U. S. DEPARTMENT OF COMMERCE
CHARLES SAWYER, SECRETARY
COAST AND GEODETIC SURVEY
LEO OTIS COLBERT, *Director*

APRIL 1, 1950 SERIAL NO. 736

UNITED STATES COAST PILOT

Atlantic Coast Section B

Cape Cod to Sandy Hook

FIFTH (1950) EDITION

VK
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.N32
5th ed.
(1950)

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National Oceanic and Atmospheric Administration

Climate Database Modernization Program

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Important

The courses and bearings are given in degrees (true), reading clockwise from 000° at north to 359°. In the case of lights all bearings are from seaward. When a course is given as "067°", it means that is the true course to be made good.

Distances are in nautical miles unless otherwise noted. Multiply nautical miles by 1.15 to obtain the approximate statute miles.

The directions of winds are the points from which they blow; of currents, the points toward which they set. These directions are true.

Depths are in feet or fathoms below mean low water. Heights are in feet above high water.

Currents are expressed in knots, which are nautical miles per hour.

Light and fog signal characteristics are not fully described, and light sectors are not always defined. The mariner should consult the Light Lists which are published at intervals of about a year.

When using this Coast Pilot, reference should be made to the latest supplement and also to each Notice to Mariners issued subsequently. Mariners are requested to notify the Director, United States Coast and Geodetic Survey, Washington 25, D. C., of any changes affecting this pilot.

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Preface

THIS is the fifth edition of the United States Coast Pilot, Atlantic Coast, Section B, Cape Cod to Sandy Hook. It is based on examinations by the United States Coast and Geodetic Survey and includes the results of a special field inspection made in 1949. Weather information was prepared by the United States Weather Bureau; channel information and data on ports and terminals were obtained from the Corps of Engineers; general information and detailed data on navigational aids were furnished by the Coast Guard; and port information was furnished by local authorities at New York, Providence, New Bedford, and other cities in the area.

This edition is corrected to 1 April 1950, including Notice to Mariners 13 of 1950. It cancels the previous edition published in 1940.

Supplements to the Coast Pilot, containing corrections and additions from various sources, are issued 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 free upon application to the United States Coast and Geodetic Survey.

Mariners are requested to forward to the Director, United States Coast and Geodetic Survey, Washington 25, D. C., any information affecting this Coast Pilot.

LEO OTIS COLBERT, *Director*.

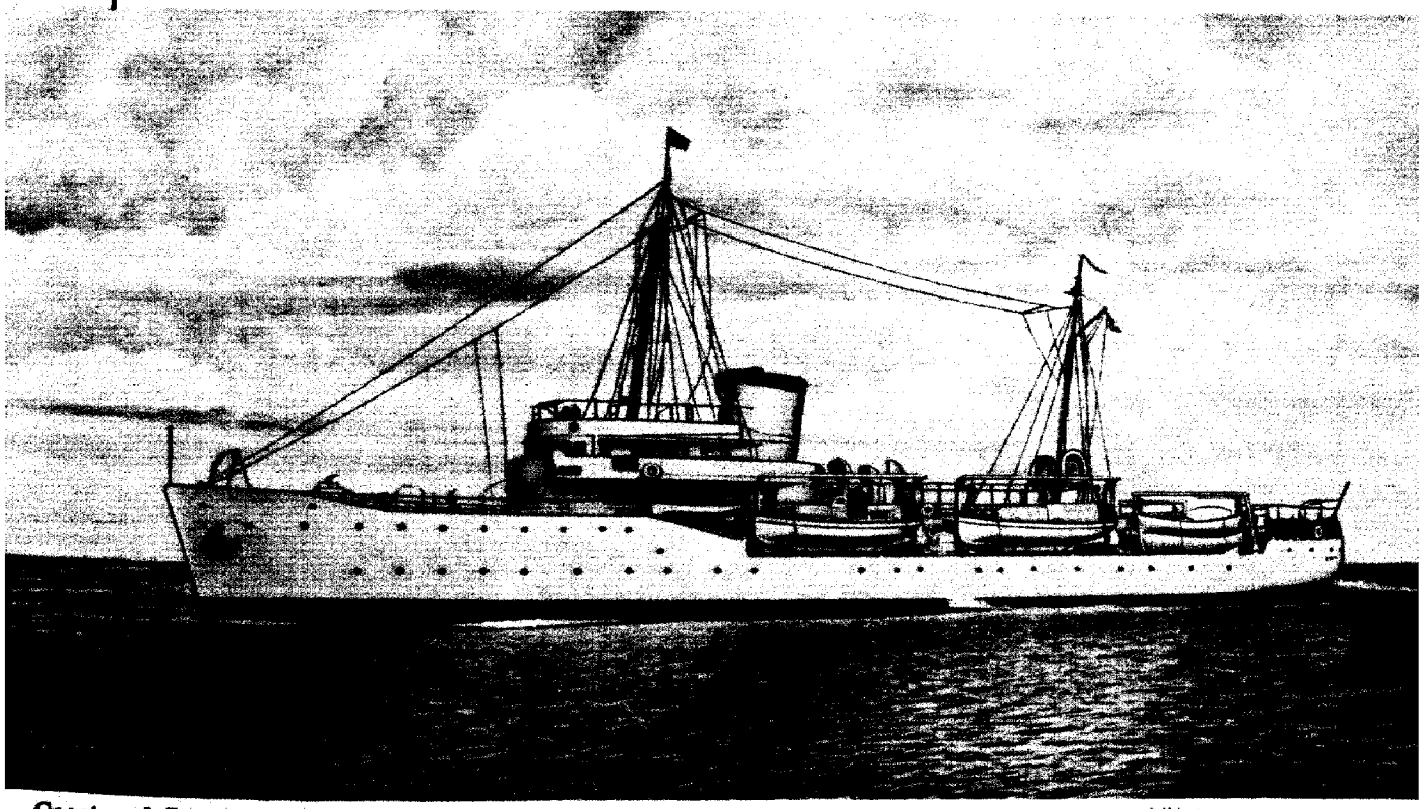
1 April 1950.

SERVICE FLAG
U. S. COAST AND GEODETIC SURVEY

Index Maps

U. S. Coast and Geodetic Survey Charts

Cape Cod to Sandy Hook



Coast and Geodetic Survey Ship *EXPLORER*; length 198 feet, draft 15 feet, displacement 1850 tons.

NUMERICAL LIST OF NAUTICAL CHARTS

1 April 1950

No.	Price	Scale
50	$0.75	1:210,100
70	.75	1:675,000
71	.75	1:500,000
77	.75	1:197,250
78	.75	1:200,000
214	.50	1:20,000
215	.75	1:20,000
216	.50	1:20,000
217	.50	1:20,000
218	.75	1:20,000
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581	.25	1:40,000
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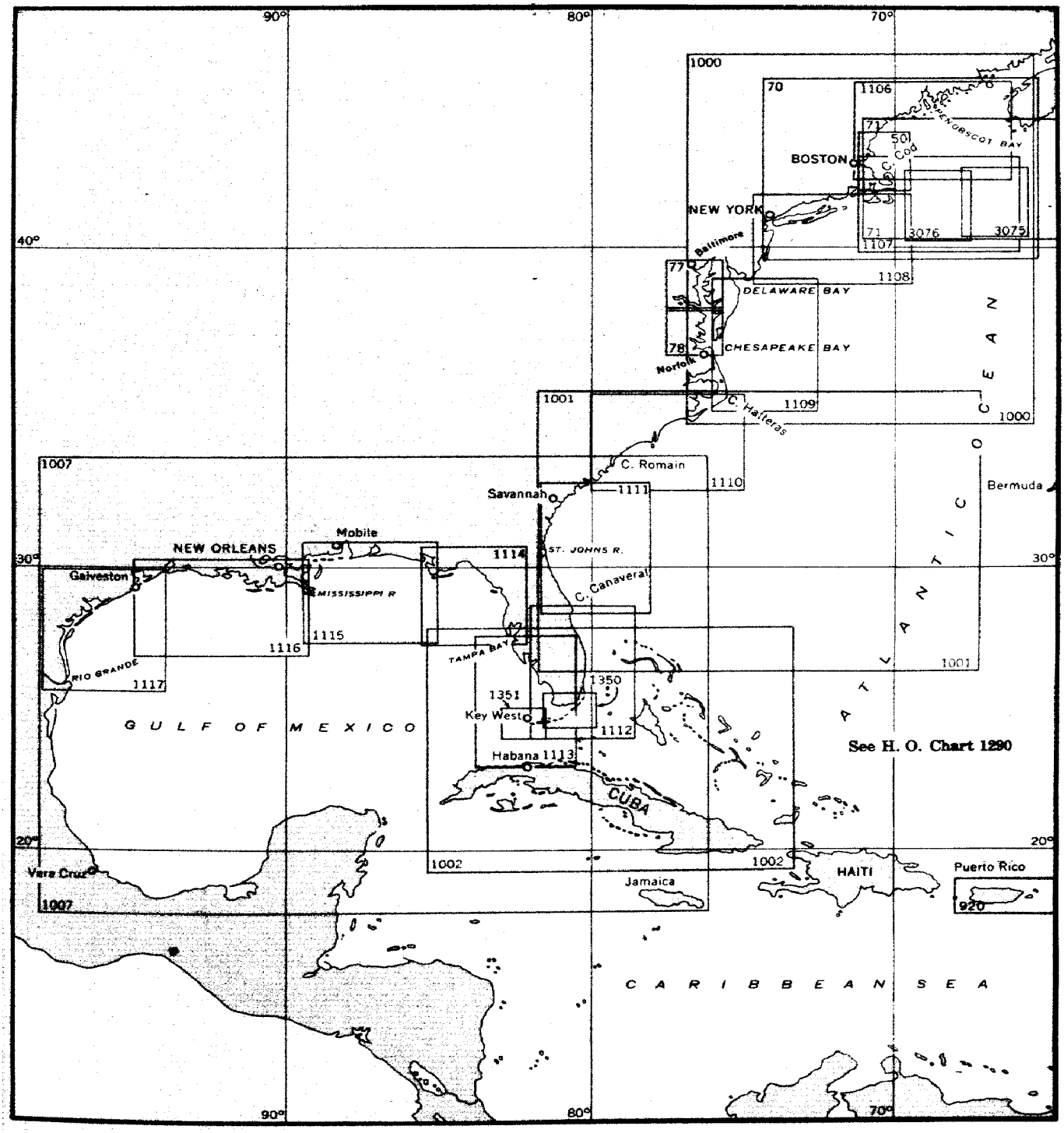
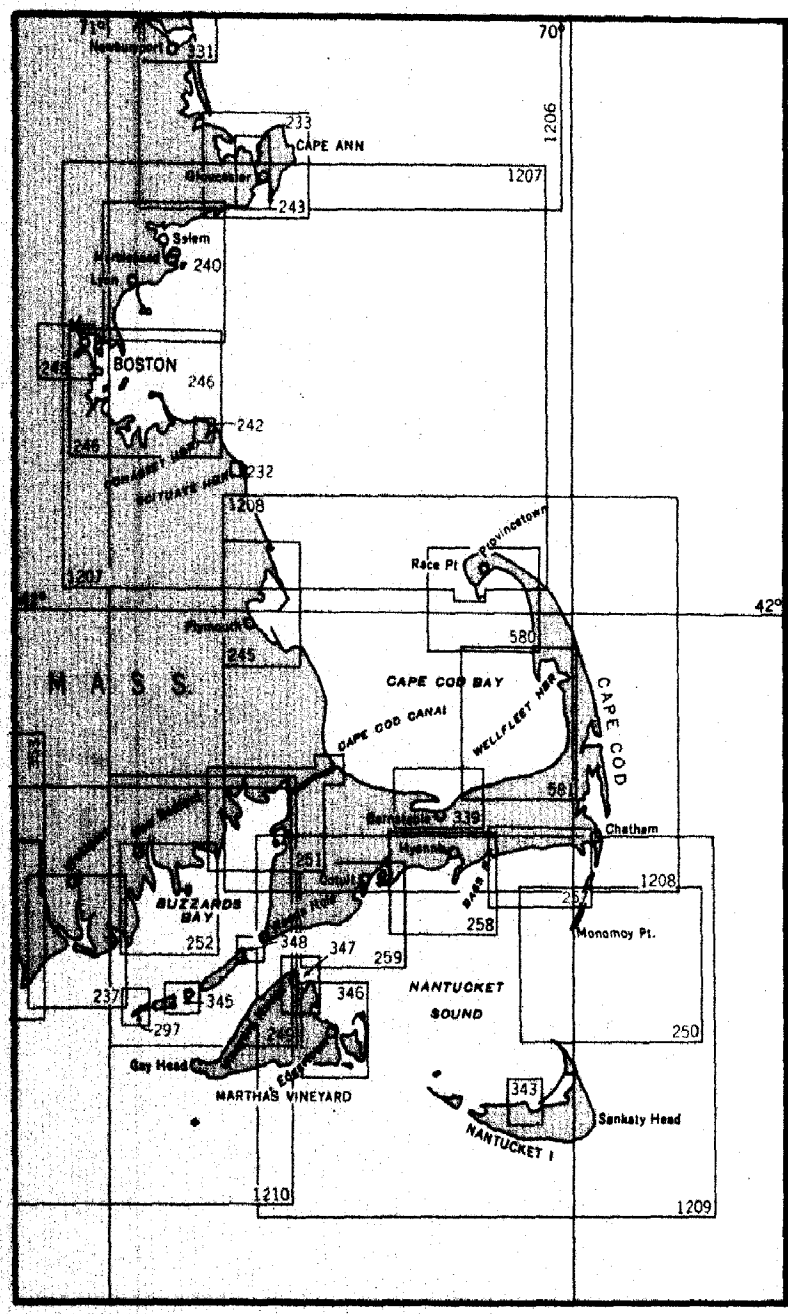
746	.75	1:10,000
747	.75	1:10,000
748	.75	1:10,000
920	.75	1:326,856
1000	.75	1:1,200,000
1001	.75	1:1,207,256
1002	.75	1:1,210,765
1007	.75	1:2,161,530
1106	.75	1:378,838
1107	.75	1:400,000
1108	.75	1:400,000
1109	.75	1:416,944
1110	.75	1:432,720
1111	.75	1:449,659
1112	.75	1:466,940
1113	.75	1:470,940
1114	.75	1:456,394
1115	.75	1:456,394
1116	.75	1:458,596
1117	.75	1:460,732
1203	.75	1:80,000
1204	.75	1:80,000
1205	.75	1:80,000
1206	.75	1:80,000
1207	.75	1:80,000
1208	.75	1:80,000
1209	.75	1:80,000
1210	.75	1:80,000
1211	.75	1:80,000
1212	.75	1:80,000
1213	.75	1:80,000
1214	.75	1:80,000
1215	.75	1:80,000
1350	.75	1:180,000
1351	.75	1:180,000
3075	.75	1:220,000
3076	.75	1:220,000

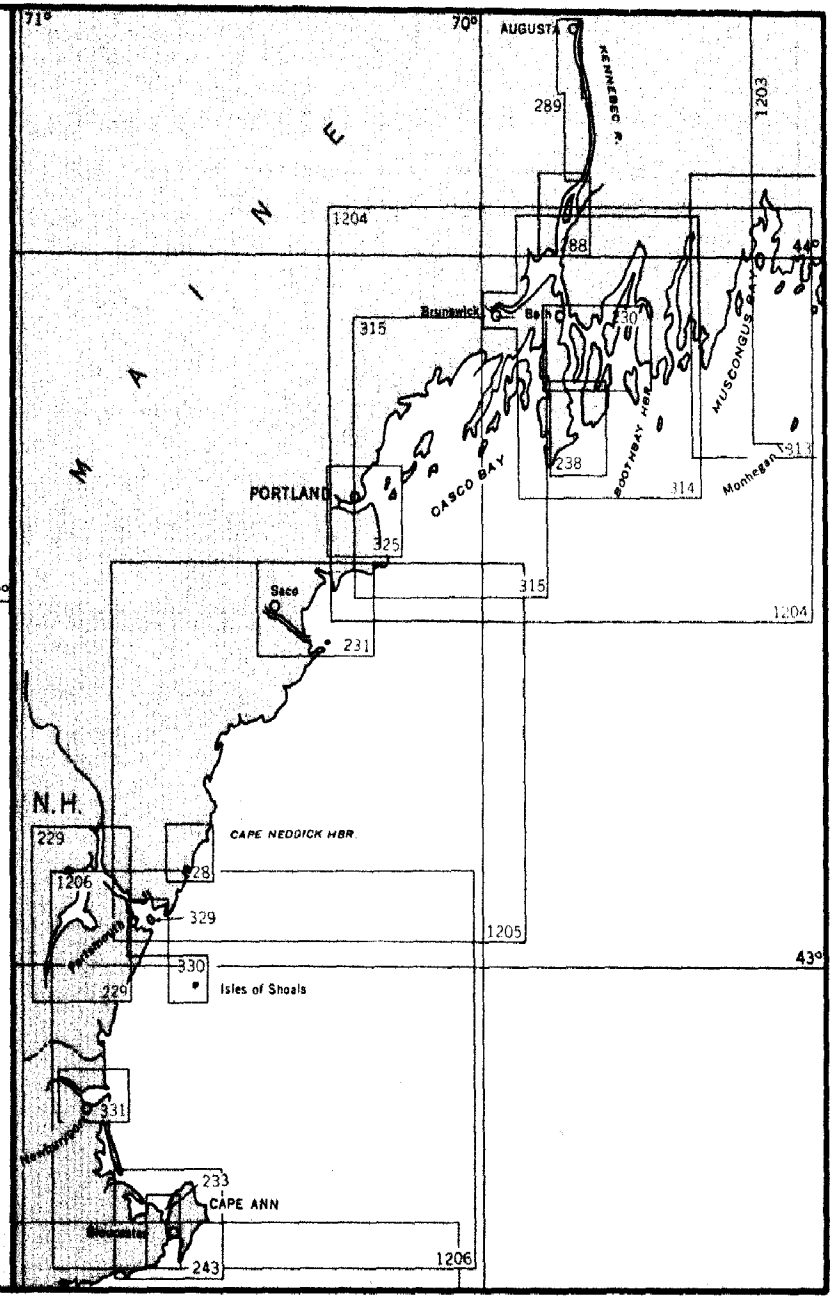
SAILING AND GENERAL CHARTS - ATLANTIC AND GULF COASTS



CAPE ANN TO BUZZARDS BAY, MASS.

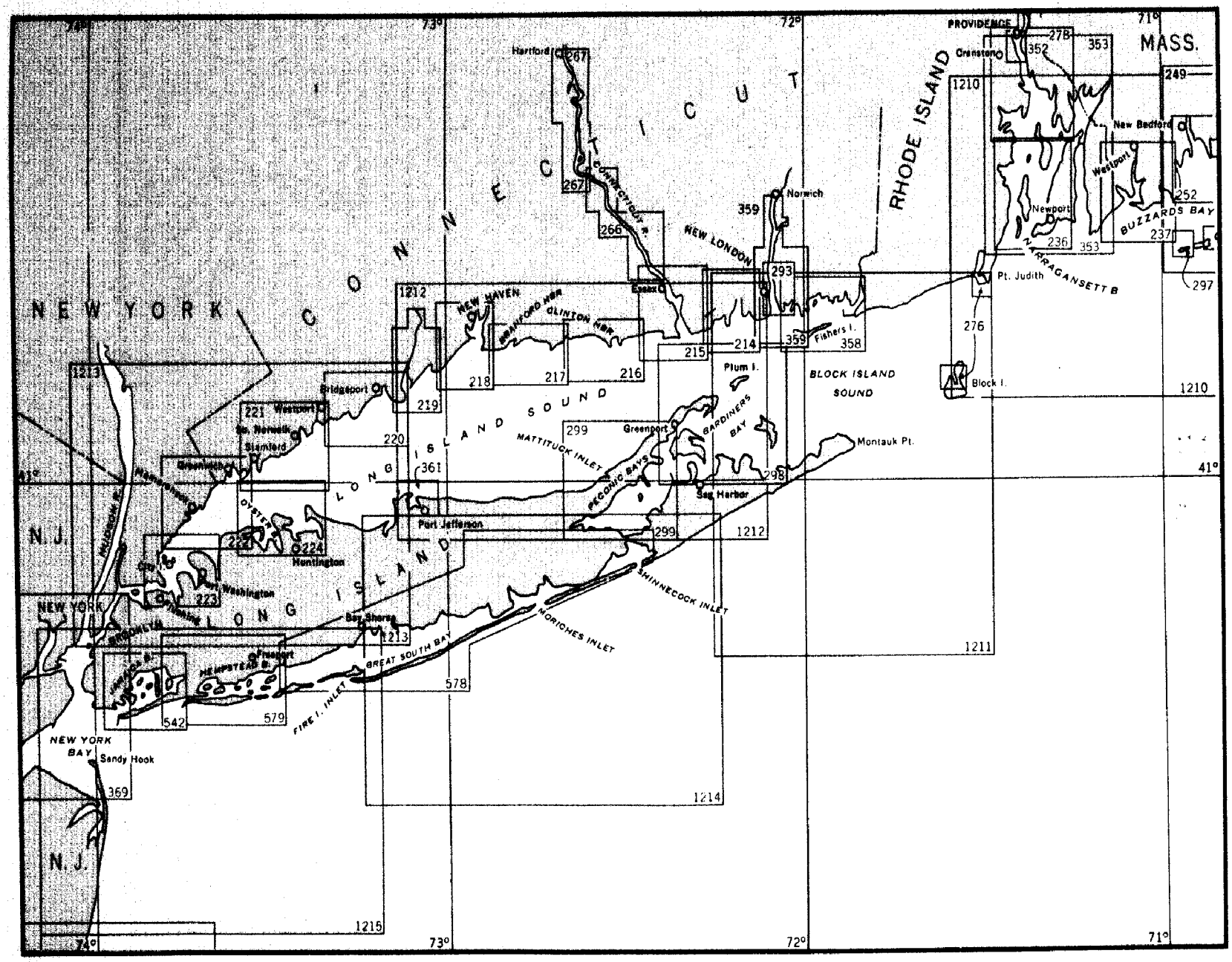


MONHEGAN I., MAINE TO CAPE ANN, MASS.



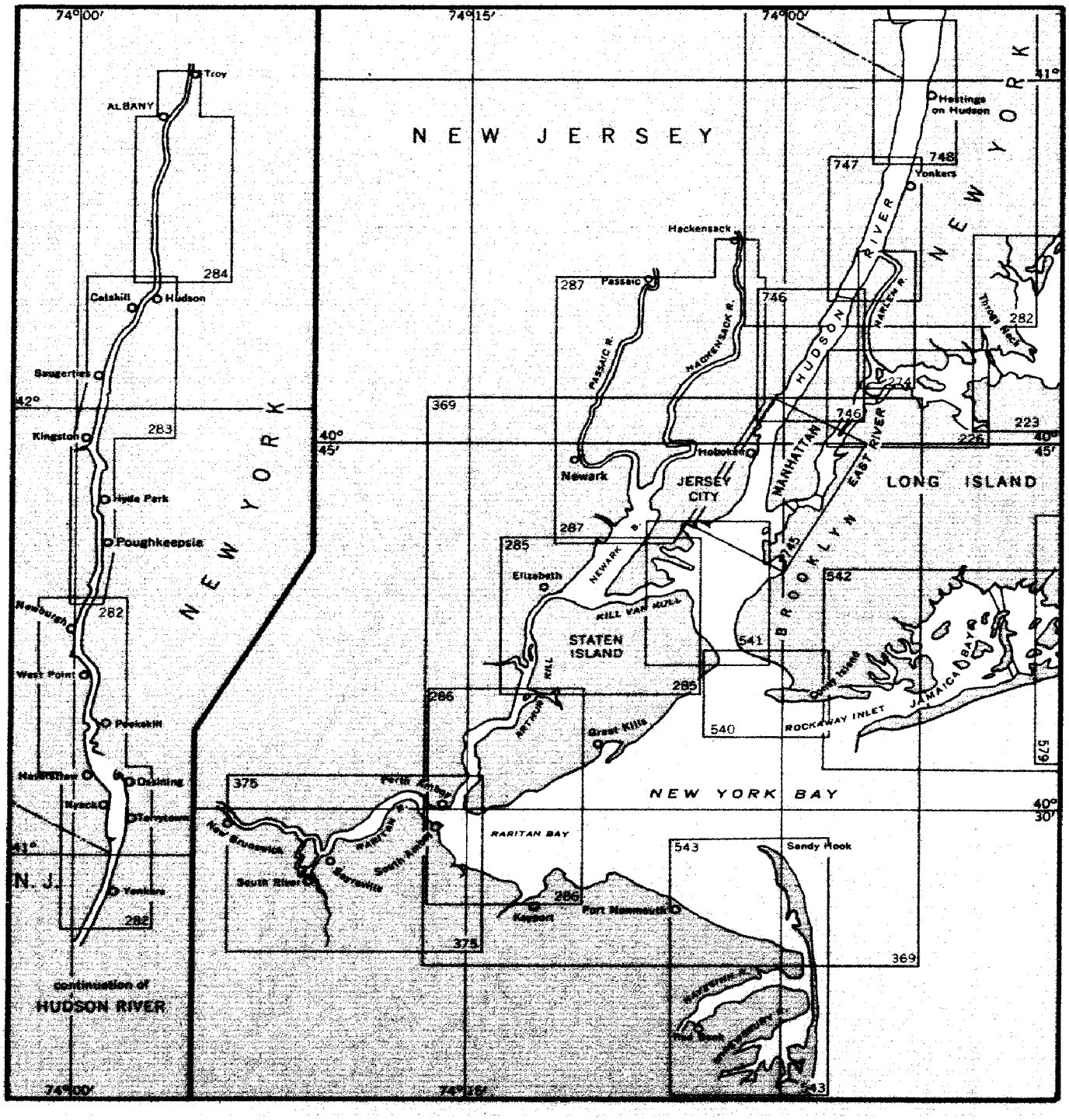
COAST AND HARBOR CHARTS - ATLANTIC COAST

BUZZARDS BAY, MASS. TO NEW YORK, N.Y.

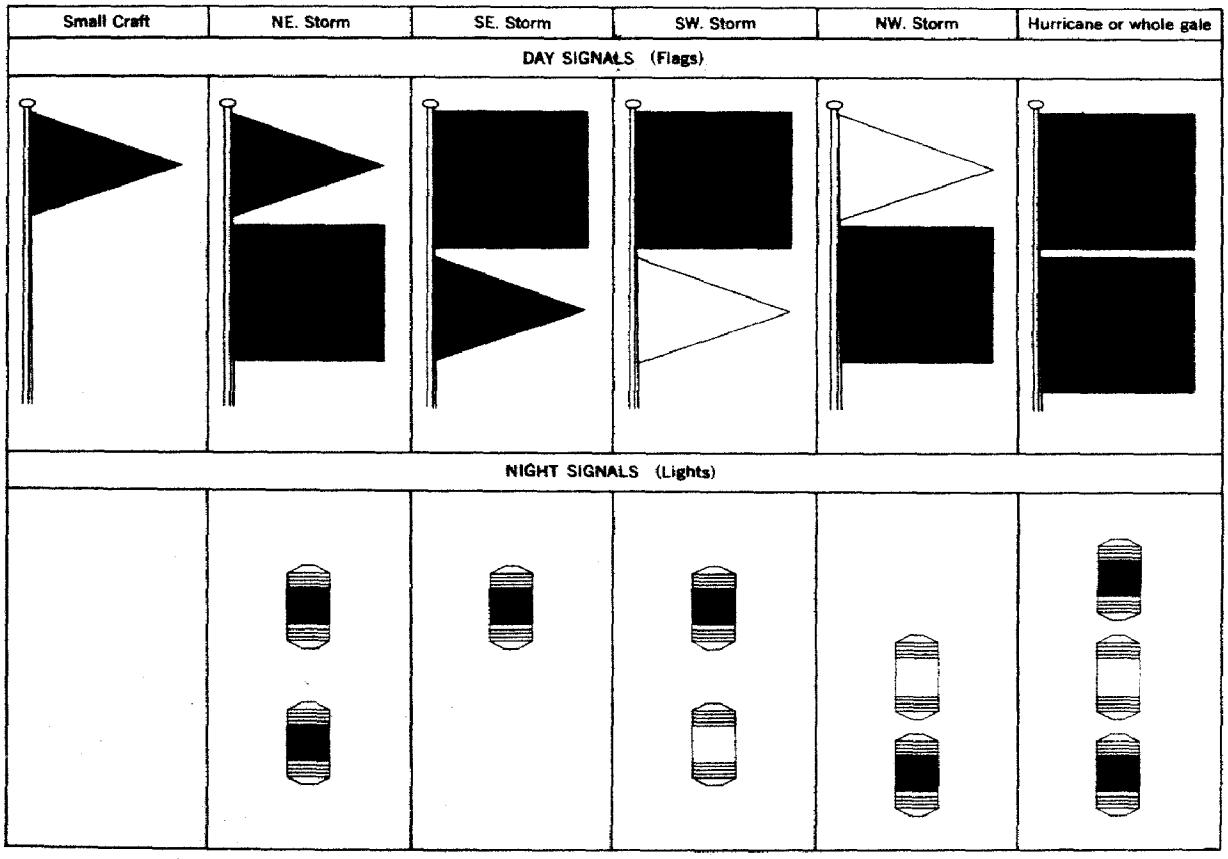


COAST AND HARBOR CHARTS - ATLANTIC COAST

NEW YORK HARBOR AND HUDSON RIVER



STORM WARNING SIGNALS



EXPLANATION OF SMALL CRAFT, STORM, AND HURRICANE WARNINGS

The small craft warning.—A red pennant indicates that moderately strong winds that will interfere with the safe operation of small craft are expected. No night display of small craft warnings is made.

The northeast storm warning.—A red pennant *above* a square red flag with black center displayed by day, or two red lanterns, one above the other, displayed by night, indicates the approach of a storm of marked violence with winds beginning from the *northeast.*

The southeast storm warning.—A red pennant *below* a square red flag with black center displayed by day, or one red lantern displayed by night, indicates the approach of a storm of marked violence with winds beginning from the *southeast.*

The southwest storm warning.—A white pennant *below* a square red flag with black center displayed by day, or a white lantern *below* a red lantern displayed by night, indicates the approach of a storm of marked violence with winds beginning from the *southwest.*

The northwest storm warning.—A white pennant *above* a square red flag with black center displayed by day, or a white lantern *above* a red lantern displayed by night, indicates the approach of a storm of marked violence with winds beginning from the *northwest.*

Hurricane, or whole gale warning.—Two square flags, red with black centers, one above the other, displayed by day, or two red lanterns, with a white lantern between, displayed by night, indicate the approach of a tropical hurricane or of one of the extremely severe and dangerous storms which occasionally move across the Great Lakes.

Code Flags and Single Meanings

** General Signal*

Able (Affirm*) *Speed Trial*	**King** *Stop Instantly*	**Uncle** *Standing into danger*	**1**
Baker *Explosives*	**Love** *Stop, Something to communicate*	**Victor** *Require Assistance*	**2**
Charlie *Yes*	**Mike** *Doctor on Board*	**William** *Require Medical Assistance*	**3**
Dog *Keep Clear*	**Nan** (Negative*) *No*	**Xray** *Stop your Intentions*	**4**
Easy *Altering Course to Starboard*	**Oboe** (Option*) *Man Overboard*	**Yoke** *Carrying Mails*	**5**
Fox *Disabled*	**Peter** (Prep*) *About to Sail (Lights out)*	**Zebra** *Shore Stations*	**6**
George *Want a Pilot*	**Queen** *Request Pratique*	**1st Repeat**	**7**
How *A Pilot is on Board*	**Roger** *Way is off my ship*	**2nd Repeat**	**8**
Item (Interrogatory*) *Altering Course to Port*	**Sugar** *Going full speed astern*	**3rd Repeat**	**9**
Jig *Semaphore*	**Tare** *Do not pass ahead of me*	*(Decimal Point)* *Code and Answering Pennant:*	**0**

CHAPTER 1

General Information

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, and table of predicted tides and currents** 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, 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; see Appendix for agents located within the area covered by this Coast Pilot. The charts and publications can also be purchased from the Washington Office and from most of the District Offices. Orders mailed to Washington, D. C., should be accompanied by check or money order, made payable to the Treasurer of the United States. Postage stamps or Superintendent of Documents coupons cannot be accepted. The catalog of nautical charts and related publications can be obtained free of charge from the Coast and Geodetic Survey or any of its agencies.

Important.—Mariners and others using this Coast Pilot are urgently requested to forward to the Director, United States Coast and Geodetic Survey, Washington 25, D. C., directly or through a District Office, any information affecting it or the charts that may come to their attention, as well as any suggestions they may have for increasing the value of these publications. Reports of an urgent character should be sent by radio or telegraph.

Special signals for surveying vessels.—The following signals have been prescribed for vessels of the United States engaged in hydrographic surveying:

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.

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

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*.

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.

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 regulation, required to be carried.

In addition to the signals described, vessels of the Coast and Geodetic Survey when engaged in survey work often hoist one of the following International Code signals:

HD signifying "I am engaged in submarine survey work, you should keep clear of me."

HF signifying "I have a sweep out, you should keep clear of it."

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. Steamers 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 wire drag launches while the wire is being set out or taken in, unless it would endanger a vessel to do otherwise. In setting out or taking up the wire drag, the tension on the bottom wire is released and the floats at each 100-foot section may cause the wire to be held near the surface. At this time the launches are usually headed either directly toward or away from each other and the operation of taking up or setting out may usually be clearly seen.

Nautical charts are published primarily for the use of the mariner, although they serve the public interest in many other ways. They are compiled principally from the basic field surveys of the Coast and Geodetic Survey, supplemented by data from other Government organizations. They include all available information necessary for safe navigation.

Projections.—Nautical charts, with few exceptions, are constructed on the Mercator projection. On this projection meridians and parallels are straight lines intersecting 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.

Notes, symbols, and abbreviations.—Charts contain various types of notes placed in association with the title or in the proximity of the detail to which they refer. They may include such matters as scale, projection, date to which chart has been corrected, source of charted data, and explanation of the more important symbols and abbreviations, and index or notation of adjoining charts, controlling depths, caution notes, and the like. These notes are essential for the complete interpretation of the chart and should be thoroughly understood by the chart user.

Accuracy of charts.—Each sounding represents an actual measure of depth and location at the time the survey was made. Shores and shoals where sand and mud prevail, and especially bar harbors and the entrances of bays and rivers exposed to strong tidal current and a heavy sea, are subject to continual change of a greater or less extent, and important ones may have taken place since the date of the last survey. In localities which are noted for frequent and radical changes, such as the entrances to a number of estuaries on the Atlantic, Gulf, and Pacific coasts, notes are printed on the charts calling attention to the fact.

It should also be remembered that in coral regions and where rocks and boulders abound it is always possible that soundings, however detailed, may have failed to find every small obstruction. For these reasons, when navigating such waters, the customary sailing lines and channels should be followed and those areas avoided where the irregular and sudden changes in depth indicate conditions which are associated with pinnacle rocks, coral heads, or boulders.

Dredged channels.—These are generally shown on the chart by two broken lines to represent the side limits of the improvement together with the depth and date. The depth is the controlling depth through the channel on the date charted and does not mean that this depth obtains over the full width of the channel, nor that the depth has not subsequently changed due to either shoaling or dredging. The Coast Pilot generally gives the project dimensions of an improved channel.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact station, especially when in exposed localities. It is safer, when possible, to navigate by bearings or angles referred to fixed objects on shore and by the use of soundings.

Plane of reference for soundings on charts.—For the Atlantic Coast of the United States and the West Indies, the plane of reference for soundings is the mean of all low waters; for the Pacific Coast of the United States, Alaska, and the Hawaiian Islands, it is the mean of the lower low waters. For foreign charts many different planes of reference are in use, but that most frequently adopted is mean low water springs.

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. Natural and artificial changes, many of them critical, are occurring constantly, and it is important that navigators obtain up-to-date charts at regular intervals, or hand-correct their copies for changes listed in *Notices to Mariners*.

Nautical charts bear three dates, which are important to persons using them: (1) The **edition date** (month and year) of the publication note, *printed* on most charts, centrally in the lower margin; (2) the **print date** (year, month, and day), the latest date *printed* in the lower left-hand corner below the border, which is the date of correction to the printing plate; (3) the **date of issue**, *stamped* in the right lower margin and just to the left of the subtitle. Charts are hand-corrected to show all essential changes for lights, buoys, beacons, recently reported dangers, and other critical information as of date of issue from the Washington, D. C., Office. All important corrections subsequent to the date of issue are published in the *Notice to Mariners*, and should be immediately applied by the mariner to charts on hand or purchased from agents.

Scales of charts.—The scales of nautical charts range from 1:2,500 to about 1:5,000,000. Graphic scales are generally shown on charts with scale 1:80,000 or larger and numerical scales are given in the upper right border for smaller scale charts.

For convenience of reference, Coast and Geodetic Survey charts are classified according to scale as follows:

Sailing charts.—Scales 1:600,000 and smaller. These 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.—Scale 1:100,000 to 1:600,000. These are for coastwise navigation outside of outlying reefs and shoals.

Coast charts.—Scale 1:50,000 to 1:100,000. These 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. These are for harbors, anchorage areas, and the smaller waterways.

Intracoastal Waterway (inside route) charts.—Scale 1:40,000. This is a special series of charts embracing the inside route in New Jersey, the route from Norfolk, Va., to Key West, Fla., on the Atlantic Coast, and from Key West, Fla., to the Mexican boundary on the Gulf Coast.

Caution in using small-scale charts.—It is obvious that dangers to navigation cannot be shown with the same amount of detail on small-scale charts as on those of larger scale; therefore, in approaching the land or dangerous banks, the largest scale chart available should be used. A small error in laying down a position means only yards on a large-scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile. For the same reason, near objects should be used for bearings in preference to objects farther off, although the latter may be more prominent, as a small error in a bearing or in laying it down on the chart has greater effect in misplacing the position, the longer the line to be drawn.

Depth curves.—Since the installation of echo-sounding apparatus on most modern ships, the Coast and Geodetic Survey has been giving special prominence to depth curves on nautical charts of areas where modern hydrographic surveys have been made. Deep-water submarine relief has become important to the navigator, and the more faithfully the chart depicts this relief, the closer the navigator can relate his depth readings to the chart and the more certain will be his position. Previously, the charts were distinguished by many soundings and few depth curves; the newer charts are characterized by many depth curves and fewer soundings.

Compass roses on charts.—The annual change in variation gradually introduces an error in magnetic compass roses on charts, and in some cases, the displacement of position from neglect of this change may be of importance. 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 certain of the sailing and general charts the magnetic variation is shown by isogonic lines in addition to the compass roses.

Magnetic disturbance of the compass.—The charts show areas where local magnetic disturbance of the compass, or *local attraction*, is caused by magnetic masses external to the ship. Such disturbances are fairly common in shallow waters; they are never encountered over oceanic depths. Magnetic force diminishes so rapidly with distance

that a magnetic center in the visible land would have to be of unprecedented intensity to be capable of affecting the compass of a vessel 0.5 mile from shore.

It is unlikely that all the areas of magnetic disturbance have been located. When such an area is discovered, the position should be fixed and the facts reported as far as they can be ascertained. It is particularly important to note the time at which the disturbance was encountered, so as to rule out the possibility that the effects were caused by a magnetic storm rather than by local irregularity.

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 is conveniently possible by soft iron and permanent magnets, suitably placed in or on the binnacle. See U. S. Coast and Geodetic Survey Special Publication No. 96, *Instructions for compensation of the magnetic compass*.

Determination of compass error by the use of navigational ranges.—The azimuths of channel ranges which have been determined with sufficient accuracy for compass error determination are indicated in degrees and minutes in the *Light Lists* and in the *Notice to Mariners*. Azimuths given only in degrees should not be used for this purpose.

Use of electrical equipment affecting magnetic compasses.—Experiments with portable electric megaphones show that such instruments have a definite effect on magnetic compasses, so that when such instruments are within 6 feet of a compass an error of 2° to 4° will result. Closer proximity increases this greatly. Other equipment, such as emergency lights and portable telephones, will have similar effects. So as not to affect magnetic compasses, such electric equipment should not be stowed within 10 feet of magnetic compasses and care should be taken to see that such instruments are not used in proximity of magnetic compasses for a time greater than necessary. Serious deflection of a ship's compass has been caused by the helmsman wearing an electric suit of the type used by airmen. Masters are advised to prohibit the wearing of such garments in the vicinity of the compass.

Tides and Currents.—**Tide Tables** are published in advance annually by the Coast and Geodetic Survey. See *Publications* at the end of this chapter. Each volume includes full daily predictions of the times and heights of high and low waters for certain reference stations along the coasts. The use of Table 2 of the Tide Tables should be known to every navigator. By means of this table the predictions given for the reference ports are extended so as to enable one to obtain the predictions for each day for a large number of other stations. Table 3 provides a means for computing the height of tide at any time.

The effect of strong winds, in combination with the regular tidal action, may at times cause the water to fall considerably below the plane of reference of the chart. The water may also rise considerably above mean high water due to similar causes.

Caution.—In using the Tide Tables, slack water should not be confused with high or low water. For ocean stations there is usually but little difference between the time of high or low water and the beginning of ebb or flood current; but for places in narrow channels, land-locked 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

either to information given for various places in this volume of the Coast Pilot or to the Current Tables.

Current Tables for the Atlantic Coast and for the Pacific Coast of the United States are published in advance annually by the Coast and Geodetic Survey. Each volume includes the daily predicted times of slack water and the times and velocities of strength of flood and ebb for certain reference stations and a table of current differences and constants by means of which corresponding daily predictions may be readily obtained for numerous other places. Tables for the velocity of current at any time, duration of slack, and rotary tidal currents at certain offshore locations, together with data on the Gulf Stream and wind currents are included. There are also current diagrams for a number of sounds, bays, and harbors which show in a graphical form the velocities of the flood and ebb currents and the times of slack and strength over a considerable stretch of the channel of these waterways. See *Publications* at the end of this chapter.

Tidal Current Charts are published by the Coast and Geodetic Survey for various localities; see *Publications* at the end of this chapter. These current charts are good for any year and show the direction and velocity of the tidal current for each hour of its cycle. They present a comprehensive view of the tidal current movement of the area as a whole and also supply a means of readily determining the direction and velocity of the current at various localities throughout the area. The Tidal Current Charts are designed for use with the daily current or tide predictions contained in the annual tables.

Destructive and Other Waves.—Wind waves.—The most common type of wave is caused by the wind. The size of ocean waves depends on the strength of the wind, its duration, and the extent of open water over which it blows. As they travel across the ocean, their height continually decreases, their length increases, and several days later they roll toward the coast as a long, low **swell** or **ground swell.** This swell may be all but hidden by short irregular wind waves until it enters shallow water. Offshore the swell is almost uniform in character until it is deflected by outlying islands and scattered up and down the coast so that a number of systems of swell approach the shore.

Waves from deep water are modified when they get into shoal water. Where the swell approaches a shoreline at an angle it tends to turn parallel to the shore. It bends into bays and around outlying points. When the depth is reduced to less than one-half the wave length, the waves become higher and shorter, the crest arches forward and finding itself unsupported by sufficient water in front, dashes downward breaking into **surf.** Transformations occur everywhere, and therefore, the character of the surf varies considerably on adjacent beaches although caused by a uniform swell offshore. An individual breaking wave either on a beach, an isolated rock, or a shoal is a **breaker.**

When viewed from a vessel, especially a small boat, the surf or breaker never appears as dangerous as it is, and often when comparatively smooth at sea a dangerous surf is running which is not perceptible 400 yards offshore. Many lives have been lost unnecessarily by the crews of stranded vessels being thus deceived and attempting to land in the ship's boats.

When large swells encounter the seaward margin of a submarine terrace they break and form smaller waves of translation or rollers. These **rollers** differ from the usual waves found in deep water in that they are entirely above the still-water level. They may cross the shallow water to the shore without change until they break as surf on the beach. Rollers often transport shingle and other material shoreward along the

bottom. They do not break and form surf until the depth of water equals the height of the wave.

Seiche and surge.—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 an external force such as strong winds, changes in barometric pressure, swells, or seismic sea waves disturbing the equilibrium of the water surface. It is found both in enclosed bodies of water and superimposed upon the tidal waves of the open ocean. When these external forces cause a short-period horizontal oscillation of 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 the eye to be completely undisturbed; heavy mooring lines have repeatedly been parted under such conditions. Pilots advise taut lines to reduce the effect of the surge.

Destructive waves.—Unusual sudden changes in height of water level can be caused by seismic sea waves or violent storms. Seismic sea waves sometimes spread out in all directions from places at which severe seismic disturbances occur. They travel long distances and can cause tremendous damage by wrecking ships and inundating coastal regions. Violent storms can produce extreme heights of tide which reflect the piling up of water to high levels or the withdrawal of water with consequent low levels. 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.—The destructive effect of great seismic sea waves which occur from time to time should not be minimized. The loss of life and property can be lessened if shipmasters and others acquaint themselves with the behavior of these waves so that intelligent action can be taken when they become imminent.

Tide gage records of the waves of April 1, 1946, in the Pacific and of many others that have occurred in the past show that the recession of the water is usually, though not always, preceded by a smaller but distinct rise of water level. Except for the possible grounding of floating equipment, the rise following the first fall is generally the first destructive part of the series of waves. The waves are so long that they are not visually recognizable as such, but manifest themselves as a rapid rising and falling of the water surface with a period of 12 to 20 minutes.

At Honolulu, which is reasonably well protected from the direct onslaught of the waves, there was on April 1, 1946, first a rise of about ½ foot in 6 minutes followed by a fall of 2¼ feet in the next 7½ minutes. In the 3 succeeding 7½-minute periods there was a rise of 2¾ feet, a fall of about 3½ feet, and then a rise of 4 feet to the third and highest crest of the series. The oscillations continued for many hours. The Honolulu record is probably representative of the pattern, though not the magnitude, of the wave in other parts of the islands where heights of 40 feet or more have been reported. The larger heights occurred on the shores facing the approaching wave, which in this case were the northern shores. Except for the possible grounding of floating equipment, the rise following the first fall is generally the first destructive part of the series of waves.

In some harbors there is normally a seiche whose period is determined by the size and depth of the harbor. If the seismic sea waves, even though small, should have a period about equal to that of the seiche, a resonance may be set up which would considerably magnify the usual oscillation and make it difficult to hold a ship to her moorings.

Waves travel outward from the epicenter at speeds which depend on depth. Though their speed may exceed 400 knots in the open ocean, they are relatively low, extremely long, and harmless and hence will pass a ship unnoticed. Upon reaching shoaler water the waves decrease in velocity and length, and increase in height. They become dangerous on either nearby or distant coasts where depths and shape of coastline conspire to augment them.

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

The times required for a seismic sea wave to reach Honolulu from various potential epicentral areas have been computed and are as follows: 7½ to 9 hours from the main islands of Japan, 6 to 6½ hours from Kamchatka, 4¼ to 5½ hours from the Aleutian Islands and Alaska Peninsula, 6 to 12 hours from Mexico and Central America, and 12½ to 15½ hours from South America.

After the receipt of a seaquake warning, safety requires that ships put to sea and that people on shore retreat to high ground away from the water front. If lack of time or other reason makes it necessary for a ship to remain in a harbor, the following account of the experience of a United States naval vessel while lying in the port of Kahului, Maui, on April 1, 1946, may be helpful.

"At or about 0650 this date, the water in this harbor was observed to be receding seaward and the level dropped from 10 to 12 feet in a matter of 15 to 20 minutes. Later the tide surged back into the entrance of the harbor through the jetties with waves washing over the breakwater and, shortly thereafter, over the docks and land on the northeast side. There were officially recorded on the log 20 separate waves from 0650 until 0920. These waves started with great magnitude from 10 to 15 feet in height and lessened as time progressed. Due to the suddenness of the first tidal wave approaching it was impossible to get the vessel safely under way. Later the terrific currents around the harbor entrance made navigation extremely hazardous. In view of these facts, a decision was made to remain alongside the dock and maintain the safety of the ship by the use of mooring lines and wire.

"The vessel was moored starboard side to dock No. 2 and the strong currents within the harbor moved virtually in all directions, causing the ship to alternately move forward, aft, away from the dock, and then toward the dock. During this emergency, the manila lines and two 1⅝ towing hawsers were parted but were replaced immediately. Approximately 30 lines were parted, and all hands were made available at all times to cope with the situation. During the time our lines were being rapidly depleted through breakage, new ones were furnished by the Navy Supply Office and the Marine Corps. In the meantime, the harbor began filling with debris to such an extent that the main generators were shut down, due to the congestion of the sea chest. As a result, the handling of all lines was accomplished by hand, as all our winches and windlasses are operated electrically. It was feared at one time that in low water the vessel might rest on the bottom with a possibility of capsizing. . . . The damage caused is not sufficiently severe to prevent continued operation of the vessel."

Extreme tides.—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 tides can result in depths which are considerably less than those shown on nautical charts. This storm type of tidal wave occurs especially in coastal regions bordering on shallow waters which are subject to tropical storms.

Use of Oil for Modifying the Effects of Breaking Waves.—Experience has proved the usefulness of oil in modifying the effect of breaking waves and has developed simple and effective methods of using it. The principal facts developed are:

1. The heaviest and thickest oils, notably animal and vegetable oils, are the most effective. Crude petroleum is serviceable and should be used when no better oil is available; it may be improved by mixing with other oils. Refined kerosene is of little value.
2. In cold weather oils thicken and do not spread freely. This tendency to thicken may be reduced by thinning a heavy, sticky oil with petroleum.
3. A small quantity of oil suffices if it can be made to spread to windward.
4. Oil spreads very slowly so a vessel with engines stopped or running slowly before a sea can make a slick to windward but not to leeward, except perhaps close alongside, for the vessel's drift or speed will exceed the rate of spread of the oil.
5. The effect of oil on free waves—that is, on waves in deep water—is greatest.
6. The effect of oil on a surf or waves breaking on a bar where a mass of shallow water is in actual motion is less than on free waves, but oil is of some service under these conditions.
7. A vessel at sea will get the best results by drifting or running slowly before the sea and distributing oil either from canvas bags filled with oakum saturated with oil and slung over the side into the sea or from the waste pipes.
8. In crossing a bar in heavy weather oil in considerable quantities is needed on both sides of the vessel for a short time. A convenient method in this situation is to trail a hose over the bow and pour oil freely through it.
9. In crossing a bar with flood current pour oil overboard and allow the oil to float in ahead of the vessel. To an entering vessel crossing a bar with an ebb current oil is of little use.
10. Oil is useful to vessels and boats when running, lying to, or wearing.
11. A vessel riding to a sea anchor can fasten an oil bag to an endless line rove through a block on the sea anchor. This method distributes the oil ahead and provides a means to haul the bag aboard for refilling.
12. Before boarding a wreck have the wreck use oil freely on both sides, if able to do so. If the wreck cannot use oil, the rescuing vessel should first pass to leeward of the wreck, using oil freely to form a slick into which the wreck will drift. If the wreck is aground, the attending circumstances will indicate the methods to be used.
13. In lowering or hoisting boats in heavy weather, in port or at sea, oil will greatly assist the operation.
14. In towing another vessel in a heavy sea, oil should be distributed from the towing vessel forward and on both sides; if it is only distributed from the after part of the towing vessel, only the tow is benefited.

CORPS OF ENGINEERS.—The improvement of the rivers and harbors of the United States and miscellaneous other civil works are under the charge of the **Corps of Engineers, Department of the Army.** The miscellaneous civil works 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 some places are defined and limited by the Corps of Engineers. They also publish regulations controlling the use of these areas. These are enforced by the United States Coast Guard. 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 are quoted at length, where applicable, in the Coast Pilots.

The **Port Series,** prepared jointly by the Corps of Engineers and the United States Maritime Commission, and sold by the Superintendent of Documents, are complete reports covering the principal seaports of the United States. They are primarily of interest to commercial and industrial concerns. The volumes of the series are wide in their scope and treat the subjects of particular interest to the shipping world, such as the physical features of each port (includes list of piers, wharves, and docks, with data), its organization and practices, regulations regarding the movement of ships and goods, port dues and charges, fuel and supplies, water and rail connections, and character and commerce of the hinterlands.

Port and Terminal Charges, a series of four volumes prepared by the Corps of Engineers and sold by the Superintendent of Documents, give detailed information regarding all port services and charges, including dockage, wharfage, storage, and handling charges, at practically all ports of the United States. These publications include the more important governmental regulations affecting the movement of vessels, freight, and passengers. This information includes a digest of the more important regulations of the United States Public Health Service (quarantine and hospital services), the Customs Service, and the Immigration and Naturalization Service.

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 manner as to obstruct, impede, or endanger navigation. And whenever a vessel, raft, or other craft is wrecked and sunk in a navigable channel, accidentally 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.

The **HYDROGRAPHIC OFFICE** of the United States Navy exists for the improvement of the means of navigating safely the vessels of the United States Navy and the mercantile marine by providing accurate nautical charts, light lists, and sailing directions (pilots) of foreign navigable waters, navigator's tables and manuals of instruction for the use of all vessels of the United States, and for the benefit and use of navigators generally.

Publications issued by Hydrographic Office for the use of mariners are: Charts of the high seas and all foreign waters, Sailing Directions for the same areas, Light Lists, Table of Distances Between Ports, Radio Navigational Aids, Radio Weather Aids to Navigation, International Code of Signals, American Practical Navigator (Bowditch), and several books of navigational tables that are described in the American Practical Navigator and in the General Catalog of Hydrographic Office Publications. Periodic publications of the Hydrographic Office are: The Notice to Mariners (weekly), the Hydrographic Bulletin (weekly), the Daily Memorandum, and the Pilot Charts for various oceans (monthly or quarterly); see *Publications* at the end of this chapter.

Notice to Mariners, containing corrections to the charts, Coast Pilots, Sailing Directions, Light Lists, and other publications, is issued weekly and mailed free on application to the Hydrographic Office, Washington 25, D. C., or through any Branch Hydrographic Office, District office of the Coast and Geodetic Survey, or District office of the Coast Guard. Two editions of this publication are issued: the Western Hemisphere Edition and the World Edition. The paragraph numbers and chart and publication references are identical in both editions. The Western Hemisphere Edition is usually ready for distribution about four days in advance of the World Edition.

WEATHER BUREAU.—Weather forecasts and warnings of the approach of storms over land and ocean areas are issued by the **Weather Bureau,** among services to navigation, commerce, agriculture, and the general public. Other warnings cover a variety of hazards, such as cold waves, frost, forest-fire hazard, floods, and many types of weather conditions affecting the nation's economy.

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 localities throughout the continental United States and possessions. Stations in the area of concern to this 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. Reports based on this cooperative service by seamen are included in various publications. Among these are the *United States Coast Pilots*, which contain sections on weather and climate, storm charts, and meteorological tables. The *Pilot Charts* issued by the Hydrographic Office contain ocean meteorological data prepared in the Weather Bureau. *Sailing Directions*, *Naval Air Pilots*, and other publications of the Hydrographic Office also contain summaries of weather information prepared by the Weather Bureau for various parts of the world from reports rendered chiefly by officers of merchant ships.

The hurricane and storm warning service.—This 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, special teletype circuits expedite the exchange of special reports from the Atlantic and Gulf coasts. Special ship reports are described under the heading *Reports from Ships*. Special aircraft reports are obtained during the hurricane season from weather reconnaissance planes which fly near the storms, and sometimes into the storm centers. Hurricane warnings, as well as gale and storm warnings, are disseminated also by flag and lantern displays from about 400 storm-warning towers or flagstaffs located on the Atlantic, Gulf, and Pacific coasts and on the shores of the Great Lakes.

Weather information service for overseas air transport.—The Weather Bureau has provided forecasts for trans-Atlantic flights, and has helped develop weather service required for regularly scheduled air transport operations over the oceans.

Under agreements with foreign governments, the Weather Bureau now provides weather information service for domestic and foreign aircraft. A detailed forecast, based on all available weather information for the ocean and adjacent land areas, is supplied to the aircraft captain just before departure, and any necessary amendments are transmitted by radio to the aircraft during flight. Forecasts cover wind conditions, icing, turbulence, cloud extent and heights, temperatures, and storms or other severe conditions to be expected en route and at the destination airport and alternates at estimated time of arrival.

General public service.—Weather Bureau publications may be obtained on request from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., upon payment of list price. The current *Price List of Weather Bureau Publications* may be requested from the Weather Bureau, Washington 25, D. C. Certain

publications, such as *Annual Meteorological Summaries*, may be obtained free of charge, ordinarily from the individual Weather Bureau offices which prepare them.

Other means by which weather information of public concern is disseminated are described under the headings of *Storm Signals*, *Weather Broadcasts*, and *Reports from Ships* (*Weather reports, United States*) in this chapter. A table of commercial radio stations which broadcast directly from Weather Bureau microphones is contained in the Appendix. Additional information pertaining to weather radio or teletype services may be requested from the Weather Bureau, Washington 25, D. C.

Storm Signals are displayed by the United States Weather Bureau at numerous places on the coasts of the United States and the shores of the Great Lakes. No visual displays of storm warnings are made at coastal stations in Alaska since distribution of the messages is effected by local radio broadcasts, as a rule.

These storm signals are used to warn of the approach of a storm of marked violence with the wind beginning to blow from the indicated direction.

The mariner must bear in mind that the storm signals do not necessarily mean that a storm will occur at the place where the signal is displayed, but that one is expected either there or within such a distance that vessels leaving port would be liable to be caught in it.

DAY SIGNALS:

Two pennants, red and white, and one flag, square, red, with black center, used either alone or in combination and have the following meanings:

Red pennant.—Small craft warning indicates that moderately strong winds that will interfere with the safe operation of small craft are expected.

Red pennant over flag.—Northeast storm.

White pennant over flag.—Northwest storm.

Flag over red pennant.—Southeast storm.

Flag over white pennant.—Southwest storm.

Two flags.—Hurricane or whole gale.

NIGHT SIGNALS:

Red and white lanterns having the following meanings are used at night:

Red lantern.—Southeast storm.

Red lantern over white lantern.—Southwest storm.

Two red lanterns.—Northeast storm.

Two red lanterns with white lantern between.—Hurricane or whole gale.

White lantern over red lantern.—Northwest storm.

For additional information regarding weather broadcasts see *Radio Services*.

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 Radiobeacon Charts.

Light Lists.—All aids to navigation, such as lights, radiobeacons, fog signals, buoys, and daymarks, are described in these publications which are for sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., and by the various sales agencies. Mariners are referred to the above publications for detailed information regarding the characteristics, power, and visibility of lights, as well as descriptions of light structures and daymarks, buoys, and fog signals. Such detailed information is not given in this Coast Pilot; see *Publications* at the end of this chapter.

The Light List is corrected to the date of publication printed on the title page. The mariner is cautioned that the latest list must be used; he should keep his Light Lists as well as his charts corrected from changes announced in the weekly *Notice to Mariners*.

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

The navigator who expects to make a light of considerable power should find the geographic range corresponding to his own height of eye by reference to the Visibility Table in the *Light Lists*. For lights of small luminous power it is obvious that the increased geographic range is of no interest.

If, when first sighted, a light can be made to dip below the horizon by at once lowering the eye several feet, it is evident that the vessel is at the limit of the geographic range and that the light is of considerable luminous power. If, under the same circumstances, the light cannot be made to dip, it is evident that the vessel is well within the geographic range and may, in fact, be very close to the light, and that the light is of relatively small power. This same maneuver will also aid in distinguishing the lights of another vessel from the more powerful navigational lights, as a vessel's lights are usually so limited in intensity that they do not carry far enough to be intercepted by the horizon. The distance of a light cannot be estimated by its dimness or brilliance. See inside back cover for *Distance of Visibility of Objects at Sea* table.

Buoys.—For the system of buoyage of the United States—color, shape, numbering, and light characteristics—the mariner is referred to the preface of the *Light Lists*.

Buoys are liable to be carried away, shifted, or capsized; lighted buoys may be extinguished; or audible buoys may not sound as the result of storm, ice conditions, collision, or other accidents. The navigator should, if possible, check his position by bearings on fixed objects on shore and by soundings.

Fog signals that depend upon the transmission of sound through the air have, as aids to navigation, certain inherent defects that should be considered. Sound travels through the air in a variable manner, even in the absence of wind, and its behavior cannot be predicted or guarded against. The distance at which a fog signal can be

heard may vary with the bearing of the signal and may be different on different occasions. The intensity of the sound may be greater at a distance than close-to. There are sometimes areas, perhaps close to the signal, where the sound is entirely inaudible. Mariners must not judge their distance from a fog signal by the intensity of the sound and must not assume that a signal is not sounding because they do not hear it.

All these considerations point to the necessity for the utmost caution when navigating near land in a fog. Audible signals are useful, but the navigator's principal reliance should be on the sounding equipment and on radio bearings, if such are available.

Echoes.—When a vessel is in the vicinity of a high rocky shore the navigator may find it advantageous to time the echo of his own signal and thus obtain a rough estimate of the distance offshore. The velocity of sound in air can be taken as 1,100 feet per second. In some localities **echo boards** have been erected to facilitate this operation. Two general types are in use. The first is specially constructed so that the echo will be heard at a specified distance off. The second is a flat surface which will reflect any sound striking it. See the *Light List* for the construction details of each echo board before using it.

Radiobeacons are operated continuously during fog and low visibility and also at scheduled intervals during clear weather, night and day. The more powerful stations have an effective range far greater than is possible with light and fog signals, and bearings of them will furnish the navigator with a valuable indication of his position long before the land is in sight.

A list and descriptive details of all marine radiobeacons are given in the *Light List* and H. O. Publication No. 205, *Radio Navigational Aids*. Radio aircraft ranges and standard broadcast stations that may be received on marine radio compasses are listed in the Appendix. The correction to be applied to convert a great circle direction to the rhumb line direction for plotting on a Mercator chart can be obtained from *Radio Navigational Aids* or Table 1, *Bowditch*, H. O. Publication No. 9.

A vessel steering a course for a radiobeacon should observe the same precautions that apply 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 her 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.

During a period of radio propagation disturbance, radiobeacon observations may be unreliable. See later discussion under *Time Signals*.

Numbering and recording of undocumented vessels.—Under the act of June 7, 1918, as amended, and the regulations issued thereunder, every undocumented vessel operated in whole or in part by machinery, owned in the United States and found on the navigable waters thereof, except public vessels and vessels not exceeding 16 feet in length, measured from end to end over the deck excluding sheer, temporarily equipped with detachable motors, shall be numbered. The requirements contemplate that machinery-propelled undocumented vessels of less than 5 net tons used for commercial purposes, which are owned in the United States and found on such waters, be numbered

under the provisions of the act as such vessels, by reason of tonnage, are exempt from documentation. The Numbering Act, however, is for the purpose of identification only and the certificate of award of number which is issued to any such vessel is solely for such purpose. It is not an authorization, license, or permit for any such vessel to engage in trade.

Vessels of 16 gross tons and over used exclusively for pleasure purposes are entitled to be documented as yachts by the Bureau of Customs. The documentation of such vessels as yachts is not a mandatory requirement, however, and where such vessels are machinery-propelled and found on United States waters, if not documented, they must be numbered under the provisions of the act. There is no restriction as to length, tonnage, or size of such vessels and the provisions of the Numbering Act should not be confused with those of the Motorboat Act of 1940 providing for the equipment of motorboats not exceeding 65 feet in length and with other machinery-propelled vessels. The regulations issued by the Commandant of the Coast Guard under authority of the Numbering Act clarify the language of the statute requiring the following undocumented vessels to be numbered:

(*a*) All boats equipped with permanently installed motors.

(*b*) All boats over 16 feet in length equipped with detachable motors.

The following undocumented vessels are not required to be numbered:

(*a*) Public vessels.

(*b*) All boats not exceeding 16 feet in length temporarily equipped with detachable motors.

(*c*) Motor lifeboats carried as lifesaving equipment on inspected vessels.

The words *temporarily equipped with detachable motors* shall be construed to mean outboard motors which are clamped or otherwise temporarily fastened as distinguished from outboard motors bolted or otherwise permanently secured. The controlling principle shall be whether or not the vessel has permanently installed motors rather than the design or construction of the vessel. A boat designed specifically for the use of an outboard motor as the ordinary means of propulsion, if not exceeding 16 feet in length, is nevertheless exempt from the requirements of the act if temporarily equipped with an outboard motor.

Applications and issuance of numbers.—Upon the purchase of an undocumented vessel which has been issued a certificate of award of number under the provisions of the act of June 7, 1918, as amended, and after completion of the bill of sale on the reverse side of the certificate by the vendor or the former owner, the purchaser should execute the application for number for undocumented motor vessel, which is incorporated on the reverse side of the certificate of award of number (CG 1513) and surrender the certificate, bill of sale, and application for a new number to the Officer in Charge, Marine Inspection, U. S. Coast Guard, having jurisdiction over the area in which the vessel is owned, within the statutory period of 10 days. That officer upon receipt of the certificate with the bill of sale and application properly executed, and upon being satisfied with the evidence of ownership, will assign a number to the vessel and forward the certificate and accompanying papers to the District Commander for processing. He will at the same time issue to the new owner a letter authorizing the operation of the vessel for a limited period, without the certificate of award of number on board, pending the issuance of such papers by the District Commander.

In the case of such vessels which are new or which have never been numbered

under the provisions of the act of June 7, 1918, as amended, or which are operating under the old form of certificate of award of number, application should be made to the Officer in Charge, Marine Inspection, U. S. Coast Guard, having jurisdiction over the area in which the vessel is owned, for a certificate of award of number by presenting proper evidence of ownership such as a bill of sale, or builder's certificate, and by the execution of Form CG 1512, application for number for undocumented motor vessel. Upon the execution of these cards in duplicate and the presentation of evidence of ownership, the Officer in Charge, Marine Inspection, U. S. Coast Guard, will accept the application and accompanying papers, transmitting same to the District Commander for processing and will thereupon assign a number to the vessel, at the same time issuing a letter authorizing the operation of the vessel for a temporary period under the numbers assigned and pending the issuance of a certificate of award of number by the District Commander.

Number required on bows of vessels.—Upon assignment of a number by the Officer in Charge, Marine Inspection, U. S. Coast Guard, or upon receipt of the certificate of award of number, the number awarded shall be painted or attached to each bow of the vessel and shall be in block characters of good proportion and not less than 3 inches in height, reading from left to right and parallel with the waterline, as near the forward end of the bow as legibility of the entire number for surface and aerial identification permits. The number shall also be of a color in contrast with the color of the hull so as to be distinctly visible and legible.

Carrying certificate of award of number.—The certificate of award of number must be kept on board at all times (unless in the custody of the Coast Guard), except in the case of vessels not exceeding 17 feet in length, or vessels whose design or fittings are such that the carrying of such certificate on board would render it imperfect, illegible, or would otherwise tend to destroy its usefulness as a means of ready identification.

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.

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

Black or 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 marker buoys which are about 3 feet in diameter, painted yellow, and equipped with telephones for communication with the interior of the submarine. 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.

Aircraft distress signals.—The attention of all navigators of surface vessels is called to the procedure which will be used by United States aircraft in attracting the attention of surface vessels when their assistance is required in any case of distress at sea:

The aircraft will establish identification if necessary. It will then circle the ship at least once, fly across the bow of the ship at low altitude, opening and closing the throttle, and will head in the direction of distress scene, rocking the wings. This procedure will be repeated until the ship has acknowledged by following the aircraft. If possible, the aircraft will maintain visual contact with the ship until the latter sights the plane or ship in distress or the survivors thereof.

Danger signal information.—During the war it came to the attention of the Coast Guard that many American masters and officers, when on the high seas and danger of collision appeared imminent, used the danger signal of four or more short blasts of the whistle as provided by Article 18, Rule 3 of the Inland Pilot Rules. The International Rules for the Prevention of Collision provide no danger signal, and the use of four or more short blasts of the whistle is neither appropriate nor applicable. The International Code of Signals provides a special signal, the letter **U** which may be transmitted visually or by means of Morse Code (• • —), using a flashing light or a whistle or siren, which signifies *you are standing into danger*. The International Code Signal **D** which may be transmitted visually or by means of Morse Code (— • •), using a whistle or siren, signifies *keep clear of me—I am maneuvering with difficulty*, and can be used as a warning.

Ship fire signal.—In many ports a standard signal of five prolonged blasts of the whistle or siren has been adopted for use as an alarm in the event of a fire occurring on board the vessel, except vessels underway, or at the dock to which the vessel is moored. Such signal may be used in addition to other means of reporting a fire. The words *prolonged blast* shall mean a blast of from four to six seconds' duration. The signal is not to be used for other purposes. On hearing the 5-blast whistle signal persons on shore should pull a fire alarm box or turn in an alarm to the Fire Department by the most convenient means.

Reports of accidents.—The licensed officer in command of any vessel shall report in writing and in person to the Coast Guard officer nearest the port of first arrival any accident to said vessel involving loss of life, or damage to property, and shall also report

in like manner any casualty or loss of life from whatever cause of any person on board such vessel and any stranding or grounding, whether or not any damage has been sustained by the vessel.

CUSTOMS.—The functions of the **Bureau of Customs** include the following: Enter and clear vessels; supervise the discharge of cargo; ascertain the quantities of imported merchandise, appraise and classify such merchandise, and assess and collect the duties thereon; control the custom warehousing of imported merchandise; enforce customs and other laws by inspecting international traffic by vessels.

The Bureau of Customs administers the navigation laws pertaining to registry, enrollment, and licensing of vessels, including the 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 volume are tabulated in the Appendix.

The **IMMIGRATION AND NATURALIZATION SERVICE** is under the jurisdiction of the Department of Justice. The functions of the Service are the administration of the laws relating to the admission, exclusion, and deportation of aliens, the registration and fingerprinting of aliens, and the naturalization of aliens lawfully resident in the United States.

The primary function of the Immigration Border Patrol, which operates as a part of the immigration force, is to detect and prevent the smuggling and surreptitious entry of aliens into the United States in violation of the immigration laws, and to apprehend smugglers of aliens and aliens who have effected unlawful entry.

The immigration laws provide that there shall be paid to the collector of the customs by the master, agent, owner, or consignee of a vessel arriving at an American port from a foreign port or place a head tax of $8 for, with certain exceptions, every alien passenger thereon entering the United States.

The designated ports of entry for aliens are divided into three classes. Class A is a designated port of entry for all aliens. Class B is a designated port of entry 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 a designated port of entry 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 at a designated port of entry until and unless he has been inspected by an immigration officer or officers and found to be entitled under the provisions of the immigration laws and

regulations to enter the United States. A list of the ports of entry for aliens is given in the Appendix.

QUARANTINE AND HEALTH.—The **United States Public Health Service** is the governmental guardian of the public health, working to prevent the spread of human contagious and infectious diseases.

In addition to its other duties, this bureau administers hospitalization and outpatient treatment at marine hospitals and many other relief stations to legal beneficiaries of the Government; it administers the foreign and domestic quarantine laws, supervising the medical examination of immigrants and enforcing interstate quarantine laws.

Radio report of disease aboard.—The master of the vessel shall report promptly by radio, to the medical officer in charge at the port of entry, the occurrence or suspected occurrence on board of any of the following communicable diseases: Anthrax, chancroid, chickenpox, cholera, dengue, diphtheria, favus, gonorrhea, granuloma inguinale, impetigo contagiosa, infectious encephalitis, leprosy, lymphogranuloma venereum, measles, meningococcus meningitis, plague, poliomyelitis, psittacosis, ringworm of the scalp, scarlet fever, smallpox, streptococcic sore throat, syphilis, trachoma, tuberculosis, typhoid fever, typhus, yellow fever, or other diseases characterized by fever or skin rash.

Quarantine.—Vessels subject to quarantine inspection include (*a*) all vessels from a port not under the control of the United States, except a vessel which in its current voyage has not touched at any port other than ports under the control of the United States or ports in Canada, Newfoundland, the Islands of St. Pierre and Miquelon, Iceland, Greenland, the west coast of Lower California, Cuba, the Bahama Islands, the Canal Zone, or the Bermuda Islands; or a vessel which having received pratique at a Canadian port located in the international waters of the Juan de Fuca, Haro, Georgia, and Rosario Straits, and Puget Sound and tributaries and connecting waters on the Pacific coast, travels on the same international waters to a United States port and presents a duplicate copy of the Canadian pratique to the quarantine officer.

(*b*) A vessel arriving from any port whether or not under the control of the United States, which has aboard a person infected or suspected of being infected with anthrax, chickenpox, cholera, dengue, diphtheria, infectious encephalitis, measles, meningococcus meningitis, plague, poliomyelitis, psittacosis, scarlet fever, smallpox, streptococcic sore throat, typhoid fever, typhus, or yellow fever, or arrives from a port where at the time of departure there was present or suspected of being present cholera, plague, or yellow fever, or where there was significant increase in the prevalence of smallpox or typhus at the time the vessel touched there.

A vessel shall fly a yellow flag, International Code Flag **Q**—Queen; 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, transmissions, or spread of communicable disease.

Quarantine regulations are given in the text under the names of the ports.

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, either by officers of the service or by the Bureau in Washington, D. C.

Medical service.—United States merchant seamen are entitled to medical relief obtainable through the Public Health Service at its established hospitals and relief stations.

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 engaged in such care, preservation, or navigation.

Relief stations 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*.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.—To prevent the entry or spread within the United States and its territories of injurious insects and plant diseases, the **Bureau of Entomology and Plant Quarantine** enforce quarantines and restrictive orders, issued under authority provided in various acts of Congress, which prohibit or regulate the importation or interstate movement of injurious insects and of plants and products that may introduce or spread insect pests or plant diseases new to or not widely prevalent within the United States or its territories. In compliance with plant-quarantine regulations it inspects at ports of entry plants and plant products that may be brought into the United States or its territories. A list of the ports within the area covered by the volume at which inspectors of this Bureau are located, is given in the Appendix.

The Bureau inspects plants and plant products offered for export and certifies to shippers and interested parties such products in accordance with the sanitary requirements of the country to which they may be exported.

RADIO.—Radio supervision.—The radio communications in the United States and its possessions, except the Panama Canal Zone, are controlled by the **Federal Communications Commission,** Washington 25, D. C.

Responsibility of shipmasters.—Shipmasters have the responsibility of seeing that the general radio regulations are carried out by the radio operators.

Radio inspectors.—Inspectors of the Federal Communications Commission have authority to board ships at United States ports for the inspection of the radio station to determine whether it complies with international treaties, Federal laws, and such rules and regulations of the Federal Communications Commission which may apply. In general, these inspectors operate at the following ports where field officers of the

Commission are located and where information concerning radio regulations and communications may be obtained:

Boston, Mass.	San Juan, P. R.	Los Angeles, Calif.
New York, N. Y.	Tampa, Fla.	San Francisco, Calif.
Philadelphia, Pa.	New Orleans, La.	Portland, Oreg.
Baltimore, Md.	Beaumont, Tex.	Seattle, Wash.
Norfolk, Va.	Galveston, Tex.	Juneau, Alaska.
Savannah, Ga.	Houston, Tex.	Honolulu, T. H.
Miami, Fla.	San Diego, Calif.	

Service documents.—The rules and regulations of the International Telecommunication Convention require that when a radio-transmitting installation is compulsory equipment on board a ship, the latter must be provided with the following service documents:

1. The radio license.
2. The operators' certificates.
3. Register (radio service log) in which shall be noted, at the time they occur, service incidents of all kinds, as well as the communications exchanged with land stations or mobile stations and relating to reports of disaster. If the regulations on board permit, the position of the ship shall be indicated once a day in the said register.
4. Alphabetical list of call letters.
5. List of coast and ship stations.
6. List of stations performing special services.
7. The general radio regulations and the additional radio regulations as well as the provisions of the convention necessary for the operations of radio-communication service on board ships.
8. The telegraph rates of the countries for which the station (ship) most frequently accepts radiotelegrams.

The rules and regulations of the United States Frederal Communications Commission require certain vessels to have additional service documents, a complete list of which may be obtained from the Federal Communications Commission, Washington 25, D. C., or from its suboffices. For further details concerning the above rules and regulations consult the following publications:

Ship Radiotelegraph Safety Rules.
The Communications Act of 1934, with amendments.
Radio Navigational Aids, H. O. 205.

Weather Broadcasts.—**Major weather bulletins** issued four times daily by United States naval radio stations NSS, Washington, D. C., NPG, San Francisco, Calif., NBA, Balboa, C. Z., and NPM, Honolulu, T. H., include observations from ships at sea, selected land station reports, and weather analyses for specific ocean areas. The information in these bulletins is suitable for preparing weather maps at sea. The naval radio station bulletins and broadcasts issued by marine shore station KPH, Bolinas, Calif., contain ocean area storm advisories, forecasts, and weather summaries in plain language.

The areas covered by these forecasts, summaries, and storm advisories are as follows:

NSS, Washington, D. C.: North Atlantic north of 10° N. latitude and west of 35° W. longitude.

NPG, San Francisco, Calif.: North Pacific from 30° to 50° N. latitude and east of 140° W. longitude.

NBA, Balboa, C. Z.: North Atlantic south of 25° N. latitude and west of 60° W. longitude; North Pacific between the Equator and 30° N. latitude and east of 115° W. longitude.

NPM, Honolulu, T. H.: North Pacific between the Equator and 45° N. latitude and from 140° W. to 160° E. longitude.

KPH, Bolinas, Calif.: North Pacific east of the 180th meridian.

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.
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.

Transmission procedure:

1. Urgent messages as defined in A:

The urgent signal (XXX) is transmitted on 500 kc., followed by QSW—kc. (Directing a shift to the frequency specified) and an appropriate phrase such as "tidal wave." After shifting, the message is transmitted on the wave specified.

2. Less urgent messages as defined in B:

The safety signal (TTT) is transmitted on 500 kc., followed by QSW—kc., and an appropriate phrase such as "storm warning." After shifting, the message is transmitted on the frequency specified.

Emergency broadcasts by Coast Guard Radio Stations.—Storm and hurricane warnings, advisories, and other urgent marine information are broadcast by United States Coast Guard Radio Stations as follows:

A. By radiotelegraph:

1. One transmission immediately on receipt.
2. One transmission during each of the next two ensuing single-operator periods for merchant ships.

B. By radiotelephone:

1. One transmission on receipt.
2. Transmission at 2-hourly intervals thereafter for a period of 6 hours unless the information is canceled or superseded.

Transmission Procedure:

1. Radiotelegraph transmission will follow the same procedure outlined for naval radio stations.

2. Radiotelephone transmissions will be preceded by a preliminary announcement on 2670 kc., containing the appropriate radiotelephone equivalents ("PAN" and/or "SECURITY") of the urgent and/or safety signals together with instructions to shift to certain designated frequencies. After shifting, the message is transmitted on the frequency specified.

Storm warnings are broadcast in plain language and on the frequencies assigned to the service (maritime or aeronautical) for which they are intended.

Scheduled radiotelegraphic broadcasts of weather information affecting the coasts of the United States, Canada, and Alaska, are also made by Mexican and Canadian radio

stations. Most Canadian coastal stations of the mobile service supply weather information on request only and without charge.

Radiotelephonic 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 harbor radiotelephone service. These broadcasts are followed immediately by reports of dangers, obstructions, and changes in aids to navigation.

This service gives to yachts, fishing vessels, tugboats, and any vessels within range, equipped with an ordinary radio receiving set, having a band covering the frequency range of 2 to 3 megacycles, direct official weather information from the Weather Bureau in plain language, and on regular schedules, such as is available to ships equipped with radiotelegraph apparatus and operator. This service should also prove of value to dock terminals, pilots, and yacht clubs.

These radiotelephone broadcasts are made twice daily at definite times and consist of the transmission of weather bulletins issued by the Weather Bureau. The bulletins contain forecasts (and storm warnings whenever they are issued) for specified regions and adjacent coastal waters.

Certain local radio broadcasting stations have microphones installed in nearby Weather Bureau Offices. From these stations forecasts and weather summaries are broadcast on a regular schedule. For stations and schedules in the area covered by this volume see the Appendix.

North of the United States, radiotelephone weather and navigational information are furnished on request and on schedule, without charge, by certain Canadian radio stations.

West Indies.—Radiotelephonic broadcasts of storm and hurricane warnings are made by various stations in the West Indies.

Alaska.—Weather broadcasts are made by Navy and Coast Guard radiotelegraph and radiotelephone stations in Alaska.

For times and schedules of broadcasts, see H. O. Publication 205, *Radio Navigational Aids*.

Circulars giving complete details relative to the broadcasting of weather information are published by the Weather Bureau. These circulars, together with a card descriptive of storm warnings, may be obtained upon application to the Chief, United States Weather Bureau, Washington 25, D. C. Similar information is also given in H. O. Publication 206, *Radio Weather Aids to Navigation*. These publications give the schedules with times and frequencies of weather broadcasts, together with tables for decoding as needed.

At Coast Guard stations, storm warnings are also broadcast on receipt and three times thereafter at 2-hour intervals, whenever they are issued by the Weather Bureau. The first of these special broadcasts begins on receipt of the message at the radio station and the broadcast is repeated on each odd or even hour thereafter for a period of 6 hours. If the warnings are superseded by another message from the Weather Bureau before the completion of three broadcasts, the later information is used and broadcast three times unless superseded again.

Reports from ships.—The master of every United States ship 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.

Weather reports (United States).—Weather reports should not be sent regularly except from ships with which specific arrangements have been made by the Weather Bureau, but masters of all ships encountering tropical or other severe storms should send special observations by radio. These reports should be sent in the international meteorological code, preceded by the ship's name, unsigned, and checked prepaid, United States Government.

If a copy of the international meteorological code is not on shipboard, the code will be found in H. O. Publication 206, *Radio Weather Aids to Navigation*, or a copy may be obtained on application to the United States Weather Bureau, Washington 25, D.C. If the code is unavailable, the message may be sent in plain language.

During the West Indies hurricane season, June 1 to November 30, ships in the Gulf of Mexico, Caribbean Sea, and southern North Atlantic Ocean are urged to cooperate with the Weather Bureau in order that more complete information may be supplied to ships and for the purpose of warning the inhabitants of coastal areas.

TIME SIGNALS.—The **United States system** of broadcasting time signals begins at 55 minutes 0 seconds of some hour and continues for 5 minutes. Signals are transmitted on every second during that time, except that there is no signal on the twenty-ninth second of any minute, nor on certain seconds at the ends of the minutes, as shown in the following diagram:

Minute	Second										
	50	51	52	53	54	55	56	57	58	59	60
55	—		—	—	—	—					—
56	—	—		—	—	—					—
57	—	—	—		—	—					—
58	—	—	—	—		—					—
59	—										—

The dashes in the above diagram indicate seconds on which signals are transmitted. The seconds marked "60" are the zero seconds of the following minutes. All seconds from 0 to 50, inclusive, are transmitted except the twenty-ninth second. The dash on the beginning of the hour (shown as 59 minutes 60 seconds) is much longer than the others, i. e., 1.3 seconds. In all cases the beginnings of the dashes indicate the beginnings of the seconds, and the ends of the dashes are without significance. It will be noted that 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 the event of a failure or an error occurring in any of the time signals another time signal will be transmitted 1 hour later on the same frequency.

Standard Frequency Broadcast Service of National Bureau of Standards.—The technical radio services broadcast continuously by the National Bureau of Standards, Central Radio Propagation Laboratory, from its radio station WWV near Washington, D. C., include a total of eight radio frequencies, 2.5, 5, 10, 15, 20, 25, 30, and 35 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.

Station WWVH on the island of Maui, Hawaii, broadcasts on three frequencies, 5, 10, and 15 megacycles. Further information about WWVH is given later in this section.

The services are: (1) Standard radio frequencies, (2) time announcements, (3) standard time intervals, (4) standard audio frequencies, (5) standard musical pitch, 440 cycles per second, corresponding to A above middle C, (6) radio propagation disturbance warning notices.

Megacycles	Power, kw.	Modulation	Audio frequencies cycles per second
2.5	0.7	1	400 or 600
5	8.0	1	440 or 600
10	9.0	1	440 or 600
15	9.0	1	440 or 600
20	*8.5	1	440 or 600
25	0.1	1	440 or 600
30	0.1	1	
35	0.1	1	

* 0.1 kw., for first 4 work days after first Sunday of each month.

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 time service of the United States Naval Observatory so that they mark accurately the hour and successive 5-minute periods.

Universal Time (Greenwich Civil Time or Greenwich Mean Time) is announced in telegraphic code each 5 minutes. This provides a quick reference to correct time where a timepiece may be in error by a few minutes. The 0- to 24-hour system is used starting with 0000 at midnight. The first two figures give the hour and the last two figures the number of minutes past the hour when the tone returns. For example, at 1655 UT, or 11:55 AM, Eastern Standard Time, four figures (1, 6, 5, and 5) are broadcast in code. The code used, International Morse, is given below. The time announcement refers to the end of the announcement interval, i. e., when the audio frequencies are resumed.

Numerals in International Morse Code

0 — — — — —	2 • • — — —	4 • • • • —	6 — • • • •	8 — — — • •
1 • — — — —	3 • • • — —	5 • • • • •	7 — — • • •	9 — — — — •

A voice announcement of Eastern Standard Time is given following each telegraphic code announcement. For example, at 9:10 e.s.t. the voice announcement in English is: "This is radio station WWV; when the tone returns it will be 9:10 a.m. Eastern Standard Time; 9:10 a.m."

Two standard audio frequencies, 440 cycles per second and 600 cycles per second, are broadcast on all radio carrier frequencies except 30 and 35 Mc. The audio frequencies are given alternately, starting with 600 cycles every hour on the hour for four minutes, interrupted one minute, followed by 440 cycles for four minutes, and interrupted one minute. Each ten-minute period is the same.

Standard time intervals.—On each carrier frequency is a pulse of 0.005-second

duration which occurs at intervals of precisely 1 second. The pulse consists of five cycles, each of 0.001-second duration, and is heard as a faint tick when listening to the broadcast. It may be used as an accurate time signal. On the fifty-ninth second of every minute the pulse is omitted. The 1-minute, 4-minute, and 5-minute intervals, synchronized with the seconds pulses, are marked by the beginning or ending of the periods when the audio frequencies are off.

Radio propagation disturbance warning notice.—A warning of radio propagation conditions is broadcast in code on each of the standard radio carrier frequencies at 19 and 49 minutes past the hour. If a warning is in effect, the letter "W" (in International Morse Code • — —) is repeated 6 times following the time announcement; if unstable conditions are expected, the letter "U" (in International Morse Code • • —) is repeated 6 times; if there is no warning, the letter "N" (in International Morse Code — •) is repeated 8 times.

A warning (W) means that radio propagation disturbance of the ionosphere-storm type in the North Atlantic region is anticipated within 12 hours, or is in progress, with its most severe effects on radio transmission paths for which the control points of transmission lie in or near the northern auroral zone. This type of radio propagation disturbance is characterized by low intensities, accompanied by flutter or rapid fading on the normal frequencies used at the different times of the day, or by complete blackouts of signals. By shifting to lower than normal frequencies for that time of day it may be possible to obtain communication, although with lower than normal intensity. Owing to increased auroral-zone absorption during the disturbance, however, usable transmission may be impossible on any high frequency. Also, *during a period of radio propagation disturbance, direction-finder observations may be unreliable.* Sudden ionosphere disturbances (SID) characterized by simultaneous fadeouts in the entire high-frequency spectrum, on paths in the daylight side of the world, are not covered by this warning.

The usual daily time for changing the announced warning is 2119 GMT (4:19 p.m., EST). The notice is, however, changed at any hour when disturbance becomes noticeable or anticipated. After a warning (W), the announcement is returned to "U" and later to "N" as conditions return to normal. Thus any time a radio operator questions reception of North Atlantic paths, it would be advisable to check with the WWV announcement to see whether conditions are considered disturbed by the Bureau's Warning Service.

Distance range of reception.—Of the radio frequencies of WWV, the lowest provides service to short distances, and the highest to great distances. Reliable reception is in general possible at all times throughout the United States and the North Atlantic Ocean, and at some times throughout the world. One should select the frequency that gives the best reception at any particular place and time. This can usually be done by two methods:

A. By tuning to the different frequencies and selecting the one most suitable at that time. For nighttime conditions over the propagation path, lower frequencies than those used during the day are usually necessary because of the skip. Received intensities on usable frequencies are much greater for nighttime than for daytime conditions.

B. By making use of techniques of prediction of usable frequencies.

Additional information on how to receive and utilize the service is given in the Bureau's Letter Circular, LC974, *Technical Radio Broadcast Services, Radio Station*

WWV, obtainable on request. The Bureau welcomes reports on reception, methods of use, or special applications of the service. Correspondence should be addressed to Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Radio Station WWVH.—Radio station WWVH, recently established by the National Bureau of Standards on the island of Maui, Territory of Hawaii, broadcasts on an experimental basis, on 5, 10, and 15 megacycles. Station WWVH extends to the Pacific area the following technical services: Standard radio frequencies, time announcements, standard time intervals, standard audio frequencies and standard musical pitch. Omnidirectional antennas radiate approximately 400 watts of power at each carrier frequency.

The program of broadcasts of WWVH, on its three frequencies, 5, 10, and 15 Mc, is the same as that of station WWV for standard time intervals, time announcements in code, standard audio frequencies, and accuracy. Reports received indicate that station WWVH may be usefully received at many locations not served by station WWV and that simultaneous reception of WWV and WWVH does not interfere with ordinary use of the standard frequencies and time signals.

The entire broadcast (modulation and carrier) is interrupted for periods of approximately four minutes immediately after each hour and half hour, and for periods of approximately forty minutes beginning at 0700 and 1900 UT. These interruptions are made to permit operation of automatic ionospheric sounding equipment at the Hawaiian field station and to compare the local standards at WWVH with broadcasts by station WWV.

NAVIGATIONAL WARNINGS.—Radiotelegraphic navigational warnings affecting the waters of the United States and possessions are compiled by the United States Hydrographic Office; the United States Coast Guard; and the North Atlantic International Ice Patrol, United States Coast Guard vessel. These warnings contain information of importance to the safety of navigation, such as the position of ice and derelicts, and defects and changes in aids to navigation, mine fields, and the like which are later published in the *Notice to Mariners*.

Radiotelephone transmission by voice of navigational warnings is made immediately after the regular radiotelephonic broadcast of weather information by the same stations, following the same schedule and method of procedure.

These radiotelephone warnings contain the latest reports of local changes in aids to navigation such as are later published in the *Notice to Mariners* and the late and more important reports of obstructions to navigation in nearby waters as received from the Hydrographic Office and local sources.

Complete details relative to radiotelephonic or radiotelegraphic navigational warnings are given in H. O. Publication 205, *Radio Navigational Aids*.

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 "COGUARD." 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.
2. Position, course, and speed (including drift).
3. Nature of trouble and condition of vessel, sea, and wind.
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 permit 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 2670 kc. (112 m.) frequency. Practically all Coast Guard units maintain a continuous watch on 2670 kc. and will answer emergency calls thereon, if heard.

Medical advice by radio.—Arrangements are made in various countries whereby mariners of all nationalities may obtain medical advice by radio. In the United States and its possessions free medical advice is obtainable through Government and commerical radio stations of its mobile service. The advice is given in language intelligible to the layman. For further details see H. O. Publication 205, *Radio Navigational Aids*.

Loran is a system of position finding by reception of radio signals from specially designed transmitting stations of known position. The name is derived by combining the first two letters of "long," the first two letters of "range," and the first letter of "navigation." It is designed to furnish reliable positions to navigators at greater distances from the transmitting stations than is possible by other methods of radio navigation.

The principle of the Loran system is the determination of the difference of the distances of two radio transmitting stations from the observer, though not the actual distance of either station. This is accomplished by determining how much more time a signal or pulse from one station takes to reach him than a signal or pulse from the other. Upon a chart a curve is drawn through all points whose distances from these stations differ by the amount found from the observation. The vessel must be somewhere on this curve, which is the Loran line of position with reference to these stations. Similarly, another line of position is obtained by comparing the signals received from another pair of stations. Since the vessel must be on both lines, the point of their intersection is its position.

Because of the velocity of propagation of radio waves, 162,000 nautical miles per second, the time differences are extremely small being measured in millionths of a second. These small time intervals are determined visually by measuring on the luminous time scale of the receiver aboard ship or aircraft the separation between reference marks made by the reception of the pulses from the transmitting stations. This time scale is formed by the motion of a point of light, which is the tip of a ray of electrons, controlled by electrical circuits in the receiver. The components of this motion

take place in a few millionths of a second and are not visually perceptible, but the complete cycle in the formation of the time scale is repeated over and over at the rate of approximately 25 times per second. Due to persistence of vision, the eye sees a continuous pattern as in motion pictures. It is on this microsecond time scale that the time difference is measured.

The position of the vessel is found from the time difference by the use of Loran charts or tables. For the service area of each pair of transmitting stations the time differences which a vessel would observe are laid down in a pattern of lines. Each line is labeled with the time difference which is common to all points on it. The navigator has only to select the line of position indicated by the reading of the Loran receiver. Loran tables are used to determine positions of greater accuracy than is possible with the average small-scale Loran chart. The tables furnish the data necessary to plot, on any chart, the required segment of the line of position.

Caution.—Loran Position determinations on or near the base line extensions are subject to considerable error and therefore should be avoided whenever possible. For accurate position determinations in the base line extension area, the use of a radio bearing (or other means) along with Loran lines from another rate is recommended.

Loran charts and tables are compiled and distributed by the Hydrographic Office. They are available for all effective Loran service areas, which include the more frequented portions of the North Atlantic, North Pacific, South Pacific, and Indian Oceans.

The Coast and Geodetic Survey is printing Loran lines of positions on various sailing and inshore navigational charts.

Radar (Radio Detection and Ranging) is one of the most important of recent developments affecting the techniques of navigation. It is an anticollision and piloting device that may be used during darkness and low visibility to detect most objects and to furnish an accurate measurement of range under all conditions. However, it has many limitations as well as advantages. Radar is merely a supplement and a highly valuable adjunct to other navigational methods.

Radar works on the principle of echoes. Instead of sound a radar transmits a radio signal. The radar equipment is basically an instrument for measuring the distance from the transmitter of an object which will reflect electromagnetic energy of radio frequencies.

The accuracy of a position obtained by radar varies considerably with different types of radar and the skill of the operator. In general, the accuracy of radar fixes compares favorably with, and sometimes exceeds, those obtained by other methods.

Advantages.—For navigational purposes, radar has several advantages over other navigational aids; namely:

1. Radar can be used at night and during periods of low visibility, when most other methods are not available.

2. Radar navigation is often more accurate than other methods of piloting. The limitations of accuracy of each set should be determined.

3. Radar fixes can be obtained rapidly. With the PPI (Plan Position Indicator) scope a continuous position is available.

4. A fix can be obtained from a single object, since both range and bearing are provided.

5. Radar may be available at greater distances from land than most methods of piloting.

6. Radar is a reliable anticollision device, permitting higher speeds (with relative safety) during periods of low visibility.

Failure on the part of a Government vessel to make use of radar while under way in low visibility has been held by a court to be directly contributory to a collision in which the vessel was involved. Article 29 of both International Rules of the Road and Inland Rules of the Road are applicable. This decision places an additional burden on vessels, which are equipped and manned to use radar to do so while under way during periods of reduced visibility without in any way relieving commanding officers of the responsibility of carrying out normal precautionary measures.

7. Radar can be used to locate and track violent tropical storms.

8. Radar reception is not affected by the same factors that cause interference and poor reception in radio communication. Consequently, radar's use is insured when normal radio communication is impossible.

Limitations.—As a navigational aid, radar is subject to certain limitations and disadvantages, as follows:

1. Radar is subject to mechanical failure. Also, as radar sets are sensitive instruments requiring accurate and precise adjustment, any error in the adjustment or synchronization will cause an error in the result.

2. There are both minimum and maximum range limitations. The minimum range is dependent on several factors. Inasmuch as the receiver is disconnected while a pulse is being sent out, any echo returning during transmission of the pulse will not be indicated. Excessive sea return, or echo from nearby water, and other obstruction nearby also affect the minimum effective range. Sea return becomes less with increased range because of the change in the angle of incidence, more of the signal is reflected away from the ship and less is returned in the form of echo. A good practical minimum range is 100 yards.

Maximum range is usually limited by the curvature of the earth to the line-of-sight, or slightly more (about 15 percent), because high frequency radio waves travel in a straight line and do not follow the earth's curvature except under the abnormal atmospheric conditions heretofore mentioned. The approximate maximum range at which any given target will return an echo can be determined by means of the table of *Distance of Visibility of Objects at Sea* in the same manner used for determining the distance at which a light can be expected to be seen at sea. This assumes, of course, that the radar is of sufficient power to extend to such a distance, that the scope is graduated for range to this distance, and that the target is of a nature that it will return a good echo.

3. Interpretation of the information presented on the scope is not always easy, even after considerable training.

4. Radar may be less accurate than other methods of piloting. A visual bearing, for instance, is usually more accurate than the radar bearing.

5. Radar may be unreliable or unavailable during certain atmospheric conditions.

6. Radar requires transmission from the ship.

7. Charts do not always give information necessary for identification of radar echoes.

8. Small boats and buoys may not be detected, especially if a light sea is running, if they are near the shore, or lack sufficient elevation to produce an echo. Most icebergs

can be detected at distances equal to that at which a similar land mass could be seen, but *radar is not wholly reliable in the detection of growlers and floe ice large enough to damage or sink ships.*

9. Radar cannot distinguish the *nature* of small targets. One small object capable of returning an echo looks to radar just about the same as another.

The limitations of each radar set should be thoroughly understood by those who are depending upon the information it presents.

PUBLICATIONS.—The following résumé of the United States Government publications of navigational value is included for the ready reference of the mariner.

Certain libraries have been designated by the Congress of the United States to receive prints, as issued, of all publications printed by the Government for public distribution. These publications may be consulted by anyone during business hours.

Sales agencies have been established in various ports by the Coast and Geodetic Survey, Hydrographic Office, and Superintendent of Documents. District Offices of the Coast and Geodetic Survey sell all publications of that Bureau. Branch Hydrographic Offices do not sell any of the publications of that Bureau.

The mailing address of the Coast and Geodetic Survey, Hydrographic Office, Superintendent of Documents, Weather Bureau, Coast Guard, and Federal Communications Commission is Washington 25, D. C.

The Catalog of the United States Coast and Geodetic Survey Nautical Charts, Coast Pilots, Tide Tables, Current Tables, and Tidal Current Charts is distributed free by the United States Coast and Geodetic Survey and its agents.

Nautical Charts.—Coast of the United States, Territories, Possessions, and Philippine Islands:
Issued by the United States Coast and Geodetic Survey.
For sale by the Coast and Geodetic Survey and its sales agents.
Mississippi River from the Head of Passes to Cairo:
Issued and for sale by the Mississippi River Commission, Vicksburg, Miss.
Illinois Waterway System:
Issued and for sale by the United States Corps of Engineers, Chicago, Ill.
Ohio River:
Issued and for sale by the United States Corps of Engineers, Cincinnati, Ohio.
Great Lakes, Lake Champlain, New York State Canals, and the St. Lawrence River, St. Regis to Cornwall, Canada:
Issued and for sale by the United States Lake Survey, Detroit, Mich.
New York State Canal System:
Issued and for sale by the Superintendent of Public Works, Albany, N. Y.
Foreign Countries:
Issued by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.

Coast Pilots.—Coasts of the United States, Territories, Possessions, and Philippine Islands:
Published by the United States Coast and Geodetic Survey.
For sale by the Coast and Geodetic Survey, and its sales agents.
Foreign countries:
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.

Tide and Current Tables.—Tide Tables, East Coast, North and South America:
Tide Tables, West Coast, North and South America, including Hawaiian Islands:
Tide Tables, Atlantic Ocean:
Tide Tables, Pacific Ocean and Indian Ocean:
Current Tables, Atlantic Coast, North America: 5
Current Tables, Pacific Coast, North America:
Tide and Current Tables, Philippine Islands:
Tide and Current Tables, Japan and China:
Published by the United States Coast and Geodetic Survey.
For sale by the Coast and Geodetic Survey and its sales agents. 10

Tidal Current Charts.—Boston Harbor, Narragansett Bay to Nantucket Sound, Long Island and Block Island Sounds, New York Harbor, Delaware Bay and River, San Francisco Bay, Puget Sound Northern Part, Puget Sound Southern Part—Eight volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the Coast and Geodetic Survey and its sales agents. 15

Water Temperatures and Densities.—Surface Water Temperatures, Atlantic and Gulf Coasts (TW 1).
Surface Water Temperatures, Pacific Coast (TW 2).
Density of Sea Water, Atlantic and Gulf Coasts (DW 1).
Density of Sea Water, Pacific Ocean (DW 2).
Published by and free on application to the United States Coast and Geodetic Survey. 20

Notice to Mariners.—Notices to Mariners are published weekly and may be secured free of charge from the United States Hydrographic Office.

Light Lists.—Atlantic and Gulf Coasts, Intracoastal Waterway, Pacific Coast:
Published by the United States Coast Guard.
For sale by the Superintendent of Documents and his sales agents. 25
Foreign countries:
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.

Radio.—Charts of Radiobeacon System, Atlantic and Gulf Coasts, Pacific Coast, and Great Lakes:
Free on application to the United States Coast Guard. 30
Radio Circulars giving schedules, frequencies, and data included in weather broadcasts.
Free on application to the Chief, United States Weather Bureau.
Radio Navigational Aids (H. O. Pub. No. 205).
Radio Weather Aids to Navigation (H. O. Pub. No. 206).
Published by the United States Hydrographic Office. 35
For sale by the Hydrographic Office and its sales agents.
List of radiobeacons:
See Light Lists published by the United States Coast Guard.
Hydrographic Bulletin:
Issued weekly by the United States Hydrographic Office. 40
International Code of Signals [American Edition] Vol. II—Radio (H. O. Pub. No. 88):
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.
International Convention for the Safety of Life at Sea, London, 1929 (affecting radio), Extracts From:
May be obtained from United States Federal Communications Commission. 45
Communications Act of 1934:
For sale by Superintendent of Documents.

Ship Radio Telegraph Safety Rules:
From the United States Federal Communications Commission or the Superintendent of Documents.
The International Bureau of Telecommunication Union, Berne, Switzerland, publishes and sells the following:

1. List of Frequencies.
2. List of Coast Stations and Ship Stations.
3. List of Aircraft and Aeronautical Stations.
4. List of Broadcasting Stations.
5. List of Stations Performing Special Services.
6. List of Call Letters of Fixed Land and Mobile Stations.
7. List of Fixed Stations.
8. The Telegraph Rates.

Radio Service Bulletin:
Issued by United States Federal Communications Commission.

Weather.—Instructions to Marine Meteorological Observers. (W. B. Circular M.)
Preparation and Use of Weather Maps at Sea. (W. B. Circular R.)
Codes for Cloud Forms and States of the Sky. (W. B. Circular S.)
Published by the United States Weather Bureau.
For sale by Superintendent of Documents. These publications will also be furnished free of charge on request of ships' officers cooperating with the Weather Bureau.

Miscellaneous.—American Practical Navigator [Bowditch] (H. O. Pub. No. 9):
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office, the Superintendent of Documents, and their agents.
The American Ephemeris and Nautical Almanac:
Published by the United States Naval Observatory.
For sale by the Superintendent of Documents and his sales agents.
International Code of Signals [American Edition] Vol. I—Visual (H. O. Pub. No. 87):
Published by the United States Hydrographic Office.
For sale by the Hydrographic Office and its sales agents.
Pilot Rules for Certain Inland Waters of Atlantic and Pacific Coasts and Coast of Gulf of Mexico:
Published by and free on application to the United States Coast Guard.
Pilot Rules for Rivers whose Waters Flow into the Gulf of Mexico and Their Tributaries and Red River of the North:
Published by and free on application to the United States Coast Guard.
Pilots Rules for Great Lakes and Their Connecting and Tributary Waters:
Published by and free on application to the United States Coast Guard.
Navigation Laws of the United States:
Published by the United States Coast Guard.
For sale by the Superintendent of Documents.
Rules and Regulations relating to the Navigable Waters of the United States:
Published by the United States Corps of Engineers.
For sale by the Superintendent of Documents.
General Rules and Regulations Prescribed by the Board of Supervising Inspectors—four volumes:
Published by and issued free on application to the United States Coast Guard.
Laws Governing Steamboat Inspection:
Published by and issued free on application to the United States Coast Guard.
Annual Report of the Chief of Engineers, United States Army:
Part 1.—Report upon river and harbor improvement work, including flood-control operations.
Part 2.—Commercial Statistics, Water-borne Commerce of the United States.
These volumes may be consulted at the libraries which are public depositories.

Port Series—of the United States:
Prepared by the Corps of Engineers, United States Department of the Army, in cooperation with the United States Maritime Commission.
For sale by the Superintendent of Documents.
Port and Terminal Charges: 5
Prepared by the Corps of Engineers, United States Department of the Army.
For sale by the Superintendent of Documents.

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CHAPTER 2

Regional Information

FROM Provincetown to Sandy Hook embraces part of the coast of Massachusetts, and all of the coasts of Rhode Island, Connecticut, and New York. The principal geographic features include Georges Banks, Nantucket and Vineyard Sounds, Buzzards Bay, Narragansett Bay, Long Island Sound and tributaries, and New York Harbor and tributaries including the Hudson River.

Cape Cod, a long peninsula jutting eastward from the mainland of Massachusetts, may be likened to an arm bent upward at the elbow. It was originally formed by the last great glacier and has been refashioned by the seas and winds. The outer end of *The Cape*, as it is called by eastern New Englanders, is a wild and desolate region with long yellow beaches, while much of the remainder of the forearm is bleak grassy country. The southern side of the delta-like plain of Cape Cod has been cut along high bluffs by the surf and waves. This section of the coast is covered with growths of pitch pine and scrub oak.

Nantucket, Martha's Vineyard, the Elizabeth Islands, and numerous smaller islands were also formed by the glacier. The plains of Martha's Vineyard and Nantucket are broad grassy heaths. The Elizabeth Islands are hilly, partly wooded, and generally the shores are low bluffs.

The western shore of Buzzards Bay is of moderate height, very gently sloping, cleared, and cultivated with occasional groves of trees. Several towns and the city of New Bedford are visible along the shores.

Between Buzzards and Narragansett Bays the coast is a mass of sand hillocks with steep faces forming a line along the shore. Several headlands along this stretch of coast have fine sand beaches between them.

The boundary line between Massachusetts and Rhode Island strikes the coast just westward of Quicksand Point.

Among the islands in Narragansett Bay are Aquidneck, Conanicut, and Prudence. These rather large islands are gently sloping, undulating, and covered with cultivated fields, orchards, and occasional groves of trees.

Westerly from Point Judith to Napatree Point is a continuous line of beaches behind which are many *salt ponds*. These ponds have been formed by the sea breaking through the outer sand barrier, and then depositing sand to close the opening. The shore near the water is low, grassy, and nearly level, but gradually rises with a series of gentle curves to higher wooded lands some distance back.

Block Island is another formation of the glacier. A prominent feature of the island is the entire absence of trees. The surface when viewed from the eastward has a grassy undulating appearance and the hills in many places show steep sandy faces. Near the shoreline the land is low, but rapidly rises toward the center of the island to steep hills covered only with grass and dotted occasionally with houses.

The boundary line between Rhode Island and Connecticut follows the Pawcatuck River to above the head of navigation.

The coastline of Connecticut is rock-bound and rugged, with numerous sandy beaches, and occasional *salt meadows* or marshland. The surface is mildly rolling near the shore. The depression of small valleys along the shore has created a number of good harbors. The shoreline has been well developed commercially and residentially. It is lined with seaside resorts, State parks, and bathing beaches.

The boundary line between Connecticut and New York follows the Byram River for slightly over 1 mile.

Long Island, originally formed by the glacier and thrusting about 105 miles eastward from New York Bay to a point abreast of New London, faces the New England coast across Long Island Sound on the north. The long, narrow outline of the island resembles that of a whale. Its eastern end is split by Peconic Bay and the 35- and 25-mile peninsulas thus formed are the north and south flukes. The island is almost a plain. On the north coast bluffs rise to a height of 200 feet. South of these, extending well into the island's midsection, run several chains of hills. The south shore from about 30 miles west of the eastern extremity to the western end is a barrier beach. The western portion of this beach has been developed into a series of bathing resorts.

Within the 100-fathom curve off the coast covered by this Coast Pilot are three off-lying features which are described at this point, namely, Georges Bank, Nantucket Shoals, and submarine canyons.

Georges Bank is an extensive bank with depths of less than 50 fathoms, extending for over 150 miles northeastward from the offshore end of Nantucket Shoals.

In heavy weather the danger area may be considered to be the oval-shaped top of the bank which is about 80 miles long in a northeast and southwest direction and which has a maximum width of about 50 miles. The bottom within this area is extremely broken and irregular, with a great number of ridges and shoal spots having depths of less than 10 fathoms. Between these shoals are channels of varying widths in which depths of about 20 fathoms may be found. All of this area lies within the 30-fathom curve and so much of it has depths of less than 20 fathoms that it may practically all be considered to lie within a generalized 20-fathom curve.

On the southeast side of the bank, outside the 20-fathom curve, the water deepens gradually and with such regularity that soundings would be of considerable value in approaching the bank. On the northwest side the water deepens more rapidly.

The bottom is generally of sand, sometimes with shell, and in places pebbles. Bottom samples as obtained during surveys are shown in a great many places on the charts.

The two principal dangers on the bank are Georges Shoal and Cultivator Shoal, which are located near the center of the oval area. **Cultivator Shoal** is a ridge nearly 15 miles long, on which depths of from 3 to 10 fathoms are found. The 3-fathom spot is near the north end of the shoal and is marked by a black whistle buoy located in approximate latitude 41°40′ and longitude 68°12′. About 20 miles east of Cultivator

Shoal is **Georges Shoal**, which is another ridge about 13 miles long and on which are several shoal soundings of 2¼ fathoms and 3 fathoms. In the locality of these shoals the sea in heavy weather breaks in 10 fathoms and the locality should be avoided by deep-draft vessels.

The entire area within the 20-fathom curve has an extremely broken bottom. It has numerous ridges and shoal spots on which depths dangerous to navigation, particularly in heavy weather, may be found. These shoal spots generally have steep sides and very little or no indication is given by soundings. **Tide rips** and **swirls**, as well as **overfalls**, are common in the locality of these spots. These tidal swirls and the like are not always visible. They show best with a smooth sea and with the current flowing in certain directions. These disturbances are not usually over the shoalest depths but are commonly alongside them. Small, detached overfalls may be seen in 20 fathoms of water. The tidal currents are rotary with no period of slack water. The velocity at strength is about 2 knots and the velocity of the minimum current which occurs about midway between the times of strength is about 1 knot. The flood sets northward and the ebb southward. The hourly velocities and directions of the tidal current are shown by means of current roses on Coast and Geodetic Survey Charts.

A navigator must bear in mind while navigating in an area of this character that it is impossible for the surveyor, without a vast expenditure of time, to determine and locate all of the shoalest spots on the many dangerous shoals found. Sudden shoaling on a bank of this character must be considered an indication of possibly dangerous water. This bank has not been wire-dragged.

Vessels passing south of the dangerous part of Georges Bank should not shoal the water to less than 25 fathoms. Approaching this part of the bank from eastward or southward, the water shoals gradually. Approaching from westward, the depths are irregular and the water shoals abruptly in places of 20 fathoms or less. On the north side of Georges Bank, between longitude 66°00′ W. and 68°00′ W., the 100-fathom and 50-fathom curves are but a few miles apart, and when approaching the dangerous part of the bank from northward 50 fathoms may be taken as a good depth to avoid the shoals.

During the recent survey of Georges Bank, numerous large steamers were observed on tracks which lead dangerously close to the shoals on the bank.

Vessels equipped with echo sounding and following the 100-fathom curve along the south side of Georges Bank, can frequently verify their position when crossing the several submarine gorges which were discovered and charted during the recent survey of the banks.

Great South Channel is the passage across Georges Bank between the easternmost of the Nantucket Shoals and the westernmost shoal spots of Georges Bank. It is about 30 miles wide and is generally used by vessels over 24-foot draft.

Nantucket Shoals is the general name of the numerous broken shoals which lie southeastward of Nantucket Island. They make this area one of the most dangerous parts of the coast of the United States for the navigator. These shoals extend 23 miles eastward and 40 miles southeastward from Nantucket Island. They are shifting in their nature, and the depths vary from 3 and 4 feet on some to 4 and 5 fathoms on others, while slues with depths of 10 fathoms or more lead between those farthest offshore. The easterly edge of the shoals has depths of 4 and 4½ fathoms in places, and trends

166° from latitude 41°18′ N., longitude 69°29′ W., to latitude 40°57′ N., longitude 69°22′ W.

The currents in the area are strong and erratic, reaching a velocity of 3 to 5 knots around the edges of the shoals. They are made erratic by the obstruction of the shoals, in some cases being deflected to such an extent as to cause the direction to change 180° from one side of the shoal to the other.

The tidal current over the shoals is rotary turning clockwise. The average velocity at strength is from 1½ to 2 knots, setting northeastward about 2 hours after low water at Boston on the northern part of the shoals, and about 3½ hours after low water at Boston on the southern part. The strength of the southwestward current is from 1½ to 2 knots and occurs about 2 hours after high water at Boston on the northern part of the shoals and about 3½ hours after high water at Boston on the southern part. A velocity at strength of 2½ knots or more is common in places on the shoals. Considerable change in velocity may be experienced with but a small change in position relative to the shoals.

Since the current is rotary, there is no true slack. The minimum current is about ½ to 1 knot, setting southeastward about 1 hour before high water at Boston over the northern portion of the shoals, and about ½ hour after high water at Boston over the southern portion. Over the northern part of the shoals the northwestward minimum current of ½ to 1 knot occurs about 1 hour before low water at Boston, while over the southern portion it occurs about ½ hour after low water at Boston.

The tidal current at Nantucket Lightship is rotary, turning clockwise. The maximum northeastward current occurs about 2 hours before high water at Boston and has a velocity of about 1 knot. The maximum southwestward current occurs about 2 hours before low water at Boston and has a velocity of about 1 knot. The minimum currents set northwestward with a velocity of about ½ knot about 1 hour after low water at Boston and southeastward with a velocity of about ½ knot about 1 hour after high water at Boston. The tidal current, however, is affected by winds which, when blowing with the current, accelerate it and when against the current, retard it.

Nantucket Shoals should be entirely avoided by deep-draft vessels when possible and by light-draft vessels without local knowledge on account of the treacherous currents. There are, however, channels through these various shoals which can be negotiated with local knowledge and caution. In calm weather at slack water these shoals are sometimes difficult to see and a vessel is liable to be taken into shoaler water than was intended.

Calm, clear days are few, when the sea is calm it is usually foggy, and when clear, it is usually rough. Also a considerable amount of hazy weather is to be expected which limits visibility.

Should it become necessary to anchor in this area, open sea anchorage may be had anywhere that depths permit. Due consideration should be given to the close proximity of shoals and possibility of dragging due to the winds and currents. Generally it has been found best to avoid the deeper channels and when rougher water is experienced anchor in the lee of a shoal which would tend to knock down the heavier swells. A scope of five to one or greater should always be used.

Nantucket Shoals Lightship, the leading mark for vessels passing southward of Nantucket Shoals, is moored in 30 fathoms of water at 40°37.′0 N., 69°38.′3 W. and 43 miles 159° from Sankaty Head Light. The lightship has a red hull with the word

NANTUCKET on each side, two masts with a circular gallery at each masthead. The light is 65 feet above the water and visible 14 miles; a riding light is on the forestay. The fog signal is a two-tone air diaphone, steam whistle if diaphone is inoperative; the radiobeacon is synchronized with the fog signal for distance finding. A short range warning radiobeacon emits a distinctive warble note for 1 minute following the regular radiobeacon to serve as a warning to vessels that they are in the vicinity of the lightship and must navigate with caution; the range will vary with receiving conditions. The code-flag signal and radio call is NNBN. **Storm warnings** are displayed during the daytime. A red station whistle buoy is 1 mile 055° from the lightship.

Beginning at the northernmost, the various parts which make up the Nantucket Shoals are McBlair Shoal, Rose and Crown, Bass Rip, Old Man Shoal, Davis Bank, Great Rip, Old South Shoal, Davis South Shoal, Fishing Rip, Middle Rip, Phelps Bank, and Asia Rip.

Phelps Bank, the southeasternmost part of the Nantucket Shoals, is about 6.5 miles long and 2.5 miles wide. **Asia Rip,** the shoalest point of the bank with 5¾ fathoms when last surveyed in 1939, is the southeastern part of the bank and lies 14 miles 044° from Nantucket Shoals Lightship. Deep-draft vessels should pass southward and eastward of Asia Rip. The wreck of the S. S. *Oregon* lies 3 miles 156° from Asia Rip.

Middle Rip, with a least-found depth of 4 fathoms and lying north-northwest of Phelps Bank, is about 13.5 miles long and 4.5 miles wide. This shoal consists of two large parts with depths of 4 fathoms on the eastern and 6¼ fathoms on the western separated by a channel with a depth of 16 fathoms and four outlying shoals of 8 to 10 fathoms. A lighted whistle buoy is about 4 miles eastward of the northern 10-fathom spot.

Fishing Rip, bow-shaped, with depths of 3½ to 10 fathoms, is about 26 miles long north and south and 6.5 miles wide at its widest point. The north point is 20 miles 073° and the south point is 27.5 miles 136°, respectively, from Sankaty Head Light. A wreck is reported to lie about 5 miles northeast of the southernmost part of the shoal and on the outer edge of the rip.

The unmarked channel westward of Fishing Rip is obstructed by three shoals in the northern section which have least found depths of 7½, 6¼, and 4½ fathoms, respectively. In the southern part of this channel are four shoals with depths of 8 to 10 fathoms.

Davis Bank, the innermost of the outer Nantucket Shoals, is bow-shaped and has depths of 3¼ to 10 fathoms of water over it. The bank is about 30 miles long north and south and has a greatest width of 4 miles. The wreck of the vessel *Progress* is off the inner edge of the bank about 13 miles north-northeastward of the southern end of the bank.

The channel westward of Davis Bank is marked at each end by buoys. The use of this channel should be restricted to clear weather due to the strong currents encountered throughout this area.

The inner Nantucket Shoals all lie within the 10-fathom curve. The area is very foul. Only a few of the shoals are described. **Davis South Shoal,** about 20 miles south-southeast of Sankaty Head, consists of two spots of 2¾ and 3 fathoms about 3 miles apart. Davis South Shoal West buoy is horizontal-banded, moored in 48 feet

and 1.5 miles west of the 2¾-fathom spot. Fishing buoy is a nun moored on the east side of the 3-fathom spot.

Old South Shoal, consisting of two spots of 2½ fathoms with a 2-fathom spot and foul ground between them, is about 13.5 miles southeast of Sankaty Head. This shoal is unmarked. **Great Rip,** about 13 miles east-southeast of Sankaty Head, has depths of 1 to 2¾ fathoms. This shoal is about 7 miles long north and south and from 1 to 2 miles wide. A lighted buoy marks its southern end. About 1.5 miles westward of Great Rip and separated from it by depths of 14 to 19 fathoms is an unnamed and unmarked shoal of 1½ to 2½ fathoms.

Rose and Crown is a boot-shaped shoal with its southern end about 10.5 miles east-southeast of Sankaty Head. The shoal extends about 5 miles northward and then 3 miles westward. Depths of 1¼ and 1½ fathoms are found in the leg of the boot, a depth of ½ fathom and marked by a buoy northeastward of it forms the heel, and a depth of 2½ fathoms is found in the toe. Northward of the toe of Rose and Crown is a shoal with foul ground and spots of 1½ and 2¾ fathoms.

Bass Rip, about 2.5 miles eastward of Sankaty Head, is about 3.5 miles long north and south. A depth of ½ fathom is 3 miles 115° from the light. The northern end of the shoal has a depth of 2½ fathoms. **Old Man Shoal** extends 4.5 miles southwestward from a point about 1.5 miles off the southeastern end of Nantucket Island. Depths of 1¼ to 2¾ fathoms are found on this shoal.

McBlair Shoal, the northernmost of the Nantucket Shoals and marked on its northern side by buoys, forms part of the southern side of Great Round Shoals Channel. Depths on this shoal vary from 2¼ to 3½ fathoms.

Submarine canyons are indentations in the edge of the *continental shelf* which is bounded on its seaward side by the 100-fathom curve. They may be traced from depths of 1,000 fathoms or more to the shoaler areas of the continental shelf. The navigator who has available some means of echo sounding should have in mind the various canyons found in this locality. The soundings in crossing them are very characteristic in each case and such soundings may be used to determine the vessel's position with considerable accuracy.

The names of some of the most important submarine canyons are shown on the charts. The longitude following the name is approximate and only given to assist in locating the feature on the chart. **Corsair Canyon,** 66°10′ W., on the eastern side of Georges Bank, has a northwesterly trend. On the southern side and toward the western end of Georges Bank, having a northerly trend, are **Lydonia Canyon,** 67°40′ W.; **Gilbert Canyon,** 67°50′ W.; **Oceanographer Canyon,** 68°05′ W.; and **Welker Canyon,** 68°30′ W. Southeastward and southward of Nantucket Shoals, having a northerly trend, are **Hydrographer Canyon,** 69°00′ W.; **Veatch Canyon,** 69°35′ W.; and **Atlantic Canyon,** 70°15′ W. **Block Canyon,** 71°20′ W., is south-southeasterly of Block Island Sound and has a north-northwesterly trend. **Hudson Canyon,** 72°20′ W., extends northwestward to the mouth of the Hudson River. The inshore section of this canyon is called Mud Gorge.

COASTAL CURRENTS.—It must be borne in mind that the current to which a vessel is subjected at any time is the combination of tidal current, wind current, and

other currents such as those due to drainage or oceanic circulation. The combination of currents is discussed in the *Atlantic Coast Current Tables*.

The current tables should always be consulted for predicted currents and up to date current information.

Detailed results of analyses of extensive current observations taken at approximately fifty lightship stations, many of which have been discontinued, along the Atlantic Coast of the United States are given in the Coast and Geodetic Survey Special Publication No. 230, *Coastal Currents along the Atlantic Coast of the United States*.

Away from the immediate vicinity of the shore, the tidal currents are generally rotary. They shift direction, usually clockwise, at an average rate of about 30° an hour. They attain velocities of 1 to 3 knots or more throughout the Nantucket Shoals-Georges Bank area, the larger velocities occurring generally over the shoaler parts of the area. Between Nantucket Island and Sandy Hook their velocities generally do not exceed ½ knot except in the vicinities of the entrances to the larger bays and inland waterways, where the velocities increase as the entrances are approached. For considerable distances from the entrances strengths of flood and ebb set respectively toward and away from those entrances, and minimums of velocity, corresponding to the slacks of reversing currents, set at right angles to the directions of the flood and ebb strengths.

Off shore and away from the influence of the tidal flow into and out of the Gulf of Maine and the larger bays, the tidal current maintains an approximate uniform velocity. Shifting its direction continuously to the right, it sets in all directions of the compass during each tidal cycle of 12.4 hours.

In the offshore area between Cape Cod and Sandy Hook there is a resultant southward drift which is stronger in winter than in summer and has an average velocity less than 0.1 knot.

Wind Currents.—Wind currents are very complicated. Their velocities and directions depend upon a number of factors such as 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.

The velocity of the current relative to that of the wind also varies with the location. It follows, therefore, that local wind current information is desirable. Such information based upon extensive current and wind observations at a number of lightship stations is given in the *Atlantic Coast Current Tables* under the heading "Wind-driven Currents."

The largest current velocities likely to occur during storms at a number of locations offshore and in the sounds are given as follows: Pollock Rip Lightship, 2½ knots; Stone Horse Shoal Lightship, 4 knots; Handkerchief Lightship, 2½ knots; Great Round Shoal Lighted Whistle Buoy 9, Nantucket Entrance, 2½ knots; Nantucket Shoals Lightship, 1 mile east of, 2½ knots; Cross Rip Lightship, 2½ knots; Hedge Fence Lighted Gong Buoy, Nantucket Sound, 2½ knots; Vineyard Sound Lightship, 2 knots; Hen and Chickens Lightship, Buzzards Bay Entrance, 1½ knots; Brenton Reef Lightship, 1½ knots; Bartlett Reef, ½ mile south of Long Island Sound, 2½ knots; Cornfield

Point Lightship, 4 knots; Fire Island Lighted Whistle Buoy 2FI, 1½ knots; Ambrose Channel Lightship, 2 knots; Scotland Lightship, 2½ knots.

WEATHER AND CLIMATE.—The following material was prepared by the United States Weather Bureau. Temperatures are given in Fahrenheit degrees and barometric pressures in inches of mercury. Meteorological tables for nine land stations and one ocean area will be found in the Appendix. Lists of Weather Bureau Offices, storm warning points and radio stations which transmit weather information direct from Weather Bureau microphones are also in the Appendix.

General.—This part of the Atlantic Coast (i.e. the area to which this Coast Pilot applies) is located in the region of the prevailing Westerly winds of the globe and it is on the leeward side of the North American Continent. This means that there is a tendency for the climate of this region to be more like the continental type than like the marine. Relatively sudden changes of temperature are common.

The charts following give the average sea level pressure, the average air temperature and the average water temperature for one month of each of the four seasons for the entire Atlantic Coast of the United States. These charts give a good picture of the seasonal variations of these elements, but in making use of them it should be kept in mind that there are very strong (1) day to day fluctuations caused by the passage of Highs and Lows with their attendent frontal systems and (2) diurnal variations caused by differences of night and day, superimposed on the more gradual seasonal changes.

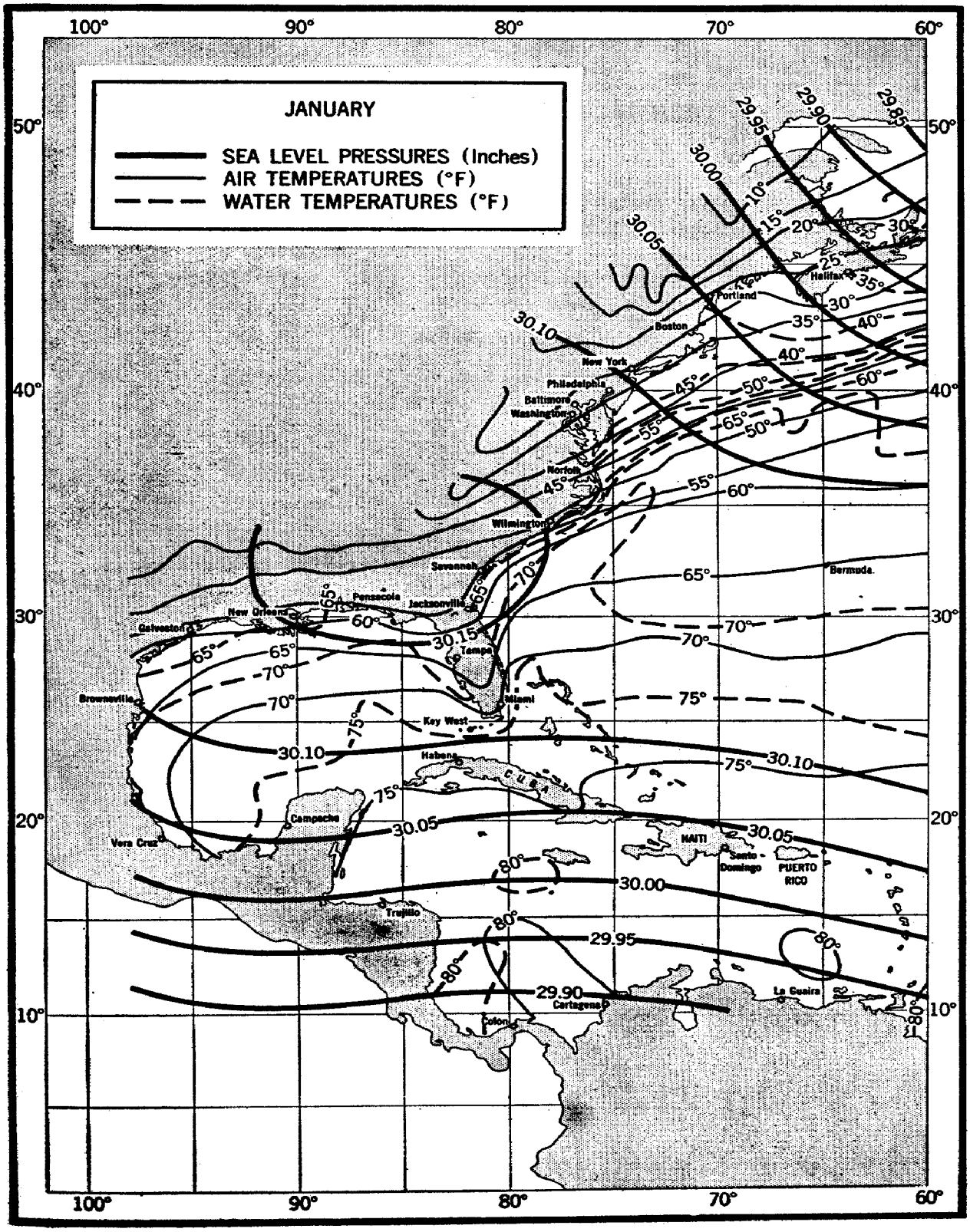
Wind.—Stations well exposed to the sea, such as Block Island, Nantucket and Provincetown, show that the prevailing wind is from the southwest most of the months of the year and that it is only in the cold months that the prevailing direction is from the northwest. Stations not so well exposed to the sea usually show the prevailing wind from the northwest about seven to nine months of the year with southwest winds only in the summer time.

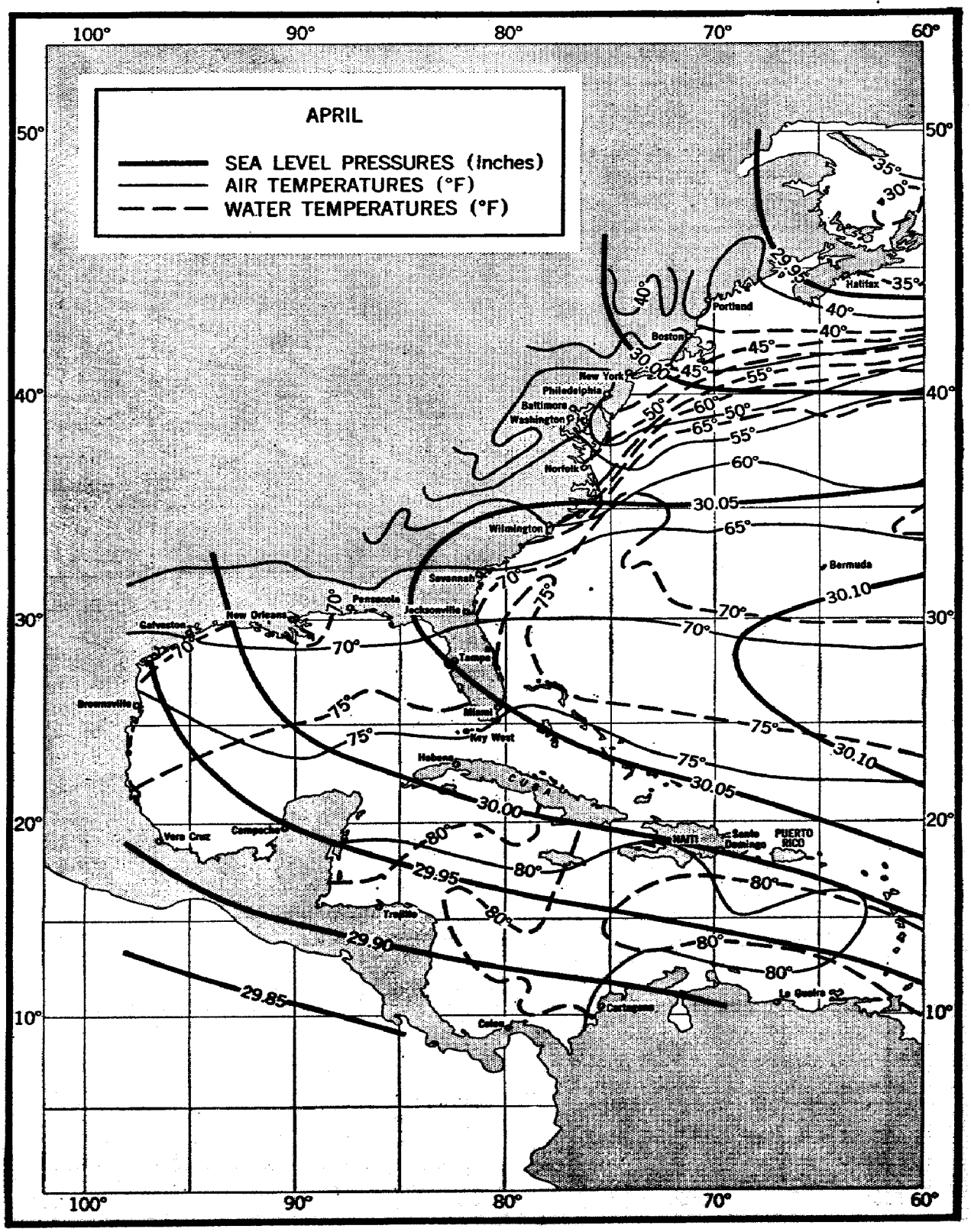
Climate of the land areas.—The mean temperature varies from about 29° F. at the coldest time of the year, which is about February 1, to about 72° F. at the end of July. The diurnal variation of temperature is superimposed on this seasonal variation. The diurnal variation is about 13° in January and 15° in July.

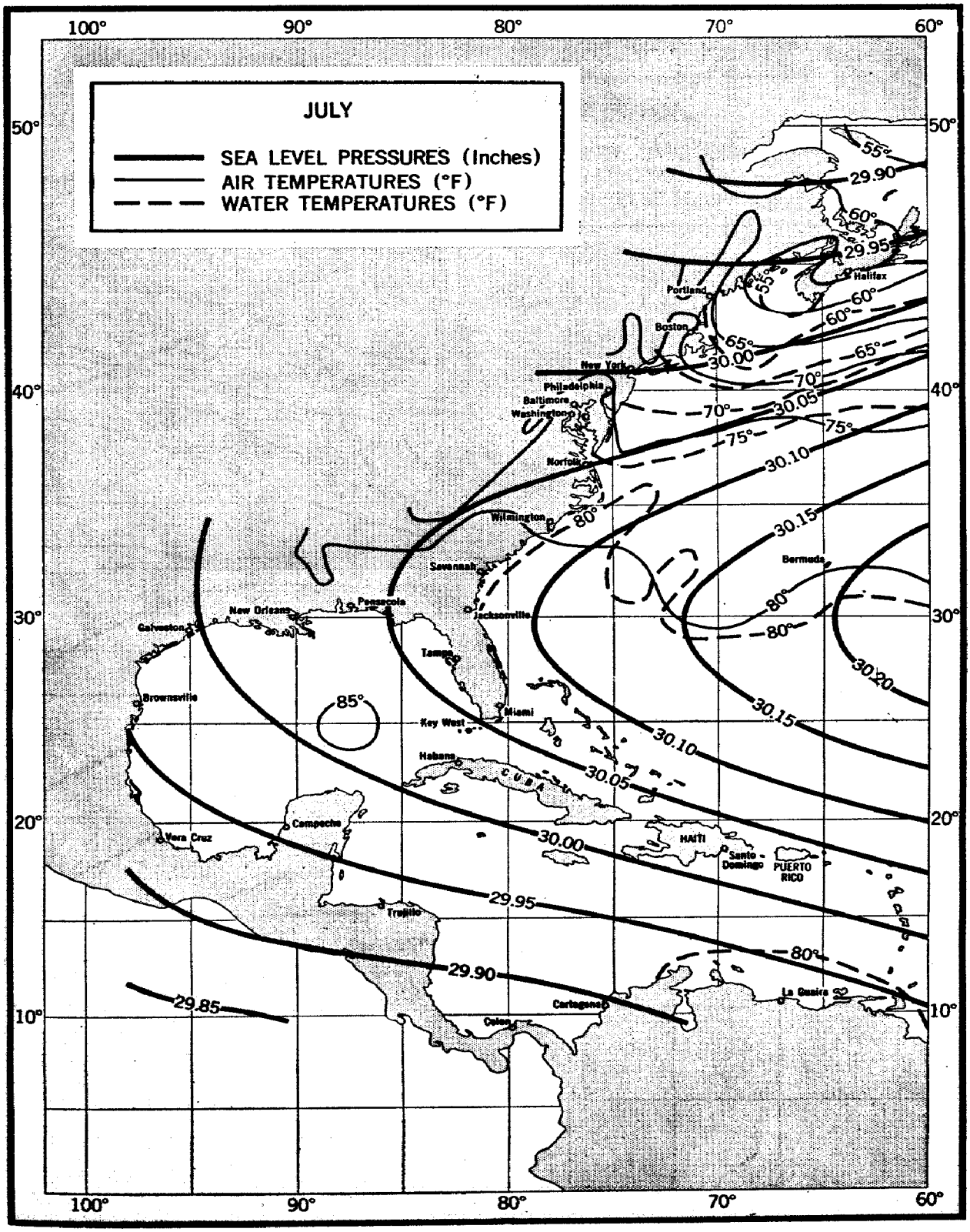
Precipitation is well distributed throughout the year. The average annual precipitation is about 44 inches at most stations. Some snow falls every winter and the average fall of snow during the winter season is about 30 inches. Snow covers the ground on an average of about 35 days. Twenty-five inches of snow fell in a single storm over New York City on December 26–27, 1947.

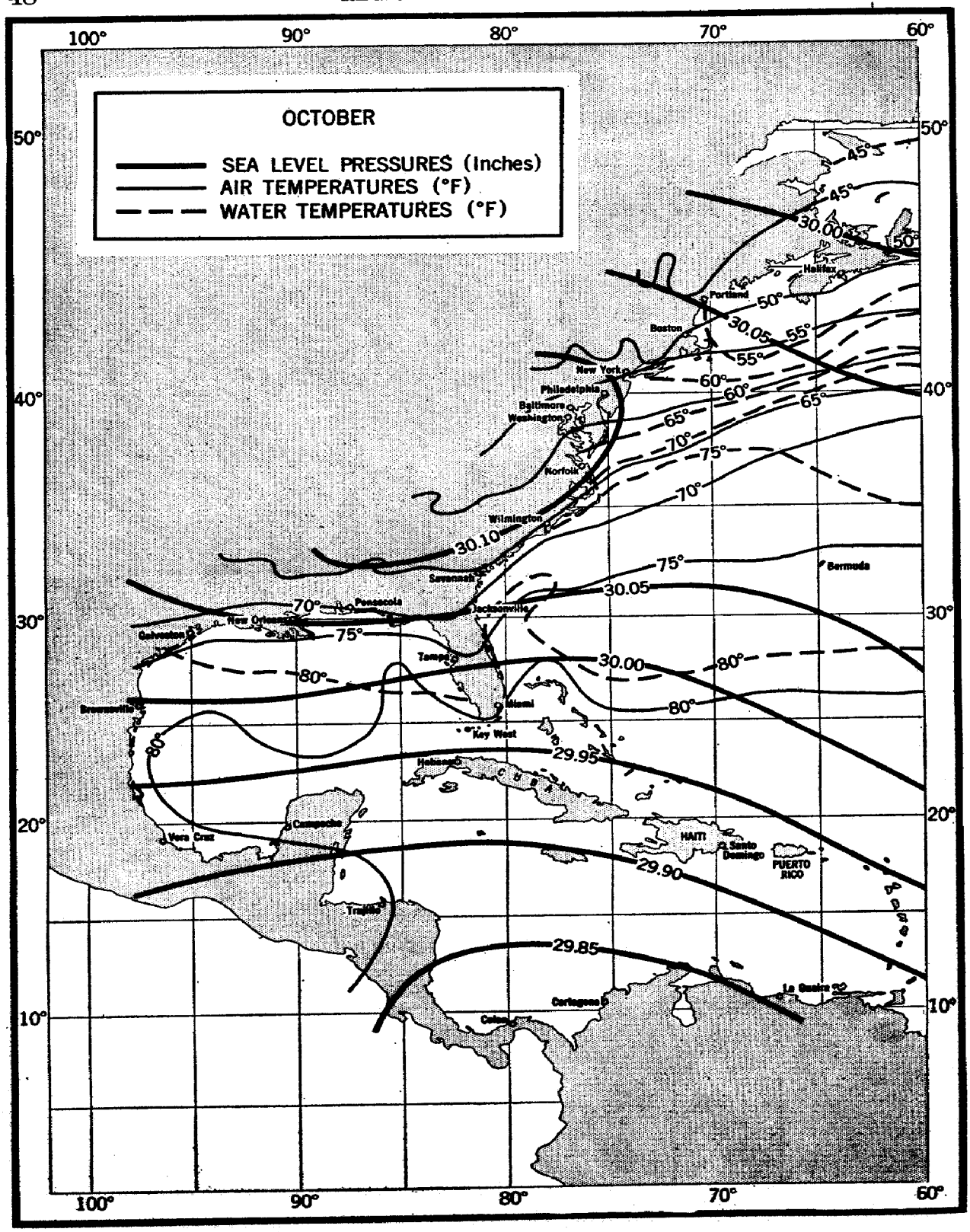
Climate of the water areas.—The mean temperature of the sea shows consistent differences from that of the air immediately over it. For the year as a whole, the water is warmer than the air above it by 0.7° F. In the winter time the water is considerably warmer than the air, the greatest difference being 5.5° F. in December while in the summer the air is warmer than the water, the greatest difference being 3.3° F. in June. The diurnal variation of the temperature over the water is less than that over the land. There is little difference in the rainfall over the land and water surfaces. The average wind speed is greater over the water than over the land due to the lower friction offered by the relatively smoother sea surface.

Fog.—Compared with other portions this part of the Atlantic coast has about an


JANUARY
SEA LEVEL PRESSURES (Inches)
AIR TEMPERATURES (°F)
WATER TEMPERATURES (°F)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
29.95
29.90
29.85
30.00
30.05
30.10
30.15
Halifax
Portland
Boston
New York
Philadelphia
Baltimore
Washington
Norfolk
Wilmington
Savannah
Jacksonville
Pensacola
New Orleans
Galveston
Tampa
Miami
Key West
Brownsville
Habana
CUBA
Campeche
Vera Cruz
HAITI
Santo-Domingo
PUERTO RICO
Trujillo
Cartagena
Colon
La Guaira
Bermuda


APRIL
SEA LEVEL PRESSURES (inches)
AIR TEMPERATURES (°F)
WATER TEMPERATURES (°F)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
Halifax
Portland
Boston
New York
Philadelphia
Baltimore
Washington
Norfolk
Wilmington
Savannah
Jacksonville
Pensacola
New Orleans
Galveston
Brownsville
Tampa
Miami
Key West
Havana
Vera Cruz
Campeche
Trujillo
Cartagena
Colon
HAITI
Santo Domingo
PUERTO RICO
Le Gosier
Bermuda
30.05
30.10
30.00
29.95
29.90
29.85
35°
40°
45°
50°
55°
60°
65°
70°
75°
80°


JULY
SEA LEVEL PRESSURES (Inches)
AIR TEMPERATURES (°F)
WATER TEMPERATURES (°F)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
29.90
29.95
30.00
30.05
30.10
30.15
30.20
29.85
55°
60°
65°
70°
75°
80°
85°
Halifax
Portland
Boston
New York
Philadelphia
Baltimore
Washington
Norfolk
Wilmington
Savannah
Jacksonville
Pensacola
New Orleans
Galveston
Tampa
Miami
Key West
Brownsville
Habana
CUBA
Campeche
Vera Cruz
HAITI
Santo Domingo
PUERTO RICO
Trujillo
Cartagena
Colon
La Guaira
Bermuda


OCTOBER
SEA LEVEL PRESSURES (Inches)
AIR TEMPERATURES (°F)
WATER TEMPERATURES (°F)
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
30.00
30.05
30.10
29.95
29.90
29.85
45°
50°
55°
60°
65°
70°
75°
80°
Halifax
Portland
Boston
New York
Philadelphia
Baltimore
Washington
Norfolk
Wilmington
Savannah
Jacksonville
Pensacola
New Orleans
Galveston
Tampa
Miami
Key West
Bermuda
Brownsville
Vera Cruz
Campeche
Tampico
Havana
HAITI
Santo Domingo
PUERTO RICO
Cartagena
Colon
La Guaira

Wind Force and State of Sea Surface with Specifications and Equivalents

Beaufort No.	Description of wind	Sea area: State of sea surface	Sea area: Description of sea	Sea area: Scale	Specifications for use on land	Nautical miles per hour	Terms used in U. S. Weather Bureau forecasts
0	Calm	Sea like a mirror—smooth	Glassy-calm	0	Calm; smoke rises vertically	Less than 1	Light.
1	Light air	Ripples with the appearance of scales are formed but without foam crests.	Rippled	1	Direction of wind shown by smoke drift, but not by wind vanes.	1 to 3	
2	Light breeze	Small wavelets, still short but more pronounced. Crests have a glassy appearance and do not break.	Smooth	2	Wind felt on face; leaves rustle; ordinary vane moved by wind.	4 to 6	
3	Gentle breeze	Large wavelets; crests begin to break; foam is not white but of glassy appearance, perhaps scattered whitecaps.		3	Leaves and small twigs in constant motion; wind extends light flag.	7 to 10	Gentle.
4	Moderate breeze	Small waves, becoming longer; fairly frequent whitecaps.	Slight	4	Raise dust and loose paper; small branches are moved.	11 to 16	Moderate.
5	Fresh breeze	Moderate waves, taking a more pronounced long form; many whitecaps are formed. (Chance of some spray.)	Moderate	5	Small trees in leaf begin to sway; crested wavelets form on inland waters.	17 to 21	Fresh.
6	Strong breeze	Large waves begin to form; white foam crests are more extensive everywhere. (Probably some spray.)	Rough	6	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.	22 to 27	Strong.
7	Moderate gale (high wind)	Sea piles up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.	Very rough	7	Whole trees in motion; inconvenience felt in walking against wind.	28 to 33	
8	Fresh gale	Moderately high waves of greater length; edges of crest begin to break into the spindrift. The foam is blown in well-marked streaks along the direction of the wind.	High	8	Breaks twigs off trees; generally impedes progress.	34 to 40	Gale.
9	Strong gale	High waves. Dense streaks of foam along the direction of the wind. Sea begins to "roll." Spray may affect visibility.		9	Slight structural damage occurs (chimney pots and slate removed).	41 to 47	
10	Whole gale (heavy gale).	Very high waves with long overhanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea takes a white appearance. The rolling of the sea becomes heavy and shock-like. Visibility affected.	Very high	10	Seldom experienced inland; trees uprooted; considerable structural damage occurs.	48 to 55	Whole gale.
11	Storm	Exceptionally high waves (small and medium-sized ships might be for a time lost to view behind the waves). The sea is completely covered with long white patches of foam along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.	Phenomenal [1]	11	Very rarely experienced; accompanied by widespread damage.	55 to 65	
12	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.		12		Above 65	Hurricane.

[1] As might exist at the center of a hurricane.

average amount of fog. Fog is more frequent in winter than in summer. Light and moderate fog occurs about 13 percent of the time in January or about 96 hours out of the month and about 10 percent of the time in July or about 75 hours. Dense fog (visibility 1,000 feet or less) occurs about 2 percent of the time in January or about 15 hours out of the month and less than 1 percent in July or about 6 hours. There is also a pronounced diurnal variation in the occurrence of fog at all times of the year. Fog is more frequent about sunrise which is also the usual time of the lowest temperature, and least frequent during the afternoon at about the time of the highest temperature.

Thunderstorms.—There is considerable variation in the average number of thunderstorm days from station to station. In general, the nearer to water surface the fewer the days with thunderstorms. On the average there are about 16 days with thunderstorms over the water and about 36 days well to the inland with a general average of about 24 days for the entire area. There is pronounced diurnal variation in the occurrence of these storms with the greatest likelihood of occurrence during the mid-afternoon. Thunderstorms are practically unknown in the winter time and are most frequent in July.

Clouds.—There is a tendency for the autumn months, notably September and October to be the least cloudy and for December or January to have the most clouds. The average annual cloudiness, i.e. percent of sky covered, is 55; in December or January it is about 61 over the land stations and 63 over the water while in September it is only about 48 over both land and water. There is a definite tendency for clouds of the cumulus type to be more frequent in the summer season of the year and during the afternoon, while clouds of the stratus type are more frequent in the winter time and during the night and early morning hours. There is little variation either diurnal or seasonal in the frequency of high clouds, i.e. cirrus and cirro-stratus. On the average there are about 106 days clear, 133 days partly cloudy, and 126 days cloudy during the year. About 80 of these cloudy days are completely overcast.

Miscellaneous.—Water spouts and hurricanes occasionally visit this area. Hurricanes are discussed in the separate section below. One of the most famous water spouts was the one on August 19, 1896 at Cottage City (now Oak Bluffs) Martha's Vineyard.

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.

Hurricanes which have passed over this region since 1900.

Year	*Dates*	*Year*	*Dates*
1902	June 11–20	1934	June 4–21
1902	June 19–July 1	1934	September 5–9
1903	September 13–17	1936	September 8–26
1904	September 8–16	1936	September 25–October 1
1911	August 24–30	1938	September 16–22
1912	September 11–23	1938	October 23–24
1915	July 31–August 5	1940	August 30–September 3
1916	July 12–22	1944	July 13–19
1920	September 27–October 1	1944	July 31–August 4
1923	October 14–19	1944	October 13–21
1924	August 16–27	1945	June 20–27
1927	August 19–27	1945	September 12–19
1932	September 9–17	1949	August 24–29
1933	September 10–16		

Note: The dates give the full duration of the hurricane. The hurricane usually passes the Cape Cod to Sandy Hook region near the end of the dates given.

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 table shows the number of tropical storms that have been recorded in North Atlantic waters during the 20-year period 1929–48, according to records of the United States Weather Bureau. 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. Paths of past hurricanes, selected as typical of the different months of the hurricane season, are to be found on the *Pilot Charts* of the *North Atlantic Ocean* and *Central American Waters*, published monthly by the United States Hydrographic Office.

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.

Storm tides and the hurricane wave.—The winds on the right side of the center (looking forward along the hurricane's path) are blowing in the same direction as the hurricane is moving, and are felt with greater force at a point over which the hurricane moves than are winds in other parts of the hurricane. These winds drive the water forward and flood the coast in advance of the hurricane. The highest tide occurs to the right of the point where the hurricane center crosses the coast. These high tides or storm waves are one of the great dangers from the hurricane. A hurricane of large diameter generally creates higher tides on the coast than one of smaller diameter, and a slow moving hurricane may produce higher tides than one of rapid progress. In each case, the higher water is caused by the greater duration of the drive of the wind in the same direction. A tidal rise in water level may begin when the hurricane center is 500 or more miles distant, and will continue until the hurricane center moves inland. This rise is called the *hurricane tide*, and is superimposed on the normal gravitational tide. The rise is most pronounced in a partially enclosed body of water, such as the Gulf of Mexico, where the concave coastline does not readily permit the escape of water, which is thus piled up on the coastline. The strongest winds and greatest fetch being in the right quadrant, the strongest current therefore is directed along and to the right of the storm attack. Heights of *hurricane tides* near the centers of storms vary from 3 to 10 feet above mean sea level. On the Atlantic Coast the average is less, and on small islands, around which the current may flow easily, there is little or no tidal effect.

The *hurricane wave* itself, sometimes erroneously called a tidal wave, is the concerted lifting up of the level of the sea at or near the center of an intense hurricane. It usually is not a series of individual waves, but one big uplift of water, and is most noticeable in the calm center. It has been noticed in all areas where tropical storms occur. Hurricane waves occur as readily on small islands as on continental coastlines. This wave has been responsible for heavy losses of life, and precautions should always be taken against it, especially at and to the right of the point where the center will cross

the coastline. The hurricane wave is superimposed upon the hurricane and gravitational tides prevailing at the time, but it usually subsides quickly, although the tidal effects may remain for some time. This wave has been ascribed to the decrease in atmospheric pressure, but even in the most severe hurricanes this would only permit a rise of approximately 5 feet, and the rise would be gradual. It now is thought, rather, that the wave is caused by the draining effect of the wind on the forward side of the calm center following against the current set up by a strong wind from the opposite direction on the rear side of the calm center. Waves of 30 feet or more in height have been reported, and instances of waves of 20 feet can be credited.

Showers have been commonly observed 300 to 500 miles in advance of a West Indian hurricane. As the storm moves somewhat nearer, there is likely to be a slight rise of the barometer as the weather clears. At the outer limits of the hurricane area itself, rainfall again is usually in the form of showers. As the center approaches further, the characteristic squalls of the hurricane begin; that is, the showers increase in frequency and intensity. Nearer the center, the rain is heavy to excessive, and continuous. Hurricane floods may do enormous damage in mountainous areas, and have resulted in high death tolls in such portions of some of the larger West Indian Islands.

Information regarding tropical cyclones by radio.—Modern developments in radio communication have made it possible for organized meteorological services to collect daily weather reports from island stations, from ships at sea, and from planes, and thus to locate tropical cyclones when they develop, and to issue warnings to shipping as to their intensities and probable movements. As a further aid, the mariner may secure weather reports direct by radio from other ships in the vicinity of the tropical cyclone. Although these radio weather reports and warnings have made it unnecessary in many instances for the navigator to depend entirely upon his own observations and knowledge in avoiding dangerous positions with respect to the storm center, it is still an essential of good seamanship that he understand the rules for ascertaining from his own observations the existence of a tropical cyclone and for locating its center. *Attention is directed to the heading hurricane seamanship at the end of this section.*

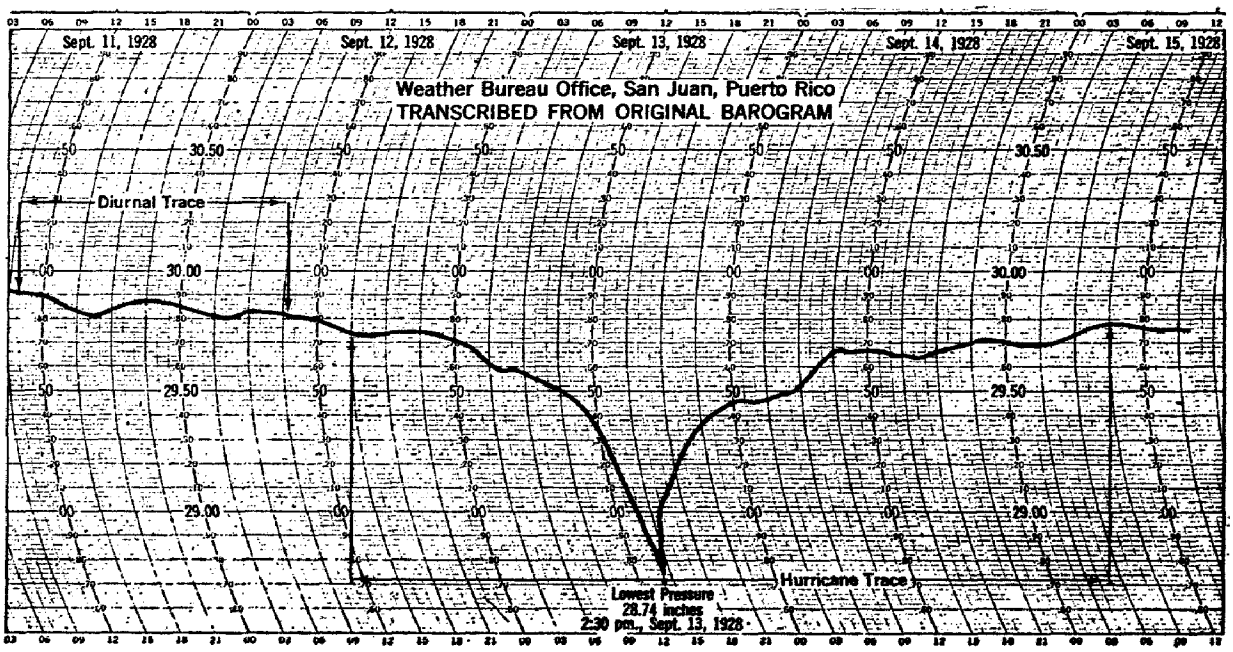
Rules for establishing the existence of a storm and locating its center.—During the season of tropical storms, any interruption in the diurnal cycle of the barometer should be considered an indication of a change of weather. The barometer is by no means an infallible guide for warnings much in advance, but after the beginning of a storm it will, more or less, indicate the rapidity of approach and distance from the center, and its indications should in no case be disregarded.

One of the earliest indications of the approach of a tropical storm is the appearance of the sky and general clearness of the atmosphere. These storms are said to be preceded by a day of unusual clearness, when distant objects, not ordinarily visible, stand out with great distinctness. The atmosphere at such times is more than usually oppressive.

These conditions are frequently accompanied by a high barometer. The barogram shows pressure variations at San Juan during the passage of the hurricane of September 13, 1928. The changes in pressure differ in detail for individual storms. Later, there may follow a restless oscillation or pumping of the mercury, related to the disturbed condition of the atmosphere. Then the sky becomes overcast and remains so, at first with a delicate tufted cirrus, *mares' tails*, which shows no disposition to clear away at sunset, but which later becomes gradually more and more dense until the *bar*, or

dark mass of the true hurricane cloud, appears upon the horizon. From the main body of this cloud, portions are detached from time to time and drift across the sky, their progress marked by squalls of rain and wind of increasing force.

Rain, in fact, forms one of the more prominent features of the storm. In the outer portions, it is fine and mistlike, with occasional showers. These later increase in frequency and in copiousness. In the neighborhood of the center, rain falls in torrents. Usually the rain area extends farther in advance of the storm than in the rear.



When the sky first becomes overcast with the characteristic veil of cirrus, the storm center most probably lies in the direction of greatest density of the cloud. It sometimes happens that the snow white fibrous mares' tails appear when the center is about 300 to 400 miles distant.

After the slight rise of the barometer as the storm first approaches, there follows a continuous fall. In front of the storm, if it is advancing from an easterly direction toward the observer, the winds blow from a northerly point (northeast, north, or northwest). If it is advancing from a southerly direction toward the observer, the winds blow from an easterly point (southeast, east, or northeast). In general, a high barometer (or restless pumping of the barometer), followed by an unusually long fall in pressure, when concurrent with other indications, warns of the approach of a hurricane.

Surrounding the actual storm area is a territory of large extent throughout which the barometer reads a tenth of an inch or more below the average, the pressure diminishing toward the central area, but with no such rapidity as is noted within the area itself. Throughout the outer ring unsettled weather prevails. The sky is ordinarily covered with a light haze, which increases in density as the center of the storm approaches. Showers are frequent. Throughout the northern portion of this ring (in the Northern

Hemisphere at moderately low latitudes) the wind rises to force 6 or 8—the *reinforced trades*—and is accompanied by squalls.

Storm swells.—A further indication of the approach of a hurricane is an unusually rough, increasing sea. Another usual early indication is the occurrence of a long, heavy swell. Noticeable at a considerable distance, sometimes 2 or 3 days in advance of the storm (300 to 800 miles), the early swell will not usually match the winds or local waves observed at the vessel. The direction of the swell, and the time between crests, depend on the force and fetch of the winds at the place where the swell was formed. The normal frequency of swells in deep Atlantic waters is 8 per minute. Hurricanes set up swells with a greater wave length and period. Swell frequency is indicative of hurricane intensity. In severe storms the frequency decreases to 4 per minute. Swells will approach the observer from approximately the direction of the storm *at the time the swell was formed.*

The normal frequency of swells in the Gulf of Mexico is 12 to 15 crests per minute. This corresponds to a period of 12 to 15 seconds between crests. An approximate rule for deep water is that groups of swells travel at a speed in knots equal to 1½ times their period. Using the rule, these storm swells travel about 20 knots. The average movement of the tropical storms is about 10 knots. Storm swells therefore are useful in detecting storms at some distance. In the case of a storm which entered the Gulf 800 miles from an observer, he might notice the swell at the vessel about 40 hours before the storm arrived, under the conditions described above. Occasionally the swell warning may not extend well ahead of the storm, however. For instance, a storm, upon arriving in the Gulf, might set up a swell whose period was 12 seconds, and which therefore would travel at about 18 knots. If the storm itself traveled at about 15 knots, the swell would reach a vessel 540 miles away only 6 hours before the storm. Hence with a rapidly moving storm the swell may offer less of a warning, particularly in the Gulf of Mexico or at similar locations where land intervenes to prevent the arrival of the swell until the storm already is close to the vessel. In general, this warning is more effective in the case of large storms which advance slowly.

The height of the swells is also an indication of the storm's intensity, particularly when they have not encountered shallow water. Caution must be used in observing the direction of movement of swells from a coastal position, since the shallow water along the coast tends to turn the swell movement toward a direction at a right angle to the coastline (or at a right angle to the contour lines of a shoal portion of ocean floor).

Within the tropical cyclone, the winds turn to the left of the storm swell in the Northern Hemisphere. Waves do not deviate markedly from the wind in the absence of a cyclonic storm or other unusual weather condition.

If the swell comes always from the same direction, and increases, the hurricane may be following a direct path which will bring its center either toward the vessel, or near to her starboard side if she were to head into the swell. Should an observer facing the swell find that it comes in some time later from his left, the hurricane is likely to be following a path which will take its center to his left. Should an observer facing the swell find that it comes in some time later from his right, the hurricane is likely to be following a path which will take its center to his right.

The height of a swell decreases as the swell advances. An approximate rule for deep water is that swells lose one-third of their height each time they travel a distance in miles equal to their length (crest to crest) in feet. In terms of swell frequency,

an approximate rule for deep water is that swells lose one-third of their height each time they travel a distance in miles equal to 5 times the square of their period (the number of seconds between successive crests).

A hurricane swell having 5 crests per minute would, then, lose one-third of its height each time it traveled about 700 miles (which travel would require only about a day for so long a swell—this point is discussed later under the heading *Compass bearing of the hurricane's center*). There is some indication that the period of the swell also increases as the swell advances, although at the present time this matter is controversial.

Should land intervene between the hurricane and the vessel, the early swell may be reduced, confused and unreliable as an indication of the hurricane's action.

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.

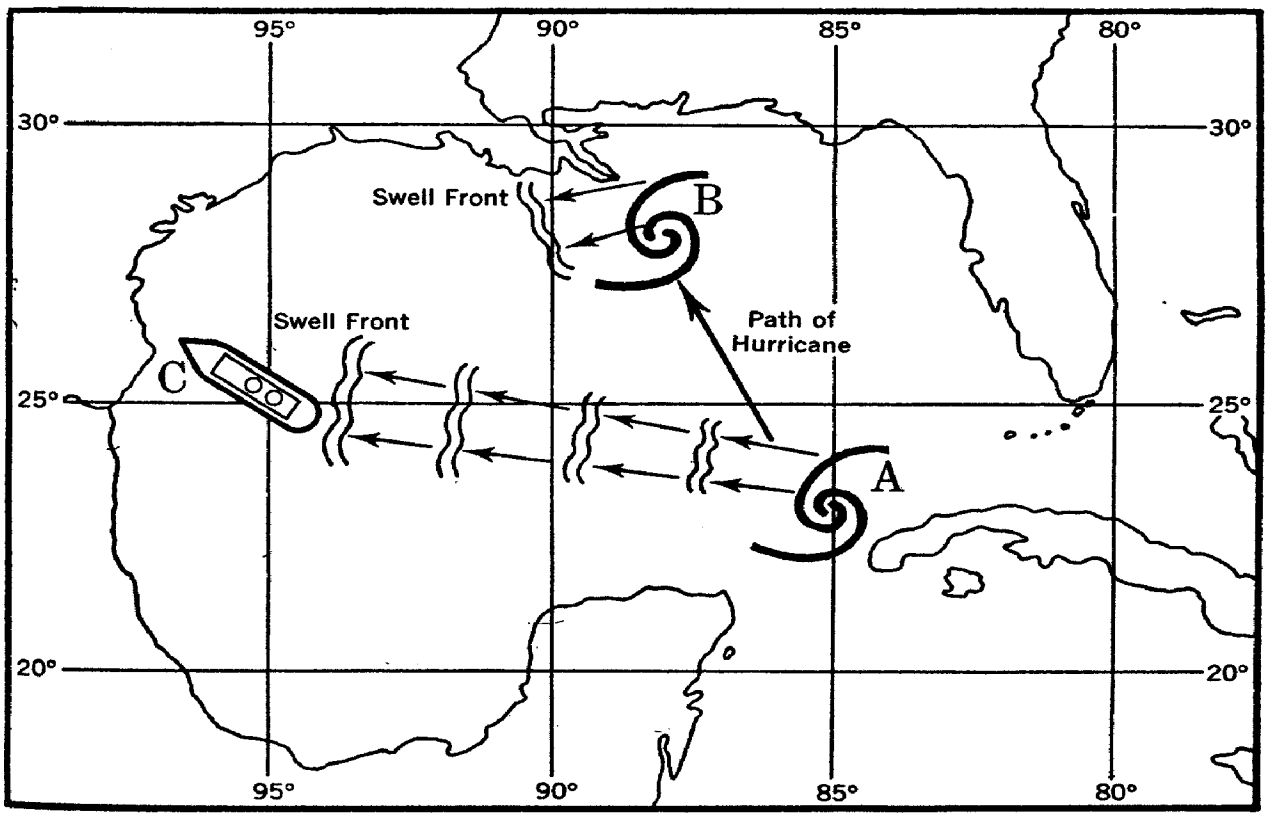
Distance of the hurricane's center.—The distance from the center of a hurricane can be estimated from a consideration of the height of the barometer and the rapidity of its fall, and the velocity of the wind and the rapidity of its changes in direction. If the barometer falls slowly and the wind increases 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. When clearly observed, these signs will be valuable supplements to the radio reports of the storm's bearing and location. Moreover, a hurricane, however closely studied, may change its path with little apparent warning. The following old table from Piddington's *Horn Book* may serve as a guide, but it can give only an imperfect estimate of the distance and too much reliance must not be placed upon it.

Average fall of barometer per hour	Distance in miles from center
From 0.02 to 0.06 inch	From 150 to 250.
From 0.06 to 0.08 inch	From 100 to 150.
From 0.08 to 0.12 inch	From 80 to 100.
From 0.12 to 0.15 inch	From 50 to 80.

Compass bearing of the hurricane's center.—If an observer faces into the wind, the storm center is likely to be located 8 to 12 points to his right in the Northern Hemisphere. When the storm is distant, it may be 10 to 12 points, and when the barometer has fallen 5 or 6 tenths of an inch it may be nearer to 8 points. Two or more observations, apart in point of distance, would aid in estimating the location of the center, and two or more observations, apart in point of time, will aid in estimating the movement of the center.

In estimating the direction of the hurricane from a consideration of swell indications, the swell's travel time must be taken into account. The direction from which

the swell comes can indicate only the position of the storm at the time when the swell was generated. The speed of movement of a group of deep water swells, in knots, is roughly 1½ times the number of seconds between successive crests. Thus a normal group of swells having 12 to 15 crests per minute in the Gulf of Mexico would advance about 7 knots. A group of hurricane swells having 4 to 5 crests per minute would advance at about 20 knots. The swell's travel time, in hours, is about two-thirds of the estimated distance of the storm, in nautical miles, divided by the number of seconds between successive crests. Actually, the individual wave is believed to travel with twice the speed of the group of swells but the group speed governs the speed of advance of the *swell front*; see diagram. The direction of the storm, and its distance, both are estimated for the time when the swell was formed. If a swell is believed to have left the storm 36 hours before arriving at the vessel, then the direction from which the swell arrives reveals only the probable direction of the hurricane 36 hours previously.



Prepared by U. S. Weather Bureau

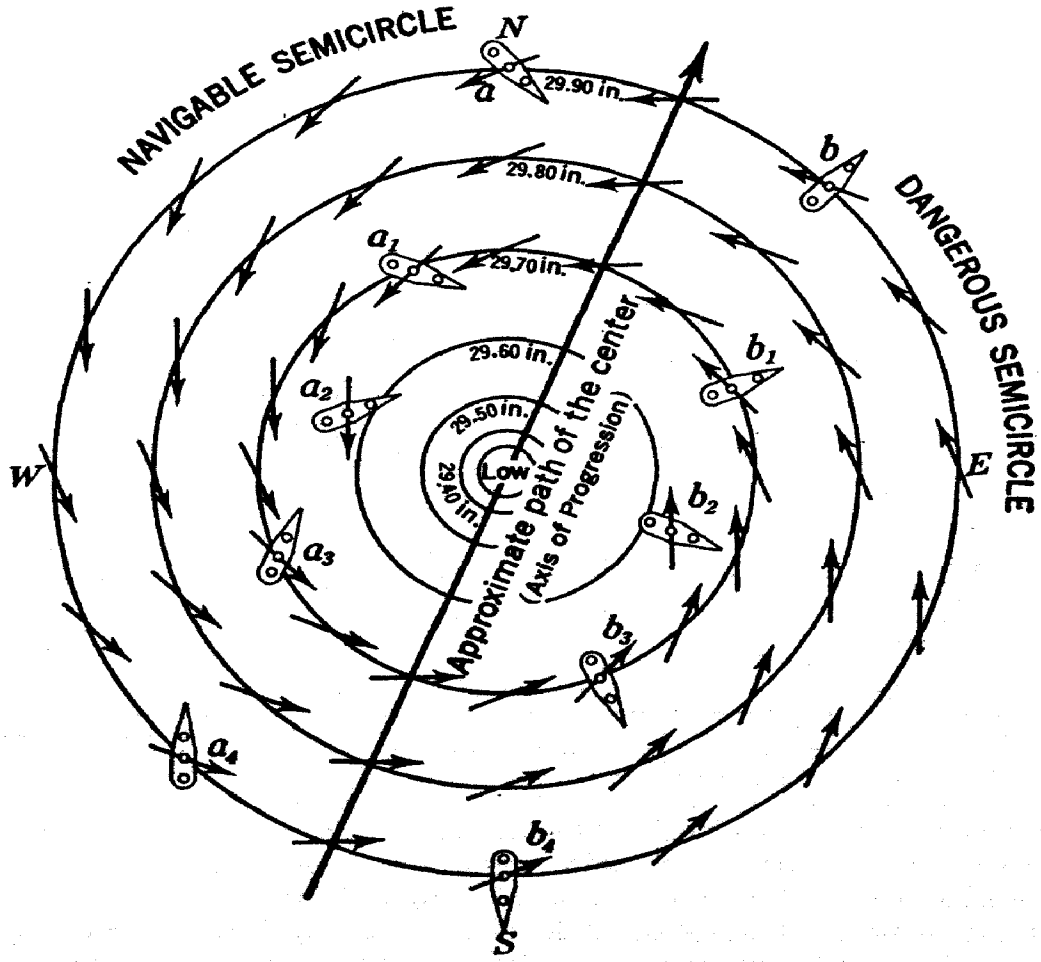
Advance of Hurricane and Change in Swell Front; By the time swell front A reaches vessel at C, hurricane has traveled to B.

High cirrus clouds associated with a tropical cyclone move with the general air stream in which the storm is embedded. Since these clouds usually extend a considerable distance ahead of the storm center, especially in the direction of the front right quadrant, the direction of movement of the cirrus is often significant. This is especially so when a change is observed in the direction of movement of these very high clouds, indicating a corresponding change in the direction of movement of the storm. If the

cirrus clouds move very slowly, however, the hurricane will tend to move at a small angle (generally less than 20°) to the right of the movement of the cirrus clouds. Moreover, very young storms may fail to follow the path of the cirrus clouds.

Practical rules.—When there are indications of a hurricane, vessels should remain in port or seek one if possible, taking every precaution to avert damage by striking light spars, strengthening moorings and, if a steamer, preparing steam to assist the moorings. In stormward ports, including the ports of the southern States, hurricanes are generally accompanied by very high tides, especially in the front right quadrant. Vessels may be endangered by overriding the wharf where moored, if the position is at all exposed. In a few other bays, especially facing from the storm on larger coasts, and larger bays on islands, the water level may be lowered dangerously. 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



HURRICANE DIAGRAM [NORTHERN HEMISPHERE]

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.

To find in which semicircle the vessel is situated.—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. In the Northern Hemisphere, the semicircle on either side of the axis is called, respectively, the right-hand or dangerous semicircle and the left-hand or navigable semicircle. In the *Hurricane Diagram*, vessels marked *a* are in the navigable semicircle and vessels marked *b* are in the dangerous semicircle.

If (while the vessel's position does not change) the wind veers to the right, the vessel will be in the dangerous semicircle; that is, in the right-hand semicircle with regard to the direction in which the storm is moving. If the wind backs to the left, the vessel will be in the left-hand or navigable semicircle. Should the wind not shift its direction, and the barometer continue to fall (assuming the vessel's position does not change between readings), the vessel is probably in the path of the storm. Should the ship be to the westward of the storm center in low latitudes, it may be assumed that the center will draw nearer more or less directly. It then becomes especially important to determine its path, and so learn whether the vessel is in the right or left semicircle of the storm area.

At this point it may be recalled that the winds in the dangerous semicircle are likely to be more severe than in the navigable semicircle. Furthermore, there is a distinct tendency for West Indian hurricanes to curve to the right. In the absence of good information, it would appear that the side of such a hurricane nearest the Equator would be the most likely to place a vessel within the navigable semicircle, especially in low latitudes (where young storms tend to move generally toward the west prior to curving), in the Caribbean during earlier months of the season, or in more eastern Atlantic waters during the later months. In the absence of good information, general considerations might suggest that a somewhat more westerly location with respect to the storm center would be more likely to place the vessel within the navigable semicircle at certain other times and places, especially in middle or higher latitudes.

Handling the ship within the storm area.—If, from the weather indications given above and such others as his experience has taught him, the navigator is led to believe in the approach of a storm, he should at once—

First. Determine the bearing of the center.

Second. Estimate its distance.

Third. Plot its apparent path.

The first two of these determinations will locate the approximate position of the center, which should be marked on the chart. The relation between the position of the ship and the position and prospective track of the center will indicate the proper course to pursue (1) to enable the vessel to keep out of, or to escape from, the dangerous semicircle and to avoid the center of the storm; (2) to enable the vessel to ride out the storm with the least danger if unable to escape from it.

In order to determine the path of the storm, and consequently in which semicircle the ship finds herself, it is necessary to wait until the wind shifts. When this occurs, plot a new position of the center 10 points to the right of the new direction of the wind as before, and the line joining these two positions will be the *probable* path of the storm. If the ship has not been stationary during the time between the two sets of observa-

tions (as is likely unless at anchor), allowance must be made for the course and distance she has traveled in the interim.

Two bearings of the center, at an interval of 2 to 3 hours, will in general be sufficient to estimate the course of the storm, provided an account is kept of the ship's way, but if the storm be moving slowly a longer interval will be necessary.

Should the wind not shift, but continue to blow steadily with increasing force, and with a falling barometer, it may be assumed that the vessel is on or near the storm track. Owing to the slow advance of storms in the Tropics, a vessel in low latitudes might come within the disturbed area by overtaking the center. In such a case a slight decrease in speed would probably suffice, but it should be borne in mind that the storm path is by no means constant either in speed or direction, and that it is particularly likely to curve away from the Equator.

A vessel hove-to in advance of a tropical cyclonic storm will experience a long heavy swell, a falling barometer with torrents of rain, and winds of steadily increasing force. The shifts of wind will depend upon the position of the vessel with respect to the track followed by the storm center. Immediately upon the track, the wind will hold steady in direction until passage of the central calm, the *eye of the storm*, after which the gale will renew itself, but from a direction different from that which it previously had. To the right of the track, or in the *right-hand semicircle* of the storm (the observer being supposed to face along the track), the winds, as the center advances and passes the vessel, will constantly shift *to the right*. The rate at which the successive shifts follow each other increases with proximity to the center. In this semicircle, then, in order that the wind shall draw aft with each shift and the vessel not be taken aback, a sailing vessel must be hove-to on the starboard tack. Similarly, in the *left-hand semicircle*, the winds will constantly shift *to the left*. Here a sailing vessel must be hove-to on the port tack so as not to be taken aback. These rules hold for all cyclonic storms north of about 5° or 8° North Latitude.

Since the wind circulates counterclockwise in the Northern Hemisphere, the rule in that hemisphere is to face into the wind and the storm center will be on the right hand. If the wind traveled in exact circles, the center would be 8 points to the right. However, the wind follows more or less a spiral path inward, which brings the center from 8 to 12 points to the right.

The number of points to the right may vary during the same storm. Since the wind usually shifts in squalls, its direction should be taken just after a squall.

The center will bear more nearly 8 points from the direction of the lower clouds than from that of the surface wind.

Ten points to the right (in north latitude) when facing into the wind is a good average allowance to make if in front of the storm, but a larger allowance should be made when in the rear. If very near the center the allowance should be reduced to 8 or 9 points in the front quadrants.

The direction of the storm center can be determined with fair accuracy if the vessel is definitely within the wind system of the cyclone. The direction of movement of the storm can be determined roughly from the change of the barometer and the shifts of the wind. It is helpful, in judging the probable course of West Indian hurricanes, to study the recorded paths of storms in different months as shown on the various *Pilot Charts*, since the places of origin and the area traversed vary with the season. For example, tropical storms originating in the western Caribbean Sea

in June nearly always move northwestward into the Gulf of Mexico. In November storms originating in the same region usually move northeastward into the Atlantic.

With storms of varying area and different intensities, the lines of equal barometric pressure (isobars) lie much closer together in some cases than in others, so that it is quite impossible more than to guess at the distance of the center from the height of the mercury or its rate of fall.

At the same time, storms travel at varying rates of speed. In the Tropics this ranges from 5 to 15 knots, generally decreasing as the storm track turns northward and curves, but increasing again as it passes well into the mid-latitudes of the North Atlantic, where hurricanes may travel as fast as 40 to 45 knots. Within the Tropics, the storm area usually is small, the region of violent winds seldom extending more than 150 miles from the center. The barometer, however, falls rapidly as one progresses from the circumference toward the center, a difference of more than 3 inches having been observed in this distance.

The winds accordingly blow with greater violence and are more symmetrically disposed around the center in the Tropics than in higher latitudes. After the storm has curved it gradually widens out and becomes less severe, and its own speed of travel increases as the speed of its winds becomes more moderate. Its center no longer is a well defined area of small size, marked by a patch of clear sky and near which the winds blow with the greatest violence. Out of the Tropics, the strongest winds often are found at some distance from the center.

The central area of calm, and perhaps blue sky, characteristic of tropical cyclones, is not found in well-developed storms which form outside of the Tropics. Sometimes there is found, in LOW's where the cyclonic circulation is but imperfectly developed, a region of relative calm and clear sky lying between the easterly winds to the front of the depression and the westerly winds in the rear. The phenomenon is not, however, analogous to the *eye* of the tropical cyclone. The *eye* appears to be caused by intensity of rotation, and to disappear when this has diminished sufficiently. Occasionally, a cyclone which formed in the Tropics will maintain its organization, including the calm center, until it reaches middle latitudes.

It must not be forgotten that the shifts of wind will occur in the order described above only when the vessel is stationary. When the course and speed are such as to maintain a constant relative bearing between the ship and storm center, there may be no shift of the wind. Should the vessel be outrunning the storm, the wind may shift in a direction opposite to that given, and a navigator in the right semicircle, for instance, should he judge only by the shifts of wind without taking his own run into account, might imagine himself on the opposite side. In such a case, the barometer must be the guide. If it falls, one is approaching the center. If it rises, one is receding.

An examination of the *Hurricane Diagram* shows how this is. A vessel hove-to at the position marked b, and being passed by the storm center, will occupy successive positions in regard to the center from b to b_4, and will experience shifts of wind, as shown by the arrows, from east through south to southwest. On the other hand, if the storm center be stationary or moving slowly, and a vessel be overtaking it along the line from b_4 to b, the wind will back from southwest to east, and is likely to convey an entirely wrong impression as to the location and movement of the center.

