office Box 835.

PUBLICATIONS.—A résumé of the United States Government publications of navigational value is included for the ready reference of the mariner. In addition to the agents located in the principal seaports handling sales publications, certain libraries have been designated by the Congress of the United States to receive the publications as issued for public review.

Nautical Charts.—Coasts of the United States, Territories, and Possessions: published by United States Coast and Geodetic Survey; for sale by C&GS and its sales agents.

Mississippi River (Cairo, Ill., to Gulf of Mexico): Published and for sale by Mississippi River Commission, Vicksburg, Miss.

Mississippi River (Cairo, Ill., to Minneapolis, Minn.) and Illinois Waterway (Mississippi River to Lake Michigan): Published and for sale by United States Army Engineer District, Chicago, Ill.

Great Lakes, Lake Champlain, New York State Canals, and the St. Lawrence River-St. Regis to Cornwall, Canada: Published and for sale by United States Lake Survey, Detroit, Mich.

Foreign countries: Published by United States Navy Hydrographic Office; for sale by HO and its sales agents.

Coast Pilots.—Coasts of the United States, Territories, and Possessions: Published by United States Coast and Geodetic Survey; for sale by C&GS and its sales agents.

Great Lakes Pilot published and for sale by United States Lake Survey, Detroit, Mich.

Foreign countries.—Sailing Directions: Published by United States Navy Hydrographic Office; for sale by HO and its sales agents.

Tide and Tidal Current Tables, and Tidal Current Charts.—Published by United States Coast and Geodetic Survey; for sale by C&GS and its sales agents.

Notices to Mariners may be obtained free from the following: Local Notices to Mariners—District Commander of the local Coast Guard district; Weekly Notice to Mariners, Part I (Western Hemisphere Edition)—Commandant, United States Coast Guard; Weekly Notice to Mariners, Part II (Eastern Hemisphere Edition)—United States Navy Hydrographic Office; Weekly Notice to Mariners, Great Lakes—Commander, Ninth Coast Guard District, Cleveland, Ohio.

Light Lists.—United States, Territories, and Possessions: Published by Coast Guard; for sale by the Superintendent of Documents and his sales agents.

Foreign countries: Published by United States Navy Hydrographic Office; for sale by HO and its sales agents.

Radio.—Radio Navigation Aids (HO Pub. No. 205), Radio Weather Aids (2 volumes), (HO Publication 206) and International Code of Signals, Volume II. Radio (HO Publication No. 88): Published by United States Navy Hydrographic Office; for sale by HO and its sales agents.

Miscellaneous.—American Nautical Almanac and American Ephemeris and Nautical Almanac: Published by United States Naval Observatory; for sale by Superintendent of Documents and his sales agents.

American Practical Navigator (Bowditch) (HO Publi-

cation No. 9), and International Code of Signals, Volume I—Visual (HO Publication No. 87): Published by United States Navy Hydrographic Office; for sale by HO and its sales agents.

Rules to Prevent Collisions of Vessels and Pilot Rules for Certain Inland Waters of the Atlantic and Pacific Coasts and of the Coast of the Gulf of Mexico (CG–169), Pilot Rules for the Western Rivers and the Red River (CG–184), and Pilot Rules for the Great Lakes and Their Connecting and Tributary Waters and the St. Marys River (CG–172): Published by and free on application to the United States Coast Guard.

Port Series of the United States: Prepared by the Corps of Engineers, United States Army, in cooperation with the Maritime Administration, United States Department of Commerce; for sale by the Superintendent of Documents.

CORPS OF ENGINEERS, UNITED STATES ARMY, Districts—Jacksonville District.—Office: 575 Riverside Avenue, Jacksonville 2, Fla.

The Jacksonville district comprises a portion of south-central Georgia and all of peninsular Florida except a small northeastern portion, embracing the watersheds tributary to the Atlantic Ocean and the Gulf of Mexico from, but not including, the harbor at Fernandina, Fla., to and including the Aucilla River. It also includes Puerto Rico, the Virgin Islands of the United States, and other nearby islands.

Mobile District.—Office: 2301 Grant Street, Mobile 7, Ala.

The Mobile district comprises a small portion of southeastern Tennessee, western Georgia, western Florida, all of Alabama south of the Tennessee River Basin, eastern Mississippi, and a small portion of southeastern Louisiana embraced in the drainage basins tributary to the Gulf of Mexico, west of the Aucilla River Basin, to and including the Pearl River Basin. It includes the section of the Gulf Intracoastal Waterway from St. Marks, Fla., to Lake Borgne Light No. 41, La.

New Orleans District.—Office: Foot of Prytonia Street, New Orleans 9, La.

The New Orleans district comprises a portion of the State of Louisiana, including the drainage area of the Red River south of Fulton, Ark., in Arkansas and Texas, embraced in the drainage basins tributary to the Mississippi River and the Gulf of Mexico, except the Mississippi River above mile 320 above Head of Passes, the drainage area of the Ouachita-Black River Basin, and small eastern and western portions of Louisiana tributary to Pearl River and Sabine River and Lake. It includes the sections of the Intracoastal Waterway from Lake Borgne Light No. 41 to the Sabine River, and the Passes of the Mississippi River.

Galveston District.—Office: 606 Santa Fe Building, Galveston, Tex.

The Galveston district comprises the drainage basin of all the short streams arising in the coastal plain of Texas and flowing into the Gulf of Mexico, including the entire basin of Buffalo Bayou, San Jacinto, San Bernard, Lavaca, Navidad, Mission and Aransas Rivers. It also includes the lower basins of the major streams flowing into the Gulf as follows: Sabine River, Texas and Louisiana, below Bon Weir; Neches River below Town Bluff; Trinity River below Riverside; Brazos River below the confluence with Navasota River; Colorado River below Austin; Guadalupe River below the confluence with the San Marcos River; San Antonio River below Goliad; Nueces River below Calallen. It further embraces the coastal area situated to the east of the Missouri-Pacific Railroad between Calallen and Raymondville, and all of Starr, Hidalgo, Cameron, and Willacy Counties, covering the Lower Rio Grande Valley.

COAST GUARD.—Commander, Seventh Coast Guard District, 150 Southeast Third Avenue, Miami 32, Fla.

The district includes South Carolina and Georgia; Florida, except that part west of the Apalachicola River; Panama Canal Zone; all of the island possessions of the United States pertaining to Puerto Rico and Virgin Islands; and all United States naval reservations in the islands of the West Indies and on the north coast of South America.

Captain of the Port Office, Coast Guard Base, Key West, Fla. All navigable waters of the United States and contiguous land areas within the following boundaries: On the east the 81°44′00″ W. meridian; on the south the 24°27′00″ N. parallel; on the west the 81°55′00″ W. meridian; and on the north the 24°39′00″ N. parallel.

Captain of the Port Office, 406 Federal Building, Tampa 2, Fla. All navigable waters of the United States and contiguous land areas within the following boundaries: a line extending from a point located at 28°03′00″ N., 82°49′00″ W. east to the 82°20′00″ W. meridian; thence south to the 27°27′00″ N. parallel; thence west to the 82°43′00″ W. meridian; thence northwesterly to a point at 27°36′00″ N., 82°56′00″ W.; thence northeasterly to the point of beginning.

Commander, Eighth Coast Guard District, 328 Customhouse, New Orleans 16, La.

The district includes New Mexico, Texas, and Louisiana; those parts of Alabama, Mississippi, and Arkansas south of latitude 34° N.; and that part of Florida west of the Apalachicola River.

Captain of the Port Office, 919 Jones Building, Corpus Christi, Tex. All navigable waters of the United States and contiguous land areas within the following boundaries: On the east the 96°55′00″ W. meridian; on the south the 27°35′00″ N. parallel; on the west the 97°35′00″ W. meridian; and on the north the 28°00′00″ N. parallel.

Captain of the Port Office, Post Office Box 358, Galveston, Tex. All navigable waters of the United States and contiguous land areas within the following boundaries: On the east the 96°55′00″ W. meridian, on the south the 29°10′00″ N. parallel, on the west the 95°00′00″ W. meridian, and on the north the 29°50′00″ N. parallel.

Captain of the Port Office, Houston, Tex., Post Office Box 446, Galena Park, Tex. All navigable waters of the United States and contiguous land areas within the

following boundaries: On the east the 95°00′00″ W. meridian; on the south the 29°40′00″ N. parallel; on the west the 95°30′00″ W. meridian; and on the north the 29°50′00″ N. parallel.

Captain of the Port Office, Coast Guard Base, Post Office Box 270, Mobile, Ala. All navigable waters of the United States and contiguous land areas within the following boundaries: On the east the 87°10′00″ W. meridian, on the south the 30°05′00″ N. parallel, on the west the 88°10′00″ W. meridian, and on the north the 31°00′00″ N. parallel.

Captain of the Port Office, Post Office Box 2406, Customhouse Station, New Orleans, La. All navigable waters of the United States and contiguous land areas within the following boundaries: On the south the 28°50′00″ N. parallel, on the west the 91°20′00″ W. meridian, on the north the 31°00′00″ N. parallel to the Louisiana boundary line, thence south along said boundary line to the coast, thence east-southeasterly to a point located at 30°00′00″ N., 88°50′00″ W., thence south to 28°50′00″ N.

Captain of the Port Office, Coast Guard Group, Sabine, Tex. All navigable waters of the United States and contiguous land areas within the following boundaries: On the east the 93°10′00″ W. meridian, on the south the 29°30′00″ N. parallel, on the west the 94°10′00″ W. meridian, and on the north the 30°25′00″ N. parallel.

Captain of the Port Office, Coast Guard Lifeboat Station, Box 38, Port Isabel, Tex. All navigable waters of the United States and contiguous land areas within the following boundaries: On the east the 97°00′00″ W. meridian, on the south the 26°00′00″ N. parallel, on the west the 97°50′00″ W. meridian, and on the north the 26°25′00″ N. parallel.

Lifeboat Stations.—The lifeboat stations operated by the United States Coast Guard along the Gulf Coast are:

Santa Rosa, Fla. (No. 212), 30°19′05″ N., 87°15′20″ W. Near west end of Santa Rosa Island, easterly of entrance to Pensacola Bay.

Grande Isle, La. (No. 214), 29°13′48″ N., 89°59′53″ W. 3.5 miles southwest of Barataria Pass.

Sabine, Tex. (No. 216), 29°43′40″ N., 93°52′14″ W. West side of Sabine Pass Channel, north of Sabine.

Galveston, Tex. (No. 217), 29°20′00″ N. 94°46′15″ W. East side of Galveston Channel at Fort Point.

Freeport, Tex. (No. 219), 28°56′28″ N., 95°18′04″ W. East side of channel to Freeport Harbor.

Port O'Connor, Tex. (No. 220), 28°23′56″ N., 96°24′24″ W. Near northeast end of Matagorda Island, on west side of Pass Cavallo entrance channel.

Port Aransas, Tex. (No. 221), 27°50′15″ N., 97°03′32″ W. Near northeast end of Mustang Island, southerly of Aransas Pass entrance channel.

Port Isabel, Tex. (No. 222), 26°04′26″ N., 97°09′51″ W. Near south end of Padre Island, north of Brazos Santiago entrance channel.

UNITED STATES CUSTOMS DISTRICTS.—The first-named ports in the following list are the headquarters ports. An asterisk (*) precedes the names of ports authorized to issue marine documents.

Florida District: The limits are the State of Florida, the north bank of St. Marys River, and the City of Marys, Ga.

Ports of entry: *Tampa, including Port Tampa and Port Tampa City; *Apalachicola, Boca Grande, Carabelle, *Key West, Panama City, *Pensacola, Port St. Joe, St. Petersburg.

Mobile District: The limits are the State of Alabama and that part of the State of Mississippi lying south of 31° N. latitude.

Ports of entry: *Mobile, *Gulfport, Pascagoula. (Marine documents are issued at Biloxi, though it is not a port of entry.)

New Orleans District: The limits are the State of Louisiana except the parishes of Cameron and Calcasieu, and that part of the State of Mississippi lying north of 31° N. latitude.

Ports of entry: *New Orleans, *Baton Rouge. (Marine documents are issued at Morgan City, though it is not a port of entry.)

Sabine District: The limits are that part of the State of Texas from Sabine Pass north along State line to north boundary line of Shelby County; west to Neches River; down west shore of said river to north boundary of Jefferson County; westerly along said boundary to east boundary of Liberty County; south to gulf; also the parishes of Cameron and Calcasieu in the State of Louisiana.

Ports of entry: *Port Arthur, *Beaumont, *Lake Charles, Orange, Sabine.

Galveston District: The limits are that part of the State of Texas lying east of 97° W. longitude, except territory embraced in Sabine district. Also those portions of the counties of Dallas, Aransas, and Refugio, lying west of 97° W. longitude, and the counties of Tarrant, San Patricio, and Nueces.

Ports of entry: *Galveston, including Port Bolivar and Texas City; *Corpus Christi, Freeport, *Houston.

Laredo District: The limits are that part of the State of Texas lying west of 97° W. longitude and east of the Pecos River except the territory included in the Galveston District.

Ports of entry: Laredo, *Brownsville.

Puerto Rico District: The limits are the Territory of Puerto Rico.