Hence it is recommended that a vessel suspecting the approach or proximity of a cyclonic storm should stop (if a sailing ship, heave-to on the starboard tack) for a while,

until the path of the center is located by observing the shifts of the wind and the behavior of the barometer.

If the wind remains steady in direction and increases in force in heavy squalls while the barometer falls rapidly, say, at a rate greater than 3 hundredths of an inch per hour, the vessel is probably on or near the track of the storm and in advance of the center.

In this position, with plenty of sea room, the proper course is to run with the wind well on the starboard quarter, if north of the Equator. The vessel thus will make her way into the navigable semicircle, and be most likely to increase her distance from the center. The wind will draw more forward as she recedes from the center, but the compass course first set should be adhered to until well clear.

The procedure is the same if the observations place the ship anywhere within the navigable semicircle.

The most critical situation is that of a vessel finding herself in the forward quadrant of the dangerous semicircle, particularly if at some distance from the center, where the wind shifts but slowly and the barometer indications are indecisive, both causes combining to render the bearing of the center obscure.

The general objective, however, of putting as much distance as possible between oneself and the storm center should be kept in mind.

With steamers this may not be difficult, although, should the storm be curving, the course first set may have to be altered later in order to continue to draw away.

A *sailing vessel* will be set by the wind directly toward the path of the storm and may become involved with the center without being able to avoid it. If so caught in the dangerous semicircle, a *sailing vessel* should haul by the wind on the starboard tack when in north latitude, keep coming up as the wind draws aft, and carry sail as long as the weather permits. If obliged to heave to, do so on the starboard tack when in north latitude.

This maneuver, while it may not carry the vessel clear of the storm track, will make the best of a bad situation.

A vessel so hove-to will find the shifts of wind drawing aft, enabling her to come up to them instead of being headed off, as would be the case on the other tack.

Moreover, since the sea changes its direction less rapidly than the wind, the vessel will come up more nearly head-on to the old sea, instead of having it more abeam as on the opposite tack.

A general rule for *sailing vessels* is always to heave-to on whichever tack permits the shifts of wind to draw aft.

The *Hurricane Diagram* (representing a cyclonic storm in the Northern Hemisphere after curving) illustrates these rules for *sailing vessels* graphically.

For simplicity the area of low barometer is made perfectly circular and the center is assumed to be 10 points to the right of the direction of the wind at all points within the disturbed area. Let us assume that the center is advancing about north-northeast, in the direction of the long arrow, shown in heavy full line. The ship a has the wind at east-northeast; she is to the left of the track, or in the navigable semicircle. The ship b has the wind at east-southeast, and is in the dangerous semicircle. As the storm advances these ships, if lying-to, a upon the port tack, b upon the starboard tack, as shown, take with regard to the storm center the successive positions a to a_4, and b to b_4. The wind of ship a shifts to the left, of ship b to the right, and in both cases

draws aft. This diminishes the probability that either ship will be struck aback with possible serious damage to spars and rigging, a danger to which a vessel lying-to on the opposite tack constantly would be exposed, since the wind in the latter case constantly would tend to draw forward. The ship *b* continually is beaten by the wind and sea toward the storm track. The ship *a* is drifted away from the track, and should she be able to carry sail would soon find better weather by running off to the westward.

Should *steamers* find it necessary to heave-to, the method of doing so must depend upon the position within the storm area.

A steamer is concerned more with the damage resulting from heavy seas than from wind. Furthermore, a steamer is not dependent for her course upon the direction of the wind, but is free to maneuver to keep away from the storm center, where the heaviest and most confused seas are found, unless other circumstances such as proximity to the land prevent this.

If unable to escape from the storm (and this can be done only in low latitudes or otherwise when the storm covers a comparatively limited area), the principal objective of a steamer is that of avoiding the center of the storm.

Referring to the *Hurricane Diagram*, it is obvious that in the Northern Hemisphere, if a steamer finding herself in the left-hand (*navigable*) semicircle at a or a_1 should obey the rule for sailing vessels and heave-to on the port tack, her head will lie toward the storm track and the greatest danger. On the other hand, under the same circumstances, if the steamer heaves-to on the starboard tack, her head will lie away from the storm track, and such headway as is made over the ground will all be in the direction of safety.

Following the same reasoning, a steamer in the Northern Hemisphere, caught in the right-hand (*dangerous*) semicircle at b or b_1 in the diagram and obliged to heave-to, should do so head to sea. In this case both the wind and sea are constantly beating her toward the storm track, and less leeway will be made when lying-to head to sea than in any other position.

Many steamers behave better when hove-to with the sea astern, or on the quarter, but the adoption of this method must depend upon the position of the vessel within the storm area. Referring again to the diagram, it will be seen that, in the Northern Hemisphere, a steamer may heave-to safely with the sea astern or on the starboard quarter if in the forward quadrant of the left-hand semicircle at position a or a_1. This course, however, should never be preferred when in the forward quadrant of the right-hand semicircle (position b or b_1) for the reason that any headway made over the ground would be, in all probability, toward the storm center where the high and confused seas would be likely to inflict damage.

If, in spite of all endeavors, the storm center should pass directly over a vessel, she will experience a short period of calm, but the seas will be high, confused and dangerous, being swept in from all directions. After a short interval the wind will burst with hurricane force from a point different from, but not necessarily opposite to, that from which it was blowing before. The vessel must be prepared to meet this wind, and to avoid being caught aback.

Rules for maneuvering.—The rules for maneuvering in the Northern Hemisphere, insofar as they may be generalized, are:

Right or dangerous semicircle.—Steamers: Bring the wind on the starboard bow, make as much way as possible, and if obliged to heave-to, do so head to sea. Sailing

vessels: Keep close-hauled on the starboard tack, make as much way as possible, and if obliged to heave-to, do so on the starboard tack.

Left or navigable semicircle.—Steam and sailing vessels: Bring the wind on the starboard quarter, note the course and hold it. If obliged to heave-to, steamers may do so stern to sea; sailing vessels on the port tack.

On the storm track in front of the center.—Steam and sailing vessels: Bring the wind 2 points on the starboard quarter, note the course and hold it, and run for the left semicircle. When in that semicircle, maneuver as above.

On the storm track in the rear of the center.—Avoid the center by the best practicable route, having due regard for the tendency of cyclones to curve to the northward and eastward.

In all cases, it is advisable to increase the vessel's distance from the center as soon as possible, keeping in mind that the whole storm field is advancing. If a vessel should find herself inside the relatively calm center, or *eye,* it should be realized that the gales will be renewed sharply from another quarter upon leaving the center, and that the new wind direction need not be directly opposite the old wind direction. When the storm center moves away, the barometer may be expected to rise, and the wind and sea to subside.

Importance of information by radio.—Since coastal vessels generally have radio facilities, the main value of the preceding discussion of hurricanes is that it may assist in understanding, and acting sensibly in the light of, radio reports, forecasts and advisory messages. Apparent lack of agreement between radio reports and local indications then becomes a signal for special caution and a close radio watch. Further information about radio reports will be found in Chapter 1 under the heading *Weather Broadcasts*.

Destruction by hurricane of aids to navigation.—Caution should be observed when navigating over an area recently visited by a hurricane. Lights and beacons are damaged or swept away in the storm, and high tides and floods may make familiar landmarks unrecognizable. Temporary markers and devices are usually placed as quickly as possible after the storm has passed, but these guides are not necessarily the same as those destroyed. Thus a signal may be placed near but not exactly at the place of the original one. A small light may replace a larger one, a buoy may be used or other expedient substitutes placed.

Hurricane seamanship.—This item is based on Instructions to the Pacific Fleet by Admiral Nimitz, February 13, 1945. The West Indian hurricane, the counterpart of the Western Pacific typhoon, may well be encountered anywhere in the Caribbean, Gulf of Mexico, and in much of the Western Atlantic. The same principles of seamanship are applicable to the more frequent and extensive, though less violent, North Atlantic extra-tropical storms.

Many fine ships, crews, and cargoes have been needlessly lost as the result of taking too little heed of unmistakable weather symptoms in sufficient time to enable the master to take evasive or preventive action.

A hundred years ago, a ship's survival depended almost solely on the competence of her master and on his constant alertness to every hint of change in the weather. To be taken aback or caught with full sail on by even a passing squall might mean the loss of spars or canvas; and to come close to the center of a genuine hurricane or typhoon was synonymous with disaster. While to be taken by surprise was thus serious, the

facilities for avoiding it were meager. Each master was dependent wholly on himself for detecting the first symptoms of bad weather, for predicting its seriousness and movement, and for taking the appropriate measures to evade it if possible and to battle through it if it passed near to him. There was no radio by which weather data could be collected from all over the oceans and the resulting forecast by expert meteorologists broadcasted to him while afloat on the high seas. There was no one to tell him that the time had now come to strike his light sails and spars, and snug her down under close reefs or storm trysails. His own barometer, the force and direction of the wind, and the appearance of sea and sky were all that he had for information. Ceaseless vigilance in watching and interpreting signs, plus a philosophy of taking no risk in which there was little to gain and much to be lost, was what enabled him to survive.

Seamen of the present day should be better at forecasting weather at sea, independently of the radio, than were their predecessors. The general laws of storms and the weather expectancy for all months of the year in all parts of the world are now more thoroughly understood, more completely cataloged, and more readily available in various publications. Weather and hurricanes are described above in this chapter. The Pilot Charts, available to all ships, give excellent information as to the probable incidence and movements of cyclonic storms.

A navigator is held culpable if he neglects "log, lead, and lookout" through placing blind faith in radio fixes. Likewise, a seaman is culpable if he regards personal weather estimates as obsolete and assumes that if no radio storm warning has been received then all is well, and no local weather signs need cause him concern.

Mariners are reminded to give full consideration to the adverse weather likely to be encountered in the West Indian hurricane area during the season. In this connection, masters should refresh themselves as to ship-handling in heavy weather. In order to know what outside weather reports are broadcast and what he should be getting, the mariner should be familiar with *Radio Weather Aids to Navigation* (H. O. 206).

Masters should be fully aware of the stability characteristics of their ships, particularly the effect of free-liquid surfaces upon stability.

Any, and possibly all, of the following conditions can be expected if the vessel is so poorly handled that she finds herself within the destructive area of a severe cyclonic storm.

1. Visibility reduced to 1,000 yards or less and sea becoming mountainous and nearly indescribable.

2. Ship not merely rolling, but heeled far over continually by the force of the wind, thus leaving very little margin for further rolling to leeward.

3. Ingress of water through ventilators and other topside openings.

4. Switchboards and electrical machinery shorted and drowned out and possible fires resulting from short circuits.

5. Free water over engineroom or fireroom floor plates and probably in other spaces.

6. Loss of steering control, failure of power and lighting, and stoppage of main engines. Loss of means of radio communication.

7. High winds and seas carrying away masts, funnels, boats, davits, and deck structures, and generally making it impossible for crew to secure gear adrift or to jettison deck cargo or top-side weights.

8. The storm "taking charge" and making impossible various evasive and security measures which might have been effective at an earlier stage.

An experienced and prudent seaman, analyzing the foregoing, will readily appreciate that a vessel so situated is indeed in dire circumstances. He will also realize that it is now too late to prevent serious damage or actual foundering. At the same time, he will fail to understand why the vessel was allowed to continue until such dangerous conditions became unavoidable and the vessel placed in jeopardy.

It is emphasized that in bad weather, as in other situations, safety and fatal hazard are not separated by any sharp boundary line but shade gradually from one into the other. There is no "little red light" which is going to flash on and inform the master that from now on there is extreme danger from the weather and that measures for the ship's safety must now take precedence over further efforts to continue the voyage without delay or deviation. This time of decision will always be a matter of personal judgment. Naturally, no master is going to cut thin the margin between staying afloat and foundering, but he may nevertheless unwittingly pass the danger point even though his ship is not yet *in extremis*. A ship that keeps going as long as the severity of wind and sea has not yet come close to capsizing her or breaking her in two may nevertheless become helpless to avoid catastrophe later if things get worse. By then she may be unable to steer any heading but in the trough of the sea, or may have her steering gear, lighting, and main engines disabled, or may be helpless to secure or jettison deck cargo. The time for taking measures for a ship's safety is while still able to do so. Nothing is more dangerous than for a seaman to be grudging in taking precautions lest they turn out to have been unnecessary. Safety at sea for a thousand years has depended on exactly the opposite philosophy.

LOCAL SERVICES, Pilots and Pilotage.—In the area covered by this volume, pilotage, with a few unimportant exceptions, is compulsory for all vessels, both domestic and foreign, engaged in the foreign trade, but not for vessels in the domestic trade. Information for the more important ports is given in the description of the localities.

Pilots cruise off the entrance of the more important ports. Local pilots can be obtained on inquiry at most of the larger ports covered by this volume. The masters of towboats are usually licensed pilots.

Towboats are available at the more important ports. For further information refer to the description of the port.

Harbor masters.—Harbor masters are appointed for the principal ports, and they have charge of the anchorage and berthing of vessels in their respective harbors. Federal harbor and anchorage regulations are published in this chapter. Federal laws prohibit the dumping of refuse material of any kind and of oil into the navigable waters of the United States, see Chapter 1.

Standard time.—The standard time zone used within the limits of this volume is the standard time of the meridian 75° west, five hours slow of Greenwich time.

Daylight saving time.—In most localities the clocks are advanced one hour between 2:00 a.m. on the last Sunday in April and 2:00 a.m. on the last Sunday in September.

Legal holidays.—The following are the legal holidays in the States of Massachusetts, Rhode Island, Connecticut, and New York:

January 1, New Year's Day.—All.
February 12, Lincoln's Birthday.—Connecticut, New York.
February 22, Washington's Birthday.—All.

Good Friday.—Connecticut.
May 30, Memorial Day.—All.
July 4, Independence Day.—All.
Labor Day.—All.
October 12, Columbus Day.—All.
November 11, Armistice Day.—All.
Thanksgiving Day.—All.
December 25, Christmas Day.—All.

Supplies.—New York, New Haven, Bridgeport, New London, and Providence are the principal ports where general supplies can be obtained, including fuel oil, Diesel oil, gasoline, coal, fresh water, ship chandlery. Similar items but in more limited quantities can be obtained at many places mentioned under descriptions of the different ports.

Repairs.—The principal places where extensive repairs to hulls and machinery of large vessels can be made are tabulated in the Appendix. Small vessels can be hauled out and minor repairs to machinery can be made at many other places mentioned under the descriptions of different ports.

Salvage.—Salvage equipment consisting of tugs, lighters, pumps, derricks, diving apparatus, etc., is available at New York, New London, New Bedford, and Providence, Rhode Island.

Measured courses are at the following places, for details see text.

Cape Cod between Race Point and Long Point.

Narragansett Bay, Rhode Island, on the west shore of the north end of Aquidneck Island.

Norwalk Islands, between the southwest end of Sheffield Island and the south side of Hammock Island.

Port Jefferson Harbor, Long Island, N. Y.

Between the south end of City Island, N. Y. and the south side of Hart Island, N. Y.

Inland waterway, South Oyster Bay, south shore of Long Island, N. Y.

Anchorages and inlets.—Between Cape Cod and Sandy Hook the more important harbors either commercially or as places of refuge are New Bedford Harbor, Narragansett Bay, New London Harbor, Bridgeport Harbor, New Haven Harbor, New York Harbor, City Island, New York, Port Jefferson, Long Island, Greenport, Long Island.

Harbor entrances.—The entrances to most harbors in this section, except the south shore of Long Island, are dredged and well marked channels which are easy of access. In some cases jetties and breakwaters have been built at the entrances. The south shore and the inland waterway of Long Island are subject to shifting sand bars and obstructions.

Aids to navigation.—The lights, lightships, and radiobeacons and other aids to navigation are the principal guides and mark the approaches and channels to the principal ports. Many light stations are equipped with radiobeacons, particularly in the vicinity of the larger ports.

For a complete description of all lighted aids, buoys, and daybeacons see the *Light List*.

Wrecks.—Many vessels have been wrecked along this coast as a result of collision, foundering, and other causes. Most of the offshore wrecks have been located and wire dragged to determine the least depth over the highest projecting part. Dangerous

wrecks for the most part are marked by buoys of various colors and shapes and often show a quick flashing or an interrupted quick flashing light.

Rules of the Road.—*Rules to prevent collisions of vessels and pilot rules for certain inland waters of the Atlantic and Pacific Coasts and the Coast of the Gulf of Mexico* apply to the inland waters of the Atlantic Coast included by the boundaries as follows:

Nantucket Sound, Vineyard Sound, Buzzards Bay, Narragansett Bay, Block Island Sound, and easterly entrance to Long Island Sound.—A line drawn from Chatham Light to Pollock Rip Lightship; thence to Great Round Shoal Channel Entrance Lighted Whistle Buoy GRS; thence to Sankaty Head Light. A line drawn from the westernmost extremity of Smith Point, Nantucket Island, to No Mans Land Lighted Whistle Buoy 2; thence to Gay Head Light; thence to Block Island Southeast Light; thence to Montauk Point Light on the easterly end of Long Island, New York.

New York Harbor.—A line drawn from Rockaway Point Coast Guard Station to Ambrose Channel Lightship; thence to Navesink Light (south tower).

General Rule 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 buoys 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.

Coastwise traffic.—This section of the coast has a great deal of traffic in all types of vessels. Long Island Sound is heavily traveled by coastwise vessels and small pleasure craft bound between New York and northern ports via the Cape Cod Canal. The routes generally followed are given in Chapter 3.

Many **fish weirs** are found along the outside coast. The stakes often become broken off and form a danger to navigation, especially at night. Regulations limiting the areas within which fish weirs may be established have been prescribed by the Secretary of the Army and the supervision of the fishing structures is controlled by the Chief of Engineers, United States Army. Strangers should proceed with caution when crossing areas of possible fish weirs, and should avoid crossing such areas at night, whenever possible. In general, the limits of the fish trap areas are shown on the charts.

Regulations prescribe that fishing structures and appliances in navigable waters of the United States shall be lighted for the safety of navigation, as follows:

Lighting fishing structures. (1) Fishing structures and appliances in navigable waters of the United States will be lighted for the safety of navigation as follows:

The lights will be displayed between sunset and sunrise. They will be placed at each end of the structure, excepting where the inner end terminates in such situation that there is no practicable navigation between it and the high-water line of the adjacent coast, in which case no inner light will be displayed. The outer light will be white, and the inner light will be red. The size, capacity, and manner of maintenance of the light will be such as may be specified in the Department of the Army permit authorizing the erection of the structure or appliance. When several structures or appliances are placed on one line with no navigable passage between them, they will be considered for lighting purposes as one structure.

(2) By authority of the Secretary of the Army conditions in form as follows will be included in all permits for fishing structures and appliances in navigable waters of the United States, issued by the Chief of Engineers or by District Engineers specially authorized by him to issue such permits:

That the weir, trap, or pound will be lighted between sunset and sunrise, by and at the expense of the permittee, for the safety of navigation. The lights will be displayed at each end, the outer end of the structure, and at an elevation of not less than_____ feet above high water. The outer light will be

white, the inner light will be red, and both will be equal to_____ with a capacity to burn _____ days untended. They will be subject to the inspection of the aforesaid District Engineer before use. (Additions may be made to this condition and superfluous words deleted as may be necessary to provide for lighting the particular structure.)

That there will be installed and maintained on the weir, trap, or pound, by and at the expense of the permittee, such additional lights and signals, if any, as may be prescribed by the U. S. Coast Guard, and that provision will be made for proper attendance by watchman or otherwise of all lights and signals, so that they will at all times be in effective condition.

Lobster pots.—The waters described in this Coast Pilot contain many lobster pots. Painted wooden buoys, secured by small lines, float on the surface. An additional buoy of cork or unpainted wood is sometimes secured to a second position on the pot and is difficult to distinguish. These buoys are from shore out to, and in many cases across, the sailing routes. Small craft are cautioned against fouling which is liable to result in a fouled wheel or sprung shaft or propeller.

INLAND WATERWAYS.—The following data concerning the Intracoastal Waterway from Boston to the Rio Grande and the Mississippi River with its navigable tributaries are included for ready reference. The New York and Canadian Canal Systems are included in Chapter 13 following the description of the Hudson River.

The **Intracoastal Waterway** affords a protected route, with the exception of various sections, for vessels between Boston, Mass., and the Rio Grande; a distance of approximately 2,900 miles. No toll is charged for passage as the waterway is under Federal jurisdiction. Navigation is restricted, however, by the limiting depths, and horizontal and vertical clearances in the various sections of the waterway.

Boston to New York Harbor.—Between Boston and Long Island Sound it is necessary to pass through comparatively exposed waters and no inland route exists except for the passage through the Cape Cod Canal and its approaches. The canal extends from Cape Cod Bay to Buzzards Bay and with its approach channels affords a sea-level waterway 12.6 miles in length. The project depth is 32 feet over a width of 450 to 500 feet. The minimum vertical clearance is 135 feet at high water. Cape Cod Bay and the canal are described in *United States Coast Pilot, Atlantic Coast, Section A.* Cape Cod Canal and Buzzards Bay to New York are fully described in this volume.

New York Harbor to Norfolk.—Between New York and Manasquan Inlet the route follows the outside coast. From Manasquan Inlet to Delaware Bay the inside route follows the New Jersey Inland Waterway. The State-maintained channels have a project depth of 6 feet. The Corps of Engineers have been authorized to maintain a waterway with a project depth of 12 feet over a width of generally 100 feet. The minimum horizontal clearance is 30 feet. Up to 1950 no work had been done on this project by the Corps of Engineers. The route then follows Delaware Bay and River to the Chesapeake and Delaware Canal, through the canal to Chesapeake Bay. The canal has a project depth of 27 feet over a width of 250 to 400 feet. The minimum vertical clearance is 135 feet at high water. *United States Coast Pilot, Atlantic Coast, Section C,* fully describes the route between New York and Norfolk.

Norfolk to Key West.—This waterway consists of dredged channels and land cuts roughly parallel to the coast. The project depth is 12 feet from Norfolk to St. Johns River with minimum clearances of 47 feet horizontal and 80 feet vertical. From St.

Johns River to Miami the project depth is 8 feet with minimum clearances of 52 feet horizontal and 79½ feet vertical. From Miami to Cross Bank the project depth is 7 feet with a minimum horizontal clearance of 40 feet. Between Cross Bank and Key West the waterway follows a natural channel 5 feet deep. *United States Coast Pilot, Atlantic Coast, Section D,* fully describes the route between Norfolk and Key West.

Key West to the Rio Grande.—Between Key West and Apalachicola, the waterway follows the outer coast. From Apalachicola to the Rio Grande, it consists of dredged channels and land cuts roughly parallel to the coast. The project depth is 12 feet over a width of 125 to 150 feet. The minimum clearances are 75 feet horizontal and 70 feet vertical. *United States Coast Pilot, Gulf Coast,* fully describes the route between Key West and the Rio Grande.

Notes:—In the following discussion of the Mississippi River and its tributaries all mileages are given in statute miles. Distances on the Mississippi River are in statute miles from Head of Passes. Mileages on tributaries are in statute miles above the mouth of the tributary.

The **Mississippi River,** *Gulf of Mexico to Baton Rouge.*—This section of the river is a deep-water channel and is described in the *United States Coast Pilot, Gulf Coast.* Navigation is safe and easy at all seasons.The bridge 2 miles above New Orleans has a vertical clearance of 135 feet above high water. Baton Rouge is 228.9 miles above Head of Passes, Gulf of Mexico.

Baton Rouge to Cairo, Mile 228.9 to Mile 964.0.—The project depth of the channel is 12 feet over a width of 300 feet. This dimension is greatly exceeded during medium and high stages. The minimum clearances are horizontal 600 feet and vertical 58 feet at extreme high water, 109 feet at low water.

Cairo to the mouth of the Missouri River, Mile 964.0 to Mile 1,159.3.—The project for this section of the Mississippi River is 9 feet deep and 300 feet wide from Cairo to the northern boundary of the city of St. Louis, thence 200 feet wide to the mouth of the Missouri River. The minimum clearances of the 10 fixed bridges crossing this section are horizontal 500 feet and vertical 47 feet at extreme high water, 88 feet at low water. Navigation is continuous throughout the year except when the river is blocked by ice.

Mouth of the Missouri River to St. Paul and Minneapolis, Mile 1,159.3 to Mile 1,821.0.—The project provides for a channel 9 feet deep. The minimum clearances of the 51 bridges and the 27 locks between the Missouri River and the Northern Pacific Railroad bridge in Minneapolis are horizontal 56 feet, vertical 59 feet at normal pool levels, and length of lock 320 feet. The navigation season is usually from April to December.

The **Red River** enters the Mississippi River 300.8 miles above Head of Passes. The project provides for a channel 9 feet deep and 100 feet wide from the Mississippi to Mile 31.0, thence a lateral canal with locks to Shreveport, La., Mile 325.0, thence continued improvement to Fulton, Ark., Mile 462.9. In 1949 preliminary engineering was underway for the lateral canal, however, the Red River has been improved by snagging, dredging shoals, and clearing of the banks to Fulton. A minimum depth of 6½ feet can be taken from the mouth to Mile 35.5, where the Black River enters, thence 3 feet to Alexandria, La., Mile 121.0, thence 1 to 2 feet to Shreveport, thence 1 foot or less to Fulton. From about January to July the minimum depth to Shreveport is 5 feet and to Fulton 4 feet. The minimum clearances on the river are horizontal 100 feet and vertical 37 feet at high water.

The *Black River* enters the Red River 35.5 miles above the mouth. At about Mile 57.0, above Jonesville, La., the Black River is joined by the Tensas and Little Rivers and the name changes to the *Ouachita River*. The project provides for a channel 6½ feet deep from the mouth to Camden, Ark., Mile 350.8, and a channel 7 feet deep from the mouth to Arkadelphia, Ark., Mile 417.0. The project has been completed to Camden, Ark., and project depths or greater are available for that distance. However, between Camden and Arkadelphia, navigation is restricted to small craft from January to June; the remainder of the year only a few inches may be expected. The minimum clearances of the 16 bridges and 6 locks are horizontal 55 feet, length of lock 268 feet, and vertical 57 feet at normal pool level. The project for the *Tensas River*, La., which enters the Black River above Jonesville and *Bayou Macon*, La., which enters Tensas River at Mile 42.7, provides for the removal of snags to Tendal, La., Mile 137.8 on the Tensas River and to Floyd, La., Mile 111.6 on Bayou Macon. In ordinary seasons navigation is possible between January and June, the remainder of the year depths reduce to 1 foot. The minimum clearances on the Tensas River are horizontal 55 feet and vertical 8 feet at high water, 22 feet at low water; on Bayou Macon, horizontal 58 feet, and vertical 1 foot at high water, 30 feet at low water. *Boeuf River* enters Ouachita River at Sicily Island Gorge about Mile 81.0. The river has been snagged to Wallace Landing, La., Mile 166.0. In ordinary seasons navigation is restricted to between January and June, the remainder of the year the depths usually reduce to 1 foot. The minimum clearances are horizontal 58 feet and vertical 8½ feet at high water, 28½ feet at low water. *Little Missouri River* enters Ouachita River about Mile 379.0. The river was snagged to Rawles Bluff, Ark., about Mile 23.0 but no work has been done in recent years and vessels attempting to navigate the stream encounter leaning trees, snags, and other similar obstructions. Minimum clearances of the bridges over the previously snagged portions are horizontal 12 feet and vertical 2½ feet at high water, 25 feet at low water.

The **Yazoo River** enters the Mississippi River at Vicksburg, Miss., through a dredged canal 431.7 miles above Head of Passes. The project provides for a depth of 6½ feet in the canal, a distance of 9 miles, and a depth of 4 feet over a width of 200 feet in the river to the junction of the *Tallahatchie* and *Yalobusha Rivers* at Mile 189.0. The minimum clearances are horizontal 83 feet and vertical 50 feet at high water.

The *Big Sunflower River* enters the Yazoo River about Mile 44.0. The project provides for a channel 4½ feet deep and 100 feet wide from the mouth to the mouth of the *Hushpuckena River* at Mile 171.4. Project depth is available to Pentacost, Miss., Mile 124.6, from January to June. The minimum clearances are horizontal 36 feet and vertical 12 feet at high water, 31 feet at low water.

The **Arkansas River** enters the Mississippi River at Mile 575.0 above Head of Passes. The project provides for clearing and snagging from the mouth to *Neosho (Grand) River* in Oklahoma, Mile 459.3. Under average conditions 4-foot draft vessels can be taken to Pine Bluff, Ark., Mile 117.0, from the first of February to the middle of July. From the middle of August to the middle of December the draft is generally limited to about 2 feet. The minimum clearances to Pine Bluff are horizontal 160 feet and vertical 56 feet at high water; to the head of the project, horizontal 130 feet and vertical 2 feet at high water, 42½ feet at low water.

The *Fourche La Fave River* enters the Arkansas River at Mile 192.2. The river is navigable to Perryville, Ark., Mile 22.2.

The *Petit Jean River* enters the Arkansas River at Mile 234.9. The river is navigable to Rocky Crossing, Ark., Mile 28.2.

The *Poteau River* enters the Arkansas River at Mile 362.0. The river is navigable to Braden, Okla., Mile 8.6.

The **White River** enters the Mississippi River 583.5 miles above Head of Passes. The river is considered navigable downstream from Branson, Mo., Mile 520.0, however, the project provides for channel maintenance only to Batesville, Ark., Mile 301.0, and for locks and dams to provide a 4-foot channel from Batesville to Guion, Ark., an additional 33 miles. Under ordinary conditions, boats of 6-foot draft may be taken from the mouth to Peach Orchard Bluff, Ark., Mile 169.0, from the first of February to the last of June. The rest of the season the controlling depth is generally 3 feet. A depth of 4 feet will be found between Batesville and Guion. The minimum clearances to Guion are horizontal 36 feet, length of lock 147 feet, and vertical 47 feet at high water.

The *Black River* enters the White River at Jacksonport, Ark., Mile 264.8. The project provides for channel maintenance to Poplar Bluff, Mo., Mile 211.0. A depth of 2 feet prevails from the mouth to the *Current River* in Arkansas, Mile 96.0, thence 1½ feet to Poplar Bluff. Vessels up to 7-foot draft may operate in the lower 15 miles of the river for about 6 months of the year. Minimum clearances are horizontal 32 feet and vertical ½ foot at high water, 18 feet at low water.

Buffalo River, Ark., enters the White River at about Mile 389.0. The river is considered navigable from its mouth to *Rush Creek*, Mile 22.0, however, at present there is no water-borne traffic.

The **St. Francis River** enters the Mississippi River 669.7 miles above Head of Passes. The project provides for channel maintenance to Marked Tree, Ark., Mile 148.2. During 5 months of the year a depth of 6 feet or more can be carried to Parkin, Ark., Mile 101.0 and for about 7 months a depth of 1 foot or more will be found. The minimum clearances to Marked Tree are horizontal 78 feet and vertical 7 feet at high water, 47½ feet at low water.

The *L'Anguille River* enters the St. Francis River at Mile 11.8. The project provides for channel maintenance to Marianna, Ark., Mile 8.3. For 5 months depths of 3 feet are available and for 7 months, less than 3 feet.

Blackfish Bayou, Ark., enters the St. Francis River at Mile 38.3. The project provides for channel maintenance to *Fifteen Mile Bayou*, Mile 6.0. For 5 months depths of 3 feet are available to *Frenchmans Bayou* and for 7 months less than 3 feet.

The **Wolf River** enters the Mississippi River at Memphis, Tenn., 774.0 miles above Head of Passes. The lower 3 miles of the river has been developed to provide additional water front for the city of Memphis. A project provides for a channel 9 feet deep from the mouth to Hendman Ferry Road with widths varying from 125 feet in the upper end of the project to 250 feet at the mouth.

The **Hatchie River**, Tenn., enters the Mississippi River about 774 miles above Head of Passes. Snagging and clearing on the river and its tributaries has been completed a distance of 148.3 miles, however, only a small portion has been done in recent years.

The **Obion River**, Tenn., enters the Mississippi River 821.5 miles above Head of Passes. Snagging and clearing on the river and its tributaries has been completed a distance of 208.8 miles, however, only a small portion has been done in recent years.

Mayfield Creek, Ky., enters the Mississippi River 960.2 miles above Head of Passes. Snagging and clearing on the creek has been completed a distance of 5 miles.

The **Ohio River** enters the Mississippi River 964.0 miles above Head of Passes and 2 miles below Cairo, Ill. The project provides for the construction of dams and locks to provide a channel 9 feet deep for the entire river from the mouth to Pittsburgh, Pa., Mile 981.0. The minimum clearances in the 46 locks and 53 bridges are horizontal 110 feet, length of lock 600 feet, and vertical 63 feet at normal pool level. Running ice and ice gorges may occur during the months of December, January, or February, but seldom later.

The *Tennessee River* enters the Ohio River at Mile 48.4. The project provides for a channel 9 feet deep by the construction of locks and dams, from the mouth to the junction of the French Road and Holston Rivers at Mile 652.1, 4.4 miles above Knoxville, Tenn. The minimum clearances in the 10 locks and 32 bridges are horizontal 60 feet, length of lock 265 feet, and vertical 50 feet at normal pool level. The *Hiwassee River* enters the Tennessee River at Mile 499.4. The river is navigable to Charleston, Tenn., Mile 18.8, with depths of 8½ feet. The minimum vertical clearance is 27 feet. The *Clinch River* enters the Tennessee River near Kingston, Tenn., at Mile 567.7. The river has a channel 9 feet deep to Mile 18.8. The *Little River* enters the Tennessee River at Mile 635.6. A channel 9 feet deep at minimum pool elevation leads to Singleton, Tenn., Mile 12.0. The *French Broad River*, one of the rivers forming the Tennessee River, is navigable to Douglas Dam, Tenn., Mile 24.1. The project for the river provides for a channel 2½ feet deep.

The *Cumberland River* enters the Ohio River at Mile 60.6. The project provides for a channel 6 feet deep to Waitsboro Shoals, Ky., Mile 513.0, thence 4 feet deep an additional 3 miles to Burnside, Ky., Mile 516.0. The minimum clearances of the 15 locks and 21 bridges are horizontal 52 feet, length of lock 280 feet, and vertical 74½ feet at normal pool level, 34 feet at extreme high water.

The *Tradewater River*, Ky., enters the Ohio River at Mile 107.0. The project depth is 9 feet to a coal tipple at Mile 3.0. A depth of 8 feet is usually available.

The *Wabash River*, forming part of the boundary between Illinois and Indiana, enters the Ohio River at Mile 132.8. Most of the Wabash River, the entire *White River*, an important tributary of the Wabash River, and short portions of the forks of the White River are classed as navigable streams. However, there has been no through navigation on these rivers for many years and there is no project at present for maintenance of a navigable channel. With local knowledge shallow-draft vessels may enter the Wabash from the Ohio.

The *Green River* enters the Ohio River at Mile 196.9. The project depth is 5½ feet to Mammoth Cave, Ky., Mile 197.8. The minimum clearances of the 6 locks and 8 bridges are horizontal 35½ feet, length of lock 137½ feet, and vertical 64½ feet at normal pool level, 26 feet at extreme high water. The *Rough River* enters the Green River at Mile 71.0. The project provides for a slack water channel of 4 feet to Hartford, Ky., Mile 29.5. The minimum clearances of the 1 lock and 2 bridges are horizontal 27 feet, length of lock 123 feet, and vertical 26½ feet at normal pool level, ½ foot at extreme high water. The *Barren River* enters the Green River at Mile 149.5. The project provides for a channel 5½ feet deep to Bowling Green, Ky., Mile 30.1. The minimum clearance of the 1 lock is horizontal 56 feet and length of lock 360 feet. *Bear Creek*, Ky., enters the Green River at Mile 168.4. The project depth is 5½ feet to

Mile 8.0. The *Nolin River* enters the Green River at Mile 183.5. The project depth is 5½ feet to Meredith Ferry, Ky., Mile 7.8.

The *Kentucky River* enters the Ohio River at Mile 435.2. The project provides for a channel 6 feet deep from the mouth to Mile 258.6 above Beattyville, Ky. The minimum clearances in the 14 locks and 23 bridges are horizontal 38 feet, length of lock 145 feet, and vertical 43½ feet at normal pool level, 2 feet at extreme high water.

The *Scioto River* enters the Ohio River near Portsmouth, Ohio, at Mile 624.5. The project provides for the construction of a harbor channel immediately above the mouth of the Scioto River.

The *Big Sandy River* enters the Ohio River at Mile 664.0. The Big Sandy River divides at Louisa, Ky., Mile 27.2, forming *Levisa* and *Tug Forks*. The project provides for a depth of 6 feet from the mouth to Louisa, Mile 27.2, thence on Levisa Fork to Cox Branch, an additional 17.5 miles and on Tug Fork to Bear Branch, an additional 12.5 miles. The minimum clearances of the 5 locks and 7 bridges are horizontal 52 feet, length of lock 158 feet, and vertical 46½ feet at normal pool level, 7½ feet at extreme high water.

The *Kanawha River* enters the Ohio River at Point Pleasant, W. Va., Mile 715.4. The project provides for a channel 9 feet deep from the mouth to Mile 90.6. The minimum clearances of the 3 locks and 9 bridges are horizontal 56 feet, length of lock 360 feet, and vertical 51 feet at normal pool level, 27 feet at extreme high water.

The *Little Kanawha River* enters the Ohio River at Mile 796.4. The project depth is 4 feet from the mouth to Creston, W. Va., Mile 48.0. The minimum clearances of the 5 locks and 5 bridges are horizontal 23 feet, length of lock 125 feet, and vertical 50 feet at normal pool level, 1½ feet at extreme high water.

The *Muskingum River* enters the Ohio River at Marietta, Ohio, Mile 808.8. The project depth is 4½ feet from the lock near the mouth to Mile 93.1. The minimum clearances of the 11 locks and 24 bridges are horizontal 35½ feet, length of lock 156½ feet, and vertical 15½ feet at normal pool level, zero feet at extreme high water.

The *Beaver River* enters the Ohio River at Rochester, Pa., Mile 955.6. A project to provide a depth of 12 feet from the mouth of Beaver River to and up the *Mahoning River* to Struthers, Ohio, thence this depth to continue to Lake Erie at or near Ashtabula, Ohio, has been approved but no work has been done.

The *Allegheny River*, at the head of the Ohio River, has a project depth of 9 feet to Mile 72.0, 2 miles above East Brady, Pa. The minimum clearances of the 8 locks and 22 bridges in the improved section are horizontal 56 feet, length of lock 300 feet, and vertical 28¼ feet at normal pool level, 4 feet at extreme high water. Drafts of 2 to 5 feet operate in the river above the project.

The *Monongahela River*, at the head of the Ohio River, has a project providing for slack-water navigation its entire length, from Pittsburgh, Pa., to above Fairmont, W. Va., about Mile 128.0. A depth of 9 feet is available to Mile 100.3, thence 7 feet to above Fairmont. The minimum clearances of the 13 locks and 41 bridges are horizontal 56 feet, length of lock 182 feet, and vertical 42½ feet at normal pool level, 12 feet at extreme high water. The *Youghiogheny River* enters the Monongahela River at Mile 14.5. The project provides for a channel 9 feet deep to West Newton, Pa., Mile 19.3. The project has not been completed and at present navigation is possible to McKeesport, Pa., just inside the mouth.

The **Missouri River** enters the Mississippi River 1,159.0 miles above Head of

Passes. The project depth is 9 feet from the mouth to Sioux City, Iowa, Mile 761.5. The minimum clearances of the 22 bridges from the mouth to Mile 386.2, above Kansas City, Kans., are horizontal 120 feet and vertical 71½ feet above the zero of the Weather Bureau gages. The Weather Bureau publishes the gage readings daily. The navigation season of this section of the river is generally from March 15 to November 30. A channel with a minimum depth of 6 feet and a minimum width of 200 feet is generally available during the navigation season. The minimum clearances of the 22 bridges on the Missouri River from Mile 386.2 to Sioux City, Mile 761.6, are horizontal 160 feet and vertical 63¼ feet above the zero of the Weather Bureau gage. The navigation season of this section of the river is generally from April 1 to November 15. A channel with a minimum depth of 5½ feet is generally available to Omaha, Nebr., Mile 632.0, thence 3½ feet to Sioux City.

The *Gasconade River* enters the Missouri River at Mile 103.5. A depth of 3 feet is available to Mile 3.0, thence less than a foot to Gascondy, Mo., Mile 61.4.

The *Osage River* enters the Missouri River at Mile 129.1. The project depth is 3 feet from the mouth to Bagnell Dam, Mo., Mile 75.4. The minimum clearances of the 1 lock and 4 bridges are horizontal 42 feet, length of lock 220 feet, and vertical 32 feet at high water, 59½ feet at low water.

The *Big Sioux River* enters the Missouri River above Sioux City, Iowa. A project provides for the construction of a harbor in the mouth of the river. The project has not been completed.

The **Illinois River** enters the Mississippi River 1,181.9 miles above Head of Passes. The Illinois River, together with the *Des Plaines River*, the *Chicago Sanitary and Ship Canal*, and the south branch of the *Chicago River*, forms the **Illinois Waterway** connecting the Mississippi River and the Great Lakes. The project provides for a channel 9 feet deep and 300 feet wide from the mouth of the Illinois River, through the river and Des Plaines River to Lockport, Ill., Mile 291.1, thence 9 feet deep with present width to the controlling works, Mile 293.1, thence 9 feet deep with a width of 225 feet to the junction with the Calumet-Sag Channel, Mile 303.5. From Mile 303.5 the waterway divides, one portion continues up the Chicago Sanitary and Ship Canal and the south branch of the Chicago River to Lake Street, Chicago, Mile 325.6, with a least depth of 9 feet, thence through the Chicago River into Lake Michigan. The other branch follows the Calumet-Sag Channel to the lock at Blue Island, Ill., Mile 319.5, thence a channel 9 feet deep and 300 feet wide in the Calumet and Little Calumet Rivers to turning basin 5, Mile 327.3. From this point Lake Michigan may be entered by continuing up Calumet River to Calumet Harbor. The project provides further for a channel 9 feet deep and 225 feet wide along the Grand Calumet River to Indiana Harbor and to Gary, Ind. The minimum clearances from the Mississippi River to Lake Michigan are: Via the Chicago River, horizontal 72 feet and vertical 17 feet at ordinary water; via Calumet River, horizontal 70 feet and vertical 12½ feet at ordinary water. The minimum clearances from the Mississippi to the junction of the Chicago Sanitary and Ship Canal and the Calumet-Sag Channel are horizontal 110 feet and vertical 35 feet at high water.

The **Illinois and Mississippi Canal** enters the Mississippi River at the mouth of **Rock River**, 1,443.1 miles above Head of Passes. The project provides for a canal from the mouth of the Rock River to the Illinois River near Bureau Junction, Ill. A feeder canal joins the main canal at Mile 47.3 and leads to Rock Falls, Ill. Depths of

6½ feet are found in the main canal and 5½ feet in the feeder canal. Minimum clearances in the 32 locks and 58 bridges on the main canal are horizontal 35 feet, length of lock 143 feet, and vertical 16½ feet above normal pool level. The minimum clearances in the 2 locks and 25 bridges in the feeder canal are horizontal 35 feet, length of lock 143 feet, and vertical 12 feet at normal pool level. The navigation season is usually from April 1 to November 15.

The **Galena (Fever) River** enters the Mississippi River about 1,529 miles above Head of Passes. Navigation by small craft to the city of Galena, Ill., Mile 3.8 is possible. Above Galena navigation is restricted to small craft during periods of high water. Two drawbridges cross the river between the mouth and Galena with a minimum horizontal clearance of 93 feet and a minimum vertical clearance, closed, of 15¾ feet at normal pool level, ¼ foot at extreme high water.

The **Black River** enters the Mississippi River 1,662.2 miles above Head of Passes. The project provides for a channel 9 feet deep from the mouth to Mile 1.4 at the La Crosse, Wisconsin terminal. The minimum horizontal clearance is 127 feet.

The **St. Croix River** enters the Mississippi River 1,775.3 miles above Head of Passes. The project provides for a channel 9 feet deep to Stillwater, Minn., Mile 24.5, thence 3 feet to Taylors Fall, Minn., Mile 52.3. Minimum clearances to Stillwater are horizontal 103 feet and vertical 57 feet at normal pool level. Navigation season is usually from April to December.

The **Minnesota River** enters the Mississippi River 1,808.0 miles above Head of Passes. The project provides for a channel 4 feet deep from the mouth to Shakpee, Minn., Mile 25.6. Local interests have completed a channel 9 feet deep and 100 feet wide from the mouth to Port Cargill, Minn., Mile 13.1. The minimum clearances to Port Cargill are horizontal 100 feet and vertical 63 feet at normal pool level.

§ 202. **ANCHORAGE REGULATIONS.**—Regulations governing anchorage areas and anchorage grounds within the limits covered by this Coast Pilot follow.

SUBPART A—SPECIAL ANCHORAGE AREAS

§ 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 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.

§ 202.40 *Silver Beach Harbor, North Falmouth, Mass.* All the waters of the harbor northward of the inner end of the entrance channel.

§ 202.45 *Onset Bay, Mass.* Northerly of a line extending from the northernmost point of Onset Island to the easternmost point of Wickets Island; easterly of a line extending from the easternmost point of Wickets Island to the southwest extremity of Point Independence; southerly of the shore line; and westerly of the short line and of a line bearing due north from the northernmost point of Onset Island.

§ 202.50 *Stonington Harbor, Conn.* Northerly of a line 150 feet north of and parallel to the main steamboat pier formerly owned by the New York, New Haven and Hartford Railroad Company; and easterly of a line extending from the northwest corner of said pier to the east abutment of the railroad bridge at the head of the harbor.

§ 202.55 *Connecticut River, Conn.*—(a) *Area No. 1, at Essex.* Beginning at a point on the shore on the west side of Haydens Point bearing approximately 211°, 270 yards, from Haydens Point Light; thence 270°, 160 yards; thence due north, 140 yards; thence 300°, 190 yards; thence 330°, 400 yards; thence 90°, 60 yards; thence 150°, 350 yards; thence 120°, about 434 yards to a point on the shore; thence along the shore southwesterly to the point of beginning.

(b) *Area No. 2, at Essex.* Beginning at a point bearing 293°, 350 yards, from Haydens Point Light; thence 270°, 70 yards; thence 330°, 300 yards; thence 348°, 330 yards; thence 20°, 63 yards; thence 117°, 251 yards; thence 180°, 238 yards; thence 171°23′20″ approximately 296 yards to the point of beginning.

(c) *Area No. 3, at Essex.* Beginning at a point 112 yards due north of the northeast corner of Area No. 2; thence 297°, 212 yards; thence 20°, 376 yards; thence 90°, 60 yards; thence 180°, approximately 450 yards to the point of beginning.

(d) *Area No. 1, at Maromas.* Beginning at a point bearing 16°, 1,400 yards, from Sears Shoal Front Light; thence 12°, 435 yards; thence 102°, 170 yards; thence 197°, 435 yards; thence 282°, 135 yards, to the point of beginning.

(e) *Area No. 2, at Maromas.* Beginning at a point bearing 12°, 35 yards, from the northwest corner of Area No. 1; thence 12°, 430 yards, thence 102°, 110 yards; thence 175°, 275 yards; thence 197°, 170 yards; thence 282°, 175 yards; to the point of beginning.

§ 202.60 *The Port of New York and vicinity.*—(a) *Huntington Harbor.* All of the Huntington harbor anchorage grounds (described in §202.150).

(b) *New Rochelle Harbor, west and south of Glen Island.* That portion of Long Island Sound Anchorage No. 1 (as described in § 202.155 (a)) between Hog Island, Travers Island, Neptune Island and Glen Island and the mainland, to the westward of a line extending from the cupola at the southeast extremity of Glen Island to the easternmost extremity of Hog Island, and to the northeastward of a line extending from the southwest extremity of Hog Island to the southeast corner of Travers Island; excluding therefrom all waters within 25 feet of the 50-foot channel west and south of Glen Island.

(c) *New Rochelle Harbor, east of Glen Island.* That portion of Long Island Sound Anchorage No. 1 (as described in § 202.155 (a)) between Glen Island and Goose Islands breakwater, northward of a line extending from the northwest end of Goose Islands breakwater to the cupola at the north end of the bathing beach on Glen Island.

(d) *Eastchester Bay, west of City Island.* That portion of Long Island Sound Anchorage No. 1 (as described in § 202.155 (a)) west of City Island and within the following limits: Northward of a line ranging 244° from the Duryea Pier at the foot of City Island Avenue to Big Tom Nun Buoy No. 2 (latitude 40°50′01″, longitude 73°47′25″); thence northeastward of a line ranging 329° from Big Tom Nun Buoy No. 2 through the Nun Buoy (latitude 40°50′46″, longitude 73°48′01″) off the southern end of Rodman Neck; southeastward of a line ranging 205° from the east abutment of the City Island Bridge through the south tower of the Bronx-Whitestone Bridge; and southward of a line ranging 90° from the Pelham War Memorial in Pelham Bay Park and the steeple of the church at the southeast corner of Elizabeth Street and City Island Avenue.

(e) *Eastchester Bay, along west shore.* That portion of Long Island Sound Anchorage No. 1 (as described in § 202.155 (a)) along the west shore of Eastchester Bay north of and including Weir Creek, shoreward of a line ranging 349° from the end of the timber pier at the foot of Pope Place, Edgewater, and through the transmission tower at the northeast side of the draw of the New York, New Haven and Hartford Railroad Bridge over Eastchester Creek, and having as its northerly limit the line ranging 79° through the row of telephone poles along the north side of Watt Avenue.

(f) *Eastchester Bay, Locust Point Harbor.* That portion of Long Island Sound Anchorage No. 2 (as described in § 202.155 (a)) included within the limits of Locust Point Harbor between Wright Island and Throgs Neck and to the westward of a north and south line (longitude 73°47′58″) through the southerly corner of the concrete culvert at the southerly end of the stone wall at Locust Point on Wright Island.

(g) *Manhasset Bay, west area at Manorhaven.* That portion of Long Island Sound Anchorage No. 4 (described in § 202.155) westward of a line (longitude 73°42′53″) ranging 180° fro mthe end of the Town of North Hempstead pier at Manorhaven; northwestward of a line ranging 233° from the intersection of the shore and the northerly line of Corchang Avenue (extended) on Tom Point toward Plum Point Shoal Buoy 3 (latitude 40°49′48.5″, longitude 73°43′25″); and northeastward of a line ranging 119° from the cupola on Plum Point toward the inshore end of the northerly side of the Purdy Boat Company pier at Port Washington; excluding therefrom the seaplane restricted area described in § 207.35.

(h) *Manhasset Bay, east area of Manorhaven.* That portion of Long Island Sound Anchorage No. 4 (described in § 202.155) bounded as follows: Beginning at the southerly tip of Tom Point; thence 270° to latitude 40°49′58″, longitude 73°42′41″; thence 234° to latitude 40°49′48.5″, longitude 73°42′58″; thence 90° to latitude 40°49′48.5″, longitude 73°42′22.5″; thence 20° to latitude 40°50′01.5″, longitude 73° 42′16″; thence due north to the point of land at Manorhaven northeasterly of Tom Point; and thence southwesterly along the shore to the point of beginning.

(i) *Manhasset Bay, at Port Washington.* That portion of Long Island Sound Anchorage No. 4 (described in § 202.155) southward of latitude 40°49′44″; eastward of a line ranging 161° from the offshore end of the Yacht Service Club, Inc., pier on the Copp Estate at Manor-the Whitney Dock at Plandome; and northward of latitude 40°49′06″.

(j) *Manhasset Bay, at Plandome.* That portion of Long Island Sound Anchorage No. 4 (described in § 202.155) southward of the line of the Whitney Dock at Plandome extended; eastward of a line ranging 06° from the tank at Tom Point toward the Manhasset-Lakeville Fire Department tank at Manhasset; and northward of Thompson's pier at Plandome extended.

(k) *Little Neck Bay.* That portion of Long Island Sound Anchorage No. 5 (as described in § 202.155 (a)) southward of a line (latitude 40°47′33″) ranging 90° from the flagpole at Fort Totten, Willets Point, and eastward of a line (longitude 73°46′10″) ranging due north from the flagpole at the Bayside Yacht Club.

(l) *Flushing Bay, north area.* That portion of East River Anchorage No. 10 (as described in § 202.155 (b)), on the east side of Flushing Bay, southward of the prolonged southerly side of 15th Avenue, College Point eastward of a line parallel to and 100 feet eastward of the easterly channel line of the buoyed Federal channel in Flushing Bay, and northward of a line ranging 252° from the center of the most westerly of four coal hoppers of the Kraemer Coal Company, near the foot of 22d Avenue, College Point, toward Flushing Bay Channel Lighted Buoy 1.

(m) *Flushing Bay, south area.* That portion of East River Anchorage No. 10 (as described in § 202.155 (b)), on the east side of Flushing Bay, southward of a line ranging 232° from the center of the southwesterly of four oil tanks of the Sunrise Oil Company, near the foot of 23d Avenue, College Point, toward Flushing Bay Light 4 at the northerly end of the dike in Flushing Bay, eastward of a line parallel to, and 100 feet eastward of the easterly channel line of the buoyed Federal channel in Flushing Bay, and northward of a line ranging 258° from the northeast corner of the one-story field office building at the entrance to the plant of Metropolitan Sand and Gravel Corporation, Flushing, toward Flushing Bay Channel Buoy No. 7.

(n) *Bowery Bay.* All that portion of East River Anchorage No. 10 (described in § 202.155) on the west side of Bowery Bay.

(o) *Hudson River, at Yonkers.* Northward of a line on range with the footbridge across the New York Central Railroad Company tracks at the southerly end of Greystone Station; eastward of a line on range with the square, red brick chimney west of the New York Central Railroad Company tracks at Hastings-on-Hudson and the easterly yellow brick chimney of the Glenwood powerhouse of the Yonkers Electric Light and Power Company; and southward of a line on range with the first New York Central Railroad Company signal bridge north of the Yonkers Yacht Club.

(p) *Hudson River, at Hastings-on-Hudson.* Northward of a line on range with the northerly face of the clubhouse of the Tower Ridge Yacht Club; eastward of a line on range with the elevated tank of the Anaconda Wire and Cable Company and the channelward face of the northerly building on the water front of the said Company's property; and southward of a line on range with the first footbridge across the New York Central Railroad Company tracks, north of the Tower Ridge Yacht Club.

SUBPART B—ANCHORAGE GROUNDS

§ 202.140 *Buzzards Bay, Nantucket Sound, and adjacent waters, Mass.*—(a) *New Bedford Outer Harbor*—(1) *Anchorage A.* West of Sconticut Neck, and shoreward of a line described as follows:

Beginning at a point 100 yards southwest of Fort Phoenix Point; thence 154° along a line which passes 100 yards east of New Bedford Channel Buoys 8, 6, and 4, to a point bearing approximately 130°, 225 yards, from New Bedford Channel Buoy 4; thence 87°, 340 yards; thence 156° along a line approximately one mile to its intersection with a line ranging 87° from the cupola on Clarks Point; thence 87° to Sconticut Neck.

(2) *Anchorage B.* Southeast of a line ranging 222° from the southwest corner of Fort Phoenix to the New Bedford shore; west of a line ranging 154° from Palmer Island Light to Butler Flats Light; and north of a line bearing 267° from Butler Flats Light to the shore.

(b) *Buzzards Bay near entrance to approach channel to Cape Cod Canal*—(1) *Anchorage C.* West of a line parallel to and 850 feet westward from the centerline of Cleveland Ledge Channel; north of a line bearing 129° from the tower on Bird Island; east of a line bearing 25°30′ and passing through Bird Island Reef Bell Buoy 13; and south of a line bearing 270° from Wings Neck Light.

(2) *Anchorage D.* Beginning at a point bearing 185°, 1,200 yards, from Hog Island Channel 4 Light; thence 129° to a point bearing 209°, approximately 733 yards, from Wings Neck Light; thence 209° to Southwest Ledge Buoy 10; thence 199° along a line to its intersection with a line bearing 129° from the tower on Bird Island; thence 309° to a point 850 feet easterly, right angle distance, from the centerline of Cleveland Ledge Channel; thence northeasterly along a line parallel to and 850 feet eastward from the centerline of Cleveland Ledge Channel to its intersection with a line bearing 218°30′ from the point of beginning; thence 38°30′ to the point of beginning.

(c) *Vineyard and Nantucket Sounds*—(1) *Anchorage E.* South of a line beginning at a point bearing 180°, about 3.25 miles, from Cuttyhunk Light, thence 65° to a point bearing 180°, 0.625 mile, from Nashawena Lighted Whistle Buoy, thence 57°30′, passing 600 yards northerly of Middle Ground Lighted Bell Buoy 25A, to a point bearing 145°, 1.25 miles, from Nobska Point Light; southwest of a line ranging 113° through West Chop Buoy 25 to East Chop Flats Bell Buoy 23; and west of a line bearing 163° between East Chop Flats Bell Buoy 23 and Lone Rock Buoy 1.

(2) *Anchorage F.* Southeast of the Elizabeth Islands, north of a line ranging 97°30′ from Cuttyhunk Light toward Nashawena Lighted Whistle Buoy to a point 0.375 mile from that buoy; northwest of a line bearing 57°30′ from the last-named point to a point opposite the entrance to Woods Hole; and southwest of a line from the shore of Nonamesset Island bearing 114° and ranging through West Chop Light and East Chop Light.

(3) *Anchorage G.* South of a line bearing 113° from Lone Rock Buoy 1 to Outer Flats Bell Buoy 17, thence 86° to Cross Rip Lightship, thence 118°30′ to Tuckernuck Shoal Bell Buoy 7, thence ranging 149° toward Brant Point Light to the breakwater at Brant Point.

(4) *Anchorage H.* In the vicinity of Squash Meadow shoal, east of a line ranging 163° through Squash Meadow West End Buoy 21; north of lines parallel to and 0.5 mile northerly from lines joining Lone Rock Buoy 1, Outer Flats Bell Buoy 17, and Cross Rip Lightship; and south of a line ranging 97° from East Chop Light toward Cross Rip Lightship.

(5) *Anchorage I.* Northerly of a line ranging 109° from Nobska Point Light toward Hedge Fence Lighted Horn and Gong Buoy 16, and of a line ranging 97°30′ through Hedge Fence East End Buoy to Halfmoon Shoal Lighted Bell Buoy 12, thence 73° to Handkerchief Shoal Buoy 16, and thence to the westernmost point of Monomoy Island.

(6) *Anchorage J.* East of a line bearing 329° parallel to and 0.875 mile northeasterly of a line running from Brant Point Light through Tuckernuck Shoal Bell Buoy 7, from Coatue Beach to a point 1.25 miles southeasterly from a line between Halfmoon Shoal Lighted Bell Buoy 12 and Handkerchief Shoal Buoy 16; thence 73°, parallel to and 1.25 miles southeasterly from a line running from Halfmoon Shoal Lighted Bell Buoy 12 through Handkerchief Shoal Buoy 16, to a point bearing 215° from Stone Horse North End Lighted Bell Buoy 9; thence 35° to Stone Horse North End Lighted Bell Buoy 9; thence 70° to a point bearing 207° from Pollock Rip Lightship; and thence 27° through, and to a point 5.0 miles northeasterly from, Pollock Rip Lightship.

(7) *Anchorage K.* North of a line tangent to the southeasterly edge of Monomoy Point and extending to Bearse Shoal North End Buoy 2A, and west of a line bearing 7° from Bearse Shoal North End Buoy 2A to Chatham Bar Buoy 2.

(d) *The regulations.* (1) Floats or buoys for marking anchors or moorings in place will be allowed in all areas. Fixed mooring piles or stakes are prohibited.

(2) Except in cases of great emergency, no vessels shall be anchored in New Bedford Outer Harbor,

Buzzards Bay near the entrance to the approach channel to Cape Cod Canal, or Vineyard and Nantucket Sounds, outside of the anchorage areas defined in paragraphs (a) to (c) of this section.

(3) Anchors must not be placed outside the anchorage areas, nor shall any vessel be so anchored that any portion of the hull or rigging will at any time extend outside the boundaries of the anchorage area.

(4) Any vessel anchoring under the circumstances of great emergency outside any anchorage area must be placed near the edge of the channel and in such position as not to interfere with the free navigation of the channel, nor obstruct the approach to any pier nor impede the movement of any boat, and shall move away immediately after the emergency ceases or upon notification by an officer of the Coast Guard.

(5) A vessel upon being notified to move into the anchorage limits or to shift its position in anchorage grounds must get under way at once or signal for a tug, and must change position as directed with reasonable promptness.

(6) Whenever the maritime or commercial interests of the United States so require, any officer of the Coast Guard is hereby empowered to shift the position of any vessel anchored within the anchorage areas, of any vessel anchored outside the anchorage areas, and of any vessel which is so moored or anchored as to impede or obstruct vessel movements in any channel.

(7) Nothing in this section shall be construed as relieving the owner or person in charge of any vessel from the penalties of the law for obstructing navigation or for obstructing or interfering with range lights, or for not complying with the navigation laws in regard to lights, fog signals, or for otherwise violating the law.

§ 202.145 *Narragansett Bay, R. I.*—(a) *East Passage*—(1) *Anchorage A.* East of Conanicut Island, west of a line bearing 9° from the easternmost of The Dumplings to latitude 41°30′30″, thence ranging 12° toward Fiske Rock Buoy, a line ranging 311°30′ from Bishop Rock Shoal Lighted Bell Buoy 8A, and a line ranging 351° from Rose Island Light; and south of latitude 41°32′07″ which parallel passes through a point 130 yards north of Gould Island Light; excluding the approach of the Jamestown Ferry, a zone 300 yards wide to the southward of a line ranging 103° from a point 100 yards north of the existing ferry landing toward the spire of Trinity Church, Newport.

(i) That portion of the area to the northward of the approach of the Jamestown Ferry shall be restricted for the anchorage of vessels of the United States Navy. In that portion of the area to the southward of the approach of the Jamestown Ferry the requirements of the Navy shall predominate.

(ii) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(2) *Anchorage B.* Off the west shore of Aquidneck Island from Coasters Harbor Island to north of Coggeshall Point, northeast of a line ranging 303° from the north end of the breakwater west of Coasters Harbor Island toward Torpedo Range buoy 1; east of a line ranging 19° from the easternmost of The Dumplings through Dyer Island North Point Shoal Lighted Bell Buoy 12A to a point bearing 219° from Coal Mine Rocks Lighted Bell Buoy 16, thence ranging 39° toward Coal Mine Rocks Lighted Bell Buoy 16; southwest of a line bearing 132° from the southeast corner of the pier at Homestead, Prudence Island; west of a line ranging 205° through a point on the southwestern boundary of the U. S. Naval measured nautical mile Trial Course 1,070 yards from the western shore of Aquidneck Island; and southwest of a line running from the last-described point to the shore at the easterly end of the north boundary of the cable area in the vicinity of Coggeshall Point; excluding the area between the south limit of the cable area to Gould Island and latitude 41°32′15″, the area between latitude 41°33′12″ and latitude 41°33′30″ which parallels pass through points 490 yards south and 117 yards north of the north end of Midway Pierhead, respectively, and the cable area in the vicinity of Coggeshall Point.

(i) In this area the requirements of the Navy shall predominate.

(ii) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(3) *Anchorage C.* (i) East of Rose Island, southwest of a line ranging 338° toward Gull Rocks South Buoy; southeast of a line bearing 248° through Tracey Ledge Buoy 5; northeast of a line bearing 158° through, and to a point 100 yards southeasterly of, Mitchell Rock Buoy 3; and northwest of a line bearing 68° from a point 100 yards southeasterly of Mitchell Rock Buoy 3.

(ii) West of Coasters Harbor Island, west of a line bearing 351° from Tracey Ledge Buoy 5 through Seventeen-foot Spot Buoy northeast of Gull Rocks; south of a line bearing 292° from the cupola at the Naval War College; east of a line ranging 19° from the easternmost of The Dumplings towards Dyer

Island North Point Shoal Lighted Bell Buoy 12A; and north of latitude 41°30′22″ which parallel passes through a point 230 yards north of Rose Island Shoal Northeast End Buoy 8.

(iii) In these areas the requirements of the Navy shall predominate.

(iv) Temporary floats or buoys for marking anchors or moorings in place will be allowed in these areas. Fixed mooring piles or stakes will not be allowed.

(4) *Anchorage D.* West of Goat Island, south of a line bearing 247° from Newport Harbor Light; east of a line ranging 176°30′ from Rose Island Aviation Light toward the northerly radio tower at Fort Adams, and north of a line bearing 117° from the cupola with gables at Jamestown to longitude 71°20′, thence 95° to Goat Island Shoal Light.

(i) In this area the requirements of the Navy shall predominate from May 1 to October 1, subject at all times to such adjustments as may be necessary to accommodate all classes of vessels which may require anchorage room.

(ii) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(5) *Anchorage E.* South of Coasters Harbor Island, east of a line bearing 341° from the outer end of Briggs Wharf to the southwestern shore of Coasters Harbor Island near the War College Building; and north of a line ranging 265° from the flagstaff at Fort Greene toward Rose Island Light.

(i) In this area the requirements of the naval service will predominate from May 1 to October 1, but will at all times be subject to such adjustment as may be necessary to accommodate all classes of vessels that may require anchorage room.

(ii) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(6) *Anchorage F.* In the central and southerly part of Newport Harbor proper, east of a line ranging 34° through a point 75 yards easterly of the end of the south wharf at Fort Adams toward Goat Island Shoal Light, a line ranging 329° through a point 35 yards east of the north end of the north wharf at Fort Adams toward the northeast corner of the Fort Adams stone wharf, and a line ranging 23° from the south corner of the north wharf at Fort Adams toward Newport Harbor Light; south of a line ranging 116° from Fort Adams Light to Ida Lewis Rock Light, and a line ranging 74° from the south end of the north wharf at Fort Adams toward the spire of the St. Spyridon Hellenic Orthodox Church; east of a line ranging 4° from the city stone pier at King Park toward the end of the Navy Section Base Fleet Wharf; south of a line ranging 95° from the south end of the wharf of the United States Naval Torpedo Station on Goat Island toward the northwest corner of Bowen's wharf; and west of a line ranging 176° from the southwest corner of the city wharf toward the southwest corner of Wellington and Houston Avenues opposite King Park, a line ranging 132° from the south end of the Torpedo Station wharf, Goat Island, toward the powerhouse chimney, Newport, and a line ranging 177° from the southeast corner of the city wharf through a point 50 yards westerly from the outer end of Commercial Wharf.

(i) Floats or buoys for marking anchors or moorings in place and fixed mooring piles or stakes are prohibited in this area:

(7) *Anchorage G.* In Newport Inner Harbor, northeast of a line ranging 108° from the southeast corner of the city wharf toward the northwest corner of the Government wharf.

(i) Floats or buoys for marking anchors or moorings in place and fixed mooring piles or stakes are prohibited in this area.

(b) *West Passage*—(1) *Anchorage H.* North of a line 1,000 yards long bearing 88° from Bonnet Point; west of a line bearing 3° from the eastern end of the last-described line; and south of a line ranging 302° through a point 200 yards south of the Kearny wharf toward the church spire at South Ferry, Boston Neck.

(i) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(2) *Anchorage I.* North of a line 1,000 yards long bearing 88° from Bonnet Point to the shore at Austin Hollow; east of a line bearing 183° from Dutch Island Light; and south of a line ranging 302° through a point 200 yards south of the Kearny wharf toward the church spire at South Ferry, Boston Neck.

(i) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(3) *Anchorage J.* At Saunderstown, south of a line ranging 110° from the south side of the ferry wharf toward the cable crossing sign on Dutch Island; west of a line ranging 192° from Plum Beach Shoal

Buoy 1 PB toward the east shore of The Bonnet; and north of a line from the shore ranging 108° toward Dutch Island Light and the north end of the wharf at Beaver Head.

(i) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(4) *Anchorage K.* In the central and southern portion of Dutch Island Harbor, north of a line ranging 106° from Beaver Head Point Shoal Buoy 2 toward the Jamestown standpipe; east of a line ranging 14° from Beaver Head Point Shoal Buoy 2 toward the inshore end of the engineer wharf, Dutch Island; southeast of a line ranging 50° from Dutch Island Light toward the windmill north of Jamestown; and south of a line parallel to and 100 yards southwesterly from a line ranging 132° from the engineer wharf, Dutch Island, and the west ferry wharf, Jamestown.

(i) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(5) *Anchorage L.* North of a line ranging 101° from a point on shore 300 yards northerly of the Saunderstown ferry wharf toward the entrance to Round Swamp, Conanicut Island; west of a line bearing 15° parallel to and 1,000 feet westerly from a line joining the western point of Dutch Island and Twenty-three Foot Rock Buoy 4, and a line ranging 6° from Dutch Island Light toward Warwick Light; and south of a line ranging 290° from Sand Point, Conanicut Island, to Wickford Harbor Light, and a line bearing 226° from Wickford Harbor Light to Poplar Point tower.

(i) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(6) *Anchorage M.* East and north of Dutch Island, northeast of a line ranging 316° from the inshore end of the west ferry wharf, Jamestown, toward the north end of Dutch Island to a point bearing 88°, 200 yards, from the engineer wharf, Dutch Island, thence ranging 3° toward the shore of Conanicut Island at Slocum Ledge; north of a line 200 yards off the Dutch Island shore ranging 281° from the entrance to Round Swamp toward a point on shore 300 yards northerly from the Saunderstown ferry wharf; east of a line ranging 15° from the western point of Dutch Island to Twenty-three Foot Rock Buoy 4; and south of a line bearing 77° from Twenty-three Foot Rock Buoy 4 to the shore.

(i) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(7) *Anchorage N.* West of the north end of Conanicut Island, south of a line bearing 262° from Conanicut Island Light; east of a line bearing 8° from Twenty-three Foot Rock Buoy 4; and north of a line ranging 290° from Sand Point toward Wickford Harbor Light.

(i) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(c) *Bristol Harbor*—(1) *Anchorage O.* South of the south line of Franklin Street extended westerly; west of a line bearing 164°30′ parallel to and 400 feet westerly from the State harbor line between Franklin and Constitution Streets, and of a line ranging 244° from a point on the north line of Constitution Street extended 400 feet beyond the State harbor line toward Usher Rock Buoy 3; and north of the north line of Union Street extended to the Popasquash Neck shore.

(i) Temporary floats or buoys for marking anchors or moorings in place will be allowed in this area. Fixed mooring piles or stakes will not be allowed.

(d) *The regulations.* (1) Except in cases of great emergency, no vessel shall be anchored in the entrances to Narragansett Bay, in Newport Harbor, or in Bristol Harbor, outside of the anchorage areas defined in paragraphs (a), (b) and (c) of this section.

(2) Anchors must not be placed outside the anchorage areas, nor shall any vessel be so anchored that any portion of the hull or rigging shall at any time extend outside the boundaries of the anchorage area.

(3) Any vessel anchoring under the circumstances of great emergency outside the anchorage areas must be placed near the edge of the channel and in such position as not to interfere with the free navigation of the channel, nor obstruct the approach to any pier, nor impede the movement of any boat, and shall move away immediately after the emergency ceases, or upon notification by an officer of the Coast Guard.

(4) A vessel upon being notified to move into the anchorage limits or to shift its position on anchorage grounds must get under way at once or signal for a tug, and must change position as directed with reasonable promptness.

(5) Whenever the maritime or commercial interests of the United States so require, any officer of the Coast Guard is hereby empowered to shift the position of any vessel anchored within the anchorage areas, of any vessel anchored outside the anchorage areas, and of any vessel which is so moored or anchored as to impede or obstruct vessel movements in any channel.

(6) Nothing in this section shall be construed as relieving the owner or person in charge of any vessel from the penalties of the law for obstructing navigation or for obstructing or interfering with range lights, or for not complying with the navigation laws in regard to lights, fog signals, or for otherwise violating the law.

§ 202.147 *New London Harbor, Conn.*—(a) *The anchorage grounds*—(1) *Anchorage A (Naval).* In the Thames River east of Shaws Cove, bounded by lines connecting points which are the following bearings and distances from Monument, Groton (latitude 41°21′18″, longitude 72°04′48″): 243°, 1,400 yards; 246°, 925 yards; 217°, 1,380 yards; and 235°, 1,450 yards.

(2) *Anchorage B.* In the Thames River southward of New London, bounded by lines connecting points which are the following bearings and distances from New London Harbor Light (latitude 41°18′59″, longitude 72°05′25″): 2°, 2,460 yards; 9°, 2,480 yards; 26°, 1,175 yards; and 8°, 1,075 yards.

(3) *Anchorage C.* In the Thames River southward of New London Harbor, bounded by lines connecting a point bearing 100°, 450 yards, from New London Harbor Light, a point bearing 270°, 575 yards, from New London Ledge Light (latitude 41°18′21″, longitude 72°04′41″), and a point bearing 270°, 1,450 yards, from New London Ledge Light.

(4) *Anchorage D.* In Long Island Sound approximately two miles west-southwest of New London Ledge Light, bounded by lines connecting points which are the following bearings and distances from New London Ledge Light; 246°, 2.6 miles; 247°, 2.1 miles; 233°, 2.1 miles; and 235°, 2.6 miles.

(b) *The regulations.* (1) Anchorage A is for barges and small vessels drawing less than 12 feet. This anchorage shall be used only by naval vessels, and by other vessels holding special permits issued by the Captain of the Port when he finds that such special permits to anchor are not inimical to the requirements of the Navy.

(2) Except in emergencies, vessels shall not anchor in New London Harbor or the approaches thereto outside the anchorages defined in paragraph (a) of this section unless authorized to do so by the Captain of the Port.

§ 202.150 *Huntington Harbor, Long Island, N. Y.*—(a) *The anchorage grounds.* Northwestward of a line ranging from New York Telephone Company pole No. 4J with a transformer on top along the northeast side of Mill Dam Road toward the southwest corner of a timber hopper on the Old Town Dock; westward of a line bearing 177° from the tower of Ferguson's Castle along the east side of New York Avenue; south-eastward of a line bearing 234°12′ from the southeast corner of the main building of Knutson's Shipyard, north of the Town Park; eastward of a line bearing 35°55′ from the corner of the south abutment of the Mill Dam Road bridge across the Mill Pond spillway; and north-eastward of a line bearing 111°33′ from the chimney at the north end of the house at the westerly end of Mill Dam Road.

NOTE: This anchorage ground is described as a special anchorage area in § 202.60.

(b) *The regulations.* (1) When applied for, a berth in this anchorage, if available, may be assigned to any vessel by the Captain of the Port of New York.

(2) The Captain of the Port is authorized to issue permits for maintaining mooring buoys within the anchorage. The method of anchoring these buoys shall be as prescribed by the Captain of the Port.

(3) No vessel shall anchor in the anchorage in such manner as to interfere with the use of a duly authorized mooring buoy.

(4) No vessel shall be navigated within the anchorage at a speed exceeding six knots.

(5) In case of emergencies, the Captain of the Port is authorized to shift the position of any unattended vessel moored in or near the anchorage.

§ 202.155 *The Port of New York*—(a) *Long Island Sound*—(1) *Anchorage No. 1.* Southwest of a line between Neptune Island and Glen Island ranging from Aunt Phebe Rock Light and tangent to the north edge of Glen Island; southwest of a line tangent to the northeast edge of Glen Island and Goose Island breakwater; southwest of a line bearing southeasterly from the southwest end of Goose Island breakwater and on range with the south gable of the Casino on the northeast end of Glen Island; west of a

line ranging from the east edge of Goose Island breakwater to the west edge of the north end of Hart Island; west of Hart Island; and northwest of a line extending from Hart Island Light to Locust Point.

(i) Boats shall not anchor in this area in buoyed channels.

(ii) Boats shall be so anchored as to leave at all times an open, usable channel, at least 50 feet wide, west and south of Glen Island.

NOTE: Special anchorage areas in Anchorage No. 1 are described in § 202.60.

(2) *Anchorage No. 1—A.* Southwest of a line ranging from Duck Point, Echo Bay, through Bailey Rock Lighted Buoy 3 BR; northwest of a line ranging from Hicks Ledge Buoy 2H to Old Tom Head Rocks Buoy 4; and north of a line ranging from Old Tom Head Rocks Buoy 4 to the southernmost point of Davenport Neck.

(3) *Anchorage No. 1—B.* West of a line ranging from the point on the southwest side of the entrance to Horseshoe Harbor, Larchmont, to Hicks Ledge Buoy 2H; north of a line ranging from Hicks Ledge Buoy 2H to Duck Point; and in Echo Bay north and west of the channel.

(4) *Anchorage No. 2.* West of a line from Locust Point tangent to the northeasterly sea wall at Throgs Neck.

NOTE: A special anchorage area in Anchorage No. 2 is described in § 202.60.

(5) *Anchorage No. 3.* Northeast of a line from the south side of Barker Point to Gangway Rock Bell Buoy 27; southeast of a line from Gangway Rock Bell Buoy 27 to Sands Point Reef Lighted Buoy 25; and southwest of a line from Sands Point Reef Lighted Buoy 25 through Sands Point Light to Sands Point.

(6) *Anchorage No. 4.* Manhassett Bay, excluding the seaplane restricted area described in § 207.35; and that portion of Long Island Sound northeast of a line ranging from Stepping Stones Light through Elm Point Buoy 2 to Elm Point; southeast of a line ranging from Stepping Stones Light to Gangway Rock Bell Buoy 27; and southwest of Anchorage No. 3.

NOTE: Special anchorage areas in this anchorage are described in § 202.60.

(7) *Anchorage No. 5.* In Little Neck Bay; and east of a line ranging from Fort Totten flagpole to Hart Island Light; and south of Anchorage No. 4.

NOTE: A special anchorage area in Anchorage No. 5 is described in § 202.60.

(b) *East River*—(1) *Anchorage No. 6.* On Hammond Flats north of a line bearing 260° from the head of the pier on Throgs Neck at the foot of Pennyfield Avenue to the north tower of Bronx-Whitestone Bridge at Old Ferry Point.

(2) *Anchorage No. 7.* South of a line from Whitestone Point to the outer end of Willets Point Wharf.

(3) *Anchorage No. 8.* North of a line between the north tower of Bronx-Whitestone Bridge at Old Ferry Point and East River Lighted Buoy 4.

(4) *Anchorage No. 9.* East of a line from College Point Reef Light tangent to the west side of College Point; and south of a line from College Point Reef Light to Whitestone Point.

(5) *Anchorage No. 10.* In Flushing Bay, southeast of a line ranging through Rikers Island Channel Lighted Bell Buoy 1A and tangent to the northwest corner of College Point; and on the west side of Bowery Bay, southward of a line ranging from the Aero Beacon on the Administration Building of LaGuardia Field to the easterly corner of the Consolidated Edison Company of New York, Inc., bulkhead on the north side of the entrance to Steinway Creek, southeastward of the east rack of Log Pond adjacent to Steinway Creek, northwestward of the New York City Sewage Disposal Plant pier near the foot of 42nd Street, Astoria, New York, and westward of a line ranging 09° from the northwest corner of the sewage plant pier to the tank on Rikers Island.

NOTE: Special anchorage areas in this anchorage are described in § 202.60.

(6) *Anchorage No. 11.* East of Rikers Island and south of a line from the northeast corner of the T-shaped north pier of Rikers Island to Rikers Island Channel Entrance Lighted Bell Buoy, west of a line from Rikers Island Channel Entrance Lighted Bell Buoy to Rikers Island Channel Lighted Buoy 2, north of a line from Rikers Island Channel Lighted Buoy 2, to Rikers Island Channel Lighted Buoy 4, and north of a line from Rikers Island Channel Lighted Buoy 4 to Rikers Island Channel Lighted Buoy 6.

(7) *Anchorage No. 12.* West of Rikers Island and northeast of a line from Rikers Island Channel Lighted Buoy 6 to South Brother Island Ledge Light, east of a line from South Brother Island Ledge Light to the west side of South Brother Island, and south of a line through South Brother Island Light to the northwest corner of the T-shaped north pier of Rikers Island.

(8) *Anchorage No. 14.* In Hallets Cove, east of a line from a point on shore 100 feet west of the southerly prolongation of 2nd Street, Astoria, to Gibbs Point.

(c) *Hudson River*—(1) *Anchorage No. 16.* North of a line on a range with the north side of the north pier of the Union Dry Dock and Repair Company Shipyard, Edgewater, New Jersey; west of a line ranging 25° from a point 120 yards east of the east end of said pier to a point (500 yards from the shore and 915 yards from the Fort Lee flagpole) on a line ranging approximately 100°22′ from the Fort Lee flagpole toward the square chimney on the Medical Center Building at 168th Street, Manhattan; and south of said line ranging between the Fort Lee flagpole and the square chimney on the Medical Center Building.

(i) Subject to the provisions for Anchorage No. 19 (for naval vessels), the Captain of the Port may shift the position, or clear the area, of any vessel so moored as to obstruct the use of this area for the additional anchorage of naval vessels when found necessary.

(2) *Anchorage No. 17.* North of a line bearing 66° and ranging between the south face of the building known as Bill Miller's Riviera, Inc., north of George Washington Bridge at Fort Lee, New Jersey, and the Bell Tower of The Cloisters at Fort Tryon Park, Manhattan; west of lines bearing 29° from latitude 40°51′34″, longitude 73°56′54″, to latitude 40°52′27″, longitude 73°56′16″, thence 20° to latitude 40°54′17″, longitude 73°55′23″, thence 15° to latitude 40°56′20″, longitude 73°54′39″; and south of a line bearing 104° on a range with the latter point and the stack of the Yonkers Sewage Disposal Plant.

(i) Subject to the provisions for Anchorage No. 19 (for naval vessels), the Captain of the Port, may shift the position, or clear the area, of any vessel so moored as to obstruct the use of this area for the additional anchorage of naval vessels when found necessary.

(3) *Anchorage No. 18—A.* East of lines bearing 8° from the northwest corner of the crib icebreaker north of the New York Central Railroad Company drawbridge across Spuyten Duyvil Creek (Harlem River) to a point 250 yards offshore and on line with the New York Central Railroad signal bridge at the foot of West 231st Street, extended, at Spuyten Duyvil, Bronx, New York; thence bearing 19° to the channelward face of the Mount St. Vincent Dock at the foot of West 261st Street, Riverdale, Bronx, New York.

(i) Subject to the provisions for Anchorage No. 19 (for naval vessels), the Captain of the Port may shift the position, or clear the area, of any vessel so moored as to obstruct the use of this area for the additional anchorage of naval vessels when found necessary.

(4) *Anchorage No. 18—B.* North of the south side of West 181st Street, prolonged; east of a line ranging 28° from the northwest corner of the east tower of George Washington Bridge and tangent to the east shore of the river at Inwood Hill Park; and south of the prolongation of the south side of Dyckman Street, Manhattan, New York, where it passes beneath the tracks of the New York Central Railroad.

(i) Subject to provisions for Anchorage No. 19 (for naval vessels), the Captain of the Port may shift the position, or clear the area, of any vessel so moored as to obstruct the use of this area for the additional anchorage of naval vessels when found necessary.

(5) *Anchorage No. 19 (for naval vessels).* North of a line bearing 298° and ranging from the south side of 70th Street, New York, to the south side of Pier 11–A, Weehawken; east of the east channel line of the federally improved Weehawken-Edgewater Channel, said east channel line being extended to a point opposite West 156th Street; thence east of a line bearing 17° ranging between the end of the pier at the foot of West 134th Street and a point on the George Washington Bridge 250 yards westward of the air beacon on the east bridge tower; and south of said bridge.

(i) In order to give free passage for ferry boats, no vessel shall anchor within 300 yards of the line of the West 125th Street, Manhattan, to Edgewater, New Jersey, ferry.

(ii) In the discretion of the Captain of the Port, small commercial or pleasure vessels may anchor in this area shoreward of a line extending from the channelward end of the New York Central Railroad pier at the foot of West 70th Street to the channelward end of the pier at the foot of West 129th Street and shoreward of the United States pier-head line between West 134th Street and a prolongation of the bridge over the New York Central Railroad tracks located 1,000 feet south of the George Washington Bridge.

(iii) The Captain of the Port may grant permission for one stake boat to occupy an area in the westerly 200-yard portion of the naval anchorage.

(iv) The Captain of the Port may permit limited temporary anchorage, not to exceed 24 hours, of commercial vessels awaiting berths in the westerly portion of the naval anchorage south of West 135th Street when use of the anchorage by naval vessels will permit.

(v) The established anchorages for naval vessels having been found inadequate at times when large

numbers of such vessels are in the harbor, a numbered series of anchorages is defined and established as shown on Key Charts Nos. 1 to 4, inclusive (not published in this section) in order that when a necessity for additional anchorages arises, permission may be given naval vessels to anchor at designated points serially numbered from 2 to 40 for capital ships, from 100 to 129 for intermediate ships, from 213 to 399 for destroyers and small craft, and from 508 to 611 for the anchorage of destroyers and small craft on the east side of the river, when the space is not required for capital or intermediate ships. Berths 16 to 18, 546, 547, and 551 to 555, are for use only on occasions when the other numbered berths available are not sufficient for the accommodation of the naval ships present. The Captain of the Port, on request from the proper naval authorities, may grant permission to occupy the numbered anchorages outside or extending outside of Anchorage No. 19, provided those specified in the request can be made available, commercial conditions at the time being given proper consideration. If, in his opinion, there are reasons why the anchorage or anchorages asked for should not be assigned, he will confer with the naval officers making the request, and if other numbers can be agreed upon will authorize their use; otherwise he will communicate the request to the Secretary of the Army with a statement of the circumstances and his recommendation.

(vi) Whenever this area is required for the anchoring of naval vessels, it shall be immediately cleared of commercial vessels by the Captain of the Port upon request of the appropriate naval authority.

(d) *Upper Bay*—(1) *Anchorage No. 20.* Northeast of Ellis Island; southeast of a line ranging approximately 51°15′ from the northwest corner of Ellis Island toward the end of Central Railroad of New Jersey Pier No. 7; south of a line ranging approximately 96°20′ from the southeast corner of Central Railroad of New Jersey Pier No. 11, toward the outer end of the Staten Island Ferry rack on the Manhattan shore; west of a line ranging approximately 183°30′ from the southeast corner of Lehigh Valley Railroad Pier "A" to latitude 40°41′54.3″, longitude 74°01′59″; and north of a line ranging approximately 85°10′ from the southeast corner of the northerly half of Ellis Island toward the outer end of the Staten Island Ferry rack on the Manhattan shore.

(i) No vessel shall cast anchor within this area south of the northerly limit of the cable area shown on United States Coast and Geodetic Survey Chart No. 745, between Ellis Island and the Manhattan shore.

(2) *Anchorage No. 20—A.* South of a line bearing 102° and ranging between the southeast corner of the southerly half of Ellis Island and Governors Island Light; west of a line bearing 194°30′ from latitude 40°41′42″, longitude 74°02′02″, to Main Channel Lighted Bell Buoy 31, thence 206° to latitude 40°40′05″, longitude 74°02′55″; and north of a line extended and ranging 313° through Claremont Terminal Channel Buoy 2 and the northeast corner of Caven Point Pier.

(i) The portion of Anchorage No. 20—A which is easterly of a line ranging 204°30′ from the east end of the east landing pier on Bedloes Island to Bayonne Terminal Lighted Bell Buoy 2 and Robbins Reef Lighted Gong Buoy 27 and the northerly prolongation of that line is set aside as a temporary anchorage for vessels arriving in and leaving port. No vessel shall occupy this anchorage for a longer period than 72 hours, unless a permit is obtained from the Captain of the Port for that purpose.

NOTE: Anchorage No. 49—B in this area is reserved for vessels carrying explosives (see paragraph (m) (1) of this section) and is excluded from use as a general anchorage.

(3) *Anchorage No. 20—B.* South of a line bearing 129° from the southeast corner of Pennsylvania Railroad pier "B", Greenville Terminal, to the center of the south pier of the Bethlehem Steel Company Drydock, Brooklyn; west of a line bearing 206° from latitude 40°39′50″, longitude 74°03′05″, to latitude 40°39′31.5″, longitude 74°03′17″, north of a line bearing 121° and ranging from New Jersey Pierhead Channel North Entrance Buoy 15 to the northwest corner of Pier 3, Brooklyn; west of a line bearing 204°30′ and ranging from Bayonne Terminal Lighted Buoy 1 through Robbins Reef Lighted Gong Buoy 27 and Coast Guard Depot North Dock Light, St. George, Staten Island; north of a line ranging 262° from Robbins Reef Lighted Gong Buoy 27; and northeast of the channel approach to the north side of Constable Point.

(i) The portion of Anchorage No. 20—B which is easterly of a line ranging 204°30′ from the east end of the east landing pier on Bedloe's Island to Bayonne Terminal Lighted Bell Buoy 2 and Robbins Reef Lighted Gong Buoy 27 is set aside as a naval anchorage. The Captain of the Port may permit commercial vessels to anchor temporarily in this area, ordinarily for not more than 24 hours, when the anchorage will not be needed for naval vessels. Commercial vessels so anchored shall be moved at their own expense whenever the anchorage is needed for naval vessels.

(4) No vessel shall anchor between Ellis Island and the piers of the Central Railroad of New Jersey

or in the dredged channel approaches to this space or the piers and wharves of the railroad, or in the dredged channel approaches to the National Docks at Black Tom Island, to Bedloe's Island, to the Greenville and Claremont Terminals, or in the New Jersey Pierhead Channel or near the entrances to said channels so as to obstruct the approaches or interfere in any way with the free navigation thereof.

(5) *Anchorage No. 21*. South of a line passing through Claremont Terminal Lighted Buoy 1, Bay Ridge Channel Lighted Bell Buoy 7A, and the middle point of the west front of the New York Dock Company Pier No. 41, Brooklyn Standard Bag Corporation; east of a line bearing 208° and ranging from Governors Island Extension Light through Gowanus Flats Lighted Bell Buoy 30, Gowanus Flats Lighted Bell Buoy 28, Gowanus Flats Lighted Bell Buoy 26, to Gowanus Flats Lighted Bell Buoy 24, thence 173° to Bay Ridge Channel Junction Lighted Gong Buoy; west of a line bearing 18° from Bay Ridge Channel Junction Lighted Gong Buoy to latitude 40°38′41.7″, longitude 74°02′32.5″; thence west of the dredged Bay Ridge and Red Hook Channels as marked by channel and anchorage buoys. A fairway 600 feet wide, crossing Anchorage No. 21, marked by buoys at each entrance, shall be excluded therefrom. Its northerly side is on range with Claremont Terminal Lighted Buoy 1, at the entrance to Claremont Terminal Channel, and the center of the head of the north pier of the Long Island Railroad Terminal at the foot of 64th Street, Bay Ridge, Brooklyn. Anchorage No. 21 is divided into Anchorages Nos. 21—A and 21—B.

(i) *Anchorage No. 21—A (for barges)*. That portion of Anchorage No. 21, northward of the fairway, northward and eastward of Anchorage No. 21—B. Deep-draft vessels are required to use the western half of the anchorage, light-draft vessels are required to use the eastern half, and barges drawing 12 feet or less are required to use that portion of the anchorage southward of a line ranging from the end of the 39th Street Ferry rack (northeast rack), Brooklyn, to Gowanus Flats Lighted Bell Buoy 28.

(ii) *Anchorage No. 21—B (for steamers)*. That portion of Anchorage No. 21 southward of the fairway; and that portion of Anchorage No. 21, northward of the fairway, southward of a line ranging from the end of the 39th Street Ferry rack (northeast rack), Brooklyn, to Gowanus Flats Lighted Bell Buoy 28, and westward of a line ranging from the westerly point of Red Hook to the north corner of Pier 21 of the Pouch Terminal at Clifton, Staten Island.

(iii) Vessels of the various types required to use Anchorages Nos. 21—A and 21—B may be anchored in areas other than those set aside for them for a limited time after first obtaining a permit from the Captain of the Port, when and to the extent that they are not needed for vessels of the types assigned to them. No vessel shall occupy these anchorages for a period longer than 30 days, unless a permit is obtained from the Captain of the Port for that purpose.

(6) *Anchorage No. 23 (temporary general anchorage)*. South of a line bearing 88° from the Turret Tower (Curtis High School), St. George, to its intersection at latitude 40°38′44″, longitude 74°03′55″, with a line bearing 146°30′ from the westerly tank of Bayonne Naval Depot, west of lines bearing 146°30 from the westerly tank of Bayonne Naval Depot to latitude 40°38′25″, longitude 74°03′38.5″, thence 167° ranging from Robbins Reef Light to latitude 40°37′26.5″, longitude 74°03′21″; and north of a line bearing 84° on a range with the latter point, the northeast corner of Pier 19, Staten Island, and the tower of the Marine Hospital, Stapleton, Staten Island.

(i) No vessel shall occupy this anchorage for a period longer than 48 hours, unless a permit is obtained from the Captain of the Port for that purpose.

(ii) The entire area is designated a "temporary general anchorage," but vessels arriving at quarantine may anchor within that portion of this anchorage south of a line bearing 262° which is in prolongation of the north side of Pier 10, Staten Island, whenever Quarantine Anchorage No. 24 is congested and fully utilized.

(7) *Anchorage No. 24 (quarantine anchorage)*. South of a line bearing 84° from the tower of the Marine Hospital, Stapleton, Staten Island, through the northeast corner of Pier 19, Staten Island, to latitude 40°37′26.5″, longitude 74°03′21″; west of a line bearing 167° ranging from Robbins Reef Light to latitude 40°36′32″, longitude 74°03′04″; and north of a line bearing 270° on range with the latter point and the northerly corner of Fort Lafayette.

(i) Vessels arriving at quarantine and awaiting inspection shall anchor to the south of a line bearing 262° and ranging from the southeast corner of Pier 25, Staten Island, to the south chimney of the Wrigley Plant, and shall clear said area immediately after being granted pratique. Whenever the area south of Pier 25, Staten Island, is congested, vessels arriving at quarantine and awaiting inspection may anchor in the northern section of the quarantine anchorage. Such vessels must clear the anchorage within 24 hours after being granted pratique. Vessels arriving for quarantine may anchor in that portion of

Anchorage No. 23 south of a line bearing 262° which is in prolongation of the north side of Pier 10, Staten Island, whenever the quarantine anchorage is congested and fully utilized. No vessel shall occupy this section of the anchorage for a period longer than 48 hours, unless a permit is obtained from the Captain of the Port for that purpose.

(ii) Whenever the quarantine anchorage and the southerly part of Anchorage No. 23 are fully utilized, vessels shall anchor as directed by the Captain of the Port.

NOTE: The establishment of quarantine anchorages and the issuance of rules and regulations governing quarantine and their enforcement are under the jurisdiction of the administrator, Federal Security Agency, and the foregoing quarantine anchorage has been established under his authority.

(e) *Gravesend Bay; Anchorage No. 25.* North of a line ranging 271°30′ between Coney Island Light on Norton Point and the south point of Hoffman Island; east of a line bearing 342° from latitude 40°34′36″ longitude 74°01′42″, to latitude 40°35′59″, longitude 74°02′17″, and ranging through a point 250 yards due west of Fort Lafayette and a point 300 yards due east of Robbins Reef Light; and south of a line bearing 70° from latitude 40°35′59″, longitude 74°02′17″, through Fort Hamilton Southwest Buoy 20.

NOTE: Anchorage No. 49—C in this area is reserved for vessels carrying explosives (see paragraph (m) (2) of this section) and is excluded from use as a general anchorage.

(f) *Lower Bay*—(1) *Anchorage No. 26.* In Sandy Hook Bay South of a line extending from Point Comfort to Sandy Hook Point Light.

NOTE: Anchorages Nos. 49—F and 49—G in this area are reserved for vessels carrying explosives (see paragraph (m) (4) and (5) of this section) and are excluded from use as general anchorages.

(i) Pleasure or commercial craft may not navigate or moor within 750 yards of the Naval Ammunition Depot Pier at Leonardo, New Jersey, nor anchor in the approach channel or the turning basin adjacent thereto.

(ii) When immediate action is required and representatives of the Coast Guard are not present in sufficient force to exercise effective control of shipping, the Commanding Officer of the Naval Ammunition Depot at Earle, New Jersey, may control the anchorage or movement of any vessel, foreign or domestic, to the extent he deems necessary to insure the safety and security of his command.

(2) *Anchorage No. 27*—(i) *Atlantic Ocean.* South of Gedney Channel, west of a line ranging due north and south through Scotland Lightship, and north of a line ranging due east from Navesink Light: *Provided*, That no vessel shall anchor in South Channel.

(ii) *Romer Shoal.* Beginning at Gedney Channel Lighted Bell Buoy 2; thence to Ambrose Channel Entrance Lighted Whistle Buoy 1A; thence along the southwest side of Ambrose Channel to Ambrose Channel Lighted Whistle Buoy 9, and thence to Ambrose Channel Lighted Whistle Buoy 13; thence along a line ranging toward West Bank Light to its intersection with a line ranging from Ambrose Channel Lighted Buoy 15 to Chapel Hill Channel Buoy 14; thence to Chapel Hill Channel Buoy 14; thence to Swash Channel Lighted Gong Buoy 6; thence to Swash Channel Buoy 4A; thence to Romer South Edge Buoy 2S; and thence to Gedney Channel Lighted Bell Buoy 6 and along the north side of Gedney Channel to the point of beginning.

(iii) *Flynns Knoll.* Beginning at Sandy Hook Channel Lighted Bell Buoy 18; thence along the north side of Sandy Hook Channel to Sandy Hook Channel Lighted Buoy; thence along the southwest side of Swash Channel to Junction Buoy; thence along the east side of Chapel Hill Channel to Chapel Hill Channel Buoy 2; and thence to the point of beginning.

(3) *Anchorage No. 28.* West of lines bearing 154°30′ from Fort Wadsworth Light to Craven Shoal Lighted Bell Buoy 19A, thence in succession to the buoys marking the east side of West Bank and the buoys on the west side of Chapel Hill Channel to Southwest Spit Junction Lighted Gong Buoy, thence 182° to a line extending from Sandy Hook Point Light to Point Comfort; north of the latter line and the New Jersey shore; and east of a line bearing 353° from the head of the Keansburg Steamboat Pier at Point Comfort, through Great Kills Flat Buoy 4, to the Staten Island Shore.

(g) *Kill Van Kull; Anchorage No. 29.* West of the westerly rack of the Bergen Point Ferry at Bayonne, New Jersey; north of a line ranging from the north end of Frank McWilliams, Inc., Pier 2, West New Brighton, Staten Island, to the southwest corner of the pier, foot of Humphreys Avenue, Bayonne; north of a line ranging 258° from the inshore end of the Bergen Point Ferry at Bayonne; thence north of a line ranging 90° from Bergen Point Light; thence southeast of a line running 55° to the shore at Bergen Point.

(h) *Newark Bay*—(1) *Anchorage No. 34.* South of the bridge of the Central Railroad Company of New Jersey; west of lines from a point on the bridge 100 yards west of the west pier of the west lift

span to Newark Bay Channel Buoy 5, thence to the east end of the dike north of Shooters Island; north of the dike and a line ranging from the west end of the dike through Kill Van Kull Light 18 and Kill Van Kull Buoy 20; and east of a line 250 feet east of and parallel to the Singer Manufacturing Company bulkhead.

(2) *Anchorage No. 35.* North of Anchorage No. 29; east of lines ranging from the center of Bergen Point Light to the west pier of the west lift span of the Central Railroad of New Jersey bridge, extending to a point off the north side of the pier of the Texas Company, and thence to a point 100 yards east of the east pier of the east lift span of the railroad bridge; and south of the bridge.

(3) *Anchorage No. 36.* South of Port Newark Terminal Channel; west of a line ranging from a point 200 yards west of Newark Bay Light 3 to a point 100 yards west of the west pier of the west lift span of the Central Railroad of New Jersey Bridge; and north of said bridge.

(4) *Anchorage No. 37.* North of the Central Railroad of New Jersey bridge; east of a line ranging from a point 200 yards east of the east pier of the east lift span of the bridge to a point 200 yards east of the east end of the lift span of the Pennsylvania-Lehigh Valley Railroad bridge; and south of the latter bridge.

(5) *Anchorage No. 38.* North of the Pennsylvania-Lehigh Valley Railroad bridge; east of lines ranging through a point 200 yards east of the east end of the lift span of the said bridge and the red channel buoys marking the dredged channel in Newark Bay and Hackensack River; and south of the Central Railroad Company of New Jersey bridge.

(6) *Anchorage No. 39.* Between the entrance channels of the Hackensack and Passaic Rivers, northwest of lines from the abutment of the Central Railroad of New Jersey bridge on the west side of the Hackensack River to Hackensack River Light 1, and thence to Newark Bay Light 5, and east of a line from said light ranging toward the southeast corner of the Texas Company wharf, and of a line ranging from the southeast corner of Gross Wharf to the abutment and end of fill of the Central Railroad of New Jersey bridge on the east side of the Passaic River.

(i) *Arthur Kill*—(1) *Anchorage No. 41.* The passage between Pralls Island and Staten Island included between a line running 29° from the extreme northwest point of Pralls Island to a point on Staten Island and a line from the southern point of Pralls Island to the north side of the mouth of Neck Creek at Travis, Staten Island.

(2) *Anchorage No. 42.* East of lines ranging from the head of the Tottenville Shipyard Company pier at Tottenville, Staten Island, to the first pier of the Outerbridge Crossing west from the Staten Island shore, thence to Arthur Kill Light 10, thence to Arthur Kill Light 14, and thence to Arthur Kill Lighted Buoy 16; and south of a line from thence to Smoking Point.

(j) *Raritan Bay*—(1) *Anchorage No. 44.* West of the Raritan Bay Channel leading into Arthur Kill; northeast of a line ranging from Raritan Bay Channel Lighted Buoy 15 through Anchorage Buoy A; east of a line bearing 331°31′ and ranging through Great Beds Light, Cutoff Channel Light 1, and St. Peter's Church spire at Perth Amboy, New Jersey; and southeast of the Cutoff Channel between Raritan River and Arthur Kill.

(2) *Anchorage No. 45.* West of the Raritan Bay Channel leading into Arthur Kill; north of the Raritan River Channel leading into Raritan River; and east of the Cutoff Channel between Raritan River and Arthur Kill, except that part of the said area occupied by Anchorage No. 44.

(3) *Anchorage No. 45—A.* West of the Cutoff Channel between Raritan River and Arthur Kill; north of the Raritan River Channel; east of the New York and Long Branch Railroad bridge; and north of the Raritan River Channel to the prolongation of Market Street, Perth Amboy, New Jersey, in Arthur Kill.

(4) *Anchorage No. 46.* West of the west limit of Anchorage No. 28, as defined by a line bearing 353° from the head of the Keansburg Steamboat Pier at Point Comfort, through Great Kills Flat Buoy 4 to the Staten Island shore; north of Raritan Bay Channel as defined by the buoys and lights marking the north side of the channel, including Princess Bay; northeast of Raritan Bay Channel leading into Arthur Kill; and south of a line bearing 243° from the gable of a house at Ward Point, Staten Island.

(5) *Anchorage No. 47.* South of the Raritan River Channel from opposite the Sun Oil Company pier at South Amboy to Raritan River Buoy 3; thence south of a line in the direction of Boundary Daybeacon to latitude 40°28′48.5′, longitude 74°14′31.6″; thence south of lines through Raritan Bay Light 7B, Raritan Bay Light 3A, and the buoys marking the south side of Raritan Bay Channel off Seguine Point to the west limit of Anchorage No. 28 as defined by a line bearing 353° from the head of the Keans-

burg Steamboat Pier through Great Kills Flat Buoy 4 to the Staten Island shore; and west of the latter line.

(i) Vessels shall not anchor in the channel to Keyport Harbor west of lines ranging from Keyport Channel Buoy 1 to Keyport Channel Buoy 9, thence through Keyport Channel Buoys 11 and 13 to the northeast corner of the easterly steamboat wharf; and east of a line extending from a point 400 yards west of Keyport Channel Buoy 1 tangent to the west shore at the mouth of Matawan Creek.

NOTE: Anchorage No. 49—D in this area is reserved for vessels carrying explosives (see paragraph (m) (3) of this section) and is excluded from use as a general anchorage.

(k) *Sheepshead Bay*—(1) *Anchorage No. 48—A.* South of a line 25 feet south of and parallel to the bulkhead wall along the south side of Emmons Avenue; east of a line 200 feet east of and parallel to the prolonged west line of East 15th Street; north of a line 75 feet north of and parallel to the bulkhead wall along the north side of Shore Boulevard between Amherst Street and Dover Street and as prolonged to a point 315 feet south of the bulkhead wall along the south side of Emmons Avenue and 25 feet west of the prolonged west side of Ocean Avenue; and west of a line parallel to and 25 feet west of the prolonged west line of Ocean Avenue.

(2) *Anchorage No. 48—B.* South of the established United States Pierhead Line on the north side of the bay; west of the prolonged west line of Coyle Street; north of a line ranging from a point 90 feet south of said pierhead line in said prolonged west line of Coyle Street to the intersection of the south line of Shore Boulevard and the west line of Kensington Street; north of a line parallel to and 325 feet north of the bulkhead wall along the north side of Shore Boulevard; northeast of a line ranging from the point of intersection of the last-mentioned line with the prolonged east line of East 28th Street, toward a point, on the prolonged east line of East 27th Street and 245 feet south of the established United States Pierhead Line on the north side of the bay; and east of the prolonged east side of East 27th Street.

(3) *Anchorage No. 48—C.* South of a line extending from a point 175 feet northerly of the bulkhead wall along the north side of Shore Boulevard (perpendicular distance) and in the prolonged west side of Hastings Street to a point on the prolonged east side of Mackenzie Street 125 feet north of the bulkhead wall on the north side of Shore Boulevard; thence south of a line parallel to and 125 feet northerly of the bulkhead wall along the north side of Shore Boulevard from the last-mentioned point to the prolonged west line of Coyle Street; west of the prolonged west line of Coyle Street; north of a line parallel to and 25 feet north of the bulkhead wall along the north side of Shore Boulevard; and east of the prolonged west side of Hastings Street.

(l) *General regulations.* (1) Except in cases of great emergency, no vessel shall be anchored in the navigable waters of the Port of New York outside of the anchorage areas established in this section, nor cast anchor within a cable or pipe line area shown on a Government chart, nor be moored, anchored, or tied up to any pier, wharf, or vessel in such manner as to obstruct or endanger the passage of any vessel in transit by, or to or from, adjacent wharves, piers, or slips.

(2) No vessel shall occupy for a longer period than 30 days, unless a permit is obtained from the Captain of the Port for that purpose, any anchorage for which the time of occupancy is not otherwise prescribed in this section. No vessel in a condition such that it is likely to sink or otherwise become a menace or obstruction to navigation or anchorage of other vessels shall occupy an anchorage except in an emergency, and then only for such period as may be permitted by the Captain of the Port.

(3) Whenever, in the opinion of the Captain of the Port, such action may be necessary, that officer may require any or all vessels in any designated anchorage area to moor with two or more anchors.

(4) Every vessel whose crew may be reduced to such number that it will not have sufficient men on board to weigh anchor at any time shall be anchored with two anchors, with mooring swivel put on before the crew shall be reduced or released, unless the Captain of the Port shall waive the requirement of a mooring swivel.

(5) Anchors of all vessels must be placed well within the anchorage areas, so that no portion of the hull or rigging shall at any time extend outside the boundaries of the anchorage area.

(6) Any vessel anchoring under circumstances of great emergency outside of the anchorage areas must be placed near the edge of the channel and in such position as not to interfere with the free navigation of the channel nor obstruct the approach to any pier nor impede the movement of any boat, and shall move away immediately after the emergency ceases, or upon notification by the Captain of the Port.

(7) When applied for, a berth in an anchorage, if available, shall be assigned to any vessel by the Captain of the Port. He may grant revocable permits for habitually maintaining and using the same mooring space in an anchorage area, but no vessel shall occupy continuously a berth in an anchorage area

when a vessel in regular traffic requires the berth or when navigation would be menaced or inconvenienced thereby. The Captain of the Port is authorized to issue permits for maintaining mooring buoys. The method of anchoring these buoys shall be as prescribed by the Captain of the Port. No vessel shall moor in any anchorage in such a manner as to interfere with the use of a duly authorized mooring buoy. In case of emergencies the Captain of the Port is hereby authorized to shift the position of any unattended vessel moored in or near any anchorage. No vessel shall be navigated within the limits of an anchorage at a speed exceeding six knots when in the vicinity of a moored vessel.

(8) Barge dispensing stations and stake boats may be anchored in such places as the Captain of the Port may designate, subject to the approval of the District Engineer, Corps of Engineers.

(9) Upon approval of the District Engineer, Corps of Engineers, the Captain of the Port may permit wrecking plant or other vessels legally engaged in recovering sunken property, or in laying or repairing pipe lines or cables legally established, or plant engaged in dredging operations, to anchor within channels of the Port of New York. Permit issued by the Captain of the Port is not necessary for plant engaged upon works of river and harbor improvement under the supervision of the District Engineer, but the District Engineer will notify the Captain of the Port in advance of all such proposed work.

(10) Whenever the maritime or commercial interests of the United States so require, the Captain of the Port is hereby empowered to shift the position of any vessel anchored within the anchorage areas, of any vessel anchored outside the anchorage areas, of any vessel which is so moored or anchored as to impede or obstruct vessel movements in any channel or obstruct or interfere with range lights and of any vessel which, lying at the exterior end of a pier or alongside an open bulkhead, obstructs or endangers the passage of vessels in transit by, or to or from, adjacent wharf property or impedes the movements of vessels entering or leaving adjacent slips.

(11) A vessel upon being notified to move into the anchorage limits or to shift its position on anchorage grounds, shall get under way at once or signal for a tug, and shall change position as directed, with reasonable promptness.

(12) Nothing in this section shall be construed as relieving any vessel or the owner or person in charge of any vessel from the penalties of law for obstructing navigation or for obstructing or interfering with range lights, or for not complying with the navigation laws in regard to lights, fog signals, or for otherwise violating law.

(m) *Anchorages for vessels carrying explosives*—(1) *Anchorage No. 49—B.* On the New Jersey Flats, south of a line parallel to and 500 yards south of the National Docks (Black Tom) dredged channel; west of a line bearing 208° from the Torch, Statue of Liberty, and ranging through National Docks Channel Buoy 1 and New Jersey Pierhead Channel North Entrance Buoy 4; north of a line ranging through the latter buoy and New Jersey Pierhead Channel North Entrance Lighted Buoy 6; northeast of a line bearing 313° being parallel to and 500 yards north of Caven Point Pier; and east of a line bearing 38° from the twin chimneys on Constable Hook, New Jersey, through the brick pump house on the inshore end of the trestle to Caven Point Pier.

(i) Vessels shall not anchor within 800 yards of Bedloes Island, within 500 yards of any pier, or within 100 yards of the New Jersey Pierhead Channel.

(ii) No vessel using this anchorage shall carry more than 20 tons of high explosives.

(iii) No vessel carrying explosives of any kind shall anchor in this anchorage within 500 feet of any other vessel carrying high explosives; except that the Captain of the Port may authorize the placing of moorings not less than 500 feet apart within this area and the making fast thereto of not to exceed three barges at each mooring, provided the combined load of the barges at a mooring is not more than 20 tons of high explosives.

(iv) Insofar as practicable, in the use of this anchorage preference shall be given to vessels storing explosives for current consumption.

(v) In cases of great emergency and when weather conditions are such that it is impossible for barges, scows, or lighters loaded with more than 20 tons of high explosives to proceed to Gravesend Bay or Raritan Bay, or lie at anchor there, such vessels may anchor temporarily in the Jersey Flats anchorage, but in each case the Captain of the Port must be immediately notified, and such vessel will not remain so anchored without his special permission.

(vi) This area shall not be used by vessels which do not carry explosives except in cases of great emergency.

(2) *Anchorage No. 49—C (naval and military anchorage).* In Gravesend Bay, north of a line bearing 260°30′ from latitude 40°34′58″, longitude 74°01′20″, to latitude 40°34′54″, longitude 74°01′49″,

and ranging through the stack on Hoffman Island; east of a line bearing 342° from the last-mentioned point to latitude 40°35′59″, longitude 74°02′17″, and ranging 250 yards due west of Fort Lafayette; south of a line bearing 96° from the last-mentioned point to latitude 40°35′56″, longitude 74°01′45″; and west of a line bearing 343° from the last-mentioned point to latitude 40°34′58″, longitude 74°01′20″, and passing through Fort Hamilton Southwest Buoy 20.

(i) The Captain of the Port may permit the anchorage of commercial vessels in the southerly part of the area south of a line bearing 252° from the flagpole in the vicinity of Bay Parkway, Brooklyn, when use of the anchorage by naval or military vessels will permit. Any commercial vessels so moored as to obstruct the use of the area for the anchorage of naval or military vessels may be required by the Captain of the Port to shift its position or clear the area when found necessary, at its own expense.

(ii) Fishing and navigation by pleasure and commercial craft are prohibited within the area at all times when vessels which are moored in the area for the purpose of loading or unloading explosives display a red flag by day or a red light by night, unless special permission is granted by the Captain of the Port.

(iii) Vessels carrying high explosives in this anchorage shall not anchor closer than 400 yards to one another, but the number of vessels which may anchor in the area at any one time shall be at the discretion of the Captain of the Port. This provision is not intended to prohibit barges or lighters from tying up alongside ships for the transfer of cargoes.

(iv) Vessels carrying high explosives shall not occupy this anchorage for a period of time longer than is necessary to receive or discharge such cargoes, or between sunset and sunrise except by special permit from the Captain of the Port in cases of great emergency.

(v) Barges and lighters loaded with explosives may anchor in the easterly portion of this area provided such barges and lighters are anchored so as not to approach one another closer than 300 feet. The Captain of the Port may authorize the placing of moorings in the easterly portion of the area and the making fast thereto of not to exceed three barges or lighters at each mooring, provided these moorings are so spaced that the vessels at one mooring shall at all times be not less than 300 feet from the vessels at an adjacent mooring.

(3) *Anchorage No. 49—D.* In Raritan Bay, south of a line bearing 250° from West Bank Light; west of a line ranging 137° from the tower of former Princess Bay Light to the tower of former Waackaack Light; north of a line ranging 250° from Old Orchard Shoal Light to Boundary Daybeacon; and east of a line bearing 306° from Boundary Daybeacon.

(i) This area shall not be used by vessels which do not carry explosives except in cases of great emergency.

(4) *Anchorage No. 49—F (emergency naval anchorage).* That portion of Sandy Hook Bay bounded by a line bearing 170°, 3,800 yards, from a point bearing 281°30′, 2,050 yards, from Sandy Hook Light; thence 260°, 500 yards; thence 350°, 3,800 yards; thence 80°, 500 yards, to the point of beginning.

(i) This anchorage is to be used for the anchorage of naval vessels during emergencies only.

(ii) No pleasure or commercial craft shall navigate or moor within this area at any time when naval vessels which are moored in the area display a red flag by day or a red light by night.

(5) *Anchorage No. 49—G (naval anchorage).* That portion of Sandy Hook Bay bounded by a line bearing 208°, 1,350 yards, from a point bearing 292°30′, 3,600 yards, from Sandy Hook Light; thence 298°, 620 yards; thence 2°, 1,250 yards; thence 107°, 1,150 yards, to the point of beginning.

(i) No pleasure or commercial craft shall navigate or moor within this area at any time when vessels which are moored in the area display a red flag by day or a red light by night.

(n) *Regulations for explosives anchorages.* (1) Anchorages Nos. 49—B, 49—C, 49—D, 49—F, and 49—G are reserved for vessels carrying explosives. All vessels carrying explosives shall be within these areas when anchored, except as provided in subparagraph (6) of this paragraph.

(2) A written permit shall be obtained from the Captain of the Port before vessels carrying explosives, or on which explosives are to be loaded, may proceed to the anchorages provided for them; and no vessel shall occupy a berth in such anchorage except by authority of such permit, which permit may be revoked at any time.

(3) Vessels used in connection with loading or unloading explosives on vessels in anchorage areas, including tugs and stevedore boats, shall carry a written permit from the Captain of the Port. The Captain of the Port may, in his discretion, require every person having business on board vessels which are being loaded with explosives, other than members of the crew, to have a pass from the Captain of

the Port in such form as he shall prescribe. Such permit or pass shall be shown whenever required by him or by his authorized agents.

(4) Whenever any vessel not fitted with mechanical power anchors in the explosives anchorages while carrying explosives, the Captain of the Port may require the attendance of a tug upon such vessel when in his judgment such action is necessary.

(5) Vessels carrying explosives shall comply with the general regulations in paragraph (1) of this section when applicable.

(6) The District Engineer, Corps of Engineers, may authorize, in writing, a vessel carrying explosives for use on river and harbor works or on other work under federal permit issued by the District Engineer to anchor in or near the vicinity of such work without a permit from the Captain of the Port. The District Engineer will prescribe the quantities of such explosives allowed on such vessel and the conditions under which they are to be stored and handled, and will furnish the Captain of the Port with a copy of such safety instructions together with a copy of his written authorization.

(7) Every vessel loading, unloading, transporting, or containing explosives shall display by day a red flag at least 16 square feet in area at its masthead, or at least 10 feet above the upper deck if the vessel has no mast, and shall display by night a red light in the same position specified for the flag.

(8) When local regulations of any place require previous local authority for the transfer of explosives or fireworks between vessels or between a vessel and a wharf or other place ashore, the Captain of the Port will permit the removal from the anchorage of such vessel containing explosives to any place covered by such local regulations only when he is satisfied that the required local authority has been granted.

§ 202.156. *Randall Bay, Freeport, Long Island, N. Y.* —(a) *The anchorage grounds.* Southward of a line 312 feet south of and parallel to the south side of Casino Street; eastward of a line 215 feet east of and parallel to the east side of West Side Avenue, said line extending southerly to a point 233 feet north of the prolonged north side of Clinton Street; northeastward of a line from the last-mentioned point to a point 243 feet southerly of the prolonged south side of Clinton Street and 210 feet east of the east side of Prospect Street; eastward of a line 210 feet east of and parallel to the east side of Prospect Street; northward of a line 25 feet north of and parallel to the prolonged north side of Suffolk Street; westward of a line 210 feet west of and parallel to the west side of South Long Beach Avenue, said line extending northerly to a point 222 feet south of the prolonged south side of Queens Street; southwestward of a line from the last-mentioned point to a point 74 feet northerly of the prolonged north side of Queens Street and 120 feet west of the west side of Roosevelt Avenue; and westward of a line 120 feet west of and parallel to the west side of Roosevelt Avenue.

(b) *The regulations.* (1) When applied for, a berth in this anchorage, if available, may be assigned to any vessel by the Captain of the Port of New York.

(2) The Captain of the Port is authorized to issue permits for maintaining mooring buoys within the anchorage. The method of anchoring these buoys shall be as prescribed by the Captain of the Port.

(3) No vessel shall anchor in the anchorage in such manner as to interfere with the use of a duly authorized mooring buoy.

(4) No vessel shall be navigated within the anchorage at a speed exceeding six knots.

(5) In case of emergencies, the Captain of the Port is authorized to shift the position of any unattended vessel moored in or near the anchorage.

§ 203. BRIDGE REGULATIONS.—Regulations governing the operation of drawbridges within the limits covered by this Coast Pilot follow.

§ 203.80. *Acushnet River, Mass.; State of Massachusetts bridge between New Bedford and Fairhaven*—(a) *Prompt opening required.* Except as otherwise provided in paragraph (b) of this section, the draw of this bridge shall, upon proper signal, be opened promptly for the passage of any vessel or other watercraft not able to pass under the closed draw.

(b) *Exceptions.* (1) From 6:30 a.m. to 8:30 a.m., from 11:30 a.m. to 1:30 p.m., and from 4:00 p.m. to 6:00 p.m., on all days other than Sundays and legal holidays observed in the locality, the draw shall not be opened for the passage of any vessel drawing at the time less than 15 feet of water.

(2) From one hour after sunset to one hour before sunrise the draw shall be opened within a reasonable time after notice to the draw tender. The owner of or agency controlling the bridge shall provide

arrangements whereby the draw tender can be conveniently reached by telephone or otherwise at any hour of the night, and shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in a position where it can be read easily at any time, a copy of the regulations in this section together with a notice stating exactly how the draw tender may be reached.

(3) These exceptions shall not apply to vessels owned or operated by the United States, nor shall they apply to vessels employed by the City of New Bedford or the Town of Fairhaven for police and fire protection. All such United States and municipal vessels shall be passed without delay through the draw of the bridge at any hour of the day or night.

(c) *Signals*—(1) *By the vessel.* When a vessel or other watercraft intends to pass through the draw from one hour before sunrise to one hour after sunset, the master or pilot thereof shall, on approaching within reasonable signaling distance, signify such intention by sounding with a whistle or horn three short blasts. When a vessel drawing at the time 15 feet of water or more intends to pass through the draw during any period prescribed in paragraph (b) (1) of this section, the master or pilot thereof shall, on approaching within reasonable signaling distance, signify such intention by sounding with a whistle or horn three short blasts followed by one long blast. When any United States or municipal vessel as described in paragraph (b) (3) of this section intends to pass through the draw at any hour of the day or night, the master or pilot thereof shall, on approaching within reasonable signaling distance, signify such intention by sounding with a whistle or horn four long blasts.

(2) *By the bridge.* If the draw is to be opened promptly, the draw tender shall reply by one long blast of a whistle or horn. If the draw is not to be opened promptly, the draw tender shall reply by three long blasts and, in addition, a red flag or ball by day and a red light by night shall be conspicuously displayed on the bridge.

§ 203.85. *Sakonnet River, R. I.; State of Rhode Island highway bridge and New York, New Haven and Hartford Railroad Company bridge at Tiverton.* (a) The signal for opening the draw of each of these bridges shall be three short blasts of a whistle or horn. This signal shall be answered by one long blast of a whistle or horn on the bridge when the operation of opening is commenced, or, if the draw cannot be opened promptly, by three long blasts and in addition a red flag or ball by day and a red light by night shall be conspicuously displayed on the bridge.

(b) Except as otherwise provided in this section, the draws of the bridges shall be immediately opened, upon receiving the prescribed signal, at all times during the day or night for the passage of foreign vessels and "vessels of the United States" as defined in R. S. 4311 (46 U. S. C. 251) unable to pass under the closed draws.

(c) When a train which will entirely cross the railroad bridge before stopping has reached the distance signal of the bridge and is in motion toward the bridge, the train may continue across the bridge, but in no case, except as provided in paragraph (e) of this section, shall the opening of the bridge for a vessel be delayed more than four minutes after the signal is given.

(d) For all vessels or watercraft other than those described in paragraph (b) of this section which cannot pass the closed bridges, the draws shall, upon receiving the prescribed signal, be opened when two or more such vessels or other watercraft may be ready to pass through: *Provided,* That in no case shall the delay be more than 20 minutes.

(e) When the draw of either of the bridges shall have been open for 10 minutes or longer, it may be closed for the crossing of trains, cars, vehicles, or persons, if any be waiting to cross, and after being so closed for 10 minutes or for such shorter time as may be necessary for the trains, cars, vehicles, or persons to cross, it shall again be opened promptly for the passage of foreign vessels or "vessels of the United States," if there be any such desiring to pass. The length of time that a draw shall have been open shall be computed from the time that the drawspan is fully open, and the length of time that a draw has been closed shall be computed from the time that the drawspan ceases to move in closing.

(f) For every vessel that cannot pass the closed bridges the operation of the draw shall afford full horizontal and vertical clearance in the draw opening regardless of the size or requirements of the passing vessel.

(g) Trains, cars, vehicles, or persons shall not be stopped on any drawspan for the purpose of delaying the opening of the draw, nor shall any vessel or other watercraft be so handled or placed as to delay the opening or closing of any drawspan, but all passage over, under, or through a drawspan shall be prompt so as to reduce delays to water and land traffic to a minimum.

(h) The owner of or agency controlling each bridge shall maintain in good and efficient order the

drawspan and the machinery and appliances for operating the same and for assisting vessels while passing through the draw. The owner of or agency controlling the bridge shall also provide and maintain at the drawspan such number of draw tenders or operators as may be necessary to open and close the same promptly; and shall also provide and maintain in good order on the bridge piers or fenders such fixtures as may be necessary to vessels in mooring or making fast while waiting for the drawspan to open.

§ 203.87 *Taunton River, Mass.; bridges.* (a) The signal for opening the draw of each of the drawbridges shall be three short blasts of a whistle or horn. This signal shall be answered by one long blast of a whistle or horn on the bridge when the operation of opening is commenced, or, if the draw cannot be opened promptly, by three long blasts and in addition a red flag or ball by day and a red light by night shall be conspicuously displayed on the bridge.

(b) Except as otherwise provided in this section, the draws of the bridges shall be immediately opened, upon receiving the prescribed signal, at all times during the day or night for the passage of foreign vessels and "vessels of the United States" as defined in R. S. 4311 (46 U. S. C. 251) unable to pass under the closed draws.

(c) When a train which will entirely cross a railroad bridge before stopping has reached the distance signal of the bridge and is in motion toward the bridge, the train may continue across the bridge, but in no case, except as provided in paragraph (f) of this section, shall the opening of the bridge for a vessel be delayed more than four minutes after the signal is given.

(d) Between 10:00 p.m. and 5:00 a.m. from May to October, inclusive, and between 6:00 p.m. and 6:00 a.m. from November to April, inclusive, the draw of the Bristol County highway bridge at Berkley shall be opened for the passage of all vessels which cannot pass the closed bridge upon notice given by telephone or otherwise to the operator at least 30 minutes in advance of the time the vessel desires to pass through the draw. The owner of or agency controlling the bridge shall provide arrangements whereby the draw tender can be reached by telephone or otherwise from the bridge, or through a public telephone exchange, and notice of such arrangements shall be kept conspicuously posted on the bridge.

(e) For all vessels or watercraft other than those described in paragraph (b) of this section which cannot pass the closed bridges, the draws shall, upon receiving the prescribed signal, be opened when two or more vessels or other watercraft may be ready to pass through: *Provided*, That in no case shall the delay be more than 20 minutes.

(f) When the draw of any of the bridges shall have been open for 10 minutes or longer, it may be closed for the crossing of trains, cars, vehicles, or persons, if any be waiting to cross, and after being so closed for 10 minutes or for such shorter time as may be necessary for the trains, cars, vehicles, or persons to cross, it shall again be opened promptly for the passage of foreign vessels or "vessels of the United States," if there be any such desiring to pass. The length of time that a draw shall have been open shall be computed from the time that the drawspan is fully open, and the length of time that a draw has been closed shall be computed from the time that the drawspan ceases to move in closing.

(g) For every vessel that cannot pass the closed bridges the operation of the draw shall afford full horizontal and vertical clearance in the draw opening regardless of the size or requirements of the passing vessel.

(h) Trains, cars, vehicles, or persons shall not be stopped on any drawspan for the purpose of delaying the opening of the draw, nor shall any vessel or other watercraft be so handled or placed as to delay the opening or closing of any drawspan, but all passage over, under, or through a drawspan shall be prompt so as to reduce delays to water and land traffic to a minimum.

(i) The owner of or agency controlling each bridge shall maintain in good and efficient order the drawspan and the machinery and appliances for operating the same and for assisting vessels while passing through the draw. The owner of or agency controlling the bridge shall also provide and maintain at the drawspan such number of draw tenders or operators as may be necessary to open and close the same promptly; and shall also provide and maintain in good order on the bridge piers or fenders such fixtures as may be necessary to vessels in mooring or making fast while waiting for the drawspan to open.

§ 203.90 *Providence Harbor, R. I.; bridges.* (a) The regulations contained in this section shall govern the operation of the City of Providence highway bridge at Point Street across the upper Providence River, and the New York, New Haven and Hartford Railroad Company India Point Bridge

at India Street, the State of Rhode Island Washington Bridge at Fox Point Boulevard, the New York, New Haven and Hartford Railroad Company Tunnel Bridge, and the City of Providence Red Bridge at Waterman Street, across the Seekonk River.

(b) Except as otherwise provided in paragraph (c) of this section, the draw of each bridge shall be opened promptly, upon receiving the prescribed signal, at all times during the day or night for the passage of vessels unable to pass under the closed draw.

(c) Between 7:00 and 9:00 a.m., and between 4:00 and 6:00 p.m., daily the draws of the highway bridges need not be opened for the passage of vessels other than loaded self-propelled cargo vessels and any assisting tugs: *Provided*, That the draws shall be opened promptly at all times for vessels owned or operated by the United States or the City of Providence desiring passage because of an emergency involving danger to life or property, upon sounding of four distinct blasts of a whistle or horn.

(d) The call signal for opening of the draw of each bridge shall be three short blasts of a whistle or horn. If the draw can be opened immediately, the call signal shall be acknowledged by one long blast of a whistle or horn on the bridge. If the draw cannot be opened immediately, the call signal shall be acknowledged by three long blasts, and in addition a red flag or ball by day and a red light by night shall be conspicuously displayed on the bridge.

§ 203.95 *Mystic River, Conn.; bridges (highway and railroad) at Mystic, Conn., operated by town of Groton, and New York, New Haven & Hartford Railroad Co.*—(a) *For the highway bridge.* (1) The draw shall be opened for the passage of foreign vessels and "vessels of the United States" as defined by section 4311 of the Revised Statutes (46 U.S.C. 251) at any time between sunrise and 1 hour after sunset (almanac time) immediately upon a signal given by one long blast and two short blasts of a horn or steam whistle, and at any time between 1 hour after sunset and sunrise (almanac time) upon notice to the draw tender given 1 hour or more in advance of the time the vessel desires to pass through the draw.

(2) The draw shall, when the signal described in subparagraph (1) of this paragraph is given, be opened as soon as practicable between sunrise and 1 hour after sunset (almanac time) for all other vessels which cannot pass the closed bridge, but in no case shall the delay be more than 20 minutes.

(3) In case the bridge cannot be immediately opened when the signal is given, a red flag or ball shall be conspicuously displayed.

(b) *For the railroad bridge.* (1) The draw shall be immediately opened at all times during the day or night for the passage of foreign vessels and "vessels of the United States," as defined by section 4311 of the Revised Statutes (46 U. S. C. 251) upon a signal to be given by one long blast and one short blast of a horn or steam whistle, except when an express passenger train, scheduled to pass beyond the bridge without stop, has entered the block in which the bridge is located, or when any other train which will entirely cross the bridge before stopping has reached the distance signal of the bridge, and is in motion toward the bridge, or when a passenger or mail train is actually ready to pass over it, but in no case shall the opening of the bridge for the vessels above-described be delayed more than 8 minutes after the signal is given.

(2) The draw shall, when the signal described in subparagraph (1) of this paragraph is given, be opened as soon as practicable for all other vessels which cannot pass the closed bridge, but in no case shall the delay be over 20 minutes.

(3) In case the bridge cannot be immediately opened when the signal is given, a red flag or ball by day or a red light by night shall be conspicuously displayed.

(4) Signals for the opening of the draw will be answered by the whistle on the bridge with one long blast when the operation of opening is commenced, or by three long blasts when the bridge cannot be promptly opened.

§ 203.100 *Thames River, Conn.; bridges of New York, New Haven & Hartford Railroad Co., and the State of Connecticut, at New London.* (a) As these bridges are less than 200 feet apart they must be operated as a unit to insure the safety and convenience of navigation. The opening of the State highway bridge shall be made upon signal from the operator of the railroad bridge, who shall direct the time of opening of both bridges.

(b) The signal for opening the draws of both of the bridges shall be given by three short blasts, each of about 2 seconds' duration, of a horn or steam whistle. In case the draws cannot be immediately opened when the signal is given, a red flag or ball by day and a red light by night shall be conspicuously displayed on each bridge.

(c) The signal for the opening of the draws shall be answered by one short blast of a whistle or horn on the railroad bridge when the operation of opening is commenced, or, if the draws cannot be promptly opened, by a series of not less than four short, sharp blasts (each of not more than 1 second duration) from either bridge.

(d) Except as provided in subparagraph (1) of this paragraph, the draws of the bridges shall be immediately opened, upon the prescribed signal, at all times during the day or night for the passage of foreign vessels and "vessels of the United States," as defined in section 4311 of the Revised Statutes (46 U. S. C. 251).

(1) *Exceptions.* (i) When a westbound train scheduled to cross the railroad bridge without stop has passed Midway Station, or a southbound train Groton Station, or an eastbound train New London Station, and is in motion toward the railroad bridge, the draws shall be opened for the above-named vessels as soon as the train has crossed the railroad bridge.

(ii) Closed periods when the draws of these bridges need not be opened are authorized as follows: For all days of the week:

Between 6:45 a.m. and 7:45 a.m.

Between 2:45 p.m. and 3:45 p.m.

(iii) Vessels of the United States Army, Navy, or Coast Guard services may request opening of the draws during the above periods, in event of emergency or other extraordinary circumstances.

(e) For all other vessels which cannot pass the closed bridges, the draws shall, upon the prescribed signal, be opened as soon as practicable, but in no case shall the delay be more than 20 minutes except as provided in paragraph (d) (1) of this section.

(f) This section shall take effect and be in force on and after October 1, 1919, and all regulations or parts of regulations in conflict therewith are hereby revoked to take effect on that date.

§ 203.105 *Shaws Cove, New London Harbor, Conn.; bridge of New York, New Haven & Hartford Railroad Co. at New London, Conn.* (a) Except as provided in subparagraphs (1) and (2) of this paragraph, the draw shall be immediately opened for the passage of foreign vessels and "vessels of the United States," as defined by section 4311 of the Revised Statutes (46 U. S. C. 251) at any time between 6 a.m. and 7 p.m. upon a signal given by one long and one short blast of a whistle or horn.

(1) *First exception.* Between 11 a.m. and 1:30 p.m., and between 3:15 p.m. and 4:30 p.m., the bridge may remain closed to all vessels, except in the case of fire above the bridge or other similar emergency, when the draw shall be immediately opened upon the prescribed signal being given.

(2) *Second exception.* When a westbound train scheduled to cross the bridge without stop has passed New London Station, or an eastbound train Waterford Station, and is in motion toward the bridge, the draw shall be opened for the above-named vessel as soon as the train has crossed the bridge, but in no case shall the opening of the draw for vessels above-described be delayed more than 10 minutes.

(b) The draw shall be opened as soon as practicable for the passage of all other vessels which cannot pass the closed bridge, at any time between 6 a.m. and 7 p.m., when the above-prescribed signal is given, but in no case shall such vessel be delayed more than 20 minutes, except as provided in the first exception under paragraph (a) of this section.

(c) Between 7 p.m. and 6 a.m. the draw shall be opened for the passage of all vessels which cannot pass the closed bridge, upon notice given by telephone or otherwise to the draw tender or the operator in the signal tower controlling the bridge signals at least 1 hour in advance of the time the vessel desires to pass through the draw, except that in case of fire or similar emergency the draw shall be promptly opened upon notification. Arrangements shall be provided whereby the draw tender or signal operator on duty can be conveniently reached by telephone between 7 p.m. and 6 a.m., and notice of such arrangements shall be kept conspicuously posted on the bridge.

(d) In case the bridge cannot be immediately opened when the signal is given, a red flag or ball by day and a red light by night shall be conspicuously displayed.

(e) Signals for the opening of the draw shall be answered by a whistle or horn on the bridge with the same signal named in paragraph (a) of this section (one long and one short blast) when opening is commenced; and by a series of four short blasts, each of not more than 1 second's duration, when the bridge cannot be promptly opened.

§ 203.110 *Niantic River, Conn.; bridges of New York, New Haven & Hartford Railroad Co., and the State of Connecticut at Niantic, Conn.* (a) The owners of, or agencies controlling the above-

named bridges shall provide the appliances and 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 (c) 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 except as provided in paragraph (c) of this section.

(c) *Signals*—(1) *Call signals for opening of draw*—(i) *Sound signals.* Railroad Bridge, one long and two short blasts of horn or whistle. Highway Bridge, three short blasts of horn or whistle.

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

(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: Two long blasts of a horn or whistle, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Visual signals.* To be used in conjunction with sound signals when conditions are such that sound signals cannot be heard. Draw to be opened immediately: A white flag by day or a green light at night swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately, or, if open, must be closed immediately: A red flag by day, a red light by night, swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

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

(4) *Exceptions*—(i) *For both bridges.* Between 8 p. m. and 4 a. m. during the period from April 1 to October 31 and 6 p. m. and 6 a. m. during the remaining months of the year the draw shall be opened for the passage of all vessels which cannot pass the closed bridges upon notice given by telephone or otherwise to the operators at least one hour in advance of the time the vessel desires to pass through. The owners of the bridges shall provide arrangements whereby the draw tenders may be reached by telephone or otherwise, and notice of such arrangements shall be kept conspicuously posted on the bridges.

(ii) *For the railroad bridge.* When a train scheduled to pass beyond the bridge without stop has entered the block in which the bridge is located the draw shall be opened as soon as the train has crossed the bridge, unless another train similarly scheduled and running in the opposite direction to the first train enters the block before the first train clears the bridge, in which case the draw shall be opened as soon as both trains have crossed the bridge. Further delay for train operation across the bridge is prohibited.

(d) A copy of the regulations in this section shall be conspicuously posted on both the upstream and downstream sides of the bridges in such a manner that it can be easily read at any time.

(e) This section shall take effect and be in force on and after December 31, 1937.

§ 203.115 *Connecticut River, Conn.; bridges.* (a) The signal for opening the draw of each of the drawbridges shall be one long blast (of about five seconds' duration) of a whistle or horn. This signal shall be answered by one long blast of a whistle or horn on the bridge when the operation of opening is commenced, or, if the draw cannot be opened promptly, by a series of not less than four short, sharp blasts (each of not more than one second's duration) and in addition a red flag or ball by day and a red light by night shall be conspicuously displayed on the bridge.

(b) Except as provided in subparagraph (c) of this section, the draws of the bridges described in this section shall be promptly opened, upon the prescribed signal, at all times during the day or night, for the passage of foreign vessels and "vessels of the United States," as defined in section 4311 of the Revised Statutes (46 U. S. C. 251).

(c) *Exceptions*—(1) *Railroad bridge at Lyme.* When a westbound train scheduled to cross the bridge without stop has passed Lyme and Blackhall Station, or an eastbound train Saybrook Junction Station, and is in motion toward the bridge, the draw shall be opened for the vessels described in paragraph (b) of this section as soon as the train has crossed the bridge.

(2) *Railroad bridge at Middletown.* When a westbound train scheduled to cross the bridge without stop has passed Portland Station, or an eastbound train Middletown Station, and is in motion toward the bridge, the draw shall be opened for the vessels described in paragraph (b) of this section as soon as the train has crossed the bridge.

(d) For all other vessels which cannot pass the closed bridges the draws shall, upon the prescribed signal, be opened as soon as practicable, but in no case shall the delay be more than 20 minutes.

(e) For every vessel that cannot pass the closed bridge the operation of the draw shall afford full horizontal and vertical clearance in the draw opening, regardless of the size or requirements of the passing vessel.

§ 203.120 *New Haven Harbor, Quinnipiac, West and Mill Rivers, Conn.; bridges (highway) operated by City of New Haven, Conn.* The regulations in this section are prescribed to govern the opening of certain drawbridges operated by the City of New Haven, Connecticut, as follows:

Tomlinson Bridge
Chapel Street Bridge across Mill River
Ferry Street Bridge across Quinnipiac River
Grand Avenue Bridge across Quinnipiac River
Kimberly Avenue Bridge across West River

(a) The owners of or agencies controlling the above-named bridges shall provide the appliances and 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 (c) 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 except as provided in subparagraph (c) of this section.

(c) *Signals*—(1) *Call signals for opening of draw*—(i) *Sound signals.*

Tomlinson Bridge, two short blasts of horn or whistle.
Chapel Street Bridge, three short blasts of horn or whistle.
Ferry Street Bridge, one short blast of horn or whistle.
Grand Avenue Bridge, one long blast of horn or whistle.
Kimberly Avenue Bridge, three short blasts of horn or whistle.

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

(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: Two long blasts of a horn or whistle, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Visual signals.* Draw to be opened immediately: A white flag by day or a green light at night swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately, or, if open, must be closed immediately: A red flag by day, a red light by night, swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

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

(d) *Exceptions.* Closed periods when the draws need not be opened are authorized as follows: Between 7:30 a. m. and 8:00 a. m., between 12:00 m. and 12:15 p. m., between 12:45 p. m. and 1:00 p. m., and between 5:00 p. m. and 5:30 p. m.

(e) A copy of the regulations in this section shall be conspicuously posted on both the upstream and downstream sides of the bridge in such manner that it can be easily read at any time.

(f) This section shall take effect and be in force on and after August 3, 1937, and the regulations approved March 20, 1923, to govern the operation of the above-named bridges are hereby revoked.

§ 203.125 *Housatonic River, Conn.; bridges (highway and railroad) between Milford and Stratford, Conn., known as the Washington Bridge and Bridge of New York, New Haven & Hartford Railroad Co.*—(a) *For the highway bridge.* (1) The draw shall be immediately opened at any hour of the day or night for the passage of foreign vessels and "vessels of the United States," as defined by section 4311, Revised Statutes (46 U. S. C. 251), upon a signal given by one long and one short blast of a horn or steam whistle.

(2) The draw shall, when the signal described in subparagraph (1) of this paragraph is given, be opened as soon as practicable for all other vessels which cannot pass the closed bridge, but in no case shall the delay be over 20 minutes.

(3) In case the bridge cannot be immediately opened when the signal is given, a red flag or ball by day or a red light by night shall be conspicuously displayed.

(4) Signals for the opening of the draw shall be answered by a whistle or Klaxon horn on the bridge with the same signal, one long and one short blast named in paragraph (a) of this section, when the operation of opening is commenced, or by a series of not less than four short sharp blasts, each of not more than 1 second's duration, when the bridge cannot be promptly opened.

(b) *For the railroad bridge.* (1) Except as provided for in subdivision (i) of this subparagraph, the draw shall be immediately opened at any hour of the day or night for the passage of foreign vessels and "vessels of the United States," as defined by section 4311, Revised Statutes (46 U. S. C. 251), upon a signal given by one long and two short blasts of a horn or steam whistle.

(i) *Exception.* When a train scheduled to pass beyond the bridge without stop has passed the last station nearest the bridge and is in motion toward the bridge, the bridge shall be opened for the vessels named in subparagraph (4) of this paragraph as soon as the approaching train has been brought to a stop at the drawbridge signal.

(2) The draw shall, when the signal described in subparagraph (1) (i) of this paragraph is given, be opened as soon as practicable for all other vessels which cannot pass the closed bridge, but in no case shall the delay be over 20 minutes.

(3) In case the bridge cannot be immediately opened when the signal is given, a red flag or ball by day or a red light by night shall be conspicuously displayed.

(4) Signals for the opening of the draw shall be answered by a whistle or Klaxon horn on the bridge with the same signal, one long and two short blasts, named in paragraph (e) of this section, when the operation of opening is commenced, or by a series of not less than four short sharp blasts, each of not more than one second's duration, when the bridge cannot be promptly opened.

§ 203.130 *Poquonock River, Yellow Mill Channel, and Johnsons River, Conn.; bridges (highway and railroad) at Bridgeport, Conn.* The regulations in this section are prescribed to govern the opening of certain drawbridges in the City of Bridgeport, Connecticut:

Poquonock River:
Stratford Avenue Highway Bridge.
New York, New Haven and Hartford Railroad Bridge.
Congress Street Highway Bridge.
East Washington Avenue Highway Bridge.
Grand Street Highway Bridge.
Yellow Mill Channel:
Yellow Mill Highway Bridge at Stratford Avenue.
Johnsons River:
Pleasure Beach Highway Bridge at end of Seaview Avenue.

(a) The signals for opening the draws of the bridges listed in this section shall be given by blasts of a horn or steam whistle as follows:

(1) For Stratford Avenue Highway Bridge, one long and one short blast.
(2) For New York, New Haven and Hartford Railroad Bridge, three short blasts.
(3) For Congress Street Highway Bridge, four short blasts.
(4) For East Washington Avenue Highway Bridge, one long and two short blasts.
(5) For Grand Street Highway Bridge, one long and three short blasts.
(6) For Yellow Mill Highway Bridge, one long and one short blast.
(7) For Pleasure Beach Highway Bridge, one long and one short blast.

In case the draw of any bridge cannot be immediately opened when the signals are given, a red flag or ball by day and a red light by night shall be conspicuously displayed on the bridge.

(b) (1) *Opening of draws.* Except as provided in subparagraph (2) of this paragraph, the draws of the bridges listed in paragraph (a) of this section shall be immediately opened, upon the prescribed signal, at all times during the day or night, for the passage of foreign vessels and "vessels of the United States," as defined in section 4311 of the Revised Statutes (46 U. S. C. 251), and for any other vessels or water craft which cannot pass the closed bridges the said draws shall be opened at such time within 20 minutes after the prescribed signal from the vessel or craft as in the judgment of the bridge tender will cause the least interference with the land traffic over the bridge.

(2) *Exceptions.* Closed periods when the draws of the highway bridges over the Poquonock River and the Yellow Mill Channel need not be opened:

(i) For vessels of any class:

6:45 a. m. to 7:15 a. m.

7:45 a. m. to 8:15 a. m.

(ii) Opened only for the passage of power-driven vessels, other than yachts and pleasure craft, 50 feet or over in length or 25 tons or over net register: 11:45 a. m. to 1:15 p. m.

(iii) For vessels of any class, except when an emergency condition exists, such emergency to be decided mutually by the Superintendent of Bridges, or his authorized representative, and navigation interests involved, and is provisionally defined as the passage of boats that are unavoidably compelled to pass through the bridges during the period due to urgency of service or condition of tide: 4:30 p. m. to 6:10 p. m.

(iv) Pleasure Beach Highway Bridge for vessels of any class:

10:30 p. m. to 11:00 p. m.

11:15 p. m. to 11:45 p. m.

(v) Delay in opening the draw of the New York, New Haven and Hartford Railroad Bridge for not more than 7 minutes after the giving of signal, is authorized when a passenger or mail train is actually ready to pass over the bridge.

(c) For every vessel that cannot pass the closed bridges the operation of the draws shall afford full horizontal and vertical clearance in the draw opening, regardless of the size or requirements of the passing vessel.

(d) There shall be kept conspicuously posted on both the upstream and downstream sides of the bridges in a manner that it can easily be read at any time a copy of the regulations in this section; also a notice shall be posted at the Stratford Avenue Bridge over the Poquonock River and the Yellow Mill Channel Bridge stating exactly how the Superintendent of Bridges, or his authorized representative, specified in paragraph (b) (2) (iii) of this section, may be reached.

(e) This section shall take effect and be in force on and after February 19, 1935, and all regulations or parts of regulations in conflict therewith are hereby revoked to take effect on that date.

§ 203.135 *Saugatuck River, Conn.; bridge of New York, New Haven & Hartford Railroad Co. at Saugatuck, Conn.* (a) Except as provided in subparagraph (1) of this paragraph, the draw shall be immediately opened for the passage of foreign vessels and "vessels of the United States," as defined by section 4311, Revised Statutes (46 U.S.C. 251), at any time between the hours of 5:00 a.m. and 9:00 p.m. upon a signal given by three short blasts (each of about 2 seconds' duration) of a horn or steam whistle.

(1) *Exception.* When a train scheduled to pass beyond the bridge without stop has passed the last station nearest the bridge and is in motion toward the bridge, the bridge shall be opened for the vessels described in paragraph (a) of this section as soon as the approaching train has been brought to a stop at the drawbridge signal.

(b) The draw shall, when the signal described in paragraph (a) of this section is given, be opened as soon as practicable between 5:00 a. m. and 9:00 p. m. for all other vessels which cannot pass the closed bridge, but in no case shall the delay be over 20 minutes.

(c) In case the bridge cannot be immediately opened when the signal is given, a red flag or ball by day or a red light by night shall be conspicuously displayed.

(d) Signals for the opening of the draw shall be answered by a whistle or Klaxon horn on the bridge with the same signal, three short blasts, described in paragraph (a) of this section, when the operation of opening is commenced, or by a series of not less than four short, sharp blasts, each of not more than 1 second's duration, when the bridge cannot be promptly opened.

§ 203.145 *Norwalk River, at Norwalk, Conn.; Washington Street Highway bridge and the New York, New Haven & Hartford Railroad bridge.* (a) The owners of or agencies controlling the bridges described in this section shall provide the appliances and 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 (c) (1) 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 except as provided in paragraph (d) of this section.

(c) *Signals.*—(1) *Call signals for opening of draw*—(i) *Sound signals.* Highway Bridge, three short blasts of horn or whistle. Railroad Bridge, one long and two short blasts of horn or whistle. Except

that for vessels drawing at the time 14 feet and more the above signals shall be followed by one long blast of horn or whistle.

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

(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: Two long blasts of a horn or whistle, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Visual signals.* Draw to be opened immediately: A white flag by day or a green light at night swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately, or, if open, must be closed immediately: A red flag by day, a red light by night, swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

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

(d) *Exceptions.* (1) The highway bridge: Closed periods when the draw need not be opened except for vessels drawing at the time more than 14 feet of water:

Between 7:15 a. m. and 8:20 a. m.
Between 11:50 a. m. and 12:15 p. m.
Between 12:45 p. m. and 1:00 p. m., and
Between 4:15 p. m. and 5:15 p. m.

(2) The railroad bridge: Closed periods when the draw need not be opened: When signal for opening the bridge is given between the hours of 7:00 a. m. and 9:00 a. m., or between 4:00 p. m. and 6:00 p. m. and low tide is predicted in the tide tables published by the United States Coast and Geodetic Survey to occur within 1 hour before or after the time when such signal is given, the opening of the bridge may be delayed not to exceed 20 minutes from the time such signal is given: *Provided, however*, That when a train scheduled to pass beyond the bridge without stop has passed the last station nearest the bridge and is in motion toward the bridge, the bridge need not be opened until the approaching train has been brought to a stop.

(e) A copy of the regulations in this section shall be conspicuously posted on both the upstream and downstream sides of the bridge in such manner that it can be easily read at any time.

(f) This section shall take effect and be in force on and after April 28, 1937, and the regulations approved June 21, 1933, to govern the operation of the bridges listed in this section are hereby revoked.

§ 203.150 *Mianus River, Conn.; bridge of New York, New Haven & Hartford Railroad Co. at Coscob, Conn.* (a) The signal for opening the draw of the bridge described in this section shall be given by three short blasts of a horn or steam whistle. In case the draw cannot be immediately opened when the signal is given, a red flag or ball by day or a red light by night shall be conspicuously displayed on the bridge.

(b) The signal for the opening of the draw shall be answered by three short blasts of a whistle or horn on the bridge when the operation of opening is commenced, or, if the bridge cannot be promptly opened, by a series of not less than four short, sharp blasts, each of not more than 1 second's duration.

(c) (1) Except as provided in subparagraph (2) of this paragraph, the draw shall be immediately opened upon the prescribed signal at any time between 5:00 a.m. and 9:00 p.m. for the passage of foreign vessels and "vessels of the United States," as defined by section 4311 of the Revised Statutes (46 U. S. C. 251).

(2) *Exception.* When a train scheduled to pass beyond the bridge without stop has passed the last station nearest the bridge and is in motion toward the bridge, the bridge shall be opened for the vessels described in subparagraph (1) of this paragraph as soon as the train has crossed the bridge.

(d) For all other vessels which cannot pass the closed bridge, the draw shall, upon the prescribed signals and between the hours of 5:00 a.m. and 9:00 p.m., be opened as soon as practicable, but in no case shall the delay be over 20 minutes.

§ 203.155 *Hutchinson River, N. Y.; bridges.* (a) The owners of or agencies controlling these drawbridges shall provide the appliances and personnel necessary for the safe, prompt, and efficient operation of the draws.

(b) The bridges shall be opened promptly at any time, day or night, when the prescribed signal is given by an approaching vessel which cannot pass under the closed draw.

(c) *Signals.* (1) *Call signals for opening of draw*—(i) *Sound signals.* By vessels of the United States or of the City of New York, four distinct blasts of a whistle, horn, or megaphone, or four loud and distinct strokes of a bell, and by all other vessels, three distinct blasts of a whistle, horn or megaphone, or three loud and distinct strokes of a bell, sounded within reasonable hearing distance of the bridge.

(ii) *Visual signals.* To be used in conjunction with sound signals when conditions are such that sound signals may not be heard. 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.

(2) *Acknowledging signals by the 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: Two long distinct blasts of a whistle, horn, or megaphone, or two loud and distinct strokes of a bell, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Visual signals.* To be used in conjunction with sound signals when conditions are such that sound signals may not be heard. Draw to be opened immediately: A white flag by day, a green light by night, swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately or, if open, must be closed immediately: A red flag by day, a red light by night, swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

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

(d) Trains, automobiles, trucks, other vehicles, and vessels shall not be stopped or operated in such manner as to hinder or delay the operation of the bridges, but all passage over drawspans or through draw openings shall be such as to expedite both land and water traffic.

(e) A copy of the regulations in this section shall be conspicuously posted on both the upstream and downstream sides of each bridge in such manner that it can be easily read at any time.

§ 203.160 *Harlem River, N. Y.; bridges.* (a) The drawbridges which leave a clear space, between the under sides thereof and the high water of spring tides, of 24 feet, shall not be opened except for vessels propelled by steam with or without vessels in tow; nor shall they be required to be opened at any times other than between 10:00 a.m. and 5:00 p.m.

(b) To the end that the draws of the bridges shall not be required to be opened or operated oftener than necessary between 10:00 a.m. and 5:00 p.m., the pilothouses, flagpoles, and smokestacks of all tugs propelled by steam, with or without vessels in tow, habitually using the river, shall not exceed 24 feet in height above the water line or, if exceeding that height, shall be reduced in height or hinged so that they can conveniently pass underneath the draws when closed.

(c) Any tug passing the draw of any of the bridges as often as once a day for 10 days of any month will be regarded as using the river "habitually" and shall conform to paragraph (b) of this section. A failure to comply with such requirement by any tug after one warning by the owner of or agency controlling any of the bridges shall be sufficient cause for a refusal to open the draw for the accommodation of such tug until such later time as may be convenient to the owner of or agency controlling the bridge.

(d) When a steam vessel wishes to pass a bridge within the time prescribed for opening the draw, it shall signify its intention by three blasts of the whistle. If the draw is ready to be opened, the signal shall be answered by three blasts of the whistle from the bridge; if the draw is not ready for opening, the signal shall be answered by two blasts from the bridge.

(e) The draw shall be opened with the least possible delay upon receiving the prescribed signal except when such signal is given to a railroad bridge five minutes or less before the scheduled arrival of an express passenger train. In such case the draw need not be opened until after the passage of the train unless the bridge tender has information that the train is delayed as much as five minutes.

(f) The draw of the low bridge at the mouth of Spuyten Duyvil Creek shall be opened at all times during the day and night when approached by boats desiring to pass it upon receiving the prescribed signal.

(g) Vessels owned, controlled, or employed by the United States or by the City of New York shall

be passed without delay through the draw of any of the bridges at any time, day or night, after giving a signal of four blasts of the whistle.

§ 203.165 *Newton Creek, N. Y.*—(a) *City of New York highway bridge at Vernon Avenue.* The draw of this bridge shall be opened promptly, upon signal, for the passage of all vessels unable to pass under the closed bridge at any time, day or night, except on weekdays between 6:20 and 6:30 a.m., 7:20 and 7:30 a.m., 7:50 and 8:00 a.m., 8:20 and 8:30 a.m., 12:00 noon and 12:10 p.m., 12:50 and 1:00 p.m., 5:10 and 5:20 p.m., and 5:50 and 6:00 p.m.

(b) *City of New York highway bridge across East Branch at Grand Street.* The draw of this bridge shall be opened promptly, upon signal, for the passage of all vessels unable to pass under the closed bridge at any time, day or night, except between 7:30 and 8:30 a.m., 12:00 noon and 12:15 p.m., 12:45 and 1:00 p.m., and 4:30 and 5:30 p.m. on all days other than Sundays and holidays.

(c) *Signals.* Whenever a vessel unable to pass under either closed bridge approaches it, the signal of its desire for the draw to be opened shall be three blasts of a whistle or horn blown on the vessel. This signal shall be repeated at intervals until it is answered from the bridge. Upon receiving the signal from the vessel, the operator of the bridge, in case the draw can be opened immediately, shall reply by three blasts of a whistle or horn, or by three loud and distinct strokes of a bell. In case of accident to the machinery or other contingency necessitating delay in opening the draw, the signal from the vessel shall be answered by the operator of the bridge by two blasts of a whistle or horn or by two loud and distinct strokes of a bell.

§ 203.170 *Coney Island Creek, N. Y.; City of New York highway and trolley bridge at Stillwell Avenue.* (a) When a vessel which cannot pass the closed bridge has signified by three blasts of a whistle or horn its intention to pass, the draw shall be opened at any time, day or night, for the passage of the vessel.

(b) After the prescribed signal is given, the draw shall be opened as soon as practicable, but in no case shall the vessel be delayed over 10 minutes at the bridge.

(c) Automobiles, trucks, other vehicles, and vessels shall not be stopped or operated in such manner as to hinder or delay the operation of the bridge, but all passage over the drawspan or through the draw opening shall be such as to expedite both land and water traffic.

§ 203.175 *Jamaica Bay and connecting waterways, N. Y.*—(a) *City of New York highway bridge across Mill Basin on Belt Parkway.* On Sundays from May 15 to September 30, inclusive, and on Memorial Day, Independence Day, and Labor Day, the draw of this bridge shall not be required to open for the passage of vessels between 12:00 noon and 9:00 p.m. (e. d. s. t.): *Provided,* That during the period from two hours before to one hour after the time of predicted high tide for the locality the bridge shall be opened promptly upon proper signal for the passage of vessels unable to pass under the bridge: *Provided further,* That the draw shall be opened promptly at any time for the passage of vessels owned, controlled, or employed by the United States or by the City of New York.

NOTE: For the purpose of the regulations in this part, high tide at the bridge shall be deemed to occur 15 minutes later than the time of high tide for Sandy Hook as given in the tide tables for the United States, published by the United States Coast and Geodetic Survey, Department of Commerce. The time stated in the tables is eastern standard time and one hour should be added thereto to convert to eastern daylight saving time.

(b) *City of New York highway bridges across North Channel (Grassy Bay) at Jamaica Bay Boulevard, Shellbank Basin at Nolins Avenue, and Hawtree Basin at Nolins Avenue.* (1) On Sundays, holidays, and between 6:00 p.m. and 6:00 a.m., the draws of these bridges shall not be required to open for the passage of vessels: *Provided,* That the draws shall be opened promptly at any time for the passage of vessels owned, controlled, or employed by the United States or by the City of New York when operators are present, and when operators are not required to be present the draws shall be opened for the passage of such vessels with the least possible delay upon receipt of verbal or written notice: *Provided further,* That the draws shall be opened for the passage of other vessels unable to pass under a closed bridge on Sundays, holidays, or between 6:00 p.m. and 6:00 a.m., if at least 24 hours' advance notice of the time the opening is required is given, by telephone or otherwise, to the authorized representative of the owner of or agency controlling the bridge. In addition to the posting of a copy of the regulations, required by paragraph (h) of this section, a notice shall be conspicuously posted on both the upstream

and downstream sides of these bridges in such manner that it can be easily read at any time stating exactly how the authorized representative may be reached.

(2) When two or more vessels are approaching from opposite directions and intend to pass a bridge, each vessel shall signal for the opening of the draw as prescribed in paragraph (f) 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 the right of way. When vessels are approaching the bridge from the same direction each vessel shall signal independently for the opening of the draw and shall be navigated in accordance with the applicable pilot rules.

(c) *Long Island Railroad bridge across Broad Channel at Broad Channel Station.* The draw of this bridge shall not be required to open for the passage of vessels between 7:00 and 9:00 a.m. and 5:00 and 7:00 p.m.

(d) *City of New York highway bridge across Beach Channel at Jamaica Bay Boulevard.* On Sundays and holidays from May 15 to September 15, inclusive, the draw of this bridge shall not be required to open for the passage of vessels between 12:00 noon and 9:00 p.m.: *Provided,* That during the period from two hours before to one hour after the time of predicted high tide for the locality the bridge shall be opened promptly upon proper signal for the passage of vessels unable to pass under the bridge: *Provided further,* That the draw shall be opened promptly at any time for the passage of vessels owned, controlled, or employed by the United States or by the City of New York.

NOTE: For the purpose of the regulations in this part, high tide at the bridge shall be deemed to occur 35 minutes later than the time of high tide for Sandy Hook as given in the tide tables for the United States, published by the United States Coast and Geodetic Survey, Department of Commerce.

(e) *Requirements for operation of draws.* The owners of or agencies controlling the bridges shall provide the appliances and the personnel necessary for the safe, prompt, and efficient operation of the draws. Except as otherwise provided in paragraphs (a) to (d) of this section, the draws shall be opened promptly when the prescribed signal for the opening of a draw is received from an approaching vessel which cannot pass under the closed bridge.

(f) *Signals*—(1) *Call signals for opening of draw*—(i) *Sound signals.* By vessels of the United States or of the City of New York, four distinct blasts of a whistle, horn, or megaphone, or four loud and distinct strokes of a bell, and by all other vessels, three distinct blasts of a whistle, horn, or megaphone, or three loud and distinct strokes of a bell, sounded within reasonable hearing distance of the bridge.

(ii) *Visual signals.* To be used in conjunction with sound signals when conditions are such that sound signals may not be heard. 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.

(2) *Acknowledging signals by the 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: Two long distinct blasts of a whistle, horn, or megaphone, or two loud and distinct strokes of a bell, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Visual signals.* To be used in conjunction with sound signals when conditions are such that sound signals may not be heard. Draw to be opened immediately: A white flag by day, a green light by night, swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately or, if open, must be closed immediately: A red flag by day, a red light by night, swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

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

(g) *Land and water traffic.* Trains, automobiles, trucks, other vehicles, and vessels shall not be stopped or operated in such manner as to hinder or delay the operation of the bridges, but all passage over drawspans or through draw openings shall be such as to expedite both land and water traffic.

(h) *Posting of regulations.* A copy of the regulations in this section shall be conspicuously posted on both the upstream and downstream sides of each bridge in such manner that it can be easily read at any time.

§ 203.180 *Long Island Intracoastal Waterway; Nassau County highway bridges across Reynolds Channel at Long Beach and Atlantic Beach, N. Y.* (a) The owner of or agency controlling these bridges

shall provide the appliances and the personnel necessary for the safe, prompt, and efficient operation of the draws.

(b) Except as provided in paragraph (c) of this section, the draws shall be opened promptly when the prescribed signal for the opening of the draw is received from an approaching vessel which cannot pass under the closed draw.

(c) (1) *Atlantic Beach Bridge.* From May 15 to September 30, inclusive, of each year, on Saturdays and Sundays and on Memorial Day, Independence Day, and Labor Day between 11:00 a.m. and 9:00 p.m., and on weekdays between 4:00 p.m. and 7:00 p.m., openings of the draw will be made, only if necessary, every half-hour on the hour and on the half-hour: *Provided,* That during the period from two hours before to one hour after the time of predicted high tide the bridge shall be opened promptly upon proper signal for the passage of vessels unable to pass under the closed draw: *Provided further,* That the draw shall be opened promptly at any time for the passage of vessels owned, controlled, or employed by the United States. The time specified is eastern daylight saving time or eastern standard time, whichever is in force.

NOTE: For the purpose of the regulations in this part, predicted high tide shall be deemed to occur ten minutes earlier than the time of predicted high tide for Sandy Hook as given in the tide tables for the United States published by the United States Coast and Geodetic Survey, Department of Commerce. The time stated in the tables is eastern standard time, and one hour should be added to convert to eastern daylight saving time.

(2) *Long Beach Bridge.* From May 15 to September 30, inclusive, of each year, on Saturdays and Sundays and on Memorial Day, Independence Day, and Labor Day between 3:01 p.m. and 7:59 p.m., openings of the draw will be made, only if necessary, every half-hour on the hour and on the half-hour: *Provided,* That the draw shall be opened promptly at any time for the passage of vessels owned, controlled, or employed by the United States. The time specified is eastern daylight saving time or eastern standard time, whichever is in force.

(d) *Signals*—(1) *Call signals for opening of draw*—(i) *Sound signals.* By vessels owned, controlled, or employed by the United States, four distinct blasts of a whistle, horn, or megaphone, or four loud and distinct strokes of a bell, and by all other vessels, three distinct blasts of a whistle, horn, or megaphone, or three loud and distinct strokes of a bell, sounded within reasonable hearing distance of the bridge.

(ii) *Visual signals.* To be used in conjunction with sound signals when conditions are such that sound signals may not be heard. 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.

(2) *Acknowledging signals by the 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: Two long distinct blasts of a whistle, horn, or megaphone, or two loud and distinct strokes of a bell, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Visual signals.* To be used in conjunction with sound signals when conditions are such that sound signals may not be heard. Draw to be opened immediately: A white flag by day, a green light by night, swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately or, if open, must be closed immediately: A red flag by day, a red light by night, swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

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

(e) Automobiles, trucks, other vehicles, and vessels shall not be stopped or operated in such manner as to hinder or delay the operation of the bridges, but all passage over drawspans or through draw openings shall be such as to expedite both land and water traffic.

(f) The owner of or agency controlling the bridges shall provide and keep in good legible condition on each bridge two board gages painted white, with black figures not less than eight inches high, to indicate the minimum headroom clearance under the closed drawspan at all stages of the tide. The gages shall be so placed on each bridge that they will be plainly visible to the operator of a vessel approaching the bridge either upstream or downstream.

(g) The bridges shall not be required to open for craft carrying appurtenances unessential for

navigation which extend above the normal superstructure. Military masts shall be considered as part of the normal superstructure.

NOTE: Upon request, the District Engineer, Corps of Engineers, will cause inspection to be made of the superstructure and appurtenances of any craft habitually frequenting the waterway with a view to adjusting any differences of opinion in this matter between the vessel owner and the bridge owner.

(h) A copy of the regulations in this section shall be conspicuously posted on both the upstream and downstream sides of each bridge in such manner that it can be easily read at any time.

§ 203.185 *Hudson River, N. Y.; bridges at Albany and Troy.* (a) The draw of each of the bridges below the head of tidewater shall be opened promptly at any time, upon receiving the prescribed signal, for the passage of any vessel which cannot pass under the closed draw: *Provided*, That The Delaware & Hudson Railroad Corporation bridge at Troy need not be opened between 6:00 p.m. and 6:00 a.m. unless notice has been given before 6:00 p.m. of the time a vessel may be expected to pass through.

(b) The draw of any bridge shall not be required to remain open for the passage of vessels for a period longer, consecutively, than 15 minutes. Upon being closed it may remain closed for a time sufficient to allow delayed land traffic to pass, but in no case for a period longer, consecutively, than 10 minutes if a vessel desires to pass, unless at the expiration of such period a train in motion having passed the derailing point is approaching the draw, which train shall be permitted to pass before opening of the draw: *Provided*, That no train shall be stopped on the bridge between the derailing points except in a case of great emergency, after which the draw shall be opened promptly for any vessel desiring to pass: *Provided further*, That these limitations shall not apply to any vessel of more than 500 tons burden, to any tug with a tow on a hawser, to single tows which require longer than 15 minutes to pass through the draw, or to vessels downbound during a freshet whose height exceeds an elevation determined upon by the District Engineer, Corps of Engineers.

(c) The length of time that a draw has been opened shall be computed from the time that the drawspan begins to move in opening, and the length of time that a draw has been closed shall be computed from the time that the drawspan ceases to move in closing.

(d) Vessels with tows shall not so approach a bridge as to attempt to pass the draw in succession without interval. They shall arrange their approach so as to cause no delay in closing the draw promptly for the relief of land traffic.

(e) The draw of a bridge shall not be required to be opened for the passage of vessels habitually using the river which have stacks, jack staffs, or flagstaffs exceeding 21 feet in height above the water line and which are otherwise capable of clearing the bridge when closed. If such vessels wish to pass the bridge the stacks, jack staffs, or flagstaffs must be so erected that they may be lowered to permit the passage under the bridge. Any tug or vessel passing the draw of a bridge as often as once a day for 10 consecutive days of any month shall be regarded as using the river habitually within the meaning of this paragraph. A failure to comply with such requirement by any tug or vessel after one warning by the owner of or agency controlling any of the bridges shall be sufficient cause for a refusal to open the draw for the accommodation of such tug or vessel until such later time as may be convenient to the owner of or agency controlling the bridge.

(f) Vessels which are owned or controlled by the United States or by the police or fire departments of any of the neighboring cities or villages shall be passed without delay through the draws of any of the bridges on identification of such vessels.

(g) *Signals*—(1) *Call signals for opening of draw.* By vessels bound north: Three long blasts of the whistle or horn. By vessels bound south: Three long blasts followed by one short blast of the whistle or horn. If a vessel desires to pass through more than one bridge the call signal shall be repeated for each bridge. Private signals of towing or steamboat companies which may be mistaken by a bridge tender for call signals shall not be used.

NOTE: As used in the regulations in this part, the term "long blast" means a blast of five seconds' duration, and the term "short blast" means a blast of one second's duration.

(2) *Acknowledging signals by the bridge operator*—(i) *All bridges.* If the draw is to be opened, three long blasts of a whistle or horn. If the draw cannot be opened in time for the vessel to pass through safely, five short blasts of a whistle or horn.

(ii) *Additional visible signals to be displayed by the bridges at Albany.* The day signal shall be displayed at least 15 feet above the fixed day signal at the middle point of the drawspan and so as to be

visible from both sides of the bridge. The night signal shall be displayed at least 15 feet above the fixed light at the center of the draw. The "fixed" signals referred to are those required by the regulations for lighting bridges prescribed by the United States Coast Guard (see Part 68 of this title). By day, if the draw is to be opened, the visible signal shall be a round ball not less than three feet in diameter and painted green, and if the draw is not to be opened, the visible signal shall be a latticework barrel-shaped sign five feet six inches high and four feet in diameter and painted red. By night, if the draw is to be opened, the visible signal shall be a green light from a standard marine lamp, and if the draw is not to be opened, the visible signal shall be a red light from a standard marine lamp.

§ 203.190 *Navigable waters in the State of New York and their tributaries; bridges where constant attendance of draw tenders is not required.* (a) The owners of or agencies controlling the bridges listed in paragraph (f) of this section will not be required to keep draw tenders in constant attendance.

(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) The bridges to which this section applies, and the regulations applicable in each case, are as follows:

(1) Arm of Eastchester Bay; City of New York highway bridge between Rodman Neck and City Island. At least 24 hours' advance notice required.

(2) Bronx River; New York, New Haven and Hartford Railroad Company bridge north of Westchester Avenue. At least 24 hours' advance notice required.

(3) Flushing Creek; City of New York highway and rapid transit bridge at Roosevelt Avenue. At least 24 hours' advance notice required: *Provided*, That the draw shall be opened for the passage of vessels owned, controlled, or employed by the United States or by the City of New York at any time, day or night upon reasonable advance notice. The draw need not be opened for the passage of vessels, other than vessels owned, controlled, or employed by the United States or by the City of New York, between 7:30 a.m. and 9:30 a.m. and between 4:30 p.m. and 6:30 p.m., or for the passage of tug boats, with or without vessels in tow, habitually passing the bridge, which exceed 24 feet in height above the water line, at any time. Any tug passing the bridge once a day for 10 days in any 30-day period will be regarded as habitually passing the bridge. Failure to conform to the height specified by any tug after one warning in writing by the owner of or agency controlling the bridge shall be sufficient cause for refusal to open the draw for the passage of such tug until such time as may be convenient to the owner of or agency controlling the bridge.

(4) Richmond Creek; City of New York highway bridge at Richmond Avenue, Staten Island. At least 24 hours' advance notice required.

(5) Peekskill (Annsville) Creek; New York Central Railroad Company bridge near Peekskill, N. Y. At least 30 days' advance notice, in writing, required. Openings will not be required on Saturdays, Sundays, and holidays, consisting of New Year's Day, Lincoln's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Election Day, Armistice Day, Thanksgiving Day, and Christmas Day, or on the days preceding and following such holidays. Openings will be between 11:00 a.m. and 2:00 p.m. except that for vessels owned, controlled, or employed by the United States, by the State of New York, or by any political subdivision thereof, the bridge shall be opened at any time, day or night, upon 96 hours' advance notice. Openings shall not be required more than twice in any 30-day period for a vessel that can pass under the bridge at low tide or the construction of which can be altered at reasonable expense so that it can pass under the bridge at low tide;

unless the vessel is owned, controlled, or employed by the United States, by the State of New York, or by political subdivision thereof.

(6) Lake Champlain; Vermont Department of Highways bridge across Alburg Passage, between Alburg Tongue and North Hero Island, at South Alburg, Vt. At least one hour's advance notice required.

(7) Lake Champlain; Vermont Department of Highways bridge across entrance to Missisquoi Bay, between Alburg Tongue and Hog Island, at East Alburg, Vt. At least 24 hours' advance notice required.

§ 203.200 *Newark Bay, Passaic and Hackensack Rivers, and their navigable tributaries; General regulations.* (a) The draws shall be opened promptly, upon signal, for the passage of vessels during the day or night, except as prescribed in paragraphs (b), (c), or (f) of this section.

(b) During the hours between 7:30 and 10:00 a.m. and between 5:00 and 7:30 p.m. drawbridges shall not be required to remain open longer than 10 minutes nor shall the passage of any vessel be delayed for longer than 10 minutes except as provided in paragraph (f) of this section.

(c) The draw of any bridge used solely for the United States mail, passenger, and express trains need not be opened for a vessel reaching said draw less than 5 minutes before the scheduled arrival of any such train until such train passes, unless the bridge tender has notice that the train is delayed more than 5 minutes. The owners of bridges acting under this rule shall maintain a tug at the drawbridge to control and aid in the passage of vessels.

(d) When a vessel approaches within signaling distance of a bridge for passage, the master thereof shall signify his intention by three blasts of a whistle or horn. For those bascule bridges that have two separate and distinct drawspans the approaching vessel shall signal for an opening of the bridge in the customary manner by three blasts of a whistle or horn, and this shall be followed after a short interval with one blast, if it is desired that the drawspan on the starboard hand as the vessel approaches be opened, or by two blasts if it is desired that the one on the port hand be opened. The signal of the craft shall be immediately answered by the tender or operator of the bridge. If the draw is ready to be immediately opened, the answer shall be three blasts of a whistle or horn from the bridge. In case of delay in opening the draw, as is provided for in this section, or as may be necessary by accident to the machinery or other contingency, the signal from the vessel shall be answered by two long blasts of a whistle or horn from the bridge. In all cases when delay signals have been given, a signal of three blasts of a whistle or horn shall be given as soon as it is possible to open the draw.

(e) Upon hearing or perceiving the signals prescribed, the tenders or operators of a drawbridge, except as provided in paragraphs (b), (c) and (f) of this section, shall at once open the draw signaled for so as to allow the prompt passage of any vessel or craft: *Provided*, That the bridge may not be opened when there is a train, wagon, or vehicle at the time passing over said drawspan, or a train approaching so closely that it cannot be safely stopped before reaching the bridge, but it shall be opened as soon as the drawspan can be cleared. In case the opening of the draw will be delayed under the provisions of paragraph (c) of this section the tug stationed at the draw shall immediately go to the assistance of the vessel.

(f) Each tug, towboat, barge and other small craft regularly and habitually navigating the aforementioned waterways shall be subject to inspection and measurement by the District Engineer, Engineer Department at Large in charge of the locality, to determine which vessels, if any, would, by reasonable reductions in heights of masts and/or stacks, be capable of passing under the closed draw of any bridge affording at least vertical clearance of 35 feet at mean high water. The said District Engineer will notify the owners of such vessels as can be so modified, of the date by which the modifications shall be completed. In the event of the failure of said owners to comply with such notification, the District Engineer will authorize the above bridge owners to delay opening their bridges, for the passage of said vessels, until convenient to do so, but on no occasion for more than 45 minutes: *Provided, however*, That such vessel shall not be so delayed when it has in tow another vessel or craft of such height as to require the opening of the bridge, or when, because of the stress of weather, prompt opening is necessary.

(g) 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 drawspan or through the draw opening shall be in a manner to expedite both land and water traffic.

(h) The regulations in paragraphs (a) to (g) of this section apply only to commercial or pleasure vessels. Steamers or vessels employed or controlled by the United States Government, State govern-

ment, or by municipal departments shall be passed without delay through the draws of said bridges at any hour of the day or night, upon giving four blasts of the whistle.

(i) Clearance gages of a type to be approved by the District Engineer, Engineer Department at Large, in charge of the locality, shall be provided by the owner of each bridge and be kept in good legible condition. Unless otherwise specified, such clearance gages shall consist of two board gages painted white with black figures not less than 9 inches high, which shall indicate the headroom clearances under the closed span at all stages of the tide. These gages shall be illuminated at night and during the time of fog, rain and snow. These gages shall be so placed that they will be plainly visible to the navigator of a vessel approaching the bridge either up or downstream.

§ 203.210 *Raritan River and Arthur Kill, and their navigable tributaries; bridges.* (a) All drawbridges spanning Raritan River and Arthur Kill, and their navigable tributaries, shall be opened promptly upon signal, for the passage of vessels during the day or night, except as prescribed in paragraph (b) of this section.

(b) During the hours between 7:30 and 10 a.m. and between 5:00 and 7:30 p.m. drawbridges shall not be required to remain open longer than 10 minutes nor be permitted to remain closed longer than 10 minutes to the exclusion of vessels approaching for passage: *Provided*, That the draw of any bridge used solely for United States mail, passenger, and express trains need not be opened for a vessel reaching said draw less than 5 minutes before the scheduled arrival of any such train, until such train passes, unless the bridge tender has notice that the train is delayed more than 5 minutes: *Provided further*, That the owners of bridges acting under this rule shall maintain a tug at the drawbridge to control and aid in the passage of vessels.

(c) When a vessel approaches within signaling distance of a bridge for passage, the master thereof shall signify his intention by three blasts of a whistle or horn. The signal shall be answered by three blasts of a whistle or horn from the bridge unless, under paragraph (b) of this section a delay in opening is permitted, when the answer from the bridge will be two blasts of whistle or horn, and the tug stationed at the draw shall immediately go to the assistance of the vessel.

(d) Upon hearing or perceiving the signals prescribed, the tenders or operators of a drawbridge except as provided in paragraph (b) of this section shall at once open the drawspans of the bridge for the prompt passage of any vessel or craft: *Provided*, That the bridge may not be opened when there is a train, wagon, or vehicle at the time passing over said drawspan, or a train approaching so closely that it cannot be safely stopped before reaching the bridge, but it shall be opened as soon as the drawspan may be cleared.

(e) Wagons, vehicles, and trains shall not be stopped on a drawbridge or on a drawspan for the purpose of delaying the operation of the drawbridge, nor shall water craft or vessels be so manipulated as to hinder or delay the operation of the drawspan, but all passage upon, through, or under a drawbridge shall be prompt, to prevent delay to either land or water communication.

(f) Paragraphs (a) to (e) of this section apply only to commercial or pleasure vessels. Steamers or vessels employed or controlled by the United States Government or by municipal departments shall be passed without delay through the draws of said bridges at any hour of the day or night upon giving four blasts of the whistle.

(g) This section will take effect on and after September 1, 1905.

§ 203.215 *Navigable streams flowing into Raritan Bay (except Raritan River and Arthur Kill), the Shrewsbury River and its tributaries, and all inlets on the Atlantic Ocean including their tributaries and canals between Sandy Hook and Bay Head, N. J.; bridges.* (a) The owners of or agencies controlling drawbridges shall provide the appliances and the personnel necessary for the safe, prompt and efficient operation of the draws.

(b) Drawbridges shall be opened promptly for the passage of any vessel or other water craft unable to pass under the closed spans, except as hereinafter provided.

(c) *Signals*—(1) *Call signals for opening of draw.* (i) *Sound Signal.* Three distinct blasts of a whistle, horn or megaphone, or three loud and distinct strokes of a bell, sounded within a reasonable hearing distance of the bridge.

(ii) *Visual signal.* To be used in conjunction with sound signals when conditions are such that sound signals cannot be heard. 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.

(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:

Two long distinct blasts of a whistle, horn or megaphone, or two loud and distinct stokes of a bell, to be repeated at regular intervals until acknowledged by the vessel.

(ii) *Visual signals.* To be used in conjunction with sound signals when conditions are such that sound signals cannot be heard. Draw to be opened immediately: A white flag by day or a green light at night swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately, or, if open, must be closed immediately: A red flag by day, a red light by night, swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

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

(d) Trains, automobiles, trucks, and other vehicles, vessels or other water craft shall not be stopped or manipulated in a manner hindering or delaying the operation of these drawbridges, but all passage over drawspans or through draw openings shall be so as to expedite both land and water traffic.

(e) The owners of or agencies controlling these bridges shall provide and keep in good legible condition two board gages painted white, with black figures not less than 8 inches high, to indicate the headroom clearance under the closed drawspan at all stages of the tide. The gages shall be so placed on the bridge that they will be plainly visible to the operator of the vessel approaching the bridge either up or downstream.

(f) These drawbridges shall not be required to open for craft carrying appurtenances unessential for navigation which extend above the normal superstructure. Military masts shall be considered as part of the normal superstructure. Upon request, the district engineer in charge of the locality will cause inspection to be made of the superstructure and appurtenances of any craft habitually frequenting those waterways, with a view to adjusting any differences of opinion in this matter between the vessel owner and the bridge owner.

(g) Copies of the regulations in this section shall be conspicuously posted on both the upstream and downstream sides of the bridges in such manner that it can be easily read at any time.

(h) This section shall take effect and be in force on and after June 11, 1937.

(i) The regulations to govern the operation of the Ocean Avenue bridge across the mouth of the Shark River between Belmar and Avon-by-the-Sea, and to govern the operation of drawbridges across Manasquan River, its navigable tributaries and the Bay Head-Manasquan Canal, New Jersey, prescribed under the dates of March 29, 1933, and January 18, 1937, respectively, are hereby revoked.

§ 203.225 *Navigable waters in the State of New Jersey; bridges where constant attendance of draw tenders is not required.* (a) The owners of or agencies controlling the bridges listed in paragraph (f) of this section will not be required to keep draw tenders in constant attendance.

(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) The bridges to which this section applies, and the regulations applicable in each case, are as follows:

(1) Overpeck Creek; New York Susquehanna and Western Railroad Company bridge and West Shore Railroad Company (New York Central System) bridge at Ridgefield Park. Between 10:00 p. m. and 6:00 a. m., at least two hours' advance notice required. At all other times and in all other respects the regulations contained in § 203.200 shall govern the operation of these bridges.

(2) Passaic River; Passaic and Bergen Counties highway bridge at West Eighth Street, Passaic. At least 24 hours' advance notice required.

(3) Elizabeth River; The Central Railroad Company of New Jersey bridge at Elizabeth. At least four hours' advance notice required.

(4) Shrewsbury River (South Branch) at junction of Parker Creek and Oceanport Creek; Monmouth County Gooseneck Highway Bridge. From November 1 to April 30, inclusive, at least four hours' advance notice required. At all other times and in all other respects the regulations contained in § 203.215 shall govern the operation of this bridge.

(5) Oceanport Creek; The New York and Long Branch Railroad Company bridge near Oceanport. At least four hours' advance notice required.

§ 204. DANGER ZONE REGULATIONS.—Regulations governing danger areas within the limits covered by this Coast Pilot follow.

§ 204.5 *Nantucket Sound, Buzzards Bay, and adjacent waters, Mass.; danger zones for naval operations*—(a) *Nantucket Sound in vicinity of Horseshoe Shoal*—(1) *The area.* An area one mile square located on Horseshoe Shoal, bounded on the north by latitude 41°31′12″, on the east by longitude 70°21′38″, on the south by latitude 41°30′12″, and on the west by longitude 70°22′58″. The center of the area, at latitude 41°30′42″, longitude 70°22′18″, bears approximately 167° true, 11,900 yards, from West Bay Entrance Light at Osterville, Massachusetts. Vessels used as bombing targets within this area, whether anchored or grounded, will be properly secured and marked.

(2) *The regulations.* During the period from November 1 to June 1, inclusive, no vessel shall enter or remain in the area unless authorized to do so by the enforcing agency. The regulations in this paragraph shall be enforced by the Commander, Naval Air Bases, First Naval District, Quonset Point, Rhode Island, and such agencies as he may designate.

(b) *Atlantic Ocean in vicinity of No Mans Land*—(1) *The area.* The waters within a rectangular area bounded on the north by latitude 41°16′00″, on the east by longitude 70°47′30″, on the south by latitude 41°12′30″, and on the west by longitude 70°50′30″.

(2) *The regulations.* No vessel shall enter or remain in the area at any time except by permission of the enforcing agency. The regulations in this paragraph shall be enforced by the Commandant, First Naval District, and such agencies as he may designate.

(c) *Buzzards Bay northeasterly of Weepecket Island*—(1) *The area.* The waters within a circular area with a radius of 1,000 yards having its center on a rock northeasterly of Weepecket Island at latitude 41°31′06″, longitude 70°44′06″.

(2) *The regulations.* No vessel shall enter or remain in the area at any time except as authorized by the enforcing agency. The regulations in this paragraph shall be enforced by the Commandant, First Naval District, and such agencies as he may designate.

(d) *Vineyard Sound in vicinity of Quicks Hole*—(1) *The area.* The waters within a circular area with a radius of 900 yards having its center on Nashawena Island at latitude 41°26′, longitude 70°51′.

(2) *The regulations.* No vessel shall enter or remain in the area from 10:00 a. m. to sunset except as authorized by the enforcing agency. The regulations in this paragraph shall be enforced by the Commandant, First Naval District, and such agencies as he may designate.

(e) *Buzzards Bay in vicinity of Gull Island*—(1) *The area.* The waters within a circular area with a radius of 1,000 yards having its center on Gull Island at latitude 41°26′46″, longitude 70°54′26″.

(2) *The regulations.* No vessel shall enter or remain in the area at any time except as authorized by the enforcing agency. The regulations in this paragraph shall be enforced by the Commandant, First Naval District, and such agencies as he may designate.

(f) *Atlantic Ocean in vicinity of Sow and Pigs Reef*—(1) *The area.* A circular area located on Sow and Pigs Reef with a radius of 2,000 feet having its center at latitude 41°24′12″, longitude 70°57′48″, which bears approximately 222° true, 1,800 yards, from Cuttyhunk Light on the southwest point of Cuttyhunk Island. Vessels used as bombing targets within this area, whether anchored or grounded, will be properly secured and marked.

(2) *The regulations.* During the period from November 10 to April 30, inclusive, no vessel shall enter or remain in the area unless authorized to do so by the enforcing agency. The regulations in this paragraph shall be enforced by the Commander, Naval Air Bases, First Naval District, Quonset Point, Rhode Island, and such agencies as he may designate.

(g) *Buzzards Bay in vicinity of Hen and Chicken Reef*—(1) *The area.* A circular area located on Hen and Chicken Reef with a radius of 2,000 feet having its center at latitude 41°28′12″, longitude 71°01′42″, which bears approximately 151° true, 1,670 yards, from the southern end of Gooseberry Neck. Vessels used as bombing targets within this area, whether anchored or grounded, will be properly secured and marked.

(2) *The regulations.* No vessel shall enter or remain in the area at any time unless authorized to do so by the enforcing agency. The regulations in this paragraph shall be enforced by the Commander, Naval Air Bases, First Naval District, Quonset Point, Rhode Island, and such agencies as he may designate.

§ 204.10 *Narragansett Bay and adjacent waters, R. I.; danger zones for naval operations*—(a) *Bombing target area in vicinity of Cormorant Rock*—(1) *The area.* A circular area with a radius of 1,000 feet having its center on Cormorant Rock at latitude 41°27′37″, longitude 71°14′54″.

(2) *The regulations.* (i) No vessel shall enter or remain in the area between 9:00 a. m., and 5:00 p. m. (local time), Monday to Friday, inclusive, except as authorized by the enforcing agency.

(ii) The regulations in this paragraph shall be enforced by the Commandant, First Naval District, and such agencies as he may designate.

(b) *Torpedo-testing range and prohibited area, Naval Operating Base, Newport*—(1) *The torpedo-testing range.* The waters within an area east of Conanicut Island and west of Prudence Island bounded as follows: Beginning at a point on the east shore of Conanicut Island at latitude 41°31′00″, thence 90° to longitude 71°20′48″; thence to latitude 41°31′45″, longitude 71°20′09″; thence to latitude 41°33′56″, longitude 71°19′30″; thence 346° to the south shore of Prudence Island; thence northerly along the west shore of Prudence Island to the north side of Coggeshall Cove; thence to the easternmost point of Patience Island; thence southwesterly and northwesterly along the shore of Patience Island to North West Point; thence 177° to the east shore of Conanicut Island; and thence southerly along the east shore of Conanicut Island to the point of beginning.

(2) *The prohibited area.* An area overlapping the torpedo-testing range bounded as follows: Beginning at a point on the east shore of Conanicut Island at latitude 41°33′15″; thence to latitude 41°32′14″ longitude 71°20′58″; thence to latitude 41°32′17″, longitude 71°20′32″; thence due north to latitude 41°37′17″; thence 270° to longitude 71°21′03″; thence to latitude 41°37′15″, longitude 71°21′26″; thence to a point on the north shore of Hope Island at longitude 71°22′00″; thence along the north, east, and southeast shore of Hope Island to longitude 71°22′03″; thence to a point on the northeast shore of Conanicut Island at longitude 71°22′00″; thence southerly along the east shore of Conanicut Island to the point of beginning.

(3) *The regulations.* (i) No vessel shall at any time, under any circumstances, anchor or fish or tow a drag of any kind in the prohibited area because of the extensive cable system located therein.

(ii) Anchoring in the torpedo-testing range outside the prohibited area is forbidden except in cases of great emergency, and vessels anchoring therein under such conditions shall move out of the area as soon as possible.

(iii) The danger zone shall be given a wide berth when possible in order to avoid danger from running torpedoes, damage to range installations, or interference with range operations.

(iv) The danger zone may, in case of necessity, be entered by vessels proceeding to or from the Naval Air Station, Quonset Point, the advanced Base Depot, Davisville, or other points in the western part of Narragansett Bay, and passing between Conanicut Island and Gould Island, under the following conditions:

(*a*) *When firing is in progress.* In the case of major vessels making this passage, firing will be suspended on their approach to the danger zone or on request to the Proof Officer, Firing Pier, Gould Island. Minor vessels making this passage must proceed with caution, avoid torpedoes, and observe orders from craft patrolling the zone which are identified by a square red flag. Other than as specified in this subparagraph, vessels shall not enter the danger zone while firing is in progress except by special arrangement through the Proof Officer, Firing Pier, Gould Island, or through the Officer in Charge, Magnetic Range, if entering for operations on the Magnetic Range.

(*b*) *When firing is not in progress.* Vessels may make this passage without special precautions, except that diving tenders with divers down shall be given a wide berth and passed at slow speed.

(v) A large red flag by day, an all around green light by night, will be displayed from the Firing

Pier at the north end of Gould Island to indicate that torpedo firing is in progress or is about to begin Torpedo firing may be expected at any time of the day or night, Sundays and holidays included.

(vi) When torpedo firing is in progress, a patrol boat will be kept in readiness and will give timely warning to vessels approaching the danger zone and will issue necessary orders and instructions regarding the navigation of the danger zone. Craft patrolling the danger zone are identified by a square red flag.

(vii) Orders and instructions issued by patrol craft or other authorized representatives of the enforcing agency shall be promptly carried out by vessels in or in the vicinity of the danger zone. The following emergency signals will be employed by patrolling aircraft:

(*a*) *Emergency, stop and await instructions.* Plane lands in front of, or drops smoke float directly ahead of, the vessel.

(*b*) *Emergency, torpedo heading toward you, maneuver to avoid.* Plane zooms over the vessel in danger.

(viii) Nothing in this paragraph shall prevent the setting of fish traps outside the prohibited area under permits issued by the Department of the Army, nor shall the passage of fishing vessels to and from authorized traps be unreasonably interfered with or restricted.

(ix) This paragraph shall be enforced by the Commandant, United States Naval Operating Base, Newport, Rhode Island, and such agencies as he may designate.

Prohibited area in vicinity of Ohio Ledge—(1) *The area.* A circular area with a radius of 900 yards having its center on Ohio Ledge at latitude 41°41′00″, longitude 71°19′30″.

(2) *The regulations.* (i) No vessel shall enter or remain in the area at any time except as authorized by the enforcing agency or as provided in subdivision (ii) of this subparagraph.

(ii) The area is released for the use of surface craft during the periods beginning at midnight before Saturday and ending at midnight after Sunday, both local time, and similarly from midnight before, to midnight after, Independence Day, Labor Day, Armistice Day, Thanksgiving Day, Christmas Day, New Year's Day, Washington's Birthday, and Memorial Day.

(iii) This paragraph shall be enforced by the Commandant, First Naval District, and such agencies as he may designate.

§ 204.12 *Block Island Sound in vicinity of Gardiners Point, N. Y.; naval aircraft bombing target area*—(a) *The danger zone.* A circular area with a radius of 2,000 feet having its center on the Ruin at Gardiners Point, latitude 41°08′30″, longitude 72°08′46″, which point bears 326° true, 2,700 yards, from the northern end of Gardiners Island.

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

(2) The regulations in this section shall be enforced by the Commander, Naval Air Bases, First Naval District, Quonset Point, Rhode Island, and such agencies as he may designate.

§ 204.19 *Sandy Hook Bay; mine practice training area, Fort Hancock, N. J.*—(a) *Danger zone.* The mine practice area includes the waters of Sandy Hook Bay, within the area inclosed by lines bearing 205° true from Sandy Hook Point Light and 269°31′ true from Can Buoy "3FH".

(b) *Regulations.* (1) No vessel shall anchor in and no vessel with a draft exceeding 12 feet shall enter the danger zone excepting vessels of the United States.

(2) This section shall be enforced by the Commanding Officer, Fort Hancock, New Jersey, and such agencies as he may designate.

§ 206. FISHING AND HUNTING REGULATIONS.—Regulations governing fishing and hunting regulations for areas other than those shown on the charts within the limits covered by this Coast Pilot follow.

§ 206.46 *Hudson River, N. Y., north of Stony Point, Stony Point, N. Y.; fishing.* (a) That fixed nets and poles for shad or other fishing may be placed in the river without special permission provided that they shall not obstruct or endanger navigation, subject to the following conditions:

(1) That this authority does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining State assent to the work authorized. It merely expresses the assent of the Federal Government so far as concerns the public rights of navigation. (See *Cummings* v. *Chicago*, 188 U. S. 410.)

(2) That no fixed nets or poles for shad or other fishing shall be placed closer than 100 feet of the Federal project channel; or within 1,000 feet of the line of a ferry; or within an area 600 feet of a normal line drawn from the center of the channel to any point of a dock used for navigation or to the mouth of a navigable creek, river, tributary, cove or estuary.

(3) That the District Engineer, Engineer Department at Large, in charge of the locality, who is charged with the duty of supervising the enforcement of the law and the regulations may order the prompt removal of any fish nets and/or poles at any time, if, in his judgment, the interests of navigation so require.

(4) That upon ceasing to use for fishing purposes any fixed nets or poles placed in the river they shall at once be removed by the owner and failure to do so shall be considered sufficient ground for their summary removal by the United States at the expense of the owner and for his prosecution under the provisions of sections 10 and 12 of the River and Harbor Act approved March 3, 1899, for maintaining illegal structures endangering navigation.

(5) That no fixed nets or poles for shad or other fishing shall be maintained in any area regularly frequented by small boats from June 20 to September 15.

(6) Fishing structures and appliances in navigable waters of the United States are required to be lighted for the safety of navigation as provided in § 209.130 (q) of this chapter.

(b) In the absence of the issuance of the Department of the Army permits under this section fishermen placing nets and poles in the proximity of areas used by navigation shall light the structures with lights visible in clear weather at least 3 miles and to suitably mark the location of the net in the daytime by red flags 2 feet square.

§ 207. NAVIGATION REGULATIONS.—Regulations governing navigation in special areas within the limits covered by this Coast Pilot follow.

§ 207.20 *Cape Cod Canal, Mass.; use, administration, and navigation.* These regulations follow the description of the canal in a later chapter.

§ 207.23 *Narragansett Bay, East Passage, west of Gould Island; naval prohibited area*—(a) *The area.* Beginning at Gould Island South Light (latitude 41°32′, longitude 71°21′); thence 256° true, 710 yards; thence 346° true, 1,000 yards; thence 76° true, 850 yards, to the northern end of Gould Island; and thence southerly along the line of mean high water to the point of beginning.

(b) *The regulations.* (1) No vessel shall at any time, under any circumstances, anchor, fish, or tow a drag of any kind in the prohibited area because of the extensive cable system located therein.

(2) No vessel shall enter the prohibited area except under the direction of appropriate United States Naval authority.

(3) This section shall be enforced by the Commandant, Naval Operating Base, Newport, Rhode Island, and such agencies as he may designate.

§ 207.35 *Manhasset Bay, N. Y.; seaplane restricted area*—(a) *The restricted area.* An area in Manhasset Bay between the shore at Manorhaven on the north and the southerly limit line of the special anchorage area in Manhasset Bay, west area at Manorhaven (described in § 202.60), on the south; its axis being a line bearing 166°50′ true from latitude 40°50′17.337′, longitude 73°43′03.877″, which point is on the south side of Orchard Beach Boulevard at Manorhaven; and being 100 feet wide for a distance of 380 feet in a southerly direction from the south side of Orchard Beach Boulevard, and thence flaring to a width of 300 feet at the southerly limit line.

(b) *The regulations.* (1) Vessels shall not anchor or moor within the restricted area.

(2) All vessels traversing the area shall pass directly through without unnecessary delay, and shall give seaplanes the right-of-way at all times.

(3) The regulations in this section shall be enforced by the Captain of the Port of New York and such agencies as he may designate.

§ 207.40 *Ambrose Channel, New York Harbor, N. Y.; navigation.* (a) The use of Ambrose Channel (formerly and before improvement called "East Channel") is hereby restricted to navigation by vessels under efficient control with their own motive power and not having barges or other vessels or floats in tow. Sailing vessels and vessels carrying tows are not permitted to use this channel except under permit as provided in paragraph (b) of this section.

(b) The district engineer in charge of the improvement of Ambrose Channel may, by written permit, authorize vessels under tow to use Ambrose Channel in special cases when, in his judgment, the draft of such vessels or other conditions may render unsafe the use of other channels.

(c) Vessels permitted to use Ambrose Channel under paragraphs (a) and (b) of this section must proceed through the channel at a reasonable speed such as not to endanger other vessels and not to interfere with any work which may become necessary in maintaining, surveying, or buoying the channel; and they must not anchor in the channel except in cases of emergency, such as fog or accident, which would render progress unsafe or impossible.

(d) This section is not to be construed as prohibiting any necessary use of the channel by any Government boats while on Government duty, nor in emergencies by pilot boats whether steam or sail, nor by police boats.

(e) This section shall remain in force until modified or rescinded, and shall supplant all prior regulations governing the use of Ambrose Channel, which are hereby revoked.

§ 207.50 *Hudson River Lock at Troy, N. Y.; navigation*—(a) *Authority of lockmaster.* The movement and position of all boats and floating craft, while at the lock or in the entrance thereto, shall be subject to the direction of the lock tenders, whose orders must be obeyed by masters and others in the operation and mooring of such boats and craft. The men in charge of boats shall give such assistance in making the lockage as the lock tender may require.

(b) *Signals.* Steamboats or tows desiring lockage in either direction shall give notice to the lock tenders, at not more than three quarters of a mile from the lock, by one long blast of the whistle, not exceeding 10 seconds, followed by one short blast, not exceeding 3 seconds. The signal from the lock for boats or other craft to enter will be shown by the signal posts.

(c) *Draft of boats.* Deep-draft boats must clear the miter sills by at least 3 inches. Boats drawing too much water will not be allowed to lighter cargo in the entrances.

(d) *Precedence.* Usually the boat arriving first at the lock will be the first locked through; but when many boats are to be passed, precedence will be given to the boats belonging to the United States. Passenger boats will have precedence over tows and like craft. If the traffic is crowded in both directions, up and down lockages will usually be made alternately, but the lock tender may permit two or more lockages to be made at one time in the same direction when this will not cause unreasonable delay. In case two or more boats or tows are to enter for the same lockage, they shall enter as directed by the lock tender. No boat shall run ahead of another while in the lock. The boat that enters first shall leave first.

(e) *Pleasure boats.* Pleasure boats, houseboats, and other craft not employed for commercial purposes will be locked through only at the end of each hour, except that whenever a lockage is made for a commercial boat other craft may pass through if there is room. The decision of the lock tender as to the time for locking shall be final.

(f) *Stations while waiting.* Boats waiting their turn to enter the lock must lie at a sufficient distance from the lock and in such a position as to leave sufficient room for the passage of boats leaving the lock.

(g) *Unnecessary delay.* (1) Boats must not cause delay in entering or leaving the lock. Masters and pilots will be held to a strict accountability in this matter, and those with tows must provide enough men to move barges promptly. Boats failing to enter the lock with reasonable promptness after being signaled will lose their turn.

(2) Tugboats arriving with their tows in a condition which will delay locking shall lose their turn if so ordered by the lock tender. Leaking boats may be excluded until put in shape to be passed through safely.

(h) *Mooring.* Boats in the lock or waiting in the entrance shall be moored where directed by the lock tender, by bow, stern, and spring lines, to the snubbing posts or line hooks. Tying boats to the lock ladders is strictly prohibited.

(i) *Protection of lock gates.* Boats will not be permitted to enter or leave the lock until the lock gates are at rest in the gate recesses and the lock tender has directed the boat to start.

(j) *Damage to walls, etc.* All craft passing through the lock must be free from projections or sharp corners which might scar the walls or injure other parts. Steamboats must be provided with suitable fenders, etc. One man shall be kept at the head of every tow till it has cleared the lock and guide walls, and shall use the fender to prevent scarring the walls.

(k) *Handling machinery.* None but employees of the United States will be allowed to move any valve, gate, or other machinery belonging to the lock.

(l) *Refuse in lock.* Throwing ashes, refuse, or other obstruction in the entrances or in the lock, or on the walls thereof, and passing coal from flats or barges to a steamboat while in the lock is prohibited.

(m) *Commercial statistics.* Masters or clerks of boats shall furnish in writing to lock tenders such statistics of passengers and cargoes as may be required.

(n) *Trespass on United States property.* Trespass on United States property, or willful injury to the banks, masonry, fences, trees, houses, machinery, or other property of the United States at or near the lock is strictly prohibited.

(o) *Penalties.* Boats which fail to comply with paragraphs (a) to (n) of this section will thereafter be refused lockage until they are complied with.

(p) *Copies of regulations.* A copy of the regulations in this section will be furnished to masters of boats on application to lock tender.

(q) *Effective date.* This section shall go into effect on May 1, 1916.

§ 207.60 *Federal Dam, Hudson River, Troy, N. Y.; pool level.* (a) Whenever the elevation of the pool created by the Federal dam at Troy, N. Y., shall fall to a point level with the crest of the main spillway, the elevation of which is + 14.33 feet mean sea level, the operation of the power plant shall cease and further operation thereof shall be suspended until such time as the water level rises to or above + 14.43 feet mean sea level.

(b) Flashboards may be maintained on the section of the spillway of the dam having an elevation of + 14.33 feet mean sea level in order to increase the elevation of this section to an elevation equal to that of the auxiliary spillway, or + 16.33 feet mean sea level: *Provided,* That the flashboards are so erected as to drop automatically when the pool level rises to an elevation of + 18.5 feet mean sea level and conform in other respects to the plans attached thereto.

(c) The tide staff to be used in determining the elevation of the pool shall be the ceramic tide staff now located on the westerly face of the east lock wall north of the northerly gates, the zero of which is set 2 feet below mean sea level.

(d) The regulations of the pool level and the maintenance of flashboards shall be subject to the supervision and approval of the district engineer, New York City.

(e) This section shall take effect and be in force on and after December 15, 1924.

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CHAPTER 3

Routes and Sailing Directions

NAVIGATION along the coast between Cape Cod and New York, either coasting or approaching from sea, presents to the mariner a problem of unusual difficulty from three causes, the off-lying shoals which are generally shifting in character, strong and variable currents, and large amount of fog. Weather, currents, and the off-lying shoals are described and discussed in Chapter 2.

For the convenience of the navigator, courses and distances are given in tabular form for the coastwise routes and for entering the principal ports. The courses given will be found dependable if used judiciously in connection with the latest charts. These are slackwater courses and due allowance must be made for currents and wind. The courses tabulated should be used in conjunction with the general information given concerning the currents, depths, and cautions.

All bearings and directions are true. The geographical positions given are those of the turning points and not the reference objects. When the course on a range is given in degrees and minutes the azimuth has been determined with sufficient accuracy for compass error determination.

Sailing directions for bays, harbors, channels, and the like not shown in the tables will be found under the headings of the various features.

When crossing the banks or approaching the coast, navigators should not neglect to take soundings at frequent intervals. Due to the irregular bottom, the soundings are of little value for locating the position, but are essential for safety in preventing too close an approach to danger.

Vessels equipped with radio compass should make frequent use of radiobeacon signals. The area has good loran coverage. However, in view of the fact that several base line extensions are within this section the precautions given in Chapter 1 should be followed.

Approaching New York from the vicinity of Nantucket Shoals Lightship, a slight allowance should be made for a southwesterly set of the current. Should the wind be easterly it is customary to allow, in order to make a course good, a set of the current with it of at least ½ knot.

North Atlantic Lane Routes

The practice of following recognized routes across the North Atlantic in both directions has contributed to safety of life at sea. Vessels should follow, as far as

circumstances will permit, the North Atlantic lane routes. Attention is called to the fact that three lanes are used from United States ports, eastward of the seventieth meridian, depending on the season of the year. The following table gives the courses and distances to be followed between New York and the western termini of the great circle courses. Details of the great circle courses and the general instructions relative to the lanes are given on the back of H. O. Chart 1262.

Table 1.—Track A.—Extra Southern

WILL BE BROUGHT INTO OPERATION ONLY WHEN NECESSITY ARISES

Position	True course	Distance
Eastbound		
1. **Ambrose Channel Lightship** bearing 180°, distant 0.3 mile; 40°27′.4 N., 73°49′.4 W. Chart 1108:	*Degrees*	*Nautical miles*
Direct	096	177.0
2. **Latitude 40°10′.0 N., longitude 70°00′.0 W.** Chart H.O. 0955:		
Direct	092	1,062.0
3. **Latitude 39°30′.0 N., longitude 47°00′.0 W.**		
Westbound		
1. **Latitude 40°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955:		
Direct	270½	1,032.0
2. **Nantucket Shoals Lightship** bearing 000°, distant 1.0 mile; 40°36′.0 N., 69°38′.3 W. Chart 1108:		
Direct	267	192.0
3. **Ambrose Channel Lightship** bearing 180°, distant 0.3 mile; 40°27′.4 N., 73°49′.4 W.		

Table 2.—Track B.—Southern

FROM APRIL 11 TO JUNE 30 (BOTH DAYS INCLUSIVE)

Eastbound		
1. **Ambrose Channel Lightship** bearing 180°, distant 0.3 mile; 40°27′.4 N., 73°49′.4 W. Chart 1108:		
Direct	096	177.0
2. **Latitude 40°10′.0 N., longitude 70°00′.0 W.** Chart H.O. 0955:		
Direct	089	1,058.0
3. **Latitude 40°30′.0 N., longitude 47°00′.0 W.**		
Westbound		
1. **Latitude 41°30′.0 N., longitude 47°00′.0 W.** Chart H.O. 0955:		
Direct	267	1,030.0
2. **Nantucket Shoals Lightship** bearing 000°, distant 1.0 mile; 40°36′.0 N., 69°38′.3 W. Chart 1108:		
Direct	267	192.0
3. **Ambrose Channel Lightship** bearing 180°, distant 0.3 mile; 40°27′.4 N., 73°49′.4 W.		

Table 3.—Track C.—Northern

FROM JULY 1 TO APRIL 10 (BOTH DAYS INCLUSIVE)

Position (Reverse directions in *italics*—read upward)	True course	Distance
Eastbound		
1. **Ambrose Channel Lightship** bearing 180°, distant 0.3 mile; 40°27′.4 N., 73°49′.4 W. Chart 1108:	*Degrees*	*Nautical miles*
Direct	096	177.0
2. **Latitude 40°10′.0 N., longitude 70°00′.0 W.** Chart H.O. 0955:		
Direct	083	915.0
3. **Latitude 42°00′.0 N., longitude 50°00′.0 W.**		
Westbound		
1. **Latitude 43°00′.0 N., longitude 50°00′.0 W.** Chart H.O. 0955:		
Direct	260½	894.0
2. **Nantucket Shoals Lightship** bearing 000°, distant 1.0 mile; 40°36′.0 N., 69°38′.3 W. Chart 1108:		
Direct	267	192.0
3. **Ambrose Channel Lightship** bearing 180°, distant 0.3 mile; 40°27′.4 N., 73°49′.4 W.		

Coastwise and Port Courses

Table 4.—New York to Boston via Nantucket Shoals

CHARTS 1107, 1108, 1215, 1208, 1207

1. **Gedney Channel lighted whistle buoy** close aboard; 40°28′.8 N., 73°53′.6 W. Chart 1215:		
Direct	090	32.2
Reverse	*270*	*32.2*
2. **Fire Island Light** bearing 352°, distant 9.3 miles; Fire Island lighted whistle buoy 2FI close aboard; 40°28′.7 N., 73°11′.4 W. Change to Chart 1108 (*1215*):		
Direct	089	162.8
Reverse	*269*	*162.8*
3. **Nantucket Shoals Lightship** bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W. Change to Chart 1107 (*1108*):		
Direct	056	22.3
Reverse	*236*	*22.3*
4. **Latitude 40°44′.4 N., longitude 69°13′.0 W.:**		
Direct	000	19.6
Reverse	*180*	*19.6*
5. **Nantucket Shoals outer lighted whistle buoy 10** bearing 270°, distant 1.0 mile; 41°04′.0 N., 69°13′.0 W.:		
Direct	330	71.2
Change to Chart 1208 (*1107*) **at 41°45′.6 N., 69°45′.0 W.**		
Reverse	*150*	*71.2*

Table 4.—New York to Boston via Nantucket Shoals—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
6. Cape Cod Light bearing 215°, distant 4.0 miles; 42°05′.6 N., 70°00′.6 W.:		
Direct	292½	36.6
Change to Chart 1207 (*1208*) in 42°07′.4 N., 70°06′.1 W. Peaked Hill Bar lighted whistle buoy 2PH bearing 202°, distant 0.4 mile.		
Reverse	112½	*36.6*
7. Boston Lightship bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W. Chart 1207.		

Table 5.—New York to Cape Cod Canal via Fire Island

CHARTS 1215, 1214, 1211, 1210, 249, 251

1. Gedney Channel lighted whistle buoy close aboard; 40°28′.8 N., 73°53′.6 W. Chart 1215:		
Direct	090	32.2
Reverse	*270*	*32.2*
2. Fire Island Light bearing 352°, distant 9.3 miles; Fire Island lighted whistle buoy 2FI close aboard; 40°28′.7 N., 73°11′.4 W. Change to Chart 1214 (*1215*):		
Direct	061	37.1
Reverse	*241*	*37.1*
3. Shinnecock Light bearing 000°, distant 4.0 miles; 40°46′.5 N., 72°28′.7 W.:		
Direct	063	12.6
Change to Chart 1211 (*1214*) in 40°51′.8 N., 72°15′.0 W.		
Reverse	*243*	*12.6*
4. Bridgehampton lighted bell buoy 2A bearing 000°, distant 0.5 mile; 40°52′.2 N., 72°13′.9 W.:		
Direct	063	19.2
Keep clear of lobster pot fishing area southeast of Montauk Point.		
Reverse	*243*	*19.2*
5. Montauk Point Light bearing 000°, distant 3.5 miles; 41°00′.8 N., 71°51′.4 W.:		
Direct	065	15.3
Reverse	*245*	*15.3*
6. Block Island Southeast Light bearing 000°, distant 2.0 miles; 41°07′.2 N., 71°33′.1 W.:		
Direct	052	29.7
Change to Chart 1210 (*1211*) in 41°10′.0 N., 71°28′.4 W.		
Reverse	*232*	*29.7*
7. Hen and Chickens Lightship bearing 029°, distant 1.7 miles; Seventeen-Foot Ledge lighted whistle buoy bearing 353°, distant 550 yards; 41°25′.6 N., 71°02′.2 W.:		
Direct	050	4.8
Reverse	*230*	*4.8*
8. Mishaum Ledge lighted gong buoy 3 bearing 000°, distant 0.3 mile; 41°28′.6 N., 70°57′.4 W. Change to Chart 249 (*1210*):		
Direct	074	2.9
Reverse	*254*	*2.9*
9. Traffic lighted buoy 6 bearing 180°, distant 0.5 mile; 41°29′.5 N., 70°53′.6 W.:		
Direct	062	2.8
Reverse	*242*	*2.8*
10. Negro lighted bell buoy 5 bearing 000°, distant 0.2 mile; 41°30′.8 N., 70°50′.4 W.:		
Direct	044	7.7
Reverse	*224*	*7.7*

Table 5.—New York to Cape Cod Canal—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
11. **Buzzards Bay lighted bell buoy 7** bearing 314°, distant 0.3 mile; 41°36′.2 N., 70°43′.4 W.:	*Degrees*	*Nautical miles*
Direct	025	1.4
Reverse	*205*	*1.4*
12. **Obstruction lighted buoy 2B** bearing 135°, distant 300 yards; 41°37′.5 N., 70°42′.5 W.:		
Direct	052	0.6
Reverse	*232*	*0.6*
13. **Cleveland Ledge Light** bearing 090°, distant 300 yards; 41°37′.8 N., 70°41′.9 W. Change to Chart 251 (*249*). Enter Cape Cod Canal through Cleveland Ledge Channel; be guided by aids on Chart 251:		
Direct	various	14.5
Reverse	*various*	*14.5*
14. **Canal Breakwater Light** bearing 257°, distant 680 yards; 41°46′.8 N., 70°29′.0 W. Chart 251.		

Table 6.—New York to Boston via Vineyard Sound and Nantucket Sound

CHARTS 1215, 1214, 1108, 1211, 1210, 1209, 1208, 1207

1. **Gedney Channel lighted whistle buoy** close aboard; 40°28′.8 N., 73°53′.6 W. Chart 1215:		
Direct	090	32.2
Reverse	*270*	*32.2*
2. **Fire Island Light** bearing 352°, distant 9.3 miles; Fire Island whistle buoy 2FI close aboard; 40°28′.7 N., 73°11′.4 W. Change to Chart 1214 (*1215*):		
Direct	065	85.9
Change to Chart 1211 (*1214*) at 40°48′.5 N., 72°15′.0 W.		
Reverse	*245*	*85.9*
3. **Block Island Southeast Light** bearing 325°, distant 5.5 miles; 41°04′.7 N., 71°28′.9 W. Change to Chart 1108 (*1211*):		
Direct	055	27.9
Change to Chart 1210 (*1108*) in 41°10′.0 N., 71°18′.7 W.		
Reverse	*235*	*27.9*
4. **Cuttyhunk Light** bearing 014°, distant 4.3 miles; 41°20′.6 N., 70°58′.4 W.:		
Direct	058	6.5
Reverse	*238*	*6.5*
5. **Nashawena lighted whistle buoy** bearing 328°, distant 500 yards; 41°24′.1 N., 70°51′.1 W.:		
Direct	058	11.1
Reverse	*238*	*11.1*
6. **Nobska Point Light** bearing 328°, distant 1.1 miles; 41°30′.0 N., 70°38′.6 W. Change to Chart 1209 (*1210*):		
Direct	106	7.3
Reverse	*286*	*7.3*
7. **Hedge Fence lighted horn and gong buoy 16** bearing 016°, distant 0.4 mile; 41°28′.0 N., 70°29′.2 W.:		
Direct	096	8.8
Reverse	*276*	*8.8*
8. **Cross Rip Lightship** bearing 180°, distant 0.2 mile; 41°27′.1 N., 70°17′.5 W.:		
Direct	091	2.6
Reverse	*271*	*2.6*
9. **Halfmoon Shoal lighted bell buoy 12** bearing 000°, distant 0.2 mile; 41°27′.0 N., 70°14′.1 W.		

Table 6.—New York to Boston via Vineyard Sound and Nantucket Sound—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
Via Pollack Rip Channel		
9. **Halfmoon Shoal lighted bell buoy 12** bearing 000° distant 0.2 mile; 41°27′.0 N., 70°14′.1 W.:	*Degrees*	*Nautical miles*
Direct	075	7.9
Reverse	*255*	*7.9*
10. **Handkerchief Lightship** bearing 345°, distant 0.2 mile; 41°29′.1 N., 70°03′.9 W.:		
Direct	045	5.0
Reverse	*225*	*5.0*
11. **Stonehorse Shoal Lightship** bearing 000°, distant 300 yards; 41°32′.6 N., 69°59′.1 W.:		
Direct	068	4.4
Reverse	*248*	*4.4*
12. **Pollack Rip Entrance lighted whistle buoy** bearing 000°, distant 0.4 mile; 41°34′.3 N., 69°53′.7 W.:		
Direct	022	8.0
Change to Chart 1208 (*1209*) in 40°41′.0 N., 69°50′.0 W.		
Reverse	*202*	*8.0*
13. **Chatham lighted whistle buoy 6** bearing 270°, distant 0.2 mile; 41°41′.7 N., 69°49′.6 W. Chart 1208.		
Via Great Round Shoal Channel		
9. **Halfmoon Shoal lighted bell buoy 12** bearing 000°, distant 0.2 mile; 41°27′.0 N., 70°14′.1 W.:		
Direct	095	11.5
Reverse	*275*	*11.5*
10A. **Point Rip lighted bell buoy 11A**, bearing 210°, distant 300 yards; 41°26′.0 N., 69°58′.9 W.:		
Direct	119	3.2
Reverse	*299*	*3.2*
11A. **Great Round Shoal Channel lighted whistle buoy 9** bearing 166°, distant 700 yards; 41°24′.5 N., 69°55′.0 W.:		
Direct	079	9.3
Reverse	*259*	*9.3*
12A. **Great Round Shoal Channel Entrance lighted whistle buoy GRS** bearing 300°, distant 800 yards; 41°26′.3 N., 69°42′.9 W.:		
Direct	341½	16.2
Change to Chart 1208 (*1209*) in 41°40′.0 N., 69°48′.9 W.		
Reverse	*161½*	*16.2*
13. **Chatham lighted whistle buoy 6** bearing 270°, distant 0.2 mile; 41°41′.7 N., 69°49′.6 W.		
13. **Chatham lighted whistle buoy 6** bearing 270°, distant 0.2 mile; 41°41′.7 N., 69°49′.6 W.:		
Direct	348	14.6
Reverse	*168*	*14.6*
14. **Nauset lighted whistle buoy 4** bearing 270°, distant 0.2 mile; 41°56′.0 N., 69°53′.5 W.:		
Direct	331	11.0
Reverse	*151*	*11.0*
15. **Cape Cod Light** bearing 215°, distant 4.0 miles; 42°05′.6 N., 70°00′.5 W.:		
Direct	292½	36.6
Change to Chart 1207 (*1208*) in 42°07′.4 N., 70°06′.1 W. Peaked Hill Bar lighted whistle buoy 2PH bearing 202°, distant 0.4 mile.		
Reverse	*112½*	*36.6*
16. **Boston Lightship** bearing 022°, distant 1.0 mile; 42°19′.5 N., 70°46′.0 W.		

Table 7.—New York to Cape Cod Canal via East River

CHARTS 745, 226, 223, 1213, 1212, 1211, 1210, 249, 251

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
1. **The Battery:** 40°42′.0 N., 74°01′.0 W. Chart 745:		
Direct	various	4.1
Steer various courses which will lead in mid-channel passing under the center of the Brooklyn, Manhattan, and Williamsburg Bridges.		
Reverse	*various*	*4.1*
2. **Blackwells Island Reef Light** bearing 058°, distant 620 yards; 40°44′.6 N., 73°58′.2 W.:		
Direct	036	2.5
Steer mid-channel passing under the center of the Queensboro Bridge. Change to Chart 226 (*745*).		
Reverse	*216*	*2.5*
3. **Mill Rock Southerly Light** bearing 326°, distant 240 yards; 40°46′.7 N., 73°56′.3 W.:		
Direct	various	2.6
Steer various courses which will lead in mid-channel passing under the center of the Triborough and Ward Island Bridges.		
Reverse	*various*	*2.6*
Caution.—Vessels navigating Hell Gate at flood tide sometimes find it necessary to pass starboard-to-starboard to meet the conditions produced by strong currents in the region between Hallets Point and Negro Point. This situation may arise when one of the vessels does not maneuver readily or is a tow. This possibility should be considered by those not having local knowledge and where the vessels are not being handled by pilots.		
4. **North Brothers Island North Light** on north end of island bearing 205°, distant 225 yards; 40°48′.2 N., 73°53′.9 W.:		
Direct	115	0.5
Reverse	*295*	*0.5*
5. **East end of wharf on Rikers Island** bearing 197°, distant 250 yards; 40°48′.0 N., 73°53′.3 W.:		
Direct	106	0.7
Reverse	*286*	*0.7*
6. **Hunts Point Light** bearing 350°, distant 400 yards; 40°47′.8 N., 73°52′.4 W.:		
Direct	080	2.5
Change to Chart 223 (*226*) at 40°48′.1 N., 73°50′.5 W.		
Reverse	*260*	*2.5*
7. **Whitestone Point Light** bearing 190°, distant 400 yards; 40°48′.3 N., 73°49′.1 W.:		
Direct	099	1.3
Reverse	*279*	*1.3*
8. **Throgs Neck Light** bearing 000°, distant 400 yards; 40°48′.1 N., 73°47′.5 W.:		
Direct	060	0.4
Reverse	*240*	*0.4*
9. **Throgs Neck Light** bearing 270°, distant 700 yards; 40°48′.3 N., 73°47′.0 W.:		
Direct	006	1.2
Reverse	*186*	*1.2*
10. **Stepping Stones Light** bearing 096°, distant 500 yards; 40°49′.5 N., 73°46′.8 W.:		
Direct	034	3.4
Reverse	*214*	*3.4*
11. **Execution Rocks Light** bearing 000°, distant 700 yards; 40°52′.4 N., 73°44′.3 W.		
Direct	051	3.4
Change to Chart 1213 (*223*) in 40°53′.8 N., 73°42′.0 W.		
Reverse	*231*	*3.4*
12. **Matinicock Point Shoal lighted bell buoy 21** bearing 090°, distant 1.9 miles; 40°54′.6 N., 73°40′.7 W.:		
Direct	066½	14.0
Reverse	*246½*	*14.0*

Table 7.—New York to Cape Cod Canal via East River—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
13. **Eatons Point lighted bell buoy 11B** bearing 180°, distant 0.2 mile; 41°00′.2 N., 73°23′.7 W.:	*Degrees*	*Nautical miles*
Direct	083	13.6
Reverse	*263*	*13.6*
14. **Stratford Shoal Middle Ground Light** bearing 353°, distant 1.8 miles; 41°01′.8 N., 73°05′.8 W. Change to Chart 1212 (*1213*):		
Direct	074	29.0
Pass 0.4 mile northward of a 28-foot spot marked by a lighted bell buoy.		
Reverse	*254*	*29.0*
15. **Six Mile Reef lighted whistle buoy 8A** bearing 344°, distant 0.9 mile; 41°09′.9 N., 72°29′.1 W.:		
Direct	078	14.3
Reverse	*258*	*14.3*
16. **Plum Island lighted whistle buoy** bearing 350°, distant 0.3 mile; 41°13′.0 N., 72°10′.7 W. Change to Chart 1211 (*1212*):		
Direct	090	7.6
Reverse	*270*	*7.6*
17. **Race Rock Light** bearing 315°, distant 2.3 miles; 41°13′.0 N., 72°00′.7 W.:		
Direct	075	25.5
Reverse	*255*	*25.5*
18. **Point Judith Light** bearing 344°, distant 2.0 miles; 41°19′.7 N., 71°28′.2 W. Change to Chart 1210 (*1211*):		
Direct	073	20.4
Reverse	*253*	*20.4*
19. **Hen and Chickens Lightship** bearing 029°, distant 1.7 miles; Seventeen-Foot Ledge lighted whistle buoy bearing 353°, distant 550 yards; 41°25′.6 N., 71°02′.2 W.:		
Direct	050	4.8
Reverse	*230*	*4.8*
20. **Mishaum Ledge lighted gong buoy 3** bearing 000°, distant 0.3 mile; 41°28′.6 N., 70°57′.4 W. Change to Chart 249 (*1210*):		
Direct	074	2.9
Reverse	*254*	*2.9*
21. **Traffic lighted buoy 6** bearing 180°, distant 0.5 mile; 41°29′.5 N., 70°53′.6 W.:		
Direct	062	2.8
Reverse	*242*	*2.8*
22. **Negro lighted bell buoy 5** bearing 000°, distant 0.2 mile; 41°30′.8 N., 70°50′.4 W.:		
Direct	044	7.7
Reverse	*224*	*7.7*
23. **Buzzards Bay lighted bell buoy 7** bearing 314°, distant 0.3 mile; 41°36′.2 N., 70°43′.4 W.:		
Direct	025	1.4
Reverse	*205*	*1.4*
24. **Obstruction lighted buoy 2B** bearing 135°, distant 300 yards; 41°37′.5 N., 70°42′.5 W.:		
Direct	052	0.6
Reverse	*232*	*0.6*
25. **Cleveland Ledge Light** bearing 090°, distant 300 yards; 41°37′.8 N., 70°41′.9 W. Change to Chart 251 (*249*). Enter Cape Cod Canal through Cleveland Ledge Channel, be guided by navigational aids on Chart 251:		
Direct	various	14.5
Reverse	*various*	*14.5*
26. **Canal Breakwater Light** bearing 262°, distant 700 yards; 41°46′.8 N., 70°29′.0 W. Chart 251.		

Table 8.—Cape Cod Canal to Boston Lightship

CHARTS 1208, 1207

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **Canal Breakwater Light** bearing 262°, distant 700 yards; 41°46′.8 N., 70°29′.0 W. Chart 1208:	*Degrees*	*Nautical miles*
Direct	026	2.3
Reverse	*206*	*2.3*
2. **Canal Approach lighted bell buoy** close aboard; 41°48′.9N., 70°27′.7 W.:		
Direct	354	20.8
Pass 0.7 mile eastward of Manomet lighted gong buoy 6A.		
Reverse	*174*	*20.8*
3. **Humarock Shoal lighted whistle buoy 4** bearing 263°, distant 2.0 miles; 42°09′.5 N., 70°30′.8 W. Change to Chart 1207 (*1208*):		
Direct	316	15.1
Reverse	*136*	*15.1*
4. **Boston Lightship** bearing 270°, distant 0.5 mile; 42°20′.4 N., 70°44′.8 W. Chart 1207.		

Table 9.—Cape Cod Canal to Diamond Shoals

CHARTS 249, 1210, 1211, 1108, 1109

1. **Cleveland Ledge Light** bearing 090°, distant 300 yards; 41°37′.8 N., 70°41′.9 W. Chart 249:		
Direct	252	0.6
Reverse	*052*	*0.6*
2. **Obstruction lighted buoy 2B** bearing 135°, distant 300 yards; 41°37′.5 N., 70°42′.5 W.:		
Direct	205	1.4
Reverse	*025*	*1.4*
3. **Buzzards Bay lighted bell buoy 7** bearing 314°, distant 0.3 mile; 41°36′.2 N., 70°43′.4 W.:		
Direct	224	7.7
Reverse	*044*	*7.7*
4. **Negro lighted bell buoy 5** bearing 000°, distant 0.2 mile; 41°30′.8 N., 70°50′.4 W.:		
Direct	242	2.8
Reverse	*062*	*2.8*
5. **Traffic lighted buoy 6** bearing 180°, distant 0.5 mile; 41°29′.5 N., 70°53′.6 W.:		
Direct	254	2.9
Reverse	*074*	*2.9*
6. **Mishaum Ledge lighted gong buoy 3** bearing 000°, distant 0.3 mile; 41°28′.6 N., 70°57′.4 W. Change to Chart 1210 (*249*):		
Direct	230	4.8
Reverse	*050*	*4.8*
7. **Hen and Chickens Lightship** bearing 029°, distant 1.7 miles; Seventeen-Foot Ledge lighted whistle buoy bearing 353°, distant 550 yards; 41°25′.6 N., 71°02′.2 W.:		
Direct	227	28.9
Reverse	*047*	*28.9*
8. **Block Island Southeast Light** bearing 325°, distant 4.1 miles; Block Island Southeast lighted whistle buoy close aboard; 41°05′.8 N., 71°30′.0 W. Change to Chart 1211 (*1210*):		
Direct	252	13.8
Reverse	*072*	*13.8*

Table 9.—Cape Cod Canal to Diamond Shoals—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
9. **Montauk Point Light** bearing 310°, distant 4.1 miles; Montauk Point lighted whistle buoy MP close aboard; 41°01′.7 N., 71°47′.3 W. Change to Chart 1108 (*1210*):	*Degrees*	*Nautical miles*
Direct	223	185.7
Reverse	*043*	*185.7*
10. **Five Fathom Bank Lightship** bearing 300°, distant 2.2 miles; 38°46′.2 N., 74°32′.2 W. Change to Chart 1109 (*1108*):		
Direct	199	21.5
Reverse	*019*	*21.5*
11. **Fenwick Shoal lighted whistle buoy 2** bearing 260°, distant 3.9 miles; 38°25′.9 N., 74°41′.0 W.:		
Direct	199	32.8
Reverse	*019*	*32.8*
12. **Winter Quarter Shoal Lightship** bearing 295°, distant 1.5 miles; 37°54′.8 N., 74°54′.6 W.:		
Direct	185½	167.8
Reverse	*005½*	*167.8*
13. **Diamond Shoal Lightship** bearing 240°, distant 5.0 miles; 35°07′.8 N., 75°14′.5 W. Chart 1109.		

Table 10.—Nantucket Shoals to Southern Ports

CHARTS 70, 1000, 1001

To Delaware Bay		
1. **Nantucket Shoals Lightship** bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W. Chart 70:		
Direct	245	251.4
Change to Chart 1000 (*70*) in 40°00′.0 N., 71°08′.1 W. Change to Chart 1219 (*1000*) in 38°50′.6 N., 73°20′.0 W.		
Reverse	*065*	*251.4*
2. **Five Fathom Bank Lightship** bearing 300°, distant 2.2 miles; 38°46′.2 N., 74°32′.2 W.:		
Direct	274	23.0
Reverse	*094*	*23.0*
3. **Overfalls Lightship** bearing 045°, distant 0.2 mile; 38°47′.8 N., 75°01′.6 W. Chart 1219.		

To Chesapeake Bay Entrance		
1. **Nantucket Shoals Lightship** bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W. Chart 70:		
Direct	233	356.6
Change to Chart 1000 (*70*) in 39°44′.0 N., 71°00′.0 W. Change to Chart 1222 (*1000*) in 37°05′.9 N., 75°30′.0 W.		
Reverse	*053*	*356.6*
2. **Chesapeake Lightship** bearing 000°, distant 0.2 mile; 36°58′.5 N., 75°42′.2 W.:		
Direct	259	12.6
Pass 0.5 mile south of Cape Henry Approach lighted whistle buoy 2, and close-to on either side of Cape Henry Junction lighted whistle buoy.		
Reverse	*079*	*12.6*
3. **Cape Henry Light** bearing 257°, distant 2.3 miles; 36°56′.0 N., 75°57′.7 W. Chart 1222.		

Table 10.—Nantucket Shoals to Southern Ports—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
To Diamond Shoals		
1. **Nantucket Shoals Lightship** bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W. Chart 70:		
Direct	*Degrees* 219½	*Nautical miles* 420.2
Change to Chart 1000 (*70*) in 39°43′.0 N., 70°30′.0 W.		
Change to Chart 1232 (*1000*) in 35°12′.2 N., 75°10′.0 W.		
Reverse	*039½*	*420.2*
2. **Diamond Shoal Lightship** bearing 240°, distant 5.0 miles; 35°07′.8 N., 75°14′.5 W. To continue southward, *see U. S. Coast Pilot, Section D, Cape Henry to Key West.*		
To Jupiter Inlet		
1. **Nantucket Shoals Lightship** bearing 352°, distant 5.0 miles; 40°32′.0 N., 69°37′.3 W. Chart 70:		
Direct	212	884.8
Change to Chart 1000 in 39°50′.0 N., 70°11′.0 W.		
Change to Chart 1001 in 35°00′.0 N., 74°00′.0 W.		
2. **Latitude 28°00′.0 N., longitude 79°01′.0 W.** Change to Chart 1112:		
Direct	219	81.2
Change to Chart 1247 in 27°09′.4 N., 79°47′.0 W.		
3. **Jupiter Inlet Light** bearing 270°, distant 6.0 miles; 26°56′.9 N., 79°58′.3 W.		

Table 11.—Block Island to Southern Ports

CHARTS 1211, 1108, 1000, 1110

To Delaware Bay		
1. **Block Island Light** bearing 325°, distant 4.1 miles; 41°05′.8 N., 71°30′.0 W. Chart 1211:		
Direct	225	197.9
Change to Chart 1108 (*1211*) in 40°40′.0 N., 72°03′.9 W.		
Change to Chart 1219 (*1108*) in 38°55′.7 N., 74°20′.0 W.		
Reverse	*045*	*197.9*
2. **Five Fathom Bank Lightship** bearing 300°, distant 2.2 miles; 38°46′.2 N., 74°32′.2 W.:		
Direct	274	23.0
Reverse	*094*	*23.0*
3. **Overfalls Lightship** bearing 045°, distant 0.2 mile; 38°47′.8 N., 75°01′.6 W. Chart 1219.		

Table 11.—Block Island to Southern Ports—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
To Chesapeake Bay		
1. **Block Island Light** bearing 325°, distant 4.1 miles; 41°05′.8 N., 71°30′.0 W. Chart 1211:		
Direct	*Degrees* 218½	*Nautical miles* 315.9
Change to Chart 1000 (*1211*) in 40°40′.0 N., 71°57′.0 W. Change to Chart 1222 (*1000*) in 37°10′.6 N., 75°30′.0 W.		
Reverse	*038½*	*315.9*
2. **Chesapeake Lightship** bearing 000°, distant 0.2 mile; 36°58′.5 N., 75°42′.2 W.:		
Direct	259	12.6
Reverse	*079*	*12.6*
3. **Cape Henry Light** bearing 257°, distant 2.3 miles; 36°56′.0 N., 75°57′.7 W. Chart 1222.		
To Diamond Shoal		
1. **Block Island Light** bearing 325°, distant 4.1 miles; 41°05′.8 N., 71°30′.0 W. Chart 1211:		
Direct	206	399.5
Change to Chart 1000 (*1211*) in 40°40′.0 N., 71°46′.3 W. Change to Chart 1110 (*1000*) in 35°30′.0 N., 75°01′.0 W.		
Reverse	*026*	*399.5*
2. **Diamond Shoal Lightship** bearing 240°, distant 5.0 miles; 35°07′.8 N., 75°14′.5 W. To continue southward, *see U. S. Coast Pilot, Section D, Cape Henry to Key West.*		

Table 12.—Montauk Point to Southern Ports

CHARTS 1211, 1108, 1000, 1110

To Delaware Bay		
1. **Montauk Point Light** bearing 310°, distant 4.1 miles; 41°01′.7 N., 71°47′.3 W. Chart 1211:		
Direct	223	185.7
Change to Chart 1108 (*1211*) in 40°43′.3 N., 72°10′.0 W. Change to Chart 1219 (*1108*) in 38°56′.4 N., 74°20′.0 W.		
Reverse	*043*	*185.7*
2. **Five Fathom Bank Lightship** bearing 300°, distant 2.2 miles; 38°46′.2 N., 74°32′.2 W.:		
Direct	274	23.0
Reverse	*094*	*23.0*
3. **Overfalls Lightship** bearing 045°, distant 0.2 mile; 38°47′.8 N., 75°01′.6 W. Chart 1219.		

Table 12.—Montauk Point to Southern Ports—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
To Chesapeake Bay		
1. **Montauk Point Light** bearing 310°, distant 4.0 miles; 41°01′.7 N., 71°47′.3 W. Chart 1211:	*Degrees*	*Nautical miles*
Direct	217	304.5
Change to Chart 1000 (*1211*) in 40°40′.0 N., 72°08′.8 W. Change to Chart 1222 (*1000*) in 37°11′.4 N., 75°30′.0 W.		
Reverse	*037*	*304.5*
2. **Chesapeake Lightship** bearing 000°, distant 0.2 mile; 36°58′.5 N., 75°42′.2 W.:		
Direct	259	12.6
Pass 0.5 mile south of Cape Henry Approach lighted whistle buoy 2, and close-to on either side of Cape Henry Junction lighted whistle buoy.		
Reverse	*079*	*12.6*
3. **Cape Henry Light** bearing 257°, distant 2.3 miles; 36°56′.0 N., 75°57′.7 W. Chart 1222.		
To Diamond Shoals		
1. **Montauk Point Light** bearing 310°, distant 4.0 miles; 41°01′.7 N., 71°47′.3 W. Chart 1211:		
Direct	205	389.9
Change to Chart 1000 (*1211*) in 40°40′.0 N., 72°00′.2 W. Change to Chart 1110 (*1000*) in 35°40′.0 N., 75°01′.5 W.		
Reverse	*025*	*389.9*
2. **Diamond Shoal Lightship** bearing 240°, distant 5.0 miles; 35°07′.8 N., 75°14′.5 W. To continue southward, *see U. S. Coast Pilot, Section D, Cape Henry to Key West.*		

Table 13.—North Shore of Nantucket Sound

CHART 1209

1. **Nobska Point Light** bearing 328°, distant 1.1 mile; 41°30′.0 N., 70°38′.6 W.:		
Direct	046	2.7
Reverse	*226*	*2.7*
2. **West Chop Light** bearing 180°, distant 3.0 miles; 41°31′.8 N., 70°36′.0 W.:		
Direct	086	3.7
Pass southward of Davis Neck Shoal buoy 20.		
Reverse	*266*	*3.7*
3. **East Chop Light** bearing 210°, distant 4.5 miles; 41°32′.1 N., 70°31′.1 W.:		
Direct	094	3.5
Pass northward of Small Shoal buoy.		
Reverse	*274*	*3.5*
To pass southward of Bishop and Clerks		
4. **Wreck Shoal west lighted bell buoy 18A** bearing 000°, distant 100 yards; 41°31′.9 N., 70°26′.4 W.:		
Direct	076	8.5
Pass northward of Eldridge Shoal buoy 11 and Horseshoe buoy 9.		
Reverse	*256*	*8.5*

Table 13.—North Shore to Nantucket Sound—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
5. Bishop and Clerks Abandoned Lighthouse bearing 040°, distant 0.6 mile; 41°33′.9 N., 70°15′.5 W.:	*Degrees*	*Nautical miles*
Direct	120	10.3
Pass south of Bishop and Clerks buoy 12.		
Reverse	*200*	*10.3*
6. Great Point Light bearing 173°, distant 5.5 miles; 41°28′.9 N., 70°03′.7 W.		
To pass northward of Bishop and Clerks		
4. Wreck Shoal west lighted bell buoy 18A bearing 000°, distant 100 yards; 41°31′.9 N., 70°26′.4 W.:		
Direct	070	1.9
Reverse	*250*	*1.9*
5A. Wreck Shoal bell buoy 16 bearing 000°, distant 200 yards; 41°32′.5 N., 70°24′.0 W.:		
Direct	056	5.1
Reverse	*236*	*5.1*
6A. West Southwest Ledge lighted bell buoy 14 bearing 315°, close aboard; 41°35′.4 N., 70°18′.3 W.:		
Direct	095	3.0
Reverse	*275*	*3.0*
7A. Bishop and Clerks Abandoned Lighthouse bearing 218°, distant 0.8 mile; 41°35′.1 N., 70°14′.3 W.:		
Direct	129	9.2
Reverse	*309*	*9.2*
8A. Handkerchief Shoal buoy 16 bearing 038°, distant 50 yards; 41°29′.3 N., 70°04′.8 W.:		
Direct	123	1.0
Reverse	*303*	*1.0*
6. Great Point Light bearing 173°, distant 5.5 miles; 41°28′.9 N., 70°03′.7 W.		

Table 14.—Point Judith to Vineyard Sound

CHART 1210

1. Point Judith Light bearing 350°, distant 1.7 miles; 41°20′.0 N., 71°28′.5 W.:		
Direct	084	21.5
Reverse	*264*	*21.5*
2. Cuttyhunk Light bearing 041°, distant 3.6 miles; 41°22′.2 N., 71°00′.2 W.:		
Direct	075	7.2
Reverse	*255*	*7.2*
3. Nashawena lighted whistle buoy bearing 328°, distant 500 yards; 41°24′.1 N., 70°51′.1 W.		

Table 15.—Narragansett Bay to Newport and Providence

CHARTS 353, 236, 278

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **Brenton Reef Lightship** bearing 315°, distant 0.4 mile; 41°25′.3 N., 71°22′.2 W. Chart 353:	*Degrees*	*Nautical miles*
Direct	358	2.4
Change to Chart 236 (*353*) in 42°26′.0 N., 71°22′.2 W.		
Reverse	*178*	*2.4*
2. **Castle Hill Light** bearing 270°, distant 0.4 mile; 41°27′.7 N., 71°22′.4 W.:		
Direct	047	1.6
Reverse	*227*	*1.6*
3. **Newport Harbor Light** bearing 047°, distant 1.2 miles; Fort Adams Light bearing 073°, distant 880 yards; 41°28′.8 N., 71°20′.8 W.		
To Newport Harbor		
3. **Newport Harbor Light** bearing 047°, distant 1.2 miles; Fort Adams Light bearing 073°, distant 880 yards; 41°28′.8 N., 71°20′.8 W. From this position steer 047° until Ida Lewis Rock Light is opened from the light on the dock northward of Fort Adams, and then round the northern end of the dock, giving it a berth of 150 yards. Then steer 111° and round the south end of Goat Island at a distance of about 250 yards, passing 150 yards southward of the buoys and Great Island Shoal Light. Then steer northeastward to the piers:		
Direct	various	1.5
Reverse	*various*	*1.5*
4A. **Newport Harbor Piers** 41°29′.1 N., 71°19′.1 W.		
To Providence		
3. **Newport Harbor Light** bearing 047°, distant 1.2 miles; Fort Adams Light bearing 073°, distant 880 yards; 41°28′.8 N., 71°20′.8 W.:		
Direct	358	1.4
Reverse	*178*	*1.4*
4. **Gull Rocks Light** bearing 088°, distant 0.65 mile; 41°30′.1 N., 71°20′.9 W.:		
Direct	022	2.2
Reverse	*202*	*2.2*
5. **Gould Island East lighted bell buoy** close aboard; 41°32′.1 N., 71°19′.8 W.:		
Direct	019	4.2
Reverse	*199*	*4.2*
6. **Prudence Island Light** bearing 322°, distant 700 yards; 41°36′.1 N., 71°17′.9 W.:		
Direct	359	1.4
Reverse	*179*	*1.4*
7. **Prudence Island Light** bearing 190°, distant 1.1 miles; Hog Island Shoal Light bearing 068° distant 1.3 miles; 41°37′.4 N., 71°18′.0 W. Change to Chart 278 (*236*):		
Direct	340	1.6
Reverse	*160*	*1.6*
8. **Popasquash Point lighted bell buoy 7** bearing 270°, close aboard; 41°38′.9 N., 71°18′.7 W.:		
Direct	358	2.4
Reverse	*178*	*2.4*
9. **Rumstick Shoal South lighted bell buoy 24** bearing 051°, distant 100 yards; 41°41′.3 N., 71°18′.8 W.:		
Direct	322	2.3
Reverse	*142*	*2.3*
10. **Conimicut Light** bearing 202°, distant 250 yards; 41°43′.1 N., 71°20′.7 W.:		
Direct	304	1.0
Reverse	*124*	*1.0*

Table 15.—Narragansett Bay to Newport and Providence—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
11. **Providence River lighted bell buoy 4** bearing 062°, distant 175 yards; 41°43′.7 N., 71°21′.8 W.:	*Degrees*	*Nautical miles*
Direct	343	2.1
Reverse	*163*	*2.1*
12. **Sabin Point Light** bearing 090°, distant 190 yards; 41°45′.7 N., 71°22′.7 W.:		
Direct	020	0.5
Reverse	*200*	*0.5*
13. **Providence River buoy 16** bearing 115°, distant 115 yards; 41°46′.2 N., 71°22′.4 W.:		
Direct	008	0.5
Reverse	*188*	*0.5*
14. **Pomham Rocks Light** bearing 130°, distant 250 yards; 41°46′.7 N., 71°22′.3 W.:		
Direct	342	0.6
Reverse	*162*	*0.6*
15. **Fuller Rock Light** bearing 337°, distant 0.4 mile; 41°47′.3 N., 71°22′.6 W.:		
Direct	320	1.6
Reverse	*140*	*1.6*
16. **State Pier** 41°48′.5 N., 71°24′.0 W. Chart 278.		

Table 16.—New London Harbor

CHART 359

1. **Race Rock Light** bearing 090°, distant 0.5 mile; 41°14′.6 N., 71°03′.5 W.:		
Direct	345	3.9
Reverse	*165*	*3.9*
2. **New London Ledge** bearing 076°, distant 240 yards; 41°18′.3N., 72°04′.8 W.:		
Direct	354	3.2
Reverse	*174*	*3.2*
3. **State Pier**, New London; 41°21′.6 N., 71°05′.2 W.		

Table 17.—New Haven Harbor

CHART 218

1. **Southwest Ledge Light** bearing 340°, distant 2.1 miles; New Haven lighted bell buoy NH close aboard; 41°12′.1 N., 75°53′.8 W.:		
Direct	334	2.1
Reverse	*164*	*2.1*
2. **Southwest Ledge Light** bearing 084°, distant 475 yards; 41°14′.0 N., 72°55′.1 W.:		
Direct	006	2.3
The axis of the channel has a slight curve and while this course does not follow the centerline it does remain within the dredged channel limits.		
Reverse	*186*	*2.3*

Table 17.—New Haven Harbor—Continued

Position (Reverse directions in *italics*—read upward)	True course	Distance
	Degrees	*Nautical miles*
3. **New Haven lighted bell buoy 12** bearing 090°, distant 85 yards; 41°16′.3 N., 72°54′.7 W.:		
Direct	356	0.4
Reverse	*176*	*0.4*
4. **New Haven lighted buoy 13** bearing 270°, distant 100 yards; 41°16′.8 N., 72°54′.8 W.:		
Direct	008	1.0
Reverse	*188*	*1.0*
5. **Off New Haven Wharves**; 41°17′.8 N., 72°54′.5 W.		

Table 18.—New York Harbor

CHART 369

1. **Gedney Channel lighted whistle buoy** close aboard; 40°28′.8 N., 73°53′.6 W.:		
Direct (West Bank-Staten Island Range ahead)	297	6.1
Reverse (West Bank-Staten Island Range astern)	*117*	*6.1*
2. **West Bank Light** bearing 297°, distant 1.6 miles; 40°31′.5 N., 74°00′.7 W.:		
Direct	323	0.9
Reverse	*143*	*0.9*
3. **West Bank Light** bearing 271°, distant 0.9 mile; 40°32′.2 N., 74°01′.4 W.:		
Direct	348	3.0
Reverse	*168*	*3.0*
4. **Craven Shoal lighted bell buoy 19A** bearing 258°, distant 0.2 mile; 40°35′.2 N., 74°02′.2 W.:		
Direct	338	1.9
Reverse	*158*	*1.9*
5. **Fort Wadsworth Light** bearing 189°, distant 0.6 mile; 40°36′.9 N., 74°03′.1 W.:		
Direct	356	2.0
Reverse	*176*	*2.0*
6. **Gowanus Flats lighted bell buoy 24** bearing 090°, distant 200 yards; 40°38′.9 N., 74°03′.3 W.:		
Direct	028	1.8
Reverse	*208*	*1.8*
7. **Buttermilk Channel Range Front Light** bearing 064°, distant 1.2 miles; 40°40′.5 N., 74°02′.2 W.:		
Direct	015	0.7
Reverse	*195*	*0.7*
8. **Governors Island Extension Light** bearing 103°, distant 500 yards; 40°41′.2 N., 74°01′.9 W.:		
Direct	040	0.1
Reverse	*220*	*0.1*
9. **The Battery**: 40°42′.0 N., 74°01′.0 W.		

6.0
1
3.5
9.7
17.8

Table 19.—New York (Battery) to Troy Lock

CHARTS 745, 746, 282, 283

Position (Reverse directions in *italics*—read upward)	True course	Distance
1. **The Battery**; 40°42′.0 N., 74°01′.0 W. Chart 745:	*Degrees*	*Nautical miles*
Direct	309	0.5
Reverse	*129*	*0.5*
2. **Pier 1, Fire Boat Station** bearing 090°, distant 0.3 mile; 40°42′.3 N., 74°01′.6 W.:		
Direct	010	2.8
Reverse	*190*	*2.8*
3. **Pier 62, Chelsea Docks, New York** bearing 114°, distant 0.2 mile; 40°45′.0 N., 74°01′.0 W.:		
Direct	026	1.6
Reverse	*206*	*1.6*
4. **Pier 99, New York** bearing 090°, distant 0.2 mile; 40°46′.4 N., 74°00′.1 W. Change to Chart 746 (*745*):		
Direct	029	2.7
Reverse	*209*	*2.7*
5. **General Grants Tomb** bearing 090°, distant 0.4 mile; 40°48′.8 N., 73°58′.4 W.:		
Direct	various	2.5
Reverse	*various*	*2.5*
6. **George Washington Bridge**; 40°51′.1 N., 73°57′.1 W. Change to Chart 281 (*746*):		
Direct	027	1.9
Reverse	*207*	*1.9*
7. **Spuyten Duyvil Creek** bearing 090°, distant 0.3 mile; 40°52′.7 N., 73°56′.0 W.:		
Direct	017	3.6
Reverse	*197*	*3.6*
8. **Municipal Pier, Yonkers,** bearing 090°, distant 0.25 mile; 40°56′.1 N., 73°54′.7 W.:		
Direct	013	6.3
Reverse	*193*	*6.3*
9. **East end of Piermont Pier** bearing 306°, distant 0.9 mile; 41°02′.1 N., 73°52′.8 W.:		
Direct	000	2.1
Reverse	*180*	*2.1*
10. **Tarrytown South Channel Range Front Light** bearing 048½°, distant 0.8 mile; 41°05′.1 N., 73°52′.9 W.:		
Direct	000	4.1
Reverse	*180*	*4.1*
11. **Haverstraw Bay Light 6** bearing 090°, distant 0.1 mile; 41°08′.3 N., 73°52′.9 W.:		
Direct	various	4.5
Reverse	*various*	*4.5*
12. **Hudson River lighted buoy 14** bearing 090°, distant 0.25 mile; 41°11′.8 N., 73°56′.5 W. Chart 282:		
Direct	338	3.0
Reverse	*158*	*3.0*
13. **Stony Point Light 11** bearing 270°, distant 0.2 mile; 41°14′.4 N., 73°58′.0 W.:		
Direct	various	99.0
Change to Chart 283 (*282*) at 41°34′.4 N., 73°57′.5 W.		
Reverse	*various*	*99.0*
14. **Troy Lock**; 42°45′.0 N., 73°41′.1 W. Chart 283.		

CHAPTER 4

Provincetown to Monomoy Island

Chart 1208

CAPE COD is a long peninsula forming the easterly extremity of Massachusetts. It makes out from the mainland in an easterly direction for 31 miles, thence extends northward for over 20 miles. The cape forms the southern and eastern shores of Cape Cod Bay, the northern shore of Nantucket Sound, and the western shore of Buzzards Bay. The northern trend of Cape Cod, forming what is sometimes termed the *Hook of the Cape,* is known as the Lower Cape. This section is well settled and composed almost entirely of sandy lands, with high, bare, sand hills and low, nearly level plains. The portion of Cape Cod between Chatham and Cape Cod Canal is known as the Upper Cape. This region is wooded and is well settled by numerous towns and villages. Along the southern shore are many private summer residences and estates.

On the approach to the northern part of the cape in clear weather, the most conspicuous object is the Pilgrim Monument in Provincetown. Other landmarks are spires and a standpipe, but more important are the navigational lights. Of these, the most important are Cape Cod Light in the northern section, and Nauset Beach Light, near North Eastham in the southern section. Coast Guard stations with their accompanying masts also are conspicuous. It is frequently difficult to recognize natural landmarks on Cape Cod when approaching from seaward owing to the lack of distinctive features.

Cape Cod Bay, and the coast northward, are described in *Atlantic Coast Pilot, Section A, St. Croix River to Cape Cod.*

Chart 580.—Provincetown Harbor, formed by a turn in the northern end of the Hook of Cape Cod, has a diameter of about 2 miles. It is one of the best harbors on the Atlantic coast having a sizable anchorage area in depths of 18 to 50 feet with excellent holding ground. Coasters and fishermen find protection here in gales from any direction. The historical town of **Provincetown** is on the northwestern side of the harbor. It is the home port of many vessels engaged in cod, mackerel, and other fishing. Coal, lumber, and some petroleum products make up the remainder of the shipping.

The approach and entrance to the harbor are free from dangers and are marked by three lights and Pilgrim Monument. **Race Point Light,** 41 feet above the water and visible 12 miles, is shown from a white tower on the northwest point of Cape Cod. The fog signal is an air whistle. **Wood End Light,** 45 feet high and visible 12 miles, is shown

from a white square tower near the water on the southern end of the hook. The fog signal is a siren. A Coast Guard station is near the light. **Long Point Light,** 36 feet above the water and visible 11 miles, is shown from a white square tower at the western point of the entrance to the harbor. The fog signal is a bell. At night Cape Cod Light will show over the land westward of it when approaching the entrance on certain bearings. **Pilgrim Monument,** a slim stone structure about 350 feet above the water, rises 252½ feet above **High Pole Hill** in Provincetown.

Excellent anchorage may be had in Provincetown Harbor. In addition, small craft sometimes anchor in **Herring Cove,** 0.8 mile south of Race Point Light. A temporary lee from easterly winds is found well inshore in depths of 10 to 24 feet.

The two **measured trial courses** between Race Point and Long Point Lights are the outer and inner Naval standardization courses for submarines which may be operating submerged while making trials in the Provincetown area. Accordingly, shipping should keep good lookout for periscopes and avoid as far as possible navigation along or across the measured-mile courses. Buoys mark the trial courses.

Shark Painter Bar extends to a maximum distance of 0.6 mile off the shore between Race Point and Wood End Lights. It rises abruptly from deep water, and is marked by a buoy 1.1 miles southeastward from Race Point Light. **Wood End Bar** is the continuation of the shoal which makes sharply into Wood End. A bell buoy is about 0.5 mile southward of Wood End Light.

The mean range of the tide in Provincetown Harbor is about 9 feet.

About 1 mile west of Race Point the tidal current has a velocity of about 1 knot at strength. The flood sets southwestward and the ebb northeastward, and tide rips occur during heavy weather when the wind is against the current. Westward of the stretch of coast between Wood End and Race Point, the velocity at strength is about 1 knot. In this locality the ebb current sets northwesterly and the flood sets southeasterly. At the entrance and in the harbor the tidal currents have little velocity. For current predictions the *Current Tables* should be consulted.

Ice forms only in severe winters in the harbor, and then only for short periods. There are recorded cases of fields of ice being driven northward from the shallow harbors of Cape Cod Bay into the harbor so as to close it briefly, but such cases are rare.

Storm warnings are shown day and night from a skeleton tower on the hill near the Pilgrim Monument, and are visible from all directions. They also are displayed at Cape Cod Light.

The principal wharf is owned by the town and has a depth of 13 feet off its face and 12 feet at its east side. The harbor has ample depths for deep-draft vessels to within 0.4 mile of the wharves, thence the water shoals to the piers, some of which are dry at low water. Diesel oil, gasoline, and water are available at the town wharf. Supplies are available in town. Two float landings are alongside the town wharf. Wharfage is charged for small craft.

Bus service is available throughout the year and the railroad operates freight service. During summer months, July through Labor Day, daily steamer service is operated to Boston.

Chart 1208.—From Race Point the shore curves northeastward, eastward, and then southeastward to the **Highlands,** a total distance of about 9 miles, and is composed of bare sand hillocks of various heights. On approaching the Highlands the sand hills

begin to be covered with a brownish-looking growth of grass, and the land is higher. The pitch of the cape at this point shows a high bluff, on which stands Cape Cod Light. In coasting several former lifesaving stations are seen. At the Highlands the shore may be safely approached as close as 0.5 mile, but the water shoals somewhat abruptly, and care must be taken not to go inside the 5-fathom curve.

A Coast Guard station is 1.5 miles northeast of Race Point Light.

Peaked Hill Bar, about 4.5 miles east-northeast of Race Point Light and 0.6 mile offshore, includes shoals covered by 14 and 16 feet. Vessels have grounded here, mainly because of failure to take soundings. This area should be given a berth of at least 2 miles. A lighted whistle buoy is moored about 2 miles off Peaked Hill Bar and about 5 miles northwestward of Cape Cod Light. Keeping in a depth of 20 fathoms will insure passing 2 to 2.5 miles off the eastern side of Cape Cod and will lead to the lighted whistle buoy off Peaked Hill Bar.

Between Race Point and Chatham Light tidal current velocities are generally less than 1 knot. Strengths of flood and ebb set northward and southward respectively along the coast.

The time of current changes rapidly, strength of flood or ebb occurring about 2 hours later off Nauset Beach Light than off Chatham Light.

Cape Cod Light, 183 feet above the water and visible 20 miles, is shown from a white tower with covered way to the dwelling, situated on the brow of a hill of the Highlands. The fog signal is an electric diaphragm horn. A radiobeacon and a Coast Guard lifesaving station are at the light. **Storm warnings** are displayed day and night. Just northward is a reporting station by which vessels may communicate with Boston by using International Code signals. A stone crenellated tower on the summit of a ridge 0.5 mile south of the light is prominent.

The shore southward from the Highlands to Nauset Beach Light, a distance of about 12 miles, has a slight curve. The terrain continues hilly with narrow valleys at intervals. Two spires at **Truro,** 2.5 miles south of Cape Cod Light and a tank on the shoreline about a mile east of Truro, are prominent. A tank stands out near the shore opposite **South Wellfleet,** about 8.5 miles southward of Cape Cod Light. From Cape Cod Light to near Chatham entrance the coast should not be approached closer than 0.5 mile.

Nauset Beach Light, 114 feet above the water and visible 17 miles, is shown from a conical tower, the upper part red, the lower part white, on the beach at **Eastham.** A Coast Guard station about a mile south of the light is conspicuous. A lighted whistle buoy is about 5.0 miles northeastward of the light.

Three submarine cables of the French Telegraph Cable Company are located along the east shore of Cape Cod as follows: From a landing at Nauset Beach Light trending in a northeasterly direction, from a landing at Nauset Harbor trending in an easterly direction, and from a landing at Nauset Beach, East Orleans, trending in a southerly direction.

The cable company cautions vessels from anchoring near these cables. It is willing to indemnify any vessel for anchor and gear cut away and lost in order to prevent interruption of cable communication. This will be done on presentation of the proper sworn evidence of the facts with the exact position of the vessel at the time.

Nauset Harbor entrance is 3.8 miles south of the light. Houses are clustered fairly thickly on **Nauset Heights,** south of the entrance and consisting of rising ground some-

what higher than the land northward. The entrance is used considerably by small local craft; the shoalest depth is about 3 feet at lowest tides. Strangers should never attempt to enter.

The coast from Nauset Beach Light turns gradually southward to Chatham, a distance of 11 miles, and gradually becomes lower and less steep. The terrain slopes gently back from the beach and is covered with a scanty growth of grass. A signal tower is prominent on the beach eastward of **North Chatham.** A tall radio mast at **Chatham Port** also is conspicuous; three red lights are exhibited on it from sunset to sunrise. From the base of the mast which is 80 feet above the water, the highest light is 360 feet above the base, the middle light 240 feet, and the lower light, 120 feet above the base. About 0.6 mile southward of the radio mast is a standpipe.

Chatham, about 11.5 miles southward of Nauset Beach Light, is on fairly high ground and several spires and a tall stack in the town are prominent. **Chatham Light,** 80 feet above the water and visible 15 miles, is shown from a white conical tower on the west side of Chatham Harbor. **Storm warnings,** day and night, are displayed from a Coast Guard station near the light.

Chatham Bar is the eastern entrance to Chatham. The channel across the bar is marked by a privately maintained light, a lighted bell buoy, and several unlighted buoys. The channel is subject to frequent changes. The unlighted buoys do not always mark the best water and are not charted. They should be used with local knowledge. The depth over the bar was reported to be 3½ feet in 1949. The channel is used only by small local craft with a smooth sea and strangers should not attempt it. This bar is dangerous in thick weather and vessels in the vicinity should stay in depths of 8 fathoms or more.

A channel about 7.5 miles long has been dredged to the head of navigation at Orleans; the reported controlling depth in 1949 was 4 feet. A boat basin has been dredged in **Aunt Lydia's Cove,** a part of **Chatham Inner Harbor** between **Tern Island** and Chatham. The depth in the basin in August 1949 was 6 feet. A fish pier is south of the dredged basin; Diesel oil is available at the pier. A cable crosses the waterway just northward of Chatham Light. Craft usually approach Chatham from Stage Harbor on Nantucket Sound, described in the next chapter.

Pleasant Bay, northward of North Chatham, is used only by small local craft. A cable crosses the water between **Nickerson Neck** and Strong Island.

CHAPTER 5

Nantucket Sound

Chart 1209

NANTUCKET SOUND is between the south coast of Cape Cod on the north and Nantucket Island and part of Martha's Vineyard on the south. Vineyard Sound is on the westward providing an inside passage. Nantucket Sound has a length of about 23 miles in an east-west direction and width of from 6 to 22 miles. At the eastern entrance and within the sound are numerous shoals. Between these shoals are well-marked channels making the navigation of these waters in clear weather and with a fair wind comparatively easy westward of Monomoy Shoals. The shoals at the eastern entrance are subject to considerable shifting. Those inside are sand shoals, except along the shores where boulders occur, but are subject to little change.

Vessels of 24-foot draft can pass through Nantucket Sound and Vineyard Sound and thus avoid Nantucket Shoals. This route is used principally by coasting steamers. The navigational aids are colored and numbered for passing through the sound from the eastward.

Monomoy and Nantucket Shoals are eastward and southeastward of the eastern entrance to Nantucket Sound. Owing to the great extent and distance of some part of these shoals from land, and the strong and baffling tidal currents which set over them, their navigation in thick or foggy weather is hazardous. In clear weather the lights, lightships, and buoys render navigation of the two principal channels comparatively easy. The deeper channel leads through these shoals in an easterly direction from Nantucket (Great Point) Light, and for the purpose of description will be considered as the dividing line between Nantucket and Monomoy Shoals. The channels through the shoals are discussed later.

Chart 250.—Monomoy Shoals consist of numerous detached shoals extending about 5.5 miles in an easterly direction and 9.5 miles in a southeasterly direction from **Monomoy Point,** the northeast entrance point of Nantucket Sound. Narrow sloughs separate the many parts of the shoals. It should be remembered that the shoals are shifting in character and are subject to change both in location and depth.

Bearse Shoal and **Pollock Rip,** extending about 5 miles eastward of Monomoy Point, are a series of sand shoals and ridges with little water over them in places. Pollock Rip Channel, discussed later, is between the shoals. Buoys and lightships mark the channel.

Broken Part of Pollock Rip, with depths of 10 to 18 feet, is eastward of Pollock Rip

and is separated from it by **Pollock Rip Slue.** Just southward of Broken Part of Pollock Rip is **Twelvefoot Shoal** and **Broken Rip** with depths of 7 to 16 feet.

Stone Horse, Little Round, and **Great Round Shoals** are portions of a continuous series of sand shoals and ridges with depths of 5 to 18 feet. These shoals are directly eastward of the entrance to Nantucket Sound and between the two main channels. Southward and eastward of these shoals are numerous shoal spots, including **Orion Shoal,** with depths of 9 to 18 feet.

Shovelful Shoal, with a least depth of 4 feet, is a small shoal about 580 yards south of Monomoy Point. A narrow channel is between this shoal and Monomoy Point and another channel is between the shoal and Handkerchief Shoal. Heavy tide rips are usually encountered in this area. The bottom is subject to considerable changes and local information is considered necessary for the safe navigation of these channels.

Handkerchief Shoal, extending for 5 miles southwestward from Monomoy Point, has depths of 2 to 18 feet. On the northwest side the water shoals gradually and soundings will indicate an approach to danger, but on the southeast side the shoal rises abruptly from the deeper water. Handkerchief Shoal is uneven and shifting in character. Vessels should not attempt to pass northward of the buoy which marks its southern end.

Chart 1209.—Nantucket Shoals is the general name of the numerous broken shoals which extend 23 miles eastward and 39 miles southeastward of Nantucket Island. These extremely dangerous shoals are fully described in Chapter 2 and caution must be exercised in navigating in this area.

Halfmoon Shoal, near the center of Nantucket Sound, has a least depth of 13 feet. Its southern end is marked by a lighted bell buoy. Depths of 22 to 24 feet are 1.4 to 2.5 miles southeastward of the buoy and deep-draft vessels should use care to avoid them.

Cross Rip Shoal, about 2.5 miles west-southwestward of Halfmoon Shoal, has a least depth of 11 feet. Its northern edge is marked by a buoy and a lightship. A shoal with a least depth of 24 feet extends 1.2 miles eastward of the lightship. Deep-draft vessels must use caution in passing between this shoal and the shoal making out southwestward from Halfmoon Shoal.

Horseshoe Shoal, about 7.5 miles long, bares in places at low water. Its western side is marked by two buoys and its southeastern side by a lighted buoy. The main channel, discussed later, passes between the lighted buoy and the lightship north of Cross Rip Shoal. A danger zone has been established on Horseshoe Shoal; for description and regulations see § 204.5 (b) in Chapter 2.

L'Hommedieu Shoal and **Hedge Fence,** lying in an east-west direction in the western end of Nantucket Sound and the eastern end of Vineyard Sound, have depths of 2 to 18 feet. The water deepens abruptly at the edge of these shoals and soundings will give little warning of approaching dangers. The main channel passes southward of the shoals. L'Hommedieu Shoal is marked by a buoy at its east and west ends. Hedge Fence is marked by a lighted horn and gong buoy and a buoy on its southeastern side and a buoy on its western end. The wreck of the steamer *Port Hunter* is on the southwestern side of Hedge Fence.

The numerous other shoals in Nantucket Sound are discussed with the land features near them.

Channels.—Two principal channels lead from the eastward into Nantucket Sound. The northerly one is through Pollock Rip Channel and Butler Hole, and the southerly one through Great Round Shoal Channel. Between the numerous shoals in Nantucket Sound are two well-marked channels leading through the sound to the eastern end of Vineyard Sound. Muskeget Channel, discussed later in this chapter, leads into the sound from the southward.

Chart 250.—Pollock Rip Channel and **Butler Hole** is the most direct channel leading from points northward of Cape Cod to Nantucket Sound. The channel leads between Bearse Shoal and Pollock Rip, thence eastward of Handkerchief Shoal. A Federal project provides for a channel 30 feet deep through the shoals. The project has been completed and the controlling depth in 1946 was 30 feet for a width of 1,750 feet, 12 feet over a width of 2,000 feet.

Steamship traffic is very heavy in this channel; fishing vessels and small craft should avoid this area during thick or foggy weather.

The channel is well marked by a daybeacon, three lightships, lighted buoy and fog signals, and buoys. In winter the lighted buoys are removed when in danger of being carried away by ice and their location is marked by spar buoys. This channel is generally used in preference to Great Round Shoal Channel.

Monomoy Point Daybeacon, an unused lighthouse tower with a covered way to a dwelling, is on Monomoy Island about 1.3 miles northward of Monomoy Point. The daybeacon is an excellent landmark by day. The 35-foot tower is red in color. An inactive Coast Guard station is 0.8 mile southward of the former lighthouse.

Pollock Rip Lightship is moored in 60 feet of water 3 miles northeastward of the entrance to Pollock Rip Channel. The lightship has a red hull with the word POLLOCK on each side, and two masts with a circular gallery at each masthead. The light, displayed from the foremast, is 57 feet above the water and visible 13 miles; a riding light is on the forestay. The fog signal is an air diaphone; the radiobeacon is synchronized with the fog signal for distance finding. The code-flag signal and radio call is NNBS. **Storm warnings** are displayed during the daytime. Radio messages of importance in the maintenance of aids to navigation or other urgent matters will be received during the scheduled time of operation.

Stone Horse Shoal Lightship is moored in 84 feet of water 0.9 mile 153° from Monomoy Point Daybeacon. The lightship has a red hull with the word STONE-HORSE on both sides, and a tubular mast. The light is 48 feet above the water and visible 12 miles; a riding light is on the forestay. The fog signal is a two-tone air diaphone; the radiobeacon is synchronized with the fog signal for distance finding. The code-flag signal is NNBX. **Storm warnings** are displayed during the daytime. A vessel showing her distinguishing lights at night or her number with International Code signals by day, will be reported. The radio at the lightship receives and transmits messages.

Handkerchief Lightship is moored in 49 feet of water in the eastern part of Nantucket Sound southwestward of Monomoy Point. The lightship has a red hull with the word HANDKERCHIEF on both sides, and a mast with gallery and lantern at the masthead. The light is 40 feet above the water and visible 12 miles; a riding light is on the forestay. The fog signal is an air diaphragm horn; the radiobeacon is synchronized

with the fog signal for distance finding. The code-flag signal is NNBO. **Storm warnings** are displayed during the daytime.

Great Round Shoal Channel is used mostly by the very deep-draft vessels passing through the sound and sometimes by sailing vessels that are headed by the wind so as to prevent their working through Pollock Rip Channel. The channel is between Great Round Shoal and Nantucket Shoals and has a depth of about 30 feet. Lighted buoys and buoys mark the channel but the aids and fog signals are not as numerous as in Pollock Rip Channel.

Chart 1209.—Main Channel leads southward of Halfmoon Shoal; through the dredged **Cross Rip Channel**, southward of Horseshoe Shoal, through the fairway Hedge Fence and Squash Meadow, and thence into the eastern end of Vineyard Sound. This channel is used by most of the vessels bound through Nantucket Sound. With care a least depth of 30 feet can be carried through Main Channel, but the draft of the vessel using it seldom exceeds 24 feet. A Federal project provides for a channel 30 feet deep and 4,000 feet wide in a length of about 1.7 miles in Cross Rip Channel. The project has been completed.

Main Channel is well marked by a lightship, lighted buoys and fog signals, and buoys. **Cross Rip Lightship** is moored in 42 feet of water north of Cross Rip Shoal. The lightship has a red hull with the words CROSS RIP on both sides, and a mast with gallery at the masthead. The light is 40 feet above the water and visible 12 miles; a riding light is on the forestay. The fog signal is an air diaphragm horn; the radiobeacon is synchronized with the fog signal for distance finding. The code-flag signal is NNBH. **Storm warnings** are displayed during the daytime.

North Channel leads along the north side of Nantucket Sound, on either side of Bishop and Clerks, northward of Horseshoe Shoal, between Wreck Shoal and Eldridge Shoal, northward of L'Hommedieu Shoal, and through one of the openings in the shoals westward of L'Hommedieu Shoal in Vineyard Sound. This channel is used mostly by craft bound to points on the north shore of Nantucket Sound and by vessels bound through the sound during northerly winds or in winter when the prevailing northerly winds keep the north shore of the sound free from drift ice. The least depth in the channel is about 16 feet. Lighted buoys and buoys mark the channel.

Anchorages.—Vessels working through the sound against a head wind usually anchor during the night, or if becalmed and drifting toward the shoals it is best to anchor and wait for a favorable current or change of wind. There are no anchorages for vessels of over 10-foot draft that afford shelter from all winds except Nantucket Harbor, Hyannis Harbor, and Edgartown inner harbor. Vineyard Haven, the anchorage most used by coasters, is exposed to northeasterly winds. In northerly winds the best anchorages are off Dennis Port, Hyannisport and along the north shore. The anchorage off Falmouth is used in most winds by vessels with good ground tackle. In easterly winds vessels sometimes anchor in smooth water westward of Handkerchief Shoal or inside Great Point. Good shelter from easterly winds can also be found in Chatham Roads and Edgartown outer harbor. In southerly and westerly winds Edgartown Harbor and Vineyard Haven are the best anchorages. With the aid of the chart and the directions given under the discussion of these harbors, strangers can enter the anchorages.

Several anchorage areas in Nantucket Sound and approaches are prescribed by

Federal regulations. For definition and regulations see § 202.10(6), (7), (8), (9), (10), (11) (b) in Chapter 2.

Directions.—Sailing directions for the channels through and entering Nantucket Sound are given in Chapter 3. Because of the numerous shoals, strong tidal currents, thick fog at certain seasons, and the large number of vessels which may be encountered in the narrow parts of the channel, the navigator must use more than the ordinary care when in these waters.

In clear weather, day or night, the aids are readily distinguished and sufficiently numerous to enable a stranger to follow the channel without difficulty. The strongest currents will be encountered in Pollock Rip Channel, between Stone Horse Shoal and Handkerchief Lightships, and off East and West Chops. In some places the current sets directly on the shoals and in a calm, sailing vessels are sometimes obliged to anchor to prevent going aground. Most of the shoals rise abruptly from deep water and the bottom is very irregular so soundings alone cannot be depended upon to keep clear of danger. Sailing vessels with a favorable current and with some local knowledge beat through the sound against a head wind in clear weather. If they find they are losing ground, they come to anchor within the prescribed anchorage areas under the lee of one of the shoals or in one of the harbors until the wind or current changes.

In thick weather or fog when the aids cannot be seen vessels in the vicinity of Pollock Rip Channel are cautioned against anchoring in the channel or near the buoys or lightships. The large number of steamers and tows passing through the channel in thick weather depend almost entirely on the sound signals of the aids, making it necessary for them to pass close to the aids. This increases the probability of collision with vessels anchored near the aids and, as there is seldom a necessity for such action, sailing vessels should avoid doing so; there is no excuse for a steamer anchoring near the aids.

Vessels off Pollock Rip entrance lighted whistle buoy desiring to anchor, wind and sea permitting, should stand northwestward and anchor west of a line joining Bearse Shoal North End buoy 2A and Chatham Bar buoy 2, see § 202.10 (a) (11) in Chapter 2. Anchorage may also be had in depths of 5 to 7 fathoms about 1.5 miles south-southeastward of the buoy and northeastward of Broken Part of Pollock Rip.

When in the vicinity of Stone Horse Lightship and desiring anchorage, steer **136°** for about 1.5 miles from the lightship and anchor in depths of 22 to 35 feet. This anchorage is about 1.3 miles southward of the channel.

Vessels between Butler Hole and Handkerchief Lightship or in the vicinity of the lightship can anchor anywhere southwestward of Stone Horse Shoal in 25 to 39 feet. Care should be taken to keep Stone Horse North End lighted bell buoy 9 bearing westward of 035° and to be 1 to 1.5 miles southeastward of the sailing line. Vessels may also anchor northwestward of Handkerchief Lightship and on the west side of Handkerchief Shoal.

In Great Round Shoal Channel the danger of collision is not as great as in Pollock Channel. In thick weather a vessel may anchor, wind and sea permitting, anywhere in the channel and wait for clear weather. The bottom is generally sand, gravel, pebble, or a combination of these. The tidal currents are not as strong as in Pollock Rip Channel. Easterly winds make high tide and strong westerly current. Westerly winds make low tides and strong easterly currents.

The directions given in Chapter 3 for Pollock Rip and Great Round Shoal Channels

are good for a depth of 29 feet. However, these channels are subject to change and deep-draft vessels should wait for a favorable tide.

Main Channel is well marked and strangers should experience little difficulty navigating this channel. Deep-draft vessels must take care to avoid the 24-foot shoal eastward of Cross Rip Lightship and the 22- to 27-foot shoals southward of Halfmoon Shoal.

North Channel has broken ground with depths of 16 to 17 feet in some places. Strangers should not attempt this channel at night.

Currents.—The *Current Tables* and *Tidal Current Charts* described in Chapter 1 contain detailed current information for many locations in this area. For the largest velocities likely to occur at a number of locations see Chapter 2.

At a point midway between lighted buoys 1 and 2 in Pollock Rip Channel the flood current sets about 055° and the ebb 225° or at an angle of approximately 20° to the axis of the channel.

Daily current predictions for Stone Horse Lightship at the western end of Pollock Rip Channel are published in the *Current Tables*. At this location strengths of flood set about 035° and ebb about 225°.

At the south end of Great Round Shoal the tidal current is rotary, turning clockwise. The strength of flood sets 065° with a velocity of about 1½ knots. The strength of ebb sets 250° with a velocity of about 1½ knots. There is no true slack since the current is rotary. Minimum velocities before flood and ebb average about ½ knot and set approximately 315° before flood and 160° before ebb.

From the eastern entrance of Nantucket Sound to the lighted horn and gong buoy off Hedge Fence, the time of current becomes gradually later; the average velocity at strength varies from about 1 to 2 knots, the flood setting eastward and the ebb westward.

Weather.—Fogs may occur at any time but are more frequent from April to October than during the remainder of the year. The fogs come more frequently with easterly and southerly winds; northerly winds clear them away. Southwesterly winds are usually accompanied by haze.

In mild winters **ice** interferes but little with the movement of vessels in the sound. In severe winters drift ice accumulates and renders the movements of sailing vessels hazardous and sometimes almost completely obstructs their progress for periods of as much as six weeks. Steamers force their way through the ice. During northerly winds which prevail in winter the passage along the north shore will be clear when other parts of the sound are unsafe. Sailing vessels if caught in a floe while entering Pollock Rip Channel are almost certain to be carried on the shoals. Vessels should keep in mind that the buoys and even the lightships are liable to be moved out of their positions by drift ice.

Storm warnings are displayed day and night at Nantucket and Nobska Point. Day displays are shown at Chatham Light, Wychmere Harbor, and Pollock Rip, Stone Horse Shoal, Handkerchief, and Cross Rip Lightships.

Pilotage.—State pilotage is not compulsory for vessels passing through the sound; it is only compulsory for foreign and registered vessels entering or clearing the ports. Pilots for the sound or Monomoy and Nantucket Shoals may sometimes be obtained at Boston by vessels coming from northward, or at New York by vessels coming from westward.

Vessels requiring a **tow** usually take a towboat from the port of their departure.

Monomoy Island, on the northeastern side of Nantucket Sound, is a low, narrow spit covered with sand hillocks. Vessels sometimes anchor off the east shore of the island in depths of 4 to 6 fathoms to await a favorable current for entering the sound. As a general rule vessels should not approach nearer than 1 mile for a distance of 4 miles southward of Chatham Light. Off Monomoy Point, the south end of the island, shoals make off up to 5 miles eastward. A restricted area has been established off Monomoy Island; for description and regulations see Chapter 2.

Monomoy Beach, about 4.5 miles long, is the strip of land between Monomoy Island and Chatham Bar. In passing eastward of the beach the town of Chatham and Chatham Light can be seen over it. A privately maintained light, 20 feet above the water, is shown from a gray pipe tripod on the beach near Chatham Bar.

The large bight formed by Monomoy Island and the north shore of Nantucket Sound, eastward of Point Gammon, has extensive shoals scattered throughout and bordering the shores. Some of the shoals are not marked by buoys.

Chart 257.—Chatham Roads, at the northeast end of Nantucket Sound, is between the extensive shoals which extend northwestward from the northern end of Monomoy Island and the shoals extending 1.6 miles from the south shore of Cape Cod at Harwich Port. The roads are the approach to **Stage Harbor** and the prominent summer resort of **Chatham** on the hilly ground at the northeast shore of Nantucket Sound. Among the conspicuous landmarks are a stack, a radio tower, church spires, Chatham Light and adjoining signal tower, and Stage Harbor Light. **Stage Harbor Light,** 48 feet above the water and visible 11 miles, is shown from a white skeleton tower on **Harding Beach** on the northeast side of Chatham Roads. An old tower is near the light. Chatham Light is described in the previous chapter.

A Federal project provides for a channel 10 feet deep and 150 feet wide from Chatham Roads to Stage Harbor. No work has been done on the project. A narrow, buoyed entrance channel leads to the harbor. The controlling depth in the channel was 2 feet in 1949. Because of a break-through in the coast south of Chatham Light, the easterly end of Stage Harbor is shoaling. In 1949 it was reported that small boats were entering the harbor at high water from Chatham Bar through the break. A narrow channel good for drafts of up to about 5 feet leads northerly from Stage Harbor to **Mill Pond.** Across the channel to Mill Pond is a hand-operated bascule bridge with a horizontal clearance of 14 feet and a vertical clearance, closed, of 7 feet at high water. During the summer months the bridge will be opened upon reasonable advance notice to the harbor master or at the Town Hall.

Good anchorage for vessels up to about 18-foot draft can be had in Chatham Roads in depths of 21 to 30 feet, good holding ground. This anchorage is insecure for small craft in heavy southwesterly gales. Small craft can find a well-sheltered anchorage in Stage Harbor.

Vessels approaching Chatham Roads from the southward should pass westward of Handkerchief Shoal and the extensive shoals westward of Monomoy Island. Approaching from the westward pass either side of Bishop and Clerks and thence southward of the buoy off **Kill Pond Bar,** a shoal with depths of 4 to 11 feet off the northwest entrance to Chatham Roads. When off the entrance to Chatham Roads steer **063°** with Stage Harbor and Chatham Lights in range. This course will lead north of the buoy marking **Common Flat,** the shoal on the eastern side of the roads, and to the buoy off the entrance

to Stage Harbor; anchorage may be had northward of this buoy in about 28 feet. Boats continuing to Stage Harbor must be alert to find the narrow entrance channel 700 yards off Stage Harbor Light. The channel is narrow and twisting but well marked.

The harbor is closed by ice for short periods each winter. **Storm warnings** are displayed day only at Chatham Light. Local fishermen will act as pilots for craft desiring a pilot.

The wharves at Chatham have a depth of about 4½ feet alongside. Gasoline, oil, water, provisions, and marine supplies are available. Diesel oil may be had at the fish pier in Aunt Lydias Cove, discussed in the previous chapter.

A boatyard has a marine railway capable of hauling out craft up to 80-ton weight, 80-foot length, and 4½-foot draft forward, 6-foot aft. Machine shop facilities are available for all hull and engine repairs.

Bucks Creek, 1.6 miles northwestward of Stage Harbor Light, is used only at high water by local craft. A tall radio tower is prominent about 700 yards west of the jetties. The entrance between the jetties is closed but small craft can get through one of the two break-throughs in the sand bar to **Cockle Cove.** One opening, just east of the jetties is about 30 yards wide, the other opening is about 470 yards east of the jetties.

Wychmere Harbor, 3.6 miles west of Stage Harbor Light, has an entrance about 100 feet wide protected by a long, L-shaped jetty. The harbor is used by fishing and pleasure craft. The village of **Harwich Port** is west of the harbor. The Exchange Building, a large square building with a cupola, at **Harwich,** shows up well from seaward. A church spire about 0.5 mile westward of the harbor and a hotel building on the west bank of the entrance are conspicuous. A light shown from a black skeleton tower marks the end of the jetty.

The controlling depth over the bar about 300 yards south of the jetty was 4 feet in 1949. Inside the jetty, the channel had a depth of 5 feet to the harbor. The channel is subject to shoaling. The outer anchorage basin, known locally as **Harwich Port Harbor,** had a depth of 7 feet in 1949 with good holding ground.

Storm warnings are displayed, day only, from May to October, at the Stone Horse Yacht Club on the east bank of the harbor. Diesel oil, gasoline, ice, water, provisions, and ship's chandlery are available at Harwich Port. A small boatyard has two marine ways, the largest capable of hauling out craft up to 10-ton weight, 40-foot length, and 6-foot draft, for general repairs.

Allen Harbor, about 1 mile west of Wychmere Harbor, has a narrow entrance between two jetties. An elevated water tank north of the harbor makes a good landmark. In July 1949 the controlling depth in the entrance was 0 feet at low water and off the entrance 2 to 4 feet, but dredging was underway to open a channel 3 feet deep. The channel is winding, leads between solid marsh on both sides, and is not difficult to follow. Strangers should wait for high water and obtain local information before entering. The harbor affords good anchorage for small craft. A shop with outboard motor repair facilities and a wharf are at the head of Allen Harbor.

Herring River, about 1 mile westward of Allen Harbor, has a large, prominent hotel on the west side of the entrance. The entrance between two small jetties had a controlling depth of ½ foot in 1949; only shallow-draft craft and rowboats were using the entrance. Fishermen enter the river at high water but strangers should not attempt it without local knowledge. A basin dredged in the river just below the bridge has moorings for craft drawing up to 3 feet. The fixed bridge, about 0.3 mile above

the mouth, has a horizontal clearance of 17 feet and a vertical clearance of 7 feet at high water. Limited supplies may be obtained at **Dennis Port.** A small boatyard has facilities for repairing small craft.

Chart 258.—Bass River, 9.6 miles westward of Stage Harbor Light, is entered between two jetties. A light, 33 feet above the water, is shown from a steel skeleton tower and tank house on the west jetty. The approach to the jetties has shoaled and in 1949 the reported controlling depth from the deeper water in the sound over the bar to the jetties was 3 feet. A channel 6 feet deep and 60 feet wide has been dredged inside the jetties and in the river to an anchorage basin. However, the shoaling off the entrance restricts craft to 3-foot draft or less at high water and with local knowledge. Buoys maintained by the towns of **Dennis** and **Yarmouth** mark the channel to the second fixed bridge near **South Dennis** from June 15 to September 15. The channel is subject to shoaling. A rocky area in the channel about 0.4 mile north of the breakwater light has been reported to have a depth of 3½ feet. Privately maintained buoys mark the north and south side of this area. A fixed bridge crosses the river at **South Yarmouth** and **West Dennis,** about 1.5 miles above the mouth. The bridge has a horizontal clearance of 36 feet and a vertical clearance of 10 feet at high water.

A small boatyard on the west side of the river has marine ways capable of hauling out craft up to 35-foot length and 6-foot draft for general repairs. Gasoline, water, ice, ship's chandlery, and some provisions are available at the yard. Other supplies can be obtained at South Yarmouth and West Dennis.

Dogfish Bar, an extensive shoal area off Bass River entrance, has depths of 1 to 6 feet. A small breakwater, formerly used as a shelter for small craft, is on the easterly end of the bar, about 1 mile southeastward of the light off Bass River entrance. The area around the breakwater and northeasterly of it has shoaled. Rocks awash at low water are about 0.4 mile northwestward of the breakwater.

Point Gammon, 12 miles west-northwestward of Monomoy Point, is the eastern entrance to Hyannis Harbor. The point, prominent and wooded, is marked by an unused lighthouse tower. A reef, partly bare at low water, extends 0.5 mile south of the point and is marked at the end by a buoy. Extensive flats with rocks bare at low water extend 1 mile northwestward of the point. **Gazelle Rock,** about 0.5 mile south-southeasterly of the point, has a depth of 5 feet over it. **Senator Shoal,** unmarked, with depths of 11 to 12 feet, is about 1 mile southeasterly of the point. **Hallets Rock,** marked by a buoy, is about 1 mile south of the point. The rock has a depth of 15 feet with surrounding depths of 21 to 27 feet.

Bishop and Clerks is an extensive shoal, the center of which is about 2.2 miles southward of Point Gammon. The gray granite tower of a former lighthouse is near the center of the shoal. The 47-foot tower rises from a group of rocks about 12 feet above high water. Several rocks awash at low water are on an arm of the shoal which extends nearly 0.9 mile south of the tower. A buoy marks the southern end of the arm. A rock with a depth of 5 feet over it, surrounded by depths of 13 to 16 feet, is about 0.7 mile south-southeastward of the tower. The remainder of the shoal has depths of 12 to 18 feet. Caution should be used when navigating in this area. A lighted bell buoy is near the northeast edge of the shoal.

Broken Ground, a shoal area westward of the south end of Bishop and Clerks, has depths of 14 to 18 feet. **West Southwest Ledge,** 1.6 miles southwest of Point Gammon

and northwest of Bishop and Clerks, has depths of 15 to 18 feet. A lighted bell buoy is westward of the ledge.

Three dangerous rocks are on the edge of the flat which extends northwestward from Point Gammon and into the approach to Hyannis Harbor. **Great Rock** is marked by a daybeacon, cage on iron spindle; **Gardiners Rock,** marked by a buoy on its western side, has a depth of 11 feet over it; **Halftide Rock,** eastward of Gardiners Rock and southeastward of Great Rock, is unmarked.

Hyannis Harbor, protected by a breakwater, is used as a harbor of refuge by coasting vessels and pleasure craft of less than 14-foot draft. The harbor is the approach to Hyannisport, Lewis Bay, and Hyannis. A Federal project provides for a breakwater and the dredging of the protected area behind the breakwater, a length of about 535 yards, to a depth of 15½ feet. The dredged area together with the area having natural depths over 15½ feet provide a protected basin nearly 0.4 mile in diameter with depths of 12 to 16 feet. The depth in the natural channel to the breakwater is 13 to 16 feet, but the approach is somewhat obstructed by the flats extending westward from Point Gammon and an extensive shoal with numerous rocks on the west side of the approach.

Vessels approaching Hyannis Harbor from the east should pass 1 mile 233° from the Bishop and Clerks tower. From this point steer **284°** for 1.8 miles passing 250 yards south of Hallets Rock buoy. When the Bishop and Clerks tower bears 138°, distant 1.4 miles, steer **318°** for 1.6 miles with the tower astern. When Great Rock Daybeacon bears 047°, distant 1,100 yards, steer **011°** for about 0.9 mile, passing 50 yards or more eastward of Hyannis Breakwater lighted buoy 1, and anchor 300 yards northeastward or northward of the east end of the breakwater in depths of 15 to 20 feet, soft bottom. Small craft can anchor in the northern portion of the harbor in depths of 6 to 12 feet, but care must be taken to keep clear of the area around a former wharf as submerged piling may be encountered.

Approaching from the westward, from a position close aboard Wreck Shoal West lighted bell buoy 18A, steer **074°** about 2.5 miles with Bishop and Clerks tower ahead. This course passes about 600 yards north of Eldridge Shoal buoy 11 and about 300 yards south of Wreck Shoal bell buoy 16. From a position about 800 yards north of Horseshoe buoy 9, steer **058°** for 4.4 miles to a position where West Southwest Ledge lighted bell buoy 14 bears 350°, distant 0.4 mile and the Bishop and Clerks tower bears 104°, distant 2.4 miles. Thence steer **011°** for about 2.6 miles, passing about 150 yards eastward of Southwest Ground buoy 1 and 50 yards or more east of Hyannis Breakwater lighted buoy 1.

Ice seldom interferes with the movement of vessels in Hyannis Harbor; the prevailing northerly winds keep the harbor clear. In 1949, one licensed pilot with headquarters at the town landing, was available for the harbor and Lewis Bay channel.

Hyannisport is a resort on the northerly side of Hyannis Harbor. A gray stone church with a square tower is conspicuous in **West Hyannisport.** A basin dredged to a depth of about 6 feet leads to the south side of the yacht club landing on the west side of the harbor. Gasoline, fresh water, and some provisions are available.

Lewis Bay, a large bay with depths of 2 to 11 feet, extends northeastward from Hyannis Harbor. In the northwest corner of the bay is the channel to the important summer resort of **Hyannis.** A Federal project provides for a channel 12 feet deep and 150 feet wide from Hyannis Harbor to the deep water in Lewis Bay, thence 12 feet deep

and 100 feet wide from Lewis Bay to the town wharf at Hyannis, with an anchorage basin 12 feet deep north of **Harbor Bluff**. The channel is subject to shoaling. The controlling depth in the buoyed channel from Hyannis Harbor to Hyannis in July 1949 was 5 feet. It has been reported that the depth has shoaled to 3 feet. The deepest draft taken to Hyannis at high water is about 8 feet. Vessels entering Lewis Bay must be guided by the buoys marking the dredged channel and by the color of the water, deepest where it is darkest. Lewis Bay is closed by ice for about two months each winter.

A bulkhead has been built at the town landing at Hyannis which affords berthing of craft drawing up to 7 feet. Plans were underway to complete in 1949 8 finger piers 40 feet long with depths of 8 feet alongside. Diesel oil deliveries by truck, gasoline, ice, water, provisions, and some yacht supplies are available. Two boatyards operate in the vicinity, the largest marine railway capable of hauling out craft up to 70-ton weight, 80-foot length, and 7-foot draft for hull and engine repairs. Machine shop facilities are available.

The Hyannis Steamship Line, based at the town landing, operates daily boats to Nantucket Island during the summer months. Rail and highway communications are available at Hyannis.

Westward of Hyannis Harbor breakwater the water is shoal with numerous rocks extending well offshore. **Eddie Woods Rock,** 0.6 mile southwestward of the end of the breakwater, is unmarked and has a depth of 5 feet over it.

Squaw Island, 0.7 mile westward of the inshore end of Hyannis Harbor breakwater, is marked by a prominent tower. **Hyannis Point,** the southerly tip of the island, is on the eastern side of Centerville Harbor.

Southward of Hyannis Point and Centerville Harbor are numerous shoals and rocks. **Southwest Ground,** the area about 1.5 miles south of Hyannis Point, has numerous rocks and shoal spots necessitating extreme caution for vessels navigating the area. **Southwest Rock,** about 1.1 miles south of Hyannis Point, is marked by a daybeacon, a barrel on end atop an iron spindle. Unmarked rocks, some bare at low water and others with depths of 2 to 6 feet over them, are between the daybeacon and Hyannis Point. Among the other dangers are the following: **Hodges Rock,** 1 mile southward of Southwest Rock Daybeacon, has a depth of 5 feet and is marked by a buoy. An unmarked rock, 300 yards east of Hodges Rock, has a depth of 8 feet. **Bearse Rock,** 0.5 mile southwest of the daybeacon, has a depth of 5 feet and is marked by a buoy. **Channel Rock,** 0.4 mile west of Bearse Rock, has a depth of 5 feet and is marked by a buoy. **Gallatin Rock,** 0.4 mile southwestward of Bearse Rock, has a depth of 4 feet and is marked by a buoy. **Collier Ledge,** 1.5 miles southwest of the daybeacon, is bare at low water and is marked by a lighted buoy from April 15 to November 1, a buoy from November 1 to April 15. **Gannet Ledge,** 1.1 miles southwest of Hyannis Point, has a depth of 5 feet and is marked by a buoy. **Gannet Rocks,** 0.3 mile northward of Gannet Ledge, include two unmarked rocks 7 and 3 feet high and a rock with a depth of 4 feet over it. **Spindle Rock,** near the head of Centerville Harbor, is bare at low water and is marked by a buoy; another rock bare at low water and a rock with a depth of 2 feet are 200 yards northward of the buoy; and two unmarked rocks 1.7 miles southwest of Hyannis Point have depths of 6 feet.

Centerville Harbor is a bight 2 miles wide in the north shore of Nantucket Sound westward of Hyannis Point. A church spire and an elevated tank in **Centerville,** the

village inland from the head of the harbor, are used as guides for entering the harbor. **Craigville Beach** on the north side of the harbor is a popular bathing beach. The approach to Centerville Harbor is obstructed by the previously mentioned rocks and shoals, but a natural channel with a depth of 9 to 10 feet leads to the anchorage. Anchorage with good holding ground may be had in depths of 15 to 21 feet, however, vessels seldom anchor here for shelter as the harbor is exposed to southerly winds. The shoals off the entrance somewhat break the force of the seas from southward, but not sufficiently to make it a safe anchorage.

A course of 330°, passing about 450 yards eastward of Gallatin Rock buoy, midway between Channel Rock buoy and Bearse Rock buoy, and about 350 yards abeam westward of Gannet Ledge buoy, leads over a least found depth of 9 feet. Anchorage may be had 0.5 mile from the shore in depths of 15 to 21 feet, soft bottom. Strangers should not enter except in the daytime with clear weather. Ice closes the harbor in the winter.

East Bay, on the west side of Centerville Harbor, has depths of 1 to 4 feet. The bay is used principally by oyster boats. Pleasure boats and small yachts enter the bay en route to Centerville River. The jettied entrance to East Bay has been dredged to a depth of 6 feet but is subject to shoaling. Strangers should not attempt to enter without local information. **Centerville River**, which enters the north side of the bay, has been dredged to a depth of 5 feet for a width of 40 feet practically to the head of navigation. In 1949 the reported controlling depth was 3 feet. A bascule foot bridge crosses the river about 0.3 mile above East Bay with a horizontal clearance of 35 feet and a vertical clearance, closed, of 9 feet at high water. Small boats anchor in the river off Centerville or tie up to private piers.

Chart 259.—Cotuit Anchorage, 6.5 miles west of Point Gammon, is an anchorage for small craft between the shoals which make off from the shore. The anchorage is exposed to southerly winds and is seldom used except by local craft. The channel to the anchorage is marked by buoys and vessels of less than 6-foot draft should experience no difficulty in keeping in the best water. Vessels approaching from the westward frequently use the channel between Succonnesset and Wreck Shoals. **Lone Rock**, near the southerly side of the anchorage, has a depth of 4 feet and is marked by two horizontal-banded buoys. A shoal marked on its southeasterly side by two buoys extends southeasterly from the east side of the anchorage. Depths on the shoal are 4 to 5 feet.

West Bay, on the northerly side of Cotuit Anchorage, has a jettied entrance about 150 feet wide. A light, privately maintained from May 1 to November 1, is shown from the shoreward end of the east jetty. The light is obscured from 193° to 259°. The bay is the approach to **Osterville**, a village on the east side of the bay marked by an elevated tank. The controlling depth in the channel over the bar and into West Bay was 6 feet in 1949. Privately maintained buoys mark the channel over the bar through West Bay and into Great Bay. Anchorage may be had in the northeast part of West Bay near the yacht club landing in depths of about 7 feet, or abreast the boatyard in depths of 6 feet. Ice closes the bay for about 2 months each winter. The depth at the wharves at Osterville is about 4 feet. Several oyster wharves are near the bridge. Gasoline, fresh water, and provisions can be obtained. A boatyard at Osterville has ways capable of hauling out craft up to 15-ton weight, 48-foot length, and 6-foot draft for hull and engine repairs.

Little Island, on the northern shore of West Bay, separates West and Great Bays. **Great Bay** has depths of 6 to 17 feet. Strangers should obtain local information for the navigating of Great Bay. The bay is usually closed by ice during the winter. A depth of about 4 feet can be taken in the narrow channel between West and Great Bays. A bascule bridge crosses the channel between Osterville and Little Island. The draw has a horizontal clearance of 31 feet and a vertical clearance, closed, of 15 feet at high water. The bridge is opened upon signal between 0700 and 1800 daily during the month of June. In July, August, and September the hours of operation are 0700 to 2000 daily. The remainder of the year the bridge is unattended.

Cotuit Bay, northwestward of Cotuit Anchorage, is separated from West Bay by **Osterville Grand Island. Cotuit** is a village on the west side of the bay. An elevated water tank near the village is prominent. A dredged channel, 100 feet wide, leads from Cotuit Anchorage to off **Cotuit Highlands,** thence the channel curves between **Sampsons Island** and **Bluff Point** into Cotuit Bay. Privately maintained buoys mark the channel into Cotuit Bay and the channel from Cotuit Bay to Great Bay. In 1949 the controlling depth from the anchorage to Cotuit Highlands was 6 feet, thence 5 feet into Cotuit Bay. A depth of about 6 feet was in the channel to Great Bay. **Seapuit River,** south of Osterville Grand Island, connects Cotuit and West Bay. A channel 6 feet deep has been dredged in the river. Cotuit Bay is usually closed by ice each winter. Gasoline, fresh water, and provisions can be obtained at Cotuit. The town landing had a depth of 5 feet at its face in 1949.

Poponesset Bay, westward of Cotuit Anchorage, is used only by oyster boats. The narrow and unmarked entrance extends southwestward from the inner end of the entrance channel to Cotuit Bay. A channel 60 feet wide and 6 feet deep was dredged in the entrance but it is subject to shoaling. In 1949 the channel was good for a draft of only 3 feet. The greater part of the bay has depths of 1 to 4 feet.

Wreck Shoal, about 3 miles south of Cotuit Anchorage, is about 1.4 miles long in an east-west direction and about 0.3 mile wide. Depths on the shoal range from 4 to 13 feet. A bell buoy marks the southeast side of the shoal and a buoy and lighted bell buoy are on the southwesterly side. An unmarked shoal with depths of 8 to 15 feet is about 1.5 miles northeast of Wreck Shoal and southward of Cotuit Anchorage approach. Broken ground with a least known depth of 13 feet is between this shoal and Wreck Shoal.

Eldridge Shoal, about 0.9 mile south of Wreck Shoal, is about 1 mile long in a northeasterly direction and about 0.2 mile wide. Depths on the shoal range from 3 to 14 feet. A buoy marks the northern side. A channel between Eldridge and Wreck Shoals has depths of 23 to 41 feet. A channel between Eldridge and Horseshoe Shoals has depths of 21 feet or more.

Succonnesset Shoal extends about 2.4 miles westward from Wreck Shoal to the shoal area off the shore southwestward of **Succonnesset Point.** Depths of 1 to 5 feet are throughout the shoal. Between Succonnesset and Wreck Shoals is a narrow unmarked channel. Between Succonnesset and L'Hommedieu Shoals is **Small Shoal** with a least depth of 9 feet and marked by a buoy.

Waquoit Bay, about 5 miles southwestward of Cotuit Anchorage, has depths of 2 to 8 feet. The entrance, about 250 feet wide, is between two stone jetties. In 1949 the controlling depth was 6 feet from the jetties into the bay. A small boatyard is at

the head of the bay. The marine railway at the yard can haul out craft up to 38-foot length and 5-foot draft. Gasoline and some supplies are available.

Between Waquoit Bay and Falmouth Inner Harbor are several ponds formed by the barrier beach, some of which have outlets. Many jetties or groins have been built out from the shore for beach erosion control.

Eel Pond, west of Waquoit Bay, has a narrow entrance marked by privately maintained buoys. In 1949 a draft of 3 feet could be taken through the entrance and pond to the **Seapuit River** and thence into the upper part of Waquoit Bay. **Menauhant** is a summer colony on the west shore of Eel Pond and the east shore of **Bowen Pond.** The entrance to Bowen Pond is closed by a fixed highway bridge.

Green Pond, 1.6 miles west of Eel Pond, is connected to the sound by a narrow channel which has broken through the shore. It was reported in 1949 that only rowboats could get through the channel.

Chart 249.—Falmouth Heights, about 3 miles east-northeast of Nobska Point Light and east of the town of **Falmouth,** is a prominent yellow bluff on the summit of which are numerous homes and a large hotel.

Falmouth Inner Harbor, westward of Falmouth Heights, is a tidal lagoon about 0.7 mile long and less than 0.1 mile wide. A tall standpipe about 1.5 miles west of Falmouth is one of the most prominent landmarks in this vicinity. The yacht club dock and flagpole are conspicuous from close inshore. The entrance to the harbor is protected by two jetties; a lighted buoy is off the west jetty. A Federal project provides for an entrance channel 10 feet deep and 100 feet wide between the jetties into the inner harbor and for a depth in the inner harbor of 10 feet for an area of about 17 acres. The controlling depth in July 1949 was 9 feet in the entrance channel and 7 feet in the inner harbor.

Diesel oil, gasoline, fresh water, ice, and supplies are available in Falmouth Inner Harbor. The depth at the wharves is between 7 and 10 feet. The three boatyards have facilities for complete engine and hull repairs. Machine shop facilities are available. The largest marine railway can haul out craft up to 130-ton weight, 80-foot length, and 8½-foot draft.

Falmouth Harbor is the open roadstead off the south shore of Cape Cod from 1 to 3 miles eastward of Nobska Point Light. The harbor affords an anchorage for vessels in 24 to 36 feet about 0.8 mile from the shore. Smaller craft can anchor closer to the shore in 15 to 18 feet. The bottom is generally sticky and good holding ground; the depths shoal gradually toward the shore. The anchorage affords a lee in northerly winds; in southerly winds the sea is somewhat broken by L'Hommedieu Shoal and the shoals which extend westward of it, so that a vessel with good ground tackle can ride out a gale in comparative safety.

Falmouth Harbor is frequently used by vessels with good ground tackle who prefer this anchorage to the anchorage in Vineyard Haven which is generally crowded in bad weather. Vessels are cautioned to stay clear of the two shoal areas with depths of 10 to 16 feet which extend westward of L'Hommedieu Shoal. Buoys mark the shoals. A cable area is between Falmouth and Martha's Vineyard, west of West Chop. Vessels approaching the anchorage at night, if less than 2 miles eastward of Nobska Point and with West Chop Light eastward of 167°, should anchor just before Nobska Point Light comes in range with Tarpaulin Cove Light; if farther eastward, vessels should keep well

southward of this range. Vessels can enter from the southward on a course of **344°** with West Chop Light astern, and pass about 0.1 mile westward of New Shoal buoy 19. Vessels in the vicinity of Nobska Point Light can pass 0.4 mile eastward of the light on a north-northeasterly course, and when Tarpaulin Cove and Nobska Point Lights are nearly in range, stand eastward to an anchorage.

Nobska Point, about 18.5 miles west-southwestward of Point Gammon, is a low bluff marked by a light, a 125-foot radiotower, and a storm warning tower. The light, 87 feet above the water and visible 15 miles, is shown from a white tower at the end of Nobska Point. The light has a red sector from 263° to 289° which covers Hedge Fence and L'Hommedieu Shoal. The fog signal is an air diaphragm horn. A radio beacon is at the light; radio bearings have been verified over an arc of 235° from 225° to 100°. **Storm warnings** are displayed day and night from the tower near the light. Ledges, partly bare at low water, extend 150 yards southwestward from the point.

Chart 1209.—Nantucket Island, on the southeast side of Nantucket Sound, is about 13 miles long, hilly, partly wooded, and covered with vegetation that flourishes in sandy soil. The highest part of the island, about 100 feet high, is in the eastern part; the eastern and southern sides have steep sand bluffs. The northern shore is fringed with shoals for a distance of about 1 mile. The island was for more than a century a principal seat of the whaling industry and, since the decline of that industry, has become a famous summer resort.

Great Point, the northeastern point of Nantucket Island, is a long, low, sandy point marked by **Nantucket (Great Point) Light,** 70 feet above the water and visible 14 miles, and shown from a white tower. The light has a red sector from 084° to 106° which covers Cross Rip and Tuckernuck Shoals.

Point Rip is a shoal extending 3.8 miles east-northeastward of Great Point. For a distance of 2 miles from the point, the shoal has little water over it; farther eastward the depths range from 12 to 18 feet. Buoys mark the northeasterly and easterly sides of the shoal. Shoal water with depths of 19 to 22 feet extends about 1 mile northward from these buoys; a lighted bell buoy marks the northern side of the shoal water.

Squam Head, a summer resort, is on the east side of Nantucket Island, about 5 miles south of Great Point. Many large houses including one with a prominent cupola show prominently from seaward.

Sesachacha Pond entrance, about 1.3 miles south of Squam Head, is a non-navigable cut into the pond. From seaward breakers mark the cut. In the winter the entrance fills in and each spring it is cut through for drainage purposes.

Sankaty Head Light, 166 feet above the water and visible 19 miles, is shown from a white tower with a red band in the middle, on a bluff about 95 feet high on the east side of Nantucket Island.

Siasconset, a village on the southeast end of the island, is marked by a prominent standpipe. The village has bus communication with Nantucket. Siasconset has a post office and a general store.

The south shore of Nantucket Island has no harbors and is frequented only by local fishermen. The towers of a loran station, about 0.6 mile southward of Siasconset, five radio towers, and the cupola of a former Coast Guard station on the west side of the island near **Long Pond,** are prominent from offshore.

The thoroughfare between **Smith Point,** the southwestern point of Nantucket

Island, and Tuckernuck Island is full of shifting, unmarked shoals. The passage is used only by fishing vessels and a few pleasure craft.

Tuckernuck, Gravel, and **Muskeget Islands** are low, sandy, and extending westward from Nantucket Island. The islands are separated by sand bars, some bare at low water, which are constantly shifting.

Maddaket Harbor, on the western side of Nantucket Island, has numerous unmarked sand shoals surrounded by depths of 5 to 10 feet. An unmarked channel has been dredged from Maddaket Harbor into **Hither Creek,** on the eastern side of the harbor. In September 1949 the channel depth was 6 feet from the entrance to the first bend in the creek.

Chart 343.—Nantucket Harbor is near the middle of the north shore of Nantucket Island. A shallow lagoon about 5 miles long extends northeastward from the harbor. The harbor is the approach to the town of **Nantucket** on the western shore. The principal industry is fishing. Prominent from offshore are a standpipe about 1.5 miles west of Nantucket; a gilded cupola atop a church clock tower and a large white church in the town; an abandoned lighthouse attached to a dwelling and the lighted range on **Brant Point,** the western entrance point of the harbor; and lights off Brant Point and the east breakwater. **Brant Point Light,** 26 feet above the water and visible 10 miles, is shown from a white cylindrical tower connected to the shore by a foot bridge on the west side of the entrance to the harbor. The fog signal is a bell. The breakwater light, 23 feet above the water and visible 9 miles, is shown from a black house on a conical pile of riprap at the outer end of the partially submerged east breakwater. The fog signal is an electric diaphragm horn. The range lights are shown from white skeleton towers on Brant Point. The front light is 35 feet above the water and visible 11 miles; the rear light is 51 feet above the water and visible 13 miles. This range is somewhat difficult to pick up in the daytime. The bearing of the range is 162°.

A Federal project provides for a jettied entrance channel 15 feet deep and about 1.5 miles long; an anchorage area 15 feet deep and 300 to 1,100 feet wide south of Brant Point; and a fairway 15 feet deep and 200 feet wide along the west side of the anchorage. The jetties are partly submerged at high water. Shoal water extends about 1 mile offshore on both sides of the entrance. The channel is well marked by buoys and the previously mentioned range and lights. The controlling depth on the range and to the anchorage area was 15 feet in July 1949.

Chart 1209.—A narrow, unmarked channel leads through the lagoon northeast of Nantucket Harbor to **Head of the Harbor.** In 1949 it was reported that not more than 1½ feet could be taken safely as far as the village of **Wauwinet** on the southeast shore of Head of the Harbor. Shoals extend off **Third Point** and **Five Fingered Point.**

Chart 343.—Anchorage in Nantucket Harbor may be had in depths of 6 to 17 feet off the south and southwest sides of Brant Point or in depths of 12 to 17 feet off the docks about 500 yards south of Brant Point Light. In general the bottom is sticky. Although shelter is afforded to vessels, it is advisable for small craft to use heavy ground tackle as the harbor becomes choppy with easterly winds. Caution should be exercised to avoid anchoring in the fairway and maneuvering area to the steamboat wharf.

The following directions are good for a draft of 14 feet with smooth water on the bar.

From off Handkerchief Lightship steer **189°** for 10.4 miles to Nantucket Bar bell buoy, or, from a point 0.5 mile northeast of Cross Rip Lightship, steer **120°** for 5.8 miles to a position about 0.3 mile northeast of Tuckernuck Shoal lighted and bell buoy 7, thence steer **149°** for 6.2 miles to Nantucket Bar bell buoy. When off Nantucket Bar bell buoy steer **162°** in the buoyed channel on Nantucket Harbor Lighted Range until about 0.2 mile from the front range light, thence steer **133°** until abeam Brant Point Light. Round Brant Point at a distance of about 75 yards and stand southwestward into the harbor. Anchor with Brant Point Light bearing 009°, or select anchorage in line with the northern side of the steamboat wharf and with the old tower on Brant Point in range with the rear range light. The mean range of the **tide** is about 3 feet.

Fogs are frequent during the summer months and are apt to shut in almost without warning. Except in severe winters, the harbor is seldom closed by local formation of **ice**. However, the harbor is frequently closed by drift ice from the sound which packs and remains across the entrance during northerly winds. **Storm warnings** are displayed day and night from the Coast Guard station near Brant Point.

The harbor has a harbor master but no pilot service. The larger fishing vessels can act as towboats in emergencies.

The depth at the wharves ranges from 6 to 13 feet. The most northerly large wharf is the steamboat wharf. A submerged pier end and remains of a pier uncover at low water off the next pier southward. A privately maintained daybeacon, white cask on unpainted pile dolphin, marks the former pier head. The water eastward of the daybeacon is foul and marked by dolphins. A submerged pier also extends off the next pier southward and off the southernmost wharf. Vessels proceeding to any of the wharves should exercise caution to avoid these submerged piles. North of the steamboat wharf is a long finger pier and several float landings of the Nantucket Yacht Club. Craft up to 4 feet draft come alongside the yacht club pier. The depth at the float is about 9 feet.

Diesel oil, gasoline, coal, provisions, and some ship chandlery can be obtained in Nantucket. Water is piped to the principal wharves. Gasoline engine and hull repairs can be made at the two boatyards. The largest marine railway can haul out craft up to 20-ton weight, 40-foot length, and 4½-foot draft.

There is communication with the mainland by cable and by steamer. An airline operates daily between New York and Boston. Bus and taxicab transportation are available.

Charts 1209, 1210.—Martha's Vineyard and **Chappaquiddick Island** have a combined length of 18 miles, the two islands being separated by Edgartown Harbor, Katama Bay, and the narrow slue connecting them. The northern extremity of Martha's Vineyard is about 3 miles south of the western end of Cape Cod. Martha's Vineyard is well settled, especially along its northern shore, and is popular as a summer resort. Along the northern shore the island presents a generally rugged appearance. The southern shore is low and fringed with ponds; only one of these, **Oyster Pond,** has broken through. Approaching from the south the principal landmarks are Gay Head on the west side; a church spire near **Chilmark,** in the western part; a chimney on a house eastward of Chilmark; an aviation light near the center of the island; and a standpipe at Edgartown. Communication with the mainland is maintained by steam-

ship, airline, cable, and telephone. The principal towns are Edgartown, Oak Bluffs, and Vineyard Haven.

Chart 1209.—Muskeget Channel is an opening nearly 6 miles wide between Muskeget and Chappaquiddick Islands. The opening is full of shifting shoals. The best water is found close to the eastward of Wasque Shoal and about 1.5 miles eastward of the eastern shore of Chappaquiddick Island. Although this channel is partly buoyed, strangers should never attempt it as tidal currents with velocities of 2 to 5 knots at strength make navigation dangerous. The currents through the channel are strong, having an average velocity at strength of about 3½ knots at a location east of Wasque Point.

Wasque Shoal extends southward of **Wasque Point,** the southeastern extremity of Chappaquiddick Island. The shoal rises abruptly on its southern and eastern sides from depths of 18 to 48 feet to depths of 2 to 4 feet. **Skiffs Island,** a small, sand island on the eastern edge of the shoal, is awash at low water.

Mutton Shoal, 0.6 mile east of Wasque Shoal with depths of 4 to 17 feet, is marked on its western side by a lighted bell buoy. The best water in Muskeget Channel is between Mutton and Wasque Shoals. Eastward of Mutton Shoal are numerous shoals with depths of 3 to 6 feet over them.

Between Muskeget Channel and the channel north of Cross Rip Lightship are numerous shoals, some of which are separated by unmarked channels. **Tuckernuck Shoal,** northeast of Muskeget Channel, is marked on its eastern side by a lighted buoy and a bell buoy. **Shovelful Shoal,** west of Tuckernuck Shoal, has depths of 3 and 4 feet. **Long Shoal,** northwest of Shovelful Shoal, has depths of 3 to 6 feet. **Edwards Shoal,** south of Cross Rip Shoal, has a least known depth of 10 feet. **Norton Shoal,** southwestward of Cross Rip Shoal, has depths of 8 to 16 feet; two buoys mark the north side of the shoal. **Hawes Shoal,** westward of Norton Shoal, has depths of 4 to 14 feet; buoys mark the northwest and southwest sides of the shoal.

Chart 346.—Cape Poge, the northeastern point of Chappaquiddick Island, is a bare, bluff precipitous head. A light, 55 feet above the water and visible 13 miles, is shown from a white conical tower on the cape.

Cape Poge Flats, extending about 1.5 miles northeastward from Cape Poge, are marked near their outer end by a buoy and a bell buoy. The bell buoy is maintained only from May 1 to October 30. The southerly edge of the white sector of West Chop Light is about 1 mile north of the buoys. Shoal water extends about 0.4 mile offshore westward and northwestward of Cape Poge. A buoy, 1 mile west-northwestward of Cape Poge Light, marks the western side of the shoal water.

Cape Poge Bay, a lagoon of considerable size in the northern part of Chappaquiddick Island, is entered from Edgartown Harbor. The unmarked entrance is used mostly by local fishermen.

Edgartown Harbor, on the eastern side of Martha's Vineyard and westward of Cape Poge, is divided into an outer and an inner harbor. The outer harbor is used principally as a harbor of refuge in southerly and easterly winds and as a night anchorage. At the head of the outer harbor, a narrow arm makes southward into Katama Bay, forming the inner harbor. The inner harbor affords good anchorage and is the approach to **Edgartown,** a fishing and resort town on the western shore. **Katama Bay,**

used by local fishermen and small pleasure craft, is large and shallow. A light, 45 feet above the water and visible 12 miles, is shown from a white conical tower at the end of the jetty on the west side of the head of Edgartown Harbor. The fog signal is a bell.

The buoyed channel through the outer harbor is free from dangers and has a depth of 23 to 37 feet until nearly up to Edgartown Light. Near the light the channel narrows and makes a sharp bend westward leading to the wharves in the town; a reported depth of 14 feet was in this section of the channel in 1949. Abreast the town the channel is narrow and has a depth of 24 to 36 feet. The channel then curves southward to Katama Bay, its eastern side marked by buoys in the vicinity of Middle Ground Shoal; depths of 16 to 28 feet are found for a distance of about 1.2 miles south of the town. The southern half of Katama Bay is full of shoals. A channel is sometimes cut through the beach between **Norton Point** and Wasque Point to the ocean, however, the head of the bay is subject to frequent changes.

Anchorage with good shelter from easterly gales is found westward of Cape Poge on the eastern side of the outer harbor. In westerly and southerly gales vessels find shelter in the southern end of the outer harbor about 0.4 mile eastward or east-southeastward from Edgartown Light. In northerly or northeasterly gales vessels usually go to Woods Hole or Tarpaulin Cove for sheltered anchorage. Vessels should not anchor in the channel abreast the town, where the bottom is hard sand, the channel narrow, and tidal currents strong. South of the town anchorage may be found south of Middle Ground Shoal in depths of 24 to 30 feet, sticky bottom.

On the western side of the outer harbor is a shoal which extends 2.8 miles north-northeastward from Edgartown Light. The northern extremity of this shoal, a spot with a depth of 11 feet, is 2 miles 296° from Cape Poge Light. The depth over the remainder of the shoal is irregular and there are a number of rocks with from 3 to 5 feet over them. Strangers should never attempt to pass across this shoal. A bell buoy marks the northern edge of the shoal; vessels entering or leaving the harbor pass eastward of this buoy. The eastern side of the shoal is marked by a lighted buoy from June 1 to September 30, and buoys.

Sturgeon Flats extend about 600 yards off the southeastern shore of the outer harbor between the narrow entrance to Cape Poge Bay and the entrance to the inner harbor. Depths of 3 to 15 feet are on the shoal. A buoy marks the northwesterly side. Edgartown Light bearing anything southward of 245° clears the shoal.

A sand bar is making off southeastward from Edgartown Light. A buoy is on the eastern side of the shoal. Except for this shoal the entrance to the inner harbor is not difficult to navigate. **Middle Ground Shoal,** in the inner harbor south of the town, was dredged to a depth of 12 feet. Buoys mark the northern and western sides of the shoal. A depth of 11½ feet is on the northerly side.

The following directions are good for vessels of 18-foot draft to the anchorage eastward of Edgartown Light and for vessels of 14-foot draft to the town wharves. Vessels approaching from the eastward, from a position about 400 yards north of Cross Rip Lightship, steer **267°** for the high water tower on Martha's Vineyard southward of Oak Bluffs passing northward of the buoys north of Cape Poge Flats. When Cape Poge Light bears 155°, steer **208°** with Edgartown Light ahead. When Cape Poge Light bears 087°, steer **197°** for about 1.9 miles; this course passes about 0.4 mile eastward of Edgartown Light. Anchor east or southeastward of the light, distant 0.3 to 0.5 mile, in depths of 23 to 30 feet.

Vessels approaching from the westward and passing northward of Squash Meadow use sailing directions for Nantucket Sound given in Chapter 3 until Hedge Fence lighted horn and gong buoy 16 bears 016°, distant 0.4 mile. Thence steer **177°** passing 0.7 mile eastward of Squash Meadow East End bell buoy 19 and 0.3 mile eastward of Outer Flats bell buoy 17 until Cape Poge Light bears 087° and Edgartown Light bears 208°. Thence steer **197°** and proceed as in the preceding paragraph.

In the daytime, to pass southward of Squash Meadow, pass about 200 yards northeastward of East Chop Flats bell buoy 23 and steer **124°** for Cape Poge Light. This course passes about 200 yards southwest of Squash Meadow West End buoy 21 and about 0.2 mile northeast of Outer Flats bell buoy 17. When 1.8 miles from Cape Poge Light steer **177°** and proceed as in the previous paragraph.

To enter the inner harbor, pass about 70 yards south of Edgartown Channel buoy 6 on a course of **278°**. A good range for this course is a prominent flagpole, fitted with yardarm, situated near the water front in range with the southeastern corner of the prominent white square church tower. This range is easily picked up and good until off the wharves, thence follow off the wharves at a distance of about 50 yards. Strangers in sailing vessels seldom enter the inner harbor as a fair wind is necessary to keep in the channel.

The mean range of the **tide** is about 2 feet. The **tidal current** in the narrow part of the channel inside Edgartown Light and off the town has a double flood and a double ebb, and in general follows the direction of the channel. Near the middle of each flood or ebb period there is an approximate slack preceded and followed by maximums of velocity. For predicted times of slacks and maximums of velocity the *Current Tables* should be consulted. The average velocity at strength of flood or ebb is about 1 knot.

Weather conditions for this general area have been described in Chapter 2. Fogs are prevalent during the summer months and at times appear without warning. Drift **ice** from the sound, driven into the entrance by the wind, obstructs the entrance to sailing vessels during a part of the winter. The tidal currents keep the inner harbor open except for a few days at a time during severe winters.

There are no pilots for Edgartown Harbor. Towboats are seldom used and none are available. Fishing craft will act as tugs in an emergency.

The harbor master has control of the anchoring of vessels in the harbor; he will usually be found at the yacht club wharf. Copies of the harbor regulations may be obtained from the harbor master or the harbor patrolman. A great many yachts and pleasure craft use the harbor in the summer.

The depth at the steamboat wharf is about 18 feet. Depths at the other wharves southward of the steamboat wharf are about 11 feet except at the yacht club wharf where depths of 35 feet are found. Diesel oil, gasoline, coal, water, ice, provisions, and some supplies are available. Two marine railways are located at Edgartown; the largest way, a vertical lift elevator, can haul out craft up to 10- to 12-ton weight, 38-foot length, and 5-foot draft for general repairs.

A small ferry operates between Edgartown and Chappaquiddick Island. No schedule is maintained but the ferry runs on call. Bus transportation is available to Oak Bluffs where connections may be made with the daily steamer to New Bedford. Telephone and telegraph communication to the mainland are in the town.

Sengekontacket Pond, about midway between Edgartown and Oak Bluffs, has two entrances both of which are shoal. The northerly entrance is preferable and

navigated by boats of 3-foot draft or less. Both entrances are crossed by fixed highway bridges which have vertical clearances of 5 feet at high water.

Squash Meadow is a shoal south of the main channel through Nantucket Sound and about 4 miles northwest of Cape Poge. The hard sand shoal has depths of 5 to 18 feet and is marked by a bell buoy on its eastern side and a buoy on its western side.

Chart 347.—Harts Haven is a small pond northward of Sengekontacket Pond. The entrance is through a privately dredged channel between two short jetties. About 4-foot draft could be taken through the entrance. The pond has depths of 3 to 4 feet.

Lone Rock, with a depth of 4 feet, is 400 feet off shore about 700 yards southeasterly of the steamboat wharf at Oak Bluff. The rock is surrounded by depths of 11 to 15 feet. A buoy is off the north side of the rock.

Oak Bluffs Harbor, about 5 miles northwestward of Edgartown inner harbor, has depths of 5 to 8 feet except in the northern end and along the shores. **Oak Bluffs,** an active summer resort, is southward of the harbor and along the eastern shore of Martha's Vineyard. The entrance to the harbor, protected by two jetties, was dredged to a depth of 10 feet for a width of 100 feet. In 1949 the controlling depth between the jetties was 9 feet. A light is on the end of the north jetty. Anchorage for small craft may be had in the harbor. An obstruction with a depth of 9 feet over it was reported about 0.3 mile eastward of the jetty light; a buoy is moored about 75 yards southwestward of the obstruction.

Several boat landings and mooring buoys are in Oak Bluffs Harbor. The steamer wharf is off the town southward of the entrance to the harbor. The depths at the wharf in 1949 were 12 feet at the east face, 9 to 13 feet on the north side, 7 to 14 feet on the south side, and 9 feet on the short west side. Southward of the steamer wharf several swimming piers extend into Nantucket Sound. Diesel oil, gasoline, water, ice, and some provisions can be obtained in the harbor. Steamers from New Bedford and Woods Hole call regularly in the summer. Telephone and telegraph communication are available.

East Chop and **West Chop** are prominent points on the north side of Martha's Vineyard and on the east and west side of the entrance to Vineyard Haven. Both points terminate in a high wooded bluff which shows prominently from the sounds; each is marked by a light.

East Chop Light, 79 feet above the water and visible 14 miles, is shown from a brown tower on the summit of East Chop.

West Chop Light, 84 feet above the water and visible 15 miles, is shown from a white conical tower at the summit of West Chop. The light has a red sector from 281° to 331° covering Squash Meadow and Norton Shoal. The fog signal is an air whistle.

East Chop Flats with depths of 8 to 18 feet over them extend about 0.4 mile northeasterly from East Chop. A bell buoy, which is removed when endangered by ice, marks the shoal. A buoy about 320 yards northward of East Chop Light marks the shoal water extending northward of East Chop.

Vineyard Haven is a funnel-shaped bight in the northern side of Martha's Vineyard between East Chop and West Chop. The bight is about 1.4 miles long in a southwest direction and about 1.3 miles wide at the entrance. The harbor, easy of access, is the most important and generally used harbor of refuge for coasters between Provincetown and Narragansett Bay. The depth is sufficient for the largest vessels passing through

the sounds; it ranges from 35 feet or more at the entrance to 15 feet at the head of the harbor. Vineyard Haven is exposed to northeasterly winds, but vessels with good ground tackle can ride out most blows. The greatest danger encountered by vessels at anchor in a northeast gale is from vessels with poor ground tackle, which are likely to drift and foul other vessels and then go ashore.

The harbor is the approach to the village of **Vineyard Haven.** A breakwater, showing about 2 feet above high water, is on the flats on the western side of the harbor near the head. A light is on the southeastern end of the breakwater; the fog signal, an electric diaphragm horn, is privately maintained.

The natural channel in the harbor is clear and soundings will be the best guide in selecting an anchorage. When well inside the entrance, the depths shoal gradually toward the western shore; the eastern shore shoals abruptly in the vicinity of Canal Flats and should be given a berth of about 300 yards. A dredged channel 17 feet deep leads southward of the breakwater to the steamer wharf.

Canal Flats, partly bare at low water, make off 300 yards from the eastern shore of the harbor about 1 mile inside East Chop Light. The northwestern edge of the shoal water is marked by a buoy.

Vessels anchor, according to draft, anywhere from the points at the entrance to the head of the harbor. The light draft vessels favor the western shore. A Federal project provides for an anchorage basin 12 feet deep behind the breakwater and an area 17 feet deep, 150 to 275 feet wide north of the fairway. In July 1949 the controlling depth in the anchorage basin was 12 feet except for minor shoals along the northeast edge and 16 feet in the area north of the fairway.

Vessels entering the harbor, with a head wind or light breeze at the end of a favorable current through the sound, should stand on in the channel until the harbor is well opened before standing in for the anchorage. This will aid the clearing of the points at the entrance.

Approaching from the eastward, vessels will keep clear of Squash Meadow and East Chop Flats by keeping in the white sector of West Chop Light. From a position near Hedge Fence lighted horn and gong buoy, steer for West Chop Light on a course of **275°** until East Chop Light bears 163°. Thence steer **220°** into the harbor, giving the eastern shore a berth of about 0.3 mile. This course will pass about 175 yards abeam Canal Flats buoy and 25 to 50 yards abeam the buoy off the breakwater. Good anchorage is northeastward of the breakwater buoy in 20 to 23 feet, but care must be taken to keep clear of Canal Flats which rise abruptly.

Vessels approaching from the westward steer for East Chop Light on a course of **133°** until West Chop Light bears 262°. Thence steer **189°** into the harbor to a position about 200 yards west-northwestward of Canal Flats buoy. From this point a course of **220°** will lead to the head of the harbor.

The mean range of the **tide** is about 1¾ feet. The **tidal currents** have little velocity in the harbor; however, care should be taken on the ebb, which sets westward, not to approach too closely to West Chop as the current in that vicinity sets on the ledges eastward and northward of the point. The currents turn about ½ hour earlier inshore across the entrance of the harbor than in the channel through the sound.

Both local and drift **ice** obstruct the movement of vessels in severe winters and at times entirely close the harbor. Strong northerly winds drive drift ice from the sound into the harbor and endanger vessels at anchor.

Pilots and towboats are not available; however, fishing boats will act as tugs in an emergency.

A United States Marine **hospital** where seamen entitled to hospital treatment are cared for, is located in Vineyard Haven.

At the head of the harbor are several wharves with depths of 11 to 17 feet off their ends. The steamer wharf had depths of 22 feet at its east face, 9 to 24 feet on its south side, and 17 to 23 feet on its north side. The ferry slip angles off the north side of the steamer wharf.

Coal in limited quantity and fresh water can be obtained at the steamer wharf. Diesel oil, gasoline, ice, provisions, and some ships' chandlery stores are available at Vineyard Haven. Two boatyards are in the vicinity; the largest ways can haul out craft up to 20-ton weight, 50-foot length, and 6-foot draft for hull and engine repairs. New Bedford is the nearest point where repairs to the machinery of steamers can be made.

Transportation to New Bedford and Woods Hole by steamer and to the mainland by airline is available. Telephone and telegraph communication serve the town.

Lagoon Pond, entered from a jettied channel on the east side of Vineyard Haven, has average depths between 7 and 9 feet, although spots of much deeper water will be found. The pond is used only by local craft. The controlling depth in the entrance to the pond was 4 feet in 1949. Across the entrance to the pond is a bascule bridge with a horizontal clearance of 30 feet and a vertical clearance, closed, of 14 feet at high water. The bridge is opened, day or night, upon advance notice to the tender who works at a nearby garage.

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CHAPTER 6

Martha's Vineyard to Point Judith

Chart 1210

VINEYARD SOUND, Buzzards Bay, and Narragansett Bay, discussed in this chapter, are deep and easily navigated day or night. Vineyard Sound, together with Nantucket Sound, provides an inside route from New York to Boston avoiding Nantucket Shoals. Buzzards Bay, together with Cape Cod Canal and Cape Cod Bay, provides the shortest deep-draft route between New York and Boston. Narragansett Bay is the approach to Providence, Fall River, and Newport.

Vineyard Sound is bounded on the north by the southwestern part of Cape Cod and the Elizabeth Islands and on the south by part of Martha's Vineyard. It joins Nantucket Sound on a line between Succonnesset Point and East Chop providing an inside passage clear of Nantucket Shoals. The navigational aids are colored and numbered for passing through the sound from the eastward. The eastern portion of Vineyard Sound between Succonnesset and Nobska Points and East and West Chops are described in the previous chapter.

The channel through the sound is well marked and generally free of dangers. There are no anchorages for vessels of over 10-foot draft that afford shelter from all winds except Woods Hole. In northerly and westerly winds good anchorage may be had in Tarpaulin Cove. In southerly winds shelter can be had in Menemsha Bight, although Vineyard Haven, previously discussed, is generally used. Several anchorage areas in Vineyard Sound are prescribed by Federal regulations. For definition and regulations see § 202.10 in Chapter 2.

Vineyard Sound (Sow and Pigs) Lightship is moored in 102 feet of water on the north side of the west entrance to Vineyard Sound. The lightship has a red hull with the word VINEYARD on each side, and two masts with a lantern and gallery on each masthead. The light is 65 feet above the water and visible 14 miles; a riding light is on the forestay. The fog signal is a steam diaphragm horn; the radiobeacon is synchronized with the fog signal for distance finding. The code flag signal is NNBY. **Storm warnings** are displayed during the daytime.

Sailing directions for Vineyard Sound are given in Chapter 3. With southerly or westerly gales there is a heavy sea in the westerly entrance to the Sound, and a heavy, ugly sea occurs at times in the Sound off the entrance of Quicks Hole. To avoid this sea tows, especially, frequently use Quicks Hole.

The time of **current** becomes somewhat earlier from Hedge Fence westward through Vineyard Sound. The average velocity at time of strength increases from 1½ knots at Hedge Fence lighted horn and gong buoy to 3 knots off West Chop Light, and then gradually diminishes to 1½ knots off Gay Head Light. See "Current Diagram Vineyard and Nantucket Sound" in the *Current Tables, Atlantic Coast;* also Tidal Current Charts, Narragansett Bay to Nantucket Sound.

At Vineyard Sound (Sow and Pigs) Lightship the tidal current is rotary, turning clockwise. The velocity is small averaging about ½ knot at strength; the average minimum is about ¼ knot. The strength of flood sets about 335° and the strength of ebb about 160°. Since the tidal current is weak, winds greatly affect it, and the current frequently sets approximately with the wind.

From West Chop to Gay Head the northwestern part of Martha's Vineyard presents a rugged and generally inaccessible shoreline.

Chart 249.—Shoal water extends about 0.3 mile northward and eastward of West Chop. **Alleghany Rock,** 0.3 mile north of West Chop Light, has a depth of 6 feet over it; a buoy is north of the rock. A bell buoy, replaced when endangered by ice, marks the edge of the shoal water 0.5 mile northeast of the light. The rocks awash at low water off the east side of West Chop are marked by a buoy southeastward of the light.

A narrow, somewhat shifting ridge extends from a point about 0.5 mile northwest of West Chop Light a distance of about 9 miles, approximately parallel to 2 miles off the northerly shore of Vineyard Sound. **Middle Ground** is the easterly half of this ridge and has depths of 4 to 8 feet over the greater parts. **Lucas Shoal,** with depths of 12 to 18 feet, is the western end of the ridge and is separated from Middle Ground by depths up to 31 feet. A buoy marks each end of the ridge and a lighted bell buoy is on the north side. The channel generally used through Vineyard Sound is north of the ridge.

Norton Point and **Cape Higgon** are prominent bluffs on the northwest side of Martha's Vineyard about 3 and 8 miles southwestward of West Chop Light.

Chart 1210.—**Menemsha Bight,** on the northerly side of the western end of Martha's Vineyard 2 to 3 miles east of Gay Head, affords shelter from southerly and easterly winds for vessels of any size in depths of 35 to 60 feet, sticky bottom. There are no dangers in the bight if the shore is given a berth of 0.3 mile.

Menemsha Inlet, on the southeasterly side of Menemsha Bight, is an opening between two jetties into the northerly end of **Menemsha Pond.** A Federal project provides for a channel 10 feet deep and 80 feet wide between the jetties to a 10-foot anchorage, thence 8 feet deep and 80 feet wide through Menemsha Creek to the deep water in Menemsha Pond; for an anchorage basin just inside the entrance 10 feet deep in the wide northern portion and 6 feet deep in the narrow southern end. In 1949 the work on this project had not begun. A channel has been dredged through the entrance and into a small dredged basin. The depth in the channel is about 8 feet but inside the entrance the basin has a depth of 6 feet. Fishing craft up to 6-foot draft use the channel. A light is on the outer end of the east jetty. Local craft approach the jetties from the eastward and steer close to the east jetty in entering, thus avoiding the stronger currents along the westerly side. Steer **146°** favoring the east jetty until almost to the inner end of the breakwater, thence steer **095°** for a distance of about 300 feet, thence come on a

course of **130°** for a distance of 450 feet, thence steer **163°** on a mid-channel course to an anchorage in depths of 6 feet or tie up alongside the piers.

The **currents** through the entrance have an estimated velocity of 3 knots or more at strength. Slacks are reported to occur about ¾ hour after local high and low waters.

Several wharves are in the small harbor. Diesel oil, gasoline, water, ice, and some provisions may be obtained at the small settlement on the eastern shore of the harbor. A Coast Guard lifeboat station is located in the harbor.

Gay Head, the westerly end of Martha's Vineyard, is a prominent high bluff marked by a light. The light, 170 feet above the water and visible 19 miles, is shown from a brown tower with a covered way to a dwelling on Gay Head. The light is partially obscured by No Mans Land between 342° and 359° being occasionally visible through the notches in the hilltops and trees.

Devils Bridge is a reef making off 0.8 mile in a northwest direction from Gay Head. The reef has a depth of 2 feet about 0.4 mile offshore and 17 feet at its end. A lighted gong buoy and a buoy mark the outer end of Devils Bridge.

No Mans Land is a prominent, high, rocky island about 5.5 miles southward of Gay Head. Except for a small section on its northwestern side, the shore consists of clay and gravel cliffs 10 to 18 feet high with boulders from the continual erosion of the sea lining the shores. In the interior of the island are many hills, the highest over 100 feet high, with considerable marshy area between the hills. A danger zone has been established in the vicinity of No Mans Land. For description and regulations see § 204.5 (c) in Chapter 2.

Several sunken rocks and ledges are in the passage between No Mans Land and Martha's Vineyard. **Lone Rock,** with a depth of 8 feet, and **Old Man,** a ledge with a least depth of 4 feet, are marked by buoys. A buoyed channel about 0.7 mile wide between the islands may be used by small vessels in the daytime.

Chart 249.—Elizabeth Islands, including Nonamesset, Uncatena, Weepecket, Naushon, Pasque, Nashawena, Penikese, and Cuttyhunk Islands, extend about 14 miles west-southwest from the southwest end of Cape Cod. The islands form part of the northern shore of Vineyard Sound and separate the sound from Buzzards Bay. They are hilly and partly wooded; the shores are, in general, low bluffs. Westward of Woods Hole are several buoyed channels between the islands, but Quicks Hole is the only one recommended for strangers.

Chart 348.—Woods Hole is a narrow passage from Vineyard Sound to Buzzards Bay between the southwestern tip of Cape Cod and **Nonamesset Island,** the easternmost of the Elizabeth Islands. Little and Great Harbors comprise the eastern portion of Woods Hole; Hadley Harbor is in the western portion. The passage is the approach to the village of **Woods Hole** on the northeastern shore. The village is a busy commercial center and a transshipping point for passengers and freight to and from Nantucket and Martha's Vineyard. During the summer it is an active resort and frequently a port of call by yachts passing through to Vineyard Sound or Buzzards Bay.

The most prominent landmark approaching Woods Hole is Nobska Point and light, described in the previous chapter. Other prominent features include a house high on **Juniper Point,** the point between Little and Great Harbors; a standpipe, the buildings and stacks in the village; and the lights.

The passage through Woods Hole, between numerous ledges and shoals, is well marked by a lighted range, lights, lighted buoys, and other buoys. However, tidal currents are so strong that the passage is difficult and dangerous without some local knowledge. Buoys in the narrowest part of the channel frequently are towed under by currents and a stranger should attempt passage only at slack water.

The entrance to **Great Harbor** from Vineyard Sound, between Great Ledge and Nonamesset Shoal, has depths of over 18 feet. A lighted range on a bearing of 344½°, and buoys mark the channel to the piers at Woods Hole. The range lights are shown from white skeleton towers with white tank houses; the front light, 24 feet above the water, is near the shoreward end of the Fish and Wildlife dock; the rear light, 37 feet above the water, is on the northern shore of Great Harbor. The rear marker is partially obscured when a vessel is at the Fish and Wildlife dock. When entering on the range, attention should be paid to the currents through Woods Hole; the current from Buzzards Bay has a tendency to set vessels eastward.

The northerly channel in Woods Hole from Great Harbor to Buzzards Bay has a narrow but straight reach which was dredged to a depth of 13 feet for a width of 300 feet. The dredged portion has shoaled and numerous spots with depths of 10 to 12 feet are in the channel. Another channel, **Broadway,** was dredged 11 feet deep and 300 feet wide but use of this channel necessitates a sharp turn. The straight reach should be given preference because of the difficulty of making the turn in the strong currents. The deepest draft using the passage are local steamers of 11-foot draft. Mariners entering from Buzzards Bay should keep in mind that the buoys are colored and marked for passage from Vineyard Sound to Buzzards Bay. The channels into Little Harbor, Eel Pond, and Hadley Harbor are discussed under their headings.

An anchorage at the head of Great Harbor is about 0.2 mile long and nearly 0.2 mile wide. The depths in the anchorage are irregular, ranging from 20 to 60 feet; the holding ground is mostly poor. Shoals with depths of 5 to 9 feet are northwest of the anchorage. About 200 yards northwest of the Fish and Wildlife wharf is good anchorage in depths of 30 to 48 feet. Small craft can find good protection in Little Harbor and Hadley Harbor.

Numerous ledges and shoals border the channel through Woods Hole. **Great Ledge** is an extensive rocky shoal, awash only at low tide with a full northwest gale, between the entrances to Little and Great Harbors. A buoy marks its southwest side; a lighted buoy marks an 18-foot spot about 200 yards southward of the ledge. **Coffin Rock,** with a depth of 5½ feet, is eastward of Great Ledge; a lighted buoy marks the rock. **Nonamesset Shoal,** with depths of 10 to 13 feet near its edge, extends 400 to 500 yards eastward of Nonamesset Island on the western side of the entrance to Great Harbor; a gong buoy is on the southeasterly side of the shoal, a lighted buoy on the easterly side. **Parker Flats** extend up to 150 yards off the eastern shore of Great Harbor northward of Juniper Point; a buoy is on the western side of the flat.

Red Ledge, awash at low water, and **Grassy Island** are on the western side of Great Harbor opposite Parker Flats. The eastern entrance of the straight reach of the channel through Woods Hole passes between these dangers and is marked by buoys and a light. Caution is recommended as one of these buoys is often towed under. The northeasterly end of the ledges surrounding Grassy Island is marked by a buoy. The channel to the anchorage in Great Harbor is between this buoy and the buoy marking the rocky area south of the Fish and Wildlife wharf.

Middle Ledge, separated from Red Ledge by Broadway and on the south side of the straight reach, is partly bare at low water. A buoy is on the northeast side, a light on the northwest side. **Pine Island** is southward of Middle Ledge and about 300 yards westward of **Mink Point,** the northeast point of Nonamesset Island. The island has washed away but boulders remain bare at high water. **Hadley Rock,** about 500 yards west-southwestward of Middle Ledge Light, has a least depth of 5 feet; a horizontal-banded buoy marks the rock. A rocky shoal area extends 625 yards westward of **Penzance Point,** the southern extremity of Penzance. Buoys are on the southern side of the rocky area. **Penzance** is the curving peninsula on the west and northwest side of Great Harbor. Shoals extend 150 to 350 yards off its west and northwest shore.

The following directions are good for vessels of not too great a draft with slack water in Woods Hole. Approaching from the eastward pass about 0.3 mile southward of Nobska Point and Coffin Rock lighted buoy on a west-southwesterly course until on Great Harbor Lighted Range, or from a point close to Nobska Point Experimental Float steer **279°** until on the range. Approaching from the westward, give the south side of the Elizabeth Islands a berth of about 0.5 mile and steer for Nobska Point Light on any bearing northward of 051° until on Great Harbor Lighted Range.

Steer **344½°** on Great Harbor Lighted Range passing about 25 yards westward of Great Ledge lighted bell buoy 2, about 200 yards eastward of Nonamesset gong buoy 1, about 50 yards westward of Great Ledge buoy 2A, and about 50 yards eastward of Nonamesset Island Shoals lighted buoy 3. Vessels desiring to proceed to the anchorage in Great Harbor continue on the range until past Parker Flats buoy 6, thence steer north-northwestward, passing eastward of the Grassy Island Ledge buoy 5 and about 75 yards westward of the Fish and Wildlife wharf.

Vessels continuing through Woods Hole stay on the range until Parker Flats buoy 6 is passed abeam. Thence continue on the range for about 30 yards and turn sharply westward on a course of **257°** midway between Red Ledge North Part buoy 1 and Grassy Island Ledge buoy 2. Caution must be observed as these buoys are sometimes towed under by the strong currents. This course will pass about 65 yards north of Middle Ledge buoy 3 and about 50 yards north of Middle Ledge Light. When past Middle Ledge Light, bring it astern on a course of **284°** with the northern extremity of Uncatena Island ahead. Steer this course for a distance of about 500 yards until Long Neck Rock buoy 10 is in range with the northwest extremity of Penzance on a bearing of 014°. Thence steer **330°** into Buzzards Bay, passing about 50 yards eastward of Uncatena Shoal buoy 5, and about 75 feet from Timmy Point Shoal lighted buoy 7.

Vessels of light draft can pass 300 yards south of Nobska Point and steer **290°** to a point 100 yards southwest of Parker Point buoy 4. Thence steer **333°** with the outer end of the Fish and Wildlife wharf ahead until abeam with Parker Flats buoy 6. If passing through to Buzzards Bay follow the directions in the previous paragraph.

The mean range of **tides** in the passage is about 1½ feet at the east end and 3½ feet in the west end. Strong northwesterly winds may lower the water in the passage as much as 2 feet.

In the narrow part of Woods Hole the average velocity of the **current** at strength of flood or ebb is about 4 knots during the spring tides and 3 knots during neap tides. For times of slacks and times and velocities of strengths, the *Current Tables* should be consulted. Hourly velocities and directions are shown in Tidal Current Charts, Narragansett Bay to Nantucket Sound. Both the velocity of the current and time of

slack water are affected by strong winds. At the north entrance to Woods Hole the velocity of the current at strength is about 1 knot while at the south entrance it is about 1½ knots. In the upper part of Great Harbor, near the Fish and Wildlife wharf, the currents are barely perceptible and vessels at anchor lie head to the wind.

Drift **ice** is brought through from Buzzards Bay, but seldom interferes with navigation in Woods Hole except in unusually severe winters, when it may close the entrance from the bay. Small craft may experience difficulty in severe winters but steamers usually proceed through the ice. The strong tidal currents usually keep Great Harbor open. **Storm warnings** are displayed day and night near Nobska Point Light.

On the eastern side of Great Harbor is the wharf and depot of the New York, New Haven and Hartford Railroad Company, where the steamers land. Above this wharf are the buildings and wharf of the Woods Hole Institute of Oceanography; the wharves of the Marine Biological Laboratory; the wharf, basin, and buildings of the United States Fish and Wildlife Service; the Coast Guard pier; the new Town Pier; and several private landings. Depths at the principal piers vary from 11 to 30 feet. A rock with a depth of 5 feet over it and marked by a buoy is off the southern end of the Fish and Wildlife wharf. A rock with a depth of 1½ feet and marked by a vertical pipe is about 70 feet west-northwestward of the New Town pier.

Diesel oil, gasoline, water, ship chandlery, and supplies are available. A boatyard in Eel Pond has a marine railway capable of hauling out craft up to 30-ton weight, 50-foot length, and 6-foot draft for hull and engine repairs. The village has rail and bus communication.

Little Harbor is the easternmost cove in Woods Hole. A channel 150 feet wide and 17 feet deep has been dredged to a basin 12 to 17 feet deep and 400 feet wide off the Coast Guard Depot. Lighted buoys and buoys mark the channel which in 1949 had a controlling depth of 15 feet to the wharf. Small craft can anchor off or above the wharf, favoring the western side in depths of 7 to 15 feet. A small private wharf with a depth of about 7 feet at its end is north of the Coast Guard Depot.

Eel Pond entrance, on the east side of Great Harbor, was dredged to a depth of 8 feet. In 1949 the controlling depth in the channel was 5 feet. Across the entrance is a bascule bridge with a horizontal clearance of 30 feet and a vertical clearance, closed, of 5 feet at high water. Except in emergencies, the bridge is closed between the hours 2030 and 0630, between 0745 and 0830, and for a period of 15 minutes after the arrival or departure of steamers and trains. From September 15 to June 15, the bridge is open on 2-hour intervals from 0700 to 1900.

Hadley Harbor, at the western portion of Woods Hole, is at the northwest end of Nonamesset Island and between this island and **Uncatena** and **Bull Islands.** The inner harbor is suitable only for small craft because of its size and narrow, crooked channel. There are two entrances from the northeastward, the southern marked by two buoys, the northern by privately owned and maintained buoys. The deeper entrance, about 75 yards off Nonamesset Island, is between ledges on both sides; the northern ledge is marked by piled-up rocks painted white. The other channel is northwestward of the deeper channel and about 210 yards off Nonamesset Island, a daybeacon, white pipe with reflector, is on the shoal area between the channels. The inner harbor forms a well sheltered anchorage for small craft.

Two wharves, with a depth of about 9 feet at their ends, are on the western side of the harbor. At the west end of Nonamesset Island is a privately maintained day-

beacon, white barrel on iron pipe. About 100 yards east of the daybeacon is a private wharf with a depth of about 7 feet at its end; a privately maintained light is shown infrequently on the wharf. About 100 yards west of this wharf and across the channel on **Goats Neck** is a small pier with a depth of about 5 feet at its end.

Chart 249.—Naushon Island, the largest of the Elizabeth Islands, extends west-southwestward from Uncatena and Nonamesset Islands.

Weepecket Island and the two islets northeastward of it are in Buzzards Bay off the northeastern part of Naushon Island and are bare and rocky. **Weepecket Rock,** on a rocky ledge 1.3 miles northeastward of Weepecket Island, has a depth of 10 feet and is marked by a buoy. A danger zone has been established in the vicinity of Weepecket Island. For regulations and description see § 204.5 in Chapter 2.

Lackeys Bay is between Nonamesset Island and **Jobs Neck,** the southeastern extremity of Naushon Island. The bay is shoal with numerous rocks bare at low water.

Tarpaulin Cove, about 5 miles west-southwest of Nobska Point, is a bight about 0.5 mile in diameter in the south shore of Naushon Island. The cove affords shelter from northerly and westerly winds and is frequently used. A light, 78 feet above the water and visible 14 miles, is shown from a white tower on the southwest side of Tarpaulin Cove. Good anchorage in depths of 14 to 18 feet, good holding ground, is in the cove with the light bearing between 212° and 189°. Deep-draft vessels should anchor farther out in depths of 36 feet or more. A mooring buoy is in the cove. The eastern and northern shores should be given a berth of 200 yards. Rocks are near the western shore and should be given a berth of over 300 yards; two buoys are off the western shore.

Chart 345.—Robinsons Hole is a narrow passage from Vineyard Sound to Buzzards Bay between the western end of Naushon Island and the eastern end of **Pasque Island.** The narrow, buoyed passage has numerous rocks and ledges and has strong tidal currents. The buoys often tow under with the currents and the passage should never be attempted by strangers; local fishermen sometimes use the passage. It has been reported that currents sometimes reach a velocity of 5 knots in the passage. The average velocity at strength in the narrow part is about 3 knots. Predictions and detailed information may be obtained from the *Current Tables* and Current Charts.

Quicks Hole, between the western side of Pasque Island and the eastern side of **Nashawena Island,** is the only passage between Vineyard Sound and Buzzards Bay eastward of Cuttyhunk available for vessels of over 10-foot draft. The clearly defined entrance from Vineyard Sound, about 0.6 mile wide, is about 4 miles westward of Tarpaulin Cove and about 5 miles north of Gay Head. The passage is used considerably by tows, especially during westerly or southerly winds, to avoid the very heavy sea in the entrance to Vineyard Sound, and also because a secure anchorage from these winds can be had, if necessary, on the north side of Nashawena Island. The passage is considered unsafe for a long tow at night, but otherwise it may be used by steamers either night or day.

The channel through Quicks Hole is nearly straight with a width of about 700 yards. The general depth is 30 feet or more, but there are several spots with depths of 16 to 18 feet and a number of depths of 21 to 27 feet. The passage has been examined by means of a wire drag and the dangers charted; however, because of the broken nature

of the bottom, the passage is not recommended for a greater draft than 21 feet in the absence of local knowledge. Lighted buoys and buoys mark the channel.

The eastern side of the passage through Quicks Hole is foul from Pasque Island to the lighted buoy about 500 yards offshore and no attempt should be made to pass eastward of the buoy. **Felix Ledge,** 0.2 mile off the eastern shore of Nashawena Island, has depths of 16 to 18 feet; a buoy is off the eastern side of the ledge.

Lone Rock, with a depth of 6 feet, is off the northern entrance to Quicks Hole 0.7 mile northward of **North Point,** the northeastern extremity of Nashawena Island. Depths of 13 to 18 feet are southward of the rock. A lighted buoy is off the northeasterly side of Lone Rock. A danger area has been established off **Fox Point,** the southeastern extremity of Nashawena Island. For regulations and description see § 204.5 in Chapter 2.

The following directions for Quicks Hole are given from Vineyard Sound to Buzzards Bay. In the daytime from a position 0.3 mile east of Quicks Hole lighted bell buoy 1 steer **331°** with Quicks Hole Ledge lighted buoy 2 a very little on the starboard bow to a position about 175 yards east of Felix Ledge buoy 5; at night from a position about 0.2 mile east of Quicks Hole lighted bell buoy 1, steer **330°** with Dumpling Rock Light ahead and Quicks Hole Ledge lighted buoy 2 on the starboard bow to a position about 375 yards southwest of Quicks Hole Ledge lighted buoy. Then steer **355°** with Gay Head Light astern passing about 300 yards east of Lone Rock lighted buoy. The course can then be shaped up or down Buzzards Bay as desired. Vessels passing through Quicks Hole from Buzzards Bay must keep in mind that the aids in Quicks Hole are colored and numbered for passage from Vineyard Sound.

The **tidal currents** have considerable velocity in Quicks Hole, about 2 to 2½ knots at strength, and a sailing vessel should not attempt to pass through unless with a strong favorable wind on a favorable current. Deep-draft vessels should be careful not to be set off their course. With a strong westward current through Vineyard Sound there is a northward current through Quicks Hole; with a strong eastward current in Vineyard Sound, the current sets southward through Quicks Hole. Strong winds affect the regularity of the currents. For daily prediction see the *Current Tables,* and for the hourly movement, the tidal current charts.

Chart 297.—Penikese Island, a grassy and hilly island, is about 1.3 miles northwestward of **Knox Point,** the northwestern extremity of Nashawena Island. Shoal water extends from Penikese Island to **Gull Island,** a small islet 0.5 mile southeastward. No attempt should be made to pass between them. Rocky ledges extend southward and westward from Gull Island; buoys are on the southern edge of the shoal area. The channels to Cuttyhunk Harbor from Buzzards Bay are southward of the ledges. A danger area has been established in the vicinity of Gull Island. For description and regulations see § 204.5 in Chapter 2.

Cuttyhunk Harbor is formed by the bight between the western end of Nashawena Island and the eastern end of **Cuttyhunk Island,** the westernmost of the Elizabeth Islands. Northward of the harbor are Penikese and Gull Islands and a number of ledges, which shelter the harbor from winds from that direction. The harbor is exposed to winds from the northeastward. Weather-bound coasting vessels and fishermen sometimes use the anchorage in the harbor. The harbor is the approach to the town

of **Cuttyhunk** and to **Cuttyhunk Pond,** which is entered through a dredged cut in the eastern part of Cuttyhunk Island.

Prominent from offshore are a light on the southwestern end of Cuttyhunk Island; two elevated tanks, one on the southwest side of the island and the other on **Copicut Neck,** the northeast end of the island; and a monument 156 feet high on **Gosnold Island,** a small island in **Gosnold Pond** on the western part of the island. The light, 63 feet above the water and visible 13 miles, is shown from a white daymark and tankhouse on a white skeleton tower on the southwestern side of Cuttyhunk Island.

Vessels bound for Cuttyhunk Harbor generally approach from Buzzards Bay. The principal dangers are marked by buoys. Strangers should not enter except in the daytime with clear weather. If entering from the westward a greater draft than 15 feet should not be taken in. There are two openings to the harbor from Vineyard Sound. The westernmost was formed by the washing through of the peninsula on which the former Coast Guard station was located, leaving the station on an island. This opening is impassable for vessels with the exception of pulling boats at high water. **Canapitsit Channel,** between east end of this island and Nashawena Island, is a dredged cut marked by buoys. Depths in the channel are from 6 to 14 feet; a 4-foot spot has been reported just east of West Rock buoy 1. The channel is used by local craft of 5-foot draft. The tidal currents have an average velocity at strength of 2¼ knots. Predictions may be obtained from the *Current Tables*. This channel should never be used during a heavy ground swell. With southerly winds heavy seas will break across the entrance.

A Federal project provides for a channel 10 feet deep and 75 feet wide from the harbor to the westerly terminal in Cuttyhunk Pond, and anchorage 10 feet deep, 800 feet wide, and 900 feet long in the pond, and the maintenance of existing jetties. The project has been completed, and in December 1949 had a controlling depth of 10 feet. The jettied entrance is marked by a light and a daybeacon. The light, 25 feet above water and visible 7 miles, is shown from a red skeleton tower with a white tankhouse on a concrete base on the north jetty. The light has a dark sector from 284° to 044° covering Vineyard Sound. The daybeacon, a black ball daymark on a spindle, is off the end of the south jetty.

Small craft can anchor in the pond in depths of 9 to 10 feet. Anchorage may be had in depths of 12 to 24 feet in Cuttyhunk Harbor. The shores on both sides of the harbor are foul, and the anchorage is in the middle. Shoals extend out about 0.5 mile northeastward from Cuttyhunk Island; **Whale Rock** and **Pease Ledge** show at low water and are marked by buoys. **Middle Ground** with a least depth of 9 feet is 0.5 mile north of Copicut Neck in the western approach to the harbor; a buoy is on the south side of the shoal. **Middle Ledge,** about 0.4 mile eastward of Middle Ground, has a depth of 15 feet and is marked by a buoy. **Edwards Rock,** with a depth of 7 feet, is 250 yards eastward of Whale Rock and marked by a buoy. Numerous other unmarked rocks and ledges with depths of 10 to 12 feet are between Cuttyhunk Island and the ledges southwestward of Penikese and Gull Islands. The eastern point at the entrance and the eastern shore of the harbor should be given a berth of over 300 yards.

The following directions are for approaching Cuttyhunk Harbor from Buzzards Bay. From the eastward care should be taken to avoid Lone Rock which is 0.7 mile northward of the northeastern extremity of Nashawena Island. When westward of Lone Rock and Quicks Hole steer **230°** with Cuttyhunk North Jetty Light ahead until

abeam Gull Island lighted bell buoy 7. Thence steer **256°** to a position 325 yards south of Gull Island South Point buoy 5. From this position steer **231°** for about 950 yards when Cuttyhunk North Jetty Light bears 205° and Gay Head is just open westward of Nashawena Island, anchor in the middle of the harbor eastward of the buoys marking Edwards Rock and Pease Ledge. If less than 9-foot draft, steer **184°** for the former Coast Guard station and anchor over 0.3 mile offshore in depths of 16 to 18 feet.