Ports of entry: *San Juan, Aguadilla, Fajardo, Guanica, Humacao, Jobos, *Mayaguez, *Ponce.

Virgin Islands District: The limits are the Virgin Islands of the United States of America.

Ports of entry: *Charlotte Amalie, Cruz Bay, Coral Bay, Christiansted, Frederiksted.

UNITED STATES PUBLIC HEALTH SERVICE.—Quarantine Stations:

Florida:

Tampa: U. S. Quarantine Station; supervision of quarantine and medical examination of aliens from Cedar Keys to Boca Grande.

Alabama:

Mobile: U. S. Quarantine Station, U. S. Courthouse; supervision of quarantine and medical examination of aliens.

Louisiana:

New Orleans: U. S. Quarantine Station; supervision of quarantine and medical examination of aliens.

Texas:

Galveston: U. S. Quarantine Station; supervision of quarantine and medical examination of aliens. Brownsville: U. S. Quarantine Station; supervision of quarantine and medical examination of aliens.

Puerto Rico: San Juan: U. S. Quarantine Station; supervision of quarantine and medical examination of aliens.

Additional ports of entry at which quarantine inspection and/or medical examination of aliens are performed:

Corpus Christi, Tex.
Gulfport, Miss.
Key West, Fla.
Lake Charles, La.
Panama City, Fla.
Pensacola, Fla.
Port St. Joe, Fla.

Marine Hospitals:

New Orleans, La., 210 State St.
Galveston, Tex., 45th St. and Avenue N.

Outpatient Clinics:

Tampa, Fla., Davis Island.
Mobile, Ala., U. S. Courthouse.
Houston, Tex., Appraisers Stores Bldg.
Port Arthur, Tex., U. S. Postoffice and Customhouse.
San Juan, P. R.
Charlotte Amalie, St. T., U. S. Postoffice and Customhouse.

Outpatient Offices:

Florida:

Apalachicola, 17½ Avenue E.
Key West, 420 Simonton St.
Panama City, 456 Grace Ave.
Pensacola, 1003 North 12th St.
Port St. Joe, Ward Clinic.

Mississippi:

Biloxi, 423 Lameuse St.
Gulfport, 404–406 Hewes Bldg.
Natchez, 306 Franklin St.
Vicksburg, 1600 Monroe St.

Louisiana:

Baton Rouge, 707 North 7th St.

Texas:

Brownsville, Medical Arts Center, 105 W. Elizabeth St.
Corpus Christi, Medical Center, 2400 Morgan Ave.

Puerto Rico:

Ponce, 40 Isabel St.

IMMIGRATION and NATURALIZATION.—Offices of these services are in the following places:

Florida:

Key West; Federal Bldg., Caroline and Simonton Sts.
Pensacola; Federal Bldg., Palafox and Chase Sts.
Tampa; Federal Bldg., Florida Ave. and Zack St.

Alabama:

Mobile; Federal Bldg., St. Joseph and St. Louis Sts.

Mississippi:

Gulfport; Post Office Bldg., 13th St. and 25th Ave.

Louisiana:

New Orleans; 908 Masonic Temple Bldg., 333 St. Charles St.
Lake Charles; Gayle Bldg.

Texas:

Houston; Federal Office Bldg., Franklin and Fannin Sts.
Port Arthur; Post Office and Customhouse, Austin Ave. and 5th St.
Galveston; Post Office Bldg., 25th St. and Avenue F.
Corpus Christi; Federal Bldg., Lower Broadway and Starr Sts.
Brownsville; foot of Gateway International Bridge.

Puerto Rico:

San Juan; Federal Bldg.

Virgin Islands:

Charlotte Amalie, Post Office and Customhouse Bldg.

LEGAL HOLIDAYS.—The following are the legal holidays in the area covered by this Coast Pilot:

Jan. 1, New Year's Day.—All States, Puerto Rico, and Virgin Islands.
Jan. 6, Three Kings' Day (Epiphany)—Puerto Rico.
Jan. 8, Battle of New Orleans—Louisiana.
Jan. 11, De Hostos' Birthday—Puerto Rico.
Arbor Day—Florida (3d Friday in January).
Jan. 19, Robert E. Lee's Birthday—All States.
Jan. 30, Franklin D. Roosevelt Day—Virgin Islands.
Feb. 12, Lincoln's Birthday—Virgin Islands.
Mardi Gras (Shrove Tuesday)—Alabama, Florida, and Louisiana.
Feb. 22, George Washington's Birthday—All States.
Mar. 2, Texas Independence Day—Texas.
Mar. 22, Emancipation Day—Puerto Rico.
Mar. 31, Transfer Day—Virgin Islands.
Holy Thursday—Virgin Islands.
Good Friday—Florida, Louisiana, Puerto Rico, and Virgin Islands.

Easter Monday—Virgin Islands.
Apr. 13, Thomas Jefferson's Birthday—Alabama.
Apr. 16, Jose de Diego's Birthday—Puerto Rico.
Apr. 21, San Jacinto Day—Texas.
Apr. 26, Confederate Memorial Day—Alabama, Florida, and Mississippi.
Whit Monday—Virgin Islands.
May 30, Memorial Day—Louisiana, Puerto Rico, and Virgin Islands.
June 3, Jefferson Davis' Birthday—All States.
June 22, Organic Act Day—Virgin Islands.
July 4, Independence Day—All States, Puerto Rico, and Virgin Islands.
July 17, Munoz Rivera's Birthday—Puerto Rico.
July 25, Constitution Day—Puerto Rico, and Virgin Islands.
July 27, Barbosas Birthday—Puerto Rico.
Aug. 30, Huey P. Long's Birthday—Louisiana.
Labor Day—All States, Puerto Rico and Virgin Islands.
Oct. 12, Columbus Day—Alabama, Florida, Louisiana, Texas, and Puerto Rico.
Nov. 1, All Saints Day—Louisiana and Virgin Islands.
Nov. 11, Veterans Day—All States, Puerto Rico, and Virgin Islands.
Nov. 19, Discovery Day—Puerto Rico.
Thanksgiving Day—All States, Puerto Rico, and Virgin Islands.
Dec. 25, Christmas Day—All States, Puerto Rico, and Virgin Islands.

YACHT CLUBS.—Yacht clubs active in the area covered by this Coast Pilot include:

Alabama:
Fairhope, Fairhope Yacht Club.
Mobile, Buccaneer Yacht Club.
Mobile, Mobile Yacht Club.

Florida:
Belleair Beach, Belleair Yacht Club.
Bradenton, Bradenton Yacht Club.
Clearwater, Carlouel Yacht Club.
Clearwater Beach, Clearwater Yacht Club.
Crystal Beach, Crystal Beach Yacht Club.
Dunedin, Dunedin Boat Club.
Fort Myers, Royal Palm Yacht Club.
Gulfport, Gulfport Yacht Club.
Key West, Key West Yacht Club.
Naples, Naples Yacht Club.
Palmetto, Palmetto Yacht Club.
Panama City, St. Andrew Bay Yacht Club.
Pass-a-Grille Beach, Pass-a-Grille Yacht Club.
Pensacola, Pensacola Yacht Club.
Redington Beach, Redington Beach Yacht Club.
Sarasota, Sarasota Yacht Club.
St. Petersburg, St. Petersburg Yacht Club.
St. Petersburg, Sunshine City Boat Club.
Tampa, Davis Island Yacht Club.
Tampa, Tampa Yacht and Country Club.
Venice, Venice Yacht Club.

Louisiana:
Lafitte, Lafitte Yacht Club.
New Orleans, New Orleans Yacht Club.
New Orleans, Southern Yacht Club.

Mississippi:
Bay St. Louis, Bay-Waveland Yacht Club.
Biloxi, Biloxi Yacht Club.
Gulfport, Gulfport Yacht Club.
Pascagoula, Pascagoula Yacht Club.
Pass Christian, Pass Christian Yacht Club.

Texas:
Corpus Christi, Corpus Christi Yacht Club.
Kemah, Texas Corinthian Yacht Club.
La Porte, Houston Yacht Club.
Port Arthur, Port Arthur Yacht Club.
Seabrook, Lakewood Yacht Club.

FEDERAL COMMUNICATIONS COMMISSION.—District field offices:
Tampa, Fla.—U. S. Post Office Bldg.
Mobile, Ala.—U. S. Courthouse and Customhouse.
New Orleans, La.—Federal Office Bldg.
Beaumont, Tex.—U. S. Postoffice Bldg.
Houston, Tex.—U. S. Appraisers Bldg.
San Juan, P. R.—Federal Bldg.

U. S. WEATHER BUREAU.—Offices: Barometers may be compared with standards at the following offices:
Key West, Fla., Federal Bldg., Caroline and Simonton Sts.
Tampa, Fla., Terminal Bldg., International Airport.
Apalachicola, Fla., Federal Bldg.
Pensacola, Fla., U. S. Post Office Bldg., Palafox and Chase Sts.
Mobile, Ala., Municipal Airport.
New Orleans, La., U. S. Post Office Bldg., 600 Camp St.
Lake Charles, La., Bldg. T-109, USAF Lake Charles Field.
Beaumont, Tex., Jefferson County Airport.
Galveston, Tex., U. S. Post Office Bldg., 25th St. and Church Ave.
Houston, Tex., Federal Office Bldg., Fannin St. and Franklin Ave.
Corpus Christi, Tex., Cliff Maus Field.
Brownsville, Tex., Administration Bldg., Rio Grande International Airport.
San Juan, P. R., Weather Bureau Bldg.

Radiotelephone Broadcasts of Weather Information.—Regular broadcasts of weather forecasts, coastal (storm) warnings, and other information are made by commercial coastal harbor radiotelephone stations in plain language, as follows:

Miami, Fla., WDR, 2514 kc., and 2490 kc. daytime only; 0715 and 1915 e. s. t.; warnings on receipt and at even hours thereafter while in effect.

Tampa, Fla., WFA, 2550 kc., 0700 and 1900 e. s. t.; warnings on receipt and at odd hours thereafter while in effect.

Mobile, Ala., WLO, 2572 kc., odd hours daily from 0500 to 2300 c. s. t.

New Orleans, La., WAK, 2598 kc., 2482 kc., and 2558 kc. daytime only; 0800 and 2300 c. s. t.; warnings on receipt and thereafter at odd hours.

Galveston, Tex., KQP, 2530 kc., 2450 kc. daytime only; 1230 and 1900 c. s. t.; warnings on receipt and thereafter at odd hours.

Radiotelephone Broadcasts by United States Coast Guard and Navy.—Local notices to mariners, hydrographic information, and coastal and hurricane warnings are transmitted by radiotelephone in plain language on the designated frequencies, preceded by preliminary announcement on 2182 kc., as follows:

Miami, Fla., NMA, 2678 kc., 1150 and 2350 e. s. t. On receipt.

St. Petersburg, Fla., NOF, 2678 kc., 1120 and 2320 e. s. t. On receipt.

New Orleans, La., NMG, 2686 kc., 1150 and 2350 c. s. t. On receipt.

Galveston, Tex., NOY, 2686 kc., 1120 and 2320 c. s. t. On receipt.

San Juan, P. R., NMR, 2678 kc., 0620 and 1820 a. s. t. On receipt.

Weather Broadcasts by Commercial Radio Stations.—The following commercial radio stations have installed microphones in nearby Weather Bureau offices, from which forecasts and summaries are broadcast on the schedules indicated:

Key West, Fla., WKWF, 1600 kc., 0745, 1230, and 1830 daily; 0745 and 1230 Saturdays, and 0800 and 1155 Sundays. Covers Florida and offshore eastern gulf area.

Fort Myers, Fla., WMYR, 1410 kc., 0810 and 1220, daily. Covers Florida and offshore eastern gulf area.

Tampa, Fla., WDAE, 1250 kc., 0750 daily and Saturdays. Covers Florida and offshore eastern gulf area.

Mobile, Ala., WABB, 1480 kc., 0715, 1235, 1740, and 2235, daily; 0715 Saturdays, and 0715 and 1135 Sundays. Covers Alabama, Mississippi, and offshore middle and western gulf area.

New Orleans, La., MNOE, 1060 kc., 0730, 0840, 1210, and 1805 daily; 0730 Saturdays and Sundays. Covers Louisiana, Mississippi, Alabama, northwestern Florida, and offshore western gulf area.

Lake Charles, La., KPLC, 1470 kc., 0635, 0730, and 1155 daily; 0635, 0732, and 1155 Saturdays. Covers Louisiana and offshore western gulf area.

Galveston, Tex., KLUF, 1400 kc., 1140, and (in season) 1730 daily. Covers offshore western and central gulf areas.

Corpus Christi, Tex., KEYS, 1440 kc., 0655 daily and holidays. Covers Texas and offshore. KRIS, 1360 kcs., 0745 daily and Saturdays, and 0705 Sundays. Covers Texas and offshore.

Brownsville, Tex., KRGB, 1290 kc., 0620 and 0700 daily. Covers local and offshore western gulf areas. KGBT, 1530 kc., 0735 and 1800 daily. Covers local and offshore western gulf areas. KBOR, 1600 kc., 1145 daily. Covers local and offshore western gulf areas.

COASTAL (STORM) WARNING STATIONS.—Weather Bureau listing of display stations in the area covered by this coast pilot follow. **DN** indicates day and night display, **D**, day display only; **W**, no display, posted warnings only.