Vessels approaching from the westward, from a position midway between Ribbon Reef buoy and Cuttyhunk Light, steer **051°**, heading approximately for the south knob on Penikese Island. Hold this course until abeam Middle Ground buoy 1 at a distance of 600 yards; the buoy will bear 141°. Thence steer **090°** for a distance of about 700 yards until Middle Ground buoy 1 and Cuttyhunk Light are in range on a bearing of 214½°; steer **124°** passing about 150 yards northeastward of Middle Ledge buoy and 100 yards northeast of a 12-foot shoal. Continue on this course until Edwards Rock buoy is in range with the north tangent of Copicut Neck, bearing about 250°. Thence steer **180°** until Cuttyhunk North Jetty Light bears about 232° where anchorage may be had in depths of about 20 feet.

Gay Head Light, open a little westward of Nashawena Island, clears the rock westward of the southern end of Penikese Island, and the light just shut in leads between the shoals making off Gull and Cuttyhunk Islands.

To enter Cuttyhunk Pond from the anchorage, steer any course avoiding Pease Ledge to a mid-channel position southward of the jetty light, thence steer mid-channel courses through the dredged channel to the anchorage basin in the inner harbor. If the channel has shoaled, local knowledge is necessary. The Coast Guard will lead vessels through the channel at high water if shoaling has occurred.

Drift ice is carried into Cuttyhunk Harbor with northerly winds and closes the harbor during severe winters.

Diesel oil, gasoline, and a small quantity of provisions may be had at Cuttyhunk. There is telephone communication and daily launch service with New Bedford.

Chart 249.—Buzzards Bay is the approach to New Bedford, many small towns, villages, and the entrance of Cape Cod Canal. The bay indents the south shore of Massachusetts in a northeasterly direction north of the Elizabeth Islands which separate the bay from Vineyard Sound.

The shores are irregular, rocky in character, and broken by many bays and rivers. Large boulders are common, in places extending considerable distance from shore, thus making close approach to the shore dangerous.

The main part of Buzzards Bay and its approach have been surveyed by wire drag. The bottom in this locality is very broken with boulder reefs in places. Vessels should proceed with caution when crossing shoal areas in the tributaries of the bay where the depths are not more than about 6 feet greater than the draft. Caution must also be exercised in the vicinity of the wrecks shown on the chart. Deep water prevails as far as Wings Neck, above which the bay is full of shoals.

Buzzards Bay has six entrances but two of these are so narrow and dangerous as to exclude their use except by small craft with local knowledge. The four major entrances are the main channel, from westward, passing north of Cuttyhunk Island; Cape Cod Canal from northeastward; Quicks Hole from the southward; and Woods Hole from the southward. The two hazardous entrances are Canapitsit Channel,

between Cuttyhunk and Nashawena Islands, and Robinsons Hole, between Pasque and Naushon Islands.

The western and main entrance has a clear width of 4.3 miles between Sow and Pigs and Hen and Chickens Reefs. The bottom in this entrance is irregular and rocky and there are spots with depths of 17 to 34 feet. Because these shoal areas are surrounded by deeper water, vessels of 16-foot draft or more must exercise extra caution when entering the bay. In heavy southwest gales the sea breaks over these spots. Vineyard Sound Lightship, Cuttyhunk Light, and Hen and Chickens Lightship are the best guides for entering. Gay Head Light is a guide for ships approaching from the southward.

Chart 237.—Hen and Chickens Lightship is moored in 60 feet of water 3.8 miles 306° from Cuttyhunk Light. The lightship has a red hull with the words HEN AND CHICKENS on each side, and two masts with lantern and gallery at each masthead. The light is 67 feet above the water and visible 14 miles; a riding light is on the forestay. The fog signal is an air chime diaphragm horn; the radiobeacon is synchronized with the fog signal for distance finding. The code flag signal is NNBP. **Storm warnings** are displayed during the daytime.

Hen and Chickens, a ledge on the northern side of the entrance to Buzzards Bay, is described later. A buoy marking the south part of the ledge is about 0.7 mile 317° from Hen and Chickens Lightship. Rocks with as little as 22 feet over them are 1 mile southward of the ledge and southeastward of the lightship. A rock with a depth of 17 feet is 1.5 miles 219° from Hen and Chickens Lightship; a lighted whistle buoy marks the southeast edge of the rock. Rocks with a depth of 30 feet are 1 and 1.5 miles southward of the lightship.

Chart 249.—Sow and Pigs Reef extends about 1.5 miles in a west-southwest direction from Cuttyhunk Island. A portion of the reef is dry or awash at low water. A bell buoy, about midway between Vineyard Sound Lightship and Cuttyhunk Light, marks the westerly side of the reef. A rock with a depth of 20 feet over it lies about 0.7 mile north of the reef. A prohibited area is on the reef; for definition and regulations see § 204.5 (g) in Chapter 2.

Ribbon Reef, a small, detached ledge with a depth of 18 feet over it, is 1.5 miles northwestward of Cuttyhunk Light. It is surrounded by deep water, and marked off its northern side by a buoy. About 1.2 miles northward of Ribbon Reef and about 1.5 miles eastward of Hen and Chickens Lightship is **Coxens Ledge** with a depth of 23 feet over it. The sea breaks on this ledge in heavy southwest gales. A lighted bell buoy marks its western side.

Mishaum Ledge consists of several shoal, rocky spots with a least depth of 8 feet. The ledge extends 1.8 miles off the northern shore about 3 miles eastward of Gooseberry Neck. A lighted gong buoy marks its south end at a distance of about 500 yards. Strangers should pass southward of this buoy.

A rock with a depth of 22 feet over it is nearly 1 mile north-northwestward of the northern end of Penikese Island, and another rocky shoal with a depth of 18 feet is 0.5 mile northward of the northern end of the island. The 22-foot spot is marked by a lighted bell buoy about 0.3 mile to the westward of it. The channel between this buoy and the buoy off Mishaum Ledge is about 1.1 miles wide.

Anchorages.—New Bedford Inner Harbor affords anchorage for vessels of 25-foot draft. Cuttyhunk Harbor affords anchorage in depths of 10 to 24 feet, but, except for the small-craft inner harbor, is exposed to northeasterly winds. A good anchorage sheltered from all southerly winds may be had off the northerly side of Nashawena Island eastward of Penikese and Gull Islands in depths of 40 to 48 feet. This anchorage, frequently used by tows, is available for vessels of any draft; however, care must be taken to stay clear of the prohibited area and fish trap area in the vicinity. Two defined anchorage areas are off the Cape Cod Canal Entrance.

Prohibited areas are off Sow and Pigs Reef, Hen and Chickens Reef, Gull Island, and Weepecket Island. A dumping ground for the material from the Cape Cod Canal is on the east side of Buzzards Bay southeast of Cleveland Ledge. The minimum depth shall not be less than 27 feet, however, in 1949 three known spots of 18, 21, and 23 feet depths existed in it.

Tides.—Throughout Buzzards Bay the time of the tide is practically simultaneous and the mean range of the tide is about 4 feet.

Currents.—In the passages between Buzzards Bay and Vineyard Sound the currents have considerable velocity, and require special attention. At Hen and Chickens Lightship, the tidal current is rotary, turning clockwise. Strengths of flood and ebb have average velocities of about ½ knot and set northeastward and southwestward, respectively. Minimum velocities before flood and ebb average about ¼ knot and set northwestward and southeastward, respectively. The *Current Tables* and current charts should be consulted for predictions and other detailed information. See also Chapter 2.

Ice.—The head of the bay and the harbors in that vicinity are generally closed to navigation during the winter months. The approaches to the harbors on the eastern shore are rendered dangerous by drift ice. In severe winters this drift ice extends across the bay and joins the local formations on the western shore forming an impassable barrier for short periods. Ice forms more rapidly in the bay with winds from north to west as the western shore forms a shelter from such winds. When the field ice extends sufficiently far out toward the channel as to be affected by the winds from north to west, the outer edges are broken up and carried off to the eastern or southern shore where they form drift ice. Under ordinary circumstances a northeast wind, if continued for 48 hours, will clear the bay of ice. Southerly winds, especially southeastern, diminish the extent and weaken the strength of the pack. The ice does not usually affect the position of the spar buoys in the bay and the lighted buoys are replaced or removed when the ice runs.

Daytime **storm warnings** are displayed at Vineyard Sound and Hen and Chickens Lightships. They also are shown at Cataumet, Fairhaven and at Wings Neck Light.

Pilots.—State pilotage is compulsory at New Bedford and the Cape Cod Canal for all vessels of more than 7 feet in draft, except fishing craft, ships regularly employed in the coasting trade, and vessels carrying United States licensed pilots. For signals and other details see the description of those places.

Towboats are available at New Bedford for work in the inner harbor only. Special arrangements are necessary for towboats to assist vessels in Cape Cod Canal.

The southern side of Buzzards Bay from Cuttyhunk to Woods Hole has been discussed previously in this chapter.

Quamquisset Harbor, called **Quisset Harbor** locally, is a small harbor lying about

1.5 miles northwestward of the northern entrance to Woods Hole. The northern point of the entrance to the harbor is a small, prominent knoll. When off the entrance, the residences on the southeastern shores are prominent. A conspicuous standpipe is about 1 mile northeastward of the entrance. The narrow, buoyed entrance, marked by a lighted buoy on its outer end from May 1 to October 1, has a reported depth of 7 feet. By closely following the buoys, small craft can find anchorage in the middle of the harbor in depths of 16 to 18 feet, sticky bottom, width of anchorage about 250 yards. Local boats generally anchor in the north part of the harbor northerly of the small islet. This anchorage is smaller in size than the anchorage in the lower harbor. A shoal extends about 75 yards off the port on the west side northward of the islet.

Several landings are on the southeastern side of the harbor and several piers are near the head. Some supplies, water, and gasoline are available. A small boatyard has facilities capable of hauling out craft up to 6-ton weight, 30-foot length, and 6-foot draft. Depth off the face of the pier is reported 7 feet.

Hamlin Point, about 2 miles north-northeastward of Quamquisset Harbor, is marked by a prominent hotel with twin cupolas. A shoal, with a depth of 12 feet near its end, extends about 1 mile westward from Hamlin Point and **Gunning Point,** the point 0.4 mile southwest of Hamlin Point. A buoy marks the outer end of the shoal.

Gifford Ledge, with a depth of 10 feet near its end, extends 0.9 mile from the shore 1.4 miles northward of Hamlin Point. Westward and northward of the ledge is the dumping ground for material from Cape Cod Canal.

West Falmouth Harbor, 2.2 miles northward of Hamlin Point, has depths of 1 to 6 feet and bares in places at low water. A small breakwater extends northward from **Chappaquoit Point,** on the south side of the entrance to the harbor. A rock with a depth of 4 feet over it lies 500 yards 256° from the outer end of the breakwater; a buoy marks the rock. A boulder reef extends about 400 yards westward and northwestward from the northern point of the harbor entrance. A buoy marks the western side of the reef. A narrow channel with a least depth of about 5 feet leads along the south shore of the harbor to an anchorage basin, 6 feet deep and 300 feet wide, off the village of **West Falmouth.** To enter, pass between the two buoys off the entrance and steer for the end of the breakwater. Round the breakwater closely and steer east-southeastward passing 100 feet off the rounding point marked by a number of boat sheds, and 200 feet off the next point. Thence steer south-southeastward and round the point extending from the north shore at a distance of 80 yards; a reef extends 70 yards southward from this point. Anchor about midway between this point and the town wharf; the wharf has a depth of about 1 foot at low water.

Chart 251.—Wild Harbor, affording anchorage in northerly or easterly winds, is a small cove on the south side of **Nyes Neck,** 1.8 miles northward of West Falmouth Harbor. Just inside the entrance are depths of about 11 to 20 feet. The shores of the harbor are foul and the easterly part of the harbor is shoal. The entrance is clear in mid-channel. A channel 50 feet wide and 6 feet deep has been dredged to **Silver Beach Harbor,** a small basin 6 feet deep, in the northeastern part of the harbor. A stone jetty extends off the south side of the entrance to the basin. The unmarked channel is subject to shoaling. Silver Beach Harbor has been designated as a special anchorage area. For description and regulations see § 202.1 in Chapter 2.

Megansett Harbor is entered between Nye Neck on the south and **Scraggy Neck**

on the north. The natural channel is buoyed to a rock breakwater at **Megansett** at the head of the harbor. In 1949 a wharf inside the breakwater was bare at low water. The harbor has extensive shoals and ledges but by following the buoyed channel a draft of about 9 feet can be carried to an anchorage in depths of 18 to 22 feet. **Cataumet Rock** with a depth of 7 feet over it is on the south side of the entrance and is marked off its north side by a buoy. **Halftide Rock,** bare at low water, is about 500 yards southwestward of the end of the breakwater.

Squeteague Harbor, northward of Megansett, is entered through a narrow channel from the head of Megansett Harbor. The channel is unmarked but the shoals are visible. The village of **Cataumet** is near the northern part of the harbor.

Seal Rocks, partly bare at half tide, extend 0.4 mile southwestward from Scraggy Neck on the north side of the entrance to Megansett Harbor. A buoy marks them at the southwest end. A narrow channel between the ledge and Scraggy Neck has a depth of about 6 feet.

Southwest Ledge consists of two patches of shoal covered by 2 to 18 feet of water located westward of Scraggy Neck. A rock is awash in the northerly shoal. The northerly patch is marked by two buoys, the southerly by a buoy.

Pocasset Harbor lies between Scraggy Neck and Wings Neck. **Bassett Island** separates the inner part of Pocasset Harbor from Red Brook Harbor. Broken ground, with depths of 17 to 18 feet in places, extends across the entrance. Entering about 250 yards north of buoys marking the north side of Southwest Ledge, vessels of about 14-foot draft can anchor westward of Eustis Rock buoy in depths of 20 to 30 feet. This anchorage is exposed to westerly winds. **Eustis Rock,** about 500 yards north of Scraggy Neck and marked by a buoy, has a depth of 5 feet over it. Eastward from Eustis Rock to Bassett Island the harbor is shoal.

A narrow buoyed channel with a depth of about 6 feet leads north of Bassett Island to the inner part of Pocasset Harbor. By following a mid-channel course, anchorage may be had south of Chadwick Point buoy 1 in depths of 14 to 18 feet. **Barlows Landing,** at the northeast end of the harbor, had a depth of 1½ feet in 1949.

From Eustis Rock a draft of 7 feet can be carried through a natural buoyed channel to a small anchorage with depths of 8 to 15 feet in **Hospital Cove,** east of Scraggy Neck and south of Bassett Island. A boulder reef extends northeastward from Scraggy Neck in the approach to the cove; a buoy marks the edge of the reef. Several private piers with depths of 5 to 8 feet alongside are in the cove.

Red Brook Harbor and **Hen Cove** are eastward of Bassett Island. A draft of 6 feet can be taken into the harbor via Pocasset Harbor; a draft of 4 feet via Hospital Cove, taking care to avoid a rock, bare at half-tide, 250 yards off the eastern side of Bassett Island.

Wings Neck extends about 2 miles in an east-southeast direction into Buzzards Bay. The neck is an irregular, hilly, prominent peninsula. Wings Neck Light and the anchorage areas southwestward of the neck are discussed under Cape Cod Canal.

Bennetts Neck, eastward of Wings Neck, is on the east side of **Pocasset River** which is very shallow except at its mouth.

Tobys Island, on the south side of Phinneys Harbor, is connected to the mainland by a causeway.

Mashnee Island extends as a peninsula southward of **Hog Island,** on the western side of **Phinneys Harbor.** A light, 15 feet above water, is shown from a small black

house on stone mound, in 9 feet, in the angle of the turn in the approach channel to Phinneys Harbor. The light is maintained from May 1 to October 1. This harbor is entered from the southward through a buoyed channel with depths of from 13 to 30 feet which leads along the north side of Wings Neck to the anchorage area. The harbor's size makes it available as anchorage only for small craft and very small vessels for which the chart is sufficient guide. In June 1949 the controlling depth was 8 feet to within about 350 yards of the beach. From there, however, the water is shallow up to the shore. A group of three rocks marked by a buoy is 350 yards west of the beach. Another rock 200 yards north of Tobys Island is marked by a buoy. A small wharf, dry at low water, is at **Monument Beach,** on the east shore of the harbor. A small boatyard with a marine railway is on the beach.

Back River, emptying into the north side of the harbor, is obstructed by rocks and is nearly bare at low water except near its entrance. It is crossed by two fixed bridges having a minimum vertical clearance of 6 feet. Small craft sometimes anchor in the entrance.

The **Cape Cod Canal** is a deep-draft, sea-level waterway that extends westward from Cape Cod Bay to the head of Buzzards Bay. The total length of the waterway, including approach channels, is about 15 miles. The canal shortens the distance between points north and south of the cape by 50 to 150 miles and eliminates the necessity for the run outside the cape and Nantucket Shoals. The canal is maintained by the Government as a free waterway.

Prominent features.—A light, 40 feet above the water and visible 12 miles, is shown from a red skeleton structure at the outer end of the breakwater on the north side of the Cape Cod Bay entrance to the canal; the fog signal at the light is an electric-diaphragm horn. A radiobeacon is near the Coast Guard station on the south side of the entrance. Other marks for the entrance are the lighted channel buoys, the white daymarks on the skeleton structures of the 245° lighted range, the Coast Guard boathouse, and the high-level highway bridge that crosses the canal at Sagamore, 2.5 miles west of the breakwater light. The breakwaters should not be confused with the smaller jetties at Sandwich Harbor, 1 mile to the southeastward, nor should the two white church spires back of Sandwich Harbor be mistaken for the range towers.

On the eastern side of the Buzzards Bay approach to the Cape Cod Canal is **Cleveland Ledge Light,** which is 74 feet above the water, visible 14 miles, and shown from a white cylindrical tower and dwelling on a white caisson; the fog signal is an air-diaphragm horn that is synchronized with the radiobeacon for distance finding. Other marks for the western entrance are the lighted buoys along Cleveland Ledge and Hog Island Channels; the abandoned lighthouse on Bird Island; the light, 59 feet above the water and visible 13 miles, that is shown from a white skeleton tower on the southwest end of Wings Neck; the white skeleton towers and tankhouses of the Cleveland Ledge Channel 015° lighted range; the two tanks on the mainland immediately northeastward of Hog Island; the vertical-lift railroad bridge over the canal at the village of Buzzards Bay; and the high-level highway bridge at Bourne. The railroad bridge is especially conspicuous and can be seen for many miles down Buzzards Bay.

Channels.—The Federal project provides for a channel 32 feet deep and 500 to 700 feet wide. The project is under constant maintenance, and controlling depths are published from time to time in the weekly *Notice to Mariners.*

Anchorages.—Mooring basins are located at the east and west ends of the canal. The East Mooring Basin, located on the north side of the canal, is 2,000 feet long, 300 feet wide, and has been dredged to a depth of 25 feet. The West Mooring Basin, located on the southeast side of Hog Island Channel, is 2,600 feet long, 350 feet wide, and has been dredged to a depth of 32 feet. Mooring dolphins are provided in both basins. Controlling depths reported in March 1950 were 19 feet in the East Basin and 21 feet in the West Basin.

The small-boat basin, on the south side of the canal opposite the East Mooring Basin, is 440 feet long, 250 feet wide, and has been dredged to a depth of 12 feet. The controlling depth reported in March 1950 was 12 feet.

Bridges.—The canal is crossed by two fixed high-level highway bridges at **Sagamore** and **Bourne** and by a vertical-lift railroad bridge at the village of **Buzzards Bay.** The highway bridges have horizontal clearances of 500 feet and vertical clearances of 135 feet at high water. The railroad bridge has a horizontal clearance of 500 feet, a closed vertical clearance of 7 feet at high water, and an open vertical clearance of 135 feet; the lift span is normally maintained in the raised position and lowered for the passage of trains. Signals for the railroad bridge are given in the regulations which follow this general discussion of the canal. An overhead cable that crosses the canal about midway between the highway bridges has a vertical clearance of 160 feet at high water.

Traffic Lights.—Red, green, and amber electric traffic lights, 30 to 35 feet above the water and visible about 2 miles, day or night, are located on the south side of the Cape Cod Bay entrance to the canal, on the north side near the Corps of Engineers substation 0.2 mile west of the railroad bridge, and near Wings Neck Light on the southeast side of the Buzzards Bay entrance. Traffic signals are given in the regulations which follow this general discussion of the canal.

The canal proper is lighted at night, on both banks, by sodium-vapor and white lights spaced, alternately, about 500 feet apart, 140 feet from the edge of the channel, and 25 feet above the water.

Two-way traffic through the canal will be allowed when, in the opinion of the Corps of Engineers representative charged with directing traffic, conditions are suitable.

When the railroad bridge lift span is lowered during periods of low visibility, there will be four blasts on an air whistle on the span every two minutes.

Vessels should not attempt to transit the canal until clearance by radio, radiotelephone, signal lights, megaphone, or motorboat contact has been obtained. Strong tidal currents occur in the canal, especially during spring tides. Low-powered vessels should await slack water or favorable current. Fishing boats and small craft should not obstruct the channel, and anchoring in the fairway is not permitted except in emergencies. **All vessels, large and small, must operate at moderate speed.**

Tides.—The mean range of tide is about 9½ feet at the Cape Cod Bay entrance and 4 feet at the Buzzards Bay entrance. As the tide in Cape Cod Bay occurs about 3 hours later than that in Buzzards Bay, the periodic differences in level are large, and this causes strong currents. Subnormal tides may lower the canal level 2 feet below mean low water or even more if attended by heavy offshore winds.

Currents.—Predictions for the time of slack water and the times and velocities of strength of current for every day in the year are given in the *Current Tables*. Under ordinary conditions the currents have an average velocity at strength of about 3½ knots in midstream. The average strength of current at spring tides is about 4 knots.

Weather.—The fog is said to be always less dense over the canal than outside, but at times a water vapor rises from the canal to such an extent that traffic has to be suspended. The canal proper never has been closed by **ice**, but occasionally Buzzards Bay becomes so congested with ice that navigation through the canal is prevented.

Storm warnings are displayed, day and night, at the Coast Guard station at the eastern entrance, and at Wings Neck Light on the western side.

Pilotage.—Pilotage is not compulsory for vessels carrying a pilot licensed for the canal by the Coast Guard. The pilots maintain a station at the wharf at the east end of the canal. Usually pilots may be obtained by making signal on approaching either end of the canal, but advance calls by radio are advised. The Corps of Engineers does not maintain pilot service, but will contact local independent pilots whenever requested. Towboats may be had by prior arrangement.

Terminal facilities.—The State Pier at the village of Buzzards Bay, on the north side of the canal near the western entrance, is 600 feet long and the berthing space at the face has been dredged to a depth of 25 feet. The controlling depth reported on the channel side of the pier in March 1950 was 22 feet.

A harbor master supervises use of the State Pier. Supplies and communications are available. Water, fuel oil, and gasoline also are available at the terminal near the boat basin at the Cape Cod Bay entrance to the canal.

Communications.—Information on operating conditions, widths, depths, or other data concerning the canal is available at all hours, day or night, by telephoning Buzzards Bay 97; or by ship-to-shore telephone to the Scituate station, whose call letters are WOU; or by radiotelegraph to the Chatham station, whose call letters are WIM and WCC, whence messages are relayed by telephone to the canal authority.

The radiotelephone in the canal office at Buzzards Bay is in continuous operation. The call letters are WUA21 and the frequency is 2350 kc.; only calls on that frequency can be answered.

§ 207.20 *Cape Cod Canal, Mass.; use, administration and navigation*—(a) *Limits.* The Cape Cod Canal, including approaches, extends from the outer extremity of the northerly stone breakwater in Cape Cod Bay at Sandwich through dredged channels and land cuts to a point in Buzzards Bay, Massachusetts, about 5 miles southwest of Wings Neck Light.

(b) *Supervision.* The movement of all vessels and craft of every description through the canal, and the care and maintenance of the canal and all property of the United States pertaining thereto, shall be under the supervision of the United States Division Engineer, New England Division, Building No. 21, U. S. Naval Drydock, South Boston, Mass., who has general charge of Federal waterway improvements in the locality, and his authorized representatives.

(c) *Vessels allowed passage.* The canal is open for passage to all adequately power motivated vessels in good condition, of sizes consistent with safe navigation as governed by the controlling dimensions of the waterway. Vessels without engine motive power must not attempt to sail through the canal. Low powered vessels should await slack water or favorable current.

(d) *Tows.* Tows shall be assembled outside the canal entrances when practicable. Vessels in tow shall be securely fastened to the towing vessel and to each other. Long hawsers are not permitted.

(e) *Obtaining clearance.* Vessels 25 feet or more in length shall not transit the canal until clearance has been obtained. Ordinarily, vessels will be given clearance in order of arrival, but when several vessels are to be passed, clearance will be given in the following order:

(1) *First.* To vessels owned by the United States or employed on canal improvement work.

(2) *Second.* To passenger vessels.

(3) *Third.* To freight vessels, towboats and pleasure craft.

(f) *Clearance signals.* The following signals apply to all vessels 25 feet or more in length:

(1) *Westbound traffic.* When the green light is showing at the eastern or Cape Cod Bay terminal,

vessels may proceed through the canal. When the amber light is showing, vessels may proceed as far as the East Mooring Basin where they must stop and from whence clearance will be granted by motor boat or other signal. When the red light is showing, vessels must stop clear of the outer end of the Cape Cod Bay approach channel.

(2) *Eastbound traffic*—(i) *Signals at Wings Neck.* When the green light is showing, vessels may proceed through the canal. When the amber light is showing, vessels may proceed through the Hog Island Channel as far as the West Mooring Basin or the State Pier. When the red light is showing, vessels, other than those bound to Onset Bay or Monument Beach, must stop clear of Buoys Nos. 1 and 2 at the entrance to Hog Island Channel. In daytime when sunshine partially obscures the traffic lights or if the electrical current should be temporarily interrupted, a red ball or shape will be operated from a pole about 60 feet southwest of the traffic lights. The raised ball has the same meaning as the red light; the ball lowered to the ground, the same meaning as the green light.

(ii) *Signals at Station 389.* (*a*) These signals will be operated in synchronism with the signals at Wings Neck except:

(*1*) In emergencies not foreseen when a vessel passes in by Wings Neck.

(*2*) When dispatching vessels from the West Mooring Basin or the State Pier.

(*3*) When the railroad bridge is lowered.

(*b*) When the green light is showing, vessels may proceed. When the amber light is showing, vessels may proceed through the Hog Island Channel as far as the West Mooring Basin or the State Pier. When the red light is showing, vessels must not pass Station 389.

(3) *Procedure in thick weather.* (i) Obtaining clearance. When signal lights are obscured by thick weather clearance should be secured by radio or other reliable medium.

(ii) *Signalling by vessels.* In thick weather all vessels, having obtained clearance, shall signal by three long blasts of whistle or horn when passing in by Wings Neck Light or Sandwich Breakwater.

(4) When signal lights are obscured by thick weather, clearance should be secured by radio or other reliable medium.

(g) *Railroad bridge signals.* (1) The vertical lift span of the railroad bridge is normally kept in the raised position except when lowered for the passage of trains. Immediately preceding the lowering of the span the operator will sound two long blasts of a whistle or horn. Immediately preceding the raising of the span, the operator will sound one long blast of a whistle or horn. When a vessel is approaching the bridge with the span in the lowered position, if it will not be raised immediately, the operator will so indicate by sounding four short blasts in quick succession upon a whistle or horn.

(2) When the railroad lift span is lowered in foggy weather, there will be 4 blasts of a whistle or horn on the span every 2 minutes. Vessels in transit, especially when with a fair current, must exercise extreme caution when the span is lowered.

(h) *Speed*—(1) *General.* No boat in the canal shall be raced or crowded alongside another boat. All vessels must pass mooring dolphins, wharves, landings, and dredging plant or other floating work units at minimum speed so as to avoid damage to moored or anchored vessels by wave wash or suction.

(2) *Limits.* Vessel speed will be determined by the time of passage (east or west) between Canal Stations 35+00 (opposite U. S. Engineer Observer's Station near east end) and 388+00 (opposite U. S. Engineer Sub-Office near west end). No boat shall pass between these points in less than the following specified minimum running times:

Current direction:	*Minimum running time canal stations 35 to 388 (minutes)*
Head (against boat)	60
Fair (with boat)	30
Slack	45

This minimum running time for slack water shall apply to any boat which enters that portion of the canal between Stations 35 and 388 by passing either Station 35 or Station 388 at any time within a period of 1 hour before the predicted time of slack water as given in the U. S. Coast & Geodetic Survey publication "Current Tables, Atlantic Coast." The applicable minimum running times for head or fair current, respectively, shall apply to any boat which enters that portion of the canal between

Stations 35 and 388 by passing either Station 35 or Station 388 at any time other than designated above for applicability of the requirement for slack water.

(3) *Example.* For example, the predicted times of slack current on October 1, 1940, at Cape Cod Canal (Bournedale), Mass., as given on page 32 of the U. S. Coast & Geodetic Survey publication "Current Tables, Atlantic Coast" are 2:25 a. m., 8:43 a. m., 2:50 p. m., and 9:07 p. m. On October 1, 1940, the slack current schedule will apply to any boat which enters the canal by passing either Station 35 or Station 388 between 1:25 a. m. to 2:25 a. m., 7:43 a. m. to 8:43 a. m., 1:50 p. m. to 2:50 p. m., and 8:07 p. m. to 9:07 p. m.; the head or fair current schedule, as applicable, will apply to any boat which enters the canal by passing either Station 35 or Station 388 between midnight to 1:25 a. m., 2:25 a. m. to 7:43 a. m., 8:43 a. m. to 1:50 p. m., 2:50 p. m. to 8:07 p. m., 9:07 p. m. to midnight.

(i) *Management of vessels*—(1) *Pilot rules.* The canal is an inland waterway of the United States and the pilot rules for such waterways as contained in the United States Coast Guard publication "Pilot Rules" are applicable concerning matters not otherwise covered in this section.

(2) *Passing of vessels.* Restricted passing is permissible, particularly when a leading, low-powered vessel is unable to stem the current, but extreme care to avoid collision is imperative.

(3) *Unnecessary delay in canal.* Vessels must not obstruct navigation by unnecessary delay in entering or passing through the canal or by anchoring in the channel.

(4) *Mooring or anchoring in mooring basins.* Vessels mooring or anchoring in the mooring basins shall do so in such manner as not to obstruct the canal channel or impede vessel movement to and from the basins.

(5) *Landing of freight, etc.* Except in emergencies, vessels shall not stop to land passengers, freight or baggage or to transfer same to another vessel under such conditions as would in any way interfere with navigation.

(j) *Statistics.* Masters of vessels shall furnish the authorized representative of the Division Engineer, on each passage through the canal, such verbal or written statement of passengers, freight and registered tonnage as may be requested by said authorized representative.

(k) *Deposit of refuse.* No oil or other liquid, ashes or other material of any kind shall be thrown, pumped or swept into the canal or approaches, or deposited on canal grounds.

(l) *Trespass or injury to property.* Subject to the provisions of paragraph (m) of this section, trespass upon the canal property or injury to the canal, lands, banks, revetment, bridges, breakwaters, dikes, dolphins, fences, culverts, trees, telephone lines, power lines, or any other property of the United States pertaining to the canal is prohibited.

(m) *Fish and game.* All persons are forbidden to enter upon the canal or the lands of the United States pertaining thereto for the purpose of fishing or hunting or taking fish or game by any means without a written permit from the Division Engineer or his authorized representative, except that fishing with rod and line from the banks of the canal at such locations as may be established by the Division Engineer or his authorized representative is allowed without such a permit, subject to the provisions of paragraph (l) of this section. The fish and game laws of the United States and of the State of Massachusetts will be enforced upon the canal and the lands of the United States pertaining thereto.

Buttermilk Bay lies at the northeast end of Buzzards Bay. Depths in the bay range from 1 to 7 feet. A narrow buoyed channel and **Cohasset Narrows** connect the bay with Cape Cod Canal. A Federal project provides for a channel 7 feet deep and 100 feet wide across the sand bar in the channel from Cape Cod Canal to Cohasset Narrows. In June 1949 no work had been done on the project and the controlling depth in the buoyed channel was 3 feet. Two bridges cross Cohasset Narrows, the first a bascule railroad bridge, has a horizontal clearance of 25 feet and a vertical clearance, closed, of 6 feet at high water. The bascule span has never been in operation, the bridge being used as a fixed bridge. The second, a fixed highway bridge, has a horizontal clearance of 55 feet and a vertical clearance of 9 feet at high water. At the highway bridge there is double flood; the ebb is normal. The flood sets northeastward; the ebb southwestward. Slack before flood occurs 1¾ hours earlier than at Pollock Rip Channel. First

maximum of the double flood has an average velocity of 1 knot and occurs 3¾ hours earlier than maximum flood at Pollock Rip Channel. Minimum flood has a very small velocity and occurs 2½ hours earlier than maximum flood at Pollock Rip Channel. Second maximum of the double flood has an average of about 1¼ knots and occurs ¼ hour earlier than maximum flood at Pollock Rip Channel. Slack before ebb occurs ¾ hour earlier than at Pollock Rip Channel. Maximum ebb has an average velocity of about 2 knots and occurs 1 hour earlier than at Pollock Rip Channel. The only facilities in Buttermilk Bay are small private piers for shallow-draft boats.

Butler Cove, on the western side of Cohasset Narrows southward of the bridges, has depths of 3 to 5 feet.

The mouth of **Onset Bay** lies between **Sears Point,** a point jutting southeasterly toward Hog Island Channel, and **Hog Neck,** 0.7 mile southward of Sears Point. The bay is the approach to the village of **Onset. Wickets Islands,** in the northwestern portion of the bay, is high and wooded and marked by a large dwelling. On the western shore of the island is a small wooden pier with 6 to 10 feet alongside. A project provides for a channel 15 feet deep and 100 feet wide from Cape Cod Canal to Onset Bay; a channel 15 feet deep and 150 feet wide from the deep water in the vicinity of Wickets Island to the town wharf at Onset; for enlargement of the 15-foot turning basin at the town wharf; and for an anchorage basin of about 16 acres, contiguous to the proposed channel and turning basin, having a depth of 8 feet. In June 1949 the controlling depth in the entrance channel was 10 feet.

Strong currents frequently tow under the buoys in the entrance channel. A rock with a depth of 8 feet is about 75 yards northeast of Hog Island Channel Light 11, near the entrance channel. The channel southwest of Wickets Island had a shoal in the eastern portion in 1949. Vessels should favor the west side of the channel where depths of 15 feet were found.

An abandoned channel leading from Cape Cod Canal into the Onset Bay Channel near **Burgess Point** should not be used. A sand shoal, distinguishable by its discoloration, makes into the abandoned channel which had a controlling depth of 4 feet in 1949.

A special anchorage area has been established by Federal regulations in Onset Bay. For description and regulations see § 202.1, *Onset Bay,* in Chapter 2. Depths in the approach to this anchorage area range from 8 to 15 feet with depths of 2 to 10 feet in the anchorage. Additional anchorage may be found off the town wharf in depths of 9 to 15 feet.

The wharf at Onset had a depth of 14 feet at its face in June 1949. Visiting craft sometimes tie up at the wharf for short periods. Gasoline, oil, water, ice, and some supplies can be obtained at Onset. A boatyard with marine railway can haul out craft up to 50-ton weight, 65-foot length, and 7-foot draft. Engine and hull repairs can be made; dry storage is available. Along the north shore of the bay westerly from Burgess Point are several private marine ways. Bus and limited railroad service are available. Both marine and land taxi service operate during the summer months.

East River empties into Onset Bay south of the village. A draft of 3 feet can be taken to an anchorage just above the fixed bridge which connects Onset and **Long Neck.** The fixed bridge has a horizontal clearance of 93 feet and a vertical clearance of 11 feet at high water.

The Widows Cove lies between Hog Neck and **Cedar Island Point,** a point about 0.5 mile southwestward of Hog Neck. Depths in the cove are 3 to 5 feet.

Cedar Island Point and **Stony Point,** about 400 yards southwest of Cedar Island Point, are on the southeast side of **Great Neck. Stony Point Dike,** a breakwater about 5 feet high, extends in a general south-southwesterly direction from Stony Point to Abiels Ledge, a distance of about 1.8 miles. This breakwater affords protection for Hog Island Channel. Cleveland Ledge Channel Range Front Light marks the south end of the dike.

Abiels Ledge, between Hog Island Channel and the south end of Stony Point Dike, has a depth of only 3 feet over it.

Dry Ledge, about 1 mile northwestward of Abiels Ledge, bares at half tide. A buoy is on the southwestern side. Between Dry Ledge and **Little Bird Island,** 0.8 mile northward, the depths vary from 4 to 10 feet. About 500 yards southward of the ledge is a shoal with a depth of 13 feet.

Between Little Bird Island and **Warren Point,** the southernmost point on **Indian Neck** 0.6 mile northward of Little Bird Island, the bottom is uneven with depths of 1 to 19 feet. Between Warren Point and **Long Beach Point,** the point at the mouth of Wareham River 1.4 miles northwestward, an extensive shoal makes southward.

Wareham River empties into the northern end of Buzzards Bay. The river is the approach to the town of **Wareham** on the west bank. **Great Hill,** wooded, 124 feet high, and about 1.5 miles southward of Long Beach Point, is prominent for boats approaching the river. An elevated tank, a chimney, and a standpipe in Wareham are conspicuous. The buoyed channel to the town is crooked and twisting. In 1949 the controlling depth was 6 feet, the critical section being in the vicinity of **Quahaug Bar,** north of Long Beach Point. A shoal makes off southeasterly from **Cromeset Point,** 0.6 mile southward of Long Beach Point. Depths shoal to 2 and 3 feet close to the buoyed channel and craft must take care to pass eastward of the buoys. The river offers no anchorage except in the channel. A fixed bridge crosses the river above the wharves at Wareham. The bridge has a horizontal clearance of 28 feet and a vertical clearance of 2½ feet at high water. **Oakdale** is on the east bank just above the bridge.

Vessels approaching Wareham River from Buzzards Bay pass 0.8 mile east of the abandoned tower on Bird Island and steer **351°** for about 2.6 miles. Anchor 400 to 500 yards eastward of the wharf off the northeast side of Great Hill in a depth of 15 feet, soft bottom. Strangers should obtain local information regarding channel depths before navigating the river.

The mean range of the tide is about 4 feet. The velocity of the current is not great enough to materially interfere with a vessel having a good breeze. During the first half of the ebb the current below the wharves of the town sets across the flats westward of the channel; and during the whole of the ebb it sets across the flats eastward of the channel below Long Beach Point. Current predictions for Wareham River may be obtained from the *Current Tables.* The river ices over for short periods each winter.

The depths at the wharves at Wareham are from 5 to 11 feet. **Speed** in the harbor channel is limited to 5 knots. Gasoline, water, and a limited amount of ship's chandlery are available. A boatyard has a marine railway capable of hauling out craft up to 15-ton weight, 40-foot length, and 6-foot draft. A depth of 6 feet is alongside the boatyard wharf. Bus and rail communication serve the town.

Marks Cove, on the west side of the channel to Wareham River between **Swifts Beach** on the north and **Cromeset Neck** on the south, has depths of 2 to 5 feet. The cove is used by small boats.

Weweantic River, entered southward of Cromeset Neck, has a narrow and crooked channel which is partly obstructed by rocks. It is navigable for 2 miles above the fixed highway bridge by small craft. The bridge, about 1.7 miles above the mouth, has a horizontal clearance of 40 feet and a vertical clearance of 5 feet at high water.

From Wareham River to New Bedford the shore is indented sharply by rocks and ledges extending offshore nearly 2 miles in places.

Wings Cove, between **Great Hill Point** southeast of Great Hill, and **Pine Point** on the eastern side of **Sippican Neck,** has depths of 8 to 17 feet in its outer section. The cove affords protection from westerly winds but is seldom used. Rocks are off Pine Point.

Butler Point is on the southern tip of Sippican Neck. Eastward of the point is a former yacht basin which in June 1949 was not in use. Shoal water extends 700 yards southward from the point to **Bird Island,** a round, low, flat island. The abandoned lighthouse tower on the island is a prominent landmark. The tower is white and 36 feet high.

Bird Island Reef, about 0.4 mile eastward of Bird Island, has depths of 15 to 18 feet. It is marked on its east side by a bell buoy.

Southwest of the island is **Centerboard Shoal,** marked at its southerly end by a lighted buoy. The shoal has depths of 12 to 25 feet over it.

About 0.9 mile southwest of Centerboard Shoal are **The Bow Bells,** isolated shoals with depths of 11 to 18 feet, and marked by a buoy at their southerly end. About midway between Centerboard Shoal and Cleveland Ledge is a 17-foot shoal marked by a lighted gong buoy near its southern side.

Sippican Harbor, scene of much pleasure boat activity, makes into the north shore of Buzzards Bay about 3 miles southward of Wareham River. The harbor is the approach to **Marion,** a small town on the western shore. The entrance is marked on the east by Bird Island and its abandoned lighthouse and on the west by a flagpole and a large prominent house on **Blake Point.** Several tall radio masts at the head of the bay northward of the town can be seen for many miles on a clear day. The standpipes on Sippican Neck and in Marion can also be seen.

Mendells Rocks and **Seal Rocks** are shoal, rocky areas northwestward of Blake Point extending up to 400 yards off the west shore of the harbor. **Planting Island,** a peninsula extending about 0.6 mile northwesterly from Sippican Neck, is on the eastern side of the harbor. The natural channel between Sippican Neck and Planting Island on the east and the shoal area northward of Blake Point on the west gradually lessens in width until at **Ram Island,** off Marion, the passage between the island and the western shore is less than 275 yards wide. The currents in the narrow portion of the channel have considerable velocity at times. **Little Island** lies on the western side of the channel about 0.2 mile northwestward of Ram Island. The channel is marked by buoys and in 1949 had a controlling depth of 9 feet from the entrance to Marion.

Blankenship Cove and **Planting Island Cove,** on the eastern side of Sippican Harbor, have a common entrance northward of Ram Island. They have general depths of 3 to 5 feet. **Meadow Island** separates the two coves. A rock bare at low water lies in mid-channel in the approach to the coves northward of Ram Island. Gibbs Rock Daybeacon, red and black keg on iron spindle, is on the south side of the channel north of Ram Island. It and other daybeacons, which are not charted, in the bight into the coves are privately maintained.

Hammett (Briggs) Cove in the northeastern part of Sippican Harbor has a small marine railway to which a draft of about 4 feet can be taken at high water and with local knowledge. Four daybeacons, can on iron spindle, are in the cove; they are privately maintained from April 15 to December 15.

To enter Sippican Harbor, from a position midway between The Bow Bells buoy 11 and Centerboard Shoal lighted buoy 2, steer **348°** passing about 150 yards eastward of Mendells Rock buoy 1 until abeam and close to Seal Rocks buoy 3. Thence steer **328°** passing westward of Sippican Shoal buoy 2A and eastward of Black Rock buoy 5. Alter heading as necessary to pass westward of Ram Island Point Shoal buoy 4, thence steer **358°** passing eastward of Little Island buoy 5A and anchor in depths of 10 to 13 feet southeastward of the wharf at Marion.

The mean range of the tide in Sippican Harbor is about 4 feet. Ice usually closes the harbor about a month or more each winter. The depth at the wharf at Marion is about 5 feet. Three boatyards with marine ways are in the vicinity. The largest ways can handle vessels up to 40-ton weight, 50-foot length, and 5-foot draft. Dry storage is available. One yard has some ship's chandlery. Its dock has about 3 feet alongside. Gasoline and water are available.

Aucoot Cove, about 0.8 mile southward of Sippican Harbor, has depths of 10 to 19 feet. Small fishing craft occasionally use it as an anchorage in westerly winds. The other coves between Sippican and Mattapoisett Harbors are foul and seldom entered, even by local boats.

Chart 252.—Mattapoisett Harbor is about 3.5 miles southwest of Sippican Harbor and about 4.5 miles northeastward of New Bedford Harbor. The harbor is the approach to the town of **Mattapoisett** on the northern shore and is used by numerous yachts during the summer months. Although exposed to southeasterly winds, the ledges at the entrance somewhat break the sea from that direction. A light, 41 feet above the water and shown from a white tower on **Ned Point,** marks the approach to the harbor. The light is maintained from April 15 to October 15. A standpipe and radio tower are in the town. The entrance, between **Angelica** and **Strawberry Points** on the east and **Mattapoisett Neck** on the west, is about 1.5 miles wide. A buoyed natural channel leads through the numerous rocks and ledges in the entrance to the anchorage area off the town. The channel has a depth of about 14 feet, but because of the broken character of the bottom, vessels should proceed with caution over areas where the charted depths are not more than 6 feet greater than the draft. Strangers should not attempt to enter at night.

Shoals and rocks make off from Angelica and Strawberry Points on the east side of the entrance. A daybeacon, black barrel on iron spindle, and buoy mark the shoal area. Off the west side of the entrance **Mattapoisett Ledge** extends in a southeasterly direction for a distance of about 1 mile from Mattapoisett Neck. Rocks awash and depths of 1 to 8 feet are found on the generally foul area of the ledge. Buoys mark its eastern side. About 0.4 mile southeastward of Mattapoisett Ledge is **Nye Ledge** with depths of 7 to 17 feet over it. A bell buoy marks the southwesterly side. The entrance channel passes between the following submerged dangers which are marked by buoys: **Gallatin Rock,** with a depth of 10 feet, and **Sunken Ledge,** with a depth of 3 feet, on the western side of the channel; **Snow Rock,** with a depth of 5 feet, and **Barstow Rock,**

with a depth of 8 feet, on the eastern side of the channel. A shoal with a depth of 3 feet over it near the landing is marked by a buoy.

To enter Mattapoisett Harbor, from a position 600 yards east of Nye Ledge bell buoy 9A steer **313°** for 2 miles passing 75 to 100 yards abeam Gallatin Rock buoy 3. When abeam Barstow Rock buoy 6, distant about 150 yards, steer **320°** heading for the stone wharf. Anchor about 0.3 mile from the northeast shore between Ned Point and the wharves in depths of 13 to 17 feet.

The mean range of the tide in the harbor is about 4 feet. The stone wharf at the town has a depth of 5 feet at its face and 7 feet along its side. Diesel oil, gasoline, oil, water, and some supplies are available. A boatyard has facilities for hauling out craft up to 15-ton weight, 45-foot length, and 6-foot draft for general repairs. A commercial seaplane base operates charter flights to the islands.

Ram Island, about 1.5 miles southwestward of Mattapoisett Harbor, is a low, grassy island connected to Mattapoisett Neck by a narrow shoal. Rocky, shoal water surrounds the island a distance of 400 yards.

Cormorant Rock, 0.9 mile southeastward of Ram Island, bares at half-tide. A daybeacon, black spindle with cage, marks the rock. Ledges with very little water over them surround the daybeacon at a distance of 150 yards. A rock with 14 feet over it is about 0.2 mile northeastward of the daybeacon; depths of 18 to 21 feet extend 0.3 mile southward. The channel between the rock and Ram Island has a depth of about 15 feet.

Nasketucket Bay is entered between Cormorant Rock on the east and **West Island** on the west. Northward and westward of West Island the bay is greatly obstructed by rocks and small islands. Because of these obstructions only small craft proceed through the bay to **Little Bay,** at the head of Nasketucket Bay and **Nasketucket River,** at the head of Little Bay. Numerous rocks, including **Whale Rock,** are on the east side of West Island at the entrance. A causeway connects the western side of West Island with **Long Island.** A fixed span in the causeway has a horizontal clearance of 25 feet and a vertical clearance of 5 feet at high water. The depth at the bridge is 6 feet. The approach from the southward to the west side of West Island runs among many sunken rocks and shoals and is very dangerous. The causeway between Long Island and **Sconticut Neck,** the neck of land forming the east side of New Bedford Harbor, completely obstructs passage between the two.

West Island Shoal extends nearly 1 mile southward from West Island, and for half this distance is mostly bare at extreme low water. For the remainder of the distance, the depths range from 10 to 18 feet. A bell buoy marks the south end of the shoal. A rock covered by 17 feet lies about 0.8 mile northeastward of the buoy, a small ledge with 13 feet over it is 0.4 mile westward, and another ledge with 16 feet over it is nearly 1 mile southwestward. A large area southward of West Island is a designated dumping ground.

Between West Island Shoal and **Sconticut Point,** the southern point of Sconticut Neck, are numerous rocks, islands, and ledges including **West Island Ledge, Little Black Rock, Mosher Ledge, Black Rock,** and **Angelica Rock.** Black Rock is marked by a daybeacon, red cask on end on iron spindle. Strangers without local knowledge should keep south of buoys marking these dangers.

New Bedford Harbor is a tidal estuary at the mouth of the **Acushnet River** on the northwestern side of Buzzards Bay. It is the approach to the city of New Bedford and the town of Fairhaven. By water the harbor is about 163 miles from the Battery

at New York via Long Island Sound, and 80 miles from Boston via the Cape Cod Canal. The harbor includes all the tidewater lying northerly of a line from Clark Point at the southern extremity to Sconticut Point at the southern end of Fairhaven and extends to the head of navigation on the Acushnet River at Acushnet. The outer harbor consists of the area south of Palmer Island; the inner harbor consists of the area north of the island to a short distance above the New Bedford-Fairhaven bridge.

New Bedford is a manufacturing city on the west side of the Acushnet River. **Fairhaven** is on the east side of the river. Principal shipping includes receipts of coal and petroleum products. Considerable commercial fishing craft operate from the ports. The deepest draft entering the port is about 28 feet.

The approach from Buzzards Bay and the entrance to New Bedford Harbor are much obstructed by ledges and shoals, between which are several channels leading to the dredged entrance. The bottom is very broken, characterized by large boulders, and as a matter of safety vessels should proceed with caution when crossing areas off the general track when the charted depths are not more than 6 to 8 feet greater than the draft.

Prominent features.—From the main channel numerous landmarks can be discerned on the westerly side. Dumpling Rock Light off Round Hill Point and 3 miles west of the channel is conspicuous. Just northwest of the old tower on Round Hill Point are two high radio towers. **Clark Point,** on the west side of the channel, is marked by a granite fort. About 0.7 mile northeast of the point is Butler Flats Light near the edge of the shoal. Palmer Island Light is 1.7 miles northwest of Butler Flats Light. A group of four large white cement stacks are on the west side of the inner harbor. Although there are no landmarks on Sconticut Neck, **Fort Phoenix** is a promontory fairly conspicuous just east of the channel, almost opposite Palmer Island. Several church spires are prominent in Fairhaven. Tall radio towers are on **Popes** and **Crow Islands** in the inner harbor.

Butler Flats Light, 53 feet above the water and visible 13 miles, is shown from a white conical tower on a black cylindrical base on the west side of the channel. The fog signal is an air diaphragm horn; a marker radiobeacon operates continuously at the light.

Palmer Island Light, 34 feet above the water and visible 11 miles, is shown from a white conical tower on the north end of Palmer Island. The fog signal is a bell.

Channels.—Several channels lead from Buzzards Bay to New Bedford Harbor. The eastern channel, which is the maintained channel, has a project depth of 30 feet. The middle and western channels are good for a depth of about 21 feet, however, they are not as well marked as the eastern channel.

A Federal project provides for a channel 30 feet deep and 350 feet wide from the deep water in Buzzards Bay to a point just above the New Bedford-Fairhaven bridge, a distance of about 5 miles, with increased widths for anchorage and maneuvering purposes in the area northwest of Palmer Island and above the bridge. The project further provides for a channel 25 feet deep between harbor lines along the New Bedford wharf front near the bridge, a distance of about 0.2 mile; a channel 100 feet wide and 18 feet deep from the 30-foot area north of Fish Island to Belleville, a distance of about 2 miles, with a turning basin at the upper end 300 feet wide; dredging this area west of a line 50 feet channelward of the Fairhaven Harbor line to a depth of 15 feet over widths of 150 to 400 feet from Pierce & Kilburn wharf to the Old South wharf, and thence 10 feet

deep and 150 feet wide to a point 1,000 feet south of the old causeway pier, a distance of about 0.7 mile; and for the maintenance of the 25-foot anchorage area east of the channel and north of Palmer Island.

The controlling depths in the channels in June 1949 were: Buzzards Bay to Palmer Island Light, 27 feet in mid-channel, 26 feet in the outside quarter; Palmer Island Light to just above the New Bedford-Fairhaven bridge, 28 feet in mid-channel; the western maneuvering area, 27 feet; turning basin just above the bridge, 29 feet; Fairhaven Harbor line, 14 feet in 15-foot area, 10 feet in the 10-foot area; the eastern anchorage area, 25 feet. The project above Fish Island to Belleville has not been completed. A depth of 18 feet was available to within 1,200 feet of the Coggeshall Street bridge, thence about 7 feet under the bridge. Above the bridge little traffic other than launches and small craft use the upper river.

The main entrance channel to New Bedford Inner Harbor is well marked with a lighted range, formed by Butler Flats and Palmer Island Lights, lighted buoys and buoys. Above the New Bedford-Fairhaven bridge the channel is marked by buoys to the Coggeshall Street bridge. The channel in the upper river is not marked.

Directions.—Keeping in mind the broken character of the bottom, vessels should proceed with caution where the charted depths are not more than 6 to 8 feet greater than the draft. Strangers should not attempt to enter except in periods of clear weather when the aids are visible.

Main Channel, Eastern Channel.—From a position with Mishaum Ledge lighted gong buoy 3 bearing 000°, distant 0.3 mile, steer **057°** to a point where Wilkes Ledge buoy 5 bears 000°, distant 0.6 mile; thence steer **040°** to a position on the range line where Hursell Rock gong buoy 3 bears 303°, distant 0.3 mile. From this position steer on the range formed by Butler Flats and Palmer Island Lights on a course of **335°**. Swing eastward off the range when about 0.3 mile southward of Twenty-Five-and-One-Half-Foot-Spot buoy 3A until 150 yards eastward of the buoy. After passing abeam the buoy swing gradually back on range. This range leads between Brooklyn Rock, marked by a lighted bell buoy, and Henrietta Rock, marked by a buoy.

To enter the inner harbor steer **336½°** when abeam Brooklyn Rock lighted bell buoy staying mid-channel until abeam New Bedford Channel lighted bell buoy 2, thence steer **334°** to abeam Palmer Island Light. From this point the course can be laid to the anchorage north of Palmer Island, to the wharves, or through the drawbridge.

If approaching New Bedford Harbor from the westward, the range can be picked up in the vicinity of Negro lighted bell buoy 5.

Middle Channel.—From a position with Mishaum Ledge lighted gong buoy 3 bearing 000°, distant 0.3 mile, steer **057°** to a point where Wilkes Ledge buoy 5 bears 340°, distant 0.5 mile. From this position steer **006°** until off Bedford Channel lighted bell buoy 2. The high elevated tank at Fairhaven is a good leading mark for this leg. The course passes 450 yards eastward of Wilkes Ledge buoy 5, close to Great Ledge buoy 6, and midway between the two 18-foot spots off North Ledge, entering the dredged channel southeastward of Butler Flats Light. Continue to New Bedford inner harbor as in the preceding paragraph.

West Channel.—From a position with Mishaum Ledge lighted gong buoy 3 bearing 000°, distant 0.3 mile, steer **026°** for 6.2 miles, passing 200 yards westward of Seventeen-Foot Spot buoy and about 500 yards eastward of Dumpling Rocks Light. When

Decatur Rock buoy 8 bears 137°, distant 515 yards, steer **006°** and proceed as in the preceding paragraph.

Anchorages.—Before proceeding into New Bedford Harbor vessels occasionally anchor in depths of 20 to 30 feet about 0.7 miles south of Clark Point. Two anchorage areas have been established in the outer harbor. For description and regulations see § 202.10 (a) (1) (2) (b) in Chapter 2. In the inner harbor vessels may anchor in the two dredged anchorage areas on either side of the channel in depths of 25 to 30 feet.

Bridges.—Three bridges cross Acushnet River as New Bedford. The first is the New Bedford-Fairhaven bridge having a swing span with a horizontal clearance of 94 feet and a vertical clearance, closed, of 6½ feet at high water. Deep-draft vessels should pass through the west opening. Federal regulations governing this bridge are given in § 203.80, Chapter 2. About 1 mile above this drawbridge is the Coggeshall Street bridge, formerly a drawspan which now remains closed since its mechanism became inoperative in 1944. In June 1949 city officials said that it was not the city's intention to operate it in the future. The bridge has a horizontal clearance of 38 feet in the west span and 40 feet in the east span and a vertical clearance of 4 feet at high water. About 2 miles above the Coggeshall Street bridge is a fixed bridge with a horizontal clearance of 34 feet and a vertical clearance of 6 feet at high water.

Tides.—The mean range of the tide is about 3¾ feet. Tidal currents are weak.

Winds.—The prevailing winds during the winter are from north to west, and during the summer months from south to southwest.

Ice.—The channels and anchorage area usually are navigable throughout the year, although in prolonged periods of extreme cold weather the harbor as well as all of Buzzards Bay may become closed to navigation because of ice. Such conditions are infrequent and of short duration. Steamers generally can make their way through ice in the harbor.

Storm warnings are shown day only from a Fairhaven boatyard.

Pilotage.—Pilotage is compulsory for vessels of 7 feet or more draft engaged in foreign trade. Pilots usually board vessels off Hen and Chickens Lightship. Request for pilot services should be directed either to Western Union, which will contact a pilot, or to the Buzzards Bay and Cape Cod Canal Pilots Association, 4 Bridge Street, Fairhaven. Radio telephone calls for pilots may be made to the pilot commissioner, a State-appointed official.

The Commonwealth of Massachusetts has fixed rates as follow:

Net registered tonnage (either inbound or outbound)	*Per foot of draft*
Under 500 tons	$3.00
500 to 1,000 tons	3.50
1,000 to 1,500 tons	4.00
1,500 to 2,000 tons	4.50
Over 2,000 tons	5.00

Vessels of not more than 200 tons burden, which decline the services of a pilot, are, if otherwise liable to pilotage, liable for one-half the regular fees.

If the pilot offers his services outside of Mishaum Ledge, he shall be entitled to full pilotage, provided he is taken. If not, he is entitled to one-half. If taken between Mishaum Ledge buoy to opposite Penekese, he shall be entitled to three-quarters pilotage. If taken on board from Sand Spit bell buoy to Mosher Ledge he shall be en-

titled to one-half pilotage. If the vessel should arrive at Butlers Flats before being spoken, it shall be exempt from the inward pilotage.

If steam towage is taken by the desire of the master, the vessel is required to pay full pilotage fees, but if taken by direction of the pilot in charge, such vessel is required to pay the pilot 75 percent of the regular fees.

Towage.—Although steamers usually proceed to and from the harbor without assistance, towboat aid sometimes is needed in docking and undocking large vessels. In 1949 only one firm had towboat service.

Quarantine.—The U. S. Public Health Service conducts quarantine inspection of vessels and their crews at an anchorage ground in the outer harbor.

Hospitals.—There is no quarantine hospital in New Bedford. Vessels with quarantinable diseases on board are remanded to ports having such facilities. The United States Public Health Service is represented by a designated physician who maintains an office and dispensary where out-patients receive treatment. This office is in the Customhouse, William and North Second Streets, where out-patients are received 1100 to 1200 daily. The United States contract hospital is St. Lukes. New Bedford has several hospitals.

Customs and immigration.—New Bedford is a port of entry and marine documents may be issued. The customhouse is at the southwest corner of William and North Second Streets. The Immigration Service maintains a branch office in the Federal Building, Pleasant and William Streets.

Harbor regulations.—The harbor master is the city authority who directs anchoring, berthing, and movement of vessels, and discharge operations. City ordinance prohibits obstructing of channels by lines or otherwise, but does not restrict speed in the harbor. However, vessels are expected to proceed slowly in the vicinity of docks. State laws forbid pollution and dumping of refuse and rocks inside the harbor.

Fire signal.—In the event of fire on any vessel not under way in the harbor, the vessel may sound five prolonged blasts of whistle or siren as an alarm indicating fire on board or at the dock to which the vessel is moored. The signal may be repeated at intervals to attract attention, and is not a substitute for but may be used in addition to other means of reporting a fire.

Terminal facilities.—Enlargement of the State pier at the foot of Union Street was completed in 1949 to provide a total berthing space of 600 feet on the north side, 449 feet on the face, and 775 feet on the south side. The total pier area is nearly 350,000 square feet. The sheds, protected by a sprinkler system and other fire preventatives, comprise a two-story concrete and steel shed along the north side, 105 feet wide by 300 feet long, and a one-story wooden shed 105 feet wide by 256 feet long. A Naval Reserve Training Station is on the pier. The project depth of 30 feet along each side is maintained by the Commonwealth of Massachusetts.

Dockage and wharfage charges are assessed, and listings of these may be obtained from the pier office, or from the Commonwealth, Department of Public Works, Boston, Massachusetts. Free time of five days is allowed for merchandise on the pier. At City Pier No. 3, no dockage charges are assessed for fishing vessels. In addition to the State and city piers, there are numerous privately-owned piers.

Supplies.—Diesel oil, coal, water, gasoline, provisions, and supplies of all kinds are available. Two companies have facilities to supply bunker coal. Bunker fuel oil is handled in adequate quantities and by rapid delivery rate. Several docks and yards

supply Diesel oil. The water is excellent for domestic and boiler use; a water boat services it to craft at anchor and several piers sell fresh water.

Repairs.—Three boatyards are at Fairhaven and one at New Bedford. The largest marine railway can haul out craft up to 130 feet in length and 500 tons in weight, with a draft of up to 13 feet. Facilities are available for making repairs to boilers, dynamos, and machinery. Iron, brass, or bronze castings are obtainable. Adequate wet and dry storage is offered. In 1949 five derrick lighters were operating, some having air compressors and diving equipment.

Communications.—There is limited rail service to Boston, and frequent bus service to Providence, Newport, and Fall River. One daily steamer round-trip is made to Martha's Vineyard and Nantucket. A mail boat makes trips to Cuttyhunk Wednesdays and Saturdays in the winter and daily in the summer.

The coast between New Bedford Harbor and the entrance of Sakonnet River is fringed with extensive shoals, many of them rocky and a considerable number of them well offshore. The entrances to several inlets are shoal and are only used by local fishing and pleasure boats.

Clark Cove, between Apponaganset Bay and New Bedford Harbor, affords anchorage in depths of 12 to 22 feet. It is exposed to southerly weather and is seldom used. Several small piers can accommodate small craft. Four sewer outlets consisting of rock cribs which bare 2 and 3 feet at high water are near the head of the cove. Several rocks are off **Moshers Point** on the west side of the cove.

Apponaganset Bay is entered about 2 miles southwestward of Clark Point. Small pleasure craft and a few fishermen frequent this bay in the summer but the bay is insecure in southeasterly gales. **Nonquitt** and **Bayview** are villages on the south side of the entrance and **South Dartmouth** (**Padanaram**) is on the northerly shore. A silo on **Ricketsons Point,** on the northern side of the entrance, is prominent. **Padanaram Breakwater,** marked off its outer end by a lighted buoy, extends southward from the shoal area off Ricketsons Point. The approach to the bay is obstructed by numerous ledges and rocks and strangers should enter only in the daytime with clear weather. Inside the breakwater the channel is marked by buoys. **Dartmouth Rock,** with a depth of 4 feet, is on the northeast side of the channel, and marked off its southern side by a buoy. Anchorage buoys mark the area off South Dartmouth. A swing bridge crosses the channel at the village. The bridge has a horizontal clearance of 31 feet and a vertical clearance, closed, of 8½ feet at high water. Some delay may be encountered in opening the bridge as the tender works nearby. Above the bridge small craft find anchorage in a narrow channel near the eastern shore.

To enter pass 500 yards east of Dumpling Rock Light and steer **352°** until between Hussey Rock buoy 1 and Lone Rock buoy 4 LR. Thence, steer **315°** and enter the bay southward of Apponaganset Bay lighted buoy 4A. Anchorage can be selected in depths of 13 to 17 feet, sticky bottom.

Southward of the bridge are the two principal piers with depths of 7 to 11 feet off their faces. One pier is the landing of the New Bedford Yacht Club, and the other a commercial wharf used by fishermen and others. Diesel oil, gasoline, fresh water, and some supplies are available. A small boatyard is nearby.

In the area between Sconticut Point and Round Hill Point are numerous rocks and ledges, the more important of which are marked with buoys. **Pocket Rock** with a depth of 5 feet and **Henrietta Rock** with a depth of 11 feet, both dangers to the eastward

of the main approach channel to New Bedford Harbor, are marked off their southwestern sides by buoys. **Brooklyn Rock** with a depth of 18 feet is marked by a lighted bell buoy off its eastern side. **Hursell Rock** on **Negro Ledge**, marked on its northeast side by a bell buoy, has a depth of 14 feet. **North Ledge** has depths of 9 to 18 feet and is marked on the northeast and southeast sides by buoys. South of North Ledge is **Decatur Rock** which has a depth of 7 feet and **Church Rock** which has a depth of about 15 feet. The north and south extremities of this reef are marked by buoys. **Phinney Rock** with a depth of 11 feet is marked by a buoy. **Great Ledge**, about 1.2 miles south of Church Rock, is about 0.2 mile in diameter with depths of 1 to 16 feet. It is marked on the east side by a buoy and on the southwest side by a buoy. Westward of North Ledge, **Bents Ledge** with a depth of 6 feet, **Inez Rock** with a depth of 11 feet, **Lone Rock** with a depth of 2 feet, **Hussey Rock** with a depth of 4 feet, and **Middle Ledge** with a depth of 5 feet are marked by buoys. A lighted buoy on the east side of Middle Ledge marks the channel on that side of the ledge. Off Nonquitt extremely shoal water with numerous rocks awash and submerged surround **Keel Rock** and **Barekneed Rocks.** A buoy is off the northeast side of Keel Rock and a daybeacon, 32 feet high composed of a black, horizontal cross on an iron spindle, marks Barekneed Rocks. **White Rock** and **Ragged Rocks** show above the water and extend about 0.5 mile offshore and about the same distance northward of Dumpling Rock Light. **Fatal Rock**, with a depth of 3 feet, is shoreward of Ragged Rocks and marked by a buoy off its east side.

As this area has a very broken bottom, vessels should proceed with caution if away from the general sailing track that is usually followed. Navigators should pay careful attention to the chart, which is the best guide, in order to navigate in the safest water, since attention has been directed only to the more important dangers.

Round Hill Point, about 3.5 miles southwestward of Clark Point, is marked by a prominent round hill on which is a white tower. Care should be taken not to confuse this tower with Dumpling Rock Light. Westward of the hill are three high radio masts.

Dumpling Rocks, a group of bare and sunken rocks, extend 0.4 mile southeastward from Round Hill Point. A light, 52 feet above the water and visible 11 miles, is shown from a skeleton tower on a rock off Round Hill Point. The fog signal is an electric siren. A buoy marks the southeastern portion of the shoal area around Dumpling Rocks.

The Sandspit, a shoal with depths of 10 to 17 feet over it, is about 0.5 mile southeastward of Dumpling Rock Light. A lighted bell buoy marks the western side of the shoal. Between this buoy and the buoy southeast of Dumpling Rocks is a channel about 0.3 mile wide. A rock with a depth of 16 feet over it 0.7 mile south of Dumpling Rock Light and rocks with depths of 2 and 3 feet over them about 1 mile southwest of the light are marked by buoys.

Wilkes Ledge is about 0.4 mile in diameter, with depths less than 24 feet and has a least depth of 9 feet near its northern side. The middle of the ledge lies nearly 1.6 miles 162° from Dumpling Rock Light, and is marked on its southern side by a buoy; the buoy should be given a good berth. The wreck of a barge lies awash at low water on the ledge.

Between Round Hill Point and **Salters Point,** 1.1 miles southwestward, **Hunts Rock Breakwater** extends 270 yards in a northeast-southwest direction.

Mishaum Point, 1.9 miles southwestward of Round Hill Point, is the southern point of **Smiths Neck.** Shoal water extends about 400 yards off the point.

Chart 237.—Slocums River, westward of Mishaum Point, has a bar at the entrance nearly bare at low water. The channel inside is narrow and unmarked and little used. **Slocums Ledge,** extending 0.6 mile westward of Mishaum Point, is marked on its west side by a buoy. **Pawn Rock,** baring 3 feet at low water, is 0.2 mile easterly of **Barneys Joy Point,** the point on the west side of the river entrance.

Gooseberry Neck, about 4 miles southwestward of Mishaum Point, is marked by a prominent watch tower. The neck, irregular and elongated, extends about 1 mile southward from **Horse Neck Beach** to which it is joined by a narrow roadway over rock fill. The water surrounding the neck is very foul.

Hen and Chickens, extending 1.4 miles southward of Gooseberry Neck, is an extensive reef consisting of many large boulders, most of them baring a foot or less at high water. The reef is in two groups, the southerly group being the larger. Numerous sunken rocks are well away from the visible part of the danger. A narrow ledge with depths of 5 to 13 feet extends southward from Gooseberry Neck to the visible rocks. A buoy marks the northern side of this ledge. Small boats sometimes pass over this shoal instead of going outside the reef, but strangers should not attempt it. **Old Cock,** a rock awash at high water, and **The Wildcat,** are in the southern shoal area. Old Cock is marked by a daybeacon which consists of a black cross on an iron spindle. A buoy marks the southern end of the shoal area. Strangers are advised to stay outside the 5-fathom curve in this vicinity.

The lightship and dangers southward of Hen and Chickens have been previously discussed under the entrance to Buzzards Bay. A prohibited area is on the reef; for definition and regulations see § 204.5(h) in Chapter 2. A submarine chaser hulk has been grounded near the center of the area.

Tidal currents setting northward and southward near this reef are strong at times. Tide rips occur when a sea is running against the current.

In addition to Hen and Chickens, numerous rocks and reefs surround Gooseberry Neck. Shoal water extends 0.6 mile southwestward of the neck to **Lumber Rock,** with a depth of 6 feet and marked by a buoy, and over 0.5 mile westward to **Browning Ledge,** with a depth of 6 feet over it. **Little Southwest Rock** is marked by a daybeacon which is a red cask on an iron spindle. **Hicks Rock,** 300 yards northward of Lumber Rock, has a depth of 3 feet over it. **Southwest Rock,** 6 feet above high water, and numerous other rocks awash at low water are south and west of the neck.

Westport River empties into the large bight between Gooseberry Neck and Sakonnet Point. The mouth of the river is between **Horse Neck Point,** 2.7 miles northeast of Gooseberry Neck, and **The Knubble,** a protruding mound of granite about 0.2 mile south of Horse Neck Point. The river is the approach to **Westport Harbor,** the area just inside the entrance; the village of **Westport Point,** on the north shore of the east branch of the river; and the village of **Acoaxet,** westward of The Knubble. Fishing and pleasure boats use the river as far as Westport Point. **Westport Light,** 31 feet above the water and visible 8 miles, is shown from a black skeleton tower with a white tank house on the east end of The Knubble. The light is maintained from March 15 to December 15.

The channel into the river is narrow and crooked but well marked with buoys. In June 1949 the reported controlling depth over the bars was 6 feet, however, depths over the bars are continually changing and local information should be obtained by strangers as to the depths and the best water. No vessels should try to enter at night.

Boats should not try to enter during strong southerly winds as heavy seas break over the entrance bar. About a mile above the entrance the river divides into two branches. The west branch is shallow with a narrow, unmarked channel and is little used. Above Westport Point, the east branch is little used and unmarked. A hand-operated swing bridge crosses the east branch at the village with a horizontal clearance of 34½ feet in the north draw, 29 feet in the south draw, and a vertical clearance, closed, of 6 feet at high water. Some delay may be encountered as the tender works nearby. Hix Bridge crosses the east branch about 3.5 miles above the village. The fixed span has a horizontal clearance of 35 feet and a vertical clearance of 3½ feet at high water.

Approaching Westport River boats must take care to pass westward of the dangers off Gooseberry Neck and eastward of the dangers off the river entrance. Numerous rocks and ledges are southward of the entrance to the river. **Twomile Rock,** 1 mile southeastward of Westport Light, is marked by a daybeacon, a black spherical cage on an iron spindle, on its northwest side. Shoals with depths of 5 to 18 feet are southeasterly of the rock. A buoy and a bell buoy are southeast of the shoals. The approach to the river is east of the bell buoy. **Halfmile Rock** is 3 feet above high water and 325 yards southeast of the light. The shoal water surrounding the rock is marked on its western side by a buoy. The buoyed channel is west of the buoy. **Dogfish Ledge,** 0.2 mile south-southwestward of Halfmile Rock, has depths of 4 to 7 feet and is marked on its southeast side by a buoy. The area south of The Knubble is very foul. Other unmarked dangers include **Twomile Ledge,** extending 1 mile south of The Knubble with depths of 2 to 12 feet; **Flat Rock** with a depth of 4 feet on the inshore edge of Twomile Ledge; **Markham Ledge** with a depth of 8 feet midway between Twomile Rock and Twomile Ledge; **Joe Burris Ledge** with a depth of 14 feet midway between Halfmile Rock and Twomile Rock; **Pinetree Ground** about 1 mile south of Twomile Rock with depths of 25 to 30 feet; **Inner Church Ledge** with a depth of 28 feet and **Hibby Ground** with a depth of 30 feet about 0.6 mile southwestward of Twomile Ledge; and **Palmer Ledge** with a least depth of 11 feet; **Newet Rocks** with depths of 4 to 7 feet over them; **Tripp Ledge** with a depth of 16 feet; **Briggs Rock** with a depth of 3 feet over it, **Old Whale Rock** awash at low water; and **Long Rock** 4 feet above high water, all less than 1 mile west of Twomile Ledge.

The shore in this vicinity should be given a berth of about 1.3 miles, due to numerous rocks and ledges extending about 1 mile offshore for a distance of 2.5 miles westward of Westport Harbor.

The mean range of the tide is about 3 feet. The tidal current in the entrance has a spring velocity at strength of about 3 knots and caution is recommended when navigating the river. For current predictions the *Current Tables* should be consulted.

At Westport Point are two piers where fishing and pleasure boats tie up. In 1949 the easterly one had a depth of 4 feet at its face and the westerly one 8 feet. A small yacht club is on the south shore of the river westward of the village. The dock at the club has a depth of about 8 feet. Just west of the yacht club is a boatyard with facilities for hauling out boats up to 25-ton weight, 50-foot length, and 6- to 7-foot draft. A woodshop is at the boatyard.

Quicksand Point is about 1.5 miles west of The Knubble. The boundary line between Massachusetts and Rhode Island is near the point. **Cutty Wow Rock,** awash at low water, is 1 mile southwestward of the point.

Briggs Point, 2 miles southwestward of Quicksand Point, is surrounded by shoals

and rocks. **Halfway Rock,** 2 feet above high water, is 0.4 mile southeastward of the point. **Ship Pond Cove** indents the coast just easterly of Briggs Point.

Chart 353.—Narragansett Bay, about 17 miles eastward of Buzzards Bay entrance, is the approach to the cities of Newport, Providence, Fall River, and Taunton, as well as numerous towns and villages. **Aquidneck Island,** the largest island in the bay, is the eastern shore of the bay proper. The entrance is between Brenton Point, the southwestern part of Aquidneck Island, on the east and Point Judith Neck on the west. The bay is about 18 miles long from the entrance to the mouth of the Providence River. Navigation of the bay is easy during day or night in clear weather as it is well marked by lights. **Conanicut** and **Prudence Islands,** of considerable size, and several smaller islands divide the bay into two passages. Sakonnet River, although not a part of Narragansett Bay, is included with it in the following discussion.

Channels.—The approaches to Narragansett Bay for a width of about 6 miles southward of Brenton Reef Lightship, have been examined by means of a wire drag from longitude 71°25′ W. eastward to the entrance to Buzzards Bay. The East Passage and parts of the West Passage abreast Conanicut Island have also been partly examined.

East and West Passages, the principal channels in Narragansett Bay, are discussed in more detail later in this chapter. East Passage is good for a least depth of about 60 feet for 12 miles up the channel and thence a depth of 32 feet to the entrance of the dredged channel to Providence. West Passage, is the approach to Dutch Island Harbor, Wickford, Greenwich Bay, and Providence River. Vessels of over 16-foot draft rarely go above Dutch Island Harbor without a pilot, but vessels of 16-foot draft or less should have no difficulty in going to the head of the bay and the Providence River if the directions are followed. Sakonnet River is good for a depth of 18 feet from the mouth to Mount Hope Bay.

Anchorage.—The principal anchorages for vessels seeking shelter are Newport Harbor in the East Passage, and Dutch Island Harbor in the West Passage. These harbors afford anchorage with good holding ground for deep-draft vessels, and are used some by coasting vessels on the passage between Vineyard Sound and Long Island Sound. Good anchorage will be found almost anywhere in the bay under the lee of islands or the shore, where vessels becalmed or at night frequently anchor. Point Judith Harbor of Refuge is just west of Point Judith. Anchorage areas in Narragansett Bay have been established by Federal Regulations. For description and regulations see § 202.15 in Chapter 2.

Directions.—The following directions are for vessels approaching Brenton Reef Lightship. Directions for East Passage including Newport and Providence are given in Chapter 3; directions for the other passages and ports are given under the discussion of the passage or port.

Vessels approaching Brenton Reef Lightship from the eastward should keep the lightship bearing northward of 268° to avoid Seal Ledge and other dangers. In clear weather vessels may pass 0.4 mile eastward of the lightship; Brenton Reef and other dangers on the easterly side of the entrance will be avoided by keeping Castle Hill Light bearing eastward of 003° and passing westward of the bell buoy off Butter Ball Rock. In thick weather Brenton Reef Lightship should be passed close-to.

Approaching from Buzzards Bay, from a position 0.2 mile south of Seventeen Foot

Ledge lighted whistle buoy, steer **270°** for 15 miles to a position 0.3 mile east of Brenton Reef Lightship.

Approaching from Vineyard Sound, from a position 0.5 mile south of Vineyard Lightship, steer **281°** for about 17 miles to a position with Brenton Reef Lightship bearing 315°, distant 0.4 mile.

Approaching from Block Island Sound, from a position 2 miles **344°** from Point Judith Light, steer **029°** for 9 miles to a position 0.4 mile west of Castle Hill Light.

Dangers.—A torpedo testing range and prohibited area have been established by Federal Regulations in Narragansett Bay; for description and regulation see § 204.10 in Chapter 2. Another prohibited area has been established in the vicinity of Gould Island; for description and regulation see § 207.23 in Chapter 2.

Tides.—The tidal movement in Narragansett Bay with its vertical and horizontal constituents—tide and current, respectively—is a continuation of the tide wave of the Atlantic Ocean. This wave sweeps into the three entrances between Sakonnet Point and Point Judith and continues up the bay and into each of its tributaries until stopped by rapids or other obstructions. As is usual when oceanic tidal movements enter inland waterways, the nature of the movement is modified by the hydrographic features encountered. In this area the local features are such that the current movement in particular is subject to considerable distortion. The mean range of the tide varies from about 3½ feet at the entrance to 4½ feet at Providence.

Currents.—The flood current in Narragansett Bay frequently has two maximums of velocity separated by a minimum velocity which at times becomes an ebb flow. Over the greater part of the bay, the usual maximum flood or ebb velocity is from ½ knot in the broad portions of the waterways to 1 knot in the more constricted sections. Velocities between 1 and 1½ knots occur at the bridges in the Seekonk River, a velocity of about 2 knots in the Narrows at the mouth of the Kickamuit River, and velocities of approximately 2¼ and 2¾ knots at the railway and highway bridges, respectively, in the Sakonnet River. In the Sakonnet River, from the highway bridge to its mouth, current velocities are small, being generally less than ½ knot.

The *Current Tables* and Tidal Current Charts should be consulted for predictions and details of the current movement. A more extensive discussion of currents in Narragansett Bay and adjoining waterways is contained in Coast and Geodetic Survey Special Publication No. 208, *Currents in Narragansett, Buzzards Bay, and Nantucket and Vineyard Sounds*, sold by the Superintendent of Documents, Washington 25, D. C.

At Brenton Reef Lightship the tidal current is practically reversing. The strengths of flood and ebb have velocities of about ½ knot setting northward and southward, respectively. See also discussion in Chapter 2.

Weather.—In the entrance to the bay and its approaches, **fogs** are more prevalent from April to October than during the rest of the year. The fogs are brought in by winds from east through south to southwest and are cleared off by northerly and westerly winds. The usual duration of the fog is 4 to 12 hours but periods of 4 to 6 days have been known with but short clear intervals. The head of the bay will sometimes be free from fog when the entrance is completely shut in.

Navigation of the bay and its tributaries is sometimes impeded by floating **ice** and in severe winters by pack of field ice. The ice which breaks up in the Providence River and Mount Hope Bay is set by north and northeast winds down the bay through East Passage; if there is much ice, a gorge is sometimes formed at Fort Adams, but it is of

short duration. The passages are rarely closed for any length of time below Gould Island in the East Passage and Duck Island in the West Passage. During January and February, Mount Hope Bay, Bristol Harbor, Warren, Providence River, Greenwich Bay, and Wickford are usually closed to sailing vessels unaided by steam. The inner harbor of Newport is also sometimes closed during these months with the exception of a channel kept open by the steamers.

Storm warnings are displayed day and night at Saunderstown and Providence; by day only at Brenton Reef Lightship and at Wickford.

Pilots for Fall River and the ports in Rhode Island usually meet vessels off Brenton Reef Lightship after contact by radiotelephone or the ship's agent. Rates are given under the discussion of the ports.

Sakonnet River, on the easterly side of Narragansett Bay, is between the mainland and the eastern shore of Aquidneck Island. The width of the river varies from 0.7 mile to 2 miles except at its northern end where a least width of 0.3 mile is found. The river is little used except by fishing vessels and small local craft. The easterly side of the southerly entrance to the river is marked by Sakonnet Light. The light, 68 feet above the water and visible 14 miles, is shown from a white conical tower on a brown cylindrical pier at the edge of the shoal area westward of the point. The fog signal is an air diaphragm horn.

The channel of the Sakonnet River is good for a depth of 18 feet from the mouth to Mount Hope Bay. There are numerous shoals and outlying rocks, but the dangers are well marked by buoys. Except for Sakonnet Light and the breakwater light off Sakonnet Harbor, no lighted aids are in the river and strangers should not attempt to navigate it at night.

Good anchorage for vessels of 20-foot draft or less can be had in mid-river about 5 miles above Sakonnet Light and just below High Hill Point in depths of 21 to 28 feet. Although open to the southward, a heavy sea seldom reaches as far as this anchorage. In southeasterly gales the water is comparatively smooth inside the mouth of the river. Fishermen seeking shelter frequently anchor on the flats in the bight northward of Fogland Point in depths of 10 to 14 feet.

Two drawbridges cross the narrow part of Sakonnet River just southward of Mount Hope Bay. The southerly bridge, a stone highway bridge, has a bascule span with a horizontal clearance of 100 feet and a vertical clearance, closed, of 8¾ feet at high water. The railroad bridge, 0.8 mile northward of the stone bridge, has a swing span with a horizontal clearance of 99 feet in the west draw and a vertical clearance, closed, of 12 feet at high water. The channel is through the west draw. Regulations governing the railroad bridge are given in Chapter 2, § 203.85.

Vessels proceeding up the Sakonnet River from a position 0.8 mile west of Sakonnet Light steer **002°** for 4.5 miles, heading for High Hill Point. This course leads about mid-river, passing 0.4 mile west of Sakonnet River bell buoy 4, to a position about 0.5 mile eastward of Black Point. Thence steer **340°** about 1.6 miles passing about 100 yards eastward of Sakonnet River buoy 5 to a position 100 yards west of Sakonnet River buoy 6. Thence steer **015°** for 1.5 miles to a position about midway between Sakonnet River buoys 7 and 8. From this position steer **003°**, giving Gould Island a berth of about 150 yards, until to the stone bridge. Pass through the draw of the bridge and keep mid-river passing through the west draw of the next bridge. From the

bridge steer **009°** for 0.5 mile to a position 175 yards east of Sakonnet River buoy **13**, thence steer **348°** following a mid-channel course into Mount Hope Bay.

The mean range of the **tide** at Sakonnet Point is about 3½ feet.

The two bridges act as dams to maintain the water at different levels on either side of them, causing dangerous **currents** through the draws. The currents change with great rapidity both in velocity and in direction, and are characterized by a double flood. They are described in considerable detail in the *Current Tables* and in the Coast and Geodetic Survey Special Publication No. 208. Vessels usually pass through the draws near the times of slack water, which occurs about 1 hour before the times of high and low water at Newport.

The river north of Fogland Point is usually closed by **ice** for short periods each winter. Ice packs occur at the railroad bridge.

Sakonnet Point, at the eastern entrance to Sakonnet River, is surrounded by bare and sunken rocks. Several islets including **East** and **West Islands**, are south of the point. Sakonnet Light is on the west side of the foul area. **Schuyler Ledge**, with a least depth of 8 feet, is about 0.5 mile southward of West Island; a bell buoy is on the southern side of the ledge.

Cormorant Rock, a bare, dark rock off the western side of the entrance to the river, is about 0.8 mile south of **Sachuest Point**, the southeastern extremity of Aquidneck Island. The rock is the center of a danger area, see § 204.10 in Chapter 2. Vessels should not pass between Cormorant Rock and **Cormorant Reef**, 600 yards southward of the rock. The least depth on the reef is 2 feet; a bell buoy is off the southeastern side of the reef. **Elbow Ledge** with a least depth of 12 feet is about 0.6 mile west of Cormorant Rock.

Sakonnet Harbor is a small boat harbor 0.8 mile north-northeastward of Sakonnet Light. A short breakwater, marked at its outer end by a light, extends northward from the western part of the harbor. Depths in the harbor range from 4 to 7 feet until 100 yards from its head. Two bare rocks with ledges close-to are 75 to 125 yards eastward of the breakwater and light; a buoy marks the rocks. No protection can be found in the harbor from northwesterly and northerly winds. A yacht club wharf on the east shore of the harbor has a depth of 5 feet alongside. Gasoline and some provisions may be obtained during the summer months.

The western shore of the river from the entrance to Sandy Point should be given a berth of 0.4 mile to avoid shoals with depths of 17 feet. **Island Rocks** and other rocks extend up to 500 yards offshore between Sachuest Point and **Flint Point**, about 1 mile northward. **Flint Point Ledge**, about 0.5 mile north-northeast of Flint Point, has a least depth of 7 feet; a buoy marks the ledge.

Black Point is a rocky bluff on the western side of the river 4.7 miles northward of Sakonnet Light. **Sandy** and **McCurry Points**, low points backed by high land, are 1.4 and 2.9 miles northward of Black Point.

The western portion of the river from McCurry Point to the stone bridge is shoal with depths of 7 to 14 feet. The buoyed channel eastward of these shoals and westward of the shoals off the east shore is about 0.2 mile wide. The channel passes eastward of **Gould Island**, a high, wooded island 2.5 miles north-northeastward of McCurry Point. This Gould Island should not be confused with the island of the same name in East Passage. A rock with a depth of 1 foot is northwest of the island and is marked by a buoy.

The eastern side of the Sakonnet River is bolder than the western side. The east shore should be given a berth of 0.7 mile from Sakonnet Point to **Church Point,** a flat point with bluffs at the water, about 2.8 miles northward of Sakonnet Point. **Old Bull,** with a depth of 1 foot, is about 900 yards southward of Church Point and marked by a bell buoy. About 1.7 mile east of Church Point is a prominent church spire at **Little Compton. High Hill Point,** about 3 miles north of Church Point, is a prominent small hill with bluffs at the water. **Fogland Point,** about 0.9 mile northward of High Hill Point, is a projecting, prominent point the westerly and northerly sides of which should be given a berth of over 200 yards. **Almy Rock,** bare at low water, is 400 yards southwest of Fogland Point; a shoal westward of the rock and extending southwestward of Fogland Point has depths of 16 to 17 feet and is marked on its southwest side by a buoy. The broad bights between Fogland Point and the bridge are shoal.

Nannaquaket Pond is on the east side of Sakonnet River eastward of Gould Island. The narrow entrance to the pond is crossed by a fixed bridge with a vertical clearance of 6 feet at high water. The deeper water in the entrance is along the northern shore; several rocks are off the southern shore. A rock off the entrance is marked by a horizontal-banded buoy. The currents have considerable velocity. The northern part of the pond has depths up to 28 feet; the remainder has depths of about 3 feet.

The Cove on the western side of the river between the bridges had a controlling depth of 2½ feet in the entrance in 1949; depths in the cove are 3 to 4 feet. The cove is entered only by small local craft.

Tiverton is a town on the eastern bank of the Sakonnet River between the bridges. Gasoline, provisions, and some supplies are available. Bus and limited rail-freight communications may be had at Tiverton.

Chart 236.—The southern shore of Aquidneck Island is rocky with numerous offlying rocks and ledges. Numerous prominent residences are on the eastern side of **Newport Neck,** the southwestern part of Aquidneck Island. A large brick residence with several towers is on the southeastern point of Newport Neck. A very conspicuous stone tower, which can be seen from offshore, is about 0.8 mile north of **Easton Point,** the point about 1.3 miles eastward of Newport Neck. The tower has a short spire at each corner. Westward of Easton Point is a bathing beach with a prominent pavilion. Several private landings are northward of **Gooseberry Island,** a small islet south of Newport Neck. Local knowledge is required to proceed to the landings.

East Passage, the principal passage in Narragansett Bay, is between Aquidneck Island on the east and Conanicut and Prudence Islands on the west. It is the most direct route to Newport, Bristol, Providence, Mount Hope Bay, and Taunton River. Directions approaching East Passage are given in the discussion of Narragansett Bay and the directions for East Passage are given in Chapter 3.

Brenton Reef Lightship is moored in 90 feet of water off the entrance to East Passage. The lightship has a red hull with the word BRENTON on each side, and a tubular mast. The light is 50 feet above the water and visible 12 miles; a riding light is shown. The fog signal is an air diaphone; the radiobeacon is synchronized with the fog signal for distance finding. The code flag signal is NNBD. **Storm warnings** are displayed during the daytime.

Brenton Point, the southwestern extremity of Aquidneck Island and the eastern entrance point of East Passage, is marked by a large residence with a cupola. **Brenton**

Reef, bare in places at low water, extends 0.5 mile south-southwestward of the point and is marked at its southwestern side by a gong buoy. Another reef extends 0.5 mile offshore just eastward of the point; **Seal Rock** is a bare rock at the southern end of this reef.

Seal Ledge, about 0.5 mile south of Seal Rock, has depths of 17 to 29 feet. A lighted bell buoy marks the south side of the ledge. **Haycock Ledge,** 0.4 mile eastward of Seal Rock, has a least depth of 14 feet.

Beavertail Point, the southern extremity of Conanicut Island on the western side of the entrance to East Passage, is marked by a light. The light, 64 feet above the water and visible 14 miles, is shown from a square granite tower, upper half white, attached to a white dwelling on the point. The fog signal is an air siren. The light is obscured from 175° to 215°. **Newton Rock,** about 300 yards south of the point, has a depth of 3 feet. A bell buoy is about 0.3 mile southward of the point.

Six radar towers are prominent on the high ground 0.7 mile northward of Beavertail Light. **Bass Rock** is close inshore off **Lion Head,** 0.5 mile northeastward of the light. **Hull Cove,** about 1 mile northeastward of the light, is rocky and exposed to southerly winds.

Castle Hill, the westernmost point of Aquidneck Island, is marked by a light. The light, 40 feet above the water and visible 10 miles, is shown from a conical granite tower, the upper half white, on the eastern side of East Passage inside the entrance. The fog signal is a bell. A Coast Guard station is on the hill northeast of the light. **Butter Ball Rock,** a small bare rock 500 yards south of the light, is marked off its southwestern side by a bell buoy.

Mackerel Cove indents the southern shore of Conanicut Island about 1.8 miles northeastward of Beavertail Light. A house with a cupola is prominent on **Southwest Point,** the eastern entrance point of the cove. The cove is exposed to sea and wind in southerly weather and is seldom entered. **Kettle Bottom Rock,** about 300 yards southeastward of Southwest Point, is bare. A gong buoy is on the southern end of the shoal surrounding the rock.

Bull Point, the southeastern extremity of Conanicut Island, is rugged and rocky, and fringed by shoals. **Fort Wetherill** is on the point. On the eastern arm of the point is a prominent building with a cupola. A gong buoy is off the southern side of the point and a lighted bell buoy is about 450 yards eastward of the point. **The Dumplings,** northeast of Bull Point, are numerous bare and sunken rocks and islets. The most southerly islet has a tall house on it covering almost the entire islet.

Fort Adams is on a peninsula off the north side of Newport Neck. The buildings and masonry of the fort are prominent on the western slope of the peninsula. A dock extending northward from the fort is marked by a light. The light, 40 feet above the water and visible 12 miles, is shown from a red skeleton tower on a white tank house on the north end of the dock. The fog signal is a bell.

Newport Harbor is on the western shore of Aquidneck Island, and on the eastern side of East Passage, 3.5 miles above its mouth. The harbor is about 11 miles northeast of Point Judith, 45 miles from Vineyard Haven, 108 miles from Boston via the Cape Cod Canal, and 140 miles from New York. The harbor is an important harbor of refuge for coasters, tows, and yachts. Its approach is well marked by lights and fog signals and the harbor is of easy access both day and night. **Goat Island,** 0.6 mile long in a north-south direction, divides Newport Harbor into an outer and inner harbor. The outer

harbor is on the western side of Goat Island, northward of The Dumplings and southward of Gould Island. The inner harbor is on the eastern side of Goat Island and extends along the western front of Newport.

Newport, on the eastern shore of the inner harbor, is one of the principal summer resorts on the Atlantic Coast. Some coastwise traffic passes through the port; few foreign vessels enter the port. A Naval operating base is located at the harbor.

Many prominent objects will be seen whether the harbor is approached from southward of northward, among which are the following: Two high tanks and the red and gray buildings on Goat Island; a white building of the yacht club near the light on Ida Lewis Rock in the southerly part of the harbor; a silver, spherical, gas tank near the southerly end of the water front; a brick stack which is the tallest object on the water front; four church spires in the town; the buildings of the training station and Naval War College on Coasters Harbor Island, in the north part of the harbor; and a tower and tank on Rose Island. To the westward on Conanicut Island are several large hotels and a standpipe. Numerous lights and aids mark the passages through the harbor.

The entrance to the outer harbor from the southward is unobstructed; the entrance from northward passing either side of Gould Island, is clear, but the passage eastward of Rose Island is partly obstructed by the rocks and ledges between Rose and Coasters Harbor Islands.

The inner harbor has two entrances north and south of Goat Island. A Federal project provides for a channel 21 feet deep and 300 feet or more wide around both ends and along the east side of Goat Island; the maintenance of those portions of a channel 18 feet deep and 750 feet wide along the south and east sides of Goat Island outside the 21-foot channel; and two anchorages 13 and 18 feet deep in the inner harbor. The project has been completed, and in general, near project depths prevail. In 1949 the controlling depth into the inner harbor was 19 feet.

Anchorage areas have been prescribed in the outer and inner harbor and, except in emergencies, vessels must anchor in these areas. See § 202.15 in Chapter 2. Vessels of more than 18-foot draft are obliged to anchor in the outer harbor in depths of 36 to 100 feet, good holding ground.

In the inner harbor, an anchorage basin with depths of about 17 feet is southward and eastward of the dredged channel east of Goat Island to a line extending 044° from Ida Lewis Rock Light to the wharves. Southeast of this basin is another anchorage with depths of about 12 feet. Good anchorage may be had in **Brenton Cove,** the bight eastward of Fort Adams, in depths of 15 to 17 feet. The cove is frequently used by yachts; the docks and piers along its westerly shore are for use of military craft. When entering, the western shore should be given a berth of 200 yards.

Shoals with little water over them make out nearly 300 yards from the southern shore of the inner harbor to **Ida Lewis Rock** and **Little Ida Lewis Rock.** A light, shown from a red skeleton tower with a white tank house, marks the Ida Lewis Rock. A daybeacon, a red keg on an iron spindle, marks Little Ida Lewis Rock.

The breakwater at the north end of Goat Island and the island should be given a berth of 150 yards. **Newport Harbor Light,** 33 feet above the water and visible 11 miles, is shown from a white stone tower on the end of the breakwater at the north end of Goat Island. The fog signal is a bell. A light, 25 feet above the water and visible 10 miles, is shown from a red square tower at the south end of Goat Island. The fog signal is a

bell. A lighted bell buoy and buoys mark the shoal area off the light. Numerous buildings, docks, and Naval facilities are on the island.

Rose Island, a military reservation marked by a tall water tank, is surrounded by a shoal with little water over it. The shoal extends 700 yards northeastward of the island where it rises abruptly from the deep water and is marked off its northerly side by a lighted bell buoy and two other buoys. A light, 48 feet above the water and visible 12 miles, is shown from a white dwelling on the southeast point of Rose Island. The fog signal is a reed horn. A rock with a depth of 1 foot over it is about 100 yards south of Rose Island; a buoy is off the southwest side of the rock. **Mitchell Rock** with a depth of 14 feet is 200 yards southeast of the dock on the southeast side of the island; a gong buoy marks the rock. **Citing Rock,** showing 2 feet above high water, is 350 yards east of the north end of the island and on the edge of the shoal surrounding Rose Island. **Tracey Ledge,** with a depth of 9 feet is about 300 yards east of Citing Rock; a buoy marks the ledge.

Gull Rocks, about midway between Rose and Coasters Harbor Islands, are marked by a light. The light, 45 feet above the water, is shown from a black, square, skeleton tower with white tank house in the center of the rocks. The fog signal is a bell. The former lighthouse, now used as a dwelling, northwest of the light, is a wedge-shaped shingled wooden building. Vessels may pass as close as 100 yards eastward and westward of the light, but shoals and rocks extend over 200 yards northward and about 300 yards southward of the light. A buoy marks the northern end of the shoal and a horizontal-banded buoy marks the south end of the shoals. Deep water channels are between Gull Rocks, Rose, and Coasters Harbor Islands. The channel between the rocks and Coasters Harbor Island is the safer for strangers. A rock with a depth of 17 feet is 0.3 mile north-northwestward of Gull Rocks Light; a horizontal-banded buoy marks the 17-foot spot.

Off the northern and southern sides of **Coaster Harbor Island** are numerous rocks and ledges. Two lights mark the channel south of the island. A rock with a depth of 13 feet is about 350 yards south-southwestward of the southern extremity of the island; a buoy marks the rock. **St. Patrick Rock** with a depth of 5 feet over it is about 0.3 mile south of the island; a buoy marks the rock. Numerous buildings are on the island.

The western portion of the outer harbor is generally free of dangers northward of The Dumplings.

Directions.—The directions to the inner harbor approaching from the southward are given in Chapter 3. Vessels up to 18-foot draft approaching the inner harbor from the northward generally use the passage south of Goat Island. From a position 400 yards west of Rose Island Light steer **138°** with Ida Lewis Rock Light ahead until Goat Island Shoal Light bears 077°. Thence haul eastward rounding the south end of Goat Island at a distance of 250 yards and anchor in the anchorage area in depths of 18 feet, soft bottom. If eastward of Gould Island and standing for the inner harbor, give Gould Island a berth of over 200 yards, then bring Gould Island Light astern and Newport Harbor Light ahead on a course of **164°**. When about 200 yards eastward of Gull Rocks Light, steer **154°** to a position 200 yards east of Newport Harbor Light, thence steer **175°** till off the anchorage area.

Bridges.—There are no bridges crossing the approach to the harbor or any portion of the harbor used for commercial purposes. Three small fixed bridges across the narrow

shoal waterway between Coasters Harbor Island and the northerly portion of Newport have vertical clearances of 3 to 5 feet at high water.

Tides.—Daily predictions of the times and heights of high and low waters for Newport are given in the *Tide Tables*. The mean range of the tide is 3½ feet.

Currents.—In the entrance off Bull Point the flood current is often irregular. There may be a long period of slack water preceding the flood or there may be a double flood. The average flood reaches its strength of about 1¼ knots approximately ¾ hour before maximum flood at Pollock Rip Channel. The ebb is regular and reaches its strength of about 1½ knots 1½ hours before ebb strength at Pollock Rip Channel.

Northward of Bull Point tidal current velocities seldom exceed 1 knot. In the inner harbor they are usually less than ½ knot. See the *Current Tables* for further details.

Weather.—The prevailing winds are southwesterly in the summer and northwesterly in the winter. The heaviest gales are usually from the northwest and northeast.

The harbor and its approach are navigable throughout the year, although in severe winters **ice** may interfere with navigation in the inner harbor for short periods. Steamers and tugs keep the ice well broken up in the main channel through the inner harbor.

No **storm warnings** are displayed at Newport; the nearest display is at Saunderstown where day and night signals are shown.

Pilotage for vessels engaged in foreign trade is compulsory if spoken before passing the line from Whale Rock Light to Brenton Reef Lightship. Pilots meet vessels by previous arrangement with the vessel's agent or by ship-to-shore call to their pilot boat, *Rhode Island*. Rates are as follow:

Draft	*Rate per foot, inward*
12 feet and under	$2.00
12½ feet to 15 feet	3.25
15½ feet to 20 feet	3.50
20½ feet and over	4.00

A **towboat** is available at Newport Harbor, the charges for which are by mutual agreement. Towboats may also be obtained from Providence.

Quarantine is enforced in accordance with the regulations of the United States Public Health Service. Vessels bound for Newport and subject to quarantine inspection are boarded in the outer harbor at the quarantine anchorage located north of Fort Adams, south of Gull Rock Light and west of Goat Island. There is no quarantine hospital at Newport. A vessel arriving with quarantinable diseases on board is refused entry and is remanded to one of the larger ports where quarantine facilities are available. The Newport hospital is a contract hospital for Marine and Public Health Service cases. Application for hospital treatment and medical relief may be had at 105 Pelham Street. A Naval hospital is at Newport.

Customs.—Newport is a port of entry and marine documents are issued. The customhouse is located in the Federal Building at the corner of Thames and Franklin Streets.

Immigration.—There is no immigration office in Newport. An official from the Providence office visits Newport when necessary on call from the Collector of Customs. Rarely do immigrants enter through the port.

Harbor regulations.—The harbor master under the supervision of the Commissioner

of Public Works is charged with the enforcement of the harbor regulations, the regulation of the movement of vessels and the assigning of berths. The speed limit inside the harbor is 5 knots. Other regulations may be obtained from the harbor master.

Terminal facilities include a city wharf, a Government landing, a yacht club pier, and numerous private and Government piers. The depth at the principal wharves ranges from 11 to 18 feet. No charge is made at the city wharf. Lighterage is not performed by any of the regular established transportation lines.

Supplies.—Diesel oil, fuel oil, gasoline, water, provisions, and some ship chandler's stores may be obtained at Newport. Previous arrangement must be made to bunker coal. Facilities are available for supplying fuel oil directly to vessels from storage tanks. Arrangements can be made for the delivery of bunker oil by barge and tank truck. Water of excellent quality both for drinking and boiler purposes is available at most of the oil companies wharves.

Repairs.—Three boatyards in Newport have facilities for engine and hull repairs. The largest ways at the foot of Brewer Street can accommodate ferry boats and can haul out vessels up to 155-foot length, 46-foot beam, drafts of 16-foot aft and 10-foot forward, and 750-ton weight.

Communications.—Newport has bus and freight train communications. A ferry operates between Jamestown and Newport; the Navy operates a ferry to Rose and Gould Island for military personnel. In the summer months the boat between Block Island and Providence calls at Newport.

Jamestown is a town on the east side of Conanicut Island on the west side of East Passage. A standpipe in the southern part of the town and a cupola on a hotel near the water front are prominent. Two privately maintained lights mark the ferry wharf off the town. The fog signal at the ferry wharf is an electric siren.

Taylor Point, about 1 mile above the ferry wharf, is on the southern side of **Potter Cove.** This cove should not be confused with the Potter Cove off Prudence Island. About 1 mile north of the point is a pontoon pier marked by a light at each end of the L-shaped pierhead.

Coddington Point is about 0.5 mile north of Coasters Harbor Island on the east shore of East Passage. **Bishop Rock Shoal,** with a depth of 8½ feet, is westward of the point and about 0.3 mile northwestward of Coasters Harbor Island; a lighted bell buoy marks the shoal. **The Sisters** are submerged rocks westward of Coddington Point and marked on their north side by a buoy.

Coddington Cove, eastward of Coddington Point, is a good anchorage in southerly or easterly winds. Above the point several tanks, silos, and shore establishments are prominent.

Gould Island, a military establishment, is about 2 miles north of Rose Island and 0.8 mile east of Conanicut Island. A light, 47 feet above the water and visible 12 miles, is shown from a steel tower on the east side of Gould Island. The fog signal is an air diaphragm horn. The light is obstructed by trees from a westerly direction. Another light, shown from a black skeleton tower on a white tank house with a black base, marks the south side of Gould Island. The island is sparsely wooded; a prominent tall water tank with a red light on top is near the center of the island; a steel tower is prominent near the southerly end of the island.

The passage is clear on either side of Gould Island but vessels are advised to pass eastward of the island as the area westward falls within restricted areas.

Halfway Rock, about 1.6 miles northeastward of Gould Island and about 0.9 mile south-southwestward of the south end of Prudence Island, is a small ledge bare at its southern end. A daybeacon, a black barrel on a spindle, is on the bare part of the ledge. About 0.2 mile northeastward of the daybeacon is **Fiske Rock,** a submerged rock with a depth of 8 feet over it. A horizontal-banded buoy is west of the rock. Strangers should not pass between the daybeacon and the buoy.

An elevated tank on the high ground near the southerly end of Prudence Island is prominent from East Passage.

Dyer Island, about 0.8 mile eastward of the southern portion of Prudence Island, is low and brush covered. A reef, partly bare at low water, extends 0.4 mile southward and southwestward of the island. Buoys are off the southwest and southeast sides of the reef. A radar target on top of a piling is about 400 yards southwest of the island. Between the shoal area south of Dyer Island and Aquidneck Island is a bar with depths of 8 to 17 feet over it. A depth of 15 feet can be carried over the bar by steering on the lighted range at Melville. North of Dyer Island is a reef with depths of 10 to 18 feet. A lighted bell buoy is northward of the reef.

Melville, a Naval fueling station, is on the west shore of Aquidneck Island, east of Dyer Island. A tall stack near the shore and an elevated tank about 0.7 mile east of the lighted range are prominent.

North of Melville and on the west shore of Aquidneck Island are the beacons of a **measured mile course.** The front range markers are a red triangle, point up, on a yellow square target; the rear range markers are a yellow triangle, point down, on a red square target. The course of the measured mile is **025°.** Vessels should not approach the shore closer than 810 yards from the front markers.

Sandy Point, about 2 miles north of the southern extremity of Prudence Island and on the east shore of the island, is marked by **Prudence Island Light.** The light, 28 feet above the water and visible 10 miles, is shown from a white octagonal tower on Sandy Point. The fog signal is a bell. A lighted bell buoy marks a shoal with a least depth of 25 feet about 700 yards southeastward of the light.

The shoal water west of **Arnold Point,** the point about 2 miles north of Melville on Aquidneck Island, is marked by a lighted bell buoy. About 0.3 mile eastward of the point is a large prominent lumber mill with a prominent stack and elevated tank adjoining it. A privately maintained channel with a depth of about 29 feet leads to a 600-foot pier at the mill.

Chart 278.—Hog Island, about 1 mile north of Arnold Point, is in the entrance to Bristol Harbor, dividing the waters into the harbor into two channels. The island has a rolling wooded terrain on which are a few houses and cottages. Shoal water surrounds the island extending as much as 0.4 mile southward and 0.8 mile northward. The southeastern side of the shoal is marked by Hog Island Shoal Light, and a buoy. The light, 54 feet above the water and visible 13 miles, is shown from a white conical tower on a black cylindrical pier on the shoal south of Hog Island and on the north side of the channel to Mount Hope Bay. The fog signal is an electric siren. Vessels proceeding to Mount Hope Bay must pass southward of the buoy which is moored about 400 yards southward of the light. The southwestern edge of the shoal off Hog Island is marked by a buoy. The shoal area northward of Hog Island is described under the discussion of Bristol Harbor following Mount Hope Bay.

About 0.6 mile east-northeastward of Hog Island Shoal Light is **Musselbed Shoals Light.** The light, 43 feet above the water and visible 8 miles, is shown from a skeleton tower on the southeast side of the channel to Mount Hope Bay.

Chart 353.—Mount Hope Bay, in the northeastern part of Narragansett Bay, is the approach to the city of **Fall River** and the **Taunton River.** There are two approaches by water to the bay. The approach from the Sakonnet River, previously discussed, is little used. The approach from East Passage is well marked and has depths of over 36 feet in the channel into the bay. Fall River, on the eastern shore of the mouth of the Taunton River and head of Mount Hope Bay, is an important cotton manufacturing center as well as a distribution point of petroleum products. Principal products handled through the port are petroleum products, latex, oil, coal, and some lumber.

Mount Hope Bridge, across the entrance to Mount Hope Bay and between **Bristol Point** and Aquidneck Island, has two lighted towers which are visible for many miles in clear weather. It is a high-level suspension highway bridge with a horizontal clearance of 1,156 feet and a vertical clearance for 400 feet in the center of the span of 135 feet at high water. The fog signal on the northerly span pier of the bridge is a bell.

Mount Hope is a prominent hill on the western side of the bay 2 miles northeastward of the suspension bridge. The eastern and western slopes are wooded and a flagstaff is on the summit.

Channels.—A Federal project provides for a channel 35 feet deep and 400 feet wide adjacent to the water front from the deep water west of **Common Fence Point,** the northernmost extremity of Aquidneck Island, through Mount Hope Bay and Fall River Harbor to the wharves above the bridges at Fall River, with increased width at the bend in the approach to Slades Ferry Bridge. The project further provides for a turning basin 35 feet deep, about 1,000 feet wide and 850 feet long about 0.8 mile above the bridges, a 25-foot anchorage west of the harbor channel and a 30-foot channel east of the harbor channel and a turning basin 35 feet deep, 600 feet wide, and 600 to 1,800 feet long near the Massachusetts-Rhode Island boundary.

In 1950 work on the project had not been completed, however, the former channel to Fall River Harbor, dredged to 30 feet, had a controlling depth of 29 feet to Bordens Flats Light, thence 28 feet to the bridge in 1949.

The Federal project for the Taunton River above Fall River provides for a channel 12 feet deep and 100 feet wide to the municipal wharf at Taunton, for a turning basin below the wharf, and for an anchorage 8 feet deep off Dighton. The project has not been completed and in 1949 the controlling depths were 10 feet in the channel to Peters Point, thence 4 feet to Taunton, 6 feet in the turning basin, and 3 feet in the anchorage. **Somerset,** about 5.3 miles and **Dighton,** about 7.5 miles, above Fall River, are towns on the west bank of the river. **Taunton,** a manufacturing city, is at the head of navigation about 12.5 miles above Fall River.

Three shallow streams empty into the northern part of Mount Hope Bay. They are entered only by small local craft. **Kickamuit River,** the westerly one, has a narrow buoyed entrance through which the currents have considerable velocity. **Cole River,** the middle of the three, has a buoy on the east side of its entrance. **Lee River** is navigable to a fixed bridge about 1.2 miles above the entrance.

Anchorage.—There are no designated anchorages for Fall River Harbor. Vessels may anchor on either side of the dredged approach channel in the outer harbor or at any locality in Mount Hope Bay where the depth and bottom are suitable. Abreast the town is the dredged 25-foot anchorage basin. In 1949 the depths in the east side of the harbor off the wharves were 26 to 32 feet. The harbor master controls the anchoring and berthing of vessels in the main harbor.

Spar Island is a small, low island near the center of Mount Hope Bay. A buoy marks the western edge of the shoal area surrounding the island.

Old Bay Rock with a depth of 3 feet over it is about 0.6 mile north-northwestward of Spar Island. A buoy is south of the rock.

Borden Flats is the shoal area northward of the channel in Fall River Harbor. A light, 48 feet above the water and visible 12 miles, is shown from a white conical tower on a brown cylindrical pier north of the channel opposite Fall River. The fog signal is a bell.

Directions.—From a position with Prudence Island Light bearing 322°, distant 700 yards, steer **025°** for about 1.2 miles until abeam Coal Mine Rocks lighted bell buoy 16, thence steer **054°** for a little over 1 mile and until Hog Island Shoal Light is in range with Southwest Point on Hog Island. Steer **035°** passing north of Musselbed Shoals Light and under Mount Hope Bridge. After passing the bridge steer for the dredged channel to the wharves at Fall River.

Bridges.—Mount Hope Bridge, across the entrance to the bay, has been previously discussed. The bridges across the Taunton River are governed by Federal regulations, see § 203.87 in Chapter 2. At Fall River two bascule bridges cross the river. The first, Slades Ferry Bridge, has a horizontal clearance of 100 feet and a vertical clearance, closed, of 6½ feet at high water. The second, Brightman Street Bridge, has a horizontal clearance of 98 feet and a vertical clearance, closed, of 27 feet at high water. Between Fall River and Taunton the river is crossed by two swing bridges. The highway swing bridge at **Berkley**, about 9 miles above the mouth, has a horizontal clearance of 49½ feet and a vertical clearance, closed, of 7 feet at high water. The highway swing bridge at Taunton, the Weir Bridge, has a horizontal clearance of 35½ feet and a vertical clearance, closed, of 8½ feet at high water. This bridge has not been in operation for years.

Tides.—The mean range of the tide at Fall River is about 4½ feet and at Taunton about 3 feet.

Currents.—In Taunton River the currents generally follow the direction of the channel and except at bridges do not hinder navigation. The ebb is usually stronger than the flood. For further details see the *Current Tables*.

Weather.—The prevailing winds are northwesterly for all but the summer months, when the direction is southwesterly. The heaviest gales are usually from the northwest. The approach channel and harbor are generally free from **ice** and navigable throughout the year. Taunton River is commonly closed from December to March. During severe winters the harbor and Mount Hope Bay are occasionally frozen over but the channels to the principal wharves are kept open by the steamers and tugs operating in the harbor.

Pilotage is compulsory for foreign vessels of 7 feet or more draft. Pilots are usually contacted in Newport and board incoming vessels off Brenton Reef Lightship. Rates for Fall River and Mount Hope Bay are:

Net registered tonnage (either in-bound or out-bound)

Vessels under registry	*Per foot of draft*
Under 500 tons	$3.00
501 to 1,000 tons, inclusive	3.50
1,001 to 1,500 tons, inclusive	4.00
1,501 to 2,000 tons, inclusive	4.50
Over 2,000 tons	5.00
Vessels under enrollment	
Under 500 tons	3.00
Over 500 tons	3.50

Towboats are used by the larger vessels and those bound into the Taunton River. Towboats are obtained from Providence or Newport.

Quarantine and hospitals.—Vessels subject to quarantine are boarded in the harbor anchorage. There is no quarantine hospital or detention station; cases of quarantinable contagious diseases aboard ship which would be permitted by law to land are cared for at Fall River General Hospital. The Union Hospital is a designated United States contract hospital. Sick or injured seamen apply at the office of the physician, 2123 Highland Avenue, or in emergencies, directly to Union Hospital.

Customs.—Fall River is a customs port of entry where marine documents are issued. The customhouse is in the Federal Building, Bedford and Second, Pocasset and Third Streets, about 0.8 mile from the wharves.

Immigration.—There is no Immigration Service office in Fall River, the administration of the immigration regulations are conducted by the New Bedford office.

The **harbor master** controls the anchoring and berthing of vessels in the main harbor, he may be contacted through the city engineer's office. The speed limit is 5 knots in the channel off the docks.

Terminal facilities.—The wharves and piers at Fall River afford over 9,000 feet of berthing space. Some of the piers have rail connections. Depths at the wharves range from 10 to 35 feet. A privately maintained light is shown from a petroleum wharf above the bridges. A municipal wharf is at Davol Street.

Supplies.—Diesel oil, fuel oil, gasoline, coal, water, provisions, and supplies of all kinds can be obtained in Fall River. Facilities for fuel oil bunkering are at a terminal in the north end of the harbor. Two firms are equipped to bunker coal. Water, available at the wharves or delivered to vessels in the stream, is of excellent quality for both domestic use and boilers.

Repairs.—At **South Somerset**, opposite Fall River, are two marine railways, the larger of which can haul out vessels up to 2,500-ton weight, 325-foot length, and 15-foot forward, 18-foot aft, draft. A small boatyard is on the east side of the Taunton River about 1.5 miles above Slades Ferry Bridge. The marine way can haul out craft up to 60-foot length and 5-foot draft.

Communications.—A railroad operates freight service between Boston and Fall River. Bus and taxi service are available.

Chart 278.—Bristol Harbor, between **Bristol Neck** on the east end and **Popasquash Neck** on the west, is in a cove about 2 miles long and 1.3 miles wide at its southern end,

narrowing to 0.4 mile wide at its northern end. The harbor proper, the northern part of the cove, is about 1 mile long and nearly 0.5 mile wide with depths of 15 to 17 feet, except in the northern portion which has depths of 7 to 12 feet.

Bristol is a town on the eastern side of the harbor. A boatyard no longer in operation in the southern part of the town formerly built the famed international racing yachts. Approaching the harbor the most prominent mark is Mount Hope Bridge. The navigation lights and a stone tower, stack, and tank on the high ground back of the town are prominent.

Hog Island is in the middle of the entrance to Bristol Harbor. A natural channel with depths of 20 to 25 feet is on both sides of the island. Excellent anchorage may be found in the harbor abreast the town in depths of 15 to 17 feet, soft bottom. Vessels are required to anchor at least 400 feet off the ends of the wharves and westward of a line extending northeast by east from Usher Rock buoy.

Numerous shoal areas are in the approach to Bristol Harbor. In addition to the previously mentioned shoal area south of Hog Island, shoals extend off both sides of the island and 0.8 mile northward of the island. **Middle Ground,** the northern end of the shoal area north of the island, has a least depth of 5 feet. A horizontal-banded buoy is off the northern end of the shoal. **Castle Island,** a rock bare at low water on the western side of the shoal extending northward of the island, is marked by a light. **Hog Island Rock,** about 300 yards eastward of the island, has a depth of 3 feet over it. A buoy is on the eastern side of the rock. A rock with a depth of 9 feet is off the western side of Bristol Point. Vessels entering Bristol Harbor through the eastern passage should pass westward of the buoy marking this rock. A rock with a depth of 15 feet and marked by a buoy is in the approach to the western passage about 0.5 mile westward of Hog Island. Shoal water extends about 300 yards southward of **Popasquash Point,** the western entrance point to Bristol Harbor, a horizontal-banded bell buoy marks the shoal water. **Usher Rocks,** about 0.7 mile northeastward of Popasquash Point, is bare at low water. A buoy is westward of the rocks and on the eastern side of the western passage to the harbor. **Usher Cove,** eastward of Usher Rocks, is shoal. A small reef, bare at half tide, is off a wharf in the northern part of the harbor. A buoy marks the reef.

Vessels approaching Bristol Harbor eastward of Hog Island should pass about midway between the island and Bristol Neck and steer **340°** passing about 250 yards eastward of Hog Island Rock buoy. When off the wharves at a distance of at least 400 feet anchor in depths of 15 to 17 feet, soft bottom. If approaching westward of Hog Island from a position 300 yards east of Popasquash Point bell buoy steer **033°** until north of Middle Ground buoy, thence proceed to anchorage as directed above.

The mean range of the **tide** in Bristol Harbor is about 4 feet.

Gasoline, provisions, and water are available in Bristol Harbor. Depths at the piers and wharves range from 9 to 13 feet. A light is on the end of the Coast Guard depot wharf. The town has freight railroad service and bus communications. Motor launch ferries operate regularly to Prudence and Hog Islands.

Potter Cove, on the northeast side of Prudence Island, is a small nearly landlocked harbor. Buoys mark the entrance channel off **Gull Point.**

A prohibited area surrounds **Ohio Ledge,** about 2.5 miles northward of Potter Cove. The ledge with a least depth of 8 feet is marked on its east side by a horizontal-banded buoy and a horizontal-banded bell buoy. See § 204.10 in Chapter 2.

Warren River is a small river emptying into the head of Narragansett Bay westward of Bristol Neck. The river is the approach to the towns of **Warren** and **Barrington** and the **Barrington River** which enters the Warren River at Warren. An elevated tank on Bristol Neck and about 0.5 mile inland from the river entrance and a church spire in Warren are prominent.

From the bay, the channel to Warren is crooked and winding but well marked with buoys and a light. In 1949 the controlling depth in the channel to the lower wharves at Warren was 9 feet. A depth of about 6 feet can be carried from the Warren River up the Barrington River to the fixed highway bridge about 0.5 mile above the entrance.

An excellent anchorage may be found at the mouth of the Warren River about 0.2 mile from the eastern shore in depths of 14 to 15 feet, soft bottom. There is not room for anchorage in the river for any but small craft. Abreast the lower end of Warren the channel is 450 feet wide with depths of 16 to 18 feet in mid-channel and small vessels can anchor temporarily at this point. Small craft anchor in the Barrington River about 0.3 mile below the highway bridge in depths of 6 to 8 feet, hard bottom, but good holding ground. Small craft usually anchor with two anchors.

Vessels approaching the river must take care to avoid **Rumstick Shoal** which extends nearly 0.6 mile south of **Rumstick Point**, the southernmost point of **Rumstick Neck** and the western entrance point of the river. The shoal has depths of 2 to 12 feet and is marked on its southeastern side by a buoy. **Rumstick Rock**, a bare rock, is on the western part of the shoal 0.3 mile southwest of Rumstick Point. **Rumstick Ledge**, bare at low water, is 200 yards northwestward of the rock. On the east side of the entrance is **The Brothers**, rocks bare at low water, marked by a buoy. The buoyed channel through the river passes between numerous shoals and rocks including **Lower Middle Ground**, **Allen Rock**, which is marked by a light, **Upper Middle Ground**, **Penivs Rocks**, and **Tree Point Rocks**.

A fixed highway bridge and a railroad trestle with a minimum horizontal clearance of 19½ feet and a minimum vertical clearance of 5 feet at high water cross the Warren River above Warren. About 0.5 mile above the mouth of the Barrington River are a fixed highway bridge and a railroad trestle with a minimum horizontal clearance of 32½ feet and a minimum vertical clearance of 6½ feet at high water.

The mean range of the **tide** at Warren is about 4½ feet. The tidal **current** off the town of Warren has an average velocity at strength of about 1 knot. Strong currents may be encountered in the Barrington River.

Diesel oil, gasoline, water, and provisions are available in Warren. The depths along the major wharves are 7 to 15 feet. A yacht club is on the point of land near the confluence of the two rivers. Three boatyards are in the vicinity, the largest marine ways can haul out vessels up to 250-ton weight, 103-foot length, and 12-foot draft. Covered storage is available and arrangements for oil bunkering can be made at the yards. Freight railroad service and bus communications are available.

Chart 278.—Providence River empties into the head of Narragansett Bay between **Nayatt** and **Coninicut Points.** The river is the approach to the city of Providence, numerous towns and villages, and the Seekonk River. The approach and river have been improved by dredging providing a deep water passage from Narragansett Bay to Providence.

Providence, about 7 miles above the entrance to Providence River, is an important commercial port and a major oil distribution center. The city is at the head of

navigation on the Providence River and at the junction of the Providence and Seekonk Rivers.

Seekonk River is the approach by water to **Phillipsdale** and **Pawtucket.** The distance from the mouth of the river at Providence to the head of navigation at Pawtucket is about 5 miles. The river has been improved by dredging to provide a 16-foot channel to Pawtucket. **East Providence** on the east bank of the Seekonk River, is connected with Providence by four bridges across the river.

Pawtuxet, a village on the west bank of the Providence River, has a cove frequented only by small craft.

Prominent features.—Conimicut Light, on the western side of the approach channel and an abandoned lighthouse and a low square tower on Nyatt Point, are prominent in the approach to Providence River. **Conimicut Light,** 58 feet above the water and visible 13 miles, is shown from a white conical tower on brown cylindrical piers on the west side of the entrance to Providence River. The light has a red sector from 322° to 340° which covers Ohio Ledge. The fog signal is a bell.

Channels.—A Federal project for Providence River provides for a channel 35 feet deep and generally 600 feet wide from the deep water in Narragansett Bay off Popasquash Neck to **Field Point,** about 5 miles above the mouth, thence 35 feet deep for widths up to 1,700 feet to **Fox Point** near the junction of the Providence and Seekonk Rivers. The channel is well marked with lights, lighted buoys, and buoys. In June 1949 the controlling depth to Field Point was 33 feet, thence to Fox Point 33 feet with isolated shoals of 28 to 32 feet.

The Federal project for the Seekonk River provides for a channel 16 feet deep and 150 to 230 feet wide from Red Bridge at Providence to the wharves at Pawtucket, thence 16 feet deep and 100 to 60 feet wide to Division Street Bridge. The channel is marked by buoys and lights. In June 1949 the controlling depth to the State pier at Pawtucket was 14 feet.

A channel has been dredged from the main channel in Providence River to a turning basin at the Naval Reserve Training center southwestward of Field Point. The channel is marked by buoys and in 1949 had a controlling depth of 13 feet, with 11 feet in the basin.

A privately maintained lighted range marks the channel to **Pawtuxet Cove,** off the village of Pawtuxet. Craft up to 7-foot draft can enter the cove at high water and numerous small pleasure craft find a well protected anchorage in the cove. Remains of a stone beacon in the cove, covered at high water, are marked by a buoy.

Anchorage.—Vessels anchor as directed by the harbor master on the edge of the channel between Field Point and Fox Point. Eastward of Fox Point a few vessels may anchor in the area where a portion of **Green Jacket Shoal** was removed. Small craft sometimes anchor in depths of 3 to 4 feet westward and northward of **Sunshine Island,** a small islet on the western side of the river southward of Field Point. Approach from the southward is preferred, giving the island a berth of over 100 yards. Small craft may also find anchorage in Pawtuxet Cove.

Dangers.—Numerous rocks and ledges border the Providence River channel on either side. Lights mark the shoal area off **Bullock Point,** about 1.5 miles above the mouth; off **Sabin Point,** about 3 miles above the mouth; off **Pomham Rocks,** about 3.5 miles above the mouth; and off **Fuller Rock,** about 5 miles above the mouth.

Directions for Providence River are given in Chapter 3.

Bridges.—There are no bridges across the Providence River between the mouth and the principal wharves. Point Street highway bridge crosses the Providence River about 600 yards above Fox Point. The swing span has a horizontal clearance of 99 feet in the east draw, 101 feet in the west draw and a vertical clearance, closed, of 9 feet at high water. Special regulations have been prescribed for this bridge, see § 203.90 in Chapter 2. An overhead cable, about 300 yards south of the bridge, has a vertical clearance of 145 feet at high water.

Four drawbridges cross the Seekonk River within 1.5 mile of the mouth: India Street Bridge, a swing railroad bridge with a horizontal clearance of 83 feet in the east draw, 84½ feet in the west draw, and a vertical clearance, closed, of 5 feet at high water; Washington Bridge, a highway bascule bridge with a horizontal clearance of 100 feet and a vertical clearance, closed, of 40½ feet at high water; Tunnel Bridge, a railroad bascule bridge with a horizontal clearance of 92½ feet and a vertical clearance, closed, of 17 feet at high water; Red Bridge, a highway swing bridge with a horizontal clearance of 69½ feet and a vertical clearance, closed, of 13 feet at high water. Special regulations govern the operation of these bridges, see § 203.89 in Chapter 2. Two overhead cables cross the Seekonk River, one near the mouth and the other at Pawtucket, with a vertical clearance of 145 feet at high water.

Tides.—The mean range of the tide at Providence is about 4½ feet and the maximum range due to the combined effect of wind and other causes may reach 8 feet or more at times.

Currents.—Tidal currents are weak in the approach channel and the harbor, except in the constricted parts of the Seekonk River. At India Street Bridge and Red Bridge the tidal currents have average velocities at strengths of about 1½ knots. In the Seekonk River the double flood is very pronounced. The velocity near the middle of the flood period is generally less than ½ knot and is sometimes in an ebb direction. For further information see the *Current Tables*.

Weather.—The prevailing winds are northwesterly except in July, when southwesterly as well as northwesterly winds occur. The heaviest gales are usually from the northwest.

Fog is more prevalent during the winter and spring months and is most frequent with easterly and southerly winds. Northerly and westerly winds will usually clear the fog.

The approach channel and the harbor are generally free of ice and navigable throughout the year. During severe winters the harbor and several miles of the Providence River and upper Narragansett Bay are occasionally frozen over, but the ice is usually kept broken up in the channels to the principal wharves by the traffic in the harbor.

Storm warnings are displayed, day and night, at the Edgewood Yacht Club.

Pilotage is compulsory for vessels engaged in foreign trade. Pilots usually board incoming vessels and leave outgoing vessels between Brenton Reef Lightship and the entrance to Narragansett Bay. No vessel bound for Providence is required to take a pilot unless spoken by a branch pilot below Nayatt Point. The customary pilotage rate is $4 per foot on deepest draft in and out.

Towboats are available at Providence. Large vessels, particularly tankers bound for the dock north of the Point Street Bridge, generally require the assistance of a tow. Most steamers usually proceed without assistance to the wharves below Fox Point.

Quarantine and hospital.—Vessels subject to quarantine inspection are boarded at the dock unless they carry infectious cases or come from ports of known or suspected infection, in which event they are boarded at anchor or intercepted prior to arrival. There is no quarantine hospital at Providence. When quarantinable diseases are found aboard, the patients are sent to Charles V. Chapin Hospital.

The Public Health Service has an office and dispensary in Room 404 of the Federal Building where out-patients are treated. Seamen will be admitted to Roger Williams General Hospital for other than contagious diseases. Except in an emergency, application for hospital admission should be made at the dispensary at the Federal Building.

Customs.—Providence is a customs port of entry and marine documents are issued. The customhouse is located on Weybosset Street at the corner of Custom House Street.

Immigration.—The officer in charge of immigration has his office in the Federal Building. As there is no immigration detention station at this port, steamship companies are required to deliver immigrants to the station at East Boston for detention or further examination upon order of the local immigration officer.

Harbor regulations are enforced by the harbor master whose headquarters are at the eastern end of Point Street Bridge. The harbor master regulates the movement and anchoring of vessels in the harbor. The **speed limit** in the harbor is 5 knots.

Terminal facilities.—Most of the wharves at Providence are reserved for the exclusive use of their owners or operators. There is a State pier about 0.5 mile south of Fox Point and a municipal wharf north of Field Point. Some of the wharves are served by railroad connections. The principal wharves at Pawtucket have depths of 9 to 14 feet.

Supplies.—Diesel oil, fuel oil, gasoline, water, coal, provisions, and ship supplies of all kinds are available. The largest facilities for oil bunkering are located near **Kettle Point,** on the opposite side of the river from the municipal wharf. Delivery is made directly to vessels through pipe lines at the wharves of the plants. There are also facilities for bunkering vessels at anchor in the stream. The two firms offering coal bunkering facilities have delivery capacities of about 250 tons per hour. The water at nearly all the wharves on the westerly side of the harbor is of excellent quality for either domestic use or use in boilers.

Repairs.—The marine repair facilities at Providence are limited as there is no drydock or marine railway of sufficient capacity to serve general shipping. Repairs to machinery, steel hulls, and boilers can be obtained in several well-equipped machine shops. Several marine railways for small craft up to 50-foot length and 5-foot draft are in the vicinity and in Pawtuxet Cove. Two firms equipped with divers and salvage equipment engage in contract wrecking and salvage.

Communications.—Providence is served by rail, bus, and air communications. A coastal steamer operates daily in the summer to Newport and Block Island.

Chart 236.—West Passage, between Conanicut and Prudence Islands on the east and the mainland on the west, is the approach to Dutch Island Harbor, Wickford, Quonset Point, and East Greenwich. Vessels may also go to Providence by West Passage, although the route through East Passage is deeper and generally used.

The following directions for West Passage to Providence River are good for a draft of 19 feet but local knowledge is required for a greater draft than 12 feet. Approaching from the eastward pass clear of Brenton Reef Lightship and steer for Whale Rock Light

until southwest of Beavertail Light, thence steer **004°** with Dutch Island Light ahead, passing between 0.4 and 0.5 mile west of Beavertail Light. Approaching from the southward, from a position 2.0 miles 344° from Point Judith Light, steer **021°** for 7.7 miles to a position between Beavertail Light and Whale Rock Light, thence steer **004°** with Dutch Island Light ahead. At night a careful study of the characteristics of the lights is necessary as a number of lights marking East Passage will be seen on the starboard bow when approaching from Point Judith.

When 0.6 mile from Dutch Island Light, steer **340°** to a position about 550 yards west of Dutch Island Light, thence steer **017°** with the center of the Jamestown-North Kingstown Bridge ahead. After passing under the center of the bridge steer **006°** with Warwick Light ahead for 4.3 miles until abeam the south tangent of Hope Island. This course crosses the dredged channel to Quonset Point. When abeam the south tangent of Hope Island steer **023°** for about 2.2 miles until Warwick Light bears 349°. Steer **349°** for about 1.8 miles with Warwick Light ahead passing between Warwick Narrows west buoy 5 and Warwick Narrows east buoy 2. When about 0.4 mile from Warwick Light and abeam Patience Island lighted bell buoy 2A, steer **053°** for about 1.7 miles passing 100 yards north of Fork Rock buoy until Conimicut Light bears 001°. Thence steer **099°** for 1.2 miles and then **037°** for 0.5 mile. This final course will lead into the dredged channel approaching Providence River. Continue by directions for Providence River in Chapter 3.

Narragansett Pier, about 3 miles west-southwestward of Beavertail Point, is a summer resort having railroad communications. The large hotels and a square granite tower are prominent. A municipal bathing beach and pavilion at the Upper Pier are prominent from an easterly direction.

Pettaquamscutt River is a shallow, unimportant stream with a narrow foul entrance about 1 mile northeastward of Narragansett Pier. **Bass Rock, River Rock, Clump Rocks, Cormorant Rock,** and **Old Antonio** are rocks off the entrance to the river; River Rock, Bass Rock, and Clump Rocks show at high water but the others are awash or covered at that stage of the tide. **River Ledge,** about 0.5 mile southeast of the river entrance, has a depth of 14 feet and is marked by a buoy.

Whale Rock, on the western side of the entrance to West Passage, is marked by a light. The light, 59 feet above the water and visible 7 miles, is shown from a skeleton tower on the base of the former lighthouse. A gong buoy is about 300 yards east of the light. About 200 yards north of the light is **Little Whale** with a depth of 7 feet.

Between Whale Rock and **Dickens Reef,** on the western shore, is a channel with a depth of about 50 feet; strangers should not use this channel but pass eastward of the buoy off Whale Rock.

Jones Ledge, about 1.1 miles north of Whale Rock, has a depth of 9 feet; a horizontal-banded buoy marks the ledge.

Wesquage Beach is on the north shore of the bight formed by **Bonnet Point,** the point about 0.4 mile north of Jones Ledge. A bathing pavilion at the beach is prominent from a southeasterly direction.

The Bonnet, a prominent hill the shoreward face of which is bold and rocky, is on the west side of West Passage north of Bonnet Point. The shore between Bonnet Point and **South Ferry,** 1.3 mile northward should be given a berth of 400 yards. Pilings extend 130 yards eastward just south of the old pier at South Ferry. A church spire inland of South Ferry is prominent from southward to above Dutch Island.

Austin Hollow is a bight on the west shore of Conanicut Island about 1 mile north of Beavertail Point. The eastern shore of West Passage from the northern end of this bight to Dutch Island Harbor entrance can be approached as close as 200 yards.

Fox Hill, on the southern side of the entrance to Dutch Island Harbor and 2.5 miles north of Beavertail Point, is a high point which terminates to the northward in **Beaverhead,** a bluff rocky face. A square wooden rock crib is about 120 yards west of Fox Hill.

Dutch Island Harbor is in the West Passage of Narragansett Bay about 3 miles north of Beavertail Light. The harbor is a semicircular indentation 0.5 by 1 mile in extent in the west side of Conanicut Island.

Dutch Island, on the western side of the harbor, is marked by a light. The light, 56 feet above the water and visible 12 miles, is shown from a white, square tower attached to a dwelling on the south point of Dutch Island. The light is an excellent guide for vessels bound up West Passage from the southward.

Dutch Island Harbor may be approached from the northward or southward. The southward entrance is good for a depth of about 28 feet; the northern entrance has an extensive shoal with depths of 16 to 18 feet. As the harbor is of easy access, it is frequently used as a harbor of refuge. Excellent anchorage may be had in depths of 12 to 45 feet, sticky bottom. Vessels of over 18-foot draft seeking anchorage should give the eastern shore of the harbor a berth of at least 0.4 mile; if the draft is less than 14 feet, the eastern shore may be approached much closer as the general depths are 15 to 17 feet. The eastern shore of Dutch Island should be given a berth of 100 yards. The anchorage areas prescribed for Narragansett Bay include Dutch Island Harbor, see § 202.15 in Chapter 2.

A narrow spit with a depth of 6 feet at its outer end extends about 150 yards south-southwestward of Dutch Island Light. A horizontal-banded gong buoy marks the southern end of the shoal. A bell buoy marks the shoal area off the northern side of Dutch Island. The piers off the east side of Dutch Island are in ruins. A shoal extends about 200 yards westward and 350 yards northward of Beaverhead. At its northern extremity this shoal rises abruptly from depths of about 50 feet to a depth of 5 feet; a buoy marks the northern side of the shoal. In the southeastern part of the harbor is a shallow cove which extends about 0.5 mile southeastward to the narrow neck of land which separates it from Mackerel Cove.

Vessels approaching Dutch Island Harbor from the southward steer **004°** for Dutch Island Light until about 400 yards south of the light, thence steer **043°** into the harbor and select anchorage according to draft. Approaching from the northward, from a position 150 yards west of Twenty-three Foot Rock buoy 4 just south of the bridge steer **164°** into the harbor. Vessels of over 14-foot draft should approach from the southward.

Tidal currents of from 1 to 1½ knots may be encountered in the vicinity of Dutch Island. Elsewhere in West Passage velocities are usually less than 1 knot. See the *Current Tables*.

Saunderstown is on the western shore of West Passage abreast Dutch Island. **Storm warnings** are displayed day and night at the Weather Bureau station. A former ferry dock off the town is in ruins.

Shoaling has been reported in West Passage between Saunderstown and **Casey Point,** 0.3 mile northward.

Plum Beach Shoal, with depths of 12 to 16 feet over it, extends 0.5 mile from the western shore about 1 mile north of Dutch Island. The northeast end of the shoal is marked by a daybeacon, an old conical lighthouse tower, 60 feet high; the southeastern edge of the shoal is marked by a buoy. The **Jamestown-North Kingstown Bridge** crosses West Passage at Plum Beach Shoal. The fixed span has a horizontal clearance of 600 feet and a vertical clearance at the center of the span of 144 feet at high water. The fog signal at the westerly main channel pier is a siren. Vessels passing westward of Dutch Island will clear Plum Beach Shoal by heading for the main bridge span.

Slocum Ledge is about 200 yards south of the easterly end of the bridge; a 23-foot spot off the ledge is marked by a buoy.

From Slocum Ledge, northward, **Great Ledge** extends along the west shore of Conanicut Island for a distance of 1.5 miles. The ledge extends 175 yards offshore at its southern end increasing to 500 yards offshore at **America Ledge,** its northern end. **The Brothers, Fowler Rock, Dick Rock, Sinker Rock,** and numerous sunken rocks close inshore are on Great Ledge.

Between Plum Beach Shoal and **Rome Point,** on the western side of West Passage 1.2 miles above the bridge, are several rocks, including **Red Rock** and **Old Sergeant,** up to 0.2 mile offshore. Bare and sunken rocks including **The Clump** are northeastward and eastward of Rome Point.

Bissel Cove, westward of Rome Point, is shoal. The cove can be entered at high water with drafts of 3 or 4 feet; strong currents are in the unmarked entrance. **Annaquatucket River** enters the western side of the cove.

Fox Island, 0.4 mile northeast of Rome Point and southward of Wickford Harbor, is small and low. A shoal with numerous submerged rocks including **Seal Rock** extends southward of the island. A narrow channel, suitable only for small craft, is between this shoal and the shoals extending northeastward of Rome Point. **Halfway Ledge** with a depth of 18 feet is about 0.5 mile east of Fox Island.

Wickford Harbor, on the western side of Narragansett Bay westward of the north end of Conanicut Island, comprises an outer and an inner harbor. The outer harbor is a broad bight between Quonset Point on the north and **Wild Goose Point,** about 0.6 mile west of Fox Island, on the south. The entrance is about 2 miles wide. Depths in the middle and southern parts of the outer harbor average 14 to 17 feet. The inner harbor entrance is between **Poplar Point,** 1.3 miles northwest of Fox Island, on the south and **Sauga Point,** about 0.4 mile north of Poplar Point, on the north. The town of **Wickford** is on the southwestern side of the inner harbor.

Storm warnings are displayed by day only.

Several prominent landmarks are visible when approaching Wickford Harbor. A chimney about 1 mile south of town, the North Kingstown standpipe, and a church spire in Wickford may be seen for many miles. A former lighthouse on Poplar Point and the light off the point are prominent. The light, 50 feet above the water and visible 8 miles, is shown from a black, square skeleton tower with a white tank house on **Old Gay Rock** on the southwest side of the channel to the inner harbor.

The channel to the inner harbor is restricted by breakwaters and shoals off Sauga and Poplar Points to a width of about 150 yards. The harbor light is off the southern side of the entrance and a light is off the north breakwater. The channel leads to the junction of three coves, **Fishing Cove** to the northward, **Mill Cove** to the northwest-

ward, and **Wickford Cove** to the southwestward. Wickford Cove is the scene of considerable pleasure boat activity. The channel in the cove is between flats, many of which are dry at low water. A Federal project provides for the maintenance of a channel 9 feet deep and 60 feet wide to the wharves on Wickford Cove; and for two breakwaters the northerly one about 1,130 feet long off Sauga Point, the southerly one about 825 feet long off Poplar Point. In 1949 the controlling depth was 9 feet to abreast the shipyard, thence 8 feet to the uppermost yacht slip.

Good anchorage may be had in the middle and southern parts of the outer harbor in depths of 14 to 17 feet. The northern part of the outer harbor has numerous rocks and ledges with a least depth of 7 feet. **General Rock,** with a depth of 9 feet over it, is the southerly limit of this shoal and is 0.9 mile north-northeastward of Fox Island. A rock with a depth of 8 feet over it is about 500 yards westward of General Rock. **Brig Ledge,** about 0.5 mile north of General Rock, has a depth of 9 feet. The southern shore of the outer harbor is foul for a distance of 200 yards offshore from Wild Goose Point to **Little Tree Point,** about 0.3 mile northwestward. From Little Tree Point to Poplar Point numerous rocks, including **Cold Spring Rock,** extend as much as 600 yards offshore. **Charles Rock,** with a depth of 4 feet, is just inside of the northern breakwater; a buoy marks the rock. A shoal extends 200 to 300 yards offshore, from the harbor light to **Big Rock Point,** on the east side of the entrance to Wickford Cove.

Vessels approaching Wickford Harbor from the southward, after passing through the main span of the Jamestown-North Kingstown Bridge, steer **340°** passing between 0.2 and 0.3 mile eastward of Plum Beach Daybeacon and the same distance eastward of Fox Island. When northeastward of Fox Island steer for Wickford Harbor Light on any bearing between 313° and 290°, anchoring 0.2 mile or more southeastward of the light in depths of 14 to 15 feet, soft bottom. A depth of 9 feet may be taken to the wharves off Wickford Cove by passing 200 feet northward of Wickford Harbor Light and a slightly greater distance southward of Charles Rock buoy on a course of 285°. When the entrance to the cove is open, swing slowly to **203°** and steer to favor the wharf on the easterly side.

In severe winters the inner harbor is closed by ice, but the outer harbor is usually open although drift ice is occasionally encountered.

Gasoline and some provisions are available in Wickford. A shipyard has marine railways capable of hauling out craft up to 65-foot length and 6- to 14-foot drafts for hull and engine repairs. The yard maintains a yacht marina along the channel with slips for 56 craft.

Quonset Point, on the north side of Wickford Harbor, is marked by three radio masts, several elevated tanks, and an aviation light. Near the eastern end of the point are the conspicuous buildings of the power station. An elevated tank and numerous low buildings are in the vicinity of **Camp Endicott.** The Navy pier at Quonset Point and the pier at **Davisville Depot,** another Navy establishment about 1.5 miles northward, are usually approached from East Passage until north of Conanicut Island, thence through a dredged channel to a basin off the point from which a channel leads to the depot. In 1949 the controlling depth in the channel to the basin was 33 feet. With the exception of a 28- and 30-foot spot in the basin depths of 32 to 35 feet were throughout the basin and alongside the pier. The channel to Davisville Depot had a depth of 30 feet.

The channel to the basin off Quonset Point is well marked with buoys, lighted

buoys, and **Conanicut Island Light.** The light, 52 feet above the water and visible 13 miles, is shown from a red skeleton tower on **Conanicut Point,** the northernmost point of Conanicut Island. Just southward of the basin off the point two horizontal-banded lighted buoys mark a shoal area with depths of 10 and 18 feet.

Hope Island, about 1.6 miles north of Conanicut Point, has low grassy hills with a few trees. Bare and sunken rocks surround the island for a distance of about 0.2 mile. **Despair Island** is on the outer end of a rocky ledge extending 0.2 mile northeastward of Hope Island; a bell buoy is off the northeast side of the ledge. **Scup Rock** and **Round Rock** are off the eastern side of Hope Island and **Gooseberry Island** and **Seal Rock** are off the western side. A hazardous reef with piles and a boiler awash on it is about 0.4 mile southwestward of the southwest point of Hope Island; a horizontal-banded buoy marks the area.

Allen Harbor, 2 miles north of Quonset Point, is entered through a dredged buoyed channel which had a controlling depth of 8 feet in 1949. Inside the harbor is a basin with depths of 8 to 10 feet. **Old Sow Rock,** bare at low water, is on the south side of the entrance channel.

Calf Pasture Point is on the north side of the entrance to Allen Harbor. Abreast the point and for some distance northward of it, a shoal extends 0.5 mile from the shore. **Calf Pasture Rock,** 500 yards northeasterly of the point, has a depth of 2 feet.

Chart 278.—Potowomut River, entering the west side of West Passage 1.7 miles north of Calf Pasture Point, is separated from Greenwich Bay on the north by **Potowomut,** a neck of land. The bar at the entrance of the river has depths of 2 to 4 feet, inside the channel is narrow and crooked. Caution is necessary to avoid rocks with depths of 1 foot over them in the entrance. Strangers should not enter the river.

Two berthing areas are located about 1 mile southeast of Potowomut River. Buoys mark the boundaries of the areas.

About 0.7 mile east of the entrance to the Potowomut River are **Flat Rock,** covered at high water, **Crack Rock,** with a depth of 5 feet, and **Round Rock,** showing 1 foot at high water. A buoy marks Round Rock. About 0.2 mile southeastward of Round Rock is **Hunts Ledge** with a depth of 12 feet.

The natural channel of West Passage passes between the shoal area eastward and southeastward of Hunts Ledge and the shoal area westward and southward of Patience Island. The channel has depths of 19 to 74 feet and a least width of 300 feet. Buoys mark the entrance from the southward and a lighted bell buoy and station buoy mark the northeastward edge of the shoal off Patience Island. The channel is the approach from the southward to Greenwich Bay, Warwick Point, and the channel from West Passage to Providence River. The channel is on a 349° bearing for Warwick Light. The shoal area off Hunts Ledge extends 0.5 mile eastward and 1.5 miles southeastward of the ledge and has depths of 13 to 17 feet; a buoy is on the southeast extremity of the shoal.

Patience Island, 0.2 mile west of the northern end of Prudence Island, is surrounded by shoals. A shoal with 11 to 15 feet extends 600 yards west of the island and is marked on its northwest side by a lighted bell buoy and a station buoy. The shoal extending about 1 mile south-southwestward has depths of 15 to 17 feet; a buoy is on the western side of this shoal near its southern edge.

Warwick Point, the southernmost point of **Warwick Neck** and 0.7 mile northwest of Patience Island, is marked by a light. The light, 51 feet above the water and visible 13 miles, is shown from a white conical tower on the north side of the entrance to Greenwich Bay. The fog signal is an air diaphragm horn.

Greenwich Bay, at the northwestern end of Narragansett Bay, has its entrance between Warwick Neck and Potowomut. Shoal water borders the shore of the bay but the general depth throughout the greater part is 10 feet. Directions for Greenwich Bay are given in the discussion of Greenwich Cove.

Old Warwick Cove, at the northeastern part of Greenwich Bay, has a depth of 4 feet in the unmarked entrance, with a narrow channel of greater depths inside. A shoal, bare at low water, extends about 150 yards eastward from the western entrance point.

Brush Neck Cove, about 0.5 mile west of Old Warwick Cove, is fronted by a flat with a general depth of about 2 feet. **Buttonwoods Cove** joins Brush Neck Cove at its entrance. **Oakland Beach, on Horse Neck,** between Brush Neck and Old Warwick Coves, is a summer resort with bus communication.

Apponaug Cove, in the northwestern part of Greenwich Bay, has depths of about 4 feet for 0.2 mile above the entrance, above which the cove is nearly bare at low water. **Apponaug** is a village nearly 1 mile above the entrance.

At **Cowesett,** on the northwestern side of the bay, is **Folly Wharf,** to which 8 feet can be taken at high water.

Chepiwanoxet Island, in the western part of the bay northward of the entrance to Greenwich Cove, is a small neck of land with a yellow bluff facing eastward. From this island shoals with little water over them extend about 500 yards northward and 300 yards eastward and southeastward; a buoy marks the southeastern extremity of the shoal.

Shoals extend about 300 yards northward and northwestward of **Long Point,** the northwestern extremity of Potowomut. The western edge of the shoal is marked by a buoy; the entrance to Greenwich Cove is westward of the buoy.

Greenwich Cove, in the southwest end of Greenwich Bay, is about 1.3 miles long and 300 to 600 yards wide. The general depths in the cove except in its upper end are 8 to 10 feet. On the western shore is the town of **East Greenwich.** The narrow channel into the cove has a depth of 9 feet at high water; a depth of 12 feet can be carried to some of the wharves. A depth of 4 feet can be carried to the yacht club landing. Good anchorage may be had off the wharves in depths of 8 to 11 feet; the deeper water is on the eastern side of the cove.

Vessels approaching Greenwich Cove pass 500 yards southwest of Warwick Light and steer **302°** to a position 150 yards north of Greenwich Bay buoy 1. Thence steer **284°** to a position 75 yards north of Greenwich Bay lighted bell buoy 3, thence steer **238°** passing close southward of Greenwich Bay buoy 2 and 75 yards northward and 50 yards westward of Greenwich Bay buoy 5. Swing south-southeastward into the cove keeping in the middle of the cove and anchor in depths of 8 to 11 feet not more than 0.5 mile above the entrance.

The mean range of the **tide** is about 4½ feet.

Diesel oil, gasoline, fuel oil, and most supplies are available at East Greenwich. Near the entrance to the cove is a shipyard with marine railways capable of hauling

out vessels up to 150-ton weight, 125-foot length, and 9-foot draft. Machine shop facilities are available. A small towboat is at the shipyard. There are facilities for both dry and wet boat storage.

Sally Rock, with a depth of 4 feet over it, is about 400 yards northward of **Sally Rock Point**, a point 0.7 mile eastward of Chepiwanoxet Island. A lighted bell buoy is just north of a buoy northward of the rock.

From **Sandy Point**, the eastern extremity of Potowomut, shoals with depths of 2 to 9 feet extend northeasterly for about 0.7 mile. A buoy marks the edge of the shoal northeast of the point.

Extensive shoals extend off the eastern side of Warwick Neck to Ohio Ledge. **Rocky Point** is on the eastern side of the neck 1.7 miles north-northeastward of Warwick Point.

The natural channel between the shoals off Warwick Neck and the shoals northward of Patience and Prudence Islands is about 0.3 mile wide with depths of 19 to 50 feet. A buoy marks the shoal off **Providence Point**, the northernmost point of Prudence Island. Vessels of over 12-foot draft prefer the approach between Ohio Ledge and Providence Point to the abandoned channel between Rocky Point and Ohio Ledge.

Chart 1210.—The shoreline of **Point Judith Neck** between West Passage and Point Judith should be given a berth of at least 0.6 mile. From Narragansett Pier to **Black Point**, a rocky promontory 1.9 miles southward, the shoreline is a rugged rocky ledge with deep water close inshore. **Gunning Rock** and **The Brothers** are dangers within 0.2 mile of the shore. The waters along the shoreline between Black Point and Point Judith are boulder-strewn and shoal up gradually. **League Rock, Little League Rock, Peaked Rock,** and **Champlin Rock** are small dangerous rocks from 0.1 to 0.3 mile offshore and surrounded by shoal water. All but Peaked Rock show above high water.

Three very prominent landmarks are Point Judith Light, the elevated water tank 1.7 miles north of Point Judith, and Hazard's Tower, a high, square stone tower 0.5 mile south of Narragansett Pier. Closer inshore the stone bathing pavilion at the State-operated **Scarborough Beach**, 0.5 mile south of Black Point, and an open stone tower on a house 0.4 mile north of Black Point are prominent.

CHAPTER 7

Point Judith to New London

Chart 1211

FROM Point Judith to New London the shoreline forms the north boundary of Block Island Sound and Fishers Island Sound. It is generally rocky and broken with short stretches of sandy beach. Many inlets and harbors, especially in the vicinity of Fishers Island, afford harbors of refuge for vessels. While many navigational dangers exist in the form of rocks and shoals, they are well buoyed and lighted. The waters in the central portion of the sound are deep and will accommodate vessels of the greatest draft. The sound is a link for water-borne commerce between Cape Cod and Long Island Sound.

The southern part of Block Island Sound is bounded by the eastern extremity of Long Island and Gardiners Island. Plum Island and Fishers Island are at the western end of the sound.

Westward of Gardiners Island and enclosed between the northeastern and eastern ends of Long Island are Gardiners Bay, Shelter Island, and Great Peconic and Little Peconic Bays. This area is well protected, but generally shallow, and is not suited for deep-draft vessels. The shoreline is marked by many indentations and shallow harbors. Due to the protected character and many anchorages, these waters are much used by commercial fishing vessels and small pleasure craft.

Block Island Sound is a deep navigable waterway forming the eastern approach to Long Island Sound, Fishers Island Sound, and Gardiners Bay from the Atlantic Ocean. It has two entrances from the Atlantic Ocean, an eastern entrance between Block Island and Point Judith, and a southern entrance between Block Island and Montauk Point. Block Island Sound is connected with Long Island Sound by The Race, by the passages between the Gull Islands, and by those between Great Gull and Plum Islands. Block Island Sound is connected with Fishers Island Sound by the several passages between rocky reefs from Watch Hill Point to East Point, Fishers Island.

The more important places, either commercially or as harbors of refuge, are Point Judith Harbor and Great Salt Pond, in Block Island Sound; Gardiners Bay and Greenport; and Stonington and Mystic Harbor in Fishers Island Sound.

Block Island North Reef is a sand shoal extending 1.5 miles northward from Block Island North Light to the 6-fathom curve. Depths less than 18 feet are found for a distance of over 1 mile northward of the light, and the shoal should be avoided by all vessels. The depths on the shoal change frequently, and its position is also subject to a slow change. It is practically steep-to on all sides, so that soundings alone cannot

be depended on to clear it. A lighted bell buoy is moored about 0.4 mile northward of the 6-fathom curve at the end of the shoal.

Southwest Ledge is 3.5 miles southwestward of **Southwest Point,** the southwestern extremity of Block Island, and has a least depth of 23 feet. It is marked at its southwest end by a lighted bell buoy. Rocky patches with least depths of 27 and 29 feet extend 1.5 miles northeastward from Southwest Ledge. The sea breaks on the shoaler places in heavy weather.

The deepest passage in the entrance to Block Island Sound is just westward of Southwest Ledge, and has a width of over 2 miles; this is the best passage for deep-draft vessels. In heavy weather vessels desiring to enter the sound westward of Block Island should pass westward of Southwest Ledge lighted bell buoy.

Between the inner patch and the shoals, which extend 0.9 mile from Block Island, is a channel 1.3 miles wide, with a depth of about 36 feet. Vessels using this channel round the southwest end of Block Island at a distance of 1.5 miles. It is not advisable to use this passage during heavy weather.

Entering between Point Judith and Block Island, this entrance is used by all coasting vessels from the bays and sounds eastward to Long Island Sound. The generally used route is through The Race. Tows of light barges and steamers of 14 feet or less draft sometimes go through Fishers Island Sound, especially during daylight with a smooth sea. This entrance is clear with the exception of Block Island North Reef. The coast from Point Judith nearly to Watch Hill should be given a berth of over 1 mile, avoiding the broken ground with depths less than 30 feet. See Chapter 3 for directions.

Full **tidal** information, including daily predictions, is given in the *Tide Tables.*

The effect of strong winds, in combination with the regular tidal action, may at times cause the water to fall several feet below the plane of reference of the chart, which is mean low water. The water has been known to rise about the same amounts above mean high water, due to similar causes. The mean range of the tide throughout the sound varies from about 3 feet at Point Judith to 2 feet at Montauk Point.

Current data for a number of locations in Block Island Sound are given in the *Current Tables.* See Publications in Chapter 1. Current directions and velocities throughout the Sound for each hour of the tidal cycle are shown on *Tidal Current Charts, Long Island and Block Island Sounds.* See Publications in Chapter 1.

The tidal currents throughout Block Island Sound have considerable velocity; the greatest velocities occur in the vicinity of The Race and in the entrances between Montauk Point, Block Island, and Point Judith. Soundings alone cannot be depended upon to locate the position; approaching the shores or dangers the shoaling is generally abrupt.

In the passage between Point Judith and Block Island, 1.5 miles north of Sandy Point, the average velocity at strength is about 2 knots. In the middle of the passage and near Point Judith it is about 1 knot. The flood sets westward, the ebb eastward.

In the passage between Block Island and Montauk Point the flood sets generally northwestward, the ebb southeastward. In the middle of the passage the average velocity at strength of flood is about 1½ knots. Off Montauk Point the velocity at strength of flood or ebb is 2¼ knots.

In Block Island Sound and in the eastern part of Long Island Sound **fogs** are generally heaviest with southeast winds. In these waters the usual duration of a fog

is from 4 to 12 hours, but periods of from 4 to 6 days have been known with very short clear intervals. In the autumn, *land fogs* as they are termed locally, sometimes occur with northerly breezes, but are generally burned off before midday.

The Race may be said to be the only locality where tidal currents have any decided influence on the movements of the **ice**. Large quantities of flow ice usually pass through The Race during the ebb, especially if the wind be westerly, and in severe winters this ice causes some obstruction in Block Island Sound and around Montauk Point. These obstructions are the most extensive around the middle of February.

Block Island is 5 miles long, hilly, with elevations up to 211 feet, and is bare of trees. The shore of the island is fringed in most places by boulders, and should be given a berth of over 0.3 mile even by small craft; the shoaling is generally abrupt in approaching the island.

New Shoreham is the legal name of the town but is seldom used.

Block Island North Light, 58 feet above water and visible 13 miles, is shown from a brown tower on a gray granite dwelling on **Sandy Point**, at the north end of the island. On the shore of **Cow Cove** between Sandy Point and **Grove Point** is Tercentenary Monument, a high, tapering, granite pillar with a pyramidal top. It is placed on the site where the first settlers are believed to have landed in April 1661.

Block Island Southeast Light, 201 feet above water and visible 21 miles, is shown from a red-brick octagonal, pyramidal tower attached to a dwelling on **Mohegan Bluffs** at the southeast point of the island. The fog signal is an air diaphragm; a radiobeacon is synchronized with the fog signal for distance finding. It has been reported that the fog signal is indistinct and difficult to hear when close-to, yet is plainly audible several miles away. Because of this phenomenon caution should be exercised. **Storm warnings** are displayed near the light.

At a distance of 450 yards southeast of the light is the wreck of the S. S. *Lightburne*, a large tanker. At low water the main deck is awash. At **Clay Head**, on the northeast side of Block Island, is a lone white house on top of the bluff. Two nearby silos are conspicuous.

Chart 276.—The Harbor is an artificial harbor formed by two breakwaters on the east side of Block Island 1.4 miles northward of Block Island Southeast Light. A Federal project provides for two rubble-mound breakwaters, the main breakwater extending northerly about 1,950 feet from shore, the other extending northerly and easterly about 1,100 feet long, enclosing with the main breakwater, an area designated as Inner Harbor; masonry walls in the southeastern corner of Inner Harbor, enclosing an area nearly 300 feet square designated as **The Basin**; and dredging to a depth of 15 feet the outer protected area and about 67 percent of the Inner Harbor and Basin. In July 1949 the controlling depth through the outer and inner harbor and thence to the head of the basin was 13 feet. However, shoaling had occurred to constrict the channel opposite the west breakwater light to substantially less than its 100-foot project width. Strangers should obtain local information before entering. It is reported that shoaling had occurred more rapidly in 1948 and 1949 than in any similar period. The inner harbor had depths of 13 to 16 feet except at the edges, is about 600 feet by 800 feet in the clear, and is occupied by pleasure craft during the summer. The breakwater on the north side should be given a berth of 100 feet, the one on its western side 150 feet, and the southwestern shore 250 feet. The eastern part of the inner harbor is left clear for

the passage of the steamer to the wharf. The basin at the south end of the inner harbor is 250 feet square, and is usually occupied by fishing boats and other local craft which moor to piles on the sides of the basin and to the bulkhead on its south side. The deepest draft using Block Island Harbor is about 12 feet.

The east breakwater extends about 300 yards northward of the entrance of the inner harbor, and is marked at its end by Block Island Breakwater Light, 33 feet above water and visible 7 miles. It is shown from a black skeleton square tower on a white tank house with black concrete base. A buoy is close northward of the end of the breakwater, and a bell buoy 600 yards northeastward. The end of the breakwater on the west side at the entrance of the inner harbor is marked by Block Island Breakwater Outer Basin Light, 27 feet above water, shown from a red skeleton tower and daymark, with white tank house.

To enter The Harbor steer a 185° course passing 250 feet westward of the light at the end of the east breakwater, about 140 feet eastward of the light on the west side of the inner harbor, and continuing to the middle of the entrance of the basin. A 9-foot spot on the west side of the channel opposite the east breakwater light is marked by a buoy.

Great Salt Pond, on the west side of Block Island, is the best harbor in the sound for vessels of 18-foot or less draft. In easterly gales when the sea is too heavy to enter The Harbor, a landing can be made at Great Salt Pond. The entrance is 2 miles southwestward of Block Island North Light. The entrance is a dredged cut 300 to 500 feet wide through the narrow beach separating the pond from the sound. The southwestern side of the entrance is formed by a jetty extending to a depth of about 18 feet in the sound. On the northern end of the jetty is Great Salt Pond Breakwater Outer End Light, 49 feet above water and visible 12 miles. It is shown from two red, square skeleton towers, white tank houses on the outer end of the breakwater.

The fog signal, which is adjacent to and mounted on a similar red skeleton tower, is sounded on an air diaphragm horn.

Great Salt Pond Breakwater Inner End Light, 28 feet high and visible 10 miles, is shown from a red square tower, concrete base on the inner end of breakwater. A shoal on the southeast side of the pond is marked by a buoy. A shoal extends about 0.3 mile from the north side of the pond. The 18-foot curve lies 150 to 200 yards from the west side of the pond, except off **Cormorant Point,** where it makes off 250 yards.

A Federal project provides for a channel from the ocean to the pond, 600 feet wide and 25 feet deep in the center, and for two riprap jetties at the entrance, the north jetty about 1,200 feet long and the south jetty extending 350 feet beyond the 18-foot contour. In July 1949 shoaling had constricted the channel to less than 200 feet in width at a point just north of the Coast Guard station. Shoaling also is making out northeasterly from the Breakwater Outer End Light into the channel. The controlling depth through the channel was 22 feet. The steamer wharf has a depth along its northeast side of 16 feet, 20 feet at the face. The southwesterly side has depths of 14 to 16 feet. A 12-foot spot was found 75 yards northwest of the northwest corner of the steamer wharf. All piloting is done by local fishermen.

The usual anchorage in Great Salt Pond is near the southeast end, off the steamboat wharf, in 15 to 48 feet, taking care to leave a fairway to the steamboat wharf and avoid the cable area from the harbor entrance to the southwest side of the same wharf. A dredged channel with a controlling depth of 9 feet leads to **Trim Pond** where local

fishing craft are moored. Block Island Coast Guard Station 62 is on the west side of the pond at the south side of the entrance. The mean range of the **tide** is about 2½ feet.

Tidal currents in the entrance to the pond have an average velocity at strength of about ½ knot. Consult *Current Tables* for predictions.

Storm warnings are displayed near Block Island Southeast Light and from a Weather Bureau skeleton tower about 0.3 mile from the south end of Great Salt Pond.

To enter Great Salt Pond pass 50 yards eastward of Great Salt Pond Breakwater bell buoy 2 and steer **143°** through the middle of the entrance, heading for the steamboat wharf at the head of the pond passing 300 feet off the southwest jetty and midway between the buoys marking the inner end of the entrance channel. This course leads to the usual anchorage.

Supplies of most kinds for small boats are available both at The Harbor and at Great Salt Pond. In Great Salt Pond, about 0.3 mile to the westward of the steamboat wharf, is a private wharf with 16 feet at its face in July 1949. Water, ice, and gasoline can be obtained at this wharf, and mooring buoys have been established to the northwestward of the wharf.

A marine railway capable of handling small craft up to about 50 tons weight is located at New Harbor, but in 1949 it was inactive.

There is a steamer service from The Harbor to Providence, via Newport. During the summer a steamer runs from Great Salt Pond to New London. In heavy southeasterly weather the Providence boat uses Great Salt Pond. A steamer operates from Point Judith to both Great Salt Pond and The Harbor. It carries mail, passengers, freight, and vehicles.

The island is also served by a cable and telephone service to the mainland. A radio station near the Shoreham Coast Guard Station is available for public use.

Chart 276.—Point Judith Light, 65 feet above the water and visible 14 miles, is shown from an octagonal, pyramidal tower, with the lower half white, upper half brown, connected with a dwelling. The fog signal is an air diaphragm horn. A radiobeacon operates at the light. **Storm warnings** are displayed day and night from the Coast Guard station which is 100 yards north of the light.

A lighted whistle buoy is 1.2 miles southward of the light. A lighted gong buoy is 2.2 miles southward of the light. Eastbound traffic usually makes the gong buoy and westbound traffic makes the whistle buoy.

A prominent elevated water tank is 1.8 miles north of Point Judith Light.

The area around Point Judith, including the approaches to Point Judith Harbor of Refuge, has depths less than 42 feet, is irregular with rocky bottom, and indications of boulders. Caution is advisable to avoid the shoal spots, even with a smooth sea, and to exercise extra care where the depths are not more than 6 feet greater than the draft.

Point Judith Harbor of Refuge, on the west side of Point Judith, is formed by a main V-shaped breakwater and two shorearm breakwaters extending to the shore. The harbor is easy of access for steamers and sailing vessels, except with a heavy southerly or southeasterly sea. It is little used by tows. The only soft bottom in the harbor is found in the southern part of the deeper water enclosed by the main breakwater. On the north side the shoaling is gradual, the 18-foot curve being about 0.3 mile from shore, except at the northwest corner where it reaches out 0.5 mile.

A shoal area with depths of 4 to 6 feet extends southward into the harbor from the north shore off the entrance to Point Judith Pond. A buoy marks the southwest limit of this shoal. A shoal spot with depths of 4 to 6 feet is 100 yards north of the buoy, and other shoal spots of 5 to 8 feet extend northward to the east breakwater at the pond entrance. Near the central part of the harbor are two shoals; the northernmost one having depths of 15 to 18 feet and the southernmost one having depths of 17 to 19 feet, and marked by a buoy.

The area within the main breakwater and south of a line joining its northern ends affords protected anchorage for small craft. The breakwater should be given a berth of 200 yards to avoid broken and hard bottom, and a rocky shoal area about 100 yards wide, paralleling the west side of the main breakwater northward from the angle should be especially avoided. A good berth for a large vessel is on a line between the East and West Main Breakwater Lights and midway between them in 30 feet. This position falls on the edge of the east-west thoroughfare used by pleasure craft and fishing boats.

The east entrance to the Harbor of Refuge is 400 yards wide, and the ruling depth is 22 feet, with deeper water lying in the western half of the entrance. At 0.6 mile southward of the entrance is a shoal ridge which extends in a curve from the angle of the main breakwater to Point Judith. A shoal with depths of 20 and 21 feet is 520 yards southeast of the Main Breakwater Center Light, and other 20-and 21-foot spots extend as far as 300 yards south of the same light.

Spots with 25 to 28 feet have been found on this ridge, and less water for a distance of nearly 0.4 mile off Point Judith Light and nearly 0.3 mile off the angle of the breakwater. On account of the broken bottom, 20 feet is about the deepest draft that should cross the ridge with a comparatively smooth sea.

Approaching the east entrance from eastward and northeastward, give Point Judith a berth of about 0.6 mile and steer for Main Breakwater Center Light on any bearing northward of 270° until the entrance bears northward of 314° and then haul up for it. From westward, pass southward of the bell buoy, lying more than 0.5 mile southward of the angle of the main breakwater, on an east course, and haul up for the entrance when Main Breakwater East Light bears northward of 004°. When passing through the entrance, the course should be westward in the harbor. Deep-draft vessels should favor the west side of the entrance.

The west entrance to the Harbor of Refuge is 500 yards wide, with ruling depth of 19 feet. Spots of 17 feet in depth and less extend a distance of 150 yards south of the north side of the entrance, and spots of 18 feet in depth lie as far as 120 yards west and northwest of the south side. A shoal with depths of 22 to 26 feet is 0.5 mile west of the Main Breakwater Center Light.

The tidal currents have a velocity at strength of about 3 knots and cause surface disturbances at times. See *Current Tables* for predictions.

Currents.—Predicted times of slack water and times and velocities of strength of current for every day in the year are given in the *Current Tables, Atlantic Coast*. In the middle of The Race, the flood sets about 315° and the ebb 120°. Near Race Rock and Little Gull Island the current turns about ½ hour earlier than in the middle of The Race. The average velocity at strength of flood is about 3⅓ knots and at strength of ebb 4⅓ knots. There are always strong rips and swirls in the wake of all broken ground in The Race, except for about ½ hour at slack water. The rips are exceptionally

heavy during heavy weather, and especially when a strong wind opposes the current, or the current sets through against a heavy sea.

Point Judith Pond is a salt water tidal pond extending 3.3 miles northerly from the northwestern part of the Harbor of Refuge at **The Breachway** to the town of **Wakefield.** It is extensively used by small fishing vessels and pleasure craft, and several fish wharves are inside the entrance.

The villages of **Galilee** on the east side of the entrance and **Jerusalem** on the west side, at **Succotash Point,** have State piers and numerous small piers chiefly used by fishermen. A lifeboat sub-station is maintained at Galilee from the U. S. Coast Guard Station at Point Judith.

A Federal project, approved June 30, 1948, provides for a channel into Point Judith Pond 15 feet deep and 150 feet wide between the jetties and extending thence on the west side of the pond to a point 100 feet north of the State pier at Jerusalem with a branch channel 15 feet deep and 200 feet wide on the east side of the pond extending to a point 100 feet north of the State pier at Galilee; an anchorage basin 10 feet deep in the triangular area between the branch channels; a channel 6 feet deep and 100 feet wide from the 15-foot west branch channel to the vicinity of Wakefield with an anchorage basin 6 feet deep and about 5 acres in area at the upper end.

The pond entrance is 75 yards wide, with rock jetties on both sides and depths from 10 to 19 feet. A large shoal area, with its south tip marked by a buoy, is just inside the entrance, between the State piers. The shoal bares at low water, but depths of 8 to 12 feet are on both sides of it. A channel, marked by buoys, extends along the west side of the pond to the north end. In August 1948, the channel depths were 4 to 8 feet, with sand bars of 3 feet narrowing it on both sides in the area from 1 to 1.3 miles north of the entrance. Thence 4 feet in the buoyed channel to Wakefield.

To enter Point Judith Pond, give the south end of the western breakwater a berth of 100 yards and enter about midway between this breakwater and the buoy 190 yards north-northeast of the breakwater light. A minimum of 11 to 12 feet may be carried by keeping the western breakwater about 60 yards on the port beam and increasing this distance to 90 yards when passing the sharp northeast bend in the breakwater 300 yards from the breakway entrance.

To approach the State pier at Galilee, keep 50 to 75 yards off the eastern water front and avoid the center shoal marked by a buoy. To go up the pond from the entrance, head for the State pier on the western water front until it is close by, then follow the buoys at a distance of about 50 feet. A stranger should obtain local information at the wharves near the entrance.

The tides in the pond have a range of about 3 feet, and occur later than those in the Harbor of Refuge by approximately 15 minutes just inside the entrance and 50 minutes at the north end. The currents in the entrance have a maximum velocity of about 3 knots and cause slight rips and overfalls at changes of tide.

Gasoline, water, and provisions are available at Galilee and Wakefield. Repair parts are available at Wakefield.

A small repair yard on the west side of the pond about 0.7 mile from the entrance has a marine railway limited to small craft with a draft of not more than 3 feet. Light repairs to hulls and motors can be obtained.

A boatyard at the north end of the pond has several boat landings and a marine railway capable of handling vessels up to 68 feet length and 5 feet draft.

Daily boat service is available to Block Island from Galilee. Daily bus service to Providence is maintained. Wakefield has railroad service.

Chart 1210.—Potter Pond is a shoal landlocked pond 0.5 mile west of Point Judith Pond and is connected with it by a narrow high-tide channel suitable for row-boats only. The channel is crossed by a highway with a clearance of 5 feet at high water and a current of more than 3 knots develops on the ebb. The pond has general depths of 1 to 6 feet and an arm at the north with depths of 26 feet.

The mean range of tide is about 1 foot, and it occurs about 2½ hours later than in the Harbor of Refuge.

Chart 1211.—From Point Judith to Watch Hill the shore is low and for the most part consists of sandy beaches which are broken by several projecting rocky points. Back from the immediate shore are areas of cultivation interspersed with rolling grass-covered or wooded hills. Except for Point Judith Pond, most pond outlets are either closed or used only at high tide by rowboats. The coast is fringed by broken ground and boulders in places, which should be avoided by deep-draft vessels where the depths are less than 36 to 42 feet.

Matunuck is a summer resort about 3 miles west of Point Judith. Three square observation towers, 1 mile west of Matunuck, are prominent. Southwest of **Matunuck Point,** 2 miles distant, is **Nebraska Shoal,** a patch of boulders with a depth of 21 feet over them and marked on the south side by a buoy. The shoal is at the south end of broken ground, with depths less than 30 feet making off from the coast; the water deepens abruptly around the patch.

Charlestown Beach is a small summer settlement on the beach between **Green Hill** and **Ninigret Ponds.**

Quonochontaug Beach is a summer settlement at the outlet of **Quonochontaug Pond.** The entrance is used only by shallow-draft boats.

Weekapaug Point is bold, rocky, and prominent from the southwest and southeast. The entrance to **Winnapaug Pond** is shallow and strangers should never attempt to enter. A fixed bridge crossing the entrance has a horizontal clearance of 50 feet and a vertical clearance of 6½ feet at high water.

Old Reef, with a depth of 4 feet over it, is about 1 mile west of Weekapaug Entrance and about 0.5 mile offshore. It is marked by a buoy.

Misquamicut is a summer resort near the west end of Winnapaug Pond.

Chart 358.—Watch Hill is a high bare bluff, with a number of large hotels and summer houses. Communication is by bus with Westerly.

Watch Hill Light, 61 feet above the water and visible 13 miles, is shown from a square gray granite tower attached to a white dwelling on **Watch Hill Point,** a low point of land southward of Watch Hill. The light is obscured from 240½° to 254½° by an observation tower located adjacent to the light. The fog signal is an electric diaphragm horn. It is reported that the fog signal is not easily heard when eastward of the light. From the southwest it can be heard nearly to Montauk Point.

Watch Hill Coast Guard Station is 300 yards northward of the light.

Gangway Rock, awash at low water, is part of a boulder reef extending 400 yards southward from Watch Hill Light. A lighted bell buoy marks the south end of the reef. A sunken rock is about 100 yards westward of the buoy.

Watch Hill Passage is the principal entrance, and the only one used by strangers, to Fishers Island Sound from eastward. It has a least depth of about 17 feet. The currents are sufficiently strong to tow under the buoys at times, but set with the course through the passage. A spot with 12 feet over it in the passage is marked by a horizontal-banded buoy; the best channel is northward of this buoy, giving it a berth of about 100 yards. A lighted fairway whistle buoy is 2.5 miles 170° from the light.

Watch Hill Reef, on the southwest side of Watch Hill Passage, has rocks bare at low water and is marked by a gong buoy on the northeast end. The wreck of a vessel with one mast showing about 30 feet above the water, lies on the northeastern side of the reef. In the vicinity of the reef the current has an average velocity of about 2 knots at strength.

Sugar Reef Passage, between Watch Hill Reef and Sugar Reef, has a width of 0.3 mile in which the least depths are 20 to 23 feet. The tidal currents have about the same velocity as in Watch Hill Passage.

Sugar Reef has little depth in places and is marked at its northwest end by Sugar Reef Daybeacon, a spindle with a conical cage. The reef extends 600 yards east-southeastward and 0.3 mile southward from the spindle.

Catumb Passage, between Sugar Reef and Catumb Rocks, has a width of 250 yards in which the least depth found is 22 feet. The tidal currents are stronger than in Watch Hill Passage.

Catumb Rocks, the highest part awash at high water, is marked by a buoy at the west end and by two buoys at the east end. Rocks with 1 to 18 feet over them extend 0.8 mile westward of Catumb Rocks to a buoy which marks the rocks on the east side of Lords Passage. **Lords Passage,** eastward of Wicopesset Rock, has a width of nearly 0.3 mile, in which the least depth is 20 feet. The tidal currents set diagonally across the passage and have an average velocity of nearly 2 knots at strength, the ebb being greater than the flood.

On the east side of Lords Passage a reef with depths of 5 to 15 feet extends in a general northwesterly and southeasterly direction for a distance of over 1 mile. The west side is marked by a buoy.

Wicopesset Island, small, low and rocky, is surrounded by foul ground. **Wicopesset Rock,** at the eastern end of the foul ground, is marked on the northeast side by a buoy.

Wicopesset Passage is between Wicopesset Island and East Point. This channel is narrow and is obstructed by a rock in the middle which is marked by a buoy; it is suitable only for small craft and should not be used by strangers. A bell buoy marks the southern entrance.

Extreme caution is recommended when using the passage as boats are apt to be set by the ebb current on the foul ground which extends 0.3 mile northwestward from Wicopesset Island.

Fishers Island is 6 miles long, hilly, and sparsely wooded. **Chocomount,** 136 feet high, is the highest point on the island. The Coast Guard station at **East Harbor,** about 1 mile from East Point of Fishers Island, is prominent; numerous buildings on the western part of Fishers Island and a large yellow hotel building are conspicuous. **Storm warnings** are displayed day and night from a signal mast east of the Coast Guard station. The south side of the island is fringed with foul ground which rises abruptly from depths of 42 to 48 feet; but by giving the shore a berth of 0.5 mile all dangers will be avoided.

Race Point Ledge, partly bare at low water, extends nearly 0.3 mile southwestward from **Race Point**, the southwest extremity of Fishers Island, and is marked at its end by a buoy. Inside the buoy are boulders with 3 to 9 feet over them. The passage between this buoy and Race Rock Light has very irregular bottom, although the least depth found was 25 feet. It is suitable only for small vessels with a comparatively smooth sea.

Race Rock, on the northeast side of The Race, is nearly 200 yards in diameter, with a depth less than 18 feet, and is marked by Race Rock Light.

Race Rock Light, 67 feet above the water and visible 14 miles, is shown from a granite tower attached to a dwelling on a granite pier, 0.5 mile southwest of Race Point. The fog signal is an air siren.

Chart 298.—Little Gull Island Light, 91 feet above water and visible 15 miles, is shown from a gray granite tower, attached to a red dwelling on a pier at the south side of the east entrance to Long Island Sound. The fog signal is an air diaphragm horn; the radiobeacon is synchronized with the fog signal for distance finding.

Little Gull Reef, with little depth over it, extends nearly 0.3 mile east-northeastward from little Gull Island Light, and is marked by a buoy. Depths less than 30 feet extend nearly 0.4 mile northeast and north from the light which should not be approached closer from these directions. Deep-draft vessels should avoid this locality. The passage between Little and Great Gull Islands is foul. Great Gull Island is described under Gardiners Bay.

The Race is the main entrance from eastward to Long Island Sound. It is marked by Race Rock and Little Gull Island Lights, between which it has a width of 3.5 miles. Between these lights the only dangers are Valiant Rock and Little Gull Island Reef. Cerberus Shoal is the only outlying danger in the southeasterly approach.

Vessels should pass from 0.5 to 0.8 mile southwestward of Race Rock Light in passing north of Valiant Rock. Passing southward of the rock, vessels will keep in the clearest part of the passage on a southeasterly course by passing about 1 mile northeastward of Little Gull Island Light.

Valiant Rock, nearly in the middle of The Race, has a least found depth of 18 feet, and the surrounding shoal area is nearly 0.4 mile long in a northeast and southwest direction with depths of 18 to 30 feet. The 10-fathom curve surrounding Valiant Rock includes the area that should be avoided by deep-draft vessels, and preferably by all vessels, on account of the heavy swirls and rips. The lights are the guides, as soundings cannot be depended on. A lighted bell buoy marks the northerly side of the rock.

Chart 1211.—Cerberus Shoal, 6 miles 136° from Race Rock Light, has a length of about 0.4 mile in a north and south direction, with depths less than 36 feet, has a least depth of 12 feet on a small rocky patch near its north end. Seas break on this shoal during heavy swells. It is marked by a lighted whistle buoy. Near the shoal tide rips are unusually strong.

Chart 298.—Great Gull Island is 0.4 mile long, 30 feet high, rocky, and has a number of large buildings. A wharf with 15 feet at its end is on the north side of the island. Except for about one-half hour after the beginning of the flood current in The Race, the current sets eastward at the wharf, and vessels generally land at the

wharf heading westward. Both eastward and westward of the wharf are rocks which extend outside the line of its face, those eastward of the wharf being marked by a buoy. Approaching from eastward, keep the outer small house on the west end of the island open from the wharf, and in leaving swing the bow out from the wharf to insure clearing the rocks westward.

The passage between Great Gull Island and Plum Island has a number of known dangers and very irregular bottom with boulders, and should be avoided. The part of the passage between Old Silas Rock and Plum Island has been examined by means of a wire drag; boulders with depths of 3 to 10 feet were found. The average velocity of the tidal current at strength is about 2¼ knots, but considerably higher velocities occur at times. The tide rips are bad in heavy weather. **Old Silas Rock** is awash at high water. The buoy marking an 8-foot rock on **Middle Shoal** is reported to be towed under by tidal currents of less than spring velocity.

Bedford Reef is broken ground, on which the least depths found are 13 to 16 feet, extending about 1.5 miles southward from broken ground lying between Great Gull and Plum Islands. It should be avoided. **Constellation Rock** is on the southeasterly extension of this broken ground; it has 17 feet over it, is marked by a buoy and lies 1.9 miles 184° from Little Gull Island Light.

Chart 1211.—Montauk Point, the easterly extremity of Long Island, is a high sandy bluff, on the summit of which is the light. The land is grass-covered and has a greatest elevation of 165 feet at **Prospect Hill,** 2 miles westward of the point. The south side of the point is bold, the 10-fathom curve being about 0.5 mile from shore; depths of 24 feet and less extend 0.8 mile off the northeast side of the point.

Montauk Point Light, 168 feet above water and visible 19 miles, is shown from a white octagonal, pyramidal tower, brown band midway of height, covered way to dwelling on the bluff. The fog signal is sounded on two air diaphragm horns pointing 030° and 140°. The radiobeacon is synchronized with the fog signal for distance finding.

Surrounding Montauk Point to a distance of about 4 miles is an area which includes Montauk Shoal, Great Eastern Rock, Phelps Ledge, and Endeavor Shoals. This area has been closely developed but the bottom is very broken and extra caution should be observed where the depths are less than about 10 feet greater than the draft. In general, the shoals are a series of long narrow ridges, in places only a few yards wide, and their positions are indicated by the rips over them at the strength of the tidal currents.

By giving Montauk Point a berth of over 1 mile and avoiding Great Eastern Rock and the shoalest part of Endeavor Shoals, the dangers eastward and northeastward of Montauk Point would not in smooth weather interfere with vessels of 20 feet or less draft. From longitude 71°46′.5 W., 3.8 miles eastward of Montauk Point Light to within 0.5 mile of Block Island, the area with depths less than 60 feet has been examined by means of a wire drag, and the least depths are shown on the chart.

Montauk Shoal, with depths of 30 to 36 feet, is between 2 and 3 miles southward and south-southeastward of Montauk Point Light. The shoal is 1.5 miles long in a west-northwest direction. It has been examined by means of a wire drag, and the least depth found is 32 feet. The shoaling is abrupt from 66 feet on the south side of the shoal. Detached shoals, on which the least found depth is 33 feet, are 1.5 miles south-

southeastward of Montauk Point. A lighted whistle buoy is moored 4 miles southeastward of Montauk Point.

Great Eastern Rock has a least depth of 24 feet and is 1.5 miles 074° from Montauk Point Light. The rock is marked by a bell buoy. **Phelps Ledge** has a least found depth of 28 feet. The least found depths found on **Endeavor Shoals** are 21 to 24 feet on a narrow ridge about 0.4 mile long, which is 2.3 miles 028° from Montauk Point Light; detached shoals extend farther eastward for a distance of 2 miles where the depth is 27 feet. A lighted gong buoy marks the southern extremity.

Broken ground with rocky bottom and boulders extends 2 miles northward to **Shagwong Reef,** which is marked by a lighted bell buoy. **Shagwong Rock,** marked by a buoy, and **Washington Shoal** are 0.3 mile and 1.0 mile, respectively, northward of **Shagwong Point.** The principal danger outside Shagwong Reef lighted bell buoy is a shoal with a depth of 30 feet, 1.8 miles northwestward of the buoy. An obstruction with 10 feet over it has been reported as lying 600 yards 228° from Shagwong Reef. Vessels should avoid this broken ground.

Montauk Harbor (Great Pond) has been developed by private interests and is a good harbor for small craft. The approach is marked by a bell buoy 0.3 mile northward of the entrance. The entrance channel, which in 1948 had a reported controlling depth of 9 feet for a width varying from 150 to 75 feet, leads between stone jetties the seaward ends of which are marked by flashing lights. From the inner end of the land cut, the channel leads directly to the anchorage basin of Star Island on which the yacht club is located. It was reported in September 1949 that a dredged channel 12 feet deep and 175 feet wide would be completed during the latter part of that month.

Star Island is connected to the mainland by a causeway on the southwest side of the island. A basin on a radius of 400 yards from the south end of Star Island has been dredged to a depth of 12 feet. A bar covered by 3 feet at the south end of this dredged area, except for a 7-foot channel near the west side of the bay, was an obstruction to the lower part of the bay.

In the anchorage area depths range from 8 feet near the wharves on Star Island to 15 feet about 200 yards off the yacht club landing. Local craft consisting mostly of fishing boats anchor in the bight south of the island in depths of 5 to 8 feet. Anchorage in the harbor is designated by the harbor master at the yacht club. Local regulations regarding speed, mooring, garbage disposal, and navigation within the harbor may be obtained from the harbor master.

The mean range of the tide is about 2 feet.

During spring tides there are strong currents in the entrance, reported to be as much as 3 knots. They decrease rapidly after entering the harbor and are practically negligible near the the yacht club landing.

To enter the harbor, steer midway between the jetties on a course **167°**. When abreast the wharf on the west side of the entrance steer **128°** heading for the northeast tangent of Star Island, continue on this course until the east jetty bears **347°** (prolongation of the centerline of the jetty) and then steer **100°** for about 200 yards. When northward of the north end of Star Island steer on mid-channel course **135°**, between Star Island and the shore of the mainland northeast of the island to the anchorage east of the yacht club landing.

On the westward side of the entrance is a well constructed wharf the face of which parallels the channel for a distance of 180 feet and which has a depth of about 12 feet

along the entire length. A wharf is at the north end of Star Island. Several private landings are on the east side of the harbor with depths of about 8 feet at the ends. On the east side of Star Island are several piers and landings for use by the yacht club. The yacht club landing has 12 feet depth at the face. The slips have about 8 feet depth.

Gasoline, Diesel oil, lubricants, fresh water, and ice are available at the dock on the west side of the entrance. Provisions and other supplies may be obtained at the village of Montauk or at the yacht club.

See regulation § 206.40 (b) (7) for boat opening in the fish traps in Chapter 2.

Fort Pond Bay is a semicircular bay about 1 mile wide on the north side of Long Island, 5 miles westward of Montauk Point. The bay is free from dangers, but flats with 8 to 12 feet over them make out 0.3 mile from its eastern shore. The bay affords anchorage for vessels in 42 to 40 feet, soft bottom, but is exposed to northerly and northwesterly winds; the shoaling is abrupt on its east and south sides. The flats at the southeast corner of the bay are generally occupied as an anchorage by small craft during the summer. **Montauk**, a summer resort at the southeast end of the bay, is the terminus of the Long Island Railroad. The railroad pier at Montauk has a depth of 25 feet at the end, shoaling to 19 feet near the head of the dock and 20 feet about 200 feet on the line of its face; the shoaling abrupt. The northerly wharf at Montauk has a reported depth of 16 feet at its end. The smaller wharves have depths of from 5 to 10 feet at their ends. Diesel oil, gasoline, fresh water, and provisions can be obtained at Montauk.

Chart 298.—Gardiners Bay is at the western end of Block Island Sound from which it is separated by Gardiners Island. It is an excellent anchorage and easily entered either day or night. It is the approach to Shelter Island Sound and the Peconic Bays, localities frequented by numerous yachts and motorboats during the summer. The main part of the bay has been examined by means of a wire drag. In addition to the lights, the white church spires at Orient and Sag Harbor are prominent and can be used as aids to navigation. The principal entrance is from eastward, northward of Gardiners Point, and is available for vessels of any draft. The entrance from Long Island Sound is through Plum Gut. The entrance southward of Gardiners Island, Promised Land Channel, is used by fishing vessels. The nearest marine railways are at Greenport, New London, and Fishers Island Sound.

Numerous oyster stakes are in the bay and small craft should proceed with caution when crossing areas where they are found.

Plum Island is 2.5 miles long, hilly, bare of trees except near the southwest end, has a number of large buildings, and is marked at its westerly end by a light.

Plum Island Light, 75 feet above water and visible 14 miles, is shown from a white tower on a granite dwelling on the west end of the island. The fog signal is an electric siren, if the siren is disabled, a bell is sounded.

The bight in the southeast side of Plum Island is foul out to **Plum Island Rock** which is 0.5 mile from shore abreast of the middle of the island, has 1 foot over it, and is marked by a buoy.

Plum Gut Harbor, on the southwest side of Plum Island, has an entrance between jetties and a reported depth of 15 feet in the entrance and harbor, but it is reported that there has been some shoaling in this area. A bell buoy is moored about 300

yards off the end of the east jetty. It is necessary only to stand in midway between the jetties on a **025°** course and go to the wharves.

Small yachts seeking shelter in the harbor lie alongside the wharves. Plum Gut Harbor is under the supervision of the Department of the Army and may be used only with the permission of the local representative of that department.

Plum Gut, the entrance to Gardiners Bay from Long Island Sound, is nearly 0.8 mile wide and has sufficient water for vessels of the deepest draft; in the passage are several rocks with depths of 17 to 19 feet over them, and tidal currents set through with great velocity. Steamers or sailing vessels with a strong favorable wind should have no difficulty in passing through.

Slack water and strengths of flood and ebb occur about 1¼ hours earlier than the corresponding phases of current at The Race. Daily predictions for The Race are given in the *Current Tables*. Strengths of flood or ebb have average velocities of about 3¾ knots. The flood sets northwestward and the ebb southeastward. Heavy tide rips occur. Caution is recommended when using this passage.

Orient Point Light, 64 feet above the water, visible 14 miles, is shown from a brown conical tower on a black pier on the outer end of **Oyster Pond Reef.** The fog signal is an air diaphragm horn. Caution is recommended when using sound signals as aids to navigation as they are difficult to hear, particularly with an easterly wind. Numerous boulders and little depth are between the light and **Orient Point.** The light should be given a berth of over 600 yards when northward and east-northeastward of it.

A wire drag set to 16 or 17 feet has been passed over the broken ground in Plum Gut between, but not over, **Midway Shoal** and the end of Oyster Pond Reef, passing 350 yards east-northeastward of Orient Point Light and over the **Middle Ground,** passing 250 yards westward of Plum Island Light. This insures a clear channel for vessels of about 15 feet draft at low water by avoiding Midway Shoal; it is well to give Plum Island and Orient Point Lights and the shore of Plum Island, just southward of Plum Gut Harbor, a berth of over 0.2 mile. The best water in the passage will be found on a **295°** course, passing Pine Point and Midway Shoal buoy at a distance of 350 yards and passing midway between Orient Point and Plum Island Lights. A wharf in ruins is on the south side of Orient Point, 1 mile westward of the light. It has a depth of 8 feet at the end. A steamer from New London and Montauk stops here during the summer.

Ram Head is a prominent yellow bluff on the western shore of Gardiners Bay. A lower bluff is nearly 1.5 miles westward of Ram Head with a house on top. A shoal with 7 to 12 feet over it extends 1.5 miles southeastward from Ram Head.

A boulder with 1 foot over it is 230 yards from shore about 650 yards northeastward of the northern point of the entrance to Coecles Harbor. Other boulders with little depth are between this boulder and Ram Island.

The entrance to **Coecles Harbor** is at the south end of Ram Head; it is little used except by local craft of shallow draft.

Threemile Harbor, on the south side of Gardiners Bay, has a dredged channel over a shifting bar leading into it. The controlling depth at mean low water across the bar and to the head of the improved channel was reported to be 5½ feet in 1949. Buoys mark the entrance channel which leads between two short jetties. A light is on the north end of the east jetty which is privately maintained. After passing the entrance

buoys the channel is marked by small colored pilings which are privately maintained.

A public commercial landing is on the east side of the channel about 0.6 mile from the entrance with reported depths of 8 feet at mean low water.

Anchorage is available in Threemile Harbor in depths of 9 to 14 feet with soft bottom and good holding ground.

The range of the tide in the entrance to the harbor is about 2½ feet. The tidal currents have a velocity of about 3 knots through the entrance of the harbor.

Several boatyards with marine railways are in Threemile Harbor. At **Maidstone,** on the east side of the harbor, are two marine railways with a maximum capacity of 55 tons weight, and capable of handling small craft up to 75 feet length with 9 feet draft. The yard is equipped with a lift of 12 tons capacity and can make all major repairs. The depth along the face of the dock at mean low water is 8 feet and in the mooring basin 7 feet. Diesel oil, gasoline, water, ice, and food are available.

The boatyard at the southeast end of Threemile Harbor has marine railways capable of handling small craft up to 70 feet in length, 6 feet in draft, and 40 tons in weight. Repairs to hulls and some machinery can be obtained. Diesel oil, gasoline, lubricants, fresh water, ice, and ship chandlery are available. Provisions can be obtained at the town of **East Hampton,** 3.5 miles south of Threemile Harbor.

Storm warnings are displayed by day from the Maidstone Boatyard.

Hog Creek Point, south of Gardiners Bay, is generally flat, with bluffs approximately 25 feet in height. A boys' school with a landing at **Fireplace** is just east of the point. **Lionhead Rock,** off the point, is awash at high water. Fishtraps are westward of the point.

Cartwright Island is a narrow, low, sandy island 1 mile long, extending in a southerly direction off the south tip of Gardiners Island. Its size and shape are subject to considerable change by storms. It is reported that a shoal sandy hook is making out in a general southeastward direction from the south end of the island. It is reported that depths of 1 to 3 feet extend about 0.7 mile from shore.

Napeague Bay is a shallow bay southeastward of Gardiners Island. The passage southward of Gardiners and Cartwright Islands is **Promised Land Channel.** It is used principally by fishing vessels. The deepest draft of the vessels using the channel from Napeague Bay to Promised Land is 16 feet.

Promised Land Channel leading to Gardiners Bay westward of Promised Land is well marked by buoys. The channel has a least depth of 14 to 16 feet in the center, but the shoals are shifting in character and local knowledge is necessary for vessels of over 10-foot draft. The tidal currents have an average velocity at strength of about 1½ knots through all the channels between the shoals.

Promised Land is a fishing village on the southwest side of Napeague Bay. Diesel oil, gasoline, fresh water, and provisions in limited quantities can be obtained here. The depths at the wharves are 15 feet and under. A depth of 7 feet can be carried to the landing of the Devon Yacht Club 1.3 miles westward of Promised Land.

In the absence of local knowledge it is not advisable for vessels of greater draft than 10 feet to attempt the passage of Promised Land or through Gardiners Bay, and then only when the buoys can be seen. Due to frequent changes occurring here no directions are given. The buoys should be followed.

Napeague Harbor has its entrance northeastward of **Hicks Island.** It is reported that vessels up to 5-foot draft can enter, and it is frequently used by small local craft,

especially in northeasterly weather when the adjoining bays are unsafe. The entrance is very narrow and there are no landings in the harbor.

Gardiners Island is partly wooded and has an elevation of 130 feet near its middle. Crow Head is the high bluff at the western end of Gardiners Island. A white experimental buoy is 1.8 miles west of **Crow Head**, the western headland of the island.

Shoal water with depths of 9 to 16 feet extends 1.8 miles southwestward from **Cherry Hill Point**, the southwest end of Gardiners Island and terminates at **Crow Shoal**. Crow Shoal with depths of 3 to 10 feet is marked on the western side by a buoy. A rock with 3 feet over it is near the northern part. The shoal is generally steep-to.

The bight between the south part of Gardiners Island and Crow Shoal is **Cherry Harbor.** It has depths of 24 to 27 feet with mud bottom and affords shelter from northeasterly winds.

Bostwick Bay is the bight on the northwest side of Gardiners Island. It affords excellent anchorage in easterly winds in depths of 24 to 25 feet, but is exposed to all westerly winds. No dangers are in the bay or its approaches, with the exception of Crow Shoal and the bar extending from the north point of Gardiners Island to Gardiners Point.

Gardiners Point is a low spit on which are the ruins of a concrete structure about 20 feet high and is at the northerly end of a very shoal bar which extends 1.5 miles north-northwestward from Gardiners Island. This shoal is steep-to on its north and west sides and is marked at its north end by a lighted buoy. A rock with a depth of 2 feet over it is just east of the north point of Gardiners Island and is marked by a buoy just to the eastward of it.

Courses to Gardiners Bay entrance are given in the directions for Block Island Sound. Little Gull Island and Orient Point Light and Gardiners Island lighted and bell buoys are the principal guides for the entrance from Block Island Sound. This entrance is over 1 mile wide between the 6-fathom curve on the broken ground surrounding Constellation Rock and Bedford Reef and the 6-fathom curve eastward of Gardiners Point. Course 274° for Orient Point Light leads in about the deepest water through the middle of this channel. When past Gardiners Island lighted and bell buoys, vessels can stand over for an anchorage which affords the best lee in the prevailing winds, or from abreast Gardiners Island lighted bell buoy deep-draft vessels can steer westward or west-southwestward until Orient Point Light bears north and then bring it astern on a 167° course, which leads in a least depth of about 36 feet until approaching the southern end of the bay.

The principal dangers are the broken ground between Constellation Rock and Bedford Reef, the shoal making out to Gardiners Point, and Crow Shoal. The shoaling is generally abrupt in approaching these dangers. In general, the shoaling is gradual in approaching the shoals on the western side of the bay. Fish pounds and many oyster stakes are on most of the shoals.

Plum Gut is used by vessels entering Gardiners Bay from Long Island Sound.

From a point about 0.4 mile southeast of Midway Shoal buoy at the south end of Plum Gut a course of 214° for 4.5 miles will lead to a position about 400 yards southeast of Shelter Island North Channel Entrance bell buoy; or, passing 0.3 mile northward of Gardiners Island lighted buoy, a course of 239° for 6 miles will also lead to the bell buoy.

If bound for Sag Harbor from Plum Gut a course of 191° from a point about 0.3

mile southeast of Midway Shoal buoy will lead to about 200 yards east of the Shelter Island South Channel buoy 2; or, passing 0.3 mile northward of Gardiners Island lighted buoy a course of 214° will also lead to the same position eastward of Shelter Island South Channel buoy 2.

Charts 298, 299.—**Shelter Island Sound** and Peconic Bays extend westward from Gardiners Bay about 22 miles to Riverhead, the head of navigation on Peconic River. They are much frequented by yachts and motorboats in summer. Fish traps and oyster stakes are on many of the shoals.

At low water a depth of 21 feet can be carried through the north part of Shelter Island Sound and Little Peconic Bay as far as Robins Island, and 18 feet through the south part of Shelter Island Sound. Across the bar between Little and Great Peconic Bays 14 feet can be carried at low water, and there is a greater depth in Great Peconic Bay. A depth of 6 feet at low water can be carried to South Jamesport; above this only launches and lighters go as far as Riverhead. From Great Peconic Bay boats of 4½-foot draft can be taken through Shinnecock Canal and by inside waters along the south side of Long Island to East Rockaway Inlet.

The mean range of the **tide** is about 2½ feet. The **tidal currents** have considerable velocity wherever the channel is narrowed. The average velocity at strength in the narrower places is about 1¾ knots.

Ice obstructs navigation in the coves and shallow harbors during January and February. Some drift ice is at Greenport but not sufficient to interfere with navigation. In the south arm of Shelter Island the ice is sufficiently heavy at times to be destructive to structures exposed to it.

No regular pilots are available. The piloting is generally done by fishermen or masters of small local vessels.

Towboats are rarely used, but they can be obtained from New London. Oyster steamers are available in case of necessity.

Diesel oil, gasoline, provisions, ice, water, and ship chandlery can best be obtained at Greenport and Sag Harbor.

Several shipyards and marine railways are at Greenport, also enclosed basins with excellent facilities for laying up and fitting out yachts. The largest marine railway is 170 feet long, with a capacity of 600 tons, and can haul out vessels up to 17-foot draft. Repairs to engines and hulls can be made.

Chart 298.—Extensive flats make off from Ram Head and the shore between it and Hay Beach Point. Southward and southwestward of the Long Beach Bar Abandoned Light are depths of 5 feet for a distance of nearly 0.8 mile from the south shore, and the edge of the shoal is marked by a buoy. The northerly part of these shoals extending 0.5 mile off the eastern side of Hay Beach Point is called **Hay Beach Point Flats** and is marked at the north end by a lighted buoy. From southward of Long Beach Bar Abandoned Light to Hay Beach Point the edge of the shoal is steep-to. **Hay Beach Point** is a low flat with a clump of scrub at the end, backed by wooded high land. Fish pounds are on the shoals and on both sides of Long Beach Point.

Long Beach Point is a low spit from which a bar with little depth extends to the former Long Beach Bar Light, a white tower and dwelling on concrete foundation.

Shoals with 10 to 12 feet over them extend 0.5 mile eastward from Long Beach

Point. The south and west sides of the shoal have depths of 14 to 15 feet, and rise abruptly from the channel. The limit of the shoal south of the point is marked by two lighted buoys. The bar has extended southward far enough to become a real danger to small boats. A lighted bell buoy is southward of the former light and northwestward of the lighted gong buoy marking the south limit of the shoal.

Orient Harbor is an excellent anchorage northwestward of Long Beach Point, the depths ranging from over 20 feet in its southern part to 16 feet at its northern end. A shoal extends 0.9 mile from the western shore at the entrance of Orient Harbor and is marked at its end by a buoy which is 0.6 mile northwestward of Long Beach Bar Abandoned Light.

Orient is a village at the northwest end of Orient Harbor. At the end of the main wharf the depth is 8½ feet.

To enter Orient Harbor, pass between the buoy and the abandoned light, giving the abandoned light a berth of over 300 yards, and steer **359°** up the middle of the harbor; select anchorage as desired, avoiding shoals extending off the shores. The eastern part of Orient Harbor, eastward of a line from Long Beach Bar Abandoned Light to the end of the wharf at Orient, has depths of 7 to 9 feet, with the exception of a channel 0.2 mile wide midway between them, which leads to Long Beach Bay. The channel is subject to shoaling and caution is recommended. Fish pounds are on the shoals.

About 0.4 mile northeast of **Cleaves Point,** at the southwest end of Orient Harbor, the shore has cut through to a small pond which is used as a basin for small craft. The entrance is between two jetties. Although a private basin, permission for its use is not necessary. South of the entrance is **Sheepshead Rock** which is marked by a buoy.

Long Beach Bay makes eastward from Orient Harbor on the north side of Long Beach Point. A dredged channel, with a least width of 35 feet and protected by dikes in places, leads through the bay to a wharf on the west side near its north end. In 1949 the channel had a depth of less than 3 feet, and the wharf had a depth of 6 feet. The channel is marked by the dikes and private aids. Leave the first dike, on the port hand, then follow the next dike, leaving it on the starboard hand until in the channel between the dikes, and when past them follow the bush stakes, leaving them on the port hand. The aids and dikes should be passed at a distance of about 20 feet. This channel is shoaling and local information is necessary before entering, even then considerable caution should be maintained.

Stirling Basin, on the northeast side of Greenport, is a part of Greenport Harbor. It was dredged in 1939 to form an anchorage basin 1,000 feet long and 360 feet wide over a depth of 8 feet. A channel 100 feet wide with the same depth connects the anchorage basin to Greenport Harbor. In September 1949 the controlling depth was 8 feet in both the anchorage and entrance channel for full project width except for two minor shoals in the channel at a least depth of 7 feet. A marine railway for small boats is at the head of the basin. A staked channel 2½ feet deep leads to oyster wharves in the northern part. In the approach to the basin is a marine railway together with several wharves, of which the principal and only public one is Union Wharf, which has a depth of about 11 feet at its outer part. A course **323°** for Union Wharf leads in the best water.

Greenport is an important town and the terminus of a branch of the Long Island Railroad. The white church spire, near the northern end of town, and the standpipe in the center of town, are prominent.

Greenport Harbor is formed on the northeast by a breakwater 5 feet high, which extends 0.3 mile south-southeastward from **Youngs Point**, nearly to the 18-foot curve, and is marked at its outer end by Greenport Harbor Light. The light, 27 feet above the water, is shown from a red skeleton tower, white tank house, on a red concrete base. From the shore end of the breakwater a flat extends 200 yards southward to the 6-foot curve and 300 yards to the 12-foot curve, and the generally used anchorage is off the edge of this flat in 12 to 36 feet, soundings being a good guide. The depths at the wharves range from 7 to 21 feet, according to location. The steamship and railroad wharves are on the south front of the town.

Several shipyards, marine railways, and a well-equipped machine shop are in Greenport. The largest marine railway has a capacity of 600 tons weight, 170 feet length, 28 feet draft. Facilities are available for boat building and all repairs on hulls and machinery.

Supplies of all kinds are available. Diesel oil, gasoline, and fresh water are obtainable at the docks of the various oil companies. A chart agency is located near the ferry landing. A ferry plies between Greenport and Shelter Island. Bus service connects Greenport and Orient Point where a steamer connects with New London during the summer.

Dering Harbor, southward of Greenport, is a favorite anchorage for yachts and motorboats. A shoal, with 5 to 7 feet over its outer part, extends halfway across the entrance from the southwest point at the entrance, and is marked at its northeast end by a buoy. The entrance is between the buoy and its eastern shore. The depths in the harbor range from about 12 to 15 feet just inside the entrance to 8 or 9 feet near the shores. Motorboats anchor eastward of the line of the coal pier at the southwest end of the harbor to avoid the shoal on the west shore. Vessels too large to enter can anchor outside the entrance buoy in 18 to 36 feet.

Shelter Island Heights is a post office on the southwest side of Dering Harbor. A ferry operates between Greenport and Shelter Island, the landing being at the southwest part of Dering Harbor.

Fanning Point is on the north shore of the channel at the southwest end of Greenport. Several prominent oil tanks are on the point. A shoal extends 300 yards off the point and is marked at its end by a buoy. Three dolphins, each surmounted by a light, are just northward of the point. They are privately maintained from March 1 to December 1.

Currents of 2 knots, running fair with the channel, have been reported in the vicinity of Fanning Point.

Pipes Cove, about 0.8 mile in extent, is southwestward of Greenport between Fanning Point and Conkling Point. Extensive shoals make off from the shores, and it is little used except by motorboats, which moor on its northeast side, where there are a few private landings. Boulders are found on the northwest side of the cove, and in general, boats should give the shores a berth of over 200 yards.

Conkling Point, on the north shore 1 mile southwestward of Fanning Point, is low and sandy at the end and has deep water as close as 150 yards.

Chart 299.—**Mill Creek** is the entrance to **Hashamomuck Pond.** The entrance is obstructed by a bar with a reported depth of 2½ feet. About 400 yards eastward of the entrance is a small bight into which leads a 4-foot channel. On the west side is a small repair yard with a marine railway for hauling out craft of 16 tons weight, 45 feet length, and 4½ feet draft. Gasoline and fresh water are available. Repairs to wooden hulls and gasoline engines can be made. Two fixed bridges cross the creek about 0.2 mile above the mouth. The first is a highway bridge with a horizontal clearance of 35 feet and a vertical clearance of 5 feet at high water. The second, a railroad bridge, has a horizontal clearance of 8 feet and a vertical clearance of 3½ feet at high water.

Jennings Point, the western end of Shelter Island, is high and wooded. Rocks are off the point close-to, and it should be given a berth of over 150 yards. A lighted buoy is moored off the northwestern extremity of the point.

The town of **Southold** is at the head of **Southold Bay,** which is the bight at the western end of Shelter Island Sound westward of Jennings Point. The public wharf with a depth of 6 feet is at **Founders Landing.** The wharf should be approached on a course of **270°** to obtain the deepest water.

For a distance of 1 mile northeastward of the wharf shoals with 12 feet or less extend nearly 0.4 mile from shore and are generally steep-to. The southwest part of the bay is shoal for a distance of 600 yards from shore. Anchorage can be selected with wharf bearing between 292° and 253° and distant from 0.1 to 0.4 mile, in 12 to 18 feet.

A small basin is about 0.5 mile northeast of Founders Landing, the entrance to which is between jetties. The controlling depth in the entrance and basin is about 4½ feet. Southold has a dredged channel 40 feet wide and a controlling depth of 6 feet. A boatyard can make all hull and engine repairs. A marine railway can handle boats of 25 tons weight, 50 feet length, and 7 feet draft. Gasoline, lubricants, water, electricity, and a full line of ship chandlery can be obtained.

On the opposite shore south of Founders Landing is a prominent white tower which is a conspicuous landmark. Gasoline, lubricants, fresh water, and ship chandlery can be obtained. A small repair yard with a marine railway for hauling out small craft of 25 tons weight, 50 feet length, and 7 feet draft is available.

Paradise Point, on the west side of the sound, is low and wooded, and from the point a sloping sand spit shows nearly out to **Paradise Point Shoal** lighted buoy, which marks the end of the shoal off the point. Southward of Paradise Point, shoals with depths of 10 to 15 feet extend from the west shore to mid-sound; the southeast point of the shoals is marked by a buoy which is about 0.7 mile southeastward of Paradise Point. Oyster stakes are in places on the shoals.

The channel north of Shelter Island is good for a depth of 21 feet and is easily followed when the buoys can be seen. It is generally used by all vessels, including those going to Peconic Bays. Vessels of less than 7-foot draft can follow the south side of Long Beach at a distance of 500 yards on course **239°**, passing about the same distance southward of Long Beach Bar Abandoned Light.

From Gardiners Bay to Hay Beach Point at a position about 200 yards southeast of Shelter Island North Channel Entrance bell buoy steer **273°** with the first buoy on the south side of the channel a very little on the port bow, passing south of the bell buoy south of Long Beach Point and when Long Beach Bar Abandoned Light bears 337°, steer **305°**, passing 250 yards northeastward of the lighted buoy. Rounding the lighted buoy at this distance, steer **259°** to a position 350 yards northward of Hay

Beach Point, and then, if going to Greenport, steer southwestward and pass south of the bell buoy off the light on the end of the breakwater.

From Hay Beach Point to Little Peconic Bay round Hay Beach Point at a distance of 350 yards, steer 222°, follow the southern shore at a distance of 350 yards, and round Conkling Point and Jennings Point at this distance. Then steer 154°, pass 100 yards eastward of the lighted buoy off Paradise Point, and continue the course about 0.5 mile past the lighted buoy until approaching a buoy south of Paradise Point. Round this buoy at a distance of about 200 yards, steer 208°, and pass 100 yards northwestward of Jessup Neck Shoal lighted buoy.

Chart 298.—The channel south of Shelter Island has numerous shoals, but is easily followed by vessels of 13 feet or less draft when the buoys can be seen. The approach from Gardiners Bay is across a shoal or bar which extends in a southeasterly direction from Ram Head to the south shore, the depths on which vary from 7 to 11 feet for a distance of 1.2 miles from Ram Head, and thence 13 to 17 feet to the buoys which mark the south side of the entrance. The southern end of this shoal, across which the channel leads, is called **Ram Head Shoal,** good for a depth of 17 feet, and is marked by a buoy. **Dangerous Rock,** awash at low water, in surrounding depths of about 12 feet, is 400 yards south of the channel which crosses the shoal. It is marked on the north side by a horizontal-banded buoy.

Cedar Point Shoal extends 0.3 to 0.4 mile north of the shore of **Cedar Point.** The shoal has boulders, and its edge is marked by buoys.

Cedar Island Light, 48 feet above water, visible 11 miles, is shown from a black skeleton tower, white tank house, on an island on the east side of the channel.

Nichols Point Shoal, with boulders and little water in places, extends nearly 0.5 mile east-southeastward from **Nichols Point** and is marked at its end by a buoy which is 0.5 mile northward of Cedar Island Light.

Single Rock buoy marks a boulder with 3 feet over it, which is on the western edge of the channel, 600 yards from shore, and 0.4 mile westward of Cedar Island Light.

Northwest Harbor is between Cedar Island Light and **Barcelona Point** and is strewn with boulders with 4 to 6 feet over them.

A group of rocks, locally known as **Gull Island,** showing bare at half-tide, is nearly 0.4 mile northeastward of the breakwater at Sag Harbor, and is marked off the north end by a buoy.

Gull Rock, bare at low water, is about 100 yards off the northeast side of the breakwater and about 400 yards southeast of Sag Harbor Breakwater Light. The rock is unmarked.

Sand Spit, an extensive shoal, partly bare at half-tide, is between **Mashomack Point,** the southeastern extremity of Shelter Island, and Sag Harbor. The southeast and sides of the shoal are marked by buoys and a light.

Sand Spit Light, 26 feet above water, is shown from a red skeleton tower, white tank house, red concrete base, on the north side of main channel northeast of Sag Harbor.

Sag Harbor is about 2.5 miles southwestward of Cedar Island Light and is formed on the northeast by a breakwater.

Sag Harbor Breakwater Light, 28 feet high, is shown from a black skeleton tower,

white tank house, black concrete base, on the end of breakwater, east side of entrance to the harbor.

A standpipe is a conspicuous landmark. Another prominent landmark is a gas tank with a silver colored spherical tank adjoining it.

The harbor has been dredged and provides an entrance channel 100 feet wide from near the end of the breakwater to the wharves, thence in an east-southeasterly direction to a point near the oil docks in the southeast part of the harbor. In September 1949 the controlling depth was 10 feet in the entrance channel and turning basin; 6 feet in the southerly anchorage area, and 8 feet in the main anchorage area. The channel to **Sag Harbor Cove** has a depth of about 6 feet. A fixed bridge crosses the entrance which has a horizontal clearance of 37 feet and a vertical clearance of 20 feet at high water.

Supplies of all kinds can be obtained at **Sag Harbor.** A railroad serves Sag Harbor.

Smith Cove, a bight 0.6 mile in diameter on the south side of Shelter Island, is a good anchorage for small craft in the northerly weather. The depths range from 14 to 30 feet. A lighted buoy south of the entrance to the cove marks a 16-foot shoal about 400 yards north of the northeast point of **North Haven.** A ferry operates between **South Ferry** on the southwest side of the cove to North Haven. A private concrete wharf, with boathouse and a large dwelling, is about 500 yards westward of the South Ferry slip. No landings are allowed at this private wharf.

West Neck Harbor and **West Neck Creek** are shallow connecting bodies of water on the southwest side of Shelter Island. A depth of 5 feet can be carried from Shelter Island Sound through a narrow staked channel in West Neck Harbor to a yacht club landing on West Neck Creek. The entrance is close to eastward of the jetty at the northeast end of a small island which separates the harbor from the sound, and the channel follows along the north side of this island to the west side of the harbor and thence to the landing on the west side of the creek, 0.5 mile above its mouth. During the summer months there is a light on the end of the jetty which is privately maintained.

A small boatyard with marine railways can accommodate small craft up to 70 and 100 feet in length and a maximum draft of 5 feet. Gasoline, lubricants, and ship chandlery can be obtained.

West Neck Bay is a circular landlocked bay at the head of the creek. The depths are 11 to 14 feet.

Noyack Bay is between North Haven and Jessup Neck and southward of the western end of Shelter Island. No dangers will be encountered if the shores be given a berth of 0.4 mile.

The entrance to Shelter Island Sound, south arm, is little used except by vessels going to Sag Harbor, the usual draft being 10 feet or less and the greatest draft about 11 feet. Vessels from Greenport going to Sag Harbor or the reverse generally use the inside route around the western end of Shelter Island. From a point about 300 yards south of Shelter Island South Channel, east entrance, buoy 2, steer **252°** for 1 mile, passing about 150 yards north of the buoy on the south side of the channel. When abeam of Cedar Point Shoal buoy, steer **230°** until Cedar Island Light bears 090°, then steer **164°**, heading for the east end of the bluff on Barcelona Point; when abeam of Shelter Island South Channel buoy 5 at a distance of 200 yards gradually swing onto a course of **201°**, heading directly for Sag Harbor Light 3, with buoy 5

dead astern, until the southwest tangent of Mashomack Point is on the starboard beam; then steer **225°** and pass about 125 yards northwestward of buoy 9; continue with mid-channel courses, passing about 100 yards southward of Sand Spit Light, to a position about 75 yards northwestward of buoy 13.

To enter Sag Harbor pass midway between buoy 13 and the horizontal-banded buoy to the northwestward of it and steer **224°** to a position 150 yards westward of the light on the end of the breakwater. Then steer for the east side of the wharf house on a course **174°**, passing west of buoy 1. The end of the breakwater should not be rounded too closely, as a depth of about 6 feet is found near its end. The deepest water is found near the buoy. Anchor eastward or northeastward of the end of the steamboat wharf, taking care to keep westward of the range of the end of the breakwater and the foot of the bluff on the east side of North Haven.

Sag Harbor to Peconic Bays.—Leave the horizontal-striped buoy on the port hand and buoy 12 at the southwest end of the sandpit, about 100 yards on the starboard hand. Then steer **337°**, passing about 100 yards westward of buoy 14 and 350 yards eastward of the lighted buoy off the north end of North Haven. Steer **249°** and pass 100 yards northward of this buoy, keeping at least 150 yards off the beach at South Ferry. When the northeast end of the small island at West Neck Harbor bears 000°, change course to **225°** and pass southward of West Neck Shoal lighted buoy at a distance of about 300 yards; thence steer **270°** passing about 100 yards northward of Jessup Neck Shoal lighted buoy at the entrance of Little Peconic Bay, or from a position about 0.8 mile westward of the lighted buoy in Noyack Bay steer **000°** for 1.5 miles to a position about 300 yards eastward of the buoy southeast of Paradise Point.

Chart 299.—Jessup Neck is a long, narrow strip, partly high and wooded, separating Noyack Bay from Little Peconic Bay. The north end of the neck is a sandspit from which a shoal with 5 to 11 feet over it extends nearly 0.4 mile north-northwestward. The end of the shoal is marked by a lighted buoy.

Little Peconic Bay is about 5 miles long and 4 miles wide at its widest part. The southeasterly shore of the bay is clear if given a berth of 0.4 mile, but shoals extend 0.6 mile from the shore at the south end of the bay.

A prominent yellow bluff, known locally as **Holmes Hill,** is just eastward of the entrance of **North Sea Harbor.** This harbor was dredged in 1949 and provides a channel reported to be 60 feet wide with a controlling depth of 6 feet at mean low water. The channel is marked by bush stakes with red flags and black flags and the entrance by a light which is maintained by the town during the summer months. It provides an excellent harbor of refuge for small boats with drafts not exceeding 3½ feet. The bottom is soft with good holding ground. A boat repair yard and marine railway are located at the southwest part of the harbor. The yard has a capacity of 20 tons weight, 40 feet length, and 4 feet draft. General repairs and engine repairs are available. Gasoline, lubricants, ice, water, and some ship chandlery can be obtained.

A shoal with depths of 5 to 7 feet extends 1.5 miles southwestward from **Great Hog Neck,** on the northwest side at the entrance of Little Peconic Bay; this shoal is marked near the middle of its southeast side by a buoy, a guide for the main channel of the bay.

Heavy tide rips occur southeast of Great Hog Neck during the flood with a southwesterly wind. During such times small craft can avoid the worst of them by favoring the shore on the northwest side of the passage.

Corey Creek, at the north end of **Hog Neck Bay**, is a shallow creek which has been dredged out to form a basin for small craft. It is not navigable except for small row boats.

Nassau Point, the long neck on the northwest side of Little Peconic Bay, has high bluffs on the eastern side. A shoal with little depth over it extends 0.5 mile southward from Nassau Point and is marked at its end by a lighted buoy. The southeast part of the shoal has 5 to 8 feet over it and lies 0.4 mile northeastward from the buoy.

Cutchogue Harbor, between Nassau Point and New Suffolk, is used by local oyster boats having 6-to 10-foot draft.

On the east shore of Cutchogue Harbor, northwestward of Nassau Point, two channels leading into the ponds have been dredged by private interests. At the northerly one, 0.9 mile northwest of the extremity of Nassau Point, is a private wharf and the channel leads between two jetties.

A depth of 8 feet can be taken within 100 feet of the wharves at **New Suffolk** by passing eastward and about 200 yards northward of the buoy westward of Nassau Point and steering for the wharves on a course of about 280°. A small basin with a depth of about 10 feet is northward of the wharf. At the north end of the town of New Suffolk, where a small stream had been, dredging has been done and a basin has been formed extending to the highway. The basin had a depth of about 4½ feet in 1949.

New Suffolk has several boat repair shops and marine railways, the largest of which has a capacity of 20 tons weight, 50 feet length, and 5 feet draft.

Diesel oil, gasoline, lubricants, fresh water, and ship chandlery are available.

Wickam Creek has a controlling depth of about 3 feet at the entrance. Fishing boats tie up in this basin in slips. In southeast gales, local craft of less than 6-foot draft seek shelter in the small cove, locally known as **Horseshoe Cove**, in the northeast part of Cutchogue Harbor.

The through channel northward of **Robins Island** has no aids and is not used except by light-draft boats. The channel southward of Robins Island has a controlling depth of 14 feet and is marked by buoys.

Tide rips occur between the mainland and the south end of Robins Island when the tidal current sets against the wind. They can be avoided to some extent by favoring the southeast side of the passage, passing about 250 yards southeast of the black channel buoys.

To enter Little Peconic Bay and Great Peconic Bay, pass 100 yards northwestward of Jessup Neck Shoal lighted buoy, continue course 208° for about 1 mile to position 0.3 mile southeastward of the buoy south of Great Hog Neck. Then steer 218°, pass 300 yards southeastward of the lighted buoy off Nassau Point, and continue the course, passing midway between the buoys which mark the dredged channel southward of Robins Island. Westward of the dredged channel, vessels of about 10 feet or less draft can cross the shoal west-southwestward of the south end of Robins Island on a course between 240° and 270°. Deeper-draft vessels should follow the buoys southward, the courses for which are: Passing 100 yards westward of buoy 11, steer 180°,

passing 200 yards eastward of buoys 20 and 22; then steer 202°, passing 100 yards eastward of buoy 24, and then 247°, passing northward of buoy 13.

Great Peconic Bay is about 5 miles in diameter. The navigation is confined mostly to local motorboats from Shinnecock Canal and yachts. The bay is generally clear, but extensive shoals make off from the shores, except on its south side. Shinnecock Canal is the entrance of a passage for boats of 4½-foot draft. The controlling depth for a 50-foot width is 3½ feet from Great South Bay opposite Patchogue to Ponguogue Highway Bridge; thence 4½ feet to the south end of Shinnecock Canal. The canal is described in Chapter 10.

Shoal water extends southwestward from Robins Island. For a distance of over 1 mile the depths are 4 to 10 feet. As the shoal continues southward the depths increase, ranging from 12 to 15 feet. The shoal is steep-to on the west and east sides, the east side being marked by buoys.

Rodgers Rock is about 1 mile offshore from **Cow Neck** and about 1.2 miles south-southwest of Robins Island. This rock has a depth of 6 feet over it and is marked on the northeast side by a buoy. A rock 0.8 mile west of the south end of Robins Island is awash at low water. It is marked on the south side by a buoy. Caution is recommended when navigating in the vicinity of this danger.

Sebonac Creek, on the southeast side of Great Peconic Bay, is used extensively by yachts, and serves as a yacht harbor for the town of Southampton. A channel 50 feet wide with a controlling depth of 5 feet is staked by the town of Southampton. It is reported that a depth of 6 feet over a width of 100 feet can be carried to the landings at **West Neck**, a small settlement northeastward of **Ram Island**. An obstruction buoy is locally maintained during the summer to mark a rock about 100 feet westward of the town landing. A small repair yard and marine railway at West Neck is capable of hauling out small craft of 15 tons weight, 50 feet length, and 4 feet draft. Light repairs and a limited amount of yachting supplies can be obtained. Gasoline and lubricants are available.

Near the middle of the western part of Great Peconic Bay is a lighted buoy which marks the entrance of a channel having a depth of 6 feet at low water leading to **South Jamesport.** Passing close southward of this buoy a 260° course will lead to the buoy south-southeast of **Miamogue Point**, then steer northwestward to a buoy south of that point and then northward for the wharf at South Jamesport.

Local knowledge is necessary to avoid the shoals in this area and strangers should take soundings frequently to keep in the best water. Small boats anchor or moor to piles in the bight westward of the wharf. Gasoline, lubricants, and water can be obtained. A public dock with 4 feet at mean low water is available. A boat repair yard and marine railway have facilities for boats of 40 feet length and 3½ feet mean draft. The town has railroad service.

Flanders is a small village at the head of **Reeves Bay**, 2.5 miles west-southwestward of South Jamesport.

Riverhead, on the **Peconic River** 4 miles westward of South Jamesport, is at the head of navigation.

A Federal project for the improvement of Peconic River provides for a channel 6 feet deep and 100 feet wide, extending from deep water in Great Peconic Bay westerly for a distance of 1,100 feet, thence of the same depth and a width of 75 feet about

1,100 feet below Peconic Avenue in Riverhead. The river is usually frozen from December 15 to February 1 of each year.

Boats continuing through Flanders Bay to Riverhead should steer a westerly course for about 250 yards after passing the buoy south of South Jamesport before setting the course for the lighted buoy which marks the shoal extending from the point 0.6 mile westward of South Jamesport. After passing close southward of this buoy, the channel into Riverhead, through Flanders Bay is buoyed and lighted.

From May 1 to November 15 the channel is marked by a lighted buoy. Lights on single piles marking the channel are privately maintained from May 1 to November 15.

Supplies of all kinds are available. A boat repair yard with marine railways is capable of hauling out craft of 20 tons weight, 55 feet length, and 6 feet draft. All major repairs can be made. A large stock of ship chandlery and mooring facilities are available.

Chart 358.—Fishers Island Sound is between the mainland of Connecticut and Fishers Island and forms one of the entrances into Long Island Sound that is used to some extent by light tows and other vessels up to 14-foot draft. Fishers Island Sound has numerous shoals and lobster trap buoys and the entire area is exceedingly treacherous, being characterized by boulder patches which rise abruptly from deeper water. Vessels should follow the deeper channels between the shoals and proceed with caution if obliged to cross shoal areas. In general, all shoal spots or abrupt changes of depth are indications of boulders and should be avoided as anchorages.

On the south side of the sound are **Seal Rocks,** partly bare at low water. They are 0.1 to nearly 0.4 mile off the north side of **East Point** of Fishers Island, and are marked off the north side by a buoy. A rocky patch with 13 feet over it is northeastward of this buoy and is marked by a buoy on its north side.

Youngs Rock, about 0.3 mile northward of Fishers Island and 0.4 mile westward of Seal Rocks, has about 1 foot over it and is marked by a buoy. A rocky patch extends about 400 yards to the east-northeastward.

East Harbor and **Chocomount Cove,** in the north shore of Fishers Island, are sometimes used as anchorages by small craft. There is considerable foul ground in East Harbor and in the approach to Chocomount Cove, and they are exposed to northerly winds. The approach to East Harbor is marked by two buoys. A Coast Guard station with a boathouse and dock is prominent near the south side of East Harbor.

Storm warnings are displayed by day from the Coast Guard station. Several piers are in East Harbor, the western one for a boat shed with about 6 feet at the end and the other the landing of the Fishers Island Club, with about 10 feet at the end. The Coast Guard landing has about 9 feet at its end.

To enter East Harbor, pass about 100 yards east of the nun buoy at the entrance on course 130°, on line with the end of the club wharf. This leads through the best water.

The north shore of the island from East Harbor around into West Harbor has many private landings.

East Clump, 0.8 mile from Fishers Island and 1.3 miles 250° from Latimer Reef Light, is a small cluster of rocks, partly bare at high water and marked on the north side by a buoy.

Middle Clump, a cluster of rocks awash at high water, is about 0.7 mile from

Fishers Island, northward of Chocomount Cove. Rocks with 7 to 10 feet over them have been found on the shoals which extend south-southeastward from Middle Clump to Fishers Island. A buoyed channel with a depth of about 15 feet is between the shore of Fishers Island and these rocks. From Middle Clump a shoal with rocky bottom and boulders extends westward to South Dumpling. The least depths found are 5 feet between Middle Clump and **West Clump,** which is bare at low water. **Pulpit Rock,** 0.2 mile westward of West Clump, is bare at low water and is marked by a buoy on its north side. **Flat Hammock** is a low gravel islet, from which a shoal extends nearly 0.2 mile northeastward, and is marked at its end by a buoy. The shoal between Flat Hammock and South Dumpling has depths of 6 to 10 feet. **South Dumpling** is a grassy and brush-covered island, from which a rocky shoal with 13 feet over it extends 0.3 mile southward and is marked at its south end by a lighted buoy. A boulder reef partly bare at low water extends 0.2 mile northwestward from the northwest end of Fishers Island, and is marked on its northeast side by buoys.

North Dumpling is a small grassy island 0.7 mile north of the northwest end of Fishers Island. North Dumpling Light, 69 feet above water and visible 14 miles, is shown from a white tower on a dwelling on the southwest side of the island. It has a red sector between the bearings 257° and 023° which covers East Clump on the north side and the shoal waters on the west side of Fishers Island. The fog signal is an air diaphragm horn.

West Harbor is on the north side of Fishers Island southeastward of North Dumpling Light and affords shelter from southerly winds. A depth of about 10 feet can be taken to the wharves on the west side of the harbor; a dredged channel with a controlling depth of 13 feet in August 1949 leads into the harbor. Foul ground extends halfway across the entrance of West Harbor to a bare rock, which should be given a berth of nearly 300 feet; the northern limits of the foul ground are buoyed. Approaching West Harbor from eastward, small craft can cross the shoal between Pulpit Rock and Flat Hammock, where the general depth is between 13 and 14 feet by passing about 300 yards eastward of Flat Hammock buoy and steering **193°** for **Hawks Nest Point** in range with the end of the wharf in West Harbor. A 9-foot spot has been reported to be 130 yards west of this range and east of Flat Hammock. When the northwest end of Fishers Island bears 270°, steer **177°** for the channel entering West Harbor, passing about 100 feet eastward of the lighted entrance buoy.

From westward, pass close to the bell buoy which is 0.4 mile south-southwestward of North Dumpling Light, steer **140°** passing about 150 yards south of a lighted buoy and then steer **117°**, which course leads about 300 yards northward of Hawks Nest Point. Pass about 50 feet eastward of the buoy at the entrance of the harbor and steer **173°**, leaving the horizontal-banded buoy about 225 yards on the port hand, and when just abeam of horizontal-banded buoy, steer **189°** for about 125 yards and change to **222°**, passing about 150 yards northwestward of the bare rock, and then ease gradually for the wharf. Fishers Island Yacht Club wharf is in the southwest end of the harbor. The head of the harbor is used by boats of less than 5-foot draft which enter by the narrow channel eastward of **Goose Islet.**

Diesel oil, gasoline, lubricants, water, and ice can be obtained here.

Hay Harbor is used by small craft. It is the most sheltered harbor in the area. Near the head of the harbor are several hotels with small landings.

Silver Eel Pond is on the west side of Fishers Island, 0.6 mile northeastward of

Race Point. The entrance is about 75 feet wide between jetties and has a depth of 16 feet, shoaling to 12 feet inside. Dolphins are on the northeast side of the pond, and the channel is clear between them and the wharves on the southwest side. Vessels must go to the wharves as there is no room for anchorage. It is only necessary to open the entrance and stand in midway between the jetties. The entrance is difficult with northwesterly or westerly winds. A lighted bell buoy is about 450 yards off the entrance.

Silver Eel Pond Light, 10 feet above water and visible 8 miles, is shown on the offshore end of the southwest jetty. Extending above the light is a 7-foot shaft-like daybeacon with two small intersecting disks uppermost giving the appearance of a ball. The fog signal is a manually operated bell nearby.

On the north side of Fishers Island Sound are Little Narragansett Bay and Pawcatuck River leading to Westerly and Pawcatuck, Stonington Harbor, and Mystic Harbor on which are the towns of Noank and Mystic.

Napatree Beach, 1.2 miles long between Watch Hill Point and **Napatree Point,** is bare. The sandspit extending 1.5 mile from Napatree Point to **Sandy Point** is bare except for a section 0.3 to 0.7 mile northward of Napatree Point which was broached during the 1938 hurricane.

Napatree Point Ledge is a boulder reef having little depth for a distance of nearly 0.3 mile southward of the point. At the end of the ledge is a 15-foot spot 0.4 mile south-southwestward of the point; it is marked by a lighted bell buoy.

The west side of Napatree Point should not be approached closer than 175 yards to avoid a stone jetty which is covered at high water. Between Napatree Point and East Breakwater off Stonington Harbor is an extensive flat on which the general depths are 5 to 10 feet. The bottom is generally rocky with boulders in places. **Middle Ground,** at the western end of the flat, is marked on its west side by two buoys.

Stonington Outer Breakwater Light, 40 feet above water and visible 11 miles, is shown from a red, square, skeleton tower, white tank house, red concrete base, 75 feet from the west end of the breakwater. **Stonington Outer Breakwater** extends from **Bartlett Reef** to the north end of Middle Ground. A depth of 17 feet can be taken to an anchorage inside this breakwater by passing from 100 to 200 yards westward of the Middle Ground buoys and giving the light on the west end of the breakwater a berth of over 250 yards. When anchoring give the inside of the breakwater a berth of over 300 yards to avoid shoals and fish weirs which extend about this distance from it. This anchorage is not used much, although the shelter is good, except in southwesterly and westerly winds.

Little Narragansett Bay is a shallow bay at the eastern end of Fishers Island Sound and is the approach to Pawcatuck River which leads to Westerly. It is used by small craft going to Watch Hill. A channel 100 feet wide has been dredged through the bay to the entrance of Pawcatuck River. In July 1949 the channel from Sandy Point to the lighted buoy off **Pawcatuck Point** had a controlling depth of 7 feet. However, sizable oil tankers drawing 11 feet were passing through at high water as far up as the oil docks just below Westerly. The channel is well marked by buoys. Caution is recommended when using the channel as the entrance is subject to change. The area north of Sandy Point is shoaling. Strangers are advised to obtain local information before entering because rocks and shoal water are near the edges of the channel. Local fishermen who act as pilots may be obtained at Stonington.

To enter Little Narragansett Bay, pass southward and about 100 yards eastward of the horizontal-banded buoy southward of Stonington Point, and then head to pass 75 feet northwestward of Academy Rock lighted buoy, and then pass 50 feet northward of lighted buoy 4A which marks the northerly end of the shoal. Steer **095°**, passing 50 yards south of lighted buoy 9 and then steer **116°** and pass lighted buoy 13 in mid-channel; steer **131°**, passing 100 yards clear of Pawcatuck Point and avoiding the rock on north side of channel opposite buoy 16. From a point 175 yards south of Pawcatuck Point steer **187°**, passing about 75 yards westward of west point of Foster Cove to the buoyed channel into Watch Hill Cove. Steer a mid-channel course of about **163°** and select anchorage in depths of 6 to 8 feet. The channel from Stonington Point around Sandy Point and joining the channel in Little Narragansett Bay has shoaled and changed to a great degree. The sand bar making northerly from the abandoned Rhodes Folly Light is bare for about 100 feet and is marked at the north end by a lighted buoy. The structure of the abandoned Rhodes Folly Light tilts eastward about 10 degrees. It is reported that shoaling in this area, as well as several other sectors of these waters, has been more pronounced in the years 1946 to 1949 than at any time during the preceding 10 years.

In the dredged channel northward of Sandy Point the **currents** have an average velocity at strength of about 1½ knots. The flood sets eastward, the ebb westward. See *Current Tables* for predictions and current charts for hourly velocities and directions.

The channel leading to **Watch Hill Cove**, the extreme southeastern part of the bay, is buoyed and in July 1949 had a controlling depth of 7 feet in the entrance and depths of 9 to 11 feet inside the cove. The depths at the wharves were 8 to 11 feet.

A sunken rock with 1 foot over it is about 200 feet southwestward from the point on the north side of the entrance to **Foster Cove**. The rock is unmarked and caution is recommended to avoid it.

Dennison Rock, with a depth of 2 feet over it, is marked by a buoy on the southeast side.

Gasoline, lubricants, water, ice, and a limited amount of ship chandlery are available in Watch Hill Cove. Light repairs to motors can be obtained.

Pawcatuck River has a length of about 4 miles to Westerly, and has been improved by dredging a channel with a width of 100 feet, except through the ledge at **Pawcatuck Rock** where the width is 80 feet, to the lower wharves at Westerly and 40 feet wide along the wharves. The deepest draft towed up to Westerly is 11 feet at high water. The channel is well marked by buoys. Vessels should pass close to the buoys as the channel is narrow and its edges rocky in places. A pilot can be obtained by telephoning New London. About 1 mile above the entrance the tidal current has a velocity of about ½ knot at strength. The river is generally closed by ice from January to March.

A boatyard at **Avondale** can handle craft of 75 tons weight, 60 feet length, and 6 feet draft. Diesel oil, gasoline, water, ice, provisions, and marine supplies are available.

Colonel Willie Cove, 0.5 mile above the mouth of the river, has a marine railway capable of hauling out boats of 15 tons weight, 40 feet length and 5 feet draft. Yachts can be stored under cover.

The yacht club in **Thompson Cove** has a small marine railway.

Westerly is an important manufacturing town. Depths at the wharves are from 7 to 9 feet. Gasoline, lubricants, water, and supplies of all kinds are available.

Wequetequock Cove is shallow, but a narrow unmarked channel passes eastward

of **Elihu Island** at a distance of about 75 yards and a depth of 6 feet may be taken as far as **Goat Island**. **Wequetequock River** enters the northern part of the cove. The river is shallow and is used only by local small craft. A railroad bridge which crosses the river has a horizontal clearance of 64 feet and a vertical clearance of 6½ feet at high water.

Stonington Point is at the south end of the town of Stonington. A horizontal-banded buoy is off the south end of the shoal which surrounds the point at a distance of about 200 yards from the point and about the same distance westward of the lighted buoy marking **Academy Rock.**

Stonington Harbor is sheltered by the breakwaters, and is available for vessels of about 11 feet or less draft. Anchorage can be selected between the West Breakwater and **Penguin Shoal**, where the depths are 15 to 18 feet, taking care to keep the south end of Wamphassuc Point bearing northward of 270°. Vessels of 10 feet or less draft can anchor in the lower harbor from Penguin Shoal and Inner Breakwater to the steamboat wharf, taking care to give the western shore a berth of 250 yards. Small vessels of less than 8 feet draft can anchor in the eastern half of the harbor, above the steamboat wharf, taking care to avoid a rock which bares at low water about 50 yards to the southward of the fishing wharf. A buoy is moored near the rock.

An area in Stonington Harbor, designated as a special anchorage area wherein vessels not more than 65 feet in length, when at anchor, shall not be required to carry or exhibit anchor lights, is defined in § 202.50 in Chapter 2.

Stonington Harbor is approached from southeastward and westward. Vessels with local knowledge sometimes cross Noyes Shoal and approach from the southwestward. The southeastern approach is best, having fewer dangers, and the lights serve as guides to avoid them. In the daytime, with clear weather, no difficulty should be experienced in entering any of the approaches. Entering from southeastward, pass 100 yards southward of Napatree Point Ledge lighted bell buoy and steer **298°** for about 1.1 miles until about 175 yards southwest of the buoy at the southwest end of Middle Ground. Then steer a **354°** course for the light on the east end of Stonington West Breakwater, which leads about midway between the northern Middle Ground buoy and the bell buoy marking the east end of Noyes Shoal. Pass 350 yards westward of the light on the west end of Stonington East Breakwater and when about 150 yards past this light change course to **005°** to pass about 200 yards or more eastward of the light on the east end of Stonington West Breakwater, and enter the harbor between Inner Breakwater and the buoy marking the eastern end of Penguin Shoal.

To enter from westward, from Ram Island Reef lighted buoy steer **051°** for White Rock, passing about midway between Ellis Reef south buoy and the buoy at the northwest end of Eel Grass Ground. When 400 yards off White Rock change course as necessary to pass 200 yards southward and about 0.3 mile eastward of White Rock, and bring the rock in range with the stone building with red roof on Baker Island astern, course **088°** which leads 200 yards northward of Noyes Rock. Pass southward of the fish weirs which extend 100 yards or more southward from Stonington West Breakwater, pass 100 yards or more eastward of the light on its east end, and enter Stonington Harbor between Inner Breakwater and the buoy marking the eastern end of Penguin Shoal.

Stonington West Breakwater extends 2,400 feet in a southeasterly direction off **Wamphassuc Point**, and is marked at its eastern end by a light. Stonington Break-

water Light, 30 feet above water and visible 6 miles, is shown from a black square skeleton tower, white tank house, black concrete base, on the east end of Inner Breakwater.

Inner Breakwater is about 400 yards northward of Stonington Point, on the east side of the entrance. It extends westward about 250 yards, and is marked at its western end by a light. Stonington Inner Breakwater Light, 26 feet above water and visible 6 miles, is shown from a red square skeleton tower, white tank house, red concrete base on end of breakwater.

Stonington is a town on the railroad and has bus service to Westerly and New London. Commerce is mostly fishing. The wharves have depths of 7 to 12 feet alongside. Following southerly weather a surge is felt by vessels tied to southern side of the seaward pier.

A boat repair yard with marine railway is capable of hauling out boats of 50 tons weight, 85 feet length, and 7 feet draft. Diesel oil, gasoline, water, ice, marine supplies, and repair parts are available.

Noyes Rock, 0.4 mile southward of Wamphassuc Point, has a least depth of 9 feet, and is marked by horizontal-banded buoys at its north and south ends.

Noyes Shoal with 10 to 15 feet over it, is nearly 1.5 miles long in a west-northwesterly direction; its easterly end is 300 yards westward of the northerly Middle Ground buoy, and is marked by a bell buoy. A channel across Noyes Shoal, with Stonington Breakwater Light and Stonington Inner Breakwater Light in range, has been dredged to a depth of 12 feet. In July 1949 the least depth found on this range was 12 feet.

Latimer Reef is a very broken and rocky area 0.4 mile long; it is marked at its west end by a light. The shoal extending from the light is marked at its southern end by a buoy which is about the northern limit of the red sector of North Dumpling Light.

The eastern end of the reef has a least found depth of 6 feet, and is marked by a buoy. A rock with 15 feet over it is nearly 300 yards south-southwest of the buoy. Latimer Reef north buoy marks an 11-foot rock patch which is 0.4 mile northeastward of Latimer Reef Light.

Latimer Reef Light, 55 feet high and visible 13 miles, is shown from a white conical tower, brown midway of height, brown cylinder, on the west end of the reef. The fog signal is a bell.

Eel Grass Ground is a shoal with a least depth of 6 feet, about 0.8 mile northwestward of Latimer Reef Light. The southeast and west ends of this shoal are marked by buoys. A rock with 16 feet over it is 600 yards westward of the shoal. The bight in the north shore of Fishers Island Sound between Wamphassuc Point and Mason Island is shoal and very broken, the rocks rising abruptly from deep water. **White Rock** is a prominent bare rock off the middle of the bight. **Red Reef,** a rock with 1 foot over it, is 400 yards northward of White Rock, and is marked on its south side by a buoy. **Cormorant Reef,** on the northwest side of the bight, is awash at high water. A buoy is off the south end of this reef and another buoy off the south end of the reef midway between Cormorant Reef and Baker Island.

Baker (Ender) Island is about 0.3 mile eastward of the southern end of Mason Island, and is connected to it by a causeway. It is marked by a prominent stone building. The south end of **Mason Island** is strewn with boulders. An anchorage for

small craft is on the west side of the south end of Mason Island where depths range from 8 to 11 feet. Caution must be exercised because of boulders.

Ellis Reef is the easterly end of broken ground extending 1 mile eastward of Ram Island. The southeast end of the reef is awash at low water and is marked by a buoy. The northeast side is marked by a buoy. **Gates Islet** is on the shoals about midway between Ellis Reef and Ram Island.

Ram Island Reef is 600 yards southward of Ram Island. Shoals make passage between the reef and island unsafe. The reef is nearly awash at low water, and is marked at the west end by a buoy. A buoy also marks the south side of a rock with 6½ feet over it at the south end of the reef. Ram Island Reef lighted gong buoy is about 1,300 yards a little east of south of Ram Island.

Ram Island, 0.4 mile long, is wooded and grass-fringed. A shoal, on which are two rocky islets, extends 400 yards northeastward from Ram Island and is marked at its northeast end by a buoy. **Ram Island Shoal,** extending nearly 0.5 mile westward from Ram Island, has little water over it and many rocks bare at low water. **Whaleback Rock** and the islet 300 yards northwestward of it are bare. **Swimming Rock,** 200 yards westward of Whaleback Rock, is a boulder awash at high water.

The narrow, deep, buoyed channel along the north side of Ram Island Shoal is the easterly entrance to Mystic Harbor. **Whale Rock,** bare at low water, at the northwest end of the shoal, is marked by a red square cage on iron spindle which is 200 yards east-southeastward of Mouse Island. The rock extends about 20 feet into the channel from the daybeacon.

Between Ram Island Shoal and Groton Long Point is a shoal area with rocks in places which should be avoided by vessels. Leading across the shoal is a buoyed channel, good for a depth of about 11 feet, used by vessels in entering Mystic Harbor from westward. The south side of the shoal is marked by a buoy which is 0.4 mile east-southeastward of Groton Long Point. A rock with 10 feet over it is 300 yards eastward of Groton Long Point and is marked by a buoy; the channel leading to Mystic Harbor is northward of this buoy, and vessels will avoid the rock by giving the buoy a berth of over 100 feet. Vessels should not pass eastward of this buoy or between it and Ram Island Shoal.

Intrepid Rock, with 13 feet over it, is 0.5 mile southward of Groton Long Point, and is marked by a buoy on its south side. A 26-foot shoal is 450 yards south of Intrepid Rock. **Mouse Island,** marked by several dwellings, is 150 yards southwestward of Morgan Point. The passage between them is blocked by rocks which bare at low water. Rocks, which bare at extremely low water, are on a shoal about 250 yards northwestward of Mouse Island. A narrow channel is between them and the island.

Morgan Point, on the west side at the entrance of Mystic Harbor, is marked by an abandoned light tower.

Noank Light, 43 feet above water and visible 6 miles, is shown from a black square skeleton tower, white tank house, granite base, in 2 feet on the east point of shoal making off Morgan Point.

Noank is a village on the west bank of the entrance to the Mystic Harbor. The mean range of the tide is about 2½ feet. The depths at the principal wharves vary from 8 to 13 feet. The depth at the town landing is 11 feet. Gasoline, lubricants, fresh water, and other supplies are available. A boatyard and marine railway are capable of hauling out craft of 50 tons weight, 70 feet length, and 8 feet draft.

Mystic Harbor has a natural channel with a least depth of 12 feet and ample width, with bends eased by dredging to Willow Point. Between Willow Point and the first bridge a channel 100 feet wide with a controlling depth of 12 feet has been dredged. Between the railroad bridge and the highway bridge is a natural channel with a least depth of 14 feet. A channel 100 feet wide has been dredged for about 0.8 mile above the second bridge. The controlling depth from the highway bridge to the wharf of the Marine Historical Association is 12 feet.

At Mystic the river is crossed by two bridges, a railroad swing bridge with an opening of 67 feet, and a town bascule bridge with an opening of 65 feet. The vertical clearances of these bridges are about 4½ feet above high water, when closed. There is not room in the channel for anchorage, except for small craft, and vessels go to the wharves. Above **Sixpenny Island** the river is usually closed by ice during January and February. A river pilot can be obtained from Noank or New London.

Willow Point is on the west bank 0.6 mile below Mystic. Here is a plant for building yachts and engines, and a railway with a capacity of 200 tons weight, capable of hauling out boats up to lengths of 120 feet and a draft of 12 feet. A 10-ton lift is available. The yard has facilities for boat storage and for making all types of repairs, especially propeller work. A channel 12 feet deep has been dredged to the railway. Gasoline, water, some engine parts, and provisions can be obtained.

Mystic is a town about 2 miles above Noank. A well-equipped boatyard on the east bank of the harbor south of the highway bridge has three marine railways capable of hauling out vessels of 65 tons weight, 100 feet length, and 11 feet draft. Gasoline, lubricants, fresh water, ship chandlery, and all other supplies are available.

From Fishers Island Sound two buoyed channels lead to the entrance of Mystic Harbor; the channel from eastward is very narrow but is good for a depth of 15 feet at low water, that from the westward 12 feet. The channel is marked, but some local knowledge is needed to follow the channel and keep in the best water. It is advisable for strangers to take a pilot.

To enter from eastward proceed as follows: From southward of Napatree Point Ledge lighted bell buoy a **293°** course for a little over 3 miles will lead 250 yards northward of North Latimer Reef buoy and northward of the buoy on the northeast side of Ellis Reef. Passing 150 yards northward of this buoy, steer **261°** for the abandoned light tower on Morgan Point in range with the north end of the northern rocky islet off the north end of Ram Island until Mason Point is abaft the beam. Then haul northward and then westward, following the buoyed channel and pass 225 feet eastward of Noank Light.

To enter from westward proceed as follows: Vessels using this channel should use caution on account of the rocky bottom, with boulders in places. Pass 100 yards or more southward of Groton Long Point buoy and steer northeastward for the buoy 400 yards eastward of Groton Long Point. Pass over 100 feet northward of this buoy, then steer a course of about **057°** and pass midway between the buoys marking **Planet Rock** and the shoal to the westward. Then leave Whale Rock spindle 150 feet on the starboard hand, and pass southward and eastward of Noank Light, rounding it at a distance of 225 feet. Passing 225 feet northeastward of Noank Light, steer mid-channel course and pass about 150 feet off the buoys. The channel is well buoyed and no difficulty should be encountered. The channel leads through the west side of the railroad draw opening, then follows the wharves to the highway bridge. From the

highway bridge the channel follows the wharves on the east side and continues on the same course 600 feet past the landing of the marine engine factory. It then curves gradually northward, favoring slightly the east bank, and passes close to the southwest and west of the turning point on the east. Passing 200 feet off the north side of this point, the channel leads to the first wharf adjoining a group of brick buildings occupied as a marine museum. The channel at this point has a controlling depth of 11 feet, and is kept plainly marked on both sides by the **Marine Historical Association** for the convenience of those wishing to visit the museum by water.

The whaler *Charles W. Morgan* and the bark *Joseph Conrad* are permanently moored at the museum and are open for public inspection. Along the water front of the museum property, buildings to house the various tools and materials used by ship artificers of the days of sailing vessels are being constructed and equipped. The main buildings contain a collection of ship models and scrimshaw.

From the museum wharf the course leads to the second wharf abreast a prominent factory, where the dredged channel ends. Above this point the channel is very narrow but boats of about 5-foot draft can be taken to the **Narrows.** From the last wharf the channel curves northward, passing 125 feet off the first point where was formerly a ropewalk, and the same distance off the next point. The channel then trends a little more westward until the end of Halfway Dock is in range with the west side of the north end of the Narrows, and then passes close to the dock and in the middle through the Narrows and for nearly 500 yards above it. Above this point the channel is very narrow and winding, and has a depth between 1 and 2 feet to **Old Mystic.** This channel is not marked. It follows the east bank to the next narrows and the west bank to a building, formerly a casino, in the bight about 0.3 mile below Old Mystic.

Groton Long Point has a summer settlement. A reef extends nearly 300 yards southwestward from the point, and is marked near its end by a buoy. About 600 yards to the west a rock awash at low water is 175 yards off the southwest end of Groton Long Point. It is marked by a buoy on the southwest side.

Venetian Harbor is a yacht basin northwest of Groton Long Point. A channel 75 feet wide leads through stone breakwaters into a basin with a controlling depth of 3 feet. Gasoline, water, ice, and provisions can be obtained here.

Horseshoe Reef is bare at low water and is marked at its south end by a buoy. Broken and rocky ground extends northward from Horseshoe Reef to the shore eastward of **Mumford Point.**

Seaflower Reef is near the middle of the western entrance of Fishers Island Sound and 0.8 mile northwestward of North Dumpling Light.

Seaflower Reef Light, 40 feet above water and visible 11 miles, is shown from a red, square skeleton tower, white tank house on the southwest part of the reef. The light should not be passed closer than 150 yards and preferably 350 yards northeastwardly where the depths are 18 feet.

Vixen Ledge, with a depth of 10 feet, is marked by a buoy on the south side. This reef is about 1 mile northwest of Seaflower Reef Light.

Pine Island is a bluff grassy island about 1.3 miles west of Mumford Point. It is surrounded by shoal water and rocky bottom and is marked off the southwest side by a buoy.

In the main channel of Fishers Island Sound, including Watch Hill Passage, the slack waters and strengths of current occur approximately 1 hour earlier than the

corresponding phases of the current in The Race, daily predictions for which are given in the *Current Tables, Atlantic Coast*. The flood sets westward, the ebb eastward.

In **Watch Hill Passage** the currents are strong and necessitate caution in navigating. Spar buoys may be towed under. The flood current sets nearly in the direction of the channel, but has a tendency northward and the ebb a tendency to southward. The northerly and southerly set is more marked between Napatree Point and Latimer Reef Light.

In the main channel between Wicopesset Island and Napatree Point, the average velocity at strength of flood or ebb is about 2 knots. The flood sets approximately 305° and the ebb 120°.

In **Catumb** and **Sugar Reef Passages** the tidal currents set obliquely across the axis of the channel. The flood sets northwestwardly and the ebb southeastwardly.

In the channel south of Ram Island Reef slacks and strengths of current occur about ¾ hour earlier than the corresponding slacks and strengths at The Race. The average velocity at strength of flood or ebb is about 1.5 knots. The flood sets about 255° and the ebb 090°. The observed velocity at strength of the flood current ranged from 0.4 knot to 1.9 knots, and of the ebb 1.1 to 2.2 knots. The direction and velocity of the current are affected by strong winds and the period of flood or ebb may be increased or diminished.

The strong tidal currents prevent the formation of heavy local ice, except in shoal tributaries. The only ice to give trouble is that set in from Long Island Sound by wind and current. The ice formations in Little Narragansett Bay are sufficiently heavy to be destructive to structures exposed to it.

Fishers Island Sound is characterized by boulder patches which rise abruptly from deeper water and vessels should proceed with caution if obliged to cross shoal areas. The deepest draft of vessels passing through Fishers Island Sound is 14 feet. Watch Hill Passage is the principal entrance from eastward, and the only one used by strangers.

Passing close southward of Gangway Rock lighted bell buoy the course is **270°** for Napatree Point Ledge lighted bell buoy, and after passing close southward of this buoy steer **275°** for the buoy at the south end of Latimer Reef. When abeam and 350 yards northward of the horizontal-banded buoy that is about 0.3 mile northeastward of Seal Rocks, and Latimer Reef Light bears 289°, steer **266°** for Ram Island Reef lighted gong buoy passing 100 yards south of the buoy at the south end of Latimer Reef and about 200 yards north of the 18-foot spot which is about 650 yards northwestward of Youngs Rock. From close southward of Ram Island Reef lighted gong buoy a **257°** course will lead 0.2 mile northward of North Dumpling Light from which the course can be shaped for Bartlett Reef lighted bell buoy.

Chart 293.—Pine Island Channel, between Pine Island and Black Ledge, has a rocky and very broken bottom on which the least depth found is 12 feet. It is used to some extent by local vessels between New London Harbor and Fishers Island Sound, but should be avoided by other vessels if drawing more than 10 feet.

Black Rock, on the north side at the northwesterly end of the channel, is a prominent rocky islet; a rock with 3 feet over it is 100 yards northwest.

Black Ledge is 0.4 to 0.9 mile from shore off the east side of the entrance of New London Harbor and 0.2 to nearly 0.6 mile eastward of New London Ledge Light. Black Ledge has a rocky islet on it which is 2 feet above mean high water. The ledge

has little depth in places, and its south end has been used as a dumping ground. The ledge is marked on its north side by a buoy, a guide for Pine Island Channel. Two buoys mark the south edge of the dumping ground on the south side of the ledge.

Southwest Ledge, with 3 feet over it, is small and is marked on its west side by New London Ledge Light. A rock with 22 feet over it, 0.2 mile 153° from the light, is the only danger on its southerly approach.

New London Ledge Light, 58 feet above water and visible 13 miles, is shown from a red brick building on square pier in 30 feet on the west side of Southwest Ledge, east side of entrance to New London Harbor. The fog signal is an air diaphragm horn.

New London Harbor Light, 89 feet above water and visible 15 miles, is shown from a white, octagonal, pyramidal tower on the west side of entrance to the harbor. A red sector from 000° to 041° covers Sarah Ledge and the shoals to westward.

Broken ground fringes the shore southwestward of New London Harbor Light, and extends westward of a line running from the outer rocks near the light to the buoy eastward of Cormorant Rock. Rocks, with 2 to 11 feet over them, extend 400 yards from shore in the bight just southward of the light, and a rock with 19 feet over it is over 0.3 mile off the bight at **Ocean Beach** and 0.7 mile south-southwestward of the light.

Cormorant Rock, Goshen Ledge, and **Little Goshen Reef** are names of parts of an area of foul ground which extends about 0.7 mile from the shore for a distance of 1 mile southwestward from Ocean Beach. The southeasterly and southerly limits of this area are marked by three buoys. The area has numerous rocky patches and boulders, some showing above water, and should be avoided even by small craft. Between the buoys marking this area and those marking Rapid Rock and Sarah Ledge is a channel about 0.3 mile wide, suitable for small vessels in the daytime, but the safer course is to pass southward and eastward of Rapid Rock and Sarah Ledge.

Rapid Rock, southeast of Goshen Ledge, is a shoal with a least depth of about 10 feet and marked by a horizontal-banded buoy. **Sarah Ledge** and other dangers on the west side of New London Harbor entrance are covered by a red sector in New London Harbor Light, the easterly edge of which bears 000°. The ledge is marked by a lighted gong buoy which is about 250 yards to the eastward.

The **Thames River** flows into the eastern end of Long Island Sound northwestward of the western end of Fishers Island Sound. The entrance forms part of **New London Harbor,** the most important harbor of refuge in this part of Long Island Sound. Vessels of deep draft find anchorage here in any weather and at all seasons. The river channel is marked by buoys and lights to Norwich, 13 miles above the mouth. The city of **New London** is on the west bank of the river about 2.5 miles above the mouth. The town of **Groton** occupies the east bank and is connected to New London by a highway bridge and a railroad bridge. The main harbor comprises the lower 3 miles of the Thames River from Long Island Sound to the above-mentioned bridges and includes Shaw Cove and Winthrop Cove. It is approached through the main entrance channel extending from deep water in Long Island Sound to deep water in the upper harbor. This channel is about 600 feet wide. The harbor is generally used by vessels drawing 9 to 30 feet and the deepest draft entering the harbor is 32 feet.

Shaw Cove, on the west side of New London Harbor, has a drawbridge with two openings across the entrance, the horizontal clearances of which are 39 feet and 45 feet; the vertical clearance is 3½ feet above high water. The bridge regulations are covered

in Chapter 2, § 203.105. The basin is about 300 to 700 feet wide and about 1,100 feet long. Several coal wharves are on the west side.

Winthrop Cove is on the west side of New London Harbor about 0.5 mile above Shaw Cove. Navigation in the upper part of the cove is limited to small craft by three bridges with fixed spans, the first having a horizontal clearance of 14½ feet and a vertical clearance of about 4 feet; the second a horizontal clearance of 22 feet and a vertical clearance of 12½ feet; the third, at Crystal Avenue, has a horizontal clearance of 17½ feet and a vertical clearance of 9 feet at high water.

Prominent objects are New London Ledge Light, New London Harbor Light, the training tank at the submarine base, Avery Point Light, tanks and standpipes on the Groton side, the monument at Fort Griswold, and the highway bridge that crosses the river at New London.

A Federal project provides for: A channel 33 feet deep, generally 600 feet wide, widened at approach to State Pier, from Long Island Sound to State Pier. Length about 3.8 miles. A channel 23 feet deep, 400 feet or more in width, skirting the water front of the city. Length about 6,000 feet. Two branch channels 23 feet deep in Winthrop Cove and east of Central Vermont Railway Pier, generally 250 feet wide, 1,500 feet long, and 100 feet wide, 1,000 feet long, respectively. A maneuvering area 23 feet deep, 0 to 450 feet wide, west of main channel and south of State Pier. Dredging Shaws Cove to a depth of 15 feet, length about 1,100 feet.

In August 1949 the controlling depth from the entrance to the State Pier was 31 feet except for three 30-foot spots; the controlling depths in the subsidiary channels were 22 feet except for one spot of 19 feet, another of 20 feet, and several of 21 feet. The controlling depth in Shaws Cove was 15 feet, except for minor shoals. The controlling depth in Winthrop Cove was 22 feet.

Dangers.—**White Rock,** an islet, is in **Greens Harbor** and 200 yards from the 18-foot curve on the western edge of the channel. **Hog Back,** a small ledge awash at low water, is 150 yards southwestward of White Rock and nearly 0.3 mile from the western shore, and is marked on its southern and southeastern sides by two buoys. Rocks with 3 to 6 feet over them are in the middle of the northern part of Greens Harbor. **Melton Ledge,** with ½ foot over it, is 125 yards eastward of **Powder Island** and is marked off its eastern side by a buoy.

Anchorage.—The limits of the anchorages in New London Harbor are given in Chapter 2, § 202.147. Vessels of light draft, 7 feet or less, can anchor in Greens Harbor by following the western bank at a distance of 250 yards when 0.5 mile above New London Harbor Light. Anchor at this distance from the bank southward or southwestward of Hog Back Shoal buoys. Good anchorage is southward or southeastward of the buoys in 12 to 18 feet.

Above New London anchorage is found anywhere in the channel.

Bridges.—Two bridges cross the river at New London. The first is the railroad drawbridge about 3 miles above the mouth and less than 100 yards above it is the highway bridge. These are the only bridges between New London and Norwich. The railroad bridge has a bascule span with a horizontal clearance of 151½ feet and a vertical clearance, closed, of 31 feet at high water. The highway bridge has a horizontal clearance of 200 feet and a vertical clearance of 135 feet at high water. Bridge regulations are covered in Chapter 2, § 203.100.

New London Harbor and Thames River are easy of access by day or night, but

local knowledge is required at low water to take a greater draft than 20 feet above the bridges.

From Fishers Island Sound, pass 200 yards or more southward of Seaflower Reef Light, steer **281°** with North Dumpling Light a little on the port quarter, and pass southward of the buoys marking the south side of Black Ledge. From The Race, pass southward and westward of Race Rock Light, giving it a berth of over 200 yards, steer for New London Ledge Light and pass westward of it. The southwest end of Black Ledge is 0.4 mile 130°, and a rock with 22 feet over it is 0.2 mile 153° from the light.

From westward, shape the course for Bartlett Reef lighted whistle buoy; from it steer eastward or east-northeastward until New London Ledge Light bears anything northward of 033° and then haul up for it. New London Ledge Light is the principal guide for the entrance. It has a fog signal, and it is necessary only to give it a berth of over a hundred yards, passing westward of it. A course of **033°** for New London Ledge Light leads over 0.3 mile southeastward of Rapid Rock and 100 yards southeastward of the lighted gong buoy marking Sarah Ledge, which are the easternmost dangers on the west side of the entrance. Passing 225 yards westward of New London Ledge Light, steer **354°** for the middle of the opening in the drawbridge above New London, keeping it in range with the 135-foot tank on the submarine base.

Tides.—The mean range of the tide at New London is about 2½ feet. Daily predictions of the times and heights of high and low waters are given in the *Tide Tables*.

Freshets usually occur in the river in the spring. It is reported that they seldom exceed 2 feet above mean high water at Norwich.

The tidal **currents** follow the general direction of the channel and usually are not strong. At Gales Ferry, 4 miles above New London, the average velocity at strength is about ¾ knot, and at Easter Point, 7 miles above New London, ½ knot. During freshets, and when the river is high, the resulting current sometimes has considerable velocity, and vessels are often embarrassed in light winds, after getting in past the light, by strong surface current setting out even on the flood.

Ice seldom forms below the naval station. Above the naval station ice obstructs navigation about two months each year. In extremely severe winters, however, heavy ice from the Sound, driven in by winds, has been known to extend about 1.8 miles above the entrance. Between New London and the mouth of the river, sailing vessels may navigate with comparative safety in ordinary winters; and even in severe weather it is rare that a stoppage of navigation for sailing vessels of more than a week's duration occurs. Steamers can nearly always enter and leave with safety. Drift ice sometimes forms a decidedly dangerous obstruction in the approaches through Long Island Sound during severe winters, especially during February and March; and sailing vessels are much hindered in their movements during the months of January, February, and March.

The prevailing winds are southwesterly in summer and northwesterly in winter. **Storm warnings** are displayed day and night from Fort Trumbull.

Pilots may be obtained by making signal, or by radiophone or by other contact, and coming to anchor outside the entrance until boarded. Strangers bound for Norwich take a State pilot at New London, where one can be obtained by inquiry. **Pilotage** is compulsory for all vessels in the foreign trade drawing 9 feet or over, if spoken. The usual place of boarding is outside Sarah Ledge.

Towage.—Steam vessels usually proceed to the upper harbor without assistance.

Towboats will be found at New London, and when likely to be needed, will be found near the entrance. Strangers entering do not require a towboat unless with a head wind and contrary current.

Quarantine.—Vessels subject to quarantine anchor where directed. Inspection is made by the United State Public Health Service physician.

Hospitals.—New London has one public and several private hospitals. The Lawrence Memorial Hospital on Ocean Avenue, and New London Contagious Hospital are United States contract hospitals. Services are free for all American seamen and at a fixed minimum rate for foreign seamen. A relief station of the United States Public Health Service is here.

Customs.—The customhouse is at 150 Bank Street, at the shoreward side of the United States Coast Guard wharf.

Immigration.—No officials of the Immigration Service are stationed at this port. The necessary officers may be secured from Hartford by arrangement with the New London customs office.

The **United States Coast Guard Academy** is about 1 mile north of the center of the city. The administration building, which has a white tower and a clock in it, is very prominent, but is not visible until almost abeam of the academy. Considerable dredging has been done along the water front in this locality and the academy wharf had 16 feet at its end, 15 to 20 feet on the south face, and 12 to 17 feet on the north face in August 1949.

The **United States Naval Submarine Base** is on the east bank about 2 miles above New London. The channel has a depth of 24 feet to this point. A submarine escape training tank 135 feet high is here. The top of the tank is marked by four red lights.

Harbor regulations are in force for New London Harbor. The harbor master has authority to berth vessels, shifting them if necessary, but occasion for doing so seldom arises.

Piers, wharves, and docks.—The port's principal terminal is the State pier. It is a modern steamship terminal 1,000 feet long and 200 feet wide, and is open to all vessels on the payment of charges. It is the easterly of two long piers southwestward of the Thames River bridges. Depths at the State pier are 30 feet on the north side, 31 feet on the face, and 28 to 33 feet on the south side. At private wharves open to public use no fixed rates for dockage are established. At the railroad wharves no dockage is assessed on vessels handling freight for or from the company's lines; at the State pier the rates are assessed according to the tonnage of the vessel.

Supplies of all kinds are available in large quantities. Bunker fuel oil is available in three grades from the oil company which maintains terminal facilities. Diesel oil and gasoline can be obtained. Oil companies are prepared to supply fuel on 48 hours' notice either by barge or by tank car at any wharf with railroad connections.

The water supply is controlled by the municipality. An ample supply of pure water for drinking and for boiler purposes is available.

Repairs.—The port has marine railways capable of handling vessels of medium size. A repair yard on the west side of the Thames River about a mile north of the drawbridge operates three railways which have capacities of 1,000, 1,500, and 2,500 tons. The lengths of the cradles are 175, 145, and 250 feet, and their widths are 50, 35, and 63 feet, respectively. Depths over the forward keel blocks are from 13 to 16 feet, and depths aft range from 15 to 19 feet. The plant is equipped to make repairs

to steel and wood vessels, wooden hulls, engines, and boilers. It specialized in repairs to large yachts. A privately dredged channel with a reported depth of 20 feet leads to the shipyard from the main channel in the vicinity of Daily Point Light. The entrance is marked by privately maintained dolphins.

On the east bank of the river about 1 mile south of the drawbridge is a shipyard with a marine railway having a capacity of 2,500 tons. It is 650 feet long over all and has a 212-foot cradle 40 feet wide. Depths over keel blocks are 12 feet forward and 18 feet aft. A 15-ton traveling crane is available for service in connection with the railway. The plant is fully equipped for all types of marine repair work. In 1949 all the facilities of this plant were given over to government production.

Several companies in New London are engaged in the business of wrecking, salvage, and marine contracting work. They are equipped with pumps, diver's outfits, floating equipment, and other gear necessary for this type of work.

New London has good railroad communication. Steamers operate to Block Island, Long Island, and Fishers Island. A marine taxi is operated at the city pier for trips around the harbor or to adjacent ports.

Above New London a Federal project provides for: A channel 25 feet deep, 250 feet wide to the upper end of Bartlett Crossover, thence 200 feet wide to Norwich with increased width at bends through Long Reach, and at the head of navigation, length 9.5 miles.

A channel widening 20 feet deep, 350 feet wide, opposite the United States Submarine Base.

The construction of five training walls with tops at mean high water. The approximate lengths are: Mohegan Dike, 2,988 feet; Trading Cove Dike, 2,370 feet; Long Rock Dike, 2,800 feet; Rolling Mill Dike, 3,483 feet; and Norwich Dike, 1,050 feet.

In July 1949 the controlling depth in mid-channel was 22 feet to Ice House Light, thence 24 feet to Norwich, except for a shoal spot 19 feet deep, 60 feet wide in a southerly direction from Long Reach Upper Light.

From New London to Norwich, local knowledge is required to carry the best water in the river, and strangers are advised to take a pilot at New London. Small craft should have no difficulty in following the channel which is well marked by lights and buoys.

Gales Ferry, on the east side of the river, about 4 miles above the bridge at New London, is the site of the training quarters and the **Yale University boat house.** About 0.7 mile southward is the **Harvard University boat house.**

Opposite Gales Ferry is the town of **Bartlett** and the site of a prominent power plant. Two tall stacks on the top of the power house are conspicuous. A privately dredged channel leads to the dock and coal tipple. The channel has a width of 90 feet and a depth of about 19 feet.

At **Montville** is a dock with a depth of 15 feet on the face. The northeast end of the dock is in ruins.

Allyn Point, on the east bank about 5 miles above New London, has a large coal receiving pier for the railroad. The deepest draft brought up to the pier is about 22 feet at high water.

A power transmission line crosses the river southwestward of Allyn Point. It has a vertical clearance of 175 feet above mean high water.

Fort Point, on the east bank about 8 miles above New London, receives some lumber from coasting vessels.

Mohegan Dike has settled and is entirely submerged at the higher tides except for a rock which is about 75 feet abreast of a row of piling shoreward of the dike. Caution should be observed in navigating in the vicinity of the dike.

The red brick buildings of the Norwich State Hospital are on a bluff just north of the point and are a conspicuous landmark.

Norwich, a city at the head of navigation on the Thames River, at its junction with the **Shetucket** and **Yantic Rivers,** is about 11 miles above New London. Depths of 7 to 25 feet are found alongside most of the wharves. Small boats generally anchor in the Shetucket River just above the bridges at Norwich. Supplies of all kinds are available.

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CHAPTER 8

Eastern Long Island Sound

Chart 1212

LONG ISLAND SOUND is a deep navigable waterway situated between the shores of Connecticut and New York and the northern coast of Long Island. This chapter describes the eastern portion of the sound following the north shore to and including the Housatonic River and then the south shore to and including Port Jefferson Harbor.

In this region are boulders and broken ground, but little or no natural change in the shoals. The waters are well marked by lighthouses, a lightship, and other aids so that strangers should experience no difficulty in navigating them. As all broken ground is liable to be strewn with boulders, as a measure of safety, vessels should proceed with caution when in the vicinity of broken areas where the charted depths are not more than 6 to 8 feet greater than the draft. All of the more important places are entered by dredged channels and during fog, vessels are advised to anchor until the weather clears before attempting to enter. The numerous oyster grounds in this region are usually marked by stakes and flags. These stakes may become broken off and form obstructions dangerous to small craft, especially at night, so that they should proceed with caution when crossing areas where oyster stakes are found.

Directions.—See Chapter 3 for courses and distances through Long Island Sound.

Anchorages.—New London Harbor is the most important of the anchorages sought for shelter in the eastern part of Long Island Sound. Niantic Bay and the approach between Bartlett Reef and Hatchett Reef are used to some extent by sailing vessels bound foreign, and having unfavorable winds on reaching the eastern part of the sound. Small vessels can select anchorage eastward or westward of Kelsey Point Breakwater, also in Duck Island Roads. Off Madison there is anchorage sheltered from northerly winds. New Haven Harbor is an important harbor of refuge.

Currents.—In the eastern portion of the sound the current turns from ½ to 1½ hours earlier along the north shore than in the middle of the sound.

Proceeding westward from the The Race in the middle of the sound the velocity at strength of current is 1¾ knots at Cornfield Point Lightship, about 1 knot off New Haven, 1 knot off Eatons Neck, ½ knot between Rye Neck and Matinicock Point, and ½ knot eastward of Hart Island.

About 0.2 mile south of Bartlett Reef slack waters and strengths of current occur about 1¼ hours earlier than at The Race. The average velocity at strength of current is about 1¼ knots. The flood current sets 255° and the ebb 090°.

At Cornfield Point Lightship slack waters and strengths of current occur about

½ hour earlier than the corresponding slacks and strengths of The Race. The flood current sets 255° with an average velocity at strength of about 2 knots and the ebb sets 100° with a velocity of about 1¾ knots.

About 1 mile north of Stratford Shoal (Middle Ground) Lighthouse, the average velocity at strength is 1 knot, the flood setting westward and the ebb eastward. Slacks and strengths occur about the same time as at The Race.

Tides.—The time of tide is nearly simultaneous throughout Long Island Sound but the range of tide increases from about 2½ feet at the east end to about 7¼ feet at the west end. Daily predictions of the times and heights of high and low waters for New London, Bridgeport, and Willets Point are given in the *Tide Tables*.

The effect of strong winds, in combination with the regular tidal action, may at times cause the water to fall several feet below the plane of reference of the charts, which is mean low water.

Fog.—In Long Island Sound the north and south shores are equally subject to fog, except that on spring and summer mornings, when there is little or no wind, fog will often hang along the Connecticut shore when it is clear offshore and to the southward.

Ice.—In ordinary winters the floating and pack ice in Long Island Sound, while impeding navigation, does not render it absolutely unsafe, but in exceptionally severe winters the reverse is the case, none but powerful steamers being able to make their way.

Drift ice, which is formed principally along the northern shore of the sound under the influence of the prevailing northerly winds, drifts across to the southern side and accumulates there, massing into large fields, and remains until removed by southerly winds, when it drifts back to the northerly shore.

In ordinary winters ice generally forms in the western end of the sound as far as Eatons Neck; in exceptionally severe winters ice may extend to Falkner Island and farther eastward.

Effect of tides and winds on ice.—In Long Island Sound northerly winds drive the ice to the southern shore of the sound and southerly winds carry it back to the northern shore. Northeasterly winds force the ice westward and cause formations heavy enough to prevent the passage of vessels of every description until the ice is removed by westerly winds. These winds carry the ice eastward and if of long enough duration, drive it through The Race into Block Island Sound, thence it goes to sea and disappears.

Navigators must not depend too implicitly upon the lightship and buoys. In severe winters these are liable to be carried away; and, in fact, during every winter it is better to depend on the lighthouses and other permanent objects than on the buoys.

The buoys in New London Harbor are not usually disturbed by ice, but Cornfield Point Lightship is sometimes forced from its station.

In New Haven Harbor the influence of the northerly winds is to clear the harbor and its approaches unless the local formation is too heavy to be moved. Southerly winds force the drift ice in from the sound and prevent the local formations from leaving the harbor. Tides have little effect upon the ice. Additional information concerning ice conditions in the waters adjoining Long Island Sound is given under the local descriptions.

Chart 214.—Bartlett Reef, about 1.1 miles west of Little Goshen Reef, is marked at its southern end by a buoy and Bartlett Reef Light; at its northern end by a buoy. The reef is about 1.3 miles long in a general north and south direction and about 0.3

mile wide. The depths range from 2 to 12 feet with rocks awash at low water near the northern end. A lighted whistle buoy is about 0.5 mile southward of the reef.

Bartlett Reef Light, 40 feet above water and visible 11 miles, is shown from a red skeleton tower, white tank house on base, on the south end of the reef.

Twotree Island is a small, bare island about 0.8 mile south-southeastward of Millstone Point, the eastern point at the entrance to Niantic Bay. Shoals extend nearly 0.4 mile eastward and southward from the island and also 300 yards northward where the edge is marked by a buoy, a guide for Twotree Island Channel.

Twotree Island Channel leads northward of Bartlett Reef and Twotree Island. With an adverse current in the Sound this channel is used to some extent by light tows, and by sailing vessels with a leading wind in the daytime, as the tidal currents turn about 1 hour earlier along the north shore than in the middle of the Sound. The channel is buoyed, but strangers are advised to use it with caution and should never attempt to beat through.

To enter Twotree Island Channel, pass southward of Rapid Rock buoy and Little Goshen Reef buoy, giving the last buoy a berth of about 0.3 mile, and steer about 300°. Pass 200 to 300 yards northward of the buoy at the north end of Bartlett Reef, give the shore northward of Bartlett Reef a berth of over 300 yards, and pass about 300 yards northward of the buoy northward of Twotree Island. Then shape the course to pass 0.4 mile or more southward of Black Point, and stand westward toward Hatchett Reef and pass southward of it.

The shore westward of **Goshen Point** has scattered boulders which extend off 400 yards in places. A prominent water tank is about 1 mile west of Goshen Point. The northern part of **Jordan Cove** is foul. A short breakwater is built out from the eastern point at the entrance of this cove to form an anchorage on its north side for the boats of **Pleasant Beach,** a summer settlement. A small wharf and a quarry are about 0.3 mile northward of the breakwater. **Flat Rock,** bare at low water, is 400 yards from the shore just southward of the wharf and is marked by a buoy. **High Rock,** which shows at high water, is in the entrance of the bight 350 yards east-southeastward of **Fox Island**, eastern side of Millstone Point. A rock awash at high water is 100 yards southward of High Rock, and is marked by a buoy.

Millstone Point, on the east side at the entrance of Niantic Bay, is occupied by the buildings of a stone quarry. A cove with depths of 6 to 15 feet is on the west side of the point. A reef with 2 feet over it is just off the mouth of this cove, and is marked at its south end by a privately maintained stake. Leaving this stake on the port hand, a depth of about 9 feet can be taken into the cove and to the inside of the wharf on its north side, where the depth is about 12 feet.

White Rock is an islet on the east side of the entrance 0.5 mile westward of Millstone Point. **Little Rock,** partly bare at low water, is 150 yards east of White Rock. A rock, on which the least depth is 11 feet, is about midway between Little Rock and the cove at Millstone Point. A rock with 14 feet over it is 285 yards 151° from White Rock and is marked by a buoy on the south side.

Niantic Bay is 4.5 miles westward of New London Harbor. It is a good anchorage, sheltered from easterly, northerly, and westerly winds. It is a harbor of refuge in northerly gales and can be used by sailing vessels and tows. The general depth of the bay is about 19 feet, the water shoaling gradually northward. The entrance is 1.5 miles wide, and the dangers are marked by buoys or show above water.

Black Rock, small and bare, is 0.4 mile northward of White Rock and 400 yards from shore. It is marked by a buoy.

Waterford Island, small and bare, is 0.3 mile from the eastern shore and 0.5 mile from the head of the bay. A shoal is between the island and the shore.

Wigwam Rock, high and bare, is 200 yards from the northwest shore between Niantic and Crescent Beach. A rock bare at low water is 250 yards southwestward of Wigwam Rock, and is marked by a buoy.

Niantic and **Crescent Beach** are summer resorts with railroad communication at the north end and northwest side of the bay.

Niantic River, at the northeast end of the bay, is navigable with local knowledge. The entrance is through a narrow passage crossed by two bridges. The railroad bridge has a bascule opening 45 feet wide and a vertical clearance of 11 feet, closed, at high water; the highway bridge has a swing span with a horizontal clearance of 65½ feet and a vertical clearance, closed, of 9½ feet at high water. The bridge regulations are covered in Chapter 2, § 203.110.

The river has a natural channel which is reported frequently shifting and changing. It is marked by privately maintained stakes which are shifted to conform to the changing channel. Small craft can get about 3 miles above the entrance to **East Lyme** with local information. The river from westward of Sandy Point to the wharf at East Lyme, a distance of 1 mile, is about 800 feet wide, deep, and clear, vessels generally following the west bank. From eastward of Sandy Point a shallow cove extends northeastward. **Sandy Point** and **Pine Grove** are summer resorts. Strangers should not attempt to enter Niantic River without a pilot. One can be had from Niantic. Pilots aim to pass through the bridges either at slack water or against the current. Boats can stand for the entrance with the middle stone pier of the railroad bridge a little on the starboard bow and the wharf at Crescent Beach astern. From the railroad bridge the channel leads through the highway draw, then follows the east bank for 100 yards to the first point, then northwestward across the river, then northeastward for 0.5 mile to mid-river, thence west-northwestward curving to northward to abreast the entrance of Smith Cove, then about 340° for the west end of Sandy Point, avoiding a shoal which extends 500 feet southwestward from Sandy Point. The channel is marked by local interests. The channel is shifting and stakes are placed to conform with changes in channel.

The mean range of the tide is about 2¾ feet in Niantic Bay.

The tidal currents through the bridges have an average velocity of about 2 knots at strength and set fair with the channel; it has been reported locally, however, that much greater velocities may be expected under storm and freshet conditions. See *Current Tables* for predictions.

Smith Cove is on the west side of the river nearly 1 mile above the entrance. A prominent white tower is on the south side of the entrance. The river is generally closed by ice for about three months during the winter.

Black Point, on the west side at the entrance of Niantic Bay, is flat with bluffs at the water, and is occupied by many summer cottages. Broken ground, on which the least depth found is 21 feet, extends 0.4 mile south of the southwest side of the point.

Several small boatyards at Niantic have marine ways which can accommodate small craft of 45 feet in length and 8-foot draft. The yards have facilities for hull and engine repairs and do a small amount of building. Near the boatyards is a wharf

with a depth of 6 feet at the end where gasoline, fresh water, and some supplies can be obtained.

The bight between Black Point and Hatchett Point has many rocks showing above high water. **Griswold Island,** on the northeast side of the bight, is high and prominent. Rocks extend 0.2 mile southward and southwestward from the island. The ends of the reef to the southwest and south are marked by buoys. **South Brother,** in the center, and **North Brother,** in the northwestern part of the bight, are prominent bare rocks.

A rock with 6 feet over it is 250 yards off the west side of Black Point. **Blackboys,** two rocks bare at low water, are 0.4 mile southward of Griswold Island. They are marked on the north side by a buoy. A rock with 6 feet over it is 150 yards southward of them. A rock with 3 feet over it is 400 yards southward of Blackboys and is marked on its south side by a buoy. **Johns Rock,** with 5 feet over it, is 0.2 mile off the northwest side of the bay; the range of South Brother well open northward of Griswold Island leads southward of Johns Rock.

Strangers entering the bight should proceed with caution, as the bottom is broken; the best route is to pass southward and westward of the buoy off Blackboys, and pass on either side of South Brother. **Seal Rock,** 160 yards south of the end of **Giants Neck,** is marked by a buoy on the south side.

Hatchett Point has several large dwellings and a wharf on its southeast side. A reef extends about 400 yards off the southwest side of the point.

Hatchett Reef is 0.6 to 1 mile south-southwestward of Hatchett Point. It has a least depth of 5 feet, and is marked on its south end and at its northeast end by buoys. Close to the southeast side of the reef the depths are 30 to 48 feet. A bar with 10 to 16 feet over it extends westward from Hatchett Reef to Saybrook Bar.

Charts 215, 266, 267.—Connecticut River rises in the extreme northern part of New Hampshire, near the Canadian border, and flows southerly between the States of Vermont and New Hampshire and across Massachusetts and Connecticut to Long Island Sound. It is approximately 375 miles long and is one of the largest and most important rivers in New England. The head of commercial navigation is at Hartford, about 45 miles from the mouth. Considerable tonnage consisting mostly of oil tankers is employed in the commerce of the river. Barges must be equipped with steering gear in order to make the sharp turns.

The river water is fresh at and above Deep River.

The river is under improvement by dredging and the construction of dikes. Each year after the spring freshets, shoals with a least depth of 10 feet are found in places on bars in the upper river; dredging to remove such shoals is begun as soon as the water subsides. Vessels go to Saybrook Point in 15 feet at low water.

Between the entrance and Middletown the river banks are hard and in some places rocky, but between Middletown and Hartford the river flows through alluvial bottom land, where shoaling may occur from freshets and ice jams.

The principal towns and landings with their distance in nautical miles above Saybrook Breakwater Light are: Saybrook Point, 1.4; Lyme, 3; Essex, 6; Brockway Landing, 8.6; Deep River, 10.5; Hadlyme, 11.9; East Haddam, 14.6; Haddam, 17.5; Rock Landing, 18.6; Higganum, 21.1; Middle Haddam, 24.2; Middletown, 28; Portland, 28.2; Cromwell, 29.5; South Glastonbury, 35; Glastonbury, 40; Wethersfield, 42; and

Hartford, 45.2. A railroad on the west bank of the river affords communication to all the towns and landings on that side. The principal towns on the river have bus communications to Hartford, New London, New Haven, and New York.

A Federal project provides for: A channel 15 feet deep, 300 feet wide from the mouth of the river to the Lyme Railroad Bridge, thence 15 feet deep, generally 150 feet wide to Hartford. Length about 52 miles. A channel 11 feet deep, 100 feet wide from deep water in the river to the anchorage in North Cove. Length about 1,500 feet. Two anchorages 6 feet and 11 feet deep in North Cove. Two riprap jetties at the mouth of the river. The construction of dikes, training walls, revetments, and accessory works. A training dike about 3,700 feet long at Hartford.

The controlling depths are: 15 feet, but not full width to Hartford; 1 foot in entrance channel to North Cove; 0 feet in anchorages in North Cove.

Anchorages.—Secure anchorage can be had eastward or northeastward of Saybrook Light or abreast the wharf at Saybrook Point. Farther up anchorage can be selected anywhere in the wider parts of the channel. Special anchorage areas wherein vessels not more than 65 feet in length, when at anchor, shall not be required to carry or exhibit anchor lights have been established in the Connecticut River at Essex and Maromas. See Chapter 2, § 202.55.

Pilots who take care of the traffic on the river are at Saybrook Point, and strangers bound up the river should take one. Vessels can land at the steamboat wharf at Saybrook Point and communicate with the pilots by telephone, or, if a pilot is called by telephone when a vessel leaves any port, a pilot will be ready when the vessel passes the steamboat wharf.

Currents.—At the entrance the currents have considerable velocity at times, and always require careful attention, as the tidal current of the sound often sets directly across the direction of the current setting out or in between the jetties. For times and velocities of currents at a number of locations in the Connecticut River, the *Current Tables* should be consulted.

During the ebb, there is a strong current which runs from the Lyme Landing toward the center of the railroad bridge. Towboats with vessels in tow should steer for the east pier of the draw and should not swing out for the draw until almost in it, to avoid being set to the west side of the channel. Because of river discharge the ebb current usually will be considerably stronger than the flood. Ebb current velocities of 1 knot or more have been observed under normal conditions on the bars in Connecticut River between Higganum and Hartford; the velocities of the flood currents are much less.

Tides.—The time of tide becomes later and the range diminishes in progressing up the river. High water and low water at Hartford occur approximately at 4¾ and 6¼ hours later, respectively, than at the entrance. At Saybrook Jetty the mean range of the tide is about 3½ feet while at Haddam it is about 2½ feet and at Hartford about 1¾ feet.

Freshets occur principally in the spring, when the snow is melting, although occasional floods have occurred in every month of the year except July and September. The average annual variation in the height of the river at Hartford is about 18 feet, and the maximum about 6 feet more. The highest freshets are generally of short duration, but the period during which the river at Hartford is at the level of 8 feet or more above mean low water averages nearly two months of each year. It is reported that a freshet

of about 15 feet is at Middletown, and below this point it rapidly decreases. At the mouth the variation in water level is due to the tides.

Ice closes the river to navigation a part of every winter, the average date of closing and opening navigation being January 12 and March 15, respectively. The closed season, however, varies greatly, in one lasting only a few days and in another nearly four months. In recent years the dates of closing navigation have ranged from December 9 to February 27 and of opening from February 20 to April 14.

Storm warnings are displayed day and night from a staff on the wharf at Saybrook Point.

Storm warnings are displayed by day from May 1 to October 31 at Baldwin Yacht Basin dock on west bank of Connecticut River.

Bridges.—The Connecticut River, between the entrance and Hartford, is crossed by eight bridges up to and including the N. Y., N. H. & H. Railroad Bridge at Hartford. The railroad bridge at Lyme, 1.5 miles above Saybrook Point, is of the bascule type. It has an opening with a horizontal clearance of 139 feet and a vertical clearance of 19½ feet above mean high water when closed. A new highway bridge, the Raymond E. Baldwin, is about 0.5 mile north of the railroad bridge at Lyme. The bridge is fixed, 7 spans, with horizontal clearance of 218 feet and vertical clearance of 81½ feet at high water.

The highway bridge at East Haddam has a center pier draw with openings of 180 and 200 feet wide at the west and east sides, respectively. The vertical clearance at mean high water, closed, is 22½ feet.

The railroad bridge at Middletown has a center pier draw with openings 100 feet wide and a vertical clearance, closed, of 25½ feet above mean high water. The high level arched highway bridge, 0.2 mile above the railroad bridge, has a vertical clearance under the east span of 93 feet above mean high water.

Two highway bridges are at Hartford. The first, between Hartford Jetty Light and Colt Pier Light, is a fixed bridge with a horizontal clearance of 251 feet and a vertical clearance of 72 feet at mean high water. The second is a closed arch bridge with a horizontal clearance of 100 feet between the piers and a vertical clearance of 39 feet at high water.

Connecticut River bridge regulations are covered in Chapter 2, § 203.115.

Gasoline, fresh water, and other supplies are available at the principal towns and landings along the Connecticut River. Boatyards are available at Essex, Portland, and East Hartford.

To enter Connecticut River from eastward, pass southward of Hatchett Reef and Saybrook Bar, or keep Cornfield Point Lightship bearing westward of 241° until Saybrook Breakwater Light bears **315°**. Steer for Saybrook Breakwater Light on this course which will lead through the buoyed channel between the south end of Saybrook Bar and the east end of Long Sand Shoal, and on approaching the light keep it on the starboard bow. The dangers eastward of the entrance are described with the coast preceding.

To enter from westward, pass 1 mile southward of Falkner Island Light on a course **076°**. This will lead about 0.4 mile northward of the lighted bell buoy on the western end of Long Sand Shoal and about 0.2 mile southward of Cornfield Point Shoal buoy. Then steer about **067°**, with Saybrook Breakwater Light a little on the port bow. Long Sand Shoal and the dangers westward of the entrance are described with the coast

following. Cornfield Point Shoal is covered by a red sector in Saybrook Breakwater Light, the southerly edge of which bears 074°.

To enter from Saybrook Point, pass about 200 feet eastward of Saybrook Breakwater Light, steer **004°**, and pass the buoys which mark the edges of the dredged cut between the jetties, at a distance of about 150 feet. When past Saybrook Light, head to clear the lighted buoy northeast of the north end of Lynde Point, and leave the buoy 200 to 300 feet on the starboard hand on a course about **338°**. Anchorage can be found in the channel about 200 yards off the steamboat landing at Saybrook Point, in about 24 feet.

Chart 215.—Saybrook Outer Bar, obstructing the mouth of the Connecticut River, is a shifting bar with depths of 2 to 9 feet extending nearly 2 miles off the mouth of the river and is marked off its southeastern end by a lighted bell buoy. At the western side of the entrance, jetties have been built, and a channel 300 feet wide and 16 feet deep has been dredged between them. This improved channel is not subject to material change. The bar eastward of the jetties has several channels with a depth of 6 feet but they shift and are not reliable.

Saybrook Breakwater Light, 58 feet above water and visible 13 miles, is shown from a white conical tower on a brown cylindrical pier on the south end of west jetty. A red sector between the bearings 074° and 098° covers the foul ground south and southwestward of Cornfield Point. The fog signal is an air diaphragm horn.

Saybrook Light, 71 feet above water and visible 11 miles, is shown from a white stone tower on **Lynde Point** at the west side of the mouth of the river. The fog signal is a bell.

Saybrook Point is a village eastward of **Old Saybrook,** about 1 mile north of Saybrook Light. Depths at the dolphins off the landing on the east side are 17 to 18 feet. It is not recommended to make landings at the wharf on the northeast side of the point as the wharf is in poor condition with shoal water along its entire face.

South Cove is not navigable except by row boats. **North Cove** is entered only local craft.

From Saybrook Point to Hartford local knowledge is required to carry the best water in the river and strangers are advised to take a pilot at Saybrook Point. Small craft should have no difficulty in following the channel. Most of the range lights have white target daymarks; front diamond shape, rear square.

Lieutenant River leading to **Old Lyme** enters the Connecticut River just below the railroad bridge. It is very shoal and is crossed by two fixed bridges below the town. The first, a railroad bridge, has a horizontal clearance of 33 feet and a vertical clearance of 11½ feet at high water. The second, a highway bridge, has a horizontal clearance of 46 feet and a vertical clearance of 5½ feet at high water.

The overhead cable at the Saybrook-Lyme Bridge has a vertical clearance of 125 feet.

The **Calves Island Bar** channel passes west of **Calves Island** and south of **Goose Island.** Keep in mid-river from Goose Island to abreast the lower end of **Nott Island.**

Essex Reef Light off **Haydens Point** is shown from a black skeleton tower, white tank house, square concrete base. The light is 27 feet above water. Between the light and the point is foul. A buoy marks the shoal extending northwestward of the

light and at the junction of the channel northeastward of **Thatchbed Island** which leads to Essex.

Essex, a town on the west bank of the river about 5 miles above Saybrook Point, has considerable yachting activity. Two yacht clubs are near the town landing. Alongside the town landing the depth is 6 feet. A landing can be made at a privately owned dock where the depths range up to 15 feet at the end. Diesel oil, gasoline, fresh water, ice, provisions, and other supplies can be obtained.

Several boatyards with marine railways are at Essex with facilities for general repairs and building boats. The largest railway is capable of hauling vessels of 150 feet length, 12 feet draft, and 150 tons weight.

Northward of **Essex Shoal** keep in mid-river until eastward of the light about 0.3 mile above **Ely Wharf.** Above the light the channel follows the eastern bank and east of **Brockway Island.**

Hamburg Cove and **Eightmile River** are on the east side of the Connecticut River, 6 miles above Saybrook Point. The river has been improved by dredging a channel 75 feet wide and 8 feet deep for a distance of 1.3 miles to **Hamburg,** with a small turning basin at Hamburg, which is the head of navigation. Boulders are in places outside the dredged channel. The narrow entrance channel from Connecticut River has a depth of 10 feet and is indicated by grassy flats on both sides and is buoyed. The cove has good anchorage. The dredged channel between the cove and Hamburg is marked at times by bush stakes on the inside of the turns. A buoy marks a shoal on the south side of the channel near the entrance. The controlling depth in the channel and in the easterly side of the turning basin is 6 feet. The remaining portion of the turning basin has a controlling depth of 5 feet.

At **Brockway Bar** an unmarked channel with depths of about 12 feet follows the east bank at a distance of about 300 feet; its use is not recommended. After passing the buoy at the upper end of Brockway Bar Cut, the channel widens to nearly the full width of the river to the lower end of Eustasia Island.

Chart 266.—A channel follows both banks of the river passing **Eustasia Island** and the shoals above it. The eastern channel crossing **Potash Bar** through a dredged cut is better marked and easier to follow. The western channel leads to the landing at **Deep River** and crosses **Chester Creek Bar** through a swash channel. Two lights mark this channel, one at **Devils Wharf** south of Eustasia Island, and the other on **Chester Rock** off the mouth of **Deep River.**

At **Chester Creek** is a boatyard with a marine railway capable of hauling out boats 42 feet long, 4-foot draft, and 24 tons.

Above Potash Bar the channel follows the east bank until abeam of the mouth of the creek from **Chapman Pond** which is about 0.8 mile above **Hadlyme Landing.** The channel then follows the west bank passing through **Eddy Rock Shoal** in a dredged cut. **Rich** and **Lord Islands** are low ground on the shoal area eastward of Eddy Rock. The Chester-Hadlyme vehicular ferry crosses the river at Hadlyme Landing.

At **East Haddam** the channel follows the east bank. The shoal off the west bank is reported to be shoaling. An overhead cable with a horizontal clearance of 136 feet crosses the river at East Haddam.

Salmon Cove, on the east side of the Connecticut River about a mile above the East Haddam-Tylersville bridge, is navigable for vessels of less than 6-foot draft as

far as **Scovill Landing,** about 1.5 miles above the entrance, and for small craft of less than 3-foot draft about 1 mile farther. The entrance of this cove is subject to shoaling.

Above the Salmon Cove the channel crosses to the south bank and passes **Warners Quarry Bar** through a dredged cut. The channel follows the south bank to **Red Store Landing** where it crosses the river to pass north of **Haddam Island** and through **Haddam Island Bar** and **Rock Landing Bar** in dredged cuts. The channel swings to the south bank and passes through a dredged cut off the mouth of **Higganum Creek.** The shoal on the east bank opposite the creek has extended westward. The channel follows the west bank passing through **Scovill Rock Bar** in a dredged cut. Northward of this cut the channel crosses the river through **Sears Shoal** in a dredged cut. A training wall extends southward from the mouth of **Hurd Brook** about 200 yards eastward of the channel.

At Maromas on the west shore opposite the north end of the cut just above Sears Shoal is an anchorage area described in Chapter 2, § 202.55.

The channel now follows the east and north banks passing through **Cobalt Shoal** and **Paper Rock Shoal** in dredged cuts. Favor the south bank from the western end of the Paper Rock Shoal cut to about 300 yards from **Bodkin Rock,** then cross to the north bank and pass it close-to.

Chart 267.—About 500 yards beyond Bodkin Rock the channel follows the south bank. The shoal on the north side has rocky patches partly bare at extreme low water. A dredged cut leads through **Mouse Island Bar.**

Caution is recommended when rounding the point about 1,300 yards above Mouse Island Light as a submerged crib is in the water off the point near the 5-foot spot shown on the chart.

The channel follows along the bulkhead wharves at **Middletown** as far as the railroad bridge where it shifts to the Portland side passing east of **Wilcox Island. Portland** has facilities for repairing small craft. The marine railway is capable of hauling out vessels of 80 feet in length and 6½-foot draft. Ship chandlery, a machine shop, and boat storage are available at the boatyard. Gasoline, water, ice, and provisions are available in Portland.

The channel crosses to the west bank through a dredged cut in **Portland Bar.** It follows the west bank to the upper stone bulkhead at **Cromwell** where it crosses **Cromwell Bar** in a dredged cut to the south bank. Gasoline, water, and provisions are available at Cromwell. The channel passes around the eastern side of **Gildersleeve Island** through **Gildersleeve Island Bar, Pistol Point Bar,** and **Brownstone Bar** in an almost continuous dredged cut.

At **Belamose** the channel passes through **Dividend Bar** in a dredged cut. Above this point the river narrows, the land much lower, and the curves more pronounced. The channel follows the outside bank in the curves. At **Rocky Hill** a ferry crosses the river. The dredged cut through **Two Piers Bar** and **Glastonbury Bar** is continuous. Training walls have been constructed out from the south bank at the upper end of the Glastonbury Bar cut. Similar walls extend from the south bank at the upper end of **Press Barn Bar** cut.

At **Naubuc** a coal wharf extends to the edge of the channel. A shoal makes off from **Crow Point** northward to about 75 yards off the wharf. Cuts have been dredged through **Naubuc Bar** and **Cys Hollow Bar.**

Wethersfield Cove is on the west side of the Connecticut River opposite **Keeney Point.** It has a narrow dredged entrance channel, with a least depth of about 4 feet, and is extensively used by motorboats. A yacht club is in the cove.

Above Wethersfield Cove the channel is through dredged cuts in **Wethersfield Shoal** and **Clay Banks Bar.**

The bulk fuel handling plant of the Hartford Electric Company's power plant on the west bank of the river is the only remaining commercial dockage at **Hartford.** A flood control dike has been constructed along this bank from just north of Charter Oak Bridge to Memorial Bridge.

A boatyard in **East Hartford** on the east bank just south of Memorial Bridge has a marine railway capable of hauling boats 40 feet in length with a maximum draft of 4 feet. Gasoline, water, ice, marine hardware and supplies are available at the yard.

Connecticut River above Hartford is practically unimproved but is navigable about 30 miles to **Holyoke** for boats not exceeding 3-foot draft, when the river is not low. The channel is constantly shifting. For a distance of about 10 miles above Hartford to **Enfield Rapids,** bars with 2½ feet at low water and many other obstructions are encountered. At **Windsor Falls** are locks 88 feet long and 19 feet wide, with a depth of about 3 feet on the sill, by which boats can pass around Enfield Rapids. Above Enfield Rapids to Holyoke the depth is about 4½ feet. The bridges are closed, but the overhead clearance is ample, generally about 18 feet.

Chart 1212.—Connecticut River to New Haven. Long Sand Shoal extends 6 miles westward from off the entrance of Connecticut River and has a greatest width of nearly 0.3 mile. The general depths on the crest of the ridge are 8 to 12 feet, bottom hard and lumpy. As the lumps are shifting in position and size, spots with 7 feet over them may be found at extreme low tides. The shoaling is abrupt on both sides, but especially on the south side, where the 10-fathom curve is only 200 yards from it in places and the 15-fathom curve about 0.3 mile. The shoal is marked at its eastern end by a horizontal-banded buoy. The western end is marked by a lighted bell buoy.

Cornfield Point Lightship is moored in 162 feet of water midway of and 0.9 mile southward of Long Sand Shoal. The lightship has a red hull with the word CORNFIELD on each side, and a red skeleton steel tower with lantern and gallery. The light is 53 feet above water and visible 13 miles. A riding light is on the forestay. The fog signal is a two-tone air diaphone; the radiobeacon is synchronized with the fog signal for distance finding. If the diaphone is disabled a bell will be struck by hand. The code-flag signal and radio call is NNBG.

Storm warnings are displayed during the daytime.

At the western end of Long Sand Shoal and 1 mile southward is an area about 0.6 mile long with depths less than 36 feet in which the bottom is rocky and broken. The least depth found is 23 feet, but the area has not been fully developed.

Sixmile Reef is an area of broken ground about 2.5 miles long, in a west-northwesterly direction, with depths less than 36 feet. The shoalest part of the reef is an area about 0.5 mile long with depths of 24 feet or less, and a least found depth of 19 feet, at a distance 6.2 miles 253° from Cornfield Point Lightship. The bottom is rocky and shoaling abrupt in places. A lighted whistle buoy is off the southerly edge of this reef. With extreme low tides, due to northerly and westerly winds, this shoal may be dangerous to vessels of as little as 15-foot draft. It is on the direct course of vessels from south-

ward of Stratford Shoal Light to Cornfield Point Lightship. The safer course is to pass southward of Sixmile Reef, keeping Cornfield Point Lightship bearing anything northward of 067°. Tide rips occur on the reef whenever the direction of the tidal current is opposed to that of the wind. This is especially true during spring tides and a southwest wind.

A ridge 1.3 miles long, with depths of 28 to 36 feet, as determined by a wire drag, is near mid-sound southward of Sixmile Reef and 5 miles north-northwestward of Horton Point Light. It is marked by a lighted bell buoy.

Chart 215.—Cornfield Point is 2 miles westward of Saybrook Light and is marked by a large red-roofed stone building. **Cornfield Point Shoal,** a small rocky patch with 3 feet over it, is 0.4 mile southward of Cornfield Point and is marked on its south side by a lighted bell buoy. Small craft passing inside the shoal should proceed with caution, especially at low water, when crossing the broken ground on which the least found depths are 10 to 15 feet, extending 0.5 mile west-southwestward from Cornfield Point. On the north side of this broken ground and 0.5 mile west of Cornfield Point is **Halftide Rock** which has not been closely developed, especially on its northwest side.

Hen and Chickens, bare in places at low water and marked by a buoy near the east side of the rocks, is 0.9 mile southwestward of Cornfield Point, and is about 0.5 mile long, with depths less than 15 feet. At extreme low water seven rocks are showing.

Crane Reef, 0.9 mile westward of Hen and Chickens buoy, is an area of broken ground about 0.3 mile in diameter with a least depth of 3 feet. It is marked on its south side by a buoy.

Westbrook Harbor is the western part of the open bight between Cornfield Point and Menunketesuck Island. It has many unmarked sunken rocks, and is seldom used as an anchorage; the anchorage in Duck Island Roads is better. The bight is characterized by boulders, and has not been thoroughly developed. The best entrance is between Crane Reef and Menunketesuck Island, heading for Salt Island on any course between 337° and 022°; vessels should proceed with caution when inside the 5-fathom curve. Two bare rocks are 0.3 mile from the eastern end of the bight, and a rock bare at low water is 300 yards westward of them. Other rocky patches are about 0.3 mile from shore. **Salt Island,** bare and rocky, is near the shore abreast the eastern end of Westbrook. **Lobster Rock,** which shows at very low water, is 0.4 mile 219° from Salt Island. It is marked by a buoy on the south side. About 0.3 mile westward, a buoy marks a small shoal which nearly bares at low water.

Chart 216.—Westbrook, a town on the north side of Westbrook Harbor, is marked by a prominent church spire. A large neon sign with a lobster and the word *Casino* on it shows up well at night.

Menunketesuck Island is the outermost of several low narrow islands connected to the mainland at low water. It has boulders at the south end.

A boulder reef extends nearly 0.5 mile south-southeastward from the point to the 18-foot curve. Tide rips frequently occur on this reef.

The range of Kelsey Point and the south end of Duck Island leads southward of the reef. Reefs extend about 400 yards off the western side of the point.

All broken ground along the north shore between Menunketesuck Island and Hammonasset Point, including Duck Island Roads and approaches, but excluding

Clinton Harbor inside the depth of about 14 feet, has been examined by means of a wire drag, and the dangers are shown on the charts. A drag set at 24½ feet was passed over **Southwest Reef,** 1 mile southeastward of Kelsey Point Breakwater. A boulder reef extends nearly 0.5 mile southward from Duck Island to the 18-foot curve, and is marked at its south end by a buoy. A rock with 1 foot over it is on this reef 350 yards off Duck Island. A rock with about 2 feet over it is close by. Tide rips have been reported to extend from the vicinity of these rocks to the buoy. During strong flood currents and a southwest wind, tide rips extend from the shoal water southwest of Duck Island to the vicinity of Southwest Reef. Caution is advised when navigating small boats in this vicinity during these conditions.

Duck Island Roads is between Menunketesuck Island and **Kelsey Point.** It has been made a harbor of refuge by the construction of breakwaters 1,100 feet northward and nearly 0.5 mile westward from Duck Island, and the Kelsey Point Breakwater on Stone Island Reef. A prominent landmark on **Duck Island** is a dark house with a stone chimney on its west side. The offshore ends of both Duck Island breakwaters are marked by lights.

The anchorage enclosed by the breakwaters extending northward and westward from Duck Island has been dredged. This area is subject to shoaling. A Federal project provides for: Three riprap breakwaters, viz, one north from Duck Island, 1,100 feet long; one west from the island 2,697 feet long; one south from Stone Island 3,750 feet long.

Dredging to a depth of 16 feet a portion of the protected area back of breakwaters at Duck Island. The existing project was completed in 1917. The controlling depths in June 1949 were 8 feet in the major portion of the protected area and 16 feet in the western end. In addition to the area inside the breakwaters, a small area northward and northeastward of Duck Island North Breakwater Light can be used as an anchorage in southwesterly weather.

The western entrance of Duck Island Roads is easy of access and should be used by vessels of a greater draft than 8 feet. Passing southward of Duck Island keep the light on the end of Kelsey Point Breakwater bearing northward of 264° until Duck Island West Breakwater Light bears 347°, then steer northward, keeping the last light on the starboard bow. In a rough sea, avoid the rough spots extending 0.3 mile 194° from Duck Island West Breakwater Light. Approaching from westward, the only dangers are the two 16-foot spots south-southwestward of Kelsey Point Breakwater Light.

The eastern entrance of Duck Island Roads is obstructed by a sand shoal with a least depth of 8 feet 600 yards eastward of Duck Island and by boulder reefs which extend 400 yards off the western side of Menunketesuck Island. This entrance is easy of access for vessels of 8-foot draft. To enter, when westward of Crane Reef, steer for Kelsey Point in range with or open southward of the south end of Duck Island, course 273°, until about 0.5 mile from Duck Island. Then a 315° course will lead about 300 yards eastward of Duck Island North Breakwater Light; steer this course and pass eastward and northward of the light, rounding it at a distance of about 100 yards into the harbor.

Between the 16-foot spots which extend 0.3 mile south-southwestward from Duck Island West Breakwater Light and the 17-foot rock patches about 0.4 mile southeastward of Kelsey Point, a distance of 0.6 mile, anchorage can be had in 18 to 24 feet, bottom generally sticky, exposed however, to winds southward of east and west.

Kelsey Point Breakwater extends on **Stone Island Reef** over 0.6 mile south-southeastward from **Stone Island** and is marked at its south end by a light. The least depth on the rocky broken ground southwestward of the light is 16 feet on two spots 300 yards and 0.4 mile 210° from the light. The outer spot is marked by a gong buoy. Stone Island at the north end of the breakwater is mostly covered at high water. Some rocks bare at low water between the island and the shore. Tide rips frequently occur in the area southwestward from the end of the breakwater to the gong buoy. Depths of 18 feet or less near Kelsey Point Breakwater indicate areas of broken rocky bottom which should be avoided in anchoring. Those east of the breakwater include depths 12 feet close to it; the 18-foot patch 0.2 mile east-northeast of the end of the breakwater; **East Ledge** with depths of 2 to 17 feet, which extends 0.4 mile southward from Kelsey Point and 600 yards eastward from the north half of the breakwater; and the broken ground with depths of 8 to 17 feet which extends over 0.4 mile southeastward from Kelsey Point.

The bight at the entrance of Clinton Harbor and westward of Kelsey Point Breakwater affords anchorage, but is exposed to southeasterly and southwesterly winds. Anchorage can be selected between the broken ground which extends about 300 yards westward from Kelsey Point Breakwater and the 18-foot curve of the shoal which is marked by a lighted bell buoy and extends over 0.6 mile southeastward from Hammonasset Point, where the area is nearly 0.8 mile wide, with depths of 12 to 24 feet and soft bottom in places. Or anchorage can be selected farther northward, toward Wheeler Rock buoy, in a depth of about 14 feet, taking care to avoid the sunken rocks with depths of 5 to 12 feet which extend 0.4 mile westward from the north end of the breakwater; these rocks marked by a buoy on the southwest side will be avoided by keeping the light on the south end of the breakwater bearing anything eastward of 122°.

Clinton Harbor, the bight westward of Kelsey Point Breakwater, is the entrance to **Hammonasset River,** a stream of little commercial importance. The depth on the bar and in the channel to the coal bunker wharf at **Clinton** is 4 feet, with reported shoals of 3 feet in the channel. The greatest draft taken to the wharf does not exceed 8 feet at high water.

A Federal project provides for: A channel 8 feet deep, 100 feet wide, from the deeper water in Clinton Harbor to the wharves at Clinton, length about 1.1 miles. An 8-foot anchorage opposite and above the wharves at Clinton. The maintenance of a stone dike. Work on the existing project had not begun in August 1949.

The landing at Clinton, locally known as Petri's Dock, has depths of 3 to 5 feet. Mooring facilities are available by arrangement with the harbor master. Diesel oil, gasoline, lubricants, fresh water, and ice can be obtained. A boatyard and marine railway adjoining Petri's Dock can haul out boats of 20 tons weight, 30 feet length, and 4 feet draft. Hull and engine repairs can be made.

A small boatyard and marine railway are at the north side of the entrance of **Hammock River.** Boats of 40-foot length and 5-foot draft can be hauled out. Hull and engine repairs can be made.

Wheeler Rock buoy marks a rock with 1 foot over it just outside the bar. Above the bar the channel is staked to just above the coal bunker wharf. Boats should not depend on carrying more than 3 feet at low water across the bar.

To enter Clinton Harbor, pass 200 feet eastward of Wheeler Rock buoy, steer 008° for a prominent church spire in Clinton until across the bar, then head up for the eastern end of **Cedar Island** and be guided by stakes which are privately maintained

and at times supplemented by lighted aids. Northeastward of Cedar Island are two narrow crooked channels close together and with a depth of about 1 foot at low water. The eastern one is usually marked on the port side entering by bush stakes and leads to a landing float just inside the mouth of the Hammock River. The western channel is marked on the starboard side entering by bush stakes and leads into **Indian River.**

Hammonasset Point is a low marshy area with many wooded knolls. The end of the point is a rocky knoll marked by a lone house and barn both of which are conspicuous from an easterly or westerly direction. **Hammonasset Beach** extends northwestward from the point for a distance of about 1.5 miles and is marked by many bathhouses. **Hammonasset State Park** is marked by a conspicuous flagstaff and the buildings at the recreational center. In the summer it is an active resort. Broken ground with rocky irregular bottom and least depths of 10 to 11 feet extends 0.5 mile southward of Hammonasset Point. This broken ground has been examined by a wire drag.

West Rock is the outermost of the bare rocks which extend a short distance off the east end of Hammonasset Point. A reef, with two bare rocks on its inner part and a depth of 7 feet on its outer part, extends 0.2 mile west-southwestward from the point and farther offshore in the same general direction is a rock with a depth of 5 feet. This rock is marked by a buoy northeastward of which tide rips frequently occur. When rounding the point, vessels should pass westward of the buoy as a matter of safety. Approaching from westward the broken ground, with depths less than 18 feet extending southward and southeastward from Hammonasset Point, will be avoided by keeping the light on the end of Kelsey Point Breakwater bearing northward of 077° and the range of a prominent church in Clinton and the eastern end of Cedar Island bearing 006°. This last range leads eastwardly but close to the lighted bell buoy marking the southeast end of the shoal.

The broad bight westward of Hammonasset Point is sometimes used as an anchorage, and is sheltered in northerly and northeasterly winds, but has little to recommend it. The bight is characterized by boulders and has not been fully developed. Vessels of 15-foot draft can be taken to the anchorage northward of Madison Reef, but should proceed with caution when crossing the ridge with depths less than 24 feet, which extends eastward and westward from Madison Reef. The bottom is soft southward of Madison Reef, and vessels can stand in anywhere eastward of Kimberly Reef and over 1 mile westward of Hammonasset Point and select anchorage in 30 to 36 feet.

Madison Reef is about 0.6 mile southward of Tuxis Island and extends a little over 1 mile east and west. This reef has 4 to 10 feet over it and consists of several rocky patches with deeper water between them. A buoy 164° from Tuxis Island marks the west side of a passage across the eastern part of the reef; the eastern end of the reef is 600 yards eastward of the buoy. The western end of the reef is marked by a buoy.

Vessels can pass eastward of Madison Reef by giving Hammonasset Point a berth of over 0.8 mile and steering for Tuxis Island on any course between 304° and 315°. From westward a 056° course for Tuxis Island will lead westward of Madison and **Charles Reefs**; note that Charles Reef buoy is at the south end of the reef. Anchor about 0.3 mile southward of Tuxis Island and the same distance northward of Madison Reef in 20 to 24 feet. For a distance of 1 mile eastward of Tuxis Island, foul ground extends off a greatest distance of 0.4 mile from shore. The outer rock has 2 feet over it, with 18 to 20 feet around it and is 0.5 mile 106° from Tuxis Island.

Tuxis Island is high and rocky. Between the island and the shore the water is shallow and the ground foul. Rocks, bare at low water, are 200 to 600 yards eastward of the island. A steel bulkhead, the top of which is awash at high water, extends from shore to **Gull Rock,** a high bare ledge about 300 yards east-northeastward of Tuxis Island. A cluster of rocks, bare at low water, sometimes marked by a stake and flag, is 300 yards east-southeastward of the ledge. A bare rock marked by a spindle is 100 yards westward of Tuxis Island and a rock bare at low water and marked by a spindle is midway between the island and the shore. These two spindles do not have topmarks and are not prominent.

Madison, a town on the railroad, has two landings; the easterly one has 1 foot at its end at low water and is used by small pleasure boats; the westerly landing which is northwestward of Tuxis Island, has about 2 feet at its end. A few small craft moor in the cove on its north side. A rock, bare at low water, is 100 yards eastward of the landing. A beach club building, with a small stone landing, is northward of Tuxis Island. A church with a prominent tower and gilded dome is 0.8 mile 356° from Tuxis Island.

Chart 217.—Guilford Harbor, a bight northward of Falkner Island, is used only by small craft. Boats of 6-foot draft can be taken up **East River** at high water to the railroad bridge which has a clearance of 4 feet above high water. The controlling depths when last ascertained were: 2 feet in the natural channel through the bar and 3 feet for a width of 50 feet in East River to the mouth of **Neck River. Sluice Creek** enters East River 0.3 mile above **Guilford Point** at the entrance. It is reported that Sluice Creek has 1½ feet at low water and is virtually impassable. At high water, boats of 4-foot draft can be taken up **West River** above the railroad bridge to **Guilford.** The bridge has a horizontal clearance of 10 feet and a vertical clearance of 6 feet at high water.

Half Acre Rock, which just shows at high water, and **Lobster Rock** are the most identified of those at the entrance of Guilford Harbor. Scattered rocks, some bare at low water, and others with 7 to 16 feet over them, extend about 1 mile eastward from Half Acre Rock; the easternmost is about 0.4 mile northward and northwestward of Charles Reef. **Outer White Top,** which is 200 yards east-southeast of Lobster Rock, and several rocks northward bare at low water. The large reef northward of Indian Reef has many rocks, some of which are bare at all times, and others bare at various stages of tide. The highest part of **Indian Reef,** near its northeast end, is covered at high water. Near the north end of the reef are rocks which are covered at half tide. The rest of Indian Reef consists of sunken rocks with little depth over them. The reef is marked off its south side by a buoy. An area of broken ground on which the least depths found are 15 to 18 feet extends about 0.5 mile southeastward and southward from Indian Reef.

An unmarked rock with 6 feet over it is nearly 0.4 mile west-southwestward of Indian Reef and 0.5 mile southeastward of **Vineyard Point,** the southeasterly point of the peninsula of **Sachem Head.**

A group of rocks called **The Tailings,** marked on the eastern end by a buoy, constitute an important danger in the harbor. Part of this group is awash at low tide. **Riding Rock,** covered only by spring tides, is about 200 yards northward of this

group and northwestward of the buoy. Stakes and fish traps are likely to be found in the area northward of Riding Rock.

The entrance to Guilford Harbor is obstructed by rocks and only the buoyed channel east of Indian Reef should be used by strangers. On a course **100°** pass 100 feet eastward of Guilford Harbor lighted bell buoy 1. This course will pass about 200 feet eastward of the buoy 200 yards east of **Netties Reef,** and about 100 yards east of the buoy marking the east end of The Tailings. When abeam of the buoy marking The Tailings steer **326°** to the entrance to the staked channel into East River. Strangers should proceed with caution and if possible obtain local information before entering.

Falkner Island, 3 miles south of Guilford Harbor and marked by Falkner Island Light, is nearly 0.2 mile long. From it a reef mostly bare at low water extends 0.4 mile northward and is marked at its end by a lighted bell buoy. A bank with depths of 18 to 24 feet not closely developed extends 1.5 miles eastward from Falkner Island to **Kimberly Reef.** This reef is an area of broken ground with a least depth of 12 feet and is marked by a buoy. The bottom is generally hard and very broken between Falkner and Goose Islands. A shoal on which the least found depth is 10 feet extends 300 yards westward from the south end of Falkner Island.

Falkner Island Light, 94 feet above water and visible 15 miles, is shown from a white octagonal tower attached to a dwelling. The fog signal is an air diaphragm horn.

Goose Island is low with small bare islets just northward and 300 yards southward of it. A lighted bell buoy about 600 yards southward of Goose Island marks the south end of the reef.

Three Quarters Rock, 0.3 mile eastward of Goose Island, is bare at low water.

Reefs, partly bare at low water, extend 0.5 mile northeastward from Goose Island. From the end of these reefs a narrow reef, on the outer part of which depths of 14 feet have been reported, extends 0.5 mile north-northwestward, its north end being 1.1 miles 308° from Falkner Island Light. It should be avoided.

Jefferson Rock, covered at high water, is at the entrance of the foul bight on the south side of Sachem Head. Many rocks are southeastward of Jefferson Rock. The southeasterly one, 600 yards east-southeastward of Jefferson Rock, is bare at low water and is marked by a buoy. **Hatch Rock,** 300 yards south-southwestward of Jefferson Rock, is covered at half-tide. A buoy marks the edge of the shoal water 300 yards southward of the rock. Two bare rocks are off the south point of Sachem Head. Rocks bare at low water extend 100 yards southward and 250 yards westward from the bare rocks and the west end of the reef is marked by a buoy. These aids are placed to assist local vessels in approaching Sachem Head Harbor from eastward. A prominent flagstaff is on the southwest point of Sachem Head.

Chimney Corner Reef is a rocky broken area off the south side of Sachem Head; the least depth found on the reef is 9 feet at a point 600 yards southward of the southernmost point of Sachem Head. The bottom is rocky and very broken for a distance of 1 mile southwestward from Chimney Corner Reef; the least depths found are 19 to 23 feet, but the area has not been closely developed. A buoy is 100 yards north of the reef.

Goose Rocks consist of two rocks, the northeasterly one is a bare rock, and the southeasterly one is covered at high water. Broken ground extends in a southeasterly direction from Goose Rocks toward Chimney Corner Reef; depths of 4 to 13 feet have been found on it for a distance of 600 yards from the rocks. **Goose Rocks Shoals,** a rocky broken area, extends 0.3 mile southwestward from Goose Rocks. It has a width

of 250 yards, a least depth of 2 feet, and is marked at its south end by a bell buoy. Care should be taken not to round the buoy too closely in order to insure clearing the west end of the reef.

Sachem Head Harbor is an anchorage for small craft on the southwest side of Sachem Head. The harbor is 0.3 mile long, about 0.1 mile wide, has depths of 4 to 5 feet at the floats and in the moorings and is sheltered except from westerly winds. The island forming the south point at the entrance is connected with the shore by a bridge. A yacht clubhouse is on the island. From the north point of the island a breakwater extends 100 yards in a northwesterly direction. A string of lights is privately maintained on the breakwater during the summer season. A rock covered at half-tide is 50 yards off the southeast side of the harbor, just northward of the opening on that side, and 350 yards above the end of the breakwater.

The approach to Sachem Head Harbor for small craft from eastward is along the south side of the rocks making off from the south side of Sachem Head. Approaching eastward of Goose Rocks give the rocks a berth of over 300 yards. The approach from westward is clear between Goose Rocks and the buoy off the south end of Leetes Rocks.

Joshua Point, the west side of Sachem Head, is marked by a rocky islet on its west side. Just northward of the islet a stone jetty with a bulkhead on its north side extends about 100 yards in a northwesterly direction from the shore. The bulkhead is in bad repair, but vessels can anchor in the angle near the shore where the depth is about 4½ feet.

Joshua Cove is little used, but affords good anchorage in its entrance for small vessels in northerly or easterly winds in 6 to 10 feet, soft bottom. The approach from southwestward is clear between Goose Rocks and the buoy off the south end of Leetes Rocks.

Two short jetties have been built at the entrance to **Little Harbor** to protect a private landing with a depth of 2 feet at the end.

Leetes Rocks, midway between Sachem Head and the north end of The Thimbles, are two rocks, bare at low water, with an area of broken ground around them. A rock with 3 feet over it is nearly 400 yards eastward of the northeast rock. A rock with 9 feet over it is 200 yards southward of the southwest rock, and is marked on its south side by a buoy.

Leetes Island Quarry is a prominent feature on the south side of **Hoadley Point;** on the north side of the cove eastward of the point are the ruins of an old dock with a depth of about 7 feet. A straight channel about 50 feet wide has been dredged into the cove and to the wharf between the northeast end of **Narrows Island** and the islet eastward. This channel is reported to have a depth of about 4 feet. Rocks bare at low water are eastward of the channel and northward of the islet.

The Thimbles and the shore westward are occupied by summer homes, and the waters are much used by small pleasure craft. The water area from The Thimbles to the entrance of Branford Harbor is occupied by many islands, ledges, and rocks. It is not suitable for anything but small craft. Many oyster stakes are encountered and since they do not mark definite channels caution should be used to avoid fouling them.

Caution is advised when anchoring to avoid pipelines and cables in this area. Strangers should proceed with caution having in mind the possible existence of uncharted rocks in so broken an area.

Outer Island is the outermost of The Thimbles. A bare rock is 100 yards southeastward of it. A boat landing protected by a stone jetty is on the northeast side of Outer Island. An unmarked rock, bare at lowest tides, is 200 yards eastward.

Horse Island, the next island northeastward of Outer Island, has two outlying bare rocks off its southeasterly side. The ends of the ledges surrounding the northeast rock are bare at low water.

Old Cobble Rocks is a long reef, nearly all bare at extreme low water. Near the middle of the reef is a large boulder awash at high water. The southwest end of the reef is marked by a buoy which is at the east side of the entrance of a channel for small craft leading northward between Pot and Money Islands.

Pot Island is occupied with many dwelling houses. A landing is on the west side in the cut. A ledge makes out from the northern end of Pot Island toward Money Island. In going through this passage keep close to Money Island.

High Island has several buildings on it. A rock, bare at low water, is close to the southwest end. **Red Point Rocks** are 300 yards southwestward of the island.

Dick Rocks and the rock 150 yards southwestward of it are bare at half tide. The west end is marked by a buoy. Foul ground extends southeastward from these rocks and **Goshen Rock,** with 3 feet over it, is 200 yards southeastward of them.

A rock, bare at half tide, is 50 yards east-southeastward of the northeast end of **West Crib.** From the rock foul ground extends northeastward and joins the shoal which extends 80 yards east-southeastward from **East Crib.** This shoal is marked on its northeast side by a buoy, at the junction of the deep channel along the north side of East Crib and **Davis Island** with that leading southward through Thimble Island Harbor.

Money Island is thickly settled. The channel along its southeast side is not closely developed.

Prudden Island is marked by a small shack. Bare ledges are on its northwest side and 200 yards east-southeastward of it. **East Stooping Bush Island,** northeastward of Prudden Island, is marked by a house and flagstaff.

Hen Island is marked by a small summer house. A ledge extends 90 yards southward and a rock, bare at low water, is 90 yards southeastward of the island.

Wayland Island is marked by red buildings and a red pavilion at its south end. Between Wayland Island and the two buoys eastward is the entrance of two of the deeper and clearer channels which lead through The Thimbles from eastward. One channel passes between Davis Island and the large bare rock, Beers Island, northeastward, then southward of **Dogfish Island,** and then northward of East Crib; or, passing eastward of the buoy eastward of East Crib, a channel good for 6 feet leads southwestward through Thimble Island Harbor. The other channel passes eastward of the buoy eastward of Davis Island and joins the channel described in the second paragraph following.

Northford Rock is a bare rock 75 yards eastward of **Smith Island.** A rock bare at low water is between them. A bare rock, **Cat Island,** is 150 yards southward of Smith Island. A rock bare at extreme low water is 175 yards west-southwest of Cat Island. These rocks are marked on the south side by a buoy.

A high, bare, rocky islet is off the southwest end of Narrows Island. At 200 and 400 yards west-southwestward of this rocky islet are two rocks which are covered at three-quarters tide and are marked by private spindles. Between these two rocks is

the entrance of a channel which leads between Smith Island and the bare rock off the south side of **Bear Island,** then between **Mermaid Rock** and the rocks bare at half tide off the southwest end of Bear Island, then northeast of **Beers Island** northeastward of Davis Island, then westward of a buoy, and then around the north end of **Cut-in-two Island.** The buoy eastward of Cut-in-two Island marks a rock bare at low water northeastward of which is a bare rock. This channel then leads southward of the grassy islet 200 yards southward of Flying Point. **Flying Point** is marked by a seawall. A rock bare at low water is 150 yards west-northwestward of the islet. The two rocks off Flying Point show above water. The ledge extending 100 yards westward from the point just north of Flying Point is sometimes marked at the outer end by a spindle and cage. A wreck is halfway between the shore and the end of this reef.

Stony Creek, a village on the railroad, extends southward to Flying Point. The boat landing which has about 3 feet at low water is on the point northeastward of **Frisbie Island.** The principal danger in the approach is the shelving ledge, mostly bare at low water, making off from the next point southward of the landing. A channel 6 feet deep has been dredged to the boat landing, but is subject to shoaling and is little used. Gasoline and other supplies can be had there.

Governor Island is thickly settled. A bare rock is off its northeast end. Rocks fill the bight on its south side; the southerly rock is 175 yards from the island and bare at low water. Small craft anchor eastward of the island.

Potato Island is low and is marked by a large house. Bare rocks extend 150 yards northeastward from it. A rock bare at low water is close to its southwest end.

Rogers Island, known locally as **Yoncomis Island,** is marked by a prominent red-roofed house. A landing with 4 feet is on the northeast side, and a small breakwater is about 75 yards northwestward of the landing. About 175 yards northeastward of the landing is a spindle marking a rock. **Cedar Island** is a bare rocky islet off its southeast side, and midway between the islet and the southwest end of Potato Island is a rock which shows at lowest tides. The rocks westward of Rogers Island are bare at half tide; those southwestward show at all times. The southern limit of the rocks extending from 0.1 to 0.4 mile westward and southwestward from this island is marked by a buoy which is lighted from May 1 to November 1.

Between the rocks westward of Rogers Island and Blackstone Rocks, a channel about 75 feet wide and 10 feet deep has been dredged northeastward to a quarry wharf. In August 1949 the controlling depth over this privately dredged channel range to the quarry was 9 feet. The privately maintained range consisted of a white diamond-shaped front range on the dock and a rear range on the hill made of a black and white checkerboard square. A small turning basin marked by piles is eastward of the wharf. The depth at the wharf is about 8 feet but is subject to shoaling from crushed stone which is loaded on barges.

Thimble Island Harbor affords good shelter for small craft between Pot and Money Islands on the east and High Island and West Crib on the west. Although open southwestward, the sea from that direction loses much of its force before reaching the inner harbor. A rock with 3 feet over it and marked by a buoy is 80 yards off the east side of High Island, just above its south end. Vessels sometimes anchor near mid-channel, between this rock and the north end of Pot Island in depths of 13 to 18 feet, soft bottom, but care should be taken to avoid the cables in the area. The harbor is easy of access between Outer Island and Inner Reef. Approaching

from westward, pass southward of Negro Heads buoy, steer 075° for the south end of Outer Island, and pass northward of Northwest and Wheaton Reefs buoys and southward of Inner Reef buoy.

The following are the principal outlying dangers off and westward of The Thimbles.

East Reef, Wheaton Reef, and **Browns Reef** show at good low water, and are parts of a broken area about 0.4 mile in diameter which is 0.5 to 0.8 mile southwestward of Outer Island. The reefs are marked at the north and east sides by unlighted buoys and on the south side by a lighted bell buoy. The lighted buoy is removed if endangered by ice; a nun buoy is on station throughout the year. **Northwest Reef,** a rock with 7 feet over it, is 0.3 mile westward of Wheaton Reef and is marked by a buoy.

Inner Reef, bare in places at low water, is 200 yards long in a northeast direction, and is marked at its southwest end by a buoy. A rock with about 12 feet over it is 300 yards northwestward of the buoy. A rock with 8 feet over it is 0.4 mile west-northwestward of Inner Reef, in line between it and Hookers Rock, and is marked by a buoy which is lighted from May 1 to November 1.

Hookers Rock, bare at low water, is marked at its southeast end by a buoy. A rock with 10 feet over it is about 300 yards west of the buoy.

Gangway Rock, with 5 feet over it, is 0.4 mile southwestward of Hookers Rock buoy, a little southward of a line joining it and Negro Heads buoy. It is marked by a buoy.

Blackstone Rocks are a chain of islets and ledges extending about 1 mile southwestward from **Brown Point.** The most prominent are a rock nearly 500 yards southward, **White Topped Rock** nearly 0.5 mile south-southwestward, and two high bare rocks of **Middle Rock** over 0.8 mile south-southwestward of Brown Point. Bare rocks are 100 yards west-northwestward and 200 yards north-northeastward of White Topped Rock. Most of the other rocks are covered at half tide. Sunken rocks are around and westward of the group and great care is required to insure safety. The eastern limit of the rocks extending 0.3 mile eastward from Middle Rock is **Pork Rocks.** They are marked on the east side by a buoy.

Pine Orchard is a summer resort extending northward and westward of Brown Point. Northeastward of the point is a yacht basin 800 feet long and 300 feet wide. The dredged area has shoaled to depths of 2 to 3 feet.

The entrance channels, dredged to 7 feet, permit passage either northward or southward of **St. Helena Island,** which is eastward of Brown Point. A breakwater, extending eastward from Brown Point, is marked at its end by a light. The breakwater light serves as a front light of a range privately maintained, from May 15 to November 15. The rear range is a light on a flagpole on the shoreline.

To enter the channel leading to the quarry wharf near **Juniper Point,** follow the range until 250 yards past the lighted buoy which is 900 yards south of the breakwater light.

Gasoline, ice, and fresh water are available at the yacht club landing.

A seawall extends westward from Brown Point and the shore is thickly settled. A rock bare at half tide is 600 yards westward of Brown Point and 300 yards from shore. A rock with 4 feet over it is in mid-channel northward of the rock.

Two rocks, bare at low water, are 0.4 mile northeastward of **Haycock Point** and 300 yards from shore off the middle of the bight forming **Hotchkiss Grove Beach.**

Other rocks eastward and westward of it are closer to shore. A bare rock is 200 yards southeastward of Haycock Point; northward of this rock are many rocks bare at low water.

Rocks bare at half tide are off the southeast side and the southwest end of **Green Island.** A rock bare at low water is 0.3 mile southeastward of Green Island. The large ledge 200 yards from shore westward of Green Island is covered at high water.

Foot Rocks are partly above water and partly submerged.

Spectacle Island, the outer one off the southeast side of **Indian Neck,** is partly grass-covered. **Negro Heads,** a reef bare in one place at low water, extends 0.6 mile southward from the island and is marked at its south end by a buoy. Sunken rocks and rocks bare at low water are about 200 yards northward, westward, and southward of Spectacle Island. **Moon Rock,** bare at low water, is 0.2 mile southwestward of Spectacle Island.

Branford Reef is 1.8 miles from the north shore of the sound and 5 miles eastward of New Haven entrance. It is marked by a light. Shoal water extends for 150 yards northward and southward from the light; depths of 16 feet or less extend 450 yards northward and 250 yards southward from the light. Branford Reef Light, shown from a red skeleton tower, white tank house on granite base, is 30 feet above the water and visible 7 miles.

Sumac Island is 500 yards west of Spectacle Island. A rock, bare at low water with foul ground around it, is between Sumac and Spectacle Islands. A rock with 4 feet over it is 200 yards southwestward of Sumac Island.

Sedge Island and **Squaw Rocks** are low and grassy.

Clam Island is settled and has a boat landing on its northwest side. Between the bare rocks off the southwest end of Clam Island and Jeffrey Rock, small craft can enter **Maltby Cove,** favoring the northwest side of Clam Island. The northwest side of the cove is foul, the principal danger being a rock bare at low water near the middle northwestward of Clam Island. The rock is marked by a privately maintained spindle from June 1 to October 1. The range of the bare rock northward of Jeffrey Rock and the middle of Taunton Rock leads close to it.

A marine railway there can haul out craft up to lengths of 40 feet and draft of 6 feet. Light repairs to hull and engine can be obtained and boat storage is available.

Jeffrey Point, the eastern point at the entrance of Branford Harbor, has a bare rock close to its western end, and three bare rocks, the southernmost called **Jeffrey Rock,** extending 300 yards southward from the point.

Branford Harbor, 4 miles east of New Haven Harbor entrance, is a shallow cove between Jeffrey Point and Johnson Point. Vessels up to 10-foot draft can select anchorage in the harbor southward of the Mermaids in 10 to 14 feet, protected against all but southerly and southwesterly winds. Boats up to 5-foot draft can select a well-sheltered anchorage in the upper part of the harbor above the Mermaids. The dangers in the approach and entrance of Branford Harbor either show above water or are marked by buoys.

Little Mermaid, showing a little above high water and **Big Mermaid,** a high rock marked by a privately maintained light from June 1 to October 31, are near the middle of the harbor. Two bare rocks are near the head of the harbor. A rock, bare at low water and usually marked by stakes, is about 100 feet north-northeastward

of the north end of **Lovers Island**, and the same distance off the hotel boat landing. The landing has a depth of 2½ feet at its end.

Branford River, a narrow and crooked stream, has been improved by dredging a channel 100 feet wide and 9 feet deep through the shoals at the entrance and another channel of the same dimensions between the upper and lower wharves at Branford. Between these two channels the river is naturally deep.

In August 1949 the controlling depth to the head of navigation was 6 feet. A new pier of the Branford Yacht Club has been built into the natural channel about 600 yards east of **Branford Point** on the north side of the river. A new private pier is about 100 yards east of that pier. It is reported that the Yacht Club pier had 4½ feet at its face.

At the head of navigation the river is crossed by a fixed bridge with a horizontal clearance of 53½ feet and a vertical clearance of 4 feet at mean high water.

To enter Branford Harbor from eastward, pass southward of Negro Heads buoy, steer about **306°** heading for Taunton Rock, and enter between Taunton and Jeffrey Rocks; or a **333°** course with Branford Reef Light astern will lead into the harbor between Jeffrey and Taunton Rocks. From westward, pass southward and over 100 yards eastward of Cow and Calf lighted bell buoy, steer **044°** and enter the harbor between Blyn and Taunton Rocks.

Local craft pass northwestward of Cow and Calf Shoal and pass midway between Johnson Point and Blyn Rock. When abeam of the point a course is laid for the light on Big Mermaid. From Branford Harbor the dredged channel to Branford River leads between the Mermaids. Passing 125 yards southeast of Lovers Island, and steering for the light on Big Mermaid, leads in the first section of the dredged channel. The middle of the next section of the dredged channel then leads 100 feet southeastward of Big Mermaid Light and 125 feet southeastward of the end of the stone pier at Branford Point. Above this point follow the navigational aids, but strangers should either take it on a rising tide or employ someone with local knowledge. Stakes are on the shoals in some places. At low water the channel above Branford Point is defined by bare shoals on each side.

The principal commerce of **Branford** is in coal, iron, and foundry supplies which are carried in barges and small steamers. Diesel oil, gasoline, and boat supplies can be obtained at Branford.

A small boat repair yard with marine railway can haul out small craft up to 50 feet in length and 6 feet in draft. Light repairs to hull and engines can be obtained and boat storage is available.

Bird Rock, at the entrance to Branford Harbor, has 5 feet over it and is marked on its southwest side by a buoy.

Johnson Point, the western point at the entrance of Branford Harbor, has a rock with 2 feet over it about 100 yards off its south side. A small yacht basin has been dredged on the southwest side of the point and is well protected in all but southerly winds. The basin is privately owned and maintained.

Blyn Rock is midway between Johnson Point and Taunton Rock. It is covered at extreme high tide and is marked on its north and south sides by buoys.

Taunton Rock is a large, low, bare rock near the middle of the entrance of Branford Harbor.

Five Foot Rock is marked on its south side by a buoy.

Cow and Calf are two boulders close together; the western one is covered at high water and the other is bare at low water. Broken ground, on which the least found depth is 11 feet, extends 400 yards northwestward from Cow and Calf. A lighted bell buoy marks the south side of the rocks.

Gull Rocks are on the eastern side of the entrance of the cove westward of Johnson Point. From the islets in the north half of the group, rocks, some of which are sunken, extend 300 yards southward and 600 yards south-southwestward. At the northwest end of the cove is a boat landing with a depth of 2 feet alongside. About 350 yards off **Short Beach** and 200 yards from the west side of the cove is a rock bare at half tide. It is marked at its southwest end by a privately maintained spindle.

Green Island, about 250 yards from shore at the northeast side of the cove, is low and has a few trees.

A small repair yard with marine railway at the northwest side of the cove can haul out small craft up to 8 tons weight, 30 feet length, and 4½ feet draft. Gasoline and a limited amount of ship chandlery are available.

Farm River Cut, a bight on the west of the cove, is a good anchorage for small craft, but is very small. Depths are from 4 to 5 feet with mud bottom and protection is from all sides except easterly. A marine railway on the north side of the cut can haul out boats up to 65 feet in length and 6 feet in draft. Repairs to hull and engines can be made and storage is available. **Old Clump** is a bare rock.

East Haven River has been improved by dredging a channel 6 feet deep for a distance of 1.3 miles above the entrance to an old quarry, just westward of which is a dike, which forms the head of navigation. The channel is reported to have shoaled to 3 feet in several places. A fixed bridge crosses the river 1 mile above the mouth. The horizontal clearance is 75 feet and the vertical clearance 5 feet above mean high water.

Darrow Rocks, on the east side of East Haven River entrance, show above water. The westernmost rocky knoll is marked by a flagstaff. A ledge, bare at low water, is 200 yards south of the flagstaff. About 700 yards south-southeastward of the flagstaff is a ledge with 5 feet over it. The ledge is unmarked and caution is advised to avoid it.

Chart 218.—Stony Islet is low, bare, and surrounded by ledges, bare at low water to a distance of about 100 yards.

East Indies Rocks is a reef, covered at half-tide, at a distance of 300 to 450 yards eastward of Stony Islet. A small ledge bare at low water is midway between the reef and the south side of **Mansfield Point.** Mansfield Point and the shore westward are thickly settled and have communication by rail and bus with New Haven.

About 400 yards north-northwestward of Stony Islet is a partly bare ledge. Extending westward from this ledge and Stony Islet to the entrance of New Haven Harbor, is an area of foul ground which extends about 0.5 mile from shore. Many rocks, bare at low water, are in this area and it should be avoided. **Round Rock** is bare at low water and is surrounded by sunken ledges. It is marked by a buoy placed at the southern end of the 12-foot curve, about 0.7 mile from shore. Depths of 20 feet or less, broken and irregular bottom, extend 0.4 mile southeastward and southward from the buoy.

Townshend Ledge, marked by a lighted buoy at the south end, is 2 miles from shore and about 2.6 miles 256° from Branford Reef Light. The least depth on the ledge is 18 feet.

New Haven Harbor is commercially one of the most important harbors in Long Island Sound and is an important harbor of refuge. It is about 67 miles from New York, 174 miles from Boston via Cape Cod Canal, and 162 miles from Nantucket Shoals Lightship. It comprises all the tidewater northward of the breakwaters constructed across the mouth of the bay, including the navigable portions of the West, Mill, and Quinnipiac Rivers. It is about 2 miles wide. The inner harbor consisting of the portion northward of Sandy Point and Fort Hale is for the most part shallow, except where the depths have been increased by dredging. The main entrance channel, between Luddington Rock Breakwater and the East Breakwater, is about 400 feet wide and leads northward to Tomlinson Bridge at New Haven. Anchorage basins have been dredged on the sides of the channel above Fort Hale. The river channels are described under separate heads. The depths at the principal wharves range from 12 to 27 feet. The city wharf has a depth of 10 feet at its southwest end. Depths alongside the wharves in Quinnipiac River approximate closely the depths in the adjacent channel. The wharves along Mill River have depths of 8 to 18 feet. Depths along the West Haven wharves, bordering on the 12-foot channel, vary from 5 to 12 feet. From the 15-foot anchorage a channel 100 feet wide has been dredged toward Brewery Street. Shoals bare at low water are on both sides of this channel in places between which are channels leading to some of the wharves. The upper end of the channel is marked by piles on the southwest side. The wharves bordering on this channel have depths of 8 to 10 feet at their ends and sides, with the exception of the city wharf, which nearly bares at its southwest end at low water.

Dredged channels on the east shore, about 400 yards and 1 mile to the southward of Tomlinson Bridge, lead from the main channel to an oil wharf and coke wharf, respectively. In August 1949 the controlling depth in the channel to the oil dock was 25 feet and 24 feet to the coke wharf.

The passage eastward of the east breakwater has boulder patches and is very broken, but can be used by small craft of less than 6-foot draft, taking care to avoid the foul ground along the northeast side of the passage. This passage has been buoyed and local vessels of 10- to 12-foot draft use it at high water. Avoid **Quixes Ledge** which extends about 200 yards southeastward from the eastern end of the breakwater; pass about 100 yards eastward of the breakwater. The principal danger inside the breakwater is the reef, marked at its end by a buoy, extending 300 yards southwestward from **Lighthouse Point. Adams Fall,** a rock with 5 feet over it and marked on its southwest side by a buoy, is 0.4 mile west-southwestward of Lighthouse Point.

New Haven is an important manufacturing city at the head of the harbor and is the chief commercial port of Connecticut.

Morris Cove, on the east side of New Haven Harbor, between Lighthouse Point and Fort Hale, is much used by yachts during the summer. A yacht club is near the southern end of the cove. The dangers for vessels of less than 8-foot draft will be avoided by giving the eastern shore of the cove a berth of 0.3 mile and vessels up to 12-foot draft can select anchorage off the cove and eastward of the dredged channel. The bottom is generally soft. A rock with 2 feet over it, about 100 yards from shore and about 0.3 mile southwestward of the yacht club landing, is marked by a private buoy. **Black Rock,** bare at low water, is 200 yards from shore at the north end of the cove; shoal water is between it and the shore northeastward.

West River is between New Haven and **West Haven.** The entrance channel to West River from the vicinity of the anchorage area on the west side of the main channel is well marked by buoys and lighted aids and leads westward to a wharf on **City Point,** then southwestward along the outer wharves on the point, until halfway across the river, and then curves westward and northward, passing about 50 feet off the outer wharves at West Haven. The depths at the wharves at West Haven and the outer wharves at City Point range from 4 to 12 feet.

Mill River is between New Haven and Fair Haven.

Quinnipiac River extends easterly and northerly through the city from the Tomlinson Bridge where it has a common mouth with the Mill River.

The **prominent objects** are the Southwest Ledge Light, New Haven Light, the Soldiers and Sailors Monument on East Rock, the abandoned tower on Lighthouse Point, the Harkness Tower at Yale University, a large gas tank with red and white checkerboard band around the top, the gilded dome on top of Union New Haven Trust Building, and the aviation light about 0.8 mile northeastward of Fort Hale. **East Rock** is a hill with bluff sides over 300 feet high, and is marked by a high monument which shows well above the sky line and is prominent from the Sound. **East Breakwater** extends 3,450 feet in an east-northeasterly direction from Southwest Ledge to Quixes Ledge. **Luddington Rock Breakwater** is 4,450 feet long in a west-southwesterly direction.

West Breakwater is 4,200 feet long in a west-northwesterly direction.

Southwest Ledge Light, 54 feet above water and visible 13 miles, is shown from a white octagonal house on a brown cylindrical pier on a reef at the east side of the main entrance to New Haven. The fog signal is an air diaphragm horn.

New Haven Middle Breakwater East End Light, 29 feet above water, is shown from a black skeleton tower, white tank house, black square base, on the east end of Luddington Rock Breakwater on the west side of the main entrance to the harbor.

New Haven Middle Breakwater West End Light, 29 feet above water, is shown from a red skeleton tower, white tank house, red square base, on the west end of Luddington Rock Breakwater.

New Haven Light, 49 feet above water and visible 11 miles, is shown from a black skeleton tower, in 28 feet, inside the east end of the West Breakwater.

New Haven West Breakwater West End Light, 26 feet above water, is shown from a red skeleton tower, white tank house, red square base, on the west end of the West Breakwater.

Sandy Point Breakwater Light, 35 feet above water, is shown from a black skeleton tower, slatted daymark below lantern, white tank house, rectangular concrete base, in 6 feet off the south end of the breakwater.

New Haven Long Wharf Light is 43 feet above water and is shown on the outer end of the wharf.

Canal Dock Light is 15 feet above water and is in 14 feet off the end of the dock.

Oil Dock Light is 20 feet above water and is shown on the outer end of the dock.

A Federal project provides for: A channel 35 feet deep, 400 to 800 feet wide from Long Island Sound to the head of the main harbor. A channel 12 feet deep, 100 to 150 feet wide from the 16-foot anchorage to the Kimberly Avenue Bridge, thence 12 feet deep, 75 feet wide up West River nearly to the railroad bridge, length about 2 miles. A channel 12 feet deep, 100 feet wide from the 15-foot anchorage to Brewery Street,

length about 1,500 feet. A channel 22 feet deep, 250 to 400 feet wide from the head of the main harbor up Quinnipiac River to a point about 1,000 feet above Ferry Street, thence 16 feet deep, 200 feet wide to Grand Avenue, length about 1.25 miles. A channel 12 feet deep, 200 feet wide, up Mill River to the junction of the two branches, length about 2,000 feet, thence 12 feet in each branch to Grand Avenue Bridge, East Branch 100 feet wide, about 1,200 feet long, West Branch generally 125 feet wide, about 1,600 feet long. A turning basin 22 feet deep 200 to 800 feet wide and 700 feet long at the mouth of Mill River. Three anchorage basins; 6 feet, 15 feet, and 16 feet deep.

The controlling depths are as follows: In the main channel, 35 feet to within 1,000 feet of Tomlinson Bridge, except 27 feet on the rock area near the breakwaters, thence 18 feet to within 300 feet of Tomlinson Bridge. In the 16-foot anchorage, 9 to 25 feet. In the 15-foot anchorage, 15 feet. In the Brewery Street Channel, 12 feet. In the Mill River, 12 feet. In the Quinnipiac River to Ferry Street Bridge, 17 feet generally, thence 11 feet generally to Grand Avenue Bridge. In the West River to Kimberly Avenue Bridge, 4 feet, thence 6 feet generally to the head of channel. In the West Haven 6-foot anchorage, 0 to 12 feet.

Anchorage.—The anchorages inside West Breakwater and the southwest half of Luddington Rock Breakwater are available for vessels up to 22-foot draft. Morris Cove affords good anchorage and is used by yachts, but is rough in westerly winds. An anchorage basin with a controlling depth of 16 feet has been dredged on the west side of the channel below Long Wharf. A sunken barge with 5 feet over it in this anchorage is 550 yards 185° from New Haven Long Wharf Light. A buoy is 30 feet southeast of the wreck. This anchorage is frequently used. Shoaling from the west has taken place to about half the width of the anchorage from the western side.

The area northward of the East Breakwater is obstructed by ledges and is not available for anchorage except northward of the light where the depth is 18 to 20 feet, bottom soft in places.

An anchorage area much used by small craft and scows is the area eastward of Canal Wharf, on the northwest side of the channel where the depths range from 9 to 16 feet. A public landing is at the northwest side of this anchorage.

A 6-foot anchorage area is established in the bend of West River 600 yards south of Kimberly Avenue Bridge.

No special regulations prescribe the limits within which vessels must anchor, except that the dredged channel must be kept clear. The harbor is under the immediate supervision of the **harbor master** who gives his attention to the berthing of vessels, when necessary, in order to keep the channel clear for steamers.

Bridges.—**Tomlinson Bridge**, at the head of the main harbor, and at the mouth of the Mill and Quinnipiac Rivers, has a double bascule draw with a horizontal clearance of 125½ feet and a vertical clearance, closed, of 12 feet at mean high water.

The Chapel Street Bridge on Mill River about 0.3 mile north of Tomlinson Bridge is a center pier swing which provides two openings both of which have a horizontal clearance of 71 feet and a vertical clearance, closed, of 7 feet above mean high water.

The bridges crossing Mill River at Grand Avenue and above are fixed spans with a least horizontal clearance of 20 feet and a least vertical clearance of 3½ feet at mean high water. Small unmasted boats go as far as the bridge at State Street, 0.5 mile above Grand Avenue.

On the Quinnipiac River, two drawbridges cross the river within its improved

limits. The Ferry Street Bridge, 0.6 mile above the Tomlinson Bridge, is of the bascule type with a horizontal clearance of 101 feet and a vertical clearance, closed, of 25 feet at mean high water.

The Grand Avenue Bridge 0.5 mile farther upstream is a center pier swing bridge with two openings each of which has a horizontal clearance of 70 feet and a vertical clearance, closed, of 9½ feet at mean high water.

Above Grand Avenue are several fixed bridges and trestles with small clearances limiting the use of the river to small unmasted boats.

The Kimberly Avenue Bridge over West River has a bascule span with a horizontal clearance of 45 feet and a vertical clearance, closed, of 7 feet at high water. The fixed railroad bridge 0.4 mile above Kimberly Avenue has a horizontal clearance of 23 feet and a vertical clearance of 5 feet at high water.

The bridge regulations are covered in Chapter 2, § 203.120.

Directions.—To enter New Haven Harbor from westward, pass northward of Stratford Shoal Light at a distance of 1.8 miles. Then steer **050°** for 12 miles to a position with Southwest Ledge Light bearing 348° distant 0.9 mile. To enter from eastward, it is safer for large vessels to pass southward of Branford Reef and Townshend Ledge. Passing 1 mile or more southward of Falkner Island Light, a **270°** course will lead well southward of Townshend Ledge. When Southwest Ledge Light bears anything northward of 312° the course can be changed for the entrance. Or, passing 0.5 mile southward of Branford Reef Light, a **279°** course will lead 0.7 mile northward of Townshend Ledge lighted buoy; when abeam of the buoy change course to **271°** for New Haven Light and continue this course for a distance of 2 miles until channel entrance is abeam. Round Rock, and the shoals with less than 12 feet eastward of the entrance, will be avoided by keeping Southwest Ledge Light bearing anything northward of 284°.

The outermost 18-foot shoal just west of the harbor entrance is marked by a buoy on the south side of the shoal. A lighted bell buoy marks the west side of the entrance to the channel.

Shoals with 16 to 18 feet extend over 0.5 mile southeastward from Luddington Rock Breakwater.

A **spoil area** with reported depths of 15 feet is on the eastern side of the channel entrance. A shoal spot with 27 feet is 155° distant 550 yards from the lighted bell buoy at the entrance. A shoal spot with 18 feet is 270° distant 350 yards from Southwest Ledge Light. **Caution** is advised to avoid these hazards when approaching New Haven Harbor entrance.

Entrance to New Haven.—From a position about 100 yards eastward of the lighted bell buoy about 0.8 mile southward of Southwest Ledge Light, steer **334°** until Southwest Ledge Light is abaft the beam and then follow the well marked channel to the wharves at the head of the harbor.

Tides.—The mean range of the tide is about 6 feet. Extreme tides have been recorded as reaching more than 2½ feet below the plane of mean low water and more than 8 feet above the same datum.

Currents.—In the entrance between the breakwaters the tidal current has an average velocity at strength of about 1¼ knots. The flood sets about 320° and the ebb in the opposite direction. In the draw of Tomlinson Bridge the average velocity at strength is about 1¼ knots. The flood has an easterly set just southward of the

bridge. Ebb velocities are increased by freshets. For predicted times and velocities of currents the *Currents Tables* should be consulted.

Ice generally obstructs navigation to some extent for sailing vessels from December to March, sometimes extending to the mouth of the harbor. Steamers can generally enter and depart, except in severe winters when the ice is exceptionally thick. During severe winters the accumulation of ice is local and begins to obstruct the movements of sailing vessels in December. From that month until the latter part of March it frequently bars the passage of sailing vessels without the assistance of towboats. Except in exceptionally severe weather, steamers can always enter and leave the harbor without much difficulty. In New Haven Harbor northerly winds have a tendency to clear the harbor of ice if the formation is light; southerly winds are apt to force in drift ice from the Sound.

The prevailing winds are south and southwesterly in summer and northerly during the rest of the year. The heaviest gales are from the northeast and the southeast.

Storm warnings are displayed day and night near the old tower on Lighthouse Point.

Pilotage.—All inbound and outbound foreign vessels drawing 9 feet or over are subject to the payment of pilotage if spoken. Under other conditions pilotage is optional. The usual place of boarding is off Southwest Ledge Light or behind the breakwaters. The rates of pilotage are as follows:

Draft	*Per foot*	
	Inbound	*Outbound*
9 to 12 feet	$1.50	$0.75
12 to 14 feet	2.00	1.00
Over 14 feet	3.00	1.50

Towage.—Steamers usually proceed to the harbor without assistance. Towboats are used by sailing vessels and can always be had by making signal at Wyatts Dock. Contact is now made by phone, telegraph, or radio. Advance notice of 24 hours is requested for towboat service. Few vessels entering for anchorage take a towboat. Charges for towing, pumping, and watering are in accordance with a schedule fixed by a local towboat company whose offices are on the Wyatt Dock.