Florida:

D	Grassy Key; 24°46.0′, 80°56.7′.
D	Marathon; 24°42.2′, 81°06.7′.
D	Marathon, Leonard's Store; 24°43.8′, 81°01.8′.
D	Marathon, How's Hobby Shop; 24°43.0′, 81°04.5′.
D	Sombrero Key Light; 24°37.6′, 81°06.7′.
D	American Shoals Light; 24°31.5′, 81°31.2′.
DN	Key West, Lumley & Roberts; 24°33.6′, 81°48.1′.
D	Key West, Eisner Yacht Basin; 24°33.5′, 81°47.3′.
D	Key West, Navy Station; 24°33.1′, 81°48.4′.
D	Flamingo; 25°08.5′, 80°55.5′.
D	Fort Myers Beach; 26°27.4′, 81°57.3′.
D	Punta Rassa; 26°29.2′, 81°00.8′.
DN	Fort Myers; 26°38.8′, 81°52.3′.
D	Port Boca Grande; 26°43.2′, 82°15.6′.
DN	Punta Gorda; 26°56.1′, 82°03.2′.
D	Johns Pass, Wheelers Dock; 27°47.0′, 82°47.0′.
D	Sarasota; 27°20.0′, 82°32.7′.
D	Bradenton; 27°30.0′, 82°34.4′.
D	Gulfport, Yacht Basin; 27°44.3′, 82°41.7′.
DN	St. Petersburg; 27°46.3′, 82°37.9′.
D	Clearwater; 27°57.9′, 82°48.3′.
DN	Tarpon Springs; 28°09.3′, 82°45.7′.
W	St. Marks; 30°07.0′, 84°12.0′.
DN	Carrabelle; 29°50.9′, 84°39.8′.
DN	Port St. Joe; 29°48.7′, 85°18.2′.
DN	Apalachicola; 29°43.6′, 84°59.0′.
DN	Panama City, St. Andrews; 30°10.1′, 85°41.6′.
D	Valparaiso; 30°30.3′, 86°29.4′.
D	Destin; 30°23.7′, 86°30.7′.
D	Fort Walton; 30°24.2′, 86°36.7′.
D	Fort Walton Beach; 30°24.1′, 86°36.0′.
DN	Pensacola; 30°24.2′, 87°12.9′.

Alabama:

DN	Southport; 30°17.0′, 87°41.0′.
D	Mobile Point Rear Range; 30°13.5′, 88°01.5′.
DN	Mobile; 30°41.0′, 88°02.5′.
D	Bayou la Batre; 30°23.5′, 88°16.0′.

Mississippi:

DN	Pascagoula; 30°22.2′, 88°33.7′.
DN	Biloxi; 30°23.5′, 88°53.1′.
DN	Gulfport; 30°22.0, 89°05.5′.
D	Pass Christian; 30°18.8′, 89°15.0′.
DN	Bay St. Louis; 30°18.4′, 89°19.7′.

Louisiana:

DN	Chef Menteur, I. W. W.; 30°03.8′, 89°47.6′.
D	New Canal Light; 30°01.6′, 90°06.7′.
DN	New Orleans, Industrial Canal; 29°58.0′, 90°01.6′.
D	Port Sulphur; 29°28.5′, 89°41.5′.
DN	Pilottown; 29°11.0′, 89°15.5′.

Louisiana—Continued

D Burrwood ; 28°58.0′, 89°23.0′.
D Grand Isle Lifeboat Sta. ; 29°13.8′, 89°59.9′.
DN Morgan City ; 29°41.8′, 91°12.7′.

Texas:

D Orange ; 30°05.5′, 93°43.8′.
DN Port Arthur ; 29°52.0′, 93°56.0′.
DN Sabine Lifeboat Station ; 29°42.0′, 93°51.0′.
DN Galveston Lifeboat Station ; 29°20.0′, 94°46.0′.
D Texas City ; 29°22.5′, 94°53.0′.
DN Kemah ; 29°32.9′, 95°01.0′.
D Freeport ; 28°56.9′, 95°20.8′.
D Freeport Lifeboat Station ; 28°56.5′, 95°18.1′.
DN Matagorda ; 28°41.0′, 95°58.0′.
DN Palacios ; 28°41.9′, 96°13.0′.
D Port O'Connor Lifeboat Station ; 28°24.0′, 96°24.0′.
DN Port Lavaca ; 28°37.8′, 96°37.2′.
D Rockport ; 28°01.2′, 97°03.0′.
D Port Aransas Lifeboat Station ; 27°50.3′, 97°03.5′.
D Aransas Pass ; 27°53.9′, 97°08.4′.
D Corpus Christi, bascule bridge ; 27°48.7′, 97°23.7′.
D Corpus Christi, T-Head ; 27°47.7′, 97°23.3′.
D Corpus Christi, Causeway ; 27°39.8′, 97°16.4′.
D Corpus Christi, Padre Island ; 27°34.8′, 97°13.2′.

Texas—Continued

D Yarborough Pass ; 27°12.1′, 97°22.5′.
DN Port Mansfield ; 26°33.4′, 97°25.6′.
D Port Isabel Lifeboat Station ; 26°04.0′, 97°10.0′.
D Port Brownsville ; 25°57.1′, 97°23.7′.

Puerto Rico:

D San Juan, CG Base ; 18°28.2′, 66°06.7′.
D Club Nautico ; 18°27.7′, 66°05.3′.
D Cangrejos Yacht Club ; 18°27.5′, 65°59.5′.
D Aguadilla City ; 18°26.0′, 67°09.0′.
D Arecibo Light ; 18°29.0′, 66°42.0′.
D Cabo Rojo Light ; 17°56.0′, 67°11.5′.
D Cabo San Juan Light ; 18°23.0′, 65°37.1′.
D Fajardo ; 18°19.6′, 65°38.8′.
D Mayaguez ; 18°12.5′, 67°09.1′.
D Punta Borinquen Light ; 18°30.0′, 67°09.0′.
D Punta Tuna Light ; 17°59.4′, 65°53.1′.
D Playa de Ponce ; 17°59.0′, 66°37.2′.
D Punta Santiago ; 18°10.0′, 65°44.7′.
D Fort San Cristobal ; 18°28.2′, 66°06.6′.
D Isla Mona Light ; 18°05.0′, 67°51.0′.

Virgin Islands:

D Ham Bluff Light ; 17°46.3′, 64°52.3′.
D Charlotte Amalie ; 18°20.5′, 64°55.8′.

CLIMATOLOGICAL TABLES

These tables were compiled from U. S. Weather Bureau data.

Sky cover is expressed in a range of 0 for no clouds to 10 for complete sky cover. The number of clear days is based on average cloudiness of 0 to 3, partly cloudy days on 4 to 7, and cloudy days on 8 to 10.

Heavy fog includes data referred to at various times in the past as "Dense" or "Thick." The upper visibility limit for heavy fog is 1/4 mile.

(a) means length of record in years.
* means less than one-half.
T means trace, an amount too small to measure.

KEY WEST, FLORIDA (Post Office Building) 24°34' N., 81°48' W. Elevation (ground) 9 feet. WB-1955

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 7:30 a.m. EST	1:30 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				61	61			85	16	16	85	75	44	42	55	85	85	85	85	85	72	72
Jan.	75.8	65.8	70.8	85	43	1.54	3.97	0.0	84	69	8.9	NE	37NW	68	4.3	13	12	6	7	0	1	*
Feb.	76.8	66.3	71.6	85	44	1.64	4.04	0.0	82	66	9.0	NE	44SW	75	3.7	14	10	4	6	0	1	*
Mar.	79.0	68.4	73.7	88	49	1.57	4.52	0.0	81	67	9.1	E	45W	78	3.6	16	10	4	5	0	2	0
Apr.	82.3	71.7	77.0	90	56	2.40	7.95	T	78	66	8.9	E	43W	79	3.7	16	11	4	5	0	3	0
May	85.0	74.5	79.8	92	64	2.82	5.83	T	76	65	8.2	E	39W	74	4.4	13	13	5	8	0	4	0
June	87.7	77.4	82.6	94	65	4.01	5.48	0.0	78	69	7.5	SE	36S	68	5.3	8	15	7	11	0	8	0
July	89.1	78.3	83.7	94	69	4.24	7.46	0.0	78	68	7.1	E	36NW	68	5.3	8	17	6	13	0	11	0
Aug.	89.3	78.4	83.9	95	68	4.67	8.32	0.0	78	68	7.1	E	37SW	68	5.2	8	18	6	15	0	12	0
Sep.	88.0	77.4	82.7	95	69	6.05	11.95	0.0	82	71	7.6	E	79E	65	5.5	7	16	7	16	0	10	0
Oct.	84.2	74.7	79.5	91	59	6.78	13.54	0.0	84	70	8.9	NE	57SE	65	4.9	11	12	7	13	0	4	0
Nov.	79.1	70.0	74.6	88	51	2.02	19.88	T	84	69	9.3	NE	50NW	68	4.2	13	11	6	7	0	1	0
Dec.	76.6	66.9	71.8	86	45	1.78	3.93	0.0	85	71	8.9	NE	43NW	66	4.2	13	12	6	7	0	1	*
Year	82.7	72.5	77.6	95	43	39.52	19.88	T	81	68	8.4	E	79E	70	4.5	140	157	68	113	0	58	

FORT MYERS, FLORIDA (Page Field), 26°35' N., 81°52' W.; Elevation (ground) 15 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 7:30 a.m. EST	1:30 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				17	17		17	17	12	12	11	8	.....		9	15	15	15	16	17	12	12
Jan.	75.2	53.9	64.6	87	31	1.52	2.25	0.0	93	56	7.0	E	.....		3.5	12	12	7	5	0	1	5
Feb.	76.6	54.6	65.6	91	32	2.01	2.14	0.0	91	52	7.6	E	.....		3.9	12	11	5	5	0	1	4
Mar.	79.6	57.5	68.6	93	34	2.18	4.91	0.0	89	50	8.1	SW	.....		3.6	13	12	6	5	0	1	4
Apr.	84.1	61.8	73.0	95	39	2.37	3.82	0.0	85	48	7.8	E	.....		4.1	11	13	6	6	0	5	2
May	87.7	66.1	76.9	99	50	4.29	3.06	0.0	83	50	7.0	E	.....		3.9	11	13	7	8	0	8	1
June	90.0	71.2	80.6	100	61	9.20	5.70	0.0	85	59	6.3	E	.....		5.3	4	15	11	15	0	16	*
July	90.5	73.4	82.0	101	66	8.72	3.58	0.0	87	63	5.8	E	.....		5.8	2	16	13	19	0	24	*
Aug.	91.0	74.0	82.5	100	67	7.81	3.54	0.0	88	62	5.8	E	.....		5.3	3	17	11	18	0	22	*
Sep.	89.5	73.1	81.3	96	63	8.59	6.02	0.0	91	65	6.8	E	.....		5.7	3	14	13	17	0	14	*
Oct.	85.0	67.5	76.3	94	48	4.15	10.85	0.0	91	61	7.4	ENE	.....		4.5	11	11	9	9	0	4	1
Nov.	79.1	59.3	69.2	91	34	1.21	2.13	0.0	90	56	7.0	NE	.....		3.8	12	12	6	5	0	1	2
Dec.	76.0	55.1	65.6	88	33	1.29	1.69	0.0	93	58	6.9	E	.....		4.0	12	12	7	5	0	1	4
Year	83.7	64.0	73.9	101	31	53.34	10.85	0.0	89	57	7.0	E	.....		4.5	106	158	101	117	0	98	23

TAMPA, FLORIDA (International Airport), 27°58' N., 82°32' W.; Elevation (ground) 19 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 7:30 a.m. EST	1:30 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				67	67		67	67	67	39	67	7	45	60	37	67	67	67	67	67	66	16
Jan.	70.8	52.1	61.5	85	23	1.99	3.58	T	87	60	7.3	E	41SE	63	5.2	11	11	9	7	0	1	5
Feb.	72.3	53.4	62.9	87	22	2.60	5.06	T	85	58	7.8	E	51SW	67	4.7	11	10	7	7	0	1	3
Mar.	75.4	56.6	66.0	92	31	3.12	5.62	0.0	84	55	7.9	S	49SW	71	4.8	13	11	7	6	0	2	2
Apr.	81.1	61.8	71.5	91	38	2.51	4.25	0.0	80	52	7.7	E	43SW	74	4.7	13	11	6	5	0	3	1
May	86.0	67.0	76.5	96	52	3.29	3.55	0.0	82	52	7.2	E	49NE	75	4.6	12	13	6	7	0	7	1
June	88.9	71.9	80.4	98	59	7.77	10.41	0.0	82	59	6.6	W	49NE	66	5.8	7	15	8	14	0	15	*
July	89.5	73.8	81.7	98	64	8.11	5.53	0.0	83	62	6.2	E	54SE	61	6.3	5	18	8	17	0	20	*
Aug.	90.1	73.9	82.0	97	66	8.06	5.37	0.0	85	62	6.1	E	50S	64	6.0	5	18	8	17	0	19	*
Sep.	88.3	72.6	80.5	96	54	6.45	7.27	0.0	87	61	6.9	E	73SE	64	6.1	6	15	9	15	0	12	*
Oct.	83.4	65.8	74.6	95	43	3.14	6.48	0.0	86	57	7.6	NNE	59NE	67	4.7	13	11	7	7	0	3	1
Nov.	76.2	57.2	66.7	88	31	1.04	4.18	0.0	85	55	7.4	NNE	35NW	68	4.5	13	11	6	5	0	1	2
Dec.	72.1	53.2	62.7	86	19	1.96	3.93	T	87	60	7.1	N	44NW	62	5.2	11	11	9	7	0	1	6
Year	81.2	63.3	72.3	98	19	50.04	10.41	T	84	58	7.1	E	73SE	68	5.2	120	155	90	114	0	85	21