Quarantine.—No quarantine station is established but medical inspection is made by an acting assistant surgeon of the U. S. Public Health Service.

New Haven has many public and private hospitals and sanatoriums. The Grace New Haven Community Hospital at 1418 Chapel Street is the designated contract hospital. Sick or injured seamen may apply for treatment under the seamen's act to the acting assistant surgeon of the Public Health Service.

Customs Service.—The customs office is at 153 Court Street. Adequate facilities for bonded storage are provided.

Immigration Service.—No officials of this service are stationed at New Haven. The necessary officers can be secured from Hartford.

The **harbor master** has charge of the berthing and anchoring of vessels. Harbor regulations are not strictly defined. The harbor master's headquarters are at the Wyatt Dock, just below Tomlinson Bridge.

Wharfage and storage.—At the city wharf rates for wharfage, including storage at owner's risk, are fixed by city ordinance.

Oil bunkering terminals are maintained at New Haven by the major oil companies. Fuel oil and Diesel oil in the usual commercial grades are available. Barges are available for bunkering in the stream.

Diesel oil, gasoline, water, provisions, and ship's chandlery can be obtained.

Repairs to hulls and machinery of steamers can be made at New Haven. The largest marine railway has a capacity of 500 tons weight, 130 feet length, 7-foot draft forward and 13-foot draft aft. Several smaller shipyards and marine railways are available, the larger of which can haul 75 tons weight, 75 feet length, and 7 feet draft.

Savin Rock, a part of West Haven, is a summer resort on the northwest shore of New Haven Harbor.

Woodmont is a post office and summer settlement on **Merwin Point,** 2 miles west-northwestward of New Haven Light. The shore is rocky at Woodmont. Two large bare rocks and much foul ground are in the bight westward of the point.

Chart 219.—Pond Point, 3.7 miles southwestward of New Haven Light, has a rocky shoal, with little depth over the greater part of it, extending over 600 yards southward. It is marked at its south end by a buoy. A large yellow dwelling with a lawn in front is 0.5 mile northeastward of the point. A prominent white mast is on the point.

Point Beach is eastward of Pond Point. A resort 0.6 mile west-northwestward of Point Beach is also called **Pond Point.**

Welchs Point, 1 mile westward of Pond Point, is on the east side at the entrance of Milford Harbor. A reef extends 600 yards southward from the point and is marked at its south end by a buoy.

Milford Harbor is a bight between Welchs Point and Charles Island, about 5 miles westward of New Haven Light. The bight affords anchorage in 6 to 15 feet, sheltered in all but southerly and southeasterly winds. The entrance is clear between the buoy southward of Welchs Point and the buoy eastward of Charles Island. The shoaling is gradual and soundings are the best guide on the northwest side of the cove; the western side of Welchs Point and the reefs around Charles Island between it and the shore should be approached with caution, as the shoaling is abrupt. The mean range of tide is about 6½ feet.

Wepawaug River, on the north side of Milford Harbor, has been improved by dredging.

A Federal project provides for: A channel 10 feet deep, 100 feet wide through the lower harbor to Merwins Wharf, thence 8 feet deep, 100 to 125 feet wide, widened at bends and upper end, to a point 400 feet above the town wharf. Length about 1.2 miles. Two anchorage basins, 10 feet deep in East Basin and 10 feet deep in lower 600 feet of West Basin, thence 8 feet deep in upper portion. Two riprap jetties at the entrance to the river. The existing project has been completed except for dredging in the East Basin.

The controlling depths are: 10 feet to Merwin's Wharf, thence 7 feet to the head of the project; 8½ feet in the West Basin.

Long Jetty, which shows 3 feet above high water, extends in a westerly direction from the eastern side at the entrance of the river and is marked at its end by a light.

Milford Harbor Light, 24 feet above water, is shown from a red skeleton tower, white tank house, red square base, on the west end of the breakwater, east side of the mouth of Wepawaug River.

Burns Point Jetty, partly bare at half tide, extends southward from the western point at the entrance. It is about 75 feet westward of the dredged channel. A yacht club with a float landing is on the north side of Burns Point. Caution is advised to avoid striking the south end of Burns Point Jetty. It is marked by a buoy off its end and is covered by 2 feet of water. The entrance channel to Wepawaug River is well marked by buoys to Merwins Wharf on the east side just above Burns Point and has depths of 7 to 10 feet alongside. The principal trade is in oysters. A local pilot can be had from Merwins Wharf or the yacht club if necessary. Gasoline, water, and ice can be obtained.

Charles Island, on the southwest side at the entrance of Milford Harbor, is low and partly covered with scrubby trees. A white pole is in the center of the island. It is 0.5 miles from the shore northward with which it is connected by a bar, bare at low water. A buoy marks the end of a shoal which extends 250 yards east-northeastward from the island. **Charles Island Rocks** is the rocky shoal which extends 0.4 mile southward from the island; the south end of the shoal is marked by a lighted bell buoy. Northward of Charles Island is good anchorage in 10 to 16 feet, sheltered from southerly to southwesterly winds.

Silver Beach, Myrtle Beach, Walnut Beach, Laurel Beach, and **Cedar Beach** are summer resorts along the shore between Milford Harbor and Housatonic River. Walnut Beach has a post office.

Stratford Point Light, 52 feet above water and visible 13 miles, is shown from a white conical tower, brown band midway of height at west side of entrance to Housatonic River. The fog signal is an air diaphragm horn.

Stratford Point is on the western side of the entrance to Housatonic River. The shoals which extend southward toward Stratford Shoal Light from the shore westward of Stratford Point Light consist of narrow ridges of hard sand with deeper water between, and are occupied by oyster beds marked with stakes. Depths of 12 feet or less extend 1 mile from shore, and are marked at the south end by a gong buoy which is 15 miles southwestward of Stratford Point Light.

Chart 1212.—Stratford Shoal Middle Ground, with depths of 4½ to 16 feet, extends about 0.7 mile northward, 0.8 mile to the northeast, and 0.4 mile southward from the light marking it. The south point of the shoal is marked by a lighted gong buoy. A buoy about 225 yards southeastward of the light marks a pinnacle rock with 10 feet over it. Shoal spots with 13 feet extend 0.8 mile northeastward and northward from the light. The north end of the shoal is marked by a buoy in 36 feet about 1 mile northward of the light.

Stratford Shoal Light, 60 feet above water and visible 13 miles, is shown from a gray granite octagonal tower projecting from a house on pier 5.5 miles south of Stratford Point Light. The fog signal is an air siren. The radiobeacon is synchronized with the fog signal for distance finding.

Chart 219.—Housatonic River is marked on the west side of its entrance by Stratford Point Light. The river rises in the Berkshire Hills of western Massachusetts

and Connecticut and empties into Long Island Sound. In the vicinity of Derby, Conn., it is joined by the non-navigable **Naugatuck River** which is the principal tributary. From its entrance in the vicinity of Stratford Point the Housatonic River is navigable to a point about 1 mile above Shelton, Conn., where it is closed by a power dam. The head of navigation is practically at the wharves at the towns of Derby and Shelton, a distance of 11.5 miles above the entrance. Small vessels can anchor in the river abreast Stratford, where the channel has an available width of about 500 feet.

On the east side of the entrance a breakwater has been built out from **Milford Point** across the bar, and is marked at its south end by a light. The outer section of the breakwater shows at high water, while the inner section extending to Milford Point, is covered at three-quarters tide. Housatonic River Breakwater Light, 24 feet above water, is shown from a red skeleton tower, white tank house, red concrete base, on the southeast end of the breakwater.

A Federal project provides for: A channel 18 feet deep, 200 feet wide from the mouth to the lower end of Culvers Bar, thence 7 feet deep, 100 feet wide to Derby and Shelton. Length about 11.5 miles. A riprap breakwater at the entrance, inner arm 3,250 feet long, outer arm 2,571 feet long. A riprap dike at Stratford not to exceed 1,500 feet in length. A riprap jetty at Sow and Pigs Rock, 163 feet long.

The controlling depth in 1944 was 7 feet.

Stratford is a town on the west bank of the river 2.3 miles above the entrance. The principal wharf has a depth of 9 feet at its end. A boatyard with marine railway can haul out vessels of 350 tons weight, 100 feet length, and 12 feet draft. Repairs of all kinds to hulls and engines can be made. Gasoline, lubricants, water, and ice can be obtained.

Devon is on the east bank about 1 mile above Stratford. Local small craft anchor near the east bank of the river just north of the highway bridge in depths up to 10 feet. Gasoline, lubricants, and yachting supplies are available.

Shelton, a town on the western bank of the river, and connected to **Derby** by two bridges, has many important manufactories. Depths at the wharves of Derby and Shelton range up to 7 feet at low water. Gasoline, provisions, and some motor boat supplies can be obtained at Derby.

Two bascule bridges cross the river. The first is 1 mile above Stratford, has a horizontal clearance of 125 feet and a vertical clearance of 32 feet at mean high water. The second bridge is a railroad bridge 0.3 mile above the first. It has a horizontal clearance of 81½ feet and a vertical clearance of 19½ feet at mean high water.

A fixed highway bridge crosses the river 3 miles above Stratford. It has a horizontal clearance of 167 feet and a vertical clearance of 85 feet.

A fixed railroad bridge crosses the river at Shelton. It has a horizontal clearance of 148 feet and a vertical clearance of 17½ feet at mean high water.

A fixed highway bridge crosses above the railroad bridge. It has a horizontal clearance of 84 feet and a vertical clearance of 30 feet at mean high water.

The bridge regulations are found in Chapter 2, § 203.125.

Directions.—The channel is narrow and crooked, with little depth on either side, and across the bars in the channel are dredged cuts 100 feet wide. The tidal currents are strong, especially in the lower part of the river, and strangers are advised to take a pilot. Small craft, without a pilot, should proceed with caution and preferably on a rising tide.

Passing about 200 feet southwestward of the vertical striped bell buoy at the entrance, steer **306°** following the buoys on the starboard side at a distance of 75 to 100 feet until Housatonic River Light 1 is about abeam. On this course during a flood current care must be used to avoid being set on the shoals on the west side by the strong westerly currents.

The channel is well marked by buoys and lighted aids to Stratford and by steering mid-channel courses no difficulty should be encountered. Buoys have been established to mark the channel across the bars.

Tides.—The time of tide becomes later and the range diminishes in progressing up the river. At Stratford the tide occurs about ¾ hour later than at the entrance while at Shelton high water is about 1¾ hours later and low water about 2¾ hours later, respectively, than at the entrance. The river water is fresh above **Oronoque Bar** and above **Mill Bar** on the ebb.

Currents.—At the entrance near the end of the breakwater there is a strong westerly set on the flood. Between Milford Point and **Crimbo Point** strengths of flood and ebb have an average velocity of about 2½ knots. The flood sets about 300° and the ebb 130°.

Just south of the draw of the railroad bridge above Stratford the average velocity at strength of flood is about 1 knot and at strength of ebb 1½ knots. In the openings of the bridge the flood current has some easterly set, but the ebb sets fair with the openings.

Between the railroad bridge and Shelton the tidal current at strength has an average velocity of about 1 knot. Because of the drainage flow of the river the ebb is usually greater and the flood less than 1 knot.

For current predictions and further details the *Current Tables* should be consulted.

Spring **freshets** at Shelton rise 10 feet or more above mean high tide.

Ice closes the river above Stratford during the winter, and sometimes extends to entrance.

Pilots and towboats can be obtained at Bridgeport.

Chart 1212.—From Orient Point to Horton Point the shore is generally bluff and rocky. The 10-fathom curve is from 0.3 to 0.8 mile from shore, and the shoaling is generally abrupt. The outlying dangers are Orient Shoal and the rocky patch northward of Horton Point.

The prominent features are Browns Hills, the Coast Guard station at Rocky Point, a prominent standpipe in the northwest part of Greenport, and Horton Point Light.

Several rocky shoals, including **Orient Shoal** with a least depth of 7 feet, are offshore in the vicinity of **Rocky Point.** The north end of Orient Shoal is marked by a buoy.

Horton Point Light, 103 feet above water and visible 16 miles, is shown from a black skeleton tower, white tank house at base, on the northwest point of **Horton Neck.** The tower of the former light is close by and southwestward of the present light.

A rocky shoal with a least found depth of 28 feet is 1.6 miles north-northeastward of Horton Point. The shoal is a ridge having an east-northeast and west-southwest direction, and the shoaling is abrupt on its northwest and southeast sides.

From Horton Point to Old Field Point the shore is fringed with shoals which extend

off a greatest distance of 1.5 miles and rise abruptly from the deep water of the sound. Boulders are found near the shore on the shoals which extend off 0.5 mile in places.

Goldsmith Inlet, 2.2 miles southwestward of Horton Point Light, is dry at low water, and generally has a depth of 3 feet at high water. It is closed at times by northwest winds, but is dug out by clam diggers every spring. Rocks bare at low water and with 2½ feet over them at high water are in the entrance at the old mill. The tidal currents are strong in the entrance. The depths inside the entrance are 8 to 10 feet at low water.

A shoal with little depth in places fills the bight between Horton Point and **Duck Pond Point,** and extends off a greatest distance of nearly 1 mile abreast of Goldsmith Inlet. The bluffs begin about 1 mile westward of Goldsmith Inlet and reach their greatest elevation just eastward of Duck Pond Point; a grassy valley, forming a break in the bluffs, is just westward of the point. Boulders which bare at low water are on the shoals which fringe the shore between Duck Pond Point and Mattituck Inlet.

Chart 299.—Mattituck Inlet is 6.7 miles west-southwestward of Horton Point Light. The entrance is between two short jetties and is also marked by a long break in the bluffs at the inlet. The outer end of the west jetty is marked by a light. A bell buoy about 1 mile north of the jetty light marks the entrance of the inlet.

The sides of the channel are sandy and although shoaling is liable to occur at the entrance, the inlet can be entered by strangers without great danger.

In April 1949 a channel having a controlling depth of 6 feet in mid-channel was available to Old Mill Drawbridge. The channel is subject to rapid shoaling in the vicinity of the south end of the jetty. It is reported that the controlling depth from Waterville to the village of Mattituck is 1 foot.

The swing bridge at **Waterville** has a horizontal clearance of 57 feet on the west side of the center pier. The east opening is blocked. The vertical clearance is 6 feet above mean high water.

The tidal currents have an estimated velocity of about 3 knots at strength in the narrow parts of the entrance of Mattituck Inlet and 5 knots at the site of the old dam at the drawbridge; slack waters occur possibly 1 hour after the time of high and low water. With northerly and westerly winds the sea is rough in the entrance. The mean range of the tide is about 4½ feet at the entrance. The inlet is rarely closed by ice. Gasoline, lubricants, water, and ice can be obtained at Waterville.

A small boatyard with marine railway can haul out boats of 10 tons weight, 45 feet length, and 4 feet draft. Light repairs and facilities for boat storage are available.

Mattituck is a village on the railroad. Gasoline, provisions, and ice can be obtained here. Repairs to engines can be had.

Chart 1212.—Between Mattituck Inlet and Port Jefferson the shore is fringed with rock shoals extending in places 1.5 miles from shore. The outer ends of the shoals are marked by buoys.

Horse in Bank is an area of white patches in the brush-covered bluff at **Friar Head.** This feature is at the western end of **Roanoke Point Shoal,** and 14 miles westward of Horton Point Light.

Fresh Pond Landing is 2.3 miles westward of Friar Head. A few houses and a prominent water tank are in the valley.

Paine Landing, 3.9 miles westward of Friar Head, is marked by a prominent tank.

Wading River, at the western end of **Herod Point Shoal,** has a reported depth of about 5 feet at high water. The valley of the river forms a broad break in the high bluffs.

Tuttles White Bank is a high white bluff 0.6 mile westward of Wading River.

A group of tall radio towers at **Rocky Point,** about midway between Herod Point and Port Jefferson, is an excellent landmark and can be seen well offshore when other distinguishing objects are not visible.

Chart 361.—Mount Sinai Harbor is marked by a low break, nearly 1 mile long in the beach, and is a prominent feature. The entrance is marked by two jetties about 310 feet long and 180 yards apart. A clear channel 64 yards wide and 8 feet deep has been dredged in the harbor. In August 1949 the controlling depth was 10 feet through the opening. The harbor bares at low water except where dredging operations have taken place.

Mount Misery is a hill 180 feet high between Mount Sinai Harbor and Port Jefferson. It slopes off gradually toward the sound where the bluffs are about 60 feet high and very prominent. In 1949 sand and gravel companies were digging into the bluffs and the resulting sand banks were conspicuous.

Port Jefferson Harbor is on the south shore of Long Island eastward of Old Field Point. The entrance channel is between two converging jetties. Port Jefferson East Breakwater Light, 60 feet above water, is shown from a black square skeleton tower, white central column, white tank house, white watch house alongside, on the east breakwater. The fog signal is a bell. Port Jefferson West Breakwater Light, 29 feet above water, is shown from a red skeleton tower, white tank house, red base, on the end of the west breakwater.

The Federal project provides for a channel 16 feet deep, 300 feet wide through the entrance. Length about 0.6 mile. The repair and enlargement of two riprap jetties constructed under previous project, and the extension of the east jetty a distance of 450 feet. Length of west jetty, 940 feet; length of east jetty, 1,900 feet.

A yellow brick stack on the west side near the head of the harbor is a conspicuous landmark.

Shoals with little depth are on both sides of the channel from the entrance to the lighted bell buoy inside the entrance. A shoal with depths of 6 to 8 feet over it extends 500 yards north of the lighted bell buoy. The north end of this shoal was formerly **Barrel Island.** The lighted bell buoy cannot be seen over the breakwater at low tide by small vessels approaching the harbor. A sunken scow on the south side of that part of the shoal that formed Barrel Island has a depth of about 4 feet at mean low water. A shoal with 1 foot over it is 860 yards, 128° from the west jetty light. A sunken wreck in the northeast part of the harbor is marked by a pipe and red flag.

The controlling depth in August 1949 was 16 feet for a width varying from 300 to 80 feet, with shoals of 12 to 13 feet making out on the sides.

The harbor is 1.5 miles long and has a clear width of about 0.5 mile in its widest part; the depths are 10 to 12 feet for a distance of 0.5 mile from the head, and thence 20 to 30 feet nearly to the lighted bell buoy inside the entrance. At the outer end of Bayles Wharf and the Standard Oil wharf the depths are 10 feet. At the outer

face of the steamboat wharf the depth was 21 feet. Good anchorage in 10 to 12 feet can be had for a distance of 0.5 mile from the head.

The light on the east breakwater and the black standpipe back of Port Jefferson afford an excellent range for swinging ship. The bearing is 142°45.'3.

Port Jefferson is a town at the southern end of the harbor. The standpipe on the hill and the oil tanks at the southeastern end of the harbor are prominent.

Conscience Bay is entered through a long narrow channel at the northeast end of the harbor. The bay and entrance have depths of 1 to 2 feet at low water. Sand and gravel companies are dredging in the channel. Strangers should obtain local information before entering.

Setauket Harbor, on the western side of Port Jefferson Harbor, has a narrow crooked channel with a least depth of about 4 feet. The entrance from Port Jefferson Harbor is buoyed by the town and has daybeacons leading to the village of **Setauket**, on the south shore of Setauket Harbor, about 1 mile above the entrance.

Directions.—Port Jefferson from New Haven.—From the main entrance of New Haven Harbor between Southwest Ledge Light and Luddington Rock Breakwater, a **210°** course for 17 miles will lead to a position off the entrance of Port Jefferson Harbor westward of Mount Misery Shoal.

From Bridgeport.—From the entrance of Bridgeport Harbor, a **159°** course for 11 miles will lead to the bell buoy at the entrance of Port Jefferson Harbor. Or, a **176°** course with Stratford Shoal Light astern will lead to the entrance of Port Jefferson Harbor. The tidal current in the sound should be considered in shaping the course across it.

Approaching from westward give Old Field Point Light a berth of 0.6 mile and steer for the bell buoy on course **109°** to avoid the rocky shoal with 17 feet over it which is about 0.4 mile to the northeastward of Old Field Point Light.

Mount Misery Shoal is the principal danger in the approach to Port Jefferson. It will be avoided by keeping Old Field Point Light bearing southward of 248°. Pass about 300 yards westward of the bell buoy at the entrance to the harbor and steer **152°** heading for the lighted bell buoy inside the harbor. Pass through the entrance between the jetties and change course slightly in order to pass about 100 yards westward of the lighted bell buoy. After passing this buoy steer **136°** up the middle of the harbor.

The mean range of the tide is about 6½ feet.

Currents.—In the channel between the jetties the average velocity of the tidal current at strength is about 2¼ knots.

Ice forms over the entire harbor and interrupts navigation in very cold weather, but does not endanger shipping in the harbor.

Diesel oil, gasoline, lubricants, water, and supplies of all kinds can be obtained.

A shipyard with marine railways is at the head of the harbor. The largest railway can haul vessels of 900 tons weight, 160 feet length, and 12 feet draft. All major repairs can be done. Facilities are available for laying up yachts in winter.

A principal industry of Port Jefferson is the dredging and shipping of sand and gravel. Other industries are ship repair work, shell fishing, and distribution of petroleum products.

Communication.—Port Jefferson has railroad communication, and steamers make regular trips from Bridgeport during 8 months of the year. A bus line connects with Patchogue, Riverhead, and Greenport.

A **measured nautical mile** is between the entrance of Port Jefferson Harbor and Old Field Point Light off **Setauket Beach.** Course is 121°-301°. 5

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CHAPTER 9

Western Long Island Sound

Chart 1213

WESTERN LONG ISLAND SOUND is that portion of the deep navigable waterway situated between the shores of Connecticut and New York and the northern coast of Long Island westward of the line between Bridgeport and Old Field Point. It is described in this chapter in the following sequence: Bridgeport to Throgs Neck on the north, Old Field Point to Willets Point on the south, the East River, and the Harlem River.

In this region are boulders and broken ground, but little or no natural change in the shoals. The waters are well marked by lighthouses, a lightship, and other aids so that strangers should experience no difficulty in navigating them. As all broken ground is liable to be strewn with boulders, as a measure of safety, vessels should proceed with caution when in the vicinity of broken areas where the charted depths are not more than 6 to 8 feet greater than the draft. All of the more important places are entered by dredged channels and during fog, vessels are advised to anchor until the weather clears before attempting to enter. The numerous oyster grounds in this region are usually marked by stakes and flags. These stakes may become broken off and form obstructions dangerous to small craft, especially at night, so that they should proceed with caution when crossing areas where oyster stakes are found.

Directions.—See Chapter 3 for courses and distances through Long Island Sound.

Anchorages.—There is anchorage for large vessels in the bight outside of Bridgeport Harbor Light and in the harbor. Cockenoe Island Harbor is sometimes used by small vessels; but Sheffield Island Harbor is preferred, and is sometimes used by tows. Westward of Norwalk Islands seagoing vessels can anchor toward the north shore, and with good ground tackle hold on in northerly winds. Captain Harbor affords good shelter, but is not used much except by local vessels. On the south shore, Huntington Bay and Hempstead Harbor are available for large vessels; Oyster Bay is also used, and Manhasset Bay is available for light-draft vessels. City Island Harbor is a great resort for coasters.

Currents.—Currents along the axis of the western part of the sound turn later than at The Race by about 1 hour off Matinicock Point and 3 hours off Hart Island.

About 0.5 mile northward of Eatons Neck Light the ebb runs about 5 hours longer than the flood. Slack before flood occurs about the same time as at The Race. Strength of flood has an average velocity of about ½ knot, sets 310° and occurs about ½ hour earlier than at The Race. Slack before ebb occurs about 2 hours earlier than

at The Race. Strength of ebb has an average velocity of about 1½ knots, sets 070° and occurs about ½ hour earlier than at The Race.

Predicted times of slack water and times and velocity of strengths of current for Hell Gate, in advance for every day in the year, are given in the *Current Tables, Atlantic Coast*. In East River, the flood current sets eastward and the ebb westward. From Governors Island to Rikers Island, including Hell Gate, the currents turn practically simultaneously, and slack waters before the flood (eastward current) and ebb (westward current), respectively, occur about 1½ hours after low water and high water at the Battery.

Between Throgs Neck and Willets Point the slack waters before flood (eastward current) and ebb (westward current), respectively, occur about ½ hour after low water and high water at the Battery.

From Governors Island to Lawrence Point the mean velocity at strength of current ranges from 2 to 5 knots, the higher velocities occurring in the narrow parts of the channel eastward of Brooklyn Bridge, abreast Blackwells Island, and in Hell Gate. In Hell Gate, off Mill Rock, the mean velocity at strength is about 3½ knots for the eastward current, 4½ knots for the westward current.

The mean velocity at strength of current from North Brother Island to Whitestone Point is about 1½ knots. At Throgs Neck it is about 1 knot.

The currents generally set with the channel, but there are heavy swirls between Negro Point and the north end of Blackwells Island. A further discussion of currents and a current diagram for East River is given in the *Current Tables, Atlantic Coast*.

The direction and velocity of the current are affected by strong winds. The period of flood or ebb may be increased or diminished by winds.

The direction and velocity of the current in the East River, and from Point Judith to Throgs Neck, for each hour of the tidal cycle, will be found in *Tidal Current Charts, New York Harbor*, and *Tidal Current Charts, Long Island Sound* and *Block Island Sound*, respectively.

Tides.—The time of tide is nearly simultaneous throughout Long Island Sound but the range of tide increases from about 2½ feet at the east end to about 7¼ feet at the west end. Daily predictions of the times and heights of high and low waters for New London, Bridgeport, and Willets Point are given in the *Tide Tables*.

The effect of strong winds, in combination with the regular tidal action, may at times cause the water to fall several feet below the plane of reference of the charts, which is mean low water.

Fog.—In Long Island Sound the north and south shores are equally subject to fog, except that on spring and summer mornings, when there is little or no wind, fog will often hang along the Connecticut shore when it is clear offshore and to the southward.

In the western end of Long Island Sound, although fogs are liable to occur at any season, they are not encountered so often, nor do they generally last so long as is the case farther eastward. See also table of *hours of operation of fog signals* in the Appendix.

Ice.—In ordinary winters the floating and pack ice in Long Island Sound, while impeding navigation, does not render it absolutely unsafe, but in exceptionally severe winters the reverse is the case, none but powerful steamers being able to make their way.

Drift ice, which is formed principally along the northern shore of the sound, under the influence of the prevailing northerly winds, drifts across to the southern side and

accumulates there, massing into large fields, and remains until removed by southerly winds, when it drifts back to the northerly shore.

In ordinary winters ice generally forms in the western end of the sound as far as Eatons Neck; in exceptionally severe winters ice may extend to Falkner Island and farther eastward.

Effect of tides and winds on ice.—In Long Island Sound northerly winds drive the ice to the southern shore of the sound and southerly winds carry it back to the northern shore. Northeasterly winds force the ice westward and cause formations heavy enough to prevent the passage of vessels of every description until the ice is removed by westerly winds. These winds carry the ice eastward and if of long enough duration drive it through The Race into Block Island Sound, then it goes to sea and disappears.

Navigators must not depend too implicitly upon the buoys. It severe winters these are liable to be carried away; and, in fact, during every winter it is better to depend on the lighthouses and other permanent objects than on the buoys.

In Bridgeport Harbor winds from north to northwest clear the harbor of drift ice, and those from southeast through south to southwest force the ice into the harbor from the sound. The outer buoys are apt to be carried out of position by heavy ice during severe winters.

Additional information concerning ice conditions in the waters adjoining Long Island Sound is given under the local descriptions.

Chart 220.—Bridgeport Harbor is on the north side of Long Island Sound, north-northwestward of Stratford Shoal Light and about 52 miles from New York. The harbor consists of two widely separated units, the main harbor and its branches serving the east and central portions of the city, and Black Rock Harbor with its tributaries, serving the western portion. Black Rock and Cedar Creek will be described under a separate heading. The water-borne freight traffic at Bridgeport is large. The principal cargoes consist of coal, petroleum products, lumber, and scrap iron.

Bridgeport East Breakwater Light, 25 feet above water, is shown from a red skeleton tower, white tank house, red square base, on the southwest end of the breakwater at the entrance to the harbor.

Bridgeport Harbor Light, 60 feet above water and visible 13 miles, is shown from a white tower and dwelling on brown base, on the west side of the entrance to the harbor. The fog signal is a bell.

Bridgeport Outer Daybeacon is a black ball on an iron spindle. It is 0.4 mile northward of Bridgeport Harbor Light and 160 yards westward of the dredged channel.

Bridgeport Breakwater Light, 31 feet above water, is shown from a black conical tower at the east end of Tongue Point Breakwater. The fog signal is a bell.

Prominent objects are the group of four stacks at **Steel Point,** the towers of the high voltage line crossing at the railroad bridge, a tall slender church spire and a gas tank with checkered band at top on the west side of the river, the radio towers at Tongue Point and **Pleasure Beach**; the rays of an aviation light about 1.5 miles northwestward of Stratford Point can be seen from offshore.

The **outer harbor** is protected by two converging breakwaters between which the entrance channel 400 feet wide and dredged to 30 feet, leads from deep water in Long

Island Sound. Adjacent to the entrance channel, near its head, is a 25-foot anchorage basin. The rest of the outer harbor area consists of broad and shallow sand flats.

The **inner harbor**, about 1 mile long and from 500 to 1,500 feet wide, extends from Tongue Point to the Stratford Avenue Bridge across the Poquonock River.

Poquonock River has been improved by dredging a channel 18 feet deep for a distance of 0.9 mile above the Stratford Avenue Bridge to a point about 500 feet below Berkshire Avenue, the head of navigation. The deepest draft of vessels going up Poquonock River above the bridges is about 17 feet. The depths alongside the railroad wharf and city dock are 13 to 25 feet. Some of the wharves in Poquonock River have depths of 10 to 15 feet, but there is little depth at others. The channel in Poquonock River is easily followed by small craft, but a towboat is needed by vessels to assist in making the sharp bends.

Yellow Mill Channel has been improved by dredging a channel 18 feet deep to the upper wharf, above which it decreases to 5 feet at the head. The entrance is on the northeast side of the harbor 0.3 mile above Tongue Point and is marked on its west side by two buoys. Below the bridge the wharves extend out to the eastern edge of the channel. The coal wharf has a depth of 15 feet and the oil dock on the west side above the coal wharf 8 feet. The flats on both sides of the channel are largely bare at low water.

Johnson Creek entrance is eastward of Bridgeport Breakwater Light and at the northeast corner of the anchorage basin. Vessels require local knowledge to follow the best water, but small craft proceeding with care can use the channel as follows: Pass midway between the channel buoys at the entrance, steer for the center pier of the drawbridge, pass through, and then keep in line with the center pier until abreast of the shipyard wharf. Then make the bend, keeping 100 feet off the row of piles at the shipyard, and then follow the wharves at a distance of 75 feet. Pass about 100 feet off the yacht club landing, exercise care in making the turn, and then steer mid-channel courses.

A channel 80 feet or more wide and 8 feet deep has been dredged on the north side of **Tongue Point** to the wharf on the south side of the slip and the coal wharf on the north side. To enter, local fishermen line up the telephone poles on the south side of the road leading to the channel.

On the eastern side of the harbor 0.3 mile northward of Bridgeport Breakwater Light is the entrance of a dredged channel leading to a power plant on the east side of the harbor.

The Federal project provides for: A channel 30 feet deep, 400 feet wide from Long Island Sound widening to within 75 feet of the harbor line opposite Cilco Terminal and decreasing to a 250-foot width at a point about 720 feet below Stratford Avenue Bridge over Poquonock River. A channel 18 feet deep, 125 to 200 feet up the Poquonock River to a point about 500 feet below the dam at Berkshire Avenue. A channel 18 feet deep, 150 feet to 200 feet wide up Yellow Hill Channel to a point about 370 feet from Crescent Avenue. A channel 15 feet deep, generally 200 feet wide up Johnsons River to a point 1,700 feet below Hollisters Dam, thence 9 feet deep, 100 feet wide to a point 600 feet below Hollisters Dam. A channel 18 feet deep, 150 to 200 feet wide up Black Rock Harbor and Cedar Creek to the junction of two branches, length about 2.1 miles; thence 18 feet deep, 100 feet wide in the East Branch, length about 1,500 feet and 18 feet deep, 100 feet wide in the West Branch. A channel 7 feet deep, 100 feet wide up

Burr Creek to the south side of Yacht Street extended. A turning basin 30 feet deep at the entrance to Johnsons River (Johnson Creek) channel. Two anchorage basins 25 feet and 18 feet deep. Two riprap breakwaters at the entrance to the main harbor. The construction and maintenance of shore protection on Fayerweather Island including a sea wall connecting the northerly and southerly portions of the island.

The controlling depths in 1949 were: In the main channel, 30 feet to a point about 700 feet south of Stratford Avenue Bridge, thence 25 feet to the bridge. In the Poquonock River, 17 feet from Stratford Avenue Bridge to Congress Street Bridge; thence 16 feet to East Washington Street Bridge; thence 14 feet to the head of navigation. In the Yellow Mill Channel 17 feet to a point 1,300 feet below the head of the project, thence 15 feet to the head of project. In Johnson Creek 28 feet from the main channel to the pier 500 feet west of Pleasure Beach Bridge; thence 14 feet to a point 1,700 feet below Hollisters Dam; thence 10 feet to head of project. In the dredged channel leading from the main channel into the bight just above Tongue Point, 7 feet; in the westerly end of the basin 6 feet.

Anchorage basins have been dredged on the northeast side of the entrance channel in the outer harbor and on both sides of the channel in the inner harbor. The 25-foot anchorage on the southeast side of the channel opposite Tongue Point Breakwater has a width of 800 feet, and is the best anchorage for large vessels.

A 12-foot anchorage basin on the northeast side of the channel between the entrance to Yellow Mill Channel and Steel Point has a width of about 200 feet and depths of 8 to 16 feet. At the upper end of the inner harbor is an anchorage which is generally used by small craft. It is on the east side of the channel adjacent to and southeastward of the Stratford Avenue Bridge. The controlling depths in this area are 10 to 23 feet.

On the west side of the harbor extending northwestward from Tongue Point is an 18-foot anchorage basin, the controlling depths of which were 15 to 27 feet in August 1949.

Vessels sometimes anchor off the entrance of Bridgeport Harbor for shelter in strong northerly winds; the holding ground is good.

Bridges.—No bridges cross the outer harbor, but numerous spans cross the tributaries of the inner harbor. Five bridges cross the main channel of the Poquonock River. Stratford Avenue Bridge is a bascule bridge with a horizontal clearance of 135 feet and a vertical clearance of 7½ feet at high water. The railroad bridge is a bascule bridge with a horizontal clearance of 70 feet and a vertical clearance of 18 feet at high water. Congress Street Bridge is a bascule bridge with a horizontal clearance of 67 feet and a vertical clearance of 8 feet at high water. East Washington Avenue Bridge is a bascule bridge with a horizontal clearance of 69 feet and a vertical clearance of 4½ feet at high water. Grand Street Bridge is a bascule bridge with a horizontal clearance of 71 feet and a vertical clearance of 13 feet at high water.

At a point 600 yards above the Grand Street Bridge is a fixed railroad bridge with a horizontal clearance of 52½ feet and a vertical clearance of 3½ feet at high water. At a point 1,050 yards above the Grand Street Bridge is a fixed railroad bridge with a horizontal clearance of 54 feet and a vertical clearance of 9 feet at high water.

The Yellow Mill Channel has a bascule bridge 600 yards above the entrance channel. The horizontal clearance is 82½ feet and the vertical clearance is 11½ feet at high water.

Johnson Creek is crossed by a swing bridge near the mouth. The horizontal clearance is 70 feet in the north span and 65 feet in the south span, with a vertical clearance of 7 feet at high water.

The regulations governing the opening of bridges over the Poquonock River, Yellow Mill, and Johnson Creek are covered by § 203.130 of Bridge Regulations listed in Chapter 2.

Tides.—The mean range of the tide is about 6¾ feet. Daily predictions of the times and heights of high and low waters are given in *Tide Tables*.

Currents.—In the entrance channel, between the breakwaters, the average velocity at strength of flood or ebb is about ¾ knot. For predictions see *Current Tables*. Inside the harbor the currents are generally weak.

Prevailing winds are southwesterly in the summer and northwesterly in winter.

Ice does not, as a rule, interfere seriously with navigation. The Coast Guard keeps the channel open in the main harbor to the railroad bridge over Poquonock River. The tributaries of the harbor are closed at times. In Bridgeport Harbor winds from the north and northwest clear the harbor of drift ice, and winds from southeast through to southwest force the ice into the harbor from the sound. The outer buoys are apt to be carried out of position by heavy ice during severe winters.

Directions, Bridgeport Harbor from eastward.—Approaching around Stratford Point note the description of the shoals off the point in connection with the coast of New Haven to Bridgeport. Small vessels generally make the gong buoy which is about 1 mile from shore and 1.5 miles southwestward of Stratford Point Light. Passing over 300 yards southward and southwestward of this buoy, a **293°** course for about 2.7 miles will lead in a least depth of about 15 feet to the entrance of the harbor southward of Bridgeport Harbor lighted bell buoy 8 or a **260°** course for 3 miles will lead to Bridgeport Harbor lighted gong buoy 2 at the entrance to the 30-foot dredged channel.

From westward.—Passing about 0.5 mile southeastward of Penfield Reef Light, a **060°** course for about 1.6 miles will lead to Bridgeport Harbor lighted gong buoy 2 at the entrance to the 30-foot dredged channel.

The course through the middle of the dredged channel is **013°** passing through 120 yards eastward of Bridgeport Harbor Light and 200 yards eastward of Bridgeport Breakwater Light, on the end of Tongue Point Breakwater. With the aid of lights and buoys there should be no trouble in clear weather in following the axis of the dredged channel. There is little depth on either side of the dredged entrance channel inside of the breakwaters.

From a position 200 yards northeastward of Tongue Point, the 30-foot channel extends **317°** for about 0.5 mile along the southwest part of the lower reach of the Poquonock River, then **337°** for about 0.3 mile.

Storm warnings are displayed day and night from a prominent flagstaff at Seaside Park, western entrance of Bridgeport Harbor.

Pilotage.—All inward and outward bound foreign vessels drawing 9 feet or more are subject to the payment of pilotage if spoken by a pilot before entering port. For others, pilotage is optional. The usual place of boarding is outside of Bridgeport Harbor Light. Inward and outward rates are the same and apply throughout the year. Rates are subject to change and are made by agreement. **Towboats can always be had by making signal, usually by ship-to-shore phone.**

Quarantine.—Vessels arriving from a foreign port, other than from Canada, anchor outside the breakwaters where they are boarded for inspection.

Hospitals.—Bridgeport has several public hospitals and numerous private hospitals and sanatoriums. Bridgeport Hospital is a United States contract hospital. Contagious cases are sent to Englewood Hospital which is a city hospital of Bridgeport. A relief station of the United States Public Health Service is at Bridgeport. Release from quarantine is made by a United States Public Health Service doctor who comes on call from New Haven.

Customs.—The customhouse is in the Federal Building at the corner of Middle, Golden Hill, and Water Streets. A local warehouse has facilities for bonded storage. Vessels may enter the harbor at Bridgeport at any time. They may clear between the hours of 0830 and 1700. Clearances are affected by agents and are granted by the marine department, customs service.

Immigration Service.—No officials of the Immigration Service are stationed at this port, but they can be obtained from Hartford.

Harbor Master.—The control of the port is vested in the harbor master who is appointed by the city.

Dockage is charged at the railroad wharf, at the new city wharf, and the Cilco Terminal on the basis of registered tonnage. At other wharves the rates are by agreement.

Wharfage.—The rate of wharfage at the city wharf is arranged by the harbor master. At the other wharves the rates are by agreement.

Lighterage.—Bridgeport provides no free lighterage service. Lighters may be obtained at the port or from nearby ports. Rates depend upon the location, nature, and extent of the services rendered, based usually on a daily rate for the plant used.

Storage.—Several warehouses are available for both cold storage and general storage.

Supplies.—Diesel oil, gasoline, lubricants, coal, water, provisions, and ship chandler's stores can be obtained. Water can be had through hose at the city dock or from towboats which act as water boats.

Coal bunkering.—Facilities for coal bunkering are limited and for the most part are confined to the coaling of towboats or vessels of similar size and draft.

Oil bunkering.—Fuel oil may be obtained at a wharf on the east bank of Yellow Mill Channel in a depth of about 18 feet for a berthing space of about 200 feet. Adequate stocks of Grades 1, 2, 4, 5, and 6 bunker oil are on hand and delivery is made through pipe lines.

Repairs to vessels and machinery of steamers can be made at Bridgeport, which has several marine railways; the largest which is near the junction of Yellow Mill Channel and the main dredged channel, can haul out vessels of 600 tons weight, 150 feet length, and draft of 11 feet forward, 16 feet aft.

Communications.—Excellent means of communication both by railroad and buses to New York and Boston and other cities along the coast and in the interior are available. Steamers make regular trips to Port Jefferson and Rye Beach throughout the year.

Black Rock Harbor is 2 miles westward of the entrance of Bridgeport Harbor and is well marked by Black Rock Harbor Light 2A and Penfield Reef Light on the north and south sides of the entrance. Anchorage exposed only to southeasterly winds can

be selected in the entrance northeastward of Fairfield Bar in 18 to 22 feet. Soundings are a good guide except in the vicinity of the easterly part of Fairfield Bar and the reef on the north side of the entrance. The depths on either side of the dredged channel westward of Fayerweather Island are 6 to 8 feet, and small craft of less than 6-foot draft can select anchorage as far up as the yacht club.

Black Rock Harbor Light 2A, 41 feet above water, is shown from a skeleton tower, white tank house, red concrete base, off the south end of Fayerweather Island.

Black Rock Harbor and the creeks at its head are the approach by water to the large manufactories in the western part of Bridgeport. A channel 200 feet wide and 18 feet deep has been dredged from the harbor to **Cedar Creek,** thence the same depth and 150 feet wide to the branches, and the same depth and 100 feet wide in the branches. Some of the wharves have depths of 10 to 15 feet. The channel is marked by buoys, and some bush stakes on the shoal flats on each side of the channel. At high water vessels of 20-foot draft can go to the heads of the two branches of Cedar Creek but they will lie aground at low water. The channel in Burr Creek has a width of 50 feet and a controlling depth of 7 feet at the mouth and gradually shoaling to 0 feet at its end. It is little used and the upper reaches are being filled in. The flats at the entrance, between Burr Creek and Cedar Creek are mostly bare at low water.

In August 1949 the controlling depth was 18 feet from the harbor entrance through Black Rock Harbor to the head of navigation, in the westerly arm of Cedar Creek, and 17 feet in the easterly arm of Cedar Creek.

Directions, Black Rock Harbor, from eastward.—Approaching around Stratford Point, small vessels generally make the gong buoy which is about 1 mile from shore and 1.5 miles southwestward of Stratford Point Light. Passing southward of this buoy, a 273° course for 4.2 miles will lead to the entrance at the buoy southwestward of Black Rock Light 2A.

From Bridgeport.—When abeam of the lighted bell buoy 0.5 mile southward of Bridgeport Harbor Light, vessels of not too great a draft may steer a course of 244° which will lead southward of the buoy off the entrance to the dredged channel in Black Rock Harbor.

From westward.—Pass 0.4 mile or more southeastward of Penfield Reef Light and 0.3 mile or more eastward of Black Rock Daybeacon; or, if approaching from south of Penfield Reef, keeping Black Rock Light 2A bearing westward of 348° will lead 0.2 mile or more eastward of Black Rock Daybeacon. When Penfield Reef Light bears 237° the course can be shaped to pass westward of the buoy southwestward of Black Rock Light 2A. The dredged channel in Black Rock Harbor is well buoyed and strangers should encounter no difficulty.

A shoal off the point separating the two branches at the head of Cedar Creek must be carefully avoided. To enter the east branch pass about 100 feet off the wharf on the southeast side below the entrance and head up the middle of the branch. To enter the west branch, pass 100 feet off the wharves on the southeast side of the branch.

Tides.—The mean range of the tide is about 7 feet.

Ice.—During some part of each winter Black Rock Harbor and its tributaries are usually closed by ice.

Fayerweather Island, on the eastern side of the entrance, is marked at its south end by the white tower of a former light. A breakwater and a seawall connect its northern part with the shore eastward. **Point Rock Shoal,** which shoals abruptly,

extends 0.3 mile southward from the south end of the island and is marked at its south end by Black Rock Harbor Light 2A. A buoy marking the extremity of the shoal and the eastern side of the entrance to the dredged channel is about 100 yards southwest of the light. There is little depth for a distance of 400 yards from the island, and thence it shelves off to 18 feet at the buoy.

Yacht clubs are on the northwest side of the harbor eastward of **Grover Hill** where there is an anchorage for small craft in depths of 5 to 8 feet between the dredged channel and the yacht club landing. An old stone landing which shows at low water extends 150 yards from the shore just northward of the landing.

Gasoline, lubricants, and fresh water may be obtained at the head of the harbor where there is a depth of 4 feet at the end of the wharf. Repairs to small craft can be obtained at three boatyards, the largest of which can haul out vessels of 50 tons weight, 60 feet length, and 8 feet draft.

Fairfield Bar, forming the southwest side of Black Rock Harbor, is well bare at low water out to **The Cows,** a distance of nearly 1 mile; a shoal with little depth extends 0.3 mile eastward from The Cows to **The Little Cows** which are awash at low water. The easterly point of the reefs nearly 0.3 mile southward of the northeast point of the shoal near The Little Cows is marked by **Black Rock Daybeacon,** a red pyramidal iron skeleton with two truncated pyramids, top to top.

Penfield Reef, on which are rocks bare at low water, extends 0.3 mile southward from The Cows to Penfield Reef Light; the 18-foot curve is 250 yards southeastward of the light, and the light should not be approached closer even by small craft. **Penfield Reef Light,** 51 feet above water and visible 13 miles, is shown from a white tower on granite dwelling on pier at the south side of entrance to Black Rock Harbor. The fog signal is an air diaphragm horn. It has been reported that this light has been confused with red advertising signs in Black Rock and that the light is at times difficult to pick up.

Flat Island is nearly 2 miles westward of Penfield Reef Light. It is covered at high water, and is the highest part of a reef, partly bare at low water and with depth over any part of it, which extends over 0.4 mile southward from **Pine Creek Point.** A lighted bell buoy marking the end of the shoal is about 300 yards southward of Flat Island and over 0.5 mile southward of the point.

Southport Harbor is the entrance of **Mill River** at the head of the bight over 1 mile northwestward of Flat Island. It has been improved by dredging a channel to the wharves at Southport. The entrance is marked by two lights.

Southport Light, 25 feet high and visible 7 miles, is shown from a black skeleton tower, white tank house, black square base, off the west entrance to dredged channel.

Southport Breakwater Light, 25 feet above water, is shown from a red skeleton tower, white tank house, red square base, at the south end of breakwater, east side of channel.

The channel is well marked by buoys to the vicinity of the breakwater. Caution is recommended to avoid oyster stakes in the areas southward and southeastward of the entrance to the harbor. The yacht club landing has a depth of 9 feet and the public landing on the west side of the harbor has a depth of 4 feet. The mean range of the tide is 7 feet.

The Federal project provides for: A channel 9 feet deep, 100 feet wide from Long Island Sound to opposite East Main Street; thence 9 feet deep, 400 feet to 175 feet wide to the Golf Club wharf. Length about 1.1 miles. An anchorage 6 feet deep, 300 feet

wide and 500 feet long, north of Golf Club wharf. A stone breakwater about 1,320 feet long. A dike about 1,350 feet long.

In August 1949, the controlling depth to the head of navigation was 9 feet.

Southport is a village on the west side of Mill River. The deepest draft of vessels entering is 11 feet. Gasoline, ice, hardware and other supplies are available. A marine railway is capable of hauling out vessels 35 feet in length and 3-foot draft.

Directions, Southport Harbor.—Head for the breakwater lights on course 352° passing midway between the entrance buoys and 75 yards eastward of the outer light. When past Southport Channel buoy 7 haul to westward and round the breakwater light at a distance of about 75 yards, passing also to westward of Southport Channel buoy 8. Pass 150 feet northwestward of the angle of the breakwater, then steer mid-channel courses to southeastward of **White Rock** and then favor slightly the west side of the narrow entrance. Then head for the brick buildings at the wharf, and pass 100 feet off the wharves. Strangers should proceed with caution.

Frost Point, 1 mile westward of Southport entrance, is marked by many residences and piers on its southeast side. A reef, partly bare at low water, extends about 0.4 mile southward from the point. A windmill which is a conspicuous landmark is situated about 0.3 mile northwestward of the point.

Sherwood Point is marked by a bare boulder on the reef which extends about 250 yards off the point. A rocky patch on which the least depth found is 11 feet is 0.8 to 1 mile southward of Sherwood Point. Many oyster stakes are between Frost and Sherwood Points.

Chart 221.—Saugatuck River or **Westport Harbor** is 6 miles westward of Penfield Reef Light and northward of Cockenoe Island. Anchorage exposed to southeasterly winds can be had in the entrance in 12 to 22 feet, 0.3 to 0.4 mile southward of **Cedar Point** at the east side of the entrance. Anchorage for small craft, sheltered from all winds, can be had 75 to 100 yards off the beach westward of **Bluff Point,** north end of **Seymour Point.** The channel in Saugatuck River is narrow and crooked. Vessels suffer damage at times by striking projecting ledges or boulders and should therefore proceed with caution and preferably on a rising tide.

The channel is good for a depth of about 6 feet at low water to **Judy Point,** then 5 feet across the bar, and then 7 feet to Saugatuck. Above this point the channel was improved to obtain a width of 60 feet and depth of 4 feet to Westport, but shoaling has occurred and the depth is about 3½ feet to the lower wharves at Westport and 1 foot to the upper wharves.

A channel 100 feet wide and 7 feet deep has been dredged to a private bulkheaded basin about 200 feet wide and 10 feet deep, on the east side of the river. The entrance southward of **Kitts Island** is marked by private buoys. On the west side of the basin is a prominent concrete tower and a boathouse.

Another privately dredged channel with a controlling depth of 7½ feet leads to **Compo Yacht Basin** in the bight to the westward of Cedar Point. The entrance is marked by privately maintained range beacons for an entering course of about 018°. A yacht club with landings and mooring facilities is in the basin. Gasoline and fresh water are available at the landing.

Saugatuck, a village in the town of Westport, is 2.5 miles above the entrance. The

principal wharves have depths of about 6 feet. Gasoline and other supplies are obtainable. Diesel oil can be had by arranging for truck delivery.

Bridges.—The lower, or railroad bridge, at Saugatuck is a bascule bridge with a horizontal clearance of 57 feet and a vertical clearance, closed, of 13 feet at high water. The overhead wires at the bridge are 135 feet above high water.

The upper, or highway bridge, at Saugatuck is a center pier draw, the east opening only being used. The horizontal clearance is 54 feet and the vertical clearance, closed, 6 feet at high water.

The fixed highway bridge at Westport has a horizontal clearance of 50 feet and a vertical clearance of 1½ feet at high water.

The bridge regulations are covered by § 203.135, Chapter 2.

Westport, a town at the head of navigation, is about 1 mile above Saugatuck.

Directions, Westport Harbor, from eastward.—From the lighted bell buoy southward of Flat Island a **260°** course for 4.2 miles will lead to the lighted entrance buoy 0.2 mile southward of Cedar Point.

From westward, pass southward of the Norwalk Islands and southeastward of the lighted bell buoy about 0.5 mile southward of Georges Rock. Round the eastern end of the shoals and steer a northerly course to pass at a distance of about 0.3 mile eastward of the buoy, which is 200 yards northeastward of Georges Rock. When east of this buoy steer **322°** for a distance of about 0.5 mile heading for **Compo Hill.** When Georges Rock buoy bears 180° at a distance of about 0.4 mile, steer **289°** which will lead midway between the entrance buoys southward of Cedar Point. When entering the river steer mid-channel courses between the buoys following the curve of the channel westward and then southward to the west side of Bluff Point. The channel then follows the southward and west bank, as shown on the chart, to the large bare rock near Judy Point. Above this point stakes are placed on the south side of the lower end and the north side of the upper end of the channel at the crossover. The channel then follows the east bank to the lower bridge, the west bank to the second bridge, and then through the east opening. The west edge of the channel is then about on the line of the center pier of the draw for a little over 100 yards, and then heads for a white house on the east bank above. From a small landing on the east bank the channel crosses to the west bank abreast the tannery, then near the middle until the river widens, and then follows the west bank, keeping out of the bights, to the lower wharves at Westport.

The mean range of the **tide** is about 7 feet. **Freshets** do not affect appreciably the height of the water in the navigable part of the river.

Ice forms in the winter the whole length of the river to its mouth.

Norwalk Islands are a group of islands, rocks, and shoals which extend from 1 to nearly 2 miles off the north shore of Long Island Sound and have a length of 6 miles from Georges Rock to Greens Ledge Light. Cockenoe Island Harbor and Sheffield Island Harbor, good at low water for about 9- and 12-foot draft, respectively, are available for anchorages, and are approaches to Norwalk River. These anchorages are marked by Peck Ledge Light and Green Ledge Light and are easily made. The bottom is very irregular around the islands and rocks in the Norwalk Islands. Although the area is well surveyed, vessels should avoid all broken ground and proceed with caution when crossing shoal areas. This area is covered with a mass of oyster stakes and spars, which sometimes tow under or break off, and small vessels especially should be on the lookout for them at all times.

Cockenoe Island, at the eastern end of Norwalk Islands, is marked on its south side by two knolls, the rest of the island being low and level. A bar, dry in places at low water, but with general depths of 1 to 2 feet, connects the island with the mainland at Seymour Point.

Cockenoe Shoal is an extensive and dangerous area which extends 1.3 miles eastward and east-southeastward and 0.6 mile southward from Cockenoe Island. The least depths found are shown on the chart, but the entire area is exceedingly broken with boulders and should be avoided by strangers, even in small craft. About 0.5 mile eastward of the northern end of Cockenoe Island, rocks are bare about 3 feet at low water near the outer end of **Cockenoe Reef.**

Georges Rock, awash at lowest tides, is at the eastern end of the shoal, and is marked off its northeast side by a buoy. A lighted bell buoy marks the southeast end of the shoal. Vessels rounding the eastern end of Cockenoe Shoal should give the buoys a good berth.

Channel Rock, with 1½ feet over it, is 400 yards southwestward of Cockenoe Island and is marked by a buoy 250 yards southwestward of the rock.

Peck Ledge Light, 61 feet above water and visible 8 miles, is shown from a white conical tower, middle part brown, on black cylindrical pier, in 7 feet on the south side of east entrance to Cockenoe Island Harbor.

Cockenoe Island Harbor is westward of Cockenoe Island, and is marked by Peck Ledge Light.. It has an anchorage for vessels of less than 9-foot draft, and is also an entrance from eastward to Norwalk River. The best anchorage for vessels is in the deeper part of the harbor, in depths of 12 to 25 feet, northward and northwestward of the light. Vessels should proceed with caution at low water when crossing the shoal as 12- to 15-foot depths are southward and westward of Channel Rock buoy.

Directions.—From eastward, pass southward of Cockenoe Island Shoal Lighted Bell Buoy 2A, steer **254°** until Peck Ledge Light bears northward of 285°, then steer for the light until up with Channel Rock buoy, and then pass eastward and northward of the light at a distance of 200 to 300 yards and around the buoy north of Peck Ledge.

From westward, give the edge of the shoals a good berth until Peck Ledge Light bears westward of 348° and then steer **000°** and pass 400 yards eastward of the light and midway between Channel Rock buoy and Peck Ledge bell buoy. When abeam of Channel Rock buoy proceed as described previously.

The following islands and rocks are on the northwest side of Cockenoe Island Harbor: **Sprite Island** is high and has some trees. **Calfpasture Island** has several houses and a few trees. The island eastward of Calfpasture Island is low and covered with boulders. **Sheep Rocks** are covered at half-tide. **East White Rock** is a high white rock. **Grassy Hammock Rocks** are bare at half-tide. The rock at the south end of the group is awash at high water.

Grassy Hammock Light, 23 feet above water, is shown from a red skeleton tower, white tank house, red square base, on rocks at the north side of entrance to Norwalk Harbor from eastward. Oyster stakes may be found in the channel between Grassy Hammock Rocks and Grassy Island.

Goose Island and **Grassy Island** are low. The rest of the Norwalk Islands are hilly and partly settled. **Chimon Island** is marked by a windmill and water tank. **Copps Island** has a prominent survey signal. **Sheffield Island,** the westernmost of the Norwalk Islands, is marked by an abandoned granite tower. A boat landing is on the north side

of Sheffield Island. The western extremity of a **measured nautical mile** is on the west end of Sheffield Island, and the eastern extremity is on a rocky reef south of **Little Hammock Island.** The mile course was established in 1949.

Great Reef, 0.3 mile southward of the western end of Sheffield Island, bares 4 feet at low water and is marked by an iron pipe protruding about 6 feet above the surface at high water. It is also marked by a buoy about 350 yards southwestward of the reef.

Hiding Rocks, Old Baldy, and **Old Pelt** are northwestward of Great Reef and are bare at low water.

Greens Ledge is a rock and sand ridge extending from Sheffield Island to Greens Ledge Light. There is little depth and rocks bare at low water in places for a distance of nearly 0.3 mile from the island and thence to the light. There is a depth of about 7 feet on the ledge. Depths of 10 to 15 feet extend about 400 yards westward and southwestward from the light, and this part of the ledge is marked at its southwest end by a buoy. A rocky ledge, on which the least depth found is 21 feet, extends 0.8 mile west-southwestward from the light. Another rocky ledge with a least depth of 20 feet is about 0.4 mile south-southwestward from the light.

Greens Ledge Light, 62 feet above water and visible 13 miles, is shown from a conical tower, upper half white, lower half brown, on a black cylindrical pier in 10 feet on the north side of the west end of the ledge. The fog signal is an air diaphragm horn.

Budd Reef, a small ledge with a least depth of 24 feet, is 0.9 mile south-southeastward of Greens Ledge Light. The bottom is very broken on the south side of Greens Ledge, and deep-draft vessels should pass southward of Budd Reef and the ledge with a least found depth of 22 feet about 0.9 mile south-southwestward of Copps Island.

Cable and Anchor Reef covers an area about 0.4 mile in diameter and is about 2 miles southeastward of Greens Ledge Light. The least found depth is 22 feet. A lighted gong buoy marks the southern side of the reef.

Sheffield Island Harbor, also known as **Norwalk Harbor,** is formed by the western Norwalk Islands. It is frequently used in the fall and winter, and by tows. The depths of the anchorage northwestward of Sheffield Island range from 12 to 16 feet. The directions from westward for Norwalk River lead through the harbor. The shoal flats on the north side of the harbor have rocks and boulders in places. The edge of the shoals on the north side of the harbor south and southwestward of Tavern Island are buoyed.

Tavern Island has many houses. **Little Tavern Island** is bare. A rock covered at half-tide is about 250 yards northeastward of Little Tavern Island. Westward of the island is a bare rock. A shoal with 2½ feet over it extends southwestward of Tavern Island and is marked by a horizontal-banded buoy on the south side of the shoal. **Yellow Rock,** bare at low water, is midway between the southwest end of Tavern Island and the wharf at Wilson Point.

Cedar Hammock Island has the ruins of a brick chimney and scattered trees on it.

The following are prominent objects near the channel leading from Sheffield Island Harbor to Norwalk River: **White Rock** shows above high water. **White Rock Reef Light,** 26 feet above water, is shown from a red skeleton tower, white tank house, red square base, in 9 feet 200 yards north of rock, southeast of **Keyser Point.**

Long Beach Light, 31 feet above water, is shown from a black skeleton tower, white tank, gray square granite base, in 15 feet, northeast of **Manrissa Island.**

Round Beach Light, 26 feet above water, is shown from a red skeleton tower, white

tank house, red square concrete base, in 4 feet on east side of channel at entrance to Norwalk River and 300 yards west of **Round Beach Island.**

Fitch Point Light, 24 feet above water, is shown from a red skeleton tower, white tank house, red concrete base, in 4 feet on point of shoal off East Norwalk.

Norwalk River is on the north side of Long Island Sound northward of Norwalk Islands, about 39 miles east of New York. It is important commercially. The river has been improved by dredging to South Norwalk and Norwalk.

The Federal project provides for: A channel 12 feet deep, 200 feet wide from Outer Harbor to Gregory Point, thence 12 feet deep, 150 feet wide to South Norwalk and 250 feet wide along the wharves to Washington Street Bridge, thence 10 feet deep, generally 100 feet wide to a basin at the head of navigation at Norwalk, length about 4.6 miles. An anchorage basin 10 feet deep opposite Fitch Point. A channel 6 feet deep, 125 to 150 feet wide, along the east side of the harbor to the head of the harbor at East Norwalk, length about 0.6 mile. An anchorage basin 6 feet deep, adjacent to the upper portion of East Norwalk Channel.

In August 1949 the controlling depths were as follows: To Gregory Point, 12 feet; to Washington Street Bridge, 11 feet; and thence 10½ feet to a point 600 feet below the head of navigation, and 9 feet at Norwalk. The 10-foot anchorage basin near Fitch Point had shoaled considerably to depths of 6½ to 10 feet. Depths within a radius of 400 feet of Fitch Point Light were found to be 6½ to 7 feet. The controlling depth was 5 feet from the 10-foot anchorage area to East Norwalk.

Gregory Point, marked by a clubhouse and wharf, is on the east side of Norwalk River 0.5 mile above the entrance.

South Norwalk is an imporant commercial and manufacturing city on the west bank of Norwalk River about 1.5 miles above its mouth. The depths at the wharves below the bridges range from 5 to 12 feet. Commercial traffic is mainly in building materials, petroleum products, and shell fishing.

East Norwalk, opposite South Norwalk, is reached by small craft from the main channel through a channel dredged 75 feet wide and 5 feet deep. The upper section of the channel is marked on both sides by stakes to which small craft moor. The yacht club is at the head of navigation.

Norwalk is a city on both banks of Norwalk River at the head of navigation 1.5 miles above South Norwalk. The wharves have a depth of about 10 feet. The bulk of the tonnage is carried in drafts of 9 to 12 feet. The channel from South Norwalk to Norwalk is winding, with extensive flats on both sides, and requires local knowledge even at high water, to follow it.

The Norwalk River is crossed at South Norwalk by a bascule highway bridge with a horizontal clearance of 70 feet and a vertical clearance, closed, of 8 feet at high water.

Above the highway bridge a distance of 0.1 mile is a railroad swing bridge with a horizontal clearance of 58 feet in the east span and 55 feet in the west span. The vertical clearance, closed, is 16 feet at high water. The overhead wires at the railroad bridge are about 170 feet above mean high water.

At the head of navigation is a fixed highway bridge.

A bascule bridge crosses an arm of the river at **Harborview.** The horizontal clearance is 26 feet and vertical clearance, closed, 6 feet at high water. The rules governing the bridges are covered by § 203.145, Bridge Regulations, in Chapter 2.

Anchorages.—Sheffield Island and Cockenoe Island Harbors are largely used for

anchorages. Small craft frequently anchor on the east side of the channel south of Gregory Point.

An anchorage basin has been dredged on the east side of the river channel opposite Fitch Point. The controlling depth in August 1949 was 6½ feet.

Local regulations provide penalties for exceeding a moderate speed or for dumping in the harbor.

Directions, from eastward.—The entrance from Cockenoe Island Harbor is good for vessels of about 5-foot draft at low water. Follow directions for Cockenoe Island Harbor and pass eastward and northward of Peck Ledge Light at a distance of 200 to 300 yards, around Norwalk Harbor East Entrance buoy 3; then steer westward to a position 125 yards southward of Grassy Hammock Light, and follow the buoys marking the channel to the dredged channel southwestward of Round Beach Light. When nearly abreast the light haul to the northward and pass 250 to 300 feet westward of the light.

From westward.—The entrance from Sheffield Island Harbor is good for a depth of 10 feet at low water, and is well marked by lights and buoys. Passing southward of Execution Rocks Light, a **053°** course will lead clear of danger for Greens Ledge Light passing 0.3 mile southward of The Cows lighted bell buoy. Proceed with caution when crossing the rocky ridge, on which the least found depth is 21 feet, extending 0.8 mile west-southwestward from Greens Ledge Light, and pass over 0.3 mile westward and 200 yards northward of Greens Ledge Light. Then bring the light astern on a **050°** course which will lead to a position 100 yards southeastward of the buoy 300 yards southeast of Tavern Island. Then steer **033°** through the dredged channel to a position off Round Beach Light.

Round Beach Light to South Norwalk.—When about 300 feet southwestward of the light haul northward and then northwestward, following the channel buoys and passing about 150 feet off the wharf at Gregory Point. When up to channel buoy above Gregory Point steer **323°** and continue until off the wharves at South Norwalk.

Tides.—The mean range of the tide is about 7 feet.

Currents.—The tidal currents in Long Island Sound off Norwalk have an average velocity of about 1 knot. In Norwalk River, off Gregory Point, the average velocity at strength of current is about ½ knot. The currents in the harbor follow the direction of the channel, the ebb current being somewhat stronger than the flood. For predictions the *Current Tables* should be consulted.

Ice.—The channel up to South Norwalk is navigable throughout the year. The harbor and river above South Norwalk are covered with ice during a part of the winter. A channel is ordinarily kept open up to the highway bridge, but the East Norwalk Channel and the channel in the river are usually closed for about 6 weeks each season.

Pilotage.—Pilots are not available at Norwalk.

Towage.—No local towboats operate at this port. Towboats can be obtained from City Island, N. Y., or Bridgeport, Conn., and rates are by agreement.

Hospitals.—One public hospital and several private sanatoriums are available but no contract hospital for the treatment of seamen.

Customs, Immigration.—Norwalk is included in the Bridgeport customs district, but is not a port of entry. Immigration, customs, and quarantine services are performed at Bridgeport unless special permission to proceed to Norwalk has been given by the proper authorities.

Lighterage and warehouses.—No free lighterage service is at Norwalk. Lighters may be obtained from nearby ports. One warehouse for public storage of ship's cargo is available at the port.

Dockage.—At such wharves as are open to the public the charges are determined by agreement. No fixed charges are published. The commercial wharves are in the upper section of the main harbor. Wharves are located above the highway bridge at South Norwalk.

Oil bunkering.—Only minor facilities for fuel-oil bunkering are at Norwalk. Boats usually obtain it by tank truck delivery at an oil receiving wharf.

Coal bunkering.—Bunkering facilities at Norwalk are limited to coaling craft of moderate size. The normal supply of bunker coal is not large.

Supplies.—Coal for ship's galleys and water can be had at the wharves of South Norwalk. Diesel oil, gasoline, provisions, and other supplies are obtainable.

Repairs.—A small boatyard and marine railway at South Norwalk can haul out boats up to 60 feet long and 9 feet draft. Repairs to hull and machinery can be made.

Communications.—Good railroad and bus service are available.

Wilson Point, on the north shore of Sheffield Island Harbor, has an oil receiving wharf. The depth is 11 to 16 feet in a channel 60 feet wide, alongside the wharf for a distance of 420 feet from its end. A least depth of 9 feet leads to the wharf from 100 yards westward of the buoy which is 400 yards southeastward of Noroton Point. Between Wilson Point and the northern part of Noroton Point is good anchorage for small craft in depths of 3 to 6 feet.

Noroton Point, on **Bell Island,** is marked by a flagpole and a prominent house with a cupola. About 300 yards northward of the point are rocks bare at low water. **Pine Point,** just westward of Noroton Point, has a wharf with a depth of about 15 feet at its end. A large amusement park is westward of Pine Point. A shoal with depths of 8 to 12 feet extends about 0.3 mile from the shore westward of Noroton Point. The bottom is broken with boulders in places and small vessels crossing the shoal should proceed with caution.

Ballast Reef, almost bare at low water, extends 300 yards off **Roton Point.** At the southeast end of the reef is a detached boulder which bares at high water. The reef is marked off its south side by a buoy.

Fivemile River is a narrow inlet whose entrance is 351° from Greens Ledge Light. It is about 1 mile long, 100 to 300 yards wide, and shallow except in the dredged channel.

The Federal project provides for a channel 8 feet deep, 100 feet wide from Long Island Sound to the head of the harbor, length about 6,000 feet. In August 1949 the channel had a width of 100 feet and a controlling depth of 6 feet over the entrance bar at Butler Island and deeper water in the dredged channel above it. From the bar to Tokeneke Creek the depth was 12 feet, thence 8½ feet to about 900 yards south of the head of improvement, thence 7 feet to head of improvement.

Along the wharves the depth diminishes from 6 to 3 feet. In the northerly bend of the river the channel shoals gradually and is partly bare at low water. The river is mostly used by fishing and pleasure craft. The mean range of the tide is about 7 feet.

Directions.—Small craft can enter Fivemile River as follows: Approaching from eastward, give the shore westward of Noroton Point a berth of over 250 yards and pass southward of Ballast Reef buoy. From westward, avoid the rock with 2 feet over it,

0.4 mile 204° off the western point at the entrance. A buoy marks the northwest end of the rock and another buoy marks the southeast end of the rock.

From the entrance buoys, steer **001°** for about 0.3 mile until approaching the buoy at the first turn in the channel. Pass 75 feet westward of the buoy and steer **022°**, passing 75 feet off the first wharf and to a position 120 feet off the oil company wharf. From abreast this wharf steer **009°** heading 50 feet outside the oyster company wharf. Proceed with caution and favor the east side of the channel.

Rowayton is a village at the head of the river. The oyster company wharf has a depth of 4 feet and lesser depths at the other wharves. Diesel oil, gasoline, ice, and water can be obtained. The largest boat repair yard can haul out craft of 65 feet and 7½ feet draft. General repairs can be made.

Scott Cove has its entrance westward of **Fish Islands** and is about 1 mile west of Greens Ledge Light. The bottom in the cove and approach is very broken and is suitable only for small craft. Proceed with caution when crossing the broken ground which extends 0.3 mile off the entrance. In the cove the channel favors the west side. The two reefs near the middle of the lower part of the cove are bare at low water, and the other reefs shown on the chart are awash at high water. The channel into the small cove on the west side of the entrance of Scott Cove has been dredged to 9 feet and follows the north side closely to an anchorage with the same depth, favoring the north side. The bare rock off the south side of the entrance is marked by a private spindle from which a light is sometimes shown.

Long Neck (Collanders) Point has many summer residences and boat landings on both sides of the point. Shoals extend about 0.3 mile off the point.

The bight between Long Neck Point and Shippan Point has many reefs and boulders, and the bottom is very broken, necessitating caution in navigation. It is the approach to several shallow coves none of which are important commercially.

Darien River is a small, shallow stream on the west side of Long Neck Point. The depth is 2 to 5 feet in the approach to **The Gut** at the entrance. The best route is via the buoyed channel along the west side of Long Neck Point, taking care to avoid the rocks, bare at low water, which extend nearly 200 yards from shore between the two piers 600 yards above the south end of Long Neck Point. Above The Gut, the river is practically dry at low water but at high water a draft of 6 feet can be taken a distance of 0.6 mile to the lower dam. The higher rocks of the group on the west side of the approach show above water. The rock at the northeast end of the group is bare at low water. A rock which shows at lowest tides is a little westerly of midway between the southerly bare rock of the group and the southerly pier on the west side of Long Neck Point. It is marked by a lighted buoy maintained from May 1 to November 1 and by a buoy throughout the year. The buoys are placed eastward of the rock.

Cove Harbor is a small dredged basin, no longer maintained, about 1 mile west-northwestward of Long Neck Point. The basin has a depth of about 5 feet, and the bar across the entrance is practically bare at low water. Several rocky areas are in the approach to the harbor, and local knowledge is needed for the approach and entrance.

Smith Reef is two rocks, bare at half-tide, and marked at the south end by a buoy 0.9 mile southwestward of Long Neck Point. **Bold Rock**, bare at half-tide, is on the east end of the rocky ridge extending northward from Smith Reef. From Bold Rock the rocky ridge with depths of 4 feet or less extends 0.3 mile 316°. Many oyster stakes are on this ridge.

Cove Rocks are a large group of rocks awash at high water. They are 0.7 mile northwestward of the south end of Smith Reef and are marked on the southwest side by a buoy.

Westcott Cove, on the northeast side of Shippan Point, may be entered by shallow draft vessels. A small, well-protected yacht anchorage with a shipyard and marine railway for small craft is at the head of the cove on the west side. The marine railway can haul out craft up to 100 tons weight, 100 feet length, and a draft of 9 feet forward, 12 feet aft.

Shippan Point East Breakwater Light, 15 feet above water, is shown in 6 feet on the end of breakwater southwest side of entrance to Westcott Cove. The light is privately maintained.

Westcott Cove Breakwater Light, 15 feet above water, visible 8 miles, is shown from a green pipe at end of breakwater east side of **Jaggers Creek**. The light is maintained by the city of Stamford.

The Federal project provides for a channel 100 feet wide, 8 feet deep from that depth in Long Island Sound through Westcott Cove and to the south limit of the lagoon. Work on the project had not begun as of August 1949.

The controlling depth across the bar at the southwest corner of Westcott Cove is 4 feet, thence a reported depth of 3 feet to the yacht basin at the northwest corner of the cove.

One mile eastward of Shippan Point is a rocky patch with a least depth of 8 feet.

Directions, Westcott Cove.—Pass about 100 yards eastward and northward of the lighted buoy marking a 4-foot spot about 0.3 mile east-southeast of Shippan Point East Breakwater Light on the south side of Westcott Cove; then steer **300°** passing close southward of the lighted buoy off the breakwater; continue on this course and pass close southward of the buoy which is about 500 yards northwestward of the breakwater. Caution should be used as shoal water exists south of the course after passing the breakwater.

When about 50 yards past the buoy head northward for the light at the south end of the breakwater at the north end of the cove. Pass 150 feet westward of the light and continue up the center of the dredged channel to the basin. The west side of the dredged channel is sometimes marked with iron posts to warn the bathers along the beach of deeper water.

Stamford Harbor is on the north side of Long Island Sound, about 33 miles east of New York. The harbor consists of a bay north of a line from Shippan Point on the east through Stamford Light, to the west shore north of Greenwich Point. The harbor is shoal and the approach is obstructed to a large extent by ledges and rocks. The entrance to the harbor is between Stamford Light and Shippan Point and is marked by buoys and a lighted range.

Shippan Point, the eastern point at the entrance of Stamford Harbor, is marked by a prominent residence with a red tile roof, visible from the southward and eastward, and is surrounded by rocks which show at low water.

Stamford is a manufacturing city on the peninsula between the East and West Branches.

Prominent objects are a high radio tower 160 feet high about 2 miles north of Stamford. The next most prominent object is the aviation light on top of an elevated water tank about 0.3 mile west of West Branch. The stack of a red brick power plant

on the east side of West Branch and a gas tank on the east side of West Branch are prominent objects.

Stamford Harbor Light, 57 feet above water and visible 13 miles, is shown from a white conical tower on a red cylindrical pier on the southwest end of **Harbor Ledge.** The fog signal is an air diaphragm horn.

Stamford Harbor West Breakwater Light, 41 feet above water and visible 9 miles, is shown from a black skeleton tower with white tank house on black base on the east end of west breakwater. The fog signal is an electric bell.

Stamford Harbor East Breakwater Light, 28 feet above water, is shown from a red skeleton tower, with white tank house on red base, on the west end of east breakwater.

Flint Rocks Light, 26 feet above water, is shown from a black skeleton tower, white tank house, black base, on rocks in Stamford Harbor.

Stamford Harbor Light 3, 27 feet above water, is shown from a black skeleton tower, white tank house, black base, in 1 foot on west side of channel.

Stamford Harbor Light 2, 27 feet above water, is shown from a red, square skeleton tower, white tank house, in 3 feet near rock pile southeast side of channel.

Stamford Harbor Front Range Light, 27 feet above water, is shown from a black skeleton tower, white tank house, black base, in 6 feet at the junction of East and West Branches.

Stamford Harbor Rear Range Light, 38 feet high, is shown from a red skeleton tower, white tank house, red base, on the south end of **Pine Island** 200 yards 358° from the front light.

East Branch has been improved by dredging to the railroad tracks which is the head of navigation. The deepest draft taken to the wharves is about 16 feet at high water. The depths at the principal wharves range from 6 to 10 feet. Small vessels of less than about 8-foot draft should have no difficulty in going up to the wharves, but strangers should proceed with caution.

West Branch, in the entrance to **Rippowam River,** has been improved by dredging a channel and an anchorage basin at the head of the branch. The bottom of the channel is rocky. The lower end of the anchorage basin is 400 feet above **White Rock.** The rock is 100 feet westward of the dredged channel and shows above high water. The head of navigation is at a dam at Oliver Street Bridge, 450 feet above the head of the anchorage basin. The depths at the principal wharves range from 6 to 19 feet.

The Federal project provides for: A channel 18 feet deep, 200 feet wide to the upper end of the 18-foot anchorage, thence 15 feet deep, 200 feet wide to the junction of the branches, length about 1 mile. A channel 15 feet deep, 125 feet wide in the West Branch, with a basin 15 feet deep at the head of the branch, length about 1 mile. A channel 12 feet deep, 100 feet wide with increased width at the turns, up East Branch to a point 1,100 feet from the head of navigation, thence 12 feet deep, 85 to 125 feet wide to the head of navigation, length about 1.5 miles. Two anchorage basins 8 feet and 18 feet deep. Two breakwaters at the entrance of the harbor, the East Breakwater about 1,200 feet long, the West Breakwater about 2,900 feet long.

In the main channel the controlling depth was 18 feet in the entrance to the south end of the 18-foot anchorage, thence 16 feet to the junction of East and West Branches 16 feet in the West Branch, 12 feet in the East Branch, not full width; 18 feet in the 18-foot anchorage, except for minor shoals.

The Cows are a cluster of rocks, almost bare at low water, marked off the south end by a lighted bell buoy 0.9 mile southward of Shippan Point. Sunken rocks, with 14 feet or less over them, extend 0.8 mile southeastward from Shippan Point.

Highwater Rock is awash at high water, and rocks bare at low water extend 0.3 mile southward from it to a point 350 yards northeastward of Stamford Harbor Light.

Grass Island is low and rocky. Very little water is between the island and the channel and it practically bares at low water.

Flint Rocks, westward of the junction of East and West Branches, are marked by a light.

Anchorage.—A vessel of less than 10-foot draft can anchor just westward of the line of the Stamford Harbor Range Lights, with Highwater Rock bearing 259° distant 350 yards, in 13 feet. Deeper-draft vessels should anchor more to the southward in depths of 16 feet. Small craft can anchor off the yacht club and southward or southeastward of **Rhode Island Rocks** buoy where the depths are 5 to 7 feet. All the anchorages in the outer harbor are exposed to southerly and southwesterly winds. Local yachts are not permitted to anchor in 18-foot anchorage which the harbor master reserves for strangers and deeper-draft vessels.

The **harbor master** has charge of the berthing and anchoring of vessels. No dumping in the harbor is allowed.

Directions, from eastward.—Passing 0.5 mile or more southward of Norwalk Islands a **245°** course will lead southward of The Cows lighted bell buoy off Shippan Point. Passing 100 yards westward of the buoy a **323°** course will lead westward of the buoys on the east side of the entrance.

From westward.—Passing southward of Execution Rocks Light, a **048°** course will lead to the entrance. Or passing 300 yards southward of Woolsey Reef Buoy 34 off Greenwich Point, a **051°** course will lead southward of the gong buoy off Stamford Harbor Light.

To enter.—Passing east-southeastward of Stamford Harbor Light, about midway between the channel buoys at the entrance, the course up the harbor is **358°** with Stamford Harbor Range Lights in line ahead. The range favors the west side of the channel and does not show plainly until eastward of Stamford Harbor Light.

East Branch.—Pass 70 feet eastward of Stamford Harbor Range Front Light and steer for Stamford Harbor Light 3. When about 200 yards below this light and abreast **Ware Island,** steer to pass 50 feet eastward of Light 3. Then steer in mid-channel, and pass 65 feet westward of Stamford Harbor Light 2 and continue in mid-channel.

Caution is advised when making the turn abreast Ware Island to avoid a rock eastward of the channel line. This rock is nearly awash at high water and although outside of the channel limits it might be hit if the turn is made too soon. The west side of the channel should be favored in this vicinity.

West Branch.—Pass 75 feet southwestward of the horizontal-banded buoy southward of Stamford Harbor Range Front Light and steer for the north end of the wall at **Cook Point,** and then steer mid-channel courses passing eastward of the buoys at a distance of about 50 feet. Pass at a distance of 80 feet off the wharves on the east bank abreast White Rock, and follow the wharves at this distance until 400 feet above the rock.

Tides.—The range of the tide is about 7¼ feet.

Currents.—Currents in the harbor have little velocity and usually set fair with the channel.

Ice.—The channel in the East Branch is usually navigable throughout the year. In the West Branch the channel is closed by ice for about 6 weeks in most years. Ice forms in the harbor each winter and extends usually as far as the light. The channels are kept open as far as practicable by passing traffic.

Prevailing winds.—Prevailing winds are from the south and southwest in the summer and from northeast to northwest during the winter season.

Storm warnings are displayed by the U. S. Weather Bureau.

Pilotage.—Pilotage is compulsory for foreign vessels drawing 9 feet or more. The harbor master acts as pilot. He is contacted by phone or through agents. Inward and outward rates are the same and apply throughout the year.

Towage.—Towing service is available at Stamford. Tugs also may be obtained from Bridgeport or from City Island, N. Y. Rates for this service are fixed by agreement at the time of charter.

Customs, Immigration, Quarantine.—Stamford is in the Bridgeport customs district, but is not a port of entry. Customs, immigration, and quarantine services are performed at Bridgeport unless special arrangements have been made with the proper officials. A harbor master is present at Stamford.

Dockage and wharfage.—Charges at wharves open to the public are determined by agreement. Charges are not published. Commercial wharves are along the East Branch. They are of the bulkhead and apron type and all are privately owned. Some are open to the public upon agreement and payment of charges. Spur tracks from the railroad serve properties on both sides of both channels.

In the West Branch section of the harbor the wharves are of the same general type as in the East Branch. All are privately owned but one is open to the public at the convenience of the owner.

Storage.—Aside from the wharves of the local coal and lumber dealers and manufactories, little area is available for storage of bulk freight. No warehouses are available for the storage of ship's cargo.

Supplies.—Gasoline, provisions, and other supplies can be had. Coal and water can be had at the wharves.

Oil bunkering.—Bunker fuel oil and Diesel oil are available in several grades in adequate quantities. No bunkering facilities are in the stream.

Repairs.—Shipyards are in both the East and West Branches with facilities for hauling out vessels. The largest railway can take vessels up to 200 feet length, 600 tons weight, and a draft of 8 feet forward, 12½ feet aft. Good facilities exist for making repairs to both wooden and steel hulls, and to boilers, dynamos, and machinery.

Communications.—Stamford has rail and bus service.

Chart 222.—Captain Harbor is on the north shore of Long Island Sound, northward of Great and Little Captain Islands and the reefs between them, affords shelter from all winds. Vessels drawing 12 feet or less use the harbor for shelter. The depths at the anchorage in the deeper part of the harbor about 0.5 mile northward of Great and Little Captain Islands are 15 to 30 feet. Vessels of less than 7-foot draft anchor on the flats. The bottom is soft, but the entire harbor and entrances are characterized by boulders, and strangers should proceed with caution, especially on the flats and other shoal

areas which are not thoroughly developed. The eastern entrance to Captain Harbor, between Flat Neck Point and Little Captain Island, is the clearer and better one for strangers. The western entrance, northwestward of Great Captain Island, is easy of access, but the broken ground in this entrance requires caution on the part of vessels using it.

Greenwich Point, 1.5 miles westward of Stamford Harbor Light, is characterized by a low grassy hill. Reefs extend 0.3 mile southeastward from Greenwich Point. **Woolsey Rock** near the easterly end of the reefs is bare at low water. A buoy southeastward of Woolsey Rock at a distance of about 200 yards marks the southeast end of the foul ground and also the eastern end of **South Reef.** A buoy is placed nearly 0.5 mile southward of Greenwich Point and marks the south end of the broken ground off the point.

Flat Neck Point, the western end of Greenwich Point, is wooded and forms the easterly side of the easterly entrance to Captain Harbor. A reef, bare and sunken rocks, extends nearly 0.3 mile southwestward and westward from Flat Neck Point, and is marked at its southwest end by a buoy. About 400 yards northwestward of the point the boiler of a wreck shows above high water.

A spot with 15 feet over it is on the northeast side of the channel nearly 0.3 mile northeastward of the daybeacon on Hen and Chickens.

Greenwich Cove opens into Captain Harbor from eastward, northward of Flat Neck Point. It is of no commercial importance and is used only by small craft. **Cove Rock,** awash at low water, and marked by a buoy, and **Finch Rock** with 2 feet over it, are in the entrance. **Inner Cove Rock,** inside the cove, is awash at low water and is marked by a buoy. The post office of **Old Greenwich,** formerly called **Sound Beach,** is on Greenwich Cove.

Cos Cob Harbor on the northeast side of Captain Harbor, has a channel depth of about 5 feet for a distance of 1 mile above the entrance to the railroad bridge at **Cos Cob** and **Riverside.** A channel 100 feet wide and a controlling depth of 3 feet has been dredged in **Mianus River** for a distance of 1,300 feet above the bridge. For a distance of 0.5 mile above the improved channel to the head of navigation at Mianus the river has a narrow, somewhat crooked channel with a least depth of about 1 foot at low water, which generally follows the edge of the marsh on the west side of the river. The deepest draft taken to the power plant below the railroad bridge is 10 feet and to **Mianus** 7 feet. Good anchorage for vessels of less than 7-foot draft is found in the channel below the yacht club.

The Riverside Yacht Club is prominent on the east side of Cos Cob Harbor 0.5 mile above the entrance. A large power plant is on the west side, with a small boatyard south of it just below the bridge.

The Federal project provides for a channel 6 feet deep, 100 feet wide from Cos Cob Harbor to Mianus, length about 1.2 miles. Work on the existing project has not begun.

The channel of Cos Cob Harbor is easily followed as far as the yacht club, the principal dangers either showing above water or being marked. Passing on either side of Hitchcock Rock buoy the channel leads between the buoy west of **Bluff Island** and the buoy off Pecks Rock; then between Diving Island and the buoy east of Saw Island; then 200 to 300 feet eastward of Goose Island; then about 200 feet westward of the buoy off Sunken Rock and the landing at the Yacht Club. Above this point the channel is narrow. It leads about 300 feet from the east bank, heading for a turn in range with

the middle of a span of the bridge until 350 yards below the bridge, and then leads for the lift opening.

The following dangers are in Cos Cob Harbor: A rock on the east side of the entrance westward of Bluff Islet is partly bare at high water and is marked to the northwestward by a buoy. A rock with 3 feet over it is 175 yards southward of it. **Salt Rock** is covered at half-tide. **Ring Rock,** 250 yards north of Bluff Island, is covered at high water. **Diving Island** is a mass of rugged bare rocks; the passage 200 yards eastward of it has a controlling depth of about 6 feet for a width of about 250 feet.

Storm warnings are displayed by day from May 30 to November 1 at the Riverside Yacht Club.

The Mianus River is crossed by a bascule railroad bridge with a horizontal clearance of 67½ feet and a vertical clearance, closed, of 20 feet at high water. The overhead wires at the bridge are 110 feet above high water.

Hitchcock Rock, awash at low water, is marked by a lighted buoy. **Pecks Rock,** bare at low water, is marked by a buoy. Rocks bare at low water and marked by two private spindles, are on the west side of the channel 100 yards southeastward of **Saw Island**; this island is marked by a house and seawall and private stone wharf. A sunken ledge is 100 yards off the east side of the point northward of **Goose Island. Sunken Rock,** about 350 yards south-southwestward of Riverside Yacht Club is covered at half-tide and marked by a buoy, and has a private spindle on it.

Newfoundland Reef is a small patch with 4 feet over it in the northeast part of Captain Harbor 600 yards southward of the outer bare rock at the entrance of Cos Cob Harbor. It is marked on the south side by a lighted buoy.

Red Rock, bare at half-tide, is 0.3 mile southeastward of Tweed Island. It is marked on its south side by a buoy.

Horse Island, marked by a stone house and a small stone wharf, is connected to the mainland by a causeway.

Tweed (Finch) Island has a seawall on its southern side and is on the south side of Indian Harbor.

Indian Harbor is a narrow inlet on the north side of Captain Harbor. A channel with a least depth of about 7 feet passes about 200 feet westward of Tweed Island on a **025°** course, and follows the west bank to the bulkhead on the west side of the cove 300 yards above the entrance. Small craft can anchor in the channel just above this point, favoring the bulkhead. A narrow, crooked channel, nearly dry at low water, leads to the head of navigation 0.8 mile above the entrance. A large prominent white residence with red roof and adjacent white clock tower is on the point separating Smith Cove and Indian Harbor.

Smith Cove is an open bight with a depth of about 4 feet in the entrance and shoaling northward. Rocks extend nearly 200 feet from the shores at the entrance. Several other rocks in the harbor are hazardous to navigation.

Depths of 6 feet or less extend 250 yards southward from the point separating Smith Cove and Greenwich Harbor. Bare ledges extend 200 feet southward of the point. Sunken rocks 100 and 250 yards southward of the point are marked by buoys. The yacht club on the end of the point usually maintains lights on a flagstaff during the summer. The depth at the landing of the Indian Harbor Yacht Club is about 3 feet at low water.

Greenwich Harbor is on the north side of Captain Harbor and northeastward of Field Point. The harbor has been improved by dredging a straight channel to the yacht club on the east point at the entrance; thence to within 500 feet of the causeway at the head, where the channel is widened to form a turning basin. This channel passes 250 feet eastward of the landing on the east side of **Round Island** and then follows the wharves. The deepest draft of vessels entering the harbor is 15 feet.

The Federal project provides for a channel 12 feet deep, 130 feet wide through the Outer Harbor, thence 12 feet deep generally 100 feet wide along the wharf front to a point 50 feet from the head of the harbor, length about 1.4 miles. Two anchorage basins 6 feet and 8 feet deep on the westerly side of the channel.

In August 1949, the least depth found in the channel was 11 feet.

Greenwich is a city on the railroad. The wharves are on the point on the east side of Greenwich Harbor. The city has a harbor master. Gasoline, water, provisions, and other supplies can be obtained.

Storm warnings are displayed by day from May 1 to October 31 from Indian Harbor Yacht Club.

A boatyard on the east side of the harbor has facilities for constructing and repairing wooden hulls and for making extensive repairs to machinery. Three railways are available, the largest of which can haul out vessels of 300 tons weight and 125 feet length. The depth is 12 feet alongside the dock at the boatyard.

A ferry operates from the town landing at the head of the harbor to Little Captain Island during the summer.

Field Point, northward of Great Captain Island Light, is occupied by private estates. About 0.3 mile northeastward of Field Point is a prominent white building with a red tile roof and six white chimneys.

Byram Harbor is a bight used only by small craft at the northwest end of Captain Harbor northward of **Calf Islands. Wilson Head,** which bares at low water, is in the middle of the entrance of the bight, and is marked by a buoy on its east side. From eastward of Wilson Head a channel 50 feet wide and 6 feet deep has been privately dredged to the head of the bight. The channel has a reported controlling depth of 3 feet. The entrance to Byram Harbor from eastward is between Otter Rocks and Bowers Island. **Otter Rocks** are covered at high water and are marked by a lighted buoy on the southwest side. They should be given a berth of 100 yards. **Bowers Island** is marked by a clump of trees, and from it a reef extends 200 yards north-northwestward, being marked at its end by a buoy. A rocky ledge makes out from the point 300 yards northwestward of Otter Rocks and is marked at its southwest end by a buoy. Entering Byram Harbor from southwestward, southward of **Huckleberry Islands,** is a narrow channel used by small craft between the northwest one of the Calf Islands and the two nearest rocks, sometimes marked by private spindles northwestward. The rocks 90 yards off the southwest end of Huckleberry Islands are bare at low water. **Little Ross Rock,** 200 yards southwest of **Shore Island,** shows 2 feet at high water. **Great Ross Rock,** 350 yards southwest of Shore Island, is a rocky islet with some grass. The ledge 350 yards southwestward of Great Ross Rock is bare at low water. **Grassy Rocks** are covered at high water. The four large ledges northwestward and westward of Grassy Rocks generally show at low water.

Jones Rocks, partly bare at high water, are at the southeast end of the foul ground which extends over 0.2 mile southeastward from the south end of Calf Islands.

Jones Rocks Light, 22 feet above water, is shown from a black skeleton tower, white tank house, black base, on rocks off Calf Islands on the north side of the channel leading into Captain Harbor from westward.

Cormorant Reef, northward of Great Captain Island, is partly bare at high water. A buoy is northwestward of the main part of the reef and close to a rock which is bare at half-tide.

Great Captain Island is 0.4 mile long, and is marked near its southeast end by Great Captain Light. A summer resort and landing are on the island. The island is fringed with reefs. A buoy is placed 600 yards southwestward of the island to mark the reef making off from that end. A rocky broken area on which the least depth found is 12 feet extends 0.4 mile westward from the island. The passage between Great and Little Captain Islands is foul and is not recommended for use by strangers without local knowledge. A channel 150 yards wide with a controlling depth of 8 feet may be used by passing midway between the islands on a course of **333°** heading for the south end of Field Point.

Great Captain Island Light, 73 feet above water and visible 14 miles, is shown from a white tower on the south gable of a granite dwelling on the southeast part of the island. The fog signal is an air diaphragm horn.

Little Captain Island is two islands connected by reefs. A summer resort and landing are on the island. Little Captain Island East Reef is an area of boulders and broken ground which extends 0.4 mile eastward and southeastward from the island. It is marked at its eastern end by a lighted bell buoy. **Hen and Chickens** is a group of rocks and boulders 600 yards northeastward of Little Captain Island and is marked by a daybeacon on **Old Hen Rock.** The daybeacon is an iron spindle surmounted by a black ball.

Tides.—The mean range of the tide is about 7¼ feet. The tidal current in the entrance between Little Captain Island and Flat Neck Point has an average velocity at strength of about ¾ knot. Between Jones Rocks and Cormorant Reef the estimated velocity is 1 knot.

Ice forms in winter in all the coves and over the greater part of Captain Harbor. It sometimes extends out of the line of Little and Great Captain Islands.

Directions, from eastward.—Passing southward of The Cows lighted bell buoy 32 off Shippan Point, steer for Great Captain Light on any bearing westward of 255° which will lead southward of Woolsey Reef buoy 34 off Greenwich Point. From a position 100 yards southward of this buoy a course of **270°** for about 1 mile will lead 250 yards southward of Flat Neck Point Shoal buoy 2. Then steer **298°** until 0.3 mile north of Old Hen Daybeacon on Hen and Chickens Reef. Or, if approaching the entrance from a southeasterly direction, steer **298°** passing eastward of Little Captain Island East Reef lighted bell buoy 1 at a distance of about 250 yards and continuing on this course until 0.3 mile north of Old Hen Daybeacon. From this position steer **250°** heading for the south end of Calf Island and select anchorage in the harbor; or enter the dredged channel into Greenwich Harbor on a course of **354°** when south of the buoy marking the channel entrance.

From westward.—A course for Great Captain Light on any bearing northward of 046° will lead clear of dangers. A **014°** course for Jones Rocks Light will lead 450 yards southeastward of **Bluefish Shoal** buoy and 350 yards southeastward of Fourfoot Rocks buoy. Proceed with caution when crossing the broken rocky area on which

the least depth found is 12 feet, extending 0.4 mile westward from the western end of Great Captain Island. Pass 100 yards southeastward of Jones Rocks Light, the same distance northwestward and over 100 yards northward of the buoy northwestward of Cormorant Reef and steer **070°** in the harbor.

Port Chester Harbor, 1 mile westward of Great Captain Island, is the entrance to Byram River which leads to the city of **Port Chester,** the town of **East Port Chester.** Port Chester Harbor is protected by a breakwater which is marked at the south end by a light. The lower section of the river forms the boundary between New York and Connecticut.

Byram River has a length of 1 mile to Mill Street Bridge, a width of 100 to 300 feet and is rocky. The Federal project provides for: A channel 12 feet deep, 150 feet wide from Long Island Sound to Fox Island; 10 feet deep, 100 feet wide from Fox Island to 900 feet below Mill Street Bridge; 3 feet deep, 175 to 100 feet wide from the latter point to 100 feet below Mill Street Bridge, length about 1.5 miles. A turning basin opposite the steamboat landing, an anchorage 12 feet deep near the breakwater.

The controlling depths in August 1949 were 11 feet to Fox Island, thence 9½ feet to the turning basin, and 5 feet in the turning basin.

Directions.—The approach to Port Chester is obstructed by rocks but is not difficult with the aid of a chart. From southward it is safer to pass eastward of Bluefish Shoal bell buoy. **Fourfoot Rocks** may be passed on either side, remembering that the buoy is at the south end of the rocks. Entering the harbor, pass westward of Great Captain Rocks, eastward of Manursing Island Reef, 150 feet southward of Port Chester Light, 75 feet eastward of Port Chester Channel Light, and 75 feet westward of the channel buoy. The channel then curves northeastward into the river. A rock covered at half-tide is on the north side of the channel just westward of the entrance to the river. The channel in Byram River is fairly well defined at low water, but requires local knowledge for the best water; strangers should take it on a rising tide and proceed with caution. Local craft entering at night use the range of Port Chester Light and Port Chester Channel Light. The range should be kept slightly open to southwestward to assure passing Fourfoot Rocks and the southwest end of Great Captain Rocks at a safe distance.

Port Chester Light, 24 feet above water, is shown from a red skeleton tower, white tank house, red square base, on the south end of the breakwater making off Byram Point.

Port Chester Channel Light, 25 feet above water, is shown from a black skeleton tower, white tank house, black base, in 7 feet on the west side of the channel.

Tide.—The mean range of the tide is 7¼ feet.

The principal items of commerce are building materials, fuel oil and petroleum products, carried in vessels of 5 to 14 feet draft. Barges drawing 12 feet discharge oil cargoes at a terminal at **Fox Island** where the depth is 14 feet alongside the wharf.

Supplies and repairs.—Gasoline, water, and other supplies can be obtained. Facilities exist for hauling out small craft up to 4-foot draft.

Channel Rock, bare at low water, is 250 yards eastward of Port Chester Light. The ground is foul between it and the light.

Manursing Island Reef, the outer part bare at low water, extends 200 yards from shore and is marked at its end by a buoy which is 200 yards southeastward of Port Chester Light.

Great Captain Rocks, 0.3 mile southeastward of Port Chester Light, are three principal rocks which are covered at high water. The southwesterly rock has a buoy on its south side. Rocks partly bare at low water extend nearly 100 yards northwestward from the buoy.

Broken ground and numerous rocks fringe the shore southwest of Great Captain Island. Summer settlements are on the south side of **Manursing Island.**

Glover Reef is marked at the southeast end by a buoy.

Transport Rock is a part of several ledges which are 0.3 mile off the south side of Manursing Island, and are partly bare at high water. Two sunken rocks southwestward of these ledges are marked by buoys; between the buoys is a channel for small craft leading to Rye Beach. A reef with 6 to 14 feet over it is 600 yards southeastward of these ledges and 0.4 to 0.6 mile southward of the south end of Manursing Island. A lighted buoy maintained from April 1 to December 15 is 200 yards south of the reef.

Playland is a recreational center at **Rye Beach.** It has two prominent twin towers at the entrance which are conspicuous from a southeasterly direction. Westward and close to the north breakwater is an excellent boat landing which is marked by lights. The landing has depths of about 12 feet at low water. A breakwater extends eastward from the south end of Rye Beach and is marked at the east end by a light. Between the boat landing and the south breakwater the area is reserved for bathing and is blocked off by a wooden boom to prevent boats entering. The seaward end of the breakwaters at Rye Beach entrance are marked by lights maintained from May 1 to September 30. Bus service to New York City and Connecticut shore points is available.

Forlies Rocks are the outer part of the partially bare rocks and ledges which extend 600 yards from shore at the south end of Rye Beach. A buoy is on the south side of Forlies Rocks.

Forbes Rocks, partly bare at low water, has a reef with depths of 4 to 11 feet extending 250 yards to the southward and eastward. A buoy marks the eastern end of the reef. A channel good for a depth of 9 feet and marked by buoys, leads southward of Forlies Rocks to the ruins of a wharf at **Oakland Beach.** Another channel with a least depth of 8 feet leads southward from Oakland Beach to the Sound, passing about 100 yards offshore and about 25 yards southward of the buoy which is 250 yards to the northeast of the north end of **Pine Island.**

Porgy Shoal, 0.5 mile east-northeastward of **Parsonage Point,** has a least found depth of 5 feet and is marked at its southeast side by a watched lighted buoy. The lighted buoy is removed from station from December 15 to April 1 of each year when endangered by ice.

Scotch Caps are three rocky islets 0.3 mile southwestward from **Milton Point.** They are on the northwest side of the extensive reefs which extend 0.9 mile in a southwesterly direction from Milton Point. The southwesterly end of the reefs is marked by a watched lighted bell buoy about 0.6 mile southwestward of Scotch Caps. The entire area of the reef northward and northeastward of the lighted buoy is very broken, and should be avoided even by small craft in the absence of local knowledge; 300 yards southwestward of the lighted buoy is an obstruction with 12 feet over it.

Milton Harbor, between **Peningo Neck** and Hen Island, is used as a summer anchorage by small pleasure craft, and is exposed only to southwesterly winds. The depth of the harbor shoals gradually from 8 feet between Scotch Caps and the southwest end of Hen Island to 6 feet abreast of Milton Point, and then decreases gradually northeast-

ward. Foul ground is on the northwest side of the harbor near **Hen Island**; otherwise the principal danger in the harbor is a rock bare at low water and marked on its southeast side by a buoy a little northward of midway between Milton Point and the northeast end of Hen Island. The best entrance is between the buoys 0.4 mile southwestward of Scotch Caps.

The yacht club maintains range lights between May 15 and September 15 to mark the entrance channel between the buoys. This range is not charted but local information may be obtained from the yacht club.

The boat landing at the yacht club near the southwest end of Milton Point has a depth of 5 feet at low water. Near the clubhouse is a prominent white flagstaff from which lights are exhibited from sunset to sunrise during the summer months.

At high water small craft can go for a considerable distance up the narrow part of **Mill Pond,** which is crossed at its lower end by two fixed highway bridges with a horizontal clearance of 26 feet and a vertical clearance of 4 feet at high water.

West Rock, southwest of Scotch Caps, is marked by a daybeacon, 2 white crossed disks on a black and white pole, which is maintained during the summer by the yacht club at Milton Point.

Mamaroneck Harbor, an open bight, is 0.7 mile west of Scotch Caps between Hen Island and Delancey Point. It is exposed to southerly winds, but affords shelter against northerly winds, the depths in the outer harbor ranging from 7 to 12 feet. The important dangers are buoyed. The rocks at Mamaroneck Harbor rise abruptly and some of them are bare at low water. Vessels should proceed with caution when inside the 5-fathom curve. After reaching **Outer Steamboat Rock,** the incinerator tower, a red brick building with a large glass tower, is quite prominent.

The Federal project provides for: A main channel 10 feet deep, 100 feet wide, from Long Island Sound to **Orienta Point,** and thence 80 feet wide to a point 150 feet below Boston Post road; and a branch channel 10 feet deep, 80 feet wide, extending 300 feet northeast of the main channel. An anchorage area 10 feet deep near the head of navigation in the East Basin. An anchorage area 6 feet deep in the West Basin with a channel of the same depth and 80 feet wide connecting this anchorage with the main channel, length about 1.8 miles. The project is 100 percent completed.

The controlling depths in August 1949 were 8½ feet from the entrance to the junction of the arms; thence 7 feet in the East Arm to its upper reach; and 6 feet in the West Arm and turning basin.

The **East Basin** cannot be recommended to strangers as an anchorage because it is usually filled with moorings of local craft. The **West Basin** has a public landing for which a nominal charge is made. The West Basin also has boat moorings.

Directions.—Approaching from eastward, pass southward and 100 yards or more westward of Scotch Caps lighted bell buoy, taking care to avoid the obstruction with 12 feet over it, 300 yards southwestward of the buoy, and steer about 321° for the western end of the large building on the eastern side of the entrance of the inner harbor, which will lead to the lighted buoy on the east edge of Outer Steamboat Rock.

Approaching from westward.—A course 018°, with Execution Rock Light astern, will lead 200 yards southeastward of the buoy off Delancey Point. Anchor according to draft southward of the line joining the buoys marking **Turkey Rock** and Outer Steamboat Rock.

From Larchmont pass 100 yards southward of the breakwater, steer 062° to a posi-

tion 200 yards eastward of the southern buoy off Delancey Point and then steer **018°** and select anchorage according to draft. The approach channels to East and West Basins are well marked by buoys and no particular difficulties should be encountered.

The mean range of tide is about 7¼ feet.

The harbor master can usually be found at the float landing on the west side of the channel just north of **Harbor Island.** Harbor regulations have been established and copies can be had from him. A **speed** limit of 4 miles per hour is enforced within the limits of the inner harbor and channels.

Storm warnings are displayed night and day at Harbor Island Beach.

Supplies of all kinds are available at **Mamaroneck.**

Repairs.—A boatyard in the approach to West Basin can haul out vessels of 50 tons weight, 60 feet length, and 6½ feet draft. Repairs to hull and machinery and boat storage are available. Gasoline and fresh water can be had at the boatyard wharf which has a depth of 6 feet.

The water-borne commerce consists of building materials, coal, and petroleum products which are carried in vessels with 6- to 12-foot draft. Mamaroneck has rail and bus communication.

Black Tom shows above water. A rock southwestward of it bares at low water. The large ledge which extends toward Black Tom from **Delancey Point** shows above water; a small boat landing is inside the ledge. A rock with 9 feet over it is about 0.3 mile eastward of Delancey Point, and is marked by a buoy. Delancey Point is marked on its south side by an observation pier. A reef extends 0.3 mile southward from the pier and is marked at its south end by a buoy. A rock with 12 feet over it is about 100 yards west of the buoy.

A breakwater which shows at high water extends 1,410 feet south-southeastward from **Edgewater Point,** on the eastern side of the entrance of Larchmont Harbor.

Larchmont Harbor Light, 26 feet high, is shown from a red skeleton tower, white tank house, red square base, on the south end of breakwater making off Edgewater Point. The passage between the north end of the breakwater and the point is blocked by rocks, which are bare at low water. A rock with 9 feet over it is about 300 yards northeastward of the light.

Larchmont Harbor is between Edgewater Point and **Umbrella Point** and northward of Execution Rocks Light. The harbor is the headquarters of the Larchmont Yacht Club. The depths at the anchorage range from about 12 feet in the entrance to 6 feet near **Great Knob (Rock Island)** which is in the north central part of the harbor. In summer the harbor is full of mooring buoys for small yachts. The rocks on the west side are marked, while unmarked shoals extend 200 yards from the eastern shore. The anchorage for larger vessels is westward of the breakwater.

The private lights in Larchmont Harbor are maintained by the yacht club from May 10 to September 10 of each year. **Umbrella Rock,** marked by a black spindle and green light, is 250 yards eastward of Umbrella Point and may be passed on either side. A few rocks of a breakwater which was started on Umbrella Rock are awash at high water. Umbrella Rock is marked on the south side by a buoy.

North Ledge is near the western shore southeastward of the yacht club. The south end is bare at half-tide, and is marked by a red spindle with round target and red light. The north end is bare at low water, and is marked by a black spindle with a round

target and green light. The principal landing which has a depth of 4 feet is on the southeast side of the yacht club and lighted until midnight.

South Ledge, near the western shore, is unmarked; the north end of the ledge is bare at half-tide and the south end is bare at low water.

The back landing northward of the yacht club is no longer lighted. A spindle with a black disc target marks the northeast side of a ledge just southward of the landing. A light is exhibited from the yacht club flagpole from June 1 to October 1.

The entrance to Larchmont Harbor is on either side of Hen and Chickens. The easterly entrance is about 300 yards wide, with a depth of about 18 feet between the 15-foot spot 100 yards south-southeastward of the end of the breakwater and the unmarked rocky spots off the northeast end of Hen and Chickens.

Hen and Chickens, a reef bare at low water in places near the middle, is off the entrance to Larchmont Harbor. The area with depths less than 18 feet is marked by four buoys.

Dauntless Rock, with a depth of 8 feet, is marked by a buoy, and other rocky spots with 14 to 15 feet are off the northeast end of Hen and Chickens and extend 300 yards northward from the lighted buoy and the same distance eastward from the buoy at the north end of the reef.

Three rocks with 13 to 16 feet over them are north and east of the buoy at the south end of Hen and Chickens.

Directions.—From eastward, passing 300 yards southward of Scotch Caps lighted bell buoy, a **253°** course will lead the same distance southward of Larchmont Harbor Light on the end of the breakwater, and will lead about 200 yards south of obstruction with 12 feet over it, about 300 yards southwestward of Scotch Caps lighted bell buoy and about 100 yards south of the rock, with 15 feet over it, which is 0.7 mile eastward of Larchmont Harbor Light. From southwestward, passing southeastward of the bell buoy off the south end of Hart Island, a **023°** course will lead westward of the buoys marking Execution Rocks and eastward of the buoy marking the south end of Hen and Chickens and eastward of the rock with 13 feet over it, 450 yards eastward of this buoy. In the westerly entrance of Larchmont Harbor, northwestward of Hen and Chickens, the dangers are buoyed and the entrance is easy of access.

Horseshoe Harbor is a small cove just westward of Larchmont Harbor. A prominent gray building is at the head. The cove is used as a small boat anchorage. The deeper water in the entrance favors the eastern side; the northwest side of the cove is bare at low water. A rock, bare at low water and marked by a private spindle with can, is 60 yards off the south side of the point on the west side at the entrance.

Premium Point, marked by a prominent residence, is on the northeast side at the entrance of Echo Bay. **Spindle Rock**, 100 yards southwestward of Premium Point, is covered at high water and is marked at its southwest end by a buoy. The passage between Spindle Rock and Premium Point is practically blocked by rocks. A rock bare at low water is at the northeast end of Spindle Rock.

Between Umbrella Point and Premium Point, a reef with depths of 2 to 12 feet, extends 0.3 mile from shore and is marked by a buoy.

Hicks Ledge, about 0.4 mile southeasterly of Premium Point, has a depth of 6 feet over it and is marked on both the east side and the west side by buoys.

Bailey Rock, bare at half-tide, is near the end of a reef which extends about 200 yards off the point of **Davenport Neck**, on the southwest side at the entrance of Echo

Bay. The rock is marked off its eastern side by a buoy lighted from April 1 to November 15.

Echo Bay is a small bay 2 miles northwestward of Execution Rocks Light. The entrance is between Spindle Rock and Bailey Rock. The bay is an anchorage for small craft and is generally fully occupied during the summer. The depths range from 4 to 15 feet and small craft can anchor in the shallow cove on the northeast side of the harbor, entering between **Harrison Island** and the rocky, grassy islet off the northwest side of **Echo Island.** Vessels frequently anchor between the entrance of Echo Bay and Hicks Ledge, in depths of 20 to 24 feet. Vessels should not anchor near the sewer outlet in the middle of the bay. The outlet is about 1 mile in length extending from the mud flats opposite Beaufort Point to the buoy northward of Middle Ground. On the northwest side of Echo Bay a dredged channel 100 feet wide and 9 feet deep, marked by buoys, leads to the wharf at Beaufort Point and to a turning basin.

Northward from the turning basin the area is shoal and extensive mud flats bare at low water. Southwesterly of the turning basin the depths vary from 9 feet to 2 feet at the head of navigation.

The Federal project provides for: A channel 10 feet deep, 100 feet wide from the 10-foot contour in Echo Bay to the city wharf at Beaufort Point, length about 0.3 mile. A turning basin 10 feet deep at the inner extremity of the channel.

In August 1949 the controlling depth in the entrance channel and turning basin was 9 feet, except for an 8-foot shoal on the south side of the basin.

New Rochelle is a town on the western shore of Echo Bay. **Storm warnings** are displayed by day only from May 1 to Nov. 1 at Hugenot Yacht Club, and from June 1 to Oct. 31 at New Rochelle Yacht Club, and from Municipal Boat Club.

A masonry wharf forming the northeast side of **Beaufort Point** is municipally controlled and affords about 130 feet of berthing space. The city maintains a police patrol boat which usually docks at this wharf called the town dock. Gasoline, water, and other supplies can be had.

Several marine railways are available; the largest is capable of hauling out boats of 40 tons weight, 60 feet length, 4 feet forward and 6 feet aft draft.

The principal items of commerce are sand, gravel, and petroleum products which are carried in vessels of 6 to 8 feet draft.

On the point midway between Beaufort Point and **Duck Point** is a prominent flagstaff which shows a private green light maintained by the city during the summer. This light, on range with the lighted buoy at Bailey Rock, leads between Hicks Ledge and Middle Ground into Echo Bay.

Pine Island is rocky and covered with brush and occupied by two houses. A small private landing is on the west side of the island. Two bare rocks are 200 yards southwestward of Pine Island. Southwestward of the rocks is a long bare ledge, the southwest end of which is marked by two private spindles. Southward of these spindles are two rocks marked by private spindles and cages; the southwesterly rock is bare at low water and the easterly one bare at half-tide. Between these rocks and the spindle northward is a channel used by small craft between Echo Bay and Glen Island. A buoy marks the south end of the reef making out from these rocks and a clear channel is between this buoy and the buoy northward of Davids Island.

Middle Ground is a large boulder reef near the middle of which a few boulders show at high water. The north end of the reef is marked by a buoy. **Emerald Rock,** off the

western end of Middle Ground, is marked by a buoy. Detached submerged rocks are off the south end of Middle Ground and are marked at the south end by a lighted buoy which is 200 yards northward of Huckleberry Island.

Chart 223.—Davids Island is occupied by buildings of **Fort Slocum** and is a U. S. Government reservation. The high square red brick chimney on the south end of the island is prominent in the western end of the sound. The principal landings at the western end of the island have a depth of 12 feet at the ends, but the approaches have rocks with 8 feet over them. Reefs partly bare at low water and marked at the north end by a lighted buoy extend 350 yards northward of Davids Island.

Davids Island is surrounded on its east and south sides by a foul area of islands and rocks, the passages between which should not be used by strangers, even in small craft. **Huckleberry Island,** at the eastern end of the group, is wooded. **Pea Island** is grass covered and rocks bare at low water are southeastward of Pea Island. **Columbia Island** (**Little Pea Island**) has been improved by a seawall, making it about 150 feet square, with a pier the same length on one side. A broadcasting station with a transmission tower 410 feet high on a white stucco building is in the center of the island.

Middle Reef, 0.5 mile southward of Davids Island, has some boulders which show at high water. **Lower Green Flats,** between Columbia Island and Middle Reef, is a boulder patch marked by a buoy on its east side. The channel between these reefs should not be attempted without local knowledge.

East and **South Nonations** are rocks bare at half-tide between Middle Reef and Hoot Island. South Nonations is marked on its south side by a lighted bell buoy.

New Rochelle Harbor is a narrow channel between Davenport Neck, Glen Island, and the mainland; it is off the southerly part of the town of New Rochelle. It has been improved by dredging.

The Federal project provides for a channel 8 feet deep, 120 feet wide from deep water between Glen Island and Davenport Neck to 300 feet below the dam near Leland Avenue, New Rochelle, length about 0.6 mile. The controlling depths were 9 feet to within 275 yards of the head of the project, thence 6 feet to the head of project, in August 1949.

The water terminals are located mainly along the west shore of this improvement.

Anchorage is not recommended in the harbor because of congestion. The majority of vessels using the harbor draw from 6 to 8 feet.

Special anchorage areas wherein vessels not more than 65 feet in length, when at anchor, shall not be required to carry or exhibit anchor lights are defined in Chapter 2, § 202.60 (a) (b).

The approach to New Rochelle Harbor from northeastward is between Middle Ground and Pine Island. The easterly approach is between Huckleberry Island and the lighted buoy 200 yards northward, then between the buoy northward of Davids Island and the buoy marking the southwesterly rock northeastward, then about 100 feet north of Spindle Rock buoy and the same distance southward of Harbor Rock buoy, and then midway between the wharf ruins at the southwest end of Davenport Neck and the northeast point of Glen Island. **Spindle Rock,** bare at quarter tide, is marked on its north, south, and west sides by a buoy. A rock with 6 feet over it is midway between Spindle Rock and the bare rock northeastward of Aunt Phebe Rock.

The approach to New Rochelle Harbor from southwestward is through City Island

Harbor, passing eastward of Rat Island and the buoy marking the rocks eastward of Chimney Sweeps; the channel then leads westward of Machaux Rock lighted bell buoy, then between Davids Island and Goose Rock, and then between Aunt Phebe Rock Light and Corning Rock buoy. A clear channel is between the lighted bell buoy marking South Nonations and the reef extending northward from the north end of Hart Island.

A Government ferry operates between Neptune Island and Fort Slocum on Davids Island throughout the year. Railroad and bus lines connect with New York.

Aunt Phebe Rock, bare at half-tide, is marked by a light and fog bell. The channel is westward of the light and is marked on its west side by **Corning Rock** buoy which is midway between the light and the wall surrounding Goose Island. Southeastward of Corning Rock buoy the channel is but little over 200 feet wide, between the buoy and a reef, bare at low water, making off from Davids Island.

Goose Island is between Davids Island and Glen Island. Westward and southward of Goose Island are several bare rocks. A rock breakwater nearly surrounds Goose Island.

R. R. Stevens Rock, awash at low water, is about 350 yards southward of Goose Island and is marked by a buoy.

Glen Island is a public park used as a pleasure resort. A beach protected by two jetties is on the southeast end of the island. The channel on the northwest side of Glen Island is much used as an anchorage by small craft, particularly those bound to the club on **Travers Island.** The channel had a controlling depth of 7 feet in August 1949. A bascule bridge connects Glen Island with Neptune Island. The horizontal clearance is 59 feet and a vertical clearance, closed, is 13 feet at high water.

A yacht club is on the east side of **Neptune Island** just south of the bascule bridge. **Storm warnings** are displayed at this club from May 1 to November 1.

Adjoining the yacht club is a boat repair yard with marine railway which can haul out boats of 45-foot length, 14-foot beam, and 8-foot draft. All engine and hull repairs can be made. Diesel oil, gasoline, lubricants, ice, water, and some hardware can be had. A boatyard with marine railway on the east side of Travers Island was inactive in August 1949.

Machaux Rock is bare at low water and marked on its southwest side by a lighted bell buoy nearly 300 yards southwestward of it. An unmarked rock covered at half-tide is about midway between Machaux Rock and the south end of Davids Islands.

Twin Island is connected to **Hunter Island** by a causeway.

An islet with a few trees and two bare rocks are 200 and 400 yards respectively northeastward of Twin Island. Rocks bare at low water extend about 80 yards southward of Twin Island. Two bare boulders are 70 yards off the southwest end of Twin Island. Southward of the boulders about 175 yards is a rock bare at half-tide. A channel with a controlling depth of 5 feet in August 1949 has been dredged from the vicinity of the south end of Glen Island through the shallow water on the west side of Hunter Island to a basin which has controlling depths of 10 to 15 feet.

Orchard Beach, a park developed by the State of New York, is on the filled-in area between Hunter Island and **Rodman Neck.** The inshore water areas westward of the buoy northwest of Chimney Sweeps are fouled by many rocks awash at various stages of the tide and should not be used without local knowledge. A bathing pavilion and flagstaff are prominent landmarks.

Chimney Sweeps, two prominent bare rocks, with a small yellow house on the inshore one, are 300 yards northeastward of High Island; the passage between the island and the rocks should be used with caution. A rock, bare at low water, is 50 yards southward of the southeasterly rock, and another lies close to its north side. Rocks with 5 to 6 feet over them are 275 yards east-northeastward of the Chimney Sweeps, and are marked on the northeast side by a buoy.

High Island is wooded and is 200 yards northeastward of the north end of City Island to which it is connected by a fixed footbridge with a horizontal clearance of 33 feet and a vertical clearance of 11 feet at high water. Foul ground is between the islands.

Rat Island is a high bare rock 600 yards off the easterly side of City Island and the same distance south-southeastward of High Island. **Green Flats** is a boulder reef, the higher parts awash at high water, which extends 350 yards northeastward and westward from Rat Island. **The Blauzes,** partly bare at high water, are a part of the reef which extends 600 yards northwestward from the north end of Hart Island.

Rocks awash at low water are off the north end of Hart Island and are marked by a buoy. A rock with a depth of 18 feet is nearly in mid-channel between this buoy and the lighted bell buoy at the southwest end of South Nonations. A shoal area extends about 200 yards eastward of the east side of the island, and is marked by a gong buoy.

Hart Island, nearly 1 mile long, is occupied by prison buildings of New York City. A high buff brick chimney is near the middle of the southeast side of the island. A square white monument in the north part of the island is prominent. A reef extends about 200 yards southeastward from the south end of the island. Hart Island Light, 39 feet above water and visible 8 miles, is shown from a skeleton tower, white tank house, red concrete base, in 13 feet, off the south point of the island. The fog signal is an electric bell.

Caution is advised to avoid the 9-foot obstruction and the wreck with 13 feet over it which are 550 yards and 650 yards, respectively, westward of Hart Island Light.

The channel between City Island and Rodman Neck is used extensively as an anchorage by small pleasure craft during the summer. Boat clubs and railways for small craft are on the northwest side of City Island. The shores are generally fringed with boulders and should be approached with caution. The north shores of High Island and City Island northeastward of the bridge are very foul, and boats should avoid the shoals with depths less than 12 feet on that side.

The bridge joining the north end of City Island to Rodman Neck is a center pier draw, with horizontal clearances of 53 feet and a vertical clearance of 12 feet, closed, at high water. Advance notice of 24 hours' is needed to open this bridge. Currents at the bridge are variable and exceed 1½ knots at times. See *Current Tables*.

City Island Harbor, also called **Hart Island Roads,** is between Hart Island and City Island. It is well sheltered from easterly and westerly winds and is an important anchorage for coasting vessels in the western end of Long Island Sound. Besides serving as a harbor of refuge, it is often used by vessels desiring pilots or towboats, or awaiting orders. A spire and cupola in the center of City Island and a steeple in the northerly part of the island are conspicuous objects.

City Island, on the northeast side of Eastchester Bay, is narrow and over 1 mile in length. It is thickly settled and has a commercialized appearance. The west side is residential and has many summer homes. The east side is industrialized with several shipyards and establishments connected with marine activities.

Anchorages.—The usual anchorage for deep-draft vessels is southeastward of City Island, southward of a line joining the south ends of Hart and City Islands. When anchoring, avoid **Deep Reef** which is a small rocky patch with about 25 feet over it and 40 to 73 feet around it, 450 yards eastward of the end of the wharf at the south end of City Island. The marks for this spot are the northern wharf on the east end of City Island in range with the little hut on High Island, and the sea wall at the south end of City Island in range with a dark church spire in Westchester. Vessels of less than 14 feet in draft anchor anywhere southward of a line drawn from the north end of Hart Island to Town Dock on City Island except as noted below. See Chapter 2, § 202.155 (a).

Town Dock is the large wharf 0.6 mile above **Belden Point,** the south end of City Island. Submarine water pipes and cables cross from just above Town Dock, City Island, to the wharf on Hart Island, a little over 0.4 mile above its south end; vessels should be careful not to anchor in that locality. The western shore of Hart Island and the wharves on City Island should be given a clearance of about 150 yards.

Tides.—The mean range of the tide is about 7¼ feet.

Currents.—The tidal current has an average velocity at strength of about ½ knot.

Ice.—In the winter drift ice sometimes interferes with navigation to the extent that sailing vessels are obliged to take a towboat.

Pilotage.—City Island is one of the headquarters for East River (Hell Gate) and Sound pilots. A reporting station, maintained and operated by the pilots, is at the south end of City Island from which passing vessels are reported at Maritime Exchange, New York City, and to the Associated Press.

Supplies.—Diesel oil, gasoline, coal, and supplies of all kinds are available at City Island. Water is piped to some of the wharves and can be obtained from towboats and water boats. Connections for electricity are available.

Repairs to vessels and machinery of steamers can be made at City Island. The largest railway has a capacity for vessels of 500 tons weight, 225 feet length, and draft of 12 feet forward, 17 feet aft. Facilities exist for the building and storage of yachts.

Markers for a **measured statute mile,** 5,280 feet, are established with one extremity just west of Belden Point wharf on City Island and the other extremity on Hart Island near the light. Course 055½°.

Communication.—Buses serve the subway system of New York City. A municipal ferry operates to Hart Island throughout the year.

Eastchester Bay, between City Island and Throgs Neck, has general depths of 7 to 10 feet. The shores of the bay are fringed with boulders, and together with many shoals, it should be approached with caution. In addition, scattered boulders in the bay make it advisable to proceed with caution, expecially where the depth is not more than 3 feet greater than the draft.

At the head of the bay is a buoyed channel which follows the eastern shore to the mouth of the **Hutchinson River** (**Eastchester Creek**).

The Federal project provides for a channel 8 feet deep and generally 150 feet wide from Long Island Sound to 700 feet below Boston Post Road Bridge, and thence 8 feet deep, 70 feet wide to 300 feet above Fulton Avenue Bridge, length about 4.7 miles; a passing basin below Boston Post Road Bridge.

The controlling depth in August 1949 was 8 feet from Long Island Sound to the upper limit of the project at Fulton Avenue Bridge except for a 7-foot shoal at the mouth

of Mill Creek. In the side channel west of the Boston Post Road Bridge the depths were 3 to 8 feet.

Special anchorage areas, wherein vessels of not more than 65 feet in length will not be required to exhibit anchor lights, have been established in Eastchester Bay as follows: Eastchester Bay, west of City Island, see Chapter 2, § 202.1, § 202.60 (c). Eastchester Bay, along west shore, see Chapter 2, § 202.1, § 202.60 (d). Eastchester Bay, Locust Point Harbor, see Chapter 2, § 202.1, § 202.60 (e).

Bridges.—Hutchinson River is crossed by the following bridges:

The Pelham Parkway Bridge is a bascule bridge with a maximum horizontal clearance of 59½ feet and a horizontal clearance of 49 feet between ends of bascule leaves in open position; a maximum vertical clearance of 20 feet at center of span, and a minimum clearance of 13 feet, closed, at high water.

The railroad bridge, 700 feet above Pelham Bridge, is a rolling lift bridge with a horizontal clearance of 68 feet and a vertical clearance of 8½ feet, closed, at high water.

The Hutchinson River Parkway extension bridge, 0.9 mile above the mouth, is a bascule bridge with a horizontal clearance of 125 feet and a maximum vertical clearance of 35 feet at center of span and a minimum clearance of 31 feet, closed, at high water.

The Boston Post Road Bridge, 2.5 miles above the mouth, is a bascule bridge with a maximum horizontal clearance of 104½ feet and a minimum horizontal clearance of 95 feet between the ends of the bascule leaves in an open position, and a maximum vertical clearance of 12½ feet at the center of the span and a minimum vertical clearance of 5½ feet closed at high water.

Mount Vernon and Pelham Manor pipe bridge, 2.8 miles above the mouth, is a fixed gas main support with a horizontal clearance of full channel width and a vertical clearance of 130 feet at high water.

The Fulton Avenue Bridge, 2.9 miles above the mouth, is a bascule bridge with maximum horizontal clearance of 78½ feet and a minimum horizontal clearance of 25½ feet between ends of bascule leaves in open position, and a vertical clearance, closed, of 5½ feet at high water.

The bridge regulations are covered in Chapter 2, § 203.155.

Eastchester, on the west bank, has some trade in building materials, coal, fuel oil, and petroleum products, carried in vessels and barges of 5- to 12-foot draft. **Pelham** is on the east bank of the river.

Big Tom, bare at low water, and marked by a lighted buoy on its south side, is 600 yards 247° from the south end of City Island. Other rocks around it show at extreme low tides. The rock should be given a berth of over 200 yards. Boulders with a least depth of 2 feet are 130 yards, 085° from Big Tom. A buoy marks the easterly and westerly extensions of this reef.

Cuban Ledge is covered at half-tide and is marked by a lighted buoy on the southwest side. The entrance channel through Eastchester Bay passes close to the northeast side and the buoys marking the channel may be used as a guide for passing the ledge.

A yacht club is on the northwest shore of the bight into which **Weir Creek** discharges. A ledge of rocks 300 yards northeast of the clubhouse is marked by a buoy. Boats should not anchor close to this buoy.

Southwestward of **Locust Point** is a small cove; the entrance is marked by private daybeacons. Rocks which bare at low water are on the north side of the approach.

The entrance has a depth of about 12 feet. Within the cove depths range from 22 feet at the south end to about 9 feet at the north end. A small boatyard at the head of the cove can haul out boats up to length of 45 feet, draft of 3 feet, and weight of 7 tons. Light repairs and facilities for storage are available. Gasoline can be had at the wharf which has a reported depth of 9 feet. A limited amount of supplies are available.

The mean range of the tide is about 7 feet. Tidal currents have an average velocity at strength of ½ knot in the vicinity of Big Tom and 1½ knots at Pelham Bridge.

Chart 1213.—Old Field Point is a low bluff on the summit of which is a light and an abandoned light tower. Boulders extend a short distance off the point and the light should be given a berth of about 0.3 mile, even by small craft. A gong buoy is 0.6 mile northward of the point. Depths of 14 to 18 feet are found about 0.4 mile northward of the light.

Old Field Point Light, 74 feet above water and visible 14 miles, is shown from a black skeleton tower, white tank house at base, on the point. The abandoned tower attached to a dwelling is southward of the light.

Crane Neck Point, 2 miles westward of Old Field Point, is a bare conspicuous bluff about 90 feet high and is covered on the top with brush. Trees extend a little way back from the bluff.

Smithtown Bay is a broad open bight on the south side of the Sound and extends 7 miles westward from Crane Neck Point. Rocky shoals extend 1 mile in places from the shore, the water shoaling abruptly from 51 feet in places. A good summer anchorage in 30 to 50 feet sheltered from easterly winds is found about 1 mile southward of Crane Neck Point.

Stony Brook Harbor is a shallow bay in the southeastern part of Smithtown Bay. The channel is over a bar which extends 0.8 mile off the entrance; it has a least depth of about 3 feet just outside the entrance.

On the east side of the harbor 0.5 mile inside the entrance is a steel bulkhead wharf at the village of **Stony Brook.** The railroad station is about 1 mile from the wharf. Only small craft enter the harbor; the greatest draft is about 6 feet at high water. Caution is necessary when approaching the entrance. The water shoals abruptly from about 51 feet to about 20 feet in the vicinity of the buoy, 0.7 mile off the entrance, and to depths of about 6 feet immediately inshore from it.

In 1949 the channel was about 300 yards eastward of the buoy and during the summer it is marked by aids and daybeacons which are privately maintained from May 30 to October 1. When the buoys are in place, run on either side favoring the east shore. From the buoy the channel trends east-southeastward for 0.3 mile, and then curves gradually southward to the west side of the spit on the east side of the entrance. The channel then leads notheastward of the first islet, passes close to the east side of the northeast end of the islet, and then follows the east bank to the wharf. It is advisable to enter only on a rising tide.

The harbor is not recommended to strangers without local knowledge of the currents and many shoals. The estimated velocity of the tidal currents in the narrowest part of the entrance is about 5 knots. The depth is about 2½ feet alongside the bulkhead at the landing. Southwestward of the landing is a yacht club with depths of about 3 feet at the end of the wharf in the mooring basin. Gasoline, lubricants, and fresh

water are available at the yacht club and a limited amount of small-boat supplies may be had at the village of Stony Brook.

A high bluff is between Stony Brook Harbor and Nissequogue River, another between Nissequogue River and **Sunken Meadow Creek,** and bluffs in places between Sunken Meadow Creek and Northport Bay.

Nissequogue River is a shallow crooked stream whose mouth is about 4 miles westward of Stony Brook. Rocks and shoals, bare at low water, are on the bar outside the entrance, through which is a narrow channel with a depth of about 1 foot at low water. About 0.5 mile southwestward of the mouth of the river is a State Hospital, a prominent group of buildings with green roofs and two large red brick chimneys. Farther westward is a standpipe. The railroad station is **Kings Park.**

Chart 224.—About 10.5 miles westward of Old Field Point Light a small bight has been formed by gravel dredges working into the high bank. At the east side of the entrance to the bight is a stone jetty about 350 yards long, marked at the seaward end by a light. The gravel company maintains a lighted range at the west entrance to the bight. Reported depths in the bight are 25 feet. The bight can be used as a refuge in emergencies.

Eatons Neck is a prominent, wooded headland with elevations of 100 feet or more, and marked at its north end by a light and tower of a lifeboat station. The lookout tower is a prominent feature.

Eatons Neck Light, 144 feet above water and visible 18 miles, is shown from a white stone tower attached to a dwelling on the east side of the entrance to Huntington Bay. The fog signal is an air siren.

The northwest end of the neck is a spit in the form of a hook. The hook and submerged spit extending from it enclose a harbor adjacent to the neck. The harbor is entered through a dredged cut between two small riprap jetties about 0.5 mile southwestward of the light. The jetties are covered at half-tide. The channel between jetties is buoyed. The channel had a controlling depth of 11½ feet in August 1949. Great care should be taken in entering as the channel is very narrow. The depths in the harbor range from 9½ to 19 feet.

A general shoal area, consisting of three sections separated by channels, extends northward from Eatons Neck for a distance of 2.6 miles. For a distance of 0.3 mile from shore the area is foul with boulders and of little depth. Beyond this area the bottom is broken by a series of rocky ridges extending in a northerly direction with a least depth of 7 feet 0.7 mile northward from the light. The general depth over these ridges ranges from 10 to 15 feet, and their northerly limit is marked by a buoy 1 mile northward of the light. A rocky patch with 16 to 24 feet over it is 1.5 to 1.8 miles north-northwestward of the light; the 16-foot spot is marked by a horizontal-banded buoy. The outer part of the general shoal is a rocky ridge, about 1 mile in length, and is marked at its northern end by a lighted bell buoy 2.8 miles northward of Eatons Neck Light. This ridge has a least depth of 16 feet 300 yards south of the buoy.

Huntington Bay, on the south shore of Long Island Sound just westward of Eatons Neck, is an excellent anchorage for large vessels, protected against all but northerly winds. The bay is about 2.5 miles long in a southerly direction and 1 mile wide abreast West Beach. The depths in the bay range from 25 to 36 feet until 1.5 miles from its southern end, and anchorage can be selected according to draft and direction of wind.

An obstruction with 23 feet over it is about 0.8 mile southwestward of Eatons Neck Light. Farther in are depths of 20 feet or less in places as shown on the chart. The 18-foot curve extends 0.3 mile from the east shore, 0.4 mile from the west shore, and 0.8 mile from the south shore. Anchorage with shelter from northwesterly winds can be had for small vessels at the southwesterly end of Huntington Bay, 0.4 mile northeastward of Lloyd Harbor Light and the same distance eastward of the abandoned tower on East Beach in 18 to 36 feet. The arms of the bay are secure harbors, Northport Bay being generally used by larger vessels.

Lloyd Harbor Light, 42 feet above water, is shown from a square, concrete tower attached to dwelling on rectangular pier, at the south side of entrance to Lloyd Harbor and west side of entrance to Huntington Harbor. The fog signal is an electric bell.

To reach Huntington Bay from eastward after rounding or passing between the shoals northward and northwestward of Eatons Neck, shape a course of about **181°**, favoring the eastern shore, but giving it a berth of over 0.3 mile. From the Sound, a **169°** course, with Greens Ledge Light astern, will lead into Huntington Bay.

From westward, after passing 0.3 mile northward of the lighted bell buoy off Lloyd Point, a **116°** course will lead to the entrance, giving the shore a berth of 0.7 mile. When Lloyd Harbor Light bears 196°, a **170°** course will lead into the middle of the bay.

Tides.—The mean range of the tide is about 7¼ feet.

Currents.—In Huntington Bay the average velocity of the tidal current at strength is about ½ knot off East Fort Point and 1½ knots in the entrance to Northport Bay. See *Current Tables* for predictions.

West Beach, which extends more than halfway across the entrance of Northport Bay, was formerly occupied by the large plant of a sand and gravel company. The dredged channel extending from southward into the beach is no longer maintained.

Duck Island Harbor is a shallow cove on the north side of Northport Bay westward of **Duck Island Bluff.** The depths range from 7 to 9 feet in the entrance to 1 to 2 feet in the upper part of the harbor. A spit, with 4 feet on its outer part, extends east-southeastward nearly across the entrance from **Winkle Point.** The south side of Duck Island Bluff should be given a berth of about 300 yards to avoid shoal water and inshore rocks which extend southward from it.

Northport Bay is a large bay opening from the southeast end of Huntington Bay. The western part of Northport Bay has a good anchorage in 20 to 48 feet, and the eastern part in 8 to 11 feet. A shoal spot with 13 feet over it, and an obstruction with 11 feet over it, are 400 yards northwestward and 750 yards north-northwestward, respectively, from the lighted buoy marking the entrance from Huntington Bay. This entrance is through a narrow buoyed channel having a controlling depth of 17 feet in August 1949. The course through the middle of the narrow entrance to Northport Bay is **068°**.

Caution is advised for vessels drawing 10 feet or more to avoid the 12-foot curve on the south side of this channel when 250 yards northeastward of the southern entrance point.

From Northport Harbor lighted buoy 7, a **051°** course will lead northward of Northport Harbor lighted buoy 8, which marks the shoal extending 0.4 mile northward from **Little Neck Point.**

A sodium light, yellow orange in color, maintained at the public landing by the town of Northport, is a conspicuous mark at night for vessels going to the wharves at Northport. After rounding Northport Harbor lighted buoy 8, a course of **137°** head-

ing for the sodium light will lead through the best water, which in August 1949 had a least depth of 7 feet at mean low water.

Asharoken Beach, at the northeast end of Northport Bay, is a summer resort. Many private boat landings, with a depth of about 3 feet, are at the beach.

On the north side of **Bluff Point** is an extensive gravel pit which is conspicuous from a northwesterly direction.

Northport Harbor, at the southeast end of Northport Bay, in August 1949 had a depth of 10 feet in the entrance, shoaling gradually to between 6 and 8 feet abreast the wharves at Northport. Vessels select anchorage according to draft, the bottom is soft. During severe winters ice has been known to close the harbor for about two months.

The Federal project provides for a channel 8 feet deep at mean low water and 100 feet wide from that depth in the harbor to a point 100 feet south of the Northport Yacht Club, an anchorage basin 6 feet deep and 15 acres in area adjacent to the channel, length 0.4 mile. No work has been done on the project.

Northport is a village with rail communication on the eastern shore of Northport Harbor. The dark gray chimney of the light plant is very prominent. The depths at the principal wharves are 6 to 8 feet. The greatest draft that can be taken to Northport is 14 feet at high water. A prominent tank is about 1 mile inland and 2 miles eastward of Northport Bay. A prominent tank is just northward of the town of Northport.

Gasoline, water, ice, and other supplies can be obtained. During the summer, gasoline and lubricants can be obtained from a barge anchored in the harbor.

A boatyard with marine railway can haul out vessels of 30 tons weight, 70 feet lengths and 7 feet draft. The depth alongside the yard wharf is 7 feet. A 5-ton lift is available. General repairs to hull and engines can be obtained. Gasoline, lubricants, water, and a limited amount of ship chandlery can be had.

Centerport Harbor is a shoal bight in the south shore of Northport Bay just eastward of the entrance. A narrow, crooked channel with a depth of about 3 feet leads to the village of **Centerport.** This channel leads a little eastward of mid-harbor in approaching the bare spit which extends nearly across the bay, follows the north side of the spit at a distance of about 200 feet, curves around the southwest end of the spit, then follows its south side northeastward, and then trends southward somewhat eastward of mid-harbor. The tidal currents through the narrow channel at the end of the spit have an estimated velocity of 3 knots at strength. The harbor is little used except by pulling boats and small pleasure boats.

Huntington Harbor at the southwest end of Huntington Bay has been improved by dredging a channel through the entrance and through the harbor to a turning basin at the Old Town Dock. This channel is subject to shoaling on the bar at the entrance. The entrance is difficult on account of the narrow channel, the boulder reef which forms its western side and extends out to Lloyd Harbor Light, and the strong tidal currents which have an estimated velocity of 2 knots or more at strength. In the absence of local knowledge, only small craft should attempt the entrance and should proceed with caution.

Huntington Harbor Light, 14 feet above water, is shown from a red cylindrical structure on tripod, on the west side of the entrance to the harbor.

The Federal project provides for: A main channel 8 feet deep, 100 feet wide, from the 8-foot contour in Huntington Bay to a turning basin of the same depth and 200 feet wide opposite the Old Town Dock; thence 6 feet deep, 100 feet wide, to a point 450

feet north of the causeway, length about 2.1 miles. An anchorage 6 feet deep and 14 acres in extent west of the 6-foot channel, length about 0.2 mile. A cross channel 8 feet deep, 100 feet wide, from the main 8-foot channel to and along the wharves on the west side of the harbor, extending to within 150 feet of the causeway, length about 0.4 mile.

The controlling depths in August 1949 were: Huntington Harbor to Old Town Dock, 6 feet; thence to head of project, 3 feet; in the turning basin, 6 feet; in the anchorage, 4½ feet; in the cross channel, 2 feet.

Huntington is a village at the head of the harbor. The wharves of the light plant and the oil company have depths of 6 feet alongside. About 400 yards northward of the light plant wharf is the entrance of a narrow channel with a controlling depth of about 2 feet which leads to the coal and lumber wharves on the west side of the harbor. The channel is marked by bush stakes.

At the yacht club landing the depth was 6 feet in 1949. Gasoline and water can be obtained at the landing. Yachts may anchor off the landing but must keep clear of the channel.

To enter Huntington Harbor, pass about 150 feet westward of Huntington Harbor buoy 1 off the entrance, and 500 feet southeastward of Lloyd Harbor Light; steer to pass about 160 feet eastward of Huntington Harbor buoy 2 and Huntington Harbor lighted buoy 4, heading for Huntington Harbor Light 6 west of Sandy Point. Pass closer to the light than to Sandy Point and head to clear Huntington Harbor lighted buoy 7. The channel is buoyed as far as the yacht club landing; beyond this it is unmarked but the channel is easily distinguished. Caution is recommended to avoid the 5-foot and 6-foot spots on the northeast and southwest sides of the channel, respectively, about 700 yards southward of Sandy Point. Local information and the chart are the best guides.

Diesel oil, gasoline, water, and ship chandlery can be obtained.

On the east side of the harbor are four boatyards with facilities for building and repairing wooden hulls. The largest yard has four railways and can haul out vessels of 300 tons weight, 120 feet length, and 10 feet draft. This yard can build and repair any vessel of those dimensions. A full line of supplies is available and boat storage and mooring facilities can be obtained by agreement.

Huntington has bus service but railroad connections must be made at a point 1.5 miles south of the town.

Lloyd Harbor extends westward from Huntington Bay nearly to Oyster Bay, from which it is separated by a narrow strip of beach at high water. Vessels of less than 7-foot draft can anchor just inside the entrance, where the depths are 7 to 11 feet. The narrow part of the harbor extending westward has a narrow, crooked channel, with a least depth of 3 feet to a point about 0.7 mile from its head.

East Beach, extending halfway across the entrance, is marked near its south end by an abandoned light tower. The eastern shore of East Beach should be given a berth of 700 yards until the tower bears 271°, then enter on a 256° course, passing 250 yards southward of the tower, and between the channel buoys. Three buoys mark the entrance channel south of East Beach.

Oyster Bay is on the south side of Long Island Sound, about 5 miles westward of Eatons Neck Light. The entrance is between Lloyd Neck and Rocky Point. The entrance and harbor are characterized by extensive shoals, boulder reefs, and broken ground making off from the shores, and vessels should proceed with caution if obliged

to approach or cross shoal areas. The bay south of Cold Spring Harbor Light is a secure harbor, and is available for vessels of less than 18-foot draft.

Lloyd Neck, between Huntington and Oyster Bays, is high and wooded, and has a high, yellow bluff on its north side 0.8 mile eastward of Lloyd Point. Many patches of boulders having a least depth of 2 to 8 feet extend 0.5 mile offshore from **East Fort Point** to Lloyd Point. Small craft skirting this shore should keep well outside the line of buoys.

Lloyd Point, the north end of Lloyd Neck, is a low spit. A rocky shoal extends 0.5 mile north-northeastward from Lloyd Point. A lighted bell buoy about 1 mile northward of Lloyd Point marks the northern limit of the 30-foot curve in this vicinity. The lighted buoy is replaced by a bell buoy if it is endangered by ice.

Morris Rock, with a least depth of 2 feet, is 0.4 mile eastward of Lloyd Point and 600 yards from shore. The northerly and southerly limits of foul ground around Morris Rock are marked by buoys.

About 0.6 mile southwestward of Lloyd Point are two small jetties between which is the entrance to a pond which has been dredged into the spit by a sand and gravel company. The jetties are covered to a depth of 2 feet at mean low water. The harbor, locally known as **Sand City,** may be entered by steering a mid-channel course between the jetties. It is used considerably by local boats as an anchorage and as a harbor of refuge. The holding ground is good.

In August 1949 the controlling depths were: In the entrance channel, 12 feet; in the harbor, 4 to 22 feet; at the dock south end, 9½ feet; at the dock north end, 8 feet.

Rocky (Centre Island) Point, the northern promontory of **Centre Island,** is a small bluff on whose summit is a large prominent house.

Centre Island Reef is a dangerous boulder reef which extends 0.9 mile northward from Centre Island. A small 21-foot rocky patch is at the north end of the reef. Depths of 6 to 18 feet extend about 1 mile northward of Rocky Point and the area is marked at the northern end by a bell buoy. A wreck with a least depth of 17 feet is 350 yards southeastward of the buoy.

The reef is covered by the red sector of Cold Spring Harbor Light. Strangers without local knowledge should keep outside of the red sector.

A shoal with 5 to 9 feet over it, extends eastward from the northern part of Centre Island nearly across Oyster Bay, and is marked near its eastern end by Cold Spring Harbor Light. Small craft with local knowledge cross the shoal at a distance of 700 yards westward of the light, but strangers should not attempt it. A buoy midway between Centre Island and Cold Spring Harbor Light marks a 5-foot spot and the southern limit of the shoal in this vicinity.

Cold Spring Harbor Light, 37 feet above water and visible 11 miles, is shown from a white wooden tower on black cylindrical pier, on point of shoal. The fog signal is an electric bell. A red sector between 039° and 125° covers the shoal water off Centre Island.

Directions, Oyster Bay.—Approaching from eastward, deep-draft vessels should pass 1 mile or more northward of Lloyd Point and avoid the 22-foot spot which is about 0.3 mile southwestward of the lighted bell buoy northward of Lloyd Point. Approaching from westward, pass 0.5 mile northward of the bell buoy marking Centre Island Reef. Heading for Cold Spring Harbor Light on any course between **130° and 140°** will lead in the deepest water between **Northwest Bluff** and Centre Island Reef.

The principal channel is eastward of Cold Spring Harbor Light and is good for a depth of over 30 feet. To go through this channel, pass about 250 yards northeastward of the light and then round the end of the shoal, passing about 350 yards eastward of the light. In shaping the course for Oyster Bay Harbor, avoid a boulder reef, marked by a buoy, which extends 250 yards off the east side of Plum Point, and enter the harbor between the point and the lighted buoy marking the boulder reef making off from Cove Point.

Shoals with 10 to 12 feet on them extend 250 yards in places from shore in the bight of Centre Island for a distance of 0.5 mile southwestward of Plum Point. The best water will be carried by passing about 100 yards northwestward of the lighted buoy off Cove Point and heading to pass about 100 yards southeastward of the buoy off Moses Point.

The deepest water leads along the south end of Centre Island, passing about 100 yards southward of the buoy off Moses Point and keeping about 200 yards off the beach until close to Soper Point, which may be approached more closely. When past this point a northwest course is good into the harbor.

The mean range of the **tide** is about 7¼ feet.

Currents.—About 0.2 mile north of Cold Spring Harbor Light the velocity at strength is about ½ knot; about 0.2 mile north of Cove Point it is about ¾ knot. For predictions the *Current Tables* should be consulted.

Ice.—During severe winters ice has been known to extend the whole length of the bay during a part of January and February.

Cold Spring Harbor, the south end of Oyster Bay, extends about 2.3 miles southward of Cooper Bluff. The seminary on the hill of **West Neck** on the east side of the harbor is prominent. The harbor is free of dangers if the shores be given a berth of about 600 yards, the depths being 15 to 18 feet to near its head. A shoal spot of 10 feet is 0.7 mile eastward of Cooper Bluff, and a shoal spot of 11 feet in the southern part of the harbor is 800 yards northward of the clock tower.

Cold Spring Harbor is a village on the eastern shore near the head of the harbor. An oil company wharf is the only one used outside of some small private landings. The depth at the wharf is 20 feet. Much shoaler water is about 150 yards westward. A beach club landing in the village has reported depths of 9 feet. Shoal water extends about 200 yards from shore for a distance of nearly 500 yards northward of the club landing. The western limit of this shoal area, which is very abrupt, is marked by privately maintained spar buoys during the summer.

Cooper Bluff is a prominent bluff at the northeast end of Cove Neck. A boulder reef extends 0.3 mile northward from **Cove Point,** at the northwest end of **Cove Neck,** and is marked at its north end by a lighted buoy. The entrance of Oyster Bay Harbor is nearly 400 yards wide between this buoy and Plum Point.

Plum Point is marked at its south end by a small stone tower; boat landings are on the southwest side of the point. A yacht club marked by a prominent flagstaff is 0.3 mile west of Plum Point. The yacht club landing has depths of about 9 feet. **Storm warnings** are displayed day and night at the yacht club.

Oyster Bay Harbor is a long, crooked arm on the western side of Oyster Bay. A channel with a depth over 30 feet leads into the harbor to Moses Point and good anchorage can be selected; one of the best is southward of Moses Point. Above this point the channel is narrow and is not suitable for vessels of a greater draft than 10 feet, for

which good anchorage is found in the channel between **Moses Point** and **Soper Point** and northwestward of Soper Point. Vessels of less than 7-foot draft can anchor in the bight between Cove Neck and the wharf at Oyster Bay, and also in the large bight on the northwest side of Centre Island.

Oyster Bay is a village with rail communication on the shore south of Oyster Bay Harbor. A dredged channel with a least depth of 10 feet leads to the oyster wharf. The west side of the wharf has depths of 8 to 10 feet; the face, 10 to 11 feet; and the east side, 6 to 11 feet. Stand in to the wharf on a line of its west side. Parallel to and about 200 feet off the west side of the wharf is a row of sunken barges. A private buoy and bush stakes mark the west side of the channel on the west side of the wharf. Gasoline, ice, and other supplies can be obtained here.

About 650 feet westward of the wharf is a dredged channel with a depth of 4 feet leading into a slip having several private landings at the head, called **Park Basin.** A range of two red lights privately maintained leads into the channel.

An oil receiving wharf is about 150 yards southeastward of the oyster wharf. A channel dredged between the ends of the wharf has a depth of 8 to 12 feet and 4 feet at the end of the oil wharf. Gasoline, lubricants, and water can be had at the oyster wharf.

In the village of Oyster Bay a boat building and repair yard with two railways can haul out vessels of 500 tons weight, 150 feet length, and 13 feet draft. All repairs to hulls and engines can be had. Supplies, hardware, and dry storage are available.

Near the shore of Centre Island northwestward of Soper Point are two rocks bare at low water. About 300 yards north-northwestward is a rock with 4 feet over it. Northward of this rock at a distance of 150 yards is a sunken rock. None of these rocks are marked and caution is advised. In this area are extensive oyster beds privately owned and marked by stakes.

Mill Neck Creek is at the northwest end of Oyster Bay Harbor. A double-leaf bascule bridge crosses from Mill Neck to Pine Island Park to the north. The horizontal clearance is 75 feet and the vertical clearance, closed, is 10½ feet at high water. The area westward of the bridge has been dredged to depths varying from 5 to 16 feet. Westward of the bridge at a distance of 200 feet a submerged gas main and cables cross the channel.

After passing through the draw give the south shore inside a berth of about 100 yards and follow this for about 500 yards to avoid a mussel covered bar, then favor the north shore when approaching the narrow part 0.5 mile above the bridge, then keep near the middle. Many stakes are on the shoals in the creek. **Bayville** is the post office on **Oak Neck** on the north side of the creek.

A small boatyard is on **Oak Neck Creek.** It has a marine railway capable of hauling out vessels of 56 tons weight, 60 feet length, and 5½ feet draft. General repairs can be made. Gasoline, lubricants, and a limited amount of ship chandlery are available. Boats entering the creek do so at high water as the creek is practically bare at low water.

Pine Island Park, just west of Rocky Point, is settled with summer cottages.

Oak Neck Point is marked by many large residences. A stone jetty extends a short distance from the shore just westward of the point. A shoal strewn with boulders extends 0.3 mile from the shore for part of the distance between Oak Neck Point and Matinicock Point. A buoy 0.5 mile off Oak Neck Point marks the end of the shoal.

Chart 222.—Frost Creek is 2 miles westward of Oak Neck Point. The channel at the entrance is well defined with water below half-tide; it is protected by a stone jetty which extends a short distance from the shore about 150 feet eastward of the dredged channel. The entrance has been improved by dredging the channel 40 feet wide and 8 feet deep. **Peacock Point** is just west of Frost Creek. A stone jetty to protect a private boat landing extends a short distance from Peacock Point.

Matinicock Point is marked on its western side by a stone pier. A shoal extends about 600 yards off the point and is marked at its end by a watched lighted bell buoy. The lighted buoy is removed if endangered by ice.

Chart 223.—Hempstead Harbor is 4 miles wide at the entrance between Matinicock Point and Prospect Point. It is free from dangers if the shores be given a berth of 0.3 mile, and it is much used by vessels seeking shelter in any but strong northerly winds, affording excellent anchorage with good holding ground. Vessels can anchor in any part of the harbor according to draft and direction of the wind. A good anchorage for vessels drawing less than 20 feet is just inside a line from Mott Point to the breakwater at Glen Cove Landing. Small vessels can anchor behind the breakwater. On the western shore above and below Bar Beach are large sand and gravel plants. On the eastern shore are several villages.

Weeks Point is marked by a breakwater which protects a private boat landing. A buoy is 0.2 mile off the point. Nearly 0.5 mile southward of Weeks Point is the entrance to a basin protecting a private wharf which has a reported depth of 8 feet at the end. The basin shoals to the head and rocks bare at low water near the northern end.

Glen Cove is a city with rail and bus communication on Glencove Creek, about 1 mile back from the eastern shore of the bay. The breakwater has been built to 4 feet above high water, extends 1,564 feet west-southwestward from **Glen Cove Landing** and is marked at its end by a light. The anchorage behind the breakwater is known as **Glencove Harbor,** the depths ranging from 18 to 22 feet behind its outer half and 7 to 9 feet nearer shore. An oil barge is anchored on the south side of the breakwater near shore during the summer. Diesel oil, gasoline, and lubricants may be had from the barge.

Glencove Breakwater Light, 20 feet above water, is shown from a black skeleton tower, white tank house, black base, on the west end of the breakwater, east side of the entrance to Hempstead Harbor.

Bar Beach Light, 26 feet above water, is shown from a black skeleton tower, white tank house in base, on the east side of Hempstead Harbor.

The Federal project in Hempstead Harbor provides for a channel 6 feet deep, 100 feet wide, from the entrance at Bar Beach to a point opposite Wards wharf, a distance of about 5,600 feet, thence 80 feet wide to the Roslyn town wharf, a distance of about 3,200 feet, and thence 50 to 70 feet wide to the head of navigation, a distance of about 1,700 feet. Length about 1.6 miles.

In August 1949 the controlling depth was 7½ feet a distance of 1.3 miles from Bar Beach, thence 4 feet to the upper limit of the project.

The Federal project in Glencove Creek provides for a channel 8 feet deep, 100 feet wide, from deep water in Hempstead Harbor to the head of navigation at Glen Cove. Length about 0.8 mile.

In August 1949 the controlling depth was 7½ feet for a width of 100 feet to a point about 900 feet below Glen Cove, thence 5 feet to the head of the project.

Directions.—Passing northward and westward of the lighted bell buoy off Matinicock Point, a **213°** course will lead 200 yards northwestward of the buoy off Weeks Point, and then a **184°** course will lead westward of the light on the end of the breakwater. From westward, passing 900 yards northward of the bell buoy off Prospect Point, a **116°** course will lead for the light on the end of the breakwater, and pass northward of the obstructions with 23 and 19 feet over them, located 0.6 mile northward and 1.5 miles eastward, respectively, of Prospect Point. When northward of Mott Point bell buoy, at a distance of about 700 yards, steer **150°** for about 1 mile and select anchorage. Or, if proceeding to Glenwood Landing, steer **158°** and pass westward of Bar Beach Light.

Glencove Creek, 0.6 mile southward of Glencove Breakwater, has been improved by dredging from **Mosquito Cove** to the head of navigation at Glen Cove. Buoys mark the entrance of the channel.

Sea Cliff is a village on the steep hill on the south side of Glencove Creek. Gasoline, lubricants, and water can be obtained by boat. From Sea Cliff to the northerly wharves at Glenwood Landing a shoal extends 300 yards from the eastern shore and is marked by a buoy and light.

Glenwood Landing is a village on the eastern shore abreast **Bar Beach.** The six stacks at the power plant are prominent. Gasoline, fresh water, ice, and supplies can be obtained. The wharves at Glenwood Landing have depths of about 8 feet.

The largest boatyard can haul out vessels up to 150 tons weight, 125 feet length, and 10 feet draft. All kinds of hull and engine repairs may be had in addition to wet and dry storage.

Range lights which are privately maintained lead to the wharves of sand and gravel companies operating on the western shore south of Bar Beach.

Roslyn is a village on the railroad at the head of the harbor.

The head of Hempstead Harbor above Bar Beach is occupied by extensive flats, and the narrow channels require local knowledge. The dam at Willow Avenue is the head of navigation.

The mean range of the **tide** is about 7¼ feet.

Currents.—In the channel west of the breakwater the tidal current has a velocity at strength of about 1 knot. At Bar Beach the tidal currents have an average velocity of about 1¾ knots at strength through the narrow channel. For predictions the *Current Tables* should be consulted.

In severe winters **ice** has been known to close navigation about six weeks during January and February.

The principal items of commerce are sand, gravel, fuel oil, and building material. The usual draft of vessels engaged in this commerce is from 3 to 12 feet.

Between **Mott Point** and Prospect Point bluffs are prominent. A shoal with boulders extends 0.2 mile from shore between the points and for a short distance south of Mott Point. Buoys mark the limits of the shoal eastward and northeastward of Mott Point. **Picket Rock,** with 2 feet over it, is 350 yards offshore northward of Mott Point.

Prospect Point, marked by prominent houses on the bluff, has a rocky shoal making out nearly 0.4 mile northward from it. The shoal rises abruptly from a depth of 60 feet to 16 feet and has boulders. **Old Hen,** a boulder bare at low water, is 400 yards from

shore. The north end of the shoal is marked by a bell buoy which is 0.8 mile eastward of Execution Rocks Light. About 400 yards eastward of the buoy are rocky patches with depths of 17 and 18 feet. An obstruction with 23 feet over it is 600 yards 055° from the buoy. A rocky patch with 11 feet over it and marked by a buoy is 0.6 mile eastward of Prospect Point; about 400 yards northward of the buoy is a boulder patch with a depth of 24 feet.

Execution Rocks are a group of rocks with depths of 18 feet or less and marked by a light. The rocks extend 0.6 mile northward, 300 yards southward, and 600 yards southwestward from the light. The rocks and shoals are marked by four buoys; one off the north end, one about 300 yards northeastward of the light, one off the southwest end, and a lighted gong buoy 585 yards southward from the light. An obstruction with a least depth of 28 feet is about 250 yards northeastward of the lighted gong buoy. Rocks with 8 to 9 feet over them extend about 400 feet southward from the light. A rocky patch with 13 feet over it is about 425 yards south of the buoy on the north end of the shoal.

Execution Rocks Light, 62 feet above water and visible 13 miles, is shown from a white stone tower, brown band midway of height, granite dwelling attached, on rocks. The fog signal is an air siren; the radiobeacon is synchronized with the fog signal for distance finding.

Sands Point is marked by a light about 300 yards northwest of the point. A boulder reef extends 600 yards off the point and is marked by a lighted buoy. The boulders show at low water for a distance of about 300 yards from shore. A stone tower and a white residence with spire on top are prominent objects on this point. Sands Point Light, 49 feet above water and visible 7 miles, is shown from a black skeleton tower, white tank house, black pyramidal base, in 6 feet on end of reef off point northwest end of **Manhasset Neck.**

Barker Point is a high bluff on the northeast side of the entrance of Manhasset Bay. **Gangway Rock,** marked by a light, is at the northwesterly end of a broken line of rocks and shoal water which extends 0.6 mile northwestward from Barker Point. Gangway Rock Light, 47 feet above water and visible 11 miles, is shown from a black skeleton tower, white tank house, black base, in 14 feet near the end of the shoal off Barker Point. A bell buoy is westward of the light.

Success Rock, awash at low water and marked by a daybeacon—black iron spindle, is one of a broken line of rocks between Barker Point and Gangway Rock.

Manhasset Bay is nearly 1 mile long between Barker Point and Hewlett Point, and over 3 miles long. It affords excellent shelter for vessels of about 12 feet or less draft, and is much frequented by yachts in the summer. The depths in the outer part of the bay range from 12 to 17 feet and 7 to 12 feet in the inner part inside Plum Point. The extreme south end of the bay is shallow with extensive mud flats. A controlling depth of 2 feet can be taken through a natural channel to almost the head of the bay.

The Federal project provides for: A channel 8 feet deep, 100 feet wide, from deep water in Manhasset Bay to Crampton Brothers wharf at Great Neck, length about 1.4 miles. A turning basin 8 feet deep near the end of the project.

No progress on the project has been made to date.

Anchorage in the bay may be selected according to draft but the usual places are eastward of Plum Point in depths of 6 to 10 feet and off the water front of Port Wash-

ington in depths ranging from 8 to 12 feet. The bottom is soft and affords good holding ground. For special anchorage areas see Chapter 2, § 202.60 (f) (g) (h) (i).

The mean range of the **tide** is about 7¼ feet.

Storm warnings are displayed at Port Washington, day and night at Manhasset Bay Yacht Club, and by day from May 1 to October 15 at Knickerbocker Yacht Club.

The principal items of commerce are sand, gravel, building material, coal, and fuel oil carried in vessels of 6 to 12 feet.

Plum Point, marked by a clubhouse and a prominent flagstaff, is a low spit extending southward from the eastern shore about 1 mile northward of Barker Point. A lighted buoy is about 150 yards southward of Plum Point. The bight eastward of Plum Point is shoal. A buoy is about 0.3 mile southeastward of the point and about 100 yards east of an 11-foot spot.

Port Washington is a village with rail communication on the south side of a shoal bight about 1 mile southeastward of Plum Point. A channel with depths of 6 to 12 feet and marked at its entrance by buoys, leads along the east side of the bight, thence northwestward past the town wharf to the north end of the bight northeast of **Tom Point.** Depths at the wharves are reported to range from 4 to 9 feet.

In August 1949 the controlling depth was 11 feet from entrance buoy of inner harbor to dock off Mill Pond, thence 7 feet to the head of navigation.

Diesel oil, gasoline, water, ice, and ship chandlery can be had. From May 1 to October 1, a barge moored in the bay can supply Diesel oil, gasoline, lubricants, water, and ice.

Boatyards with marine railways are at Port Washington and **Manor Haven.** The largest, at Port Washington, can haul out vessels of 40 tons weight, 75 feet length, and 6½ feet draft. All hull and engine repairs can be made and boats built to order.

Hewlett Point is on the west side of the entrance to Manhasset Bay. A boulder reef, mostly bare at low water, extends 300 yards northward of the point and is marked at its end by a buoy.

Stepping Stones is a dangerous boulder reef which extends about 0.8 mile in a northwesterly direction from shore and is marked at its end by a light. Stepping Stones Light, 46 feet above water and visible 12 miles, is shown from a brown dwelling on granite pier, white horizontal band on southeast face of pier, at outer edge of reef. The fog signal is a bell.

Little Neck Bay is nearly 1 mile wide eastward of Willets Point, and about 2 miles long. The shores of the bay are thickly settled, with many private boat landings. The depths are about 10 to 12 feet at the entrance, 6 feet about halfway to its head, and thence shoaling gradually. Boulders are in places close to shore.

Storm warnings are displayed by day from May 1 to November 1 at Bayside Yacht Club.

Elm Point, on the east side of the bay, is 1.3 miles southward of Hewlett Point. Southward of Elm Point, a distance of 0.3 mile, at **Grenwolde** is **Kings Point Merchant Marine Academy.** An L-shaped pier encloses a lagoon with a depth of 11½ feet. A white tubular steel mast 171 feet high is in Grenwolde. The top is 216 feet above mean high water. A much used boat anchorage is in the cove on the east side of the bay 1 mile southward of Elm Point; the depths being 4 to 7 feet.

The two branches forming the head of the bay are nearly bare at low water. **Alley Creek,** at the head of the south branch, is crossed by two bridges, a railroad swing

draw with a horizontal clearance of 40 feet and vertical clearance of 3 feet, closed, above high water; a fixed highway bridge with a horizontal clearance of 37¾ feet and a vertical clearance of 10 feet at high water. The bridges are 0.2 and 0.3 mile, respectively, above the mouth.

Willets Point, on the south shore at the eastern entrance of East River, is marked by **Fort Totten,** the granite walls of which are prominent. A 13-foot channel has been dredged to the two wharves on the west side. In August 1949 the controlling depth was 9½ feet. Daily tidal predictions for Willets Point are given in the *Tide Tables.* Communication with New York City is by bus.

Throgs Neck, on the north shore at the eastern entrance of East River, is marked by a light, a square brick stack and a wharf at its south end. The stack is the highest object on Throgs Neck.

Throgs Neck Light, 64 feet above water and visible 14 miles, is shown from a red skeleton tower, white tank house, on the point of Fort Schuyler. The fog signal is an electric bell.

A shoal extends 200 yards south-southeastward from Throgs Neck, and is marked by a lighted bell buoy which should be given a berth of over 50 yards.

Storm signals are displayed at the Merchant Marine Academy.

Fort Schuyler, at Throgs Neck, is used as a base for nautical school of New York State. Vessels used for training tie up to a large wharf on the southwest side of the neck. Excessive speed while passing this point endangers workmen on the docks. Regulations regarding excessive speed in restricted waters should be observed.

Charts 1213, 223, 226, 745.—East River is the tidal strait about 14 miles long and 600 to 4,000 feet wide, connecting Hudson River and the Upper Bay at the Battery, New York City, with Long Island Sound at Throgs Neck, New York, and separating Long Island from the mainland. The stretch between Blackwells Island and Negro Point is known as Hell Gate. The Harlem River joins the East River at Wards Island in Hell Gate, and is also connected by Little Hell Gate between Wards and Randalls Islands. From the Battery to Port Morris, a distance of 10 miles, both shores are occupied by wharves, practically continuous, except where shoals or currents prevent access.

The Federal project provides for a main channel 40 feet deep and 1,000 feet wide from Upper New York Bay to the Brooklyn Navy Yard, and thence 35 feet deep, 550 to 1,000 feet wide to Throgs Neck. A channel east of Blackwells Island from the main channel to English Place, Long Island City, 30 feet deep, 500 to 900 feet wide, with widening in the approach from the main channel. A channel between South Brother and Berrian Islands, 20 feet deep, 300 feet wide, with widening in the approach from the main channel. The project is maintained.

Anchorages in East River.—For anchorage areas see Chapter 2, § 202.155 (b).

Currents.—Predicted times of slack water and times and velocities of strengths of current for Hell Gate for every day in the year are given in the *Current Tables, Altantic Coast.* In East River the flood sets eastward and the ebb westward. From Government Island to Rikers Island, including Hell Gate, the currents turn at practically the same time.

From Governors Island to Lawrence Point the mean velocity at strength of current ranges from 2 to 5 knots, the higher velocities occurring in the narrow parts of the channel

eastward of Brooklyn Bridge, abreast Blackwells Island, and in Hell Gate. In Hell Gate, off Mill Rock, the mean velocity at strength is about 3½ knots for the eastward current and 4½ knots for the westward current.

The mean velocity at strength of current from North Brother Island to Whitestone Point is about 1½ knots. At Throgs Neck it is about 1 knot. The currents generally set with the channel, but heavy swirls are found between Negro Point and the north end of Blackwells Island. A further discussion of currents and a current diagram for East River are given in the *Current Tables*.

The direction and velocity of the current are affected by strong winds. The period of flood or ebb may be increased or diminished by winds. The direction and velocity of the current in the East River for each hour of the tidal cycle will be found in *Tidal Current Charts, New York Harbor*.

Storm warnings are displayed at Throgs Neck and Whitehall Building, New York.

A time ball is dropped at noon each day on the Seamans Church Building.

Pilotage is compulsory for all foreign vessels and all American vessels bound to or from a foreign port, navigating the channel of Hell Gate which shall be spoken. A number of Hell Gate pilots have their headquarters at City Island. Pilots come off in small boats from Sands Point, City Island, and the Battery in response to signal. The rates, per foot of draft, for pilotage through Hell Gate are $4 in-bound and $4 out-bound.

Towboats will be found in the vicinity of City Island and in East River. Vessels intending to take a towboat should do so before going westward of Rikers Island.

Reporting station.—Vessels are reported at Maritime Exchange, New York City, from City Island.

Chart 223.—Little Bay, westward of Willets Point, is used as an anchorage basin by local small craft. The depths are 6½ to 10 feet but the inshore areas are shoal. **Beechhurst**, a residential section on the west side of the bay, is extensively developed. The water front is occupied by private small-boat landings.

Whitestone Point, 2 miles westward of Willets Point, is a small wooded bluff marked by a light. The light, 48 feet above the water, is shown from a black skeleton tower, white tank house on a black base.

Whitestone is a town on the south shore eastward of Whitestone Point. Off Whitestone, good anchorage in 18 to 48 feet, is found eastward of the point. No dangers exist, but the water shoals abruptly close inshore. An obstruction with 26 feet over it is about 0.5 mile eastward of Whitestone Point Light. Avoid Whitestone Point which makes off rocky northward to the light and is shoal on its western side. The depths at the principal wharves range from 13 to 24 feet. The water front is extensively developed. Gasoline, oil, fresh water and a limited amount of ship chandlery are available. The larger of two boat repair yards can haul out vessels of 40 tons weight, 90 feet length, and 7 feet draft. Communication is by bus to the railroad and to nearby towns.

The **Bronx-Whitestone Bridge** is a suspension type and furnishes a highway connection across East River between Old Ferry Point on the Bronx side to the vicinity of Whitestone Point on the Long Island side. The unobstructed horizontal clearance is 2,265 feet and the vertical clearance at the center of span is 135 feet at high water. At night red lights are exhibited at the top of the towers.

Hammond Flats, between Throgs Neck and Old Ferry Point, is an anchorage for

all classes of vessels in 30 feet or more, with good holding ground. Toward Old Ferry Point the water deepens abruptly. A 17-foot spot is about 0.6 mile east-northeastward of Old Ferry Point, about 600 yards from the north shore. About 300 yards southwest of this spot is a 15-foot shoal. The water shoals abruptly close inshore from 18 to 4 or 5 feet.

Powell Cove, 0.7 mile westward of Whitestone Point, has depths of 3 to 4 feet in the central portion and less near the shore. The ruins of a wharf make off in a northwesterly direction from the eastern point at the entrance and is marked at the end by a light. Rocks are on the north side close to the piling. **Tallman Island** is on the west side of the entrance to Powell Cove. It is marked by prominent tanks of the sewage disposal plant.

Old Ferry Point, on the north side of East River, is at the east side of the entrance to Westchester Creek. It is marked by the approaches to the Bronx Whitestone Bridge. Northeastward of the point is a shallow bight with depths of 3 to 5 feet on the east side.

Westchester Creek has its entrance in the shoal bight on the north side of East River just west of Old Ferry Point. The channel is buoyed from East River to the entrance of the narrow part of the creek.

The Federal project provides for: A channel 12 feet deep, 100 feet wide, for a distance of 2,000 feet at the entrance, thence 80 feet wide, for a distance of 3,000 feet, and thence 60 feet wide for a distance of 8,800 feet to the head of navigation at East Tremont Avenue, with widening at bends, length about 2.6 miles. Two turning basins, 12 feet deep near the head of navigation and the other near Eastern Boulevard Bridge.

In August 1949 the controlling depth was 12 feet.

The mean range of the tide is about 7 feet.

The creek is crossed by a bascule highway bridge at Unionport. The horizontal clearance is 57½ feet and the vertical clearance, closed, is 14 feet at high water.

The larger of two boat repair yards can haul out vessels of 20 tons weight, 60 feet length and 7 feet draft. All general repairs and storage can be had.

Unionport and **Westchester** have some commerce in building material, oil, coal, and gasoline carried in vessels of 6 to 12 feet draft. Small boat supplies of all kinds can be obtained.

Chart 226.—Pugsley Creek joins Westchester Creek at **Castle Hill Point.** From the point a crooked channel marked by stakes during the summer leads up Pugsley Creek to the head of navigation at a sewer crossing about 0.3 mile above Castle Hill Point. Strangers should not enter without local information.

Clason Point, on the north side of East River, is about 0.7 mile east of Old Ferry Point. The city wharf, at the southeast end of the point eastward of the discontinued ferry slip, has a depth of about 8 feet at its end. Gasoline, lubricants, water, and motor boat supplies can be obtained. Many small boats anchor on the flats on the west side of the point.

A small boatyard on the south side of the point can haul out boats of 20 tons weight, 60 feet length and 5 feet draft. Bus service connects with New York.

College Point Reef, with 6 feet over it, is about 0.4 mile north of **College Point.**

It is marked by College Point Reef Light, 27 feet above water, and shown from a black skeleton tower, white tank, black base, in 12 feet on reef.

College Point is a town on the south side of East River and east side of Flushing Bay. The wharves on the west end of College Point have depths of 8 to 10 feet. The shoal bight on the northwest side is used as a small boat anchorage.

One boatyard specializes in boat building, no repairs. The other boatyard, which makes barge and tugboat repairs, can haul out vessels of 500 tons, 135 feet length, and 14 feet draft.

The mean range of tide at College Point is 7 feet. Communication is by bus with Flushing and New York.

Flushing Bay is southwestward of College Point. A dredged channel is buoyed and leads from the main channel northwest of College Point to the entrance of Flushing Creek.

The Federal project provides for: A main channel 12 feet deep, 200 feet wide, from deep water in the East River to Northern Boulevard Bridge, and thence decreasing uniformly to a width of 160 feet at Main Street Bridge, length about 2.8 miles. A branch channel 12 feet deep, 200 feet wide, from the main channel to a maneuvering area of the same depth outside the proposed municipal boat basin at the south end of the bay, length about 0.2 mile. An anchorage basin 8 feet deep and approximately 700 feet wide west of the branch channel. A channel 6 feet deep, 150 feet wide, extending along the west shore of the bay between the two municipal boat basins.

In August 1949 the controlling depth in the main channel was 12 feet to Willets Point Boulevard Bridge, thence 11 feet to Northern Boulevard Bridge, thence 7 feet to the Roosevelt Avenue Bridge, thence 1 foot to 400 feet below the upper part of project; 7 feet in the branch channel and maneuvering area; 5 feet in the anchorage basin. The entrance to the channel along the west shore was reported silted over in September 1949.

For the most part, Flushing Bay has depths ranging from 3 to 8 feet. Eastward of the dredged channel and in the vicinity of College Point the water is slightly deeper, ranging from 3 to 14 feet. Small craft anchor south of College Point in depths of 4 to 8 feet.

For anchorage areas see Chapter 2, § 202.60 (k).

A wreck which shows at high water is about 450 yards northwestward from the light marking the north end of the dike which extends for a distance of about 0.6 mile along the west side of the south end of the dredged channel. The dike is marked by a light at each end.

At the head of the bay an L-shaped wharf with reported depths of 9 feet along the north face and 12 feet on the south end of the east face encloses a basin for landings by small craft. Diesel oil, gasoline, lubricants, and water may be obtained at this wharf.

Ice generally obstructs navigation in Flushing Bay and Flushing Creek a part of January and February. In Flushing Creek, barges are taken about 1 mile above Main Street bridge to Strongs Causeway above which the creek is very crooked but is navigable for an additional distance of about 1 mile.

Flushing Creek is crossed by four bridges as follows: Willets Point Boulevard Bridge, 0.2 mile above the mouth, is a bascule bridge with a horizontal clearance of 140½ feet and a vertical clearance, closed, of 34 feet at high water.

Northern Boulevard Bridge, 0.4 mile above the mouth, is a bascule bridge with a horizontal clearance of 80 feet and a vertical clearance, closed, of 25½ feet at high water.

Roosevelt Avenue Bridge, 0.8 mile above the mouth, is a bascule bridge with a horizontal clearance of 70 feet and a vertical clearance, closed, of 24½ feet at high water.

Main Street railroad bridge, 1.1 miles above the mouth, is a swing bridge with a horizontal clearance of 30 feet and a vertical clearance, closed, of 3 feet at high water.

Bridge regulations are covered in Chapter 2, § 203.190 (f).

Flushing has commerce in building materials, coal and ashes carried in vessels of 5- to 14-foot draft. Vessels must go to the wharves, as the creek has no room for anchorage. Gasoline, water, ice, and other supplies can be obtained.

La Guardia Airport is on the west side of Flushing Bay. An aviation light atop the control tower near south central part of the field is prominent at night. At the west end of the field is a seaplane basin which is closed to navigation of boats.

Bronx River has its entrance at the head of the shoal bight on the north side of East River west of Clason Point.

The Federal project provides for: A channel 10 feet deep, at least 100 feet wide from the East River to the dam at East 177th Street, including the widening of bends; the first dredging to include a section from the East River to Randall Avenue, 200 feet wide, thence a section to Spafford Avenue, 150 feet wide, thence a section to Watson Avenue, 125 feet wide, thence a section to the railroad bridge near Westchester Avenue, 100 feet wide, except in the south approach to the bridge where it is to be 140 feet wide, and thence 100 feet wide to the head of navigation. Length about 2.8 miles. A turning basin 10 feet deep near the head of navigation.

In September 1949 the controlling depth from deep water in East River to Westchester Avenue Bridge was 9 feet except for scattered shoals with least depth of 8 feet. A large area above this bridge will be filled in.

The river is crossed by five bridges as follows:

Ludlow Avenue Bridge, 1.0 mile above the mouth, is a bascule bridge with a horizontal clearance of 70 feet and a vertical clearance, closed, of 27½ feet at high water.

Westchester Avenue Bridge, 1.3 miles above the mouth, is a bascule highway bridge with a horizontal clearance of 60 feet and a vertical clearance, closed, of 17 feet at high water.

Westchester Avenue Bridge is a fixed railroad bridge surmounting a highway bridge with a horizontal clearance of 60 feet and a vertical clearance of 61 feet at high water.

West Farms Bridge, 600 feet above Westchester Avenue, is a rolling lift bridge with a horizontal clearance of 69½ feet and a vertical clearance, closed, of 8 feet at high water.

East 174th Street Bridge, 1.8 miles above the mouth, is a fixed bridge with a horizontal clearance of channel width and a vertical clearance of 30½ feet at high water.

The mean range of the tide at the entrance and at Westchester Avenue Bridge is about 7 feet. The principal items of commerce are building material, fuel oil, and coal carried in vessels of 6- to 14-foot draft.

Hunts Point Light, 32 feet above water, is shown from a red skeleton tower, white tank house in lower section, in 37 feet off **Hunts Point.** The fog signal is an electric bell.