APALACHICOLA, FLORIDA (Post Office Building), 29°44' N., 84°59' W.; Elevation (ground) 13 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 7:30 a.m. EST	1:30 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				34	34		34	34	31	19	31	23	31	31	31	34	34	34	34	34	34	34
Jan.	62.2	48.1	55.2	79	18	3.61	3.77	T	87	69	7.2	N	31SE	58	5.3	11	8	12	8	0	1	6
Feb.	64.0	49.7	56.9	80	21	4.09	5.74	0.0	86	67	7.6	N	35S	61	5.3	10	8	10	9	0	3	4
Mar.	67.8	54.0	60.9	85	26	4.92	8.17	0.0	84	66	7.9	S	47E	64	5.2	12	8	11	8	0	4	4
Apr.	74.2	60.8	67.5	90	37	4.28	6.32	0.0	84	65	7.6	SE	44SE	71	4.5	13	9	8	6	0	4	2
May	81.1	67.6	74.4	96	51	2.83	5.87	0.0	83	64	6.9	SE	41SE	77	4.1	14	10	7	6	0	5	1
June	86.2	73.5	79.9	101	62	5.47	5.34	0.0	85	68	6.3	SW	41NE	69	5.0	10	12	8	10	0	11	*
July	87.4	75.1	81.3	102	66	7.56	5.86	0.0	84	72	5.8	W	55N	64	5.7	7	14	10	15	0	17	0
Aug.	87.3	75.2	81.3	99	67	7.48	7.04	0.0	86	70	5.8	SW	51NE	65	5.5	9	12	10	14	0	17	0
Sep.	84.7	73.0	78.9	96	52	7.65	11.71	0.0	87	71	7.5	NE	58E	64	5.3	11	9	10	11	0	10	*
Oct.	78.2	63.8	71.0	93	41	2.55	5.63	0.0	85	63	7.6	NE	49NW	74	3.8	18	7	6	6	0	2	1
Nov.	69.0	53.7	51.4	87	24	2.45	5.84	0.0	84	64	7.3	N	41SE	69	4.3	15	7	8	5	0	1	2
Dec.	63.7	48.9	56.3	82	23	3.29	4.15	T	87	70	7.0	N	36SE	66	5.7	10	8	13	8	0	1	4
Year	75.5	62.0	68.8	102	18	56.18	11.71	T	85	67	7.0	N	58E	67	5.0	140	112	113	106	0	76	24

PENSACOLA, FLORIDA (Post Office Building), 30°25' N., 87°13' W.; Elevation (ground) 13 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 12:30 a.m. CST	12:30 p.m. CST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				77	77		77	77	13	36	74	71	77	39	74	74	74	74	77	77	63	60
Jan.	61.1	46.9	54.0	79	14	4.55	8.16	T	83	69	9.2	N	49NW	55	5.6	9	9	13	10	*	2	4
Feb.	63.1	48.8	56.0	79	7	4.10	9.16	0.1	82	68	9.4	N	54S	57	5.6	9	8	11	9	*	3	3
Mar.	66.9	53.4	60.2	88	23	6.00	8.32	T	82	66	9.6	SE	54S	63	5.3	11	9	11	9	*	4	3
Apr.	73.2	60.8	67.0	92	34	4.90	10.58	T	84	65	9.5	S	51SW	70	4.7	12	10	8	7	0	4	2
May	79.8	67.7	73.8	100	44	4.36	5.99	0.0	85	67	8.9	S	54SE	73	4.4	13	11	7	7	0	6	*
June	85.5	73.7	79.6	101	55	5.17	10.70	0.0	86	66	8.3	SW	49SE	73	4.9	10	13	7	10	0	11	*
July	86.9	75.0	81.0	103	62	7.59	7.85	0.0	88	69	7.9	SW	73SE	66	5.7	7	15	9	14	0	14	*
Aug.	87.4	74.9	81.2	103	62	7.43	9.91	0.0	89	68	7.6	SW	71SE	69	5.4	8	15	8	13	0	14	*
Sep.	84.6	72.0	78.3	102	49	5.78	8.56	0.0	85	66	8.4	NE	99E	70	4.7	12	10	8	9	0	7	*
Oct.	77.7	62.8	70.3	95	35	3.88	17.07	0.0	80	60	8.8	NE	83W	76	3.8	17	7	7	6	0	2	*
Nov.	68.0	52.4	60.2	86	22	3.84	7.66	0.0	80	62	8.9	NE	46S	65	4.5	14	8	8	7	0	1	1
Dec.	62.4	47.7	55.1	78	14	4.17	4.32	T	81	69	9.0	N	57SE	52	5.6	10	8	13	10	0	2	3
Year	74.7	61.3	68.0	103	7	61.77	17.07	0.1	84	66	8.8	NE	99E	67	5.0	132	123	110	111	*	70	16

MOBILE, ALABAMA (Bates Field), 30°41' N., 88°15' W.; Elevation (ground) 211 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 6:30 a.m. CST	12:30 p.m. CST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				15	15		8	15	15	15	8	8	.....		8	8	8	8	15	15	15	15
Jan.	62.2	43.2	52.7	84	14	5.02	3.44	0.2	87	63	10.0	N	.....		6.5	7	8	16	10	*	2	5
Feb.	64.7	45.2	55.0	82	11	4.99	5.00	T	87	60	10.0	N	.....		6.5	7	7	14	11	0	2	5
Mar.	69.1	49.9	59.5	90	21	7.62	6.52	0.1	86	58	10.3	S	.....		6.0	9	8	14	11	*	6	3
Apr.	76.3	57.0	66.7	92	36	5.10	13.36	0.0	87	55	9.5	S	.....		5.5	10	9	11	8	0	6	3
May	82.8	64.0	73.4	100	45	4.64	3.10	0.0	87	54	8.3	S	.....		5.4	10	12	9	8	0	8	1
June	88.5	70.6	79.6	102	56	6.09	3.42	0.0	87	58	7.5	S	.....		5.5	9	14	7	12	0	13	*
July	89.4	72.0	80.7	104	60	8.97	3.92	0.0	90	64	6.8	S	.....		6.7	3	15	13	17	0	19	*
Aug.	89.7	71.9	80.8	102	59	6.31	4.45	0.0	91	60	6.7	NE	.....		5.2	9	16	6	13	0	15	1
Sep.	86.6	68.7	77.7	98	47	5.78	5.79	0.0	90	60	7.8	NE	.....		5.3	11	10	9	9	0	8	1
Oct.	79.4	58.8	69.1	93	34	3.75	1.90	0.0	87	52	7.8	N	.....		3.7	17	8	6	5	0	3	2
Nov.	69.0	48.3	58.7	85	22	4.07	3.11	0.0	84	54	9.0	N	.....		4.5	13	9	8	8	0	3	3
Dec.	63.0	43.9	53.5	80	18	5.41	5.28	T	87	63	9.5	N	.....		6.2	8	8	15	11	0	2	5
Year	76.7	57.8	67.3	104	11	67.75	13.36	0.3	88	58	8.6	N	.....		5.6	113	124	128	123	*	87	29

NEW ORLEANS, LOUISIANA (Post Office Building), 29°57' N., 90°04' W.; Elevation (ground) 9.3 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 6:30 a.m. CST	12:30 p.m. CST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				83	83		86	86	68	39	86	.....	63	66	17	86	86	86	86	86	57	86
Jan.	63.5	48.3	55.9	83	15	4.78	4.67	.1	85	67	7.2	.....	44NW	49	5.9	10	9	12	10	*	2	3
Feb.	66.6	50.4	58.5	85	7	4.18	6.11	.1	84	64	7.6	.....	47SE	50	6.2	8	9	11	9	*	2	2
Mar.	71.1	54.8	63.0	90	28	6.56	10.93	T	84	60	7.6	.....	37NW	57	6.0	10	10	11	9	0	4	2
Apr.	77.7	61.8	69.8	91	38	5.45	14.01	.0	83	59	7.3	.....	41E	63	5.6	11	10	9	7	0	5	1
May	83.8	68.4	76.1	97	50	5.43	9.08	.0	83	58	6.5	.....	40N	68	5.0	11	13	7	8	0	6	*
June	89.4	74.4	81.9	102	58	5.57	6.64	.0	82	60	5.9	.....	43N	65	5.6	8	15	7	13	0	11	*
July	90.3	75.8	83.1	102	66	7.09	7.52	.0	84	64	5.6	.....	41SW	58	6.5	6	16	9	15	0	16	*
Aug.	90.5	76.2	83.4	100	63	6.41	8.90	.0	85	63	5.6	.....	46E	59	5.6	7	16	8	14	0	14	*
Sep.	87.2	73.4	80.3	99	54	5.82	10.75	.0	84	62	6.4	.....	85SE	64	5.3	11	12	7	10	0	7	*
Oct.	80.1	65.4	72.8	94	40	3.66	13.68	.0	82	58	6.7	.....	41N	70	3.7	16	9	6	6	0	2	1
Nov.	70.1	54.8	62.5	89	29	4.01	7.77	.0	83	60	7.0	.....	41SW	60	5.0	12	9	9	7	0	1	2
Dec.	64.7	49.5	57.1	84	19	4.58	4.83	T	85	66	7.1	.....	37N	46	6.0	9	9	13	10	0	2	3
Year	77.9	62.8	70.4	102	7	63.54	14.01	.2	84	62	6.7	.....	85SE	59	5.5	119	137	109	118	*	72	14

PORT ARTHUR, TEXAS (Jefferson County Airport), 29°58' N., 94°01' W.; Elevation (ground) 16 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 6:30 a.m. CST	12:30 p.m. CST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				3	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Jan.	61.7	44.0	52.9	77	26	5.12	2.19	T	88	70	10.9	N	36W	42	6.6	8	6	17	7	0	3	8
Feb.	65.1	46.8	56.0	83	26	4.19	2.77	.0	89	61	12.4	SW	39SW	54	6.0	8	7	13	8	0	4	5
Mar.	69.8	50.8	60.3	85	30	4.00	1.46	.0	87	61	12.2	S	43NW	50	6.5	6	9	16	6	0	1	6
Apr.	76.8	58.9	67.9	93	41	3.94	2.18	.0	90	62	11.4	SSE	43SE	51	6.7	6	9	15	7	0	4	3
May	83.1	65.6	74.4	93	46	4.40	7.18	.0	89	60	9.6	S	43SE	72	5.5	7	14	10	6	0	5	*
June	88.8	71.4	80.1	100	59	4.78	1.89	.0	90	58	8.3	S	41SE	78	4.9	9	16	5	6	0	10	1
July	90.7	72.6	81.7	99	67	6.80	1.92	.0	91	70	7.9	SSW	36NE	63	6.0	6	16	9	10	0	13	*
Aug.	91.3	72.2	81.8	99	62	5.14	4.19	.0	92	62	7.2	S	39SW	68	5.4	8	16	7	9	0	12	0
Sep.	87.5	68.3	77.9	96	53	4.88	1.53	.0	90	55	8.3	NE	36NE	75	4.3	14	10	6	6	0	6	*
Oct.	81.4	59.5	70.5	92	39	2.93	3.57	.0	90	54	9.2	E	56NW	79	3.6	16	13	2	8	0	3	1
Nov.	70.0	48.6	59.3	83	29	3.56	2.31	.0	85	55	11.0	N	36N	61	4.9	13	7	10	6	0	3	4
Dec.	63.7	44.4	54.1	80	24	5.47	6.24	.0	87	62	10.4	N	60S	52	5.5	11	8	12	8	0	3	8
Year	77.5	58.6	68.1	100	24	55.21	7.18	T	89	61	9.9	S	60S	63	5.5	112	131	122	87	0	67	37