A dredged channel marked by buoys leads to the wharf of a gas plant. The least depth found is a 16-foot spot on the east side of the channel south-southwesterly of Hunts Point Channel buoy 2. The westerly side of the channel should be favored for

the best water. Small craft anchor on the flats east of the channel in depths ranging from 9 to 17 feet.

Rikers Island is partly occupied by buildings of the Department of Correction of New York. A large area of the flats on the southeast side of the island has been reclaimed and is used as a dump for ashes and rubbish. The main channel of East River leads northward of Rikers Island. Rocky patches with 23 and 24 feet over them are about 0.3 mile southeastward of **Barretto Point** and 300 yards from the north shore of Rikers Island. The south side of the main channel off the north edge of the eastern part of the flats extending eastward from Rikers Island is much used as an anchorage by coasting vessels, the depths being 23 to 30 feet.

The buoyed channel southward of Rikers Island has ample width and is easily followed except at its western end between Rikers Island and Lawrence Point. At this point the channel is narrow, with rocky uneven bottom, and has rocks with little depth on both sides. The channel is buoyed but the lighted buoys will be removed if endangered by ice. The controlling depth in 1946 was 20 feet for a width of 300 feet. Strangers should proceed with caution in this locality as the tidal currents are strong.

Lawrence Point is occupied by an extensive gas and electric plant. Lawrence Point Ledge Light, 24 feet above water, is shown from a black skeleton tower, white tank house, black concrete base, on the ledge northeast of Lawrence Point. The northerly and easterly sides of the reef are marked by buoys. A buoyed channel leads from the southeastward along the wharves.

The passage between Rikers Island and **South Brother Island** is much used as an anchorage by small boats, the depths being 5 to 12 feet. Care should be taken to avoid the extensive reef, partly bare at low water, which extends 0.3 mile southward and south-southeastward from South Brother Island. South Brother Island Light, 25 feet above water, is shown from a black skeleton tower with white tank house on concrete base, 70 yards off north side of the island. The fog signal is an electric bell.

North Brother Island is occupied by hospitals and other buildings and is marked at its north and south ends by a light. North Brother Island Light, 47 feet above water, is shown from a white dwelling on the south end of the island. The fog signal is an electric bell. North Brother Island North Light, 26 feet above water, is shown from a black skeleton structure on white tank house on black base, in 6 feet off the north end of the island.

The main channel is northward of North Brother Island. A shoal extends about 275 yards off the east end of North Brother Island and is marked by a buoy. The rocky shoals between North Brother Island and Port Morris have been removed to a depth of 34 feet.

A channel 300 feet wide and 26 feet deep has been dredged midway between North and South Brother Islands. The direction of the improved channel is 070°. It is well marked by buoys.

Port Morris, northward and northwestward of North Brother Island, has extensive railroad terminals, to and from which car floats are taken through East River.

Wards Island is westward of Lawrence Point and north of Hell Gate. Hospitals and institutional buildings are on the island.

Hell Gate Railroad Bridge, crossing the East River between the southeast side of Wards Island and Borough of Queens, is a fixed bridge with a horizontal clearance of 1,017½ feet and a vertical clearance of 134½ feet at high water.

Triborough Bridge, crossing the East River between Negro Point on the southern end of Wards Island and Borough of Queens, is a suspension bridge with a horizontal clearance of full channel width and a vertical clearance of 142 feet at high water.

Negro Point Light, 34 feet above water, is shown from a red skeleton tower, rectangular concrete base, on the south end of Wards Island. The fog signal is an electric bell.

Hell Gate is the part of East River south of Wards Island and north of the northern end of Blackwells Island. The great velocity of the current, the crooked channel, and crowded traffic in Hell Gate require extra caution on the part of the navigator to avoid accident or collision, and makes it dangerous for sailing vessels. Strangers in low powered vessels should never attempt it.

Vessels navigating Hell Gate at flood tide sometimes find it necessary to pass starboard to starboard to meet conditions produced by strong currents in the region between Halletts Point and Negro Point. This situation may arise when one of the vessels does not maneuver readily or is a tow. This possibility should be considered by those not having local knowledge and where the vessels are not being handled by pilots. Northeastward of Negro Point and southwestward of Halletts Point, the customary port passings are made.

Holmes Rock and **Hog Back,** which show above water, are in the bight on the south side of Wards Island westward of Negro Point. Ledges extend 300 feet southwestward from the easterly rock and 400 feet southwestward from the westerly one. **Hog Back Light,** 24 feet above water, is shown from a red skeleton tower on white tank house, red concrete base, in 12 feet on the southwest end of the ledge.

Halletts Point, on Long Island southward of Wards Island, is marked by a light. The channel extends close to this point.

Hell Gate Light, 35 feet above water, is shown from a black skeleton tower, white tank house, white watch tower alongside, on Halletts Point. The fog signal is an electric bell.

Mill Rock is an islet about 450 yards northwestward of Halletts Point. It is occupied by buildings of the U. S. Corps of Engineers. At a distance of 150 yards southward of the south end of Mill Rock the depth is 25 feet. Mill Rock Northerly Light, 28 feet above water, is shown from a black skeleton tower, white tank house, black base, on a ledge projecting north from Mill Rock. Mill Rock Southerly Light, 28 feet above water, is shown from a red skeleton tower, white tank house, red concrete foundation, on the south end of the ledge of Mill Rock.

Rhinelander Reef, westward of Mill Rock, has been dredged to a depth of 26 feet. It extends off the ferry slips at the foot of East 92nd Street northward of the north line of East 93rd Street.

Blackwells (Welfare) Island divides East River into two channels. The western channel is the wider, has the deeper water, and is generally used. Blackwells Island Light, 56 feet above water, is shown from a gray stone tower on the north end of the island.

Chart 745.—Queensboro Bridge is a cantilever structure crossing the East River and Blackwells Island about 0.4 mile from the south end of the island. The east span has a horizontal clearance of 947 feet and a vertical clearance of 133½ feet at high

water. The west span has a horizontal clearance of 1,153 feet and a vertical clearance of 131½ feet.

Blackwells Island Reef, partly bare at half-tide, extends 900 yards southwestward from the southerly end of Blackwells Island. The reef has a general width of about 125 yards and is marked at its end by a bell buoy.

Belmont Island is 700 yards southwestward of the southern end of Blackwells Island. **Blackwells Island Reef Cross Channel Light,** 23 feet above water, is shown from a red skeleton tower, red tank house at base, and marks the south side of Cross Channel between Blackwells Island and Belmont Island. **Blackwells Island Reef Light,** 47 feet above water, is shown from a black skeleton tower, white tank house, in lower section, square concrete base, on the south end of Belmont Island.

Man of War Rock, 420 yards 217° from Blackwells Island Reef Light, has a depth of 23 feet.

A good anchorage in 24 to 60 feet is found between East 32nd Street and East 24th Street wharves on the Manhattan side of the river.

Newtown Creek entrance is on the east side of East River 0.8 mile southward of the southerly end of Blackwells Island.

The Federal project provides for: A channel 23 feet deep, 130 feet wide, from East River to 150 feet north of Maspeth Avenue. A triangular area 23 feet deep at the north side of the entrance. A turning basin 23 feet deep at **Mussel Island.** A channel in the **East Branch** 20 feet deep and 150 feet wide from 150 feet north of Maspeth Avenue to Grand Street Bridge, and thence 20 feet deep, 125 feet wide to Metropolitan Avenue.

A channel in **Dutch Kills** 20 feet deep, 75 feet to 100 feet wide, and 3,800 feet long with a turning basin at the head.

A channel in **Maspeth Creek** 20 feet deep, 100 feet wide, and 2,000 feet long.

A channel in **English Kills** 20 feet deep and 150 feet wide to Metropolitan Avenue Bridge, including the easing of bends; and thence 12 feet deep, 100 feet wide to within 80 feet of Montrose Avenue Bridge suitably widened at bends, and materially widened by the excavation of upland at the second bend above Metropolitan Avenue Bridge.

In September 1949 the controlling depth in Newtown Creek main channel was 23 feet to the entrance of Whale Creek, thence 20 feet to a point 150 feet north of Maspeth Avenue; thence the channel in the east branch 15½ feet deep to Metropolitan Avenue; thence the channel in English Kills 15½ feet deep to Metropolitan Avenue; thence varying in depth from 13 to 6 feet to head of project. In Dutch Kills the controlling depth was 13 feet from Newtown Creek to Hunters Point Avenue; thence 9½ feet to the turning basin. In Whale Creek the controlling depth was 19 feet from Newtown Creek, decreasing to 12 feet at a point 450 yards from the entrance.

Whale Creek is navigable for vessels of 11 feet draft for about 0.3 mile.

Newtown Creek is crossed by four bridges. Vernon Avenue Bridge has a bascule span with a horizontal clearance of 147 feet and a vertical clearance of 25 feet. Greenpoint Avenue Bridge has a bascule span with a horizontal clearance of 150 feet and a vertical clearance of 27 feet. The Meeker Avenue Bridge is fixed and has a horizontal clearance of 249 feet and a vertical clearance of 125 feet. Grand Avenue Bridge has a swing span with a horizontal clearance of 87 feet and a vertical clearance of 10 feet. For the regulations governing the operation of the Vernon Avenue and Grand Street Bridges see Chapter 2, § 203.165.

Dutch Kills is crossed by four drawbridges and one fixed bridge. The minimum clearances of the drawbridges are 46 feet horizontal and 3 feet vertical. The fixed bridge has a horizontal clearance of 90 feet and a vertical clearance of 90 feet.

The Metropolitan Avenue Bridge over English Kills has a bascule span with a horizontal clearance of 86 feet and a vertical clearance of 10½ feet. The swing span of the Montrose Avenue Bridge has a horizontal clearance of 46¾ feet and a vertical clearance of 4 feet.

The mean range of tide in Newtown Creek is about 4 feet. The current is weak and variable.

From Pier 72 at the foot of East 24th Street nearly to the Williamsburg Bridge, sunken reefs extend from 300 to 400 yards off the piers on the New York side of the river. **Shell Reef** on the west side of the river and 0.55 mile north of Williamsburg Bridge has a least depth of 24 feet.

The **Williamsburg Bridge** crossing East River is a suspension bridge with a horizontal clearance of 1,536 feet and a vertical clearance of 135 feet at high water.

The **United States Naval Shipyard** on **Wallabout Bay** is on the south shore southward of Williamsburg Bridge where the East River makes a bend westward.

Wallabout Channel, with entrance on the east side of Wallabout Bay, is 2,000 feet long and has a controlling depth of 40 feet.

The **Manhattan Bridge** crossing East River is a suspension bridge with a horizontal clearance of 1,403 feet and a vertical clearance of 140 feet at high water.

The **Brooklyn Bridge** crossing the East River is a suspension bridge with a horizontal clearance of 1,546 feet and a vertical clearance of 127 feet at high water.

The entrance to East River between the Battery and Governors Island is facilitated by range lights established on the east side of East River. The front light, 40 feet above water, is shown on the southwest corner of New York Dock Company Pier 11. The rear light, 81 feet above water, is shown on sidewall of New York Dock Company warehouse 36, 325 yards 080° from front light.

Seamans Church Institute Light, 216 feet above water, is shown from a tower at the head of Pier 7, on the west side of East River.

Barge Office Light, 16 feet above water, is shown on the southern end of the Coast Guard pierhead, adjacent to Governors Island Ferry Slip. The fog signal is an electric siren.

Tides.—The mean range of the tide in the Upper Bay is about 4½ feet. Daily predictions of the tide at the Battery are given in the *Tide Tables*.

Tidal currents have great velocity between Sunken Meadow and the north end of Blackwells Island; the greatest velocity is between Negro Point and Halletts Point, where extra caution is necessary to avoid collision with passing vessels. The west shore of Blackwells Island should be given a berth of at least 70 yards, and when abreast of East 65th Street the west shore of the island should not be approached closer than 100 yards.

Chart 274.—Sunken Meadow is a marshy area off the northeast end of Wards Island. It has been diked and is partly filled in. Sunken Meadow Light, 48 feet above water, is shown from a red skeleton tower, white tank house, red square base, on the east side of the meadow. The fog signal is an electric bell.

The Harlem River can be approached through **Little Hell Gate** by an unmarked

narrow foul channel leading past the north end and along the west side of Sunken Meadow. This channel can be used only by small craft.

Little Hell Gate is crossed by three fixed bridges. New York Connecting Railway bridge has a horizontal clearance of 200 feet and a vertical clearance of 61 feet. The center span of the Wards and Randalls Island Bridge has a horizontal clearance of 233 feet and a vertical clearance of 32½ feet in the center, or a vertical clearance of 15 feet minimum over a width of 200 feet. The Triborough Bridge has a horizontal clearance of 113 feet and a vertical clearance of 60 feet.

Bronx Kill is a narrow, shallow, unnavigable passage on the northeast side of Randalls Island, connecting East and Harlem Rivers. **Randalls Island** has municipal buildings scattered over it and is prominently marked by Triborough Bridge.

Harlem River and **Spuyten Duyvil Creek.**—These waters form a through passage from Hudson River, 11.8 miles above the Battery, to East River westward of Wards Island. The channel is navigable only for powered vessels. The traffic is extensive. Vessels of too great height to pass under the bridges when closed should preferably make the passage against the current.

The Federal project provides for: A channel 15 feet deep, 400 feet wide, from East River to Hudson River, except in the vicinity of Washington Bridge, where it is 354 feet wide and at the rock cut west of Broadway Bridge.

In 1946 the controlling depth from East River to Hudson River was 15 feet.

Bridges over Harlem River

Name	Type	Clearances	
		Horizontal	Vertical
		feet	*feet*
125th Street	Vertical lift	204	55
Willis Avenue	Swing	109	25½
2nd Avenue	Swing	98½ East Draw 99 West Draw.	29
3rd Avenue	Swing	100½ East Draw 102½ West Draw.	26
4th Avenue	Swing	103 East Draw 103½ West Draw.	26
Madison Ave., 138th St	Swing	104½	26
145th Street	Swing	104 East Draw 104½ West Draw.	26
Macombs Dam	Swing	164	29
Putnam	Swing	124 East Draw 123 West Draw.	29
High	Fixed	322½	101
Washington	Fixed	354	135
207th Street	Swing	101½ East Draw 102½ West Draw.	27
Broadway	Swing	101	26
Henry Hudson	Fixed	418	143
Spuyten Duyvil	Swing	100 North Draw 100½ South Draw.	6½

For bridge regulations see Chapter 2, § 203.160.

Tides.—The mean range of the tide at Willis Avenue Bridge is about 5 feet;

4th Avenue Bridge, 4¾ feet; Broadway Bridge, 3¾ feet; Spuyten Duyvil Bridge, 3½ feet.

Currents.—The local rule for the tidal currents is that the current in Harlem River runs from the Hudson River toward East River (south current), while the easterly current is running in East River (Hell Gate); and the reverse. In Harlem River the southerly stream is considered the flood.

The times of slack water are subject to variations depending upon freshet conditions in the Hudson River, but generally the slacks before the southward and northward currents occur about ¼ hour before the flood (northeastward) and ebb (southwestward) currents, respectively, begin in Hell Gate. Likewise the strengths of the southward and northward currents in Harlem occur about ¼ hour before maximum flood and maximum ebb, respectively, in Hell Gate. The velocity of the current is 2 knots or more in the narrower parts of the channel. Strong currents with swirls occur between the piers of High Bridge. For predictions and detailed information see the *Current Tables* and *Tidal Current Charts*.

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CHAPTER 10

Shinnecock Light to Fire Island Light

Chart 1214

THE SOUTH COAST OF LONG ISLAND has a general 247° trend for 68.5 miles from Montauk Point to Fire Island Inlet, and thence trends 263° for a little over 35 miles to the western end of Coney Island and the northern point at the entrance to the Lower Bay of New York. It is a clean shore and may be safely approached as close as 1 mile with not less than 30 feet anywhere between Montauk Point and Rockaway Inlet, except off Fire Island Inlet and the inlets westward, where the shore should be given a berth of at least 1.5 miles. When viewed from seaward it presents but few prominent features. It is composed of a series of sand hillocks backed by low dark woods.

A Coast Guard station is about 3.5 miles west-southwest of Montauk Point.

Shinnecock, Moriches, Great South, and Hempstead Bays are inside the beach along the south coast of Long Island and form an inside route for boats of 4-foot draft. In 1949 the three main inlets from sea to these bays used by boats were Fire Island Inlet, Jones Inlet, and East Rockaway Inlet. These inlets are subject to frequent and extensive changes, and although buoyed, should not be used in the absence of local knowledge.

Two small inlets, namely Shinnecock Inlet and Moriches Inlet, which broke through in 1938 and 1931, respectively, are used by small boats for entrance to these bays instead of the main entrance, but their use is not advisable.

Shinnecock Light, 67 feet above water and visible 14 miles, is shown from a red skeleton tower on the west side of Shinnecock Inlet. The fog signal is an electric siren.

Chart 578.—Shinnecock Canal connects Great Peconic Bay and Shinnecock Bay. It is a partly dredged cut and is protected at the northern entrance by two jetties. A light is maintained at the north end of the east jetty. The canal and dredged cuts through the bays to Great South Bay are owned and maintained by Suffolk County of New York. The cuts between the bays leading to Great South Bay were dredged to a depth of 6 feet and a width of 100 feet. Shoaling has occurred in some of these cuts and at the Great Peconic Bay buoyed entrance to the canal, and in 1949 the controlling depth from Great Peconic Bay to Great South Bay was 5½ feet. The canal is crossed by two fixed bridges, with spans for the full width of the canal and a

minimum overhead clearance of 20 feet. A lock is maintained north of the two bridges crossing the canal. The dimensions of the lock are 26¾ by 100 feet with a depth over the sills of 4½ feet. The gates are opened to allow the current to set south through the canal and are closed to prevent the water from Shinnecock Bay flowing back into Great Peconic Bay. Boats can always go through as the gates will be opened when necessary. The signal for opening the locks is 3 blasts of the boat whistle or horn.

The strength of the southward current in the canal occurs about ¾ hour earlier than maximum ebb in The Narrows, New York Harbor. At the railroad bridge it has an average velocity of 1½ knots. Swirls occur at the lock. See *Current Tables* for predictions.

On the east side of the canal just south of the jetties is a boat basin in which the depth ranges from 7 to 10 feet. Near the railroad bridge gasoline boats tie up at the bulkhead.

On the west side of the canal north of the railroad bridge is a small boatyard and marine railway which can haul boats of 35 tons weight, 50 feet length, and 5 feet draft. Hull and engine repairs can be made and boats built to order. Gasoline, lubricants, water, ice, and supplies are available. The boatyard dock has a depth of 9 feet along its face and facilities for mooring. Telephone and electrical connections are installed on the dock.

Shinnecock Bay is about 8 miles long and can be entered by boats of 4-foot draft. The channel through Shinnecock Bay is well lighted and buoyed.

Depths of about 3 feet can be taken into the small coves on the northeast side and the east end of the bay.

Shinnecock Inlet which was formed as a result of the 1938 hurricane was reported in 1949 to have depths of 8 to 23 feet through the cut, but a controlling depth of only 5½ feet in the approach from the ocean. The inlet is now marked by lights. As this inlet is subject to changes and is not buoyed, local information should be obtained before using it.

Hampton Bays, a station on the Long Island Railroad just west of the canal, is the nearest post office. **Canoe Place,** the settlement at the canal, has gasoline and some supplies. Several small boat landings are in the canal and it is quite a small boat center.

Ponquogue Point, low and sandy, is marked by a steel water tank. Coast Guard Station No. 72 is here. It displays storm warnings by day only. A highway bridge with bascule span crosses the bay at this point. It has a horizontal clearance of 49 feet and a vertical clearance of 14 feet closed at center of span at high water. A channel leads southeastward from the point south of **Warner Island** to west Shinnecock Inlet. Buoys and lights mark the channel which had a controlling depth of 5 feet in July 1949 from the waterway to Shinnecock Inlet.

Pine Neck, 2.3 miles westward of Ponquogue Point, is low, flat, and sandy. The shoal extends southward from **Pine Neck Point** and is marked on the south end by a buoy. About 0.5 mile east of Pine Neck, a 2½-foot channel leads to **Tiana Beach,** a small summer resort on the south side of Shinnecock Bay.

Weesuck Creek, on the north side near the western end of Shinnecock Bay, has been improved by a dredged channel 80 feet wide and in September 1949 had a controlling depth of 4½ feet to head of navigation. Two boatyards with marine railways are established here. The larger yard can haul out vessels up to 60 feet length and

6 feet draft. Facilities are available for storage and mooring. Gasoline, lubricants, fresh water, and ship chandlery are available. Diesel oil can be delivered by truck upon request. The post office is East Quogue.

Quogue Canal, connecting Shinnecock Bay with Quantuck Bay, has been dredged to a depth of 6 feet for a width of 100 feet. In September 1949 the controlling depth was 5½ feet. The canal is crossed by a bascule bridge which has a horizontal clearance of 50 feet and a vertical clearance of 15½ feet closed at high water.

Quantuck Bay is crossed by a dredged channel which is marked. The bay has a depth of 6 feet and joins Quogue Canal with Quantuck Canal. **Quantuck Creek,** at the head of the bay, is crossed by a fixed bridge which is the head of navigation except for small pulling boats.

Quantuck Canal, connecting Quantuck Bay and Moriches Bay, has been dredged to a depth of 6 feet for a width of 100 feet. In September 1949 the controlling depth was 5½ feet. The canal is crossed by two drawbridges; a bascule bridge at the western side of Quantuck Bay, having a horizontal clearance of 50 feet and a vertical clearance of 10½ feet closed at high water. A bascule bridge at **Potunk Point** has a horizontal clearance of 50 feet and a vertical clearance of 11 feet closed at high water.

About 300 yards northeastward of the bridge at Potunk Point is a dredged channel leading to a yacht basin at **Westhampton Beach.** The channel is along the west bank in the bight, and is marked by bush stakes with red and black flags. Piling is at the entrance to the dredged cut that leads up to Main Street in Westhampton Beach. A reported depth of 5 feet can be carried to the yacht basin, just before reaching the Stevens Lane Bridge. This is a fixed bridge with a vertical clearance of about 7 feet at high water. A depth of 4 feet can be carried from the bridge to Main Street. Gasoline, fresh water, and supplies can be had. Engine repairs can be made.

Moriches Bay, about 8 miles long, is crossed by the inside waterway leading from Shinnecock Canal to Great South Bay. The eastern and western entrances to the bay have been dredged where necessary to a depth of 6 feet. These dredged cuts are marked by buoys. In September 1949 the controlling depth was 5½ feet. The general depths in the bay range from 5 to 7 feet, but the southern part of the bay is shoal.

Speonk Point, near the eastern end of Moriches Bay on the north shore, is marked by a long narrow boat landing and a prominent flagstaff. About 0.5 mile westward is a small basin used by local craft; the entrance is between two short jetties. The depth at the mouth of the basin is about 2 feet, but inside the basin the depths are greater than 5 feet.

Seatuck Cove, on the north side of Moriches Bay, has a reported depth of 2½ feet to the landing at **Eastport,** on the point which separates the two creeks at its head. About 0.2 mile southward of the landing a shoal extends from the east side and is sometimes marked by a stake.

Hart Cove, westward of Seatuck Cove, has depths of 4 to 6 feet. On the west side of the cove is a boatyard with marine railways capable of hauling out craft up to 10 tons weight, 40 feet length, and 3½ feet draft. Alongside the small wharf the depth is 4 feet. All repairs to hulls and engines can be made. Boat storage is available. Gasoline, lubricants, water, and a full line of supplies may be obtained.

Tuthill Cove, locally known as **West Cove,** is on the north side of Moriches Bay, 1.5 miles westward of Seatuck Cove. It has depths of 1½ to 3 feet. **East Moriches** is on the north side of the cove. **Tuthill Point** is on the west side of the entrance to

the cove. Moriches Coast Guard Station No. 76 is established on the east side of Tuthill Cove. Storm warnings are displayed there by day only.

From **Moriches Inlet** to the deeper water in Moriches Bay, 2 channels have been dredged. One extends northwestward from the inlet and the other leads northward from a point about 0.5 mile northeast of the inlet to the waterway. A lighted buoy marks the southern approach to this channel. Moriches Inlet is frequently examined and the latest information given in the weekly *Notice to Mariners*. In 1949 the inlet shoaled so badly that vessels should avoid it altogether, unless of shallow draft and then with local knowledge and never at night. Local fishermen using the inlet maintain small barrel buoys during the summer to mark the channel. A wreck which is nearly covered at high water is on the east side of the entrance channel. Lights have been established at the inlet.

Orchard Neck Creek is extensively used by local small craft as a mooring basin. In 1949 the depth was 3 feet to the head of navigation. A light marks the end of the jetty on the west side of the entrance. Areskond Creek to the westward is used as a harbor by yachtsmen.

Senix Creek, 0.6 mile westward of Orchard Neck Creek, has a narrow entrance, with a depth of 3 feet between bulkheads, and the depths throughout the creek are about 2 feet with a reported depth of 4 feet near the head. A light privately maintained during the summer is on the south end of the bulkhead on the west side of the entrance. The larger of two small boatyards can haul out craft of 8 tons weight, 40 feet length, and 3 feet draft. Gasoline, lubricants, and fresh water can be had. Boat storage facilities are provided.

Forge River, at the northwest end of Moriches Bay, has a channel depth of about 4 feet in the lower half and 3 feet nearly to the railroad bridge at the head of navigation.

Narrow Bay, between Moriches Bay and Bellport Bay, has been dredged where necessary to obtain a depth of 6 feet for a width of 100 feet. The controlling depth in 1949 was 6 feet except for one spot of 5½ feet. About 0.3 mile eastward of **Smith Point** is piling near the channel. Caution is recommended in this vicinity.

Bellport Bay is shoal in its southern part but has depths of 5 to 7 feet in the northern part. The channel in the eastern end of the bay leading to Moriches Bay is marked. A dredged channel, the end of which is marked by a lighted buoy, leads from the main channel in the bay to the Bellport Lifeboat Station. It extends from Great South Beach shoreline into Bellport Bay for a distance of 1,700 yards, on a centerline bearing of 177°15′ from Bellport flagstaff.

Carmans River has a reported depth of 2 feet for nearly 1 mile above the entrance to the landing at Brookhaven, above which the river is crooked and shoal. Sometimes bush stakes are placed on each of the shoals making off from the points at the entrance. Entering in mid-river between these stakes, favor the west side for a distance of 0.5 mile and then follow mid-river. **Long Point** is on the west side of the entrance.

A boatyard, on the west side about 0.6 mile north of Long Point, can haul out small craft up to 15 tons weight, 50 feet length, and 3½ feet draft. Gasoline, lubricants, fresh water, and a limited amount of ship chandlery can be had. Boat storage can be provided.

Beaverdam (Fireplace) Creek, about 1.3 miles west of Long Point, has a small

boatyard capable of hauling out small craft up to 6 tons weight, 35 feet length, and 3 feet draft. Water and boat storage can be obtained.

Bellport, a town on the north side of Bellport Bay, has a wharf with 4½ feet at its end. The greatest draft taken to the wharf is about 5½ feet at high water. The approach is clear. Gasoline, provisions, and motorboat supplies can be obtained and gas engine repairs can be made. A ferry runs across the bay in a southeasterly direction and through a slough between the shoals to **Old Inlet** on **Great South Beach.** The slough is marked with stakes and private lights in the summer.

Great South Bay, on the south shore of Long Island, extends from Bellport Bay on the east to South Oyster Bay on the west. It is about 20 miles long and about 4 miles across its widest part. It can be entered at low water by boats of 8-foot draft through Fire Island Inlet, 4-foot draft from Great Peconic Bay, and 8-foot draft from westward through Hempstead Bay. The southeast and southwest portions of the bay are shoal. The central portion has, for the most part, depths ranging from 7 to 12 feet. The channels through the bay are well buoyed and lighted.

Patchogue Creek, on the north side of Great South Bay and 3.7 miles west of Bellport, has a buoyed approach channel 100 feet wide. The controlling depth through Great South Bay and Patchogue Creek was 8 feet in October 1949. The west side of the entrance is protected by a breakwater, the south end of which is marked by a light. The east side is protected by bulkheading and a short jetty extending southward from it. A light maintained by the town is near the inshore end of the jetty. When entering steer mid-channel courses.

Several boatyards are on Patchogue Creek, all of which have railways and facilities for making major repairs. The largest marine railway in Great South Bay is established here. It can haul out vessels up to 300 tons weight, 140 feet length, and 14 feet draft. All hull and engine repairs can be made and boats built to order. Gasoline, fresh water, and ship chandlery can be obtained. Mooring and boat storage are available. Diesel oil is delivered by truck to the dock.

Patchogue, the principal town on Great South Bay, is important as a distributing point for most of the major oil companies. A large oil terminal is on the west side of Patchogue with depths of 25 to 28 feet along the face of the wharf. Elsewhere the depths at the wharves vary from 3 to 9 feet. A yacht club is near the entrance of the creek.

Brown Creek, 3 miles westward of Patchogue, has been improved by building 2 short jetties out to a depth of about 4 feet. The west jetty is marked at the south end by a light on a black skeleton steel tower and the east jetty by a daybeacon. In August 1948 the controlling depth in the entrance channel was 2½ feet. When entering keep midway between the jetties and follow a mid-channel course up the creek.

Green Harbor, about 1 mile west of Brown Creek at **Sayville,** has a boatyard which can haul out vessels of 25 tons weight, 120 feet length, and 7 feet draft. However, the draft is limited by the depth of water in the harbor which is about 4 feet. Gasoline and water can be had at the wharf which has a depth of about 4½ feet at the end.

Westward of the entrance to Green Harbor are several wharves which are extensively used by the local oyster industry. Gasoline, water, and ice can be obtained here.

Connetquot River, locally known as **Great River,** 3 miles westward of Brown Creek, has a depth of 2½ feet for 2 miles above the entrance, to the railroad. When entering the river the east bank must be favored to avoid stumps of trees and other obstructions. A prominent residence with clock tower is on the north side of the entrance.

A small boatyard is on the east bank of the river about 1 mile from the entrance. Small craft up to 35 feet length and 3 feet draft can be hauled out. Gasoline, lubricants, and fresh water are available. On the opposite shore is a public landing with depths of 3 feet at the end of the wharf.

Great River is the name of a village on the west side of the river.

Cherry Grove is a summer resort on Great South Beach about 4 miles southward of Brown Creek. A boat landing extends to a depth of 4½ feet in Great South Bay. Boat communication is maintained between Cherry Grove and Sayville.

Point o' Woods, Fair Harbor, Ocean Beach, and **Saltaire** are summer resorts on Great South Bay westward of Cherry Grove. Gasoline and provisions can be obtained. Boat communication is maintained between these settlements and Bayshore, a town northwestward on the north shore of Great South Bay.

On the north shore of Great South Bay, in the vicinity of **Nicoll Point** is **Heckscher State Park.** Westward of Nicoll Point are several small creeks which have been dredged to various depths by private interests.

Great Cove is on the north side of Great South Bay about 4 miles westward of Nicoll Point. It has depths of 4 to 8 feet.

Orowoc Creek, which enters the northeast part of Great Cove, leads to the boat basin and wharves at the town of **Islip.** The controlling depth is about 5 feet. The channel is sometimes marked by privately maintained buoys and stakes. A light which is privately maintained during the summer marks the west edge of the 3-foot shoal on the east side of the channel near the entrance of the creek.

A boatyard with marine railways can haul out small craft up to 30 tons weight, 60 feet length, and 5 feet draft. Repairs to hull and machinery can be made. Gasoline, lubricants, fresh water, and ship chandlery are available. Mooring and boat storage facilities are available. Several large fish-packing plants are on the creek.

Bay Shore is a large fishing center on the northwest shore of Great Cove. A standpipe and a large gas tank are prominent. The town landing near the entrance of Penataquit Creek has depths of 7 to 8 feet at its end. From the town landing boats connect with Ocean Beach on a year round schedule and during the summer with Point o' Woods, Saltaire, and other beach points.

An electric power cable crosses Great South Bay from Bay Shore in a general south-southeast direction from the entrance of Penataquit Creek following the east side of West Channel to a point northeastward of the village of Saltaire. Anchorage should be avoided in the vicinity of this cable.

Penataquit Creek forms a well protected boat basin at Bay Shore. It has several boatyards, the largest of which can haul out craft up to 50 feet in length and 6 feet in draft. Repairs to hulls and machinery can be made. Facilities for mooring and storage are available. Diesel oil and water can be had at the town dock. Supplies of all kinds are available.

Watchogue Creek, locally known as West Creek, is just westward of Penataquit Creek. It has several boatyards, the largest of which can haul out craft up to 200

tons weight, 125 feet length, and 8 feet draft. All hull and engine repairs can be made. The depth alongside the bulkhead landing is from 6 to 9 feet. Gasoline, lubricants, fresh water, and a full line of ship chandlery may be obtained. A chart agency is here.

A yacht basin with a depth of 6 feet has been dredged at **Brightwaters** on the southwest side of town.

A yacht club is established near the point southwest of Watchogue Light.

East Channel, Range Channel, West Channel, and Dickerson Channel are waterways through Great South Bay leading to Fire Island Inlet.

East Channel is buoyed and is good for a depth of 8 feet. From between Fire Island Light and **Fire Islands** the channel trends northeastward to Fire Islands, then eastward along the beach to Point o' Woods, then northward to northeastward to the buoyed channel through Great South Bay.

Range Channel is close to westward of East Channel. It is marked by buoys and is good for a depth of about 7 feet.

West Channel is buoyed and is good for a depth of 7 or 8 feet. From close westward of Fire Islands the channel trends about 338° for 1 mile, and then about 321°. The lighted buoys in East, Range, and West Channels are maintained on station from April 1 to December 1.

Dickerson Channel, which branches off in a northwesterly direction from West Channel, is buoyed and is good for a depth of about 5 feet, which occurs at the crossover from West Channel to Dickerson Channel. Numerous changes have been made in the buoyage in East Channel, West Channel, and Range Channel. These buoys are changed in position with changes in the channel.

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CHAPTER 11

Approaches to New York

Chart 1215

NEW YORK is generally approached from seaward by following the south coast of Long Island or the east coast of New Jersey. In this chapter the outer coasts are described followed by a description of the inland waterway along the south coast of Long Island which is a continuation of the last part of Chapter 10. New York Harbor and the adjacent waters are described in Chapter 12.

New York Harbor is easily approached from any direction between south and east. When approaching, the low sandy beaches of the New Jersey shore will be observed to westward, and the south shore of Long Island will be seen to northward. The New Jersey shore is characterized by long sandy stretches and many summer resort settlements. The Long Island shore is readily identified by sand hillocks and thickly settled beach communities.

The two most prominent landmarks which can be seen for long distances at sea are Navesink Light and Sandy Hook Light at the north end of the Jersey coast, and Fire Island Light on the Long Island shore. When nearing the New York Lower Bay, Ambrose Lightship and Scotland Lightship will be seen. Ambrose Lightship marks the entrance to Ambrose Channel which is the principal deep water passage through the Lower Bay. Scotland Lightship marks the entrance to South Channel, a secondary passage on the south side of the Lower Bay.

Soundings will be found most useful to warn vessels of too close an approach to the shore in approaching New York Harbor. Many vessels have been wrecked on the coast of New Jersey and Long Island through failure to take frequent soundings when the position was uncertain. Depth is a better indication of position off this part of the coast than the character of the bottom, as the same characteristics may be found in widely different positions. A frequent use of soundings and close study of the charts will always give sufficient warnings of danger.

If a vessel is not certain of her position, the depth should not be shoaled to less than 15 fathoms on the south coast of Long Island eastward of Fire Island Light, 12 fathoms between Fire Island Light and Barnegat Lightship, and 10 fathoms southward of Barnegat Lightship.

From the position of the two shores relative to each other and to the entrance to New York Harbor it follows that a course of 215° will deepen the water if the vessel is on the Long Island side of the approach and will shoal if she is off the New Jersey

coast. A course of 035° will deepen the water if the vessel is off the New Jersey side of the approach and will shoal if she is off the Long Island coast.

Eastward of Fire Island Light the water shoals quite rapidly toward the Long Island shore, but inside a line drawn from Fire Island lighted whistle buoy 2FI to Barnegat Lightship, there is no marked difference in the soundings as either shore is approached except in Mud Gorge.

Modern surveys show the existence of a canyon, evidently cut by the Hudson River in prehistoric days, across the continental shelf, extending about 120 miles southeastward from off Sandy Hook. The inshore section is called the **Mud Gorge** and the offshore section the Hudson Canyon. In some sections of this cut the depths are considerably greater than those adjacent to it and the walls are very steep. The use of soundings, especially by vessels equipped with echo sounding machine, permits a very accurate determination of a ship's position by the comparison of the soundings with the depth curves on the charts. The bottom of the Mud Gorge is usually of mud while on both sides of it sand predominates.

Cholera Bank, about 10 miles southeastward of Ambrose Lightship, is about 2 miles long in an east-west direction, and has a least depth of 10 fathoms. The bank is very little raised above the general level of the bottom, however, because the bottom is rocky in character, a careful use of the lead will give useful indications in thick or foggy weather. During the summer months numerous fishing vessels may be seen on this bank.

Caution.—Telegraphic companies report serious interruptions of international telegraphic communications resulting from repeated breaking of their cables by vessels anchoring southeastward and eastward of Ambrose Channel Lightship. The companies state that they will be glad to compensate any vessel, which, having fouled the cable, cuts away its anchor and chain in order to save the cable from interruption. Vessels making New York in thick weather and finding it necessary to anchor before entering Ambrose Channel should anchor in the area southward of Scotland Lightship and westward of the meridian passing through Ambrose Channel Lightship.

Tides.—Daily tide predictions for Sandy Hook are given in the *Tide Tables*.

Currents in the approach to New York Harbor.—Between Nantucket and Cape May away from the immediate vicinity of the shore, the tidal currents are generally rotary. They shift direction, usually clockwise, at an average rate of about 30° an hour, and have velocities generally less than ¼ knot except in the vicinities of the entrances to the larger inland waterways where the velocities increase as the entrances are approached. For considerable distance from the entrances strengths of flood and ebb set respectively toward and away from those entrances, and minimums of velocity, corresponding to the slacks of reversing currents, set at right angles to the direction of flood and ebb strengths.

Offshore and away from the influence of the tidal flow into and out of the larger bays, the tidal current maintains an approximately uniform velocity. Shifting its direction continuously to the right, it sets all directions of the compass during each tidal cycle of 12.4 hours.

For predicted times and velocities of the tidal currents at a number of locations in the coastal waters, the *Current Tables* should be consulted.

Between Nantucket Island and Sandy Hook there is a general drift of the sea south-southwestward. The average velocity of this movement is about 0.1 knot.

Approaching New York Harbor from the vicinity of Nantucket Shoals Lightship, a slight allowance should be made for a southwesterly set of the current. Should the wind be easterly it is customary to allow, in order to make the course good, a set of the current with it of at least ½ knot.

The effect of the wind on the currents should always be considered. The largest velocities likely to occur during storms are 2½ knots at Nantucket Shoals Lightship and 1½ knots at Fire Island lighted whistle buoy 2FI and off Five Fathom Bank.

Between Gay Head and Montauk Point the tidal currents set northward on the flood and southward on the ebb. The estimated velocity at strength where the depth is about 25 fathoms is ½ knot; closer inshore and near the entrance this velocity increases.

At Fire Island lighted whistle buoy 2FI the tidal currents have a mean velocity at strength of about ¼ knot in a westward direction on the flood and an eastward direction on the ebb.

The important currents affecting navigation are those due to winds, the largest velocity likely to occur under storm conditions is 1½ knots. A sudden reversal in the direction of the wind produces a corresponding change in the current either diminishing or augmenting the velocity. Sustained winds do not maintain the currents at the maximum velocities. At Ambrose Channel Lightship the velocity at strength of the tidal current is about ¼ knot. The largest velocity likely to occur is 2 knots.

Prominent features.—The most prominent landmark southward of the entrance to New York Harbor is the high wooded ridge forming the **Highlands of Navesink.** On the south of the ridge is a cleared space on which is **Navesink Light.** The light, 246 feet above the water and visible 19 miles, is shown from the southerly of two brownstone towers on the easternmost spur of Navesink Highlands. The northerly tower is octagonal, the southerly tower square.

Ambrose Channel Lightship is moored in 78 feet of water off the entrance to New York Harbor. The lightship has a red hull with the word AMBROSE on each side, and two masts with circular grating at each masthead. The light, shown from the mainmast head, is 65 feet above the water and visible 14 miles; a riding light is on the bow. If the mainmast light cannot be shown a similar light will be shown from the foremast head. The fog signal is an air diaphragm horn; the radiobeacon is synchronized with the fog signal for distance finding. The code flag signal and radio call is NNBA. **Storm warnings** are displayed during the daytime.

Scotland Lightship is moored in 63 feet of water off the entrance to New York Harbor. The lightship has a red hull with the word SCOTLAND on each side, and two masts with a circular gallery at each masthead. The light is 57 feet above the water and visible 13 miles; a riding light is on the bow. The fog signal is an air diaphragm horn; a radiobeacon is at the lightship. The code flag signal is NNBU. **Storm warnings** are displayed during the daytime.

The south coast of Long Island from Fire Island Inlet to Rockaway Inlet has a general 263° trend for 30 miles. It is a clean shore, and may be approached as close as 1 mile, with not less than 5 fathoms except off the inlets where the shore should be given a berth of at least 1.5 miles. This coast is characterized by sandy beaches and summer resorts at the eastern end, and amusement parks and densely settled communities at the western end.

The shoreline is broken by three prominent and navigable inlets which lead to the inland waterway along the south shore of Long Island. Fire Island Inlet is at the eastern extremity and its entrance is marked by lights and buoys. Jones Inlet is about 12 miles to the west of Fire Island Inlet. The entrance is prominently indicated by a lookout tower and flag tower on each side. Jones Beach State Park is on the east side of the inlet; a lighted tower in the park is a conspicuous landmark.

About 9 miles westward of Jones Inlet is East Rockaway Inlet which is the extreme western entrance to the inland waterway. The inlet entrance is marked by a breakwater with a light on its seaward end. Between the two inlets the shoreline is closely built up with large communities. Elevated tanks, towers, and other tall structures are prominent in this area.

Rockaway Point, 9 miles westward of Jones Inlet, is the southwestern extremity of Long Island and the eastern entrance to New York Lower Bay. A breakwater, marked at its seaward end by a light, extends southward from the point. Rockaway Inlet forms a large deep entrance to Jamaica Bay.

The inlets are fully described in connection with the inland waterway later in this chapter.

Sandy Hook, northward of Navesink Light and the southern entrance point to New York Harbor, is low and sandy. Near the northern extremity of Sandy Hook are a Coast Guard station, a day and night **storm warning** display station, and two tall observation towers from which coastwise and foreign vessels are reported to the Maritime Exchange in New York City. These observation towers and a large black tank to the southeast are the most prominent objects on the northern end of Sandy Hook. Southward of the tank are several houses and **Sandy Hook Light.** The light, 88 feet above water and visible 15 miles, is shown from a white stone tower near the northern end of Sandy Hook. This light was established in 1764 and is the oldest in continuous use in the United States. About 0.6 mile northward of the light and on the north end of the Hook is an air diaphragm horn fog signal the structure of which is not visible from seaward.

South of Navesink Light are the following resorts with their distances from the light: **Seabright,** 2 miles; **Long Branch,** 6 miles; **Asbury Park,** 10.5 miles; **Ocean Grove**, 11 miles; **Bradley Beach,** 12 miles; **Belmar,** on the south side of Shark River Inlet, 13 miles; Spring Lake, 15 miles; and Sea Girt, 16 miles. Long Branch and Asbury Park are most conspicuous on account of the greater number of large buildings.

An illuminated advertising sign, visible 18 miles in clear weather, is shown from the top of a building in Asbury Park. This sign has two sides and is so placed that the end points to a little south of east. Mariners should be careful not to confuse this sign with any of the seacoast navigational lights.

Shrewsbury Rocks, 3.3 miles south of Navesink Light, extend 1.3 miles from shore and have a least depth of 14 feet. The eastern end is marked by a buoy and 0.9 mile farther east is a lighted bell buoy. South of Shrewsbury Rocks the 5-fathom curve follows the shoreline about 0.3 to 0.4 mile off.

Chart 578.—Fire Island Inlet, about 28 miles westward of Moriches Inlet on the south coast of Long Island, is about 3 miles long and 0.2 mile wide. The inlet, one of five affording a direct entrance to Great South Bay, is used mostly by fishermen and pleasure craft during the summer months. The inlet has been moving gradually

westward for many years and because of the constant shifting of the channel, the buoys marking it are not shown on the chart.

About 2 miles southward of the western extremity of Fire Island, at **Democrat Point,** a lighted whistle buoy marks the approach to the inlet. A lighted vertical-striped bell buoy, about 0.5 mile southward of the entrance, marks the approach to the inlet.

A jetty 5,000 feet long extends southward from Democrat Point and has a light on the outer end. About 200 yards 180° from the light is a gong buoy.

Strangers without local knowledge should not attempt to enter. A pilot can be obtained by signaling the Coast Guard station or contacting a local fisherman. Navigation through the inlet is extremely hazardous, even under normal weather conditions, with relatively calm seas. During heavy weather the entrance is obstructed by breakers which cover the entire inlet.

Fire Island Light, 167 feet about the water and visible 19 miles, is shown from a black and white horizontally-banded tower about 3 miles eastward of Democrat Point. A radiobeacon is adjacent to the light.

Fire Island Lighted Whistle Buoy 2 FI is about 9.5 miles southward of Fire Island Light, outside the 15-fathom curve, and marks the approach to **Ambrose Channel Lightship** from points eastward.

The **currents** in Fire Island Inlet, after crossing the bar, have a velocity of about 2½ knots at full strength, and are influenced greatly by the force and direction of the wind. For predictions consult the *Current Tables*. In the bay currents have little velocity except in the narrow channels between the shoals and within a radius of 3 miles from the light where their estimated velocity is 1 to 1½ knots. Inside of Fire Island Beach the channels are fairly stable. From the inlet the channel with good depths leads eastward inside the beach beyond Fire Island Light, from which several channels lead between the shoals to the north side of Great South Bay.

Fire Island Inlet remains open throughout the year, but during the months of January and February of severe winters the inland channels through Great South Bay are closed to navigation because of ice conditions.

From the Fire Island Inlet through Hempstead Bay to the East Rockaway Inlet, a distance of about 26 miles, the **Long Island State Park Commission Channel,** an inland dredged channel, provides a protected, well-marked waterway for vessels of limited tonnage and draft.

The regulations of the Long Island State Park Commission are as follows:

Boat channel.—Section 1. The following rules and regulations shall apply to the channel system under the supervision of the Long Island State Park Commission in the south bays of Long Island as shown on map entitled "Sounding Chart Showing State Boat Channel System in the Western Section of the South Shore of Long Island," prepared by the Long Island State Park Commission, Babylon, Long Island, October 1931, and filed in the office of the Long Island State Park Commission, Belmont Lake State Park, Babylon, Suffolk County, New York, copies of which have been filed in the offices of the County Clerks of the Counties of Nassau and Suffolk, and to such additional channel systems as may be shown on maps hereafter filed in the office of the Commission and in the said County Clerk's offices.

Section 2. The term "channel system" as used in these ordinances shall mean main channels, cross channels connecting with them, basins and bathing areas. The term "vessel" includes every description of watercraft or other contrivance used or capable of being used as a means of transportation in water and in air.

Section 3. All provisions of the Navigation Law of this State, of the inland rules enacted by Congress and governing the navigation of the inland waters of the United States and of the Pilot Rules for United States inland waters, applicable to the Channel Systems relative to the rules for vessels passing each other, as to lights on vessels and other matters consistent with the proper use of the Channel Systems, shall be complied with by all vessels navigating said systems.

Section 4. Selling or soliciting or conducting any trade or business in the Channel Systems is prohibited.

Section 5. Discharging of toilets is prohibited in areas designated as basin, dock, or bathing areas.

Section 6. Vessels shall not moor or anchor except at the edge of the channel and in no case shall vessels moor to or anchor within 50 feet of channel markers or so as to interfere with the full use of the channel. No vessel shall moor or tie up to any dock or other State property or moor or anchor in any area designated as a boat basin except in accordance with directions and in the manner specified on signs posted by the Commission. Any vessel which becomes a menace to navigation or to park property or the use thereof, or unseaworthy, or sinks, grounds or becomes otherwise disabled, shall be removed by the owner or person in charge thereof on order of the park superintendent or any park patrolman. If the said boat is not removed within 24 hours after orders to so remove it, it may be removed by the Long Island State Park Commission at the expense of the owner or person in charge thereof.

Section 7. The dumping of oil, refuse, garbage, or waste in the channel systems is prohibited.

Section 8. Every person operating a vessel shall at all times operate the same in a careful and prudent manner and at such a rate of speed as not to disturb the reasonable comfort, or endanger the property of another or the life or limb of any person, or so as to interfere with the free and proper use of the waters of the said channel. Throwing up a dangerous wake when approaching or passing another boat is prohibited by this ordinance.

Section 9. No vessel shall be operated at a greater speed than 12 miles per hour in channels nor at a greater speed than 4 miles per hour in areas designated as basin or anchorage.

Section 10. No person shall operate a vessel propelled wholly or partly by an engine operated by the explosion of gas, gasoline, naphtha, or other substance without having the exhaust from the engine run through a muffler so constructed and used as to muffle the noise of exhaust in a reasonable manner.

Section 11. Long Island State Park patrolmen shall have charge of enforcing the foregoing ordinances, and shall regulate and control the use of the channel systems and the speed, direction, and conduct of boats therein, and every person in charge of a vessel navigating or using the channel systems shall at all times obey orders or directions of such patrolmen. Such patrolmen shall have the right to stop any vessel navigating or using said channel systems and to board the same for the purposes of examination or for the purposes of enforcing any of the foregoing ordinances.

Penalties.—Any person who violates any provision of this code of ordinances, except those provisions governing or regulating motor vehicle traffic on parkways or park roads, shall be guilty of a misdemeanor and shall, upon conviction, be subject to a fine of not to exceed fifty dollars ($50) or imprisonment for not more than thirty (30) days or by both such fine and imprisonment. Any person who violates any provision of this code of ordinances governing or regulating motor vehicle traffic on parkways or park roads shall be guilty of a traffic infraction and subject to such fine or imprisonment or both.

The area is characterized by low, sandy beaches and numerous islands fringed by vast stretches of marshy ground. Many shallow areas, irregular in outline, are a serious menace to the navigation of light-draft vessels. An extensive network of bays creeks, coves, channels, and inlets extend over the entire area.

The channel connecting Great South Bay with Jones Inlet, East Bay, and South Oyster Bay, is narrow, treacherous, and has numerous short bends. Caution should be exercised when navigating in these areas.

A red stone water tower 202 feet high, with a pyramidal top, is adjacent to the **Central Mall** at **Jones Beach State Park**, and is prominent. The tower, floodlighted at night, is visible 25 miles.

A turning basin at the eastern extremity of the channel at **Captree Island** has a depth of 13 feet.

From opposite the northeastward point of **Oak Island** a dredged channel has a depth of 6 feet, and extends northwestward for a distance of about 1.2 miles to Great South Bay. The northern entrance about 2 miles southeastward of Babylon is marked by a lighted buoy.

About 0.3 mile northward of **West Gilgo**, a 7-foot dredged channel extending northward to South Oyster Bay, is marked by a light about 2 miles southward of Amityville.

Babylon is a town near the north shore of Great South Bay. A water tank and a church spire are prominent. The public landing, about 0.3 mile northward of Sampawams Point, and at the mouth of Sampawams Creek, has a depth of 8 feet at the end. Approaching around **Sampawams Point** give the point a berth of 0.3 mile when southeastward of it, and head northeastward for the wharf. Gasoline, Diesel oil, provisions, fresh water, and supplies of all kinds are obtainable. There are marine railways at Sampawams Creek, the largest of which is capable of hauling out boats not over 65 feet long, 30 tons, and 4 feet draft. All the boatyards are well equipped for making both hull and engine repairs.

Sampawams Creek, just northward of the wharf, has been dredged to reclaim adjacent lands, and is bulkheaded on the west side. It is used as an anchorage by small craft and has a depth of about 5 feet through the entrance and greater depths inside. Boats also anchor between the public landing and Sampawams Point. This anchorage becomes choppy during easterly or southeasterly winds.

Carll River, westward of Sampawams Point, has a dredged depth of about 4 feet, which had been cleared of grass and leads in a northerly direction from the entrance and into the creek. A yacht club and a seaplane basin are adjacent to the east side of the entrance. **West Babylon Creek**, locally known as **Mud Creek**, about 1 mile westward of Sampawams Point, has been dredged by private interests to reclaim land near it for boat basins. Several creeks to the westward have been improved in a similar manner.

Oak Beach is primarily a summer resort and fishing village on the north side of Fire Island Inlet. A privately marked channel leading north-northwestward to Babylon is a branch of the main channel. In September 1949, the controlling depth in the dredged channel was 7½ feet. During the summer a lighted buoy, locally maintained by Babylon, marks the northern end of the channel.

At **Seganus Thatch** a small boatyard has a marine railway capable of hauling out boats not exceeding 40 feet in length, and 4 feet in draft. Alongside the bulkhead there is a depth of 4 feet where gasoline and oil may be obtained.

Cedar Island Beach and **Gilgo Beach**, westward of Oak Beach, form part of the Long Island Park System.

About 0.4 mile southward of the town of **Lindenhurst** on **Neguntatogue Creek**, several small boatyards have marine railways capable of hauling out small craft not over 60 feet long, 30 tons, and 5½ foot draft. In September 1949 the town dock had a depth of 5 feet along the face. Gasoline, oil, fresh water, and provisions are obtainable. Facilities for hull and engine repairs are available. A dredged channel with a depth of 3½ feet has been cut through the bar at the entrance to Neguntatogue Creek. Several large landings near the head of the creek from which local boats leave for fishing parties are available for public use.

Great Neck Creek, westward of **Strongs Point**, has been dredged from 15 to 25 feet

for the entire length, a distance of about 1 mile. There are yacht basins on the creek where gasoline, supplies, and repairs may be obtained. A fresh water lake is at the head of the creek.

Amityville Creek, on the north side of the western extremity, has a reported depth of about 6 feet.

Several boatyards on the creek have marine railways, the largest of which is capable of hauling out small craft not over 65 feet long and 6-foot draft. Gasoline, oil, and yachting supplies are available.

Amityville is a small town on the north shore of Great South Bay at its western extremity. In September 1949 a channel with a depth of 4½ feet extended southward from Amityville Creek. It joins the main channel in the vicinity westward of Gilgo Beach. This channel, well marked by lights and posts, is an extension of the main channel and is maintained by the Long Island State Park Commission.

At Amityville a boatyard has a vertical lift marine railway capable of handling boats up to 55 feet, 25 tons, and 5 feet draft.

In September 1949 the Amityville village wharf had a reported depth of from 2 to 3½ feet along the face.

Narraskatuck (Clock) Creek, between Amityville Creek and **Carman Creek,** has been dredged to a reported depth of 3½ feet. Three boatyards are on Carman Creek. The largest has a marine railway capable of hauling out small craft not exceeding 60 feet in length, 15 tons, and 5 feet draft. Carman Creek is used by boats of 3-foot draft. Gasoline, oil, fresh water, and supplies are available. A yacht club is eastward of Narraskatuck Creek.

South Oyster Bay, lying between Great South Bay and Hempstead Bay, is shoal over its greater part. A channel, marked by piling and good for a draft of about 5 feet at high water, extends through the bay. The through traffic uses the State Boat Channel and connecting lanes on the south side of the bay. During heavy weather a short, choppy sea in Great South Bay is uncomfortable to small craft, and even dangerous to open boats.

Hole Creek Channel, connecting South Oyster Bay with the main channel, passes between **Great Island** and **Elder Island,** westward of Gilgo Island, and has a depth of 4 feet.

Gilgo Heading, between Gilgo Beach and the main channel, has a depth of about 14 feet. A **measured nautical mile** course begins just opposite the light marking the short channel to South Oyster Bay, on the south side of the main channel to 1 nautical mile eastward. This course is marked by ranges. A sign reads *Nautical Mile Begins Here.*

Chart 579.—Jones Beach State Park, on the south coast of Long Island, comprises about 2,500 acres and is under the jurisdiction of the Long Island State Park Commission.

Zacks Bay, a dredged basin above the State park, has depths of 6 to 37 feet. A 6-foot shoal spot is at the entrance. The west end of the basin is reserved for bathing.

Northeastward of Zacks Bay the main channel swings northwestward, then northward between **South Line Island** and **Green Island.**

A shallow channel extends northward from about 0.2 mile above the northeastern extremity of South Line Island to about 0.7 mile southward of **Biltmore Shores.**

About 0.5 mile northward of Green Island, a 7-foot channel extends northward to the entrance of **Seaford Creek,** a distance of about 1.5 miles. The southern entrance to the channel is marked by a lighted buoy.

At **Seaford,** a village at the head of Seaford Creek, a small boat repair yard has facilities for repairing hulls and engines. A machine shop and a marine railway for small craft are also available.

A bascule highway bridge crosses **Goose Creek,** between **Great Island** and **Green Island,** and has a horizontal clearance of 75 feet and a vertical clearance of 20 feet.

About 0.3 mile westward of the Goose Creek Bridge, a channel marked by lighted buoys has a depth of about 8 feet, and extends northward to the entrance of **Island Creek,** a distance of about 1.1 miles.

A fixed highway bridge crosses Island Creek between Great Island and Long Island, about 1.5 miles southward of **Wantagh.** The bridge has a horizontal clearance of 25 feet and a vertical clearance of 7 feet.

Hempstead Bay is the name applied to the numerous sloughs which lie inside the beach from the west end of Great South Bay to Far Rockaway. The sloughs of Hempstead Bay are subject to large changes in the vicinity of the inlets and where dredging is done to reclaim land.

A channel northward of **Snipe Island** and about 0.2 mile southward of **Egg Island,** has a depth of about 7 feet. The channel passes northward of **Deep Creek Meadow,** then southward through **Haunts Creek,** joining the **Sloop Channel** southward of **East Crow Island.** The channel is marked by lighted buoys.

A fixed highway bridge between Green Island and Jones Beach State Park has a horizontal clearance of 29½ feet and a vertical clearance of 14½ feet.

A bascule highway bridge crosses Sloop Channel between Jones Beach State Park and **Jones Island.** The bridge has a horizontal clearance of 75 feet and a vertical clearance of 27 feet in the center of the span and 21½ feet at the abutments.

The markers for the main channel north of Jones Beach, between Jones Inlet and Fire Island Inlet, are piles painted black, with caps painted white and with aluminum arrows pointing to deep water.

About 0.2 mile from the southwestern extremity of Jones Island a light marks a 3-foot shoal spot at the right-angled turn of the main channel.

From this point the channel runs north-northwestward to about 0.3 mile above the fixed highway bridge; then turns southwestward passing northward of **Meadow Island.** The bridge has a horizontal clearance of 29½ feet and a vertical clearance of 20 feet.

A fixed highway bridge between **West Crow Island** and Pettit Marsh crosses the **Fundy Channel,** and has a horizontal clearance of 29½ feet and a vertical clearance of 14 feet. A connecting channel northward of **Big Crow Island** has a depth of about 13 feet and its northern terminus is marked by a lighted buoy. An extension channel has a depth of about 5 feet and extends northeastward, passing southward of **Neds Meadow** to **Broad Creek Channel.** The junction of the two channels is marked by a lighted buoy.

A channel extending northward between **False Channel Meadow** and **Pettit Marsh** swings westward and southward of **Fighting Island** to the junction with **The Narrows** and **Freeport Creek.** The channels have depths of about 15, 10, and 12 feet, respectively. A fixed highway bridge crosses The Narrows between Fighting Island and

Pettit Marsh; the horizontal clearance is 28 feet and the vertical clearance is 12 feet.

Hudson Channel, extending northward to the piers at Freeport, has a depth of about 7 feet.

Woodcleft Canal, about 0.3 mile westward of and connecting with the channel on the northern extremity of the Hudson Channel, has a depth of about 11 feet. The channel is marked by a lighted buoy at the southern entrance.

Long Creek, between **Pine Marsh** and **Smith Meadow,** has a depth of about 6 feet, and is marked by lighted buoys. A depth of 6½ feet can be taken through Long Creek by favoring the markers northward of the channel. The section of the channel below Long Creek drawbridge has a depth of about 7 feet and is marked by lighted buoys.

A channel between Pine Marsh and Pettit Marsh has a depth of 15 feet and joins with The Narrows and Long Creek about 1 mile northward of the **Bay of Fundy.**

Freeport, a city on the north shore of **Baldwin Bay,** has a small boat repair yard adjacent to the fuel wharf at the head of Hudson Channel. A marine railway, capable of hauling out boats not over 80 feet in length, 22 tons, and 6-foot draft, is available. The dock has a depth of 8 feet alongside. Gasoline, Diesel oil, provisions, and general supplies are available.

On the west side of Woodcleft Canal, about 0.3 mile above the entrance, a small boat repair yard has facilities for general repairs on hulls and machinery. A marine railway is available for hauling up boats not exceeding 60 feet in length, and up to 6-foot draft.

A small boat anchorage is available on the north bank of the channel connecting Randall Bay and Baldwin Harbor. For further information see Anchorage Regulations in Chapter 2, § 202.20.

Freeport is served by bus and railroad to New York City, and to all other points on Long Island.

Millburn Creek, a dredged channel extending northward to Baldwin, from the northwestern extremity of Baldwin Bay for a distance of about 1.2 miles, has a depth of about 6 feet. These channels are marked by barrel buoys, locally maintained, during the summer months.

A channel connecting **Randall Bay** with **Baldwin Harbor** has a depth of about 16 feet and is marked by lighted buoys.

About 1 mile southward of **Baldwin** a lighted dredged channel eastward of **Parsonage Cove,** has a depth of about 8 feet extending southeastward, joining a 5-foot channel from Baldwin Harbor. A lighted buoy about 0.6 mile southward of the harbor marks the point where the two channels junction with **Scow Creek** which has a depth of about 2 feet.

A bascule bridge, **Loop Parkway,** crosses Long Creek between **Alder Island** and Meadow Island and has a horizontal clearance of 75 feet and a vertical clearance of 26 feet. The bridge is attended, and opens on signal at any time. The other two drawbridges observe variable opening hours, contingent upon the volume of seasonal traffic. However, there are telephone stands on each side of both bridges. In each case the phone stand is on the right side of the channel on both the east and west sides, at points 100 yards before the draw. By telephoning the tender of Long Creek Bridge openings will be arranged if either of the drawbridges is then unattended, upon

reasonable notice, as rapidly as this can be done by the tender or an employee summoned from headquarters.

Jones Inlet, about 13 miles westward of Fire Island Inlet, is on the south coast of Long Island. A Federal project for improvement provides for an entrance jetty, a channel 12 feet deep, and 250 feet wide, extending from the ocean depth through the inlet to the Loop Parkway Bridge over Long Creek. The total distance is 2.5 miles. Long Creek has a depth of about 7 feet below the bridge and is marked by lighted buoys. The entrance to the inlet, marked by a lighted fairway buoy, is characterized by strong currents and shifting sand shoal bars. **Short Beach Coast Guard Station** is on Jones Beach eastward of the inlet. A wreck with 6 feet over it is about 0.8 mile southward of the Coast Guard station.

A wreck, consisting of large pieces of iron, bares ½ foot at low water and is about 0.5 mile westward of Jones Inlet. It is usually marked by a buoy. Channel buoys mark the best water over the bar and into the entrance, but due to frequent changes of location they are not charted. These buoys occasionally tow under with a strong current.

For information relative to anchorages, see Anchorage Regulations in Chapter 2, § 202.20.

Storm warnings are displayed day only from the Short Beach Coast Guard lifeboat station near the western extremity of Fire Island and adjacent to Jones Beach State Park.

Jones Inlet Light, 12 ~~feet a~~bove the water, is shown from a red conical structure on a pipe tripod about 0.6 mile eastward of the inlet. Strangers should not enter without a pilot. Pilots are available by contacting the Coast Guard station or local fishermen. The tidal current in Jones Inlet has an average velocity at strength of about 3 knots. See *Current Tables* for predictions. The tidal range is 4¼ feet. The controlling depth of the inlet was 4½ feet in April 1949.

The inlet is used mainly by pleasure craft and fishermen and junctions with the State-controlled channels. Several privately owned small wharves are available within the area, nine of which are open to the public and have a berthing space of 2,180 feet. This inlet is the principal entrance from the sea through the inland channel routes to Freeport, Parsonage Cove, High Hill Beach, Short Beach, Coast Guard Station, Merrick, Seaford, Bellmore, Wantagh, and South Oyster Bay.

Reynolds Channel extends westward from Jones Inlet to East Rockaway Inlet and is the main thoroughfare of the route between the inlets. It is crossed by three drawbridges and a fixed span bridge. Strong currents exist in the western portion of Reynolds Channel and caution must be exercised when approaching the drawbridges, particularly with a fair current, to give the signal for opening the draw sufficiently in advance to allow the bridge to be cleared of traffic and the draw opened before arrival at the bridge. See Chapter 2, § 203.180 for bridge regulations. The currents meet at the east entrance of the canal leading west from Cinder Creek.

The fixed bridge over Reynolds Channel between **Point Lookout** and Alder Island has a horizontal clearance of 29½ feet and a vertical clearance of 21 feet.

About 0.2 mile westward of the bridge and just southward of the southeastern extremity of **Long Meadow Island,** the main channel joins Reynolds Channel.

A secondary channel extending northwestward through **Cinder Creek** and west-

ward of **Parsonage Island** to **Middle Bay** has a depth of about 3 feet. The channel is marked by a lighted buoy at its southern extremity.

In September 1949 a survey showed a 6- and a 7-foot shoal spot southward of **Ingraham Hassock.**

About 0.2 mile southwestward of **Garret Lead,** a rocky shoal, bare at low water, is marked by a lighted buoy.

The water front on the north side of **Long Beach** has been bulkheaded.

A bascule highway bridge crosses the main channel between Long Beach and **Island Park,** and has a horizontal clearance of 100 feet and a vertical clearance of 13 feet. For further information see Bridge Regulations in Chapter 2, § 203.180.

About 0.2 mile westward of the highway bridge a swing railway bridge crosses the channel between Long Beach and Island Park. The bridge has a horizontal clearance of 40 feet and a vertical clearance of 3½ feet.

A fixed footbridge, about 0.2 mile northwestward of the railway bridge, crosses a 15-foot dredged channel through Island Park and has a horizontal clearance of 29 feet and a vertical clearance of 10 feet. A fixed highway bridge about 0.2 mile above the footbridge has a horizontal clearance of 25 feet and a vertical clearance of 7 feet.

Two wharves with a total berthing space of 400 feet are available at Island Park.

Hog Island Channel, westward of Island Park, passes southward of **East** and **West Meadow** and then eastward of **Black Banks,** where it joins the main channel. The channel connecting with the East Rockaway Channel is about 2.2 miles long and has a depth of about 6 feet. The channel is marked by lighted buoys.

In 1949 the controlling depth in Hog Island Channel was 9 feet to the oil dock below **Oceanside Beach**; thence 6 feet to the junction with a marked channel eastward of East Meadow Island, and 4 feet to point where channel joins East Rockaway Channel.

At **Oceanside** are five wharves with a total berthing space of 2,000 feet. Three are oil terminals one of which has a railroad spur connection. The other two were not being used in 1948.

About 0.2 mile eastward of **Hicks Beach** a lighted buoy marks the entrance to **Broad Channel.** About 0.6 mile northward of the entrance the channel turns north-northeastward passing eastward of **Cedar Island** through **Nums Creek** to **Hewlett Bay** and **Macy Channel.** The channel has a depth of about 5 feet.

Macy Channel has been dredged to about 9 feet.

Nums Creek Channel branches out of Broad Channel northwestward of Cedar Island, and has a depth of about 4 feet.

East Rockaway Channel has shoaled and is no longer being used.

East Rockaway can be reached by small craft drawing 5 feet through Hog Island Channel or Broad Channel. A small boat repair yard at East Rockaway has a marine railway capable of hauling up boats not exceeding 65 feet in length and 9 feet in draft. A fully equipped machine shop is also available for engine repairs.

Storm warnings are displayed by day only from a point about 0.5 mile southeastward of East Rockaway.

About 1 mile southeastward of Woodmere, a secondary channel, westward of **North** and **South Green Sedge,** connects with Broad Channel about 0.5 mile northward of Hicks Beach. The channel, 1 mile long, has a depth of about 4 feet and is marked by lighted buoys.

At **Woodmere**, on **Woodmere Channel**, a small boatyard has facilities for hauling up boats not exceeding 75 feet in length and 5-foot draft.

About 0.4 mile northwestward of **Brosewere Bay**, a fixed highway bridge crosses Woodmere Channel, and has a horizontal clearance of 34 feet and a vertical clearance of 13 feet. A second fixed bridge 0.2 mile above the first has a horizontal clearance of 87½ feet and a vertical clearance of 10 feet.

A bascule highway bridge crosses the main channel from Long Island adjacent to Bannister Creek entrance to Atlantic Beach and has a horizontal clearance of 99½ feet and a vertical clearance of 15 feet. For further information relative to bridges see Chapter 2, Bridge Regulations § 203.180(c) (1). Strong currents exist in the western area of Reynolds Channel. Caution should be exercised when approaching the drawbridges, particularly with a fair current, to give the signal for opening the draw sufficiently in advance, allowing the bridge to be cleared of traffic and the draw opened before arrival at the bridge.

Atlantic Beach is an important development on the east side of the East Rockaway Inlet. The Nautilus Beach Club, a brown structure with a cylindrical tower atop, is prominent, and is visible from a considerable distance offshore. Westward of the highway bridge there are facilities for mooring. Gasoline, Diesel oil, fresh water, provisions, and other supplies are available.

Long Beach is a residential settlement and seaside resort on the outer beach eastward of East Rockaway Inlet.

The approach to **East Rockaway Inlet** from seaward is marked by a light on the outer end of the jetty on the east side of the entrance. The light, 12 feet above the water, is shown from a red skeleton tower on a tank house base. A gong buoy is moored southward of the light.

About 0.7 mile westward of the light a bell buoy marks the approach from the westward. The channel at the entrance to East Rockaway Inlet is subject to change. The buoys are not charted because they are frequently shifted in position. In 1949 a survey showed a controlling depth of 9 feet.

The inlet is on the south shore of Long Island between the main body of the land and the western extremity of Long Beach. A Federal improvement project provides for a channel 12 feet deep, and 250 feet wide from the 12-foot contour in the Atlantic Ocean to the 12-foot contour in Long Beach Channel, a distance of about 1 mile and protected by jetties. The tidal current in East Rockaway Inlet has an average velocity at strength of 2½ knots. See *Current Tables* for predictions. The currents have considerable velocity in the vicinities of the inlets, and in the sloughs in Hempstead Bay. Between Jones and East Rockaway Inlets the currents meet at the east entrance of the canal leading west from Cinder Creek. The tidal range in Hempstead Bay is greater, being 4 feet at Jones and East Rockaway Inlets, and 2 to 4 feet throughout the bay.

Strangers without local knowledge should not enter the inlet. This inlet is the principal entrance from the sea to the inland channel routes to **Far Rockaway**, Atlantic Beach, Lawrence, Long Beach, Bay Park, Oceanside, East Rockaway, Island Park, and **Lido Beach**.

Bannister Creek, about 1 mile eastward of East Rockaway Inlet, has depths of about 4 feet on the bar at the entrance. A channel with a depth of about 6 feet leads to the yacht basin. A small boatyard has a marine railway capable of hauling up boats

not exceeding 45 feet in length, and 4 feet in draft. Facilities for boat storage are available. Gasoline, Diesel oil, fresh water, and provisions can be obtained.

Lawrence, about 0.6 mile eastward of East Rockaway Inlet, is a resort settlement on the mainland.

Chart 542.—Rockaway Inlet, the entrance to Jamaica Bay, is between **Rockaway Point** on the southeastward and **Manhattan Beach** and **Barren Island** on the northward. The inlet is obstructed by a shifting sand bar.

The entrance channel, extending southwestward from Rockaway Point to westward of the jetty, is marked by buoys, some of which are lighted. A light on the outer end of the jetty, 34 feet above the water and visible 7 miles, is shown from a red skeleton tower on a red tank house.

The approach from seaward to the entrance channel is marked by a lighted fairway gong buoy about 0.7 mile southward of the jetty. A gong buoy is about 500 yards southwestward of the southern extremity of the jetty.

A shoal with depths of 9 to 17 feet extends north-northwestward for a distance of about 1.2 mile and is marked by buoys. In September 1949 the controlling depth was over 20 feet from the Atlantic Ocean to abreast Rockaway Point, thence 20 feet to Barren Island; thence 16 feet to Mill Basin, and 22 feet to Fresh Creek Basin.

Marine Parkway Bridge, vertical lift highway, crosses Rockaway Inlet between Rockaway Point and Barren Island and has a horizontal clearance of 503 feet and a vertical clearance of 152 feet when open and 55 feet when closed. An electrical siren fog signal is near the center of the bridge.

The tidal range at Rockaway Inlet is about 5 feet.

In the entrance channel near Rockaway Point the tidal current has an average velocity at strength of about 2¼ knots. The ebb attains a greater velocity than the flood and probably exceeds 3 knots at times.

South of Barren Island the velocity at strength is about 2 knots, east of Barren Island it is about 1½ knots. See *Current Tables* for predictions and *Tidal Current Charts, New York Harbor,* for hourly directions and velocities.

Storm warnings are displayed during daytime only from the Coast Guard Lifeboat Station 92 about 2.3 miles eastward of Rockaway Point.

Jamaica Bay is on the south shore of Long Island about 15 miles southeastward of the Battery, New York City. The bay is characterized by numerous meadows, hassocks, and marshes. The north and east shores are bordered by marshlands which extend inland for a short distance. Several small tidal creeks enter the bay from the north. Rockaway Beach forms the south shore. The bay is about 7 miles long and 3½ miles wide and covers an area of about 22.5 square miles. The greater portion of the bay is in the Boroughs of Brooklyn and Queens, New York City, and a small section of the eastern extremity, consisting of parts of Mott Basin and Head of Bay, is in Nassau County.

A Federal improvement project provides for an inland channel extending from the vicinity of the Marine Parkway Bridge along the west and north shores of the bay 18 feet deep and 300 feet wide to Mill Basin, with a turning basin 1,000 feet wide and 1,000 feet long at that point; thence 12 feet deep and 200 feet wide to Fresh Creek Basin; an inland channel extending from the same locality along the south shore to

Head of Bay, 15 feet deep and 200 feet wide; and an entrance channel connecting the two inland channels with deep water in the Atlantic Ocean.

The commercial vessel traffic in Jamaica Bay and in Mott Basin consists of motor tankers, barges, and tugs.

Jamaica Bay is also used extensively by pleasure craft ranging from 15 to 60 feet in length, and from 1 to 6 feet in draft. Only a few small pleasure craft use Mott Basin.

The major difficulty attending navigation in Jamaica Bay results from insufficient depth in Mott Basin. Although there is naturally deep water at the upper end of the basin, the approach channel is narrow and tortuous and has a least depth of 5 feet. This insufficient depth prevents full loading of vessels and limits operations to periods of high water.

During the winter months ice conditions in Mott Basin resulting from the freezing of the channels obstruct vessel movements for periods of about six weeks. Operations by ice breaker are impeded by shallow depths in the channels.

Jamaica Bay is well served by transportation facilities. A system of city, county, and State highways affords connection with all of Long Island and New York City. The Rockaway Beach Branch of the Long Island Railroad crosses the central part of the bay and extends eastward and westward along the Rockaway peninsula, with stations at Far Rockaway and Inwood serving the Mott Basin area.

The main channels are well marked and, with the chart as a guide, vessels should encounter little difficulty in proceeding safely through Beach Channel, Big Fishkill Channel, or Island Channel. Other channels require local knowledge.

In September 1949 **Island Channel** extending from southeastward of Barren Island to Canarsie had a controlling depth of 17 feet on the range. The channel, marked by a lighted range and buoys, can be navigated at night.

About 0.3 mile southward from the southwestward extremity of **Canarsie Pol** on **Long Pol Bar,** the Island Channel Lighted Front Range, 10 feet above the water, is shown from a red dolphin structure with white stripes. The rear range light, 24 feet above the water, is shown from a red dolphin structure with a white diamond. The range is on course 348½°. In 1949 a survey showed a shoal with a depth of 22 feet about 350 yards southward of the front range light.

Floyd Bennett Field, on Barren Island, is the site of a Naval Air Station which is bounded on the westward by Flatbush Avenue, and on the eastward and southeastward by three seaplane runways, and a turning basin between **Ruffle Bar,** Rockaway Beach, Rockaway Inlet, and Island Channel.

A city pier 500 feet in length with a depth of 24 feet alongside is on the eastern side of the island and on the west side of Island Channel. About 0.5 mile southward is a 150-foot wharf with a depth of 24 feet on the face and 3 feet at the head of the wharf. A small boat basin just northward of the city pier has a depth of 18 feet. A marine railway is adjacent to the basin.

On the southeast extremity of Barren Island, Marginal Wharf, 1,800 feet in length, has a depth of 24 feet alongside. A seaplane parking area is just westward of the wharf. At the northern end of the island three radio towers, 150 feet high, are prominent.

Mill Basin, northward of Barren Island on the west side of Jamaica Bay, has been improved by dredging a channel 18 feet deep from the main channel to the wharves on the northwest side of Mill Basin. The basin is well developed and is used mostly by tankers with drafts up to 19 feet.

A bascule highway bridge with a horizontal clearance of 135 feet and a vertical clearance of 35 feet crosses Mill Basin between Barren Island and Brooklyn. For further information see Chapter 2, Bridge Regulations, § 203.175 (a).

There are several boat repair yards in the immediate vicinity with marine railways, the largest of which is capable of hauling out boats not exceeding 110 feet in length, 300 tons, and 12 feet in draft. Major repair facilities and boat storage are available. Several slips are available for boats up to 40 feet in length. Several yacht clubs are here. Supplies are available.

In September 1949 the controlling depth in Mill Basin was 16 feet. **East Mill Basin,** about 0.4 mile northeastward of Mill Basin, has two boat repair yards one of which is on the south side of the entrance and has a marine railway capable of hauling up boats not over 50 feet in length and 5-foot draft. In September 1949 the controlling depth was 14½ feet.

Bergen Beach is a summer resort about 1 mile southwestward of Canarsie.

Canarsie, a town and summer resort on the northwestern shore of the bay, is a part of New York City, with which it has communication by electric roads.

The dredging projects in the immediate vicinity of Canarsie have resulted in the formation of two anchorages, one east and one west of the reinforced concrete pier at Canarsie. The pier is about 380 feet along its southeast side and about 580 feet on its southwest and northeast sides. A maximum current of about ½ knot under normal conditions sets along the southeast side of the pier. Public facilities at the pier include mooring berths for pleasure and fishing craft. In September 1949 the depths alongside the pier were 19 to 30 feet.

Paerdegat Basin, between Bergen Beach and Canarsie, extending northwestward for a distance of about 1.3 miles, is about 300 feet wide. In September 1949 the controlling depth was 11½ feet.

A fixed highway bridge crosses the basin near the mouth and has a horizontal clearance of 61½ feet and a vertical clearance of 29 feet.

About 0.6 mile northeastward of Canarsie pier a fixed highway bridge crosses **Fresh Creek.** The bridge has a horizontal clearance of 43 feet and a vertical clearance of 21 feet.

Eastward of Island Channel, **Big Fishkill Channel** and **Pumpkin Patch Channel** have a depth of 6 feet which may be carried to the eastern extremity of the dredged channel extending eastward from Canarsie.

A bascule highway bridge crosses the north channel with a horizontal clearance of 87½ feet and a vertical clearance of 26 feet.

In September 1949 about 0.7 mile southward of **Howard Beach** dredging operations were progressing on a project providing for a 25-foot channel connecting the north channel with Shellbank Basin and Hawtree Creek.

Shellbank Basin, extending northward about 1.0 mile from the north channel and just westward of Howard Beach, is about 300 feet wide. In September 1949 the controlling depth in the basin was 8½ feet.

A small shipyard at Shellbank Basin has a marine railway capable of hauling up boats not exceeding 60 feet in length, 10 tons, and 6 feet in draft. Facilities for general repairs are also available.

A bascule highway bridge crosses Shellbank Basin about 0.3 mile northward of the

southern extremity of Howard Beach and has a horizontal clearance of 37½ feet and a vertical clearance of 9½ feet.

Hawtree Creek, about 0.2 mile eastward of Shellbank Basin, has a depth of about 11 feet. A bascule highway bridge with a horizontal clearance of 37 feet and a vertical clearance of 10½ feet crosses Hawtree Creek near the entrance.

Rockaway Beach is a popular summer resort on the beach forming the southern extremity of Jamaica Bay. The beach has communication with New York by electric trains and buses. Excursion boats operate between New York and the beach during the summer months only. Gasoline, provisions, and some boat supplies may be obtained here. A marine railway capable of hauling up boats not exceeding 85 feet in length, 40 tons, and 6-foot draft, is available.

Beach Channel, on the north side of Rockaway Beach, has a least depth of 17 feet from the entrance channel to the highway bridge, and 11 feet to the wharves near the railroad bridge. The channel is well marked by buoys.

A bascule highway bridge crosses Beach Channel between Rockaway Beach and **Broad Channel.** The bridge has a horizontal clearance of 100½ feet, and a vertical clearance of 23 feet. For further information see Chapter 2, Bridge Regulations § 203.175 (d).

A swing railroad bridge crosses **Broad Channel** at **Broad Channel Station** and has a horizontal clearance of 58 feet in the north span and 54 feet in the south span, and a vertical clearance of 3 feet. See Chapter 2, § 203.175 (c) for regulations.

A swing railroad bridge crosses Beach Channel just westward of **Barbadoes Basin,** between **Hammel** and **Long Bar.** It has a horizontal clearance of 53 feet in the north span and 48½ feet in the south span; the vertical clearance is 3 feet.

Somerville Basin is 1.2 miles above the railroad bridge over Beach Channel. It has a depth of about 27 feet from the entrance at Conchs Hole Point and about 10 feet at the southern extremity alongside the wharves.

In the vicinity of Conchs Hole Point, Beach Channel changes to **Grass Hassock Channel.**

Mott Basin is a tidal inlet on the south shore of Jamaica Bay in the vicinity of, and partially separating, the adjoining communities of Inwood and Far Rockaway.

The city of New York has dredged the easterly portion of the south channel in Jamaica Bay upstream from Mott Basin to provide fill for the Idlewild Airport. The entrance to the basin is through **Nigger Bar Channel** which has a depth of about 6½ feet. The channel, subject to changes, is marked by private buoys which are not charted.

An overhead cable with a horizontal clearance of 70 feet crosses Mott Basin.

In Mott Basin are eight wharves, three on the south branch and five on the north branch, including a town wharf with a total berthing space of 3,072 feet available. The depths alongside range from 1 to 14 feet. Five of the terminals are used for the receipt of petroleum products. One wharf is used for coal and another for construction materials.

Grassy Bay, on the northeastward area of Jamaica Bay, extends in a general southeasterly direction from the north channel Cross Bay Boulevard bridge to the junction of Head of Bay Channel and Grass Hassock Channel, a distance of about 3 miles.

The bay adjacent to the **New York (Idlewild) International Airport** was dredged to

provide fill for the landing area, to a depth of 30 feet from about 150 yards eastward of the railway bridge to **Green Point** and about 0.6 mile southwestward from the airport on a line from the northeastward extremity of **Goose Creek** to the northeastern end of Grass Hassock Channel.

About 0.5 mile northwestward of Green Point two approach light piers about 400 feet apart, extend outward from the airport bulkhead for about 0.4 mile.

An approach light pier extends southwestward from the airport bulkhead to about 0.3 mile off Board Channel entrance.

About 250 yards southwestward of the western extremity of the two light approach piers, a 25-foot square pier is topped by red lights on red and white poles, and the base platform is marked by red lights.

Bergen Basin, at the northern extremity of Grassy Bay, has a dredged channel extending north and then eastward for a distance of about 1 mile from the bay. The entrance is marked by buoys.

In September 1949 the basin had a depth of 15 feet from the entrance to within 600 feet of the northeastern extremity where it had shoaled to 13 feet.

Coastal tankers, sand and gravel barge tows constitute most of the commerce in the basin. A red circular tank tower about 25 feet high on the southwestern side of the entrance is conspicuous. **Hamilton Beach,** on the west side of the basin, is about 0.4 mile northward of the entrance.

Head of Bay, a dredged channel southeastward of the airport, is about 1.3 miles long and has a depth of about 18 feet. The entrance to the channel is marked by buoys. The entrance channel to the oil terminal on **Uncle Daniels Point** at **Inwood** on the southeast side of Head of Bay, is marked by buoys. Towboats and barges with a 9½-foot draft can be taken to the terminals at high water. Local knowledge is advised for any draft over 5 feet.

At the eastern end of Head of Bay buoys mark the approach channel to **Hook Creek.** A fixed bridge crosses the creek at **Norton Point.** It has a horizontal clearance of 17½ feet and a vertical clearance of 10 feet.

Gerritsen Inlet, northward of Rockaway Inlet, is about 2 miles long and is the approach channel to the **Deep Creek** boat basin. The channel has a depth of about 8½ feet and is marked by buoys.

In September 1949 the lower section of **Dead Horse Bay** was filled in. A boat basin in the upper section of the bay, parallel to the boulevard, was under construction. The controlling depth in the basin was 10½ feet.

A fixed highway bridge crosses **Plumb Beach Channel** about 0.6 mile southeastward from **Gerritsen** and has a horizontal clearance of 113½ feet and a vertical clearance of 35½ feet.

Sheepshead Bay is on the northern side of the eastern extremity of Coney Island, and northward of Manhattan Beach. The bay is well protected and is frequented by numerous pleasure craft during the summer months. The approach channel extends from 200 yards off the southeastern end of Manhattan Beach to the bay entrance. In September 1949 the channel had a depth of 20 feet and is marked by buoys.

A Federal project provides for a channel 6 feet deep, 100 feet wide, from a 6-foot depth in the Atlantic Ocean to a 6-foot depth in Sheepshead Bay, a total distance of about 0.8 mile. In 1946 the controlling depth was 6 feet, 100 feet wide for the length of the channel.

Sheepshead Bay Light, 14 feet above the water, on the east side of the channel, is shown from a white box on a red pile dolphin. A shoal area about 0.3 mile long on the north side of the bay is marked by buoys.

An outfall sewer line extends southward from Sheepshead Bay to about 200 yards northward of Outfall Gate House Light. The light, 24 feet above water, is shown from a tower on the gate house, on the eastern end of a 5-foot shoal spot.

For information relative to anchorage areas established in Sheepshead Bay, see Chapter 2, Anchorage Regulations, § 202.25.

Storm warnings are displayed day only from the yacht club 2 miles southeastward of Sheepshead Bay from June to September.

Gasoline, Diesel oil, provisions, and all kinds of small boat supplies are obtainable. A marine railway capable of hauling out boats not over 60 feet in length, 10 tons, and 6-foot draft is available.

Communication with New York by electric train and ferry service to Rockaway Point is available.

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CHAPTER 12

New York Harbor

Chart 369

NEW YORK HARBOR is the principal entrance by water to the city of New York and surrounding ports. It is divided by The Narrows into Upper and Lower Bays. The approaches and prominent features in the approach to the harbor have been discussed in Chapter 11.

Lower Bay is that portion of New York Harbor extending from Sandy Hook westward to the Raritan River and northward to The Narrows. Raritan Bay, the western part of Lower Bay and Sandy Hook Bay, the southeastern portion of Lower Bay, are discussed later in this chapter. The entrance between Sandy Hook on the south and Coney Island on the north is about 6 miles wide. An extensive bar through which are several channels is across the entrance.

Channels.—Because of the constant dredging operations in New York Harbor, mariners must consult the latest chart or *Notice to Mariners* as to the condition of the channels. Vessels have damaged their propellers by striking heavy floating debris in the harbor and channels. Mariners are cautioned to maintain a sharp lookout for floating objects while in this area.

Ambrose Channel, the principal entrance to New York Harbor, extends from the sea to the deep water in Lower Bay south of The Narrows. The Federal project dimensions for Ambrose Channel are 45 feet deep and 2,000 feet wide. The channel is maintained by dredging operations. Special regulations have been prescribed for Ambrose Channel. For regulations see § 207.40 in Chapter 2.

The outer section of Ambrose Channel is marked by a lighted range on a bearing of 296°54′ formed by West Bank Light, the front range marker, and Staten Island Light, the rear range marker. **West Bank Light,** 64 feet above the water and visible 14 miles, is shown from a brown conical tower on a black cylindrical pier in Lower Bay westward of the prolongation of the axis of the outer section of Ambrose Channel. The light has a bright sector of 6° on the range line, dark sectors 27° on either side of the bright sector, and a red sector west of 004° and 181°. The fog signal is an electric diaphragm horn. **Staten Island Light,** 231 feet above the water and visible 22 miles, is shown from a light-colored, octagonal, brick tower on a gray limestone base on the high land of Staten Island at Richmond.

In addition to the lighted range marking the outer section and the lightship off the entrance, Ambrose Channel is well marked by buoys. **Gedney Channel lighted whistle buoy,** a vertical striped buoy 30 feet high and visible 11 miles, is at the intersection of the axes of Ambrose and Gedney Channels, about 3.6 miles northwestward of

Ambrose Channel Lightship. A vertical-striped station buoy is near the whistle buoy. From a point 2.2 miles northwestward of Gedney Channel lighted whistle buoy, Ambrose Channel is marked on both sides by buoys.

Gedney, Sandy Hook, and **Chapel Hill Channels** are a secondary route from the sea to the deep water in Lower Bay south of The Narrows. The project dimensions for Gedney and Sandy Hook Channels are 35 feet deep and 800 feet wide; the dimensions for Chapel Hill Channel are 30 feet deep and 1,000 feet wide. The channels are maintained by dredging operations.

In addition to the lighted whistle buoy at the junction of Ambrose and Gedney Channels, Gedney Channel is well marked by lighted buoys. **Old Orchard Shoal Light** is on the west prolongation of the axis of Gedney Channel on a bearing of 281°50′. The light, 51 feet above the water and visible 13 miles, is shown from a conical tower, the lower half brown, the upper half white, on a black cylindrical pier 3 miles southwestward of West Bank Light. The light has a red sector from 087° to 203°. The fog signal is an electric diaphragm horn.

Sandy Hook Channel is well marked by lighted buoys and buoys. **Sandy Hook Point Light,** 38 feet above the water and visible 11 miles, is shown from a red skeleton tower with a white central column and white tank house on a concrete base on a breakwater about 0.4 mile south of the channel and on the west side of Sandy Hook.

Chapel Hill Channel is marked by a lighted buoy, buoys, and a lighted range. The range, on a bearing of 185°57′, is formed by Conover Light, the front range marker, and Chapel Hill Light, the rear range marker. **Conover Light,** 45 feet above the water and visible 12 miles, is shown from a skeleton tower with horizontal bands of red and white and a red lantern on the south shore of Sandy Hook Bay. **Chapel Hill Light,** 221 feet above the water and visible 22 miles, is shown from a white tower on a dwelling about 1.4 miles inshore from Conover Light.

South and **Swash Channels** extend from the vicinity of Scotland Lightship across Sandy Hook Channel to Chapel Hill Channel in Lower Bay. The least depth on the range in the channels is 22 feet but several shoal areas of 18 feet are in the channels.

In addition to Scotland Lightship off the entrance the channels are marked by buoys and a lighted range. The lighted range, on a bearing of 311°34′ is formed by Elm Tree Light, the front marker, and New Dorp Light, the rear marker. **Elm Tree Light,** 62 feet above the water and visible 13 miles, is shown from a white concrete tower on the southeast side of Staten Island. In addition to the navigational light, an aviation light, privately maintained, is shown on call. **New Dorp Light,** 190 feet above the water and visible 20 miles, is shown from a white wooden tower on a dwelling about 1.5 miles inland from Elm Tree Light.

False Hook Channel is along and close to the eastern shore of Sandy Hook and joins Sandy Hook Channel eastward of the point of the Hook. The channel has depths of 12 to 14 feet and is buoyed off its seaward entrance. Strangers should not use the channel.

Fourteen Foot Channel enters Lower Bay just north of Ambrose Channel. The channel is unmarked and has a depth of about 15 feet.

Directions for the approach to New York Harbor and for Ambrose Channel are given in Chapter 3. Entering the harbor through Gedney Channel, from a position close aboard Gedney Channel lighted whistle buoy steer 282° for about 3.4 miles with Old Orchard Shoal Light ahead to a position midway between Gedney Channel lighted

whistle buoy 5 and Gedney Channel lighted bell buoy 6, thence steer **253°** for about 3.4 miles until south of Sandy Hook Channel lighted bell buoy 18, thence steer **286°** for about 0.6 mile until on the Conover and Chapel Hill Lighted Range. Steer the range on a course of **186°** for about 3 miles, thence steer about **012°** and join the main channel northward of Ambrose Channel. Continue by directions for Ambrose Channel given in Chapter 3.

Four shoals are on the bar in the entrance to New York Harbor. The shoals are subject to changes in depths and should be avoided by strangers. **East Bank**, northward and eastward of Ambrose Channel, has depths of 9 to 15 feet. **Romer Shoal**, between Ambrose and Swash Channels, has depths of 4 to 15 feet and is marked by a light. The light, 54 feet above the water and visible 13 miles, is shown from a conical tower, the lower part white, the upper part brown, on a black cylindrical pier northeast of Swash Channel. The fog signal is an air diaphone. **Flynns Knoll**, between Swash, Sandy Hook, and Chapel Hill Channels, has depths of 10 to 18 feet. **False Hook**, off the northeastern side of Sandy Hook, has depths of 8 to 18 feet.

Chart 540.—West Bank is on the west side of the channel between West Bank Light and **Fort Wadsworth**, 4 miles northward. The eastern side of the bank is marked by buoys which are moored in depths of 18 feet or more. **Swinburne** and **Hoffman Islands**, on West Bank, are artificial islands having a number of buildings on them. A channel with dimensions of 16 feet deep and 200 feet wide extends southward from the deep water south of Fort Wadsworth between Staten Island and Hoffman and Swinburne Islands to a point southwest of Swinburne Island. In 1949 the controlling depth was 11 feet to Hoffman Island, thence 5 feet to Swinburne Island.

Coney Island, on the northern side of the entrance to the harbor, is a large summer amusement resort. Numerous stacks, towers, and amusement rides including a red steel parachute tower the top of which is 303 feet above the water, are prominent on the island. A light, 75 feet above the water and visible 14 miles, is shown from a white square skeleton tower on **Norton Point**, the westernmost point of the island. The fog signal is an electric bell; a radiobeacon at the light is operated for calibration purposes from 0800 to 1800.

Coney Island Channel, a dredged, buoyed channel used principally by vessels going to Jamaica Bay and Coney Island, is nearly parallel to the south shore of the island. The project provides for a channel 20 feet deep and 600 feet wide. In 1949 the controlling depth was 19 feet.

Gravesend Bay is on the eastern side of the main passage to Upper Bay between the western end of Coney Island and The Narrows. The bay affords good anchorage in depths of 11 to 50 feet. A general anchorage and an explosive anchorage are in the bay, see § 202.155 in Chapter 2. The southeasterly part of the bay is shoal with depths of 1 to 6 feet.

A marine base is on the easterly side of the bay. A buoyed channel with a least depth of 15 feet is nearly parallel to the north shore of Coney Island from the deep water in the bay to off the docks. An unmarked channel parallels the northeastern shore of the bay to the docks. A shipyard on the east side of the bay has two drydocks, the larger of which can haul out vessels up to 4,000-ton weight, 275-foot length, and 22-foot draft. The yard has accommodations for wood, metal, sail, and electrical repairs.

Coney Island Creek entrance is at the southeastern end of Gravesend Bay. A large gas tank about 0.8 mile from the mouth of the creek is very prominent. A project provides for a channel 12 feet deep and 70 to 150 feet wide in the approaches and in the creek. In 1949 the controlling depths were 12 feet from the entrance to about 300 yards south of the first bridge, thence 6½ feet to the third bridge, thence 9 feet to the head of navigation, the first fixed bridge. Three drawbridges and two fixed bridges cross Coney Island Creek. The three drawbridges have a minimum horizontal clearance of 34 feet and a minimum vertical clearance, closed, of 3½ feet at high water. Special regulations govern the operation of the second drawbridge, see § 203.170 in Chapter 2. The first fixed bridge about 0.8 mile above the mouth obstructs navigation.

Chart 541.—The Narrows, connecting Upper Bay and Lower Bay, has a clear width of over 0.6 mile at its narrowest point between Fort Wadsworth and Fort Lafayette. **Fort Lafayette** is a brownstone structure on the edge of the flats 300 yards from the Long Island shore. A light, 47 feet above the water, is shown from a red skeleton tower with a white central column on a white tank house near the southwest corner of the seawall of the fort. The fog signal is an electric bell.

Fort Hamilton is east of Fort Lafayette on Long Island. **Bay Ridge,** a part of Brooklyn, is about 1 mile north of Fort Hamilton.

On the western side of The Narrows just above Fort Wadsworth are the **Quarantine Headquarters and Boarding Station.** Vessels subject to visitation by the health officer are boarded when abreast or a little northward of Fort Wadsworth. The fog signal at the quarantine wharf, an electric horn, operates only when quarantine boats are away from the dock.

Rosebank, Clifton, Stapleton, Tompkinsville, and **St. George** are above Fort Wadsworth on Staten Island. St. George has ferry communication with Manhattan. Numerous deep-draft piers including the **Foreign Trade Zone** are along this shore.

Upper Bay is that portion of New York Harbor between The Narrows and the Battery. The main channel, between Jersey Flats and Gowanus Flats, is about 0.5 mile wide and has depths of 33 to 88 feet, the shoaler water being on the east side of the channel. **Anchorage Channel,** that portion of the main channel maintained by dredging, has project dimensions of 45 feet deep and 2,000 feet wide from an extension of Ambrose Channel to opposite the anchorage grounds in Upper Bay. The project is maintained. Bay Ridge and Red Hook Channels are off the wharves of Brooklyn eastward of Gowanus Flats. Kill Van Kull connects Upper Bay with Newark Bay and Arthur Kill.

Gowanus Flats, eastward of the main channel in Upper Bay and westward of Bay Ridge and Red Hook Channels, have a least depth of 8 feet.

Bay Ridge Channel leads between Gowanus Flats and the piers off Brooklyn. The project provides for a channel 40 feet deep and 1,200 to 1,750 feet wide from The Narrows to Gowanus Bay. The piers on the upper part of the channel southward of Gowanus Bay are used by large foreign shipping interests; **Bush Terminal** buildings are located here.

The controlling depth to June 1949 was 37 feet for a width varying from 800 feet to 1,200 feet from The Narrows to Bay Ridge Avenue; thence 37 feet for a width varying from 1,550 to 650 feet, except for a reach 600 feet wide along easterly channel between

69th Street pier and U. S. Army Pier No. 3, and a reach 300 feet wide along the easterly channel line between Piers 1 to 7, Brooklyn, where the depth is 40 feet; thence 37 feet for a width varying from 1,200 to 900 feet through Red Hook Channel; thence 30 feet for a width varying from 750 to 350 feet from the junction of Bay Ridge and Red Hook Channels to opposite 28th Street.

Gowanus Bay, at the junction of Bay Ridge and Red Hook Channels, is a bight in the Brooklyn shore at the mouth of **Gowanus Creek.** The project provides for a channel in the bay 40 feet deep narrowing to 500 feet wide at 28th Street, Brooklyn. In the creek the project provides for a channel 26 feet deep and 300 to 200 feet wide from 28th Street to Percival Street, thence 18 feet deep and 200 to 100 feet wide to Hamilton Avenue. Above Hamilton Avenue **Gowanus Canal** has been improved for a distance of about 1 mile. In 1949 the controlling depths were 30 feet in the bay to 28th Street, 25 feet in the creek to Percival Street, 18 feet to a point 100 feet below Hamilton Avenue, and 12 to 8 feet in the canal to the upper limit of navigation.

Five drawbridges and two fixed bridges cross Gowanus Canal with a minimum horizontal clearance of 36 feet and minimum vertical clearances of 90 feet at high water at the fixed bridge, 3 feet, closed, at high water at the drawbridges. In addition, that part of the canal which extends southward along Fifth Street is crossed by a fixed bridge with a horizontal clearance of 36 feet and a vertical clearance of 20 feet at high water.

Red Hook Channel is west of the wharves of Brooklyn between Buttermilk Channel and Gowanus Bay. The project provides for a channel 40 feet deep and 1,200 feet wide from Gowanus Bay to Buttermilk Channel. In June 1949 the controlling depth was 37 feet for a width varying from 1200 to 900 feet.

Erie Basin, north of Gowanus Bay, is entered from Red Hook Channel. The basin is important because of its drydocks and facilities for repairing vessels.

Buttermilk Channel, between Governors Island and Brooklyn, is a passage between Upper Bay and East River. **Atlantic Basin** is on the south side of the channel. The project dimensions for Buttermilk Channel are 40 feet deep and 500 feet wide along the easterly side and 35 feet deep and 500 feet wide along the westerly side. A lighted range on a bearing of 064½° marks the outer part of the channel. The front light, 58 feet above the water, is shown from a steel structure on Pier 33, Brooklyn; the rear light, 94 feet above the water, is shown from a water tank on the roof of a building.

In 1948 the controlling depth for the west side of channel was 35 feet for a width varying from 500 to 200 feet from Anchorage Channel to 2,000 feet north, thence 25 feet for a width varying from 150 to 500 feet, to 8,000 feet north; thence 35 feet for a varying from 500 to 200 feet from Anchorage Channel to 2000 feet north, thence 25 feet for a width varying from 150 to 500 feet, to 8000 feet north; thence 35 feet for a width of 500 feet to East River; 25 feet and 33 feet in the widening at the junction with Anchorage and with East River Channels respectively. The controlling depth for the east side of channel was 40 feet for a width varying between 500 to 200 feet for the full length of project, including the widening at the Red Hook Channel.

Governors Island is at the middle of the mouth of East River where the river joins Upper Bay. **Fort Columbus** is on the northeast part of the island and **Castle William** is at its northwest end. Buttermilk Channel is south of the island and the main channel is north of the island. A light, 47 feet above the water, is shown from a red skeleton tower with a white central column on a white tank house, back of the seawall on the southwest part of the island. The fog signal is a reed horn; a bell is sounded

if the horn is inoperative. Another light, formed by two lights, one vertical above the other and 75 and 60 feet above the water, is shown from a red skeleton tower with a gallery at the top on the parapet of Castle William. The fog signal is an air siren. Two fog signals, sirens, are at the piers at the north end of the island and at the northeast end of the island. A light is on a tunnel ventilator shaft off the northeast side of the island; two privately maintained lights mark the dock on the south side of the island.

Jersey Flats, in the western part of Upper Bay, are extensive flats with depths of 1 to 6 feet. The eastern edge of the flats are marked by Robbins Reef Light, Bedloe's Island, Ellis Island, and numerous lighted buoys and buoys. **Robbins Reef Light, 56** feet above the water and visible 13 miles, is shown from a conical tower the lower half of which is brown, the upper half white, on a white base on the eastern side of the flats. The fog signal is an electric diaphragm horn; a bell is sounded by hand if the horn is inoperative.

Bedloe's Island, on the west side of the main channel about 2 miles northeastward of Robbins Reef Light, is marked by the **Statue of Liberty**, a colossal structure over 300 feet high. The figure faces 147°. The fog signal, an electric siren, is on the end of the dock at the east.

Numerous channels, well marked by lighted buoys and buoys, lead to the piers and terminals on the west side of the bay. A project provides for a channel 20 feet deep and 500 to 800 feet wide along the New Jersey pierhead line from the anchorage south of Bedloe's Island to Kill Van Kull. In 1949 the controlling depth in the channel was 18 feet for widths of 280 to 500 feet. The buoyage system from the north and south entrances changes at Bayonne Terminal Pier. A channel good for deep-draft vessels is through the flats north of Robbins Reef Light to Bayonne Terminal Pier. A channel was dredged 20 feet deep and 800 feet wide to the piers of the Pennsylvania Railroad terminal at **Greenville**. A channel 30 feet deep and 250 feet wide leads to the Lehigh Valley Railroad pier just northward of the Pennsylvania Railroad terminal; a lighted range on a course of 312°18′ marks the channel. Deep-draft vessels can be accommodated at the **Caven Point** terminal just northeastward of the Lehigh Valley Railroad pier. A channel good for about 20 feet has been dredged to the piers of the Lehigh Valley Railroad terminal on **Black Tom Island**, just southward of Bedloe's Island. From the north side of this channel a channel 8 feet deep has been dredged to the wharf at the west end of Bedloe's Island.

Chart 745.—New York City includes the boroughs of **Manhattan, Brooklyn,** the **Bronx, Queens,** and **Richmond (Staten Island)**. The Battery, the southern tip of Manhattan, is at the junction of the East and Hudson Rivers.

Anchorages.—Anchorage areas have been prescribed for the Port of New York by Federal Regulations. For description and regulations see § 202.155 and § 202.60 in Chapter 2. A Federal project provides for an anchorage area 40 feet and 30 feet deep between the lower part of Bay Ridge Channel and the main channel, and an anchorage 20 feet deep in the vicinity of Bedloe's Island. The anchorage areas are generally maintained by dredging.

Caution.—Vessels are especially cautioned against anchoring in the vicinity of the pipeline and cable areas as shown on the chart. The pipeline area across The Narrows is the water supply for Staten Island. In the vicinity of Governors Island, the Battery, and Ellis Island is an extensive cable area.

Tides.—The mean range of the tide in Upper Bay is about 4½ feet. Daily predictions of the tide at the Battery are given in the *Tide Tables*.

Currents.—The flood current entering Lower Bay from the sea attains a velocity of about 2 knots in Ambrose Channel entrance, near the outer extremities of Sandy Hook and Coney Island, and in The Narrows. It sets generally parallel to the lower straight section of Ambrose Channel and tends to continue in that direction where the channel bends toward The Narrows, setting more or less diagonally across the upper straight section of Ambrose Channel. At the beginning of the flood the current sets in at the bottom and near the shores while it is still ebbing at the surface in Ambrose Channel.

The ebb in Lower Bay is generally stronger than the flood by 10 percent or more. At its strength it sets from The Narrows approximately parallel to the upper straight section of Ambrose Channel and diagonally across the outer end of the lower straight section.

In the channel northward of Governors Island cross currents may be encountered. During the first 2 hours of flood, eastward, in the channel the current in the Hudson River is still ebbing and during the first 1½ hours of ebb, westward, in the channel the current in the Hudson River is still flooding, see *Tidal Current Charts, New York Harbor*. At such times large vessels must take special care in navigating this channel. It is reported that the most dangerous time is about 2 hours after high water at the Battery. At this time the current is setting north in the Hudson River and westward from the East River. The effect on a large vessel coming from southward and turning into the East River, is to throw her stern to port and her bow to starboard, thus causing a sheer to starboard toward the shoals off the north end of Governors Island. When coming from northward in the Hudson River the same effect tends to prevent the vessel from turning and to cause her to overrun her course. These cross currents are known locally as **The Spider.**

At the seaward end of Ambrose Channel slack waters and strengths of flood and ebb occur about 1¼ hours before the corresponding slacks and strengths in The Narrows. The mean velocity at strength of the flood current is about 1¾ knots and of the ebb current 2¼ knots.

When the ebb is strong the currents in both Ambrose and Swash Channels tend to set toward Romer Shoal. Caution should be maintained to prevent being set onto Romer Shoal when using either channel. On the flood and especially with a westerly wind, caution should be exercised to prevent being set onto Romer Shoal when using Swash Channel.

In The Narrows the mean velocity at strength of the flood current is about 1½ knots and of the ebb current 2 knots. Daily predictions of slack water and strength of current are given in the *Current Tables*.

In the Hudson River off the Battery slack waters and strengths of flood and ebb occur about 1½ hours later than the corresponding slacks and strengths at The Narrows. Off Thirty-ninth Street slacks and strengths occur about 1¾ hours later than at The Narrows. The mean velocities at strength of the flood and ebb currents are about 1¼ and 2¼ knots, respectively, off the Battery, and 1½ and 2¼ knots, respectively, off Thirty-ninth Street.

Between the Battery and Yonkers the current 15 feet below the surface is running flood approximately ¾ hour before the turning from ebb to flood at the surface.

The direction and velocity of the current throughout New York Harbor for every hour of the tidal cycle is shown in the *Tidal Current Charts, New York Harbor*.

Weather.—During ten months of the year the prevailing winds are from the northwest; in July and August the prevailing winds are southwesterly. Gales with velocities of 40 miles per hour or more are predominantly from the northwest.

The navigation of the channels in the Port of New York is not restricted by **ice.** The main channels do not freeze over and any ice in the smaller waterways is well broken up by tugs and general traffic. Fresh water ice is brought down the Hudson River in large floes during periods of thaws or winter freshets. Occasionally there are large accumulations of ice at Spuyten Duyvil where the Harlem River joins the Hudson, and at these times it is difficult for low-powered vessels or tows to make much headway. Under conditions of strong winds the slips on the exposed side of the channel become packed with drift ice causing difficulty when maneuvering in the slip or when berthing. During extremely severe winters navigation is interfered with seriously for only short periods of time.

Storm warnings are displayed day and night at the Whitehall Building, Battery, Port Newark, Hoffman Island, Sandy Hook Coast Guard Station, Long Branch, New Jersey. Day signals are shown at Red Bank, New Jersey, Scotland and Ambrose Channel Lightships, and Sheepshead Bay.

Pilotage is compulsory for foreign vessels, vessels from a foreign port, and all vessels sailing under register. Pilots generally cruise westward of a line drawn from Fire Island to Sea Girt. Pilot boats are always found near Scotland and Ambrose Channel Lightships. Rates for pilots are $5.00 per foot of draft for inbound vessels, and $4.50 per foot of draft for outbound vessels.

Reporting stations.—Vessels are reported to the Maritime Exchange at New York from City Island, Sandy Hook, and Quarantine.

Quarantine.—The quarantine headquarters and boarding station are just above Fort Washington at Rosebank, Staten Island. Vessels requiring quarantine inspection are boarded at the anchorage off the station, or in some instances, are permitted to go to the pier and undergo inspection. The quarantine regulations for the port are changed from time to time as found necessary by the Public Health authorities.

Hospitals.—Two marine hospitals and an out-patient clinic are operated by the Public Health Service in the port area. The marine hospitals are at Stapleton on Staten Island and at Ellis Island; the out-patient clinic is at 67 Hudson Street, New York City. The clinic serves as the principal admitting office from which patients are transferred to the hospitals as the cases warrant. The hours of the clinic are 0830 to 1630 Monday through Friday but emergency cases are handled at any time.

Customs.—New York is a customs port of entry and marine documents are issued. The customhouse is located at Bowling Green, New York City, near the Battery. Further description of the customs duties is given under the discussion of Harbor Regulations.

Immigration.—The United States Immigration Headquarters is at 70 Columbus Avenue, New York City, with boarding stations at Rosebank, Staten Island, and slip 7, South Ferry Terminal Building. Detention quarters are on **Ellis Island** in Upper Bay and are reached by ferry from the barge office at the Battery.

A Coast and Geodetic Survey District Office in Room 602, Federal Office Building, 90 Church Street, New York City, will furnish, without charge, information relating

to the coasts of the United States, Alaska, Hawaii, and the Philippine Islands. The office also has for sale charts, Coast Pilots, current tables, tide tables, and other publications of the Coast and Geodetic Survey. Mariners noting any dangers, changes in channels, shoals, or any discrepancy in the charts or Coast Pilots are urgently requested to forward the information to the supervisor in charge of the district office.

Chart agencies of the United States Coast and Geodetic Survey are in the New York area.

A **Branch Hydrographic Office** is at 346 Broadway, New York City. Mariners can consult various publications pertaining to navigation and correct their charts from standards.

The **Headquarters, Third District, United States Coast Guard,** are at 80 Lafayette Street, New York City. The Coast Guard, among other duties, is charged with the establishment and maintenance of aids to navigation. Mariners are requested to report direct to the Coast Guard District Commander at New York by radio, or other prompt means, defects or deficiencies in aids to navigation affecting the waters of Rhode Island from Watch Hill, Connecticut, New York, New Jersey, Pennsylvania, and Delaware, not including the Chesapeake and Delaware Canal. Recommendations as to aids to navigation or their improvement may be submitted to this office. The latest information pertaining to all aids to navigation in these waters is available at the district office.

The **Corps of Engineers** has district headquarters at New York City. Other Government offices in New York City include the Weather Bureau and the Federal Communications Commission.

Harbor regulations.—The administration of the Port of New York and the enforcement of its laws is vested in no single body, but is divided among various departments of the Federal, State, and Municipal Governments.

The **Collector of the Port** is a United States Customs official who is charged with the enforcement of the general navigation laws. His jurisdiction includes all the port on both the New York and New Jersey sides. The police powers necessary for the enforcement of these laws are vested in the United States Coast Guard which maintains patrols and reports violations to the proper authority. The collector's office is in the Customs House.

The **Captain of the Port,** an officer of the United States Coast Guard, is charged with the issuance of anchorage and explosive permits. His office is at 80 Lafayette Street.

The **Supervisor of the Harbor,** a Naval officer assigned to duty with the Corps of Engineers, supervises the dumping of waste material and enforces the anti-pollution regulations. His office is at 17 Battery Place.

The **New York City Department of Marine and Aviation** administers the piers along the New York water front within the city limits. The office is at Pier A, Battery.

The **Port of New York Authority,** an executive body appointed by the governors of New York and New Jersey, is essentially a port development body. It serves as a bureau of port information and is empowered to make regulations for the improvement of the conduct of navigation and commerce.

Terminal facilities.—A complete description of wharves and piers in New York Harbor may be obtained from the *Port Series,* a Corps of Engineers publication. The wharves and piers of New York City along the water fronts of the Hudson and East

Rivers are numbered beginning at the Battery and following in sequence eastward along the East River and northward along the Hudson River.

The **Foreign Trade Zone,** at Stapleton, Staten Island, is an enclosed, isolated, and policed area under the supervision of Federal Customs officials. Good facilities for loading and unloading cargo are at the two slips which have a depth of about 30 feet alongside. If reshipped to foreign ports, the goods may leave this zone without payment of duty. Further detailed information may be obtained from the Department of Marine and Aviation, Pier A.

A **time ball** is dropped at noon each day on the Seaman's Church Institute, 25 South Street, New York City. From May through September each year New York City uses daylight saving time.

Supplies and **repairs** of all kinds may be had in the Port of New York. The largest graving dock in Erie Basin has a length of 731 feet in clear at top and 718 feet on floor, a width of 89½ feet 6 feet above the sill and 97½ feet at the top, and a depth over the keel blocks of 32½ feet at high water.

Chart 285.—Kill Van Kull connects New York Upper Bay with Newark Bay and Arthur Kill and separates the southern shore of Bergen Neck (city of Bayonne) from Staten Island. Extensive through traffic and large factories are on its shores. The kill is about 3.5 miles long, 300 to 500 yards wide, and has general depths of 30 to 42 feet.

The main channel from Kill Van Kull to Arthur Kill leads northward of **Shooters Island,** and then in a westerly direction to Arthur Kill at Elizabethport. It is marked by buoys between **Bergen Point** and Elizabethport and is easily followed.

Bergen Point Light, 46 feet above water and visible 12 miles, is shown from a gray granite tower, southeast angle of white wooden dwelling, on stone pier on a reef. The fog signal is an electric bell.

Shooters Island Light is on the south side of the island, 1,130 yards, 259° from Bergen Point Light.

An **anchorage area** established by Federal Regulation in Kill Van Kull is described in Chapter 2, § 202.155.

Bayonne Bridge crosses Kill Van Kull at a point just east of Bergen Point. It is a fixed highway bridge with a horizontal clearance of full channel width and a vertical clearance of 150 feet.

Currents.—In Kill Van Kull the flood current sets westward and the ebb eastward. Slack waters and strengths of flood and ebb occur about 1½ hours earlier than the corresponding slacks and strengths at The Narrows. In the bight between West New Brighton and Port Richmond, on the south shore of the kill, there is more or less of an eddy when the current is at strength.

Constable Hook and **Port Johnson,** on the north shore of the kill, are parts of the city of **Bayonne,** and are commercially important for the shipment of petroleum and other products. A dredged channel 31 feet deep, marked by buoys, leads from the easterly end of the kill to the wharf on the north side of Constable Hook. A range marks the approach to this channel. Constable Hook Front Range is a white target with black vertical stripe, on black column, on Pier 5, Constable Hook. Constable Hook Rear Range is a white target with black vertical stripe on black skeleton tower, 160 yards 290° from the front light.

New Brighton, Port Richmond, and **Mariners Harbor** are on the south shore of Kill Van Kull. Several shipyards and floating drydocks are on the south shore. The largest plant can take vessels up to 12,000 tons weight, 680 feet length, and 25 feet draft. All kinds of repairs can be made.

Railroads and ferries connect Staten Island with Bayonne and New York City.

Newark Bay has a length of about 4 miles from Kill Van Kull to the junction of the two channels leading to Passaic and Hackensack Rivers. The greater part of the bay is very shoal but a dredged channel leads through the bay to the rivers. The channel is well marked by lights and buoys, and strangers in small vessels should have no difficulty when using the chart as a guide. Deep-draft vessels should employ a pilot.

The Federal project provides for a main channel 37 feet deep in rock and 35 feet deep in other material, 550 feet wide at the entrance and narrowing to 400 feet at 4,000 feet above the Central Railroad of New Jersey Bridge, thence continuing to that width and the same depths to the branch channel to Port Newark Terminal, thence 30 feet deep and 400 feet wide to the junction of the Passaic and Hackensack Rivers Channels; removal of the east and west cut-off at the junction with Kill Van Kull and widening of the bend above the Central Railroad of New Jersey to the same depths, a distance of about 4.7 miles. A branch channel in Newark Bay 37 feet in rock and 35 feet deep in other material, 600 feet wide to the inshore channel at Port Newark Terminal, widened at the turn; thence an inshore channel of the same depths and 400 feet wide, a total distance of about 1.6 miles.

The controlling depths were: 35 feet for a width of 535 feet from Kill Van Kull to 1,200 feet south of Central Railroad of New Jersey Bridge in July 1949. Thence 30 feet for a width varying from 535 to 200 feet to the junction of the Hackensack and Passaic Rivers in June 1949. For east and west cut-offs, 35 feet, except for shoal area at east end of cut-off at a least depth of 1.9 feet in March 1946. For Port Newark Channel line 24 feet for a width varying from 150 to 400 feet in October 1946.

Chart 287.—Port Newark Terminal is on the western side of Newark Bay, just southward of the second drawbridge. A channel leads from the widened section of Newark Bay Channel to a turning basin of the same depth at the upper end of the terminal wharf.

A light and a buoy mark the junction of the Port Newark Terminal Channel and Newark Bay Channel. The terminal has excellent facilities for loading and unloading with direct transfer from railroad to ship and vice versa. The terminal is served by three trunk line railroads. Regulations governing the supervision of the facilities, system of charges and rates, have been prepared by the City of Newark and are available at the administration office of the Port of New York Authority.

Anchorages in Newark Bay as established by Federal Regulations are given in Chapter 2, § 202.155.

Bridges.—Two vertical lift railroad bridges cross the bay. The southernmost bridge has a horizontal clearance of 134 feet on the east side and 216 feet on the west side. The vertical clearance, closed, is 35 feet and 135 feet when lift is up. The northernmost bridge has a horizontal clearance of 300 feet and a vertical clearance, closed, of 35 feet, and 135 feet when lift is up. Bridge regulations are given in Chapter 2, § 203.200.

Tides.—The range of the tide is about 5 feet.

Ice sometimes closes navigation during a part of January and February.

Storm warnings are displayed by day only at Port Newark.

Passaic River has been improved by dredging a channel from the upper end of Newark Bay to the Eighth Street bridge at Passaic.

Some commerce extends to Wall Street, about 0.8 mile above Eighth Street. Above Wall Street bridge the river is obstructed by boulders partly showing above water. **Dundee Dam**, the first one above Passaic, is 1.5 miles above Wall Street bridge.

The City of **Newark** extends along the Passaic River for a distance of nearly 5 miles above its mouth. The towns of **Belleville, Arlington, Rutherford, Nutley, Garfield**, and several villages are located on the river between Newark and Passaic. **Passaic** is a manufacturing city at the head of navigation.

The Federal project provides for a channel 30 feet deep, 300 feet wide, from Newark Bay to a point 3,000 feet above Lincoln Highway Bridge, a distance of 2.6 miles; thence 20 feet deep, 300 feet wide to the Nairn Linoleum Works, a distance of 4.4 miles; thence 16 feet deep, 200 feet wide, to the Montclair and Greenwood Lake Railroad bridge, a distance of 1.1 miles; thence 10 feet deep, 150 feet wide to the Eighth Street bridge at Passaic, a distance of 7.3 miles. Total length about 15.4 miles.

The controlling depths were 24½ feet from the junction of the Hackensack and Passaic Rivers to a point 3,000 feet above Lincoln Highway Bridge in January 1950; thence over 16 feet to the Jackson Street bridge in June 1949; thence 16 feet to Center Street bridge in August 1949; thence 11½ feet to Nairn Linoleum Works in June 1949; thence 10 feet to Montclair and Greenwood Railroad bridge in December 1948; thence 8 feet to 1,600 feet north of Gregory Avenue bridge at Passaic in May 1949; thence 6 feet to Market Street bridge in May 1949; thence 1 foot to Eighth Street bridge in May 1949.

Bridges over Passaic River

Name or location	Type	Distance above mouth	Clearances	
			Horizontal	Vertical
		nautical miles	*feet*	*feet*
Newark and Kearny	Swing	1.0	100	25
Lincoln Highway	Vertical lift	1.6	300	40
Pulaski Highway	Fixed	1.7	520	135
Point-No-Point, Newark	Swing	2.2	Left span, 103 Right span, 104½.	16
Jackson St., Newark	Swing	4.0	75	15
Market St., Newark	Vertical lift	4.3	200	24
Center St., Newark	Swing	4.6	Left span, 81½ Right span, 81.	10
Bridge St., Newark	Swing	4.8	Left span, 83½ Right span, 81.	8
Newark and Harrison	Swing	5.0	Left span, 77½ Right span, 78.	16
Newark and East Newark	Vertical lift	5.1	200	35
Route 25A, Clay St., Newark	Swing	5.2	75½	8½
Fourth Avenue, Newark	Bascule	5.4	126½	7½
Newark and West Arlington	Swing	6.9	Left span, 45 Right span, 48.	45½
Rutgers St., Belleville	Bascule	7.5	99	8½
Avondale	Swing	9.1	66	8
Lyndhurst and Delawanna	Swing	10.0	48	26
Rutherford Avenue	Swing	10.2	Left span, 69 Right span, 67.	9
Rutherford, Route S-3	Bascule	10.2	125	35
Union Ave., Passaic	Swing	11.3	60½	13
Aycrigg Ave., Passaic Park	Swing	11.7	62½	18½
Gregory Ave., Passaic	Swing	12.1	Left span, 71½ Right span, 90½.	12½
Second St., Passaic	Bascule	12.6	100	6
West 8th St., Passaic	Bascule	13.1	70½	5½
Wall St., Passaic	Fixed	13.6	78	5½

The bridge regulations are covered in Chapter 2, § 203.200.

Tides.—The mean range of the tide in the Passaic River from the mouth to Passaic is about 5 feet.

Freshets overcome the flood current down as far as Newark, and sometimes to the mouth of the river. Ordinary freshets cause a rise of about 2 feet and a current velocity of about 3 knots at Newark and are of a few hours' duration. Destructive freshets occasionally occur at intervals of years, generally in the spring and fall.

Repairs and supplies.—A small boatyard with marine railway is on the east bank of the river at Rutherford, about 1.5 miles below Passaic. The yard can haul out vessels of 16 tons weight, 48 feet length, and 4 feet draft. All engine and hull repairs can be obtained. Gasoline, lubricants, water, ice, and a full line of supplies may be had.

Hackensack River flows into the northeast end of Newark Bay and is navigable for about 17.8 miles to the dams at **New Milford**. The principal navigable tributaries are **Berry Creek Canal** and **Overpeck Creek**, 6.8 and 11.1 miles, respectively, above the entrance. Berry Creek Canal has a least depth of about 11 feet for about a mile above its mouth.

The Federal project provides for a channel in the Hackensack River 30 feet deep, 400 feet wide, from the upper end of Newark Bay Channel to the Central Railroad of

New Jersey Bridge, a distance of 0.96 mile; thence 30 feet deep, 300 feet wide to a point about 2,000 feet north of the D. L. and W. Railroad Bridge, a distance of 2.4 miles; thence 12 feet deep, 200 feet wide, to Little Ferry, a distance of 8.7 miles; thence 12 feet deep, 150 feet wide to the N. Y. S. and W. Railroad Bridge, a distance of 2.2 miles. Total length about 14.3 miles.

The controlling depths were over 30 feet from the junction of the Hackensack and Passaic River Channels to 300 feet south of Central Railroad of New Jersey Bridge in January 1950; thence over 30 feet to a point 2,000 feet north of D. L. and W. Railroad Bridge in January 1950; thence over 12 feet to Route 3 highway bridge in February 1949; thence over 12 feet to Overpeck Creek in September 1939; thence over 12 feet to N. Y. S. and W. Railroad Bridge in April 1949.

Bridges over Hackensack River

Name or location	Type	Distance above mouth	Clearances	
			Horizontal	Vertical
		nautical miles	*feet*	*feet*
Jersey City to Kearny	Swing	0.9	92½	25
Lincoln Highway	Bascule	1.6	150	10
Jersey City, Pulaski Highway	Fixed	1.9	300	135
Marion, Jersey City	Vertical lift	2.6	168	40
Marion, Jersey City	Vertical lift	2.6	158	11½
Newark Ave., Jersey City Route 10	Vertical lift	2.6	158	35
Marion, Jersey City	Vertical lift	3.0	150	40
Snake Hill (Laurel Point)	Swing	4.3	Left span, 99½. Right span, 105½.	23½
Snake Hill (Laurel Point)	Swing	4.6	99	7½
Secaucus	Swing	6.0	56	5½
Secaucus	Bascule	6.6	100½	4½
Route 3, Secaucus	Bascule	7.6	150	35
Route 6, Ridgefield Park	Bascule	12.2	150	35
Court St., Hackensack	Swing	14.1	Left span, 56½. Right span, 58½.	4
Hackensack and Bogata	Swing	14.2	43	2
Hackensack	Swing	14.3	Left span, 60. Right span, 58.	7½
Anderson St., Hackensack	Swing	15	45	3½
Route 4, Hackensack	Fixed	15.7	70	20½
New Bridge and Cherry Hill	Swing	16.5	39	2½
Bridge St., River Edge	Bascule	17.8	39	5½

The bridge regulations are covered in Chapter 2, § 203.200.

Tides.—The mean range of the tide is about 5 feet at the mouth of the river, 5¼ feet at Little Ferry, and 5¼ feet at Hackensack. High and low water at these points occur about ½ hour, 1½ hours, and 1¾ hours, respectively, later than at the Battery. The river has little freshet flow, and tidal currents are rarely affected by it.

Repairs and supplies.—A boatyard with marine railway is on the east bank of the river at Hackensack. It can haul out boats up to 25 tons weight, 45 feet length, and 5 feet draft. General repairs can be had and small boats built. Gasoline, lubricants, water, and other supplies can be obtained. A boat repair yard at South Kearny can haul out boats of 20 tons weight, 50 feet length, and 4½ feet draft. General repairs to hulls and engines can be made. Gasoline, lubricants, and water are available.

Charts 369, 543.—Sandy Hook Bay is the southern part of Lower Bay, westward of Sandy Hook and eastward of Point Comfort. The bay is an excellent anchorage, the depths of water ranging from 30 feet just inside Sandy Hook to 15 feet near its southern part; the shoaling is gradual and the bottom is good holding ground. The best anchorage during easterly and southeasterly winds is in the eastern part of the bay. Steamers ply between Atlantic Highlands during the summer months, and during this season anchorage on a line between Atlantic Highlands railroad pier and the entrance to the channel west of Flynns Knoll should be avoided. Vessels of more than 24-foot draft will not find good anchorage out of the channel until above Quarantine. Extensive shoals make off northward and eastward from Point Comfort, but as the depths of water decrease gradually, soundings will give sufficient warning of too close an approach to the shore. Heavy fish traps extend out to a depth of 20 feet in places on the shoals on the southwest side of Sandy Hook Bay between Atlantic Highlands and Point Comfort.

Anchorage areas are described in Chapter 2, § 202.155. Danger zones are described in Chapter 2, § 204.19.

Chart 543.—Sandy Hook, the southern point at the entrance of New York Harbor and the northern point of the New Jersey coast, is low and sandy.

Sandy Hook Point Light, 38 feet above water and visible 11 miles, is shown from a red skeleton tower, white central column, white tank house, concrete base, on breakwater, 1,900 yards 305° from Sandy Hook Light. The fog signal is an electric bell.

Sandy Hook Light, 88 feet above water and visible 15 miles, is shown from a white stone tower on the north part of Sandy Hook.

North Hook Fog Signal is mounted in a gray brick building, not visible from seaward, on the north end of Sandy Hook, 1,225 yards, 350° from Sandy Hook Light. The signal is an air diaphragm horn.

A Coast Guard station, a storm warning display tower, and two tall observation towers are at North Hook. The observation towers and a large black tank to the southeast are the most prominent objects on the northern end of the Hook.

Sandy Hook, including **Island Beach** at the mouth of the Shrewsbury River, is a Government reservation and landing is not permitted.

Measured course.—A measured nautical mile is in the northern part of the bay with the marker beacons on the west shore of Sandy Hook. The course is 353°34′–173°34′. The front ranges are poles painted in alternate black and white bands. The rear ranges are slatted targets 6 by 6 feet mounted apex up.

Navesink River and **Shrewsbury River** empty through a common entrance into the southern extremity of Sandy Hook Bay eastward of the highlands of Navesink. The rivers have a navigable length of about 7 miles above the entrance in Sandy Hook Bay.

The Federal project provides for a channel 12 feet deep, 300 feet wide following the westerly shore from deep water in Sandy Hook Bay to a point 600 feet south of the railroad bridge at Highlands, length about 1.9 miles. A channel 9 feet deep, 150 feet wide, suitably widened at bends in the Shrewsbury River from a point 600 feet south of the railroad bridge at Highlands to the Branchport Avenue Bridge at Long Branch, length about 5.9 miles. A channel 6 feet deep, 150 feet wide in the Navesink River from the junction to Red Bank.

The controlling depths were 10 feet, 300 to 180 feet wide, from Sandy Hook Bay to 2,000 feet north of railroad bridge at Highlands in May 1948; thence 8½ feet 80 to 300 feet to railroad bridge at Highlands in May 1948; thence 9½ feet 150 feet wide to a point 1,300 feet south of railroad bridge in April 1947; thence 10 feet, 130 to 150 feet wide to junction of Shrewsbury and Navesink Rivers in June 1946; thence 7 feet 150 feet wide to Branchport Avenue bridge, Long Branch, N. J., in June 1946.

The controlling depths in the Navesink River were 7 feet 100 feet wide, from junction of Navesink and Shrewsbury Rivers to Barley Point in June 1946; thence 7½ feet 150 feet wide in vicinity of Barley Point in May 1947; thence 5 feet, 150 feet wide, to head of project opposite Maple Avenue, Red Bank, N. J., in June 1946.

The Shrewsbury River is crossed at Navesink Highlands by a former railroad bridge and a highway bridge. The railroad bridge is a swing bridge with a horizontal clearance of 99½ feet in the west span. The span remains in an open position. The fender system from the center pier of the railroad bridge to the east side of the highway bascule opening is continuous. The highway bridge is a bascule type with a horizontal clearance of 100 feet and a vertical clearance of 35 feet.

Anchorages.—The east side of the river northward of the bridges and the west side 0.3 mile southward of the bridges are used as anchorages for small craft.

The entrance channel to the rivers is well marked and navigated without difficulty if mid-channel courses are followed. From the bridges the channel follows the west side to the junction of the channel leading into Navesink River, and Reeves Channel leading to Shrewsbury River.

Highlands is a town on the west side of the entrance. It is a summer resort and has only a small native population during the winter. Fishing is the chief industry.

A boatyard here can haul out boats of 90 tons weight, 85 feet length, and 7 feet draft. Some repairs to hulls and engines can be made.

Gasoline, water, and other supplies can be obtained. A railroad connects Highlands with New York. A public landing is north of the bridges at Highlands.

Reeves Channel and the channel in the Shrewsbury River are marked by lighted buoys which are maintained from April 1 to November 1.

When entering Navesink River caution should be used to avoid the submerged stone jetty at the junction of the channels of the Navesink and Shrewsbury Rivers. A lighted horizontal-banded buoy marks the junction of the channels, and craft going to points on the Navesink River should pass westward of this buoy. Many craft have been damaged by confusing the buoys and running aground on the east side of the jetty. The end of the jetty is marked by a daybeacon black on the Navesink River side and red on Reeves Channel side. The channel from **Lower Rocky Point** westward is crooked but well marked by buoys.

A bascule highway bridge crosses between Oceanic and **Locust Point.** The horizontal clearance is 75½ feet and the vertical clearance is 25½ feet.

Just west of the bridge at Oceanic is a landing with a depth of 7 feet. **Oceanic** has a boatyard and marine railway with a capacity of 30 tons weight, 60 feet length, and 6 feet draft. General repairs can be made. Gasoline, lubricants, water, ice, and other supplies are available.

Fairhaven is about 1 mile above Oceanic Bridge on the south side of the river. A boatyard here can haul out vessels up to 100 tons weight, 85 feet length, and 9 feet draft. Repairs to hulls and engines can be made. Gasoline, lubricants, water, ice, and

a full line of supplies are available. The depth off the end of the landing is about 8 feet.

Red Bank is a town at the head of navigation on the Navesink River. A boat dock has depths of 3½ to 5½ feet. A yacht works here can build craft up to 40 feet, and haul out boats up to 20 tons weight, 65 feet length, and 6 feet draft. All hull and engine repairs can be made. Diesel oil, gasoline, water, ice, and other supplies can be had. The depth off the boatyard dock is 10 feet.

Highland Beach, Navesink Beach, Normandie, Seabright, **Monmouth Beach,** and **Long Beach** are summer resorts on the ocean side of Shrewsbury River. A swing bridge crosses the river between Seabright and **Rumson.** The horizontal clearance is 75 feet and the vertical clearance is 9 feet.

Branchport is a small town at the head of navigation on the east side of Shrewsbury River. A boatyard here can haul out boats of 20 tons weight, 45 feet length, and 5 feet draft. General repairs can be made. Gasoline, lubricants, water, ice, and some other supplies can be had.

Oceanport is a town at the head of navigation on the west side of the Shrewsbury River.

The tributaries of the Shrewsbury River at the southeasterly and southwesterly ends are crossed by bridges as follows: Over **Manhasset Creek** a fixed highway bridge with a horizontal clearance of 12 feet and a vertical clearance of 6½ feet. Over **Pleasure Bay** a swing highway bridge with a horizontal clearance of 77 feet in the west span and 70 feet in the east span, and a vertical clearance of 8 feet. Over Troutmans Creek a fixed highway bridge with a horizontal clearance of 15 feet and a vertical clearance of 6 feet. Over **Oceanport Creek** a swing railroad bridge with a horizontal clearance of 65 feet in the north span and 61½ feet in the south span, and a vertical clearance of 5 feet. A fixed highway bridge with a horizontal clearance of 20 feet and a vertical clearance of 4 feet. Over **Parker Creek** a fixed railroad bridge with a horizontal clearance of 45½ feet and a vertical clearance of 5 feet. A fixed highway bridge with a horizontal clearance of 7 to 19 feet and a vertical clearance of 3 feet. The bridge regulations are covered in Chapter 2, § 203.215.

Tides.—The mean range of the tide is as follows: Entrance, 4¾ feet; Highlands, 3¾ feet; Red Bank, 3 feet; Seabright, 1¾ feet; Branchport, 1¾ feet. Strong southerly and westerly winds lower the water surface and northerly and easterly winds raise it.

Currents.—At Highlands Bridge slack waters and strengths of flood and ebb occur about ½ hour later than corresponding slacks and strengths at The Narrows, New York Harbor. The average velocity at strength is 2½ knots. At Seabright bridge the average velocity at strength is about 1½ knots and slacks and strengths occur about 1 hour later than the corresponding slacks and strengths at The Narrows, New York Harbor.

Ice.—Navigation in Navesink and Shrewsbury Rivers is generally suspended on account of ice from December to March, inclusive.

Storm warnings are displayed day and night at Long Branch, day and night at Sandy Hook, and by day at Red Bank.

Supplies.—Gasoline and lubricants can be obtained at most of the towns along the shores of the Navesink and Shrewsbury Rivers.

Communication.—Railroad or bus connects with New York to points on the New Jersey coast.

Atlantic Highlands is a town on the south side of Sandy Hook Bay about 2 miles

west of Sandy Hook. Several prominent wharves are here. The eastermost wharf was formerly a railroad terminal and is used as a terminal for summer excursion boats to New York. The westernmost wharf is used for transfer of petroleum products to storage tanks. The eastern wharf has a depth of about 14 feet at its end and about 10 feet at the end of the oil company wharf. A breakwater, about 4,000 feet in length, parallel to and about 700 yards off the water front, extends eastward from the railroad wharf. A light marks the eastern end of the breakwater. The project depth of the area between the pierhead line and the breakwater is 8 feet. The controlling depth in the anchorage area is 6 feet. Five boat basins with mooring stalls and servicing facilities for pleasure boats are at the southwest end of the anchorage.

Westward of the town of **Leonardo** a trestle pier with two landing platforms at the outer end extends 3,700 yards offshore. The pier is used for ammunition handling and the water area adjacent to the pier is prohibited to navigation. The basin in which the platforms are located had a controlling depth of about 33 feet and in the channel connecting Sandy Hook Channel and the basin, 35 feet. This channel is marked by lighted buoys and a lighted dock range. The Dock Range Front Light is in Sandy Hook Bay. The Dock Range Rear Light is on the end of spur dock 207½° from the front light. A marked channel connects the basin and a barge loading platform inshore of the outer platforms.

Diesel oil, gasoline, lubricants, and a few boat supplies can be obtained.

Railroad communication is available to New York and other points.

Compton Creek is on the south side of Sandy Hook Bay, 4 miles west-southwestward of Sandy Hook Light; the entrance is **Shoal Harbor.** A channel has been dredged to the entrance of the creek as far as the drawbridge at Main Street. The entrance channel is well marked. The creek is navigable by small boats for a distance of 1 mile to the railroad bridge.

The Federal project provides for a channel 8 feet deep, extending from deep water in Sandy Hook Bay to a point 1,000 feet upstream from the Main Street bridge across Compton Creek with a width of 150 feet in the bay and 75 feet inside the mouth of the creek, with widening at bends; length about 1.3 miles.

The controlling depth was 8 feet for a width of 150 to 90 feet through the bay and the same depth for a width of 75 to 70 feet in the creek to the vicinity of the Main Street bridge in June 1948. From Main Street bridge to the head of the project the controlling depth was 2 feet for a width of 55 feet in October 1941.

Compton Creek is crossed by a swing highway bridge and a fixed highway bridge 0.2 mile and 0.9 mile, respectively, above the mouth. The swing bridge has a horizontal clearance of 40 feet and a vertical clearance of 5 feet. The fixed bridge has a horizontal clearance of 14 feet and a vertical clearance of 2½ feet.

Chart 369.—Port Monmouth, a village at the head of the creek, is a shipping point for garden produce, fish, and oysters. The creek is used extensively as a harbor of refuge by small fishing craft.

Staten Island forms the northwest side of Lower Bay. The high wooded ridge of the island has elevations of 100 to over 300 feet. **South Beach** and **Midland Beach** are summer resorts and amusement areas on the southeast side of the island.

New Dorp Beach is southwestward of Midland Beach. Elm Tree Light and New Dorp Light form an entrance range for South Channel and Swash Channel in Lower

Bay. Three lights have been described under the channels at the beginning of this chapter.

Staten Island Flats are extensive shoals making off from the southeast side of Staten Island. Parts of these flats are **Old Orchard Shoal** and West Bank which border on the main channel up the bay. A channel, used by local vessels of less than 8-foot draft, leads westward of West Bank. From the bell buoy 0.6 mile southward of Fort Wadsworth steer southwestward through the dredged channel to the gong buoy about 0.5 mile northward of Hoffman Island and then steer for the bell buoy in range with Old Orchard Shoal Light. West Bank Light and Old Orchard Shoal Light have been previously described in this chapter.

Great Kills Harbor is a shallow bight on the south side of Staten Island northwestward of Old Orchard Shoal Light. It is used as an anchorage by small craft but it is exposed to southerly and southwesterly winds.

The Federal project provides for a channel 10 feet deep, 150 feet wide from deep water in New York Bay to the entrance of the harbor in the vicinity of the present westerly end of Crookes Island, thence of the same depth and width along the west side of the harbor; length about 1.6 miles. An anchorage area 8 feet deep and 138 acres in extent.

The controlling depth in June 1948 was 10 feet for a width varying from 100 to 150 feet in the entrance channel from New York Bay to about 3,000 feet south of Crookes Point, thence of the same depth for width of 150 feet to the head of the project, and 8 feet in the anchorage, except in areas along the south, west, and northwest portions where the depths vary from 0 to 7 feet.

Great Kills Light, 27 feet above water, is shown from a red skeleton tower, white tank house, red square concrete base, in 6 feet on end of shoal.

Range lights for entering the channel have been established on pipe dolphins. The front light, shown from a can type structure, is 10 feet above water. The rear light shown from a nun type structure, is 19 feet above water and 334½° from the front light.

A jetty about 0.2 mile long extends from **Crookes Point** toward Great Kills Light. A light marks the end of the jetty. The area on the eastern side of the jetty has been completely filled.

Great Kills has three boatyards with marine railways. The largest can haul out boats of 32 tons weight, 60 feet length, and 5 feet draft. All general repairs to hulls and machinery can be made. Gasoline and lubricants are available. From May 1 to December 1 a barge is anchored in the harbor from which Diesel oil, gasoline, lubricants, and refreshments can be obtained.

New York and **New Jersey Channels** are the channels extending from deep water in the main channel, northwest of Sandy Hook, through Lower Bay and Raritan Bay to Perth Amboy, and thence through Arthur Kill, lower Newark Bay, and Kill Van Kull, known collectively as Staten Island Sound, to deep water in Upper Bay. This route is approximately along the boundary line between the States of New York and New Jersey.

The Federal project provides for a channel 37 feet deep in rock and 35 feet in soft material, 600 feet wide, through Lower New York Bay, Raritan Bay, and Arthur Kill to a point 1,000 feet north of Smith Creek, except in the vicinities of Seguine Point and Ward Point where the width is to be 800 feet; thence 30 feet deep, 600 feet wide, to a point 1,000 feet south of Buckwheat Island; thence 37 feet deep in rock and 35 feet

deep in soft material and varying in width from 500 to 600 feet, passing north of Shooters Island and protected by a dike on its northern side, to its junction with the channel in Newark Bay; and thence, at the same depths and 800 feet wide, to Upper New York Bay; with suitable easing at the bends and junctions; length about 26.7 miles. Two anchorages 38 feet deep, to accommodate five vessels each, one in the vicinity of Sandy Hook and the other south of Perth Amboy. The project is well maintained.

Raritan Bay is the part of New York Bay lying westward of Point Comfort and southward of Staten Island. The bay is full of shoals with depths of 7 to 18 feet.

Raritan Bay Channel leads to the south end of Arthur Kill from the junction of Sandy Hook and Chapel Hill Channels west of Sandy Hook, through the Lower Bay and along the southern shore of Staten Island. It is well marked by lights and buoys. In September 1949 the controlling depth was 35 feet for a width of 600 feet from the junction of the above mentioned channels to the widening in the vicinity of **Ward Point** at the south end of Staten Island. The direct channel over the shoals is good for a depth of about 10 feet and is used only by small vessels and towboats.

Point Comfort, on the south side of Raritan Bay, is the location of **Keansburg**, a summer resort. A wharf is on the western side of the point with a depth of 8 feet at its end. A boat connection is maintained with New York during the summer and railroad connections with New York and with points east and south.

Matawan Creek is westward of Point Comfort, between **Conaskonk Point** and **Matawan Point.** A channel has been dredged from Raritan Bay to the entrance of Matawan Creek. The channel is well marked by buoys. Buoys also mark the west side of the shoal westward and northward of Conaskonk Point.

The Federal project provides for a channel 8 feet deep, 200 feet wide, from Raritan Bay to the steamboat dock at Keyport; length about 0.9 mile.

The controlling depth in June 1946 was 7 feet for full project width from Raritan Bay to 3,300 feet below the head of the project, thence decreasing gradually 3½ feet at the head of the project.

Keyport is at the entrance of Matawan Creek. The mean range of tide is about 5 feet. Diesel oil (in drums), gasoline, water, and other supplies can be obtained.

A boatyard and marine railway can haul out boats of 35 tons weight, 65 feet length, and 8 feet draft. All hull and engine repairs can be made.

Keyport has railroad and bus service to New York.

Matawan Creek, above Keyport, is very shoal with only 1 foot in the creek at low water. It is used by local craft and is not commercially important.

The creek is crossed by three bridges. The first bridge, 0.5 mile above the mouth, is a fixed highway bridge with a horizontal clearance of 49 feet and a vertical clearance of 6 feet. The second bridge is a fixed highway bridge with a horizontal clearance of 51 feet and a vertical clearance of 12 feet. The third bridge is a fixed railroad bridge with a horizontal clearance of 23 feet and a vertical clearance of 21 feet.

A privately dredged channel about 25 feet wide in places leads from the steamboat wharf at Keyport to a small boat basin at the entrance to **Luppatatong Creek.** The channel is used only at high water.

Chart 286.—Cheesequake Creek is on the south side of Raritan Bay about 3 miles northwest of Matawan Creek. The entrance is between two stone jetties awash at

high water. The jetties are 200 feet apart and are marked at the outer ends by a light on the west jetty and a daybeacon, black ball on iron spindle, on the east jetty.

The Federal project provides for a channel 5 feet deep and 100 feet wide from the 5-foot contour in Raritan Bay to the mouth of the creek, a distance of about 1,600 feet. Two parallel stone jetties 200 feet apart, one on each side of the entrance channel. A pile dike to close off the old outlet. A channel, 4 feet deep and from 50 to 100 feet wide, to head of navigation of Whiteheads Dock, including straightening of two bends. Three pike dikes, one 700 feet long and the other two each 300 feet long to protect the channel. A channel 3 feet deep, 50 feet wide, and 3,500 feet long in Stump Creek.

The controlling depths in September 1949 were 4½ feet from the 5-foot depth in Raritan Bay to the outer end of the jetties; thence project depth or more to the New Jersey highway bridge and the N. Y. and L. B. railroad bridge.

Cheesequake Creek Light, 27 feet above water, is shown from a red skeleton tower, white tank house, red concrete base on the west jetty. The creek is crossed by a bascule highway bridge with a horizontal clearance of 50 feet and a vertical clearance of 25 feet.

Local boats bound for the creek from the Lower Bay usually steer for the Boundary Daybeacon, white perch and ball on stone pier, 1.6 miles northeastward of the jetties. Passing close to the daybeacon a course of **265°** is steered heading for a prominent brick stack about 0.9 mile northwestward of Great Beds Light bearing approximately 000°. The east transmission tower, near the entrance, and the light on the north end of the west jetty is then used as a range on a course of about **196°** until almost at the entrance light, then turn and follow mid-channel courses between the jetties.

Caution is recommended to avoid the wrecks about 0.2 mile eastward of the east jetty. These wrecks are bare at low water.

The mean range of the tide is about 5 feet.

Laurence Harbor is a summer resort on the east side of Cheesequake Creek and **Morgan** is a small settlement on the west side.

A boatyard at Morgan can haul out boats of 30 tons weight, 72 feet length, and 6 feet draft. All hull and engine repairs can be made. Gasoline and a good line of supplies can be obtained.

Great Beds Light, 61 feet above water and visible 8 miles, is shown from a white conical tower on a black conical pier on the southeast end of beds, west end of Raritan Bay.

On the south side of Staten Island is a prominent tower of a former lighthouse with a statue on top on the west side of **Princess Bay,** and prominent buildings near the point at **Red Bank.**

Lemon Creek is a narrow shallow stream on the south side of Staten Island 0.2 mile westward of Seguine Point. It is not used except by local boats which enter at high water, as the entrance is practically bare at low water.

A retractile drawbridge crosses the creek. The horizontal clearance is 30 feet and the vertical clearance is 3½ feet.

Three small boatyards are on the creek. The largest can haul out boats of 5 tons weight, 45 feet length, and 4 feet draft. Gasoline and boat supplies are available. A yacht club is just eastward of the creek entrance. In 1949 the depth at the landing was 4 feet.

Seguine Point is marked by a prominent factory with a conspicuous chimney and cupola to northward. The wharf has a depth of 9 feet.

A boatyard can haul out boats of 25 tons weight, 50 feet length, and 6 feet draft. All hull and engine repairs can be made. Diesel oil (in drums), gasoline, lubricants, and other supplies can be had.

Anchorage.—Anchorages in Raritan Bay are covered by § 202.155 in Chapter 2.

Directions.—The approach to the entrance of the dredged channel in Raritan Bay is easy of access and anchorage can be selected below the dredged channel. For anchorage limits see large scale chart. Vessels of a greater draft than 15 feet should take a pilot. The sides of the dredged channel are marked by lights and many buoys. Enter the bay on courses given under the description of Sandy Hook-Gedney Channel and proceed to a position near the lighted gong buoy marking the junction of the Sandy Hook, Chapel Hill, and Raritan Bay Channels. From this lighted gong buoy steer **286°** following a mid-channel course to Seguine Point being guided by the buoys and lights marking the channel. When between Raritan Bay Channel lighted buoy 5 and Raritan Bay Channel lighted bell buoy 26 steer **267°**. A tower on top of which is a statue, on the west side of Princess Bay will be on the port bow. Pass about 150 yards southward of Seguine Point. From a position north of Raritan Bay Channel lighted buoy 7A steer a mid-channel course of **226°** until abeam of Raritan Bay Channel lighted bell buoy 34A. From this position the channel divides, part leading westward to Perth Amboy and Arthur Kill, the other part southward and westward to Raritan River and South Amboy.

To South Amboy.—From a position 107°, 800 yards distant from Great Beds Light, steer a mid-channel course of **269°** and pass about 225 yards south of Great Beds Light. When Raritan River Light 4 bears 359° distant 100 yards, steer in mid-channel course of **306°** and head for the drawspan in the railroad bridge. Anchorage can be had on the north side of the channel below the bridge.

To Perth Amboy.—From a position 090°, 600 yards distant from Great Beds Light, steer **333°** for the wharves at Perth Amboy or to the anchorage west of Ward Point.

Small vessels of less than 9-foot draft can use the direct channel over the shoals in Raritan Bay. Passing close to West Banks bell buoy 17, 0.7 mile northward of West Bank Light, steer **232°**, which will lead northward of Old Orchard Shoal Light; then bring this light astern on a **246°** course and pass northward of Conaskonk Point Shoal lighted bell buoy 5. Continue the course past the buoy until Great Beds Light bears **276°** and then steer this course for the light until up to the buoys marking the channels southward of Ward Point.

Tides.—The mean range of the tide in Raritan Bay is about 5 feet.

Ice.—In ordinary winters ice does not seriously interfere with navigation in Raritan River or Arthur Kill, but in severe winters the ice sometimes prevents the movements of vessels for periods of two weeks at a time. In easterly winds the drift ice in Lower Bay collects in Raritan Bay and obstructs navigation, but usually only for a short time, as the prevailing westerly winds drive the ice out of the bay.

Storm warnings are displayed night and day at Sandy Hook.

Pilotage for ports in the States of New York and New Jersey is compulsory for certain vessels. Pilots for New York Bay have authority and sometimes bring vessels

into Perth Amboy and South Amboy. Vessels bound up the Raritan River or Arthur Kill, and desiring a pilot can get one from a pilot boat cruising off Sandy Hook.

Towage.—Towboats are used by the larger sailing vessels, and by all but very small craft, bound up the Raritan River and Arthur Kill. They can be had by making signal off the entrance to the dredged channel, and are found cruising in Lower Bay inside Sandy Hook.

Quarantine.—The national quarantine boarding station is at a landing near the southern edge of Perth Amboy. The quarantine is westward of the middle ground off the south end of Perth Amboy. A relief station of the United States Public Health Service is at Perth Amboy.

Supplies.—Coal and water can be had at the wharves in Perth Amboy and South Amboy. Provisions and ship chandler's stores can be had at Perth Amboy, Tottenville, and New Brunswick.

Currents.—Throughout Arthur Kill the flood sets from Raritan Bay to Newark Bay and the ebb in reverse direction. Average velocities at strength of current vary with the location from about 1 to 1½ knots. Passing from Perth Amboy at the south end to Elizabeth at the north end the times of current become progressively later. At Perth Amboy slacks and strengths occur about 1¼ hours earlier than the corresponding phases at The Narrows; at Elizabeth they are ¼ hour later than at The Narrows.

Chart 286.—Perth Amboy is on the point at the junction of Raritan River and Arthur Kill at the western end of Raritan Bay. The principal wharves are along the west bank of Arthur Kill. The greatest draft entering is about 23 feet at high water. Some of the wharves have a depth of 14 to 20 feet alongside. Good anchorage is found abreast some wharves in 30 feet.

Charts 285, 286.—Arthur Kill is the narrow body of water separating Staten Island from New Jersey and has extensive traffic. On its shores are the cities of Perth Amboy, Tottenville, Elizabethport, many large factories, and two important coal shipping points.

Anchorages.—The anchorage areas in Arthur Kill are covered in Chapter 2, §202.155.

Speed.—Complaints have been made that due to the high rate of speed of vessels passing through Arthur Kill, damage is being caused to vessels moored at dock terminals. Navigators are requested to proceed with care when passing through Arthur Kill especially in the vicinity of petroleum terminals so as to safeguard against damage to petroleum vessels and other property.

Tides.—The mean range of the tide in Arthur Kill is about 5 feet.

Repairs.—Several ship repair and boat repair yards are in Perth Amboy. Five drydocks are available, the largest can handle vessels of 2,500 tons weight, 250 feet length, and 18 feet draft. Small boats of 40 tons weight, 50 feet length, and 4 feet draft can be hauled out. Facilities for repairs to hulls are excellent. Diesel oil, gasoline, lubricants, water, and other supplies are obtainable.

Communications.—Communication is by ferry from Perth Amboy to Tottenville, thence by rail to St. George, thence by ferry to the Battery.

Chart 286.—Tottenville is a small town on the southwestern end of Staten Island. A boatyard here can haul out boats of 30 tons weight, 50 feet length, and 5 feet draft for general repairs.

Outerbridge Crossing Bridge crosses Arthur Kill about 300 yards northward of **Ploughshare Point.** It is a fixed bridge and connects Perth Amboy with Tottenville. The horizontal clearance is 675 feet and the vertical clearance is 135 feet.

Woodbridge Creek enters Arthur Kill from westward about 3 miles above Ward Point.

The Federal project provides for a channel 8 feet deep, 50 feet wide, extending from Arthur Kill to the Salamander Dock; length about 1.6 miles. The controlling depth in August 1946 was 5 feet for a width varying from 30 to 50 feet from the mouth to the C. R. R. of N. J. bridge, thence 3 feet for a width varying from 20 to 50 feet, decreasing to a point 1,500 feet south of Berry Street, thence decreasing to zero depth at the head of the project.

Two bascule bridges, 300 feet apart, cross the creek 0.5 mile above the mouth. The first is a highway bridge with a horizontal clearance of 50 feet and a vertical clearance of 7½ feet. The second bridge is a railroad bridge with a horizontal clearance of 50 feet and a vertical clearance of 5 feet.

About 400 yards above Woodbridge Creek on the west side of Arthur Kill, a 30-foot dredged channel leads to **Port Socony,** an oil refinery. The channel is marked by a lighted range. **Socony Range Front Light,** 35 feet above water, is shown from a pole 560 yards 124½° from Arthur Kill Light 6. **Socony Range Rear Light,** 51 feet above water, is shown from a pole 140 yards 072° from the front light. The oil company tries to maintain a depth of at least 30 feet along this range and off the face of the dock for some distance north of the range.

Smith Creek enters Arthur Kill from northward about 0.5 mile north of Woodbridge Creek. The depth at the entrance was 4 feet in September 1949 and deeper inside. The channel at the entrance follows the western shore to avoid a shoal which extends southward from the marshy point on the east side of the creek. The creek is used as an anchorage for small craft and has numerous boat houses and private landings. Gasoline and supplies are available at a landing just south of the entrance.

Outerbridge Channel Range Front Light, 24 feet above water and visible 10 miles, is shown from a black square daymark on white tank house on pipe supports on shore, 0.2 mile northeast of the mouth of Smith Creek. Outerbridge Channel Range Rear Light, 42 feet above water and visible 12 miles, is shown from a black square daymark on white tank house, on black skeleton tower, 351½° from front light.

Port Reading, about 1.2 miles northeast of Smith Creek entrance on the north side of the channel, is a large freight terminal from which coal is shipped.

Fresh Kills enters Arthur Kills from eastward about 1.2 miles northward of **Tufts Point.** Several brickyards are along its banks. The two entrances are 0.4 mile apart. **Great Fresh Kills,** the southerly entrance, opposite the steel works at **Chrome,** is approached on a range on a northeasterly course, favoring the south shore to avoid a shoal which extends southwestward from the shore on the north side. The controlling depth in September 1949 was 10 feet. **Little Fresh Kills,** the northerly entrance, is good for a depth of about 3 feet, the channel at the entrance favoring the southerly shore to avoid a shoal which extends in a southwesterly direction from a point on the north side.

Richmond Creek, the easterly branch of Fresh Kills, has a controlling depth of about 6 feet for a distance of 1 mile to a drawbridge. Barges load to 11½ feet at high water at the brickyard at the village of **Fresh Kills,** below the bridge. Above the bridge the channel narrows and gradually shoals to about 2 feet at **Richmond,** a distance of 0.8 mile. A bascule highway bridge crosses Richmond Creek; the horizontal clearance is 60 feet and the vertical clearance 9 feet. See Chapter 2, § 203.190, for regulations.

Main Creek, the northerly branch, is shoal but barges of 5 foot-draft are towed by launches at high water to the head of the creek at Travis, a distance of about 1.5 miles.

Chart 285.—Carteret is a town on the western side of Arthur Kill, just north of Chrome and opposite **Travis,** and has ferry communication with it.

Rahway River enters Arthur Kill from westward about 1 mile north of Fresh Kills, and extends westward about 4.5 miles to the town of Rahway. It is used only by small craft.

The Federal project provides for a channel 8 feet deep and generally 100 feet wide, from the mouth of the river to a point just above Lamberts wharf, with widening at the entrance and at the bends. A turning basin 8 feet deep, at the head of the improvement. Length about 2.2 miles.

No work has been done on the project to 1949. The controlling depth in September 1949 was 5 feet to Marsh Creek, a distance of 1.1 miles above the mouth.

Bridges across Rahway River

Name or location	Type	Distance above mouth	Clearances	
			Horizontal	Vertical
		nautical miles	*feet*	*feet*
Carteret	Swing	0.1	50	4
East Rahway, C.R.R. of N. J	Bascule	1.7	65	10
Lawrence St., Rahway	Swing	3.8	59	6
State Route 25	Fixed	3.9	55	28
Milton Avenue	Swing	4.2	43½	5
Monroe Avenue	Fixed	4.4	31½	6

For bridge regulations see Chapter 2, § 203.210.

The Goethals Bridge and the Baltimore and Ohio Railroad bridge cross Arthur Kill just southward of Elizabethport. The first bridge is a fixed highway bridge with a horizontal clearance of 617½ feet and a vertical clearance of 135 feet. The railroad bridge is a swing type with a horizontal clearance of 202 feet in the left span and 212½ feet in the right span, and a vertical clearance of 31 feet. Regulations are given in Chapter 2, § 203.210.

Tugboats use the east opening of the railroad bridge whenever possible as it is easier to maneuver a tow through this draw. In the locality tugboats may be expected

to favor the east side of the channel and they do with due respect to the safety of their own tow as well as that of passing vessels.

Elizabethport is the eastern part of the city of **Elizabeth.** It is at the northern end of Arthur Kill at its junction with Newark Bay. Communication across Arthur Kill is by ferry to Staten Island, thence by railroad to St. George, thence by ferry to the Battery. Diesel oil, gasoline, water, and supplies of all kinds are obtainable.

Elizabeth River enters Arthur Kill at Elizabethport. The Federal project provides for a channel 12 feet deep, 60 feet wide, widened at the bends, from the mouth to Baltic Street bridge; length about 1 mile.

The controlling depth in September 1949 was 3½ feet for widths varying from 20 to 60 feet from the entrance to South Frost Street bridge; thence 1 foot to the railroad bridge.

Bridges across Elizabeth River

Name or location	Type	Distance above mouth	Clearances	
			Horizontal	Vertical
		nautical miles	*feet*	*feet*
South Front Street	Bascule	.04	75	4
South First Street	Bascule	.3	60	5
Elizabethport	Bascule	.6	59	15½
Baltic Street	Bascule	.8	60	6
Summer Street	Bascule	1.1	60	5½
State Route 25	Fixed	1.5	60	22
South Street	Swing	1.6	49½	2½
State Route 25	Fixed	1.6	60	22
State Route 25	Fixed	1.7	60	22
Bridge Street	Swing	1.8	31½	3

Bridge regulations are given in Chapter 2, § 203.210.

Chart 375.—Raritan River empties into the western end of Raritan Bay between Perth Amboy and South Amboy. It has a length of 11 miles from South Amboy to **New Brunswick** and is very crooked. The channel is well marked.

The Federal project provides for a main channel 25 feet deep, 300 feet wide from the turn in New York and New Jersey Channels, near Great Beds Light, to the Raritan Arsenal wharf; thence 15 feet deep, 200 feet wide to the Washington Canal; thence 10 feet deep in soft material and 11 feet deep in rock, and generally 100 feet wide with widening at bends, to the Delaware and Raritan Canal entrance at New Brunswick; length about 12 miles. A turning basin opposite Raritan Arsenal wharf, 25 feet deep, 300 feet wide and 1,000 feet long. A south channel 25 feet deep, 300 feet wide from its junction with the main channel opposite **Keasby** to the upper limit of the Titanium Pigment Company property; 10 feet deep, 150 feet wide to its junction with the main channel at **Crab Island**; length about 2.8 miles.

The controlling depths in September 1949 were as follows: New York and New Jersey Channels to bend in channel opposite Light 1, 25 feet; thence to railroad bridge, 24 feet; thence to Victory Bridge, 25 feet; thence to junction with South Channel, 24

feet; thence to upper end of Raritan Arsenal wharf, 21 feet; turning basin at Raritan Arsenal wharf, 25 feet; thence to Washington Canal, 14½ feet; thence to Lawrence Creek, 10 feet; thence to Delaware and Raritan Canal, 8½ feet. In the South Channel the controlling depth was 22 feet to the southern limit of the Titanium Pigment Company wharf; thence 9 feet to the southern limit of Crossmans dock.

Speed.—Between New Brunswick and a point 200 yards below French's or Wood's Landing vessels shall not pass any of the wharves on either side of the Raritan River at a greater speed than 4 statute miles per hour while any vessel is lying thereto, nor pass up or down the river between those points at a greater speed than 7 statute miles per hour.

Two center-pier drawbridges cross Raritan River just above South Amboy. The lower one is a railroad swing bridge with a horizontal clearance of 132 feet and a vertical clearance of 8½ feet. The **Victory Bridge** is a highway swing bridge 0.9 mile above the railroad bridge. The horizontal clearance is 140 feet and the vertical clearance 28 feet. The northern span only should be used. See Chapter 2, § 203.210 for regulations relative to these bridges. **Thomas Edison Memorial Bridge,** a high level fixed highway bridge, is 0.5 mile above Victory Bridge. The horizontal clearance is 200 feet and the vertical clearance is 135 feet. In the vicinity of New Brunswick a fixed highway bridge crosses the river which has a horizontal clearance of 90 feet and a vertical clearance of 90 feet.

The mean range of the tide is about 5¼ feet at South Amboy, 5¾ feet at New Brunswick. On the South River about 5½ feet at Raritan railroad bridge. High and low water occurs later than at Sandy Hook as follows: South Amboy about 15 minutes; New Brunswick about 1 hour.

The tidal current has a velocity at strength of about 1½ knots at the highway bridge at Perth Amboy. Slacks and strengths occur at ¾ hour earlier than at The Narrows, New York Harbor.

South Amboy is an important port for the shipment of coal, petroleum products, and building materials which are carried in vessels of 5- to 16-foot draft. The principal wharves have a depth of about 19 feet and this is about the deepest draft taken to this port. Coal, fresh water, and supplies of all kinds can be obtained here.

Sayreville is a village with extensive brickyards on the south bank of the river 6 miles above the entrance. The entrance to the Washington Canal is at the western end of Sayreville.

The **Delaware and Raritan Canal** which had its entrance to the Raritan River at New Brunswick was closed to navigation in the spring of 1933.

South River is entered through the **Washington Canal,** the entrance of which is at the western end of Sayreville, 6 miles above South Amboy.

The Federal project provides for a channel 12 feet deep and 100 feet wide in Washington Canal, 0.7 mile, and 12 feet deep and generally 150 feet wide in South River to **Old Bridge,** the head of navigation which is about 4.6 miles above the entrance.

In September 1949 the controlling depths were 12 feet through Washington Canal to South River, thence 8 feet to Deep Creek, thence 1 foot to the head of the project.

The bascule highway bridge at South River has a horizontal clearance of 58½ feet and a vertical clearance of 6 feet. The railroad swing bridge has a horizontal clearance of 49 feet and a vertical clearance of 4 feet.

Bridge regulations are covered in Chapter 2, § 203.210.

Supplies in limited amounts are available. Diesel oil, gasoline, and fresh water may be obtained at the landings.

Repairs can be obtained at a small boatyard at South River. The marine railway can haul out small craft up to 40 feet length and 4 feet draft.

CHAPTER 13

Hudson River

Charts 745, 746, 747, 282, 283, 284

HUDSON RIVER, sometimes called **North River**, rises in **Tear of the Clouds**, a small lake in the Adirondack Mountains, in the northeastern section of New York State. It flows in a general southerly direction and empties in New York Bay, the total length of the river is about 300 miles. The river water is generally fresh as far south as Poughkeepsie. Many islands in the river north of Hudson and as far north as Albany create a narrowing channel which has been protected in many places by training dikes built by the United States. The Federal dam at Troy, which is about 132 miles above the Battery at the mouth of the river, is the head of tidewater.

The river connects with the New York State Barge Canal at Waterford 2.5 miles above the dam at Troy. The canal affords free waterway communication between the Hudson River and Lake Champlain on the east and Lakes Erie and Ontario on the west. The New York Canal System is described in detail at the end of this chapter.

The deepest portion of the river, sometimes called Hudson River Channel, is a continuation of Ambrose and Anchorage Channels.

The scenic beauty of the river, between New York City and Albany, ranges in contrast from the rugged skyline of Manhattan, the steep wooded Palisades on the New Jersey bank to the rolling countryside on both banks of the river above Yonkers.

The Federal project for the improvement of the Hudson River provides for a channel 45 feet deep, 2,000 feet wide, and suitable widening at the bends from deep water in the Upper Bay to West 40th Street, Manhattan, and thence 48 feet deep and 2,000 feet wide to West 59th Street, a length of about 5 miles, and thence for a channel 40 feet deep for the full width of the river, extending from West 59th Street, Manhattan, to deep water in Upper New York Bay off Ellis Island, a length of about 5 miles, and thence a channel 750 feet wide and 30 feet deep along the Weehawken-Edgewater water front, a length of about 4 miles.

A channel 27 feet deep and 300 feet wide up to Hudson; thence of same depth and 400 feet wide through rock cuts and 300 feet wide elsewhere, from Hudson to the site of the former Albany-Greenbush Bridge at Albany; thence 14 feet deep and generally 400 feet to the Federal lock at Troy, and thence of same depth and 200 feet wide to the southern limit of the State Barge Canal at Waterford; with widening at the bends

and in front of the cities of Troy and Albany to form harbors 12 feet deep; and removal of State dam at Troy and the construction of a lock and a dam about 2.5 miles below Waterford.

In June 1948 the controlling depth from New York City to Hudson was 26 feet to below Albany, thence 10 feet to the head of the project above Troy. The channel is well marked by lights and buoys. In the channel about 2 miles above Tarrytown are some shoal spots with 13, 17, and 18 feet over them, but eastward of these spots the clear width of the channel is 1,800 feet and is marked on the eastern side by a lighted buoy. About 6 miles north of Tarrytown and 0.5 mile westward of the south end of Croton Point, an 18-foot shoal spot is marked by a buoy. Below Rondout, which is about 79 miles above the Battery, the river is easy to navigate; above Rondout navigation becomes more difficult by numerous shoals and middle grounds which arise abruptly from deep water.

The Harlem River is described in Chapter 9.

Tides.—The tides in the Hudson River vary with changes in the stages of the river as caused by freshet conditions, winds, and droughts. Because of these variable conditions, the predictions of the tides given in the *Tide Tables* for points on the Hudson River above the George Washington Bridge are based upon averages for 6-month periods, May to October, when the fresh water discharge is at a minimum.

Daily predictions of tides for the Battery and Albany, together with information for intermediate places, are given in the *Tide Tables*.

The mean range of the tide is about 4½ feet at the Battery, 3½ feet at Yonkers, 2¾ feet at West Point, 4 feet at Hudson, and 4½ feet at Albany.

Freshets most frequently occur in the spring, especially in March or April.

Currents.—Complete daily current predictions for The Narrows, New York Harbor, and the Hudson River are given in the *Current Tables, Atlantic Coast*. Current predictions for a number of places along the Hudson River from New York to Troy may be obtained by applying the current differences and ratios listed for these locations in Table 2 of the *Current Tables* to the daily predictions for The Narrows.

The values obtained from the current tables define conditions existing during the summer months when the fresh water discharge is small. Freshets or winds often modify the current in the Hudson River. The times of slack water and the velocities and durations of flood and ebb are subject to extensive changes due to these causes; the times of the strengths of flood and ebb are less likely to be affected.

During low-water stages at Albany there is an ebb current for about 8 hours and a clearly definable flood current for from 2½ to 4 hours. At such times the velocity of the flood current at strength is about ¼ knot and the ebb ¾ knot.

Currents are swift and erratic around the entrance to Spuyten Duyvil. The directions and velocities of the currents throughout New York Harbor for every hour of the tidal cycle are shown in the *Tidal Current Charts, New York Harbor*.

Much detailed information relative to tides and currents in the Hudson River is contained in Coast and Geodetic Survey Special Publication No. 180, *Tides and Currents in Hudson River*, sold by the Superintendent of Documents, Washington, D. C.

The direction of currents in the Hudson River usually set fair with the channels except in the vicinities of bends and wharves.

Freshets.—During March, April, and May freshets may be expected of from 8 feet upward in height at Albany above the plane of lowest low water and lasting as much

as 10 days or more. During warm months freshets may be expected from 8 to 14 feet in height at Albany above the plane of lowest low water, with from 3 to 5 days duration. Rain freshets are not, as a rule, very destructive, the main damage being interference due to wharves being under water. Freshets caused by ice gorges which occur nearly every year in February or March, usually rise higher, last longer, cause loss and destruction on shore, and form shoals and bars in the channel.

When the freshet low water rises to mean half-tide about 2½ feet, the flood current disappears, and the tidal wave is felt only by small fluctuations in the water level. When the freshet height reaches 10 feet above the plane of lowest low water the tidal action ceases to be apparent. During freshets of not less than 6 feet the flood current disappears and an ebb current has a velocity of about 1½ knots. After the flood current disappears the average difference in the velocities of the ebb current between the flood and ebb tides is about 1¼ knots, and during extreme freshets the current reaches a velocity of nearly 5 knots.

Ice.—Navigation is impeded by ice during winter months to some extent, particularly in severe weather. On the Hudson River, ice conditions have, in general, permitted navigation almost without interruption since the deepening of the channels. During the winter season it is the policy of the Coast Guard to maintain an open channel in the Hudson River as far up the stream as is practicable by the employment of an ice-breaking cutter or tug. In cases of unprecedented severity only the river may be closed temporarily.

Closing dates of the New York State Canal system vary, usually being between November 10 and November 18.

Tows.—In general, tows are apt to follow the shoreline which is most favorable to them, because of wind or currents. In the Hudson River, with a strong northwest wind, tows will follow the west shore regardless of the direction in which they are traveling.

Fish traps.—Numerous fish traps are planted each spring, usually from about the middle of March to the middle of May, during the seasonal running of shad to the spawning grounds in the upper Hudson. In general, the traps extend from one-fourth to two-thirds the distance across the river from the west side of the channel to the New Jersey shore. The outer end of stakes is usually marked by a flag during the day and by a lantern at night. Extreme caution should be used when navigating an area where the fish traps have previously been planted because of the danger from stakes broken off below the surface of the water.

In the river below Stony Point the areas where fish traps are permitted are shown on the charts. Above Stony Point special permission is not required. See Chapter 2, § 206.42.

Charts 745, 746.—The Hudson River below Yonkers includes that section of the river extending from the Upper New York Bay to the northern extremity of New York City, a distance of about 14.5 miles.

Prominent objects.—**Grant's Tomb,** on the west bank at 123rd Street and Riverside Drive, is a gray stone structure with a ponderous square base, a circular superstructure, and a double collonade at the entrance repeated on the other three sides with recessed columns. The memorial is the burial place of General Ulysses Simpson Grant and his wife. General Grant was President of the United States from 1869 to 1877.

Grant's Tomb should not be confused with **Soldiers' and Sailors' Monument** at 89th Street and Riverside Drive which is similar in appearance and 1.5 miles southward.

The steel-latticed television transmitting tower, 760 feet high and 810 feet to the top and the highest structure in New Jersey, is at North Bergen on the Palisades, opposite 86th Street, Manhattan, and about 1.6 miles northward of the West Shore Railroad Ferry slips.

Anchorages.—See Chapter 2, § 202.25.

Storm warnings.—Storm warnings are displayed both day and night from a tower atop the Whitehall Building at the Battery, New York City.

Pilotage.—Pilotage service is provided by the Hudson River Pilots Association and independent pilots. The charges of the Hudson River pilots from New York Harbor to Albany and other Hudson River ports are as follows:

New York to Albany or to intermediate points north of Kingston, or vice versa, per foot of draft, each way ($100 minimum)	$7.00
Shifting vessels from Albany to Rensselaer, or vice versa	35.00
Docking or undocking vessels, with tug	15.00
Docking or undocking vessels, without tug	25.00
New York to Troy or to intermediate points north of Albany or vice versa, per foot of draft, each way	7.50
New York to Irvington or to intermediate points north of Yonkers, or vice versa, per foot of draft, each way	3.00
New York to Peekskill or to intermediate points north of Irvington, or vice versa, per foot of draft, each way	3.50
New York to West Point, or to intermediate points north of Peekskill, or vice versa, per foot of draft, each way	4.00
New York to Newburgh or to intermediate points north of West Point, or vice versa, per foot of draft, each way	4.50
New York to Poughkeepsie or to intermediate points north of Newburgh, or vice versa, per foot of draft, each way	5.00
New York to Kingston or to intermediate points north of Poughkeepsie, or vice versa, per foot of draft, each way	6.00
Additional charges for each stop made by a vessel for the purpose of receiving or discharging cargo at a way port or place:	
Not more than 6 hours	15.00
More than 6 but not more than 24 hours	30.00
More than 24 hours, for each period of 24 hours or fractional part thereof	30.00

Towage.—Towage in the channel is not compulsory. Vessels proceed from sea to the river berths under their own power. Towage charges are based on time and distance. Towage service is available and information may be obtained from private interests upon sufficient advance notice.

Quarantine.—Quarantine is handled through the quarantine officers in New York Harbor. The United States Public Health Service maintains a relief hospital at 67 Hudson Street, New York City, for seamen.

Customs.—The District of New York includes a large area of the States of New York and New Jersey, with ports of entry at New York City, Albany, Newark, and Perth Amboy. The entire district is under the jurisdiction of the collector of customs at New York City.

The customhouse is at Bowling Green, near the Battery, in the center of the shipping district.

In general practice, vessels are boarded for inspection while in stream, but may be boarded while anchored in stream or moored to a berth. Vessels may clear between the hours of 8 a.m. and 4:30 p.m., or by special arrangement with the customs officials.

Immigration.—The United States Immigration station is at 70 Columbus Avenue, New York City; detention quarters are on Ellis Island and can be reached by ferry from the barge office at the Battery.

Terminal facilities.—The lower Hudson River water front, consisting of about 7 miles on Manhattan and 17 miles on the New Jersey side, has been developed for commercial use. Along the Manhattan water front are 96 piers with a berthing length of 134,947 feet, 4,465 feet of bulkheads and wharves available for docking, 12 ferry slips, and 6 car float bridges.

Along the New Jersey water front are 135 piers having a total berthing length of 167,760 feet, 23,948 feet of bulkheads and wharves available for dockage and 7 ferry slips, 11 car float bridges, 6 small boat repair yards, and 1 large shipyard. Of the terminals, 135 are publicly owned, 27 are open for public use, 159 are equipped with modern mechanical handling devices, and 135 have railroad connections.

Repairs.—There are several floating docks and marine railways along the New Jersey water front, the largest having a capacity of 10,000 tons.

Chart 747.—George Washington Highway Bridge, crossing the Hudson River between Fort Washington Point and Fort Lee, is a suspension bridge with a vertical clearance of 248 feet at high water and a horizontal clearance of 3,418 feet. The towers of the bridge rise to a height of about 600 feet above the water.

From the Battery to Irvington, about 22 miles, the deepest water follows the east bank and then leads between the shoals, fringed by broken ground, making off from the west bank from southward of Piermont to Rockland Lake Light.

From **Fort Lee** on the west bank to Piermont, 12.5 miles farther up the river, on the same side, the western bank, are the rocky cliffs of the **Palisades Interstate Park.** The cliffs are 300 to 500 feet high and in places are thickly wooded with scrub.

Fort Washington Point is also marked by **Jeffreys Hook Tower**, a former lighthouse, which stands a few feet from the southeast corner of the east abutment of the bridge. A little more than 1.3 miles above the bridge is **Tubby Hook** which is marked by the Dyckman Street ferry rack. Spuyten Duyvil Creek, about 0.5 mile above Tubby Hook, is marked by the drawbridge at the entrance. This creek is described with the Harlem River in Chapter 12.

The area 0.4 mile northward of George Washington Bridge, about 300 yards offshore, has been used as a dumping ground and depths of 14 and 17 feet have been found.

About 1.1 miles northward of George Washington Bridge opposite the entrance to Spuyten Duyvil Creek is the **Englewood Yacht Club.** A mast on the northern end of the south breakwater marks the entrance to the small craft anchorage with depths of from 3 to 7 feet.

About 0.2 mile south of the yacht club is a ferry rack of the **Englewood** terminal of the Dyckman Street Ferry. **Under Cliff Beach** is about 0.6 mile northward of the yacht club and opposite **Spuyten Duyvil.** A pier is at the southern extremity of the beach.

The New York Central Railroad, with its main line on the east bank and its West

Shore Division of the west bank, follows the Hudson from New York to Albany, and on the east bank to Troy. Albany and Troy are important railroad centers. One line operates several large excursion steamers on the river carrying passengers during the summer season only between New York, Bear Mountain, Newburgh, and Poughkeepsie.

For information on anchorage regulations and general Anchorages Areas 18B, 18A on the west bank between the George Washington Bridge and Yonkers see Chapter 2, § 202.25 (c) 2, 3, 4. For information on special anchorages on the east bank north of Yonkers just above Hastings-on-Hudson see Chapter 2, § 202.1.

Yonkers, on the east bank, 15 miles above the Battery, has 26 terminals with a docking space of 8,479 lineal feet of which 596 feet are for public use with depths alongside up to 30 feet. The shoreline of the city is parallel to the river with the developed portion of the water front adjacent to deep water.

Yonkers is included in the New York customs district, but is not a port of entry. Matters pertaining to the Public Health, Customs, and Immigration services related to vessels bound to or from Yonkers would be handled at New York. A customs surveyor is available at this port.

A fuel wharf for small craft, with a minimum depth of 4 feet, is just south of the Yonkers ferry slip. A repair yard nearby has a marine railway capable of hauling up boats not exceeding 48 feet in length and 4-foot draft. A public wharf about 1.0 mile north of the fuel wharf has moorings, fresh water, and telephone services available. Excellent transportation facilities are available.

Chart 748.—Yonkers Yacht Club is about 0.3 miles northward of **Greystone Station. Alpine,** a landing opposite Yonkers, is quite prominent and is the western terminal of a ferry line from Yonkers. A yacht basin sheltering numerous small craft is adjacent to this terminal. About 1.0 mile northward of Alpine is a prominent radio tower 400 feet high.

Hastings-on-Hudson is about 4 miles above Yonkers. The floodlights on the water front and a fixed red light atop a building nearby are prominent at night. Tower Ridge Yacht Club, just northward of the town, is adjacent to the special anchorage area. See Chapter 2, § 202.1 and § 202.60 (n).

The **boundary line** between the States of New York and New Jersey, about 20 miles above the Battery on the west bank opposite Hastings-on-Hudson, is marked by a 30-foot pole with a sign at the top reading New Jersey, New York State Line.

Dobbs Ferry, a village on the east bank of the river, is about 1.5 miles farther upstream.

Ardsley-on-Hudson is about 0.6 mile above Dobbs Ferry.

Irvington, a village about 0.7 mile northward of Ardsley-on-Hudson, has a harbor extending along the east bank for about 0.5 mile.

A Federal project provides for dredging to a depth of 27 feet between deep water in the Hudson River and a line 100 feet channelward of the Turner Company lumber wharf. The length of the improvement is about 0.3 mile.

Four water front terminals with a total berthing space of 2,000 lineal feet are available. In October 1949 it was reported that the depth was 26 feet for a length of 250 yards along the face of the lumber wharf.

Piermont, on the west bank opposite Irvington, is a grassy earthen embankment extending channelward about 0.4 mile. Piermont pier on the outer end of the em-

bankment has a depth of 16 feet along the face. A dredged channel with a depth of 16 feet extends west-southwestward about 0.5 mile from the main channel to the outer end of the pier.

A dredged channel with a depth of 18 feet extends west-northwestward for about 0.5 mile from the main channel to outer end of the pier.

The Erie Railroad has a terminus about 0.3 mile from the inner extremity of the pier. Seven stacks adjacent to a group of buildings are prominent at Piermont.

Chart 282.—Tappan Zee is the name of the stretch of the river, about 2 miles wide, extending from abreast Piermont to Croton Point, a distance of 7.5 miles.

Tarrytown, on the east bank 24 miles from the Battery, has a water front extending along the shore for a distance of about 1 mile.

A Federal improvement project provides for a channel along the water front of the harbor 12 feet deep and 250 feet wide, and northerly and southerly connections with deep water in the Hudson River with the same depth and 150 feet wide. The total length of the project is about 1.0 mile.

Tarrytown harbor can be entered by two dredged channels, the north one, northwest of the port with a depth of 10 feet, the south channel, southwest of the port, with a depth of 10 feet. Both channels are marked by buoys. The south channel is also marked by a lighted range on course **048½°**. The daymarks are white squares with black centers on red skeleton towers and white tank houses at the bases. The front range light is 30 feet above the water and the rear range light is 46 feet above the water.

In 1947 the controlling depths were 10 feet in the north channel for widths from 90 to 150 feet; thence 11 feet along the water front for widths from 70 to 250 feet; thence 11 feet in the south channel for widths from 70 to 150 feet.

There are no approved anchorage areas in the harbor. Vessels usually lie at their berths during lay-over periods and while loading or discharging cargo.

To enter the harbor through the south channel steer a **048½°** course on the lighted range and pass about 75 feet off the wharf. The port is open to navigation throughout the year. Navigation is sometimes temporarily impeded during severe winters by wind and ice floes from the upper sections of the river.

Tarrytown is included in the New York customs district, but is not a port of entry. Matters pertaining to the Public Health, Customs, and Immigration Services in relation to vessels bound to or from Tarrytown would be handled at New York.

From the northward steer a mid-channel course of **121°** passing close to the northward of the buoy at the edge of the main channel, passing about 175 yards southwestward of Tarrytown Light.

Eight water front terminals, having a total of 3,670 lineal feet of dock space, with depths of 11 feet, are available. Railroad connections are adjacent to the water front.

In October 1949 a tug drawing 11½ feet came alongside the village pier. The wharves are used primarily for the shipment of coal, building materials, and automobiles.

A yacht club near the southern end of the water front, has a marine railway capable of hauling up small craft not exceeding 25 tons, 45 feet in length, and 4 feet in draft. Gasoline, oil, and water are available at the club. Provisions and marine supplies are available in town.

Two protected basins each about 300 by 400 feet fronting a park are just south of the steamboat wharf.

A regularly scheduled daytime passenger ferry service is maintained between North Tarrytown and Nyack except when ice conditions on the river temporarily curtail operations.

At the northern end of the water front, near **Kingsland Point,** a large, lighted sign is exhibited from the Chevrolet Motor Company building and is prominent from the river at night.

Tarrytown Light, 55 feet above the water and visible 13 miles, is shown from a white conical tower on a red cylindrical pier, about 0.2 mile southwestward of Kingsland Point. The fog signal is sounded on an electric bell. A buoy marks the edge of the main channel abreast the light.

Nyack, opposite Tarrytown, has a reported depth of about 8 feet along the water front. A shipyard with several marine railways capable of hauling up boats not exceeding 65 feet in length, 20 tons and 4-foot draft are available. Good facilities for small-boat building, storage, and repairs to wooden hulls are also available. Fresh water and small-boat supplies can be obtained.

At the foot of West Main Street a passenger ferry makes regular trips to North Tarrytown during daylight hours only.

At **Upper Nyack** a shipyard has a marine railway capable of hauling up a vessel not exceeding 115 feet in length, 150 tons, and 6-foot draft.

A minimum depth of 10 feet along the face of the wharf at this shipyard was reported in October 1949.

Ossining is on the east bank, 28 miles above the Battery. The controlling depth is 7 feet on the flats off Ossining and 5 to 7 feet at the wharves, except that a bar with 2 feet over it extends about 220 yards off the mouth of **Sing Sing Creek,** at the foot of Quimby Street. **Sing Sing Prison,** the State penitentiary, is on the low flat shore at the southern extremity of Ossining. A lighted buoy on the edge of the main channel is about 0.7 mile eastward of the prison.

Hook Mountain, 730 feet high, is about 2 miles north of Nyack, about 0.3 mile westward of the west bank, and is prominent from the river. Northward of this mountain for a distance of 1.5 miles is a promontory, formerly known as **Verdrietege Hook.** It is 600 to 730 feet high and wooded with scrub, but in some places shows bare precipitous cliffs.

Rockland Lake Landing, about 3 miles above Nyack and opposite Ossining, is in the area along the shore occupied by quarry wharves which were not being used in 1949. Rockland Lake Light, 50 feet above the water, is shown from a black skeleton tower, 0.2 mile northeastward of the landing. The fog signal is an electric bell.

The west bank of the river between Rockland Lake Landing and Haverstraw rises precipitously to heights varying from 400 to 820 feet. High Tor is the highest part. About 3.0 miles northward of Rockland Lake Landing is a row of hoppers at a stone quarry which is very prominent.

Croton Point is the long peninsula extending southwestward from the east bank, just north of the **Croton River** and Ossining. A pinnacle rock with 18 feet over it, is 0.6 mile westward of the southern extremity of Croton Point, and is marked by a buoy.

Haverstraw Bay is the wide stretch of the river extending from Croton Point to

Stony Point, a distance of 5 miles. The extensive flats on the east side of the bay have depths of 7 feet.

Croton-on-Hudson is on the east bank northward of Croton Point. Along the water front wharves there is a depth of about 5 feet. About 1 mile southeastward at **Harmon** is a group of repair shops of the New York Central Railroad. A high stack here is prominent.

Haverstraw, on the west bank of the river, 32 miles above the Battery, has numerous abandoned brickyards along the water front. Near the southern end is an anchorage basin with depths to 55 feet used by local craft. The entrance channel is usually marked by brush stakes and leads to the basin. A 4-foot shoal off the water front is marked by a buoy.

High Tor, 820 feet high, is about 0.5 mile southward of the village and is marked by an aviation light surmounting a high tower which is prominent.

Minisceongo Creek has its entrance at the shoal bight westward of **Grassy Point.** A channel with a least depth of 6 feet and marked on its south side by stakes, follows the shore through the flats westward of Grassy Point and through the west opening in the drawbridge at the entrance of the creek. The highway bascule bridge has a vertical clearance of 9 feet at high water and a horizontal clearance of 45 feet. The drawbridge will be opened during daylight hours. The signal for opening is 3 blasts. The brickyard formerly there has been abandoned.

Stony Point is on the west bank 3 miles above Haverstraw. Stony Point Light, 50 feet above the water, is shown from a black skeleton tower. The fog signal is an electric bell.

Verplanck Point is used by various oil companies for terminal and storage purposes. Depths alongside the various wharves range from 8 to 18 feet. Gray, eroded, banks of tailings from a trap rock plant on the northwestward side are prominent. A small boat repair yard including a marine railway is available. Gasoline and oil can be obtained.

Tomkins Cove, on the west bank of the river opposite Verplanck, has a large stone quarry, rock crusher, and a trap rock establishment. Barges tie up at the wharf while loading crushed rock for river transportation. The west side of the river from 1 mile above Stony Point to Jones Point is an Excess Naval Vessel Berthing site. The limits are shown on Chart 282. In 1949 a large number of vessels were moored in the area.

Peekskill, 38 miles above the Battery, is a town in the shoal bight on the east bank of the river. The harbor is about 0.7 mile long and 0.6 mile wide and had a channel with a controlling depth of 9 feet in August 1947. The channel extends from the main channel westward of **Travis Point** along the water front, thence northwestward to the main channel and is marked at the outer entrance by buoys. Peekskill Flats Light, 47 feet above the water, is shown from a red skeleton tower on the north side of the south channel entrance. A dredged channel with a depth of 26 feet, privately maintained, extends from the main channel to the Fleishman Yeast Company's wharf on the north side of **Charles Point,** a distance of about 0.2 mile. A range marking the channel is lighted only when a ship or tow is expected. The daymarks are white diamond-shaped targets with block centers.

A Federal project for improvement provides for a channel 10 feet deep, 100 feet wide, and about 2 miles long, extending from deep water in the Hudson River north of the village and south of it, following the general contour of the shoreline, and two

turning basins 150 feet by 200 feet, of the same depth in front of the center and lower wharves. Five water front terminals having a total of 2,240 feet dockage are available; four are well equipped with modern, mechanical handling devices. One of the terminals is open to the public. Peekskill is included in the New York Customs District, but is not a port of entry. Matters pertaining to the Public Health, Customs, and Immigration Services in relation to vessels bound to or from Peekskill would be handled at the Port of New York. A custom surveyor is available at the port.

Peeks Kill (Annsville) Creek, just northward of Peekskill, has shoaled. The railroad bascule bridge crossing the waterway at the entrance has a horizontal clearance of 50 feet and a vertical clearance at high water of 3 feet. For regulations see Chapter 2, § 203.190.

A highway bridge with a fixed span having a horizontal clearance of 99 feet and a vertical clearance of 19 feet at high water crosses the creek about 0.2 mile above the railroad bridge.

Dunderberg, a high densely wooded hill on the west bank opposite Peekskill, terminates eastward in **Jones Point (Kidds Humbug),** which is low and flat. The summit of Dunderberg, 930 feet high, marked by an aviation light, is prominent. Just above Peekskill the river becomes much narrower and for a distance of 8 miles has a width of about 0.3 mile. A rock with 10 feet over it and marked by a buoy is about 380 yards north-northwestward of the northern point of Iona Island. The river here flows along the bases of very high hills, several exceeding 1,000 feet in height, known as the **Highlands.**

A light, 52 feet above the water, is shown from a red skeleton tower at the northern extremity of **Iona Island.** A high stack and an aviation light are also conspicuous on the island. Iona Island is a Naval depot. Government vessels only are permitted to land here.

Anthonys Nose, a steep, thickly wooded, 900-foot hill on the east bank of the river about 2 miles above Jones Point, is surmounted by an aviation light.

Bear Mountain Bridge is a suspension highway bridge with a horizontal clearance of 1,584 feet and a vertical clearance of 155 feet at high water, which crosses the river between Bear Mountain, 1,305 feet high, and Anthonys Nose.

Bear Mountain Wharf Light, privately maintained, is 14 feet above the water and is shown from the outer end of the middle wharf at **Day Line Park.** During the winter season the light is sometimes obscured by vessels moored to the wharf.

Popolopen Creek, on the west bank of the river just above the Bear Mountain Bridge, is crossed by two bridges. The railroad fixed bridge crosses the Popolopen Creek at the mouth and has a horizontal clearance of 18 feet and a vertical clearance of 4½ feet. The highway fixed bridge crosses the Popolopen Creek 0.2 mile westward of the railroad bridge and has a horizontal clearance of 327 feet and a vertical clearance of 118 feet at high water.

When approaching the sharp turns in this general vicinity of the river caution should be exercised and a warning signal should be given.

When descending the river, particularly with a strong fair current, a careful watch should be maintained to avoid being set on the 10-foot rocky shoal 380 yards north-northwestward of Iona Island.

Mystery Point, 1.2 miles above the Bear Mountain Bridge on the east bank of the river, is a prominent headland.

A light, 46 feet above the water and shown from a black skeleton tower, is on the eastern side of **Con Hook** about 2 miles above Anthonys Nose on the west side of the river.

A 7-foot rocky shoal about 700 yards southward of the light is marked by a lighted buoy. Precautions are necessary to avoid this shoal. When descending the river, particularly with a fair current, there is a tendency to be set toward the shoal.

Highland Falls is about 1.5 miles above Con Hook. An illuminated clock tower at the **Ladycliff School** for Women at Highland Falls is prominent.

Duck Island Light, 26 feet above the water, is shown from a black skeleton tower, marking the outer edge of a shoal off the west bank 1.3 miles northward of Highland Falls.

West Point, 45 miles above the Battery, is the site of the **United States Military Academy.** West Point, a splendid and impressive spectacle, rises from the west bank of the river, then levels off to a broad plateau, and beyond is the ascending series of the thickly wooded hills and terraces. On the west bank of the river is a railroad station and a ferry wharf which in October 1949 had a depth of 35 feet along the face. A passenger ferry plys between West Point and Garrison. **Garrison,** a village on the east bank, has a ferry wharf known as **Garrison Landing** with a depth of 18 feet alongside where gasoline can be obtained.

West Point Light, 39 feet above the water, is shown from a black skeleton tower on **Gees Point,** a rocky precipice marking the lower end of a sharp bend in the river, named **Worlds End,** with depths exceeding 200 feet. The light is obscured from the northeast. The fog signal is an electric bell, operated by a sound controller. The bell is actuated only by the sound emanating from the whistle of a passing vessel. Vessels desiring the bell to operate will sound their whistles. The bell will then operate at its characteristic for a period of 8 minutes, after which it will stop until it is again actuated by the sound controller. A shoaled area opposite Gees Point is marked by a buoy on the edge of the main channel.

Constitution Island, on the east bank of the river northward of West Point, is marked by **Magazine Point Light,** 61 feet above the water and shown from a red skeleton tower. The point is at the upper end of Worlds End.

Extreme caution and alert piloting should be exercised when passing through Worlds End. The channel turns sharply and the view is obstructed. Vessels should reduce speed and sound a warning signal. A rocky shoal 0.3 mile northwestward of Magazine Point Light is marked by a buoy on the edge of the main channel, abreast **Foundry Cove.**

Crows Nest Mountain, 1,403 feet high, 1.6 miles northwestward of West Point, is prominent. **Storm King Mountain,** 1,355 feet high, 1.5 miles northward of Crows Nest Mountain, is also prominent.

Little Stony Point, 1.3 miles above Constitution Island on the east bank of the river, is a rock quarry and the hopper structure is prominent.

At **Breakneck Point,** 1 mile above Little Stony Point, are three prominent tunnels, two railroad and one highway; the lights are prominent at night.

Cornwall On The Hudson is about 4 miles above West Point and 0.3 mile southward of **Moodna Creek.** A former railroad coal shipping wharf, now deserted and in ruins, was not used in 1949. A depth of 18 feet was reported on the face of the wharf.

Pollepel (Bannermans) Island, a private estate, is a small island near the edge of

the shoal on the eastern side of the river opposite Moodna Creek. The buildings on the island have the appearance of a medieval castle. A light just west of this island, shown from a red skeleton tower, is 45 feet above the water.

Newburgh, a city on the west bank of the river, 52 miles above the Battery, has some manufacturing facilities, but is primarily a distributing point. The city has a water front of about 2 miles directly on deep water of the river. There are numerous abandoned brickyards on both sides of the river. There are no approved anchorages.

Newburgh is included in the New York customs district, but is not a port of entry. Matters pertaining to the Public Health, Customs, and Immigration Services in relation to vessels bound to or from Newburgh are handled at the Port of New York. A customs surveyor is available at the port.

The majority of the piers are of the open pile type with depths alongside up to about 12 feet. Depths along the bulkhead average about 3 feet. The yacht club landing at the north end of the water front has depths of about 4 feet. Gasoline, oil, water, and some marine supplies are obtainable.

A shipyard with good facilities for construction and repair of steel and wooden hulls, machinery, and boilers, is available. The marine railway is capable of hauling a vessel 115 feet in length, 500 tons, and 5 feet in draft. Ferry service is maintained between Newburgh and Beacon.

The town of **Beacon,** on the east bank of the river opposite Newburgh and about 1.3 miles northward of **Fishkill Creek,** is connected with Newburgh by a ferry. The town has some manufacturing facilities, mainly for hats, bricks, and paper products.

On the west bank of the river between **Roseton,** 4 miles above Newburgh, and **Danskammer Point** is a large brickyard. Danskammer Point is marked off by a light shown from a black skeleton tower. The light is 55 feet above the water. The fog signal is sounded on an electric bell.

Chart 283.—Wappinger Creek is a small stream which empties into the Hudson River from the east about 0.9 mile northeastward of Danskammer Point Light. A Federal improvement project provides for a channel 8 feet deep, 80 feet wide, and about 1.5 miles long from the mouth to the lower falls. A bulkhead with 1,740 feet of dockage space close to the head of navigation is available. There are also 1,766 feet of timber and masonry bulkhead, formerly used for commercial purposes, but now in poor condition. In June 1947, the controlling depth was 7 feet to within 300 feet of head of improvement, thence 2 feet.

The entrance to the channel is marked by buoys on the edge of the main channel. Two bridges cross the creek. The railroad bridge at the entrance, a bascule bridge, has a horizontal clearance of 40 feet and a vertical clearance of 2 feet. The highway bridge has a horizontal clearance of 48 feet and a vertical clearance of 11 feet. The range of the tide is about 3 feet. For further information see Chapter 2, Bridge Regulations, § 203.190.

The channel, the entrance to which has been discussed previously, is buoyed and leads to the railroad drawbridge opening.

From the upper end of the fender piers on the railroad bridge the channel leads toward the south end of the highway bridge, above which the south bank should be followed for about 100 feet off, and pass close to the former foundry bulkhead; then head across about 80 feet off the next point on the north bank until above the dike at

a distance of about 60 feet. The channel then leads close to the coal wharf, and then follows the south bank at a distance of about 70 feet (a little more in the bight) to the upper end of a bulkhead from which a narrow channel with a depth of about 6 feet leads to what were formerly several lumber sheds on the south bank. The main channel from the upper end of the bulkhead follows the north bank at a distance of about 100 feet, drawing into about 50 feet when passing the steep section of the bank near the bend at the north end of the creek. Then steer mid-creek as close as conditions permit.

Wappinger Falls are about 1.6 miles above the entrance.

A wreck on the edge of the west side of the main channel is about 0.3 mile northward of Danskammer Point Light.

Diamond Reef, a rock with 5 feet over it, is about 0.8 mile north-northeastward of Danskammer Point Light, and is marked with a lighted buoy which is withdrawn from station between December 1 to April 1, spar buoy on station throughout the year.

New Hamburg, a village on the east bank, is about 7 miles southward of Poughkeepsie.

Lange Rack is a 10-mile section of the river extending from New Hamburg.

North of **Howland** and 1.8 miles above New Hamburg at **Clinton Point** is a large trap rock plant and quarry. Excavation of this rock is gradually cutting away the hillside. The west side of the river should be favored to Poughkeepsie to avoid several buoyed dangers of 18 feet.

A rocky shoal with 18 feet over it is about 1.4 miles above Clinton Point and is marked by a buoy. A rocky shoal with 18 feet over it is about 1.5 miles south of Poughkeepsie.

Poughkeepsie is a city on the east bank 65 miles above the Battery. It has about 1 mile of water front. The city, an important industrial center, specializes in manufactured goods, oil, and lumber. The Day Line, which maintains a summer passenger excursion service between Poughkeepsie and New York, has a modern floating barge pier at Poughkeepsie, northward of the former ferry landing. Two buoys are moored off the lumber wharves on the northern extremity of the water front to guide approaching vessels.

At Poughkeepsie the river is crossed by two bridges, a highway suspension bridge and a fixed railway bridge. The horizontal clearances of the railroad and the highway bridges are 490 feet and 1,458 feet, respectively. The vertical clearances are 137½ feet and 167½ feet. The railroad bridge is about 0.5 mile northward of the highway bridge. There are fog bells on the wharves nearest the city and both bridges are well lighted at night. A submarine cable below the railroad bridge connects Poughkeepsie and **Highland** on the west bank of the river. A pipe-line area crosses the river above the railroad bridge.

Anchorages.—There are no approved anchorage areas in the port. Vessels usually anchor in the stream while awaiting berthage.

Ice conditions.—The harbor at Poughkeepsie is open to navigation throughout the year, except when severe conditions resulting from heavy drift ice moving downstream during the months of thaw sometimes make the berthing and unberthing of vessels most difficult. A record extending over a period of 60 years shows an average closed period of 65 days on account of ice.

Dockage.—No charges are made for the occasional use of the city pier at the foot of Main Street, which had a reported depth of 27 feet along the face in October 1949.

The local lumber company, although not making a practice of permitting public use of their wharf, will permit such use provided it does not interfere with their own activities. There is no list of charges, special arrangements being necessary in each case.

Poughkeepsie is included in the New York Customs District, but is not a port of entry. Matters pertaining to the Public Health, Customs, and Immigration Services in relation to vessels bound to or from Poughkeepsie are handled at the Port of New York. A customs surveyor is available at the port.

A yacht club, just below the highway bridge on the east bank of the river, has a float landing with a reported depth of 6 feet. The river from Poughkeepsie to Rondout, 13.5 miles farther up, has a deep and unobstructed channel, and on its banks between these two places are a number of villages and landings.

Crumb Elbow, a very deep bend in the river and the upper end of Lange Rack, extends from 3 to 4.2 miles above Poughkeepsie. The light at **Greer Point** on the eastern bank marks the northern end of the elbow.

Hyde Park is a village on the east bank of the river 5 miles above Poughkeepsie. The birthplace, former residence, and library of Franklin Delano Roosevelt are about 0.4 mile eastward of the river on the picturesque 200-acre estate extending from Hyde Park to the lower bank of the river. Mr. Roosevelt was the 32nd President of the United States, 1933–1945.

Esopus Island, small and narrow, with a light at its southern end, is 7 miles above Poughkeepsie. A ledge, partly bare at low water, and marked by a buoy, extends about 300 yards northward in prolongation of the island. The better channel is westward of the island. **Esopus** is a village on the west bank of the river abreast Esopus Island. About 0.5 mile above Esopus is a large graystone building which is prominent.

Dinsmore Point is 2.5 miles above Esopus Island on the west bank of the river. Esopus Meadows Light, 52 feet above the water, is shown from a white tower and dwelling on a granite pier, and marks the edge of the main channel on the west side of the river. The light is dark from 251° to 254°. The fog signal is an electric bell. The river has shoaled on the east bank from about 1.2 miles above **Indian Kill** to **Sturgeon Point** and is marked by buoys.

Rondout Creek enters the western side of the river 79 miles above the Battery. The entrance, between two long dikes marked by lights, is a dredged channel 100 feet wide and 14 feet deep.

A prominent spherical gas tank is on the north side of the creek adjacent to the inshore extremity of the north jetty. Near the inshore end of the south jetty is a stone tower abandoned lighthouse.

The city of **Kingston** is partly on the lowlands adjacent to the north bank and partly on the elevated plateau to the north and westward. The lower portion of this creek for about 2 miles above its mouth serves as a harbor for Kingston. **Rondout Harbor** comprises the tidal mouth about 0.4 mile long, whose source is 15.7 miles west of Rondout.

A Federal project provides for a channel 100 feet wide, widening at the bends, and 14 feet deep from deep water in the Hudson River to the highway bridge 1.3 miles from the mouth, thence 12 feet deep to the west of the island dock, 1.8 miles above the mouth; two parallel dikes 350 feet apart to maintain the channel, and for a branch dike to extend upstream from the outward end of the north dike to protect that dike from running ice in the river. The tidal range is about 3¾ feet.

In June 1948 the controlling depth from the entrance to the highway bridge was 13 feet, thence 10 feet to the westward end of the island dock. The channel leads close to the north dike and the bulkhead at Kingston. Above Kingston is a depth of 9 feet to **Wilbur**, thence 5 feet can be carried to **Eddyville**. The head of navigation is at the lock of the **Delaware and Hudson Canal**, abandoned in 1899, above Eddyville landing 3.3 miles from the entrance. Two bridges cross Rondout Creek, a highway suspension bridge with a vertical clearance of 86 feet; the railway fixed bridge has a horizontal clearance of 168 feet and a vertical clearance of 144 feet.

Kingston, a maritime and industrial center, has 17 wooden wharves, privately owned, with a total dockage of 12,132 feet available along the north shore water front, with depths up to 16 feet. Dockage, in general, is not charged when vessels tie up occasionally. Wharfage is also arranged by mutual agreement. Due to the limited area of the harbor there are no approved anchorages. The harbor is open to navigation throughout the year.

Manufactured products include refrigerators, hotel equipment, bronze and iron castings, road machinery, and hardware. The city is the home port of a large fleet of towboats operating on the river.

Kingston is included in the New York Customs District, but is not a port of entry. Matters pertaining to the Public Health, Customs, and Immigration Services in relation to vessels bound to or from Kingston are handled at the Port of New York. A customs surveyor is available at the port.

Facilities are available at Kingston and **South Rondout** for the construction and repair of wooden hulls and minor repairs to machinery. A marine railway eastward of the island dock and adjacent to the highway bridge, is capable of handling boats not exceeding 250 feet in length, 1,000 tons, and 10 feet draft. A smaller yard at the foot of Ravine Street is equipped to build and repair wooden hulls. Derricks with hoisting capacities of 2 tons with reaches of 50 feet are available. The shipyard at South Rondout, on the south shore of the creek opposite the westerly end of Island Dock, has a drydock 180 feet in length, 55 feet between wings; 14 feet depth over the keel blocks, and is capable of handling vessels not exceeding 1,000 tons. Facilities at the various repair shops provide for repairs to all types of machinery and boiler work, including foundry work and pattern making. Diesel oil, water, gasoline, and supplies are available. A yacht club is about 0.5 mile westward of the bridge on the north shore.

From Kingston to Hudson the channel has a navigable depth of 27 feet, but is rendered more difficult than southward of Rondout by reason of numerous middle grounds and flats. With the aid of a chart, however, small vessels should have no difficulty in making the passage. From Kingston Point to Barrytown the channels on both sides of the flats are used. The main channel then leads westward of the Hogs Back, eastward of the Saddle Bags, westward of Green and Upper Flats, westward of Upper Coal Beds in 24 feet on the east side, westward of Rogers Island and eastward of the Middle Ground Flats to Hudson.

A regular ferry service is maintained between Kingston and **Rhinecliff** on the east bank of the river. **Kingston Point** is an oil terminal. Petroleum products, transported by tugs and barges drawing 10 to 15 feet, comprise a large percentage of the local marine traffic. There is a conspicuous warning sign for the cable crossing.

The Flat, just above Kingston Point and extending northward for a distance of 3.8 miles, is marked by a light and a buoy on the southern end. The east and west

sides of the shoal are very abrupt but at the northern and southern end are more gradual. Depths on The Flat vary from 2 to 15 feet. The main channel is westward of the shoal and is marked by two lighted buoys. A dredged channel with a depth of 27 feet extends through to deep water at the north end. Caution should be exercised, however, as it is reported that the north end of The Flat is making to the westward, encroaching on the south entrance of the dredged channel.

Barrytown is a village on the east bank of the river 5 miles above the mouth of Rondout Creek. Prominent storage tanks are here. Navigating the river above this point becomes increasingly difficult because of the numerous shoals. From Kingston to **East Kingston,** on the west bank, are many brickyards.

Hogs Back Shoal, extending northward for a distance of about 1.2 miles, is on the east side of the river and is marked by a lighted buoy. The channel between Hogs Back and above **Saddle Bags** is marked by buoys and a light. **Magdalen Island** is a small island on the east side of the river abreast **North Bay.**

Tivoli is a village on the east bank of the river, about 0.8 mile above Magdalen Island.

Esopus Creek enters the western bank of the river 88 miles above the Battery and 38.2 miles below Albany. **Saugerties** is a village on the north bank of the creek about 1 mile above the entrance which is marked by lights. A dam crosses the creek at this point. **Saugerties Harbor** comprises about 0.8 mile in length of the tidal basin of Esopus Creek, whose source is in **Winnisook Lake** about 22 miles southwestward of Saugerties.

A Federal improvement project provides for a channel 12 feet deep, 200 feet wide, from deep water in the Hudson River to the steamboat wharf in the village of Saugerties, a distance of about 0.8 mile, to be secured by dredging and rock removal between longitudinal pile dikes filled with rubblestone which were built by the previous project, and for the extension of the south dike westward about 155 feet to the shoreline. The mean tidal range is 4 feet. In July 1949 the controlling depth was 8 feet deep, 150 to 200 feet wide, from the Hudson River to the wharf at Saugerties.

A shoal which bares at low water, is on the west side of the creek about 200 yards from the sharp bend to westward. West of this bend the bottom of the creek is strewn with large boulders. Small craft, with local knowledge, use this area as an anchorage but it should be avoided by strangers. For a distance of about 1,000 feet below the landing a shoal extends 20 to 35 yards from the north bank.

Long Dock, on the west bank of the river 0.4 mile southward of Esopus Creek, is now used for occasional steamers. The main channel favors the west side of the river for a distance of about 5 miles north of the mouth of Esopus Creek. Four wooden water front wharves with a total of 2,400 feet of berthing space are available.

Malden on Hudson is a village on the west bank of the river about 1.2 miles above the mouth of Esopus Creek.

The village of **West Camp** is 2 miles above Malden on Hudson. A rock with 17 feet over it has been reported about 0.6 mile northward of Malden on Hudson.

Green Flats, on the east side of the river and extending northeastward for a distance of 1.5 miles, is marked on the west side by a light and on the southern end by a buoy.

The **Upper Flats,** separated from Green Flats on the southern extremity by **The**

Maelstrom (a dangerous whirlpool), extends northeastward for a distance of about 1.3 miles on the east side of the river.

Cheviot is a village on the east bank 92 miles above the Battery. The landing for **North Germantown** is 2 miles above the wharf at Cheviot.

Wanton Island Light, 24 feet above the water, is shown from a black skeleton tower on the northeast corner of an old dock on the west bank of the river. It is about 450 yards 300° from the southern extremity of a 12-foot shoal on the eastern edge of the main channel. The shoal is marked by a buoy.

At **Cementon,** a village on the west bank of the river 0.5 mile above West Camp, are several large cement manufacturing plants. The plant buildings and silos are prominent. At **Dewitt Point,** 2 miles above Cementon, is a large cement factory. A wharf just below the point has a depth of 8 feet at the end.

Upper Coal Beds, about 0.8 mile northeastward of Wanton Island, extending northeastward for a distance of about 1.1 miles, in the middle of the river, is marked by a light on the east side and a buoy at the southern extremity. A dredged channel with a depth of 27 feet extends northeastward for a distance of about 1.7 miles, and is marked by **Silver Point** Lighted Range on a course of 220°. The front daymark has a white diamond target with black center on a black skeleton tower on a white house base. The rear daybeacon has a white square target with black center on a black skeleton tower on a white house base. The rear daymark is 175 yards 220° from the front light. The range is lighted both day and night. The channel is on the west side of the river and is also marked by buoys.

Catskill Creek enters the west bank of the Hudson River 97 miles above the Battery. **Catskill** is a village with two factories on the creek. A long wharf extending from the village to the main channel of the Hudson River marks the north bank at the entrance of the creek. Catskill Creek Channel has a least width of about 100 feet and a least depth of 10 feet to the head of navigation, about 6,500 feet above the entrance, and 1,200 feet above the highway bridge. The north edge of the channel leads close to the end of the wharf at the entrance, then passes 75 feet off the first small pier, lying 200 yards inside the end of the wharf, and then passes close to the next small pier on the north side. The best water is then in mid-creek when approaching the first sharp bend, to avoid a rock with 4 feet over it about 50 feet off the western end of the wharf.

On the north bank where the shore curves to the northward to a bight is a small boatyard. The rock is about 150 yards southeastward of the float at the boatyard, and 100 yards southeastward of **Rocky Point,** locally known as **The Hop 'o Nose.** The rock is about 50 feet above a small brick building on the south bank of the creek abreast the point where the bulkhead breaks into the eastward of the bight. The channel then favors the south bank until about 360 yards from the highway bridge, then the north bank to the highway bridge. The bascule highway bridge has a horizontal clearance of 70 feet and a vertical clearance of 14 feet.

In October 1949 the reported controlling depth in the creek was 10 feet. The river is navigable about 100 yards above the bridge. The boatyard previously mentioned has a marine railway capable of hauling up boats not exceeding 48 feet in length, 20 tons, and 6-foot draft. The landing has depths up to 30 feet and a berthing space for boats up to 100 feet in length. Gasoline, oil, water, ice and other supplies are available.

About 2.5 miles southeastward of the entrance of Catskill Creek is an aviation light on the summit of a hill. A highway fixed bridge, **Rip Van Winkle Bridge,** has a horizontal clearance of 760 feet and a vertical clearance of 146 feet, and crosses the Hudson River just above Catskill.

Hudson, on the east bank, is a city built on a slope that rises from the Hudson River, 101 miles above the Battery, and is a shipping point for cement and manufactured products. The deepest draft of vessels loaded at Hudson is 22 feet. Along the water front 12 wooden piers with a total of 5,000 feet of berthing space are available with depths up to 14 feet. Gasoline, oil, water, and supplies are available.

Athens is a village on the west bank of the river opposite Hudson. Two sets of high voltage overhead cables cross the river between Hudson and Athens, and have a horizontal clearance of 155 feet. Red lights are exhibited from the top of the suspension towers on both sides of the river. Athens has 9 wooden water front terminals having a total berthage of 4,000 feet with depths up to 14 feet.

Middle Ground Flats, to the westward of the main channel, extends northeastward for a distance of 1.4 miles from just below Hudson. The shoal is marked by two lights, one on the west side; the other at the southern extremity.

Chart 284.—From Hudson to Troy the river is being improved to obtain a channel 300 feet wide, with 400 feet through rock cuts, to the highway bridge in Albany, thence 400 feet wide to Troy. The depth to Albany is 27 feet and 12 feet to Troy, but not for the full width of the project. The channel is well marked by buoys and lights. The bottom is rocky at many of the bars under improvement, and some local knowledge is required to insure safety for anything but small craft. Strangers are advised to take a pilot, one can be obtained at Hudson and at other cities and towns on the river, but pilots are usually engaged at New York.

The principal villages between Hudson and Albany and their distances above the Battery are: **Coxsackie,** 107 miles; **Stuyvesant,** 109 miles; **New Baltimore,** 113 miles; **Coeymans,** 115 miles; and **Castleton-on-Hudson,** 118 miles.

From **Four Mile Point** to the light southward of **Coxsackie Island** the channel favors the west bank, thence the east bank until above **Rattlesnake Island,** then the channel shifts to the west bank until above **Mill Creek Entrance.** The channel then follows the east bank until northward of **Five Hook Light.**

Stonehouse Bar Channel North End Lighted Range is about 0.4 mile northward of New Baltimore. The front daymark is a black diamond target on a black skeleton tower on a white tank house. The rear daymark, 349½° from the front light, is white with a black center on a black skeleton tower on a white tank house. About 1.2 miles northeastward of New Baltimore is an aviation light, about 350 yards eastward from the shore, and east of **Houghtaling Island.** About 1.7 miles southwestward of Castleton-on-Hudson a fixed railway bridge crosses the river and has a horizontal clearance of 371 feet and a vertical clearance of 139 feet. Above the railroad bridge the channel is about mid-river to Van Wies Point where it favors the west bank to abreast of Cabbage Island, then the channel tends to mid-river, passing Albany and on to Troy.

Albany, 125 miles above the Battery, is on the west bank of the Hudson River. It is primarily a transshipping point serving not only the immediate vicinity, but large areas of New England and most of the areas accessible by waterways. Petroleum products from the Gulf and Atlantic ports are received in tankers and tank barges, and

are reshipped to various points on canals and the Great Lakes, in craft of lesser draft. Grain is received from the west and transshipped to New York. The city, the State capital, embraces the port district within the lands belonging to the city of Albany, the town of Bethlehem, and the city of Rensselaer. The lower harbor comprises that section of the Hudson River extending from the southern extremity of Cabbage Island to a point 1,000 feet south of the highway bridge, a distance of about 2.5 miles. The upper harbor consists of that section of the Hudson River northward of this point to the northern limits of the cities of Albany and Rensselaer. It is about 7 miles south of the eastern and southern terminals of the Erie and Champlain branches of the New York State Barge Canal System.

The State of New York has provided a barge canal terminal in the upper harbor principally for the use of vessels using these canals, but it may be used by others. The Erie and Oswego divisions of the canal connect with Buffalo and Oswego on the Great Lakes, while the Champlain division connects with the St. Lawrence River through Lake Champlain and the Richelieu River. Detailed information relating to these canals may be found at the end of this chapter.

Anchorages.—The restricted width of the river at Albany is not sufficient to permit vessels to swing at anchor without interfering with passing craft. In an emergency, vessels sometimes drop anchor in midstream to wait for berthing space, but can usually be secured without the necessity for vessels to lay at anchor for any extended period. Vessels proceeding from New York to Albany frequently anchor over night in the vicinity of Kingston, about 46 miles below Albany, to await daylight hours for passing through the narrower channel above Hudson.

A yacht anchorage is at the site of the former Hudson Day Line wharf.

Bridges.—A vertical lift highway bridge crosses the Hudson River between Albany and Rensselaer and has a horizontal clearance of 309 feet. The vertical clearance is 139 feet, when open, and 41 feet when closed. A swing railway bridge crosses the river about 0.5 mile above the highway bridge and has a horizontal clearance of 109 feet at the east draw, and 105 feet at the west draw. The vertical clearance is 27 feet. A swing railway bridge is about 0.4 mile above the preceding bridge, and has a horizontal clearance of 98 feet at the east draw and 103 feet at the west draw. The vertical clearance is 25 feet. For regulations see Chapter 2, § 203.185.

Tides.—The tidal range is about 4½ feet at Albany. Tidal currents have been described earlier in this chapter.

Towage.—Towboats are available for harbor service, barge canal lighterage, and for tows down the Hudson River. The average running time to New York, under normal conditions, is about 40 hours.

Dockage.—A charge is made for dockage for all vessels except cargoes being received or delivered at railroad wharves. At the State Barge Terminal dockage is also charged except when engaged in receiving or delivering freight shipped through or destined for shipment through the canal.

Wharfage.—Charges are made in all cases except for shipments moving through the grain elevator when such shipments are the property of the lessee of the elevator. No charges are made for liquids moving through the pipe lines.

Quarantine.—Matters pertaining to quarantine are handled by authorities at the Port of New York. The United States Public Health Service maintains a relief station

at 447 State Street. Emergency cases are admitted at the Memorial Hospital, North Pearl Street.

Customs.—Albany is a port of entry. The port of Albany Customs District includes the counties of Warren, Washington, Saratoga, Fulton, Montgomery, Schenectady, Rensselaer, Albany, Schoharie, Otsego, Delaware, Greene, Columbia, Ulster, Sullivan, and Duchess (except the townships of Fishkill, Wappinger Falls, East Fishkill, Beeman, and Pawling). Clearance is obtained at the Federal Building, Broadway, Albany. Bonded warehouses are at Albany, Rensselaer, Menands, Cohoes, Gloversville, and Waterford.

Immigration.—Immigration inspectors are available at the port terminal office in the National Savings Bank Building, Pearl and State Streets, Albany.

A **Captain of the Port,** designated from the United States Coast Guard, exercises jurisdiction over all matters related to the movement and mooring of vessels and enforces the provisions of the anchorage regulations for the port.

Terminal facilities.—At Albany and Rensselaer are 30 modern well-equipped wharves with a total of 18,600 feet of berthing space, having depths up to 28 feet alongside. These terminals are adequately served with railroad trackage. There are five transit storage sheds, one warehouse, a 13,500,000-bushel grain elevator and a molasses storage plant.

The principal shipping activity of Albany is at the wharves of the Albany Port District Commission at the southern part of the city, generally known as "The Port." The trackage of the Port Terminal Railroad extends along the edge of the bulkhead, permitting direct interchange between vessel and car, and also extends in the rear of the transit sheds and warehouse, where the loading platforms are on a level with the car floor.

The port area on the east side of the river comprises 106 acres and is served by the New York Central Railroad. The terminal of the Delaware and Hudson Railroad on the west bank of the river includes two wharves, which are not in use, and a pier used for handling bulk sulphur.

Facilities on the Rensselaer side of the river consist mainly of oil terminals with pipe lines extending from the river to storage tanks in the rear, and a lumber terminal having a bulkhead 1,205 feet long. The water fronts of the cities of Albany and Rensselaer are served by well-equipped fire departments.

Supplies.—Gasoline, Diesel oil, fuel oil, fresh water, and provisions are available. The bunkering rate is about 300 barrels per hour. Current for lighting and power is available in unlimited quantities. Alternating current, 3 phase 60 cycles, is supplied.

Repairs.—There are no drydocks or marine railways for ocean going vessels at the Port of Albany. Facilities for repairs not requiring hauling out are available, consisting of all types of repairs to both steel and wooden hulls, machinery, boiler work, and machine shop work. Shafts up to 24 feet in length and 40 inches in diameter can be turned.

Communications.—Albany is served with air, railroad, highway and water communications. Telegraph and telephone connections are available.

Rensselaer is a city opposite Albany. **Troy** is a manufacturing city on the east bank of the river about 131 miles above the Battery.

About 2 miles above Albany an overhead cable crosses the river between **Patroon Island** and **Bath Dike** with a vertical clearance of 162 feet. An overhead cable crosses

the river between Breaker Island and South Troy, with a vertical clearance of 145 feet. Red lights are exhibited atop the suspension towers on both banks of the river. A vertical lift highway bridge crosses the river between South Troy and **Menands** and has a horizontal clearance of 306½ feet and a vertical clearance of 139 feet when open and 24 feet when closed. A swing highway bridge crosses the river between Troy and Watervliet, and has a horizontal clearance of 181 feet, and a vertical clearance of 32 feet. An overhead cable crosses the river 0.2 mile below the highway bridge and has a vertical clearance of 142 feet. A railway vertical lift bridge crosses the river between Troy and Green Island and has a horizontal clearance of 160 feet and a vertical clearance of 129 feet when open and 24 feet when closed. For regulations see Chapter 2, § 203.185.

Watervliet opposite Troy is the site of the United States Arsenal with a stone bulkhead 755 feet in length.

The harbor embraces the entire water front of the city of Troy from the southern extremity of the city to the Federal lock and dam.

The width of the river and the character of the bottom are unsuitable for the safe anchorage of vessels. Vessels usually berth on arrival for loading and discharging cargo or when awaiting orders.

Dockage is not charged against vessels engaged in carrying cargo destined to or from the State canals. All other vessels are assessed.

Wharfage is assessed at the State barge canal terminal for non-canal business. No drydocks or marine railways are available at Troy. There is a floating dock at **Cohoes** on the west bank of the river about 1 mile above the Federal dam. The drydock has a length of 150 feet, a width of 36 feet, and a depth of 14 feet over the sill and 11 feet over the keel blocks. Facilities for repairs on steel and wooden hulls, machinery, and boiler equipment are available in Troy for vessels not requiring drydocking or hauling out. Gasoline, Diesel and fuel oil, fresh water, and provisions are available.

Troy is included in the New York Customs District, the nearest port of entry being at Albany. Matters pertaining to the Public Health, Customs, and Immigration Services in relation to vessels bound to or from Troy are handled at Albany. There are nine well-equipped wharves at Troy with a total berthing space of 2,380 feet having depths ranging from 9 to 14 feet. A concrete bulkhead about 1 mile long extends along the Troy water front and was built by the city. The State barge canal terminal provides the only public docking facility at Troy.

At **Starbuck Island** the oil storage terminals have depths up to 14 feet alongside.

The **Federal Lock and Dam** is about 134 miles above the Battery, and 1.8 miles below Waterford. The lock, at the usable width of 44.4 feet, is 492 feet in length. The lift at the lowest stages is 17.3 feet. The depth on the upper miter sill is 16.3 feet at the normal pool level. The depth on the lower miter sill at lowest low water is 13 feet. The tidal range is about 4¾ feet at the dam. For navigation regulations see Chapter 2, § 202.55.

The following brief description of the New York State and Canadian Canal System together with extracts from the rules and regulations of the State of New York are included for ready reference.

NOTE.—All mileages in this section are given in statute miles and speeds are in statute miles per hour.

New York Canal System.—The New York canals, built by the State of New York, afford free waterway communication between the Hudson River and Lake Champlain on the east and Lakes Erie and Ontario on the west. Originally, the canals were largely artificial channels, with water supplied through feeders from natural drainage sources and controlled by locks and dams. In 1905 construction operations were begun to enlarge the old canals of limited size or supersede them by channels formed by improving natural water courses wherever feasible. The new canal system was thrown open to traffic in the spring of 1918.

The canal system comprises the following lines or branches: Erie Canal, Waterford to Tonawanda, 338 miles with 245 bridges and 35 locks; Oswego Canal, from Three Rivers Point to Lake Ontario, 24 miles with 14 bridges and 7 locks; Cayuga-Seneca Canal, from junction with the Erie Canal to Ithaca and Watkins, including Cayuga and Seneca Lakes and spur to Montour Falls, 42 miles with 16 bridges and 4 locks; Champlain Canal, Waterford to Whitehall, 60 miles with 34 bridges and 11 locks; Canal harbors at Utica, Syracuse, and Rochester, 10 miles; making a total of 524 miles, 309 bridges, and 57 locks.

Channel dimensions for the waterways are 12 feet deep at normal pool level; the minimum widths are 75 feet in earth, 94 feet in rock, and from 110 to 200 feet in river and lake sections. The inside dimensions of the chambers of all locks on the improved canal routes are approximately 310 feet long and 45 feet wide. The depth over miter sills of locks and guard gates is 12 feet at normal pool level. The maximum dimensions of a float which may enter the canal are 300 feet long, and 43½ feet wide. The maximum overhead clearance for vessels navigating the canal routes is 15 feet above the water surface. The lock lifts range from 6 feet to 40½ feet, the average being 19½ feet.

For the most part the bridges are fixed structures, except where local conditions as to grades render other types preferable. See the regulations for bridge signals.

Speed of boats.—In the improved canal channels the speed of boats shall not exceed 6 miles per hour, except in canalized rivers and lakes on which the speed shall depend upon conditions of traffic. Speed limits on the canalized rivers and lakes are posted when practicable. See the regulations for penalties for excessive speeding in the waterways. The average time of lockage is 20 minutes.

Aids to navigation.—As a considerable part of the Barge Canal is constructed through natural waterways and consists of channels bordered by shallower water, numerous aids to navigation are maintained by the State to mark the navigable courses. These comprise lights, lighted ranges, lighted buoys, and buoys. The arrangement of aids considers the entire canal system as a waterway extending from the Hudson River to interior parts of the State. All red lights and buoys appear on the right or starboard hand, and all white lights and buoys appear on the left or port hand when proceeding up or away from the Hudson River, or away from the main line in the branches.

Charts.—The United States Lake Survey, 630 Federal Building, Detroit 26, Michigan, has prepared and placed on sale seven charts showing the natural navigable waters embraced in the canal system. In addition, a loose-leaf style bound volume of charts, measuring 11 x 17 inches, covering all the canals east of Lyons, is available from that agency. Since the charting project is authorized to cover only the natural waters of

the canal system, neither the single charts nor the bound volume include the Erie Canal from Lyons to the Niagara River, which is of artificial formation.

The Division of Operation and Maintenance, Department of Public Works, Albany 1, New York, issues the pamphlet *Rules and regulations governing navigation and use of the New York State Canal System* which also contains descriptions of the routes, structures, and terminals.

Navigation season.—The opening of the navigation season depends upon natural conditions. Notice of official opening and closing dates will be announced by the superintendent annually. For general information, such dates in recent years have been April 5 to 20, as the time of opening and from November 15 to 30 as the time of usual closing dates for the various types of vessels.

Terminals.—Terminals have been constructed at New York City, Albany, Troy, Whitehall, Schenectady, Amsterdam, Utica, Rome, Syracuse, Rochester, Erie Basin at Buffalo, and the principal villages along the Barge Canal. A grain elevator with a capacity of 2,000,000 bushels is in use at Gowanus Bay terminal in Brooklyn, and another with capacity of 1,000,000 bushels at Oswego. A wide variety of freight-handling equipment, consisting of cranes, derricks, conveyors, etc., has been installed on the important sites. Temporary freight sheds of timber construction, as well as a number of permanent sheds of steel or concrete construction, have been erected on important terminal sites.

The **Erie Canal** is 340.7 miles long. From Waterford, or the pool of the Troy dam in the Hudson River, westerly to Oneida Lake, the canal consists of a canalization of the Mohawk River and of a short reach of Wood Creek, alternating, however, with stretches of independent channel or land line where conditions render the same necessary or preferable. Passing through Oneida, Seneca, and Clyde Rivers, with some land-line cut-offs to shorten and straighten the channel. Syracuse, which is not on the main line of the new route, has connection by a branch of 6.75 miles through Onondaga Lake and a section of Seneca River. The westerly portion of the Erie Canal, from Lyons to Tonawanda Creek at Pendleton, is artificial channel; thence to the Niagara River, Tonawanda Creek is utilized. The navigable connection from Tonawanda to Buffalo is afforded by the Niagara River channel and Black Rock Canal.

From elevation 15.2 feet above mean sea level in the pool of the lock and dam in the Hudson River at Troy, a flight of 5 locks at Waterford ascends around Cohoes Falls into the Mohawk River at elevation 184; thence the canal ascends the Mohawk Valley by 14 locks to the summit level near Rome at elevation 420; thence descends by 3 locks to Three Rivers Point at elevation 363; and thence ascends by 12 locks westward to the Niagara River at elevation 565.7.

The **Oswego Canal,** 23.8 miles long, is almost entirely a canalization of Oswego River, which is formed by the confluence at Three Rivers Point of the Seneca and Oneida Rivers, the latter two embraced in the new Erie Canal, as above stated. Navigation in the Oswego River is maintained in pools formed by dams. The chief land line extends from the dam at Oswego to the harbor in Lake Ontario, separated from the river by a concrete wall. This canal descends by 7 locks from elevation 363 at Three Rivers Point to elevation 244 at Lake Ontario.

The **Cayuga and Seneca Canals** are, in general, a canalization of the Seneca River and Cayuga and Seneca Lakes. The Cayuga Canal extends from the Erie Canal, near the confluence of the Seneca and Clyde Rivers, southerly to the foot of Cayuga Lake

and through that lake to Ithaca. The Seneca Canal extends from the junction at the foot of Cayuga Lake up the Seneca River to and through Seneca Lake to Watkins and Montour Falls. These lakes are two of the so-called Finger Lakes of central New York, and are from 30 to 35 miles in length each. In entering Cayuga Lake the dredging of a channel 4¾ miles long was necessary before water of sufficient depth was reached. At the head or southerly end of Cayuga Lake is a spur of 1¾ miles to reach the city of Ithaca. From elevation 374 at the Erie junction, the canals ascend by 1 lock to Cayuga Lake at elevation 381.5, and then by 3 locks to Seneca Lake at elevation 445. Distances are as follows: From Erie junction to lock No. 1, 4.1 miles; from lock No. 1 through Cayuga Lake to Ithaca, 38.1 miles; from lock No. 1 through Seneca River and Lake to Watkins, 48.2 miles.

The **Champlain Canal,** 60.4 miles long, was formed by canalizing the Hudson River from Waterford northerly to Fort Edward; thence a land line across the divide at the summit level and the canalization of Wood Creek carry the route to Lake Champlain. From elevation 15.2 at Waterford the canal ascends by 8 locks to elevation 140 at the summit near Fort Edward, and thence descends by 3 locks to elevation 96.5 at Whitehall on Lake Champlain.

The following are extracts of the Rules and Regulations dated April 1, 1949 published by the State of New York.

Definitions.—The following terms when used in these regulations, unless otherwise expressly stated or unless the context or subject matter requires otherwise, shall have the following meanings:

Superintendent of Public Works shall mean the duly appointed administrative head of the State Department of Public Works who shall be hereinafter referred to as the Superintendent.

District Engineer shall mean the administrative head of a designated area constituting a district of the State Department of Public Works.

Canal System or *Barge Canal System* shall each mean all the canals and canal terminals of the State as hereinafter defined.

Canals or *Canal* shall mean the channel and adjacent State-owned banks of the inland waterways of the State constructed, improved, or designated by authority of the legislature as canals and shall include canalized rivers and lakes, canal water supply reservoirs, canal water supply feeder channels and all appertaining structures including locks, dams, bridges, etc., necessary for the proper maintenance and operation of the canals.

Canal Terminal or *Barge Canal Terminal* shall each mean the facilities which have been constructed or acquired under authority of the legislature in connection with the canal system for loading, unloading, and/or temporarily storing commodities transported upon the canals and shall include docks, dock walls, bulkheads, wharves, piers, slips, basins, harbors, grain elevators, buildings, equipment, tracks and roadways together with the lands now owned or as may hereafter be acquired by the State for the proper maintenance and operation of the canal terminals.

Erie Canal shall mean the portion of the canal system connecting the Hudson River at Waterford with the Niagara River at Tonawanda.

Oswego Canal shall mean the portion of the canal system connecting the Erie Canal at Three Rivers with Lake Ontario at Oswego.

Champlain Canal shall mean the portion of the canal system connecting the easterly end of the Erie Canal at Waterford with Lake Champlain at Whitehall.

Cayuga and Seneca Canals shall mean the portions of the canal system connecting the Erie Canal at a point near Montezuma with Cayuga and Seneca Lakes and through Cayuga Lake with Ithaca and through Seneca Lake with Montour Falls.

Canal Lands shall mean all lands and waters forming a part of the canal system, title to which was originally vested in the State, acquired by the State or which may in the future be acquired by the State for canal purposes.

Permit shall mean a revocable agreement granting temporary occupancy or use of lands, facilities, or structures of the canal system.

Float shall mean every boat, vessel, raft or floating thing navigated on the canals or moved thereupon under the direction of some person having the charge thereof.

Master shall mean every person having for the time the charge, control, or direction of any float.

Person shall mean an individual, partnership, corporation, or association.

Mooring applies to the making fast of a float to a structure. This may be by direct attachment to the structure or through other floats.

Dockage applies to the charges which are established for the mooring of a vessel at a terminal.

Wharfage applies to the charges which are established for the privilege of moving commodities from or into floats while moored at a terminal.

Storage applies to the temporary occupancy, by commodities, of space on a canal terminal.

Canal Freight applies to commodities moved or to be moved via the New York State Canals.

Day means a period of twenty-four hours or fraction thereof.

Area Occupied will include driveways, passageways, etc., which are monopolized by the commodity to the exclusion of other shippers.

Outgoing Canal Freight shall mean freight delivered on a canal terminal for transportation on the canal system.

Incoming Canal Freight shall mean freight delivered on a canal terminal after transportation on the canal system.

Owner of a vessel is the person so declared and filed with the United States Treasury Department. (Bureau of Customs.)

Canal Free.—Navigation on the State canals is free except for mooring, dockage, wharfage, storage, or use of canal equipment or facilities for which a permit is required and are defined in these regulations. The acceptance of fees or gratuities of any kind by lock officials or other canal employees is forbidden.

Equipment.—Every float navigated on the canal shall be properly manned. Each float shall have bow and stern lines in good condition and suitable lights for night operation.

Floats in bad condition.—Any float which is in such condition as, in the opinion of the Superintendent or his representative, may jeopardize the canal structures, or is likely to become a source of damage or of delay to navigation, shall be prohibited from proceeding into any canal. If such a float is already in the canal, it shall be prohibited from proceeding farther therein. Should there be any refusal or failure on the part of any person in charge of the float to obey such prohibition, such person and also the owner shall be liable to a penalty of not less than ten dollars nor more than one hundred dollars.

Draft markings on boats.—All boats of every nature operating on the canal, normally drawing over six feet, shall be plainly marked both fore and aft on each side, showing the actual draft of the boat at all times. The marking shall be of such color paint as to be visible at all times one hundred feet away. The figures shall be not less than four inches in height and the draft markings shall be at bottom of each figure. All draft markings shall show feet and half feet of draft.

Mooring.—Each float moored in the canal shall be made fast to secure moorings, at bow and stern, with good and sufficient lines so as to prevent such float from breaking away under the ordinary strain caused by passing floats, current, etc.

No float shall be moored or anchored in the canal channel at any point where its presence will interfere with navigation; and no float shall be moored or anchored at any point in the canal for a period in excess of twenty-four hours without the written consent of the Superintendent or his representative.

No float shall be moored at any State maintained dock or terminal in excess of 48 hours in any calendar month, without first obtaining an official permit.

No mooring is permitted in the Waterford Flight between the foot of Lock E–2 and Guard Gate No. 2.

Should a float moored at the Waterford Canal Terminal remain at such terminal for a period in excess of 24 hours there may be assessed against the registered owner of such float a dockage charge of $2.50 for each day such float remains at the terminal beyond the first 24 hours.

No float shall tie by or be moored at the head or foot of any lock except with the consent of the lock official in charge of such lock, and all directions given by him shall be complied with by the captain or master of such float.

The use of ladders in the lock chambers for mooring purposes is forbidden and no float shall be tied or fastened to the same. Every float while in a lock shall be moored to the proper snubbing posts by bow and stern lines.

No float shall moor to or attach a line to any buoy, light, or channel marker in the canals.

In cities or villages no float shall be moored in the canal for a longer period than is reasonably necessary for the discharge or taking aboard of its cargo without the written permission of the Superintendent or his local representative.

Violation of this regulation shall subject the owner or person in charge of the offending float to a fine of not over $100.00.

Obstruction of navigation.—The master of any float who obstructs navigation of the canal by improper mooring, management or conduct of a float or any person who obstructs navigation of a canal by placing any object in the waters of the canal or by placing any obstruction upon the bank thereof shall, at the discretion of the Superintendent, be subject to a penalty of not over $100.00 for each such obstruction.

Pollution of canal waters, or deposit of rubbish on canal lands.—No rubbish, debris, carcass, dead animal, putrid substance, filth or sewage of any kind, shall be thrown, dumped, deposited, placed or discharged into any canals of this State, or into any basin, reservoir or feeder connected therewith, or on any canal lands.

Buoys and lights displaced.—When a buoy or light is struck by a float or whenever a buoy or light is noticed to be out of position, its light out or otherwise in bad order, the master of the float having knowledge of such condition shall report the matter to the lock official at the next lock through which the float passes with a statement as to the location of the displaced buoy, extinguished light or other improper condition and the time when the accident occurred, or the condition reported was noticed. Blanks for such report may be obtained from the lock official.

Assistance to boats.—In case any float grounds, sinks or otherwise obstructs navigation on the canal, the Superintendent may cause the same to be salvaged, destroyed or removed, subject to the provisions of Section 83 of the Canal Law.

Note: The following policy has been adopted by the Department in connection with the use of State equipment and personnel in assisting canal floats meeting with mishap on the canal:

Where a float is in the channel and in danger of obstructing navigation, or there is danger of loss of life or serious property damage, the assistance will be as prompt and thorough as possible. The Department's first duty is to keep navigation open.

Where a boat is sunk entirely outside of the channel and there is no immediate prospect of such boat coming into the channel, State equipment will ordinarily not be used in salvage work. However, in special circumstances, the District Engineer may make an exception to this rule. Where the use of State equipment is requested to assist in the removal of wrecks which do not interfere with navigation, the request may be granted when, in the discretion of the District Engineer, the equipment may be spared. In instances of this character, a fee established by these regulations will be charged. Before starting work of this character a guarantee in the form of a certified check for the estimated cost of the work is to be delivered by the owner, master or his representative to the appropriate District Engineer.

Speed on improved canals.—In the improved canal channels the speed limit of floats shall not exceed 6 miles per hour, excepting in canalized rivers and lakes. In canalized rivers and lakes the limit of speed shall depend upon the conditions of traffic. So far as may be practicable, the rates of speed will be indicated for the various sections and in no event shall such rates of speed be exceeded. For violation of this regulation the float may be refused lockage for a period of not to exceed 3 hours by the lock official at which the boat first appears, or the Superintendent may reprimand or assess a fine of not to exceed $100.00 for each offense. In extreme cases, all three penalties may be inflicted.

Speed when passing.—Every float, when passing a tow of floats, or while passing a moored float shall slow down to such extent as will prevent injury to such tow of floats or moored float from the wash of the passing float.

When passing dredge.—When two floats, going in opposite directions, shall approach each other in the vicinity of a float which is stationary or moving at a slow rate of speed, in such manner that they would, if both should continue their headway, meet by the side of such third float, the float which shall be going in the same direction as the intermediate float is going, or is headed, shall stop until the float going in the opposite direction has passed. In canalized rivers where the above contingency may occur, however, should conditions of current exist, the float which is proceeding with the current shall have the right of way past the stationary or slow-moving float and the float which is proceeding against the current shall wait until the float proceeding with the current has passed. The float proceeding with the current shall indicate to the approaching float its intention to proceed.

Preference of floats in passing.—Floats in passing shall be governed by the whistle signals as prescribed in the Pilot Rules of the U. S. Coast Guard, as published April 5, 1948. Article 25 of such regulation provides:

In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of the fairway or mid-channel which lies on the starboard side of such vessel.

When any float is approaching a lock the overtaking vessel shall not attempt to pass the overtaken float within a distance of 1,000 feet of a lock towards which the floats are progressing. Any violation of this rule shall subject the owner or master of the offending float to a penalty of not to exceed $100.00.

Passage of locks.—When a float is approaching a lock, the signal to the lock operator of the desire of the float to pass through the lock shall consist of three distinct blasts or soundings of the whistle, horn or other signaling device. Answering signals from the lock will be given by means of colored signal lights. Green will indicate that the lock is ready and the float may advance. Red will indicate that the float must wait for the lock to be made ready.

A float approaching a lock which is not ready to receive it shall come to a full stop at a safe distance from the lock gates and wait the signal of the lock official to approach. If the lock is ready to receive the float, the float shall slow down at a proper distance from the lock and shall enter the lock under perfect control. All directions given by the lock official relative to the operation of the float while awaiting lockage, entering and passing through the lock chamber shall be strictly complied with.

Every float within 300 feet of a lock, if upon the same level that the water in the lock then is, shall be permitted to pass the lock before any other float not upon the same level (provided, however, that a float arriving at a lock or entrance and being immediately followed by another float which can lock appreciably faster, shall tie up at the lock and allow the faster float to pass if ordered to do so by the lock operator).

Operators of **Double Locking Fleets**, eastbound, are required to have the power unit remain on the upper level at Lockport until the first lockage is complete. When westbound, the power unit shall enter the lock with the first lockage of its double-locking tow, so as to provide power on the upper level for the floats comprising the first lockage. Double-locking tows are not allowed in either direction through the Waterford flight of locks.

Questions as to which of two or more floats may first pass through a lock SHALL BE **determined by the lock operator** and the passage made in the manner and order directed by him. The owner or master of any float, refusing to conform to any such determination of a lock operator, or who detains or unnecessarily hinders the passage of any float through a lock, in violation of any provision of this regulation, shall, for such offense, be subject to forfeiture to the State of a sum not to exceed $100.00.

A float which shall arrive at any lock and which shall not improve the first opportunity of passing the same, shall lose its preference if there is any other float ready to pass the lock.

When a float enters a lock it shall pass through the same under the direction of the lock officials without any unreasonable or unnecessary delay. Any float delaying unreasonably or unnecessarily in a lock shall be deemed as violating this regulation and the lock officials shall have authority to cause said float to be removed from the lock and the owner of such float, in addition to being subjected to a penalty of not to exceed $100.00 shall pay the expense involved in towing or removing such float from the lock.

Disobedience of or refusal to comply with the directions of the lock officials as to the management of a float in or at a lock will be sufficient warrant for refusing lockage in such float, besides subjecting the owner, master, or captain to a penalty.

Signaling Lift Bridges.—When a float is approaching any lift bridge, the signal to the lift bridge operator of the desire of the float to pass under the bridge, consisting of three short distinct blasts or soundings of the whistle or horn or other signaling device, must be given at least 1,000 feet from the bridge in order that the operator may have ample time to clear his bridge of traffic and raise same for the passage of the float. Answering signals from lift bridges will be given by means of colored lights, horn, whistle or bell, dependent upon the type of installation provided at the particular bridge.

Warning Signal Approaching Bends.—Every power unit when nearing a short bend in the channel where, from the height of the banks or other cause, a power unit approaching from the opposite direction cannot be seen, shall sound a long distinct signal at least one-half mile from such point. This signal shall be answered by a similar signal by any float that may be approaching in the opposite direction.

When Traffic Congested.—In case of a delay to navigation causing a congestion of floats at any point, the floats shall take such places as shall be assigned to them by the Superintendent or his repre-

sentative and they shall be passed through the lock or allowed to proceed along the canal in such order as in the judgment of the Superintendent, or his authorized representative, shall be deemed best for the interests of general navigation. In all such cases the owners, masters, and captains of detained floats must comply strictly with the directions of the Superintendent, or his representative, and for any violation of this regulation a penalty of not to exceed one hundred dollars may be imposed.

Sailing Rules.—The provisions of the Pilot Rules for inland waters, as published April 15, 1948, by the United States Coast Guard, and as later amended, relative to the rules for vessels passing each other, as to lights on vessels and other matters consistent with the proper use of the canal, shall be complied with by all floats navigating the canals except as otherwise provided in these regulations.

Aids to Navigation.—Red buoys and red lights are located on the starboard side of the canal channel when entering canals at the Waterford entrance, while white buoys and white lights are located on the port side of the canal channel from the same entrance.

Clearance.—Every commercial float shall have a clearance. Clearances may be obtained at the Troy lock, at the harbor master's offices on canal terminals, or for cargoes taken aboard at interior points, at the first lock through which the float may pass after taking cargo aboard. Clearance shall be refused for floats not properly registered in accordance with these rules and regulations. No float may proceed beyond the place for which it has clearance or unload any article before its arrival there. Property transferred from one float to another shall in all cases be re-cleared.

The clearance of every float shall be exhibited to the first lock official after such float shall have left the office where clearance was issued. Unless the clearance has on it the signature of the official designated to issue clearances, the lock official shall not permit the float to pass.

A float whose clearance is lost may be detained until it is re-cleared or until the master has procured a duplicate clearance from the office where clearance is claimed to have been issued.

Clearance may be refused for a vessel against whose registered owner there is an unpaid penalty involving such vessel assessed under these rules and regulations, or against whose registered owner there is an unpaid bill rendered by the Superintendent for assistance to such vessel, or for repairing damage to State property caused by such vessel.

Clearance may be denied for any float when, in the opinion of the Superintendent or his representative, its condition or equipment does not comply with these regulations or the crew of which has navigated the float in a careless, reckless, or inefficient manner.

Registration.—The owner shall obtain a New York State **Certificate of Registry** for each commercial float before it may be navigated on the canals. **Certificate of Registry** may be obtained from the Superintendent upon the filing of a properly executed Application for Registration.

If the owner of the commercial float is a company or corporation, the title of the official signing the application shall appear thereon.

Upon approval by the Superintendent of the application for registration, a State registry number will be assigned for the float and a Certificate of Registry will be issued.

A new **Certificate of Registry** must be obtained for a float, previously registered, whose ownership, name, or hailing place has since been changed. In case of change in ownership a new **Certificate of Registry** will not be issued until a certificate of change in ownership signed by both parties to such transaction, or a certified copy of the bill of sale, has been filed in the office of the Superintendent. In case of change in name or hailing place, a new **Certificate of Registry** will not be issued until the consent of the Superintendent, in writing, to such change has been obtained.

The name and State registry number of each boat, with the hailing place as it is registered, shall be painted in letters at least four inches in height on some conspicuous and prominent part of the outside of the boat. The markings shall be of such color paint as to be visible at all times one hundred feet away.

The name or hailing place of a boat shall not be changed without the consent in writing of the Superintendent, which consent will not be given if there is any existing lien or mortgage filed in his office against such boat, unless it shall be necessary to make the name or hailing place conform to the United States customhouse registry, by reason of a change of name after having been registered at the customhouse, and in such case notice will be given to the Superintendent. The penalty for a violation of this regulation shall be not less than fifty dollars nor more than three hundred dollars.

Navigation Permits for Pleasure Boats.—Permits for pleasure boats to navigate the canals will be issued by the Superintendent. Application for such a permit should be made to him at his office, State Office Building, Albany, N. Y., at any district or section office or at the office of the operator of the

first lock through which passage is requested, and should state the name and address of the owner, the name of the boat and its dimensions and also its type, length, beam, draft and height above water line. These permits are issued without charge.

Special Regulations for Pleasure Boats.—In addition to the regulations governing general traffic on the canals, the following special regulations apply to pleasure boats:

1. No lock, guard gate, lift or swing bridge shall be operated for any craft not engaged in transporting freight, unless said craft has a navigation permit which permit shall be shown at any time upon demand of a canal official.

2. During period of low water, the locks will be operated for pleasure boats at such hours and at such intervals as will, in the judgment of the Superintendent or his representative, conserve the water supply for the lockage of freight carriers.

3. Pleasure boats are required to come to a stop at each lift or swing bridge, and said bridge will then be operated with due regard to street traffic and public convenience.

4. Pleasure boats will not be permitted to cruise back and forth on the canal in cities where doing so will compel the operation of lift bridges resulting in interfering with street traffic.

5. Speed must be restricted at all times so that the wash of the banks, damage to and upsetting of buoys and navigation aids, extinguishment of buoy lights, disarrangement of tows and the breaking of their lines and other damage may be avoided, and in no case may the speed limits as established by these regulations, or posted along the canals, be exceeded.

6. Violation of any of these rules, or refusal to comply with proper directions given by the Superintendent or his representatives, will result in revocation of the navigation permit besides subjecting the owner of such boat to a penalty.

Houseboats.—Craft of the type commonly known as houseboats shall have a navigation permit from the Superintendent before being allowed in the canal. Owners of houseboats using the canal shall observe strictly the provisions of the regulation relative to the mooring of floats.

Locking of Canoes or Rowboats.—The State Department of Public Works may require the removal of all persons and perishable property from the craft when locking canoes or rowboats, if, in the judgment of the lock operator, the locking would be dangerous to them and cause the canoe or rowboat to be towed through the lock.

Lake Champlain, through the connection at its head or southerly end with the New York canal system and the Hudson River, and through its northerly outlet to the St. Lawrence River via the Richelieu River and the Chambly Canal, forms part of an international waterway for commerce between the United States and Canada.

A narrow arm at the southerly end of the lake, designated the Narrows, is the link which connects with the New York canal system at Whitehall; the length of the Narrows from the latter place northerly to Crown Point at the south end of the main or so-called broad lake being about 37 miles. There is but little current in the Narrows at any time, due to there being no large tributary streams. The lake level is subject to variation from year to year, with long-time range varying from a minimum of 0.6 foot below to a maximum of 8.8 feet above the reference plane of low lake level. During each year the level has a seasonal rise and fall of from 4 to 5 feet, the lowest stage occurring in September or October and the highest stage in April or May. The depths given in descriptions for Lake Champlain are referred to the plane of low lake level, which is an elevation 92.5 feet above sea level.

In the southerly 13.2 miles of the Narrows from Whitehall to Benson Landing, the bed of the waterway, lying between mainland banks from 300 to 1,200 feet apart, consists of marshy flats traversed by a narrow channel or channels of open water. The project for improvement by the United States provides for a channel 12 feet deep from Whitehall to Benson Landing, with a general width of 200 feet and increased width at various bends, and also for fender booms at certain sections of the rocky banks. Work

of widening and straightening the channel in accordance with the Government project has not been completed to the extent authorized.

The limiting available depths at low lake level, as of December 1, 1948, in that section of the waterway under improvement were 10 feet deep and 90 feet wide.

The distance from Crown Point northerly through the broad lake to the international boundary near Rouses Point is about 76 miles, with deep water available. Prominent points and shoals throughout the lake are marked by lights and buoys, as shown by the charts and as described in the United States Coast Guard Light List.

The principal ports on the broad lake are Port Henry, N. Y., near the south end; Burlington, Vt., and Plattsburg, N. Y., near mid-length; and Rouses Point, N. Y., near the international boundary at the north end.

Three bridges cross the direct route through the lake proceeding from the Hudson River to the St. Lawrence River. One has a fixed span with a vertical clearance of 92 feet at low lake level and the other two have swing spans. The minimum horizontal clearance is 89 feet.

Charts of Lake Champlain are published by the United States Lake Survey.

Richelieu River and **Chambly Canal**.—From the international boundary line at the northerly end of Lake Champlain, the distance is about 80 miles to the outlet of the Richelieu River into the St. Lawrence River at Sorel, 46 miles below Montreal. The river has been rendered navigable by the construction of the Chambly Canal in its upper reach and the St. Ours lock and dam in its lower course. Bridges over the waterway are provided with draws. The size of vessels that can navigate this route is controlled by the least dimensions of the Chambly Canal locks. From the international boundary to the head of the Chambly Canal is 22 miles.

The Chambly Canal is 11¾ miles long and overcomes the rapids between Chambly and St. Johns by means of 1 guard lock and 8 lift locks, with total lift or lockage of 80 feet. The limiting dimensions of the smallest locks are: Usable length, 111 feet, 5 inches; width 23¼ feet; depth on sills, 6½ feet. The breath of the canal is 36 feet at the bottom and 60 feet at the water surface. The minimum overhead clearance is 120 feet, under telephone wires. From the foot of the canal to St. Ours Lock is a stretch of 32 miles of river, with navigable depth of 7 feet.

At St. Ours, 14 miles above the mouth at Sorel, the Richelieu River is divided by a small island into two channels. The western channel is closed by a dam 635 feet long. St. Ours Lock, located in the eastern channel, is 339 feet long (310 feet available) by 45 feet wide, with 12 feet of water on the sills and total lift of 5 feet. A draft of 12 feet is available from St. Ours Lock to the St. Lawrence River.

Navigation season on the Richelieu River and Chambly Canal is from about the middle of April to the middle of November. The exact dates are announced by the Ministry of Transport.

The Canadian Government requires permits or let-passes from pleasure boats entering Canadian waterways, which may be obtained at their canal statistical offices

at St. Johns and Prescott, or at the first lock in the St. Lawrence River below Prescott. American vessels when leaving Canada should report at the customs office.

These waterways are fully described in the *St. Lawrence River Pilot* (*Canadian Edition*) issued by the Department of Mines and Resources, Ottawa, Canada. Charts are published by the same agency. 5

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Appendix

COAST and GEODETIC SURVEY.—**COAST PILOTS.**—Atlantic Coast, Section A, St. Croix River to Cape Cod, 1950.
Atlantic Coast, Section B, Cape Cod to Sandy Hook, 1950.
Atlantic Coast, Section C, Sandy Hook to Cape Henry, 1947.
Atlantic Coast, Section D, Cape Henry to Key West, 1948.
Gulf Coast, Key West to Rio Grande, 1949.
West Indies, Puerto Rico and Virgin Islands, 1949.
Pacific Coast, California, Oregon, and Washington, 1942.
Alaska, Part I, Dixon Entrance to Yakutat Bay, 1943.
Alaska, Part II, Yakutat Bay to Arctic Ocean, 1947.
Hawaiian Islands, 1950.
Philippine Islands, Part I, Luzon, Mindoro, and Visayas, 1939.
Philippine Islands, Part II, Palawan, Mindanao, and Sulu Archipelago, 1939.
Distances between United States Ports, 1938.

DISTRICT OFFICES.—Northeastern District: Tenth Floor, Customhouse, Boston 9, Mass.
Eastern District: 602 Federal Office Bldg., 90 Church St., New York 7, N. Y.
Southeastern District: 418 U. S. Post Office Bldg., Norfolk 10, Va.
Southern District: 314 Customhouse, 423 Canal St., New Orleans 16, La.
Caribbean District: Post Office Box 3067, Santurce, San Juan, Puerto Rico.
Southwestern District: 1426 Post Office and Courthouse, Los Angeles 12, Calif.
Western District: 114 Customhouse, San Francisco 26, Calif.
Midwestern District: 502 Panama Bldg., 534 Southwest Third Ave., Portland 4, Oreg.
Northwestern District: 705 Federal Office Bldg., Seattle 4, Wash.
Pacific District: 244 Federal Office Bldg., Honolulu, T. H.

CHART AGENCIES.—Agents marked with an asterisk (*) also handle certain United States Hydrographic Office publications.

Agents marked with a (†) dagger also handle United States Coast Guard publications.

MASSACHUSETTS:

Chatham: Mayflower Shop.
Edgartown: †Avery's Inc., Main Street.
Falmouth: Falmouth Marine Railways, Inc.
Nantucket Island: The Tony Sarg Shop.

MASSACHUSETTS: Continued

New Bedford: †C. E. Beckman Co., 31–35 Commercial Street.
Osterville: Crosby Yacht Building & Storage Co., Inc.
Provincetown: Land's End Marine Supply Co., Inc., 337 Commercial Street.
Vineyard Haven: Wallace E. Tobin Co., Inc.
Woods Hole: Samuel T. Cahoon.

RHODE ISLAND:

Edgewood: Port Edgewood, Inc., 1128 Narragansett Boulevard.
Newport: W. H. Tibbetts Co., 185 Thames Street.
Providence: †Goff & Page, 54 Custom House Street.

CONNECTICUT:

Bridgeport: †Rider, Hayes Co., 610–612 Water Street.
Devon: Voorhees Marine Sales, 40 Bridgeport Avenue.
East Hartford: Weston M. Jenks, 365 Connecticut Boulevard.
Essex: †*The Essex Paint and Marine Company.
Greenwich: †*Daniel M. Taylor, 217 Millbank Avenue.
Hartford: †Clapp & Treat, Inc., 4 American Row, Old State House Square.
New Haven: Bradley & Scoville, Inc., 67-69 Orange Street.
New London: †The Darrow & Comstock Co., 94 Bank Street.
†Burr's Yacht Station, 244 Pequot Avenue.
Saugatuck: †*Kellogg Marine, Inc., 616 Riverside Avenue.
South Norwalk: Fox Cycle and Hardware Co., 108 Washington Street.
Rex Marine Basin, 144 Water Street.
Stamford: †Stamford Bookstore, Inc., 127 Bedford Street.
†*The Fairfield Marine Products Corp., 170 Lockwood Avenue.

NEW YORK:

Albany: †R. B. Wing & Son Corp., 384-386 Broadway.
Bay Shore, L. I.: D. W. Brewster, Ocean Avenue.
Brooklyn: †Kingsboro Marine Supply Corp., 986 Atlantic Avenue.
City Island: Hunter A. Winsette, 358 City Island Avenue.
Flushing: Svend Kent, 161-24 Northern Boulevard.
Freeport: †Chatfield's Marine Sales and Service, Inc., Hudson Point.
Greenport: S. T. Preston & Son.
Huntington: †Huntington Hardware Company.
Jamaica: Jamaica Watercraft, 92-28 160th Street.
Mamaroneck: †R. G. Brewer, Inc., 161 East Boston Post Road.
New York: †U. S. Coast and Geodetic Survey District Office, Room 602, Federal Office Building, 90 Church Street.
*†John Bliss & Co., 84 Pearl Street.
*†C. S. Hammond & Co., 1 East 43rd Street.
*†T. S. & J. D. Negus, 69 Pearl Street.
†*Kelvin & Wilfrid O. White Co., 38 Water Street.
The E. J. Willis Co., 91 Chambers Street.
Abercrombie & Fitch Co., Madison Avenue and 45th Street.
The Beacon Book Shop, Inc., 46 East 45th Street.
A. P. Pohl, Jr., Inc., 30 Church Street.

NEW YORK: Continued

Rand McNally & Co., 7 West 50th Street.
Patchogue, L. I.: "Toad" Conklin Boat Yard, Riverford Street on the River.
Port Washington:† A. & R. Marshall, 403 Main Street.
Poughkeepsie: McComb's, 271 Main Street.
Sag Harbor, L. I.: R. G. Barry & Son.

NEW JERSEY:

Hackensack: Wilson's Marine Store, 322 Main Street.
Newark: Umstot Boat & Marine Equipment Co., 302 Sussex Avenue.
Perth Amboy: Levin's Sporting Goods Co., 192 Smith Street.
Red Bank: Jersey Marine Co., Inc., 24 Wharf Street.

Monthly Mean Surface Water Temperatures

Place	Years of record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
		°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F
Nantucket Shoals Lightship	2	41.0	38.9	38.6	41.6	44.9	50.8	55.1	59.6	58.5	56.6	51.0	46.0	48.6
Woods Hole, Mass	6	34.2	32.7	36.8	45.3	54.2	62.4	70.4	71.2	68.1	60.0	51.1	40.5	52.2
New London, Conn	2	37.5	36.4	40.6	50.2	58.8	67.0	73.8	72.4	68.4	61.2	54.3	44.8	55.4
Montauk, Fort Pond Bay, L. I., N. Y	2	37.2	35.4	38.0	44.2	52.4	62.4	69.4	70.9	68.2	61.0	53.8	44.6	53.1
Willets Point, East River, N. Y	18	35.5	33.5	36.8	44.4	54.1	62.6	68.2	71.9	69.9	61.7	51.1	40.2	52.5
New York (The Battery), N. Y	23	37.3	35.5	38.5	45.7	55.2	65.2	71.5	73.4	70.5	62.1	52.4	42.7	54.2
New York (Fort Hamilton), N. Y	12	35.8	34.2	36.4	43.7	53.3	62.6	69.4	71.3	67.7	59.6	49.6	40.8	52.0
Sandy Hook, N. J	12	34.7	34.2	38.9	48.4	58.0	68.0	73.5	73.7	68.9	57.4	47.8	38.1	53.5

The monthly means of surface water temperature may vary somewhat from year to year and therefore means from different series are not strictly comparable. For temperature data in greater detail, write to the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C., for publication TW-1, *Surface Water Temperatures, Atlantic and Gulf Coasts.*

Monthly Mean Sea Water Densities

REDUCED TO 15° C. (59° F.)

Place	Years of record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
Nantucket Shoals Lightship	2	1.0240	1.0243	1.0244	1.0244	1.0247	1.0244	1.0242	1.0251	1.0252	1.0244	1.0240	1.0240	1.0244
Woods Hole, Mass	6	1.0236	1.0235	1.0237	1.0236	1.0238	1.0240	1.0240	1.0239	1.0241	1.0240	1.0239	1.0238	1.0238
New London, Conn	2	1.0136	1.0097	1.0088	1.0084	1.0090	1.0118	1.0160	1.0194	1.0210	1.0214	1.0194	1.0180	1.0147
Montauk, Fort Pong Bay, L. I., N. Y	2	1.0230	1.0224	1.0220	1.0217	1.0221	1.0221	1.0224	1.0230	1.0231	1.0234	1.0233	1.0231	1.0226
Willets Point, East River, N. Y	18	1.0185	1.0184	1.0181	1.0176	1.0176	1.0180	1.0185	1.0190	1.0190	1.0189	1.0188	1.0187	1.0184
New York (The Battery), N. Y	23	1.0153	1.0156	1.0132	1.0121	1.0136	1.0154	1.0165	1.0173	1.0174	1.0172	1.0160	1.0155	1.0154
New York (Fort Hamilton), N. Y	12	1.0166	1.0173	1.0148	1.0125	1.0152	1.0170	1.0181	1.0190	1.0187	1.0179	1.0168	1.0165	1.0167
Sandy Hook, N. J	12	1.0161	1.0168	1.0153	1.0151	1.0159	1.0170	1.0184	1.0186	1.0187	1.0186	1.0180	1.0176	1.0172

The monthly means of sea water density may vary somewhat from year to year and therefore means from different series are not strictly comparable. For density data in greater detail, write to the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C., for publication DW-1, *Density of Sea Water, Atlantic and Gulf Coasts.* A table for converting density to salinity is included in that publication.

Distance Table

DISTANCES GIVEN IN NAUTICAL MILES

	Nantucket, Mass.	Vineyard Haven	Woods Hole	New Bedford	Brenton Reef Lightship	Newport, Rhode Island	Tiverton	Fall River	Pawtucket	Providence	Great Salt Pond, Block Island	Stonington, Conn.	New London	Hartford	New Haven	Housatonic River	Bridgeport	Norwalk	Stamford	Montauk, Long Island	Sag Harbor	Greenport	Port Jefferson Harbor	Oyster Bay	Hempstead Harbor	New York	Albany	4 miles 130° from Montauk Pt.	Cape Cod Canal east entrance	Pollock Rip Channel	Nantucket Shoals Lightship
Nantucket, Mass.		28	32	53	66	71	90	85	94	89	80	92	103	155	139	144	152	166	167	98	114	113	147	169	175	197	323	89	68	21	69
Vineyard Haven	28		6	27	39	45	64	64	68	63	54	66	77	129	113	118	126	140	141	72	88	87	121	143	149	169	287	63	43	34	92
Woods Hole	32	6		24	35	40	59	59	63	58	49	61	72	125	108	113	121	135	136	67	83	82	116	138	144	165	282	59	22	38	87
New Bedford	53	27	24		33	38	52	54	63	58	48	60	74	124	105	113	121	135	136	67	83	82	116	138	144	163	282	58	31	59	92
Brenton Reef Lightship	66	39	35	33		5	19	20	30	25	18	28	42	93	78	82	90	104	105	36	52	51	85	107	113	135	262	32	49	72	93
Newport, Rhode Island	71	45	40	38	5		15	18	26	22	23	33	48	98	83	87	95	109	110	41	57	56	90	112	118	140	267	36	54	77	98
Tiverton	90	64	59	52	19	15		6	22	18	42	52	67	112	102	106	114	128	129	60	76	75	109	131	137	159	286	51	68	96	112
Fall River	85	64	59	54	20	18	6		24	20	38	48	62	113	98	102	110	124	125	56	72	71	105	127	133	155	282	53	69	96	113
Pawtucket	94	68	63	63	30	26	22	24		4	48	58	72	123	108	112	120	134	135	66	82	81	115	137	143	165	292	63	79	100	123
Providence	89	63	58	58	25	22	18	20	4		43	53	67	118	103	107	115	129	130	61	77	76	110	132	138	160	287	58	74	95	118
Great Salt Pond, Block Island	80	54	49	48	18	23	42	38	48	43		18	29	81	65	69	77	91	93	22	38	37	72	94	99	122	248	14	64	86	100
Stonington, Conn	92	66	61	60	28	33	52	48	58	53	18		12	68	53	57	64	77	79	20	32	29	60	89	86	109	236	20	76	98	113
New London	103	77	72	74	42	48	67	62	72	67	29	12		62	47	51	59	72	74	19	25	27	54	76	81	104	231	27	89	109	125
Hartford	155	129	125	124	93	98	112	113	123	118	81	68	62		76	80	88	101	103	67	65	63	84	106	111	133	260	78	140	161	177
New Haven	139	113	108	105	78	83	102	98	108	103	65	53	47	76		14	23	36	39	50	48	46	23	41	46	69	195	62	125	145	162
Housatonic River	144	118	113	113	82	87	106	102	112	107	69	57	51	80	14		12	24	27	54	52	50	12	28	33	56	182	66	129	150	165
Bridgeport	152	126	121	121	90	95	114	110	120	115	77	64	59	88	23	12		21	23	62	60	58	14	25	31	53	179	74	137	158	174
Norwalk	166	140	135	135	104	109	128	124	134	129	91	77	72	101	36	24	21		11	75	73	71	22	15	19	41	168	86	150	172	187
Stamford	167	141	136	136	105	110	129	125	135	130	93	79	74	103	39	27	23	11		74	73	71	24	10	12	34	138	89	152	173	188
Montauk, Long Island	98	72	67	67	36	41	60	56	66	61	22	20	19	67	50	54	62	75	74		21	22	57	76	83	106	232	16	84	104	114
Sag Harbor	114	88	83	83	52	57	76	72	82	77	38	32	25	65	48	52	60	73	73	21		11	55	77	82	105	231	31	99	120	131
Greenport	113	87	82	82	51	56	75	71	81	76	37	29	27	63	46	50	58	71	71	22	11		52	74	79	102	229	30	98	119	130
Port Jefferson Harbor	147	121	116	116	85	90	109	105	115	110	72	60	54	84	23	12	14	22	24	57	55	52		25	24	52	178	68	132	153	165
Oyster Bay	169	143	138	138	107	112	131	127	137	132	94	89	76	106	41	28	25	15	10	76	77	74	25		13	34	161	86	154	174	187
Hempstead Harbor	175	149	144	144	113	118	137	133	143	138	99	86	81	111	46	33	31	19	12	83	82	79	24	13		24	151	94	159	181	193
New York	197	169	165	163	135	140	159	155	165	160	122	109	104	133	69	56	53	41	34	106	105	102	52	34	24		126	117	182	193	213
Albany	323	287	282	282	262	267	286	282	292	287	248	236	231	260	195	182	179	168	138	232	231	229	178	161	151	126		243	308	319	343

NOTES—Distances between points in Buzzards Bay and points eastward are via Quicks Hole. For distances via Woods Hole, combine distances to the latter.

Distances from New York to points eastward are via Long Island Sound except distances to Nantucket Shoals Lightship and to point 4 miles 130° true from Montauk Point Light which are via the south coast of Long Island.

CORPS OF ENGINEERS DISTRICTS.—New England Division: Office: Bldg. No. 21, U. S. Naval Drydock, South Boston, Mass.
Mail Address: Army Base, Boston 10, Mass.

The New England Division, an operating division with both district and division functions, comprises all of New England except western Vermont and small portions of Massachusetts and Connecticut along their western boundaries, and includes small portions of southeastern New York, all embraced in the drainage basins tributary to Long Island Sound and the Atlantic Ocean east of the New York-Connecticut State line. It also includes Fishers Island, N. Y.

New York District: Office: 80 Lafayette Street, New York 13, N. Y.

The New York District comprises western Vermont, small portions of western Massachusetts and Connecticut, eastern New York, including Long Island, and northeastern New Jersey, embraced in the drainage basins tributary to Lake Champlain and the St. Lawrence River system east thereof and to the Atlantic Ocean from New York-Connecticut State line to but not including Manasquan Inlet, N. J.

It exercises jurisdiction, however, over all matters pertaining to the improvement of the Great Lakes to Hudson River waterway; and, for the purposes of study, investigation, and survey for the St. Lawrence River seaway and power project, over the International Rapids section of the St. Lawrence River, extending from Chimney Point to the foot of Cornwall Island.

BRANCH HYDROGRAPHIC OFFICES.—New York, 346 Broadway.

COAST GUARD DISTRICTS.—First, Office: 1400 Customhouse, Boston 13, Mass. The first District comprises: Maine; New Hampshire; Vermont except the counties of Orleans, Franklin, Grand Isle, Chittenden, and Addison; Massachusetts; Rhode Island; all U. S. Naval reservations on shore in Newfoundland.

Third, Office: 80 Lafayette Street, New York 13, N. Y. The Third District comprises: The counties of Orleans, Franklin, Grand Isle, Chittenden, and Addison in Vermont; Connecticut; New York, except that part of north latitude 42° N. and west of longitude 74°39′ W.; New Jersey; Pennsylvania east of longitude 79° W.; Delaware, including Fenwick Island.

Marine Inspection Offices:
Boston, 447 Commercial Street, Boston, Mass.
Providence, 409 Federal Building, Providence 3, R. I.
New York, 80 Lafayette Street, New York 13, N. Y.
Albany, 313 Federal Building, Albany 1, N. Y.
New London, 302 New Post Office Building, New London, Conn.

Lifeboat Stations, Cape Cod to Sandy Hook

Number for aviation purposes only	Name of station	State	Location
33	Wood End	Massachusetts	42°01′18″ N., 70°11′15″ W. End of Cape Cod, ¼ mile east of Wood End Light.
34	Race Point	do	42°04′42″ N., 70°13′24″ W. 1½ miles northeast of Race Point Light.
36	Cape Cod	do	42°02′23″ N., 70°03′40″ W. At Cape Cod Light.
39	Nauset	do	41°50′36″ N., 69°56′48″ W. 1⅛ mile south of Nauset Beach Light.
42	Chatham	do	41°40′18″ N., 69°57′00″ W. At Chatham Light.
47	Brant Point	do	41°17′24″ N., 70°05′30″ W. At Brant Point Light, Nantucket.
49	Gay Head	do	41°21′04″ N., 70°50′06″ W. West end Martha's Vineyard, near Gay Head Light.
50	Cuttyhunk	do	41°25′25″ N., 70°55′30″ W. Southeast side of Cuttyhunk Pond.
53	Castle Hill	Rhode Island	41°27′42″ N., 71°21′42″ W. Near and east of Castle Hill Light.
55	Point Judith	do	41°21′42″ N., 71°28′52″ W. At Point Judith Light.
59	Fishers Island	New York	41°16′58″ N., 71°56′41″ W. West shore of East Harbor, 4 miles west by south of Watch Hill Light.
62	Block Island	Rhode Island	41°11′40″ N., 71°35′20″ W. South side of entrance to Great Salt Pond.
65	Ditch Plain	New York	41°02′24″ N., 71°55′00″ W. Southwest 3½ miles of Montauk Light.
72	Shinnecock	do	40°51′00″ N., 72°30′15″ W. East side of Ponquogue Point by old light tower.
76	Moriches	do	40°47′17″ N., 72°45′00″ W. East side entrance to Tuthill Cove, Moriches Inlet.
79	Bellport	do	40°42′45″ N., 72°55′45″ W. Near east end of Great South Beach.
83	Fire Island	do	40°37′30″ N., 73°15′45″ W. North shore of Great South Beach, 2¼ miles west of Fire Island Light.
86	Jones Beach	do	40°37′13″ N., 73°23′10″ W. Hemlock Beach, 8¾ miles west of Fire Island Light.
88	Short Beach	do	40°35′24″ N., 73°33′25″ W. On inlet opposite Meadow Island.
90	Atlantic Beach	do	40°35′30″ N., 73°44′30″ W. North side of Atlantic Beach, ¾ mile northeast of breakwater.
92	Rockaway	do	40°34′04″ N., 73°53′01″ W. 2¾ miles east of Rockaway Point.
94	Eatons Neck	do	40°57′15″ N., 73°23′52″ W. East side of entrance to Huntington Bay.
97	Sandy Hook	New Jersey	40°28′15″ N., 74°00′45″ W. Bay side ½ mile from point.

Customs Districts and Ports of Entry

(The first port named in the following list is the headquarters port)
*Indicates customs ports authorized to issue marine documents

Name of district	Limits of district	Ports of entry
Massachusetts	The State of Massachusetts	*Boston *Fall River *New Bedford *Plymouth Provincetown
Rhode Island	The State of Rhode Island	*Providence *Newport
Connecticut	The State of Connecticut	*Bridgeport *Hartford *New Haven *New London
New York	That part of the State of New York not expressly included in the districts of Buffalo, Rochester, and St. Lawrence, and also the counties of Sussex, Passaic, Hudson, Bergen, Essex, Union, Middlesex, and Monmouth in the State of New Jersey.	*New York, N. Y. *Albany, N. Y. *Newark, N. J. *Perth Amboy, N. J.

PUBLIC HEALTH SERVICE

Quarantine Stations:

MASSACHUSETTS:

Boston, Room 1703, U. S. Customhouse. Supervision of quarantine and immigration from Eastport, Maine, to New London, Conn.

NEW YORK:

Rosebank, Staten Island.

Additional ports of entry at which quarantine inspection and/or medical examination of aliens is performed.

Fall River, Mass., 130 Rock Street.
New Bedford, Mass., 105 Sixth Street.
New London, Conn., 205 Williams Street.
Newport, R. I., 105 Pelham Street.
Plymouth, Mass.
Providence, R. I.
Provincetown, Mass.
Vineyard Haven, Mass.

Marine Hospitals:

Boston, Mass., 77 Warren Street.
Ellis Island, N. Y.
Staten Island, N. Y.
Vineyard Haven, Mass.

Medical Relief Stations:

MASSACHUSETTS:
Fall River, 2123 Highland Avenue.
New Bedford, 105 South Sixth Street.
Provincetown, 322 Commercial Street.

RHODE ISLAND:
Newport, 105 Pelham Street.
Providence, 403 Federal Bldg.

CONNECTICUT:
Bridgeport (Collector of Customs).
New Haven, 291 Whitney Avenue.
New London, 205 Williams Street.

NEW YORK:
New York, U. S. Public Health Service Dispensary, 67 Hudson Street.
Albany, 399 State Street.

NEW JERSEY:
Perth Amboy, Federal Bldg.

IMMIGRATION and NATURALIZATION OFFICES

MASSACHUSETTS:
Boston, 73 Tremont Street.
New Bedford, Post Office Bldg., 695 Pleasant Street.

RHODE ISLAND:
Providence, Federal Bldg.

CONNECTICUT:
Hartford, 135 High Street.

NEW YORK:
Albany, Federal Bldg., Broadway.
New York, 70 Columbus Avenue.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.—List of ports at which inspectors are located.

MASSACHUSETTS: Boston, 408 Atlantic Avenue, 405 U. S. Appraiser's Stores Building.
NEW YORK: New York, 844 Federal Building, Christopher Street.
NEW JERSEY: Hoboken, Plant Inspection House, 209 River Street.

FOREIGN CONSULS.—The following foreign governments are represented by consuls at the port of **New York**: Afghanistan, Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Burma, Canada, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Great Britain, Greece, Guatemala, Haiti, Honduras, Hungary, Iceland, India, Iran, Iraq, Ireland, Israel, Italy, Korea, Lebanon, Liberia, Lithuania, Luxembourg, Mexico, Monaco, Netherlands, New Zealand, Nicaragua, Norway,

Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Spain, Sweden, Switzerland, Syria, Thailand, Turkey, Union of South Africa, Uruguay, Venezuela, Yugoslavia.

In addition foreign consuls are stationed at the following ports:

New Bedford, Portugal.
Fall River, Portugal.
Providence, Dominican Republic, France, Mexico, Spain.
New Rochelle, Dominican Republic.
Albany, Italy, Norway.

FEDERAL COMMUNICATIONS COMMISSION.—Regional Office: 506 Federal Bldg., 641 Washington St., New York 14, N. Y.
Engineer in Charge: 1600 Customhouse, Boston 9, Mass.; 748 Federal Bldg., 641 Washington St., New York 14, N. Y.

Yacht Clubs

Aims Point Boat Club, Aims Point, West Haven, Conn.
Albany Yacht Club, Quay Street, Albany, N. Y.
American Yacht Club, Milton Point, Rye, N. Y.
Amityville Yacht Club, Amityville, N. Y.
Angelica Yacht Club, Mattapoisett, Mass.
Arrow Boat Club, Old Town Dock Road, New Rochelle, N. Y.
Arrow Yacht Club, Foot of 22nd Ave., College Point, Long Island, N. Y.
Ascension Yacht Club, Pier 144, Water St., South Norwalk, Conn.
Atlantic Tuna Club, Block Island, R. I.
Babylon Yacht Club, Foot of Eaton's Lane, West Islip, N. Y.
Baldwin Yacht Club, Old Saybrook, Conn.
Barrington Yacht Club, Barrington, R. I.
Bass River Yacht Club, Bass River, Mass.
Bay Shore Yacht Club, Foot of Ocean Ave., Bay Shore, Long Island, N. Y.
Bayside Yacht Club, Bayside, Long Island, N. Y.
The Beach Club, Inc., Belle Haven, Greenwich, Conn.
Beach Point Club, Orienta Point, Mamaroneck, N. Y.
Beechhurst Yacht Club, Inc., Foot of 154th St., Beechhurst, Long Island, N. Y.
Belle Harbor Yacht Club, Bay 126th St., Belle Harbor, Long Island, N. Y.
Bellport Bay Yacht Club, Foot of Bellport Lane, Bellport, Long Island, N. Y.
Ben Ma Chree Boat Club, Foot of Bay 32nd St., Brooklyn, N. Y.
Bergen Beach Yacht Club, Mill Basin, Brooklyn, N. Y.
Beverly Yacht Club, Butlers Point, Marion, Mass.
Black Rock Yacht Club, Black Rock Point, Bridgeport, Conn.
Branford Yacht Club, Goodsell Road, Branford Point, Conn.
Bristol Yacht Club, Foot of Constitution St., Bristol, R. I.
Broadlawn Harbour Yacht Club, Kings Point, N. Y.
Bronxonia Yacht Club, Foot of Ellsworth Ave., Throgs Neck, New York City
Brooklyn Yacht Club, Inc., Gerritson Beach, N. Y.
Brooklyn Yacht Club
Buzzards, (The), Cataumet, Mass.
Byram Shore Boat Club, Inc. Byram Park, East Port Chester, Conn.
Cedarhurst Yacht Club, Prospect Ave., Lawrence, Long Island, N. Y.
Cedar Point Yacht Club, Compo Beach, Westport, Conn.
Chatham Yacht Club, North Chatham, Cape Cod, Mass.
Chelsea Yacht Club, Chelsea, N. Y.
Chinese Yacht Club, 125 Main St., Greenport, N. Y.
City Island Yacht Club, 63 Pilot St. West, City Island, N. Y.
City Point Yacht Club, 110 South Water St., New Haven, Conn.

Cold Spring Harbor Beach Club, Cold Spring Harbor, Long Island, N. Y.
Coles River Yacht Club, Touisset-Swansea, Mass.
Colonial Yacht Club, 79th Street and Hudson River, N. Y.
Conanicut Yacht Club, Jamestown, R. I.
Cotuit Mosquito Yacht Club, Cape Cod, Mass.
Cresthaven Yacht and Country Club, 6th Ave. and Shore Rd., Whitestone, N. Y.
Croydon Yacht Club, Inc., 1703 Emmons Ave., Brooklyn, N. Y.
Dauntless Club, Essex, Conn.
Devon Yacht Club, Devon, near Amagansett, Long Island, N. Y.
Domino Yacht Club, East Patchogue, Long Island, N. Y.
Douglaston Yacht Squadron, Douglaston, Long Island, N. Y.
Duck Island Yacht Club, Grove Beach (Clinton) Conn.
East Greenwich Yacht Club, East Greenwich, R. I.
East Islip Anglers and Boating Assn., Inc., East Islip, Long Island, N. Y.
East Norwalk Boating and Yacht Club, Seaview Ave., East Norwalk, Conn.
East Rockaway Yacht Club, Foot of Althouse Ave., East Rockaway, Long Island, N. Y.
Edgartown Yacht Club, Edgartown, Mass.
Edgewater Yacht Club, Bluff Point, Northport, N. Y.
Edgewood Yacht Club, Foot of Shaw Ave., Edgewood, R. I.
Englewood Basin Yacht Club, Englewood, N. J.
Essex Yacht Club, Inc., Essex, Conn.
Excelsior Yacht Club, Foot of 26th Ave., Brooklyn, N. Y.
Fair Haven Yacht Club, 62 De Normandie Ave., Fair Haven, N. J.
Falmouth Yacht Club, Falmouth, Mass.
Fayerweather Yacht Club, 51 Brewster St., Bridgeport, Conn.
Fenwick Yacht Club, Fenwick, Conn.
Fire Island Yacht Club, Ocean Beach, Long Island, N. Y.
Fishers Island Yacht Club, West Harbor, Fishers Island, N. Y.
Flushing Bay Motor Boat Club, 110th St. and 15th Ave., College Point, Long Island, N. Y.
Freeport Yacht Club, 533 South Grove St., Freeport, Long Island, N. Y.
Great Kills Yacht Club, 142 Mansion Ave., Great Kills, Long Island, N. Y.
Great Neck Estates Yacht Club, Great Neck Estates Park, Great Neck, N. Y.
Great South Bay Yacht Racing Assn., Great South Bay, Long Island, N. Y.
Greenhaven Yacht Club, Rye, N. Y.
Greenwich Cove Racing Assn., Old Greenwich, Conn.
Groton Long Point Yacht Club, Groton Long Point, Conn.
Half Moon Yacht Club, Germantown, N. Y.
Halloween Yacht Club, Inc., Cummings Park, Stamford, Conn.
Hamburg Cove Yacht Club, Hamburg Cove, Conn.
Harlem Yacht Club, City Island, N. Y.
Hartford Yacht Club, East Hartford, Conn.
Haverstraw Yacht Club, Inc., Riverside Ave., Haverstraw, N. Y.
Hempstead Harbour Club, Garvie Point, Glen Cove, Long Island, N. Y.
Hewlett Point Yacht Club, Hewlett Point Park, East Rockaway, N. Y.
Horseshoe Harbor Yacht Club, Larchmont, N. Y.
Housatonic Boat Club, Stratford, Conn.
Hudson River Yacht Club, Basset Avenue and Mill Basin, Brooklyn, N. Y.
Huguenot Yacht Club, Station No. 1: Neptune Island, New Rochelle Harbor, N. Y.
Station No. 2: Huguenot Island, Long Island, N. Y.
Huntington Crescent Club, Huntington, Long Island, N. Y.
Huntington Cruising Club, Pratt Island Cove, Darien, Conn.
Huntington Yacht Club, Shore Road, Huntington, Long Island, N. Y.
Hyannis Yacht Club, Off Ocean St., Hyannis, Mass.
Hyannis Port Yacht Club, Hyannis Port, Cape Cod, Mass.
Ida Lewis Yacht Club, Wellington Ave., Newport, R. I.
Indian Harbor Yacht Club, Rocky Neck Point, Greenwich, Conn.
Ischoda Yacht Club, South Norwalk, Conn.
Kenilworth Yacht Assn., Kings Point, Great Neck, Long Island, N. Y.
Ketewomoke Yacht Club, Halesite, Long Island, N. Y.
Keystone Yacht Club, Woodmere, Long Island, N. Y.
Knickerbocker Yacht Club, Port Washington, Long Island, N. Y.
Larchmont Yacht Club, Larchmont, N. Y.
Little Peconic Yacht Club, Southampton, Long Island, N. Y.
Locust Point Yacht Club, Inc., 21 Longstreet Ave., Bronx, New York City

Maddequet Admiralty Assn., Inc., Maddequet, Nantucket Island, Mass.
Maidstone Boat Club, East Hampton, N. Y.
Manhasset Bay Yacht Club, Port Washington, Long Island, N. Y.
Mariners Harbor Yacht Club, Mariners Harbor, Staten Island, N. Y.
The Mason's Island Yacht Club, Mason's Island, Mystic, Conn.
Mattapoisett Yacht Club, Mattapoisett, Mass.
Mattituck Yacht Club, Inc., Mattituck, Long Island, N. Y.
Menantic Yacht Club, Menantic, Shelter Island, N. Y.
Menauhant Yacht Club, East Falmouth, Mass.
Meriden Motor Boat Club, Portland, Conn.
Miamogue Yacht Club, Foot of Seaview Ave., Bridgeport, Conn.
Middletown Yacht Club, Foot of Whitmore Dock Road, Middletown, Conn.
Milford Cruising Club, 28 Wilbar Ave., Milford, Conn.
Milford Yacht Club, Fort Trumbull Beach, Milford, Conn.
Mill Creek Yacht Club, Cross Bay Blvd. and 14th Road, Brooklyn, N. Y.
Minisceongo Yacht Club, Grassy Point, N. Y.
Miramar Yacht Club, Inc., of Sheepshead Bay, 3128 Emmons Ave., Brooklyn, N. Y.
Mishaum Point Yacht Club, Mishaum Point, South Dartmouth, Mass.
Monomoy Yacht Club, Chatham, Mass.
Montauk Yacht Club, Montauk, Long Island, N. Y.
Moriches Yacht Club, Foot of Union Ave., Center Moriches, Long Island, N. Y.
Morris Cove Boat Assn., 146 Cove St., New Haven, Conn.
Morris Yacht and Beach Club, Inc., Belden Point, City Island, N. Y.
Nanhook Yacht Club, Foot of Bleeker St., Mamaroneck, N. Y.
Nantucket Yacht Club, Nantucket Island, Mass.
Narragansett Terrace Boat Club, Riverside, R. I.
Narrasketuck Yacht Club, Amityville, Long Island, N. Y.
Nassau Yacht Club of Freeport, Freeport, N. Y.
New Bedford Yacht Club, 2 Stations, New Bedford and South Dartmouth, Mass.
Newburgh Yacht Club, Foot of Park Place, Newburgh, N. Y.
Newport Yacht Club, Swan Ave., Newport, R. I.
New Rochelle Yacht Club, Harrison Island, New Rochelle, N. Y.
New York Yacht Club, 37-41 West 44th St., New York City
Station 2 Foot of 26th St., East River, New York City.
Station 3 Foot of 86th St., North River, New York City.
Station 6 Newport, R. I.
Station 10 Glen Cove, N. Y.
Niantic Bay Yacht Club, Niantic, Conn.
Noroton Yacht Club, Baywater Drive, Noroton, Conn.
Norwalk Yacht Club, Hickory Bluff, Norwalk, Conn.
Nyack Boat Club, Nyack, N. Y.
Ocean Yacht Club, Inc., 370 Front St., Stapleton, Long Island, N. Y.
Old Cove Yacht Club, Cutchogue, Long Island, N. Y.
Old Mill Yacht Club, Foot of Crescent Street, Brooklyn, N. Y.
Orient Yacht Club, Inc., Orient, Long Island, N. Y.
Orienta Yacht Club, Mamaroneck, N. Y.
Orleans Yacht Club, Orleans, Mass.
Palisade Boat Club, Greystone, Yonkers, N. Y.
Palisades Yacht Club, Englewood Boat Basin, N. J.
Peekskill Yacht Club, Inc., Travis Point, Peekskill, N. Y.
Pequonnock Yacht Club, Inc., 66 California St., Bridgeport, Conn.
Pequot Yacht Club, Southport, Conn.
Pilgrim Yacht Club, 4 Florence Ave., Brooklyn, N. Y.
Plum Island Yacht Club, Shell Bank Creek and Belt Parkway, Brooklyn, N. Y.
Point Independence Yacht Club, Inc., Point Independence (Onset), Mass.
Point Judith Yacht Club, Wakefield, R. I.
Ponus Yacht Club, Stamford, Conn.
Pootatuck Yacht Club, Housatonic Avenue, Stratford, Conn.
Port Chester Yacht Club, Inc., Foot of Fox Island Road, Port Chester, N. Y.
Port Jefferson Yacht Club, Port Jefferson, N. Y.
Port Washington Yacht Club, Shore Road, Port Washington, Long Island, N. Y.
Poughkeepsie Yacht Club, Foot of Union St., Poughkeepsie, N. Y.
Princess Bay Yacht Club, Princess Bay, Staten Island, N. Y.
Provincetown Yacht and Tennis Club, 286 Bradford St., Provincetown, Mass.

Quanset Yacht Club, South Orleans, Mass.
Quantuck Yacht Club, Quiogue, Westhampton Beach, Long Island, N. Y.
Quissett Yacht Club, Quissett Harbor, Mass.
Ram Island Yacht Club, Noank, Conn.
Rhode Island Yacht Club, Ocean Avenue, Cranston, R. I.
Richmond County Yacht Club, Inc., Foot of Hillside Terrace, Great Kills, Staten Island, N. Y.
Rivercliff Yacht Club, 40 Bridgeport Avenue, Devon, Conn.
Riverhead Yacht Club, Riverhead (Suffolk Co.), N. Y.
Riverside Yacht Club, End of Club Road, Riverside, Conn.
Rondout Yacht Club, Kingston Point, N. Y.
Sachem's Head Yacht Club, Sachems Head, Guilford, Conn.
Sagamore Yacht Club, Theodore Roosevelt Memorial Park, Oyster Bay, Long Island, N. Y.
Sag Harbor Yacht Club, North side of Bay St., adjacent to Marine Park, Sag Harbor, Long Island, N. Y.
Sakonnet Yacht Club, Sakonnet Point, R. I.
Sands Point Yacht Club, Orchard Beach, Port Washington, Long Island, N. Y.
Sandy Point Boat Club, Inc., First Avenue, West Haven, Conn.
Saunderstown Yacht Club, Saunderstown, R. I.
Sayville Yacht Club, Sayville, N. Y.
Seacliff Yacht Club, Seacliff, Long Island, N. Y.
Seaford Harbor Yacht Club, Seaford Harbor, Long Island, N. Y.
Seawanhaka Corinthian Yacht Club, Center Island, Oyster Bay, Long Island, N. Y.
Shattemuc Yacht Club, Ossining, N. Y.
Sheepshead Bay Yacht Club, Sheepshead Bay, Long Island, N. Y.
Sheldrake Yacht Club, Harbor Island, Mamaroneck, N. Y.
Shell Bank Yacht Club, Avenue Y and Knapp Street, Brooklyn, N. Y.
Shelter Island Yacht Club, Shelter Island Heights, Long Island, N. Y.
Shennecossett Yacht Club, Eastern Point, Groton, Conn.
Shenorock Yacht Club, Milton Point, Rye, N. Y.
Shinnecock Yacht Club, Quogue, Long Island, N. Y.
Southampton Yacht Club, Southampton, Long Island, N. Y.
Southold Yacht Club, Paradise Point, Southold, N. Y.
South Shore Yacht Club, 180 Westside Avenue, Freeport, Long Island, N. Y.
Stage Harbor Yacht Club, Stage Harbor, Chatham, Mass.
Stamford Yacht Club, Ocean Drive West, Shippan Point, Stamford, Conn.
Stepping Stone Yacht Club, Inc., 140 Reynolds Ave., Bronx, N. Y.
Stone Horse Yacht Club, Harwich Port, Mass.
Stony Brook Yacht Club, Dock Road, Stony Brook, Long Island, N. Y.
Stuyvesant Yacht Club, Foot of Centre St., City Island, New York City
Sunrise Yacht Club, Foot of Whaleneck Road, Merrick, N. Y.
Swan Yacht Club, Patchogue Shores, East Patchogue, Long Island, N. Y.
Tarrytown Boat Club, Inc., Foot of White St., Tarrytown, N. Y.
Taunton Yacht Club, Dighton, Mass.
Thames Yacht Club, 396 Pequot Ave., New London, Conn.
Tower Ridge Yacht Club, River Road, Hastings-on-Hudson, N. Y.
Tri-City Yacht Club, Foot of 16th St., Watervliet, N. Y.
Varuna Boat Club, Inc., 2806 Emmons Ave., Brooklyn, N. Y.
Vineyard Haven Yacht Club, Vineyard Haven, Mass.
Wadawamuck Yacht Club, Stonington, Conn.
Waquoit Bay Yacht Club, Waquoit (Cape Cod), Mass.
Watch Hill Yacht Club, Fort Road and Bay Street, Watch Hill, R. I.
Waucoma Yacht Club, 279 North Front St., New Haven, Conn.
Wauwinet Yacht Club, Wauwinet, Nantucket, Mass.
Weekapaug Yacht Club, Weekapaug, R. I.
Weltamoe Yacht Club, 2 Monte St., Fall River, Mass.
Weetauqua Corinthian Club, Oak Bluffs, Mass.
Wenaumet Bluffs Yacht Club, Pocasset, Mass.
Weowna Yacht and Canoe Club, Dyckman Street and Hudson R., New York, N. Y.
Westchester Bay Yacht Club, Inc., waters of Westchester Bay
Westerly Yacht Club, Watch Hill Road, Westerly, R. I.
Westport Yacht Club, Inc., Horseneck Point, Mass.
Wethersfield Cove Yacht Club, 270 Hartford Ave., Wethersfield, Conn.
Wianno Yacht Club, Bridge Street, Osterville, Mass.
Wickford Yacht Club, Wickford, R. I.

Williamsburgh Yacht Club, Inc., Foot of 29th Ave., College Point, Long Island, N. Y.
Windjammers Sailing Club, Milford, Conn.
Woodmere Bay Yacht Club, Woodmere Blvd. and Woodmere Bay, Woodmere, N. Y.
Woods Hole Yacht Club, Woods Hole, Mass.
Yonkers Corinthian Yacht Club, 771 Warburton Ave., Yonkers, N. Y.
Yonkers Yacht Club, 1201 Warburton Ave., Yonkers, N. Y.

FISH AND WILDLIFE SERVICE.—Enforcement agents:
Plymouth, Mass., 205 Federal Bldg.
Blue Point, Long Island, N. Y., P. O. Box 25.
National Wildlife Refuges:
NEW YORK:
Fort Tyler.
Shinnecock.

WEATHER BUREAU.—Offices.—Barometers may be compared with standards at the following offices:
Nantucket, Weather Bureau Office at airport.
Block Island, Weather Bureau Office.
Providence, Post Office Annex Building, Exchange Terrace.
New Haven, Municipal Airport.
Bridgeport, Operations Building, Municipal Airport.
New York, 17 Battery Place.

STORM WARNING DISPLAY STATIONS.—Stations marked with an asterisk (*) display signals both day and night.

MASSACHUSETTS:
*Cape Cod Light
Nantucket Shoals Lightship
*Cape Cod Canal Coast Guard Station
*Provincetown
Cataumet
*Wings Neck Light
*Chatham
Fairhaven
Pollock Rip Lightship
Stone Horse Shoal Lightship
Harwich Port
*Nobska Point Light
Handkerchief Lightship
Hen and Chickens Lightship
Cross Rip Lightship
Vineyard Sound Lightship
*Brant Point Coast Guard Station
RHODE ISLAND:
*Point Judith Coast Guard Station
*Saunderstown
Wickford
*Block Island
RHODE ISLAND: Continued
Brenton Reef Lightship
*Providence
CONNECTICUT:
*New London
*New Haven
*Bridgeport
Stamford
Greenwich
Saybrook
*Saybrook
*Riverside
NEW YORK:
Fishers Island Coast Guard Station
*Fort H. G. Wright
Ditch Plain Coast Guard Station
Three Mile Harbor
*Oyster Bay, L. I.
New Rochelle
New Rochelle
New Rochelle
Port Washington
*Port Washington

NEW YORK: Continued
Shinnecock Coast Guard Station
Little Neck, L. I.
*Fort Schuyler
Moriches Coast Guard Station
*New York
Brooklyn
Fire Island Beach, L. I.
Short Beach
Rockaway Point

NEW YORK: Continued
East Rockaway
Rockaway Coast Guard Station
*Harbor Island Beach
NEW JERSEY:
Ambrose Lightship
Scotland Lightship
Red Bank
*Long Branch
Shark River

Commercial Broadcasting Stations Along the Coast

Frequency	Call	City	Position of Antenna	Power	Hours of Operation
			Massachusetts		
1230	WBSM	New Bedford	41°38′.5 N., 70°55′.0 W.	100 w	0700–2400
1240	WOCB	West Yarmouth	41°37′.9 N., 70°14′.9 W.	250 w	0700–2300
1340	WNBH	New Bedford	41°38′.2 N., 70°54′.7 W.	250 w	0600–2315
1400	WALE	Fall River	41°42′.1 N., 71°09′.3 W.	250 w	0630–2400
*1480	WSAR	do	41°42′.9 N., 71°10′.4 W.	5 kw	0630–2400
1570	WPEP	Taunton	41°53′.0 N., 71°03′.9 W.	1 kw	sunrise to sunset
			Rhode Island		
*630	WPRO	Providence	41°46′.4 N., 71°19′.4 W.	5 kw	0600–0105
*790	WEAN	do	41°50′.1 N., 71°21′.9 W.	5 kw	0600–2400
*920	WJAR	do	41°46′.9 N., 71°19′.9 W.	5 kw	0600–0100
1110	WHIM	do	41°49′.6 N., 71°22′.3 W.	1 kw	0630–sunset
1220	WRIB	do	41°49′.3 N., 71°23′.1 W.	250 w	sunrise to sunset
1230	WERI	Westerly	41°21′.9 N., 71°50′.2 W.	250 w	0600–2400
1240	WWON	Woonsocket	41°59′.4 N., 71°30′.3 W.	250 w	0600–0005
1290	WDEM	Providence	41°48′.9 N., 71°23′.5 W.	500 w	0600–sunset
1380	WPAW	Pawtucket	41°51′.4 N., 71°22′.3 W.	500 w	sunrise to sunset
1420	WFCI	do	41°54′.3 N., 71°24′.1 W.	5 kw	0555–0005
1540	WRJM	Newport	41°30′.1 N., 71°17′.3 W.	1 kw	0700–1945
			Connecticut		
*600	WICC	Bridgeport	41°09′.6 N., 73°09′.9 W.	500 w	0600–2400
*960	WELI	New Haven	41°22′.0 N., 72°56′.4 W.	1 kw	0645–2400
1260	WAVD	do	41°17′.3 N., 72°56′.8 W.	1 kw	daytime, varied
1300	WLIZ	Bridgeport	41°10′.3 N., 73°10′.4 W.	1 kw	daytime
1340	WNHC	New Haven	41°17′.0 N., 72°56′.3 W.	250 w	minimum, 12 hours
*1350	WNLK	Norwalk	41°06′.8 N., 73°26′.1 W.	500 w	0600–2300
1400	WSTC	Stamford	41°04′.3 N., 73°32′.1 W.	250 w	0630–0005
1450	WNAB	Bridgeport	41°10′.0 N., 73°10′.8 W.	250 w	0630–2400
1490	WNLC	New London	41°21′.8 N., 72°05′.5 W.	250 w	0700–2400
			New York		
*570	WMCA	New York City	40°45′.2 N., 74°06′.3 W.	5 kw	0545–0200
*660	WNBC	do	40°50′.9 N., 73°42′.1 W.	50 kw	0530–0100
*710	WOR	do	40°35′.9 N., 74°14′.9 W.	50 kw	24 hours daily
770	WJZ	do	40°52′.9 N., 74°04′.1 W.	50 kw	0545–0100
*830	WNYC	do	40°43′.8 N., 73°57′.6 W.	1 kw	early morning–late evening
880	WCBS	do	40°52′.6 N., 73°46′.0 W.	50 kw	0545–0100
*1010	WINS	do	40°48′.2 N., 74°06′.4 W.	10 kw	24 hours daily
*1050	WMGM	do	40°48′.3 N., 74°04′.2 W.	50 kw	0600–0200
1100	WHIL	Hempstead	40°41′.2 N., 73°36′.6 W.	250 w	0650–sunset
*1130	WNEW	New York City	40°45′.4 N., 74°06′.5 W.	10 kw	24 hours daily
1190	WLIB	do	40°42′.6 N., 73°56′.0 W.	1 kw	sunrise to 1 hour after sunset
1240	WGBB	Freeport	40°38′.7 N., 73°34′.7 W.	100 w	0700–2400
*1280	WOV	New York City	40°49′.6 N., 74°04′.6 W.	5 kw	share time with WHBI
*1330	WBBR	do	40°32′.8 N., 74°12′.2 W.	5 kw	share time with WHAZ and WEVD
*1330	WEVD	do	40°43′.2 N., 73°55′.5 W.	5 kw	share time with WHAZ and WBBR
*1380	WBNX	do	40°49′.3 N., 74°04′.1 W.	5 kw	0900–1800 1930–2400
1430	WBYN	do	40°42′.7 N., 73°55′.5 W.	500 w	share time with WAWZ
1520	WKBS	Oyster Bay	40°52′.5 N., 73°31′.7 W.	250 w	sunrise to sunset
*1560	WQVR	New York City	40°43′.0 N., 73°55′.1 W.	10 kw	minimum 12 hours
*1600	WWRL	do	40°44′.6 N., 73°54′.5 W.	250 w	0800–2400

Frequency	Call	City	Position of Antenna	Power	Hours of Operation
			New Jersey		
*620	WVNJ	Newark	40°47′.9 N., 74°21′.6 W.	5 kw	0600–0100
*930	WPAT	Paterson	40°51′ N., 74°11′ W.	1 kw	sunrise to sunset
*970	WAAT	Newark	40°45′.6 N., 74°06′.8 W.	1–5 kw	18 hours daily
1280	WHBI	do	40°44′.5 N., 74°10′.4 W.	1–2½ kw	share time with WOV
1310	WCAP	Asbury Park	40°13′.1 N., 74°02′.6 W.	250 w	0600–2400
*1430	WNJR	Newark	40°42′.2 N., 74°15′.2 W.	5 kw	0600–2400
1450	WCTC	New Brunswick	40°29′.5 N., 74°25′.2 W.	250 w	0700–2300
*1480	WHOM	Jersey City	40°50′.6 N., 74°01′.1 W.	5 kw	24 hours

*Directional antenna

Aircraft Radio Ranges

Frequency	Place	Identifier	Position of Antenna	Power
209	New York	LGA	40°49′.2 N., 73°50′.6 W	150 w. or more
221	Connecticut	BDR	41°12′.5 N., 73°04′.3 W	150 w. or more
227	New York	HEM	40°42′.3 N., 73°31′.8 W	over 50 w.
248	do	IDL	40°35′.6 N., 73°48′.4 W	over 50 w.
341	New Jersey	EWR	40°42′.2 N., 70°09′.6 W	150 w. or more
347	Rhode Island	PUD	41°41′.0 N., 71°28′.2 W	150 w. or more
356	do	NCO	41°33′.8 N., 71°22′.8 W	150 w. or more
379	New York	FBT	40°36′.2 N., 73°56′.2 W	150 w. or more

Weather broadcasts by commercial radio stations.—The following table lists geographically the radio stations that have installed microphones in nearby Weather Bureau offices. From these offices forecasts and weather summaries are broadcast on regular schedule by Weather Bureau personnel.

City	Station	Frequency	Power
Boston, Mass	WBMS	1090 kc	1,000
Do	WBMS–FM	104.1 mc	
Do	WHDH	850 kc	50,000
Do	WHDH–FM	94.5 mc	
Chicopee, Mass	WACE–FM	100.3 mc	
Providence, R. I	WJAR	920 kc	5,000
Bridgeport, Conn	WLIZ	1300 kc	1,000
Hartford, Conn	WTHT	1230 kc	250
Do	WTHT–FM	106.1 mc	
Do	WTIC	1080 kc	50,000
Do	WTIC–FM	96.5 mc	
New Britain, Conn	WKNB	840 kc	1,000
Do	WFHA–FM*	103.7 mc	
New Haven, Conn	WAVZ	1260 kc	1,000
Do	WBIB–FM	100.5 mc	
Do	WELI	960 kc	1,000
New York, N. Y	WMGM	1050 kc	50,000
Do	WNYC	830 kc	1,000
Do	WQXR–FM*	96.3 mc	
Alpine, N. J	KE2XCC–FM	93.1 mc	
Atlantic City, N. J	WFPG	1450 kc	250
Do	WMID	1340 kc	250
Camden, N. J	WCAM	1310 kc	250
Trenton, N. J	WTTM	920 kc	1,000

FM* indicates an FM station but FM is not included in call letters. This list is subject to change at frequent intervals.

Radiotelephone broadcasts by United States Coast Guard.—Regular forecasts, including weather forecasts, local Notice to Mariners, and hydrographic information, are transmitted by radiophone in plain language on 2698 kc., preceded by a preliminary announcement on 2670 kc., as follows:

Boston, Mass.*	NMF	1120	2320
New York, N. Y.	NMY	1150	2350

Emergency broadcasts, including storm warnings, advisories, and urgent information, are transmitted immediately upon receipt and at 2-hour intervals thereafter on each even hour (* odd hour) for a period of six hours unless information is canceled or superseded.

All radiotelephone broadcasts will be made through once at good writing speed.

Hours of Operation of Fog Signals

Light station	January	February	March	April	May	June	July	August	September	October	November	December	Total
Race Point	43	66	16	24	35	86	151	49	7	33	72	36	618
Cape Cod	70	83	31	59	29	101	165	100	9	33	109	58	847
Pollock Rip Lightship	85	78	56	49	84	200	351	199	47	53	128	64	1,394
Great Round Shoal Lightship	54	85	50	39	72	139	234	129	22	50	128	57	1,059
Nantucket Shoals Lightship	72	77	64	44	94	232	290	178	52	46	111	28	1,288
Nobska Point	60	70	16	23	49	88	118	41	21	20	76	42	624
Vineyard Sound Lightship	64	75	36	45	70	148	188	104	30	38	99	55	952
Dumpling Rock	91	85	22	25	55	111	121	63	20	26	108	51	778
Wings Neck	81	76	12	15	52	65	100	36	20	17	85	59	618
Brenton Reef Lightship	119	109	39	41	25	142	187	98	31	46	131	65	1,033
Newport Harbor	48	45	1	10	33	66	69	27	12	18	67	27	423
Prudence Island	57	85	5	12	34	82	85	47	10	25	86	42	570
Borden Flats	45	59	5	1	10	17	22	4	1	14	54	27	259
Plum Beach	45	72	8	16	23	85	104	25	6	23	79	34	520
Conimicut	36	52	----	4	4	17	48	7	3	17	54	33	275
Pomham Rocks	19	48	1	1	1	9	18	6	2	14	31	13	163
Point Judith	95	98	23	30	62	145	153	67	30	34	109	56	902
Block Island Southeast	85	75	43	52	73	177	233	102	36	54	97	69	1,096
Watch Hill	100	81	42	27	57	125	169	84	21	24	97	54	881
Montauk Point	98	80	67	43	71	164	208	104	38	49	102	57	1,081
New London Ledge	107	92	35	27	46	129	193	85	18	49	112	63	956
Little Gull Island	34	54	76	43	119	87	19	36	74	10	60	25	637
Orient Point	57	59	16	14	36	85	115	30	1	17	75	47	552
Saybrook Breakwater	83	53	2	16	34	79	148	55	3	45	71	44	633
Cornfield Point Lightship	103	98	35	17	30	106	158	86	31	46	132	75	917
Falkner Island	107	110	19	27	48	90	101	31	26	32	165	83	839
Stratford Point	56	72	9	14	25	52	34	11	8	16	93	50	440
Stratford Shoal	54	58	16	16	23	62	43	19	12	11	72	42	428
Eatons Neck	57	66	18	25	10	52	54	16	13	14	78	44	447
Greens Ledge	42	32	----	6	14	44	40	8	4	11	62	32	295
Great Captain Island	57	64	8	15	14	51	35	12	12	24	110	51	453
Execution Rocks	70	72	14	15	12	35	29	14	17	10	94	41	424
Throgs Neck	37	31	----	4	6	20	12	6	7	10	46	37	216
Fire Island Lightship	119	105	74	46	48	67	146	114	73	21	155	67	1,035
Ambrose Channel Lightship	158	151	114	73	63	150	128	163	75	91	215	125	1,506
Romer Shoal	48	57	17	24	7	43	24	8	16	19	87	44	394
Robbins Reef	12	4	17	6	34	8	4	20	11	22	61	5	204
Great Beds	25	34	2	6	2	4	1	4	1	20	54	42	195
Stony Point	92	83	5	8	13	12	3	6	2	30	130	71	455
Hudson City	17	13	23	1	6	3	5	6	39	47	33	56	249
Northeast End Lightship	115	63	65	76	105	92	57	43	23	25	136	29	829

Meteorological Tables

COMPILED BY THE UNITED STATES WEATHER BUREAU

Nantucket, Mass.—Position: Latitude 41°15′ N., longitude 70°04′ W.—Altitude: 43 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—‡			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow ≧ T	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	¼–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	30.03	30.99	28.82	31.3	37.3	25.3	64	−4	80	66	.....	3.79	2.54	7.3	13	8	5	(*)	23	6	2	9	89	10	8	4	6	6	16	27	23	0	12.9	56 NE.
February	30.02	30.97	28.66	30.7	36.5	24.9	60	−6	80	61	.....	3.31	2.77	7.9	12	9	4	(*)	26	5	3	8	88	13	10	5	6	8	16	20	22	(#)	12.9	52 NE.
March	29.97	30.98	28.36	35.5	41.1	29.9	68	6	81	58	.....	3.94	3.22	5.4	13	6	6	1	23	7	2	7	90	10	10	4	8	11	24	18	15	(#)	13.2	57 SE.
April	29.98	30.76	28.82	43.4	49.0	37.8	79	15	82	56	.....	3.18	2.81	0.5	12	2	6	1	3	6	5	11	84	11	14	6	9	9	26	15	10	0	12.7	53 NE.
May	29.98	30.59	29.20	52.3	58.5	46.1	86	34	84	55	.....	2.77	2.78	(T)	11	0	9	2	0	2	9	11	80	8	16	5	10	12	33	11	5	0	11.5	41 NE.
June	29.94	30.54	29.31	61.0	67.3	54.7	90	42	86	56	.....	2.98	3.74	0	10	0	11	3	0	2	9	12	79	6	13	5	8	14	38	11	5	0	10.8	37 NE.
July	29.98	30.52	29.25	67.8	74.0	61.6	92	48	88	54	.....	2.79	3.69	0	9	0	13	3	0	1	13	16	71	6	14	3	6	15	44	9	3	(#)	10.3	44 NE.
August	30.01	30.45	28.71	67.8	73.8	61.8	90	51	86	52	.....	3.29	5.73	0	8	0	10	3	0	1	6	14	80	7	17	5	9	15	34	9	4	(#)	9.9	46 N.
September	30.07	30.63	29.04	62.8	68.4	57.2	88	41	84	53	.....	2.97	4.05	0	9	0	7	2	0	2	4	5	91	10	19	7	10	14	25	9	6	(#)	10.8	45 NE.
October	30.04	30.65	29.05	54.2	59.6	48.8	82	30	81	56	.....	3.65	4.25	(T)	10	(*)	4	1	(*)	4	(#)	10	89	12	13	4	7	12	24	16	12	(#)	12.1	46 SW.
November	30.04	30.81	28.32	44.4	49.8	39.0	68	15	80	62	.....	3.31	3.58	0.5	12	2	3	1	4	5	0	5	95	9	13	5	7	9	18	20	19	(#)	12.5	53 NE.
December	30.02	30.92	28.67	35.8	41.4	30.2	61	−3	79	65	.....	3.79	2.62	4.6	13	6	3	(*)	17	5	4	10	86	11	9	4	6	6	13	26	25	(#)	12.6	54 NE.
Mean	30.01	.....	.....	48.9	54.7	48.1	.....	.....	83	58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	10	85	9	13	5	8	11	26	16	12	(#)	11.8	.....
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.77	.....	26.2	132	33	81	17	95	46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Extreme	.....	30.99	28.32	.....	.....	.....	92	−6	.....	.....	.....	.....	5.73	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	57 SE.
Number years record	61	61	61	46	46	46	58	58	57	58	.....	58	58	58	58	58	50	58	58	17	⅔	⅔	⅔	13	.....	.....	.....	.....	.....	.....	.....	13	58	45

[1] Mean of 0730 and 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds greater than 27 knots.
[4] For 5-minute period.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
‡ Statute miles.
# Less than ½ of 1 percent.

Providence, R. I.—Position: Latitude 41°50′ N., longitude 71°25′ W.—Altitude: 68 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—‡			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow ≥ 0.01 inch	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	½–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	30.06	30.99	28.72	29.8	36.9	21.7	68	−9	65	57	50	3.58	2.55	9.9	12	6	1	(*)	26	4	4	12	84	11	4	3	5	9	14	12	42	(#)	10.5	53 NW.
February	30.01	31.02	28.85	28.7	36.6	20.7	69	−17	64	53	56	2.91	2.39	10.0	10	6	1	(*)	25	4	3	10	87	12	6	3	5	10	12	10	42	0	10.7	46 W.
March	29.98	31.08	28.38	37.7	45.9	29.5	90	4	63	52	59	3.42	2.56	5.6	12	4	1	1	18	4	2	8	90	9	8	3	7	12	11	8	42	(#)	11.0	49 NW.
April	29.98	30.72	28.87	47.2	56.1	38.3	91	11	60	56	58	3.31	2.39	1.0	11	1	1	1	5	3	1	9	90	9	9	5	10	13	11	9	34	(#)	10.7	48 NW.
May	29.97	30.61	29.15	58.1	67.6	48.5	95	32	62	55	60	3.04	2.48	(T)	12	0	1	3	(*)	1	1	7	91	10	8	4	13	17	13	10	25	0	9.5	43 N.
June	29.95	30.51	29.30	66.7	76.3	56.8	98	39	66	54	62	3.16	3.04	0	11	0	(*)	4	0	1	1	9	90	9	6	3	13	17	14	13	25	(#)	8.8	49 NW.
July	29.97	30.47	29.24	72.6	81.7	63.5	100	50	68	53	63	3.22	3.83	0	10	0	1	5	0	1	1	6	93	7	6	4	11	17	20	12	23	(#)	8.0	43 NW.
August	30.01	30.46	29.18	70.8	79.7	61.8	102	44	69	51	62	3.42	4.75	0	9	0	(*)	4	0	0	1	6	93	9	7	4	9	18	16	10	26	1	7.8	39 NW.
September	30.07	30.64	28.48	64.0	73.1	55.0	96	33	71	50	60	3.23	6.17	0	9	0	1	2	0	1	2	8	90	13	9	5	8	14	14	8	29	(#)	8.2	76 SW.
October	30.06	30.67	29.05	54.0	62.8	45.0	88	25	68	47	60	2.79	3.31	(T)	8	0	1	1	1	2	3	7	90	11	6	3	6	13	13	9	39	(#)	9.2	49 W.
November	30.05	30.83	28.74	43.2	50.7	35.5	75	9	69	54	51	3.25	3.61	1.3	10	1	1	(*)	10	3	4	8	88	12	6	3	6	15	14	10	34	(#)	9.8	46 NW.
December	30.04	30.88	28.61	32.4	39.6	25.2	68	−12	66	57	49	3.44	2.78	6.0	10	4	1	(*)	23	4	2	10	88	11	5	3	4	7	11	12	47	(#)	10.2	55 W.
Mean	30.01			50.4	58.9	41.8			66	53	58										2	9	89	10	7	4	8	13	14	10	34	(#)	9.5	
Total												38.77		33.8	124	22	10	21	108	28														
Extreme		31.03	28.38				102	−17					6.17																					76 SW.
Number years record	44	44	44	44	44	44	44	44	28	44	44	44	44	44	44	44	44	44	44	17	5	5	5	13								13	35	44

[1] Mean of 0730, 1330, 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds greater than 27 knots.
[4] For 5-minute period.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
‡ Statute miles.
# Less than ½ of 1 percent.

Block Island, R. I.—Position: Latitude 41°10′ N., longitude 71°36′ W.—Altitude: 43 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—‡			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow ≥ 0.01 inch	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	½–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	30.03	30.96	28.78	31.6	37.6	25.5	59	−4	78	58	45	3.76	2.90	4.3	11	5	3	(*)	23	14	0	7	93	9	8	5	4	5	18	26	25	(#)	19.2	55 NW.
February	30.04	30.98	28.67	30.4	36.2	24.5	58	−10	78	53	52	3.45	4.54	5.3	11	4	3	(*)	22	9	1	4	95	11	11	6	4	7	16	21	24	(#)	17.2	52 NW.
March	29.94	31.01	28.20	36.3	41.8	30.8	68	6	81	53	56	3.81	4.29	3.4	12	3	4	1	16	10	1	3	96	6	9	6	5	11	22	22	19	0	16.2	56 E.
April	29.95	30.75	28.87	44.1	49.9	38.6	78	14	82	55	55	3.53	3.73	0.8	11	1	4	1	3	8	3	3	94	6	11	6	8	11	27	18	13	0	14.6	49 NE.
May	29.96	30.58	29.12	53.3	59.2	47.3	84	31	86	54	57	3.30	3.19	(T)	11	0	7	2	(*)	3	2	7	90	5	10	8	9	15	34	13	6	0	12.8	49 NE.
June	29.93	30.56	29.32	62.1	68.0	56.3	92	43	88	55	57	2.78	4.93	0	10	0	8	3	0	1	8	18	74	4	5	8	9	16	36	15	7	(#)	11.9	49 E.
July	29.93	30.52	29.37	68.6	74.4	63.0	92	52	89	51	60	2.83	6.22	0	10	0	8	3	0	1	5	11	84	5	10	6	9	11	43	12	4	(#)	11.1	43 N.
August	29.98	30.48	29.45	68.6	74.0	63.3	95	49	88	48	61	3.39	4.48	0	9	0	5	3	0	1	1	3	96	5	13	8	9	14	32	12	7	(#)	10.8	52 N.
September	30.05	30.63	28.34	63.8	70.0	59.5	87	38	85	49	60	2.84	4.88	0	9	0	4	2	0	1	1	2	97	8	14	11	10	14	24	10	9	(#)	12.2	71 SE.
October	30.02	30.71	29.02	54.8	60.8	50.3	79	29	80	45	57	3.38	3.46	(T)	9	(*)	2	1	(*)	7	0	3	97	11	11	5	4	12	20	17	20	(#)	14.8	56 E.
November	30.02	30.79	28.97	45.2	51.2	40.6	70	14	78	56	49	3.60	4.54	0.4	10	1	2	(*)	5	10	1	3	96	8	11	5	5	9	20	21	21	(#)	16.3	60 NE.
December	30.01	30.92	28.68	36.2	42.0	30.5	62	−6	75	58	42	3.76	2.52	3.1	11	3	2	(*)	18	12	4	5	91	12	9	4	4	5	14	26	26	(#)	17.4	61 NW.
Mean	29.99			49.6	55.4	44.2			82	53	54										2	6	92	7	10	6	7	11	26	18	15	(#)	14.5	
Total												40.43		17.3	124	17	52	16	87	77															
Extreme		31.01	28.20				95	−10					6.22																					71 SE.
Number years record	67	68	68	68	68	68	68	68	60	22	47	68	68	68	68	68	68	68	68	68	1	1	1	10								10	68	68

[1] Mean of 0730 and 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds greater than 27 knots.
[4] For 5-minute period.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
‡ Statute miles.
# Less than ½ of 1 percent.

New London Conn.—Position: Latitude 41°20′ N., longitude 72°07′ W.—Altitude: 14 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	½–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	30.08	30.82	28.90	29.2	36.9	21.5	65	−17	75			3.90	2.85		14		2			1				23	11	4	4	6	15	2	35	0	7.8	40
February	30.08	30.86	28.85	29.2	36.5	21.9	68	−10	74			3.73	6.66		13		2			1				20	7	5	5	4	11	18	30	0	7.8	54
March	29.99	30.57	29.07	37.0	45.4	28.6	84	3	72			4.02	2.46		14		2			0				19	8	5	5	7	13	11	32	0	7.8	41
April	29.98	30.74	29.10	46.6	55.4	37.8	91	13	70			3.65	2.38		12		2			0				13	10	5	12	13	15	10	22	0	7.8	28
May	29.98	30.48	29.29	57.2	66.5	47.9	93	31	73			3.39	2.05		12		3			0				11	13	3	21	5	19	8	15	0	6.9	30
June	29.98	30.50	29.57	65.9	74.7	57.1	97	38	77			3.10	5.97		10		2			0				10	8	5	15	15	22	13	12	0	6.1	26
July	29.97	30.49	29.58	71.4	79.6	63.2	99	44	78			3.59	1.71		12		1			0				8	3	6	11	18	26	13	15	0	6.1	33
August	30.00	30.81	29.57	69.9	78.1	61.7	95	46	79			4.23	3.71		10		1			0				13	3	5	10	11	19	15	24	0	5.2	39
September	30.08	30.58	29.43	64.1	72.7	55.5	95	35	78			3.30	1.90		11		1			0				15	10	5	6	20	22	5	17	0	6.1	29
October	30.06	30.58	29.35	53.8	62.6	45.0	87	26	76			3.62	2.88		11		1			0				16	15	6	5	6	14	15	23	0	6.9	43
November	30.07	30.81	29.32	42.8	50.9	34.7	74	10	73			3.85	2.54		12		1			1				15	12	3	3	7	13	20	27	0	7.8	43
December	30.08	30.90	29.36	32.7	39.9	25.5	67	−11	74			3.65	2.27		12		1			1				16	8	1	3	5	13	23	31	0	7.8	47
Mean	30.02			50.0	58.3	41.7			75															15	9	5	8	10	17	13	23	0	6.9	
Total												44.03			143		19			4														
Extreme		30.90	28.85				99	−17					6.66																					
Number years record																																		54

[1] Mean of 0730 and 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds greater than 27 knots.
[4] For 5-minute period.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
# Less than ½ of 1 percent.

Hartford, Conn.—Position: Latitude 41°44′ N., longitude 72°39′ W.—Altitude: 21 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—‡			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow ≥ 0.01 inch	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	½–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	30.08	31.01	28.67	27.6	35.4	19.8	70	−16	72	61	47	3.57	3.32	10.4	12	6	3	(*)	27	1	4	14	82	27	9	2	4	15	10	8	24	1	7.6	40 SW.
February	30.03	31.06	28.87	27.3	35.5	19.1	69	−24	70	56	55	3.16	3.04	12.4	10	6	2	(*)	26	1	2	14	84	26	7	2	5	15	9	7	29	0	7.8	37 S.
March	30.00	31.04	28.40	37.2	45.9	28.6	86	−4	68	56	56	3.59	2.92	6.1	12	4	3	1	20	1	3	10	87	23	8	3	7	19	9	8	22	1	8.1	35 NW.
April	29.98	30.70	28.97	47.6	57.2	38.0	91	11	65	59	55	3.54	3.73	1.3	12	1	2	2	6	1	(#)	6	94	22	10	4	8	23	10	6	17	0	8.2	35 S.
May	29.96	30.64	29.03	58.9	69.2	48.6	94	28	68	59	57	3.62	3.68	0	12	0	3	4	(*)	1	1	4	95	16	10	4	7	31	12	5	14	1	7.4	30 W.
June	29.95	30.51	29.29	67.5	77.5	57.4	98	40	72	57	59	3.58	2.52	0	11	0	2	5	0	(*)	2	7	91	15	9	3	8	33	14	6	11	1	6.9	35 S.
July	29.96	30.45	29.27	72.9	82.7	63.2	101	48	74	57	60	3.83	2.87	0	10	0	2	7	0	(*)	1	7	92	12	7	4	10	34	16	6	10	1	6.5	29 SW.
August	30.01	30.48	29.38	70.7	80.3	60.9	100	38	76	55	60	3.78	3.61	0	10	0	6	5	0	0	3	7	90	18	9	4	9	30	14	5	10	1	6.2	25 SW.
September	30.07	30.65	28.04	63.9	73.8	54.0	95	30	78	54	57	3.55	6.72	0	9	0	8	3	(*)	(*)	3	11	86	24	8	4	8	28	11	4	11	2	6.2	43 N.
October	30.06	30.71	29.01	53.4	63.5	43.4	91	18	76	52	55	2.91	5.19	0	8	(*)	8	1	3	(*)	4	7	89	23	8	3	9	24	12	5	14	2	6.8	37 S.
November	30.07	30.86	28.95	42.2	50.3	34.1	77	6	74	61	47	3.56	3.55	2.0	10	2	5	(*)	13	1	2	9	89	23	6	2	7	19	13	8	20	2	7.3	36 NW.
December	30.07	30.86	28.95	30.8	38.2	23.5	67	−18	72	62	46	3.54	2.35	7.8	10	4	4	(*)	24	1	2	10	88	26	7	2	6	14	13	9	22	1	7.3	40 NW.
Mean	30.02			50.0	59.1	40.9			72	57	54										2	9	89	21	8	3	7	24	12	7	17	1	7.2	
Total												42.23		40.0	126	23	48	28	119	7														
Extreme		31.06	28.04				101	−24					6.72																					43 N.
Number years record	42	42	42	44	44	44	44	44	36	44	37	44	44	44	44	44	9	44	44	13	5	5	5	63								13	33	32

[1] Mean of 0730 and 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds greater than 27 knots.
[4] For 5-minute period.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
‡ Statute miles.
# Less than ½ of 1 percent.

New Haven, Conn.—Position: Latitude 41°16′ N., longitude 72°53′ W.—Altitude: 12 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—‡			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow ≧ 0.01 inch	Heavy fog [2] Airport only	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	½–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	30.08	31.00	28.76	28.6	36.2	21.3	67	−14	68	55	53	3.98	2.74	9.7	12	6	2	(*)	26	1	2	16	82	12	16	2	4	8	20	19	19	0	8.1	41 NW.
February	30.05	31.04	28.76	28.8	36.5	21.1	69	−15	68	52	61	3.75	4.13	10.8	11	5	2	(*)	24	(*)	4	16	80	20	18	3	6	10	13	13	17	(#)	8.4	38 E.
March	30.00	31.02	28.27	36.8	44.7	29.0	84	0	70	50	60	4.31	4.78	6.9	12	4	4	1	18	1	4	11	85	18	14	3	8	16	14	9	18	(#)	8.6	40 N.
April	29.98	30.72	28.98	47.1	55.6	38.6	91	18	68	52	59	3.76	5.90	1.5	12	1	1	1	4	1	1	7	92	17	15	3	8	14	17	11	15	0	8.4	38 NE.
May	29.98	30.64	29.05	58.1	67.1	49.1	95	30	70	51	61	3.73	3.32	(T)	11	(*)	2	3	(*)	(*)	3	7	90	15	13	4	10	20	17	9	12	(#)	7.2	31 N.
June	29.97	30.56	29.30	66.9	75.8	58.0	99	40	74	50	64	3.40	7.50	0	11	0	1	5	0	0	2	11	87	12	10	3	11	24	19	9	12	(#)	6.6	33 NE.
July	29.98	30.51	29.34	72.3	80.7	63.8	101	47	75	49	65	4.15	7.00	0	11	0	1	6	0	(*)	1	6	93	14	11	2	7	24	23	8	11	(#)	6.2	30 S.
August	30.01	30.47	29.29	70.5	78.8	62.1	100	45	76	47	63	4.41	8.73	0	10	0	1	5	0	(*)	1	5	94	16	14	2	7	22	19	8	11	1	6.2	39 S.
September	30.08	30.64	28.11	64.2	72.9	55.5	100	32	78	45	63	3.62	6.69	0	9	0	2	2	0	(*)	2	9	89	21	17	3	7	16	17	9	10	(#)	6.7	41 S.
October	30.06	30.79	29.02	53.7	62.5	44.9	89	24	75	46	63	3.51	5.19	(T)	9	(*)	2	1	2	(*)	2	8	90	25	11	2	4	12	15	11	20	(#)	7.3	43 SE.
November	30.06	30.85	28.65	42.7	50.3	35.0	75	2	73	54	54	3.70	3.69	1.8	10	1	2	(*)	11	1	2	13	85	20	12	2	2	10	23	14	17	(#)	7.8	36 NE.
December	30.06	30.94	28.65	32.3	39.6	25.1	68	−12	70	53	54	3.87	4.25	7.6	11	4	2	(*)	23	(*)	2	14	84	23	15	(#)	1	5	20	18	18	(#)	8.0	42 NW.
Mean	30.03			50.2	58.4	42.0			72	50	60										2	10	88	18	14	2	6	15	18	12	15	(#)	7.5	
Total												46.14		38.3	129	21	22	24	108	4															
Extreme		31.04	28.11				101	−15					8.73																					43 SE.
Number years record	75	75	75	76	76	76	76	76	76	76	49	76	76	76	76	76	15	76	76	21	5	5	5	8								8	76	75

[1] Mean of 0730 and 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds greater than 27 knots.
[4] For 5-minute period.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
‡ Statute miles.
# Less than ½ of 1 percent.

New York, N. Y.—Position: Latitude 40°43′ N., longitude 74°00′ W.—Altitude: 314 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—‡			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	½–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	29.73	31.01	28.61	30.9	37.4	24.5	68	−6	69	62	52	3.66	3.42	7.7	12	9	3	(*)	24	7	1	8	91	11	7	7	3	6	14	20	32	0	14.5	57 W.
February	29.69	31.00	28.70	31.3	38.4	24.2	73	−14	67	58	59	3.82	3.25	9.5	10	9	2	(*)	22	6	4	9	87	14	9	10	4	7	12	13	31	0	14.8	63 SW.
March	29.65	31.00	28.38	37.7	45.4	30.2	84	3	66	59	59	3.64	3.60	5.7	11	6	2	1	16	7	2	7	91	13	8	9	5	11	11	11	32	0	14.3	61 NW.
April	29.65	30.71	29.03	49.4	57.2	41.6	91	12	65	59	61	3.23	3.72	1.0	11	2	2	2	3	5	2	6	92	12	9	9	7	13	13	12	25	0	13.9	56 NW.
May	29.64	30.64	29.02	60.6	68.5	52.6	95	34	67	57	61	3.24	4.17	0	11	0	2	4	0	3	2	9	89	11	8	10	8	18	14	13	18	0	12.0	60 NW.
June	29.63	30.56	29.34	68.8	77.0	60.5	97	44	70	57	63	3.33	3.88	0	11	0	2	6	0	2	3	7	90	12	6	8	9	19	16	11	19	(#)	11.3	58 NW.
July	29.64	30.51	29.35	73.8	81.7	65.9	102	54	74	57	64	4.24	3.80	0	11	0	1	7	0	1	1	6	93	12	7	7	7	22	18	12	15	(#)	10.6	59 NW.
August	29.67	30.45	29.28	73.1	80.1	66.2	102	51	75	56	63	4.33	5.05	0	10	0	(*)	6	0	1	1	5	94	13	11	8	7	19	19	10	13	0	10.3	45 NW.
September	29.78	30.63	28.72	66.8	78.7	59.8	100	39	74	51	63	3.39	6.17	0	9	0	1	3	0	1	1	6	93	14	11	11	9	16	15	10	14	0	10.9	70 N.
October	29.73	30.72	29.06	56.3	68.7	49.0	90	27	72	50	62	3.53	9.40	(T)	9	(*)	2	1	(*)	3	1	7	92	14	9	5	4	13	15	14	26	0	12.4	56 NW.
November	29.74	30.82	28.70	44.2	51.0	37.3	75	7	71	58	55	2.96	3.62	1.0	9	2	2	1	7	5	1	6	93	7	7	8	4	11	19	18	26	0	14.0	53 NW.
December	29.73	30.93	28.73	35.0	41.2	28.8	69	−13	70	60	52	3.62	3.23	6.4	11	7	3	(*)	20	6	4	9	87	11	8	8	3	6	13	19	32	0	14.4	60 NW.
Mean	29.69			52.3	60.4	45.0			70	57	60										2	7	91	12	8	8	6	13	15	14	24	(#)	12.8	
Total												42.99		31.3	125	35	22	31	92	47														
Extreme		31.01	28.38				102	−14					9.40																					70 N.
Number years record	75	74	74	46	46	46	74	74	60	58	55	50	78	64	78	64	44	65	77	37	3–4	3–4	3–4	10								10	37	38

[1] Mean of 0730 and 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds ≧ 33.9 knots.
[4] For 5-minute period.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
‡ Statute miles.
# Less than ½ of 1 percent.

Sandy Hook, N. J.—Position: Latitude 40°28′ N., longitude 74°01′ W.—Altitude: 15 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent)	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—‡			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall	Precipitation 0.01 inch or more	Snow ≥ T	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	½–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	30.09	30.99	28.74	32	33	27	66	−3	75	60	48	3.96	2.62	4.1	11	4	4	0	21	10	4	5	91	9	11	2	3	9	20	24	22	0	13.9	49 NE.
February	30.07	31.00	29.00	32	38	26	71	−11	76	57	54	3.75	2.64	7.0	11	5	4	1	21	8	1	7	92	10	15	5	5	10	15	20	20	(#)	13.9	49 W.
March	29.93	30.84	28.44	39	46	33	76	7	76	54	59	4.04	2.49	2.7	12	2	3	1	12	10	1	8	91	8	9	7	8	14	13	18	23	0	13.9	49 S.
April	29.97	30.70	29.02	48	55	42	89	12	74	56	60	3.62	1.94	1.0	11	(*)	2	2	1	7	1	8	91	7	12	6	9	16	16	17	17	0	13.0	49 NE.
May	29.98	30.62	29.00	59	66	52	93	33	76	54	63	3.72	2.43	0	12	0	2	4	0	3	0	6	94	7	11	8	10	19	17	15	13	0	11.3	35 NE.
June	29.93	30.52	29.35	68	75	61	97	48	78	54	65	3.78	3.00	0	11	0	3	7	0	3	2	12	86	5	8	7	11	21	20	16	12	0	10.4	44 NW.
July	29.94	30.40	29.33	74	81	67	101	50	80	52	66	5.12	4.44	0	12	0	2	8	0	3	2	9	89	5	9	5	10	24	22	14	11	0	10.4	48 S.
August	30.00	30.46	29.35	73	79	67	98	55	79	51	65	4.98	3.34	0	10	0	1	6	0	2	0	8	92	7	14	7	9	21	22	11	9	0	10.4	49 S.
September	30.03	30.59	28.71	68	73	62	101	41	78	50	64	3.43	5.14	0	8	0	1	3	0	3	1	4	95	8	14	8	11	18	19	12	10	0	11.3	63 N.
October	30.07	30.72	29.03	57	63	51	87	31	76	46	66	3.78	3.03	0	8	(*)	2	2	0	5	1	6	93	9	11	3	5	15	22	16	19	0	12.2	46 NW.
November	30.10	30.82	29.10	46	51	40	73	8	76	58	52	3.25	2.56	0.4	9	(*)	2	0	4	7	(#)	4	96	6	12	4	3	13	23	20	19	0	13.9	55 SW.
December	30.10	30.88	28.98	35	40	30	68	−5	74	61	48	4.04	2.10	3.4	11	4	3	0	18	9	7	11	82	7	12	3	3	8	19	26	22	(#)	13.9	51 W.
Mean	30.02			53	58	46			76	54	59										2	7	91	7	12	6	7	16	19	17	16	(#)	12.4	
Total												47.47		18.6	126	15	29	34	77	70														
Extreme		31.00	28.44				101	−11					5.14																					63 N.
Number years record	11	65	65	24	24	24	65	65	24	24	24	24	24	24	24	24	24	24	24	24	2–3	2–3	2–3	11								11	24	24

[1] Mean of 0730 and 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds greater than 27 knots.
[4] For 5-minute period.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
‡ Statute miles.
# Less than ½ of 1 percent.

Albany, N. Y.—Position: Latitude 42°45′ N., longitude 73°48′ W.—Altitude: 277 feet

Month	Pressure reduced to sea level (inches)			Air temperature (° F.)					Mean humidity (percent) [1]	Mean cloud amount (percent) sunrise to sunset	Possible sunshine (percent of hours)	Precipitation			Mean number of days with—						Percentage of observations with visibility—‡			Wind										
		Extremes		Mean			Extremes					Amount (inches)												Direction (percentage of observations)									Speed (knots)	
	Mean	Highest	Lowest	Daily	Maximum	Minimum	Maximum	Minimum				Mean	Maximum in 24 hours	Snowfall [5]	Precipitation 0.01 inch or more	Snow ≧ 1.0 [5]	Heavy fog [2]	Thunderstorms	Freezing temperature	Gales [3]	0–¼ mile	½–2 miles	More than 2 miles	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Mean	Maximum [4]
January	30.09	31.10	28.46	23.6	31.4	15.5	71	−26	78	65	41	2.50	1.66	12.8	12	3	1	(*)	28	(*)	2	19	79	11	11	1	1	32	9	7	28	0	8.7	43 W.
February	30.06	31.09	28.75	24.4	32.0	15.4	66	−22	76	60	51	2.36	1.92	13.1	11	3	1	(*)	26	(*)	1	18	81	13	12	2	1	30	8	7	27	0	10.1	43 W.
March	30.01	31.00	28.65	33.8	41.7	25.4	85	−21	72	58	53	2.69	2.29	9.4	12	2	1	(*)	23	1	1	13	86	11	9	2	2	29	9	10	28	0	9.6	39 W.
April	29.99	30.71	29.08	46.7	55.8	37.1	93	9	67	57	54	2.71	2.02	2.0	12	1	(*)	1	8	(*)	(#)	7	93	11	11	2	2	29	10	10	25	(#)	9.5	41 SW.
May	29.96	30.68	28.90	59.1	69.0	48.7	97	29	66	55	57	3.32	2.40	0.1	12	(*)	(*)	3	(*)	(*)	(#)	6	94	8	13	2	3	34	11	9	20	(#)	8.2	36 NW.
June	29.94	30.56	29.22	68.3	77.9	57.9	100	35	70	52	62	3.81	2.95	0	12	0	1	5	0	0	(#)	7	93	6	12	2	4	39	12	7	18	(#)	7.1	32 S.
July	29.95	30.55	29.32	72.4	82.7	62.8	104	44	71	50	63	3.88	4.12	0	12	0	1	6	0	(*)	1	7	92	7	11	2	4	41	12	6	17	(#)	6.4	35 SE.
August	29.99	30.51	29.36	70.6	80.3	60.7	102	35	74	50	61	3.59	4.23	0	11	0	1	4	0	0	1	8	91	7	12	2	4	41	11	6	17	(#)	5.8	33 S.
September	30.06	30.65	28.68	62.8	72.8	53.5	98	24	78	50	58	3.33	3.52	0	10	0	3	2	(*)	(*)	3	11	86	9	11	2	3	40	11	6	18	(#)	6.4	31 NW.
October	30.06	30.81	28.94	50.9	60.8	42.5	91	19	78	54	53	3.10	4.75	(T)	10	0	3	1	3	(*)	2	10	88	9	11	2	2	33	14	7	22	(#)	4.7	35 NW.
November	30.07	30.95	28.96	39.4	46.9	32.5	75	−11	77	64	39	2.89	3.49	3.3	11	1	2	(*)	15	1	2	15	83	8	9	2	2	36	12	7	24	0	8.0	36 W.
December	30.07	31.04	28.56	27.9	35.1	20.9	67	−21	78	66	39	2.55	4.02	9.3	11	2	1	(*)	26	1	2	16	82	10	11	2	2	31	11	8	25	0	8.3	47 W.
Mean	30.02			48.3	57.2	39.4			74	57	53										1	11	88	9	11	2	2	35	11	8	22	(#)	7.7	
Total												36.73		50.0	136	12	15	22	129	3														
Extreme		31.10	28.46				104	−26					4.75																					47 W.
Number years record	73	73	73	134	76	76	76	76	62	61	53	124	76	65	76	65	57	76	76	10	9	9	9	13								13	11	6

[1] Mean of 0730 and 1930 eastern standard time.
[2] Visibility less than 1,650 feet.
[3] Winds ≧ 26.0 knots.
[4] For 5-minute period.
[5] Snow, sleet and hail.
T, Trace (less than 0.05 inch snow or 0.005 inch rain).
* Less than 1.
‡ Statute miles.
# Less than ½ of 1 percent.

Ocean area.—Position: Latitude 40°45′ N., longitude 70°–75° W., Greenwich Noon Observations—Years covered: 1878–1933

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from— N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	Weather, percentages of observations recording: Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (percent)	Average air temperature	Average sea surface temperature
January	3,060	14.5	13	10	6	6	7	12	23	22	1	7	4	4	1	6	7	1	0	4	0	6	5	64	38.2	43.0
February	2,779	15.0	13	11	6	6	6	10	23	24	1	7	3	4	2	6	8	1	0	4	0	7	5	61	36.9	40.4
March	3,159	13.5	14	10	7	7	10	10	20	20	2	8	4	9	2	5	5	1	0	3	0	5	6	57	39.7	40.4
April	3,368	10.6	12	11	6	7	12	15	18	16	3	9	5	10	1	5	1	1	0	1	0	2	6	53	45.2	43.3
May	3,722	8.0	12	11	9	7	14	18	14	10	5	12	6	17	2	5	0	1	1	1	0	1	5	55	53.2	50.2
June	3,612	7.2	11	10	7	6	14	22	14	9	7	15	6	17	1	3	0	1	0	1	0	0	4	51	62.1	58.9
July	3,788	7.2	9	8	5	6	17	26	14	9	6	14	6	13	1	3	0	2	1	1	0	0	3	52	68.7	66.0
August	3,820	7.6	11	13	7	7	13	20	13	11	5	11	7	6	1	4	0	1	1	1	0	1	5	51	69.7	68.7
September	3,743	8.4	14	15	9	6	12	16	12	12	4	9	6	5	1	4	0	1	1	1	0	1	6	49	65.7	65.8
October	3,811	12.0	16	15	7	6	9	13	15	17	2	7	4	4	2	7	0	1	0	3	0	3	6	53	57.3	59.0
November	3,212	13.0	13	9	6	6	10	14	21	20	1	6	4	3	2	6	1	1	0	3	0	5	5	58	49.4	53.2
December	2,955	14.5	13	8	5	4	6	12	28	23	1	5	4	3	1	6	4	1	0	4	0	5	6	63	41.8	47.3
Means	.....	11.0	12	11	7	6	11	16	18	16	3	9	5	8	1	5	2	1	(*)	2	0	3	5	56	52.3	53.0
Totals	41,029	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Compiled by the U. S. Weather Bureau. * Less than 0.5 percent.

Conversion Tables

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

NAUTICAL MILES TO STATUTE MILES

1 nautical mile=6,080.20 feet. 1 statute mile=5,280 feet.

Nautical miles	0	1	2	3	4	5	6	7	8	9
0	0. 000	1. 152	2. 303	3. 455	4. 606	5. 758	6. 909	8. 061	9. 212	10. 364
10	11. 515	12. 667	13. 819	14. 970	16. 122	17. 273	18. 425	19. 576	20. 728	21. 880
20	23. 031	24. 183	25. 334	26. 486	27. 637	28. 789	29. 940	31. 092	32. 243	33. 395
30	34. 547	35. 698	36. 850	38. 001	39. 153	40. 304	41. 456	42. 607	43. 759	44. 911
40	46. 062	47. 214	48. 365	49. 517	50. 668	51. 820	52. 971	54. 123	55. 275	56. 426
50	57. 578	58. 729	59. 881	61. 032	62. 184	63. 335	64. 487	65. 639	66. 790	67. 942
60	69. 093	70. 245	71. 396	72. 548	73. 699	74. 851	76. 003	77. 154	78. 306	79. 457
70	80. 609	81. 760	82. 912	84. 063	85. 215	86. 366	87. 518	88. 670	89. 821	90. 973
80	92. 124	93. 276	94. 427	95. 579	96. 730	97. 882	99. 034	100. 185	101. 337	102. 488
90	103. 640	104. 791	105. 942	107. 094	108. 246	109. 397	110. 549	111. 701	112. 852	114. 004

STATUTE MILES TO NAUTICAL MILES

Statute miles	0	1	2	3	4	5	6	7	8	9
0	0. 000	0. 868	1. 737	2. 605	3. 474	4. 342	5. 210	6. 079	6. 947	7. 816
10	8. 684	9. 552	10. 421	11. 289	12. 158	13. 026	13. 894	14. 763	15. 631	16. 500
20	17. 368	18. 236	19. 105	19. 973	20. 842	21. 710	22. 578	23. 447	24. 315	25. 184
30	26. 052	26. 920	27. 789	28. 657	29. 526	30. 394	31. 262	32. 131	32. 999	33. 868
40	34. 736	35. 604	36. 473	37. 341	38. 210	39. 078	39. 946	40. 815	41. 683	42. 552
50	43. 420	44. 288	45. 157	46. 025	46. 894	47. 762	48. 630	49. 499	50. 367	51. 236
60	52. 104	52. 972	53. 841	54. 709	55. 578	56. 446	57. 314	58. 183	59. 051	59. 920
70	60. 787	61. 655	62. 524	63. 392	64. 261	65. 129	65. 997	66. 866	67. 734	68. 603
80	69. 471	70. 339	71. 208	72. 076	72. 945	73. 813	74. 681	75. 550	76. 418	77. 287
90	78. 155	79. 023	79. 892	80. 760	81. 629	82. 497	83. 365	84. 234	85. 102	85. 971

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Number in parentheses immediately following any item in this Index is number of the largest scale United States Coast and Geodetic Survey Chart on which that feature appears.

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Conversion Table, Degrees to Points and Vice Versa

° ′	Points	° ′	Points	° ′	Points	° ′	Points
0 00	N	90 00	E	180 00	S	270 00	W
1 24		91 24		181 24		271 24	
2 49	N ¼ E	92 49	E ¼ S	182 49	S ¼ W	272 49	W ¼ N
4 13		94 13		184 13		274 13	
5 38	N ½ E	95 38	E ½ S	185 38	S ½ W	275 38	W ½ N
7 02		97 02		187 02		277 02	
8 26	N ¾ E	98 26	E ¾ S	188 26	S ¾ W	278 26	W ¾ N
9 51		99 51		189 51		279 51	
11 15	N x E	101 15	E x S	191 15	S x W	281 15	W x N
12 39		102 39		192 39		282 39	
14 04	N x E ¼ E	104 04	ESE ¾ E	194 04	S x W ¼ W	284 04	WNW ¾ W
15 28		105 28		195 28		285 28	
16 53	N x E ½ E	106 53	ESE ½ E	196 53	S x W ½ W	286 53	WNW ½ W
18 17		108 17		198 17		288 17	
19 41	N x E ¾ E	109 41	ESE ¼ E	199 41	S x W ¾ W	289 41	WNW ¼ W
21 06		111 06		201 06		291 06	
22 30	NNE	112 30	ESE	202 30	SSW	292 30	WNW
23 54		113 54		203 54		293 54	
25 19	NNE ¼ E	115 19	SE x E ¾ E	205 19	SSW ¼ W	295 19	NW x W ¾ W
26 43		116 43		206 43		296 43	
28 08	NNE ½ E	118 08	SE x E ½ E	208 08	SSW ½ W	298 08	NW x W ½ W
29 32		119 32		209 32		299 32	
30 56	NNE ¾ E	120 56	SE x E ¼ E	210 56	SSW ¾ W	300 56	NW x W ¼ W
32 21		122 21		212 21		302 21	
33 45	NE x N	123 45	SE x E	213 45	SW x S	303 45	NW x W
35 09		125 09		215 09		305 09	
36 34	NE ¾ N	126 34	SE ¾ E	216 34	SW ¾ S	306 34	NW ¾ W
37 58		127 58		217 58		307 58	
39 23	NE ½ N	129 23	SE ½ E	219 23	SW ½ S	309 23	NW ½ W
40 47		130 47		220 47		310 47	
42 11	NE ¼ N	132 11	SE ¼ E	222 11	SW ¼ S	312 11	NW ¼ W
43 36		133 36		223 36		313 36	
45 00	NE	135 00	SE	225 00	SW	315 00	NW
46 24		136 24		226 24		316 24	
47 49	NE ¼ E	137 49	SE ¼ S	227 49	SW ¼ W	317 49	NW ¼ N
49 13		139 13		229 13		319 13	
50 38	NE ½ E	140 38	SE ½ S	230 38	SW ½ W	320 38	NW ½ N
52 02		142 02		232 02		322 02	
53 26	NE ¾ E	143 26	SE ¾ S	233 26	SW ¾ W	323 26	NW ¾ N
54 51		144 51		234 51		324 51	
56 15	NE x E	146 15	SE x S	236 15	SW x W	326 15	NW x N
57 39		147 39		237 39		327 39	
59 04	NE x E ¼ E	149 04	SSE ¾ E	239 04	SW x W ¼ W	329 04	NNW ¾ W
60 28		150 28		240 28		330 28	
61 53	NE x E ½ E	151 53	SSE ½ E	241 53	SW x W ½ W	331 53	NNW ½ W
63 17		153 17		243 17		333 17	
64 41	NE x E ¾ E	154 41	SSE ¼ E	244 41	SW x W ¾ W	334 41	NNW ¼ W
66 06		156 06		246 06		336 06	
67 30	ENE	157 30	SSE	247 30	WSW	337 30	NNW
68 54		158 54		248 54		338 54	
70 19	ENE ¼ E	160 19	S x E ¾ E	250 19	WSW ¼ W	340 19	N x W ¾ W
71 43		161 43		251 43		341 43	
73 08	ENE ½ E	163 08	S x E ½ E	253 08	WSW ½ W	343 08	N x W ½ W
74 32		164 32		254 32		344 32	
75 56	ENE ¾ E	165 56	S x E ¼ E	255 56	WSW ¾ W	345 56	N x W ¼ W
77 21		167 21		257 21		347 21	
78 45	E x N	168 45	S x E	258 45	W x S	348 45	N x W
80 09		170 09		260 09		350 09	
81 34	E ¾ N	171 34	S ¾ E	261 34	W ¾ S	351 34	N ¾ W
82 58		172 58		262 58		352 58	
84 23	E ½ N	174 23	S ½ E	264 23	W ½ S	354 23	N ½ W
85 47		175 47		265 47		355 47	
87 11	E ¼ N	177 11	S ¼ E	267 11	W ¼ S	357 11	N ¼ W
88 36		178 36		268 36		358 36	

Distance of Visibility of Objects at Sea

The table following 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	Statute miles	Height, feet	Nautical miles	Statute miles	Height, feet	Nautical miles	Statute miles
1	1. 1	1. 3	100	11. 5	13. 2	760	31. 6	36. 4
2	1. 7	1. 9	105	11. 7	13. 5	780	32. 0	36. 9
3	2. 0	2. 3	110	12. 0	13. 8	800	32. 4	37. 3
4	2. 3	2. 6	115	12. 3	14. 1	820	32. 8	37. 8
5	2. 5	2. 9	120	12. 6	14. 5	840	33. 2	38. 3
6	2. 8	3. 2	125	12. 9	14. 8	860	33. 6	38. 7
7	2. 9	3. 5	130	13. 1	15. 1	880	34. 0	39. 2
8	3. 1	3. 7	135	13. 3	15. 3	900	34. 4	39. 6
9	3. 5	4. 0	140	13. 6	15. 6	920	34. 7	40. 0
10	3. 6	4. 2	145	13. 8	15. 9	940	35. 2	40. 5
11	3. 8	4. 4	150	14. 1	16. 2	960	35. 5	40. 9
12	4. 0	4. 6	160	14. 5	16. 7	980	35. 9	41. 3
13	4. 2	4. 8	170	14. 9	17. 2	1, 000	36. 2	41. 7
14	4. 3	4. 9	180	15. 4	17. 7	1, 100	38. 0	43. 8
15	4. 4	5. 1	190	15. 8	18. 2	1, 200	39. 6	45. 6
16	4. 6	5. 3	200	16. 2	18. 7	1, 300	41. 3	47. 6
17	4. 7	5. 4	210	16. 6	19. 1	1, 400	42. 9	49. 4
18	4. 9	5. 6	220	17. 0	19. 6	1, 500	44. 4	51. 1
19	5. 0	5. 8	230	17. 4	20. 0	1, 600	45. 8	52. 8
20	5. 1	5. 9	240	17. 7	20. 4	1, 700	47. 2	54. 4
21	5. 3	6. 1	250	18. 2	20. 9	1, 800	48. 6	56. 0
22	5. 4	6. 2	260	18. 5	21. 3	1, 900	49. 9	57. 5
23	5. 5	6. 3	270	18. 9	21. 7	2, 000	51. 2	59. 0
24	5. 6	6. 5	280	19. 2	22. 1	2, 100	52. 5	60. 5
25	5. 7	6. 6	290	19. 6	22. 5	2, 200	53. 8	61. 9
26	5. 8	6. 7	300	19. 9	22. 9	2, 300	55. 0	63. 3
27	6. 0	6. 9	310	20. 1	23. 2	2, 400	56. 2	64. 7
28	6. 1	7. 0	320	20. 5	23. 6	2, 500	57. 3	66. 0
29	6. 2	7. 1	330	20. 8	24. 0	2, 600	58. 5	67. 3
30	6. 3	7. 2	340	21. 1	24. 3	2, 700	59. 6	68. 6
31	6. 4	7. 3	350	21. 5	24. 7	2, 800	60. 6	69. 8
32	6. 5	7. 5	360	21. 7	25. 0	2, 900	61. 8	71. 1
33	6. 6	7. 6	370	22. 1	25. 4	3, 000	62. 8	72. 3
34	6. 7	7. 7	380	22. 3	25. 7	3, 100	63. 8	73. 5
35	6. 8	7. 8	390	22. 7	26. 1	3, 200	64. 9	74. 7
36	6. 9	7. 9	400	22. 9	26. 4	3, 300	65. 9	75. 9
37	6. 9	8. 0	410	23. 2	26. 7	3, 400	66. 9	77. 0
38	7. 0	8. 1	420	23. 5	27. 1	3, 500	67. 8	78. 1
39	7. 1	8. 2	430	23. 8	27. 4	3, 600	68. 6	79. 2
40	7. 2	8. 3	440	24. 1	27. 7	3, 700	69. 7	80. 3
41	7. 3	8. 4	450	24. 3	28. 0	3, 800	70. 7	81. 4
42	7. 4	8. 5	460	24. 6	28. 3	3, 900	71. 6	82. 4
43	7. 5	8. 7	470	24. 8	28. 6	4, 000	72. 5	83. 5
44	7. 6	8. 8	480	25. 1	28. 9	4, 100	72. 4	84. 5
45	7. 7	8. 9	490	25. 4	29. 2	4, 200	74. 3	85. 6
46	7. 8	9. 0	500	25. 6	29. 5	4, 300	75. 2	86. 6
47	7. 9	9. 0	520	26. 1	30. 1	4, 400	76. 1	87. 6
48	7. 9	9. 1	540	26. 7	30. 7	4, 500	76. 9	88. 5
49	8. 0	9. 2	560	27. 1	31. 2	4, 600	77. 7	89. 5
50	8. 1	9. 3	580	27. 6	31. 8	4, 700	78. 6	90. 5
55	8. 5	9. 8	600	28. 0	32. 3	4, 800	79. 4	91. 4
60	8. 9	10. 2	620	28. 6	32. 9	4, 900	80. 2	92. 4
65	9. 2	10. 6	640	29. 0	33. 4	5, 000	81. 0	93. 3
70	9. 6	11. 0	660	29. 4	33. 9	6, 000	88. 8	102. 2
75	9. 9	11. 4	680	29. 9	34. 4	7, 000	96. 0	110. 5
80	10. 3	11. 8	700	30. 3	34. 9	8, 000	102. 6	118. 1
85	10. 6	12. 2	720	30. 7	35. 4	9, 000	108. 7	125. 2
90	10. 9	12. 5	740	31. 1	35. 9	10, 000	114. 6	132. 0
95	11. 2	12. 9						