GALVESTON, TEXAS (Post Office Building), 29°18' N., 94°50' W.; Elevation (ground) 7 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 6:30 a.m. CST	12:30 p.m. CST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				86	86		86	86	69	39	86	.....	86	66	52	86	86	86	86	86	66	64
Jan.	59.8	49.2	54.5	76	11	4.09	5.38	T	87	77	9.9	.....	46S	50	5.9	10	8	13	10	0	2	5
Feb.	62.8	52.0	57.4	83	8	2.88	6.55	.2	87	76	10.3	.....	52N	50	5.9	8	8	12	9	*	2	4
Mar.	66.9	56.6	61.8	85	27	3.10	4.58	.0	86	73	10.3	.....	43SE	55	5.7	10	10	11	8	0	3	5
Apr.	73.4	64.3	68.9	92	38	3.09	9.23	.0	86	73	10.4	.....	49N	61	5.4	10	11	9	7	0	4	2
May	80.0	71.3	75.7	93	52	3.20	6.13	.0	84	72	10.0	.....	52W	69	4.8	11	13	7	6	0	5	*
June	85.6	77.4	81.5	99	57	3.35	10.27	.0	82	70	9.3	.....	54SE	76	4.1	14	12	4	6	0	5	0
July	87.4	78.6	83.0	101	66	4.80	14.35	.0	82	69	8.3	.....	59NW	72	4.7	12	14	5	9	0	8	*
Aug.	88.0	79.1	83.6	100	67	3.55	9.05	.0	82	68	8.1	.....	79E	71	4.5	13	13	5	9	0	8	0
Sep.	84.9	75.6	80.3	96	52	5.44	10.00	.0	82	68	8.7	.....	76NE	70	4.3	14	10	6	9	0	5	0
Oct.	78.6	68.6	73.6	94	41	3.59	14.00	.0	82	66	9.0	.....	57SE	74	3.6	18	8	5	7	0	2	*
Nov.	68.9	58.2	63.6	85	26	3.84	9.01	.0	83	69	9.6	.....	47N	62	4.7	13	9	8	8	0	2	1
Dec.	62.4	51.5	57.0	80	18	4.26	4.50	T	86	75	9.7	.....	43NW	49	5.9	10	8	13	10	0	2	3
Year	74.9	65.2	70.1	101	8	45.19	14.35	.2	84	71	9.5	.....	79E	63	5.0	143	124	98	98	*	48	20

CORPUS CHRISTI, TEXAS (Cliff Maus Field), 27°46' N., 97°27' W.; Elevation (ground) 41 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 6:30 a.m. CST	12:30 p.m. CST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				18	18		14	18	18	18	14	8	14	14	18	14	14	14	18	18	17	14
Jan.	66.3	47.4	56.9	86	18	1.39	2.13	.1	88	66	10.6	SSE	51NE	49	6.4	8	8	15	8	*	1	5
Feb.	69.8	50.8	60.3	98	18	1.44	2.06	T	88	66	11.3	SSE	42SE	53	6.6	7	6	15	7	0	2	5
Mar.	74.5	56.0	65.3	94	28	1.63	2.67	T	86	63	12.3	SSE	49S	57	6.6	7	7	17	6	0	2	3
Apr.	80.1	63.3	71.7	102	39	1.74	7.19	.0	90	64	12.3	SSE	43SE	61	6.5	5	11	14	5	0	3	2
May	85.5	69.3	77.4	98	50	3.41	2.83	.0	92	65	11.5	SE	56NW	67	6.0	7	13	11	6	0	5	1
June	90.2	74.1	82.2	100	61	2.88	3.89	.0	92	62	11.0	SE	37SE	78	4.9	12	13	5	5	0	3	*
July	92.5	75.0	83.8	104	68	2.26	3.68	.0	93	58	10.3	SSE	35S	86	4.6	11	14	6	5	0	4	*
Aug.	92.9	75.0	84.0	102	65	2.08	5.52	.0	93	58	9.6	SSE	61N	83	4.2	14	12	5	5	0	4	0
Sep.	89.3	72.1	80.7	102	50	4.70	7.68	.0	91	61	8.3	E	30N	72	4.6	13	10	7	8	0	5	*
Oct.	84.0	65.0	74.5	98	40	2.46	2.63	.0	89	59	8.3	SE	40N	76	4.2	16	9	6	6	0	3	1
Nov.	74.9	54.9	64.9	95	30	1.74	3.44	.0	85	59	9.9	SSE	40N	60	5.6	10	9	11	6	0	1	2
Dec.	68.4	49.1	58.8	88	24	2.27	2.34	.0	87	64	9.6	SSE	41NW	51	6.2	9	7	15	7	0	1	5
Year	80.7	62.7	71.7	104	18	28.00	7.68	.1	90	62	10.4	SSE	61N	67	5.5	119	119	127	74	*	34	24

BROWNSVILLE, TEXAS (RGV International Airport), 25°54' N., 97°26' W.; Elevation (ground) 16 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 6:30 a.m. CST	12:30 p.m. CST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				17	17		17	17	17	17	14	7	14	14	14	14	14	14	14	14	14	14
Jan.	68.9	52.0	60.5	87	23	1.55	2.87	T	89	65	10.5	SSE	40S	48	6.5	7	9	15	6	0	1	4
Feb.	72.8	55.2	64.0	94	22	1.20	1.62	.0	90	64	10.9	SSE	40N	50	6.6	6	7	15	6	0	1	5
Mar.	76.6	59.5	68.1	99	32	1.14	1.85	T	89	61	12.1	SSE	41S	50	6.6	6	10	15	5	0	1	3
Apr.	81.6	65.8	73.7	100	45	1.56	3.69	.0	90	59	12.3	SE	42N	54	6.6	5	11	14	4	0	2	3
May	86.8	71.0	78.9	100	53	3.36	4.00	.0	91	60	12.2	SE	50SE	66	5.9	7	15	9	4	0	4	1
June	90.2	74.9	82.6	101	49	3.36	8.18	.0	91	59	11.4	SE	45E	73	5.3	7	18	5	4	0	2	*
July	91.8	75.7	83.8	103	68	2.00	3.62	.0	92	55	10.2	SE	30S	80	4.9	10	15	6	4	0	3	0
Aug.	92.7	75.5	84.1	100	68	2.45	4.39	.0	92	56	9.4	SE	50NW	75	4.9	10	15	6	7	0	5	0
Sep.	89.5	73.3	81.4	104	55	6.27	5.44	.0	92	60	8.2	SE	31NE	68	5.3	9	14	7	10	0	5	*
Oct.	84.9	67.1	76.0	95	43	2.95	6.67	.0	91	59	8.2	SE	36NW	72	4.4	14	11	6	6	0	2	1
Nov.	76.6	59.0	67.8	94	37	1.55	2.54	.0	86	60	9.6	SE	33N	53	5.9	9	8	13	7	0	1	2
Dec.	71.1	53.7	62.4	88	29	2.16	5.69	.0	88	63	9.6	SSE	39NW	48	6.4	8	8	15	6	0	*	5
Year	82.0	65.2	73.6	104	22	29.55	8.18	T	90	60	10.3	SE	50SE	61	5.8	98	141	126	69	0	27	24

SAN JUAN, PUERTO RICO (Stop 4, Ponce De Leon Ave), 18°28' N., 66°07' W.; Elevation (ground) 47 feet. WB-1956

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 2:30 a.m. AST	2:30 p.m. AST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)				58	58		58	58	14	17	57	7	57	58	58	58	58	58	58	58	58	58
Jan.	79.6	70.2	74.9	88	63	4.69	4.52	0.0	83	71	10.7	ENE	40NE	64	4.9	9	17	5	20	0	*	0
Feb.	79.7	70.0	74.9	91	62	2.74	4.84	0.0	83	70	10.3	ENE	37N	69	4.5	9	15	4	15	0	*	0
Mar.	80.6	70.6	75.6	91	63	2.42	5.26	0.0	82	69	10.8	ENE	36E	71	4.5	11	16	4	14	0	*	0
Apr.	81.5	71.7	76.6	93	65	3.80	6.72	0.0	84	72	10.4	ENE	30E	66	5.0	9	15	6	14	0	2	0
May	83.5	73.8	78.7	94	66	6.51	5.37	0.0	87	75	9.6	ENE	39N	59	5.8	6	16	9	16	0	5	0
June	84.0	75.0	79.5	93	66	5.16	6.47	0.0	87	75	10.3	ENE	35SE	62	5.8	6	15	9	17	0	7	0
July	84.2	75.7	80.0	92	70	6.02	4.05	0.0	86	76	11.4	ENE	54E	65	5.5	7	17	7	19	0	7	0
Aug.	85.0	76.0	80.5	93	68	6.26	9.83	0.0	87	75	10.3	ENE	70NE	67	5.1	8	17	6	20	0	7	0
Sep.	85.5	75.4	80.5	94	69	6.00	8.50	0.0	89	74	8.2	ENE	129NE	61	5.8	5	17	8	18	0	10	0
Oct.	85.3	74.8	80.1	94	68	5.27	3.87	0.0	88	74	7.0	SSE	37N	64	5.5	7	17	7	18	0	8	0
Nov.	83.2	73.5	78.4	93	66	6.37	8.06	0.0	87	73	8.3	ENE	35NE	63	5.2	8	16	6	19	0	3	0
Dec.	81.1	71.8	76.5	90	62	4.83	10.55	0.0	85	72	9.9	ENE	38E	65	5.1	8	18	5	21	0	1	0
Year	82.8	73.2	78.0	94	62	60.07	10.55	0.0	86	73	9.7	ENE	129NE	65	5.2	93	196	76	211	0	50	0

SANTA ISABEL, PUERTO RICO (Santa Isabel Airport), 17°58' N., 66°24' W.; Elevation (ground) 28 feet. WB-1952

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 2:30 a.m. AST	2:30 p.m. AST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	7	7	7	7	7	7	7	7	7	7	7	7	.....		7	7	7	7	7	7	7	7
Jan.	84.3	65.9	75.1	89	59	0.49	0.91	0.0	82	58	6.0	ENE	.....		4.2	14	14	3	4	0	0	0
Feb.	83.3	65.3	74.3	88	57	0.33	0.54	0.0	84	61	5.5	NE	.....		5.0	12	14	3	5	0	0	0
Mar.	84.2	66.1	75.2	89	58	0.30	0.44	0.0	82	61	7.0	ESE	.....		4.6	14	14	3	3	0	0	0
Apr.	85.1	68.4	76.8	90	62	1.18	1.66	0.0	83	65	6.3	SE	.....		5.3	10	13	7	7	0	1	0
May	86.6	71.3	79.0	89	60	2.90	1.70	0.0	74	57	5.8	SE	.....		6.6	3	17	11	11	0	5	0
June	88.0	72.6	80.3	94	67	2.45	1.94	0.0	85	66	6.4	SE	.....		6.5	4	16	10	8	0	7	0
July	88.9	72.9	80.9	96	67	3.15	3.97	0.0	84	66	6.5	SE	.....		6.2	7	13	11	9	0	8	0
Aug.	89.1	72.9	81.0	95	68	4.22	2.85	0.0	86	66	6.0	E	.....		5.3	9	15	7	10	0	12	0
Sep.	87.6	72.4	80.0	93	68	6.66	6.62	0.0	87	69	5.0	E	.....		6.5	5	13	11	13	0	15	0
Oct.	87.9	71.7	79.8	91	67	6.16	4.02	0.0	89	70	4.6	N	.....		6.3	7	14	10	12	0	15	0
Nov.	86.9	69.9	78.4	91	63	2.72	5.17	0.0	89	65	4.5	NE	.....		5.1	9	15	6	9	0	8	0
Dec.	84.5	66.8	75.7	88	59	0.99	1.98	0.0	68	63	4.6	NE	.....		4.9	13	13	5	6	0	1	0
Year	86.4	68.0	77.2	96	57	31.55	6.62	0.0	83	64	5.7	SE	.....		5.5	107	171	87	97	0	72	0

ST. CROIX, VIRGIN ISLANDS, U. S. A. (Alexander Hamilton Field), 17°42' N., 64°48' W; Elevation (ground) 53 feet. WB-1952

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum in 24 hrs.	Snow, sleet, mean total	Humidity (percent): 2:30 a.m. AST	2:30 p.m. AST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	5	5	5	5	5	5	5	5	5	5	5		.....		5	5	5	5	5	5	5	5
Jan.	82.3	69.4	75.9	88	64	3.13	2.88	0.0	81	66	11.1	ENE	.....		5.7	4	21	6	20	0	0	0
Feb.	82.6	69.2	75.9	88	62	2.91	3.95	0.0	84	64	10.5	ENE	.....		5.8	5	18	5	13	0	0	0
Mar.	83.9	69.8	76.9	88	62	2.18	3.42	0.0	83	62	10.9	ENE	.....		5.6	5	21	5	13	0	1	0
Apr.	84.9	72.0	78.5	89	65	2.87	1.24	0.0	85	66	10.9	ENE	.....		6.1	4	18	8	14	0	1	0
May	86.3	74.3	80.3	90	68	5.31	2.84	0.0	87	70	10.3	ESE	.....		7.1	1	15	15	17	0	3	0
June	87.5	75.5	81.5	91	70	2.74	1.78	0.0	85	69	11.3	ESE	.....		6.9	1	18	11	15	0	5	0
July	88.0	75.6	81.8	95	69	3.25	2.00	0.0	85	69	11.3	ENE	.....		6.9	2	17	12	18	0	4	0
Aug.	88.7	75.5	82.1	92	70	4.69	2.19	0.0	87	69	10.8	ENE	.....		6.2	2	21	8	19	0	6	0
Sep.	87.6	74.3	81.0	92	68	7.82	5.39	0.0	88	73	9.4	ENE	.....		7.0	2	15	13	18	0	9	0
Oct.	87.3	74.1	80.7	90	67	6.05	2.35	0.0	90	73	8.2	ESE	.....		6.7	2	17	12	18	0	8	0
Nov.	85.3	72.9	79.1	89	64	3.63	2.89	0.0	89	72	8.4	ENE	.....		6.1	3	19	8	18	0	4	0
Dec.	83.9	71.0	77.4	87	63	2.03	1.16	0.0	86	68	9.7	ENE	.....		5.8	5	18	8	18	0	1	0
Year	85.7	72.8	79.3	95	62	46.61	5.39	0.0	86	68	10.3	ENE	.....		6.3	36	218	111	201	0	42	0

460113 O—58——17

HOURS OF OPERATION OF FOG SIGNALS
(U. S. Coast Guard)

Light station	7 Calendar Years - 1950 thru 1956														Pre - 1950		
	Average													Max. 1 yr.	Ave.	For yrs.	Max. 1 yr.
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year				
Egmont Key, Fla. 27°36.0'N., 82°45.6'W.	31	14	17	9	1	1	4	3	6	4	11	43	144	239	166	37	593
South Pass West Jetty, La. 28°59.4'N., 89°08.4'W.	124	145	178	71	21	1	1	2	4	1	8	74	630	991	647	7	1051
Southwest Pass Entrance, La. 28°54.4'N., 89°25.6'W.	122	108	126	47	10	1	2	0	2	1	7	63	489	940	506	17	843
Head of Passes West Jetty, La. 29°08.9'N., 89°15.1'W.	159	114	155	82	20	6	7	4	8	5	17	78	655	790	573	41	968
Cubits Gap, La. 29°11.5'N., 89°15.8'W.	160	125	150	76	31	1	2	1	2	5	19	89	661	920	670	41	1031
New Canal, La. 30°01.6'N., 90°06.8'W.	35	14	8	3	1	0	1	1	0	9	17	33	122	199	248	41	604
Point Au Fer Reef, La. 29°22.3'N., 91°23.1'W.	102	70	60	33	3	12	5	3	8	23	35	82	436	1017	280	30	561
Sabine Pass East Jetty, Tex. 29°38.7'N., 93°49.4'W.	118	72	93	33	5	2	7	6	13	27	68	111	555	737	698	17	1112
Galveston Jetty, Tex. 29°19.7'N., 94°41.5'W.	98	53	67	34	5	1	3	7	6	5	31	83	393	509	516	24	829

SURFACE WATER TEMPERATURES, DENSITIES, AND SALINITIES

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
Key West, Fla. (26 years)	Temperature	71.5	72.5	74.8	78.7	82.4	85.4	86.7	87.0	85.4	81.4	75.7	72.3	79.5
	Density	1.0250	1.0249	1.0248	1.0243	1.0238	1.0231	1.0228	1.0228	1.0227	1.0230	1.0246	1.0250	.....
	Salinity	36.0	36.0	36.4	36.7	37.0	36.7	36.6	36.6	36.0	35.7	36.3	36.2	36.4
St. Petersburg, Fla (10 years)	Temperature	64.0	65.7	69.1	73.8	80.2	84.1	85.4	85.6	83.7	77.9	69.8	64.6	75.3
	Density	1.0188	1.0185	1.0188	1.0184	1.0181	1.0184	1.0180	1.0160	1.0141	1.0149	1.0178	1.0188	.....
	Salinity	26.4	26.4	27.2	27.7	28.8	30.1	29.8	27.1	24.2	24.2	26.1	26.5	27.0
Cedar Keys, Fla (15 years)	Temperature	58.8	61.3	65.7	72.4	78.5	83.4	84.5	84.8	82.2	74.4	65.9	60.1	72.7
	Density	1.0199	1.0192	1.0181	1.0168	1.0167	1.0168	1.0163	1.0155	1.0163	1.0176	1.0193	1.0199	.....
	Salinity	27.1	26.5	25.8	25.4	26.4	27.7	27.5	26.4	26.8	26.7	27.5	27.3	26.8
Pensacola, Fla (33 years)	Temperature	56.4	58.3	63.1	70.3	77.3	83.0	84.8	85.2	81.9	74.2	64.4	57.7	71.4
	Density	1.0129	1.0120	1.0090	1.0067	1.0082	1.0092	1.0088	1.0081	1.0112	1.0137	1.0163	1.0153	.....
	Salinity	17.5	16.6	13.3	11.5	14.8	17.4	17.4	16.5	20.0	21.6	23.1	20.9	17.6
Grand Isle, La., 8 miles S.E. (8 years)	Temperature	62.3	62.3	65.0	69.4	77.3	82.6	84.3	85.0	82.3	77.2	70.0	64.4	73.5
	Density	1.0215	1.0195	1.0187	1.0175	1.0148	1.0166	1.0172	1.0176	1.0177	1.0201	1.0233	1.0235	.....
	Salinity	29.7	27.1	26.4	25.6	23.7	27.3	28.6	29.3	28.8	30.7	33.5	32.7	28.6
Eugene Island, La (13 years)	Temperature	54.3	55.4	61.4	68.1	76.3	83.0	84.8	85.4	82.1	74.5	63.4	55.1	70.3
	Density	1.0026	1.0014	1.0011	1.0000	0.9988	0.9977	0.9977	0.9993	1.0031	1.0046	1.0049	1.0039	.....
	Salinity	3.9	2.5	2.8	2.4	2.1	2.0	2.4	4.8	8.9	9.4	8.0	5.8	4.6
Galveston, Tex (35 years)	Temperature	56.7	58.6	63.2	70.8	78.4	84.2	86.4	86.9	83.5	76.5	66.0	59.3	72.5
	Density	1.0169	1.0160	1.0153	1.0142	1.0123	1.0121	1.0150	1.0178	1.0165	1.0162	1.0177	1.0178	.....
	Salinity	22.7	21.8	21.7	21.6	20.6	21.6	26.0	29.9	27.5	25.4	25.4	24.3	24.0
Rockport, Tex (7 years)	Temperature	62.1	62.2	67.7	74.3	80.8	86.2	87.4	87.4	84.3	78.1	68.1	62.5	75.1
	Density	1.0202	1.0196	1.0185	1.0186	1.0177	1.0182	1.0210	1.0230	1.0193	1.0178	1.0193	1.0188	.....
	Salinity	28.0	27.2	26.7	28.0	28.4	30.3	34.5	37.1	31.4	27.7	27.8	26.1	29.4
Port Isabel, Tex (13 years)	Temperature	62.5	63.7	68.5	74.4	80.3	84.4	85.3	85.4	84.2	78.9	70.1	63.9	75.1
	Density	1.0247	1.0246	1.0237	1.0232	1.0225	1.0223	1.0235	1.0234	1.0212	1.0210	1.0243	1.0252	.....
	Salinity	33.8	33.8	33.6	34.2	34.6	35.4	37.2	37.1	34.0	32.4	34.9	34.8	34.6

Monthly mean values are given for the indicated length of series. Temperatures are in degrees Fahrenheit; densities are computed for corresponding monthly temperatures (based on the density of pure water at a temperature of 39.2°F, being equal to unity); and salinities are in parts per thousand.

For sea water temperature, density, and salinity data in greater detail, see Coast and Geodetic Survey Spec. Pub. No. 278, Surface Water Temperatures at Tide Stations, Atlantic Coast, North and South America, and Spec. Pub. No. 279, Density of Sea Water at Tide Stations, Atlantic Coast, North and South America. These publications are for sale by the Superintendent of Documents, United States Government Printing Office, North Capital and G Streets NW., Washington 25, D. C.

Radio Bearing Conversion Table

Table of corrections, in minutes

[DIFFERENCE OF LONGITUDE IN DEGREES]

Mid. L.	½°	1°	1½°	2°	2½°	3°	3½°	4°	4½°	5°	5½°	6°	6½°	7°	7½°	8°	8½°	9°	9½°	10°
15°	4	8	12	16	19	23	27	31	35	40	43	47	50	54	58	62	66	70	74	78
16°	4	8	12	17	21	25	29	33	37	41	45	50	54	58	62	66	70	74	79	83
17°	4	9	13	18	22	26	31	35	39	44	48	53	57	61	66	70	75	79	83	88
18°	5	9	13	19	23	28	32	37	42	46	51	56	60	65	70	74	79	83	88	93
19°	5	10	15	20	24	29	34	39	44	49	54	59	63	68	73	78	83	88	93	98
20°	5	10	15	21	26	31	36	41	46	51	56	62	67	72	77	82	87	92	98	103
21°	5	11	16	21	27	32	38	43	48	54	59	64	70	75	81	86	91	97	102	108
22°	6	11	17	22	28	34	39	45	51	56	62	67	73	79	84	90	96	101	107	112
23°	6	12	18	23	29	35	41	47	53	59	64	70	76	82	88	94	100	105	111	117
24°	6	12	18	24	31	37	43	49	55	61	67	73	79	85	92	98	104	110	116	122
25°	6	13	19	25	32	38	44	51	57	63	70	76	82	89	95	101	108	114	120	127
26°	7	13	20	26	33	39	46	53	59	66	72	79	85	92	99	105	112	118	125	131
27°	7	14	20	27	34	41	48	54	61	68	75	82	89	95	102	109	116	123	129	136
28°	7	14	21	28	35	42	49	56	63	70	77	84	92	99	106	113	120	127	134	141
29°	7	15	21	29	36	44	51	58	65	73	80	87	95	102	109	116	124	131	138	145
30°	7	15	22	30	38	45	53	60	68	75	83	90	98	105	113	120	127	135	143	150
31°	8	15	23	31	39	46	54	62	70	77	85	93	100	108	116	124	131	139	146	155
32°	8	16	24	32	40	48	56	64	72	79	87	95	103	111	119	127	135	143	151	159
33°	8	16	25	33	41	49	57	65	74	82	90	98	106	114	123	131	139	147	155	163
34°	8	17	25	34	42	50	59	67	75	84	92	101	109	117	126	134	143	151	159	168
35°	9	17	26	34	43	52	60	69	77	86	95	103	112	120	129	138	146	155	163	172
36°	9	18	26	35	44	53	62	71	79	88	97	106	115	123	132	141	150	159	168	176
37°	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	163	172	181
38°	9	18	28	37	46	55	65	74	83	92	102	111	120	129	139	148	157	166	175	185
39°	9	19	28	38	47	57	66	75	85	94	104	113	123	132	142	151	160	170	179	189
40°	10	19	29	39	48	58	68	77	87	96	106	116	125	135	145	154	164	174	183	193
41°	10	20	30	39	49	59	69	79	89	98	108	118	128	138	148	157	167	177	187	197
42°	10	20	30	40	50	60	70	80	90	100	110	120	130	140	151	161	171	181	191	201
43°	10	20	31	41	51	61	72	82	92	102	113	123	133	143	153	164	174	184	194	205
44°	10	21	31	42	52	63	73	83	94	104	115	125	135	146	156	167	177	188	198	208
45°	11	21	32	42	53	64	74	85	95	106	117	127	138	149	159	170	180	191	201	212
46°	11	22	32	43	54	65	76	86	97	108	119	129	140	151	162	173	183	194	205	216
47°	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	186	197	208	219
48°	11	22	33	45	56	67	78	89	100	111	123	134	145	156	167	178	190	201	212	223
49°	11	23	34	45	57	68	79	91	102	113	125	136	147	158	170	181	192	204	215	226
50°	11	23	34	46	57	69	80	92	103	115	126	138	149	161	172	184	195	207	218	230
51°	12	23	35	47	58	70	82	93	105	117	128	140	152	163	175	186	198	210	221	233
52°	12	24	35	47	59	71	83	95	106	118	130	142	154	165	177	189	201	213	225	236
53°	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
54°	12	24	36	49	61	73	85	97	109	121	133	146	158	170	182	194	206	218	231	243
55°	12	25	37	49	61	74	86	98	111	123	135	147	160	172	184	197	209	221	233	246
56°	12	25	37	50	62	75	87	100	112	124	137	149	162	174	187	199	211	224	236	249
57°	13	25	38	50	63	75	88	101	113	126	138	151	164	176	189	201	214	226	239	252
58°	13	25	38	51	64	76	89	102	115	127	140	153	165	178	191	204	216	229	242	254
59°	13	26	39	51	64	77	90	103	116	129	141	154	167	180	193	206	219	231	244	257
60°	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260

Example. A ship in latitude 39°51′. N., longitude 67°35′ W., by dead reckoning, obtains a radio bearing of 299° true on the radiobeacon located in latitude 40°37′. N., longitude 69°37′ W.

Radiobeacon station	Latitude	40°37′ N.
Dead-reckoning position of ship	Latitude	39°51′
Middle latitude		40°14′
Radiobeacon station	Longitude	69°37′ W.
Dead reckoning position of ship	Longitude	67°35′
Longitude difference		2°02′

Entering the table with difference of longitude equals 2°, which is the nearest tabulated value and opposite 40° middle latitude, the correction of 39′ is read.

As the ship is east of the radiobeacon, a minus correction is applied. The Mercator bearing then will be 299°−000°39′=298°21′. To facilitate plotting, subtract 180° and plot from the position of the radiobeacon the bearing 298°21′−180°, or 118°21′ (Mercator bearing reckoned clockwise from true north).

Distance of Visibility of Objects at Sea

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer whose eye is at sea level; in practice, therefore, it is necessary to add to these a distance of visibility corresponding to the height of the observer's eye above sea level.

Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles
6	2. 8	48	7. 9	220	17. 0	660	29. 4	2, 000	51. 2
8	3. 1	50	8. 1	240	17. 7	680	29. 9	2, 200	53. 8
10	3. 6	55	8. 5	260	18. 5	700	30. 3	2, 400	56. 2
12	4. 0	60	8. 9	280	19. 2	720	30. 7	2, 600	58. 5
14	4. 3	65	9. 2	300	19. 9	740	31. 1	2, 800	60. 6
15	4. 4	70	9. 6	320	20. 5	760	31. 6	3, 000	62. 8
16	4. 6	75	9. 9	340	21. 1	780	32. 0	3, 200	64. 9
18	4. 9	80	10. 3	360	21. 7	800	32. 4	3, 400	66. 9
20	5. 1	85	10. 6	380	22. 3	820	32. 8	3, 600	68. 6
22	5. 4	90	10. 9	400	22. 9	840	33. 2	3, 800	70. 7
24	5. 6	95	11. 2	420	23. 5	860	33. 6	4, 000	72. 5
26	5. 8	100	11. 5	440	24. 1	880	34. 0	4, 200	74. 3
28	6. 1	110	12. 0	460	24. 6	900	34. 4	4, 400	76. 1
30	6. 3	120	12. 6	480	25. 1	920	34. 7	4, 600	77. 7
32	6. 5	130	13. 1	500	25. 6	940	35. 2	4, 800	79. 4
34	6. 7	140	13. 6	520	26. 1	960	35. 5	5, 000	81. 0
36	6. 9	150	14. 1	540	26. 7	980	35. 9	6, 000	88. 8
38	7. 0	160	14. 5	560	27. 1	1, 000	36. 2	7, 000	96. 0
40	7. 2	170	14. 9	580	27. 6	1, 200	39. 6	8, 000	102. 6
42	7. 4	180	15. 4	600	28. 0	1, 400	42. 9	9, 000	108. 7
44	7. 6	190	15. 8	620	28. 6	1, 600	45. 8	10, 000	114. 6
46	7. 8	200	16. 2	640	29. 0	1, 800	48. 6		

Conversion Table, Degrees to Points and Vice Versa

° ′	Points	° ′	Points	° ′	Points	° ′	Points
0 00	N	90 00	E	180 00	S	270 00	W
2 49		92 49		182 49		272 49	
5 38	N ½ E	95 38	E ½ S	185 38	S ½ W	275 38	W ½ N
8 26		98 26		188 26		278 26	
11 15	N x E	101 15	E x S	191 15	S x W	281 15	W x N
14 04		104 04		194 04		284 04	
16 53	N x E ½ E	106 53	ESE ½ E	196 53	S x W ½ W	286 53	WNW ½ W
19 41		109 41		199 41		289 41	
22 30	NNE	112 30	ESE	202 30	SSW	292 30	WNW
25 19		115 19		205 19		295 19	
28 08	NNE ½ E	118 08	SE x E ½ E	208 08	SSW ½ W	298 08	NW x W ½ W
30 56		120 56		210 56		300 56	
33 45	NE x N	123 45	SE x E	213 45	SW x S	303 45	NW x W
36 34		126 34		216 34		306 34	
39 23	NE ½ N	129 23	SE ½ E	219 23	SW ½ S	309 23	NW ½ W
42 11		132 11		222 11		312 11	
45 00	NE	135 00	SE	225 00	SW	315 00	NW
47 49		137 49		227 49		317 49	
50 38	NE ½ E	140 38	SE ½ S	230 38	SW ½ W	320 38	NW ½ N
53 26		143 26		233 26		323 26	
56 15	NE x E	146 15	SE x S	236 15	SW x W	326 15	NW x N
59 04		149 04		239 04		329 04	
61 53	NE x E ½ E	151 53	SSE ½ E	241 53	SW x W ½ W	331 53	NNW ½ W
64 41		154 41		244 41		334 41	
67 30	ENE	157 30	SSE	247 30	WSW	337 30	NNW
70 19		160 19		250 19		340 19	
73 08	ENE ½ E	163 08	S x E ½ E	253 08	WSW ½ W	343 08	N x W ½ W
75 56		165 56		255 56		345 56	
78 45	E x N	168 45	S x E	258 45	W x S	348 45	N x W
81 34		171 34		261 34		351 34	
84 23	E ½ N	174 23	S ½ E	264 23	W ½ S	354 23	N ½ W
87 11		177 11		267 11		357 11	

TRANS-GULF DISTANCES FOR DEEP-DRAFT VESSELS
KEY WEST, FLA., TO PORT BROWNSVILLE, TEX.

March 22, 1958

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Tampa, Fla., is 809 nautical miles from Corpus Christi, Tex.

	STRAITS OF FLORIDA 24°25.0'N., 83°00.0'W.	Key West, Fla. 24°33.7'N., 81°48.5'W.	Port Boca Grande, Fla. 26°43.2'N., 82°15.3'W.	St. Petersburg, Fla. 27°45.5'N., 82°37.9'W.	Port Tampa, Fla. 27°51.7'N., 82°33.2'W.	Tampa, Fla. 27°55.4'N., 82°26.9'W.	Port St. Joe, Fla. 29°49.1'N., 85°18.8'W.	Panama City, Fla. 30°08.2'N., 85°37.6'W.	Pensacola, Fla. 30°24.0'N., 87°13.0'W.	Mobile, Ala. 30°41.5'N., 88°02.2'W.	Pascagoula, Miss. 30°21.9'N., 88°33.8'W.	Gulfport, Miss. 30°21.4'N., 89°05.6'W.	New Orleans, La. (S. Pass) 29°57.0'N., 90°03.7'W.	New Orleans, La. (SW. Pass) 29°57.0'N., 90°03.7'W.	Lake Charles, La. 30°13.1'N., 93°15.5'W.	Port Arthur, Tex. 29°49.5'N., 93°57.6'W.	Orange, Tex. 30°04.0'N., 93°43.3'W.	Beaumont, Tex. 30°04.6'N., 94°05.2'W.	Galveston, Tex. 29°18.5'N., 94°48.1'W.	Texas City, Tex. 29°22.7'N., 94°53.2'W.	Houston, Tex. 29°45.0'N., 95°17.4'W.	Freeport, Tex. 28°56.3'N., 95°20.4'W.	La Quinta, Tex. 27°52.6'N., 97°15.7'W.	Corpus Christi, Tex. 27°48.8'N., 97°24.0'W.	Port Isabel, Tex. 26°03.6'N., 97°12.8'W.	Port Brownsville, Tex. 25°57.1'N., 97°24.0'W.
STRAITS OF FLORIDA 24°25.0'N., 83°00.0'W.																										
Key West, Fla. 24°33.7'N., 81°48.5'W.	73																									
Port Boca Grande, Fla. 26°43.2'N., 82°15.3'W.	150	223																								
St. Petersburg, Fla. 27°45.5'N., 82°37.9'W.	219	292	99																							
Port Tampa, Fla. 27°51.7'N., 82°33.2'W.	228	301	108	8																						
Tampa, Fla. 27°55.4'N., 82°26.9'W.	232	305	112	18	18																					
Port St. Joe, Fla. 29°49.1'N., 85°18.8'W.	369	442	281	240	249	253																				
Panama City, Fla. 30°08.2'N., 85°37.6'W.	381	454	294	252	261	266	42																			
Pensacola, Fla. 30°24.0'N., 87°13.0'W.	431	504	357	318	327	331	120	100																		
Mobile, Ala. 30°41.5'N., 88°02.2'W.	471	544	408	370	379	383	181	162	86																	
Pascagoula, Miss. 30°21.9'N., 88°33.8'W.	468	541	409	372	381	385	186	166	90	71																
Gulfport, Miss. 30°21.4'N., 89°05.6'W.	485	558	429	394	403	407	209	191	115	96	51															
New Orleans, La. (S. Pass) 29°57.0'N., 90°03.7'W.	524	597	489	460	469	473	306	292	230	220	194	203														
New Orleans, La. (SW. Pass) 29°57.0'N., 90°03.7'W.	540	613	509	482	491	495	330	317	255	244	218	228	0													
Lake Charles, La. 30°13.1'N., 93°15.5'W.	675	748	658	635	644	648	488	474	412	402	376	385	374	361												
Port Arthur, Tex. 29°49.5'N., 93°57.6'W.	676	749	660	636	645	649	489	476	414	403	377	387	376	362	81											
Orange, Tex. 30°04.0'N., 93°43.3'W.	697	770	680	657	666	670	509	496	434	424	398	407	396	383	102	20										
Beaumont, Tex. 30°04.6'N., 94°05.2'W.	703	776	686	663	672	676	515	502	440	430	404	413	402	389	108	26	26									
Galveston, Tex. 29°18.5'N., 94°48.1'W.	702	775	692	668	678	682	521	508	446	436	410	419	408	395	120	76	96	102								
Texas City, Tex. 29°22.7'N., 94°53.2'W.	706	779	696	673	682	686	525	512	450	440	414	423	412	399	124	80	100	106	9							
Houston, Tex. 29°45.0'N., 95°17.4'W.	745	818	735	711	720	724	564	551	489	478	452	462	450	437	163	118	139	145	48	50						
Freeport, Tex. 28°56.3'N., 95°20.4'W.	719	792	713	687	696	700	542	529	467	456	431	440	429	416	155	108	129	135	56	60	98					
La Quinta, Tex. 27°52.6'N., 97°15.7'W.	802	875	813	791	800	804	652	639	577	567	541	550	539	526	282	235	255	261	182	186	225	140				
Corpus Christi, Tex. 27°48.8'N., 97°24.0'W.	807	880	818	796	805	809	658	645	583	572	546	555	544	531	287	240	260	266	188	192	230	146	15			
Port Isabel, Tex. 26°03.6'N., 97°12.8'W.	783	856	807	800	809	813	678	665	603	593	567	576	566	552	350	301	322	328	251	255	294	210	130	135		
Port Brownsville, Tex. 25°57.1'N., 97°24.0'W.	794	867	818	811	820	824	690	676	614	604	578	587	577	563	362	312	333	339	262	266	305	222	141	146	13	

All tabular distances are via STRAITS OF FLORIDA, 24°25.0'N., 83°00.0'W. For distances from Key West to west Florida ports via Rebecca Shoal Channel, 24°24.4'N., 82°42.0'W., subtract 24 miles from Port Boca Grande distance, 18 miles from Tampa Bay distances, 7 miles from Port St. Joe and Panama City distances, and 5 miles from Pensacola distance.

DISTANCES BY GULF INTRACOASTAL WATERWAY
APALACHICOLA, FLA., TO PORT BROWNSVILLE, TEX.

March 22, 1958

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Mobile, Ala., is 398 nautical miles from Beaumont, Tex.

	Apalachicola, Fla. 29°43.5'N., 84°58.8'W.	Port St. Joe, Fla. 29°49.1'N., 85°18.8'W.	Panama City, Fla. 30°08.2'N., 85°37.6'W.	Fort Walton Beach, Fla. 30°24.0'N., 86°36.7'W.	Pensacola, Fla. 30°24.0'N., 87°13.0'W.	Mobile, Ala. 30°41.5'N., 88°02.2'W.	Pascagoula, Miss. 30°21.9'N., 88°33.8'W.	Biloxi, Miss. 30°23.5'N., 88°53.1'W.	Gulfport, Miss. 30°21.4'N., 89°05.6'W.	New Orleans, La. 29°57.0'N., 90°03.7'W.	Houma, La. 29°35.9'N., 90°42.6'W.	Morgan City, La. 29°41.5'N., 91°12.9'W.	Lake Charles, La. 30°13.1'N., 93°15.5'W.	Orange, Tex. 30°04.0'N., 93°43.3'W.	Beaumont, Tex. 30°04.6'N., 94°05.2'W.	Port Arthur, Tex. 29°49.5'N., 93°57.6'W.	Galveston, Tex. 29°18.5'N., 94°48.1'W.	Houston, Tex. 29°45.0'N., 95°17.4'W.	Texas City, Tex. 29°22.7'N., 94°53.2'W.	Freeport, Tex. 28°56.3'N., 95°20.4'W.	Port O'Connor, Tex. 28°26.5'N., 96°24.4'W.	Rockport, Tex. 28°01.1'N., 97°02.9'W.	Aransas Pass, Tex. 27°54.0'N., 97°08.3'W.	La Quinta, Tex. 27°52.6'N., 97°15.7'W.	Corpus Christi, Tex. 27°48.8'N., 97°24.0'W.	Port Mansfield, Tex. 26°33.4'N., 97°25.6'W.	Port Isabel, Tex. 26°03.6'N., 97°12.8'W.	Port Brownsville, Tex. 25°57.1'N., 97°24.0'W.
Apalachicola, Fla. 29°43.5'N., 84°58.8'W.																												
Port St. Joe, Fla. 29°49.1'N., 85°18.8'W.	26																											
Panama City, Fla. 30°08.2'N., 85°37.6'W.	51	36																										
Fort Walton Beach, Fla. 30°24.0'N., 86°36.7'W.	112	97	61																									
Pensacola, Fla. 30°24.0'N., 87°13.0'W.	149	134	98	37																								
Mobile, Ala. 30°41.5'N., 88°02.2'W.	214	200	164	102	73																							
Pascagoula, Miss. 30°21.9'N., 88°33.8'W.	222	207	171	110	81	58																						
Biloxi, Miss. 30°23.5'N., 88°53.1'W.	243	228	192	131	102	79	36																					
Gulfport, Miss. 30°21.4'N., 89°05.6'W.	247	233	197	135	106	83	41	19																				
New Orleans, La. 29°57.0'N., 90°03.7'W.	302	287	251	190	161	138	95	74	64																			
Houma, La. 29°35.9'N., 90°42.6'W.	355	340	304	243	214	191	148	127	117	53																		
Morgan City, La. 29°41.5'N., 91°12.9'W.	388	373	337	276	247	224	181	160	150	86	33																	
Lake Charles, La. 30°13.1'N., 93°15.5'W.	524	510	474	412	383	360	318	296	286	222	169	136																
Orange, Tex. 30°04.0'N., 93°43.3'W.	537	522	486	425	396	373	330	309	299	235	182	149	32															
Beaumont, Tex. 30°04.6'N., 94°05.2'W.	562	547	511	450	421	398	355	334	324	260	207	174	57	26														
Port Arthur, Tex. 29°49.5'N., 93°57.6'W.	556	541	505	444	415	392	349	328	318	254	201	168	51	20	26													
Galveston, Tex. 29°18.5'N., 94°48.1'W.	614	599	563	501	472	450	407	385	376	311	258	226	108	78	84	58												
Houston, Tex. 29°45.0'N., 95°17.4'W.	653	638	602	540	512	489	446	424	415	350	298	265	148	117	123	97	48											
Texas City, Tex. 29°22.7'N., 94°53.2'W.	615	600	564	502	473	451	408	386	377	312	259	227	110	79	85	59	9	48										
Freeport, Tex. 28°56.3'N., 95°20.4'W.	650	636	600	538	509	486	444	422	412	348	295	263	145	115	121	94	40	84	44									
Port O'Connor, Tex. 28°26.5'N., 96°24.4'W.	717	702	666	605	576	553	510	489	479	415	362	329	212	182	188	161	106	150	111	71								
Rockport, Tex. 28°01.1'N., 97°02.9'W.	761	746	710	649	620	597	554	533	523	459	406	373	256	226	232	205	150	195	155	115	44							
Aransas Pass, Tex. 27°54.0'N., 97°08.3'W.	775	760	724	663	634	611	568	547	537	473	420	387	270	240	246	219	164	209	169	129	58	17						
La Quinta, Tex. 27°52.6'N., 97°15.7'W.	783	768	732	671	642	619	576	554	545	481	428	395	278	247	253	227	172	216	177	136	66	25	19					
Corpus Christi, Tex. 27°48.8'N., 97°24.0'W.	788	773	737	676	647	624	581	560	550	486	433	400	283	253	259	232	177	222	182	142	71	30	24	15				
Port Mansfield, Tex. 26°33.4'N., 97°25.6'W.	858	843	807	746	717	694	651	630	620	556	503	470	353	323	329	302	247	292	252	212	141	100	94	85	89			
Port Isabel, Tex. 26°03.6'N., 97°12.8'W.	890	875	839	777	748	726	683	661	652	587	534	502	384	354	360	334	279	323	284	243	172	131	125	116	120	34		
Port Brownsville, Tex. 25°57.1'N., 97°24.0'W.	902	887	851	790	761	738	695	674	664	600	547	514	397	367	373	346	291	336	296	256	185	144	138	129	133	46	13	

COASTWISE AND INSIDE - ROUTE DISTANCES KEY WEST, FLA., TO APALACHICOLA, FLA.

March 22, 1958

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Flamingo is 231 nautical miles from Clearwater.

	Key West, Fla. 24°33.7'N., 81°48.5'W.	Marathon 24°42.2'N., 81°06.7'W.	Matecumbe Harbor 24°51.1'N., 80°44.5'W.	Flamingo 25°08.5'N., 80°55.4'W.	Cape Sable 25°09.0'N., 81°11.0'W.	Everglades 25°51.5'N., 81°23.4'W.	Naples 26°08.0'N., 81°47.6'W.	Fort Myers 26°38.9'N., 81°52.3'W.	Port Boca Grande 26°43.2'N., 82°15.3'W.	Venice 27°06.7'N., 82°27.8'W.	Sarasota 27°20.0'N., 82°32.9'W.	Bradenton 27°30.0'N., 82°34.4'W.	St. Petersburg 27°45.5'N., 82°37.9'W.	Tampa 27°55.4'N., 82°26.9'W.	Clearwater 27°58.5'N., 82°49.6'W.	Tarpon Springs 28°09.4'N., 82°45.8'W.	Cedar Key 29°08.0'N., 83°01.9'W.	St. Marks 30°09.2'N., 84°12.2'W.	Carrabelle 29°51.0'N., 84°40.0'W.	Apalachicola, Fla. 29°43.5'N., 84°58.8'W.
Marathon	42*																			
Matecumbe Harbor	65*	29																		
Flamingo	73*	38	35																	
Cape Sable	67*	31	32	17																
Everglades	116*	81	82	67	50															
Naples	140*	105	106	91	74	39														
Fort Myers	136	143	144	129	112	81	45													
Port Boca Grande	144	152	153	139	122	90	54	53												
Venice	166	180	181	166	149	117	82	72	32											
Sarasota	182	195	196	181	164	133	97	92	48	15										
Bradenton	210	220	221	207	190	158	122	121	77	40	26									
St. Petersburg	216	228	229	214	197	165	130	127	83	48	34	22								
Tampa	230	242	243	228	211	179	143	140	96	62	48	36	18							
Clearwater	229	245	246	231	214	183	147	137	98	65	51	40	32	48						
Tarpon Springs	243	261	262	247	230	199	163	152	108	81	67	56	49	65	19					
Cedar Key	302	311	312	298	281	249	213	208	164	139	125	115	118	132	79	68				
St. Marks	376	390	391	376	359	327	292	284	240	217	203	191	194	208	157	146	90			
Carrabelle	394	407	408	393	376	345	309	302	257	232	218	208	211	225	174	164	109	52		
Apalachicola, Fla.	412	424	425	410	393	362	326	318	274	249	235	225	228	242	191	181	126	69	25	

Each distance is by shortest coastwise and/or inside route with depths equal to or greater than the shallower of the two ports concerned. An asterisk (*) indicates the Hawk Channel route to or from Key West; all other distances to or from Key West are by way of Northwest Channel.

PUERTO RICO AND VIRGIN ISLANDS DISTANCES

March 22, 1958

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: San Juan, Puerto Rico, is 78 nautical miles from Charlotte Amalie, St. Thomas.

	San Juan, Puerto Rico 18°27.8'N., 66°06.7'W.	Fajardo, Puerto Rico 18°20.8'N., 65°37.6'W.	Ensenada Honda, Culebra 18°18.0'N., 65°17.0'W.	Bahia Mulas, Vieques 18°09.6'N., 65°27.2'W.	Arroyo, Puerto Rico 17°58.7'N., 66°04.1'W.	Bahia de Jobos, Puerto Rico 17°57.0'N., 66°13.3'W.	Ponce, Puerto Rico 17°58.2'N., 66°37.3'W.	Guayanilla, Puerto Rico 18°00.0'N., 66°46.0'W.	Guanica, Puerto Rico 17°58.0'N., 66°55.5'W.	Mayaguez, Puerto Rico 18°13.2'N., 67°09.7'W.	Aguadilla, Puerto Rico 18°26.0'N., 67°09.6'W.	Arecibo, Puerto Rico 18°29.0'N., 66°42.5'W.	Charlotte Amalie, St. Thomas 18°20.1'N., 64°55.4'W.	Christiansted, St. Croix 17°45.3'N., 64°42.0'W.	Frederiksted, St. Croix 17°43.0'N., 64°53.3'W.
Fajardo	39														
Ensenada Honda	58	25													
Bahia Mulas	52	18	15												
Arroyo	86	49	63	44											
Bahia de Jobos	100	65	78	59	20										
Ponce	120	84	98	79	38	30									
Guayanilla	128	92	105	86	45	37	13								
Guanica	136	100	114	95	53	45	21	14							
Mayaguez	91	120	141	133	105	96	73	68	60						
Aguadilla	73	102	122	117	115	106	83	77	69	23					
Arecibo	39	71	90	84	119	136	116	110	101	57	39				
Charlotte Amalie	78	45	24	34	75	90	110	117	126	161	142	110			
Christiansted	107	65	47	53	85	100	119	125	133	184	170	139	38		
Frederiksted	104	61	42	46	72	87	106	113	120	172	168	136	38	19	

Each distance is by shortest coastwise route with depths equal to or greater than the shallower of the two ports concerned.

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INTERNATIONAL NAUTICAL MILES TO STATUTE MILES

1 nautical mile = 6,076.10 feet or 1,852 meters 1 statute mile = 5,280 feet or 1,609.35 meters

Nautical miles	0	1	2	3	4	5	6	7	8	9
0	0.000	1.151	2.302	3.452	4.603	5.754	6.905	8.055	9.206	10.357
10	11.508	12.659	13.809	14.960	16.111	17.262	18.412	19.563	20.714	21.865
20	23.016	24.166	25.317	26.468	27.619	28.769	29.920	31.071	32.222	33.373
30	34.523	35.674	36.825	37.976	39.126	40.277	41.428	42.579	43.730	44.880
40	46.031	47.182	48.333	49.483	50.634	51.785	52.936	54.087	55.237	56.388
50	57.539	58.690	59.840	60.991	62.142	63.293	64.444	65.594	66.745	67.896
60	69.047	70.197	71.348	72.499	73.650	74.801	75.951	77.102	78.253	79.404
70	80.554	81.705	82.856	84.007	85.158	86.308	87.459	88.610	89.761	90.911
80	92.062	93.213	94.364	95.515	96.665	97.816	98.967	100.118	101.268	102.419
90	103.570	104.721	105.871	107.022	108.173	109.324	110.475	111.625	112.776	113.927

STATUTE MILES TO INTERNATIONAL NAUTICAL MILES

Statute miles	0	1	2	3	4	5	6	7	8	9
0	0.000	0.869	1.738	2.607	3.476	4.345	5.214	6.083	6.952	7.821
10	8.690	9.559	10.428	11.297	12.166	13.035	13.904	14.773	15.642	16.511
20	17.380	18.249	19.118	19.986	20.855	21.724	22.593	23.462	24.331	25.200
30	26.069	26.938	27.807	28.676	29.545	30.414	31.283	32.152	33.021	33.890
40	34.759	35.628	36.497	37.366	38.235	39.104	39.973	40.842	41.711	42.580
50	43.449	44.318	45.187	46.056	46.925	47.794	48.663	49.532	50.401	51.270
60	52.139	53.008	53.877	54.746	55.615	56.484	57.353	58.222	59.091	59.959
70	60.828	61.697	62.566	63.435	64.304	65.173	66.042	66.911	67.780	68.649
80	69.518	70.387	71.256	72.125	72.994	73.863	74.732	75.601	76.470	77.339
90	78.208	79.077	79.946	80.815	81.684	82.553	83.422	84.291	85.160	86.029

FEET TO METERS

Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	0.30	0.61	0.91	1.22	1.52	1.83	2.13	2.44	2.74
10	3.05	3.35	3.66	3.96	4.27	4.57	4.88	5.18	5.49	5.79
20	6.10	6.40	6.71	7.01	7.32	7.62	7.92	8.23	8.53	8.84
30	9.14	9.45	9.75	10.06	10.36	10.67	10.97	11.28	11.58	11.89
40	12.19	12.50	12.80	13.11	13.41	13.72	14.02	14.33	14.63	14.93
50	15.24	15.54	15.85	16.15	16.46	16.76	17.07	17.37	17.68	17.98
60	18.29	18.59	18.90	19.20	19.51	19.81	20.12	20.42	20.73	21.03
70	21.34	21.64	21.95	22.25	22.55	22.86	23.16	23.47	23.77	24.08
80	24.38	24.69	24.99	25.30	25.60	25.91	26.21	26.52	26.82	27.13
90	27.43	27.74	28.04	28.35	28.65	28.96	29.26	29.57	29.87	30.17

FATHOMS TO METERS

Fathoms	0	1	2	3	4	5	6	7	8	9
0	0.00	1.83	3.66	5.49	7.32	9.14	10.97	12.80	14.63	16.46
10	18.29	20.12	21.95	23.77	25.60	27.43	29.26	31.09	32.92	34.75
20	36.58	38.40	40.23	42.06	43.89	45.72	47.55	49.38	51.21	53.03
30	54.86	56.69	59.52	60.35	62.18	64.01	65.84	67.67	69.49	71.32
40	73.15	74.98	76.81	78.64	80.47	82.30	84.12	85.95	87.78	89.61
50	91.44	93.27	95.10	96.93	98.75	100.58	102.41	104.24	106.07	107.90
60	109.73	111.56	113.39	115.21	117.04	118.87	120.70	122.53	124.36	126.19
70	128.02	129.85	131.67	133.50	135.33	137.16	138.99	140.82	142.65	144.47
80	146.30	148.13	149.96	151.79	153.62	155.45	157.28	159.11	160.93	162.76
90	164.59	166.42	168.25	170.08	171.91	173.74	175.56	177.39	179.22	181.05

U. S. GOVERNMENT PRINTING OFFICE : 1958 O - 460113